

New linear systematic sequence for vascular plants

The [Western Australian Herbarium](#) is updating its sequence and arrangement of collections as part of the move to a new Biodiversity Science Centre. The new systematic sequence is based on the work of the [Angiosperm Phylogeny Group \(APGIII\)](#), a large-scale collaborative ordinal classification of angiosperms based on recent molecular phylogenetic research.

For the ferns, fern allies, and gymnosperms (obviously not covered in the work of the APG) we have utilised David Mabberley's arrangement as published in the most recent edition of his *Plant-Book*. (Interestingly, the previous arrangement of families at the WA Herbarium was based on the Engler and Prantl sequence as published J.C. Willis' *A Dictionary of the Flowering Plants and Ferns* in 1919; Mabberley's *Plant-Book* is a direct descendent of Willis' work.) Mabberley in turn uses Smith *et al.* (2006) as his reference for fern phylogeny.

A small number of modifications to the globally accepted list of plant families were made for national use by the Australian Plant Census (APC) team, which base their work on Mabberley's angiosperm sequence, which is intermediate between APGII (2003) and APGIII (2009). These respective sources are indicated for each family in [Table 1](#) below.

Many herbaria around the world are adopting the version 3 of the APG's phylogenetic arrangement of families as a means for reordering not only their Census but the physical collection. The work of Haston *et al.* (2009) in developing a linear sequence, based on the results of APGIII phylogeny, is significant because it is expected that, at these higher levels of the classification, the sequence will be relatively stable into the future.

NB. The linear sequence number is simply a mechanism for putting plant families into a systematic order for use in grouping and reporting. **It is a number that will change** as needed for the purposes of managing the WA Herbarium's information and collection - it is not a replacement for the WA Herbarium's old 'Family Number', which is now entirely deprecated. It is assigned as a real number in order to interleave new families if required without entirely changing the sequence order or its ability to sort numerically (a widely recognised problem with the previous alphanumeric formulation of Family Number).

Our plan is to adopt a 'punctuated equilibrium model' whereby we will base our sequence on widely available collaborative syntheses such as those listed below. We do not intend to change the family sequence based on the very latest research as it appears, but rather wait for the next major synthesis to be published. In this way we can provide step-wise improvement in systematic knowledge while providing a stable documented reference.

Reference Sources

Angiosperm Phylogeny Group (2009). [An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III](#). *Botanical Journal of the Linnean Society*, 161, 105 – 121.

Council of Heads of Australasian Herbaria (2007 onwards). [Australian Plant Census \(APC\)](#), IBIS database, Centre for Plant Biodiversity Research, CSIRO.

Haston, E., Richardson, J.E., Stevens, P.F., Chase, M.W. and Harris, D.J (2009). [The Linear Angiosperm Phylogeny Group \(LAPG\) III: a linear sequence of the families in APG III](#). *Botanical Journal of the Linnean Society*, 128 – 131.

Mabberley, D.J. (2008). *Mabberley's Plant-Book. A portable dictionary of plants, their classifications and uses*. Third edition, xviii,1021 pp. Cambridge University Press, ISBN: 9780521820714.

Smith, A.R., Pryer, K.M., Schuettpelz, E.; Korall, P., Schneider, H. and Wolf, P.G. (2006). [A classification for extant ferns](#). *Taxon*, 55(3), 705 – 731.

Table 1. Systematic sequence of vascular plant families occurring in Western Australia

Sequence	WA Family	Order	Group	Source
1.00	Lycopodiaceae	Lycopodiales	fern ally	Mabberley
2.00	Isoetaceae	Isoetales	fern ally	Mabberley
3.00	Selaginellaceae	Selaginellales	fern ally	Mabberley
4.00	Psilotaceae	Psilotales	fern	Mabberley
5.00	Ophioglossaceae	Ophioglossales	fern	Mabberley
10.00	Gleicheniaceae	Gleicheniales	fern	Mabberley
13.00	Lygodiaceae	Schizaeales	fern	Mabberley
15.00	Schizaeaceae	Schizaeales	fern	Mabberley
16.00	Marsileaceae	Salviniales	fern	Mabberley
17.00	Salviniaceae	Salviniales	fern	Mabberley
23.00	Cyatheaceae	Cyatheaales	fern	Mabberley
26.00	Lindsaeaceae	Polypodiales	fern	Mabberley
28.00	Dennstaedtiaceae	Polypodiales	fern	Mabberley
29.00	Pteridaceae	Polypodiales	fern	Mabberley
30.00	Aspleniaceae	Polypodiales	fern	Mabberley
32.00	Thelypteridaceae	Polypodiales	fern	Mabberley
33.00	Blechnaceae	Polypodiales	fern	Mabberley
35.00	Dryopteridaceae	Polypodiales	fern	Mabberley
36.00	Lomariopsidaceae	Polypodiales	fern	Mabberley
40.00	Polypodiaceae	Polypodiales	fern	Mabberley
41.00	Cycadaceae	Cycadales	gymnosperm	Mabberley
42.00	Zamiaceae	Cycadales	gymnosperm	Mabberley
44.00	Pinaceae	Pinales	gymnosperm	Mabberley
49.00	Podocarpaceae	Pinales	gymnosperm	Mabberley
52.00	Cupressaceae	Pinales	gymnosperm	Mabberley
54.00	Hydatellaceae	Nymphaeales	basal angiosperm	APGIII
56.00	Nymphaeaceae	Nymphaeales	basal angiosperm	APGIII
64.00	Piperaceae	Piperales	magnoliid	APGIII
67.00	Aristolochiaceae	Piperales	magnoliid	APGIII
68.00	Myristicaceae	Magnoliales	magnoliid	APGIII
73.00	Annonaceae	Magnoliales	magnoliid	APGIII
78.00	Hernandiaceae	Laurales	magnoliid	APGIII

