

**Reconstruction of the evolutionary biogeography reveals the origins of *Alpinia* Roxb. (Zingiberaceae):
A case of “out-of-Asia” migration to the Southern Hemisphere**

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Table S1. Voucher information and GenBank accession numbers for DNA sequences used in this study. “–” indicates missing data.

Species	Voucher	ITS	matK
<i>Aframomum angustifolium</i> (Sonn.)K. Schum.	Kress 92-3403 US	AF478704	AF478804
<i>Aframomum daniellii</i> K. Schum.	Kress #99-6375 US	AF478705	AF478805
<i>Alpinia abundiflora</i> Burt & R.M.Sm.	–	AY742334	KJ872298
<i>Alpinia aenea</i> B.L.Burt & R.M.Sm.	Argent et al. 0016 (RBGE)	AY742351	AY742402
<i>Alpinia alpina</i> (Elmer) R.M.Sm. ex M.F.Newman, Lhuillier & A.D.Poulsen	USTH 013820	LT717096	–
<i>Alpinia aquatica</i> (Retz.) Roscoe	ZL082	AF254458	JF953079
<i>Alpinia arctiflora</i> (F.Muell.) Benth.	–	AY742336	–
<i>Alpinia argentea</i> (B.L.Burt & R.M.Sm.) R.M.Sm.	–	AY742337	–
<i>Alpinia arundelliana</i> (F.M.Bailey) K.Schum.	–	AY742338	–
<i>Alpinia assimilis</i> Ridl.	–	KJ507887	KJ507853
<i>Alpinia bilamellata</i> Makino	–	AY742339	–
<i>Alpinia blepharocalyx</i> K.Schum.	Kress #98-6136 US	AF478709	JF953081
<i>Alpinia boia</i> Seem.	–	AY742340	–
<i>Alpinia brevibras</i> C.Presl	–	AY742341	–
<i>Alpinia caerulea</i> (R.Br.) Benth.	–	AY742342	–
<i>Alpinia calcarata</i> (Haw.) Roscoe	USBG 89-0346	AF478710	JF953085
<i>Alpinia calcicola</i> Q.B.Nguyen & M.F.Newman	USTH 013820	MN545633	LT717111
<i>Alpinia calycodes</i> K.Schum.	W.Baker 1051(K)	AY769834	AY742434
<i>Alpinia capitellata</i> Jack	–	KJ507890	KJ507842
<i>Alpinia carolinensis</i> Koidz.	Kress #99-6404 US	AF478711	FJ496767
<i>Alpinia coeruleoviridis</i> K.Schum.	–	AY742343	AY742395
<i>Alpinia conchigera</i> Griff.	Kress #00-6706 US	AF478712	JF953088
<i>Alpinia congesta</i> Elmer	USTH 013826	LT717106	–
<i>Alpinia coriacea</i> T.L.Wu & S.J.Chen	–	AY742344	AY742396
