

Supplementary Material 1

Plastid phylogenomics reveals evolutionary relationships in the mycoheterotrophic orchid genus *Dipodium* and provides insights into plastid gene degeneration

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Table S1.1: Taxa included in phylogenetic analysis and divergence-time estimations. Taxonomic concepts follow CHAH (2023) <https://biodiversity.org.au/nsl/services/search/taxonomy> for Australian taxa and WFO (2023): <http://www.worldfloraonline.org> for all other regions (accessed in May 2023) except for taxa with asterisks for which a synonym was used (shown in square brackets).

Species	Subtribe	Tribe	Subfamily	NCBI/ENA no.	DNA no.	Included in divergence-time analysis
<i>Aa paleacea</i> (Kunth) Rchb.f.	Cranichidiinae	Cranichideae	Orchidoideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Acriopsis emarginata</i> D.L.Jones & M.A.Clem.	Cymbidiinae	Cymbidieae	Epidendroideae	ERR12947594	CNS_G00305	yes
<i>Aganisia cyanea</i> (Lindl.) Rchb.f.	Zygopetalinae	Cymbidieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Agapanthus coddii</i> F.M.Leight	-	-	Outgroup	NC 035971.1	-	yes
<i>Agave americana</i> L.	-	-	Outgroup	NC 032053.1	-	yes
<i>Angraecum sesquipedale</i> Thouars.	Angraecinae	Vandaeae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Anoectochilus emeiensis</i> K.Y.Lang	Goodyerinae	Cranichideae	Orchidoideae	NC 033895.1	-	yes
<i>Aphyllorchis montana</i> Rchb.f	-	Neottieae	Epidendroideae	NC 030703.1	-	yes
<i>Apostasia odorata</i> Blume	-	-	Apostasioideae	NC 030722.1	-	yes
<i>Apostasia shenzhenica</i> Z.J.Liu & L.J.Chen	-	-	Apostasioideae	NC 039812.1	-	yes
<i>Apostasia wallichii</i> R.Br.	-	-	Apostasioideae	NC 036260.1	-	yes

<i>Arundina graminifolia</i> (D.Don) Hochr.	Arethusinae	Arethuseae	Epidendroideae	MN171408.1	-	yes
<i>Asparagus officinalis</i> L.	-	-	Outgroup	NC 034777.1	-	yes
<i>Batemannia colleyi</i> Lindl.	Zygopetalinae	Cymbidieae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Bletilla striata</i> Rchb.f.	Coelogyninae	Arethuseae	Epidendroideae	NC 028422.1	-	yes
<i>Brachionidium cruziae</i> L.O.Williams	Pleurothallidinae	Epidendreae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Bulbophyllum inconspicuum</i> Maxim.	Dendrobiinae	Malaxideae	Epidendroideae	MN200377	-	yes
<i>Calanthe aristulifera</i> Rchb.f.	-	Collabieae	Epidendroideae	MN200378	-	yes
<i>Calanthe sylvatica</i> Lindl.	-	Collabieae	Epidendroideae	NC 044633.1	-	yes
<i>Calopogon tuberosus</i> (L.) Britton, Sterns & Poggenb.	Arethusinae	Arethuseae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Calypso bulbosa</i> var. <i>occidentalis</i> (Holz.) Cockerell.	Calypsoinae	Epidendreae	Epidendroideae	NC 040980.1	-	yes
<i>Catasetum integerrimum</i> Hook	Catasetinae	Cymbidieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Cattleya liliputana</i> (Pabst) Van den Berg	Laeliinae	Epidendreae	Epidendroideae	NC 032083.1	-	yes
<i>Cephalanthera damasonium</i> Druce	-	Neottieae	Epidendroideae	NC 041179.1	-	yes
<i>Cephalanthera rubra</i> (L.) Rich.	-	Neottieae	Epidendroideae	NC 041181.1	-	yes
<i>Changnienia amoena</i> S.S.Chien.	Calypsoinae	Epidendreae	Epidendroideae	NC 045402.1	-	yes
<i>Chaubardia surinamensis</i> Rchb.f.	Zygopetalinae	Cymbidieae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Cheirostylis chinensis</i> Rolfe	Goodyerinae	Cranichideae	Orchidoideae	MN641483.1	-	yes
<i>Codonorchis lessonii</i> Lindl.	-	Codonorchideae	Orchidoideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Coelogyne flaccida</i> Lindl.	Coelogyninae	Arethuseae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Corallorhiza striata</i> Lindl.	Coelogyninae	Arethuseae	Epidendroideae	NC 040978.1	-	yes
<i>Corallorhiza trifida</i> Châtel	Coelogyninae	Arethuseae	Epidendroideae	NC 025662.1	-	yes
<i>Coryanthes macrantha</i> Hook	Stanhopeinae	Cymbidieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Cremastra appendiculata</i> (D.Don) Makino	Coelogyninae	Arethuseae	Epidendroideae	NC 037439.1	-	yes
<i>Cremastra unguiculata</i> Finet.	Coelogyninae	Arethuseae	Epidendroideae	MN200381	-	yes
<i>Cymbidium aloifolium</i> (L.) Sw.	Cymbidiinae	Cymbidieae	Epidendroideae	NC 021429.1	-	yes
<i>Cymbidium canaliculatum</i> R.Br.	Cymbidiinae	Cymbidieae	Epidendroideae	ERR12947595	CNS_G00165	yes
<i>Cymbidium ensifolium</i> Sw.	Cymbidiinae	Cymbidieae	Epidendroideae	NC 028525.1	-	yes
<i>Cymbidium faberi</i> Rolfe	Cymbidiinae	Cymbidieae	Epidendroideae	NC 027743.1	-	yes
<i>Cymbidium floribundum</i> Lindl.	Cymbidiinae	Cymbidieae	Epidendroideae	MN173778.1	-	yes
<i>Cymbidium lancifolium</i> Hook	Cymbidiinae	Cymbidieae	Epidendroideae	NC 029712.1	-	yes