80.00	Lauraceae	Laurales	magnoliid	APGIII
82.00	Araceae	Alismatales	monocots	APGIII
84.00	Alismataceae	Alismatales	monocots	APGIII
86.00	Hydrocharitaceae	Alismatales	monocots	APGIII
88.00	Aponogetonaceae	Alismatales	monocots	APGIII
89.00	Juncaginaceae	Alismatales	monocots	APGIII
90.00	Zosteraceae	Alismatales	monocots	APGIII
91.00	Potamogetonaceae	Alismatales	monocots	APGIII
92.00	Posidoniaceae	Alismatales	monocots	APGIII
93.00	Ruppiaceae	Alismatales	monocots	APGIII
94.00	Cymodoceaceae	Alismatales	monocots	APGIII
97.00	Burmanniaceae	Dioscoreales	monocots	APGIII
98.00	Taccaceae	Dioscoreales	monocots	APC
99.00	Dioscoreaceae	Dioscoreales	monocots	APGIII
102.00	Stemonaceae	Pandanales	monocots	APGIII
104.00	Pandanaceae	Pandanales	monocots	APGIII
108.00	Alstroemeriaceae	Liliales	monocots	APGIII
109.00	Colchicaceae	Liliales	monocots	APGIII
112.00	Smilacaceae	Liliales	monocots	APGIII
115.00	Orchidaceae	Asparagales	monocots	APGIII
116.00	Boryaceae	Asparagales	monocots	APGIII
120.00	Hypoxidaceae	Asparagales	monocots	APGIII
121.00	Tecophilaeaceae	Asparagales	monocots	APGIII
124.00	Iridaceae	Asparagales	monocots	APGIII
126.00	Xanthorrhoeaceae	Asparagales	monocots	APGIII
127.00	Amaryllidaceae	Asparagales	monocots	APC
128.00	Asparagaceae	Asparagales	monocots	APGIII
129.00	Asphodelaceae	Asparagales	monocots	APC
130.00	Hemerocallidaceae	Asparagales	monocots	APC
131.00	Alliaceae	Asparagales	monocots	APC
132.00	Agapanthaceae	Asparagales	monocots	APC
133.00	Arecaceae	Arecales	commelinids	APGIII
135.00	Commelinaceae	Commelinales	commelinids	APGIII
136.00	Philydraceae	Commelinales	commelinids	APGIII
137.00	Pontederiaceae	Commelinales	commelinids	APGIII
138.00	Haemodoraceae	Commelinales	commelinids	APGIII
142.00	Musaceae	Zingiberales	commelinids	APGIII
143.00	Cannaceae	Zingiberales	commelinids	APGIII
147.00	Dasypogonaceae	Dasypogonales	commelinids	APGIII
148.00	Typhaceae	Poales	commelinids	APGIII
151.00	Xyridaceae	Poales	commelinids	APGIII
152.00	Eriocaulaceae	Poales	commelinids	APGIII
155.00	Juncaceae	Poales	commelinids	APGIII
156.00	Cyperaceae	Poales	commelinids	APGIII
157.00	Anarthriaceae	Poales	commelinids	APGIII
158.00	Centrolepidaceae	Poales	commelinids	APGIII