<i>Alpinia coriandriodora</i> D.Fang	X.D. Vu GD02LT (HN)	MN227654	MN335321
<i>Alpinia cylindrocephala</i> K.Schum.	–	AY742345	AY742397
<i>Alpinia chinensis</i> (Retz.) Roscoe	–	MG730443	EU586175
<i>Alpinia denticulata</i> (Ridl.) Holttum	01SCAL	MH087456	LT717120
<i>Alpinia diversifolia</i> (Elmer) Elmer	USTH 013802	LT717105	–
<i>Alpinia elegans</i> (C.Presl) K.Schum.	Kress #99-6412 US	AF478713	JF953090
<i>Alpinia emaculata</i> S.Q.Tong	ZL306-1	–	JF953092
<i>Alpinia eremochlamys</i> K.Schum.	L-97.0268	AY742346	AY742398
<i>Alpinia eubractea</i> K.Schum.	–	AY742347	–
<i>Alpinia fax</i> B.L.Burt & R.M.Sm.	Kress 94-5335	AY742348	AY742399
<i>Alpinia flabellata</i> Ridl.	L-87.0285	AY742349	AY742400
<i>Alpinia formosana</i> K.Schum.	AY742350	AY742350	AY742401
<i>Alpinia foxworthyi</i> Ridl.	Kress #98-6293 US	AF478714	JF953095
<i>Alpinia galanga</i> (L.) Willd.	Lyon 83.505	AF478715	EU586174
<i>Alpinia glabra</i> Ridl.	S.Sakai 388	AB097221	JF715463
<i>Alpinia graminifolia</i> D.Fang & G.Y.Lo	ZL012	–	JF953103
<i>Alpinia guangdongensis</i> S.J.Chen & Z.Y.Chen	Kress Sul02-60	AY742352	AY742403
<i>Alpinia guinanensis</i> D.Fang & X.X.Chen	ZL173	AY742353	JF953105
<i>Alpinia gigantifolia</i> (Elmer) R.M.Sm.	USTH 013824	LT717097	FJ496766
<i>Alpinia haenkei</i> C.Presl	Sul 02-68	AY742354	AY742404
<i>Alpinia hainanensis</i> K.Schum.	ZL311-1	AF254467	JF953107
<i>Alpinia hansenii</i> R.M.Sm.	Julius, A. & Alexander, J. & Benjamin, L.2(BORH)	DQ507828	–
<i>Alpinia havilandii</i> K.Schum.	–	DQ507829	AY742438
<i>Alpinia hookeriana</i> Valetton	–	AY742356	LT717124
<i>Alpinia intermedia</i> Gagnep.	Kress #97-5780 US	AF478716	JF953110
<i>Alpinia japonica</i> (Thunb.) Miq.	–	AY742357	AY742405
<i>Alpinia javanica</i> Blume	–	AY742358	KJ507869
<i>Alpinia jiangnanfeng</i> T.L.Wu	–	EF488011	AY742439
<i>Alpinia kusshakuensis</i> Hayata	TNU:Liu 1723	FJ496859	–
<i>Alpinia kwangsiensis</i> T.L.Wu & S.J.Chen	ZL314-1	AY742359	JF953114



