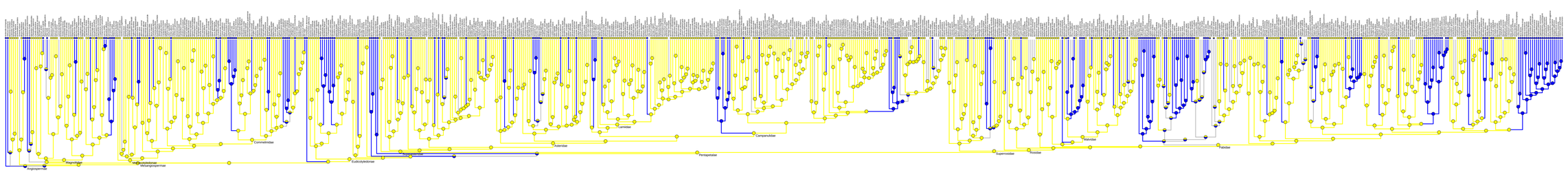
MP ancestral state reconstruction using ancestral.pars
(R phangorn)
100_A. Functional sex of flowers (D2d), 98 steps

bisexual
unisexual

Node	MP state(s)
Angiospermae	bisexual / unisexual
Mesangiospermae	bisexual
Magnoliidae	bisexual
Monocotyledonae	bisexual
Eudicotyledonae	bisexual
Commelinidae	bisexual
Ceratophyllidae	bisexual
Superasteridae	bisexual
Asteridae	bisexual
Lamidae	bisexual
Campanulidae	bisexual
Superrosidae	bisexual
Rosidae	bisexual
Malvidae	bisexual
Fabidae	bisexual

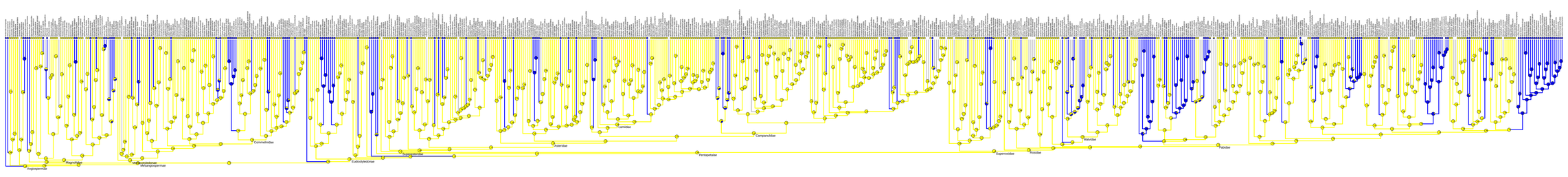


ML ancestral state reconstruction using rayDISC (R:corHMM)
100_A. Functional sex of flowers (0/2d), ARDeq model

bisexual
unisexual

Node	ML state	Prob
Angiospermae	bisexual	1
Mesangiospermae	bisexual	1
Magnoliidae	bisexual	1
Monocotyledonae	bisexual	1
Eudicotyledonae	bisexual	1
Commelinidae	bisexual	1
Gunneridae	bisexual	1
Superasteridae	bisexual	1
Asteridae	bisexual	1
Lamidae	bisexual	1
Campanulidae	bisexual	0.9993
Asteridae	bisexual	1
Rosidae	bisexual	1
Malvidae	bisexual	0.9997
Fabidae	bisexual	1

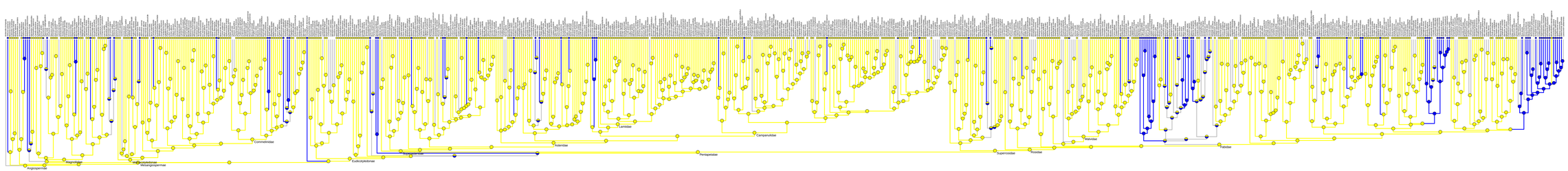
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	-312.55	2	629.11	629.12	1.38	0.24	0.003	8e−04
ARDeq*	-311.86	2	627.73	627.74	0	0.47	0.003	8e−04
ER	-315.27	1	632.54	632.54	4.8	0.04	0.0029	0.0029
UN01	-313.49	1	628.98	628.98	1.24	0.25	0.003	
UN10	-354.49	1	710.98	710.99	83.24	0		0.0119



MP ancestral state reconstruction using ancestral.pars (R phangorn)
100_B. Structural sex of flowers (D2d), 57 steps

bisexual
unisexual

Node	MP state(s)
Angiospermae	bisexual
Mesangiospermae	bisexual
Magnoliidae	bisexual
Monocotyledonae	bisexual
Eudicotyledonae	bisexual
Commelinidae	bisexual
Ceratophyllidae	bisexual
Superasteridae	bisexual
Asteridae	bisexual
Lamiidae	bisexual
Campanulidae	bisexual
Superrosidae	bisexual
Rosidae	bisexual
Malvidae	bisexual
Fabidae	bisexual

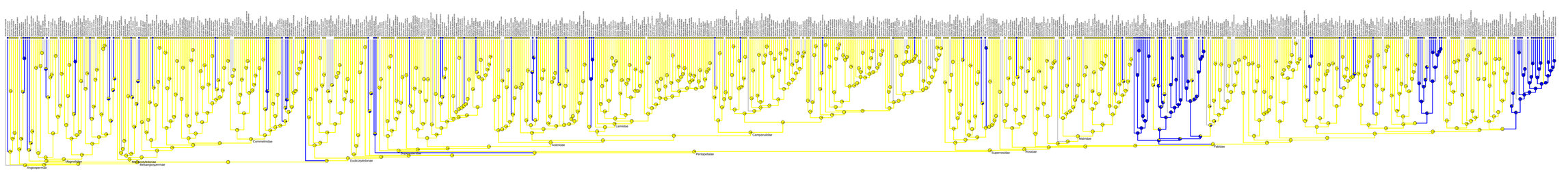


ML ancestral state reconstruction using rayDISC (R:corHMM)
100_B. Structural sex of flowers (D2d), ARDeq model

bisexual
unisexual

Node	ML state	Prob
Angiospermae	bisexual	1
Mesangiospermae	bisexual	1
Magnoliidae	bisexual	1
Monocotyledonae	bisexual	1
Eudicotyledonae	bisexual	1
Commelinidae	bisexual	0.9999
Ceratophyta	bisexual	1
Superasteridae	bisexual	1
Asteridae	bisexual	1
Lamidae	bisexual	0.9999
Campanulidae	bisexual	1
Pentapetalae	bisexual	1
Rosidae	bisexual	1
Malvidae	bisexual	1
Fabidae	bisexual	0.9977

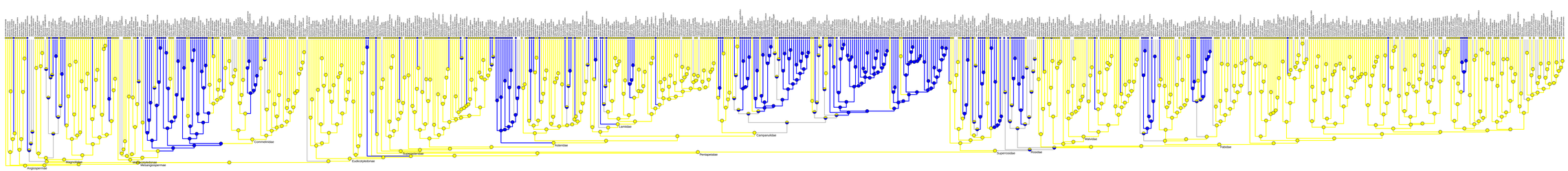
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−208.28	2	420.56	420.56	1.36	0.28	0.0015	0.0039
ARDeq**	−207.9	1	419.2	419.22	0	0.55	0.0015	0.0039
ER	−209.74	1	421.47	421.48	2.26	0.18	0.0016	0.0016
UN01	−226.92	1	455.84	455.85	35.63	0	0.0017	
UN10	−231.58	1	465.15	465.16	45.94	0		0.0167



MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
102_B. Ovary position (binary) (0/2d), 79 steps

superior
inferior

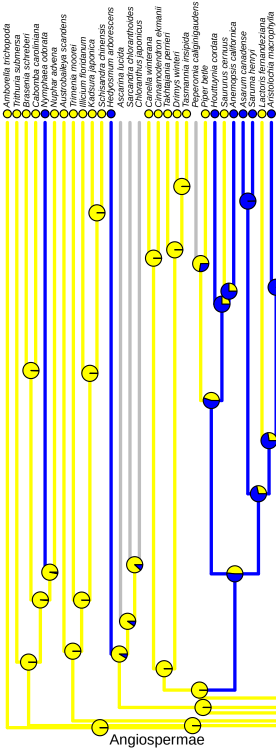
Node	MP state(s)
Angiospermae	superior
Mesangiospermae	superior
Magnoliidae	superior
Monocotyledonae	superior
Eudicotyledonae	superior
Commelinidae	superior
Ceratophyllum	superior
Superasteridae	superior
Asteridae	superior
Lamiidae	superior
Campanulidae	superior
Superrosidae	superior
Rosidae	superior / inferior
Malvidae	superior
Fabidae	superior



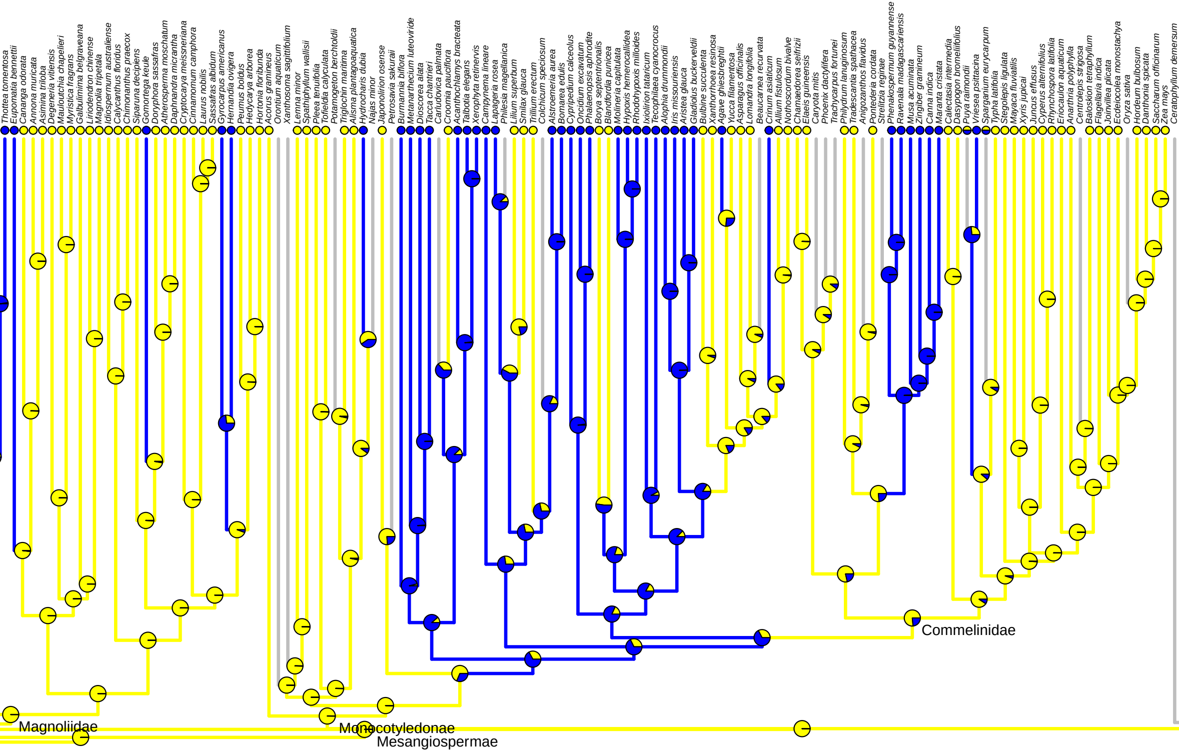
ML ancestral state reconstruction using rayDISC (R:corHMM)
102_B. Ovary position (binary) (D2d), ARDeq model

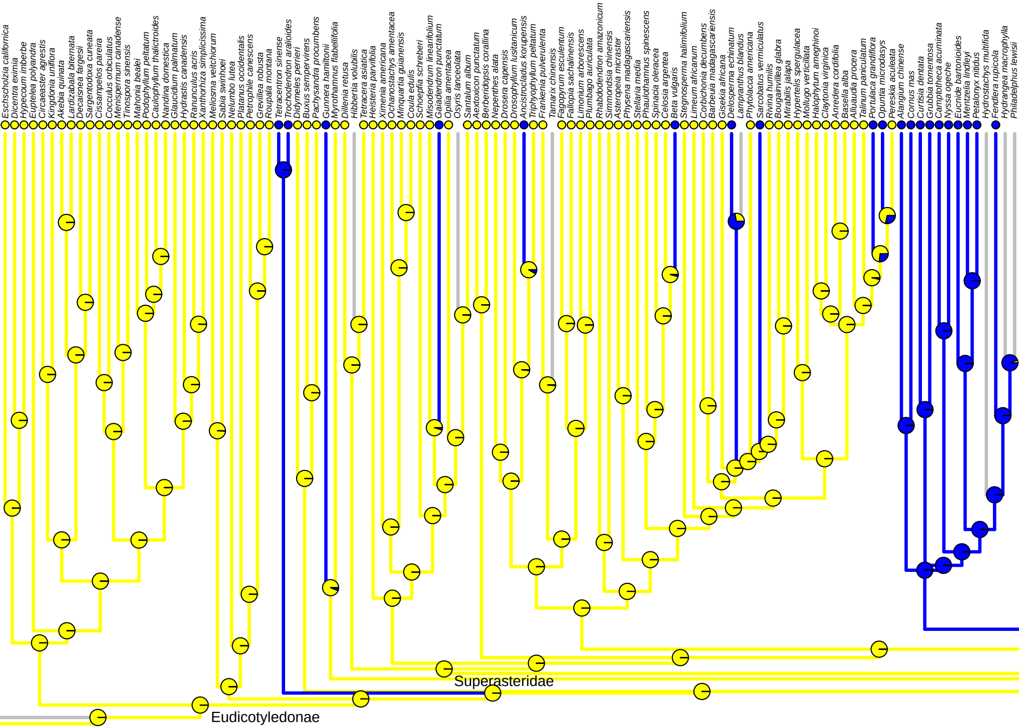
🟡 superior
🔵 inferior

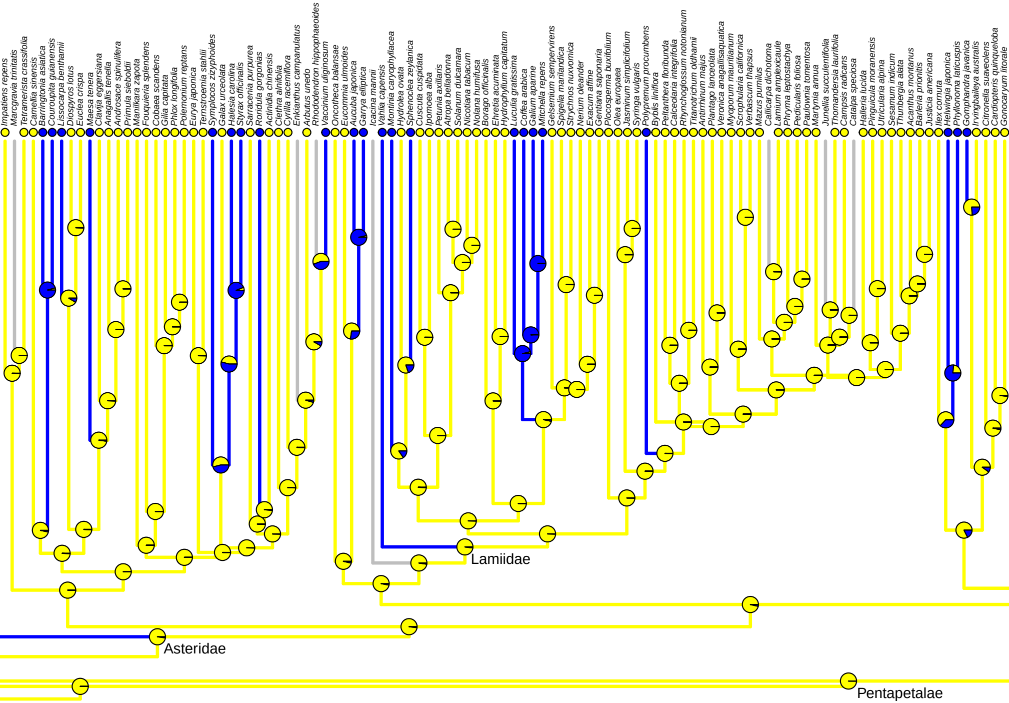
Node	ML state	Prob
Angiospermae	superior	1
Mesangiospermae	superior	1
Magnoliidae	superior	0.9997
Monocotyledonae	superior	0.9983
Eudicotyledonae	superior	1
Commelinidae	superior	0.766
Pentapetalae	superior	0.9995
Superasteridae	superior	0.9998
Asteridae	superior	0.9785
Lamiidae	superior	0.9791
Campanulidae	superior	0.8204
Superrosidae	superior	0.9776
Rosidae	superior	0.9773
Malvidae	superior	1
Fabidae	superior	0.9997

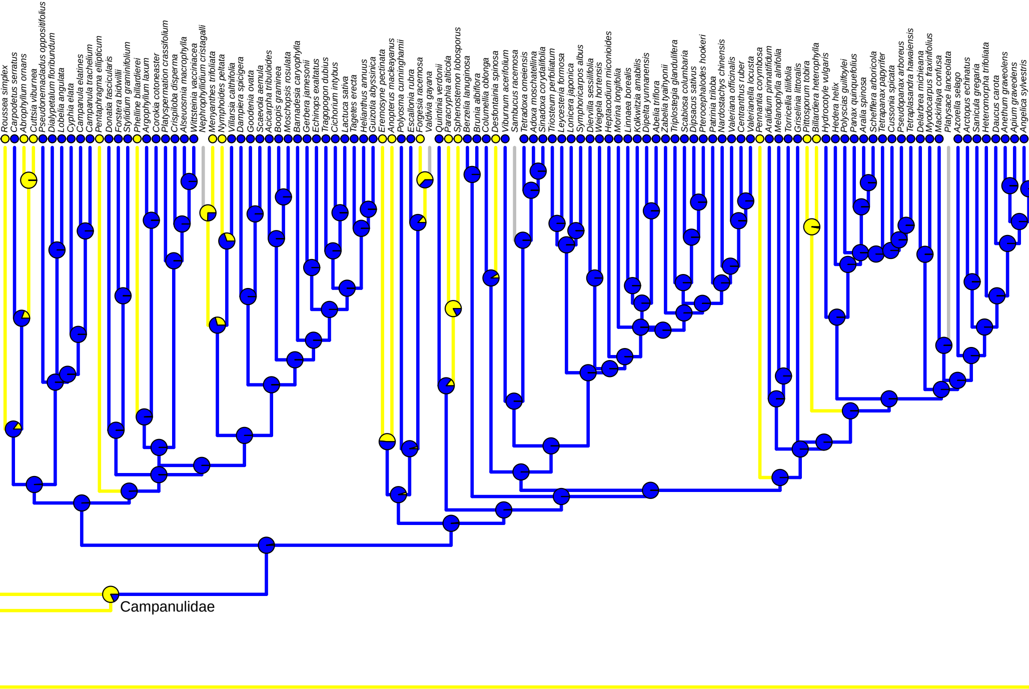


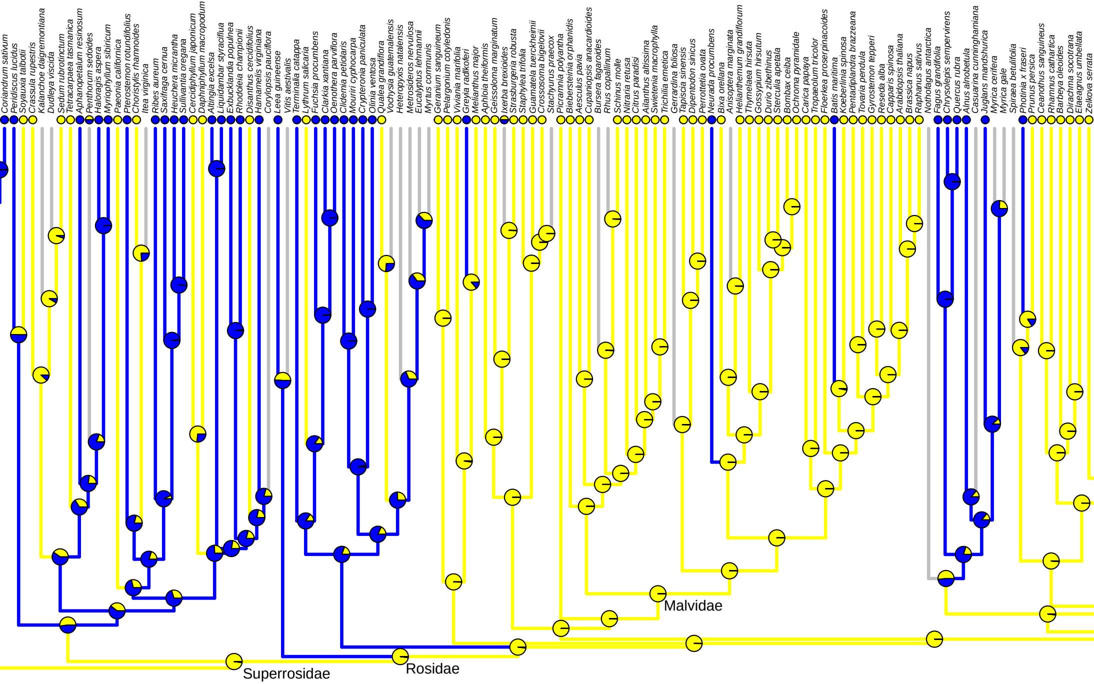
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−272.01	2	548.03	548.04	1.38	0.25	0.0021	0.0036
ARDeq*	−271.32	2	546.65	546.66	0	0.49	0.0021	0.0036
ER	−272.95	1	547.89	547.9	1.24	0.26	0.0024	0.0024
UNI01	−281.44	1	564.88	564.89	18.23	0	0.0027	
UNI10	−294.63	1	591.27	591.27	44.61	0		0.0099


Thottea tomentosa
Eupomatia bennettii
Cananga odorata
Annona muricata
Asimina triloba
Degeneria vitiensis
Mauloutchia chapelieri
Myristica fragrans
Galbulimima belgraveana
Liriodendron chinense
Magnolia tripetala
Idiospermum australiense
Calycanthus floridus
Chimonanthus praecox
Siparuna decipiens
Gomortega keule
Doryphora sassafras
Atherosperma moschatum
Daphnandra micrantha
Cryptocarya meissneriana
Cinnamomum camphora
Laurus nobilis
Sassafras albidum
Gyrocarpus americanus
Hernandia ovigera
Peumus boldus
Hedycarya arborea
Hortonia floribunda
Acorus gramineus
Orontium aquaticum
Xanthosoma sagittifolium
Lemna minor
Spathiphyllum wallisii
Pleea tenuifolia
Tofieldia calyculata
Potamogeton berchtoldii
Triglochin maritima
Alisma plantagoaquatica
Hydrocharis dubia
Najas minor
Japonolirion osense
Petrosavia sakuraii
Burmannia biflora
Metanarthecium luteoviride
Dioscorea alata
Tacca chantrieri
Carludovica palmata
Croomia pauciflora
Acanthochlamys bracteata
Talbotia elegans
Xerophyta retinervis
Campynema lineare
Lapageria rosea
Philesia magellanica
Lilium superbum
Smilax glauca
Trillium erectum
Colchicum speciosum
Alstroemeria aurea
Bomarea edulis
Cypripedium calceolus
Oncidium excavatum
Phalaenopsis aphrodite
Borya septentrionalis
Blandfordia punicea
Molineria capitulata
Hypoxis hemerocallidea
Rhodohypoxis milloides
Ixiolirion tataricum
Tecophilaea cyanocrocus
Alophia drummondii
Iris missouriensis
Aristea glauca
Gladiolus buckerveldii
Bulbine succulenta
Xanthorrhoea resinosa
Agave ghiesbreghtii
Yucca filamentosa
Asparagus officinalis
Lomandra longifolia
Beaucarnea recurvata
Crinum asiaticum
Allium fistulosum
Nothoscordum bivalve
Chamaedorea seifrizii
Elaeis guineensis
Caryota mitis
Phoenix dactylifera
Trachycarpus fortunei
Philydrum lanuginosum
Tradescantia spathacea
Anigozanthos flavidus
Pontederia cordata
Strelitzia reginae
Phenakospermum guyannense
Ravenala madagascariensis
Musa acuminata
Zingiber gramineum
Canna indica
Maranta cristata
Calectasia intermedia
Dasypogon bromeliifolius
Puya raimondii
Vriesea psittacina
Sparganium eurycarpum
Typha latifolia
Stegolepis ligulata
Mayaca fluviatilis
Xyris jupicai
Juncus effusus
Cyperus alternifolius
Rhynchospora latifolia
Eriocaulon aquaticum
Anarthria polyphylla
Centrolepis strigosa
Baloskion tetraphyllum
Flagellaria indica
Joinvillea plicata
Ecdeiocolea monostachya
Oryza sativa
Hordeum bulbosum
Danthonia spicata
Saccharum officinarum
Zea mays
Ceratophyllum demersum
Commelinidae
Magnoliidae
Monocotyledonae
Mesangiospermae


Eschscholzia californica
Dicentra eximia
Hypecoum imberbe
Euptelea polyandra
Circaeaster agrestis
Kingdonia uniflora
Akebia quinata
Lardizabala biternata
Decaisnea fargesii
Sargentodoxa cuneata
Cissampelos pareira
Cocculus orbiculatus
Menispermum canadense
Tinospora sinensis
Mahonia bealei
Podophyllum peltatum
Caulophyllum thalictroides
Nandina domestica
Glaucidium palmatum
Hydrastis canadensis
Ranunculus acris
Xanthorhiza simplicissima
Meliosma veitchiorum
Sabia swinhoei
Nelumbo lutea
Platanus occidentalis
Petrophile canescens
Grevillea robusta
Roupala montana
Tetracentron sinense
Trochodendron aralioides
Didymeles perrieri
Buxus sempervirens
Pachysandra procumbens
Gunnera hamiltonii
Myrothamnus flabellifolia
Dillenia retusa
Hibbertia volubilis
Tetracera asiatica
Heisteria parvifolia
Ximenia americana
Ochanostachys amentacea
Minquartia guianensis
Coula edulis
Schoepfia schreberi
Misodendrum linearifolium
Gaiadendron punctatum
Opilia amentacea
Osyris lanceolata
Santalum album
Aextoxicon punctatum
Berberidopsis corallina
Nepenthes alata
Drosera capensis
Drosophyllum lusitanicum
Ancistrocladus korupensis
Triphyophyllum peltatum
Frankenia pulverulenta
Tamarix chinensis
Fagopyrum esculentum
Fallopia sachalinensis
Limonium arborescens
Plumbago auriculata
Rhabdodendron amazonicum
Simmondsia chinensis
Asteropeia micraster
Physena madagascariensis
Stellaria media
Phaulothamnus spinescens
Spinacia oleracea
Celosia argentea
Beta vulgaris
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Gisekia africana
Delosperma echinatum
Lampranthus blandus
Phytolacca americana
Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Halophytum ameghinoi
Claytonia virginica
Anredera cordifolia
Basella alba
Alluaudia procera
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Alangium chinense
Cornus mas
Curtisia dentata
Grubbia tomentosa
Camptotheca acuminata
Nyssa ogeche
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Hydrostachys multifida
Fendlera rupicola
Hydrangea macrophylla
Philadelphus lewisii
Superasteridae
Eudicotyledonae


Impatiens repens
Marcgravia trinitatis
Tetramerista crassifolia
Camellia sinensis
Barringtonia asiatica
Couroupita guianensis
Lissocarpa benthamii
Diospyros lotus
Euclea crispa
Maesa tenera
Clavija eggersiana
Anagallis tenella
Androsace spinulifera
Primula sieboldii
Manilkara zapota
Fouquieria splendens
Cobaea scandens
Gilia capitata
Phlox longifolia
Polemonium reptans
Eurya japonica
Ternstroemia stahlii
Symplocos zizyphoides
Galax urceolata
Halesia carolina
Styrax officinalis
Sarracenia purpurea
Roridula gorgonias
Actinidia chinensis
Clethra alnifolia
Cyrilla racemiflora
Enkianthus campanulatus
Arbutus unedo
Rhododendron hippophaeoides
Vaccinium uliginosum
Oncotheca balansae
Eucommia ulmoides
Aucuba japonica
Garrya elliptica
Icacina mannii
Vahlia capensis
Montinia caryophyllacea
Hydrolea ovata
Sphenoclea zeylanica
Cuscuta cuspidata
Ipomoea alba
Petunia axillaris
Atropa belladonna
Solanum dulcamara
Nicotiana tabacum
Nolana humifusa
Borago officinalis
Ehretia acuminata
Hydrophyllum capitatum
Luculia gratissima
Coffea arabica
Galium aparine
Mitchella repens
Gelsemium sempervirens
Spigelia marilandica
Strychnos nuxvomica
Nerium oleander
Exacum affine
Gentiana saponaria
Plocosperma buxifolium
Olea europaea
Jasminum simplicifolium
Syringa vulgaris
Polypremum procumbens
Byblis liniflora
Peltanthera floribunda
Calceolaria integrifolia
Rhynchoglossum notonianum
Titanotrichum oldhamii
Antirrhinum majus
Plantago lanceolata
Veronica anagallisaquatica
Myoporum mauritianum
Scrophularia californica
Verbascum thapsus
Mazus pumilus
Callicarpa dichotoma
Lamium amplexicaule
Phryma leptostachya
Pedicularis foliosa
Paulownia tomentosa
Martynia annua
Junellia succulentifolia
Thomandersia laurifolia
Campsis radicans
Catalpa speciosa
Halleria lucida
Pinguicula moranensis
Utricularia alpina
Sesamum indicum
Thunbergia alata
Acanthus montanus
Barleria prionitis
Justicia americana
Ilex cornuta
Helwingia japonica
Phyllonoma laticuspis
Gomphandra javanica
Irvingbaileya australis
Citronella suaveolens
Cardiopteris quinqueloba
Gonocaryum litorale
Lamiidae
Asteridae
Pentapetalae


