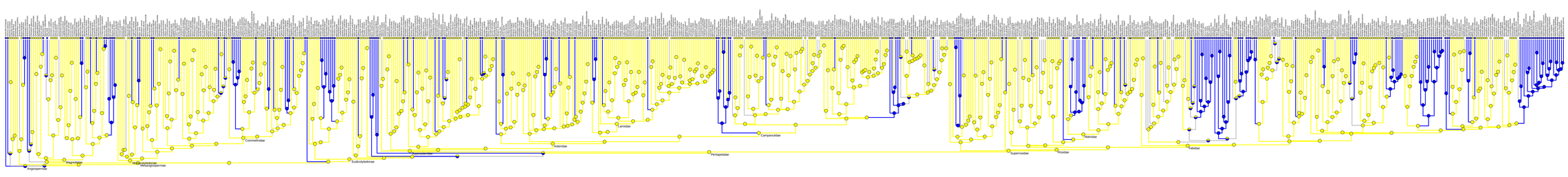
MP ancestral state reconstruction using ancestral pars
(R phangorn)
100_A. Functional sex of flowers (D2d), 96 steps

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

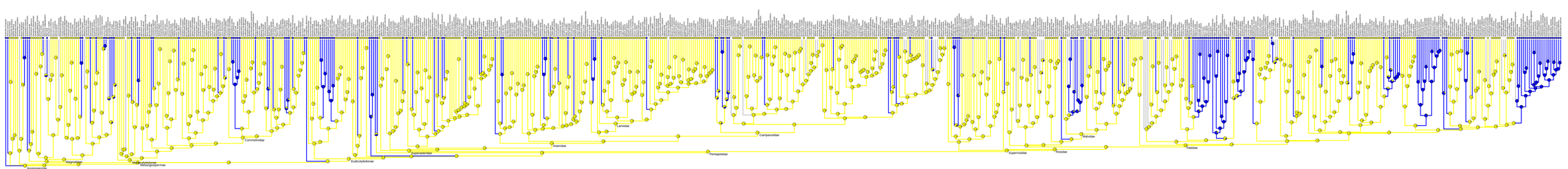


ML ancestral state reconstruction using rayDISC (R:corHMM) 100_A. Functional sex of flowers (0/2d), ARDeq model

bisexual
unisexual

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

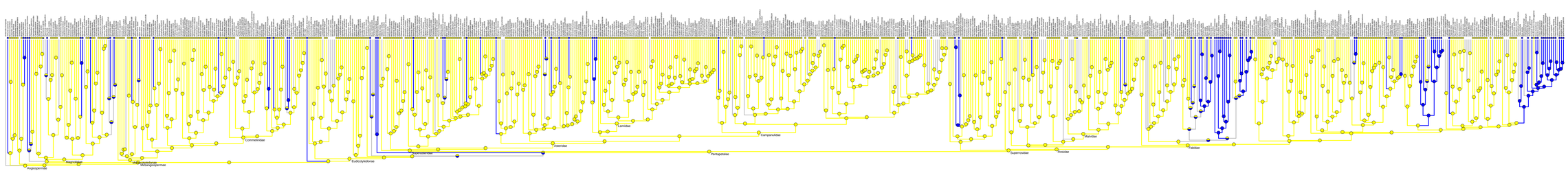
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	-311.35	2	626.69	626.71	1.38	0.21	0.0029	6e−04
ARDeq*	-310.95	2	625.91	625.32	0	0.42	0.0029	6e−04
ER	-314.41	1	630.81	630.82	5.49	0.03	0.0029	0.0029
UN01	-311.97	1	625.73	625.74	0.41	0.34	0.003	
UN10	-354.14	1	710.28	710.29	84.96	0		0.012



MP ancestral state reconstruction using ancestral pars
(R phangorn)
100_B. Structural sex of flowers (02d), 55 steps

bisexual
unisexual

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

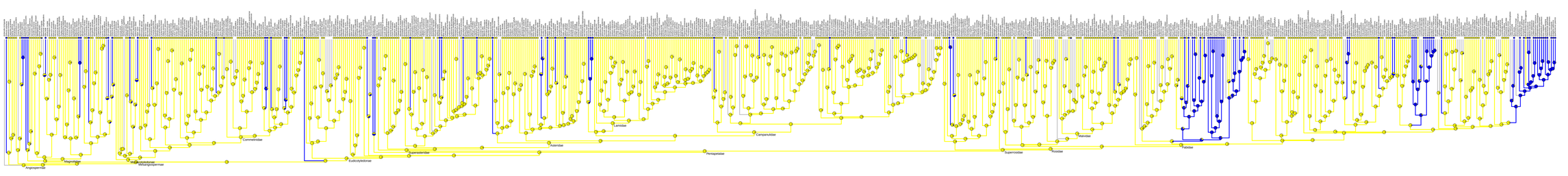


ML ancestral state reconstruction using rayDISC (R:corHMM) 100_B. Structural sex of flowers (D2d), ARDeq model

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
Ceratophyllidae	bisexual	1
Superasteridae	bisexual	1
Asteridae	bisexual	1
Lamidae	bisexual	0.9999
Campanulidae	bisexual	1
Superrosidae	bisexual	1
Rosidae	bisexual	1
Malvidae	bisexual	1
Fabidae	bisexual	0.9998

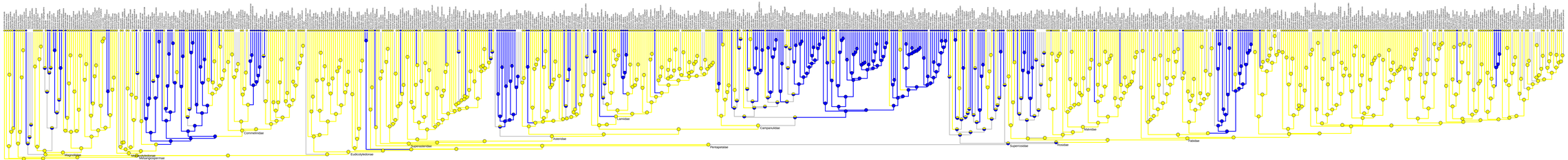
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−206.94	2	417.87	417.89	1.36	0.3	0.0015	0.0039
ARDeq**	−206.26	2	416.51	416.53	0	0.59	0.0015	0.0038
ER	−208.93	1	419.85	419.86	3.33	0.11	0.0016	0.0016
UNI01	−223.89	1	449.78	449.79	33.26	0	0.0017	
UNI10	−230.84	1	463.67	463.68	47.15	0		0.0167



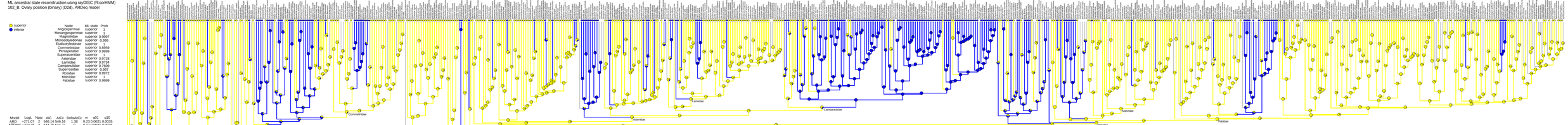
MP ancestral state reconstruction using ancestral pars
(R:phangorn)
102_B. Ovary position (binary) (D2d), 81 steps

- superior
- inferior

Node	MP state(s)
Angiospermae	superior
Mesangiospermae	superior
Magnoliidae	superior
Monocotyledonae	superior
Eudicotyledonae	superior
Commelinidae	superior
Pentapetalae	superior
Superasteridae	superior
Asteridae	superior
Lamidae	superior
Campanulidae	superior
Supercoidae	superior / inferior
Rosidae	superior / inferior
Malvidae	superior
Fabidae	superior



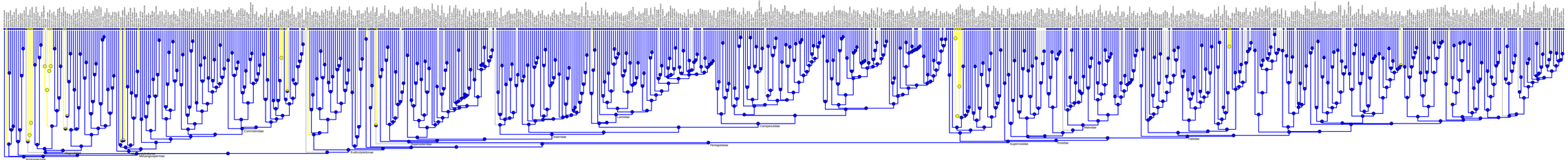
ML ancestral state reconstruction using rayDISC (R:corHMM)
102_B. Ovary position (binary) (D2d), ARDeq model



MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
201_A. Perianth presence (D2c), 20 steps

absent
present

node	MP state(s)
Angiospermae	present
Mesangiospermae	present
Magnoliidae	present
Monocotyledoneae	present
Eudicotyledoneae	present
Commelinidae	present
Ceratophyllum	present
Superasteridae	present
Asteridae	present
Lamiidae	present
Campanulidae	present
Superrosidae	present
Rosidae	present
Malvidae	present
Fabidae	present

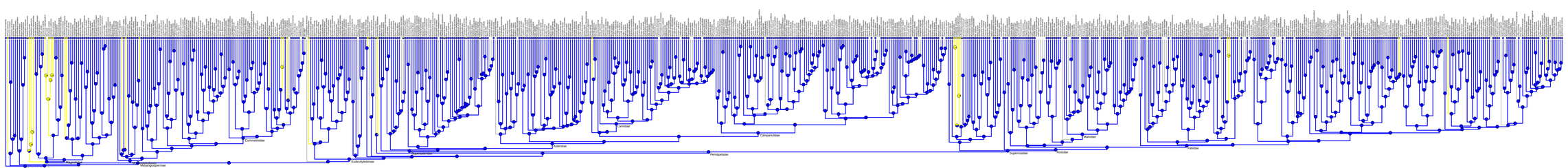


ML ancestral state reconstruction using ray[DISC (R:corHMM)
201_A. Perianth presence (D2c), UNI10 model

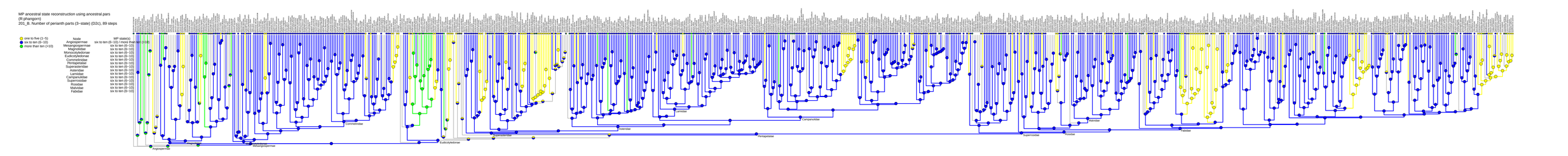
absent
present

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

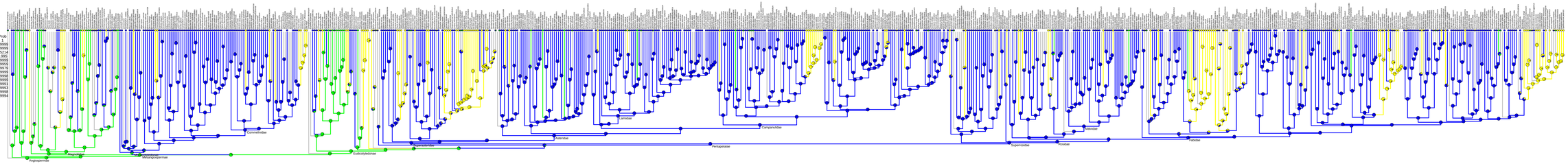
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−95.82	2	195.63	195.65	2.01	0.13	0	5e−04
ARDeq	−95.12	2	194.25	194.26	0.62	0.26	0	5e−04
ER	−96.11	1	194.22	194.22	0.58	0.26	5e−04	5e−04
UNI01	−109.95	1	221.9	221.91	28.27	0	0.0225	
UNI10*	−95.82	1	193.63	193.64	0	0.35		5e−04



MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
201_B. Number of perianth parts (3–state) (D2c), 89 steps



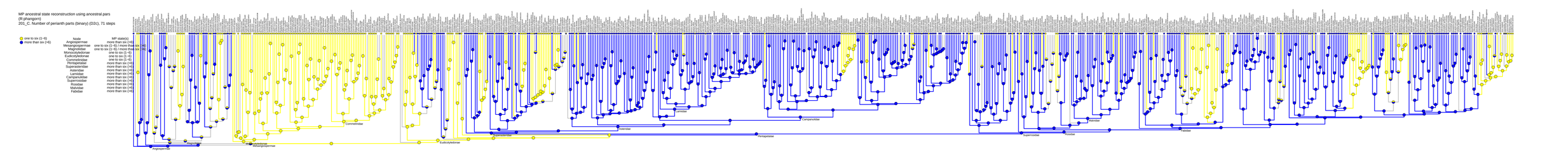
ML ancestral state reconstruction using rayDISC (RcorHMM)
201_B. Number of perianth parts (3–state) (D2c), ARDeq model



Node	ML state	Prob
Angiospermae	more than ten (>10)	1
Mesangiospermae	more than ten (>10)	0.9999
Magnoliidae	more than ten (>10)	0.9999
Monocotyledonae	six to ten (6–10)	0.5214
Eudicotyledonae	more than ten (>10)	0.995
Commelinidae	six to ten (6–10)	0.9999
Pentapetalae	six to ten (6–10)	0.9999
Superasteridae	six to ten (6–10)	0.9979
Asteridae	six to ten (6–10)	0.9999
Lamiidae	six to ten (6–10)	0.9998
Campanulidae	six to ten (6–10)	0.9999
Superrosidae	six to ten (6–10)	0.9991
Rosidae	six to ten (6–10)	0.9993
Malvidae	six to ten (6–10)	0.9998
Fabidae	six to ten (6–10)	0.9994

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	...
ARD	−329	6	670	670.11	2.2	0.25	0.0047	...
ARDeq*	−327.9	6	667.81	667.91	0	0.74	0.0047	...
ER	−356.1	1	714.2	714.2	46.29	0	0.0013	...
SYM	−344.03	3	694.05	694.09	26.17	0	0.0022	...
SYMeq	−342.96	3	691.92	691.95	24.03	0	0.0022	...
ORD	−334.95	4	677.9	677.95	10.03	0	0.0048	...
ORDeq	−333.85	4	675.7	675.75	7.84	0.01	0.0048	...
ORDSYM	−346.35	2	696.69	696.71	28.79	0	0.0022	...
ORDSYMeq	−345.29	2	694.58	694.6	26.68	0	0.0022	...
ORDER	−356.72	1	715.44	715.44	47.53	0	0.0015	...

MP ancestral state reconstruction using ancestral.pars
(R phangorn)
201_C. Number of perianth parts (binary) (D2c), 71 steps

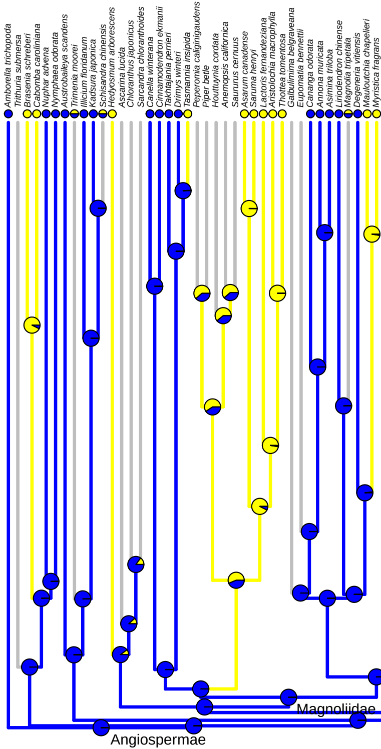


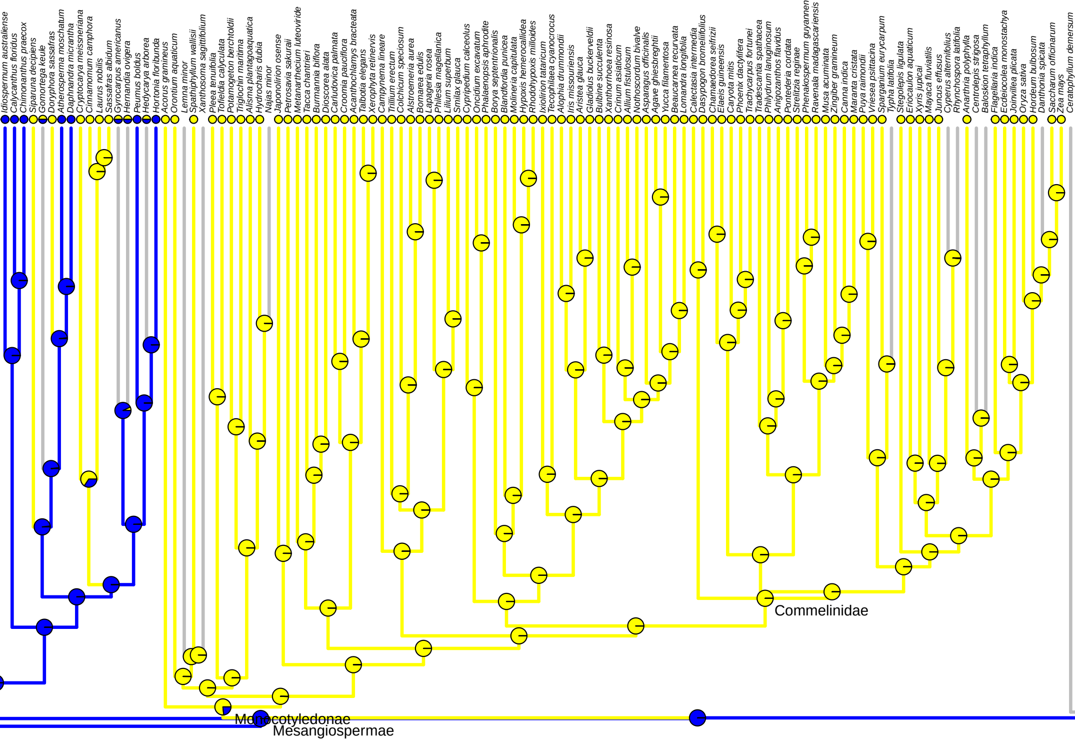
ML ancestral state reconstruction using rayDISC (R:corHMM)
201_C. Number of perianth parts (binary) (D2c), ARDeq model

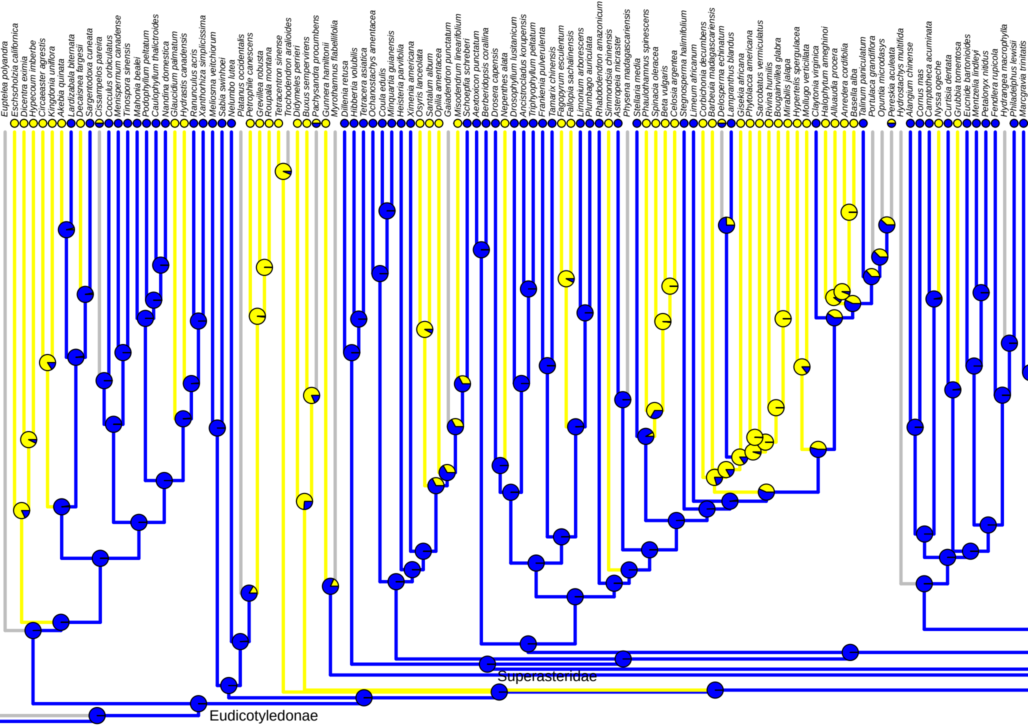
- 🟡 one to six (1−6)
- 🔵 more than six (>6)

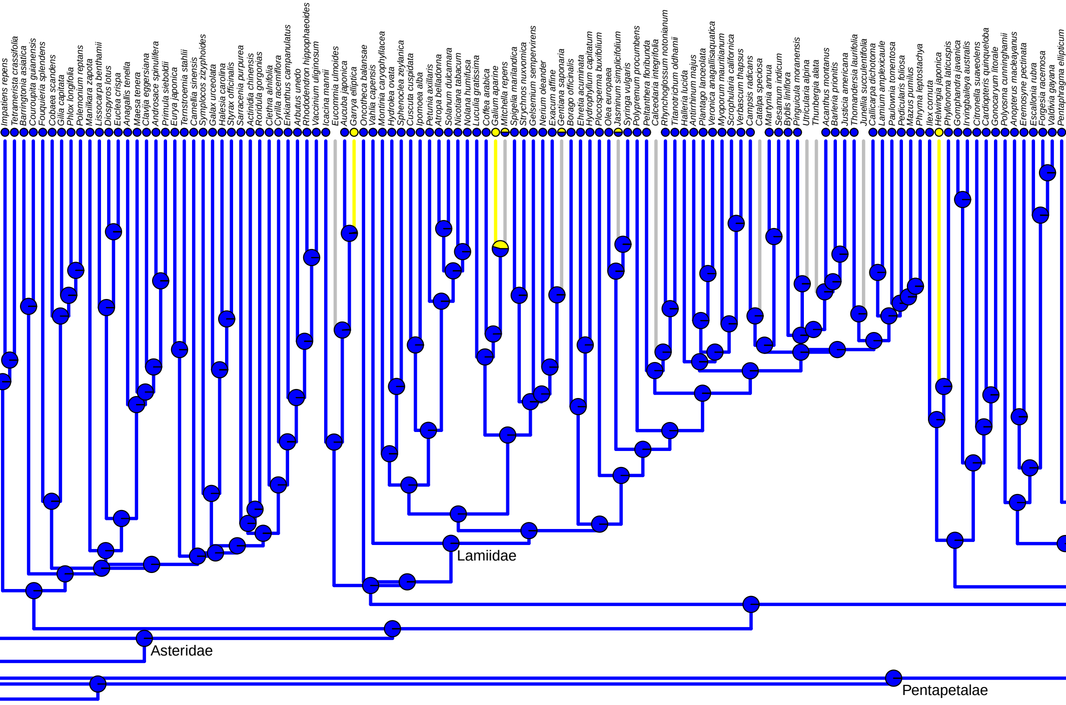
Node	ML state	Prob
Angiospermae	more than six (>6)	1
Mesangiospermae	more than six (>6)	1
Magnoliidae	more than six (>6)	1
Monocotyledonae	one to six (1−6)	0.7668
Eudicotyledonae	more than six (>6)	1
Commelinidae	one to six (1−6)	1
Pentapetalae	more than six (>6)	1
Superasteridae	more than six (>6)	1
Asteridae	more than six (>6)	1
Lamiidae	more than six (>6)	1
Campanulidae	more than six (>6)	1
Superrosidae	more than six (>6)	1
Rosidae	more than six (>6)	1
Malvidae	more than six (>6)	1
Fabidae	more than six (>6)	1

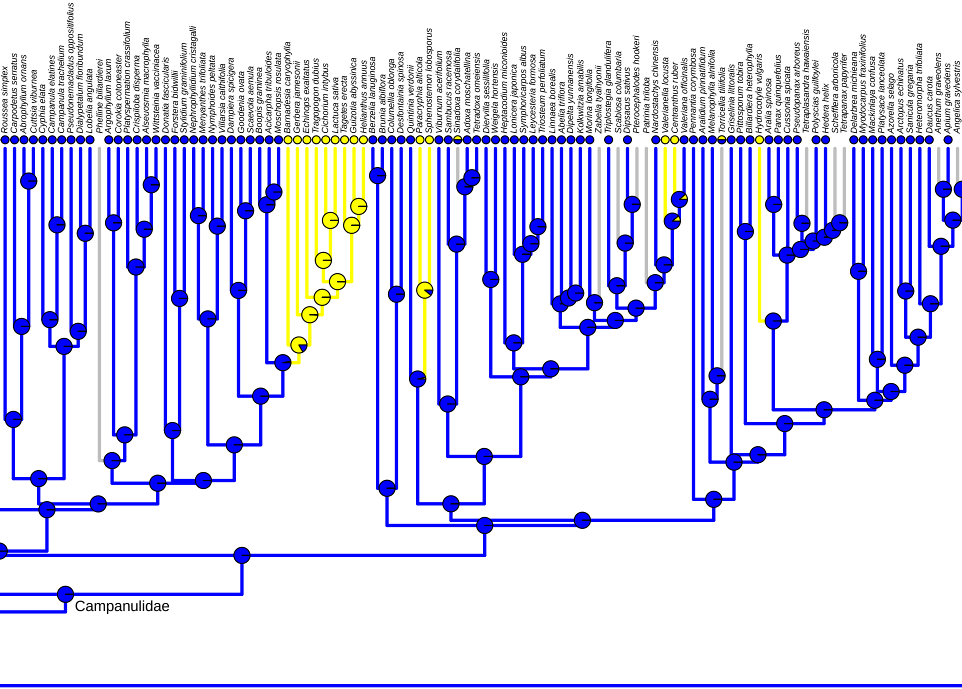
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−252.06	2	508.11	508.13	1.39	0.25	5e−04	0.0027
ARDeq*	−251.36	2	506.72	506.74	0	0.49	5e−04	0.0027
ER	−258.22	1	518.45	518.45	11.71	0	0.0022	0.0022
UNI01	−324.04	1	650.07	650.08	143.34	0	0.0083	
UNI10	−253.02	1	508.03	508.04	1.3	0.26		0.0029

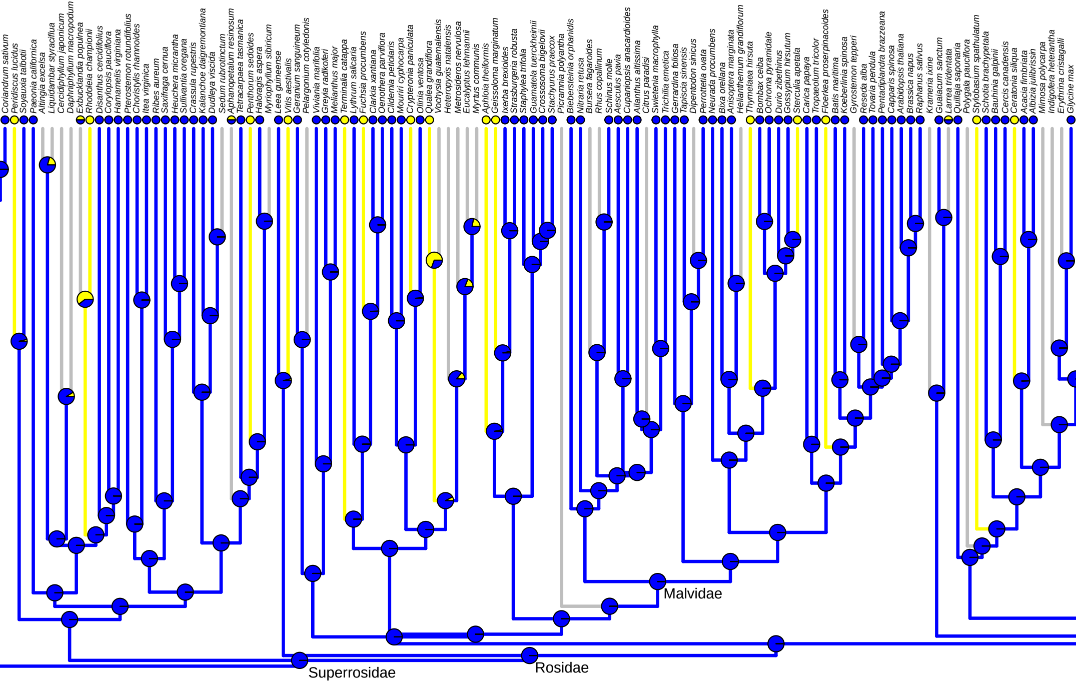


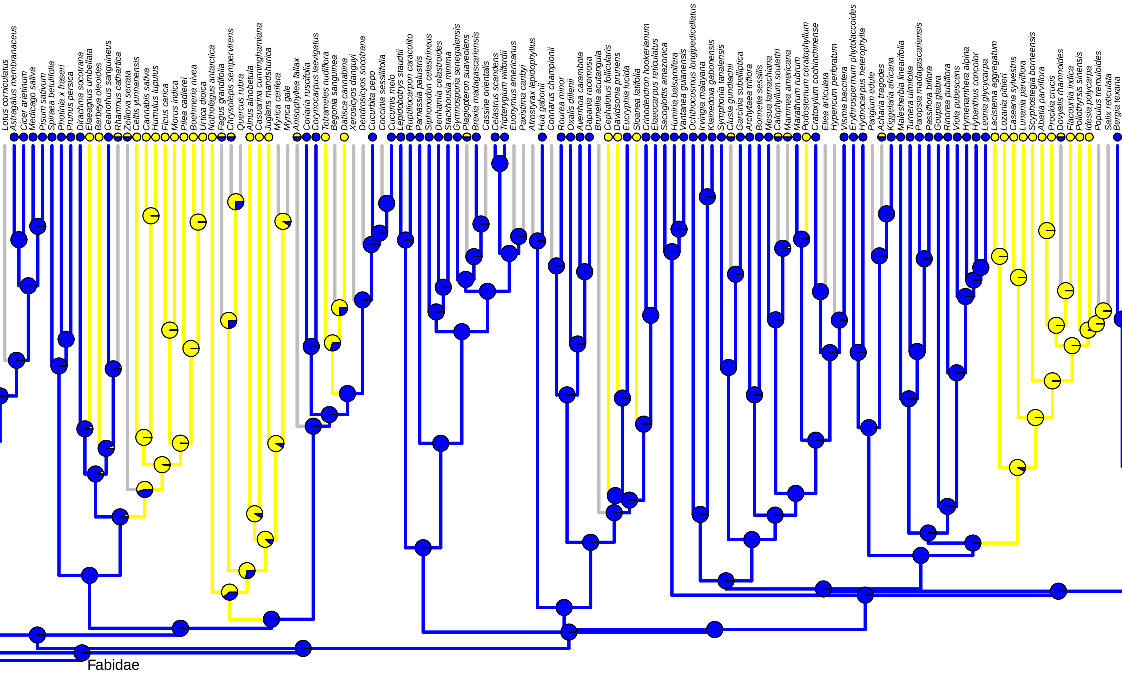

Idiospermum australiense
Calycanthus floridus
Chimonanthus praecox
Siparuna decipiens
Gomortega keule
Doryphora sassafras
Atherosperma moschatum
Daphnandra micrantha
Cryptocarya meissneriana
Cinnamomum camphora
Laurus nobilis
Sassafras albidum
Gyrocarpus americanus
Hernandia ovigera
Peumus boldus
Hedycarya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

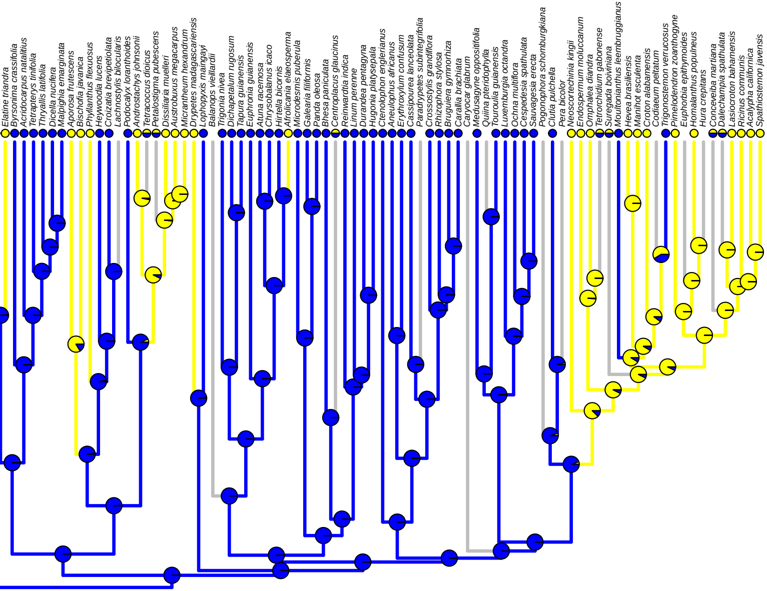

Euptelea polyandra
Eschscholzia californica
Dicentra eximia
Hypecoum imberbe
Circaeaster agrestis
Kingdonia uniflora
Akebia quinata
Lardizabala biternata
Decaisnea fargesii
Sargentodoxa cuneata
Cissampelos pareira
Cocculus orbiculatus
Menispermum canadense
Tinospora sinensis
Mahonia bealei
Podophyllum 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
Ochanostachys amentacea
Coula edulis
Minquartia guianensis
Heisteria parvifolia
Ximenia americana
Osyris lanceolata
Santalum album
Opilia amentacea
Gaiadendron punctatum
Misodendrum linearifolium
Schoepfia schreberi
Aextoxicon punctatum
Berberidopsis corallina
Drosera capensis
Nepenthes alata
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
Beta vulgaris
Celosia argentea
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Delosperma echinatum
Lampranthus blandus
Gisekia africana
Phytolacca americana
Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Claytonia virginica
Halophytum ameghinoi
Alluaudia procera
Anredera cordifolia
Basella alba
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Hydrostachys multifida
Alangium chinense
Cornus mas
Camptotheca acuminata
Nyssa ogeche
Curtisia dentata
Grubbia tomentosa
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Fendlera rupicola
Hydrangea macrophylla
Philadelphus lewisii
Marcgravia trinitatis
Superasteridae
Eudicotyledonae