<i>Cymbidium macrorhizon</i> Lindl.	Cymbidiinae	Cymbidieae	Epidendroideae	NC 029713.1	-	yes
<i>Cymbidium crassifolium</i> Wall.	Cymbidiinae	Cymbidieae	Epidendroideae	NC 021433.1	-	yes
<i>Cypripedium calceolus</i> L.	-	-	Cypripedioideae	NC 045400.1	-	yes
<i>Cypripedium japonicum</i> Thunb.	-	-	Cypripedioideae	NC 027227.1	-	yes
<i>Cyrtopodium flavum</i> Link & Otto ex Rchb.	Cyrtopodiinae	Cymbidieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Dendrobium kingianum</i> Bidwill ex Lindl.	Dendrobiinae	Malaxideae	Epidendroideae	LC331062.1	-	yes
<i>Dendrobium moniliforme</i> (L.) Sw.	Dendrobiinae	Malaxideae	Epidendroideae	MN200384	-	yes
<i>Dichaea pendula</i> (Aubl.) Cogn.	Zygopetalinae	Cymbidieae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Dipodium</i> aff. <i>roseum</i> * D.L.Jones & M.A.Clem.	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947508	HTCG0828	no
<i>Dipodium</i> aff. <i>roseum</i> * D.L.Jones & M.A.Clem.	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947509	HTCG0830	no
<i>Dipodium</i> aff. <i>roseum</i> * D.L.Jones & M.A.Clem.	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947510	HTCG0831	no
<i>Dipodium</i> aff. <i>roseum</i> * D.L.Jones & M.A.Clem.	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947511	HTCG0832	yes
<i>Dipodium</i> aff. <i>stenocheilum</i> * O.Schwarz	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947512	HTCG1691	no
<i>Dipodium ammolithum</i> M.D.Barrett, R.L.Barrett & K.W.Dixon	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947513	HTCG1372	yes
<i>Dipodium atropurpureum</i> D.L.Jones	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947514	HTCG0760	yes
<i>Dipodium atropurpureum</i> D.L.Jones	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947515	HTCG1679	no
<i>Dipodium basalticum</i> M.D.Barrett, R.L.Barrett & K.W.Dixon	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947516	HTCG1693	yes
<i>Dipodium campanulatum</i> D.L.Jones	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947517	HTCG1680	yes
<i>Dipodium campanulatum</i> D.L.Jones	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947518	HTCG1681	no
<i>Dipodium elegantulum</i> D.L.Jones	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947519	HTCG1682	yes
<i>Dipodium ensifolium</i> F.Muell.	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947520	HTCG1343	yes
<i>Dipodium hamiltonianum</i> F.M.Bailey	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947521	HTCG1683	yes
<i>Dipodium hamiltonianum</i> * F.M.Bailey [syn. <i>Dipodium interaneum</i> D.L.Jones]	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947522	HTCG0181	yes
<i>Dipodium pandanum</i> F.M.Bailey	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947593	CNS_G01262	yes
<i>Dipodium pandanum</i> F.M.Bailey	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947523	HTCG1694	no
<i>Dipodium pardalinum</i> D.L.Jones	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947524	HTCG1684	yes
<i>Dipodium pardalinum</i> D.L.Jones	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947525	HTCG1685	no
<i>Dipodium punctatum</i> * (Sm.) R.Br. [syn. <i>Dipodium pulchellum</i> D.L.Jones & M.A.Clem.]	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947526	HTCG1686	yes
<i>Dipodium punctatum</i> (Sm.) R.Br.	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947527	HTCG0827	yes
<i>Dipodium roseum</i> D.L.Jones & M.A.Clem.	Dipodiinae	Cymbidieae	Epidendroideae	MN200386	-	no