Roussea simplex
Carpodetus serratus
Abrophyllum ornans
Cuttsia viburnea
Pseudonemacladus oppositifolius
Dialypetalum floribundum
Lobelia angulata
Cyphia elata
Campanula elatines
Campanula trachelium
Pentaphragma ellipticum
Donatia fascicularis
Forstera bidwillii
Stylidium graminifolium
Phelline billardierei
Argophyllum laxum
Corokia cotoneaster
Platyspermation crassifolium
Crispiloba disperma
Alseuosmia macrophylla
Wittsteinia vacciniacea
Nephrophyllidium cristagalli
Menyanthes trifoliata
Nymphoides peltata
Villarsia calthifolia
Dampiera spicigera
Goodenia ovata
Scaevola aemula
Acicarpha tribuloides
Boopis graminea
Moschopsis rosulata
Barnadesia caryophylla
Gerbera jamesonii
Echinops exaltatus
Tragopogon dubius
Cichorium intybus
Lactuca sativa
Tagetes erecta
Helianthus annuus
Guizotia abyssinica
Eremosyne pectinata
Anopterus macleayanus
Polyosma cunninghamii
Escallonia rubra
Forgesia racemosa
Valdivia gayana
Quintinia verdonii
Paracryphia alticola
Sphenostemon lobosporus
Berzelia lanuginosa
Brunia albiflora
Columellia oblonga
Desfontainia spinosa
Viburnum acerifolium
Sambucus racemosa
Tetradoxa omeiensis
Adoxa moschatellina
Sinadoxa corydalifolia
Triosteum perfoliatum
Leycesteria formosa
Lonicera japonica
Symphoricarpos albus
Diervilla sessilifolia
Weigela hortensis
Heptacodium miconioides
Morina longifolia
Linnaea borealis
Kolkwitzia amabilis
Dipelta yunnanensis
Abelia triflora
Zabelia tyaihyonii
Triplostegia glandulifera
Scabiosa columbaria
Dipsacus sativus
Pterocephalodes hookeri
Patrinia triloba
Nardostachys chinensis
Valeriana officinalis
Centranthus ruber
Valerianella locusta
Pennantia corymbosa
Aralidium pinnatifidum
Melanophylla alnifolia
Torricellia tiliifolia
Griselinia littoralis
Pittosporum tobira
Billardiera heterophylla
Hydrocotyle vulgaris
Hedera helix
Polyscias guilfoylei
Panax quinquefolius
Aralia spinosa
Schefflera arboricola
Tetrapanax papyrifer
Cussonia spicata
Pseudopanax arboreus
Tetraplasandra hawaiensis
Delarbrea michieana
Myodocarpus fraxinifolius
Mackinlaya confusa
Platysace lanceolata
Azorella selago
Arctopus echinatus
Sanicula gregaria
Heteromorpha trifoliata
Daucus carota
Anethum graveolens
Apium graveolens
Angelica sylvestris
Campanulidae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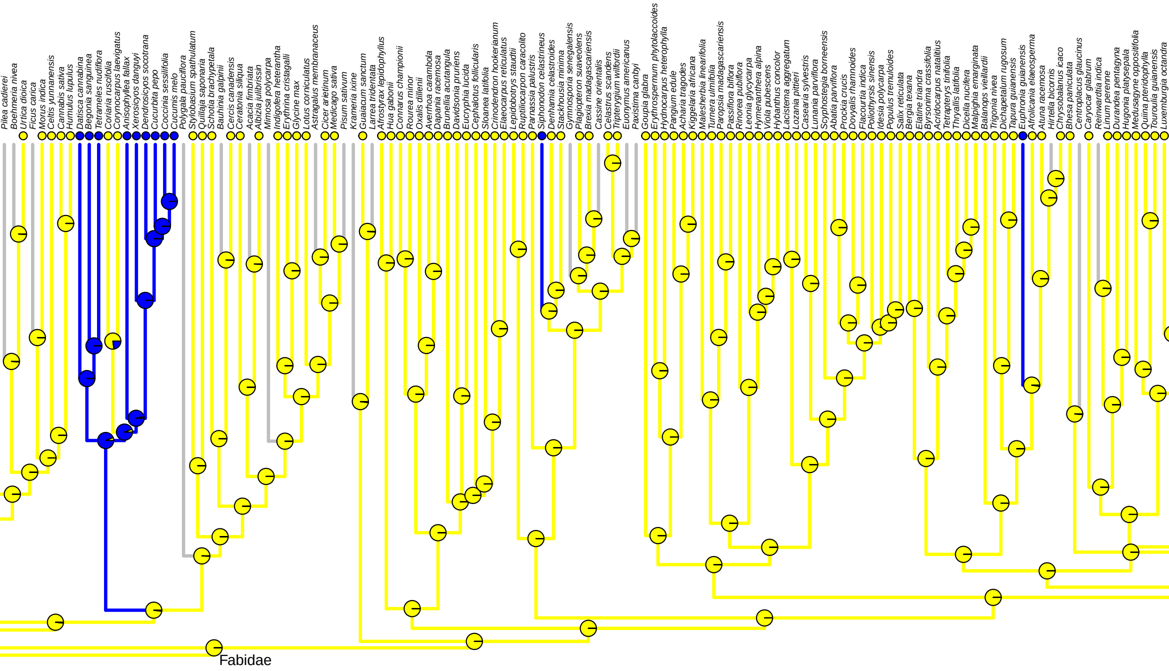
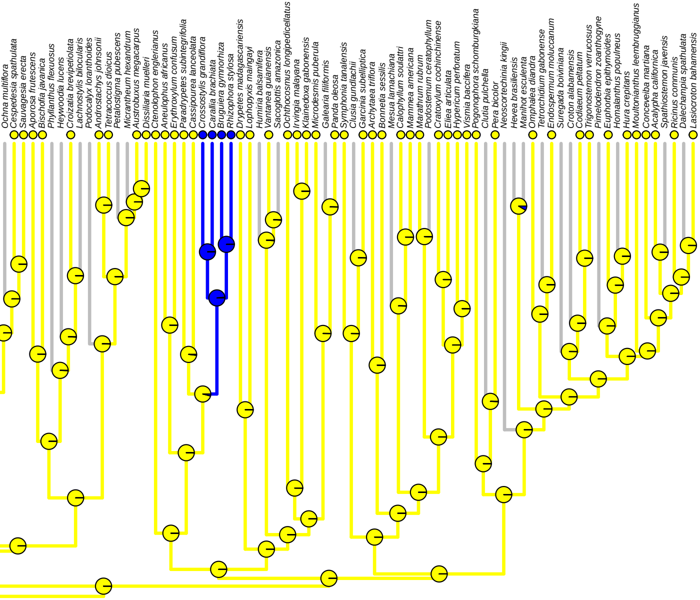
Peridiscus lucidus
Soyauxia talbotii
Crassula rupestris
Kalanchoe daigremontiana
Dudleya viscida
Sedum rubrotinctum
Tetracarpaea tasmanica
Aphanopetalum resinosum
Penthorum sedoides
Haloragis aspera
Myriophyllum sibiricum
Paeonia californica
Pterostemon rotundifolius
Choristylis rhamnoides
Itea virginica
Ribes aureum
Saxifraga cernua
Heuchera micrantha
Sullivantia oregana
Cercidiphyllum japonicum
Daphniphyllum macropodum
Altingia excelsa
Liquidambar styraciflua
Exbucklandia populnea
Rhodoleia championii
Disanthus cercidifolius
Hamamelis virginiana
Corylopsis pauciflora
Leea guineense
Vitis aestivalis
Terminalia catappa
Lythrum salicaria
Fuchsia procumbens
Clarkia xantiana
Oenothera parviflora
Clidemia petiolaris
Mouriri cyphocarpa
Crypteronia paniculata
Olinia ventosa
Qualea grandiflora
Vochysia guatemalensis
Heteropyxis natalensis
Metrosideros nervulosa
Eucalyptus lehmannii
Myrtus communis
Geranium sanguineum
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
Aphloia theiformis
Geissoloma marginatum
Ixerba brexioides
Strasburgeria robusta
Staphylea trifolia
Guamatela tuerckheimii
Crossosoma bigelovii
Stachyurus praecox
Picramnia polyantha
Biebersteinia orphanidis
Aesculus pavia
Cupaniopsis anacardioides
Bursera fagaroides
Rhus copallinum
Schinus molle
Nitraria retusa
Citrus paradisi
Ailanthus altissima
Swietenia macrophylla
Trichilia emetica
Gerrardina foliosa
Tapiscia sinensis
Dipentodon sinicus
Perrottetia ovata
Neurada procumbens
Bixa orellana
Anisoptera marginata
Helianthemum grandiflorum
Thymelaea hirsuta
Gossypium hirsutum
Durio zibethinus
Sterculia apetala
Bombax ceiba
Ochroma pyramidale
Carica papaya
Tropaeolum tricolor
Floerkea proserpinacoides
Batis maritima
Koeberlinia spinosa
Pentadiplandra brazzeana
Tovaria pendula
Gyrostemon tepperi
Reseda alba
Capparis spinosa
Arabidopsis thaliana
Brassica napus
Raphanus sativus
Nothofagus antarctica
Fagus grandifolia
Chrysolepis sempervirens
Quercus rubra
Alnus alnobetula
Casuarina cunninghamiana
Juglans mandshurica
Myrica cerifera
Myrica gale
Spiraea betulifolia
Photinia x fraseri
Prunus persica
Ceanothus sanguineus
Rhamnus cathartica
Barbeya oleoides
Dirachma socotrana
Elaeagnus umbellata
Zelkova serrata
Malvidae
Rosidae
Superrosidae

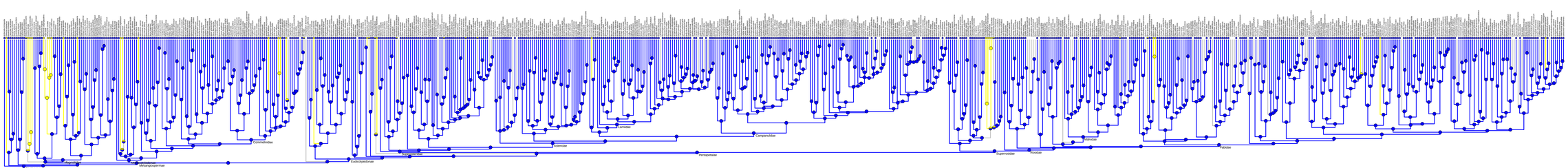

Pilea cadierei
Boehmeria nivea
Urtica dioica
Ficus carica
Morus indica
Celtis yunnanensis
Cannabis sativa
Humulus lupulus
Datisca cannabina
Begonia sanguinea
Tetrameles nudiflora
Coriaria ruscifolia
Corynocarpus laevigatus
Anisophyllea fallax
Xerosicyos danguyi
Dendrosicyos socotrana
Cucurbita pepo
Coccinia sessilifolia
Cucumis melo
Polygala pauciflora
Stylobasium spathulatum
Quillaja saponaria
Schotia brachypetala
Bauhinia galpinii
Cercis canadensis
Ceratonia siliqua
Acacia fimbriata
Albizia julibrissin
Mimosa polycarpa
Indigofera heterantha
Erythrina cristagalli
Glycine max
Lotus corniculatus
Astragalus membranaceus
Cicer arietinum
Medicago sativa
Pisum sativum
Krameria ixine
Guaiacum sanctum
Larrea tridentata
Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
Oxalis dillenii
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Davidsonia pruriens
Eucryphia lucida
Cephalotus follicularis
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Lepidobotrys staudtii
Ruptiliocarpon caracolito
Parnassia palustris
Siphonodon celastrineus
Denhamia celastroides
Stackhousia minima
Gymnosporia senegalensis
Plagiopteron suaveolens
Brexia madagascariensis
Cassine orientalis
Celastrus scandens
Tripterygium wilfordii
Euonymus americanus
Paxistima canbyi
Goupia glabra
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Rinorea pubiflora
Leonia glycycarpa
Hymenanthera alpina
Viola pubescens
Hybanthus concolor
Lacistema aggregatum
Lozania pittieri
Casearia sylvestris
Lunania parviflora
Scyphostegia borneensis
Abatia parviflora
Prockia crucis
Dovyalis rhamnoides
Flacourtia indica
Poliothyrsis sinensis
Idesia polycarpa
Populus tremuloides
Salix reticulata
Bergia texana
Elatine triandra
Byrsonima crassifolia
Acridocarpus natalitius
Tetrapterys tinifolia
Thryallis latifolia
Dicella nucifera
Malpighia emarginata
Balanops vieillardii
Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Afrolicania elaeosperma
Atuna racemosa
Hirtella bicornis
Chrysobalanus icaco
Bhesa paniculata
Centroplacus glaucinus
Caryocar glabrum
Reinwardtia indica
Linum perenne
Durandea pentagyna
Hugonia platysepala
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Fabidae


Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Micrantheum hexandrum
Austrobuxus megacarpus
Dissiliaria muelleri
Ctenolophon englerianus
Aneulophus africanus
Erythroxylum confusum
Paradrypetes subintegrifolia
Cassipourea lanceolata
Crossostylis grandiflora
Carallia brachiata
Bruguiera gymnorhiza
Rhizophora stylosa
Drypetes madagascariensis
Lophopyxis maingayi
Humiria balsamifera
Vantanea guianensis
Sacoglottis amazonica
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
Microdesmis puberula
Galearia filiformis
Panda oleosa
Symphonia tanalensis
Clusia gundlachii
Garcinia subelliptica
Archytaea triflora
Bonnetia sessilis
Mesua larnachiana
Calophyllum soulattri
Mammea americana
Marathrum rubrum
Podostemum ceratophyllum
Cratoxylum cochinchinense
Eliea articulata
Hypericum perforatum
Vismia baccifera
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Hevea brasiliensis
Manihot esculenta
Omphalea diandra
Tetrorchidium gabonense
Endospermum moluccanum
Suregada boiviniana
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Moultonianthus leembruggianus
Conceveiba martiana
Acalypha californica
Spathiostemon javensis
Ricinus communis
Dalechampia spathulata
Lasiocroton bahamensis

MP ancestral state reconstruction using ancestral.pars (R:phangorn)
201_A. Perianth presence (D2c), 21 steps

absent
present

Node	MP state(s)
Angiospermae	present
Mesangiospermae	present
Magnoliidae	present
Monocotyledonae	present
Eudicotyledonae	present
Commelinidae	present
Ceratophyllum	present
Superasteridae	present
Asteridae	present
Lamiidae	present
Campanulidae	present
Superrosidae	present
Rosidae	present
Malvidae	present
Fabidae	present

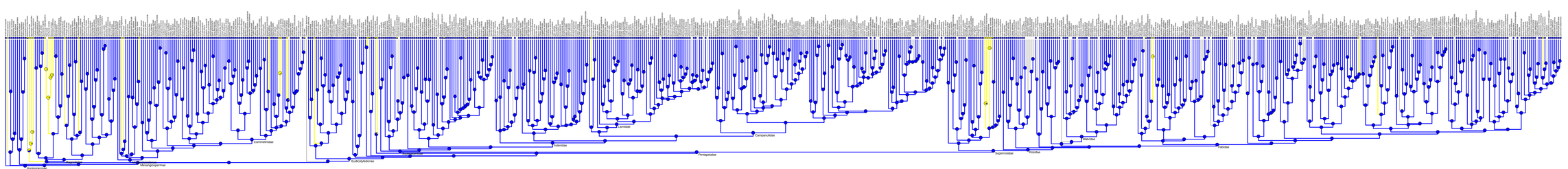


ML ancestral state reconstruction using rayDISC (R:corHMM)
201_A. Perianth presence (D2c), UNI10 model

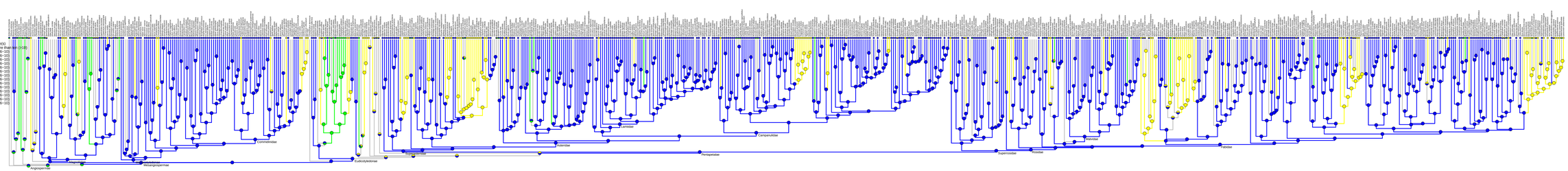
absent
present

Node	ML state	Prob
Angiospermae	present	1
Mesangiospermae	present	1
Magnoliidae	present	1
Monocotyledonae	present	1
Eudicotyledonae	present	1
Commelinidae	present	1
Gunneridae	present	1
Superasteridae	present	1
Asteridae	present	1
Lamidae	present	1
Campanulidae	present	1
Pentapetalae	present	1
Rosidae	present	1
Malvidae	present	1
Fabidae	present	1

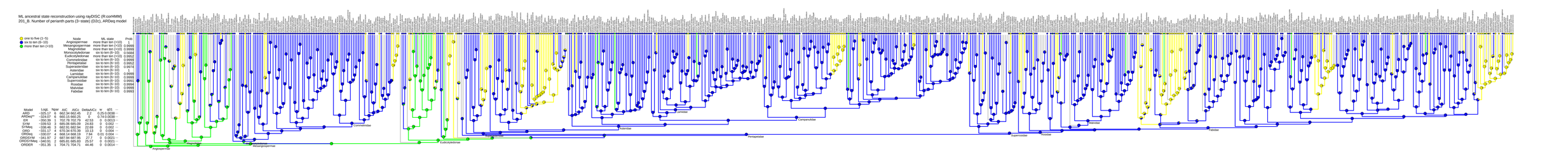
Model	LogL	Nparam	AICc	AICc_Delta	AICc_w	q01	q10
ARD	-96.83	2	197.67	197.69	2.01	0.13	0 5e−04
ARDeq	-96.14	2	196.28	196.3	0.62	0.26	0 5e−04
ER	-97.11	1	196.21	196.22	0.54	0.27	5e−04 5e−04
UNI01	-109.88	1	221.76	221.76	26.09	0	0.0224
UNI10*	-96.83	1	195.67	195.67	0	0.35	5e−04



MP ancestral state reconstruction using ancestral.pars
(R phangorn)
201_B. Number of perianth parts (3–state) (D2c), 86 steps



ML ancestral state reconstruction using ray|DISC (R:corHMM)
201_B. Number of perianth parts (3–state) (D2c), ARDeq model



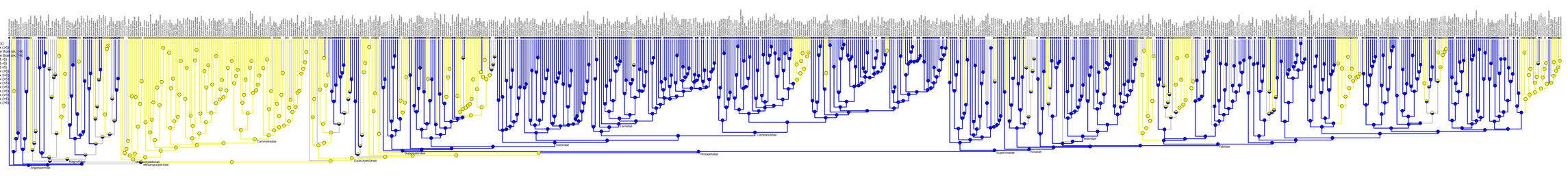
Node	ML state	Prob
Angiospermae	more than ten (>10)	1
Mesangiospermae	more than ten (>10)	0.9998
Magnoliidae	more than ten (>10)	0.9998
Monocotyledonae	six to ten (6–10)	0.5684
Eudicotyledonae	more than ten (>10)	0.9952
Commelinidae	six to ten (6–10)	0.9998
Gunneridae	six to ten (6–10)	0.9998
Superasteridae	six to ten (6–10)	0.9974
Asteridae	six to ten (6–10)	1
Lamiidae	six to ten (6–10)	0.9998
Campanulidae	six to ten (6–10)	0.9998
Caryophyllales	six to ten (6–10)	0.9994
Rosidae	six to ten (6–10)	0.9994
Malvidae	six to ten (6–10)	0.9998
Fabidae	six to ten (6–10)	0.9993

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	--
ARD	-325.17	6	662.34	662.45	2.2	0.25	0.0038	--
ARDeq**	-324.07	6	660.15	660.25	0	0.74	0.0038	--
ER	-350.39	1	702.78	702.79	42.53	0	0.0013	--
SYM	-338.46	3	682.92	682.94	22.69	0	0.002	--
SYMeq	-338.46	3	682.91	682.94	22.69	0	0.002	--
ORD	-331.17	4	670.34	670.39	10.13	0	0.004	--
ORDeq	-330.07	4	668.14	668.19	7.94	0.01	0.004	--
ORDSYM	-341.97	2	687.94	687.95	27.7	0	0.0021	--
ORDSYMeq	-340.91	2	685.81	685.83	25.57	0	0.0021	--
ORDER	-351.35	1	704.71	704.71	44.46	0	0.0014	--

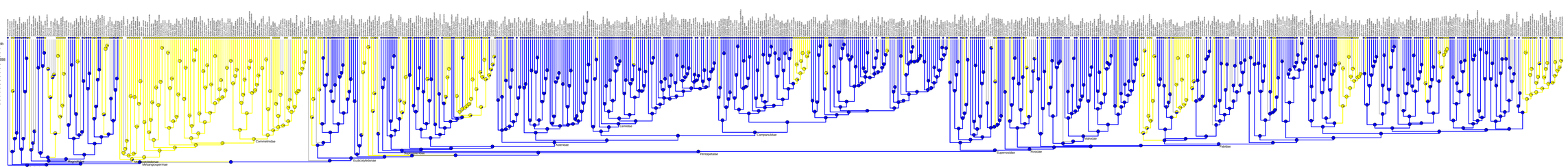
MP ancestral state reconstruction using ancestral pars
(R phangorn)
201_C. Number of perianth parts (binary) (D/2c), 69 steps

one to six (1–6)
more than six (>6)

Node	MP state(s)
Angiospermae	more than six (>6)
Mesangiospermae	one to six (1–6) / more than six (>6)
Magnoliidae	one to six (1–6) / more than six (>6)
Monocotyledonae	one to six (1–6)
Eudicotyledonae	one to six (1–6)
Commelinidae	one to six (1–6)
Ranunculidae	more than six (>6)
Superasteridae	more than six (>6)
Asteridae	more than six (>6)
Lamiidae	more than six (>6)
Campanulidae	more than six (>6)
Superrosidae	more than six (>6)
Rosidae	more than six (>6)
Malvidae	more than six (>6)
Fabidae	more than six (>6)



ML ancestral state reconstruction using ray/DISC (R:corHMM)
201_C. Number of periianth parts (binary) (D2c), ARDeq model

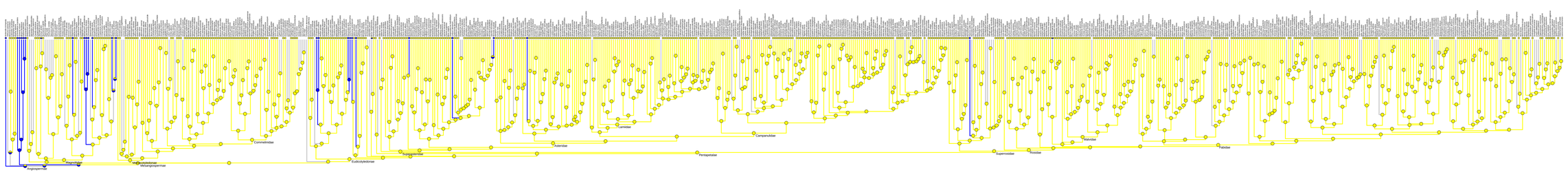


Model	LogL	Nopr	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−247.75	2	499.51	499.52	1.39	0.33	6e−04	0.0026
ARDeq**	−247.06	2	498.12	498.14	0	0.66	6e−04	0.0026
ER	−254.33	1	510.67	510.67	12.54	0	0.0022	0.0022
UN01	−323.73	1	649.46	649.46	151.32	0	0.0083	
UN10	−252.79	1	507.58	507.59	9.45	0.01		0.0029

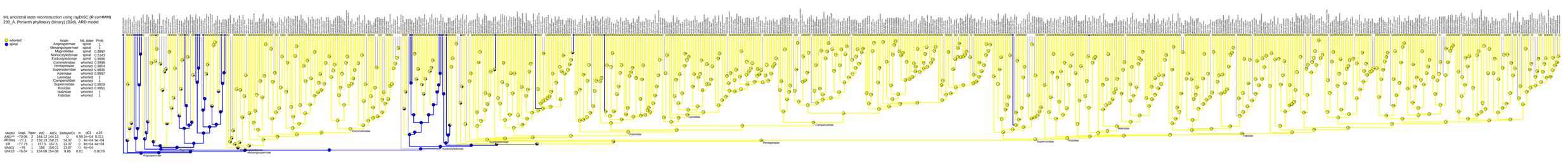
MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
230_A. Perianth phyllotaxy (binary) (D2d), 16 steps

verticil
spiral

Node	MP state(s)
Angiospermae	whorled / spiral
Mesangiospermae	whorled
Magnoliidae	whorled
Monocotyledonae	whorled
Eudicotyledonae	whorled
Commelinidae	whorled
Ranunculidae	whorled
Superasteridae	whorled
Asteridae	whorled
Lamidae	whorled
Campanulidae	whorled
Superrosidae	whorled
Rosidae	whorled
Malvidae	whorled
Fabidae	whorled



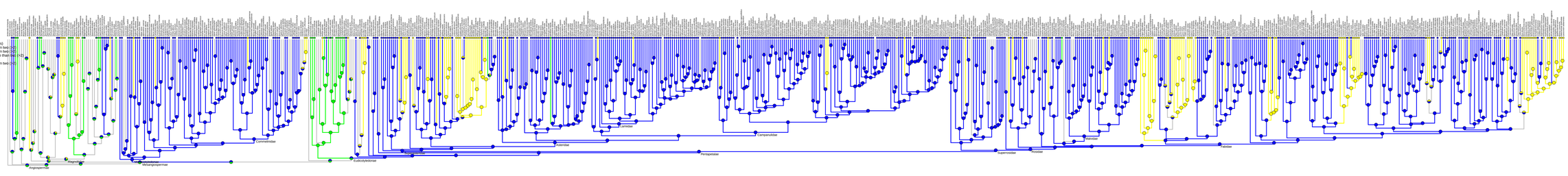
ML ancestral state reconstruction using rayDISC (R:corHMM)
230_A. Perianth phyllotaxy (binary) (D2d), ARD model



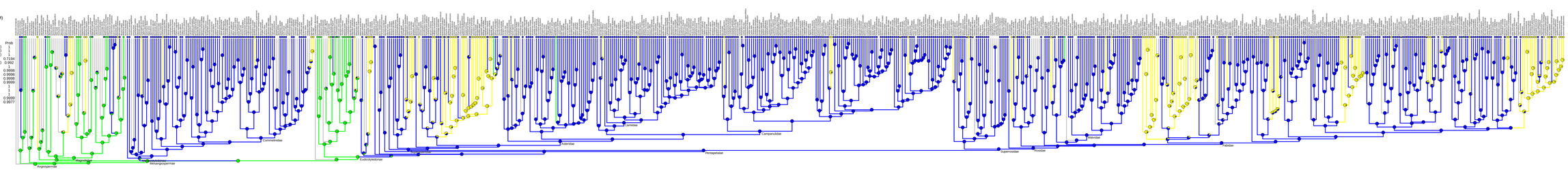
MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
231_A. Number of perianth whorls (D2c), 73 steps

one (1)
two (2)
more than two (>2)

Node	MP state(s)
Angiospermae	two (2) / more than two (>2)
Mesangiospermae	two (2) / more than two (>2)
Magnoliidae	one (1) / two (2) / more than two (>2)
Monocotyledonae	two (2)
Eudicotyledonae	two (2) / more than two (>2)
Commelinidae	two (2)
Ceratophyllidae	two (2)
Superasteridae	two (2)
Asteridae	two (2)
Lamidae	two (2)
Campanulidae	two (2)
Superrosidae	two (2)
Rosidae	two (2)
Malvidae	two (2)
Fabidae	two (2)



ML ancestral state reconstruction using rayDISC (R:corHMM)
231_A. Number of perianth whorls (D2c), ARDeq model



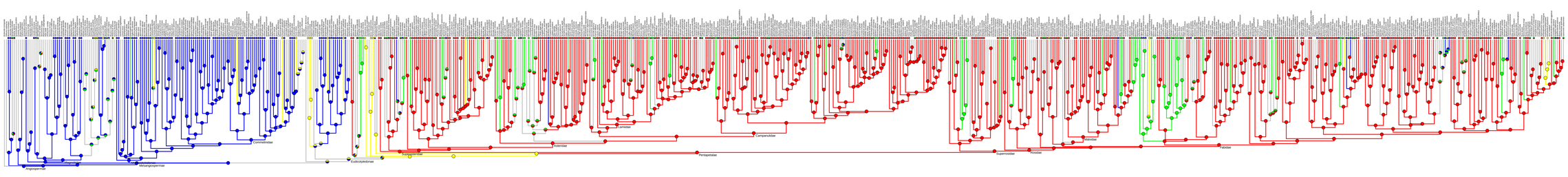
Node	ML state	Prob
Angiospermae	more than two (>2)	1
Mesangiospermae	more than two (>2)	1
Magnoliidae	more than two (>2)	1
Monocotyledonae	two (2)	0.7194
Eudicotyledonae	more than two (>2)	0.992
Commelinidae	two (2)	1
Pentapetalae	two (2)	0.9998
Superasteridae	two (2)	0.9998
Asteridae	two (2)	0.9998
Lamidae	two (2)	0.9999
Campanulidae	two (2)	1
Superrosidae	two (2)	1
Rosidae	two (2)	1
Malvidae	two (2)	0.9999
Fabidae	two (2)	0.9977

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	---
ARD	−269.96	6	551.91	552.02	2.2	0.25	0.0046	--
ARDeq*	−268.86	6	549.71	549.82	0	0.75	0.0046	--
ER	−311.23	1	624.46	624.46	74.64	0	0.001	--
SYM	−292.92	3	591.85	591.88	42.06	0	0.0019	--
SYMeq	−291.92	3	589.84	589.87	40.05	0	0.0019	--
ORD	−277.05	4	562.1	562.15	12.33	0	0.0045	--
ORDeq	−275.95	4	559.9	559.95	10.13	0	0.0045	--
ORDSYM	−298.13	2	600.27	600.28	50.46	0	0.0019	--
ORDSYMeq	−297.05	2	598.1	598.12	48.3	0	0.0019	--
ORDER	−313.56	1	629.13	629.13	79.32	0	0.0012	--

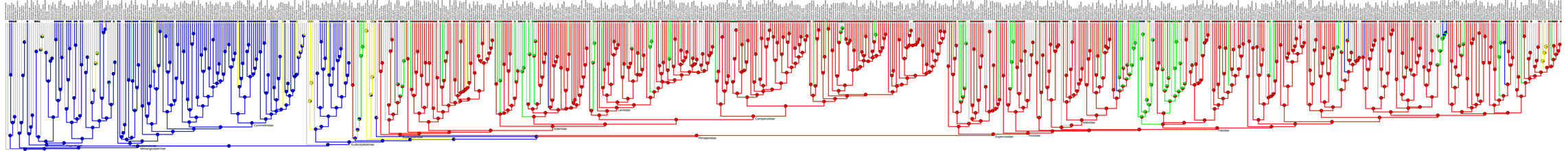
MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
232_A. Perianth merism (4–state) (D2c), 84 steps

- dimerous
- trimerous
- tetramerous
- pentamerous

Node	MP state(s)
Angiospermae	trimerous
Mesangiospermae	trimerous
Magnoliidae	trimerous
Monocotyledonae	trimerous
Eudicotyledonae	dimerous / trimerous
Commelinidae	trimerous
Gunneridae	pentamerous
Superasteridae	pentamerous
Asteridae	pentamerous
Lamiidae	pentamerous
Campanulidae	pentamerous
Superrosidae	pentamerous
Rosidae	pentamerous
Malvidae	pentamerous
Fabidae	pentamerous



ML ancestral state reconstruction using ratDISC (R:corHMM)
232_A. Perianth merism (4–state) (D2c), SYMeq model

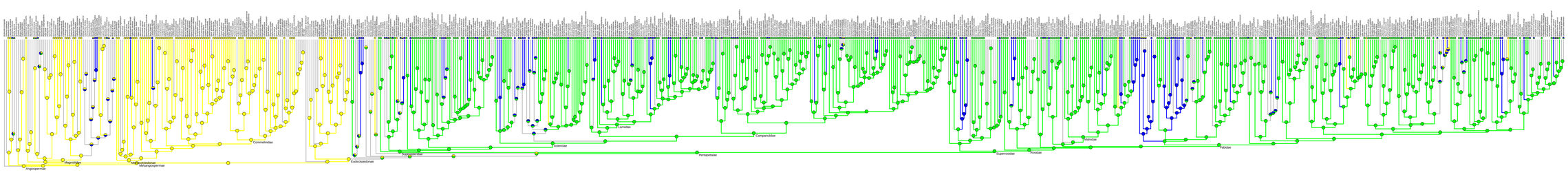


Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	...
ARD	-323.65	12	671.31	671.71	10.48	0	0	---
ARDeq	-322.29	12	668.57	669.08	7.75	0.02	0	---
ER	-360.68	1	723.35	723.36	62.13	0	8e−04	---
SYM	-324.56	6	661.12	661.22	0	0.98	0.0013	---
SYMeq	-324.56	6	661.12	661.22	0	0.98	0.0013	---
ORD	-336.72	6	685.43	685.54	24.32	0	0	---
ORDeq	-335.4	6	682.81	682.92	21.69	0	0	---
ORDSYM	-344.43	3	694.87	694.9	33.68	0	0.002	---
ORDSYMeq	-343.06	3	692.12	692.15	30.93	0	0.002	---
ORDER	-345.97	1	693.93	693.94	32.71	0	0.0025	---

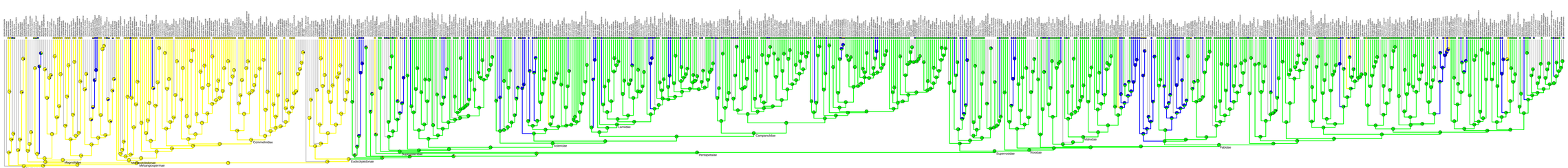
MP ancestral state reconstruction using ancestral.pars (R:phangorn)
232_B. Perianth merism (3–state) (D2c), 70 steps

trimerous
tetramerous
pentamerous

Node	MP state(s)
Angiospermae	trimerous
Mesangiospermae	trimerous
Magnoliidae	trimerous
Monocotyledonae	trimerous
Eudicotyledonae	trimerous
Commelinidae	trimerous
Gunneridae	trimerous
Superasteridae	pentamerous
Asteridae	pentamerous
Lamiidae	pentamerous
Campanulidae	pentamerous
Superrosidae	pentamerous
Rosidae	pentamerous
Malvidae	pentamerous
Fabidae	pentamerous

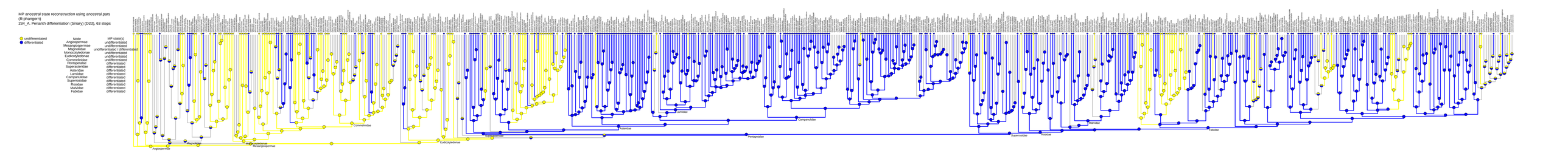


ML ancestral state reconstruction using ratDISC (R:corHMM)
232_8. Perianth merism (3–state) (D2c), SYMeq model

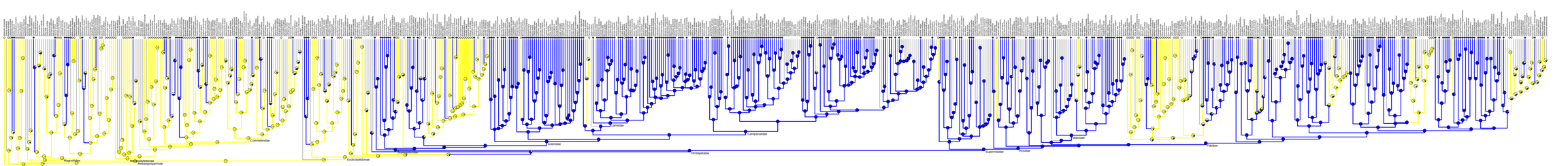


Node	ML state	Prob
Angiospermae	trimerous	1
Mesangiospermae	trimerous	1
Magnoliidae	trimerous	1
Monocotyledonae	trimerous	1
Eudicotyledonae	trimerous	0.9795
Commelinidae	trimerous	1
Core Eudicots	pentamerous	0.9998
Superasteridae	pentamerous	1
Asteridae	pentamerous	0.9999
Lamiidae	pentamerous	1
Campanulidae	pentamerous	1
Caryophyllales	pentamerous	1
Rosidae	pentamerous	1
Malvidae	pentamerous	1
Fabidae	pentamerous	1

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	...
ARD	-256.15	6	524.3	524.41	6.05	0.02	8e−04	...
ARDeq	-255.07	6	522.14	522.25	3.89	0.06	8e−04	...
ER	-291.41	1	564.83	564.83	46.47	0	0.0013	...
SYM	-256.17	3	518.33	518.36	0	0.42	0.001	...
SYMeq	-256.17	3	518.33	518.36	0	0.42	0.001	...
ORD	-256.99	4	521.98	522.03	3.67	0.07	0.001	...
ORDeq	-255.92	4	519.84	519.89	1.52	0.19	0.001	...
ORDSYM	-259.98	2	523.96	523.98	5.62	0.03	0.0015	...
ORDSYMeq	-258.89	2	521.79	521.79	3.43	0.07	0.0015	...
ORDER	-262.3	1	526.59	526.6	8.24	0.01	0.0024	...


MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
234_A. Periamth differentiation (binary) (D2d), 63 steps
undifferentiated
differentiated
Node
MP state(s)
Angiospermae
undifferentiated
Mesangiospermae
undifferentiated
Magnoliidae
undifferentiated / differentiated
Monocotyledonae
undifferentiated
Eudicotyledonae
undifferentiated
Commelinidae
undifferentiated
Ceratophyllidae
undifferentiated
Superasteridae
differentiated
Asteridae
differentiated
Lamiidae
differentiated
Campanulidae
differentiated
Superrosidae
differentiated
Rosidae
differentiated
Malvidae
differentiated
Fabidae
differentiated
Angiospermae
Magnoliidae
Mesangiospermae
Monocotyledonae
Eudicotyledonae
Commelinidae
Ceratophyllidae
Superasteridae
Asteridae
Lamiidae
Campanulidae
Superrosidae
Rosidae
Malvidae
Fabidae

ML ancestral state reconstruction using rayDISC (R:corHMM)
234_A. Perianth differentiation (binary) (D2d), ARDeq model



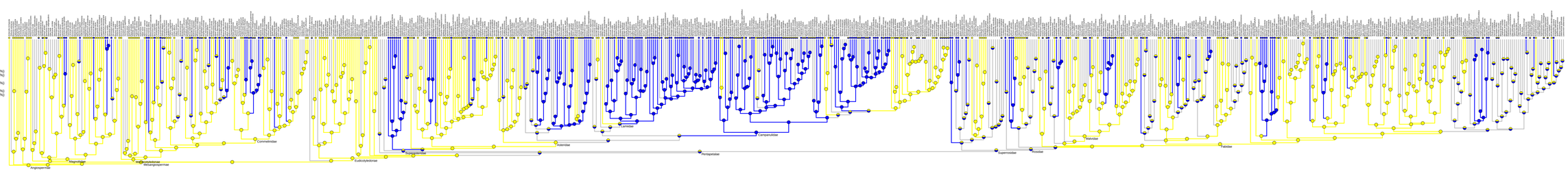
Node	ML state	Prob
Angiospermae	undifferentiated	1
Melanganospermae	undifferentiated	1
Magnoliidae	undifferentiated	0.9999
Monocotyledonae	undifferentiated	1
Eudicotyledonae	undifferentiated	0.9999
Commelinidae	undifferentiated	1
Caryophyllales	differentiated	0.9479
Superasteridae	differentiated	0.9402
Asteridae	differentiated	0.9982
Lamiidae	differentiated	0.9999
Campanulidae	differentiated	1
Santalales	differentiated	0.9921
Rosidae	differentiated	0.9953
Malvidae	differentiated	0.9989
Fabidae	differentiated	0.9872

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−199.39	2	402.77	402.79	1.38	0.33	0.0045	0.0015
ARDeq**	−199.89	2	401.39	401.4	0	0.67	0.0045	0.0015
ER	−208.5	1	419	419	17.6	0	0.0025	0.0025
UN01	−225.54	1	453.09	453.09	51.69	0	0.0086	
UN10	−234.01	1	470.02	470.02	68.62	0		0.0034

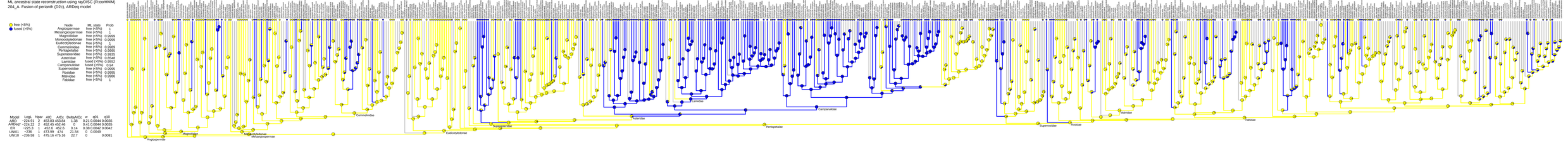
MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
204_A. Fusion of perianth (D2c), 77 steps

free (<5%)
fused (>5%)

Node	MP state(s)
Angiospermae	free (<5%)
Mesangiospermae	free (<5%)
Magnoliidae	free (<5%)
Monocotyledoneae	free (<5%)
Eudicotyledoneae	free (<5%)
Commelinidae	free (<5%)
Zingiberidae	free (<5%) / fused (>5%)
Superasteridae	free (<5%) / fused (>5%)
Asteridae	free (<5%)
Lamidae	free (<5%) / fused (>5%)
Campanulidae	fused (>5%)
Tetracoccae	free (<5%) / fused (>5%)
Rosidae	free (<5%) / fused (>5%)
Malvidae	free (<5%)
Fabidae	free (<5%)



ML ancestral state reconstruction using rayDISC (R::corHMM)
204_A. Fusion of perianth (D2c), ARDeq model



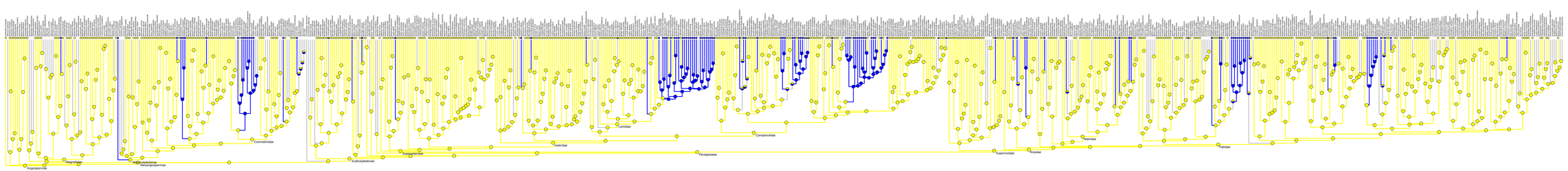
Node	ML state	Prob
Angiospermae	free (<5%)	1
Mesangiospermae	free (<5%)	1
Magnoliidae	free (<5%)	0.9999
Monocotyledonae	free (<5%)	0.9999
Eudicotyledonae	free (<5%)	1
Gunneridae	free (<5%)	0.9999
Pentapetalae	free (<5%)	0.9995
Superasteridae	free (<5%)	0.9935
Asteridae	free (<5%)	0.8548
Lamidae	fused (>5%)	0.9552
Campanulidae	fused (>5%)	0.94
Lamiidae	fused (>5%)	0.9945
Rosidae	free (<5%)	0.9995
Malvidae	free (<5%)	0.9986
Fabidae	free (<5%)	1

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−224.91	2	453.83	453.84	1.38	0.21	0.0044	0.0035
ARDeq*	−224.22	2	452.45	452.46	0	0.41	0.0044	0.0035
ER	−225.3	1	452.6	452.6	0.14	0.38	0.0042	0.0042
UNI01	−236	1	473.99	474	21.54	0	0.0049	
UNI10	−236.58	1	475.16	475.16	22.7	0		0.0081

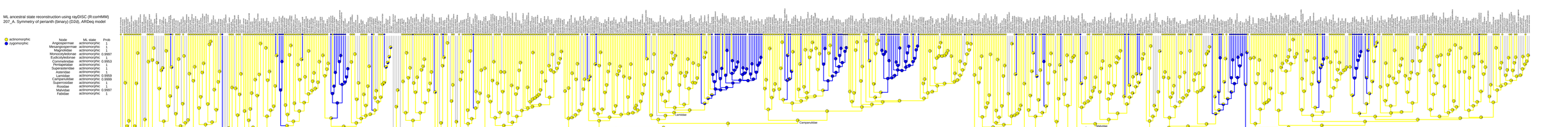
MP ancestral state reconstruction using ancestral.pars (R phangorn)
207_A. Symmetry of perianth (binary) (D2d), 55 steps

actinomorphic
zygomorphic

Node	MP state(s)
Angiospermae	actinomorphic
Mesangiospermae	actinomorphic
Magnoliidae	actinomorphic
Monocotyledonae	actinomorphic
Eudicotyledonae	actinomorphic
Commelinidae	actinomorphic
Ranunculidae	actinomorphic
Superasteridae	actinomorphic
Asteridae	actinomorphic
Lamiidae	actinomorphic
Campanulidae	actinomorphic
Superrosidae	actinomorphic
Rosidae	actinomorphic
Malvidae	actinomorphic
Fabidae	actinomorphic



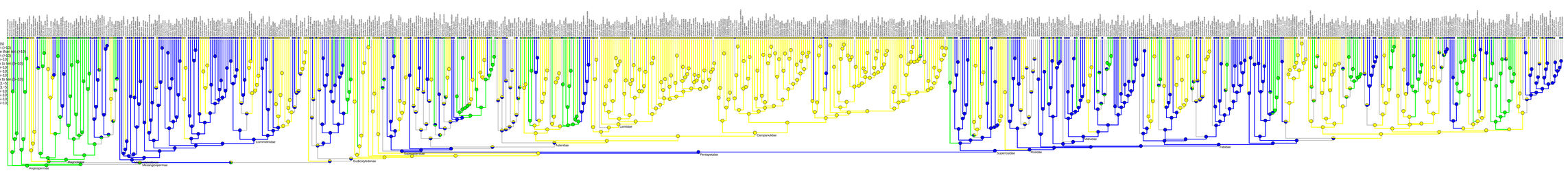
ML ancestral state reconstruction using ray|DISC (R:corHMM) 207_A: Symmetry of perianth (binary) (D2d), ARDeq model



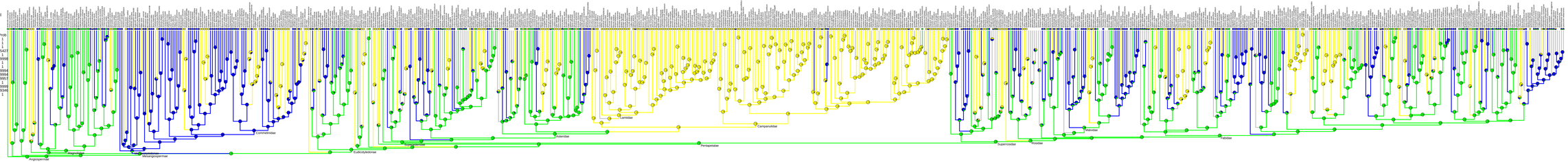
MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
301_B. Number of fertile stamens (3–state) (D2c), 156 steps

one to five (1–5)
six to ten (6–10)
more than ten (>10)

Node	MP state(s)
Angiospermae	more than ten (>10)
Mesangiospermae	one to five (1–5) / more than ten (>10)
Magnoliidae	more than ten (>10)
Monocotyledonae	six to ten (6–10)
Eudicotyledonae	one to five (1–5) / six to ten (6–10)
Commelinidae	six to ten (6–10)
Gunneridae	six to ten (6–10)
Superasteridae	six to ten (6–10)
Asteridae	one to five (1–5) / six to ten (6–10)
Lamiidae	one to five (1–5)
Campanulidae	one to five (1–5)
Superrosidae	six to ten (6–10)
Rosidae	six to ten (6–10)
Malvidae	six to ten (6–10)
Fabidae	six to ten (6–10)



ML ancestral state reconstruction using rayDISC (R:corHMM)
301_B. Number of fertile stamens (3–state) (D2c), ARDeq model



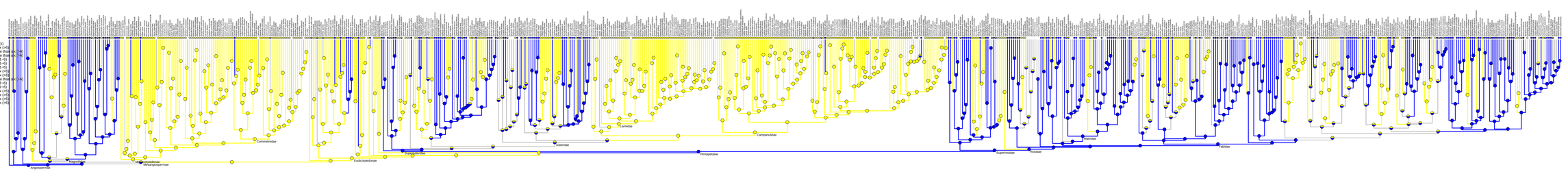
Node	ML state	Prob
Angiospermae	more than ten (>10)	1
Melangiospermae	more than ten (>10)	1
Magnoliidae	more than ten (>10)	1
Monocotyledonae	six to ten (6–10)	0.5427
Eudicotyledonae	more than ten (>10)	1
Commelinidae	six to ten (6–10)	0.9998
Pentapetalae	more than ten (>10)	1
Superasteridae	more than ten (>10)	1
Asteridae	more than ten (>10)	0.9994
Lamidae	one to five (1–5)	0.9994
Campanulidae	one to five (1–5)	0.9957
Supertrisidae	more than ten (>10)	1
Rosidae	more than ten (>10)	0.9999
Malvidae	more than ten (>10)	0.9346
Fabidae	more than ten (>10)	1

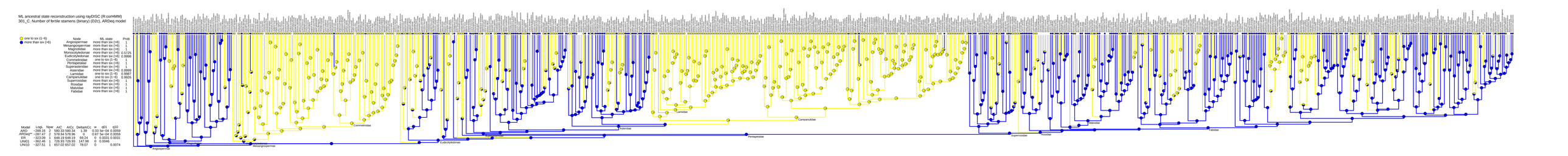
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	—
ARD	−491.49	6	994.98	995.08	2.2	0.25	4e−04	—
ARDeq*	−490.39	6	992.78	992.89	0	0.75	4e−04	—
ER	−537.6	1	1077.2	1077.2	84.32	0	0.0027	—
SYM	−530.07	3	1066.15	1066.18	73.29	0	0.0039	—
SYMeq	−529.24	3	1064.49	1064.52	71.63	0	0.0039	—
ORD	−508.62	4	1025.23	1025.28	32.4	0	7e−04	—
ORDeq	−508.11	4	1024.23	1024.28	31.39	0	8e−04	—
ORDSYM	−533.66	2	1071.33	1071.34	78.46	0	0.0043	—
ORDSYMeq	−532.78	2	1069.56	1069.58	76.69	0	0.0043	—
ORDER	−533.69	1	1069.38	1069.39	76.5	0	0.0044	—

MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
301_C. Number of fertile stamens (binary) (02c), 94 steps

one to six (1–6)
more than six (>6)

Node	MP state(s)
Angiospermae	more than six (>6)
Mesangiospermae	one to six (1–6) / more than six (>6)
Magnoliidae	one to six (1–6) / more than six (>6)
Monocotyledonae	one to six (1–6)
Eudicotyledonae	one to six (1–6)
Commelinidae	one to six (1–6)
Ranunculidae	more than six (>6)
Superasteridae	more than six (>6)
Asteridae	one to six (1–6) / more than six (>6)
Lamiidae	one to six (1–6)
Campanulidae	one to six (1–6)
Superrosidae	more than six (>6)
Rosidae	more than six (>6)
Malvidae	more than six (>6)
Fabidae	more than six (>6)

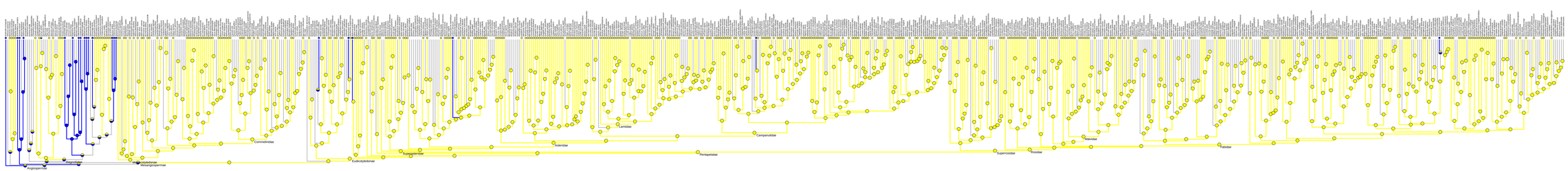



ML ancestral state reconstruction using ratDISC (RcorHMM)
301_C. Number of fertile stamens (binary) (02c), ARDeq model
one to six (1–6)
more than six (>6)
Node
ML state
Prob
Angiospermae more than six (>6) 1
Mesangiospermae more than six (>6) 1
Magnoliidae more than six (>6) 1
Monocotyledonae more than six (>6) 0.5725
Eudicotyledonae more than six (>6) 0.9998
Commelinidae one to six (1–6) 1
Ceratophyllum one to six (1–6) 1
Superasteridae more than six (>6) 1
Asteridae more than six (>6) 0.9999
Lamiidae one to six (1–6) 0.9997
Campanulidae one to six (1–6) 0.9926
Gunneridae more than six (>6) 1
Rosidae more than six (>6) 1
Malvidae more than six (>6) 1
Fabidae more than six (>6) 1
Model LogL Npar AIC AICc DeltaAICc w q01 q10
ARD −288.16 2 580.33 580.34 1.39 0.33 5e−04 0.0059
ARDeq** −287.47 2 578.94 578.96 0 0.67 5e−04 0.0059
ER −323.09 1 648.19 648.19 69.24 0 0.0031 0.0031
UN01 −362.46 1 726.93 726.93 147.98 0 0.0046
UN10 −327.51 1 657.02 657.02 78.07 0 0.0074
Angiospermae
Mesangiospermae
Magnoliidae
Monocotyledonae
Eudicotyledonae
Commelinidae
Ceratophyllum
Superasteridae
Asteridae
Lamiidae
Gunneridae
Rosidae
Malvidae
Fabidae
Campanulidae
Pentapetalae

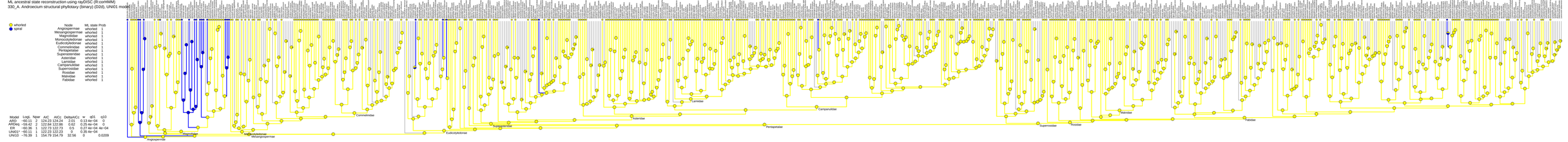
MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
330_A. Androecium structural phyllotaxy (binary) (D2d), 12 steps

whorled
spiral

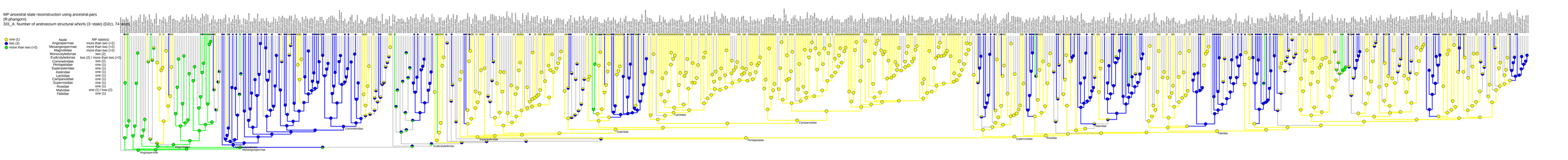
Node	MP state(s)
Angiospermae	whorled / spiral
Mesangiospermae	whorled / spiral
Magnoliidae	whorled / spiral
Monocotyledonae	whorled
Eudicotyledonae	whorled
Commelinidae	whorled
Ranunculidae	whorled
Superasteridae	whorled
Asteridae	whorled
Lamidae	whorled
Campanulidae	whorled
Superrosidae	whorled
Rosidae	whorled
Malvidae	whorled
Fabidae	whorled



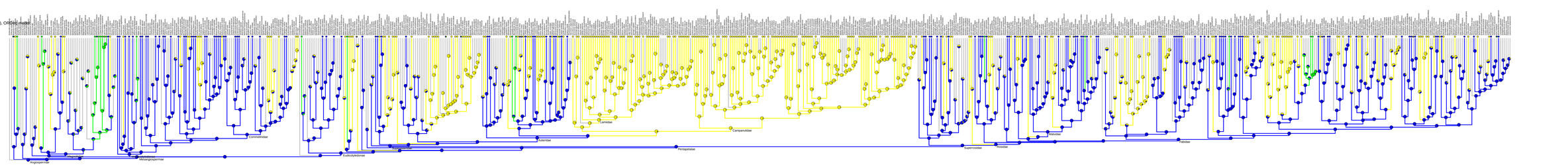
ML ancestral state reconstruction using rayDISC (R:corHMM)
330_A. Androcium structural phylotaxy (binary) (D2d), UNI01 model



MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
331_A. Number of androecium structural whorls (3–state) (D2c), 74 taxa

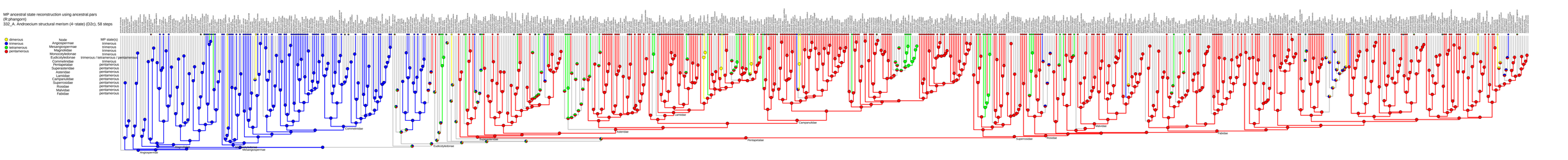


ML ancestral state reconstruction using rayDISC (R:corHMM)
331_A. Number of androecium structural whorls (3–state) (D2c), ORDER model



Node	ML state	Prob
Angiospermae	two (2)	1
Mesangiospermae	two (2)	0.9999
Magnoliidae	two (2)	0.9917
Monocotyledoneae	two (2)	1
Eudicotyledoneae	two (2)	1
Commelinidae	two (2)	1
Ceratophyllidae	two (2)	1
Superasteridae	two (2)	1
Asteridae	two (2)	1
Lamiidae	one (1)	0.9986
Campanulidae	one (1)	0.9916
Gentianidae	two (2)	1
Rosidae	two (2)	1
Malvidae	two (2)	1
Fabidae	two (2)	1

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	---
ARD	-230.47	6	472.95	473.06	0.19	0.32	0	---
ARDeq	-230.91	4	473.82	473.92	1.06	0.21	0	---
ER	-260.24	1	562.49	562.49	89.63	0	0.0017	---
SYM	-254.09	3	514.19	514.36	41.49	0	0.0035	---
SYMeq	-254.18	2	512.35	512.41	39.54	0	0.0035	---
ORD	-233.46	4	474.93	474.98	2.11	0.12	0	---
ORDeq*	-232.41	4	472.82	472.87	0	0.35	0	---
ORDSYM	-255.12	7	514.24	514.26	41.39	0	0.0036	---
ORDSYMeq	-254.05	2	512.09	512.11	39.24	0	0.0036	---
ORDER	-260.45	1	522.9	522.9	50.04	0	0.0029	---

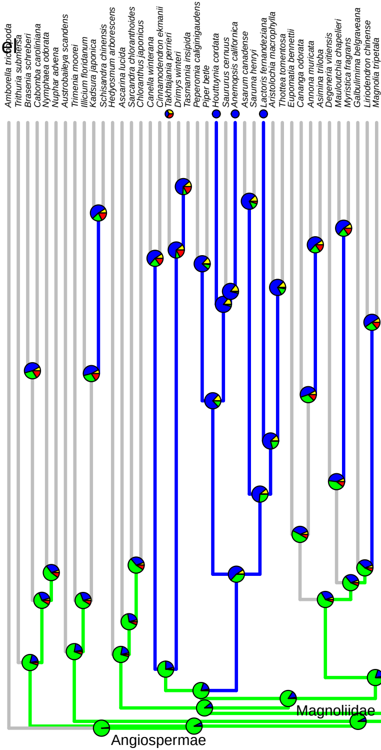

MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
332_A. Androecium structural merism (4–state) (D2c), 58 steps
dimerous
trimerous
tetramerous
pentamerous
Node
MP state(s)
Angiospermae
trimerous
Mesangiospermae
trimerous
Magnoliidae
trimerous
Monocotyledoneae
trimerous
Eudicotyledoneae
trimerous / tetramerous / pentamerous
Commelinidae
trimerous
Gunneridae
pentamerous
Superasteridae
pentamerous
Asteridae
pentamerous
Lamiidae
pentamerous
Campanulidae
pentamerous
Rosidae
pentamerous
Malvidae
pentamerous
Fabidae
pentamerous
Poales
Commelinidae
Angiospermae
Mesangiospermae
Eudicotyledonae
Gunneridae
Pentapetalae
Lamiidae
Asteridae
Campanulidae
Superasteridae
Rosidae
Malvidae
Fabidae

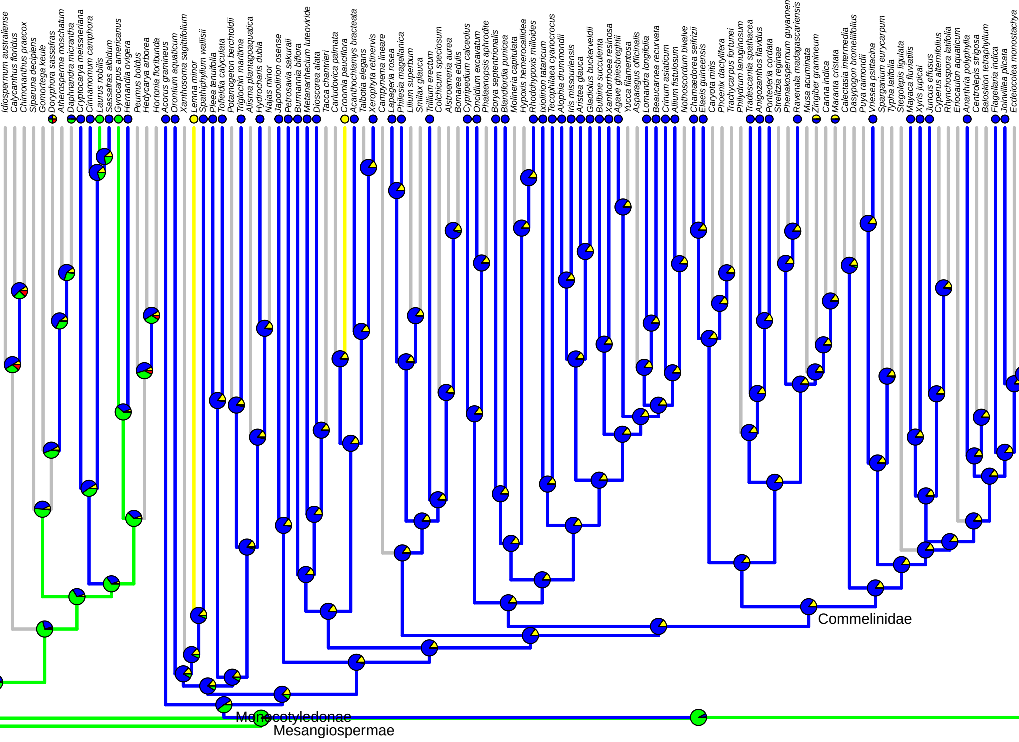
ML ancestral state reconstruction using rayDISC (R:corHMM)
332_A. Androecium structural merism (4−state) (D2c), ORDeq model