159.00	Restionaceae	Poales	commelinids	APGIII
160.00	Flagellariaceae	Poales	commelinids	APGIII
162.00	Ecdeiocoleaceae	Poales	commelinids	APGIII
163.00	Poaceae	Poales	commelinids	APGIII
164.00	Ceratophyllaceae	Ceratophyllales	eudicot	APGIII
166.00	Papaveraceae	Ranunculales	eudicot	APGIII
169.00	Menispermaceae	Ranunculales	eudicot	APGIII
171.00	Ranunculaceae	Ranunculales	eudicot	APGIII
174.00	Platanaceae	Proteales	eudicot	APGIII
175.00	Proteaceae	Proteales	eudicot	APGIII
181.00	Dilleniaceae	Dilleniales	core eudicot	APGIII
192.00	Crassulaceae	Saxifragales	core eudicot	APGIII
193.00	Aphanopetalaceae	Saxifragales	core eudicot	APGIII
196.00	Haloragaceae	Saxifragales	core eudicot	APGIII
197.00	Vitaceae	Vitales	rosid	APGIII
199.00	Zygophyllaceae	Zygophyllales	eurosids I	APGIII
201.00	Fabaceae	Fabales	eurosids I	APGIII
202.00	Surianaceae	Fabales	eurosids I	APGIII
203.00	Polygalaceae	Fabales	eurosids I	APGIII
204.00	Rosaceae	Rosales	eurosids I	APGIII
208.00	Rhamnaceae	Rosales	eurosids I	APGIII
210.00	Cannabaceae	Rosales	eurosids I	APGIII
211.00	Moraceae	Rosales	eurosids I	APGIII
212.00	Urticaceae	Rosales	eurosids I	APGIII
217.00	Casuarinaceae	Fagales	eurosids I	APGIII
220.00	Apodanthaceae	Cucurbitales	eurosids I	APGIII
224.00	Cucurbitaceae	Cucurbitales	eurosids I	APGIII
229.00	Celastraceae	Celastrales	eurosids I	APGIII
232.00	Oxalidaceae	Oxalidales	eurosids I	APGIII
234.00	Elaeocarpaceae	Oxalidales	eurosids I	APGIII
235.00	Cephalotaceae	Oxalidales	eurosids I	APGIII
238.00	Rhizophoraceae	Malpighiales	eurosids I	APGIII
239.00	Erythroxylaceae	Malpighiales	eurosids I	APGIII
242.00	Euphorbiaceae	Malpighiales	eurosids I	APGIII
246.00	Picrodendraceae	Malpighiales	eurosids I	APGIII
247.00	Phyllanthaceae	Malpighiales	eurosids I	APGIII
248.00	Elatinaceae	Malpighiales	eurosids I	APGIII
254.00	Chrysobalanaceae	Malpighiales	eurosids I	APGIII
256.00	Putranjivaceae	Malpighiales	eurosids I	APGIII
257.00	Passifloraceae	Malpighiales	eurosids I	APGIII
258.00	Turneraceae	Malpighiales	eurosids I	APC
260.00	Salicaceae	Malpighiales	eurosids I	APGIII
261.00	Violaceae	Malpighiales	eurosids I	APGIII
267.00	Linaceae	Malpighiales	eurosids I	APGIII
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272.00	Podostemaceae	Malpighiales	eurosids I	APGIII

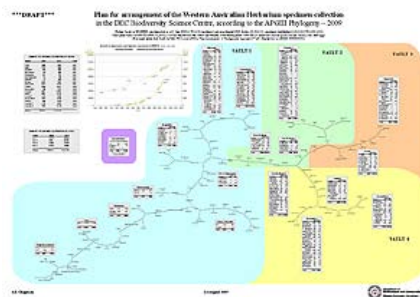
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276.00	Melianthaceae	Geraniales	rosid	APGIII
277.00	Combretaceae	Myrtales	rosid	APGIII
278.00	Lythraceae	Myrtales	rosid	APGIII
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282.00	Melastomataceae	Myrtales	rosid	APGIII
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312.00	Bixaceae	Malvales	eurosids II	APGIII
317.00	Tropaeolaceae	Brassicales	eurosids II	APGIII
318.00	Moringaceae	Brassicales	eurosids II	APGIII
323.00	Bataceae	Brassicales	eurosids II	APGIII
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331.00	Cleomaceae	Brassicales	eurosids II	APGIII
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342.00	Frankeniaceae	Caryophyllales	core eudicot	APGIII
343.00	Tamaricaceae	Caryophyllales	core eudicot	APGIII
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358.00	Chenopodiaceae	Caryophyllales	core eudicot	APC
364.00	Aizoaceae	Caryophyllales	core eudicot	APGIII
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375.00	Cactaceae	Caryophyllales	core eudicot	APGIII

382.00	Balsaminaceae	Ericales	asterids	APGIII
386.00	Polemoniaceae	Ericales	asterids	APGIII
387.00	Lecythidaceae	Ericales	asterids	APGIII
390.00	Sapotaceae	Ericales	asterids	APGIII
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392.00	Primulaceae	Ericales	asterids	APGIII
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462.00	Eremosynaceae	Escalloniales	euasterids II	APC
467.00	Caprifoliaceae	Dipsacales	euasterids II	APGIII
471.00	Pittosporaceae	Apiales	euasterids II	APGIII
472.00	Araliaceae	Apiales	euasterids II	APGIII
474.00	Apiaceae	Apiales	euasterids II	APGIII

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- [Details of the family changes](#) -
a listing of the major changes in accepted family names and generic assignment

- Draft plan for the arrangement - of the specimen collection according to the APGIII phylogeny



- Request a spreadsheet - of the linear systematic sequence

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