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

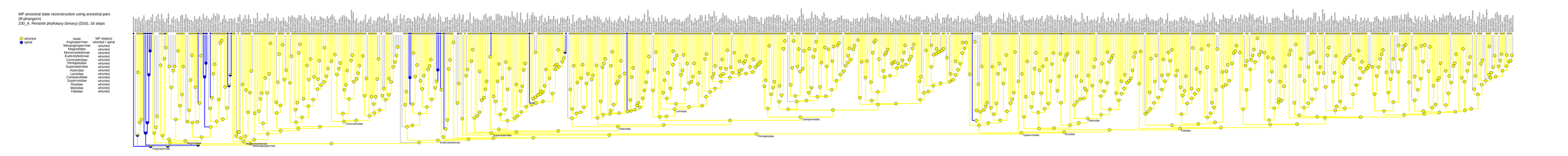

Roussea simplex
Carpodetus serratus
Abrophyllum ornans
Cuttsia viburnea
Cyphia elata
Campanula elatines
Campanula trachelium
Pseudonemacladus oppositifolius
Dialypetalum floribundum
Lobelia angulata
Phelline billardierei
Argophyllum laxum
Corokia cotoneaster
Platyspermation crassifolium
Crispiloba disperma
Alseuosmia macrophylla
Wittsteinia vacciniacea
Donatia fascicularis
Forstera bidwillii
Stylidium graminifolium
Nephrophyllidium cristagalli
Menyanthes trifoliata
Nymphoides peltata
Villarsia calthifolia
Dampiera spicigera
Goodenia ovata
Scaevola aemula
Boopis graminea
Acicarpha tribuloides
Moschopsis rosulata
Barnadesia caryophylla
Gerbera jamesonii
Echinops exaltatus
Tragopogon dubius
Cichorium intybus
Lactuca sativa
Tagetes erecta
Guizotia abyssinica
Helianthus annuus
Berzelia lanuginosa
Brunia albiflora
Columellia oblonga
Desfontainia spinosa
Quintinia verdonii
Paracryphia alticola
Sphenostemon lobosporus
Viburnum acerifolium
Sambucus racemosa
Sinadoxa corydalifolia
Adoxa moschatellina
Tetradoxa omeiensis
Diervilla sessilifolia
Weigela hortensis
Heptacodium miconioides
Lonicera japonica
Symphoricarpos albus
Leycesteria formosa
Triosteum perfoliatum
Linnaea borealis
Abelia triflora
Dipelta yunnanensis
Kolkwitzia amabilis
Morina longifolia
Zabelia tyaihyonii
Triplostegia glandulifera
Scabiosa columbaria
Dipsacus sativus
Pterocephalodes hookeri
Patrinia triloba
Nardostachys chinensis
Valerianella locusta
Centranthus ruber
Valeriana officinalis
Pennantia corymbosa
Aralidium pinnatifidum
Melanophylla alnifolia
Torricellia tiliifolia
Griselinia littoralis
Pittosporum tobira
Billardiera heterophylla
Hydrocotyle vulgaris
Aralia spinosa
Panax quinquefolius
Cussonia spicata
Pseudopanax arboreus
Tetraplasandra hawaiensis
Polyscias guilfoylei
Hedera helix
Schefflera arboricola
Tetrapanax papyrifer
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


Coriandrum sativum
Peridiscus lucidus
Soyauxia talbotii
Paeonia californica
Altingia excelsa
Liquidambar styraciflua
Cercidiphyllum japonicum
Daphniphyllum macropodum
Exbucklandia populnea
Rhodoleia championii
Disanthus cercidifolius
Corylopsis pauciflora
Hamamelis virginiana
Pterostemon rotundifolius
Choristylis rhamnoides
Itea virginica
Ribes aureum
Saxifraga cernua
Heuchera micrantha
Sullivantia oregana
Crassula rupestris
Kalanchoe daigremontiana
Dudleya viscida
Sedum rubrotinctum
Aphanopetalum resinosum
Tetracarpaea tasmanica
Penthorum sedoides
Haloragis aspera
Myriophyllum sibiricum
Leea guineense
Vitis aestivalis
Geranium sanguineum
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
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
Aphloia theiformis
Geissoloma marginatum
Ixerba brexioides
Strasburgeria robusta
Staphylea trifolia
Guamatela tuerckheimii
Crossosoma bigelovii
Stachyurus praecox
Picramnia polyantha
Biebersteinia orphanidis
Nitraria retusa
Bursera fagaroides
Rhus copallinum
Schinus molle
Aesculus pavia
Cupaniopsis anacardioides
Ailanthus altissima
Citrus paradisi
Swietenia macrophylla
Trichilia emetica
Gerrardina foliosa
Tapiscia sinensis
Dipentodon sinicus
Perrottetia ovata
Neurada procumbens
Bixa orellana
Anisoptera marginata
Helianthemum grandiflorum
Thymelaea hirsuta
Bombax ceiba
Ochroma pyramidale
Durio zibethinus
Gossypium hirsutum
Sterculia apetala
Carica papaya
Tropaeolum tricolor
Floerkea proserpinacoides
Batis maritima
Koeberlinia spinosa
Gyrostemon tepperi
Reseda alba
Tovaria pendula
Pentadiplandra brazzeana
Capparis spinosa
Arabidopsis thaliana
Brassica napus
Raphanus sativus
Krameria ixine
Guaiacum sanctum
Larrea tridentata
Quillaja saponaria
Polygala pauciflora
Stylobasium spathulatum
Schotia brachypetala
Bauhinia galpinii
Cercis canadensis
Ceratonia siliqua
Acacia fimbriata
Albizia julibrissin
Mimosa polycarpa
Indigofera heterantha
Erythrina cristagalli
Glycine max
Malvidae
Superrosidae
Rosidae

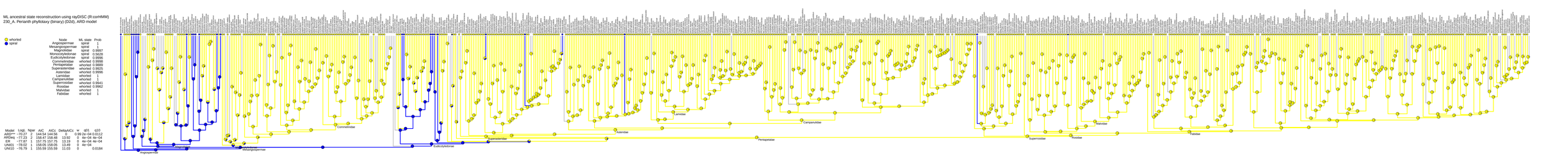

Lotus corniculatus
Astragalus membranaceus
Cicer arietinum
Medicago sativa
Pisum sativum
Spiraea betulifolia
Photinia x fraseri
Prunus persica
Dirachma socotrana
Elaeagnus umbellata
Barbeya oleoides
Ceanothus sanguineus
Rhamnus cathartica
Zelkova serrata
Celtis yunnanensis
Cannabis sativa
Humulus lupulus
Ficus carica
Morus indica
Pilea cadierei
Boehmeria nivea
Urtica dioica
Nothofagus antarctica
Fagus grandifolia
Chrysolepis sempervirens
Quercus rubra
Alnus alnobetula
Casuarina cunninghamiana
Juglans mandshurica
Myrica cerifera
Myrica gale
Anisophyllea fallax
Coriaria ruscifolia
Corynocarpus laevigatus
Tetrameles nudiflora
Begonia sanguinea
Datisca cannabina
Xerosicyos danguyi
Dendrosicyos socotrana
Cucurbita pepo
Coccinia sessilifolia
Cucumis melo
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
Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
Oxalis dillenii
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Cephalotus follicularis
Davidsonia pruriens
Eucryphia lucida
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Sacoglottis amazonica
Humiria balsamifera
Vantanea guianensis
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
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
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Goupia glabra
Rinorea pubiflora
Viola pubescens
Hymenanthera alpina
Hybanthus concolor
Leonia glycycarpa
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
Fabidae


Elatine triandra
Byrsonima crassifolia
Acridocarpus natalitius
Tetrapterys tinifolia
Thryallis latifolia
Dicella nucifera
Malpighia emarginata
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Dissiliaria muelleri
Austrobuxus megacarpus
Micrantheum hexandrum
Drypetes madagascariensis
Lophopyxis maingayi
Balanops vieillardii
Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Atuna racemosa
Chrysobalanus icaco
Hirtella bicornis
Afrolicania elaeosperma
Microdesmis puberula
Galearia filiformis
Panda oleosa
Bhesa paniculata
Centroplacus glaucinus
Reinwardtia indica
Linum perenne
Durandea pentagyna
Hugonia platysepala
Ctenolophon englerianus
Aneulophus africanus
Erythroxylum confusum
Cassipourea lanceolata
Paradrypetes subintegrifolia
Crossostylis grandiflora
Rhizophora stylosa
Bruguiera gymnorhiza
Carallia brachiata
Caryocar glabrum
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Endospermum moluccanum
Omphalea diandra
Tetrorchidium gabonense
Suregada boiviniana
Moultonianthus leembruggianus
Hevea brasiliensis
Manihot esculenta
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Conceveiba martiana
Dalechampia spathulata
Lasiocroton bahamensis
Ricinus communis
Acalypha californica
Spathiostemon javensis

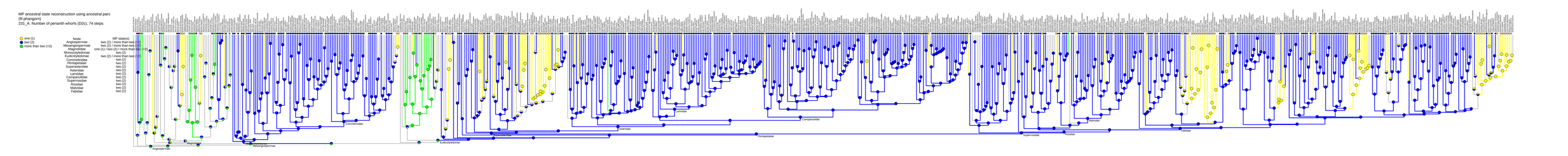
MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
230_A. Perianth phyllotaxy (binary) (D2d), 16 steps



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), 74 steps

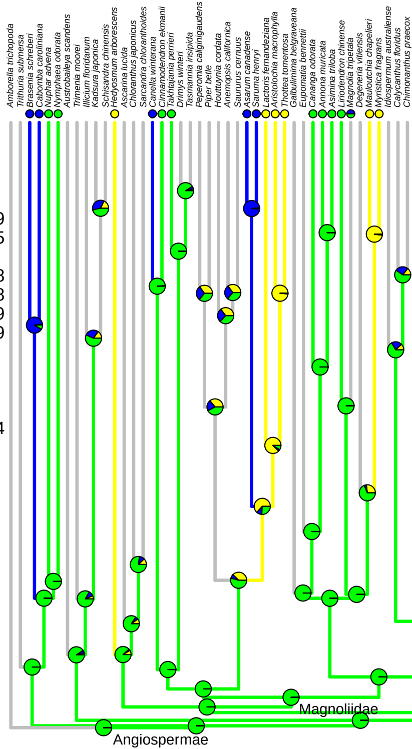


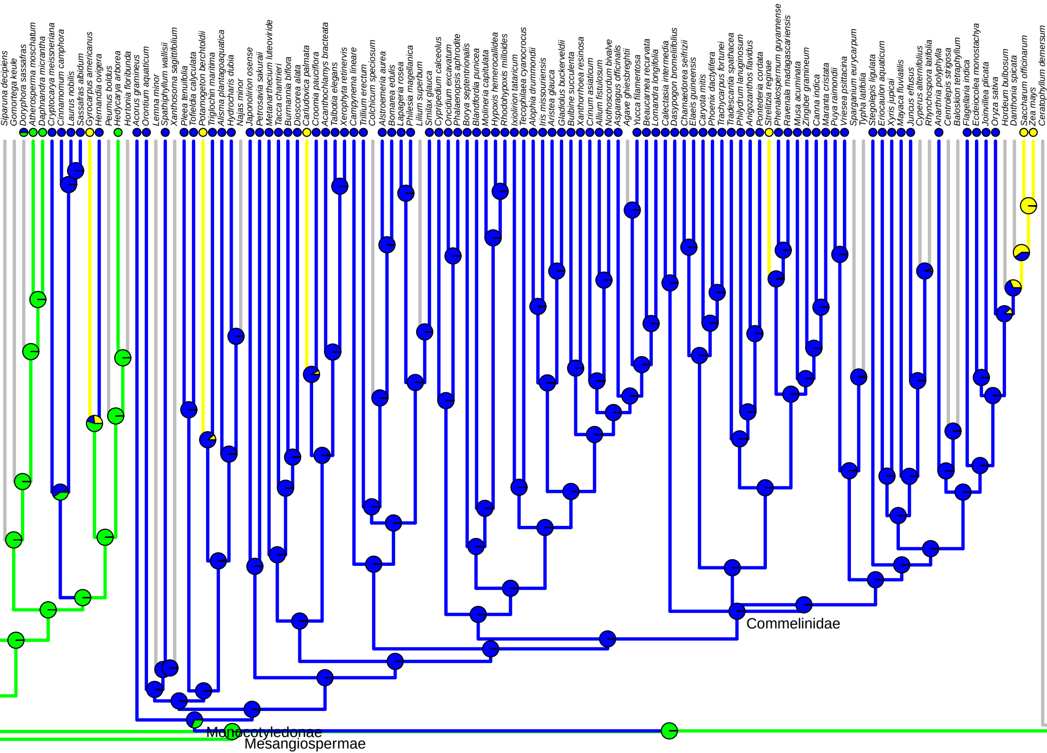
ML ancestral state reconstruction using rayDISC (R:corHMM)
231_A. Number of perianth whorls (D2c), ARDeq model

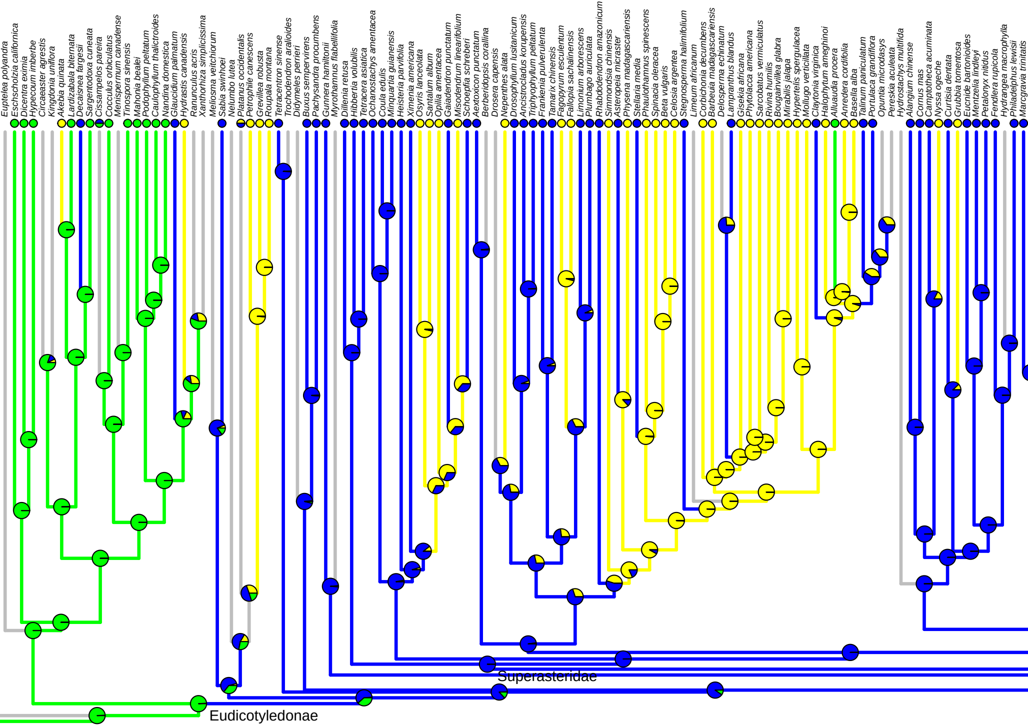
- 🟡 one (1)
- 🔵 two (2)
- 🟢 more than two (>2)

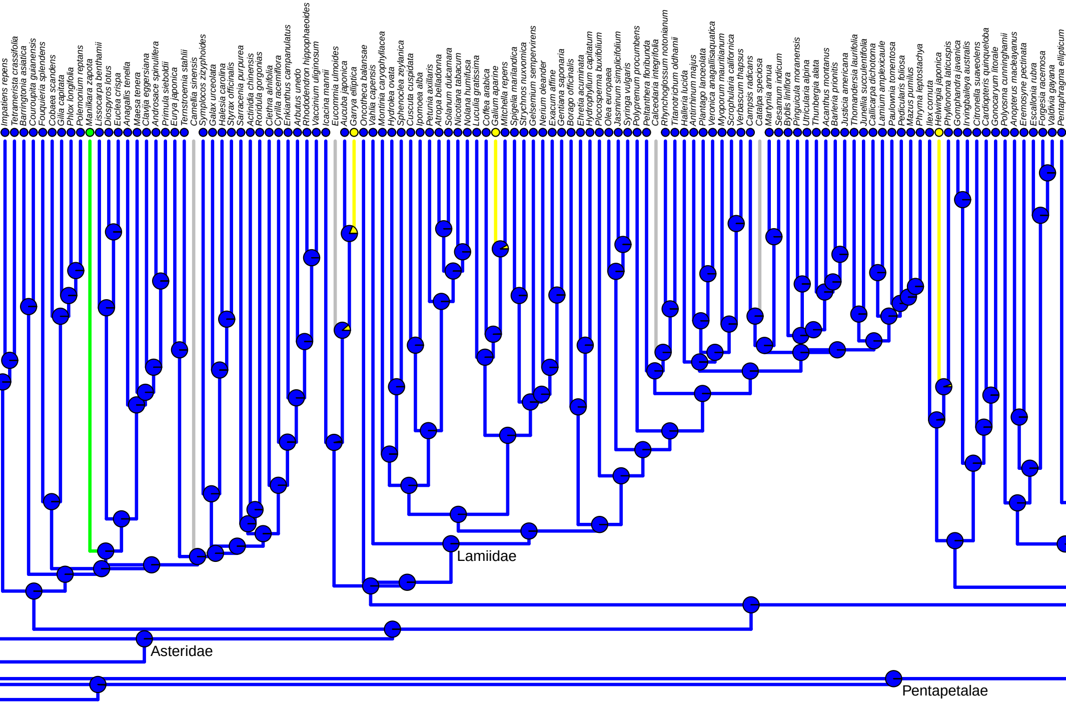
Node	ML state	Prob
Angiospermae	more than two (>2)	1
Mesangiospermae	more than two (>2)	1
Magnoliidae	more than two (>2)	1
Monocotyledonae	two (2)	0.6869
Eudicotyledonae	more than two (>2)	0.9905
Commelinidae	two (2)	1
Pentapetalae	two (2)	0.9998
Superasteridae	two (2)	0.9998
Asteridae	two (2)	0.9999
Lamiidae	two (2)	0.9999
Campanulidae	two (2)	1
Superrosidae	two (2)	1
Rosidae	two (2)	1
Malvidae	two (2)	1
Fabidae	two (2)	0.9994

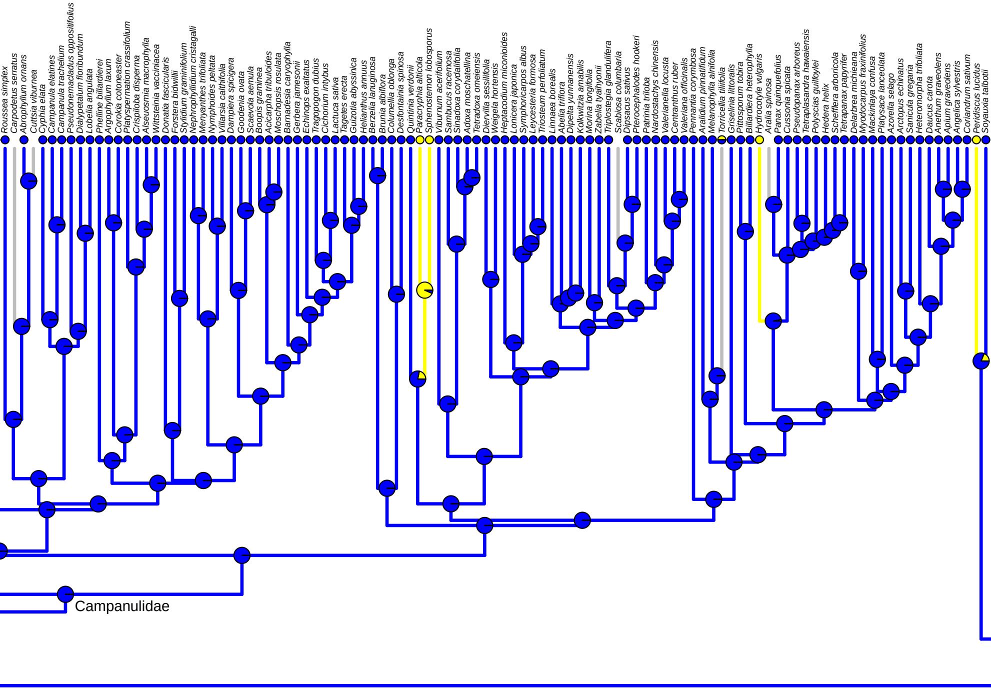
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	···
ARD	−271.02	6	554.05	554.15	2.2	0.25	0.0048	···
ARDeq**	−269.92	6	551.85	551.96	0	0.75	0.0048	···
ER	−312.72	1	627.43	627.44	75.48	0	0.0011	···
SYM	−294.12	3	594.23	594.26	42.31	0	0.0019	···
SYMeq	−293.14	3	592.29	592.32	40.36	0	0.0019	···
ORD	−279.31	4	566.61	566.66	14.71	0	0.0048	···
ORDeq	−278.21	4	564.42	564.47	12.51	0	0.0048	···
ORDSYM	−300.65	2	605.29	605.31	53.35	0	0.0019	···
ORDSYMeq	−299.57	2	603.15	603.16	51.21	0	0.0019	···
ORDER	−316.56	1	635.12	635.12	83.17	0	0.0012	···


Amborella trichopoda
Trithuria submersa
Brasenia schreberi
Cabomba caroliniana
Nuphar advena
Nymphaea odorata
Austrobaileya scandens
Trimenia moorei
Illicium floridanum
Kadsura japonica
Schisandra chinensis
Hedyosmum arborescens
Ascarina lucida
Chloranthus japonicus
Sarcandra chloranthoides
Canella winterana
Cinnamodendron ekmanii
Takhtajania perrieri
Drimys winteri
Tasmannia insipida
Peperomia caliginigaudens
Piper betle
Houttuynia cordata
Anemopsis californica
Saururus cernuus
Asarum canadense
Saruma henryi
Lactoris fernandeziana
Aristolochia macrophylla
Thottea tomentosa
Galbulimima belgraveana
Eupomatia bennettii
Cananga odorata
Annona muricata
Asimina triloba
Liriodendron chinense
Magnolia tripetala
Degeneria vitiensis
Mauloutchia chapelieri
Myristica fragrans
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
Lemna minor
Spathiphyllum wallisii
Xanthosoma sagittifolium
Pleea tenuifolia
Tofieldia calyculata
Potamogeton berchtoldii
Triglochin maritima
Alisma plantagoaquatica
Hydrocharis dubia
Najas minor
Japonolirion osense
Petrosavia sakuraii
Metanarthecium luteoviride
Tacca chantrieri
Burmannia biflora
Dioscorea alata
Carludovica palmata
Croomia pauciflora
Acanthochlamys bracteata
Talbotia elegans
Xerophyta retinervis
Campynema lineare
Trillium erectum
Colchicum speciosum
Alstroemeria aurea
Bomarea edulis
Lapageria rosea
Philesia magellanica
Lilium superbum
Smilax glauca
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
Crinum asiaticum
Allium fistulosum
Nothoscordum bivalve
Asparagus officinalis
Agave ghiesbreghtii
Yucca filamentosa
Beaucarnea recurvata
Lomandra longifolia
Calectasia intermedia
Dasypogon bromeliifolius
Chamaedorea seifrizii
Elaeis guineensis
Caryota mitis
Phoenix dactylifera
Trachycarpus fortunei
Tradescantia spathacea
Philydrum lanuginosum
Anigozanthos flavidus
Pontederia cordata
Strelitzia reginae
Phenakospermum guyannense
Ravenala madagascariensis
Musa acuminata
Zingiber gramineum
Canna indica
Maranta cristata
Puya raimondii
Vriesea psittacina
Sparganium eurycarpum
Typha latifolia
Stegolepis ligulata
Eriocaulon aquaticum
Xyris jupicai
Mayaca fluviatilis
Juncus effusus
Cyperus alternifolius
Rhynchospora latifolia
Anarthria polyphylla
Centrolepis strigosa
Baloskion tetraphyllum
Flagellaria indica
Ecdeiocolea monostachya
Joinvillea plicata
Oryza sativa
Hordeum bulbosum
Danthonia spicata
Saccharum officinarum
Zea mays
Ceratophyllum demersum
Commelinidae
Monocotyledonae
Mesangiospermae


Euptelea polyandra
Eschscholzia californica
Dicentra eximia
Hypecoum imberbe
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
Ochanostachys amentacea
Coula edulis
Minquartia guianensis
Heisteria parvifolia
Ximenia americana
Osyris lanceolata
Santalum album
Opilia amentacea
Gaiadendron punctatum
Misodendrum linearifolium
Schoepfia schreberi
Aextoxicon punctatum
Berberidopsis corallina
Drosera capensis
Nepenthes alata
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
Beta vulgaris
Celosia argentea
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Delosperma echinatum
Lampranthus blandus
Gisekia africana
Phytolacca americana
Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Claytonia virginica
Halophytum ameghinoi
Alluaudia procera
Anredera cordifolia
Basella alba
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Hydrostachys multifida
Alangium chinense
Cornus mas
Camptotheca acuminata
Nyssa ogeche
Curtisia dentata
Grubbia tomentosa
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Fendlera rupicola
Hydrangea macrophylla
Philadelphus lewisii
Marcgravia trinitatis
Superasteridae
Eudicotyledonae


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


Roussea simplex
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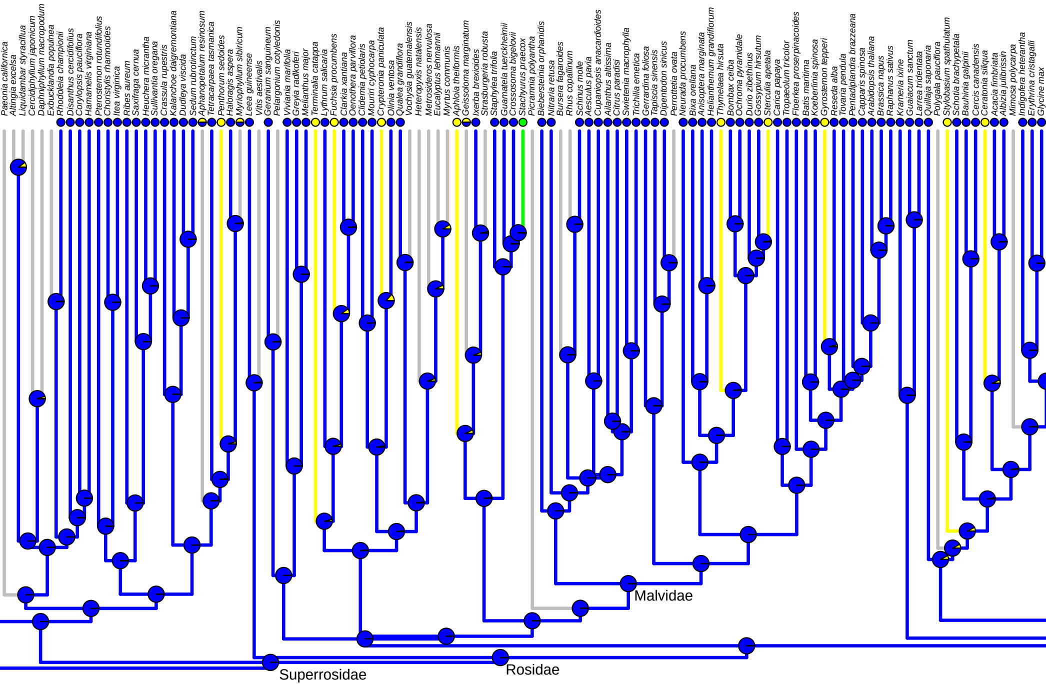
Abrophyllum ornans
Cuttsia viburnea
Cyphia elata
Campanula elatines
Campanula trachelium
Pseudonemacladus oppositifolius
Dialypetalum floribundum
Lobelia angulata
Phelline billardierei
Argophyllum laxum
Corokia cotoneaster
Platyspermation crassifolium
Crispiloba disperma
Alseuosmia macrophylla
Wittsteinia vacciniacea
Donatia fascicularis
Forstera bidwillii
Stylidium graminifolium
Nephrophyllidium cristagalli
Menyanthes trifoliata
Nymphoides peltata
Villarsia calthifolia
Dampiera spicigera
Goodenia ovata
Scaevola aemula
Boopis graminea
Acicarpha tribuloides
Moschopsis rosulata
Barnadesia caryophylla
Gerbera jamesonii
Echinops exaltatus
Tragopogon dubius
Cichorium intybus
Lactuca sativa
Tagetes erecta
Guizotia abyssinica
Helianthus annuus
Berzelia lanuginosa
Brunia albiflora
Columellia oblonga
Desfontainia spinosa
Quintinia verdonii
Paracryphia alticola
Sphenostemon lobosporus
Viburnum acerifolium
Sambucus racemosa
Sinadoxa corydalifolia
Adoxa moschatellina
Tetradoxa omeiensis
Diervilla sessilifolia
Weigela hortensis
Heptacodium miconioides
Lonicera japonica
Symphoricarpos albus
Leycesteria formosa
Triosteum perfoliatum
Linnaea borealis
Abelia triflora
Dipelta yunnanensis
Kolkwitzia amabilis
Morina longifolia
Zabelia tyaihyonii
Triplostegia glandulifera
Scabiosa columbaria
Dipsacus sativus
Pterocephalodes hookeri
Patrinia triloba
Nardostachys chinensis
Valerianella locusta
Centranthus ruber
Valeriana officinalis
Pennantia corymbosa
Aralidium pinnatifidum
Melanophylla alnifolia
Torricellia tiliifolia
Griselinia littoralis
Pittosporum tobira
Billardiera heterophylla
Hydrocotyle vulgaris
Aralia spinosa
Panax quinquefolius
Cussonia spicata
Pseudopanax arboreus
Tetraplasandra hawaiensis
Polyscias guilfoylei
Hedera helix
Schefflera arboricola
Tetrapanax papyrifer
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
Campanulidae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Altingia excelsa
Liquidambar styraciflua
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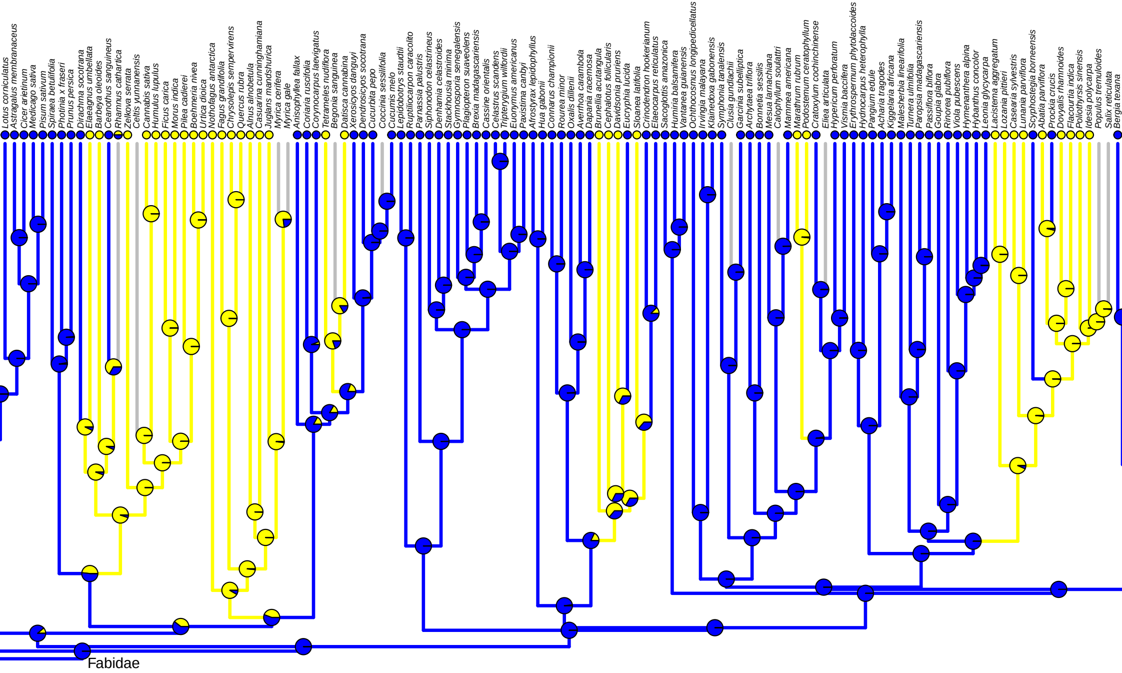
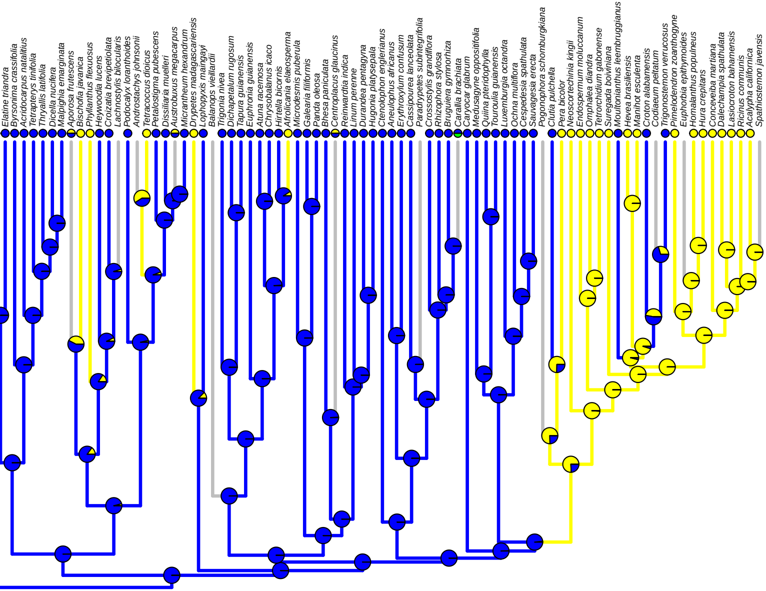
Daphniphyllum macropodum
Exbucklandia populnea
Rhodoleia championii
Disanthus cercidifolius
Corylopsis pauciflora
Hamamelis virginiana
Pterostemon rotundifolius
Choristylis rhamnoides
Itea virginica
Ribes aureum
Saxifraga cernua
Heuchera micrantha
Sullivantia oregana
Crassula rupestris
Kalanchoe daigremontiana
Dudleya viscida
Sedum rubrotinctum
Aphanopetalum resinosum
Tetracarpaea tasmanica
Penthorum sedoides
Haloragis aspera
Myriophyllum sibiricum
Leea guineense
Vitis aestivalis
Geranium sanguineum
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
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
Aphloia theiformis
Geissoloma marginatum
Ixerba brexioides
Strasburgeria robusta
Staphylea trifolia
Guamatela tuerckheimii
Crossosoma bigelovii
Stachyurus praecox
Picramnia polyantha
Biebersteinia orphanidis
Nitraria retusa
Bursera fagaroides
Rhus copallinum
Schinus molle
Aesculus pavia
Cupaniopsis anacardioides
Ailanthus altissima
Citrus paradisi
Swietenia macrophylla
Trichilia emetica
Gerrardina foliosa
Tapiscia sinensis
Dipentodon sinicus
Perrottetia ovata
Neurada procumbens
Bixa orellana
Anisoptera marginata
Helianthemum grandiflorum
Thymelaea hirsuta
Bombax ceiba
Ochroma pyramidale
Durio zibethinus
Gossypium hirsutum
Sterculia apetala
Carica papaya
Tropaeolum tricolor
Floerkea proserpinacoides
Batis maritima
Koeberlinia spinosa
Gyrostemon tepperi
Reseda alba
Tovaria pendula
Pentadiplandra brazzeana
Capparis spinosa
Arabidopsis thaliana
Brassica napus
Raphanus sativus
Krameria ixine
Guaiacum sanctum
Larrea tridentata
Quillaja saponaria
Polygala pauciflora
Stylobasium spathulatum
Schotia brachypetala
Bauhinia galpinii
Cercis canadensis
Ceratonia siliqua
Acacia fimbriata
Albizia julibrissin
Mimosa polycarpa
Indigofera heterantha
Erythrina cristagalli
Glycine max
Malvidae
Rosidae
Superrosidae

