

**Table S1** List of *Pinus* species surveyed for the presence of angiosperm-type *nad 5-1*. *Pinus* classification follows Gernandt *et al.* (2005).

Taxa	Sources	Sample size
<b>Subgenus <i>Pinus</i></b>		
<b>Section <i>Pinus</i></b>		
<b>Subsection <i>Pinus</i></b>		
<i>Pinus densiflora</i>	FFPRI, Ibaraki, Japan	4
<i>P. merkusii</i>	Chiang Mai, Thailand	4
<i>P. sylvestris</i>	Umeå, Sweden	4
<i>P. tabuliformis</i>	Linkongshani, shanxi China	4
<i>P. thunbergii</i>	FFPRI, Ibaraki, Japan	4
<i>P. yunnanensis</i>	Kunming, Yunnan, China	4
<i>P. densata</i>	Niyang valley, Xizang, China	4
<i>P. khasya</i>	Chiang Mai, Thailand	2
<i>P. massoniana</i>	Nanjing Forest University, China	4
<i>P. nigra</i>	Hørsholm Arboretum, Copenhagen, Denmark	4
<i>P. luchuensis</i>	FFPRI, Ibaraki, Japan	2
<b>Subsection <i>Pinaster</i></b>		
<i>P. canariensis</i>	ESACB, Castelo Branco, Portugal	6
	Tenerife, Canary Islands, Spain	4
	La Palma, Canary Islands, Spain	4
	El Hierro, Canary Islands, Spain	4
	Gran Canaria, Canary Islands, Spain	4
<i>P. halepensis</i>	Mountain Carmel, Haifa, Israel	4
<i>P. pinaster</i>	ESACB, Castelo Branco, Portugal	2
	Omis, Dalmatian, Croatia	2
<i>P. roxburghii</i>	Chamba, Himachal Pradesh, India	2
	Pokhara University, Pokhara, Nepal	1
	Swat, Mansehra, Pakistan	1
	Islamabad, Pakistan	1
<i>P. heldreichii</i>	DNA samples from Andreas Drouzas	4
<i>P. pine</i>	DNA samples from G.G. Vendramin	3
<i>P. brutia</i>	DNA samples from G.G. Vendramin	3
<b>Section <i>Trifoliae</i></b>		
<b>Subsection <i>Contortae</i></b>		
<i>P. banksiana</i>	Acadia National Park, Maine, USA	4
<i>P. contorta</i>	Vancouver, British Columbia, Canada	4
<b>Subsection <i>Australes</i></b>		
<i>P. taeda</i>	Northampton, North Carolina, USA	4
<i>P. rigida</i>	Acadia National Park, Maine, USA	4
<b>Subsection <i>Ponderosae</i></b>		
<i>P. maximinoi</i>	Comitan, Chiapas, Mexico	4
<i>P. ponderosa</i>	Glacier National Park, Montana, USA	4
<b>Subgenus <i>strobos</i></b>		
<b>Section <i>Parrya</i></b>		
<b>Subsection <i>Balfourianae</i></b>		
<i>P. aristata</i>	Hørsholm Arboretum, Copenhagen, Denmark	2
<i>P. balfouriana</i>	Hørsholm Arboretum, Copenhagen, Denmark	2
<b>Section <i>Quinquefoliae</i></b>		
<b>Subsection <i>Gerardianae</i></b>		
<i>P. bungeana</i>	Ankang, Shanxi, China	2
<i>P. gerardiana</i>	Chamba, Himachal Pradesh, India	2
<i>P. squamata</i>	Qiaojia, Yunnan, China	2
<b>Subsection <i>Krempfianae</i></b>		
<i>P. krempfii</i>	Da Chay, Lam Dong, Vietnam	2
<b>Subsection <i>Strobos</i></b>		
<i>P. armandii</i>	Baoxing, Sichuan, China	2
<i>P. koraiensis</i>	Yichun, Heilongjiang, China	2
<i>P. wallichiana</i>	Beijing Forest University, Beijing, China	1
<i>P. parviflora</i>	FFPRI, Ibaraki, Japan	2
<i>P. albicaulis</i>	PSRSP, California, USA	2
<i>P. strobos</i>	FFPRI, Ibaraki, Japan	2
<i>P. ayacahuite</i>	Comitan, Chiapas, Mexico	2
<i>P. pumila</i>	FFPRI, Ibaraki, Japan	2
<i>P. peuce</i>	Umeå University, Umeå, Sweden	2
<i>P. cembra</i>	Tatra National Park, High Tatras, Slovakia	2
<i>P. strobiformis</i>	PSRSP, California, USA	2
<i>P. monticola</i>	PSRSP, California, USA	2
<i>P. lambertiana</i>	PSRSP, California, USA	2
<i>P. flexilis</i>	PSRSP, California, USA	2