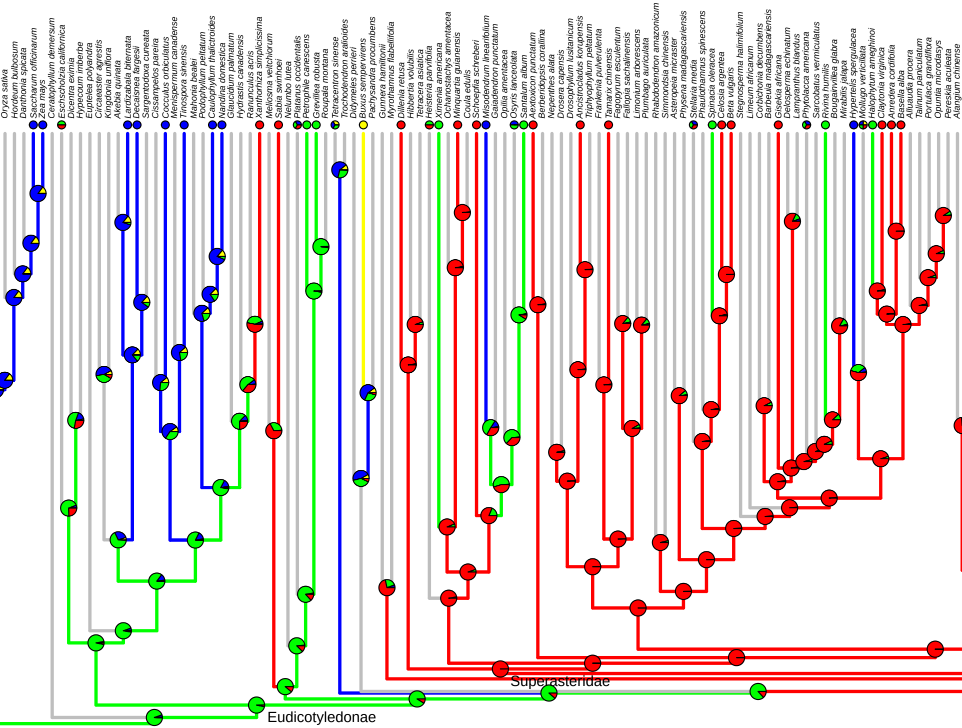
- 🟡 dimerous
- 🔵 trimerous
- 🟢 tetramerous
- 🔴 pentamerous

Node	ML state	Prob
Angiospermae	tetramerous	0.9846
Mesangiospermae	tetramerous	0.9215
Magnoliidae	tetramerous	0.8424
Monocotyledonae	trimerous	0.5155
Eudicotyledonae	tetramerous	0.9628
Commelinidae	trimerous	0.8489
Pentapetalae	pentamerous	0.9977
Superasteridae	pentamerous	0.9991
Asteridae	pentamerous	0.9998
Lamiidae	pentamerous	0.9999
Campanulidae	pentamerous	1
Superrosidae	pentamerous	0.9999
Rosidae	pentamerous	0.9999
Malvidae	pentamerous	0.9999
Fabidae	pentamerous	1

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	···
ARD	−222.8	12	469.59	469.99	348.76	0	0.0071	···
ARDeq	−221.46	12	466.92	467.32	346.09	0	0.0069	···
ER	−236.77	1	475.53	475.54	354.3	0	9e−04	···
SYM	−224.73	6	461.47	461.58	340.34	0	6e−04	···
SYMeq	−223.36	6	458.72	458.82	337.59	0	6e−04	···
ORD	−56.67	6	125.34	125.44	4.21	0.11	99.9998	···
ORDeq**	−54.56	6	121.13	121.24	0	0.89	100	···
ORDSYM	−256.73	3	519.46	519.49	398.26	0	0.0021	···
ORDSYMeq	−255.4	3	516.8	516.83	395.59	0	0.0021	···
ORDER	−257.49	1	516.97	516.98	395.74	0	0.0031	···




Idiospermum australiense
Calycanthus floridus
Chimonanthus praecox
Siparuna decipiens
Gomortega keule
Doryphora sassafras
Atherosperma moschatum
Daphnandra micrantha
Cryptocarya meissneriana
Cinnamomum camphora
Laurus nobilis
Sassafras albidum
Gyrocarpus americanus
Hernandia ovigera
Peumus boldus
Hedycarya arborea
Hortonia floribunda
Acorus gramineus
Orontium aquaticum
Xanthosoma sagittifolium
Lemna minor
Spathiphyllum wallisii
Pleea tenuifolia
Tofieldia calyculata
Potamogeton berchtoldii
Triglochin maritima
Alisma plantagoaquatica
Hydrocharis dubia
Najas minor
Japonolirion osense
Petrosavia sakuraii
Burmannia biflora
Metanarthecium luteoviride
Dioscorea alata
Tacca chantrieri
Carludovica palmata
Croomia pauciflora
Acanthochlamys bracteata
Talbotia elegans
Xerophyta retinervis
Campynema lineare
Lapageria rosea
Philesia magellanica
Lilium superbum
Smilax glauca
Trillium erectum
Colchicum speciosum
Alstroemeria aurea
Bomarea edulis
Cypripedium calceolus
Oncidium excavatum
Phalaenopsis aphrodite
Borya septentrionalis
Blandfordia punicea
Molineria capitulata
Hypoxis hemerocallidea
Rhodohypoxis milloides
Ixiolirion tataricum
Tecophilaea cyanocrocus
Alophia drummondii
Iris missouriensis
Aristea glauca
Gladiolus buckerveldii
Bulbine succulenta
Xanthorrhoea resinosa
Agave ghiesbreghtii
Yucca filamentosa
Asparagus officinalis
Lomandra longifolia
Beaucarnea recurvata
Crinum asiaticum
Allium fistulosum
Nothoscordum bivalve
Chamaedorea seifrizii
Elaeis guineensis
Caryota mitis
Phoenix dactylifera
Trachycarpus fortunei
Philydrum lanuginosum
Tradescantia spathacea
Anigozanthos flavidus
Pontederia cordata
Strelitzia reginae
Phenakospermum guyanense
Ravenala madagascariensis
Musa acuminata
Zingiber gramineum
Canna indica
Maranta cristata
Calectasia intermedia
Dasypogon bromeliifolius
Puya raimondii
Vriesea psittacina
Sparganium eurycarpum
Typha latifolia
Stegolepis ligulata
Mayaca fluviatilis
Xyris jupicai
Juncus effusus
Cyperus alternifolius
Rhynchospora latifolia
Eriocaulon aquaticum
Anarthria polyphylla
Centrolepis strigosa
Baloskion tetraphyllum
Flagellaria indica
Joinvillea plicata
Ecdeiocolea monostachya
Commelinidae
Monocotyledonae
Mesangiospermae


Oryza sativa
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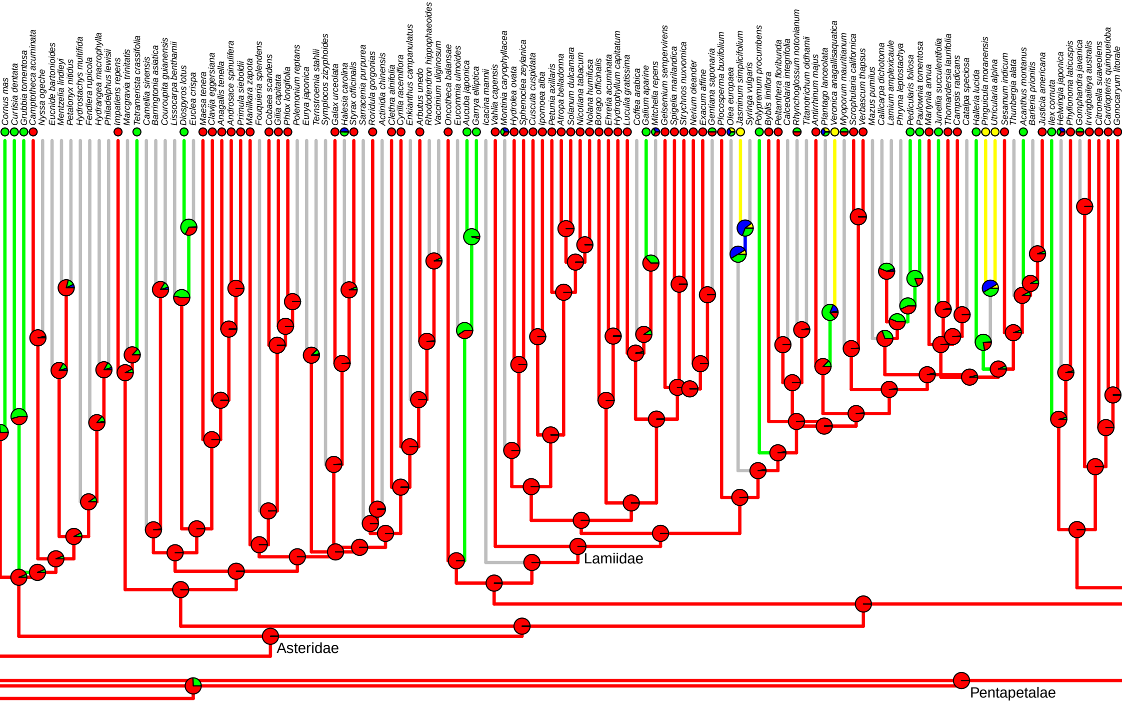
Danthonia spicata
Saccharum officinarum
Zea mays
Ceratophyllum demersum
Eschscholzia californica
Dicentra eximia
Hypecoum imberbe
Euptelea polyandra
Circaeaster agrestis
Kingdonia uniflora
Akebia quinata
Lardizabala biternata
Decaisnea fargesii
Sargentodoxa cuneata
Cissampelos pareira
Cocculus orbiculatus
Menispermum canadense
Tinospora sinensis
Mahonia bealei
Podophyllum peltatum
Caulophyllum thalictroides
Nandina domestica
Glaucidium palmatum
Hydrastis canadensis
Ranunculus acris
Xanthorhiza simplicissima
Meliosma veitchiorum
Sabia swinhoei
Nelumbo lutea
Platanus occidentalis
Petrophile canescens
Grevillea robusta
Roupala montana
Tetracentron sinense
Trochodendron aralioides
Didymeles perrieri
Buxus sempervirens
Pachysandra procumbens
Gunnera hamiltonii
Myrothamnus flabellifolia
Dillenia retusa
Hibbertia volubilis
Tetracera asiatica
Heisteria parvifolia
Ximenia americana
Ochanostachys amentacea
Minquartia guianensis
Coula edulis
Schoepfia schreberi
Misodendrum linearifolium
Gaiadendron punctatum
Opilia amentacea
Osyris lanceolata
Santalum album
Aextoxicon punctatum
Berberidopsis corallina
Nepenthes alata
Drosera capensis
Drosophyllum lusitanicum
Ancistrocladus korupensis
Triphyophyllum peltatum
Frankenia pulverulenta
Tamarix chinensis
Fagopyrum esculentum
Fallopia sachalinensis
Limonium arborescens
Plumbago auriculata
Rhabdodendron amazonicum
Simmondsia chinensis
Asteropeia micraster
Physena madagascariensis
Stellaria media
Phaulothamnus spinescens
Spinacia oleracea
Celosia argentea
Beta vulgaris
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Gisekia africana
Delosperma echinatum
Lampranthus blandus
Phytolacca americana
Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Halophytum ameghinoi
Claytonia virginica
Anredera cordifolia
Basella alba
Alluaudia procera
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Alangium chinense
Superasteridae
Eudicotyledonae


Cornus mas
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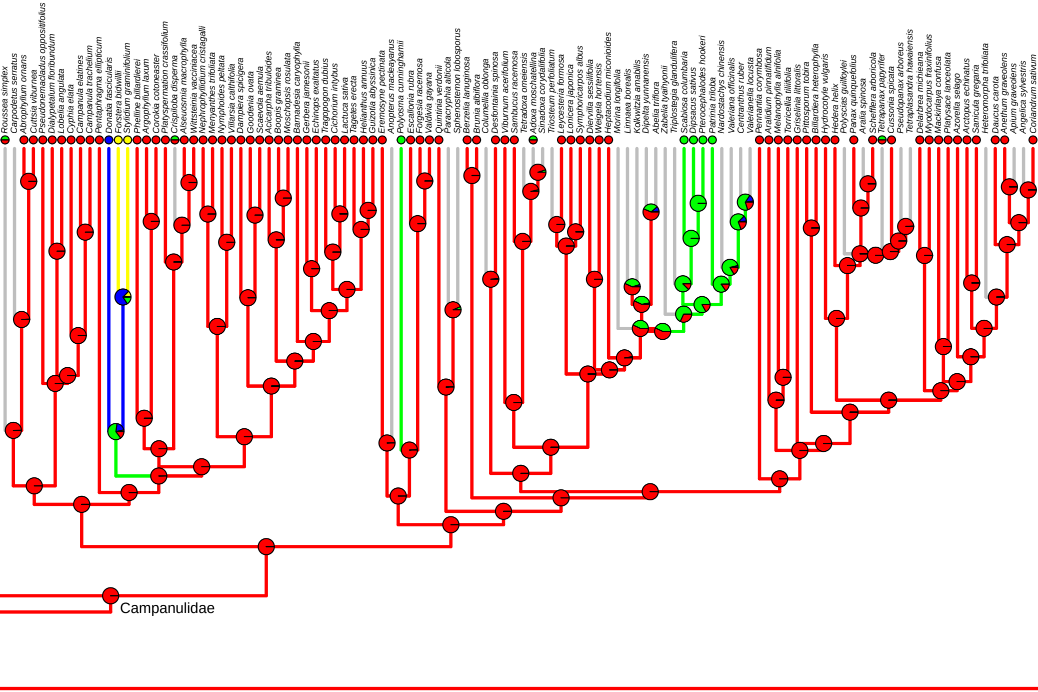
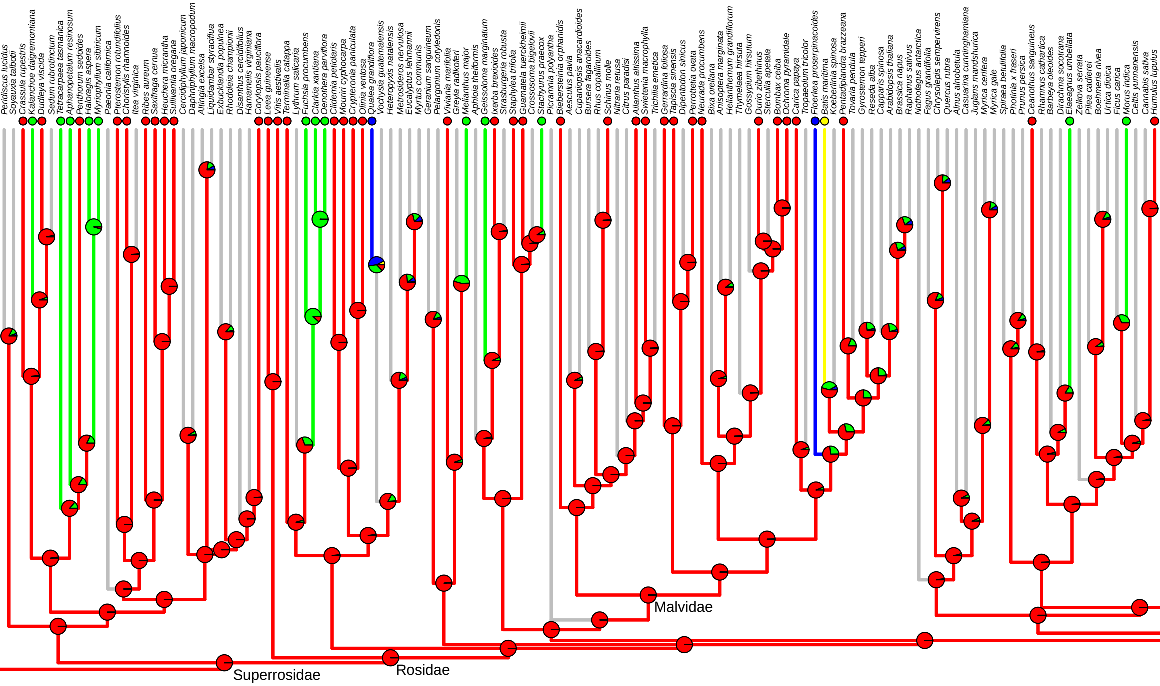
Grubbia tomentosa
Camptotheca acuminata
Nyssa ogeche
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Hydrostachys multifida
Fendlera rupicola
Hydrangea macrophylla
Philadelphus lewisii
Impatiens repens
Marcgravia trinitatis
Tetramerista crassifolia
Camellia sinensis
Barringtonia asiatica
Couroupita guianensis
Lissocarpa benthamii
Diospyros lotus
Euclea crispa
Maesa tenera
Clavija eggersiana
Anagallis tenella
Androsace spinulifera
Primula sieboldii
Manilkara zapota
Fouquieria splendens
Cobaea scandens
Gilia capitata
Phlox longifolia
Polemonium reptans
Eurya japonica
Ternstroemia stahlii
Symplocos zizyphoides
Galax urceolata
Halesia carolina
Styrax officinalis
Sarracenia purpurea
Roridula gorgonias
Actinidia chinensis
Clethra alnifolia
Cyrilla racemiflora
Enkianthus campanulatus
Arbutus unedo
Rhododendron hippophaeoides
Vaccinium uliginosum
Oncotheca balansae
Eucommia ulmoides
Aucuba japonica
Garrya elliptica
Icacina mannii
Vahlia capensis
Montinia caryophyllacea
Hydrolea ovata
Sphenoclea zeylanica
Cuscuta cuspidata
Ipomoea alba
Petunia axillaris
Atropa belladonna
Solanum dulcamara
Nicotiana tabacum
Nolana humifusa
Borago officinalis
Ehretia acuminata
Hydrophyllum capitatum
Luculia gratissima
Coffea arabica
Galium aparine
Mitchella repens
Gelsemium sempervirens
Spigelia marilandica
Strychnos nuxvomica
Nerium oleander
Exacum affine
Gentiana saponaria
Plocosperma buxifolium
Olea europaea
Jasminum simplicifolium
Syringa vulgaris
Polypremum procumbens
Byblis liniflora
Peltanthera floribunda
Calceolaria integrifolia
Rhynchoglossum notonianum
Titanotrichum oldhamii
Antirrhinum majus
Plantago lanceolata
Veronica anagallisaquatica
Myoporum mauritianum
Scrophularia californica
Verbascum thapsus
Mazus pumilus
Callicarpa dichotoma
Lamium amplexicaule
Phryma leptostachya
Pedicularis foliosa
Paulownia tomentosa
Martynia annua
Junellia succulentifolia
Thomandersia laurifolia
Campsis radicans
Catalpa speciosa
Halleria lucida
Pinguicula moranensis
Utricularia alpina
Sesamum indicum
Thunbergia alata
Acanthus montanus
Barleria prionitis
Justicia americana
Ilex cornuta
Helwingia japonica
Phyllonoma laticuspis
Gomphandra javanica
Irvingbaileya australis
Citronella suaveolens
Cardiopteris quinqueloba
Gonocaryum litorale
Lamiidae
Asteridae
Pentapetalae


Roussea simplex
Carpodetus serratus
Abrophyllum ornans
Cuttsia viburnea
Pseudonemacladus oppositifolius
Dialypetalum floribundum
Lobelia angulata
Cyphia elata
Campanula elatines
Campanula trachelium
Pentaphragma ellipticum
Donatia fascicularis
Forstera bidwillii
Stylidium graminifolium
Phelline billardierei
Argophyllum laxum
Corokia cotoneaster
Platyspermation crassifolium
Crispiloba disperma
Alseuosmia macrophylla
Wittsteinia vacciniacea
Nephrophyllidium cristagalli
Menyanthes trifoliata
Nymphoides peltata
Villarsia calthifolia
Dampiera spicigera
Goodenia ovata
Scaevola aemula
Acicarpha tribuloides
Boopis graminea
Moschopsis rosulata
Barnadesia caryophylla
Gerbera jamesonii
Echinops exaltatus
Tragopogon dubius
Cichorium intybus
Lactuca sativa
Tagetes erecta
Helianthus annuus
Guizotia abyssinica
Eremosyne pectinata
Anopterus macleayanus
Polyosma cunninghamii
Escallonia rubra
Forgesia racemosa
Valdivia gayana
Quintinia verdonii
Paracryphia alticola
Sphenostemon lobosporus
Berzelia lanuginosa
Brunia albiflora
Columellia oblonga
Desfontainia spinosa
Viburnum acerifolium
Sambucus racemosa
Tetradoxa omeiensis
Adoxa moschatellina
Sinadoxa corydalifolia
Triosteum perfoliatum
Leycesteria formosa
Lonicera japonica
Symphoricarpos albus
Diervilla sessilifolia
Weigela hortensis
Heptacodium miconioides
Morina longifolia
Linnaea borealis
Kolkwitzia amabilis
Dipelta yunnanensis
Abelia triflora
Zabelia tyaihyonii
Triplostegia glandulifera
Scabiosa columbaria
Dipsacus sativus
Pterocephalodes hookeri
Patrinia triloba
Nardostachys chinensis
Valeriana officinalis
Centranthus ruber
Valerianella locusta
Pennantia corymbosa
Aralidium pinnatifidum
Melanophylla alnifolia
Torricellia tiliifolia
Griselinia littoralis
Pittosporum tobira
Billardiera heterophylla
Hydrocotyle vulgaris
Hedera helix
Polyscias guilfoylei
Panax quinquefolius
Aralia spinosa
Schefflera arboricola
Tetrapanax papyrifer
Cussonia spicata
Pseudopanax arboreus
Tetraplasandra hawaiensis
Delarbrea michieana
Myodocarpus fraxinifolius
Mackinlaya confusa
Platysace lanceolata
Azorella selago
Arctopus echinatus
Sanicula gregaria
Heteromorpha trifoliata
Daucus carota
Anethum graveolens
Apium graveolens
Angelica sylvestris
Coriandrum sativum
Campanulidae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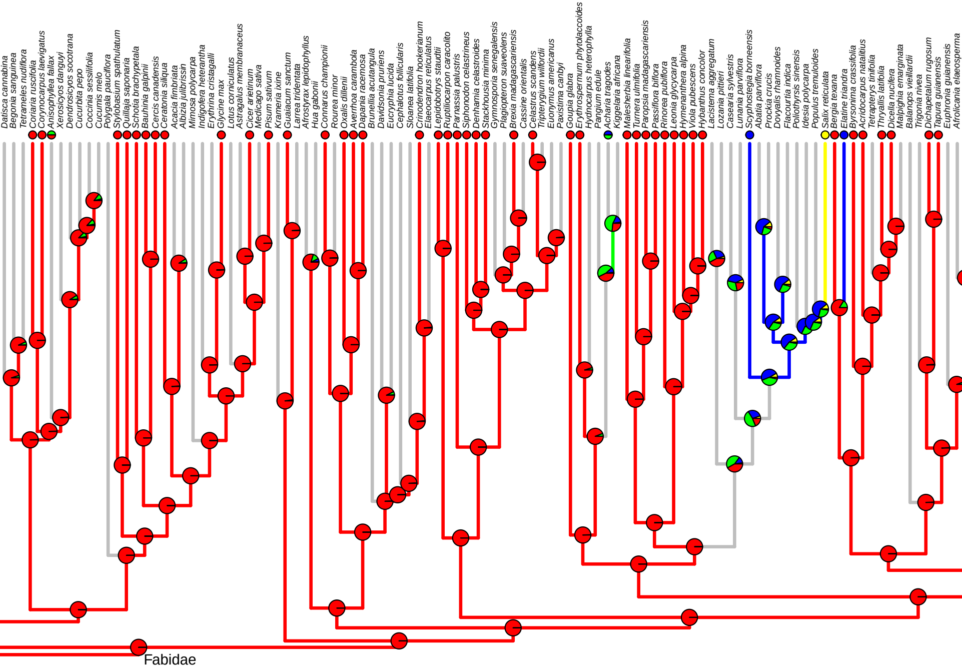
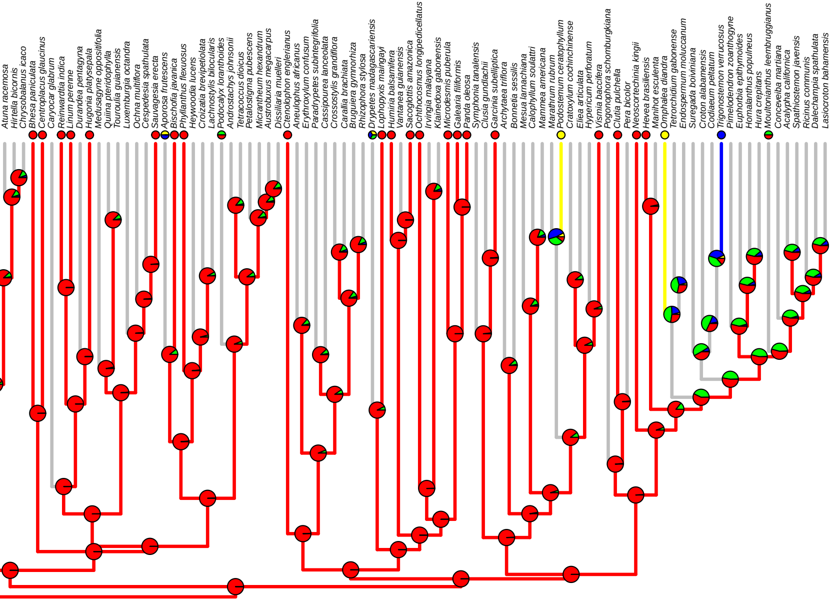
Soyauxia talbotii
Crassula rupestris
Kalanchoe daigremontiana
Dudleya viscida
Sedum rubrotinctum
Tetracarpaea tasmanica
Aphanopetalum resinosum
Penthorum sedoides
Haloragis aspera
Myriophyllum sibiricum
Paeonia californica
Pterostemon rotundifolius
Choristylis rhamnoides
Itea virginica
Ribes aureum
Saxifraga cernua
Heuchera micrantha
Sullivantia oregana
Cercidiphyllum japonicum
Daphniphyllum macropodum
Altingia excelsa
Liquidambar styraciflua
Exbucklandia populnea
Rhodoleia championii
Disanthus cercidifolius
Hamamelis virginiana
Corylopsis pauciflora
Leea guineense
Vitis aestivalis
Terminalia catappa
Lythrum salicaria
Fuchsia procumbens
Clarkia xantiana
Oenothera parviflora
Clidemia petiolaris
Mouriri cyphocarpa
Crypteronia paniculata
Olinia ventosa
Qualea grandiflora
Vochysia guatemalensis
Heteropyxis natalensis
Metrosideros nervulosa
Eucalyptus lehmannii
Myrtus communis
Geranium sanguineum
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
Aphloia theiformis
Geissoloma marginatum
Ixerba brexioides
Strasburgeria robusta
Staphylea trifolia
Guamatela tuerckheimii
Crossosoma bigelovii
Stachyurus praecox
Picramnia polyantha
Biebersteinia orphanidis
Aesculus pavia
Cupaniopsis anacardioides
Bursera fagaroides
Rhus copallinum
Schinus molle
Nitraria retusa
Citrus paradisi
Ailanthus altissima
Swietenia macrophylla
Trichilia emetica
Gerrardina foliosa
Tapiscia sinensis
Dipentodon sinicus
Perrottetia ovata
Neurada procumbens
Bixa orellana
Anisoptera marginata
Helianthemum grandiflorum
Thymelaea hirsuta
Gossypium hirsutum
Durio zibethinus
Sterculia apetala
Bombax ceiba
Ochroma pyramidale
Carica papaya
Tropaeolum tricolor
Floerkea proserpinacoides
Batis maritima
Koeberlinia spinosa
Pentadiplandra brazzeana
Tovaria pendula
Gyrostemon tepperi
Reseda alba
Capparis spinosa
Arabidopsis thaliana
Brassica napus
Raphanus sativus
Nothofagus antarctica
Fagus grandifolia
Chrysolepis sempervirens
Quercus rubra
Alnus alnobetula
Casuarina cunninghamiana
Juglans mandshurica
Myrica cerifera
Myrica gale
Spiraea betulifolia
Photinia x fraseri
Prunus persica
Ceanothus sanguineus
Rhamnus cathartica
Barbeya oleoides
Dirachma socotrana
Elaeagnus umbellata
Zelkova serrata
Pilea cadierei
Boehmeria nivea
Urtica dioica
Ficus carica
Morus indica
Celtis yunnanensis
Cannabis sativa
Humulus lupulus
Malvidae
Superrosidae
Rosidae


Datisca cannabina
Begonia sanguinea
Tetrameles nudiflora
Coriaria ruscifolia
Corynocarpus laevigatus
Anisophyllea fallax
Xerosicyos danguyi
Dendrosicyos socotrana
Cucurbita pepo
Coccinia sessilifolia
Cucumis melo
Polygala pauciflora
Stylobasium spathulatum
Quillaja saponaria
Schotia brachypetala
Bauhinia galpinii
Cercis canadensis
Ceratonia siliqua
Acacia fimbriata
Albizia julibrissin
Mimosa polycarpa
Indigofera heterantha
Erythrina cristagalli
Glycine max
Lotus corniculatus
Astragalus membranaceus
Cicer arietinum
Medicago sativa
Pisum sativum
Krameria ixine
Guaiacum sanctum
Larrea tridentata
Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
Oxalis dillenii
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Davidsonia pruriens
Eucryphia lucida
Cephalotus follicularis
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Lepidobotrys staudtii
Ruptiliocarpon caracolito
Parnassia palustris
Siphonodon celastrineus
Denhamia celastroides
Stackhousia minima
Gymnosporia senegalensis
Plagiopteron suaveolens
Brexia madagascariensis
Cassine orientalis
Celastrus scandens
Tripterygium wilfordii
Euonymus americanus
Paxistima canbyi
Goupia glabra
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Rinorea pubiflora
Leonia glycycarpa
Hymenanthera alpina
Viola pubescens
Hybanthus concolor
Lacistema aggregatum
Lozania pittieri
Casearia sylvestris
Lunania parviflora
Scyphostegia borneensis
Abatia parviflora
Prockia crucis
Dovyalis rhamnoides
Flacourtia indica
Poliothyrsis sinensis
Idesia polycarpa
Populus tremuloides
Salix reticulata
Bergia texana
Elatine triandra
Byrsonima crassifolia
Acridocarpus natalitius
Tetrapterys tinifolia
Thryallis latifolia
Dicella nucifera
Malpighia emarginata
Balanops vieillardii
Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Afrolicania elaeosperma
Fabidae


Atuna racemosa
Hirtella bicornis
Chrysobalanus icaco
Bhesa paniculata
Centroplacus glaucinus
Caryocar glabrum
Reinwardtia indica
Linum perenne
Durandea pentagyna
Hugonia platysepala
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Micrantheum hexandrum
Austrobuxus megacarpus
Dissiliaria muelleri
Ctenolophon englerianus
Aneulophus africanus
Erythroxylum confusum
Paradrypetes subintegrifolia
Cassipourea lanceolata
Crossostylis grandiflora
Carallia brachiata
Bruguiera gymnorhiza
Rhizophora stylosa
Drypetes madagascariensis
Lophopyxis maingayi
Humiria balsamifera
Vantanea guianensis
Sacoglottis amazonica
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
Microdesmis puberula
Galearia filiformis
Panda oleosa
Symphonia tanalensis
Clusia gundlachii
Garcinia subelliptica
Archytaea triflora
Bonnetia sessilis
Mesua larnachiana
Calophyllum soulattri
Mammea americana
Marathrum rubrum
Podostemum ceratophyllum
Cratoxylum cochinchinense
Eliea articulata
Hypericum perforatum
Vismia baccifera
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Hevea brasiliensis
Manihot esculenta
Omphalea diandra
Tetrorchidium gabonense
Endospermum moluccanum
Suregada boiviniana
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Moultonianthus leembruggianus
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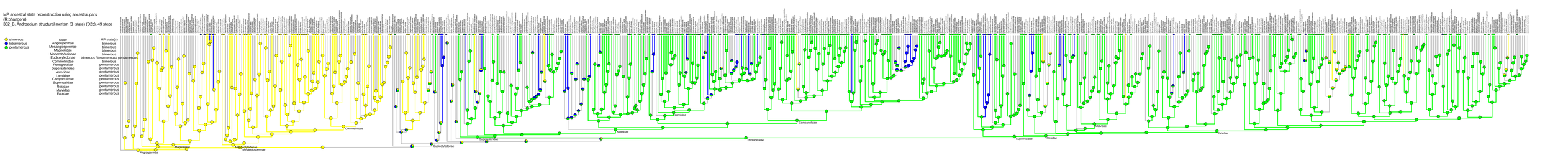
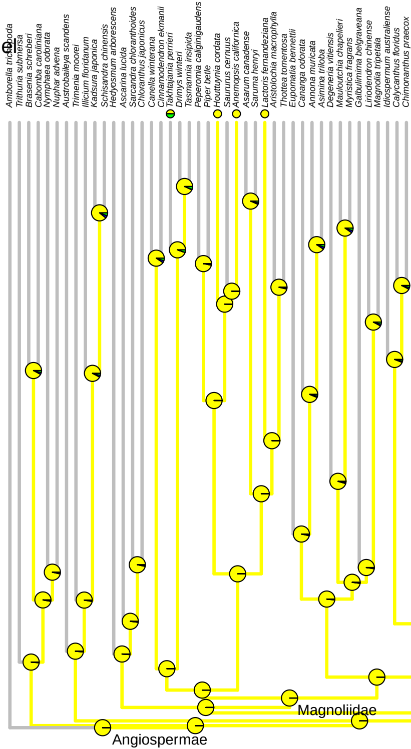

MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
332_B. Androecium structural merism (3–state) (D2c), 49 steps
trimerous
tetramerous
pentamerous
Node
Angiospermae
Mesangiospermae
Magnoliidae
Monocotyledonae
Eudicotyledonae
Commelinidae
Ceratophyllidae
Superasteridae
Asteridae
Lamiidae
Campanulidae
Santalales
Rosidae
Malvidae
Fabidae
MP state(s)
trimerous
trimerous
trimerous
trimerous
trimerous / tetramerous / pentamerous
trimerous
pentamerous
pentamerous
pentamerous
pentamerous
pentamerous
pentamerous
pentamerous
pentamerous
Angiospermae
Magnoliidae
Mesangiospermae
Ceratophyllidae
Monocotyledonae
Eudicotyledonae
Commelinidae
Superasteridae
Asteridae
Lamiidae
Santalales
Campanulidae
Pentapetalae
Superrosidae
Rosidae
Malvidae
Fabidae

ML ancestral state reconstruction using rayDISC (R:corHMM)
332_B. Androecium structural merism (3−state) (D2c), SYMeq model

- 🟡 trimerous
- 🔵 tetramerous
- 🟢 pentamerous

Node	ML state	Prob
Angiospermae	trimerous	1
Mesangiospermae	trimerous	1
Magnoliidae	trimerous	1
Monocotyledonae	trimerous	1
Eudicotyledonae	trimerous	0.8422
Commelinidae	trimerous	1
Pentapetalae	pentamerous	0.9999
Superasteridae	pentamerous	1
Asteridae	pentamerous	0.9996
Lamiidae	pentamerous	0.9999
Campanulidae	pentamerous	1
Superrosidae	pentamerous	1
Rosidae	pentamerous	1
Malvidae	pentamerous	1
Fabidae	pentamerous	1

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	···
ARD	−176.73	6	365.46	365.57	7.87	0.01	5e−04	···
ARDeq	−175.64	6	363.28	363.38	5.69	0.04	5e−04	···
ER	−185.95	1	373.9	373.91	16.21	0	0.0011	···
SYM	−176.92	3	359.85	359.88	2.18	0.22	5e−04	···
SYMeq**	−175.83	3	357.66	357.69	0	0.65	5e−04	···
ORD	−178.34	4	364.69	364.74	7.05	0.02	1e−04	···
ORDeq	−177.27	4	362.54	362.59	4.9	0.06	1e−04	···
ORDSYM	−185.89	2	375.78	375.79	18.1	0	0.002	···
ORDSYMeq	−184.81	2	373.62	373.64	15.94	0	0.002	···
ORDER	−186.63	1	375.25	375.26	17.56	0	0.0027	···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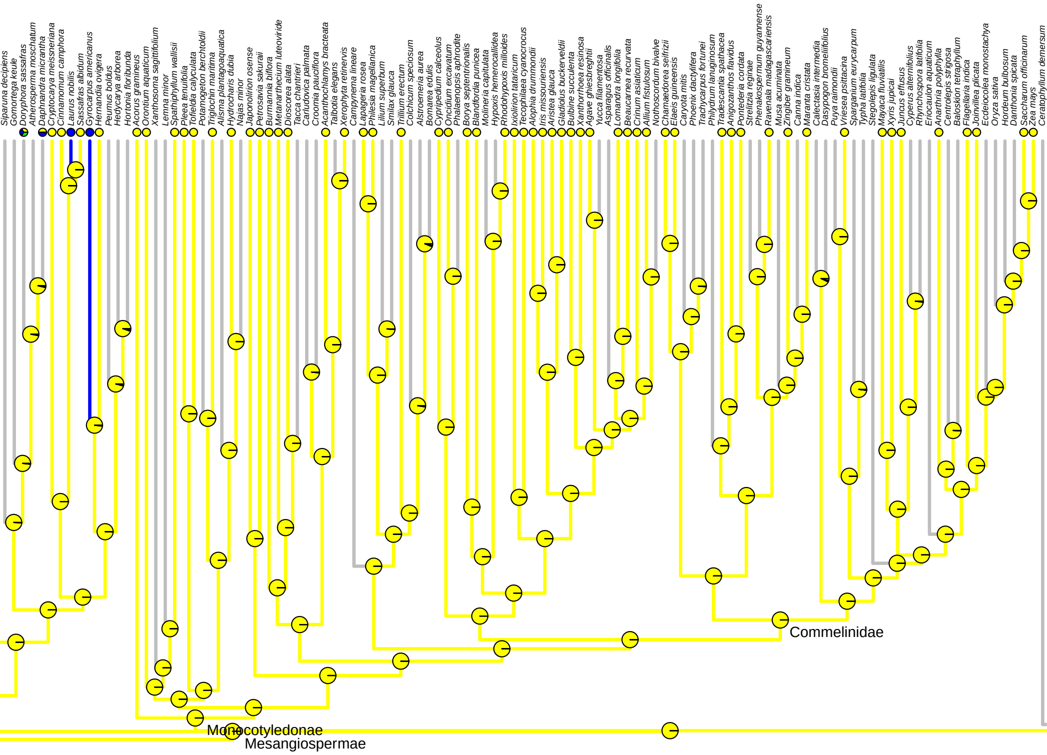
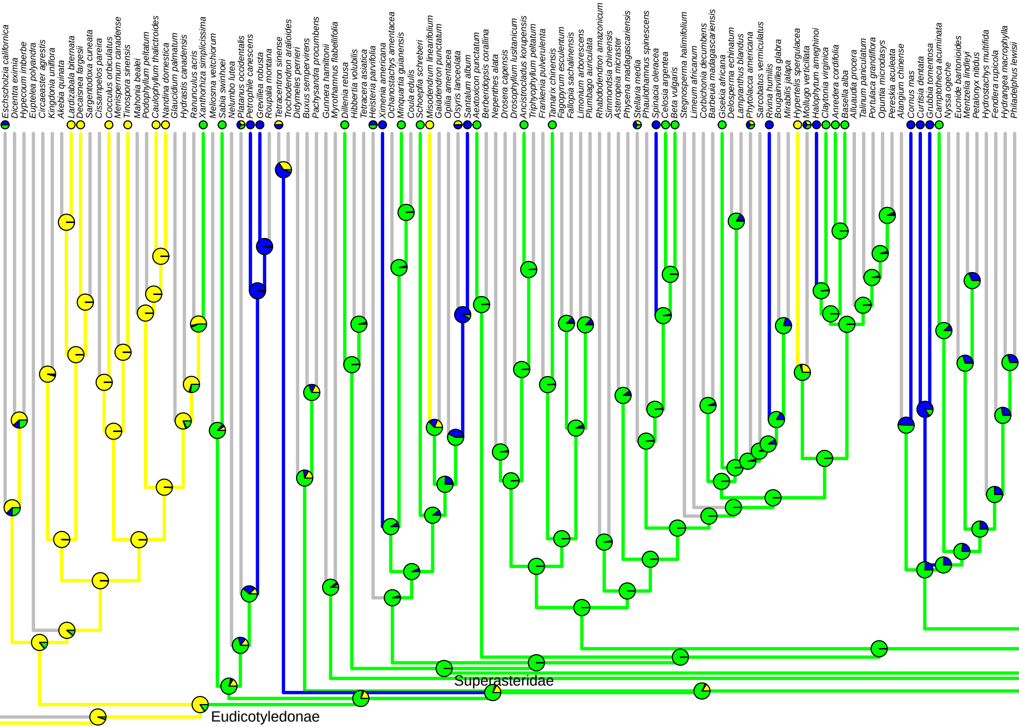
Trithuria submersa
Brasenia schreberi
Cabomba caroliniana
Nymphaea odorata
Nuphar advena
Austrobaileya scandens
Trimenia moorei
Illicium floridanum
Kadsura japonica
Schisandra chinensis
Hedyosmum arborescens
Ascarina lucida
Sarcandra chloranthoides
Chloranthus japonicus
Canella winterana
Cinnamodendron ekmanii
Takhtajania perrieri
Drimys winteri
Tasmannia insipida
Peperomia caliginigaudens
Piper betle
Houttuynia cordata
Saururus cernuus
Anemopsis californica
Asarum canadense
Saruma henryi
Lactoris fernandeziana
Aristolochia macrophylla
Thottea tomentosa
Eupomatia bennettii
Cananga odorata
Annona muricata
Asimina triloba
Degeneria vitiensis
Mauloutchia chapelieri
Myristica fragrans
Galbulimima belgraveana
Liriodendron chinense
Magnolia tripetala
Idiospermum australiense
Calycanthus floridus
Chimonanthus praecox
Magnoliidae
Angiospermae


Siparuna decipiens
Gomortega keule
Doryphora sassafras
Atherosperma moschatum
Daphnandra micrantha
Cryptocarya meissneriana
Cinnamomum camphora
Laurus nobilis
Sassafras albidum
Gyrocarpus americanus
Hernandia ovigera
Peumus boldus
Hedycarya arborea
Hortonia floribunda
Acorus gramineus
Orontium aquaticum
Xanthosoma sagittifolium
Lemna minor
Spathiphyllum wallisii
Pleea tenuifolia
Tofieldia calyculata
Potamogeton berchtoldii
Triglochin maritima
Alisma plantagoaquatica
Hydrocharis dubia
Najas minor
Japonolirion osense
Petrosavia sakuraii
Burmannia biflora
Metanarthecium luteoviride
Dioscorea alata
Tacca chantrieri
Carludovica palmata
Croomia pauciflora
Acanthochlamys bracteata
Talbotia elegans
Xerophyta retinervis
Campynema lineare
Lapageria rosea
Philesia magellanica
Lilium superbum
Smilax glauca
Trillium erectum
Colchicum speciosum
Alstroemeria aurea
Bomarea edulis
Cypripedium calceolus
Oncidium excavatum
Phalaenopsis aphrodite
Borya septentrionalis
Blandfordia punicea
Molineria capitulata
Hypoxis hemerocallidea
Rhodohypoxis milloides
Ixiolirion tataricum
Tecophilaea cyanocrocus
Alophia drummondii
Iris missouriensis
Aristea glauca
Gladiolus buckerveldii
Bulbine succulenta
Xanthorrhoea resinosa
Agave ghiesbreghtii
Yucca filamentosa
Asparagus officinalis
Lomandra longifolia
Beaucarnea recurvata
Crinum asiaticum
Allium fistulosum
Nothoscordum bivalve
Chamaedorea seifrizii
Elaeis guineensis
Caryota mitis
Phoenix dactylifera
Trachycarpus fortunei
Philydrum lanuginosum
Tradescantia spathacea
Anigozanthos flavidus
Pontederia cordata
Strelitzia reginae
Phenakospermum guyannense
Ravenala madagascariensis
Musa acuminata
Zingiber gramineum
Canna indica
Maranta cristata
Calectasia intermedia
Dasypogon bromeliifolius
Puya raimondii
Vriesea psittacina
Sparganium eurycarpum
Typha latifolia
Stegolepis ligulata
Mayaca fluviatilis
Xyris jupicai
Juncus effusus
Cyperus alternifolius
Rhynchospora latifolia
Eriocaulon aquaticum
Anarthria polyphylla
Centrolepis strigosa
Baloskion tetraphyllum
Flagellaria indica
Joinvillea plicata
Ecdeiocolea monostachya
Oryza sativa
Hordeum bulbosum
Danthonia spicata
Saccharum officinarum
Zea mays
Ceratophyllum demersum
Commelinidae
Monocotyledonae
Mesangiospermae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Dicentra eximia
Hypecoum imberbe
Euptelea polyandra
Circaeaster agrestis
Kingdonia uniflora
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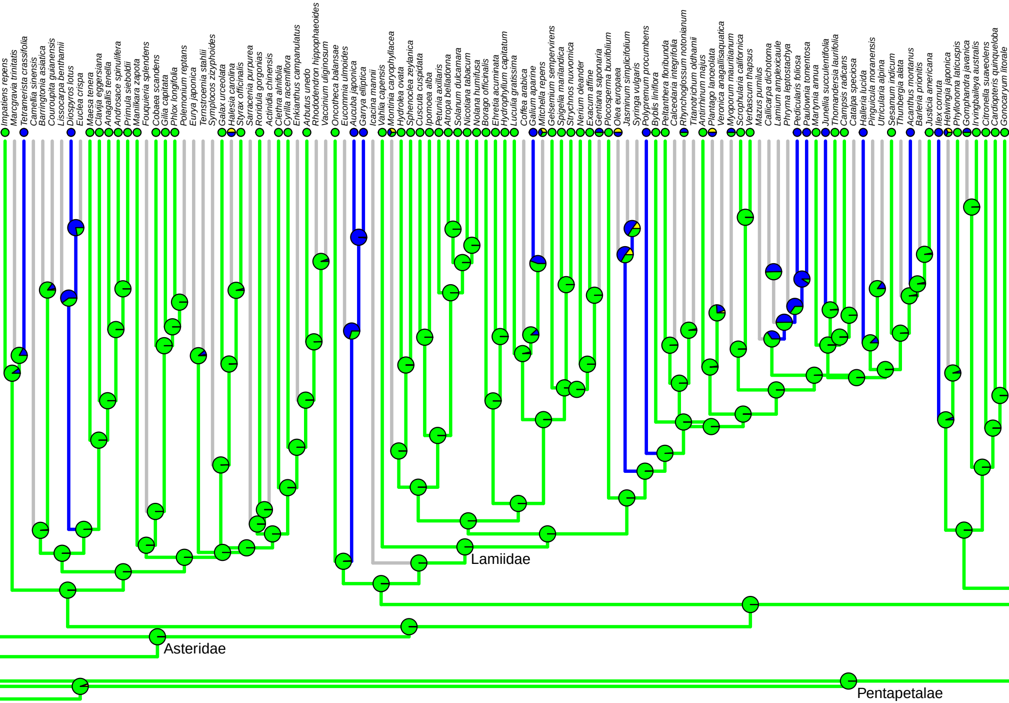
Lardizabala biternata
Decaisnea fargesii
Sargentodoxa cuneata
Cissampelos pareira
Cocculus orbiculatus
Menispermum canadense
Tinospora sinensis
Mahonia bealei
Podophyllum peltatum
Caulophyllum thalictroides
Nandina domestica
Glaucidium palmatum
Hydrastis canadensis
Ranunculus acris
Xanthorhiza simplicissima
Meliosma veitchiorum
Sabia swinhoei
Nelumbo lutea
Platanus occidentalis
Petrophile canescens
Grevillea robusta
Roupala montana
Tetracentron sinense
Trochodendron aralioides
Didymeles perrieri
Buxus sempervirens
Pachysandra procumbens
Gunnera hamiltonii
Myrothamnus flabellifolia
Dillenia retusa
Hibbertia volubilis
Tetracera asiatica
Heisteria parvifolia
Ximenia americana
Ochanostachys amentacea
Minquartia guianensis
Coula edulis
Schoepfia schreberi
Misodendrum linearifolium
Gaiadendron punctatum
Opilia amentacea
Osyris lanceolata
Santalum album
Aextoxicon punctatum
Berberidopsis corallina
Nepenthes alata
Drosera capensis
Drosophyllum lusitanicum
Ancistrocladus korupensis
Triphyophyllum peltatum
Frankenia pulverulenta
Tamarix chinensis
Fagopyrum esculentum
Fallopia sachalinensis
Limonium arborescens
Plumbago auriculata
Rhabdodendron amazonicum
Simmondsia chinensis
Asteropeia micraster
Physena madagascariensis
Stellaria media
Phaulothamnus spinescens
Spinacia oleracea
Celosia argentea
Beta vulgaris
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Gisekia africana
Delosperma echinatum
Lampranthus blandus
Phytolacca americana
Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Halophytum ameghinoi
Claytonia virginica
Anredera cordifolia
Basella alba
Alluaudia procera
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Alangium chinense
Cornus mas
Curtisia dentata
Grubbia tomentosa
Camptotheca acuminata
Nyssa ogeche
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Hydrostachys multifida
Fendlera rupicola
Hydrangea macrophylla
Philadelphus lewisii
Superasteridae
Eudicotyledonae


Impatiens repens
Marcgravia trinitatis
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Couroupita guianensis
Lissocarpa benthamii
Diospyros lotus
Euclea crispa
Maesa tenera
Clavija eggersiana
Anagallis tenella
Androsace spinulifera
Primula sieboldii
Manilkara zapota
Fouquieria splendens
Cobaea scandens
Gilia capitata
Phlox longifolia
Polemonium reptans
Eurya japonica
Ternstroemia stahlii
Symplocos zizyphoides
Galax urceolata
Halesia carolina
Styrax officinalis
Sarracenia purpurea
Roridula gorgonias
Actinidia chinensis
Clethra alnifolia
Cyrilla racemiflora
Enkianthus campanulatus
Arbutus unedo
Rhododendron hippophaeoides
Vaccinium uliginosum
Oncotheca balansae
Eucommia ulmoides
Aucuba japonica
Garrya elliptica
Icacina mannii
Vahlia capensis
Montinia caryophyllacea
Hydrolea ovata
Sphenoclea zeylanica
Cuscuta cuspidata
Ipomoea alba
Petunia axillaris
Atropa belladonna
Solanum dulcamara
Nicotiana tabacum
Nolana humifusa
Borago officinalis
Ehretia acuminata
Hydrophyllum capitatum
Luculia gratissima
Coffea arabica
Galium aparine
Mitchella repens
Gelsemium sempervirens
Spigelia marilandica
Strychnos nuxvomica
Nerium oleander
Exacum affine
Gentiana saponaria
Plocosperma buxifolium
Olea europaea
Jasminum simplicifolium
Syringa vulgaris
Polypremum procumbens
Byblis liniflora
Peltanthera floribunda
Calceolaria integrifolia
Rhynchoglossum notonianum
Titanotrichum oldhamii
Antirrhinum majus
Plantago lanceolata
Veronica anagallisaquatica
Myoporum mauritianum
Scrophularia californica
Verbascum thapsus
Mazus pumilus
Callicarpa dichotoma
Lamium amplexicaule
Phryma leptostachya
Pedicularis foliosa
Paulownia tomentosa
Martynia annua
Junellia succulentifolia
Thomandersia laurifolia
Campsis radicans
Catalpa speciosa
Halleria lucida
Pinguicula moranensis
Utricularia alpina
Sesamum indicum
Thunbergia alata
Acanthus montanus
Barleria prionitis
Justicia americana
Ilex cornuta
Helwingia japonica
Phyllonoma laticuspis
Gomphandra javanica
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Citronella suaveolens
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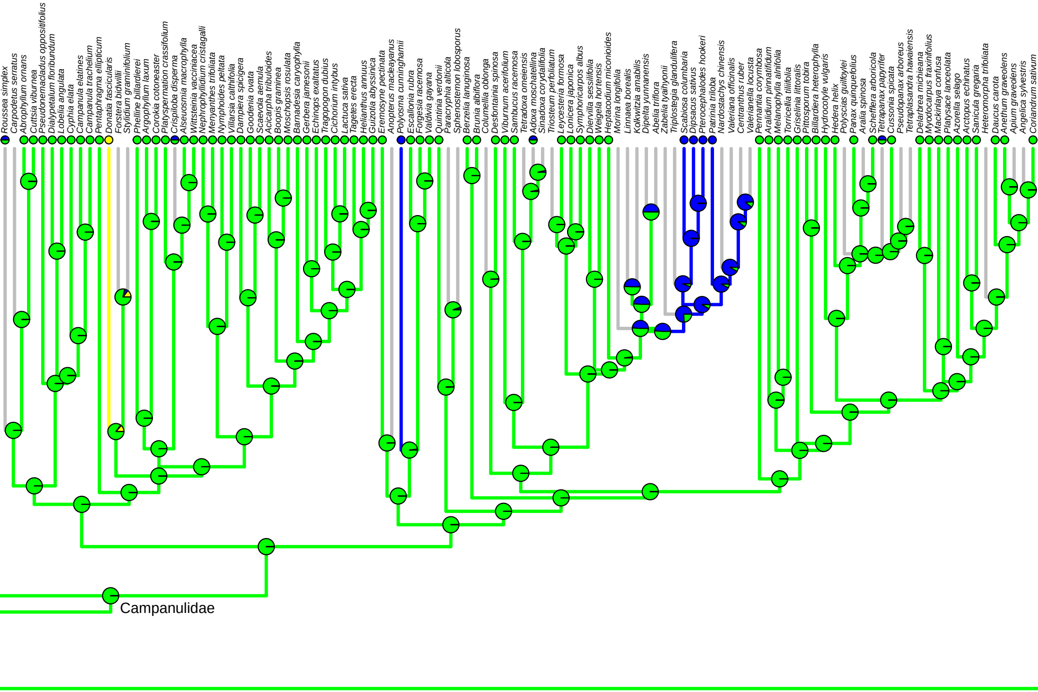
Gonocaryum litorale
Lamiidae
Asteridae
Pentapetalae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Pseudonemacladus oppositifolius
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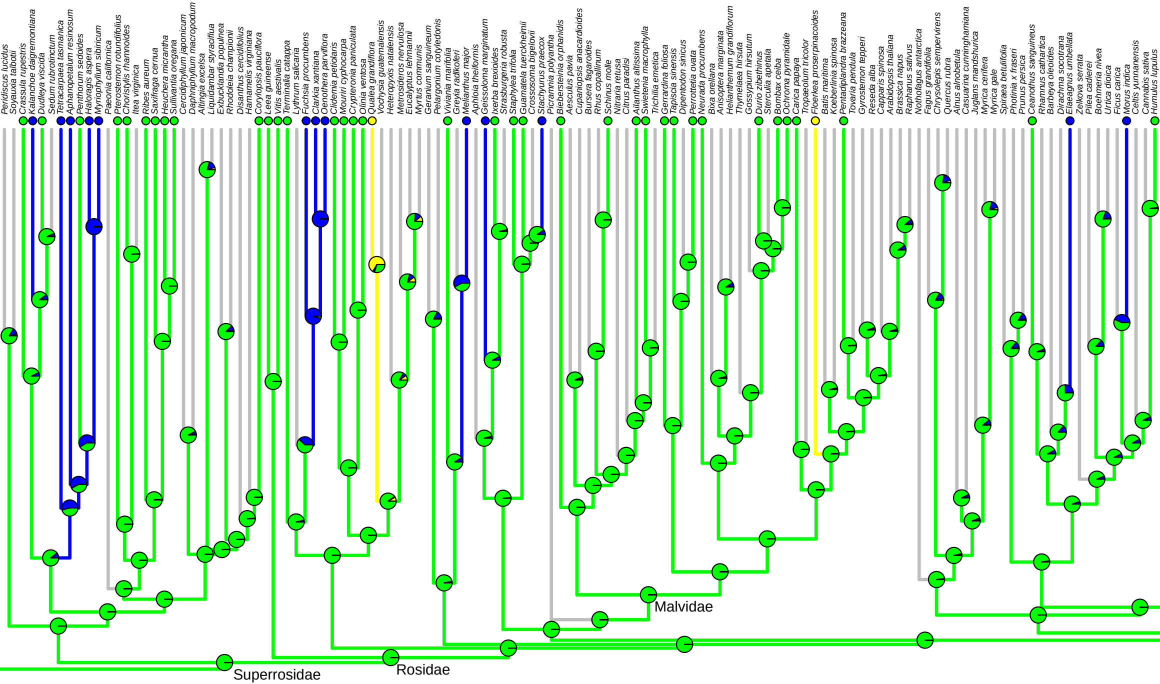
Cyphia elata
Campanula elatines
Campanula trachelium
Pentaphragma ellipticum
Donatia fascicularis
Forstera bidwillii
Stylidium graminifolium
Phelline billardierei
Argophyllum laxum
Corokia cotoneaster
Platyspermation crassifolium
Crispiloba disperma
Alseuosmia macrophylla
Wittsteinia vacciniacea
Nephrophyllidium cristagalli
Menyanthes trifoliata
Nymphoides peltata
Villarsia calthifolia
Dampiera spicigera
Goodenia ovata
Scaevola aemula
Acicarpha tribuloides
Boopis graminea
Moschopsis rosulata
Barnadesia caryophylla
Gerbera jamesonii
Echinops exaltatus
Tragopogon dubius
Cichorium intybus
Lactuca sativa
Tagetes erecta
Helianthus annuus
Guizotia abyssinica
Eremosyne pectinata
Anopterus macleayanus
Polyosma cunninghamii
Escallonia rubra
Forgesia racemosa
Valdivia gayana
Quintinia verdonii
Paracryphia alticola
Sphenostemon lobosporus
Berzelia lanuginosa
Brunia albiflora
Columellia oblonga
Desfontainia spinosa
Viburnum acerifolium
Sambucus racemosa
Tetradoxa omeiensis
Adoxa moschatellina
Sinadoxa corydalifolia
Triosteum perfoliatum
Leycesteria formosa
Lonicera japonica
Symphoricarpos albus
Diervilla sessilifolia
Weigela hortensis
Heptacodium miconioides
Morina longifolia
Linnaea borealis
Kolkwitzia amabilis
Dipelta yunnanensis
Abelia triflora
Zabelia tyaihyonii
Triplostegia glandulifera
Scabiosa columbaria
Dipsacus sativus
Pterocephalodes hookeri
Patrinia triloba
Nardostachys chinensis
Valeriana officinalis
Centranthus ruber
Valerianella locusta
Pennantia corymbosa
Aralidium pinnatifidum
Melanophylla alnifolia
Torricellia tiliifolia
Griselinia littoralis
Pittosporum tobira
Billardiera heterophylla
Hydrocotyle vulgaris
Hedera helix
Polyscias guilfoylei
Panax quinquefolius
Aralia spinosa
Schefflera arboricola
Tetrapanax papyrifer
Cussonia spicata
Pseudopanax arboreus
Tetraplasandra hawaiensis
Delarbrea michieana
Myodocarpus fraxinifolius
Mackinlaya confusa
Platysace lanceolata
Azorella selago
Arctopus echinatus
Sanicula gregaria
Heteromorpha trifoliata
Daucus carota
Anethum graveolens
Apium graveolens
Angelica sylvestris
Coriandrum sativum
Campanulidae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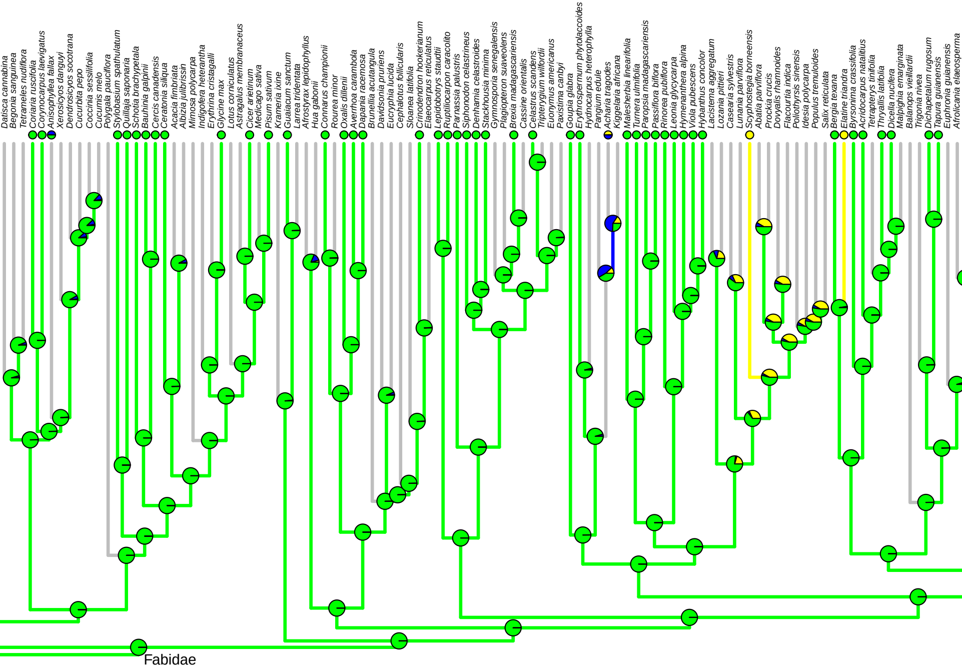
Aphanopetalum resinosum
Penthorum sedoides
Haloragis aspera
Myriophyllum sibiricum
Paeonia californica
Pterostemon rotundifolius
Choristylis rhamnoides
Itea virginica
Ribes aureum
Saxifraga cernua
Heuchera micrantha
Sullivantia oregana
Cercidiphyllum japonicum
Daphniphyllum macropodum
Altingia excelsa
Liquidambar styraciflua
Exbucklandia populnea
Rhodoleia championii
Disanthus cercidifolius
Hamamelis virginiana
Corylopsis pauciflora
Leea guineense
Vitis aestivalis
Terminalia catappa
Lythrum salicaria
Fuchsia procumbens
Clarkia xantiana
Oenothera parviflora
Clidemia petiolaris
Mouriri cyphocarpa
Crypteronia paniculata
Olinia ventosa
Qualea grandiflora
Vochysia guatemalensis
Heteropyxis natalensis
Metrosideros nervulosa
Eucalyptus lehmannii
Myrtus communis
Geranium sanguineum
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
Aphloia theiformis
Geissoloma marginatum
Ixerba brexioides
Strasburgeria robusta
Staphylea trifolia
Guamatela tuerckheimii
Crossosoma bigelovii
Stachyurus praecox
Picramnia polyantha
Biebersteinia orphanidis
Aesculus pavia
Cupaniopsis anacardioides
Bursera fagaroides
Rhus copallinum
Schinus molle
Nitraria retusa
Citrus paradisi
Ailanthus altissima
Swietenia macrophylla
Trichilia emetica
Gerrardina foliosa
Tapiscia sinensis
Dipentodon sinicus
Perrottetia ovata
Neurada procumbens
Bixa orellana
Anisoptera marginata
Helianthemum grandiflorum
Thymelaea hirsuta
Gossypium hirsutum
Durio zibethinus
Sterculia apetala
Bombax ceiba
Ochroma pyramidale
Carica papaya
Tropaeolum tricolor
Floerkea proserpinacoides
Batis maritima
Koeberlinia spinosa
Pentadiplandra brazzeana
Tovaria pendula
Gyrostemon tepperi
Reseda alba
Capparis spinosa
Arabidopsis thaliana
Brassica napus
Raphanus sativus
Nothofagus antarctica
Fagus grandifolia
Chrysolepis sempervirens
Quercus rubra
Alnus alnobetula
Casuarina cunninghamiana
Juglans mandshurica
Myrica cerifera
Myrica gale
Spiraea betulifolia
Photinia x fraseri
Prunus persica
Ceanothus sanguineus
Rhamnus cathartica
Barbeya oleoides
Dirachma socotrana
Elaeagnus umbellata
Zelkova serrata
Pilea cadierei
Boehmeria nivea
Urtica dioica
Ficus carica
Morus indica
Celtis yunnanensis
Cannabis sativa
Humulus lupulus
Malvidae
Superrosidae
Rosidae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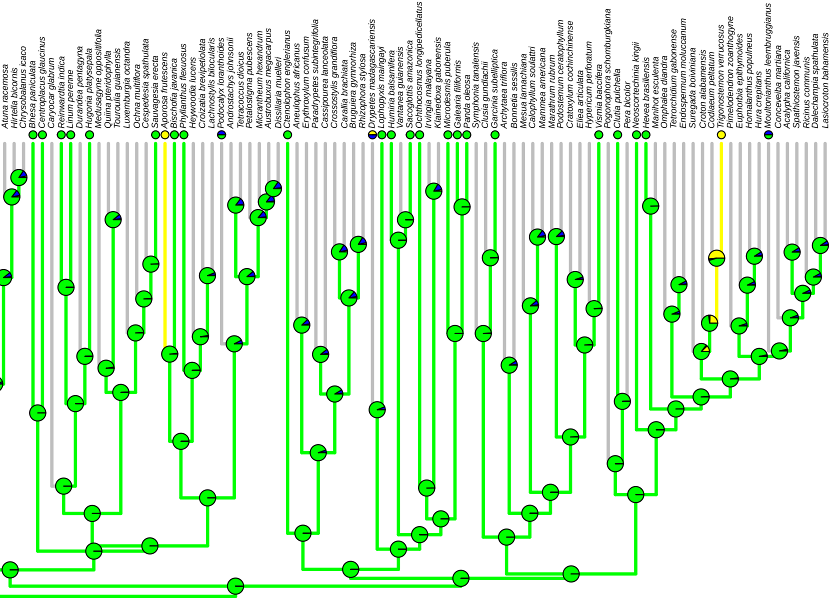
Begonia sanguinea
Tetrameles nudiflora
Coriaria ruscifolia
Corynocarpus laevigatus
Anisophyllea fallax
Xerosicyos danguyi
Dendrosicyos socotrana
Cucurbita pepo
Coccinia sessilifolia
Cucumis melo
Polygala pauciflora
Stylobasium spathulatum
Quillaja saponaria
Schotia brachypetala
Bauhinia galpinii
Cercis canadensis
Ceratonia siliqua
Acacia fimbriata
Albizia julibrissin
Mimosa polycarpa
Indigofera heterantha
Erythrina cristagalli
Glycine max
Lotus corniculatus
Astragalus membranaceus
Cicer arietinum
Medicago sativa
Pisum sativum
Krameria ixine
Guaiacum sanctum
Larrea tridentata
Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
Oxalis dillenii
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Davidsonia pruriens
Eucryphia lucida
Cephalotus follicularis
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Lepidobotrys staudtii
Ruptiliocarpon caracolito
Parnassia palustris
Siphonodon celastrineus
Denhamia celastroides
Stackhousia minima
Gymnosporia senegalensis
Plagiopteron suaveolens
Brexia madagascariensis
Cassine orientalis
Celastrus scandens
Tripterygium wilfordii
Euonymus americanus
Paxistima canbyi
Goupia glabra
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Rinorea pubiflora
Leonia glycycarpa
Hymenanthera alpina
Viola pubescens
Hybanthus concolor
Lacistema aggregatum
Lozania pittieri
Casearia sylvestris
Lunania parviflora
Scyphostegia borneensis
Abatia parviflora
Prockia crucis
Dovyalis rhamnoides
Flacourtia indica
Poliothyrsis sinensis
Idesia polycarpa
Populus tremuloides
Salix reticulata
Bergia texana
Elatine triandra
Byrsonima crassifolia
Acridocarpus natalitius
Tetrapterys tinifolia
Thryallis latifolia
Dicella nucifera
Malpighia emarginata
Balanops vieillardii
Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Afrolicania elaeosperma
Fabidae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Bhesa paniculata
Centroplacus glaucinus
Caryocar glabrum
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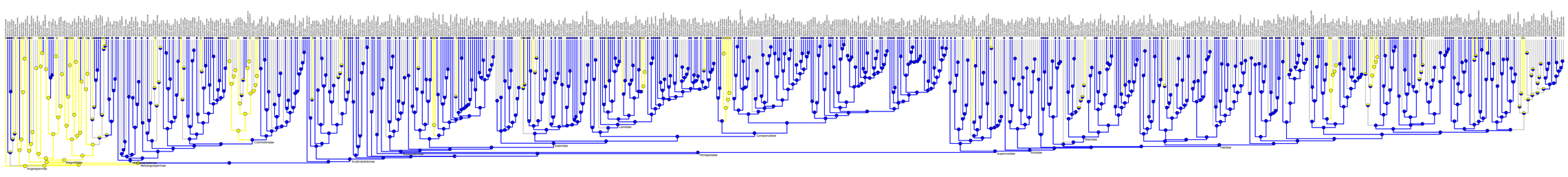
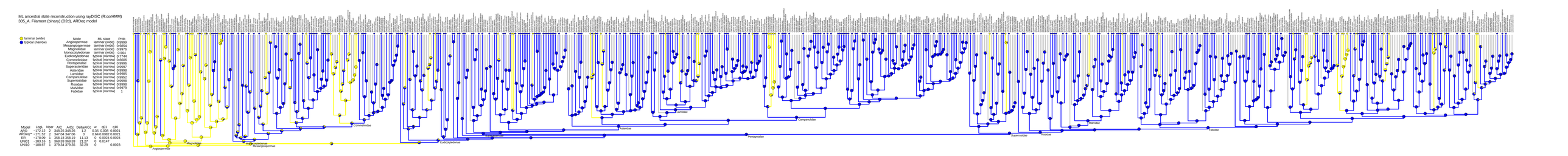
Linum perenne
Durandea pentagyna
Hugonia platysepala
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Micrantheum hexandrum
Austrobuxus megacarpus
Dissiliaria muelleri
Ctenolophon englerianus
Aneulophus africanus
Erythroxylum confusum
Paradrypetes subintegrifolia
Cassipourea lanceolata
Crossostylis grandiflora
Carallia brachiata
Bruguiera gymnorhiza
Rhizophora stylosa
Drypetes madagascariensis
Lophopyxis maingayi
Humiria balsamifera
Vantanea guianensis
Sacoglottis amazonica
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
Microdesmis puberula
Galearia filiformis
Panda oleosa
Symphonia tanalensis
Clusia gundlachii
Garcinia subelliptica
Archytaea triflora
Bonnetia sessilis
Mesua larnachiana
Calophyllum soulattri
Mammea americana
Marathrum rubrum
Podostemum ceratophyllum
Cratoxylum cochinchinense
Eliea articulata
Hypericum perforatum
Vismia baccifera
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Hevea brasiliensis
Manihot esculenta
Omphalea diandra
Tetrorchidium gabonense
Endospermum moluccanum
Suregada boiviniana
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Moultonianthus leembruggianus
Conceveiba martiana
Acalypha californica
Spathiostemon javensis
Ricinus communis
Dalechampia spathulata
Lasiocroton bahamensis