Table S1. Cont.

Species	Voucher	ITS	matK
<i>Alpinia latilabris</i> Ridl.	TNU:Liu 1300	AY742360	FJ496755
<i>Alpinia ligulata</i> K.Schum.	S.Sakai 375	AB097222	JF715465
<i>Alpinia luteocarpa</i> Elmer	Kress #99-6403 US	AF478717	AF478817
<i>Alpinia maclurei</i> Merr.	TNU:Liu 1902-1	AY742362	FJ496764
<i>Alpinia macrostephana</i> (Baker) Ridl.	–	KJ507913	KJ507913
<i>Alpinia malaccensis</i> (Burm.f.) Roscoe	–	AH008309	KJ872316
<i>Alpinia malaccensis</i> var <i>nobilis</i> (Ridl.) I.M.Turner	–	KJ507916	KJ507852
<i>Alpinia manii</i> Baker	–	KJ871948	KJ872319
<i>Alpinia modesta</i> F.Muell. ex K.Schum.	Kress 99-6372	AY742364	AY742408
<i>Alpinia monopleura</i> K.Schum.	Argent et al. 0016	AY742363	AY742394
<i>Alpinia murdochii</i> Ridl.	O. Sida, T. Fer & E. Zaveska M-11-1	KY438007	KJ507846
<i>Alpinia mutica</i> Roxb.	–	AY742365	KJ507857
<i>Alpinia napoensis</i> H.Dong & G.J.Xu	–	AF254466	–
<i>Alpinia nieuwenhuizii</i> Valetton	–	AY742366	AY742410
<i>Alpinia nigra</i> (Gaertn.) Burt	Kress 00-6808	AY742367	–
<i>Alpinia novaepommeraniae</i> K.Schum.	L-78.0474, CS 02-317	AY742368	–
<i>Alpinia nutans</i> (L.) Roscoe	L-91.0066, CS 02-337	AY742369	KX088470
<i>Alpinia oblonga</i> (Merr.) Loes.	USTH 013804	LT717098	–
<i>Alpinia oblongifolia</i> Hayata	ZL317-2	–	JF953118
<i>Alpinia oceanica</i> Burkill	L-80.0710	AY742370	AY742414
<i>Alpinia officinarum</i> Hance	Kress #00-6614 US	AF478718	EU586172
<i>Alpinia oxymitra</i> K.Schum.	SH661	MN545642	KJ507858
<i>Alpinia oxyphylla</i> Miq.	Liao 020707	AF254463	JF953121
<i>Alpinia pahangensis</i> Ridl.	APM027-17	MH424563	KJ507872
<i>Alpinia petiolata</i> Baker	APM017-17	MH424553	LT717125
<i>Alpinia pinetorum</i> (Ridl.) Loes.	Kress 95-5540	AY742373	AY742416
<i>Alpinia pinnanensis</i> T.L.Wu & S.J.Chen	–	AF254470	–
<i>Alpinia platytilus</i> K.Schum.	ZL319-1	–	JF953124
<i>Alpinia polyantha</i> D.Fang	NMNH (SI), AC 94-3744 JK	AH008311	JF953127
<i>Alpinia pricei</i> Hayata	S.M. Scott 02-101	AY742374	KY620264
<i>Alpinia pumila</i> Hook.f.	Kress 97-6119	AF254472	–
<i>Alpinia purpurata</i> (Vieill.) K.Schum.	SH125	MN545645	KJ872322
<i>Alpinia rafflesiana</i> Wall. ex Baker	–	AY742376	KJ507881
<i>Alpinia rosea</i> Elmer	L-86-0459	AY742377	AY742418
<i>Alpinia roxburghii</i> Sweet	ZSA01	–	KC597951
<i>Alpinia rubricaulis</i> K.Schum.	J. Leong-Skornickova GRC-192	AY742378	KY620256
<i>Alpinia rufa</i> (C.Presl) Náves	USTH 013799	LT717109	AF478820
<i>Alpinia rugosa</i> S. J. Chen & Z. Y. Chen	Liao 020702	AY742379	–
<i>Alpinia scabra</i> (Blume) Náves	APM012-17	MH424548	KJ507848
<i>Alpinia shimadae</i> Hayata	TNU:Liu 1121-1	FJ496828	AY742441
<i>Alpinia shimadai</i> Hayata	L-78.0474	AY742380	AY742422
<i>Alpinia sibuyanensis</i> Elmer	L-94.0309	AY742381	AY742424
<i>Alpinia smithiae</i> M.Sabu & Mangaly	–	JF423300	–
<i>Alpinia stachyodes</i> Hance	Kress 99-6366	AY742384	JF953129
<i>Alpinia strobiliformis</i> T.L.Wu & S.J.Chen	VMN-B0002188	MN545646	–
<i>Alpinia submutica</i> K.Schum.	07AISC	MH087457	–
<i>Alpinia suishaensis</i> Hayata	Kress 01-6860	AY742385	AY742428
<i>Alpinia suriana</i> C.K.Lim	APM034-17	MH479775	KJ507874
<i>Alpinia tonkinensis</i> Gagnep.	Ibrahim & Jong s.n.	AY742386	AY742431
<i>Alpinia tonrokuensis</i> Hayata	TNU:Liu 1686	FJ496848	AY742442
<i>Alpinia uraiensis</i> Hayata	–	–	FJ496760
<i>Alpinia vanoverberghii</i> Merr.	USTH 013811	LT717107	–
<i>Alpinia vitellina</i> (Lindl.) Ridl.	–	KJ507950	KJ507876
<i>Alpinia vitellina</i> var <i>cannifolia</i> (Ridl.) I.M.Turner	APM004-17	MH424540	KJ507862
<i>Alpinia vittata</i> W.Bull	L-72.0535, AN 020	JF423301	–



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Table S1. Cont.