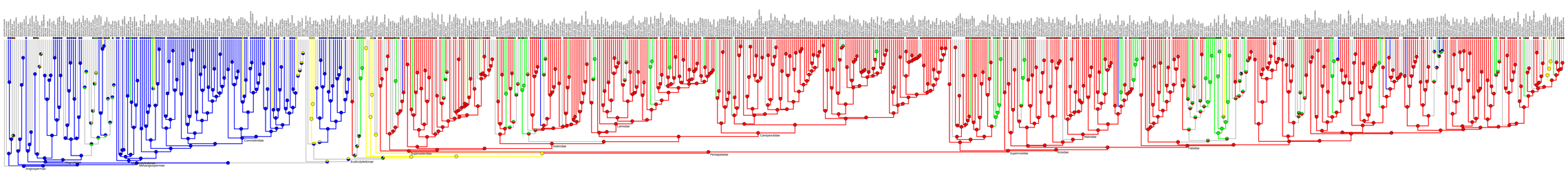

Lotus corniculatus
Astragalus membranaceus
Cicer arietinum
Medicago sativa
Pisum sativum
Spiraea betulifolia
Photinia x fraseri
Prunus persica
Dirachma socotrana
Elaeagnus umbellata
Barbeya oleoides
Ceanothus sanguineus
Rhamnus cathartica
Zelkova serrata
Celtis yunnanensis
Cannabis sativa
Humulus lupulus
Ficus carica
Morus indica
Pilea cadierei
Boehmeria nivea
Urtica dioica
Nothofagus antarctica
Fagus grandifolia
Chrysolepis sempervirens
Quercus rubra
Alnus alnobetula
Casuarina cunninghamiana
Juglans mandshurica
Myrica cerifera
Myrica gale
Anisophyllea fallax
Coriaria ruscifolia
Corynocarpus laevigatus
Tetrameles nudiflora
Begonia sanguinea
Datisca cannabina
Xerosicyos danguyi
Dendrosicyos socotrana
Cucurbita pepo
Coccinia sessilifolia
Cucumis melo
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
Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
Oxalis dillenii
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Cephalotus follicularis
Davidsonia pruriens
Eucryphia lucida
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Sacoglottis amazonica
Humiria balsamifera
Vantanea guianensis
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
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
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Goupia glabra
Rinorea pubiflora
Viola pubescens
Hymenanthera alpina
Hybanthus concolor
Leonia glycycarpa
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
Fabidae


Elatine triandra
Byrsonima crassifolia
Acridocarpus natalitius
Tetrapterys tinifolia
Thryallis latifolia
Dicella nucifera
Malpighia emarginata
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Dissiliaria muelleri
Austrobuxus megacarpus
Micrantheum hexandrum
Drypetes madagascariensis
Lophopyxis maingayi
Balanops vieillardii
Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Atuna racemosa
Chrysobalanus icaco
Hirtella bicornis
Afrolicania elaeosperma
Microdesmis puberula
Galearia filiformis
Panda oleosa
Bhesa paniculata
Centroplacus glaucinus
Reinwardtia indica
Linum perenne
Durandea pentagyna
Hugonia platysepala
Ctenolophon englerianus
Aneulophus africanus
Erythroxylum confusum
Cassipourea lanceolata
Paradrypetes subintegrifolia
Crossostylis grandiflora
Rhizophora stylosa
Bruguiera gymnorhiza
Carallia brachiata
Caryocar glabrum
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Endospermum moluccanum
Omphalea diandra
Tetrorchidium gabonense
Suregada boiviniana
Moultonianthus leembruggianus
Hevea brasiliensis
Manihot esculenta
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Conceveiba martiana
Dalechampia spathulata
Lasiocroton bahamensis
Ricinus communis
Acalypha californica
Spathiostemon javensis

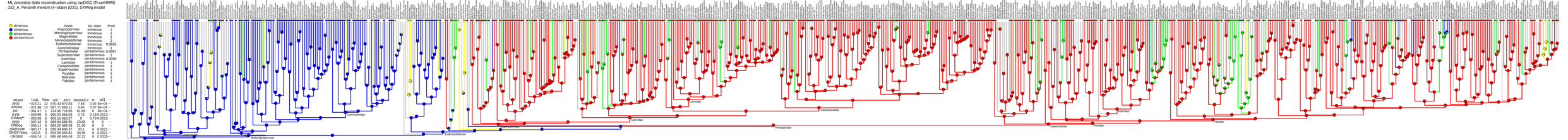
MP ancestral state reconstruction using ancestral pars
(R:phangorn)
232_A. Perianth merism (4–state) (D2c), 84 steps

- 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 rayDISC (R:corHMM)
232_A. Perianth merism (4–state) (D2c), SYMeq model



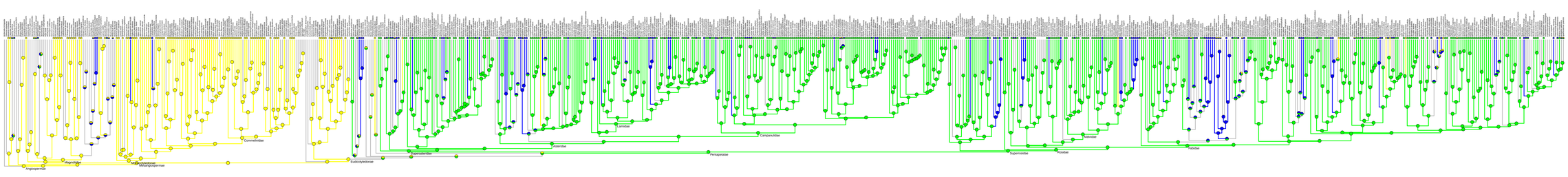
Node	ML state	Prob
Angiospermae	trimerous	1
Mesangiospermae	trimerous	1
Magnoliidae	trimerous	1
Monocotyledonae	trimerous	1
Eudicotyledonae	trimerous	0.9626
Commelinidae	trimerous	1
Ranunculidae	pentamerous	0.9997
Superasteridae	pentamerous	1
Asteridae	pentamerous	0.9999
Lamiidae	pentamerous	1
Campanulidae	pentamerous	1
Rosidae	pentamerous	1
Rosidae	pentamerous	1
Malvidae	pentamerous	1
Fabidae	pentamerous	1

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	--
ARD	-323.21	12	670.43	670.83	7.56	0.02	8e−04	--
ARDeq	-321.86	12	667.71	668.11	4.84	0.07	8e−04	--
ER	-361.47	1	724.95	724.95	61.69	0	8e−04	--
SYM	-325.58	6	663.16	663.27	0	0.18	0.0013	--
SYMeq	-325.58	6	663.16	663.27	0	0.18	0.0013	--
ORD	-337.42	6	686.84	686.95	23.68	0	0	--
ORDeq	-336.11	6	684.22	684.33	21.06	0	0	--
ORDSYM	-345.17	3	696.34	696.37	33.1	0	0.0021	--
ORDSYMeq	-343.8	3	693.59	693.62	30.36	0	0.0021	--
ORDER	-346.74	1	695.48	695.48	32.22	0	0.0025	--

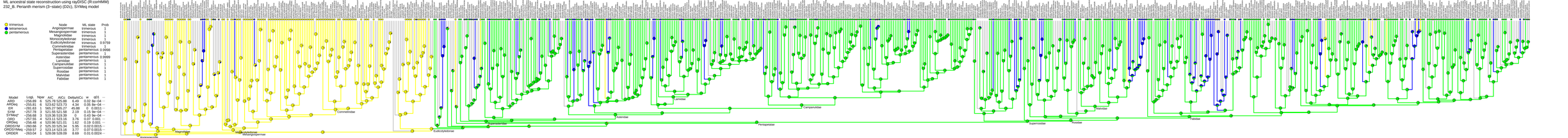
MP ancestral state reconstruction using ancestral pars
(R:phangorn)
232_B. Perianth merism (3–state) (D2c), 70 steps

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 rayDISC (R:corHMM)
232_8. Perianth merism (3–state) (D2c), SYMeq model



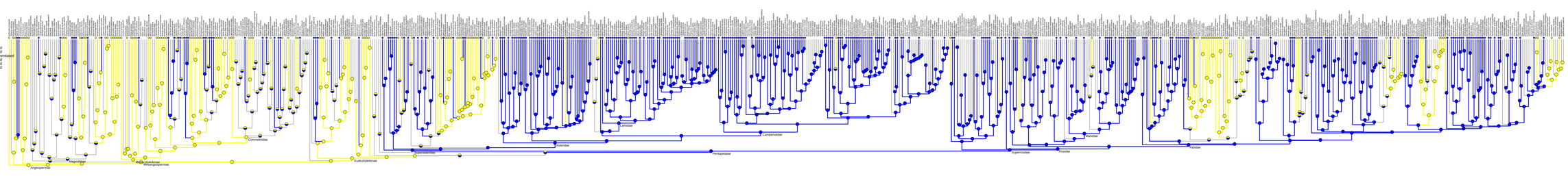
Node	ML state	Prob
Angiospermae	trimerous	1
Mesangiospermae	trimerous	1
Magnoliidae	trimerous	1
Monocotyledonae	trimerous	1
Eudicotyledonae	trimerous	0.9759
Commelinidae	trimerous	1
Ceratophyllaceae	pentamerous	0.9998
Superasteridae	pentamerous	1
Asteridae	pentamerous	0.9999
Lamiidae	pentamerous	1
Campanulidae	pentamerous	1
Caryophyllidae	pentamerous	1
Rosidae	pentamerous	1
Malvidae	pentamerous	1
Fabidae	pentamerous	1

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	...
ARD	-256.89	6	525.78	525.88	6.49	0.02	8e−04	...
ARDeq	-255.81	6	523.62	523.73	4.34	0.05	8e−04	...
ER	-281.63	1	565.27	565.27	45.88	0	0.0011	...
SYM	-256.68	3	519.36	519.48	0	0.43	8e−04	...
SYMeq	-256.68	3	519.35	519.48	0	0.43	8e−04	...
ORD	-257.55	4	523.11	523.16	3.76	0.07	0.001	...
ORDeq	-256.48	4	520.96	521.01	1.62	0.19	0.001	...
ORDSYM	-260.66	2	525.33	525.34	5.95	0.02	0.0015	...
ORDSYMeq	-259.57	2	523.14	523.16	3.77	0.07	0.0015	...
ORDER	-263.04	1	528.08	528.09	8.69	0.01	0.0024	...

MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
234_A. Perianth differentiation (binary) (D2d), 64 steps

undifferentiated
differentiated

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

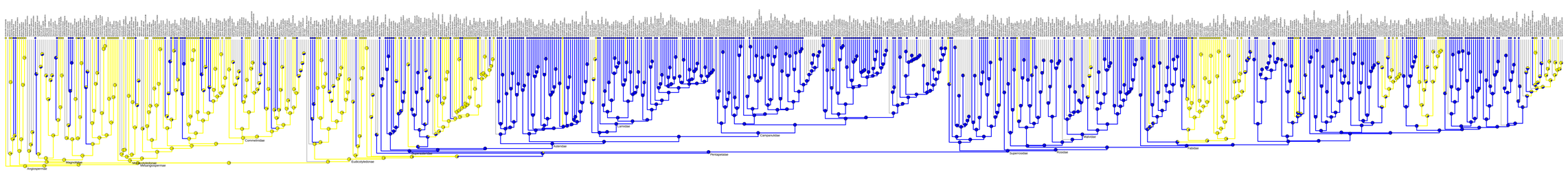


ML ancestral state reconstruction using rayDISC (R:corHMM)
234_A. Perianth differentiation (binary) (D2d), ARDeq model

undifferentiated
differentiated

Node	ML state	Prob
Angiospermae	undifferentiated	1
Mesangiospermae	undifferentiated	1
Magnoliidae	undifferentiated	0.999
Monocotyledonae	undifferentiated	1
Eudicotyledonae	undifferentiated	0.9998
Commelinidae	undifferentiated	1
Ceratophyllidae	differentiated	0.9645
Superasteridae	differentiated	0.9956
Asteridae	differentiated	0.9988
Lamidae	differentiated	0.9999
Campanulidae	differentiated	1
Gentianidae	differentiated	0.9938
Rosidae	differentiated	0.9961
Malvidae	differentiated	0.9995
Fabidae	differentiated	0.9967

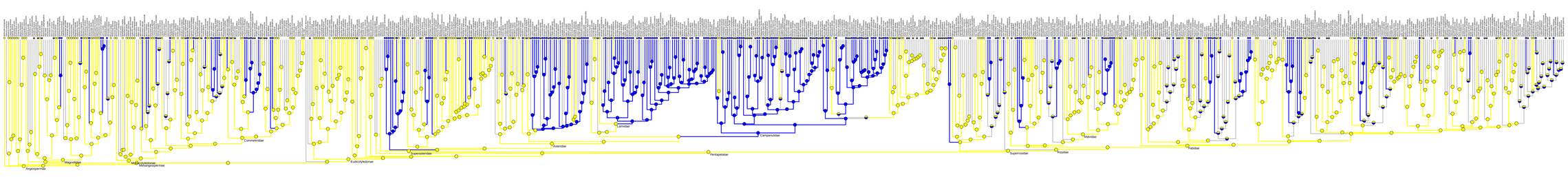
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	-198.28	2	400.56	400.58	1.38	0.33	0.0045	0.0015
ARDeq**	-197.59	2	399.18	399.19	0	0.67	0.0045	0.0015
ER	-207.61	1	417.23	417.23	18.04	0	0.0025	0.0025
UN01	-228.28	1	458.56	458.56	59.36	0	0.0089	
UN10	-233.57	1	469.15	469.15	69.96	0		0.0034



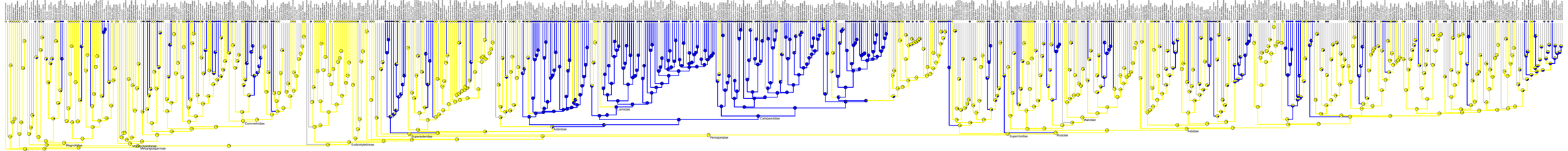
MP ancestral state reconstruction using ancestral pars (R:phangorn)
204_A. Fusion of perianth (D2c), 76 steps

free (+5%)
fused (+5%)

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



ML ancestral state reconstruction using ray|DISC (R:corHMM)
204_A. Fusion of perianth (D2c), ER model



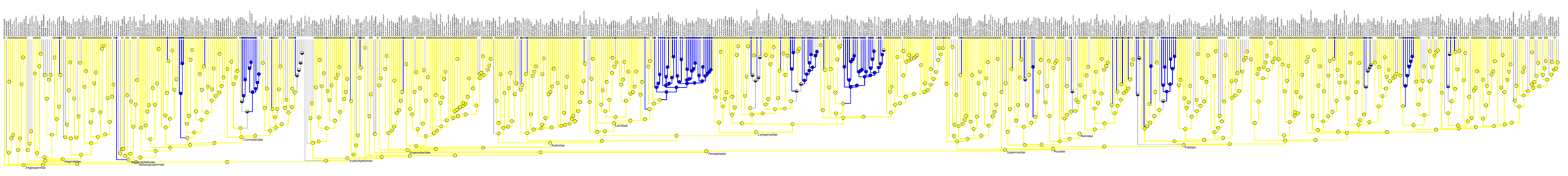
Node	ML state	Prob
Angiospermae	free (<5%)	0.9994
Mesangiospermae	free (<5%)	1
Magnoliidae	free (<5%)	0.9998
Monocotyledonae	free (<5%)	0.9999
Eudicotyledonae	free (<5%)	1
Commelinidae	free (<5%)	0.9971
Gunneridae	free (<5%)	0.9963
Superasteridae	free (<5%)	0.763
Asteridae	free (<5%)	0.7569
Lamiidae	fused (>5%)	0.9777
Campanulidae	fused (>5%)	0.9755
Caryophyllales	free (<5%)	0.9977
Rosidae	free (<5%)	0.9977
Malvidae	free (<5%)	0.9964
Fabidae	free (<5%)	0.9999

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−224.97	2	453.94	453.95	1.39	0.2	0.0044	0.0036
ARDeq	−224.28	2	452.55	452.57	0	0.41	0.0044	0.0036
ER*	−225.28	1	452.56	452.56	0	0.4	0.0043	0.0043
UN01	−237.97	1	477.94	477.95	25.38	0	0.005	
UN10	−237.8	1	477.61	477.61	25.05	0		0.0084

MP ancestral state reconstruction using ancestral.pars (R phangorn)
207_A. Symmetry of perianth (binary) (D2d), 57 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

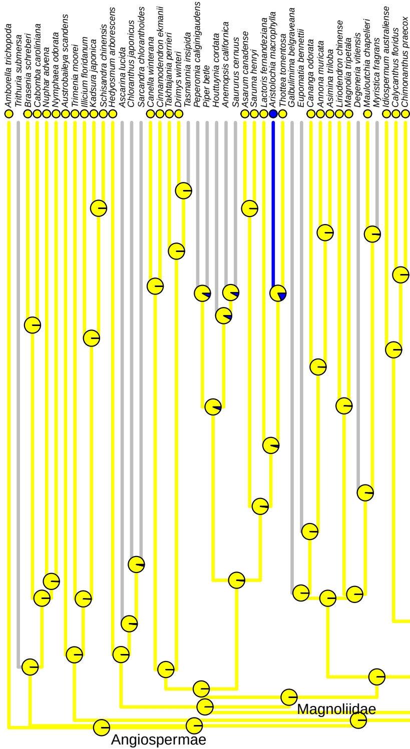


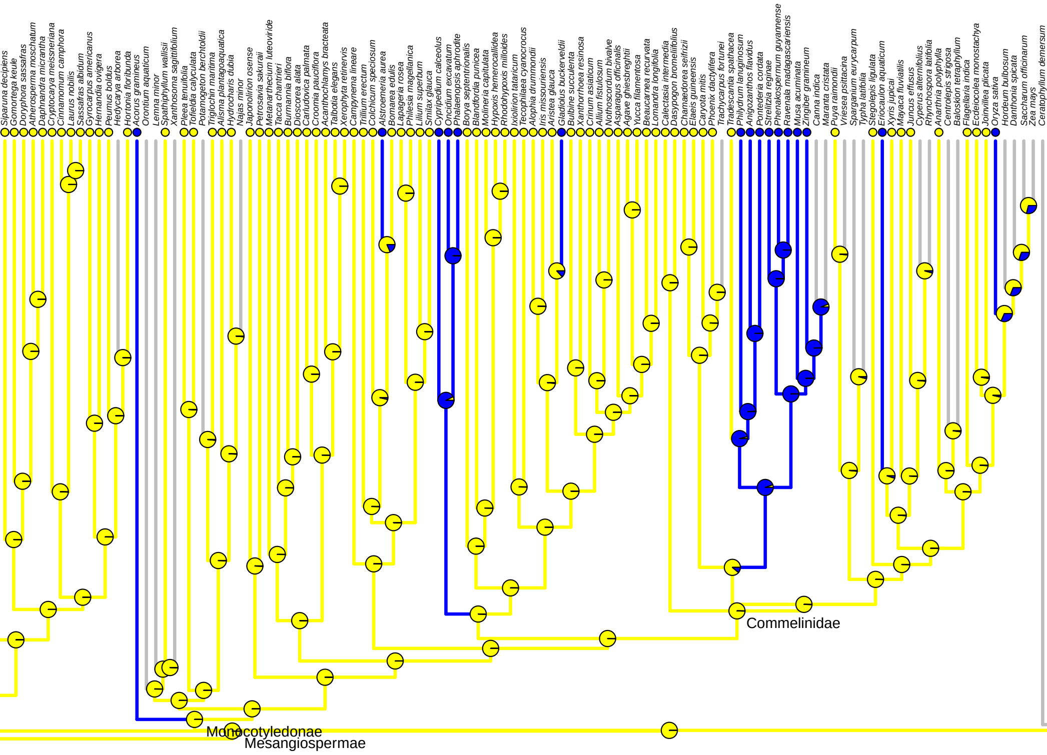
ML ancestral state reconstruction using rayDISC (R:corHMM)
207_A. Symmetry of perianth (binary) (D2d), ARDeq model

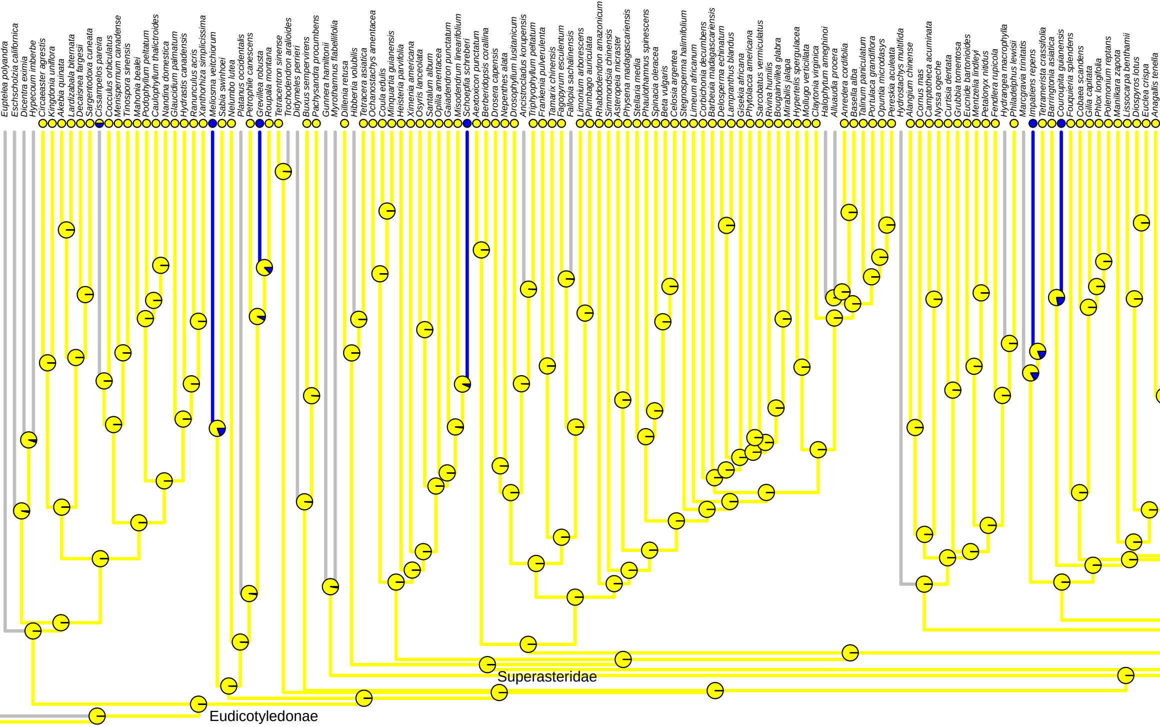
🟡 actinomorphic
🔵 zygomorphic

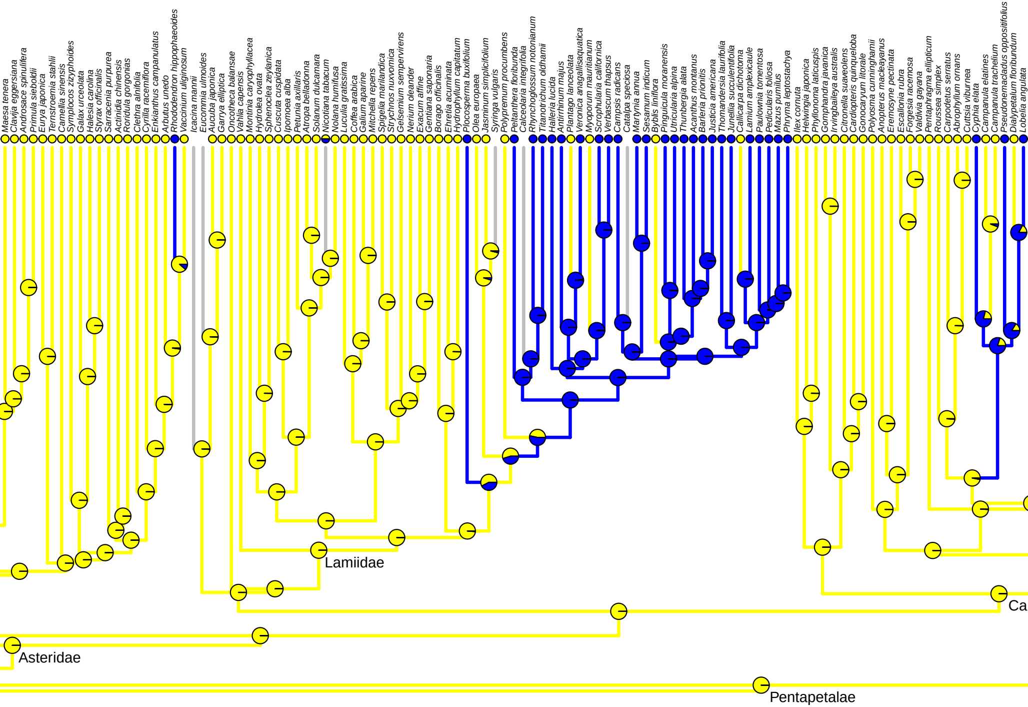
Node	ML state	Prob
Angiospermae	actinomorphic	1
Mesangiospermae	actinomorphic	1
Magnoliidae	actinomorphic	1
Monocotyledonae	actinomorphic	0.9997
Eudicotyledonae	actinomorphic	1
Commelinidae	actinomorphic	0.9959
Pentapetalae	actinomorphic	1
Superasteridae	actinomorphic	1
Asteridae	actinomorphic	1
Lamiidae	actinomorphic	0.9988
Campanulidae	actinomorphic	1
Superrosidae	actinomorphic	1
Rosidae	actinomorphic	1
Malvidae	actinomorphic	0.9998
Fabidae	actinomorphic	0.9997

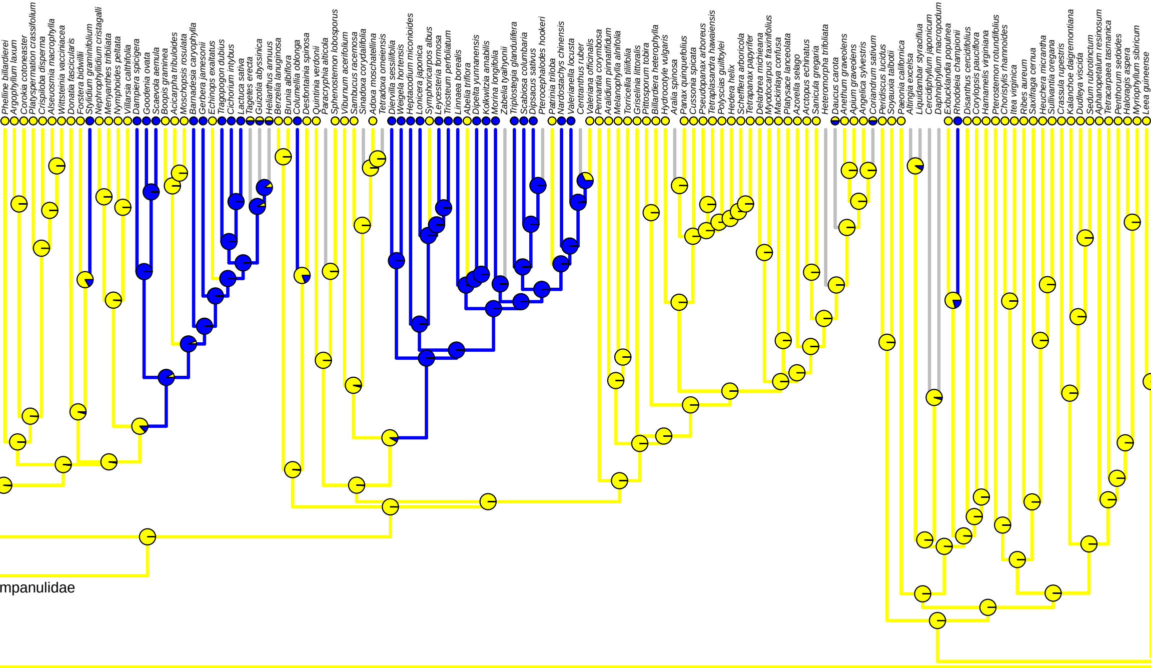
Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−210.43	2	424.85	424.87	1.37	0.33	0.0014	0.0065
ARDeq**	−209.74	2	423.48	423.5	0	0.66	0.0014	0.0065
ER	−220.76	1	443.52	443.53	20.03	0	0.0016	0.0016
UNI01	−269.97	1	541.95	541.95	118.46	0	0.0019	
UNI10	−217.94	1	437.89	437.89	14.4	0		0.0171




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
Lemna minor
Spathiphyllum wallisii
Xanthosoma sagittifolium
Pleea tenuifolia
Tofieldia calyculata
Potamogeton berchtoldii
Triglochin maritima
Alisma plantagoaquatica
Hydrocharis dubia
Najas minor
Japonolirion osense
Petrosavia sakuraii
Metanarthecium luteoviride
Tacca chantrieri
Burmannia biflora
Dioscorea alata
Carludovica palmata
Croomia pauciflora
Acanthochlamys bracteata
Talbotia elegans
Xerophyta retinervis
Campynema lineare
Trillium erectum
Colchicum speciosum
Alstroemeria aurea
Bomarea edulis
Lapageria rosea
Philesia magellanica
Lilium superbum
Smilax glauca
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
Crinum asiaticum
Allium fistulosum
Nothoscordum bivalve
Asparagus officinalis
Agave ghiesbreghtii
Yucca filamentosa
Beaucarnea recurvata
Lomandra longifolia
Calectasia intermedia
Dasypogon bromeliifolius
Chamaedorea seifrizii
Elaeis guineensis
Caryota mitis
Phoenix dactylifera
Trachycarpus fortunei
Tradescantia spathacea
Philydrum lanuginosum
Anigozanthos flavidus
Pontederia cordata
Strelitzia reginae
Phenakospermum guyannense
Ravenala madagascariensis
Musa acuminata
Zingiber gramineum
Canna indica
Maranta cristata
Puya raimondii
Vriesea psittacina
Sparganium eurycarpum
Typha latifolia
Stegolepis ligulata
Eriocaulon aquaticum
Xyris jupicai
Mayaca fluviatilis
Juncus effusus
Cyperus alternifolius
Rhynchospora latifolia
Anarthria polyphylla
Centrolepis strigosa
Baloskion tetraphyllum
Flagellaria indica
Ecdeiocolea monostachya
Joinvillea plicata
Oryza sativa
Hordeum bulbosum
Danthonia spicata
Saccharum officinarum
Zea mays
Ceratophyllum demersum
Commelinidae
Monocotyledonae
Mesangiospermae