FFPRI, Forestry and Forest Product Research Institute.

ESACB, Escola Superior Agrária do Instituto Politécnico de Castelo Branco

PSRSP, Pacific Southwest Research Station Placerville

Gernandt, D.S., Lopez, G.G., Garcia, S.O., Liston, A., 2005. Phylogeny and classification of *Pinus*. Taxon 54, 29-42.

**Table S2** The sampled species and Genbank accession numbers of the *nad 5-1* sequence of each sample.

Species	Genbank acc.	Species	Genbank acc.	Species	Genbank acc.
<b>Angiosperms</b>		<b>gymnosperm</b>		<b>gymnosperm</b>	
<i>Amborella trichopoda</i>	KF754803	<i>Pinus albicaulis</i>	KM244404	<i>Picea glauca</i>	DQ358177
<i>Daucus carota</i>	JQ248574	<i>Pinus aristata</i>	KM244412	<i>Picea smithiana</i>	AF143414
<i>Helianthus annuus</i>	KF815390	<i>Pinus armandii</i>	KM244401	<i>Picea wilsonii</i>	DQ358201
<i>Asclepias syriaca</i>	KF541337	<i>Pinus ayacahuite</i>	KM244413	<i>Picea spinulosa</i>	DQ358204
<i>Boea hygrometrica</i>	JN107812	<i>Pinus balfouriana</i>	KM244414	<i>Picea purpurea</i>	DQ358192
<i>Ajuga reptans</i>	KF709392	<i>Pinus banksiana</i>	KM244397	<i>Picea neoveitchii</i>	DQ358187
<i>Salvia miltiorrhiza</i>	KF177345	<i>Pinus brutia</i>	KP141749	<i>Picea likiangensis</i>	DQ358181
<i>Utricularia gibba</i>	KC997780	<i>Pinus bungeana</i>	KM244410	<i>Picea farreri</i>	DQ358176
<i>Mimulus guttatus</i>	JN098455	<i>Pinus canariensis</i> <sup>1</sup>	KP141748	<i>Picea retroflexa</i>	DQ358194
<i>Nicotiana tabacum</i>	BA000042	<i>Pinus canariensis</i> <sup>2</sup>	KP141747	<i>Picea orientalis</i>	DQ358190
<i>Solanum lycopersicum</i>	AC245743	<i>Pinus cembra</i>	KM244399	<i>Picea omorika</i>	DQ358189
<i>Beta vulgaris</i>	FP885834	<i>Pinus contorta</i>	KM244396	<i>Picea maximowiczii</i>	DQ358184
<i>Beta macrocarpa</i>	FQ378026	<i>Pinus densiflora</i>	KM244387	<i>Picea schrenkiana</i>	DQ358196
<i>Silene latifolia</i>	HM562727	<i>Pinus flexilis</i>	KM244418	<i>Picea brachytyla</i>	DQ358172
<i>Silene vulgaris</i>	JQ771310	<i>Pinus gerardiana</i>	KM244409	<i>Picea obovata</i>	DQ358188
<i>Citrullus lanatus</i>	GQ856147	<i>Pinus halepensis</i>	KM244385	<i>Picea meyeri</i>	DQ358186
<i>Cucumis sativus</i>	AY258277	<i>Pinus koraiensis</i>	KM244403	<i>Picea morrisonicola</i>	DQ358185
<i>Cucurbita pepo</i>	GQ856148	<i>Pinus krempfii</i>	KM244411	<i>Picea jezoensis</i>	DQ358179
<i>Cicer arietinum</i>	NC_021164	<i>Pinus lambertiana</i>	KM244419	<i>Picea glehnii</i>	DQ358178