Species	Voucher	ITS	matK
<i>Alpinia vulcanica</i> Elmer	AY742387	AY742387	AY742432
<i>Alpinia warburgii</i> K.Schum.	Liao 020702	AY742388	AY742433
<i>Alpinia zerumbet</i> (Pers.) B.L.Burtt & R.M.Sm.	–	AY742389	KX148587
<i>Amomum glabrum</i> S.Q.Tong	Kress #00-6715 US	AF478721	JF953187
<i>Amomum kerbyi</i> (R.M. Sm.) Škorničk. & Hlavatá	A.D. Poulsen & H. Mathisen 2956	MH396857	MH497355
<i>Amomum longipetiolatum</i> Merr.	Kress #99-6353 US	AF478722	AF478822
<i>Amomum petaloideum</i> S.Q. Tong	ZL365-2	–	JF953212
<i>Amomum villosum</i> Lour.	Kress #01-6978 US	AF478724	AF478824
<i>Burbridgea schizocheila</i> Hackett	Kress #01-6867 US	AF478729	AF478829
<i>Curcuma roscoeana</i> Wall.	Kress #98-6253 US	AF478739	AF478839
<i>Distichochlamys citrea</i> M. F.Newman	Kress #01-6818 US	AF478744	–
<i>Elettariopsis kerbyi</i> R.M. Sm.	–	AF478746	AF478845
<i>Elettariopsis stenosisiphon</i> (K.Schum.) B.L. Burtt & R.M. Sm.	Kress #01-6847 US	AF478748	AF478748
<i>Etlingera littoralis</i> (J.Koenig) Giseke	Kress #99-6323 US	AF478750	–
<i>Etlingera yunnanensis</i> (T.L. Wu & S.J. Chen) R.M. Sm	Kress #95-5546 US	AF478751	AF478850
<i>Gagnepainia thoreliana</i> K. Schum.	Williams #00-199 DUKE	AF478752	AF478851
<i>Globba atosanguinea</i> Teijsm. & Binn.	Williams #98-01 DUKE	AF478753	AF478852
<i>Globba wengeri</i> (C.E.C.Fisch.) K.J.Williams	Kress #00-6722 US	AF478770	–
<i>Hedychium greenii</i> W.W. Sm	–	KM983509	AF478858
<i>Hemiorchis burmanica</i> Kurz	Kress #99-6515 US	AF478764	HM367660
<i>Hornstedtia hainanensis</i> T.L. Wu & S. J. Chen	Kress #97-5769 US	AF478766	AF478865
<i>Leptosolen haenkei</i> C. Presl	H. Funakoshi & L. L. Co 2006 US	AY742331	AY742390
<i>Nicolaia elatior</i> (Jack) Horan.	S. Sakai 351	–	JF715484
<i>Paramomum petaloideum</i> S.Q. Tong	Kress #95-5508 US	AF478771	AF478872
<i>Plagiostachys</i> sp.	–	AF478772	AF478873
<i>Pleuranthodium floccosum</i> (Valeton) R.M. Sm	L-78.0460	AY742333	AY742391
<i>Pleuranthodium floribundum</i> (K. Schum.) R.M. Sm.	Waimea W75S1701	AF478774	AF478875
<i>Pleuranthodium schlechteri</i> (K. Schum.) R.M. Sm.	Kress #00-6724 US	AF478775	AF478876
<i>Pleuranthodium trichocalyx</i> (Valeton) R.M. Sm.	L-78.0460	AY742332	AY742392
<i>Renealmia alpinia</i> (Rottb.) Maas	Kress #99-6407 US	AF478778	AF478879
<i>Renealmia battenbergiana</i> Baker	Kress #94-5277 US	AF478779	AF478880
<i>Riedelia</i> sp.	GH #96-281 US	AF478785	AF478886
<i>Siamanthus siliquosus</i> K. Larsen & Mood	Kress #99-6349 US	AF478790	AF478891
<i>Siliquamomum tonkinense</i> Baill.	Kress #00-6802 US	AF478791	–
<i>Siphonochilus aethiopicus</i> (Schweinf.) B.L. Burtt	GH #00-134 US	AF478792	AF478893
<i>Siphonochilus decorus</i> (Druten) Lock	GH #00-135 US	AF478793	AF478894
<i>Siphonochilus kirkii</i> (Hook. f.) B. L. Burtt	Kress #94-3692 US	AF478794	AF478895
<i>Tamijia flagellaris</i> S. Sakai & Nagam.	Kazuyuki S55 - Kyoto	AF478797	AF478898
<i>Vanoverberghia sepulchrei</i> Merr.	Kress #95-5562 US	AF478798	AF478899
<i>Zingiber wrayi</i> Ridl.	Kress #00-6721 US	AF478802	AF478905

Table S2. A comparison of sampling rates (*Alpinia* only) in this study and Kress *et al.* (2005)

Geographic region (<i>Alpinia</i> only)	Number of species distributed in the region following Kress <i>et al.</i> (2005)	Number of species distributed in the region following this study	Sampling rates (%)
Asia	34	56	164
India	17	18	105
Malesia	38	55	144
Australasia	6	6	100

Table S3. Gene diversity statistics for each partition and the combined data sets

	No. of taxa	Alignment length (bp)	Conserv. Chars.	Variabl. Uninform.	Variabl. Inform.
matK	120	2994	2157	357	480
ITS	144	837	401	111	325
Combined	149	3831	2558	468	805