MP ancestral state reconstruction using ancestral.pars
(R phangorn)
305_A. Filament (binary) (D2d), 52 steps

laminar (wide)
typical (narrow)

Node	MP state(s)
Angiospermae	laminar (wide)
Mesangiospermae	laminar (wide)
Magnoliidae	laminar (wide)
Monocotyledonae	typical (narrow)
Eudicotyledonae	typical (narrow)
Commelinidae	typical (narrow)
Ranunculidae	typical (narrow)
Superasteridae	typical (narrow)
Asteridae	typical (narrow)
Lamiidae	typical (narrow)
Campanulidae	typical (narrow)
Superrosidae	typical (narrow)
Rosidae	typical (narrow)
Malvidae	typical (narrow)
Fabidae	typical (narrow)

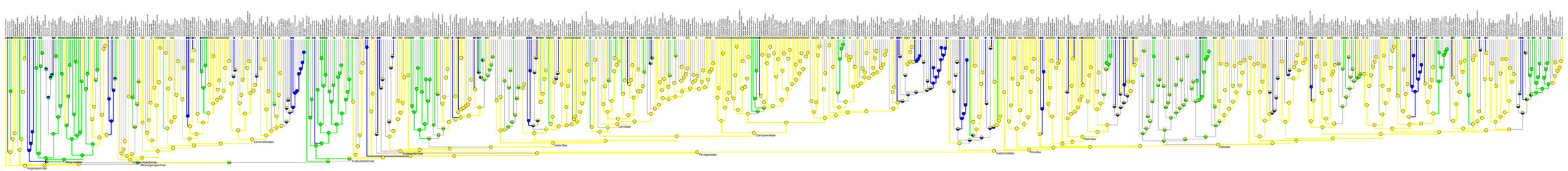



ML ancestral state reconstruction using rayDISC (R:corHMM)
305_A. Filament (binary) (D2d), ARDeq model
laminar (wide)
typical (narrow)
Node
Angiospermae
Mesangiospermae
Magnoliidae
Monocotyledonae
Eudicotyledonae
Commelinidae
Ceratophyllidae
Superasteridae
Asteridae
Lamiidae
Campanulidae
Rosidae
Malvidae
Fabidae
ML state
laminar (wide) 0.9999
laminar (wide) 0.9854
laminar (wide) 0.5976
laminar (wide) 0.564
typical (narrow) 0.7744
typical (narrow) 0.6606
typical (narrow) 0.9997
typical (narrow) 0.9997
typical (narrow) 0.9998
typical (narrow) 0.9985
typical (narrow) 0.9952
typical (narrow) 0.9998
typical (narrow) 0.9998
typical (narrow) 0.9979
typical (narrow) 1
Model
ARD
ARDeq**
ER
UN01
UN10
LogL
−172.12
−171.52
−178.09
−183.16
−188.67
Npar
2
2
1
1
1
AIC
348.25
347.06
358.18
368.32
379.34
AICc
348.26
347.06
358.18
368.33
379.35
DeltaAICc
1.2
0
11.13
21.27
32.29
w
0.35
0.64
0
0
0
q01
0.008
0.0082
0.0024
0.0147
0
q10
0.0021
0.0021
0.0024
0.0147
0.0023
Angiospermae
Magnoliidae
Mesangiospermae
Monocotyledonae
Eudicotyledonae
Commelinidae
Ceratophyllidae
Superasteridae
Asteridae
Lamiidae
Campanulidae
Pentapetalae
Rosidae
Malvidae
rabidae
Fabidae

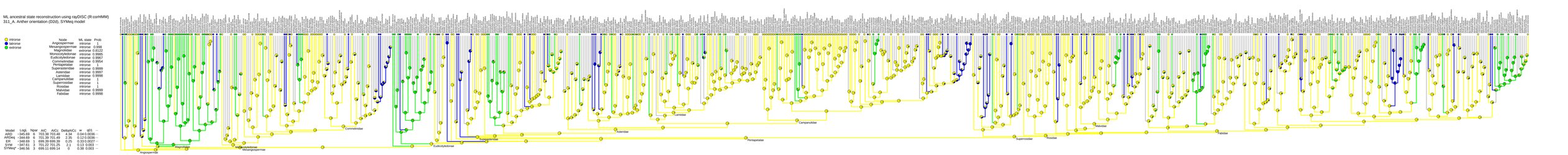
MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
311_A. Anther orientation (D2d), 108 steps

- introrse
- latrorse
- extrorse

Node	MP state(s)
Angiospermae	introrse
Mesangiospermae	introrse / extrorse
Magnoliidae	extrorse
Monocotyledonae	introrse
Eudicotyledonae	introrse / extrorse
Commelinidae	introrse
Ceratophyllidae	introrse
Superasteridae	introrse
Asteridae	introrse
Lamidae	introrse
Campanulidae	introrse
Superrosidae	introrse
Rosidae	introrse
Malvidae	introrse
Fabidae	introrse



ML ancestral state reconstruction using ray/DISC (R:corHMM)
311_A. Anther orientation (D2d), SYMeq model

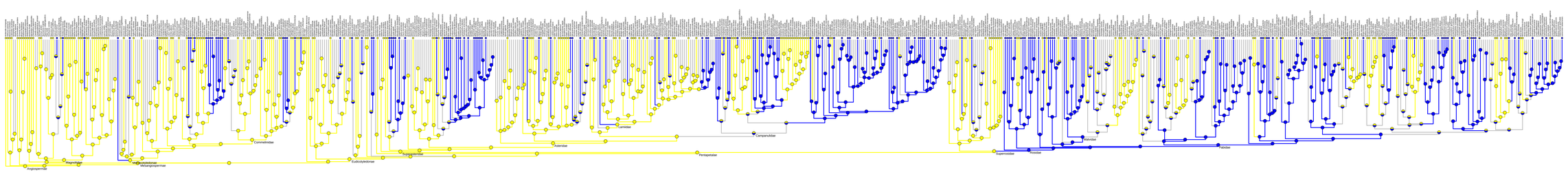


Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	---
ARD	-345.69	6	703.38	703.48	4.34	0.04	0.0036	---
ARDeq	-344.69	6	701.39	701.49	2.35	0.12	0.0036	---
ER	-348.69	1	699.39	699.39	0.25	0.33	0.0027	---
SYM	-347.81	3	701.22	701.25	2.1	0.13	0.003	---
SYMeq*	-346.56	3	699.11	699.14	0	0.38	0.003	---

MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
312_A. Anther attachment (binary) (D2d), 97 steps

basifixed
dorsifixed

Node	MP state(s)
Angiospermae	basifixed
Mesangiospermae	basifixed
Magnoliidae	basifixed
Monocotyledonae	basifixed
Eudicotyledonae	basifixed
Commelinidae	basifixed
Ceratophyllidae	basifixed
Superasteridae	basifixed
Asteridae	basifixed
Lamidae	basifixed
Campanulidae	basifixed / dorsifixed
Superrosidae	dorsifixed
Rosidae	dorsifixed
Malvidae	dorsifixed
Fabidae	dorsifixed

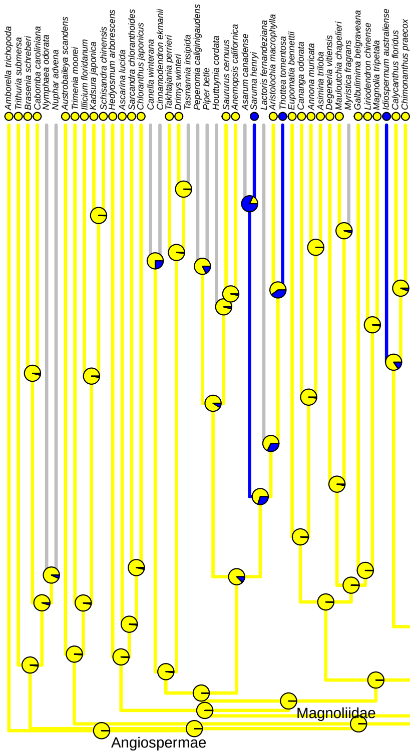


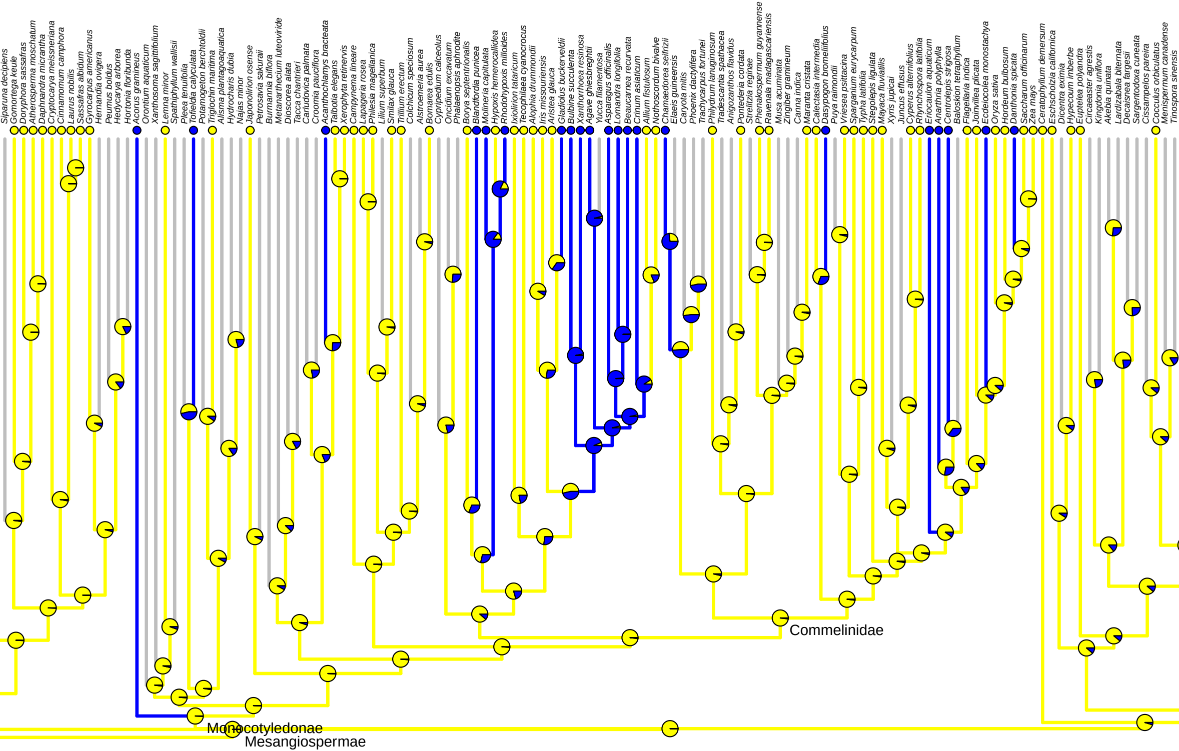
ML ancestral state reconstruction using rayDISC (R:corHMM)
312_A. Anther attachment (binary) (D2d), ARDeq model

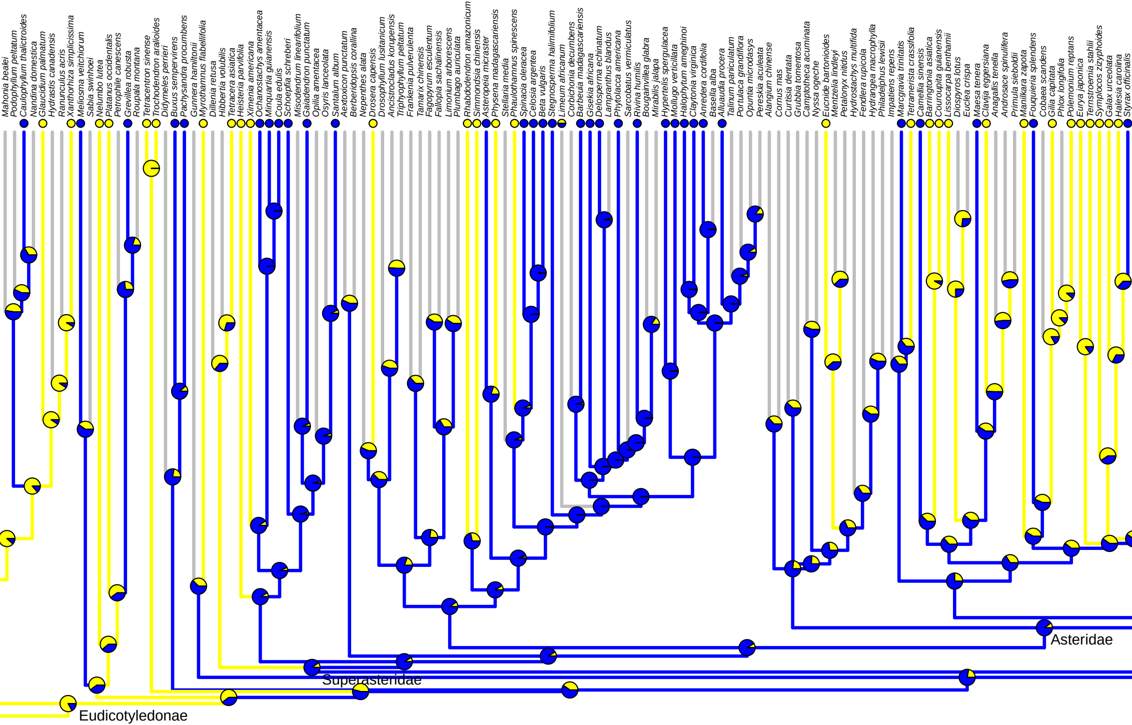
🟡 basifixed
🔵 dorsifixed

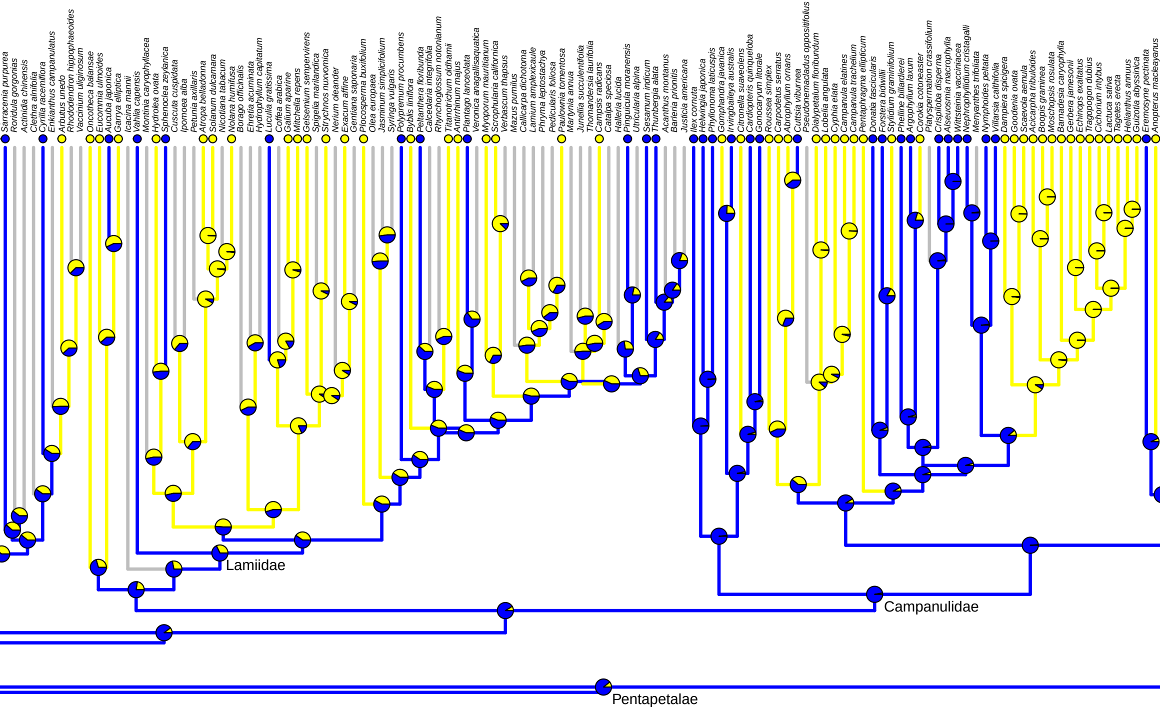
Node	ML state	Prob
Angiospermae	basifixed	1
Mesangiospermae	basifixed	0.9991
Magnoliidae	basifixed	0.9989
Monocotyledonae	basifixed	0.9932
Eudicotyledonae	basifixed	0.8303
Commelinidae	basifixed	0.9823
Pentapetalae	dorsifixed	0.892
Superasteridae	dorsifixed	0.8979
Asteridae	dorsifixed	0.8989
Lamiidae	dorsifixed	0.6781
Campanulidae	dorsifixed	0.9702
Superrosidae	dorsifixed	0.9017
Rosidae	dorsifixed	0.9483
Malvidae	dorsifixed	0.9799
Fabidae	dorsifixed	0.9998

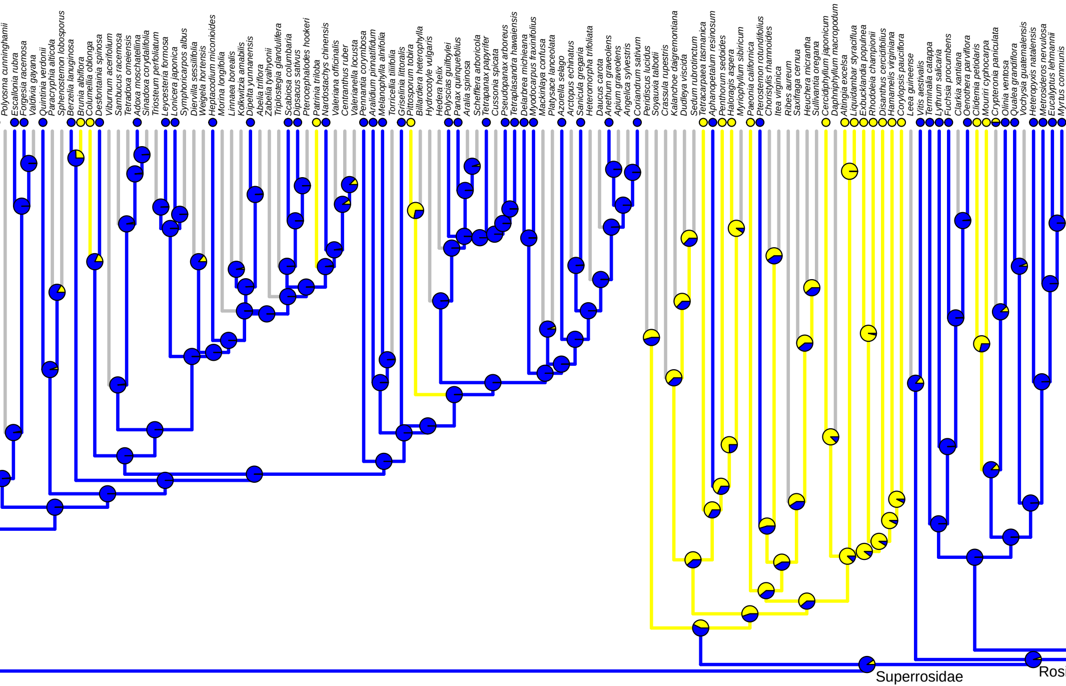
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−265.57	2	535.13	535.15	1.32	0.29	0.0043	0.0077
ARDeq**	−264.9	2	533.81	533.82	0	0.57	0.0043	0.0076
ER	−267.34	1	536.68	536.69	2.86	0.14	0.0056	0.0056
UNI01	−293.27	1	588.54	588.55	54.73	0	0.0061	
UNI10	−276.87	1	555.75	555.75	21.93	0		0.0081

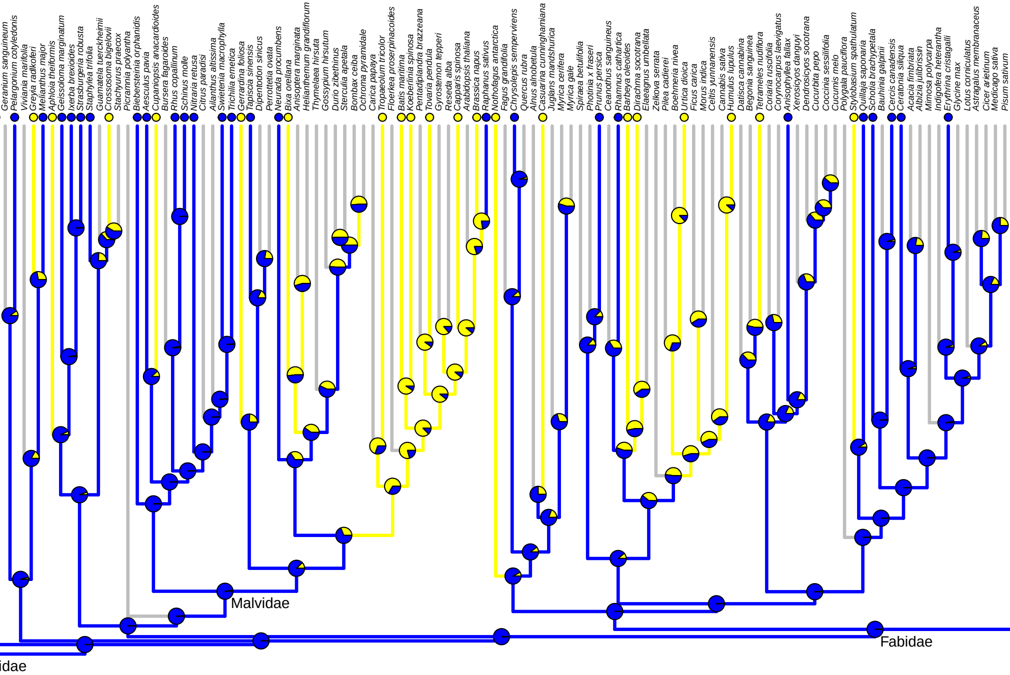

Amborella trichopoda
Trithuria submersa
Brasenia schreberi
Cabomba caroliniana
Nymphaea odorata
Nuphar advena
Austrobaileya scandens
Trimenia moorei
Illicium floridanum
Kadsura japonica
Schisandra chinensis
Hedyosmum arborescens
Ascarina lucida
Sarcandra chloranthoides
Chloranthus japonicus
Canella winterana
Cinnamodendron ekmanii
Takhtajania perrieri
Drimys winteri
Tasmannia insipida
Peperomia caliginigaudens
Piper betle
Houttuynia cordata
Saururus cernuus
Anemopsis californica
Asarum canadense
Saruma henryi
Lactoris fernandeziana
Aristolochia macrophylla
Thottea tomentosa
Eupomatia bennettii
Cananga odorata
Annona muricata
Asimina triloba
Degeneria vitiensis
Mauloutchia chapelieri
Myristica fragrans
Galbulimima belgraveana
Liriodendron chinense
Magnolia tripetala
Idiospermum australiense
Calycanthus floridus
Chimonanthus praecox
Magnoliidae
Angiospermae

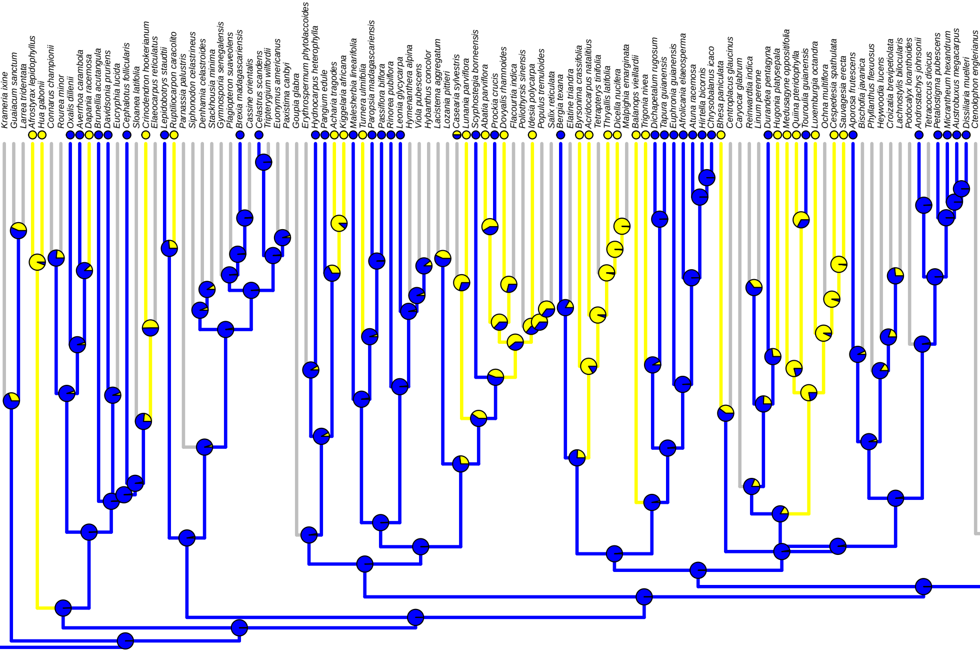

Siparuna decipiens
Gomortega keule
Doryphora sassafras
Atherosperma moschatum
Daphnandra micrantha
Cryptocarya meissneriana
Cinnamomum camphora
Laurus nobilis
Sassafras albidum
Gyrocarpus americanus
Hernandia ovigera
Peumus boldus
Hedycarya arborea
Hortonia floribunda
Acorus gramineus
Orontium aquaticum
Xanthosoma sagittifolium
Lemna minor
Spathiphyllum wallisii
Pleea tenuifolia
Tofieldia calyculata
Potamogeton berchtoldii
Triglochin maritima
Alisma plantagoaquatica
Hydrocharis dubia
Najas minor
Japonolirion osense
Petrosavia sakuraii
Burmannia biflora
Metanarthecium luteoviride
Dioscorea alata
Tacca chantrieri
Carludovica palmata
Croomia pauciflora
Acanthochlamys bracteata
Talbotia elegans
Xerophyta retinervis
Campynema lineare
Lapageria rosea
Philesia magellanica
Lilium superbum
Smilax glauca
Trillium erectum
Colchicum speciosum
Alstroemeria aurea
Bomarea edulis
Cypripedium calceolus
Oncidium excavatum
Phalaenopsis aphrodite
Borya septentrionalis
Blandfordia punicea
Molineria capitulata
Hypoxis hemerocallidea
Rhodohypoxis milloides
Ixiolirion tataricum
Tecophilaea cyanocrocus
Alophia drummondii
Iris missouriensis
Aristea glauca
Gladiolus buckerveldii
Bulbine succulenta
Xanthorrhoea resinosa
Agave ghiesbreghtii
Yucca filamentosa
Asparagus officinalis
Lomandra longifolia
Beaucarnea recurvata
Crinum asiaticum
Allium fistulosum
Nothoscordum bivalve
Chamaedorea seifrizii
Elaeis guineensis
Caryota mitis
Phoenix dactylifera
Trachycarpus fortunei
Philydrum lanuginosum
Tradescantia spathacea
Anigozanthos flavidus
Pontederia cordata
Strelitzia reginae
Phenakospermum guyannense
Ravenala madagascariensis
Musa acuminata
Zingiber gramineum
Canna indica
Maranta cristata
Calectasia intermedia
Dasypogon bromeliifolius
Puya raimondii
Vriesea psittacina
Sparganium eurycarpum
Typha latifolia
Stegolepis ligulata
Mayaca fluviatilis
Xyris jupicai
Juncus effusus
Cyperus alternifolius
Rhynchospora latifolia
Eriocaulon aquaticum
Anarthria polyphylla
Centrolepis strigosa
Baloskion tetraphyllum
Flagellaria indica
Joinvillea plicata
Ecdeiocolea monostachya
Oryza sativa
Hordeum bulbosum
Danthonia spicata
Saccharum officinarum
Zea mays
Ceratophyllum demersum
Eschscholzia californica
Dicentra eximia
Hypecoum imberbe
Euptelea polyandra
Circaeaster agrestis
Kingdonia uniflora
Akebia quinata
Lardizabala biternata
Decaisnea fargesii
Sargentodoxa cuneata
Cissampelos pareira
Cocculus orbiculatus
Menispermum canadense
Tinospora sinensis
Commelinidae
Monocotyledonae
Mesangiospermae