<i>Dipodium roseum</i> D.L.Jones & M.A.Clem.	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947528	HTCG1687	yes
<i>Dipodium roseum</i> D.L.Jones & M.A.Clem.	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947529	HTCG1688	no
<i>Dipodium stenocheilum</i> O.Schwarz	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947530	HTCG1689	no
<i>Dipodium stenocheilum</i> O.Schwarz	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947531	HTCG1690	yes
<i>Dipodium variegatum</i> M.A.Clem. & D.L.Jones	Dipodiinae	Cymbidieae	Epidendroideae	ERR12947532	HTCG1692	yes
<i>Elleanthus sodiroi</i> Schltr.	-	Sobralieae	Epidendroideae	NC 027266.1	-	yes
<i>Epipactis mairei</i> Schltr.	-	Neottieae	Epidendroideae	NC 030705.1	-	yes
<i>Epipactis thunbergia</i> A.Gray.	-	Neottieae	Epidendroideae	MN200387	-	yes
<i>Epipactis veratrifolia</i> Boiss. & ...	-	Neottieae	Epidendroideae	NC 030708.1	-	yes
<i>Eria scabrilinguis</i> Lindl.	-	Podochileae	Epidendroideae	MN477202.1	-	yes
<i>Eulophia bicallosa</i> (D.Don) P.F.Hunt & Summerh.	Eulophiinae	Cymbidieae	Epidendroideae	ERR12947533	HTCG1696	yes
<i>Eulophia graminea</i> Lindl.	Eulophiinae	Cymbidieae	Epidendroideae	ERR12947596	CNS_G02766	yes
<i>Eulophia nuda</i> Lindl.	Eulophiinae	Cymbidieae	Epidendroideae	ERR12947534	HTCG1697	yes
<i>Eulophia petersii</i> Rchb.f.	Eulophiinae	Cymbidieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	no
<i>Evetella carnosa</i> (Lindl.) J.C.Manning & Goldblatt	Coryciinae	Orchideae	Orchidoideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Gastrochilus japonicus</i> Schltr.	Aeridinae	Vandaeae	Epidendroideae	NC 035833.1	-	yes
<i>Geodorum densiflorum</i> (Lam.) Schltr.	Eulophiinae	Cymbidieae	Epidendroideae	ERR12947597	CNS_G01890	yes
<i>Gongora pleiochroma</i> Rchb.f.	Stanhopeinae	Cymbidieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Goodyera fumata</i> Thwaites.	Goodyerinae	Cranichideae	Orchidoideae	NC 026773.1	-	yes
<i>Goodyera schlechtendaliana</i> Rchb.f.	Goodyerinae	Cranichideae	Orchidoideae	MK134679.1	-	yes
<i>Guarianthe aurantiaca</i> (Bateman) Dressler & W.E.Higgins.	Laeliinae	Epidendreae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Gymnadenia conopsea</i> (L.) R.Br.	Orchidinae	Orchideae	Orchidoideae	MN200391	-	yes
<i>Habenaria arenaria</i> Lindl.	Orchidinae	Orchideae	Orchidoideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Habenaria ciliolaris</i> Kraenzl.	Orchidinae	Orchideae	Orchidoideae	MN495954.1	-	yes
<i>Hexalectris warnockii</i> Ames & Correll.	Laeliinae	Epidendreae	Epidendroideae	MH444822.1	-	yes
<i>Holcoglossum lingulatum</i> (Aver.) Aver.	Aeridinae	Vandaeae	Epidendroideae	NC 041465.1	-	yes
<i>Holcoglossum subulifolium</i> (Rchb.f.) Christenson.	Aeridinae	Vandaeae	Epidendroideae	NC 041519.1	-	yes
<i>Huntleya meleagris</i> Lindl.	Zygopetalinae	Cymbidieae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Iris sanguinea</i> Hornem	-	-	Outgroup	NC 029227.1	-	yes
<i>Lilium pensylvanicum</i> Ker Gawl.	-	-	Outgroup	NC 043876.1	-	yes