Euptelea polyandra
Eschscholzia californica
Dicentra eximia
Hypecoum imberbe
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
Ochanostachys amentacea
Coula edulis
Minquartia guianensis
Heisteria parvifolia
Ximenia americana
Osyris lanceolata
Santalum album
Opilia amentacea
Gaiadendron punctatum
Misodendrum linearifolium
Schoepfia schreberi
Aextoxicon punctatum
Berberidopsis corallina
Drosera capensis
Nepenthes alata
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
Beta vulgaris
Celosia argentea
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Delosperma echinatum
Lampranthus blandus
Gisekia africana
Phytolacca americana
Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Claytonia virginica
Halophytum ameghinoi
Alluaudia procera
Anredera cordifolia
Basella alba
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Hydrostachys multifida
Alangium chinense
Cornus mas
Camptotheca acuminata
Nyssa ogeche
Curtisia dentata
Grubbia tomentosa
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Fendlera rupicola
Hydrangea macrophylla
Philadelphus lewisii
Marcgravia trinitatis
Impatiens repens
Tetramerista crassifolia
Barringtonia asiatica
Couroupita guianensis
Fouquieria splendens
Cobaea scandens
Gilia capitata
Phlox longifolia
Polemonium reptans
Manilkara zapota
Lissocarpa benthamii
Diospyros lotus
Euclea crispa
Anagallis tenella
Superasteridae
Eudicotyledonae


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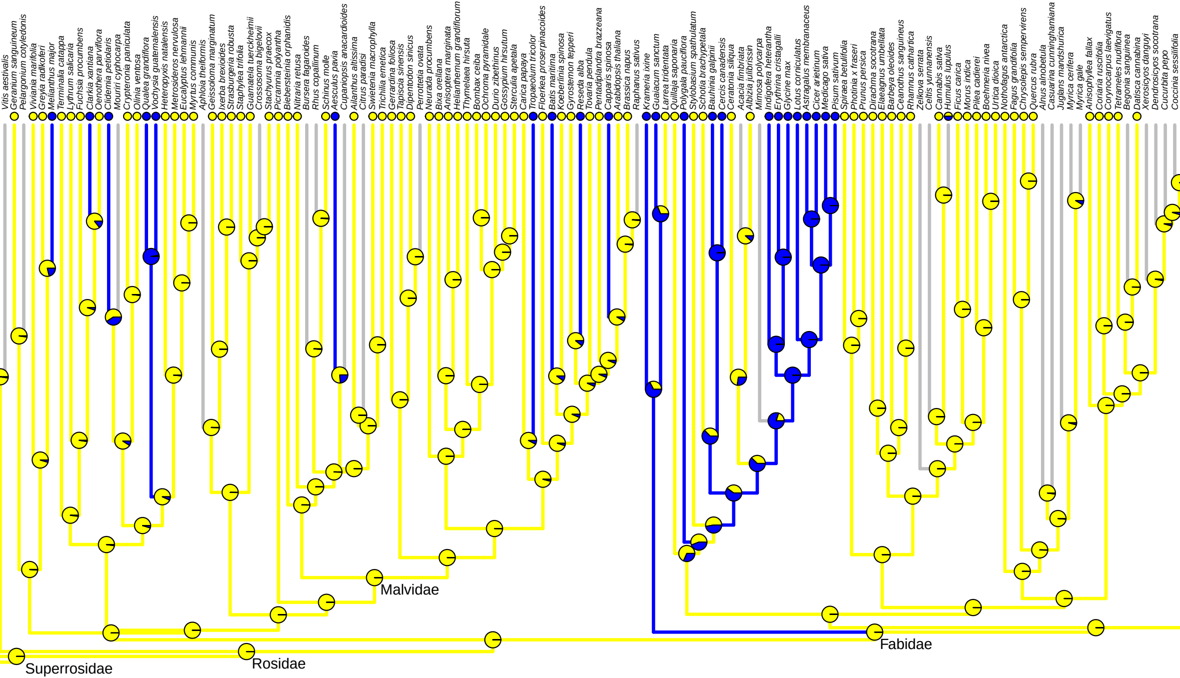
Myriophyllum sibiricum
Leea guineense
mpanulidae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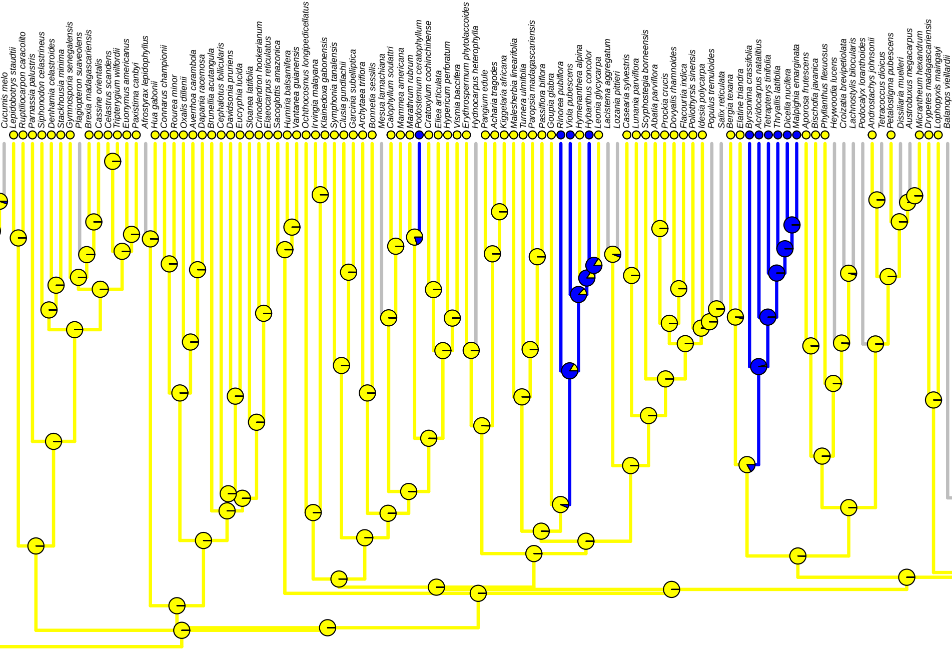
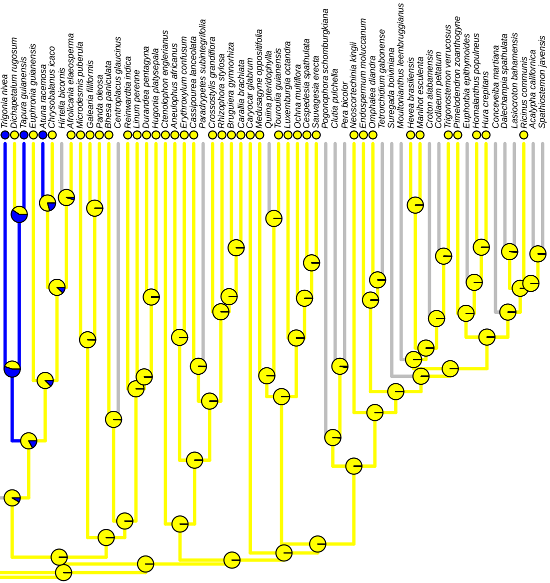
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
Terminalia catappa
Lythrum salicaria
Fuchsia procumbens
Clarkia xantiana
Oenothera parviflora
Clidemia petiolaris
Mouriri cyphocarpa
Crypteronia paniculata
Olinia ventosa
Qualea grandiflora
Vochysia guatemalensis
Heteropyxis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

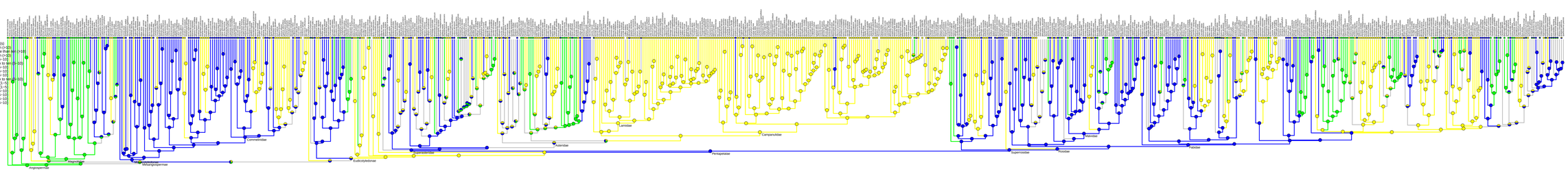

Cucumis melo
Lepidobotrys staudtii
Ruptiliocarpon caracolito
Parnassia palustris
Siphonodon celastrineus
Denhamia celastroides
Stackhousia minima
Gymnosporia senegalensis
Plagiopteron suaveolens
Brexia madagascariensis
Cassine orientalis
Celastrus scandens
Tripterygium wilfordii
Euonymus americanus
Paxistima canbyi
Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
Oxalis dillenii
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Cephalotus follicularis
Davidsonia pruriens
Eucryphia lucida
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Sacoglottis amazonica
Humiria balsamifera
Vantanea guianensis
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
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
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Goupia glabra
Rinorea pubiflora
Viola pubescens
Hymenanthera alpina
Hybanthus concolor
Leonia glycycarpa
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
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Dissiliaria muelleri
Austrobuxus megacarpus
Micrantheum hexandrum
Drypetes madagascariensis
Lophopyxis maingayi
Balanops vieillardii

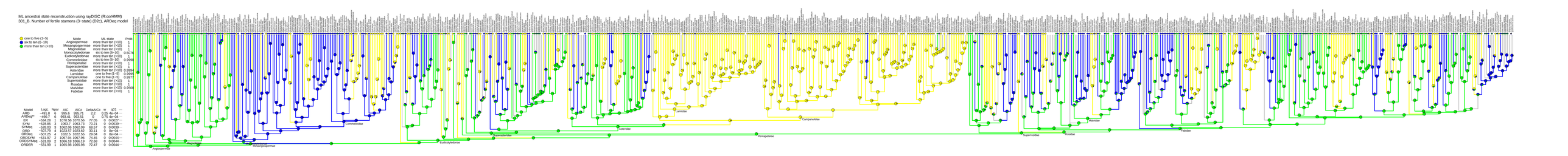

Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Atuna racemosa
Chrysobalanus icaco
Hirtella bicornis
Afrolicania elaeosperma
Microdesmis puberula
Galearia filiformis
Panda oleosa
Bhesa paniculata
Centroplacus glaucinus
Reinwardtia indica
Linum perenne
Durandea pentagyna
Hugonia platysepala
Ctenolophon englerianus
Aneulophus africanus
Erythroxylum confusum
Cassipourea lanceolata
Paradrypetes subintegrifolia
Crossostylis grandiflora
Rhizophora stylosa
Bruguiera gymnorhiza
Carallia brachiata
Caryocar glabrum
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Endospermum moluccanum
Omphalea diandra
Tetrorchidium gabonense
Suregada boiviniana
Moultonianthus leembruggianus
Hevea brasiliensis
Manihot esculenta
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Conceveiba martiana
Dalechampia spathulata
Lasiocroton bahamensis
Ricinus communis
Acalypha californica
Spathiostemon javensis

MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
301_B. Number of fertile stamens (3–state) (D2c), 155 steps

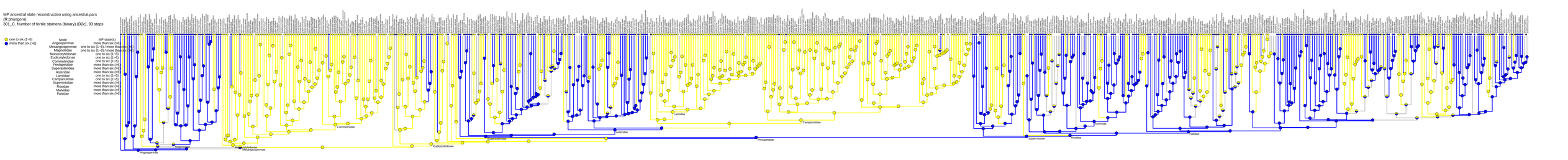
one to five (1–5)
six to ten (6–10)
more than ten (>10)

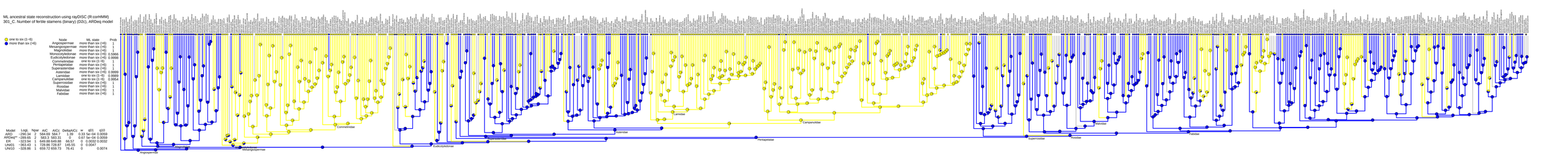
Node	MP state(s)
Angiospermae	more than ten (>10)
Mesangiospermae	one to five (1–5) / more than ten (>10)
Magnoliidae	more than ten (>10)
Monocotyledonae	six to ten (6–10)
Eudicotyledonae	one to five (1–5) / six to ten (6–10)
Commelinidae	six to ten (6–10)
Ceratophyllum	six to ten (6–10)
Superasteridae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



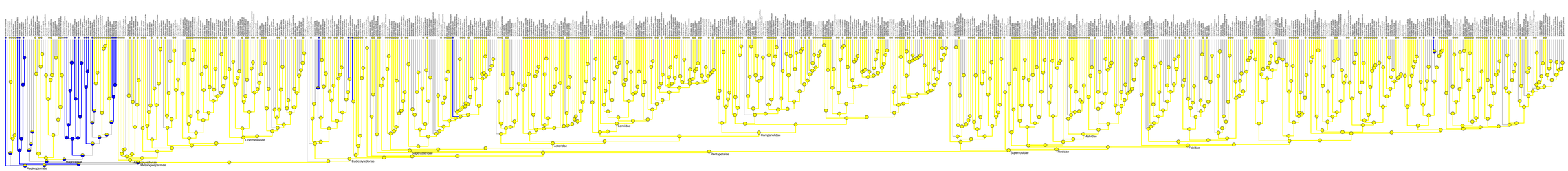

ML ancestral state reconstruction using rayDISC (R:corHMM)
301_B. Number of fertile stamens (3–state) (D2c), ARDeq model
one to five (1–5)
six to ten (6–10)
more than ten (>10)
Node | ML state | Prob
Angiospermae | more than ten (>10) | 1
Mesangiospermae | more than ten (>10) | 1
Magnoliidae | more than ten (>10) | 1
Monocotyledonae | six to ten (6–10) | 0.5078
Eudicotyledonae | more than ten (>10) | 1
Commelinidae | six to ten (6–10) | 0.9996
Ceratophyllidae | more than ten (>10) | 1
Superasteridae | more than ten (>10) | 1
Asteridae | more than ten (>10) | 0.9994
Lamiidae | one to five (1–5) | 0.9995
Campanulidae | one to five (1–5) | 0.9977
Pentapetalae | more than ten (>10) | 1
Rosidae | more than ten (>10) | 1
Malvidae | more than ten (>10) | 0.9508
Fabidae | more than ten (>10) | 1
Model | LogL | Npar | AIC | AICc | DeltaAICc | w | q01
ARD | −491.8 | 6 | 995.6 | 995.71 | 2.2 | 0.25 | 4e−04
ARDeq** | −492.7 | 6 | 993.41 | 993.51 | 0 | 0.75 | 4e−04
ER | −534.28 | 1 | 1070.56 | 1070.56 | 77.05 | 0 | 0.0027
SYM | −526.03 | 3 | 1058.06 | 1058.19 | 64.67 | 0 | 0.0039
SYMeq | −528.03 | 3 | 1062.06 | 1062.19 | 68.67 | 0 | 0.0039
ORD | −507.79 | 4 | 1023.57 | 1023.62 | 30.11 | 0 | 8e−04
ORDeq | −507.25 | 4 | 1022.5 | 1022.55 | 29.04 | 0 | 8e−04
ORDSYM | −531.97 | 2 | 1067.94 | 1067.96 | 74.45 | 0 | 0.0044
ORDSYMeq | −531.09 | 2 | 1066.18 | 1066.19 | 72.68 | 0 | 0.0044
ORDER | −531.99 | 1 | 1065.98 | 1065.98 | 72.47 | 0 | 0.0044
Angiospermae
Magnoliidae
Mesangiospermae
Monocotyledonae
Eudicotyledonae
Commelinidae
Ceratophyllidae
Superasteridae
Asteridae
Lamiidae
Campanulidae
Pentapetalae
Rosidae
Fabidae
Malvidae
Superrosidae
Malvidae

MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
301_C. Number of fertile stamens (binary) (02c), 93 steps

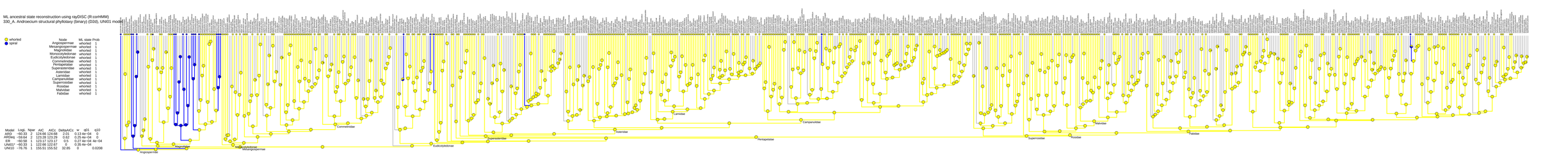



ML ancestral state reconstruction using ray/DISC (R corHMM)
301_C. Number of fertile stamens (binary) (02c), ARDeq model
one to six (1–6)
more than six (>6)
Node | ML state | Prob
Angiospermae | more than six (>6) | 1
Mesangiospermae | more than six (>6) | 1
Magnoliidae | more than six (>6) | 1
Monocotyledonae | more than six (>6) | 0.5966
Eudicotyledonae | more than six (>6) | 0.9998
Commelinidae | one to six (1–6) | 1
Ceratophyllidae | 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) | 0.9998
Campanulidae | one to six (1–6) | 0.9954
Superrosidae | 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 | Nopr | AIC | AICc | DeltaAICc | w | q01 | q10
ARD | -290.34 | 2 | 584.69 | 584.7 | 1.39 | 0.33 | 5e−04 | 0.0059
ARDeq** | -289.65 | 2 | 583.3 | 583.31 | 0 | 0.67 | 5e−04 | 0.0059
ER | -323.94 | 1 | 649.88 | 649.88 | 66.57 | 0 | 0.0032 | 0.0032
UN01 | -363.43 | 1 | 728.86 | 728.87 | 145.55 | 0 | 0.0047
UN10 | -328.86 | 1 | 659.72 | 659.73 | 76.41 | 0 | 0 | 0.0074
Angiospermae
Mesangiospermae
Magnoliidae
Monocotyledonae
Eudicotyledonae
Commelinidae
Ceratophyllidae
Superasteridae
Asteridae
Lamiidae
Campanulidae
Superrosidae
Rosidae
Malvidae
Fabidae

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



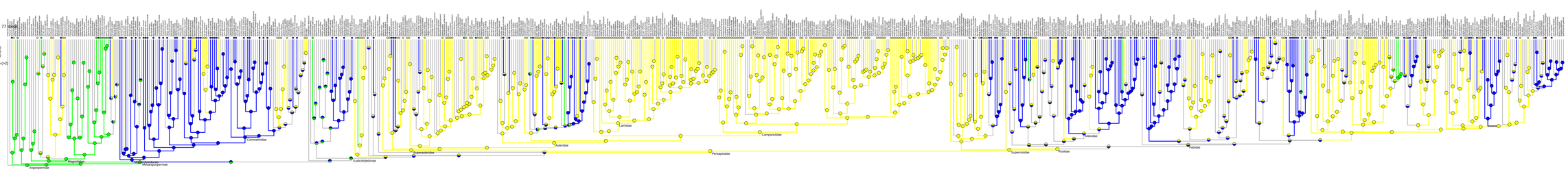
ML ancestral state reconstruction using ray(DISC (R:corHMM)
330_A. Androecium structural phylotaxy (binary) (D2d), UNI01 model



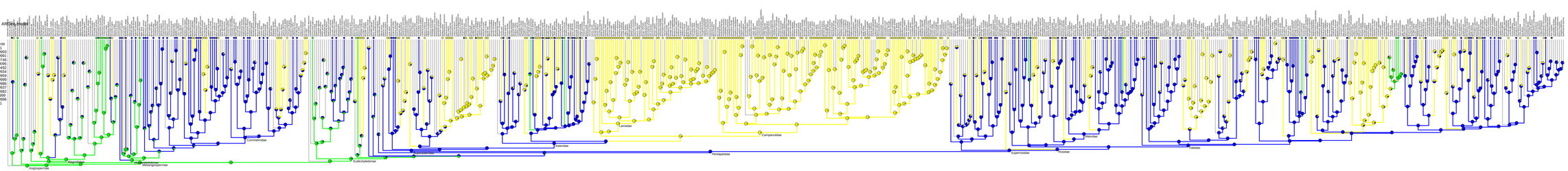
MP ancestral state reconstruction using ancestral pars
(R:phangorn)
331_A. Number of androecium structural whorls (3–state) (D2c), 77 taxa

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

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

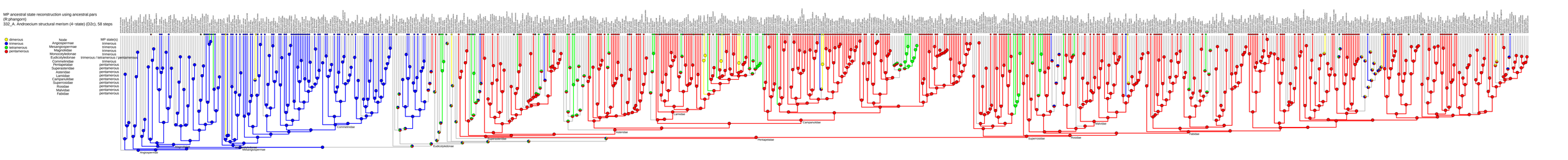


ML ancestral state reconstruction using rayDISC (R:corHMM)
331_A. Number of androecium structural whorls (3–state) (D2c), AR3eq model

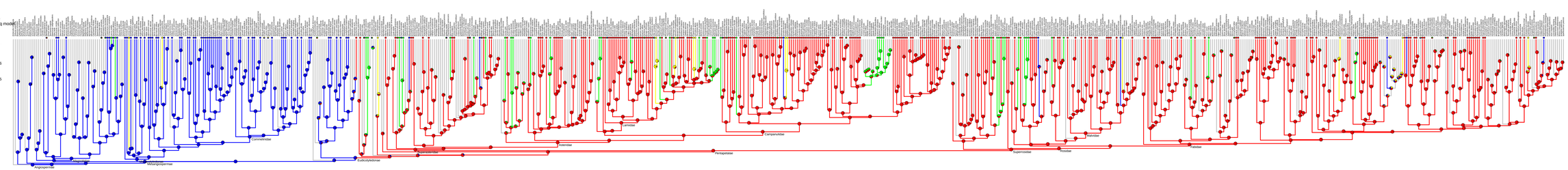


Node	ML state	Prob
Angiospermae	more than two (>2)	1
Mesangiospermae	more than two (>2)	0.9993
Magnoliidae	more than two (>2)	0.9991
Monocotyledoneae	more than two (>2)	0.9746
Eudicotyledoneae	more than two (>2)	0.9095
Commelinidae	two (2)	0.9492
Ranunculidae	two (2)	0.9997
Superasteridae	two (2)	0.9999
Asteridae	two (2)	0.9999
Lamiidae	one (1)	0.9988
Campanulidae	one (1)	0.9937
Gentianidae	one (1)	0.9999
Rosidae	two (2)	0.999
Malvidae	two (2)	0.9996
Fabidae	two (2)	1

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	---
ARD	-231.41	6	474.81	474.92	2.18	0.2	0	---
ARDeq**	-230.31	4	472.63	472.73	0	0.59	0	---
ER	-280.69	1	563.38	563.38	90.65	0	0.0017	---
SYM	-255.89	3	517.78	517.91	45.18	0	0.0035	---
SYMeq	-255.89	3	513.77	513.91	41.07	0	0.0035	---
ORD	-234.71	4	477.43	477.48	4.74	0.06	0	---
ORDeq	-233.68	4	475.35	475.4	2.67	0.16	0	---
ORDSYM	-255.53	2	515.06	515.07	42.34	0	0.0036	---
ORDSYMeq	-254.46	2	512.91	512.93	40.19	0	0.0036	---
ORDER	-261.1	1	524.2	524.2	51.47	0	0.0029	---

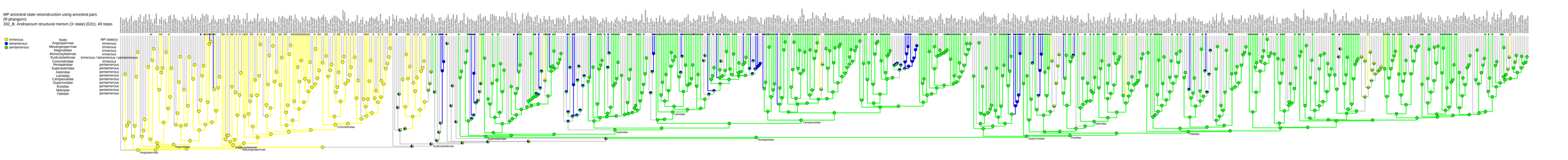

MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
332_A. Androecium structural merism (4–state) (D2c), 58 steps
dimerous
trimerous
tetramerous
pentamerous
Node
MP state(s)
Angiospermae
trimerous
Mesangiospermae
trimerous
Magnoliidae
trimerous
Monocotyledonae
trimerous
Eudicotyledonae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

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



Node	ML state	Prob
Angiospermae	trimerous	1
Mesangiospermae	trimerous	1
Magnoliidae	trimerous	1
Monocotyledoniae	trimerous	1
Eudicotyledoniae	trimerous	0.8426
Commelinidae	trimerous	1
Ceratophyllidae	pentamerous	1
Superasteridae	pentamerous	1
Asteridae	pentamerous	0.9995
Lamiidae	pentamerous	1
Campanulidae	pentamerous	1
Pentapetalae	pentamerous	1
Rosidae	pentamerous	1
Malvidae	pentamerous	1
Fabidae	pentamerous	1

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	...
ARD	-223.83	12	471.66	472.06	11.01	0	0.0068	---
ARDeq	-222.49	12	468.98	469.38	8.33	0.01	0.0066	---
ER	-238.3	1	478.6	478.6	17.55	0	9e-04	---
SYM	-224.47	6	460.94	461.05	0	0.79	6e-04	---
SYMeq*	-224.47	6	460.94	461.05	0	0.79	6e-04	---
ORD	-237.85	6	487.71	487.82	26.77	0	100	---
ORDeq	-237.24	6	486.48	486.59	25.54	0	100	---
ORDSYM	-260.66	3	527.31	527.34	66.29	0	0.0021	---
ORDSYMeq	-259.32	3	524.64	524.67	63.62	0	0.0021	---
ORDER	-261.5	1	525	525	63.95	0	0.0031	---

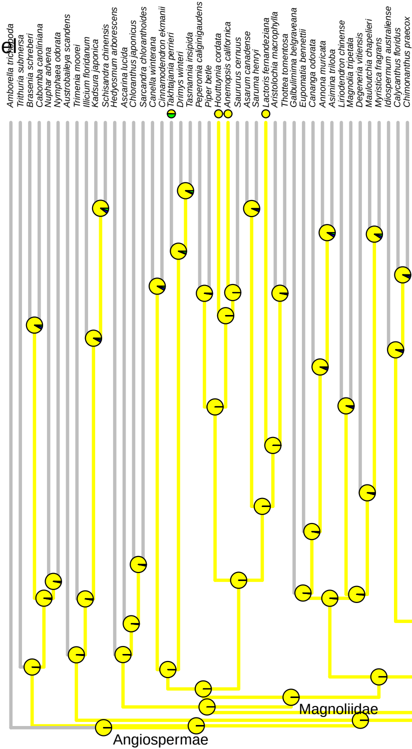

MP ancestral state reconstruction using ancestral.pars
(R:phangorn)
332_B. Androecium structural merism (3–state) (D2c), 49 steps
trimerous
tetramerous
pentamerous
Node
MP state(s)
Angiospermae
trimerous
Mesangiospermae
trimerous
Magnoliidae
trimerous
Monocotyledoneae
trimerous
Eudicotyledoneae
trimerous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

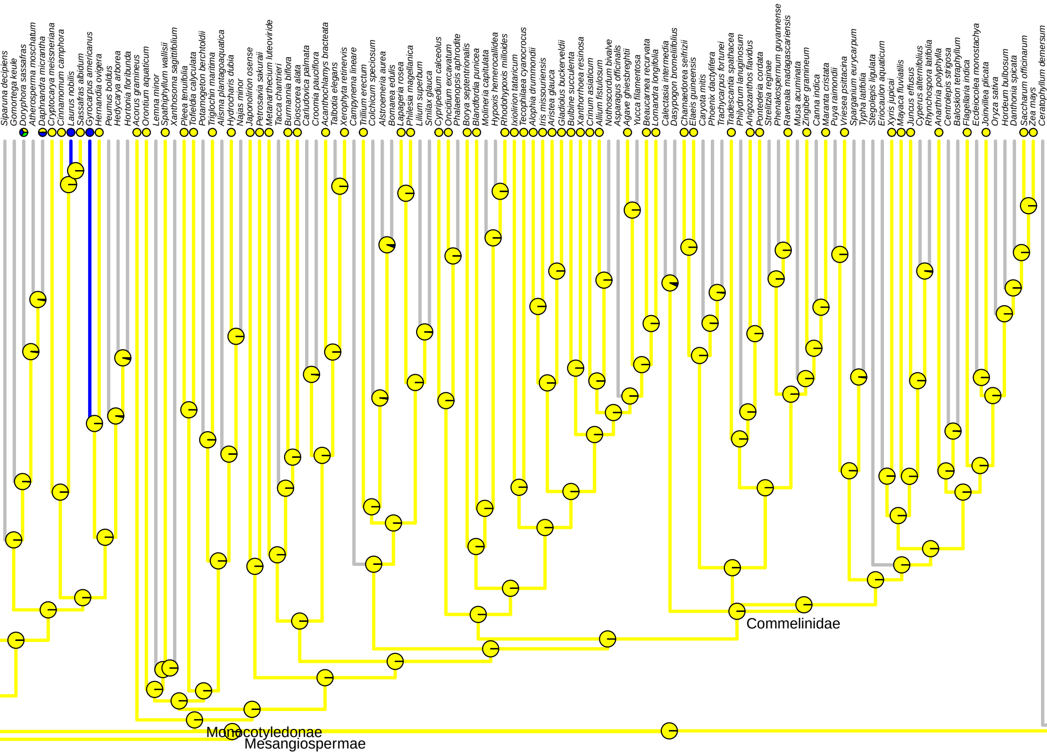
ML ancestral state reconstruction using rayDISC (R:corHMM)
332_B. Androecium structural merism (3−state) (D2c), ARDeq model

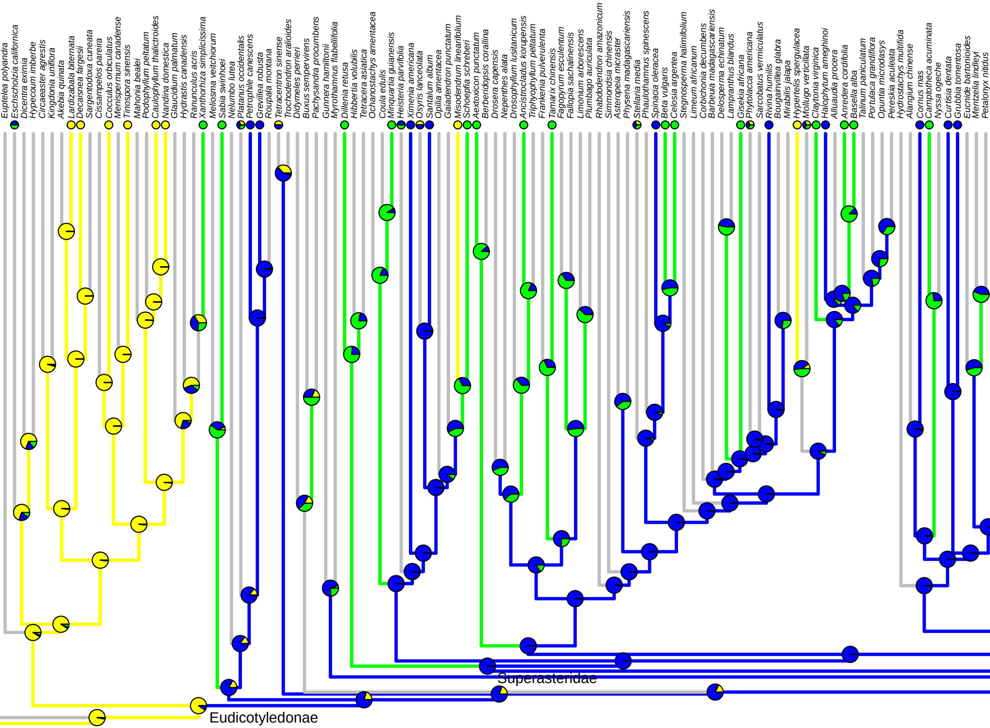
🟡 trimerous
🔵 tetramerous
🟢 pentamerous

Node	ML state	Prob
Angiospermae	trimerous	1
Mesangiospermae	trimerous	1
Magnoliidae	trimerous	1
Monocotyledonae	trimerous	1
Eudicotyledonae	trimerous	0.9066
Commelinidae	trimerous	1
Pentapetalae	tetramerous	0.9999
Superasteridae	tetramerous	1
Asteridae	tetramerous	1
Lamiidae	tetramerous	0.9937
Campanulidae	tetramerous	0.9697
Superrosidae	tetramerous	1
Rosidae	tetramerous	0.9998
Malvidae	pentamerous	0.5684
Fabidae	tetramerous	0.9736