Mahonia bealei
Podophyllum peltatum
Caulophyllum thalictroides
Nandina domestica
Glaucidium palmatum
Hydrastis canadensis
Ranunculus acris
Xanthorhiza simplicissima
Meliosma veitchiorum
Sabia swinhoei
Nelumbo lutea
Platanus occidentalis
Petrophile canescens
Grevillea robusta
Roupala montana
Tetracentron sinense
Trochodendron aralioides
Didymeles perrieri
Buxus sempervirens
Pachysandra procumbens
Gunnera hamiltonii
Myrothamnus flabellifolia
Dillenia retusa
Hibbertia volubilis
Tetracera asiatica
Heisteria parvifolia
Ximenia americana
Ochanostachys amentacea
Minquartia guianensis
Coula edulis
Schoepfia schreberi
Misodendrum linearifolium
Gaiadendron punctatum
Opilia amentacea
Osyris lanceolata
Santalum album
Aextoxicon punctatum
Berberidopsis corallina
Nepenthes alata
Drosera capensis
Drosophyllum lusitanicum
Ancistrocladus korupensis
Triphyophyllum peltatum
Frankenia pulverulenta
Tamarix chinensis
Fagopyrum esculentum
Fallopia sachalinensis
Limonium arborescens
Plumbago auriculata
Rhabdodendron amazonicum
Simmondsia chinensis
Asteropeia micraster
Physena madagascariensis
Stellaria media
Phaulothamnus spinescens
Spinacia oleracea
Celosia argentea
Beta vulgaris
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Gisekia africana
Delosperma echinatum
Lampranthus blandus
Phytolacca americana
Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Halophytum ameghinoi
Claytonia virginica
Anredera cordifolia
Basella alba
Alluaudia procera
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Alangium chinense
Cornus mas
Curtisia dentata
Grubbia tomentosa
Camptotheca acuminata
Nyssa ogeche
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Hydrostachys multifida
Fendlera rupicola
Hydrangea macrophylla
Philadelphus lewisii
Impatiens repens
Marcgravia trinitatis
Tetramerista crassifolia
Camellia sinensis
Barringtonia asiatica
Couroupita guianensis
Lissocarpa benthamii
Diospyros lotus
Euclea crispa
Maesa tenera
Clavija eggersiana
Anagallis tenella
Androsace spinulifera
Primula sieboldii
Manilkara zapota
Fouquieria splendens
Cobaea scandens
Gilia capitata
Phlox longifolia
Polemonium reptans
Eurya japonica
Ternstroemia stahlii
Symplocos zizyphoides
Galax urceolata
Halesia carolina
Styrax officinalis
Asteridae
Superasteridae
Eudicotyledonae


Sarracenia purpurea
Roridula gorgonias
Actinidia chinensis
Clethra alnifolia
Cyrilla racemiflora
Enkianthus campanulatus
Arbutus unedo
Rhododendron hippophaeoides
Vaccinium uliginosum
Oncotheca balansae
Eucommia ulmoides
Aucuba japonica
Garrya elliptica
Icacina mannii
Vahlia capensis
Montinia caryophyllacea
Hydrolea ovata
Sphenoclea zeylanica
Cuscuta cuspidata
Ipomoea alba
Petunia axillaris
Atropa belladonna
Solanum dulcamara
Nicotiana tabacum
Nolana humifusa
Borago officinalis
Ehretia acuminata
Hydrophyllum capitatum
Luculia gratissima
Coffea arabica
Galium aparine
Mitchella repens
Gelsemium sempervirens
Spigelia marilandica
Strychnos nuxvomica
Nerium oleander
Exacum affine
Gentiana saponaria
Plocosperma buxifolium
Olea europaea
Jasminum simplicifolium
Syringa vulgaris
Polypremum procumbens
Byblis liniflora
Peltanthera floribunda
Calceolaria integrifolia
Rhynchoglossum notonianum
Titanotrichum oldhamii
Antirrhinum majus
Plantago lanceolata
Veronica anagallisaquatica
Myoporum mauritianum
Scrophularia californica
Verbascum thapsus
Mazus pumilus
Callicarpa dichotoma
Lamium amplexicaule
Phryma leptostachya
Pedicularis foliosa
Paulownia tomentosa
Martynia annua
Junellia succulentifolia
Thomandersia laurifolia
Campsis radicans
Catalpa speciosa
Halleria lucida
Pinguicula moranensis
Utricularia alpina
Sesamum indicum
Thunbergia alata
Acanthus montanus
Barleria prionitis
Justicia americana
Ilex cornuta
Helwingia japonica
Phyllonoma laticuspis
Gomphandra javanica
Irvingbaileya australis
Citronella suaveolens
Cardiopteris quinqueloba
Gonocaryum litorale
Roussea simplex
Carpodetus serratus
Abrophyllum ornans
Cuttsia viburnea
Pseudonemacladus oppositifolius
Dialypetalum floribundum
Lobelia angulata
Cyphia elata
Campanula elatines
Campanula trachelium
Pentaphragma ellipticum
Donatia fascicularis
Forstera bidwillii
Stylidium graminifolium
Phelline billardierei
Argophyllum laxum
Corokia cotoneaster
Platyspermation crassifolium
Crispiloba disperma
Alseuosmia macrophylla
Wittsteinia vacciniacea
Nephrophyllidium cristagalli
Menyanthes trifoliata
Nymphoides peltata
Villarsia calthifolia
Dampiera spicigera
Goodenia ovata
Scaevola aemula
Acicarpha tribuloides
Boopis graminea
Moschopsis rosulata
Barnadesia caryophylla
Gerbera jamesonii
Echinops exaltatus
Tragopogon dubius
Cichorium intybus
Lactuca sativa
Tagetes erecta
Helianthus annuus
Guizotia abyssinica
Eremosyne pectinata
Anopterus macleayanus
Lamiidae
Campanulidae
Pentapetalae


Polyosma cunninghamii
Escallonia rubra
Forgesia racemosa
Valdivia gayana
Quintinia verdonii
Paracryphia alticola
Sphenostemon lobosporus
Berzelia lanuginosa
Brunia albiflora
Columellia oblonga
Desfontainia spinosa
Viburnum acerifolium
Sambucus racemosa
Tetradoxa omeiensis
Adoxa moschatellina
Sinadoxa corydalifolia
Triosteum perfoliatum
Leycesteria formosa
Lonicera japonica
Symphoricarpos albus
Diervilla sessilifolia
Weigela hortensis
Heptacodium miconioides
Morina longifolia
Linnaea borealis
Kolkwitzia amabilis
Dipelta yunnanensis
Abelia triflora
Zabelia tyaihyonii
Triplostegia glandulifera
Scabiosa columbaria
Dipsacus sativus
Pterocephalodes hookeri
Patrinia triloba
Nardostachys chinensis
Valeriana officinalis
Centranthus ruber
Valerianella locusta
Pennantia corymbosa
Aralidium pinnatifidum
Melanophylla alnifolia
Torricellia tiliifolia
Griselinia littoralis
Pittosporum tobira
Billardiera heterophylla
Hydrocotyle vulgaris
Hedera helix
Polyscias guilfoylei
Panax quinquefolius
Aralia spinosa
Schefflera arboricola
Tetrapanax papyrifer
Cussonia spicata
Pseudopanax arboreus
Tetraplasandra hawaiensis
Delarbrea michieana
Myodocarpus fraxinifolius
Mackinlaya confusa
Platysace lanceolata
Azorella selago
Arctopus echinatus
Sanicula gregaria
Heteromorpha trifoliata
Daucus carota
Anethum graveolens
Apium graveolens
Angelica sylvestris
Coriandrum sativum
Peridiscus lucidus
Soyauxia talbotii
Crassula rupestris
Kalanchoe daigremontiana
Dudleya viscida
Sedum rubrotinctum
Tetracarpaea tasmanica
Aphanopetalum resinosum
Penthorum sedoides
Haloragis aspera
Myriophyllum sibiricum
Paeonia californica
Pterostemon rotundifolius
Choristylis rhamnoides
Itea virginica
Ribes aureum
Saxifraga cernua
Heuchera micrantha
Sullivantia oregana
Cercidiphyllum japonicum
Daphniphyllum macropodum
Altingia excelsa
Liquidambar styraciflua
Exbucklandia populnea
Rhodoleia championii
Disanthus cercidifolius
Hamamelis virginiana
Corylopsis pauciflora
Leea guineense
Vitis aestivalis
Terminalia catappa
Lythrum salicaria
Fuchsia procumbens
Clarkia xantiana
Oenothera parviflora
Clidemia petiolaris
Mouriri cyphocarpa
Crypteronia paniculata
Olinia ventosa
Qualea grandiflora
Vochysia guatemalensis
Heteropyxis natalensis
Metrosideros nervulosa
Eucalyptus lehmannii
Myrtus communis
Superrosidae
Rosi


Geranium sanguineum
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
Aphloia theiformis
Geissoloma marginatum
Ixerba brexioides
Strasburgeria robusta
Staphylea trifolia
Guamatela tuerckheimii
Crossosoma bigelovii
Stachyurus praecox
Picramnia polyantha
Biebersteinia orphanidis
Aesculus pavia
Cupaniopsis anacardioides
Bursera fagaroides
Rhus copallinum
Schinus molle
Nitraria retusa
Citrus paradisi
Ailanthus altissima
Swietenia macrophylla
Trichilia emetica
Gerrardina foliosa
Tapiscia sinensis
Dipentodon sinicus
Perrottetia ovata
Neurada procumbens
Bixa orellana
Anisoptera marginata
Helianthemum grandiflorum
Thymelaea hirsuta
Gossypium hirsutum
Durio zibethinus
Sterculia apetala
Bombax ceiba
Ochroma pyramidale
Carica papaya
Tropaeolum tricolor
Floerkea proserpinacoides
Batis maritima
Koeberlinia spinosa
Pentadiplandra brazzeana
Tovaria pendula
Gyrostemon tepperi
Reseda alba
Capparis spinosa
Arabidopsis thaliana
Brassica napus
Raphanus sativus
Nothofagus antarctica
Fagus grandifolia
Chrysolepis sempervirens
Quercus rubra
Alnus alnobetula
Casuarina cunninghamiana
Juglans mandshurica
Myrica cerifera
Myrica gale
Spiraea betulifolia
Photinia x fraseri
Prunus persica
Ceanothus sanguineus
Rhamnus cathartica
Barbeya oleoides
Dirachma socotrana
Elaeagnus umbellata
Zelkova serrata
Pilea cadierei
Boehmeria nivea
Urtica dioica
Ficus carica
Morus indica
Celtis yunnanensis
Cannabis sativa
Humulus lupulus
Datisca cannabina
Begonia sanguinea
Tetrameles nudiflora
Coriaria ruscifolia
Corynocarpus laevigatus
Anisophyllea fallax
Xerosicyos danguyi
Dendrosicyos socotrana
Cucurbita pepo
Coccinia sessilifolia
Cucumis melo
Polygala pauciflora
Stylobasium spathulatum
Quillaja saponaria
Schotia brachypetala
Bauhinia galpinii
Cercis canadensis
Ceratonia siliqua
Acacia fimbriata
Albizia julibrissin
Mimosa polycarpa
Indigofera heterantha
Erythrina cristagalli
Glycine max
Lotus corniculatus
Astragalus membranaceus
Cicer arietinum
Medicago sativa
Pisum sativum
Malvidae
Fabidae
idae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Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
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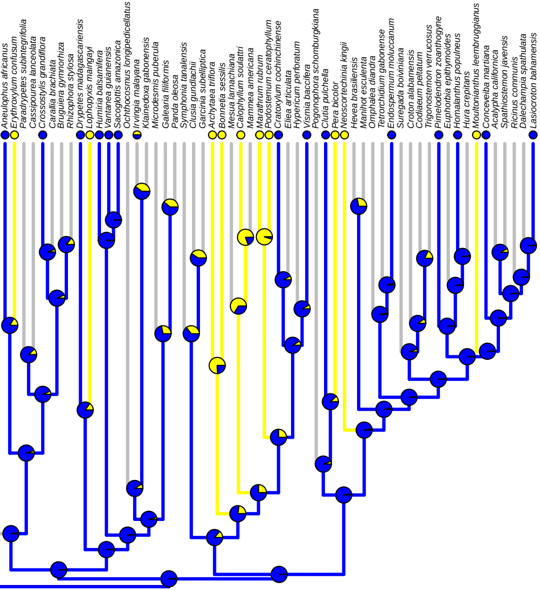
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Davidsonia pruriens
Eucryphia lucida
Cephalotus follicularis
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Lepidobotrys staudtii
Ruptiliocarpon caracolito
Parnassia palustris
Siphonodon celastrineus
Denhamia celastroides
Stackhousia minima
Gymnosporia senegalensis
Plagiopteron suaveolens
Brexia madagascariensis
Cassine orientalis
Celastrus scandens
Tripterygium wilfordii
Euonymus americanus
Paxistima canbyi
Goupia glabra
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Rinorea pubiflora
Leonia glycycarpa
Hymenanthera alpina
Viola pubescens
Hybanthus concolor
Lacistema aggregatum
Lozania pittieri
Casearia sylvestris
Lunania parviflora
Scyphostegia borneensis
Abatia parviflora
Prockia crucis
Dovyalis rhamnoides
Flacourtia indica
Poliothyrsis sinensis
Idesia polycarpa
Populus tremuloides
Salix reticulata
Bergia texana
Elatine triandra
Byrsonima crassifolia
Acridocarpus natalitius
Tetrapterys tinifolia
Thryallis latifolia
Dicella nucifera
Malpighia emarginata
Balanops vieillardii
Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Afrolicania elaeosperma
Atuna racemosa
Hirtella bicornis
Chrysobalanus icaco
Bhesa paniculata
Centroplacus glaucinus
Caryocar glabrum
Reinwardtia indica
Linum perenne
Durandea pentagyna
Hugonia platysepala
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Micrantheum hexandrum
Austrobuxus megacarpus
Dissiliaria muelleri
Ctenolophon englerianus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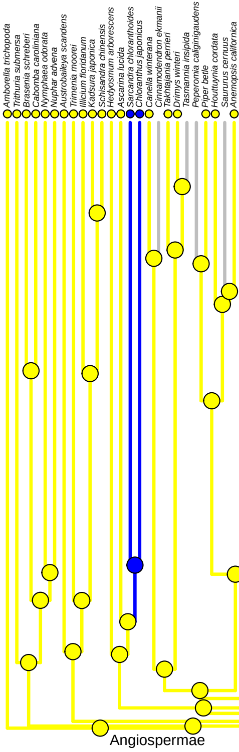
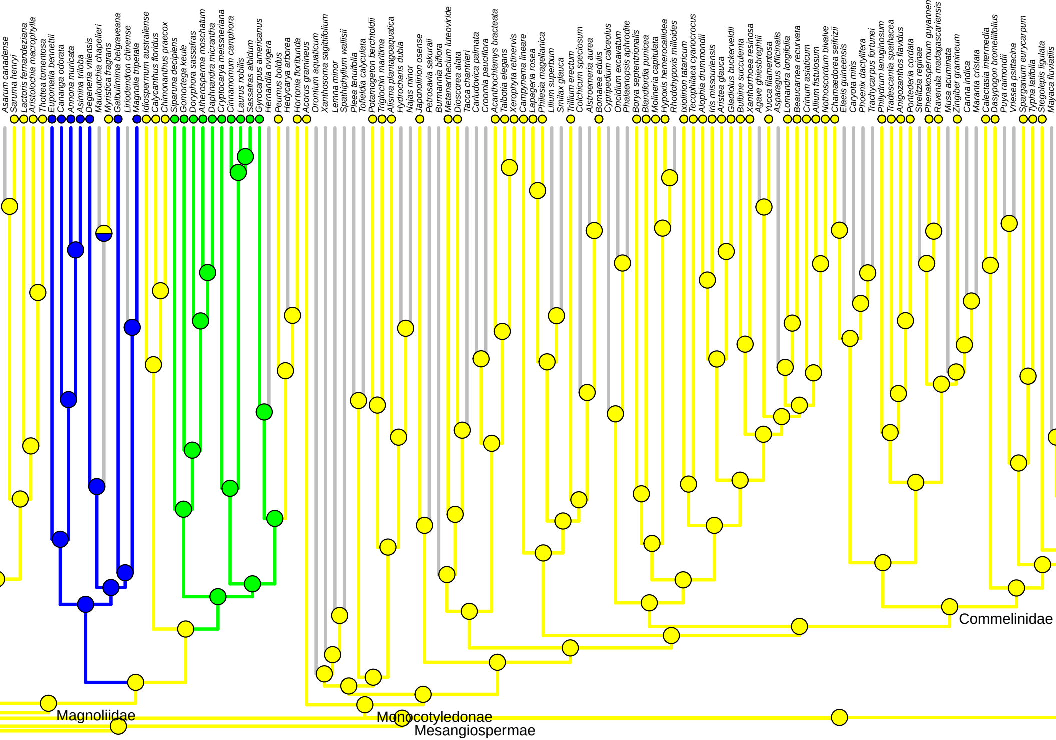
Erythroxylum confusum
Paradrypetes subintegrifolia
Cassipourea lanceolata
Crossostylis grandiflora
Carallia brachiata
Bruguiera gymnorhiza
Rhizophora stylosa
Drypetes madagascariensis
Lophopyxis maingayi
Humiria balsamifera
Vantanea guianensis
Sacoglottis amazonica
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
Microdesmis puberula
Galearia filiformis
Panda oleosa
Symphonia tanalensis
Clusia gundlachii
Garcinia subelliptica
Archytaea triflora
Bonnetia sessilis
Mesua larnachiana
Calophyllum soulattri
Mammea americana
Marathrum rubrum
Podostemum ceratophyllum
Cratoxylum cochinchinense
Eliea articulata
Hypericum perforatum
Vismia baccifera
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Hevea brasiliensis
Manihot esculenta
Omphalea diandra
Tetrorchidium gabonense
Endospermum moluccanum
Suregada boiviniana
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Moultonianthus leembruggianus
Conceveiba martiana
Acalypha californica
Spathiostemon javensis
Ricinus communis
Dalechampia spathulata
Lasiocroton bahamensis

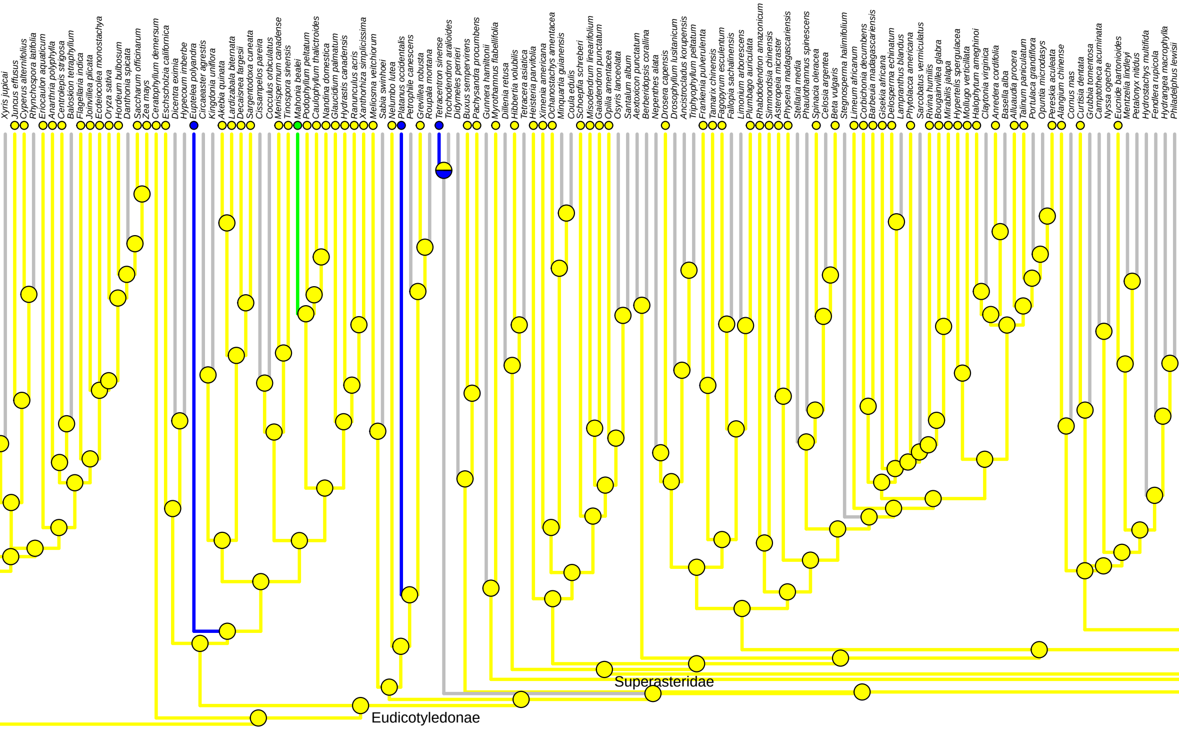
MP ancestral state reconstruction using ancestral.pars (R:phangorn)
313_A. Anther dehiscence (3−state) (D2d), 10 steps

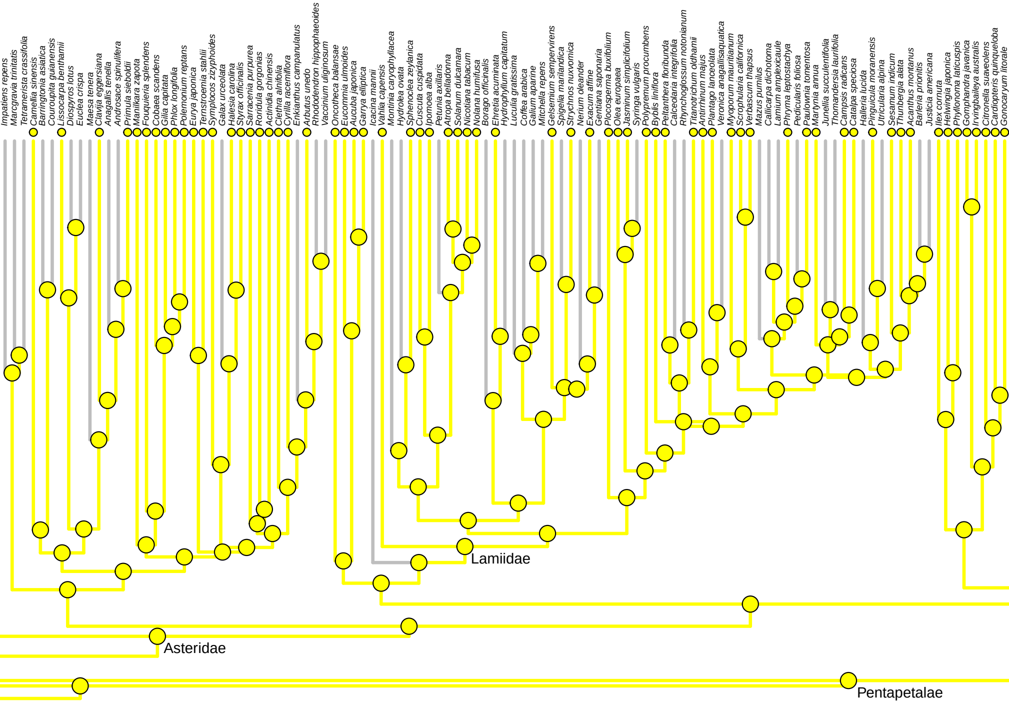
🟡 longitudinal slit
🔵 H−valvate
🟢 flap−valvate

Node	MP state(s)
Angiospermae	longitudinal slit
Mesangiospermae	longitudinal slit
Magnoliidae	longitudinal slit
Monocotyledonae	longitudinal slit
Eudicotyledonae	longitudinal slit
Commelinidae	longitudinal slit
Pentapetalae	longitudinal slit
Superasteridae	longitudinal slit
Asteridae	longitudinal slit
Lamiidae	longitudinal slit
Campanulidae	longitudinal slit
Superrosidae	longitudinal slit
Rosidae	longitudinal slit
Malvidae	longitudinal slit
Fabidae	longitudinal slit


Amborella trichopoda
Trithuria submersa
Brasenia schreberi
Cabomba caroliniana
Nymphaea odorata
Nuphar advena
Austrobaileya scandens
Trimenia moorei
Illicium floridanum
Kadsura japonica
Schisandra chinensis
Hedyosmum arborescens
Ascarina lucida
Sarcandra chloranthoides
Chloranthus japonicus
Canella winterana
Cinnamodendron ekmanii
Takhtajania perrieri
Drimys winteri
Tasmannia insipida
Peperomia caliginigaudens
Piper betle
Houttuynia cordata
Saururus cernuus
Anemopsis californica
Angiospermae


Asarum canadense
Saruma henryi
Lactoris fernandeziana
Aristolochia macrophylla
Thottea tomentosa
Eupomatia bennettii
Cananga odorata
Annona muricata
Asimina triloba
Degeneria vitiensis
Mauloutchia chapelieri
Myristica fragrans
Galbulimima belgraveana
Liriodendron chinense
Magnolia tripetala
Idiospermum australiense
Calycanthus floridus
Chimonanthus praecox
Siparuna decipiens
Gomortega keule
Doryphora sassafras
Atherosperma moschatum
Daphnandra micrantha
Cryptocarya meissneriana
Cinnamomum camphora
Laurus nobilis
Sassafras albidum
Gyrocarpus americanus
Hernandia ovigera
Peumus boldus
Hedycarya arborea
Hortonia floribunda
Acorus gramineus
Orontium aquaticum
Xanthosoma sagittifolium
Lemna minor
Spathiphyllum wallisii
Pleea tenuifolia
Tofieldia calyculata
Potamogeton berchtoldii
Triglochin maritima
Alisma plantagoaquatica
Hydrocharis dubia
Najas minor
Japonolirion osense
Petrosavia sakuraii
Burmannia biflora
Metanarthecium luteoviride
Dioscorea alata
Tacca chantrieri
Carludovica palmata
Croomia pauciflora
Acanthochlamys bracteata
Talbotia elegans
Xerophyta retinervis
Campynema lineare
Lapageria rosea
Philesia magellanica
Lilium superbum
Smilax glauca
Trillium erectum
Colchicum speciosum
Alstroemeria aurea
Bomarea edulis
Cypripedium calceolus
Oncidium excavatum
Phalaenopsis aphrodite
Borya septentrionalis
Blandfordia punicea
Molineria capitulata
Hypoxis hemerocallidea
Rhodohypoxis milloides
Ixiolirion tataricum
Tecophilaea cyanocrocus
Alophia drummondii
Iris missouriensis
Aristea glauca
Gladiolus buckerveldii
Bulbine succulenta
Xanthorrhoea resinosa
Agave ghiesbreghtii
Yucca filamentosa
Asparagus officinalis
Lomandra longifolia
Beaucarnea recurvata
Crinum asiaticum
Allium fistulosum
Nothoscordum bivalve
Chamaedorea seifrizii
Elaeis guineensis
Caryota mitis
Phoenix dactylifera
Trachycarpus fortunei
Philydrum lanuginosum
Tradescantia spathacea
Anigozanthos flavidus
Pontederia cordata
Strelitzia reginae
Phenakospermum guyannense
Ravenala madagascariensis
Musa acuminata
Zingiber gramineum
Canna indica
Maranta cristata
Calectasia intermedia
Dasypogon bromeliifolius
Puya raimondii
Vriesea psittacina
Sparganium eurycarpum
Typha latifolia
Stegolepis ligulata
Mayaca fluviatilis
Commelinidae
Magnoliidae
Monocotyledonae
Mesangiospermae


Xyris jupicai
Juncus effusus
Cyperus alternifolius
Rhynchospora latifolia
Eriocaulon aquaticum
Anarthria polyphylla
Centrolepis strigosa
Baloskion tetraphyllum
Flagellaria indica
Joinvillea plicata
Ecdeiocolea monostachya
Oryza sativa
Hordeum bulbosum
Danthonia spicata
Saccharum officinarum
Zea mays
Ceratophyllum demersum
Eschscholzia californica
Dicentra eximia
Hypecoum imberbe
Euptelea polyandra
Circaeaster agrestis
Kingdonia uniflora
Akebia quinata
Lardizabala biternata
Decaisnea fargesii
Sargentodoxa cuneata
Cissampelos pareira
Cocculus orbiculatus
Menispermum canadense
Tinospora sinensis
Mahonia bealei
Podophyllum peltatum
Caulophyllum thalictroides
Nandina domestica
Glaucidium palmatum
Hydrastis canadensis
Ranunculus acris
Xanthorhiza simplicissima
Meliosma veitchiorum
Sabia swinhoei
Nelumbo lutea
Platanus occidentalis
Petrophile canescens
Grevillea robusta
Roupala montana
Tetracentron sinense
Trochodendron aralioides
Didymeles perrieri
Buxus sempervirens
Pachysandra procumbens
Gunnera hamiltonii
Myrothamnus flabellifolia
Dillenia retusa
Hibbertia volubilis
Tetracera asiatica
Heisteria parvifolia
Ximenia americana
Ochanostachys amentacea
Minquartia guianensis
Coula edulis
Schoepfia schreberi
Misodendrum linearifolium
Gaiadendron punctatum
Opilia amentacea
Osyris lanceolata
Santalum album
Aextoxicon punctatum
Berberidopsis corallina
Nepenthes alata
Drosera capensis
Drosophyllum lusitanicum
Ancistrocladus korupensis
Triphyophyllum peltatum
Frankenia pulverulenta
Tamarix chinensis
Fagopyrum esculentum
Fallopia sachalinensis
Limonium arborescens
Plumbago auriculata
Rhabdodendron amazonicum
Simmondsia chinensis
Asteropeia micraster
Physena madagascariensis
Stellaria media
Phaulothamnus spinescens
Spinacia oleracea
Celosia argentea
Beta vulgaris
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Gisekia africana
Delosperma echinatum
Lampranthus blandus
Phytolacca americana
Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Halophytum ameghinoi
Claytonia virginica
Anredera cordifolia
Basella alba
Alluaudia procera
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Alangium chinense
Cornus mas
Curtisia dentata
Grubbia tomentosa
Camptotheca acuminata
Nyssa ogeche
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Hydrostachys multifida
Fendlera rupicola
Hydrangea macrophylla
Philadelphus lewisii
Superasteridae
Eudicotyledonae