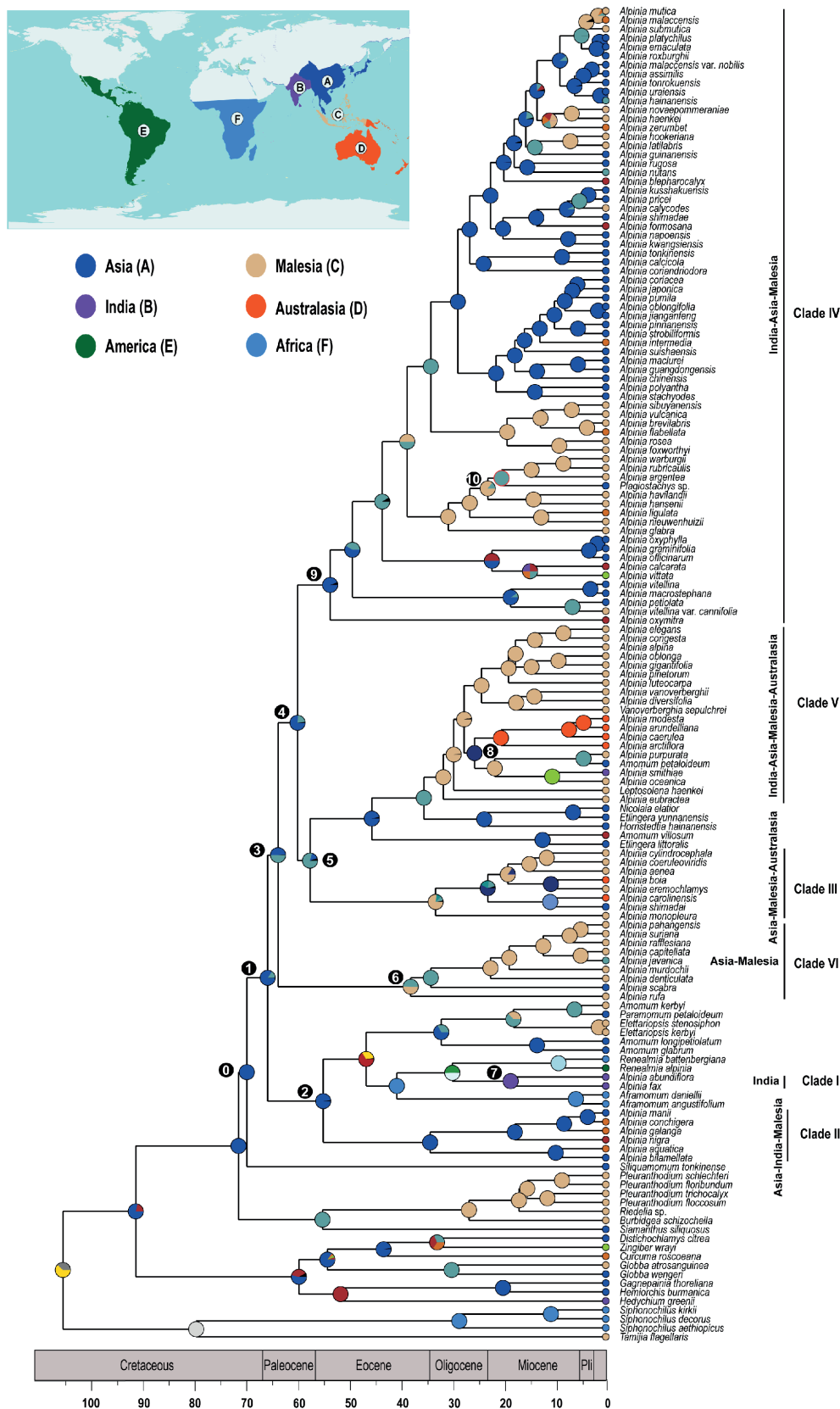


Figure S1. Ancestral area reconstruction of *Alpinia* by Bayes-DIVA. Geologic time scale is shown at the bottom. Area abbreviations are as follows: **A**, Asia (including East Asia, Indochina and Myanmar); **B**, India (including India and Sri Lanka); **C**, Malesia (including Malaysia, Indonesia, Philippines, Singapore); **D**, Australasia (including Australia, New Zealand, New Guinea and Pacific Islands); **E**, America; **F**, Africa.

References

Kress WJ, Liu AZ, Newman M, Li QJ. 2005. The molecular phylogeny of *Alpinia* (Zingiberaceae): A complex and polyphyletic genus of gingers. *American Journal of Botany* 92: 167-178.