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	···
ARD	−171.02	6	354.04	354.15	2.18	0.25	0.001	···
ARDeq**	−169.93	6	351.86	351.97	0	0.73	0.001	···
ER	−186.89	1	375.78	375.78	23.82	0	0.0011	···
SYM	−177.93	3	361.85	361.88	9.92	0.01	4e−04	···
SYMeq	−176.84	3	359.67	359.7	7.74	0.02	4e−04	···
ORD	−180.2	4	368.4	368.45	16.48	0	2e−04	···
ORDeq	−179.15	4	366.29	366.34	14.38	0	1e−04	···
ORDSYM	−187.33	2	378.67	378.68	26.72	0	0.002	···
ORDSYMeq	−186.26	2	376.51	376.53	24.56	0	0.002	···
ORDER	−188.09	1	378.19	378.19	26.23	0	0.0027	···


Amborella trichopoda
Trithuria submersa
Brasenia schreberi
Cabomba caroliniana
Nuphar advena
Nymphaea odorata
Austrobaileya scandens
Trimenia moorei
Illicium floridanum
Kadsura japonica
Schisandra chinensis
Hedyosmum arborescens
Ascarina lucida
Chloranthus japonicus
Sarcandra chloranthoides
Canella winterana
Cinnamodendron ekmanii
Takhtajania perrieri
Drimys winteri
Tasmannia insipida
Peperomia caliginigaudens
Piper betle
Houttuynia cordata
Anemopsis californica
Saururus cernuus
Asarum canadense
Saruma henryi
Lactoris fernandeziana
Aristolochia macrophylla
Thottea tomentosa
Galbulimima belgraveana
Eupomatia bennettii
Cananga odorata
Annona muricata
Asimina triloba
Liriodendron chinense
Magnolia tripetala
Degeneria vitiensis
Mauloutchia chapelieri
Myristica fragrans
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
Lemna minor
Spathiphyllum wallisii
Xanthosoma sagittifolium
Pleea tenuifolia
Tofieldia calyculata
Potamogeton berchtoldii
Triglochin maritima
Alisma plantagoaquatica
Hydrocharis dubia
Najas minor
Japonolirion osense
Petrosavia sakuraii
Metanarthecium luteoviride
Tacca chantrieri
Burmannia biflora
Dioscorea alata
Carludovica palmata
Croomia pauciflora
Acanthochlamys bracteata
Talbotia elegans
Xerophyta retinervis
Campynema lineare
Trillium erectum
Colchicum speciosum
Alstroemeria aurea
Bomarea edulis
Lapageria rosea
Philesia magellanica
Lilium superbum
Smilax glauca
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
Crinum asiaticum
Allium fistulosum
Nothoscordum bivalve
Asparagus officinalis
Agave ghiesbreghtii
Yucca filamentosa
Beaucarnea recurvata
Lomandra longifolia
Calectasia intermedia
Dasypogon bromeliifolius
Chamaedorea seifrizii
Elaeis guineensis
Caryota mitis
Phoenix dactylifera
Trachycarpus fortunei
Tradescantia spathacea
Philydrum lanuginosum
Anigozanthos flavidus
Pontederia cordata
Strelitzia reginae
Phenakospermum guyannense
Ravenala madagascariensis
Musa acuminata
Zingiber gramineum
Canna indica
Maranta cristata
Puya raimondii
Vriesea psittacina
Sparganium eurycarpum
Typha latifolia
Stegolepis ligulata
Eriocaulon aquaticum
Xyris jupicai
Mayaca fluviatilis
Juncus effusus
Cyperus alternifolius
Rhynchospora latifolia
Anarthria polyphylla
Centrolepis strigosa
Baloskion tetraphyllum
Flagellaria indica
Ecdeiocolea monostachya
Joinvillea plicata
Oryza sativa
Hordeum bulbosum
Danthonia spicata
Saccharum officinarum
Zea mays
Ceratophyllum demersum
Commelinidae
Monocotyledonae
Mesangiospermae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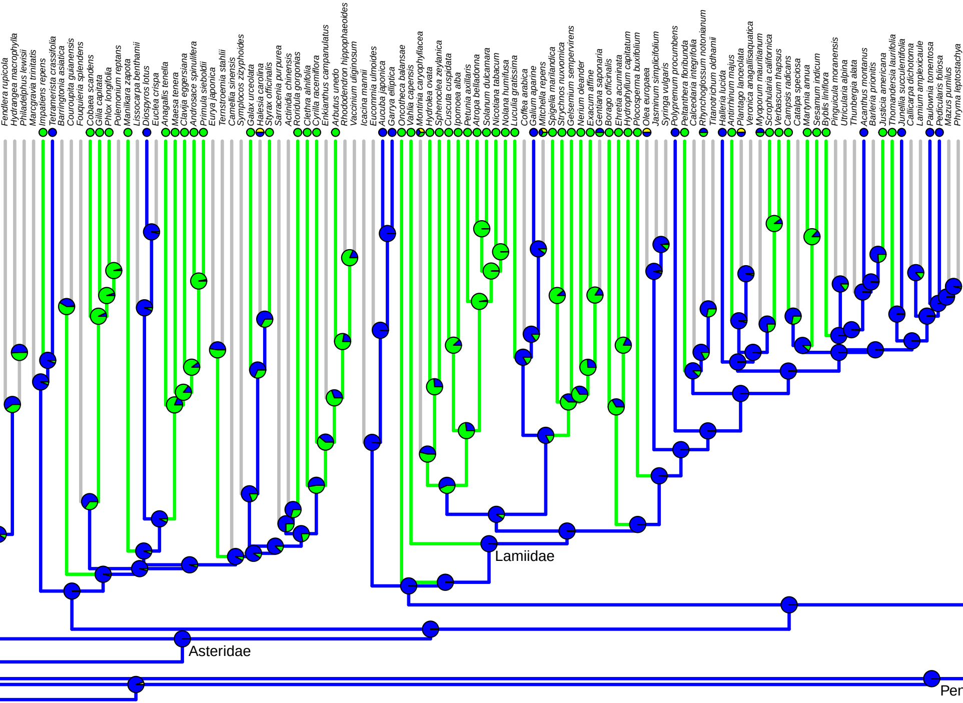
Dicentra eximia
Hypecoum imberbe
Circaeaster agrestis
Kingdonia uniflora
Akebia quinata
Lardizabala biternata
Decaisnea fargesii
Sargentodoxa cuneata
Cissampelos pareira
Cocculus orbiculatus
Menispermum canadense
Tinospora sinensis
Mahonia bealei
Podophyllum peltatum
Caulophyllum thalictroides
Nandina 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
Ochanostachys amentacea
Coula edulis
Minquartia guianensis
Heisteria parvifolia
Ximenia americana
Osyris lanceolata
Santalum album
Opilia amentacea
Gaiadendron punctatum
Misodendrum linearifolium
Schoepfia schreberi
Aextoxicon punctatum
Berberidopsis corallina
Drosera capensis
Nepenthes alata
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
Beta vulgaris
Celosia argentea
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Delosperma echinatum
Lampranthus blandus
Gisekia africana
Phytolacca americana
Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Claytonia virginica
Halophytum ameghinoi
Alluaudia procera
Anredera cordifolia
Basella alba
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Hydrostachys multifida
Alangium chinense
Cornus mas
Camptotheca acuminata
Nyssa ogeche
Curtisia dentata
Grubbia tomentosa
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Superasteridae
Eudicotyledonae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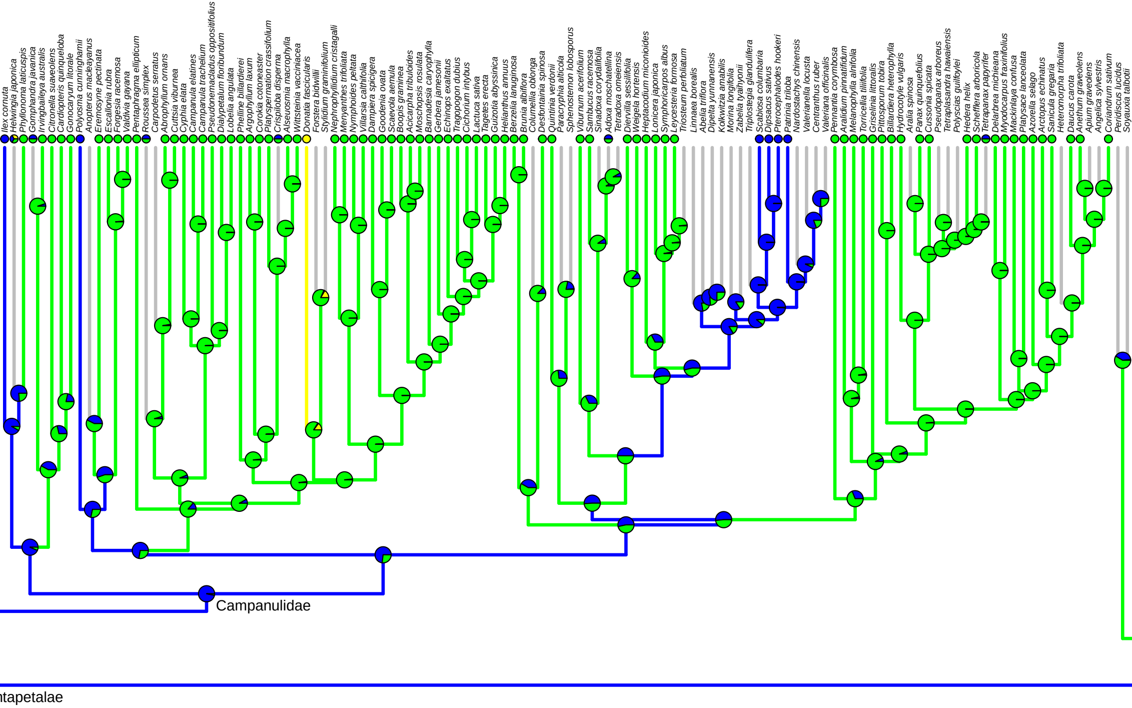
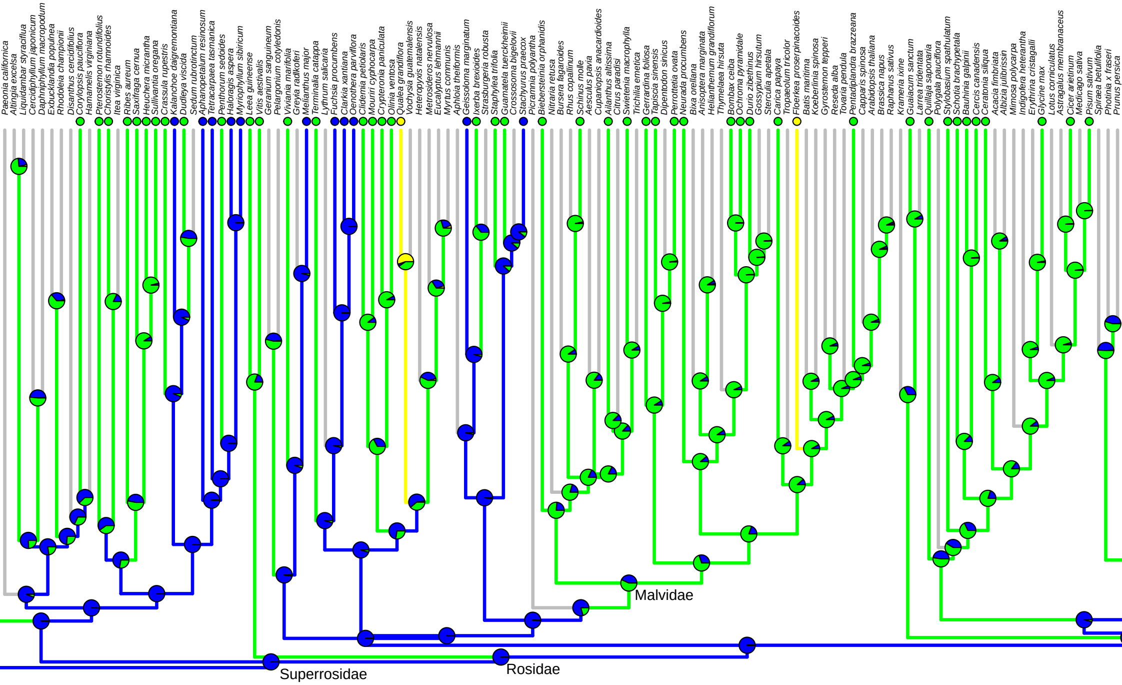
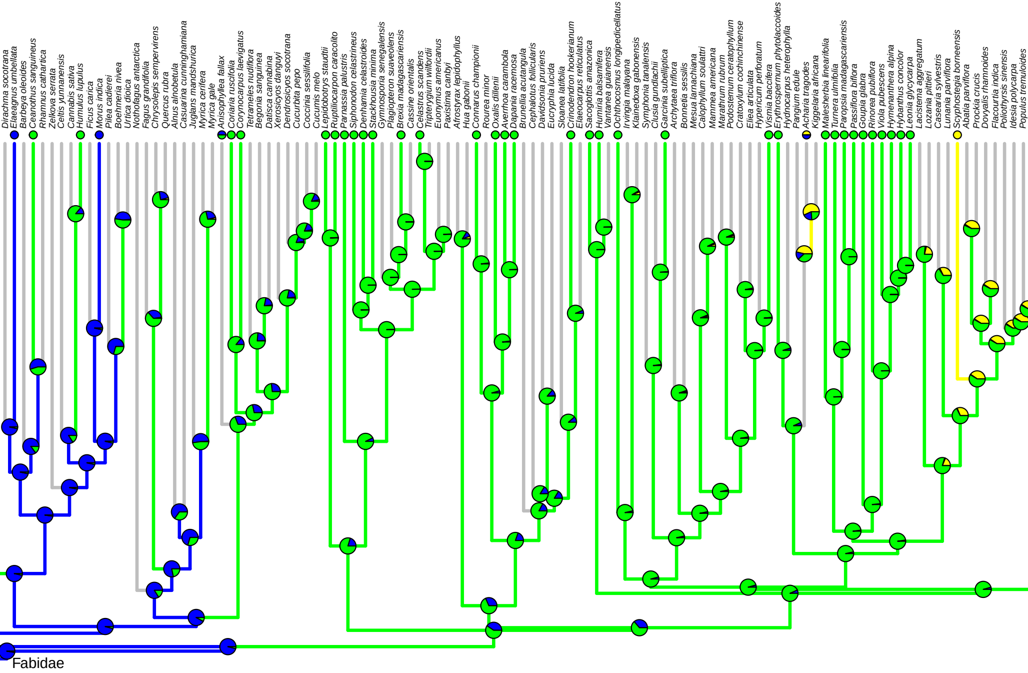
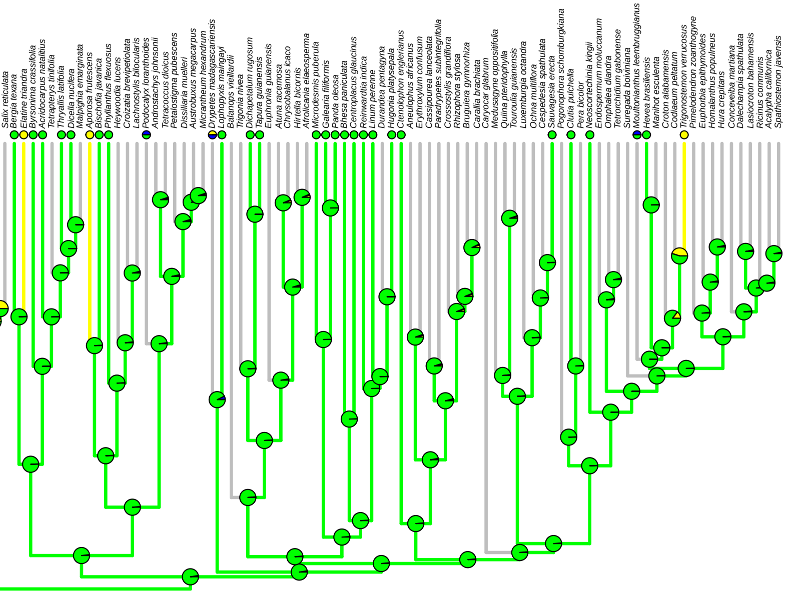
Tetramerista crassifolia
Barringtonia asiatica
Couroupita guianensis
Fouquieria splendens
Cobaea scandens
Gilia capitata
Phlox longifolia
Polemonium reptans
Manilkara zapota
Lissocarpa benthamii
Diospyros lotus
Euclea crispa
Anagallis tenella
Maesa tenera
Clavija eggersiana
Androsace spinulifera
Primula sieboldii
Eurya japonica
Ternstroemia stahlii
Camellia sinensis
Symplocos zizyphoides
Galax urceolata
Halesia carolina
Styrax officinalis
Sarracenia purpurea
Actinidia chinensis
Roridula gorgonias
Clethra alnifolia
Cyrilla racemiflora
Enkianthus campanulatus
Arbutus unedo
Rhododendron hippophaeoides
Vaccinium uliginosum
Icacina mannii
Eucommia ulmoides
Aucuba japonica
Garrya elliptica
Oncotheca balansae
Vahlia capensis
Montinia caryophyllacea
Hydrolea ovata
Sphenoclea zeylanica
Cuscuta cuspidata
Ipomoea alba
Petunia axillaris
Atropa belladonna
Solanum dulcamara
Nicotiana tabacum
Nolana humifusa
Luculia gratissima
Coffea arabica
Galium aparine
Mitchella repens
Spigelia marilandica
Strychnos nuxvomica
Gelsemium sempervirens
Nerium oleander
Exacum affine
Gentiana saponaria
Borago officinalis
Ehretia acuminata
Hydrophyllum capitatum
Plocosperma buxifolium
Olea europaea
Jasminum simplicifolium
Syringa vulgaris
Polypremum procumbens
Peltanthera floribunda
Calceolaria integrifolia
Rhynchoglossum notonianum
Titanotrichum oldhamii
Halleria lucida
Antirrhinum majus
Plantago lanceolata
Veronica anagallisaquatica
Myoporum mauritianum
Scrophularia californica
Verbascum thapsus
Campsis radicans
Catalpa speciosa
Martynia annua
Sesamum indicum
Byblis liniflora
Pinguicula moranensis
Utricularia alpina
Thunbergia alata
Acanthus montanus
Barleria prionitis
Justicia americana
Thomandersia laurifolia
Junellia succulentifolia
Callicarpa dichotoma
Lamium amplexicaule
Paulownia tomentosa
Pedicularis foliosa
Mazus pumilus
Phryma leptostachya
Lamiidae
Asteridae
Per


Ilex cornuta
Helwingia japonica
Phyllonoma laticuspis
Gomphandra javanica
Irvingbaileya australis
Citronella suaveolens
Cardiopteris quinqueloba
Gonocaryum litorale
Polyosma cunninghamii
Anopterus macleayanus
Eremosyne pectinata
Escallonia rubra
Forgesia racemosa
Valdivia gayana
Pentaphragma ellipticum
Roussea simplex
Carpodetus serratus
Abrophyllum ornans
Cuttsia viburnea
Cyphia elata
Campanula elatines
Campanula trachelium
Pseudonemacladus oppositifolius
Dialypetalum floribundum
Lobelia angulata
Phelline billardierei
Argophyllum laxum
Corokia cotoneaster
Platyspermation crassifolium
Crispiloba disperma
Alseuosmia macrophylla
Wittsteinia vacciniacea
Donatia fascicularis
Forstera bidwillii
Stylidium graminifolium
Nephrophyllidium cristagalli
Menyanthes trifoliata
Nymphoides peltata
Villarsia calthifolia
Dampiera spicigera
Goodenia ovata
Scaevola aemula
Boopis graminea
Acicarpha tribuloides
Moschopsis rosulata
Barnadesia caryophylla
Gerbera jamesonii
Echinops exaltatus
Tragopogon dubius
Cichorium intybus
Lactuca sativa
Tagetes erecta
Guizotia abyssinica
Helianthus annuus
Berzelia lanuginosa
Brunia albiflora
Columellia oblonga
Desfontainia spinosa
Quintinia verdonii
Paracryphia alticola
Sphenostemon lobosporus
Viburnum acerifolium
Sambucus racemosa
Sinadoxa corydalifolia
Adoxa moschatellina
Tetradoxa omeiensis
Diervilla sessilifolia
Weigela hortensis
Heptacodium miconioides
Lonicera japonica
Symphoricarpos albus
Leycesteria formosa
Triosteum perfoliatum
Linnaea borealis
Abelia triflora
Dipelta yunnanensis
Kolkwitzia amabilis
Morina longifolia
Zabelia tyaihyonii
Triplostegia glandulifera
Scabiosa columbaria
Dipsacus sativus
Pterocephalodes hookeri
Patrinia triloba
Nardostachys chinensis
Valerianella locusta
Centranthus ruber
Valeriana officinalis
Pennantia corymbosa
Aralidium pinnatifidum
Melanophylla alnifolia
Torricellia tiliifolia
Griselinia littoralis
Pittosporum tobira
Billardiera heterophylla
Hydrocotyle vulgaris
Aralia spinosa
Panax quinquefolius
Cussonia spicata
Pseudopanax arboreus
Tetraplasandra hawaiensis
Polyscias guilfoylei
Hedera helix
Schefflera arboricola
Tetrapanax papyrifer
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
Campanulidae
ntapetalae


Paeonia californica
Altingia excelsa
Liquidambar styraciflua
Cercidiphyllum japonicum
Daphniphyllum macropodum
Exbucklandia populnea
Rhodoleia championii
Disanthus cercidifolius
Corylopsis pauciflora
Hamamelis virginiana
Pterostemon rotundifolius
Choristylis rhamnoides
Itea virginica
Ribes aureum
Saxifraga cernua
Heuchera micrantha
Sullivantia oregana
Crassula rupestris
Kalanchoe daigremontiana
Dudleya viscida
Sedum rubrotinctum
Aphanopetalum resinosum
Tetracarpaea tasmanica
Penthorum sedoides
Haloragis aspera
Myriophyllum sibiricum
Leea guineense
Vitis aestivalis
Geranium sanguineum
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
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
Aphloia theiformis
Geissoloma marginatum
Ixerba brexioides
Strasburgeria robusta
Staphylea trifolia
Guamatela tuerckheimii
Crossosoma bigelovii
Stachyurus praecox
Picramnia polyantha
Biebersteinia orphanidis
Nitraria retusa
Bursera fagaroides
Rhus copallinum
Schinus molle
Aesculus pavia
Cupaniopsis anacardioides
Ailanthus altissima
Citrus paradisi
Swietenia macrophylla
Trichilia emetica
Gerrardina foliosa
Tapiscia sinensis
Dipentodon sinicus
Perrottetia ovata
Neurada procumbens
Bixa orellana
Anisoptera marginata
Helianthemum grandiflorum
Thymelaea hirsuta
Bombax ceiba
Ochroma pyramidale
Durio zibethinus
Gossypium hirsutum
Sterculia apetala
Carica papaya
Tropaeolum tricolor
Floerkea proserpinacoides
Batis maritima
Koeberlinia spinosa
Gyrostemon tepperi
Reseda alba
Tovaria pendula
Pentadiplandra brazzeana
Capparis spinosa
Arabidopsis thaliana
Brassica napus
Raphanus sativus
Krameria ixine
Guaiacum sanctum
Larrea tridentata
Quillaja saponaria
Polygala pauciflora
Stylobasium spathulatum
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
Spiraea betulifolia
Photinia x fraseri
Prunus persica
Malvidae
Superrosidae
Rosidae


Dirachma socotrana
Elaeagnus umbellata
Barbeya oleoides
Ceanothus sanguineus
Rhamnus cathartica
Zelkova serrata
Celtis yunnanensis
Cannabis sativa
Humulus lupulus
Ficus carica
Morus indica
Pilea cadierei
Boehmeria nivea
Urtica dioica
Nothofagus antarctica
Fagus grandifolia
Chrysolepis sempervirens
Quercus rubra
Alnus alnobetula
Casuarina cunninghamiana
Juglans mandshurica
Myrica cerifera
Myrica gale
Anisophyllea fallax
Coriaria ruscifolia
Corynocarpus laevigatus
Tetrameles nudiflora
Begonia sanguinea
Datisca cannabina
Xerosicyos danguyi
Dendrosicyos socotrana
Cucurbita pepo
Coccinia sessilifolia
Cucumis melo
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
Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
Oxalis dillenii
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Cephalotus follicularis
Davidsonia pruriens
Eucryphia lucida
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Sacoglottis amazonica
Humiria balsamifera
Vantanea guianensis
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
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
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Goupia glabra
Rinorea pubiflora
Viola pubescens
Hymenanthera alpina
Hybanthus concolor
Leonia glycycarpa
Lacistema aggregatum
Lozania pittieri
Casearia sylvestris
Lunania parviflora
Scyphostegia borneensis
Abatia parviflora
Prockia crucis
Dovyalis rhamnoides
Flacourtia indica
Poliothyrsis sinensis
Idesia polycarpa
Populus tremuloides
Fabidae


Salix reticulata
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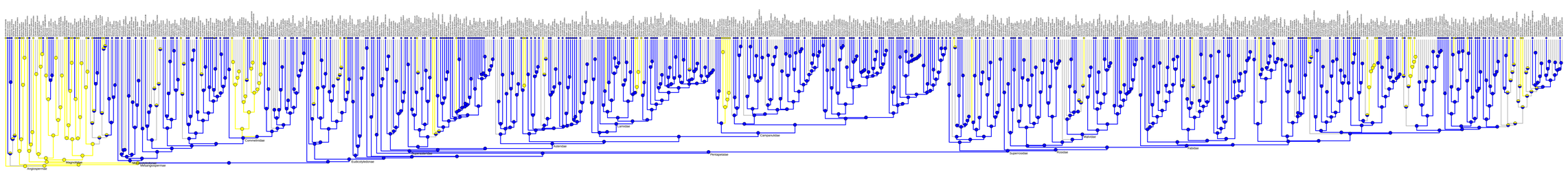
Thryallis latifolia
Dicella nucifera
Malpighia emarginata
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Dissiliaria muelleri
Austrobuxus megacarpus
Micrantheum hexandrum
Drypetes madagascariensis
Lophopyxis maingayi
Balanops vieillardii
Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Atuna racemosa
Chrysobalanus icaco
Hirtella bicornis
Afrolicania elaeosperma
Microdesmis puberula
Galearia filiformis
Panda oleosa
Bhesa paniculata
Centroplacus glaucinus
Reinwardtia indica
Linum perenne
Durandea pentagyna
Hugonia platysepala
Ctenolophon englerianus
Aneulophus africanus
Erythroxylum confusum
Cassipourea lanceolata
Paradrypetes subintegrifolia
Crossostylis grandiflora
Rhizophora stylosa
Bruguiera gymnorhiza
Carallia brachiata
Caryocar glabrum
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Endospermum moluccanum
Omphalea diandra
Tetrorchidium gabonense
Suregada boiviniana
Moultonianthus leembruggianus
Hevea brasiliensis
Manihot esculenta
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Conceveiba martiana
Dalechampia spathulata
Lasiocroton bahamensis
Ricinus communis
Acalypha californica
Spathiostemon javensis

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)
Gunneridae	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)

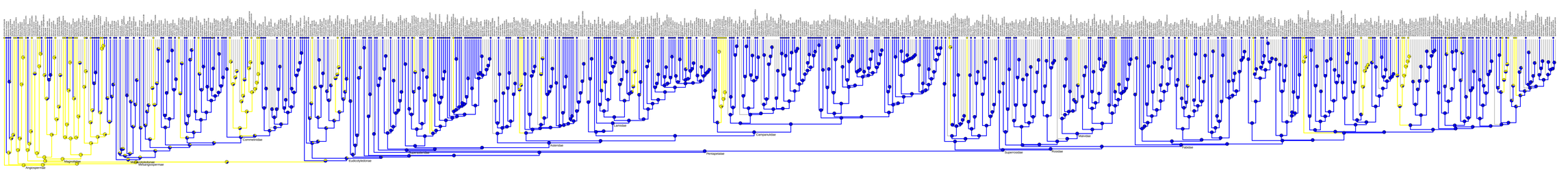


ML ancestral state reconstruction using rayDISC (R:corHMM)
305_A. Filament (binary) (D2d), ARDeq model

laminar (wide)
typical (narrow)

Node	ML state	Prob
Angiospermae	laminar (wide)	0.9999
Mesangiospermae	laminar (wide)	0.9823
Magnoliidae	laminar (wide)	0.9971
Monocotyledonae	laminar (wide)	0.5715
Eudicotyledonae	typical (narrow)	0.7656
Commelinidae	typical (narrow)	0.6933
Gunneridae	typical (narrow)	0.9997
Superasteridae	typical (narrow)	0.9997
Asteridae	typical (narrow)	0.9998
Lamidae	typical (narrow)	0.998
Campanulidae	typical (narrow)	0.9961
Lamiidae	typical (narrow)	0.9998
Rosidae	typical (narrow)	0.9998
Malvidae	typical (narrow)	0.9979
Fabidae	typical (narrow)	1

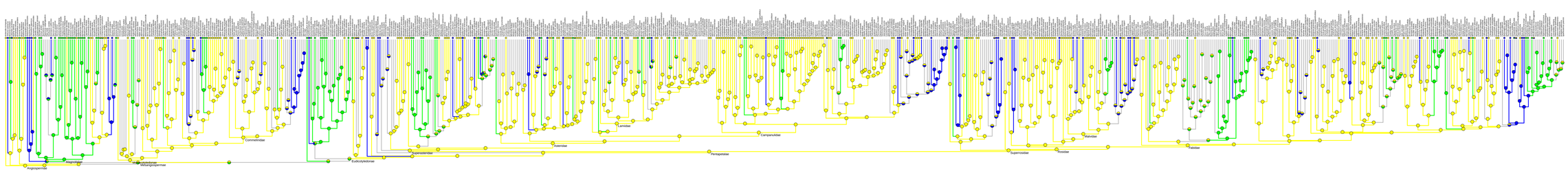
Model	LogL	Nopr	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−171.88	2	347.76	347.77	1.16	0.36	0.008	0.0021
ARDeq**	−171.3	2	346.6	346.61	0	0.64	0.0083	0.0021
ER	−177.52	1	357.04	357.05	10.44	0	0.0024	0.0024
UN01	−184.44	1	370.88	370.88	24.27	0	0.0148	
UN10	−187.63	1	377.25	377.26	30.65	0		0.0023



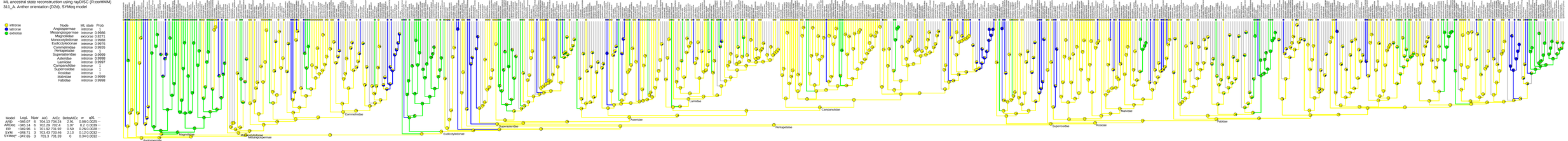
MP ancestral state reconstruction using ancestral pars (R:phangorn)
311_A. Anther orientation (D2d), 110 steps

	introrse
	latrorse
	extrorse

Node	MP state(s)
Angiospermae	introrse
Mesangiospermae	introrse / extrorse
Magnoliidae	extrorse
Monocotyledonae	introrse
Eudicotyledonae	introrse / extrorse
Commelinidae	introrse
Ranunculidae	introrse
Superasteridae	introrse
Asteridae	introrse
Lamiidae	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

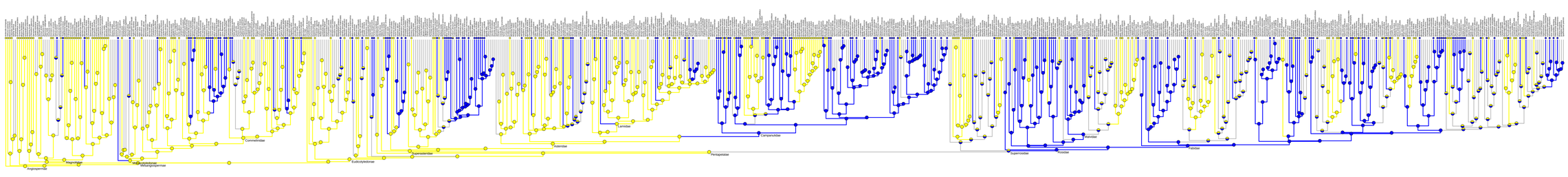


Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	···
ARD	-346.07	6	704.13	704.24	2.91	0.08	0.0025	···
ARDeq	-346.14	4	702.29	702.4	1.07	0.2	0.0039	···
ER	-349.96	1	701.92	701.92	0.59	0.26	0.0028	···
SYM	-348.71	3	703.43	703.46	2.13	0.12	0.0032	···
SYMeq*	-347.65	3	701.3	701.33	0	0.34	0.0032	···

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
Lamiidae	basifixed
Campanulidae	dorsifixed
Superrosidae	basifixed/dorsifixed
Rosidae	dorsifixed
Malvidae	dorsifixed
Fabidae	dorsifixed

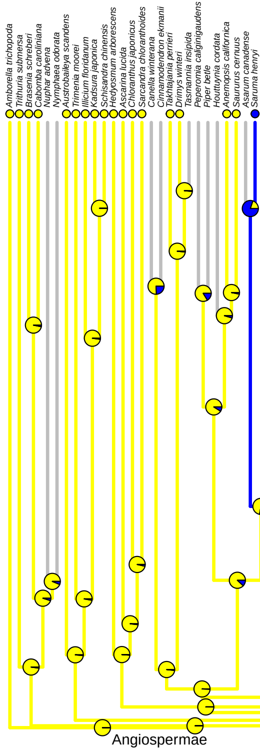


ML ancestral state reconstruction using rayDISC (R:corHMM)
312_A. Anther attachment (binary) (D2d), ARDeq model