<i>Liparis auriculata</i> Blume ex Miq.	Malaxidinae	Malaxideae	Epidendroideae	MN200365	-	yes
<i>Ludisia discolor</i> (Ker Gawl.) Blume	Goodyerinae	Cranichideae	Orchidoideae	NC 030540.1	-	yes
<i>Masdevallia coccinea</i> Linden ex Lindl.	Pleurothallidinae	Epidendreae	Epidendroideae	NC 026541.1	-	yes
<i>Maxillaria nasuta</i> Rchb.f.	Maxillariinae	Cymbidieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Maxillaria sandariana</i> Rchb.f. ex Sander	Maxillariinae	Cymbidieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Neottia listeroides</i> Lindl.	-	Neottieae	Epidendroideae	NC_030713.1	-	no
<i>Neottia ovata</i> Bluff & Fingerh.	-	Neottieae	Epidendroideae	NC 030712.1	-	yes
<i>Nervilia simplex</i> (Spreng.) Schltr.	-	Nervilieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	no
<i>Neuwiedia zollingeri</i> var. <i>singaporeana</i> (Wall. ex Baker) de Vogel	-	-	Apostasioideae	LC199503.1	-	yes
<i>Oberonia japonica</i> (Maxim.) Makino	Malaxidinae	Malaxideae	Epidendroideae	NC 035832.1	-	yes
<i>Oeceoclades pelorica</i> (D.L.Jones & M.A.Clem.) D.L.Jones & M.A.Clem.	Eulophiinae	Cymbidieae	Epidendroideae	ERR12947535	HTCG1695	yes
<i>Oncidium sphacelatum</i> Lindl.	Oncidiinae	Cymbidieae	Epidendroideae	NC 028148.1	-	yes
<i>Ophrys fusca</i> subsp. <i>iricolor</i> * (Desf.) K.Richt.	Orchidinae	Orchideae	Orchidoideae	AP018716.1	-	yes
<i>Ophrys sphegodes</i> Mill.	Orchidinae	Orchideae	Orchidoideae	AP018717.1	-	yes
<i>Otoglossum globuliferum</i> (Kunth) N.H.Williams & M.W.Chase	Zygopetalinae	Cymbidieae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Otostylis brachystali</i> Schltr.	Zygopetalinae	Cymbidieae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Pabstia jugosa</i> (Lindl.) Garay.	Zygopetalinae	Cymbidieae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Palmorchis pabstii</i> Veyret.	-	Neottieae	Epidendroideae	NC 041190.1	-	yes
<i>Paphiopedilum armeniacum</i> S.C.Chen & F.Y.Liu.	-	-	Cypripedioideae	NC 026779.1	-	yes
<i>Paphiopedilum niveum</i> (Rchb.f.) Stein	-	-	Cypripedioideae	NC 026776.1	-	yes
<i>Pelatantheria scolopendrifolia</i> (Makino) Aver.	Aeridinae	Vandaeae	Epidendroideae	NC 035829.1	-	yes
<i>Pescatoria wallisii</i> Linden & Rchb.f.	Zygopetalinae	Cymbidieae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Phaius tankervilleae</i> (Banks) Blume.	-	Collabieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Phalaenopsis japonica</i> (Rchb.f.) Kocyan & Schuit.	Aeridinae	Vandaeae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Phalaenopsis pulcherrima</i> (Lindl.) J.J.Sm.	Aeridinae	Vandaeae	Epidendroideae	MG459020.1	-	yes
<i>Phragmipedium longifolium</i> (Rchb.f. & Warsz.) Rolfe	-	-	Cypripedioideae	NC 028149.1	-	yes
<i>Platanthera mandarinorum</i> Rchb.f.	Orchidinae	Orchideae	Orchidoideae	MN200370	-	yes
<i>Platystele aurea</i> Garay.	Pleurothallidinae	Epidendreae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Pleione formosana</i> Hayata	Coelogyntinae	Arethuseae	Epidendroideae	NC 042197.1	-	yes
<i>Pogonia ophioglossoides</i> (L.) Ker Gawl.	-	Pogonieae	Vanilloideae	Givnish <i>et al.</i> (2015)	-	yes