Impatiens repens
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Tetramerista crassifolia
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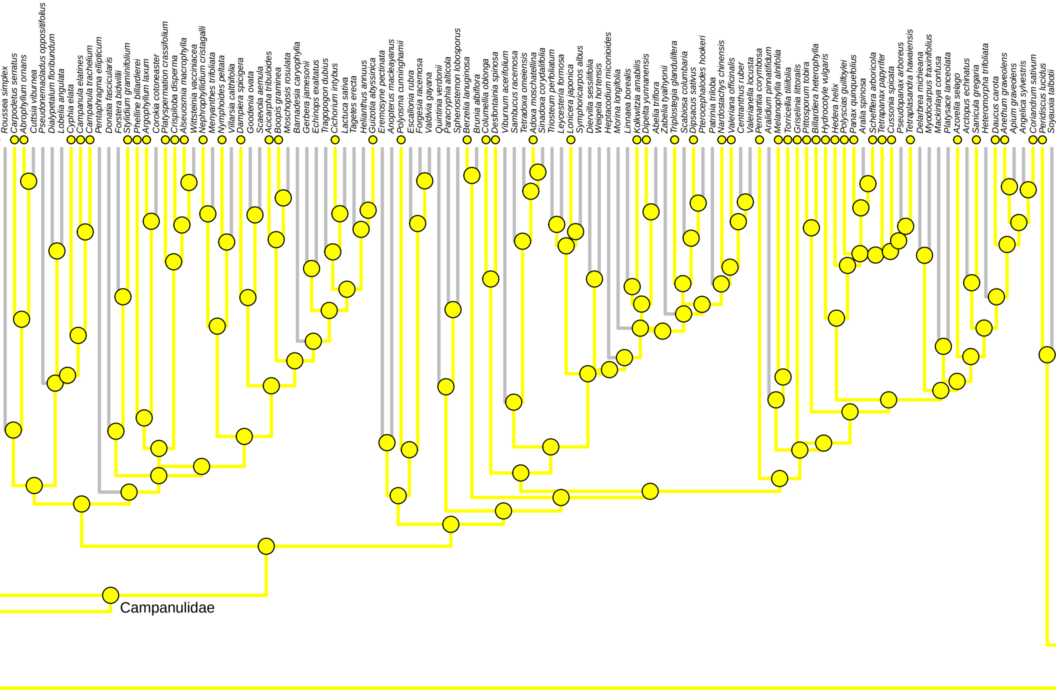
Couroupita guianensis
Lissocarpa benthamii
Diospyros lotus
Euclea crispa
Maesa tenera
Clavija eggersiana
Anagallis tenella
Androsace spinulifera
Primula sieboldii
Manilkara zapota
Fouquieria splendens
Cobaea scandens
Gilia capitata
Phlox longifolia
Polemonium reptans
Eurya japonica
Ternstroemia stahlii
Symplocos zizyphoides
Galax urceolata
Halesia carolina
Styrax officinalis
Sarracenia purpurea
Roridula gorgonias
Actinidia chinensis
Clethra alnifolia
Cyrilla racemiflora
Enkianthus campanulatus
Arbutus unedo
Rhododendron hippophaeoides
Vaccinium uliginosum
Oncotheca balansae
Eucommia ulmoides
Aucuba japonica
Garrya elliptica
Icacina mannii
Vahlia capensis
Montinia caryophyllacea
Hydrolea ovata
Sphenoclea zeylanica
Cuscuta cuspidata
Ipomoea alba
Petunia axillaris
Atropa belladonna
Solanum dulcamara
Nicotiana tabacum
Nolana humifusa
Borago officinalis
Ehretia acuminata
Hydrophyllum capitatum
Luculia gratissima
Coffea arabica
Galium aparine
Mitchella repens
Gelsemium sempervirens
Spigelia marilandica
Strychnos nuxvomica
Nerium oleander
Exacum affine
Gentiana saponaria
Plocosperma buxifolium
Olea europaea
Jasminum simplicifolium
Syringa vulgaris
Polypremum procumbens
Byblis liniflora
Peltanthera floribunda
Calceolaria integrifolia
Rhynchoglossum notonianum
Titanotrichum oldhamii
Antirrhinum majus
Plantago lanceolata
Veronica anagallisaquatica
Myoporum mauritianum
Scrophularia californica
Verbascum thapsus
Mazus pumilus
Callicarpa dichotoma
Lamium amplexicaule
Phryma leptostachya
Pedicularis foliosa
Paulownia tomentosa
Martynia annua
Junellia succulentifolia
Thomandersia laurifolia
Campsis radicans
Catalpa speciosa
Halleria lucida
Pinguicula moranensis
Utricularia alpina
Sesamum indicum
Thunbergia alata
Acanthus montanus
Barleria prionitis
Justicia americana
Ilex cornuta
Helwingia japonica
Phyllonoma laticuspis
Gomphandra javanica
Irvingbaileya australis
Citronella suaveolens
Cardiopteris quinqueloba
Gonocaryum litorale
Lamiidae
Asteridae
Pentapetalae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Cuttsia viburnea
Pseudonemacladus oppositifolius
Dialypetalum floribundum
Lobelia angulata
Cyphia elata
Campanula elatines
Campanula trachelium
Pentaphragma ellipticum
Donatia fascicularis
Forstera bidwillii
Stylidium graminifolium
Phelline billardierei
Argophyllum laxum
Corokia cotoneaster
Platyspermation crassifolium
Crispiloba disperma
Alseuosmia macrophylla
Wittsteinia vacciniacea
Nephrophyllidium cristagalli
Menyanthes trifoliata
Nymphoides peltata
Villarsia calthifolia
Dampiera spicigera
Goodenia ovata
Scaevola aemula
Acicarpha tribuloides
Boopis graminea
Moschopsis rosulata
Barnadesia caryophylla
Gerbera jamesonii
Echinops exaltatus
Tragopogon dubius
Cichorium intybus
Lactuca sativa
Tagetes erecta
Helianthus annuus
Guizotia abyssinica
Eremosyne pectinata
Anopterus macleayanus
Polyosma cunninghamii
Escallonia rubra
Forgesia racemosa
Valdivia gayana
Quintinia verdonii
Paracryphia alticola
Sphenostemon lobosporus
Berzelia lanuginosa
Brunia albiflora
Columellia oblonga
Desfontainia spinosa
Viburnum acerifolium
Sambucus racemosa
Tetradoxa omeiensis
Adoxa moschatellina
Sinadoxa corydalifolia
Triosteum perfoliatum
Leycesteria formosa
Lonicera japonica
Symphoricarpos albus
Diervilla sessilifolia
Weigela hortensis
Heptacodium miconioides
Morina longifolia
Linnaea borealis
Kolkwitzia amabilis
Dipelta yunnanensis
Abelia triflora
Zabelia tyaihyonii
Triplostegia glandulifera
Scabiosa columbaria
Dipsacus sativus
Pterocephalodes hookeri
Patrinia triloba
Nardostachys chinensis
Valeriana officinalis
Centranthus ruber
Valerianella locusta
Pennantia corymbosa
Aralidium pinnatifidum
Melanophylla alnifolia
Torricellia tiliifolia
Griselinia littoralis
Pittosporum tobira
Billardiera heterophylla
Hydrocotyle vulgaris
Hedera helix
Polyscias guilfoylei
Panax quinquefolius
Aralia spinosa
Schefflera arboricola
Tetrapanax papyrifer
Cussonia spicata
Pseudopanax arboreus
Tetraplasandra hawaiensis
Delarbrea michieana
Myodocarpus fraxinifolius
Mackinlaya confusa
Platysace lanceolata
Azorella selago
Arctopus echinatus
Sanicula gregaria
Heteromorpha trifoliata
Daucus carota
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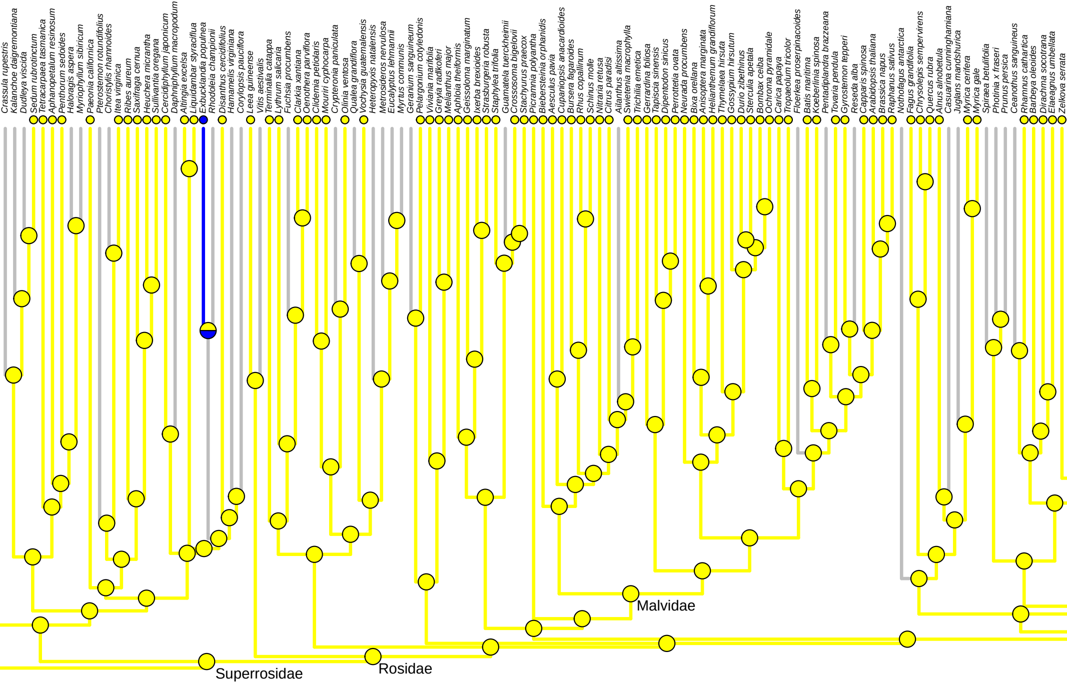
Apium graveolens
Angelica sylvestris
Coriandrum sativum
Peridiscus lucidus
Soyauxia talbotii
Campanulidae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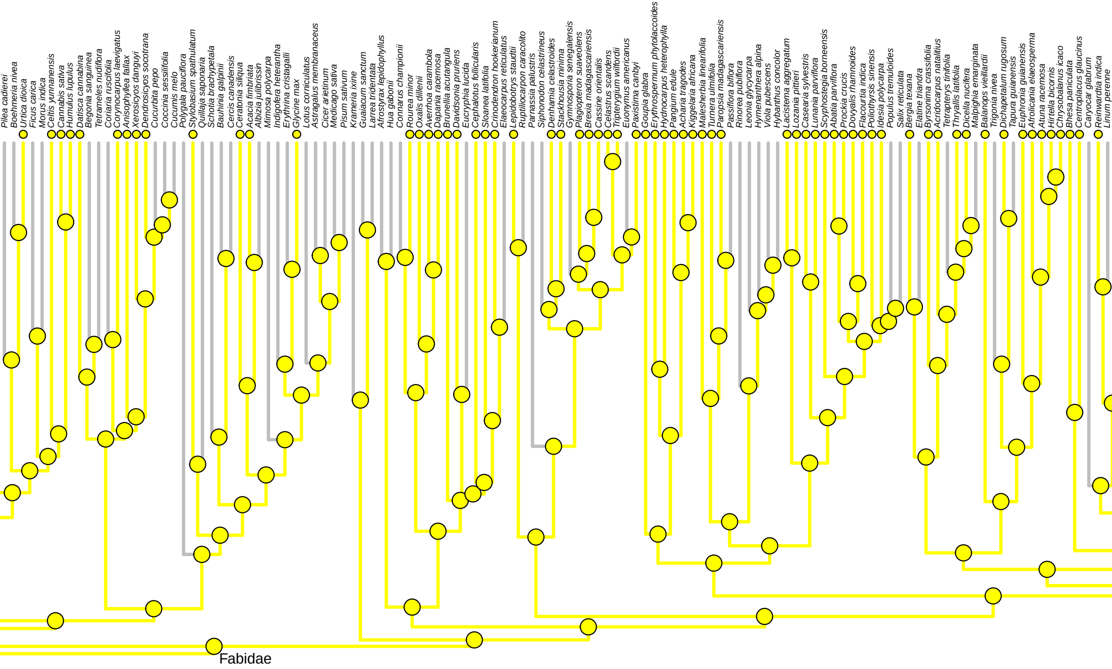
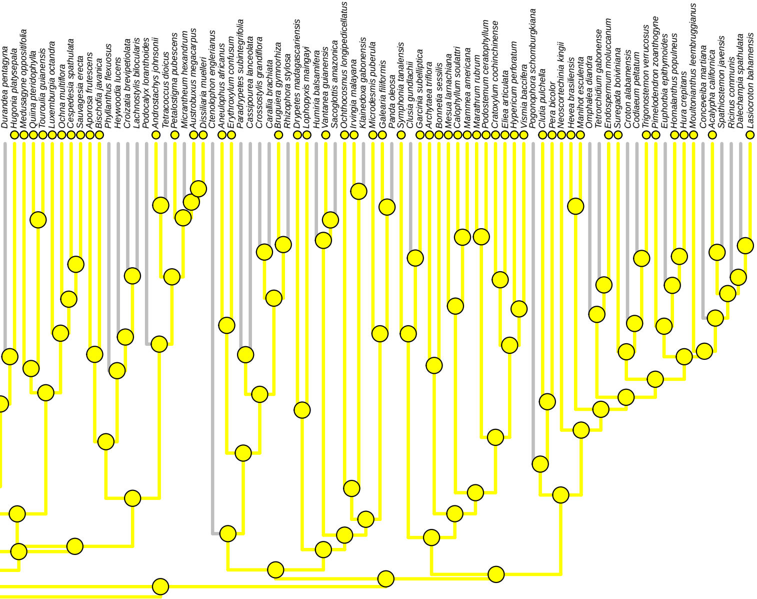
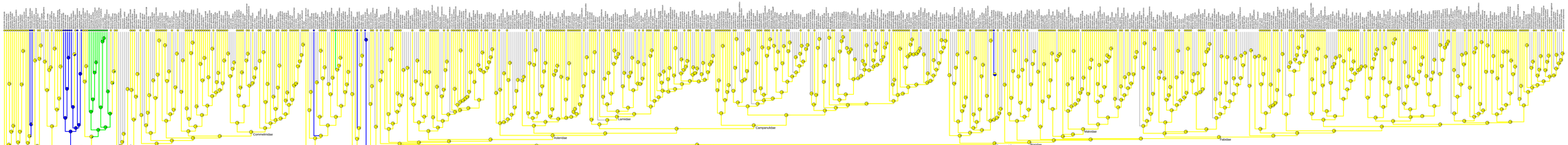
Dudleya viscida
Sedum rubrotinctum
Tetracarpaea tasmanica
Aphanopetalum resinosum
Penthorum sedoides
Haloragis aspera
Myriophyllum sibiricum
Paeonia californica
Pterostemon rotundifolius
Choristylis rhamnoides
Itea virginica
Ribes aureum
Saxifraga cernua
Heuchera micrantha
Sullivantia oregana
Cercidiphyllum japonicum
Daphniphyllum macropodum
Altingia excelsa
Liquidambar styraciflua
Exbucklandia populnea
Rhodoleia championii
Disanthus cercidifolius
Hamamelis virginiana
Corylopsis pauciflora
Leea guineense
Vitis aestivalis
Terminalia catappa
Lythrum salicaria
Fuchsia procumbens
Clarkia xantiana
Oenothera parviflora
Clidemia petiolaris
Mouriri cyphocarpa
Crypteronia paniculata
Olinia ventosa
Qualea grandiflora
Vochysia guatemalensis
Heteropyxis natalensis
Metrosideros nervulosa
Eucalyptus lehmannii
Myrtus communis
Geranium sanguineum
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
Aphloia theiformis
Geissoloma marginatum
Ixerba brexioides
Strasburgeria robusta
Staphylea trifolia
Guamatela tuerckheimii
Crossosoma bigelovii
Stachyurus praecox
Picramnia polyantha
Biebersteinia orphanidis
Aesculus pavia
Cupaniopsis anacardioides
Bursera fagaroides
Rhus copallinum
Schinus molle
Nitraria retusa
Citrus paradisi
Ailanthus altissima
Swietenia macrophylla
Trichilia emetica
Gerrardina foliosa
Tapiscia sinensis
Dipentodon sinicus
Perrottetia ovata
Neurada procumbens
Bixa orellana
Anisoptera marginata
Helianthemum grandiflorum
Thymelaea hirsuta
Gossypium hirsutum
Durio zibethinus
Sterculia apetala
Bombax ceiba
Ochroma pyramidale
Carica papaya
Tropaeolum tricolor
Floerkea proserpinacoides
Batis maritima
Koeberlinia spinosa
Pentadiplandra brazzeana
Tovaria pendula
Gyrostemon tepperi
Reseda alba
Capparis spinosa
Arabidopsis thaliana
Brassica napus
Raphanus sativus
Nothofagus antarctica
Fagus grandifolia
Chrysolepis sempervirens
Quercus rubra
Alnus alnobetula
Casuarina cunninghamiana
Juglans mandshurica
Myrica cerifera
Myrica gale
Spiraea betulifolia
Photinia x fraseri
Prunus persica
Ceanothus sanguineus
Rhamnus cathartica
Barbeya oleoides
Dirachma socotrana
Elaeagnus umbellata
Zelkova serrata
Malvidae
Rosidae
Superrosidae


Pilea cadierei
Boehmeria nivea
Urtica dioica
Ficus carica
Morus indica
Celtis yunnanensis
Cannabis sativa
Humulus lupulus
Datisca cannabina
Begonia sanguinea
Tetrameles nudiflora
Coriaria ruscifolia
Corynocarpus laevigatus
Anisophyllea fallax
Xerosicyos danguyi
Dendrosicyos socotrana
Cucurbita pepo
Coccinia sessilifolia
Cucumis melo
Polygala pauciflora
Stylobasium spathulatum
Quillaja saponaria
Schotia brachypetala
Bauhinia galpinii
Cercis canadensis
Ceratonia siliqua
Acacia fimbriata
Albizia julibrissin
Mimosa polycarpa
Indigofera heterantha
Erythrina cristagalli
Glycine max
Lotus corniculatus
Astragalus membranaceus
Cicer arietinum
Medicago sativa
Pisum sativum
Krameria ixine
Guaiacum sanctum
Larrea tridentata
Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
Oxalis dillenii
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Davidsonia pruriens
Eucryphia lucida
Cephalotus follicularis
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Lepidobotrys staudtii
Ruptiliocarpon caracolito
Parnassia palustris
Siphonodon celastrineus
Denhamia celastroides
Stackhousia minima
Gymnosporia senegalensis
Plagiopteron suaveolens
Brexia madagascariensis
Cassine orientalis
Celastrus scandens
Tripterygium wilfordii
Euonymus americanus
Paxistima canbyi
Goupia glabra
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Rinorea pubiflora
Leonia glycycarpa
Hymenanthera alpina
Viola pubescens
Hybanthus concolor
Lacistema aggregatum
Lozania pittieri
Casearia sylvestris
Lunania parviflora
Scyphostegia borneensis
Abatia parviflora
Prockia crucis
Dovyalis rhamnoides
Flacourtia indica
Poliothyrsis sinensis
Idesia polycarpa
Populus tremuloides
Salix reticulata
Bergia texana
Elatine triandra
Byrsonima crassifolia
Acridocarpus natalitius
Tetrapterys tinifolia
Thryallis latifolia
Dicella nucifera
Malpighia emarginata
Balanops vieillardii
Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Afrolicania elaeosperma
Atuna racemosa
Hirtella bicornis
Chrysobalanus icaco
Bhesa paniculata
Centroplacus glaucinus
Caryocar glabrum
Reinwardtia indica
Linum perenne
Fabidae


Durandea pentagyna
Hugonia platysepala
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Micrantheum hexandrum
Austrobuxus megacarpus
Dissiliaria muelleri
Ctenolophon englerianus
Aneulophus africanus
Erythroxylum confusum
Paradrypetes subintegrifolia
Cassipourea lanceolata
Crossostylis grandiflora
Carallia brachiata
Bruguiera gymnorhiza
Rhizophora stylosa
Drypetes madagascariensis
Lophopyxis maingayi
Humiria balsamifera
Vantanea guianensis
Sacoglottis amazonica
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
Microdesmis puberula
Galearia filiformis
Panda oleosa
Symphonia tanalensis
Clusia gundlachii
Garcinia subelliptica
Archytaea triflora
Bonnetia sessilis
Mesua larnachiana
Calophyllum soulattri
Mammea americana
Marathrum rubrum
Podostemum ceratophyllum
Cratoxylum cochinchinense
Eliea articulata
Hypericum perforatum
Vismia baccifera
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Hevea brasiliensis
Manihot esculenta
Omphalea diandra
Tetrorchidium gabonense
Endospermum moluccanum
Suregada boiviniana
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Moultonianthus leembruggianus
Conceveiba martiana
Acalypha californica
Spathiostemon javensis
Ricinus communis
Dalechampia spathulata
Lasiocroton bahamensis

ML ancestral state reconstruction using rayDISC (R:corHMM)
313_A. Anther dehiscence (3−state) (D2d), ARDeq model

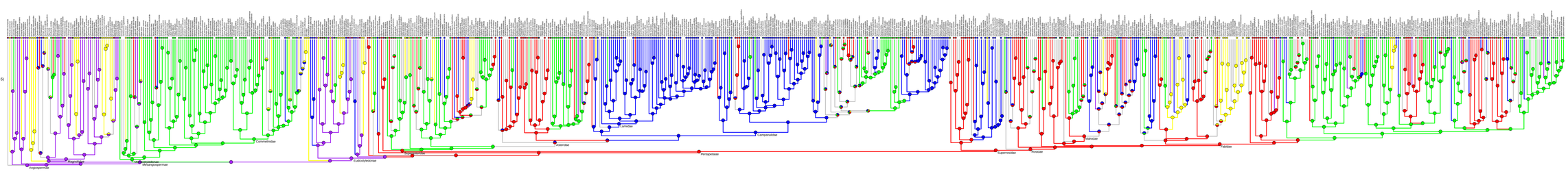


Model	Logl.	Npar	AIC	AICc	DeltaAICc	w	q01	--
ARD	−56.51	6	125.03	125.13	2.2	0.11	2e−04	--
ARDeq*	−55.41	6	122.83	122.94	0	0.32	2e−04	--
ER	−60.8	1	123.6	123.61	0.67	0.23	2e−04	--
SYM	−59.75	3	125.51	125.54	2.6	0.09	2e−04	--
SYMeq	−58.65	3	123.31	123.34	0.4	0.26	2e−04	--

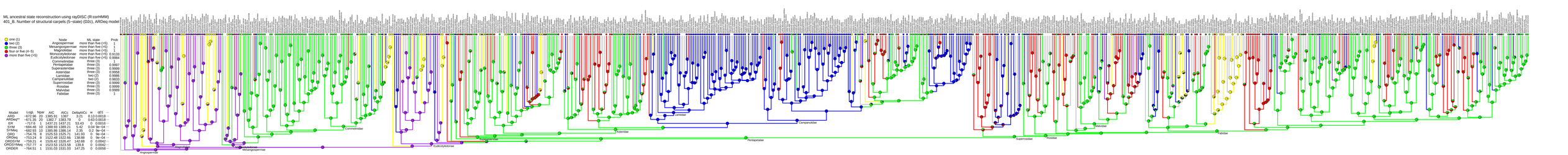
MP ancestral state reconstruction using ancestral.pars
(R phangorn)
401_B. Number of structural carpels (5~state) (D2c), 188 steps

- one (1)
- two (2)
- three (3)
- four or five (4~5)
- more than five (>5)

Node	MP state(s)
Angiospermae	more than five (>5)
Mesangiospermae	more than five (>5)
Magnoliidae	more than five (>5)
Monocotyledoneae	three (3)
Eudicotyledoneae	more than five (>5)
Commelinidae	one (1)
Ceratophyllidae	four or five (4~5)
Superasteridae	four or five (4~5)
Asteridae	two (2) / four or five (4~5)
Lamiidae	two (2)
Campanulidae	two (2)
Santalanae	four or five (4~5)
Rosidae	four or five (4~5)
Malvidae	four or five (4~5)
Fabidae	four or five (4~5)



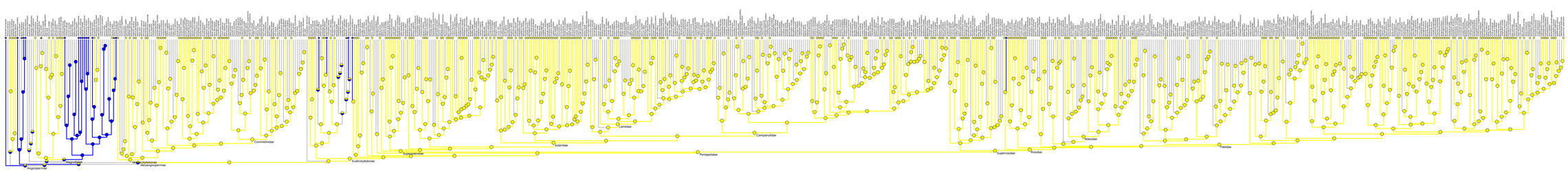
ML ancestral state reconstruction using rayDISC (R:corHMM)
401_B. Number of structural carpels (5-state) (D2c), ARDeq model



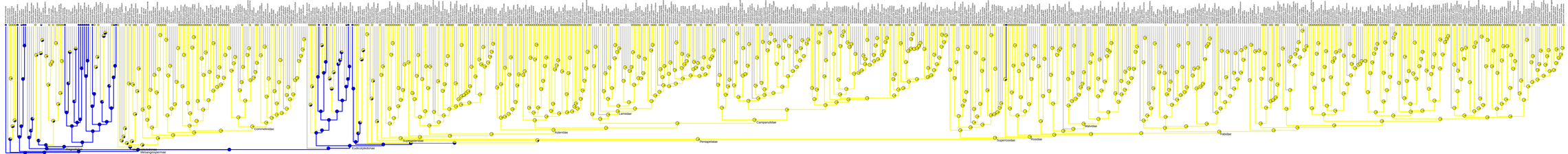
MP ancestral state reconstruction using ancestral.pars (R phangorn)
400_A. Gynoecium phyllotaxy (D2d), 10 steps

whorled
spiral

Node	MP state(s)
Angiospermae	whorled / spiral
Mesangiospermae	whorled / spiral
Magnoliidae	whorled / spiral
Monocotyledonae	whorled
Eudicotyledonae	whorled
Commelinidae	whorled
Ranunculidae	whorled
Superasteridae	whorled
Asteridae	whorled
Lamiidae	whorled
Campanulidae	whorled
Superrosidae	whorled
Rosidae	whorled
Malvidae	whorled
Fabidae	whorled



ML ancestral state reconstruction using rayDISC (R corHMM)
400_A. Gynoecium phyllotaxy (D2d), ARDeq model



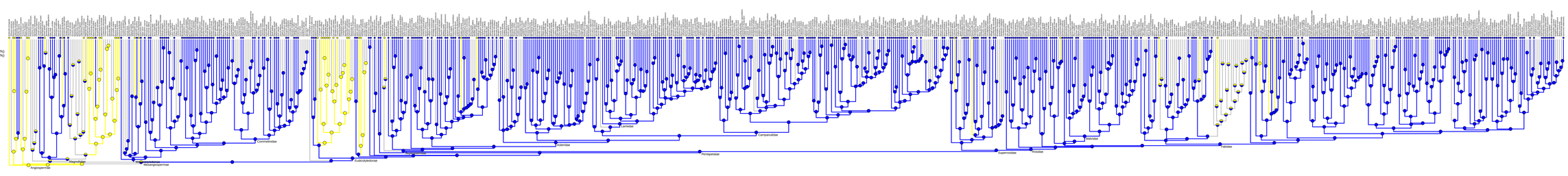
Node	ML state	Prob
Angiospermae	spiral	1
Mesangiospermae	spiral	1
Magnoliidae	spiral	1
Monocotyledonae	spiral	0.5145
Eudicotyledonae	spiral	0.9994
Commelinidae	whorled	0.9938
Ceratophyllidae	whorled	0.9976
Superasteridae	whorled	0.9976
Asteridae	whorled	1
Lamidae	whorled	1
Campanulidae	whorled	1
Pentapetalae	whorled	0.9795
Rosidae	whorled	0.9795
Malvidae	whorled	1
Fabidae	whorled	1

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	-39.93	2	83.86	83.87	1.39	0.31	1e-04	0.0084
ARDeq**	-39.24	2	82.47	82.49	0	0.63	1e-04	0.0084
ER	-51.55	1	105.1	105.1	22.61	0	4e-04	4e-04
UN01	-53.06	1	108.13	108.13	25.64	0	4e-04	
UN10	-42.6	1	87.21	87.21	4.73	0.06		0.0098

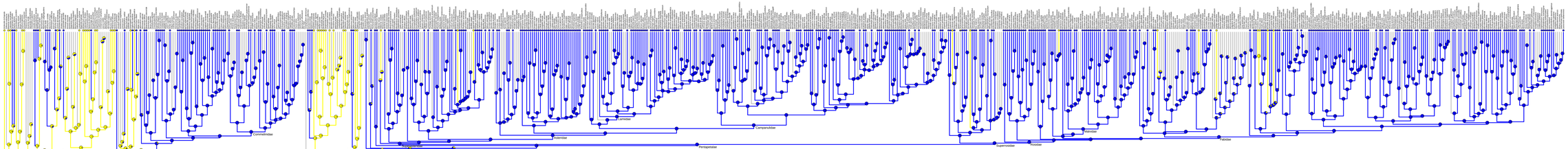
MP ancestral state reconstruction using ancestral.pars
(R phangorn)
403_A. Fusion of ovaries (binary) (D2c), 23 steps

free (<5%)
fused (>5%)

Node	MP state(s)
Angiospermae	free (<5%)
Mesangiospermae	free (<5%) / fused (>5%)
Magnoliidae	free (<5%) / fused (>5%)
Monocotyledonae	fused (>5%)
Eudicotyledonae	fused (>5%)
Commelinidae	fused (>5%)
Ceratophyllum	fused (>5%)
Superasteridae	fused (>5%)
Asteridae	fused (>5%)
Lamiidae	fused (>5%)
Campanulidae	fused (>5%)
Superrosidae	fused (>5%)
Rosidae	fused (>5%)
Malvidae	fused (>5%)
Fabidae	fused (>5%)



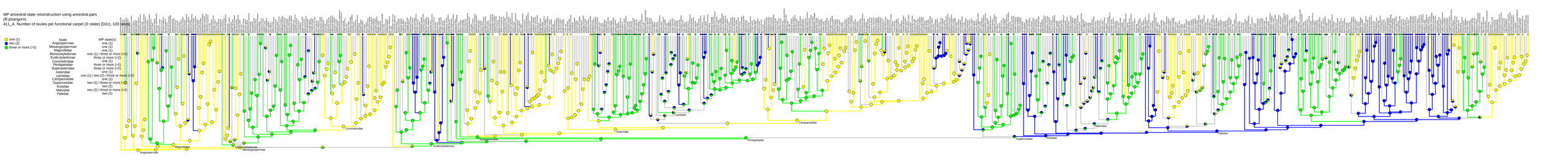
ML ancestral state reconstruction using rayDISC (R:corHMM)
403_A. Fusion of ovaries (binary) (D2c), ARD model



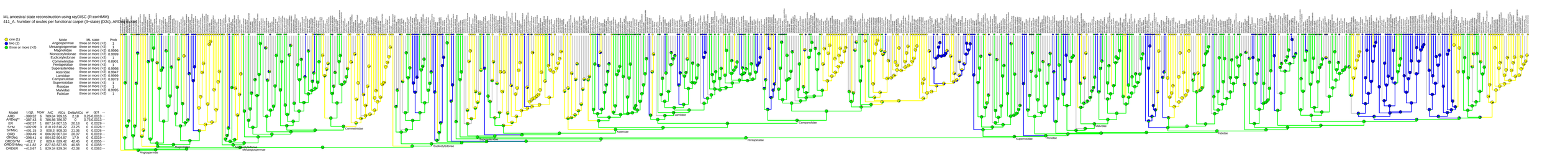
Node	ML state	Prob
Angiospermae	free (<5%)	1
Mesangiospermae	free (<5%)	1
Magnoliidae	free (<5%)	0.9999
Monocotyledoniae	free (<5%)	0.9461
Eudicotyledoniae	free (<5%)	0.9989
Commelinidae	fused (>5%)	1
Pentapetalae	fused (>5%)	0.9951
Superasteridae	fused (>5%)	0.9953
Asteridae	fused (>5%)	1
Lamidae	fused (>5%)	1
Campanulidae	fused (>5%)	1
Superrosidae	fused (>5%)	0.9995
Rosidae	fused (>5%)	0.9998
Malvidae	fused (>5%)	1
Fabidae	fused (>5%)	0.9998

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD***	−94.69	2	193.37	193.39	0	0.95	0.0053	5e−04
ARDeq	−102.29	2	208.58	208.6	15.21	0	6e−04	8e−04
ER	−102.68	1	207.36	207.36	13.97	0	8e−04	8e−04
UN01	−98.68	1	199.36	199.37	5.98	0.05	0.0113	
UN10	−106.84	1	215.69	215.69	22.31	0		9e−04

MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
411_A. Number of ovules per functional carpel (3–state) (D2c), 120 taxa



ML ancestral state reconstruction using rayDISC (R:corHMM)
411_A. Number of ovules per functional carpel (3-state) (D2c), ARD model



Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	---
ARD	-386.52	6	789.04	789.15	2.18	0.25	0.0013	---
ARDeq**	-387.43	6	786.86	786.97	0	0.75	0.0013	---
ER	-402.57	1	807.14	807.15	20.18	0	0.0029	---
SYM	-401.15	3	808.31	808.43	21.46	0	0.0026	---
SYMeq	-401.15	3	808.3	808.23	21.39	0	0.0026	---
ORD	-399.49	4	806.99	807.04	20.07	0	0.0019	---
ORDeq	-398.41	4	804.82	804.87	17.9	0	0.0019	---
ORDSYM	-412.7	2	829.4	829.42	42.45	0	0.0055	---
ORDSYMeq	-411.82	2	827.63	827.65	40.68	0	0.0055	---
ORDER	-413.67	1	829.34	829.34	42.38	0	0.0063	---