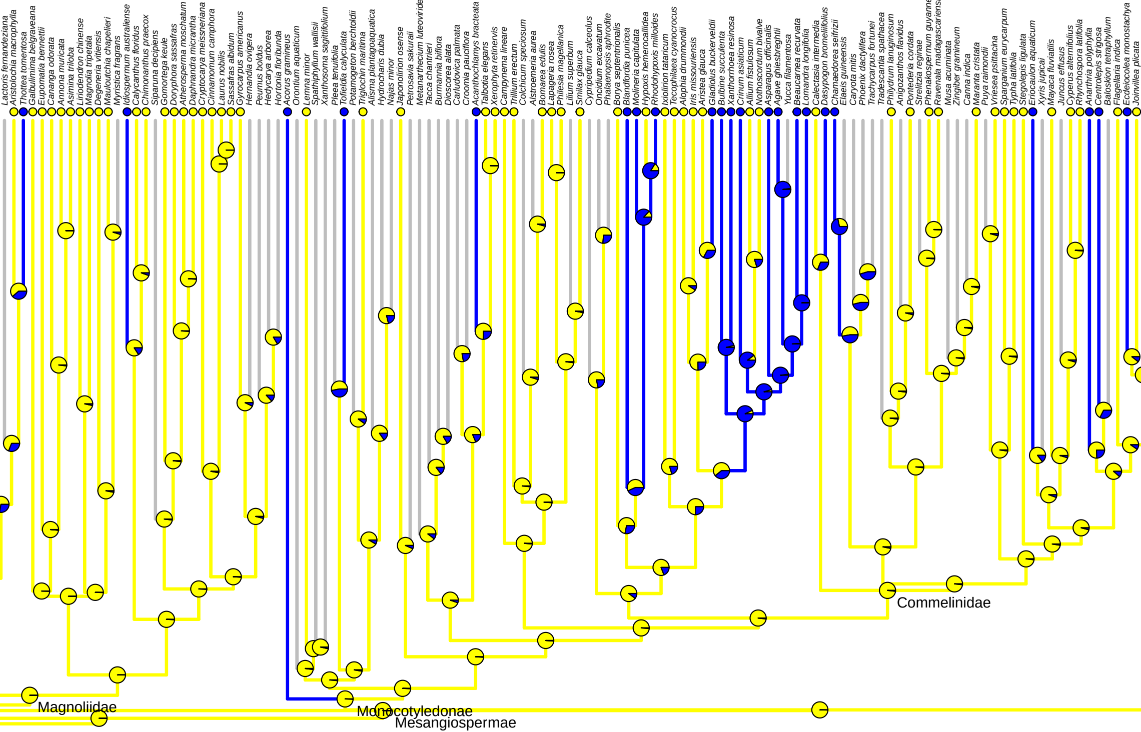
🟡 basifixed
🔵 dorsifixed

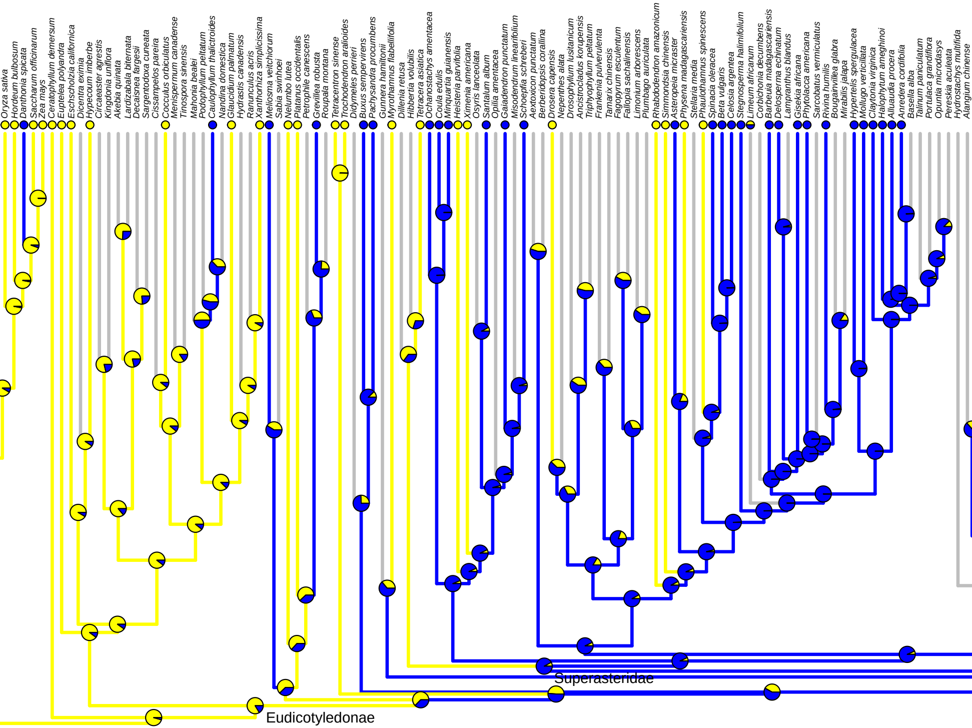
Node	ML state	Prob
Angiospermae	basifixed	1
Mesangiospermae	basifixed	0.9991
Magnoliidae	basifixed	0.9989
Monocotyledonae	basifixed	0.994
Eudicotyledonae	basifixed	0.8364
Commelinidae	basifixed	0.9823
Pentapetalae	dorsifixed	0.9139
Superasteridae	dorsifixed	0.92
Asteridae	dorsifixed	0.9182
Lamiidae	dorsifixed	0.7175
Campanulidae	dorsifixed	0.9855
Superrosidae	dorsifixed	0.921
Rosidae	dorsifixed	0.9546
Malvidae	dorsifixed	0.9807
Fabidae	dorsifixed	0.9994

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−266.03	2	536.05	536.07	1.32	0.3	0.0043	0.0077
ARDeq**	−265.37	2	534.74	534.75	0	0.59	0.0043	0.0077
ER	−268.08	1	538.16	538.17	3.42	0.11	0.0057	0.0057
UNI01	−291.52	1	585.04	585.04	50.29	0	0.0061	
UNI10	−277.64	1	557.28	557.28	22.53	0		0.0081



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


Lactoris fernandeziana
Aristolochia macrophylla
Thottea tomentosa
Galbulimima belgraveana
Eupomatia bennettii
Cananga odorata
Annona muricata
Asimina triloba
Liriodendron chinense
Magnolia tripetala
Degeneria vitiensis
Mauloutchia chapelieri
Myristica fragrans
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
Lemna minor
Spathiphyllum wallisii
Xanthosoma sagittifolium
Pleea tenuifolia
Tofieldia calyculata
Potamogeton berchtoldii
Triglochin maritima
Alisma plantagoaquatica
Hydrocharis dubia
Najas minor
Japonolirion osense
Petrosavia sakuraii
Metanarthecium luteoviride
Tacca chantrieri
Burmannia biflora
Dioscorea alata
Carludovica palmata
Croomia pauciflora
Acanthochlamys bracteata
Talbotia elegans
Xerophyta retinervis
Campynema lineare
Trillium erectum
Colchicum speciosum
Alstroemeria aurea
Bomarea edulis
Lapageria rosea
Philesia magellanica
Lilium superbum
Smilax glauca
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
Crinum asiaticum
Allium fistulosum
Nothoscordum bivalve
Asparagus officinalis
Agave ghiesbreghtii
Yucca filamentosa
Beaucarnea recurvata
Lomandra longifolia
Calectasia intermedia
Dasypogon bromeliifolius
Chamaedorea seifrizii
Elaeis guineensis
Caryota mitis
Phoenix dactylifera
Trachycarpus fortunei
Tradescantia spathacea
Philydrum lanuginosum
Anigozanthos flavidus
Pontederia cordata
Strelitzia reginae
Phenakospermum guyannense
Ravenala madagascariensis
Musa acuminata
Zingiber gramineum
Canna indica
Maranta cristata
Puya raimondii
Vriesea psittacina
Sparganium eurycarpum
Typha latifolia
Stegolepis ligulata
Eriocaulon aquaticum
Xyris jupicai
Mayaca fluviatilis
Juncus effusus
Cyperus alternifolius
Rhynchospora latifolia
Anarthria polyphylla
Centrolepis strigosa
Baloskion tetraphyllum
Flagellaria indica
Ecdeiocolea monostachya
Joinvillea plicata
Commelinidae
Magnoliidae
Monocotyledonae
Mesangiospermae


Oryza sativa
Hordeum bulbosum
Danthonia spicata
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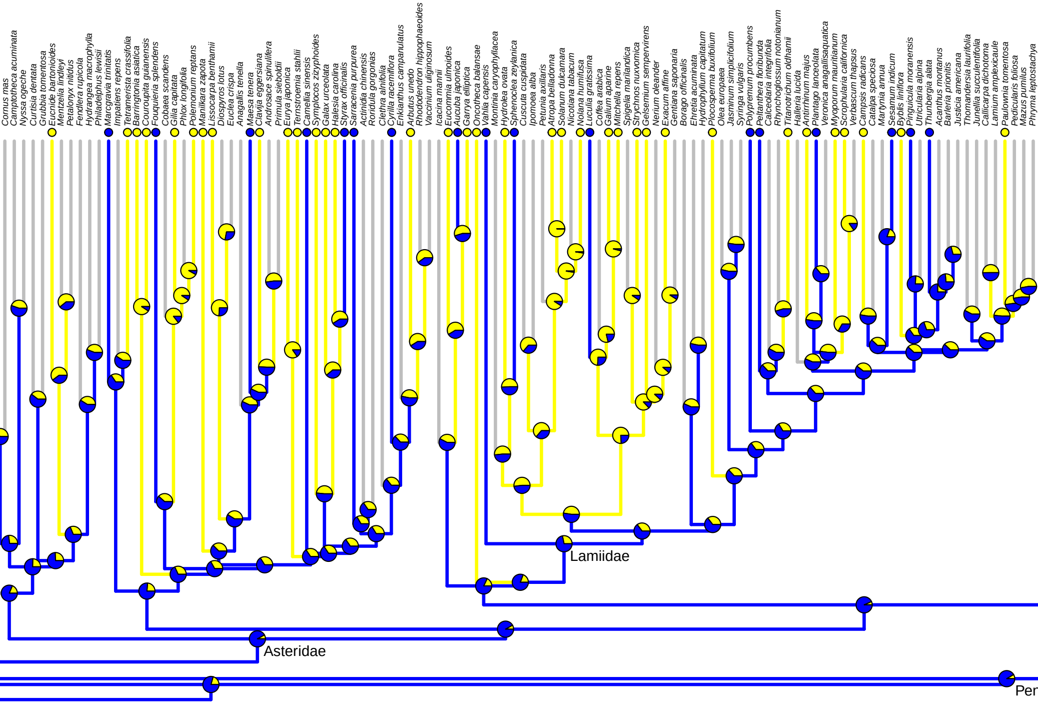
Zea mays
Ceratophyllum demersum
Euptelea polyandra
Eschscholzia californica
Dicentra eximia
Hypecoum imberbe
Circaeaster agrestis
Kingdonia uniflora
Akebia quinata
Lardizabala biternata
Decaisnea fargesii
Sargentodoxa cuneata
Cissampelos pareira
Cocculus orbiculatus
Menispermum canadense
Tinospora sinensis
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
Ochanostachys amentacea
Coula edulis
Minquartia guianensis
Heisteria parvifolia
Ximenia americana
Osyris lanceolata
Santalum album
Opilia amentacea
Gaiadendron punctatum
Misodendrum linearifolium
Schoepfia schreberi
Aextoxicon punctatum
Berberidopsis corallina
Drosera capensis
Nepenthes alata
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
Beta vulgaris
Celosia argentea
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Delosperma echinatum
Lampranthus blandus
Gisekia africana
Phytolacca americana
Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Claytonia virginica
Halophytum ameghinoi
Alluaudia procera
Anredera cordifolia
Basella alba
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Hydrostachys multifida
Alangium chinense
Superasteridae
Eudicotyledonae


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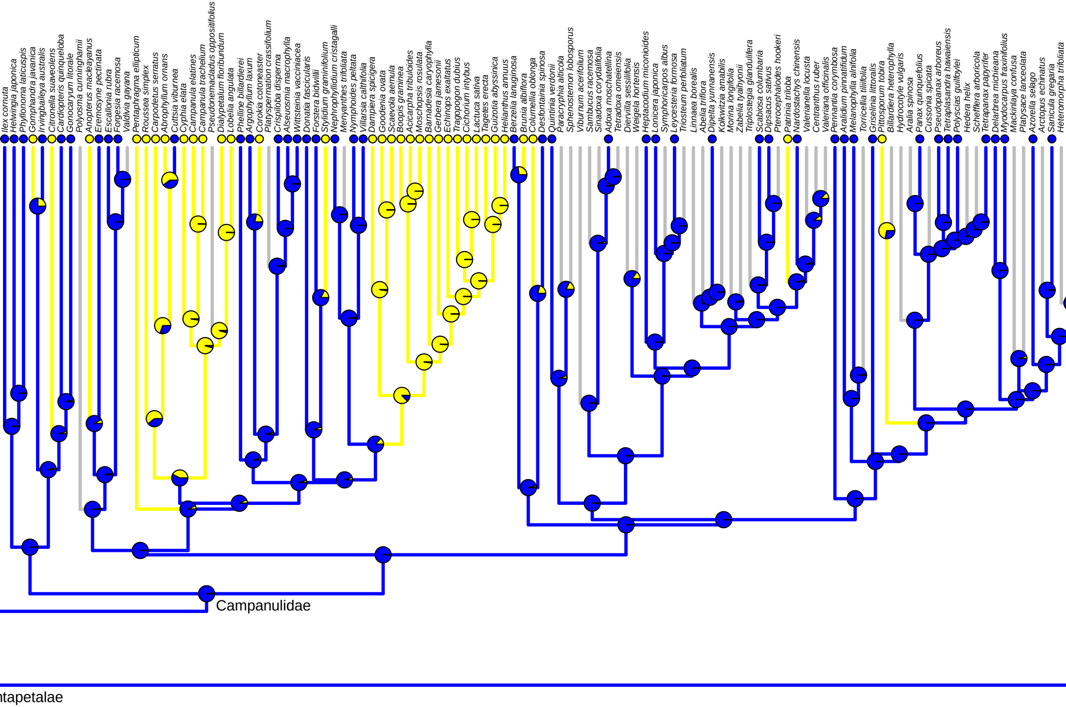
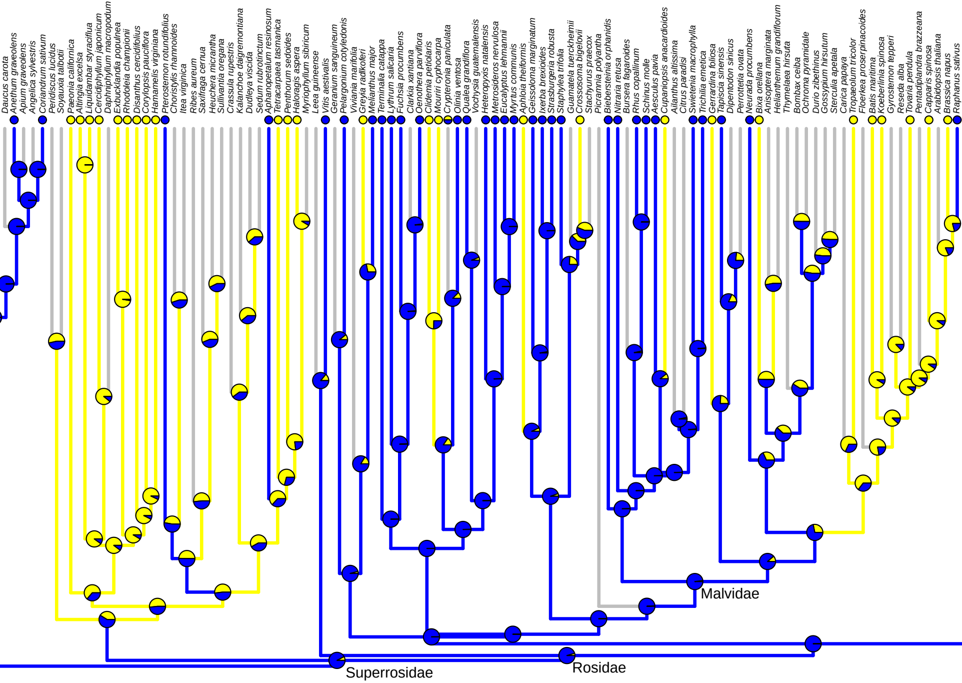
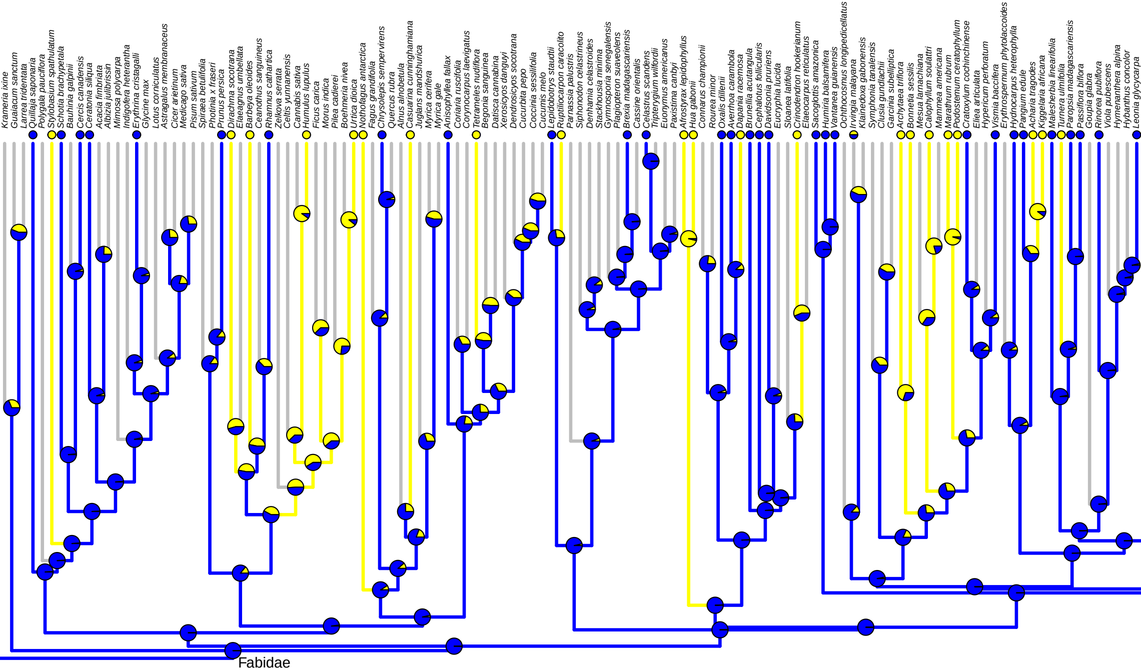
Nyssa ogeche
Curtisia dentata
Grubbia tomentosa
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Fendlera rupicola
Hydrangea macrophylla
Philadelphus lewisii
Marcgravia trinitatis
Impatiens repens
Tetramerista crassifolia
Barringtonia asiatica
Couroupita guianensis
Fouquieria splendens
Cobaea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


Ilex cornuta
Helwingia japonica
Phyllonoma laticuspis
Gomphandra javanica
Irvingbaileya australis
Citronella suaveolens
Cardiopteris quinqueloba
Gonocaryum litorale
Polyosma cunninghamii
Anopterus macleayanus
Eremosyne pectinata
Escallonia rubra
Forgesia racemosa
Valdivia gayana
Pentaphragma ellipticum
Roussea simplex
Carpodetus serratus
Abrophyllum ornans
Cuttsia viburnea
Cyphia elata
Campanula elatines
Campanula trachelium
Pseudonemacladus oppositifolius
Dialypetalum floribundum
Lobelia angulata
Phelline billardierei
Argophyllum laxum
Corokia cotoneaster
Platyspermation crassifolium
Crispiloba disperma
Alseuosmia macrophylla
Wittsteinia vacciniacea
Donatia fascicularis
Forstera bidwillii
Stylidium graminifolium
Nephrophyllidium cristagalli
Menyanthes trifoliata
Nymphoides peltata
Villarsia calthifolia
Dampiera spicigera
Goodenia ovata
Scaevola aemula
Boopis graminea
Acicarpha tribuloides
Moschopsis rosulata
Barnadesia caryophylla
Gerbera jamesonii
Echinops exaltatus
Tragopogon dubius
Cichorium intybus
Lactuca sativa
Tagetes erecta
Guizotia abyssinica
Helianthus annuus
Berzelia lanuginosa
Brunia albiflora
Columellia oblonga
Desfontainia spinosa
Quintinia verdonii
Paracryphia alticola
Sphenostemon lobosporus
Viburnum acerifolium
Sambucus racemosa
Sinadoxa corydalifolia
Adoxa moschatellina
Tetradoxa omeiensis
Diervilla sessilifolia
Weigela hortensis
Heptacodium miconioides
Lonicera japonica
Symphoricarpos albus
Leycesteria formosa
Triosteum perfoliatum
Linnaea borealis
Abelia triflora
Dipelta yunnanensis
Kolkwitzia amabilis
Morina longifolia
Zabelia tyaihyonii
Triplostegia glandulifera
Scabiosa columbaria
Dipsacus sativus
Pterocephalodes hookeri
Patrinia triloba
Nardostachys chinensis
Valerianella locusta
Centranthus ruber
Valeriana officinalis
Pennantia corymbosa
Aralidium pinnatifidum
Melanophylla alnifolia
Torricellia tiliifolia
Griselinia littoralis
Pittosporum tobira
Billardiera heterophylla
Hydrocotyle vulgaris
Aralia spinosa
Panax quinquefolius
Cussonia spicata
Pseudopanax arboreus
Tetraplasandra hawaiensis
Polyscias guilfoylei
Hedera helix
Schefflera arboricola
Tetrapanax papyrifer
Delarbrea michieana
Myodocarpus fraxinifolius
Mackinlaya confusa
Platysace lanceolata
Azorella selago
Arctopus echinatus
Sanicula gregaria
Heteromorpha trifoliata
Campanulidae
ntapetalae


Daucus carota
Anethum graveolens
Apium graveolens
Angelica sylvestris
Coriandrum sativum
Peridiscus lucidus
Soyauxia talbotii
Paeonia californica
Altingia excelsa
Liquidambar styraciflua
Cercidiphyllum japonicum
Daphniphyllum macropodum
Exbucklandia populnea
Rhodoleia championii
Disanthus cercidifolius
Corylopsis pauciflora
Hamamelis virginiana
Pterostemon rotundifolius
Choristylis rhamnoides
Itea virginica
Ribes aureum
Saxifraga cernua
Heuchera micrantha
Sullivantia oregana
Crassula rupestris
Kalanchoe daigremontiana
Dudleya viscida
Sedum rubrotinctum
Aphanopetalum resinosum
Tetracarpaea tasmanica
Penthorum sedoides
Haloragis aspera
Myriophyllum sibiricum
Leea guineense
Vitis aestivalis
Geranium sanguineum
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
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
Aphloia theiformis
Geissoloma marginatum
Ixerba brexioides
Strasburgeria robusta
Staphylea trifolia
Guamatela tuerckheimii
Crossosoma bigelovii
Stachyurus praecox
Picramnia polyantha
Biebersteinia orphanidis
Nitraria retusa
Bursera fagaroides
Rhus copallinum
Schinus molle
Aesculus pavia
Cupaniopsis anacardioides
Ailanthus altissima
Citrus paradisi
Swietenia macrophylla
Trichilia emetica
Gerrardina foliosa
Tapiscia sinensis
Dipentodon sinicus
Perrottetia ovata
Neurada procumbens
Bixa orellana
Anisoptera marginata
Helianthemum grandiflorum
Thymelaea hirsuta
Bombax ceiba
Ochroma pyramidale
Durio zibethinus
Gossypium hirsutum
Sterculia apetala
Carica papaya
Tropaeolum tricolor
Floerkea proserpinacoides
Batis maritima
Koeberlinia spinosa
Gyrostemon tepperi
Reseda alba
Tovaria pendula
Pentadiplandra brazzeana
Capparis spinosa
Arabidopsis thaliana
Brassica napus
Raphanus sativus
Malvidae
Superrosidae
Rosidae


Krameria ixine
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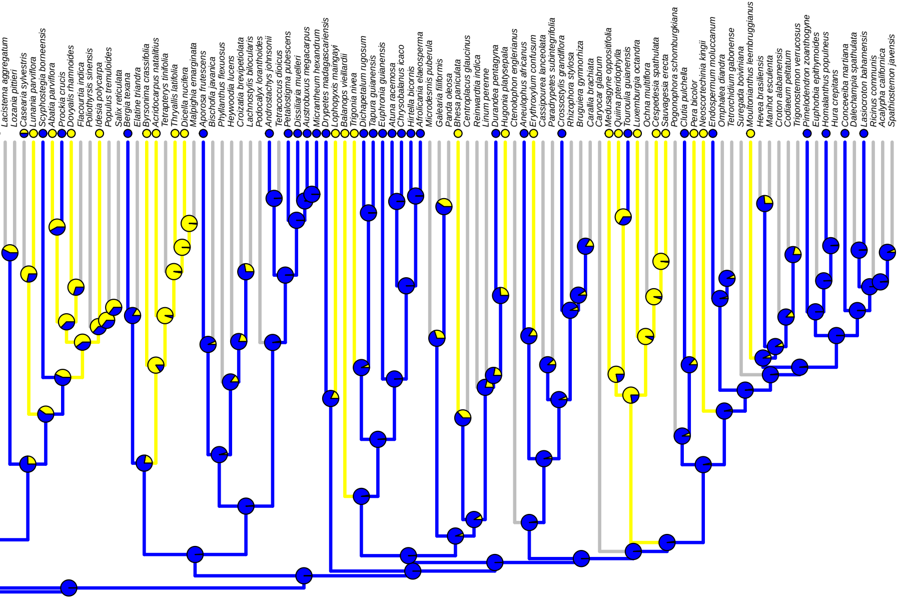
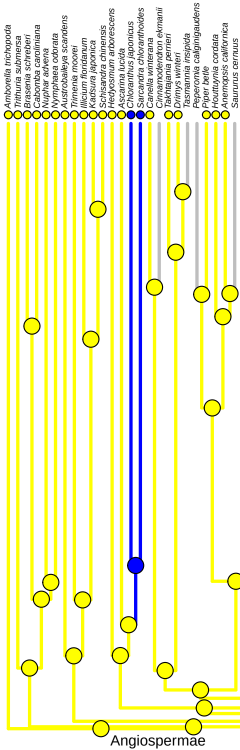
Larrea tridentata
Quillaja saponaria
Polygala pauciflora
Stylobasium spathulatum
Schotia brachypetala
Bauhinia galpinii
Cercis canadensis
Ceratonia siliqua
Acacia fimbriata
Albizia julibrissin
Mimosa polycarpa
Indigofera heterantha
Erythrina cristagalli
Glycine max
Lotus corniculatus
Astragalus membranaceus
Cicer arietinum
Medicago sativa
Pisum sativum
Spiraea betulifolia
Photinia x fraseri
Prunus persica
Dirachma socotrana
Elaeagnus umbellata
Barbeya oleoides
Ceanothus sanguineus
Rhamnus cathartica
Zelkova serrata
Celtis yunnanensis
Cannabis sativa
Humulus lupulus
Ficus carica
Morus indica
Pilea cadierei
Boehmeria nivea
Urtica dioica
Nothofagus antarctica
Fagus grandifolia
Chrysolepis sempervirens
Quercus rubra
Alnus alnobetula
Casuarina cunninghamiana
Juglans mandshurica
Myrica cerifera
Myrica gale
Anisophyllea fallax
Coriaria ruscifolia
Corynocarpus laevigatus
Tetrameles nudiflora
Begonia sanguinea
Datisca cannabina
Xerosicyos danguyi
Dendrosicyos socotrana
Cucurbita pepo
Coccinia sessilifolia
Cucumis melo
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
Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
Oxalis dillenii
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Cephalotus follicularis
Davidsonia pruriens
Eucryphia lucida
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Sacoglottis amazonica
Humiria balsamifera
Vantanea guianensis
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
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
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Goupia glabra
Rinorea pubiflora
Viola pubescens
Hymenanthera alpina
Hybanthus concolor
Leonia glycycarpa
Fabidae


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
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Dissiliaria muelleri
Austrobuxus megacarpus
Micrantheum hexandrum
Drypetes madagascariensis
Lophopyxis maingayi
Balanops vieillardii
Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Atuna racemosa
Chrysobalanus icaco
Hirtella bicornis
Afrolicania elaeosperma
Microdesmis puberula
Galearia filiformis
Panda oleosa
Bhesa paniculata
Centroplacus glaucinus
Reinwardtia indica
Linum perenne
Durandea pentagyna
Hugonia platysepala
Ctenolophon englerianus
Aneulophus africanus
Erythroxylum confusum
Cassipourea lanceolata
Paradrypetes subintegrifolia
Crossostylis grandiflora
Rhizophora stylosa
Bruguiera gymnorhiza
Carallia brachiata
Caryocar glabrum
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Endospermum moluccanum
Omphalea diandra
Tetrorchidium gabonense
Suregada boiviniana
Moultonianthus leembruggianus
Hevea brasiliensis
Manihot esculenta
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Conceveiba martiana
Dalechampia spathulata
Lasiocroton bahamensis
Ricinus communis
Acalypha californica
Spathiostemon javensis

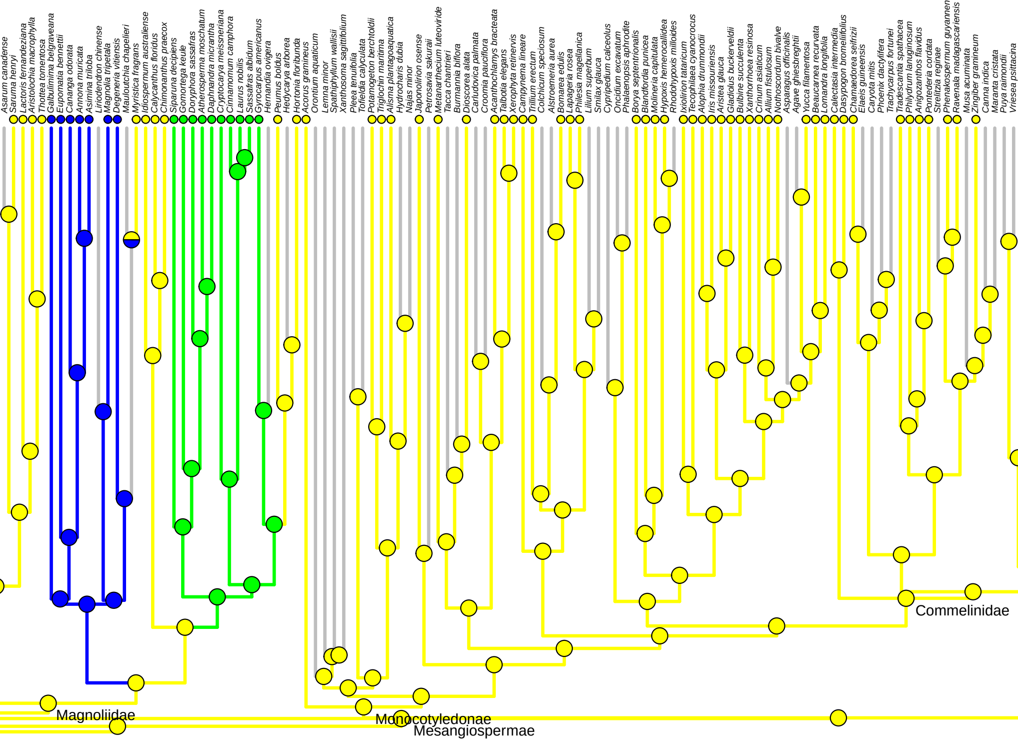
MP ancestral state reconstruction using ancestral.pars (R:phangorn)
313_A. Anther dehiscence (3−state) (D2d), 10 steps

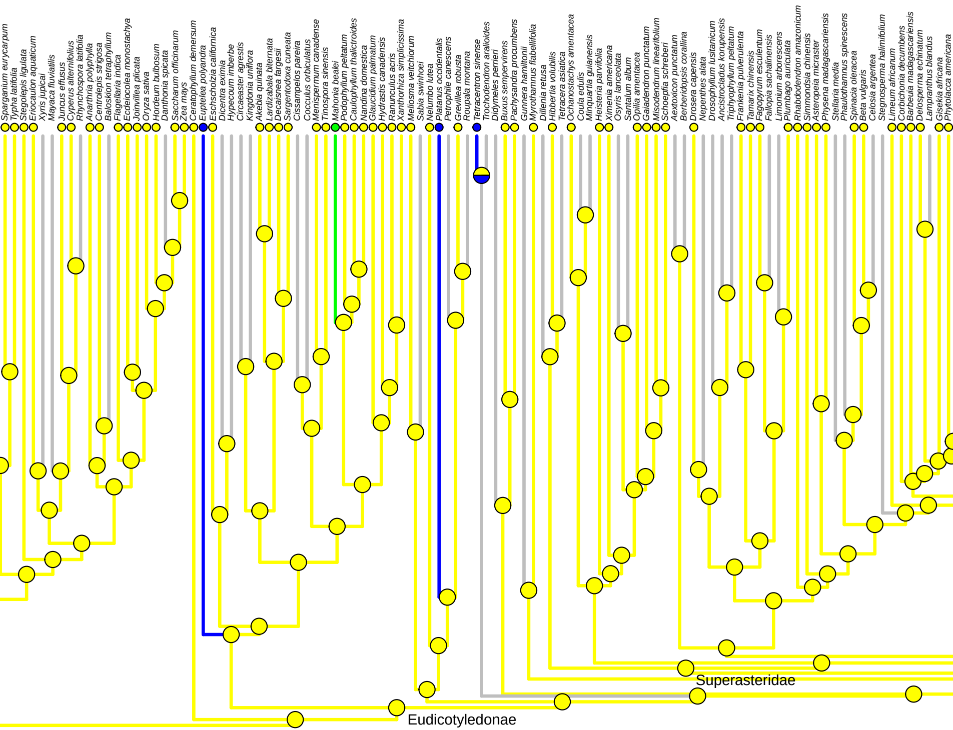
- ● longitudinal slit
- ● H−valvate
- ● flap−valvate