<i>Ponerorchis gracilis</i> (Blume) X.H.Jin, Schuit. & W.T.Jin	Orchidinae	Orchideae	Orchidoideae	MN200376	-	yes
<i>Scaphosepalum antenniferum</i> Rolfe.	Pleurothallidinae	Epidendreae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Sobralia mucronate</i> Ames & C.Schweinf.	-	Sobralieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Spiranthes sinensis</i> (Pers.) Ames	Spiranthinae	Cranichideae	Orchidoideae	MK936427.1	-	yes
<i>Teagueia</i> (Luer) Luer.	Pleurothallidinae	Epidendreae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Telipogon glicensteinii</i> Dodson & R.Escobar	Oncidiinae	Cymbidieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Thelymitra cyanea</i> (Lindl.) Benth.	Thelymitrinae	Diurideae	Orchidoideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Thrixspermum japonicum</i> Rchb.f.	Aeridinae	Vandaeae	Epidendroideae	NC 035831.2	-	yes
<i>Triphora trianthophora</i> (Sw.) Rydb.	Triphorinae	Triphoreae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	no
<i>Tropidia polystachya</i> Ames.	-	Tropidieae	Epidendroideae	Givnish <i>et al.</i> (2015)	-	yes
<i>Vanda brunnea</i> Rchb.f.	Aeridinae	Vandaeae	Epidendroideae	NC 041522.1	-	yes
<i>Vanda falcata</i> Beer.	Aeridinae	Vandaeae	Epidendroideae	NC 036372.1	-	
<i>Vanilla aphylla</i> Blume	-	Vanilleae	Vanilloideae	NC 035320.1	-	yes
<i>Vanilla planifolia</i> Andrews	-	Vanilleae	Vanilloideae	NC 026778.1	-	yes
<i>Vanilla pompona</i> Schiede	-	Vanilleae	Vanilloideae	NC 036809.1	-	yes
<i>Zootrophion hirtzii</i> Luer.	Pleurothallidinae	Epidendreae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes
<i>Zygopetalum triste</i> Barb.Rodr.	Zygopetalinae	Cymbidieae	Epidendroideae	Serna-Sánchez <i>et al.</i> (2021)	-	yes

References

Givnish, T. J., Spalink, D., Ames, M., Lyon, S. P., Hunter, S. J., Zuluaga, A., et al. (2015). Orchid phylogenomics and multiple drivers of their extraordinary diversification. *Proc. R. Soc B* 282, 20151553. doi: 10.1098/rspb.2015.1553

Serna-Sánchez, M. A., Pérez-Escobar, O. A., Bogarín, D., Torres-Jimenez, M. F., Alvarez-Yela, A. C., Arcila-Galvis, J. E., et al. (2021). Plastid phylogenomics resolves ambiguous relationships within the orchid family and provides a solid timeframe for biogeography and macroevolution. *Sci. Rep.* 11, 6858. doi: 10.1038/s41598-021-83664-5