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


Asarum canadense
Saruma henryi
Lactoris fernandeziana
Aristolochia macrophylla
Thottea tomentosa
Galbulimima belgraveana
Eupomatia bennettii
Cananga odorata
Annona muricata
Asimina triloba
Liriodendron chinense
Magnolia tripetala
Degeneria vitiensis
Mauloutchia chapelieri
Myristica fragrans
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
Lemna minor
Spathiphyllum wallisii
Xanthosoma sagittifolium
Pleea tenuifolia
Tofieldia calyculata
Potamogeton berchtoldii
Triglochin maritima
Alisma plantagoaquatica
Hydrocharis dubia
Najas minor
Japonolirion osense
Petrosavia sakuraii
Metanarthecium luteoviride
Tacca chantrieri
Burmannia biflora
Dioscorea alata
Carludovica palmata
Croomia pauciflora
Acanthochlamys bracteata
Talbotia elegans
Xerophyta retinervis
Campynema lineare
Trillium erectum
Colchicum speciosum
Alstroemeria aurea
Bomarea edulis
Lapageria rosea
Philesia magellanica
Lilium superbum
Smilax glauca
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
Crinum asiaticum
Allium fistulosum
Nothoscordum bivalve
Asparagus officinalis
Agave ghiesbreghtii
Yucca filamentosa
Beaucarnea recurvata
Lomandra longifolia
Calectasia intermedia
Dasypogon bromeliifolius
Chamaedorea seifrizii
Elaeis guineensis
Caryota mitis
Phoenix dactylifera
Trachycarpus fortunei
Tradescantia spathacea
Philydrum lanuginosum
Anigozanthos flavidus
Pontederia cordata
Strelitzia reginae
Phenakospermum guyannense
Ravenala madagascariensis
Musa acuminata
Zingiber gramineum
Canna indica
Maranta cristata
Puya raimondii
Vriesea psittacina
Commelinidae
Magnoliidae
Monocotyledonae
Mesangiospermae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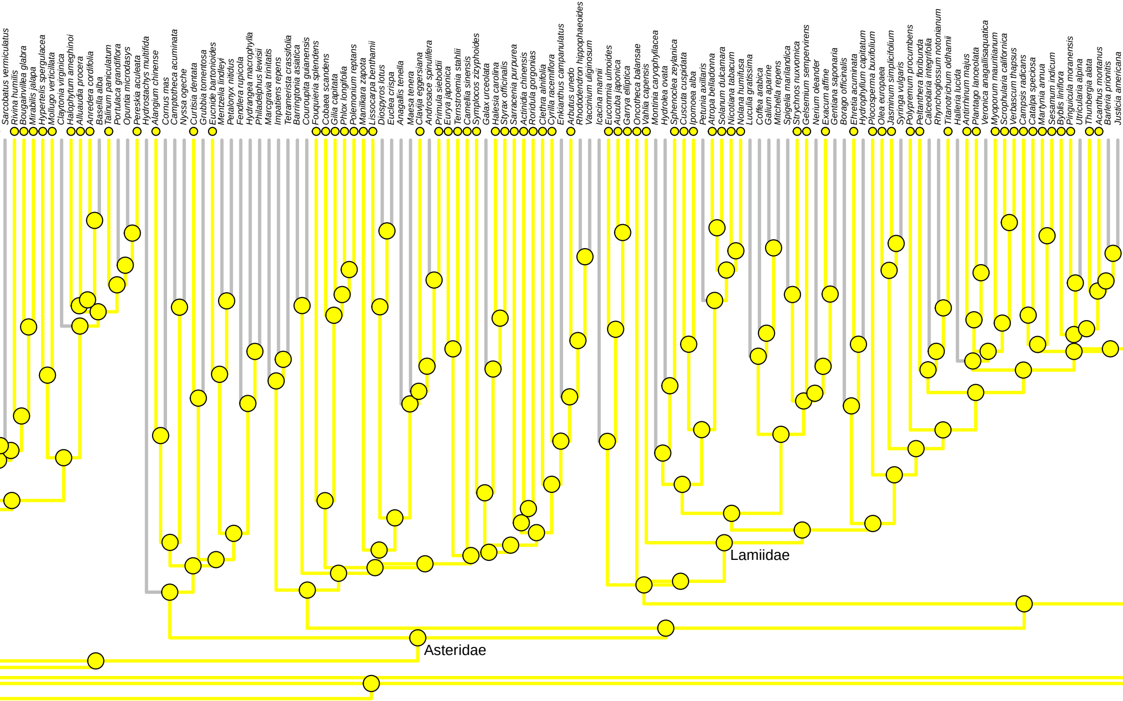
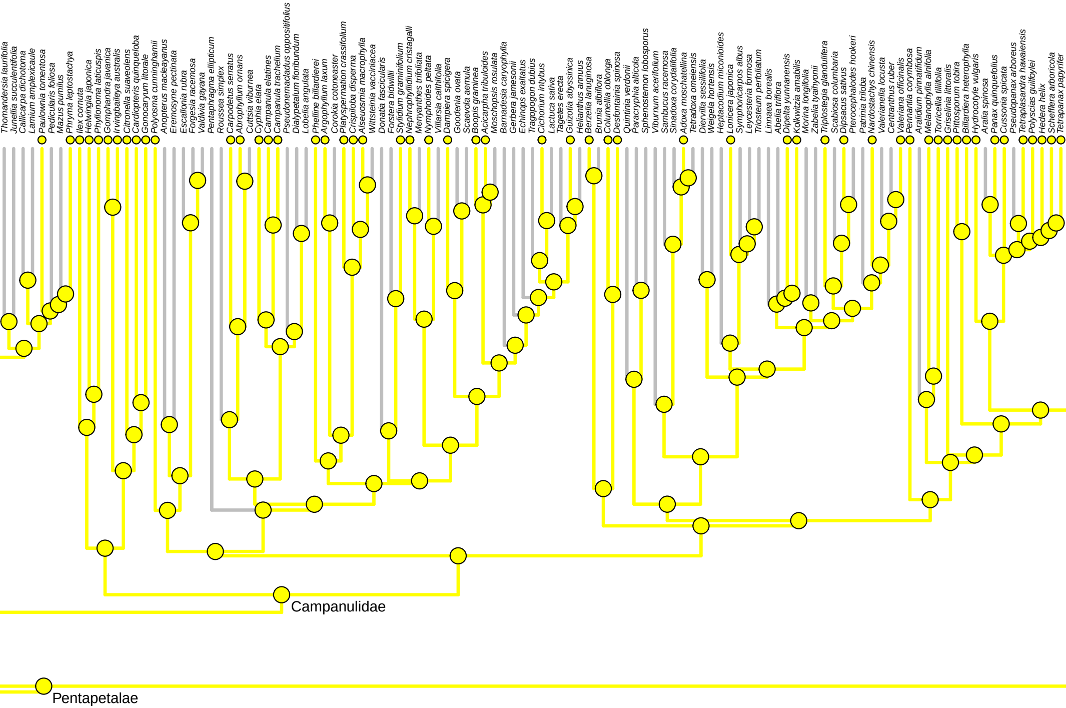
Typha latifolia
Stegolepis ligulata
Eriocaulon aquaticum
Xyris jupicai
Mayaca fluviatilis
Juncus effusus
Cyperus alternifolius
Rhynchospora latifolia
Anarthria polyphylla
Centrolepis strigosa
Baloskion tetraphyllum
Flagellaria indica
Ecdeiocolea monostachya
Joinvillea plicata
Oryza sativa
Hordeum bulbosum
Danthonia spicata
Saccharum officinarum
Zea mays
Ceratophyllum demersum
Euptelea polyandra
Eschscholzia californica
Dicentra eximia
Hypecoum imberbe
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
Ochanostachys amentacea
Coula edulis
Minquartia guianensis
Heisteria parvifolia
Ximenia americana
Osyris lanceolata
Santalum album
Opilia amentacea
Gaiadendron punctatum
Misodendrum linearifolium
Schoepfia schreberi
Aextoxicon punctatum
Berberidopsis corallina
Drosera capensis
Nepenthes alata
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
Beta vulgaris
Celosia argentea
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Delosperma echinatum
Lampranthus blandus
Gisekia africana
Phytolacca americana
Superasteridae
Eudicotyledonae


Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Claytonia virginica
Halophytum ameghinoi
Alluaudia procera
Anredera cordifolia
Basella alba
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Hydrostachys multifida
Alangium chinense
Cornus mas
Camptotheca acuminata
Nyssa ogeche
Curtisia dentata
Grubbia tomentosa
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Fendlera rupicola
Hydrangea macrophylla
Philadelphus lewisii
Marcgravia trinitatis
Impatiens repens
Tetramerista crassifolia
Barringtonia asiatica
Couroupita guianensis
Fouquieria splendens
Cobaea scandens
Gilia capitata
Phlox longifolia
Polemonium reptans
Manilkara zapota
Lissocarpa benthamii
Diospyros lotus
Euclea crispa
Anagallis tenella
Maesa tenera
Clavija eggersiana
Androsace spinulifera
Primula sieboldii
Eurya japonica
Ternstroemia stahlii
Camellia sinensis
Symplocos zizyphoides
Galax urceolata
Halesia carolina
Styrax officinalis
Sarracenia purpurea
Actinidia chinensis
Roridula gorgonias
Clethra alnifolia
Cyrilla racemiflora
Enkianthus campanulatus
Arbutus unedo
Rhododendron hippophaeoides
Vaccinium uliginosum
Icacina mannii
Eucommia ulmoides
Aucuba japonica
Garrya elliptica
Oncotheca balansae
Vahlia capensis
Montinia caryophyllacea
Hydrolea ovata
Sphenoclea zeylanica
Cuscuta cuspidata
Ipomoea alba
Petunia axillaris
Atropa belladonna
Solanum dulcamara
Nicotiana tabacum
Nolana humifusa
Luculia gratissima
Coffea arabica
Galium aparine
Mitchella repens
Spigelia marilandica
Strychnos nuxvomica
Gelsemium sempervirens
Nerium oleander
Exacum affine
Gentiana saponaria
Borago officinalis
Ehretia acuminata
Hydrophyllum capitatum
Plocosperma buxifolium
Olea europaea
Jasminum simplicifolium
Syringa vulgaris
Polypremum procumbens
Peltanthera floribunda
Calceolaria integrifolia
Rhynchoglossum notonianum
Titanotrichum oldhamii
Halleria lucida
Antirrhinum majus
Plantago lanceolata
Veronica anagallisaquatica
Myoporum mauritianum
Scrophularia californica
Verbascum thapsus
Campsis radicans
Catalpa speciosa
Martynia annua
Sesamum indicum
Byblis liniflora
Pinguicula moranensis
Utricularia alpina
Thunbergia alata
Acanthus montanus
Barleria prionitis
Justicia americana
Lamiidae
Asteridae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Junellia succulentifolia
Callicarpa dichotoma
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Paulownia tomentosa
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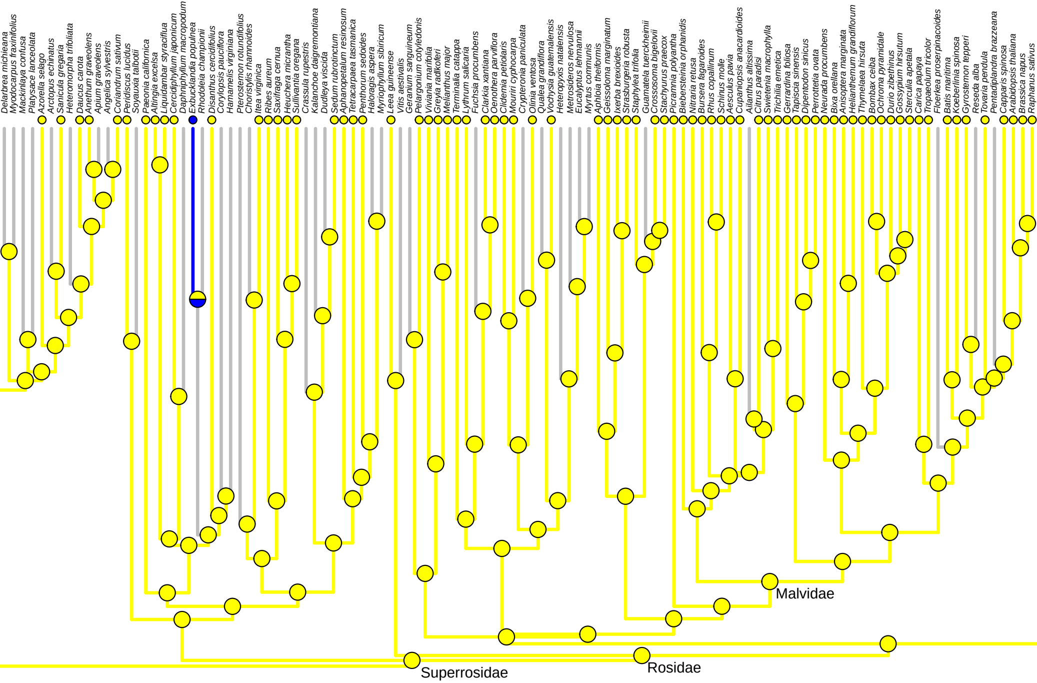
Mazus pumilus
Phryma leptostachya
Ilex cornuta
Helwingia japonica
Phyllonoma laticuspis
Gomphandra javanica
Irvingbaileya australis
Citronella suaveolens
Cardiopteris quinqueloba
Gonocaryum litorale
Polyosma cunninghamii
Anopterus macleayanus
Eremosyne pectinata
Escallonia rubra
Forgesia racemosa
Valdivia gayana
Pentaphragma ellipticum
Roussea simplex
Carpodetus serratus
Abrophyllum ornans
Cuttsia viburnea
Cyphia elata
Campanula elatines
Campanula trachelium
Pseudonemacladus oppositifolius
Dialypetalum floribundum
Lobelia angulata
Phelline billardierei
Argophyllum laxum
Corokia cotoneaster
Platyspermation crassifolium
Crispiloba disperma
Alseuosmia macrophylla
Wittsteinia vacciniacea
Donatia fascicularis
Forstera bidwillii
Stylidium graminifolium
Nephrophyllidium cristagalli
Menyanthes trifoliata
Nymphoides peltata
Villarsia calthifolia
Dampiera spicigera
Goodenia ovata
Scaevola aemula
Boopis graminea
Acicarpha tribuloides
Moschopsis rosulata
Barnadesia caryophylla
Gerbera jamesonii
Echinops exaltatus
Tragopogon dubius
Cichorium intybus
Lactuca sativa
Tagetes erecta
Guizotia abyssinica
Helianthus annuus
Berzelia lanuginosa
Brunia albiflora
Columellia oblonga
Desfontainia spinosa
Quintinia verdonii
Paracryphia alticola
Sphenostemon lobosporus
Viburnum acerifolium
Sambucus racemosa
Sinadoxa corydalifolia
Adoxa moschatellina
Tetradoxa omeiensis
Diervilla sessilifolia
Weigela hortensis
Heptacodium miconioides
Lonicera japonica
Symphoricarpos albus
Leycesteria formosa
Triosteum perfoliatum
Linnaea borealis
Abelia triflora
Dipelta yunnanensis
Kolkwitzia amabilis
Morina longifolia
Zabelia tyaihyonii
Triplostegia glandulifera
Scabiosa columbaria
Dipsacus sativus
Pterocephalodes hookeri
Patrinia triloba
Nardostachys chinensis
Valerianella locusta
Centranthus ruber
Valeriana officinalis
Pennantia corymbosa
Aralidium pinnatifidum
Melanophylla alnifolia
Torricellia tiliifolia
Griselinia littoralis
Pittosporum tobira
Billardiera heterophylla
Hydrocotyle vulgaris
Aralia spinosa
Panax quinquefolius
Cussonia spicata
Pseudopanax arboreus
Tetraplasandra hawaiensis
Polyscias guilfoylei
Hedera helix
Schefflera arboricola
Tetrapanax papyrifer
Campanulidae
Pentapetalae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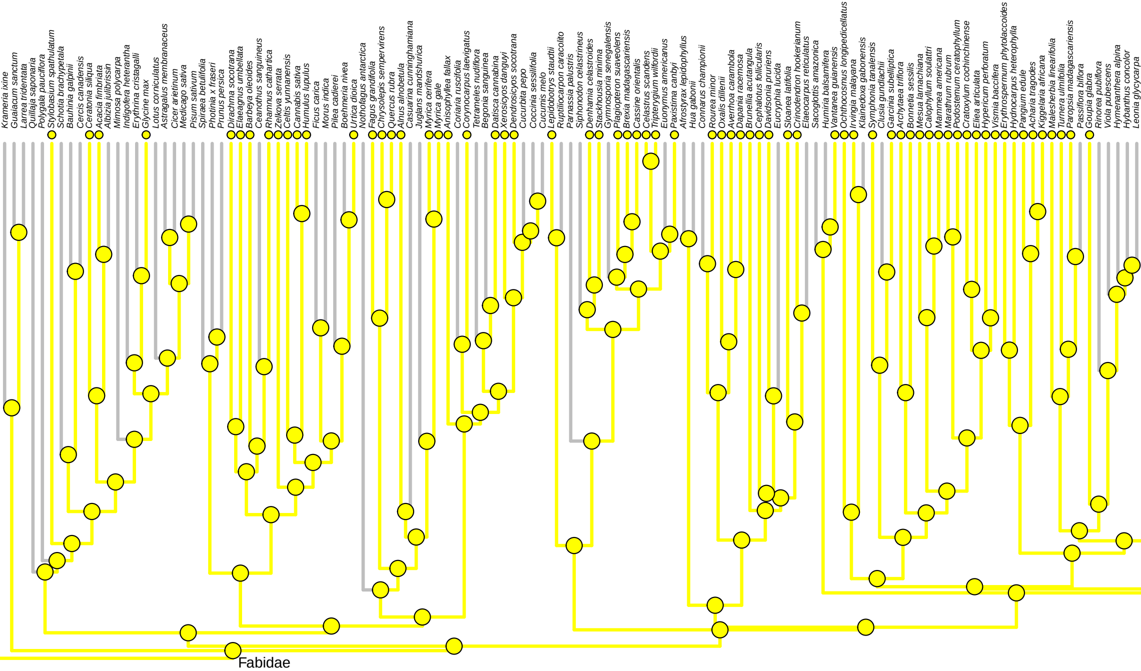
Heteromorpha trifoliata
Daucus carota
Anethum graveolens
Apium graveolens
Angelica sylvestris
Coriandrum sativum
Peridiscus lucidus
Soyauxia talbotii
Paeonia californica
Altingia excelsa
Liquidambar styraciflua
Cercidiphyllum japonicum
Daphniphyllum macropodum
Exbucklandia populnea
Rhodoleia championii
Disanthus cercidifolius
Corylopsis pauciflora
Hamamelis virginiana
Pterostemon rotundifolius
Choristylis rhamnoides
Itea virginica
Ribes aureum
Saxifraga cernua
Heuchera micrantha
Sullivantia oregana
Crassula rupestris
Kalanchoe daigremontiana
Dudleya viscida
Sedum rubrotinctum
Aphanopetalum resinosum
Tetracarpaea tasmanica
Penthorum sedoides
Haloragis aspera
Myriophyllum sibiricum
Leea guineense
Vitis aestivalis
Geranium sanguineum
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
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
Aphloia theiformis
Geissoloma marginatum
Ixerba brexioides
Strasburgeria robusta
Staphylea trifolia
Guamatela tuerckheimii
Crossosoma bigelovii
Stachyurus praecox
Picramnia polyantha
Biebersteinia orphanidis
Nitraria retusa
Bursera fagaroides
Rhus copallinum
Schinus molle
Aesculus pavia
Cupaniopsis anacardioides
Ailanthus altissima
Citrus paradisi
Swietenia macrophylla
Trichilia emetica
Gerrardina foliosa
Tapiscia sinensis
Dipentodon sinicus
Perrottetia ovata
Neurada procumbens
Bixa orellana
Anisoptera marginata
Helianthemum grandiflorum
Thymelaea hirsuta
Bombax ceiba
Ochroma pyramidale
Durio zibethinus
Gossypium hirsutum
Sterculia apetala
Carica papaya
Tropaeolum tricolor
Floerkea proserpinacoides
Batis maritima
Koeberlinia spinosa
Gyrostemon tepperi
Reseda alba
Tovaria pendula
Pentadiplandra brazzeana
Capparis spinosa
Arabidopsis thaliana
Brassica napus
Raphanus sativus
Malvidae
Superrosidae
Rosidae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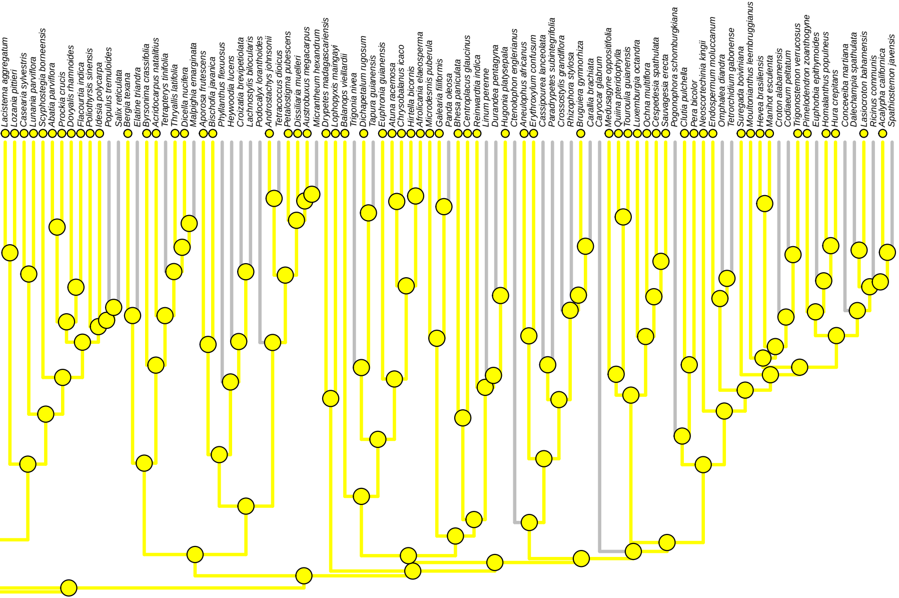
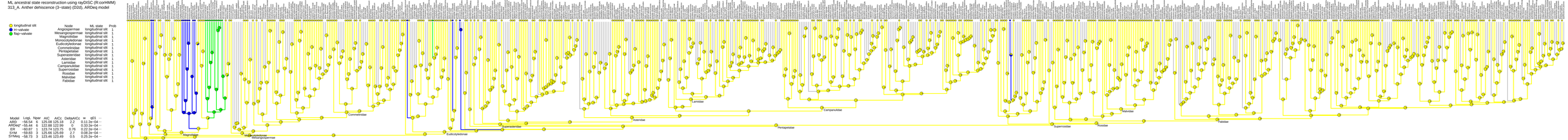
Quillaja saponaria
Polygala paucifolia
Stylobasium spathulatum
Schotia brachypetala
Bauhinia galpinii
Cercis canadensis
Ceratonia siliqua
Acacia fimbriata
Albizia julibrissin
Mimosa polycarpa
Indigofera heterantha
Erythrina cristagalli
Glycine max
Lotus corniculatus
Astragalus membranaceus
Cicer arietinum
Medicago sativa
Pisum sativum
Spiraea betulifolia
Photinia x fraseri
Prunus persica
Dirachma socotrana
Elaeagnus umbellata
Barbeya oleoides
Ceanothus sanguineus
Rhamnus cathartica
Zelkova serrata
Celtis yunnanensis
Cannabis sativa
Humulus lupulus
Ficus carica
Morus indica
Pilea cadierei
Boehmeria nivea
Urtica dioica
Nothofagus antarctica
Fagus grandifolia
Chrysolepis sempervirens
Quercus rubra
Alnus alnobetula
Casuarina cunninghamiana
Juglans mandshurica
Myrica cerifera
Myrica gale
Anisophyllea fallax
Coriaria ruscifolia
Corynocarpus laevigatus
Tetrameles nudiflora
Begonia sanguinea
Datisca cannabina
Xerosicyos danguyi
Dendrosicyos socotrana
Cucurbita pepo
Coccinia sessilifolia
Cucumis melo
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
Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
Oxalis dillenii
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Cephalotus follicularis
Davidsonia pruriens
Eucryphia lucida
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Sacoglottis amazonica
Humiria balsamifera
Vantanea guianensis
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
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
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Goupia glabra
Rinorea pubiflora
Viola pubescens
Hymenanthera alpina
Hybanthus concolor
Leonia glycycarpa
Fabidae


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
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Dissiliaria muelleri
Austrobuxus megacarpus
Micrantheum hexandrum
Drypetes madagascariensis
Lophopyxis maingayi
Balanops vieillardii
Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Atuna racemosa
Chrysobalanus icaco
Hirtella bicornis
Afrolicania elaeosperma
Microdesmis puberula
Galearia filiformis
Panda oleosa
Bhesa paniculata
Centroplacus glaucinus
Reinwardtia indica
Linum perenne
Durandea pentagyna
Hugonia platysepala
Ctenolophon englerianus
Aneulophus africanus
Erythroxylum confusum
Cassipourea lanceolata
Paradrypetes subintegrifolia
Crossostylis grandiflora
Rhizophora stylosa
Bruguiera gymnorhiza
Carallia brachiata
Caryocar glabrum
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Endospermum moluccanum
Omphalea diandra
Tetrorchidium gabonense
Suregada boiviniana
Moultonianthus leembruggianus
Hevea brasiliensis
Manihot esculenta
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Conceveiba martiana
Dalechampia spathulata
Lasiocroton bahamensis
Ricinus communis
Acalypha californica
Spathiostemon javensis

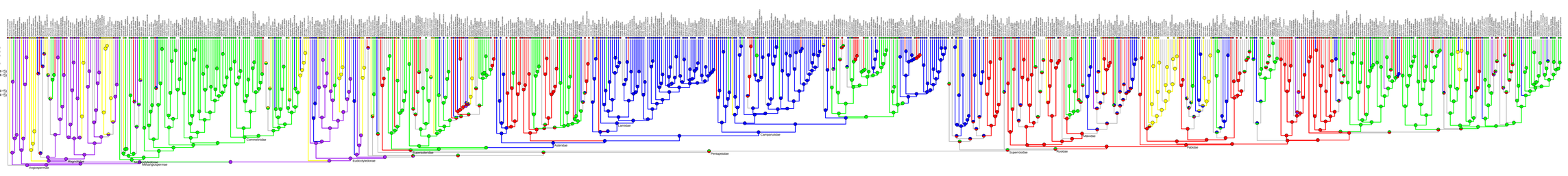
ML ancestral state reconstruction using rayDISC (R:corHMM)
313_A. Anther dehiscence (3–state) (D2d), ARDeq model



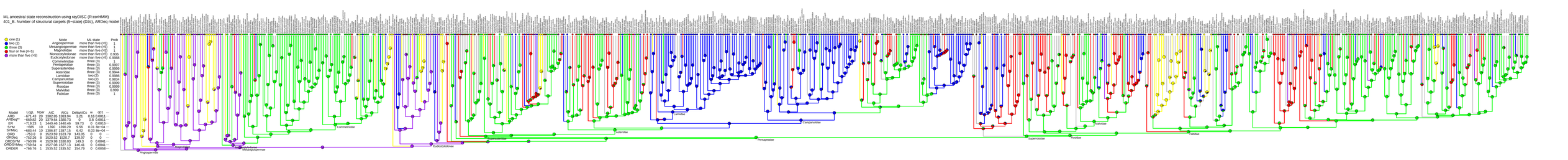
MP ancestral state reconstruction using ancestral.pars
(R phangorn)
401_B. Number of structural carpels (5~state) (D2c), 186 steps

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	three (3)
Ceratophyllidae	three (3) / four or five (4~5)
Superasteridae	three (3) / four or five (4~5)
Asteridae	two (2)
Lamiidae	two (2)
Campanulidae	two (2)
Santalanae	three (3) / four or five (4~5)
Rosidae	three (3) / four or five (4~5)
Malvidae	four or five (4~5)
Fabidae	four or five (4~5)



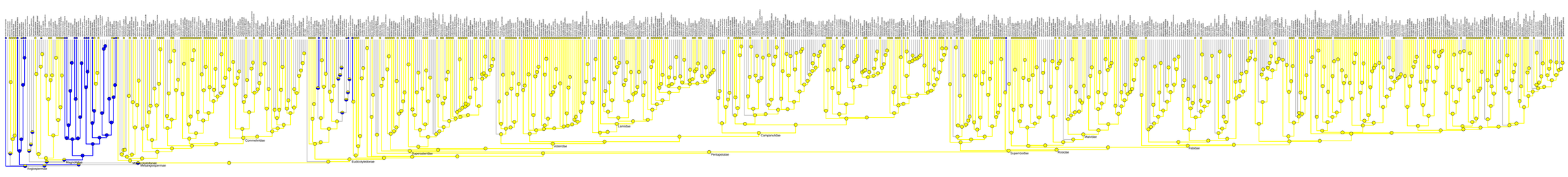
ML ancestral state reconstruction using ray[DISC (R:corHMM)
401_B. Number of structural carpels (5-state) (D2c), ARDeq model



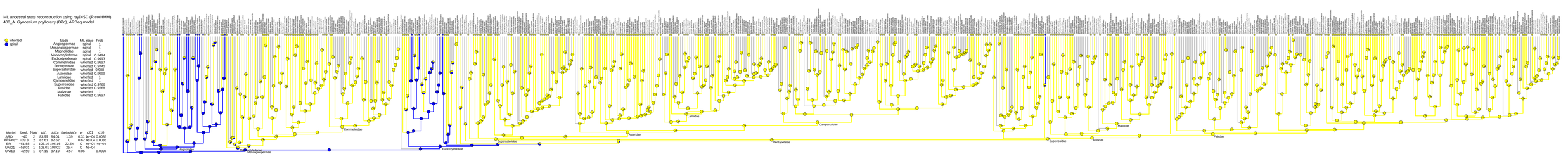
MP ancestral state reconstruction using ancestral pars (R phangorn)
400_A. Gynoecium phyllotaxy (D2d), 10 steps

whorled
spiral

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



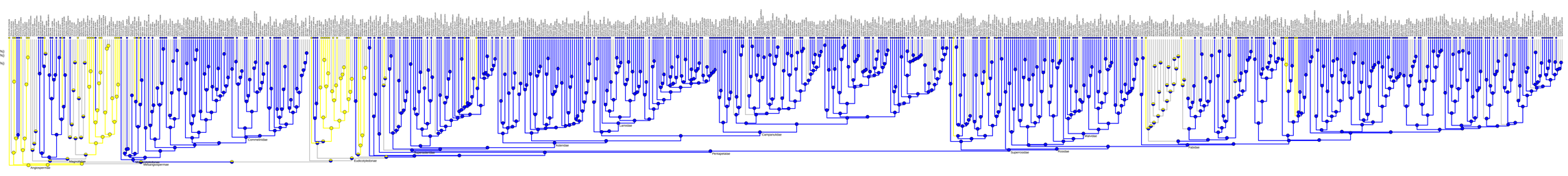
ML ancestral state reconstruction using ray[DISC (R:corHMM)
400_A. Gynoecium phyllotaxy (D2d), ARDeq model



MP ancestral state reconstruction using ancestral.pars
(R phangorn)
403_A. Fusion of ovaries (binary) (D2c), 24 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	free (<5%) / fused (>5%)
Commelinidae	fused (>5%)
Gunneridae	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%)

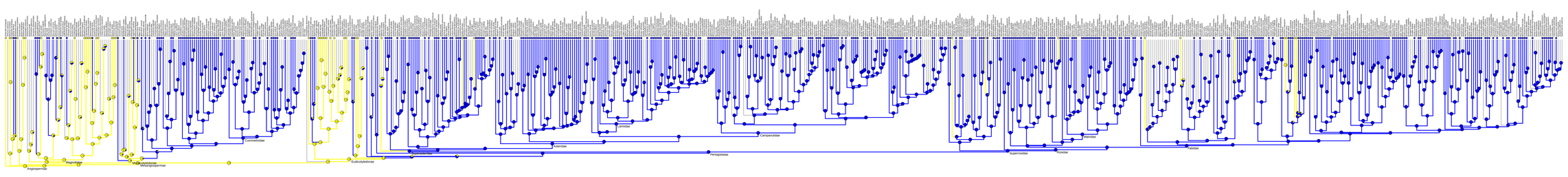


ML ancestral state reconstruction using rayDISC (R:corHMM)
403_A. Fusion of ovaries (binary) (Dr2c), ARDeq model

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

Node	ML state	Prob
Angiospermae	free (<5%)	1
Mesangiospermae	free (<5%)	1
Magnoliidae	free (<5%)	0.9999
Monocotyledonae	free (<5%)	0.9545
Eudicotyledonae	free (<5%)	0.9993
Commelinidae	fused (>5%)	1
Core Eudicots	fused (>5%)	0.9961
Superasteridae	fused (>5%)	0.9963
Asteridae	fused (>5%)	1
Lamiidae	fused (>5%)	1
Campanulidae	fused (>5%)	1
Superrosidae	fused (>5%)	0.9995
Rosidae	fused (>5%)	0.9997
Malvidae	fused (>5%)	1
Fabidae	fused (>5%)	0.9998

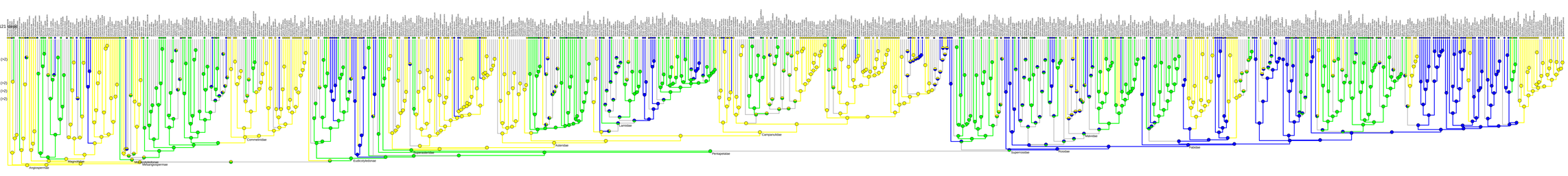
Model	LogL	Nopr	AIC	AICc	DeltaAICc	w	q01	q10
ARD	−94.6	2	193.19	193.21	1.39	0.33	0.0053	5e−04
ARDeq**	−93.9	2	191.81	191.82	0	0.66	0.0053	5e−04
ER	−103.17	1	208.34	208.34	16.52	0	8e−04	8e−04
UN01	−98.93	1	199.86	199.87	8.05	0.01	0.0114	
UN10	−107.51	1	217.02	217.02	25.2	0		8e−04



MP ancestral state reconstruction using ancestral pars
(R:phangorn)
411_A. Number of ovules per functional carpel (3–state) (D2c), 121 taxa

one (1)
two (2)
three or more (>2)

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

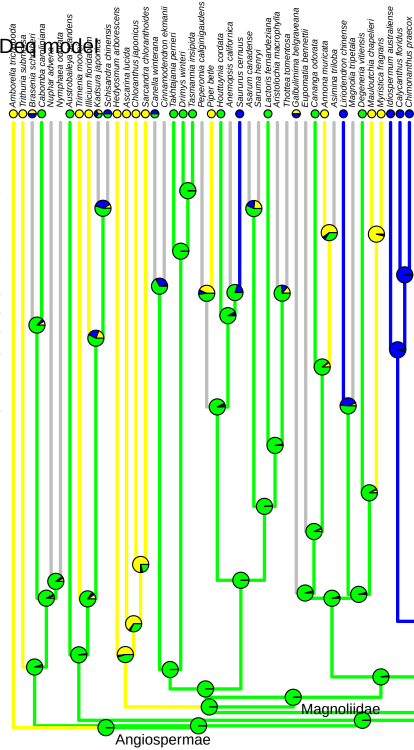


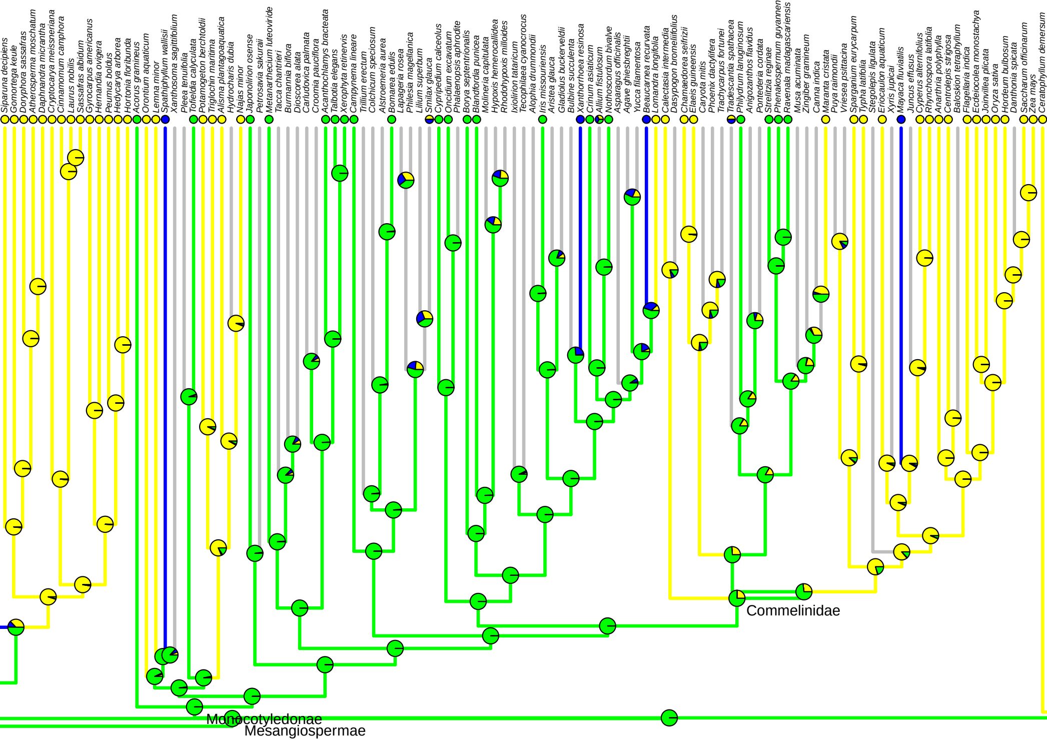
ML ancestral state reconstruction using rayDISC (R:corHMM)
411_A. Number of ovules per functional carpel (3−state) (D2c), ARDeq model

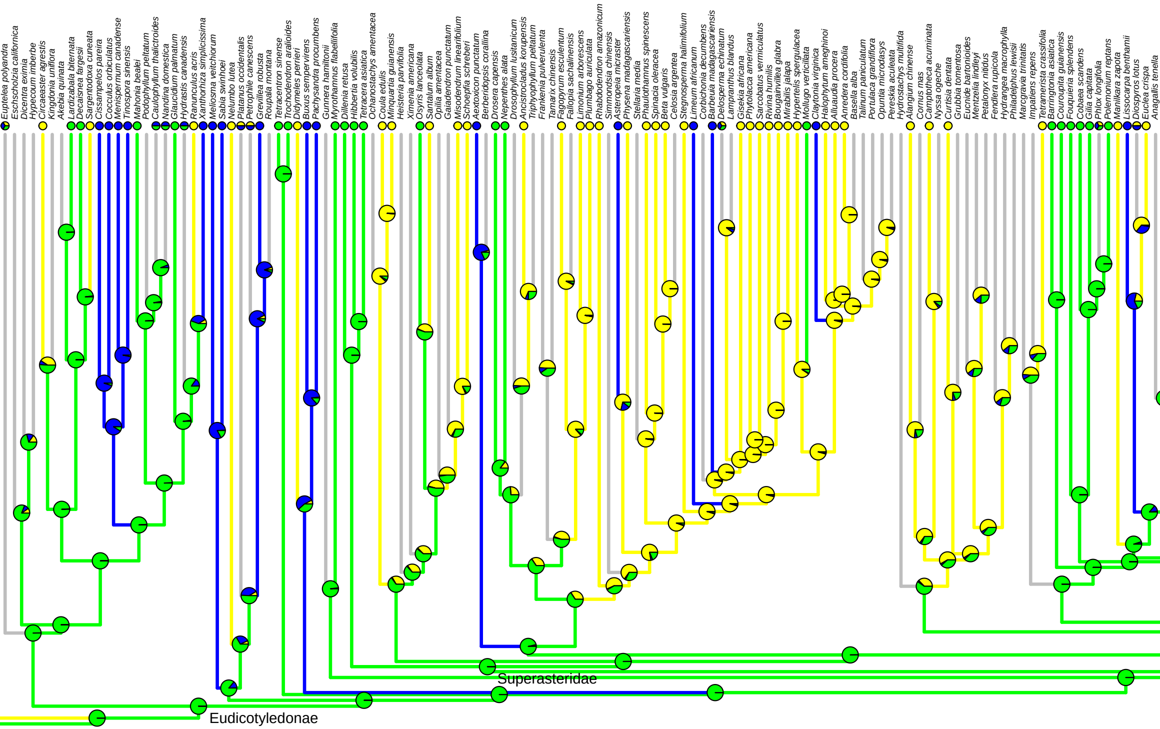
🟡 one (1)
🔵 two (2)
🟢 three or more (>2)

Node	ML state	Prob
Angiospermae	three or more (>2)	1
Mesangiospermae	three or more (>2)	1
Magnoliidae	three or more (>2)	0.9997
Monocotyledonae	three or more (>2)	1
Eudicotyledonae	three or more (>2)	1
Commelinidae	three or more (>2)	0.7521
Pentapetalae	three or more (>2)	1
Superasteridae	three or more (>2)	0.9999
Asteridae	three or more (>2)	0.9979
Lamiidae	three or more (>2)	0.9999
Campanulidae	three or more (>2)	0.9973
Superrosidae	three or more (>2)	1
Rosidae	three or more (>2)	1
Malvidae	three or more (>2)	0.9996
Fabidae	three or more (>2)	1

Model	LogL	Npar	AIC	AICc	DeltaAICc	w	q01	···
ARD	−388.1	6	788.19	788.3	2.18	0.25	0.0013	···
ARDeq**	−387	6	786.01	786.11	0	0.75	0.0013	···
ER	−401.47	1	804.94	804.95	18.83	0	0.0029	···
SYM	−400.9	3	807.81	807.84	21.72	0	0.0025	···
SYMeq	−399.99	3	805.98	806.01	19.89	0	0.0026	···
ORD	−399.37	4	806.75	806.8	20.69	0	4e−04	···
ORDeq	−398.28	4	804.57	804.62	18.5	0	4e−04	···
ORDSYM	−413.33	2	830.66	830.67	44.56	0	0.0056	···
ORDSYMeq	−412.46	2	828.92	828.94	42.82	0	0.0056	···
ORDER	−414.21	1	830.42	830.43	44.32	0	0.0064	···




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
Lemna minor
Spathiphyllum wallisii
Xanthosoma sagittifolium
Pleea tenuifolia
Tofieldia calyculata
Potamogeton berchtoldii
Triglochin maritima
Alisma plantagoaquatica
Hydrocharis dubia
Najas minor
Japonolirion osense
Petrosavia sakuraii
Metanarthecium luteoviride
Tacca chantrieri
Burmannia biflora
Dioscorea alata
Carludovica palmata
Croomia pauciflora
Acanthochlamys bracteata
Talbotia elegans
Xerophyta retinervis
Campynema lineare
Trillium erectum
Colchicum speciosum
Alstroemeria aurea
Bomarea edulis
Lapageria rosea
Philesia magellanica
Lilium superbum
Smilax glauca
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
Crinum asiaticum
Allium fistulosum
Nothoscordum bivalve
Asparagus officinalis
Agave ghiesbreghtii
Yucca filamentosa
Beaucarnea recurvata
Lomandra longifolia
Calectasia intermedia
Dasypogon bromeliifolius
Chamaedorea seifrizii
Elaeis guineensis
Caryota mitis
Phoenix dactylifera
Trachycarpus fortunei
Tradescantia spathacea
Philydrum lanuginosum
Anigozanthos flavidus
Pontederia cordata
Strelitzia reginae
Phenakospermum guyannense
Ravenala madagascariensis
Musa acuminata
Zingiber gramineum
Canna indica
Maranta cristata
Puya raimondii
Vriesea psittacina
Sparganium eurycarpum
Typha latifolia
Stegolepis ligulata
Eriocaulon aquaticum
Xyris jupicai
Mayaca fluviatilis
Juncus effusus
Cyperus alternifolius
Rhynchospora latifolia
Anarthria polyphylla
Centrolepis strigosa
Baloskion tetraphyllum
Flagellaria indica
Ecdeiocolea monostachya
Joinvillea plicata
Oryza sativa
Hordeum bulbosum
Danthonia spicata
Saccharum officinarum
Zea mays
Ceratophyllum demersum
Commelinidae
Monocotyledonae
Mesangiospermae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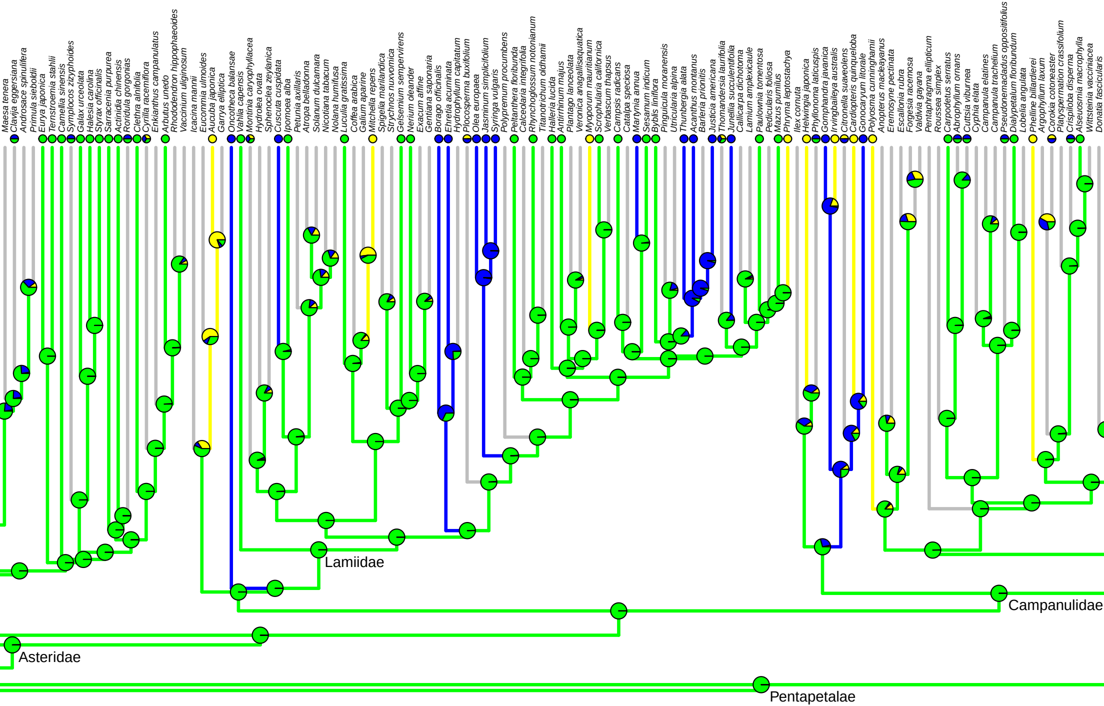
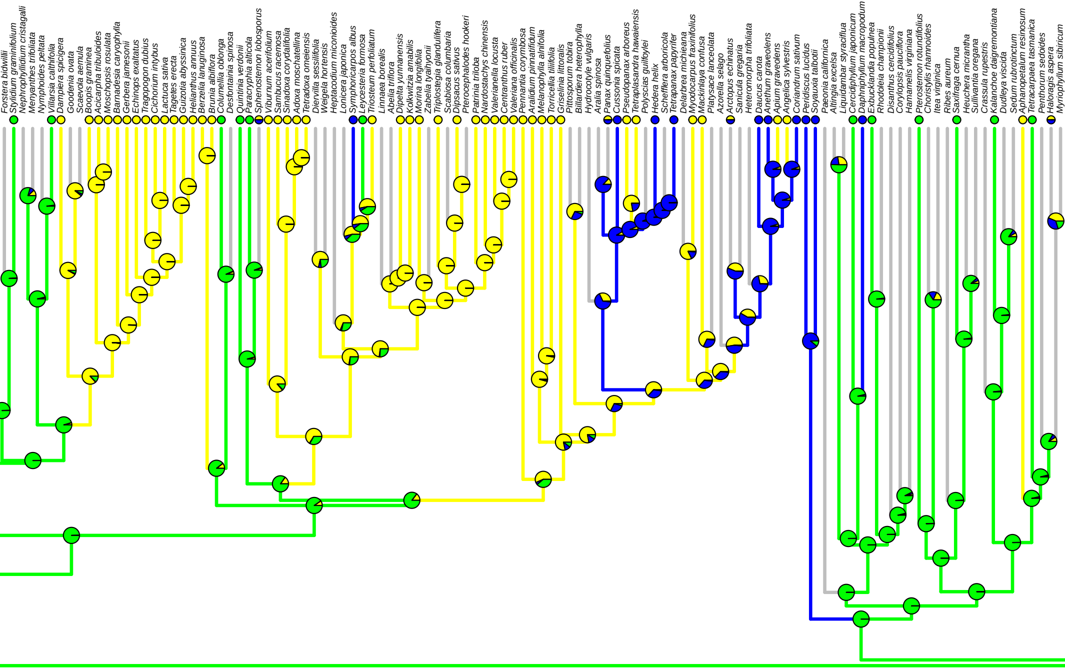
Circaeaster agrestis
Kingdonia uniflora
Akebia quinata
Lardizabala biternata
Decaisnea fargesii
Sargentodoxa cuneata
Cissampelos pareira
Cocculus orbiculatus
Menispermum canadense
Tinospora sinensis
Mahonia bealei
Podophyllum peltatum
Caulophyllum thalictroides
Nandina domestica
Glaucidium palmatum
Hydrastis 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
Ochanostachys amentacea
Coula edulis
Minquartia guianensis
Heisteria parvifolia
Ximenia americana
Osyris lanceolata
Santalum album
Opilia amentacea
Gaiadendron punctatum
Misodendrum linearifolium
Schoepfia schreberi
Aextoxicon punctatum
Berberidopsis corallina
Drosera capensis
Nepenthes alata
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
Beta vulgaris
Celosia argentea
Stegnosperma halimifolium
Limeum africanum
Corbichonia decumbens
Barbeuia madagascariensis
Delosperma echinatum
Lampranthus blandus
Gisekia africana
Phytolacca americana
Sarcobatus vermiculatus
Rivina humilis
Bougainvillea glabra
Mirabilis jalapa
Hypertelis spergulacea
Mollugo verticillata
Claytonia virginica
Halophytum ameghinoi
Alluaudia procera
Anredera cordifolia
Basella alba
Talinum paniculatum
Portulaca grandiflora
Opuntia microdasys
Pereskia aculeata
Hydrostachys multifida
Alangium chinense
Cornus mas
Camptotheca acuminata
Nyssa ogeche
Curtisia dentata
Grubbia tomentosa
Eucnide bartonioides
Mentzelia lindleyi
Petalonyx nitidus
Fendlera rupicola
Hydrangea macrophylla
Philadelphus lewisii
Marcgravia trinitatis
Impatiens repens
Tetramerista crassifolia
Barringtonia asiatica
Couroupita guianensis
Fouquieria splendens
Cobaea scandens
Gilia capitata
Phlox longifolia
Polemonium reptans
Manilkara zapota
Lissocarpa benthamii
Diospyros lotus
Euclea crispa
Anagallis tenella
Superasteridae
Eudicotyledonae


Maesa tenera
Clavija eggersiana
Androsace spinulifera
Primula sieboldii
Eurya japonica
Ternstroemia stahlii
Camellia sinensis
Symplocos zizyphoides
Galax urceolata
Halesia carolina
Styrax officinalis
Sarracenia purpurea
Actinidia chinensis
Roridula gorgonias
Clethra alnifolia
Cyrilla racemiflora
Enkianthus campanulatus
Arbutus unedo
Rhododendron hippophaeoides
Vaccinium uliginosum
Icacina mannii
Eucommia ulmoides
Aucuba japonica
Garrya elliptica
Oncotheca balansae
Vahlia capensis
Montinia caryophyllacea
Hydrolea ovata
Sphenoclea zeylanica
Cuscuta cuspidata
Ipomoea alba
Petunia axillaris
Atropa belladonna
Solanum dulcamara
Nicotiana tabacum
Nolana humifusa
Luculia gratissima
Coffea arabica
Galium aparine
Mitchella repens
Spigelia marilandica
Strychnos nuxvomica
Gelsemium sempervirens
Nerium oleander
Exacum affine
Gentiana saponaria
Borago officinalis
Ehretia acuminata
Hydrophyllum capitatum
Plocosperma buxifolium
Olea europaea
Jasminum simplicifolium
Syringa vulgaris
Polypremum procumbens
Peltanthera floribunda
Calceolaria integrifolia
Rhynchoglossum notonianum
Titanotrichum oldhamii
Halleria lucida
Antirrhinum majus
Plantago lanceolata
Veronica anagallisaquatica
Myoporum mauritianum
Scrophularia californica
Verbascum thapsus
Campsis radicans
Catalpa speciosa
Martynia annua
Sesamum indicum
Byblis liniflora
Pinguicula moranensis
Utricularia alpina
Thunbergia alata
Acanthus montanus
Barleria prionitis
Justicia americana
Thomandersia laurifolia
Junellia succulentifolia
Callicarpa dichotoma
Lamium amplexicaule
Paulownia tomentosa
Pedicularis foliosa
Mazus pumilus
Phryma leptostachya
Ilex cornuta
Helwingia japonica
Phyllonoma laticuspis
Gomphandra javanica
Irvingbaileya australis
Citronella suaveolens
Cardiopteris quinqueloba
Gonocaryum litorale
Polyosma cunninghamii
Anopterus macleayanus
Eremosyne pectinata
Escallonia rubra
Forgesia racemosa
Valdivia gayana
Pentaphragma ellipticum
Roussea simplex
Carpodetus serratus
Abrophyllum ornans
Cuttsia viburnea
Cyphia elata
Campanula elatines
Campanula trachelium
Pseudonemacladus oppositifolius
Dialypetalum floribundum
Lobelia angulata
Phelline billardierei
Argophyllum laxum
Corokia cotoneaster
Platyspermation crassifolium
Crispiloba disperma
Alseuosmia macrophylla
Wittsteinia vacciniacea
Donatia fascicularis
Lamiidae
Campanulidae
Asteridae
Pentapetalae


Forstera bidwillii
Stylidium graminifolium
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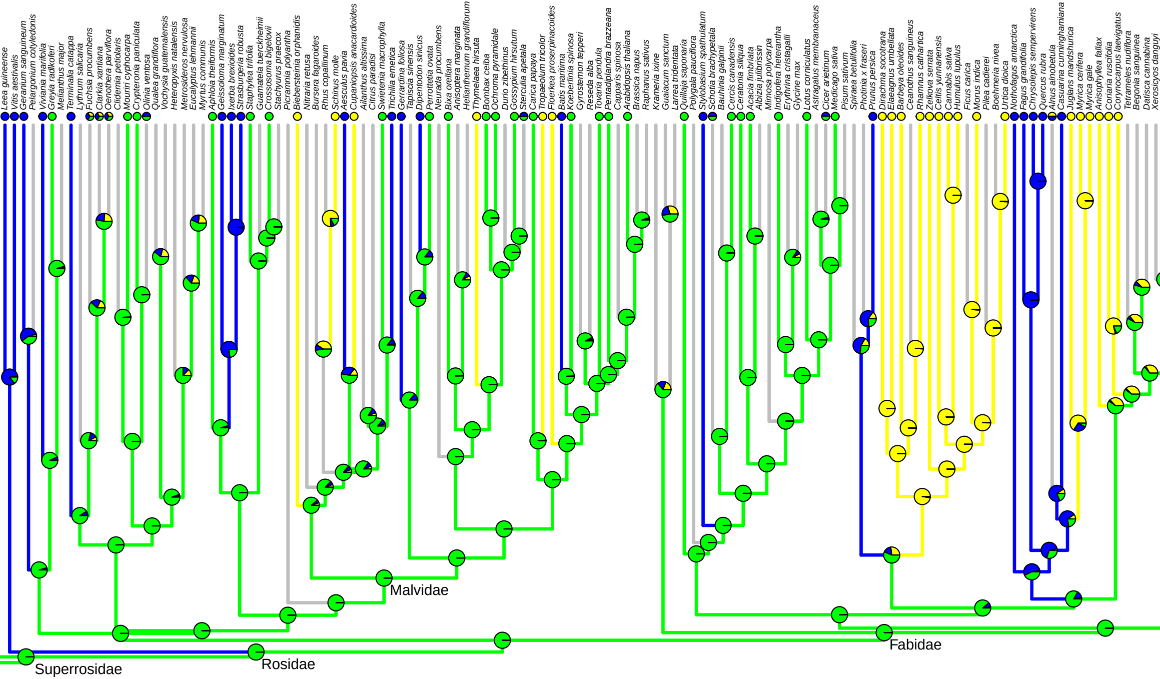
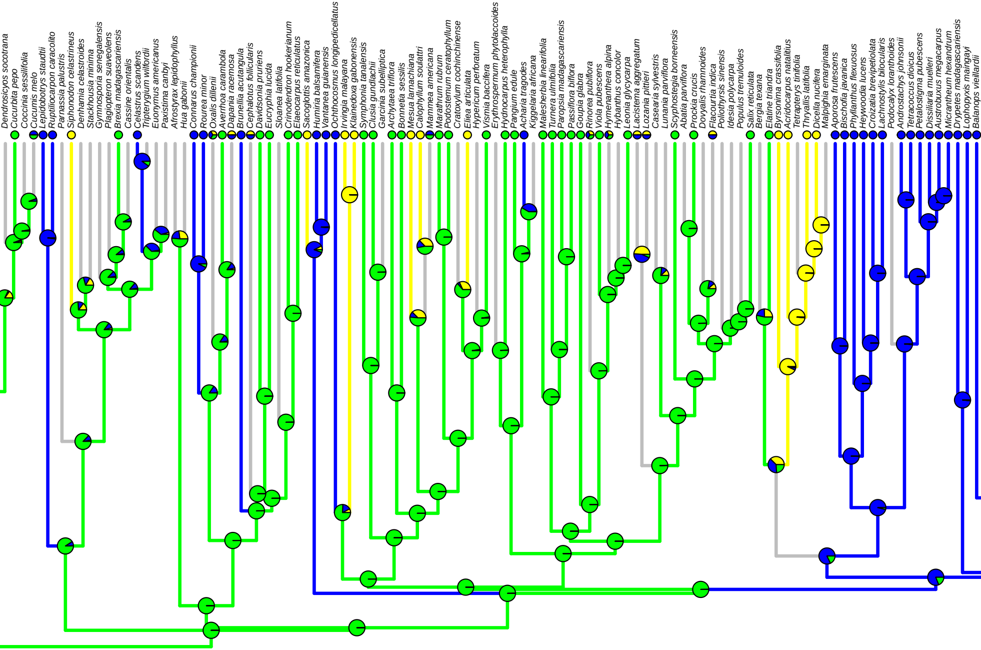
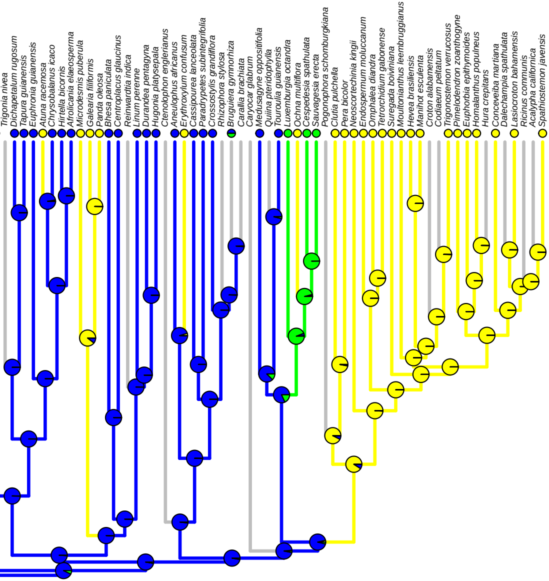
Goodenia ovata
Scaevola aemula
Boopis graminea
Acicarpha tribuloides
Moschopsis rosulata
Barnadesia caryophylla
Gerbera jamesonii
Echinops exaltatus
Tragopogon dubius
Cichorium intybus
Lactuca sativa
Tagetes erecta
Guizotia abyssinica
Helianthus annuus
Berzelia lanuginosa
Brunia albiflora
Columellia oblonga
Desfontainia spinosa
Quintinia verdonii
Paracryphia alticola
Sphenostemon lobosporus
Viburnum acerifolium
Sambucus racemosa
Sinadoxa corydalifolia
Adoxa moschatellina
Tetradoxa omeiensis
Diervilla sessilifolia
Weigela hortensis
Heptacodium miconioides
Lonicera japonica
Symphoricarpos albus
Leycesteria formosa
Triosteum perfoliatum
Linnaea borealis
Abelia triflora
Dipelta yunnanensis
Kolkwitzia amabilis
Morina longifolia
Zabelia tyaihyonii
Triplostegia glandulifera
Scabiosa columbaria
Dipsacus sativus
Pterocephalodes hookeri
Patrinia triloba
Nardostachys chinensis
Valerianella locusta
Centranthus ruber
Valeriana officinalis
Pennantia corymbosa
Aralidium pinnatifidum
Melanophylla alnifolia
Torricellia tiliifolia
Griselinia littoralis
Pittosporum tobira
Billardiera heterophylla
Hydrocotyle vulgaris
Aralia spinosa
Panax quinquefolius
Cussonia spicata
Pseudopanax arboreus
Tetraplasandra hawaiensis
Polyscias guilfoylei
Hedera helix
Schefflera arboricola
Tetrapanax papyrifer
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
Paeonia californica
Altingia excelsa
Liquidambar styraciflua
Cercidiphyllum japonicum
Daphniphyllum macropodum
Exbucklandia populnea
Rhodoleia championii
Disanthus cercidifolius
Corylopsis pauciflora
Hamamelis virginiana
Pterostemon rotundifolius
Choristylis rhamnoides
Itea virginica
Ribes aureum
Saxifraga cernua
Heuchera micrantha
Sullivantia oregana
Crassula rupestris
Kalanchoe daigremontiana
Dudleya viscida
Sedum rubrotinctum
Aphanopetalum resinosum
Tetracarpaea tasmanica
Penthorum sedoides
Haloragis aspera
Myriophyllum sibiricum


Leea guineense
Vitis aestivalis
Geranium sanguineum
Pelargonium cotyledonis
Viviania marifolia
Greyia radlkoferi
Melianthus major
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
Aphloia theiformis
Geissoloma marginatum
Ixerba brexioides
Strasburgeria robusta
Staphylea trifolia
Guamatela tuerckheimii
Crossosoma bigelovii
Stachyurus praecox
Picramnia polyantha
Biebersteinia orphanidis
Nitraria retusa
Bursera fagaroides
Rhus copallinum
Schinus molle
Aesculus pavia
Cupaniopsis anacardioides
Ailanthus altissima
Citrus paradisi
Swietenia macrophylla
Trichilia emetica
Gerrardina foliosa
Tapiscia sinensis
Dipentodon sinicus
Perrottetia ovata
Neurada procumbens
Bixa orellana
Anisoptera marginata
Helianthemum grandiflorum
Thymelaea hirsuta
Bombax ceiba
Ochroma pyramidale
Durio zibethinus
Gossypium hirsutum
Sterculia apetala
Carica papaya
Tropaeolum tricolor
Floerkea proserpinacoides
Batis maritima
Koeberlinia spinosa
Gyrostemon tepperi
Reseda alba
Tovaria pendula
Pentadiplandra brazzeana
Capparis spinosa
Arabidopsis thaliana
Brassica napus
Raphanus sativus
Krameria ixine
Guaiacum sanctum
Larrea tridentata
Quillaja saponaria
Polygala pauciflora
Stylobasium spathulatum
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
Spiraea betulifolia
Photinia x fraseri
Prunus persica
Dirachma socotrana
Elaeagnus umbellata
Barbeya oleoides
Ceanothus sanguineus
Rhamnus cathartica
Zelkova serrata
Celtis yunnanensis
Cannabis sativa
Humulus lupulus
Ficus carica
Morus indica
Pilea cadierei
Boehmeria nivea
Urtica dioica
Nothofagus antarctica
Fagus grandifolia
Chrysolepis sempervirens
Quercus rubra
Alnus alnobetula
Casuarina cunninghamiana
Juglans mandshurica
Myrica cerifera
Myrica gale
Anisophyllea fallax
Coriaria ruscifolia
Corynocarpus laevigatus
Tetrameles nudiflora
Begonia sanguinea
Datisca cannabina
Xerosicyos danguyi
Malvidae
Fabidae
Superrosidae
Rosidae


Dendrosicyos socotrana
Cucurbita pepo
Coccinia sessilifolia
Cucumis melo
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
Afrostyrax lepidophyllus
Hua gabonii
Connarus championii
Rourea minor
Oxalis dillenii
Averrhoa carambola
Dapania racemosa
Brunellia acutangula
Cephalotus follicularis
Davidsonia pruriens
Eucryphia lucida
Sloanea latifolia
Crinodendron hookerianum
Elaeocarpus reticulatus
Sacoglottis amazonica
Humiria balsamifera
Vantanea guianensis
Ochthocosmus longipedicellatus
Irvingia malayana
Klainedoxa gabonensis
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
Erythrospermum phytolaccoides
Hydnocarpus heterophylla
Pangium edule
Acharia tragodes
Kiggelaria africana
Malesherbia linearifolia
Turnera ulmifolia
Paropsia madagascariensis
Passiflora biflora
Goupia glabra
Rinorea pubiflora
Viola pubescens
Hymenanthera alpina
Hybanthus concolor
Leonia glycycarpa
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
Aporosa frutescens
Bischofia javanica
Phyllanthus flexuosus
Heywoodia lucens
Croizatia brevipetiolata
Lachnostylis bilocularis
Podocalyx loranthoides
Androstachys johnsonii
Tetracoccus dioicus
Petalostigma pubescens
Dissiliaria muelleri
Austrobuxus megacarpus
Micrantheum hexandrum
Drypetes madagascariensis
Lophopyxis maingayi
Balanops vieillardii


Trigonia nivea
Dichapetalum rugosum
Tapura guianensis
Euphronia guianensis
Atuna racemosa
Chrysobalanus icaco
Hirtella bicornis
Afrolicania elaeosperma
Microdesmis puberula
Galearia filiformis
Panda oleosa
Bhesa paniculata
Centroplacus glaucinus
Reinwardtia indica
Linum perenne
Durandea pentagyna
Hugonia platysepala
Ctenolophon englerianus
Aneulophus africanus
Erythroxylum confusum
Cassipourea lanceolata
Paradrypetes subintegrifolia
Crossostylis grandiflora
Rhizophora stylosa
Bruguiera gymnorhiza
Carallia brachiata
Caryocar glabrum
Medusagyne oppositifolia
Quiina pteridophylla
Touroulia guianensis
Luxemburgia octandra
Ochna multiflora
Cespedesia spathulata
Sauvagesia erecta
Pogonophora schomburgkiana
Clutia pulchella
Pera bicolor
Neoscortechinia kingii
Endospermum moluccanum
Omphalea diandra
Tetrorchidium gabonense
Suregada boiviniana
Moultonianthus leembruggianus
Hevea brasiliensis
Manihot esculenta
Croton alabamensis
Codiaeum peltatum
Trigonostemon verrucosus
Pimelodendron zoanthogyne
Euphorbia epithymoides
Homalanthus populneus
Hura crepitans
Conceveiba martiana
Dalechampia spathulata
Lasiocroton bahamensis
Ricinus communis
Acalypha californica
Spathiostemon javensis