<i>Glycine max</i>	JX463295	<i>Pinus leucodermis</i>	KP141750	<i>Picea crassifolia</i>	DQ358174
<i>Lotus japonicus</i>	JN872551	<i>Pinus maximinoi</i>	KM244393	<i>Picea asperata</i>	DQ358171
<i>Medicago truncatula</i>	AC145156	<i>Pinus merkusii</i>	KM244386	<i>Picea alcoquiana</i>	DQ358170
<i>Milletia pinnata</i>	JN872550	<i>Pinus monticola</i>	KM244417	<i>Picea breweriana</i>	DQ358203
<i>Vicia faba</i>	KC189947	<i>Pinus parviflora</i>	KM244402	<i>Tsuga chinensis</i>	JF829725
<i>Vigna angularis</i>	AP012599	<i>Pinus peuce</i>	KM244406	<i>Nothotsuga longibracteata</i>	AF143420
<i>Hevea brasiliensis</i>	AP014526	<i>Pinus pinaster</i>	KM244392	<i>Pseudolarix amabilis</i>	AF143423
<i>Ricinus communis</i>	HQ874649	<i>Pinus pinea</i>	KP141751	<i>Abies holophylla</i>	KM244422
<i>Fragaria vesca</i>	NW_004440462	<i>Pinus ponderosa</i>	KM244394	<i>Abies firma</i>	KM244423
<i>Malus domestica</i>	FR714868	<i>Pinus pumila</i>	KM244407	<i>Cathaya argyrophylla</i>	KM244424
<i>Arabidopsis thaliana</i>	JF729200	<i>Pinus rigida</i>	KM244398	<i>Cedrus atlantica</i>	AF143424
<i>Brassica carinata</i>	JF920287	<i>Pinus roxburghii</i>	KM244388	<i>Cedrus deodara</i>	DQ983608
<i>Brassica juncea</i>	JF920288	<i>Pinus squamata</i>	KM244400	<i>Cedrus libani</i>	DQ983606
<i>Brassica napus</i>	FR715249	<i>Pinus strobiformis</i>	KM244425	<i>Cedrus brevifolia</i>	DQ983605
<i>Brassica oleracea</i>	JF920286	<i>Pinus strobus</i>	KM244408	<i>Pseudotsuga menziesii</i>	AF143416
<i>Brassica rapa</i>	JF920285	<i>Pinus sylvestris</i>	KM244390	<i>Pseudotsuga macrocarpa</i>	GU457483
<i>Raphanus sativus</i>	AB694743	<i>Pinus tabuliformis</i>	KM244384	<i>Pseudotsuga japonica</i>	GU457482
<i>Carica papaya</i>	EU431224	<i>Pinus taeda</i>	KM244395	<i>Pseudotsuga sinensis</i>	GU457481
<i>Erodium carvifolium</i>	JQ479252	<i>Pinus thunbergii</i>	KM244389	<i>Pseudotsuga forrestii</i>	GU457478
<i>Geranium macrorrhizum</i>	JQ479253	<i>Pinus wallichiana</i>	KM244416	<i>Pseudotsuga brevifolia</i>	GU457477
<i>Geranium palmatum</i>	JQ479254	<i>Pinus yunnanensis</i>	KM244383	<i>Larix laricina</i>	GU457485
<i>Melianthus villosus</i>	JQ479255	<i>Pinus serotina</i>	JF829730	<i>Larix griffithiana</i>	GU457484
<i>Gossypium hirsutum</i>	JX065074	<i>Pinus palustris</i>	JF829722	<i>Larix gmelini</i>	AF143417
<i>Oenothera spp.</i>	X07566	<i>Pinus elliottii</i>	JF829729	<i>Cycas taitungensis</i>	AP009381
<i>Vitis vinifera</i>	GQ220326	<i>Pinus echinata</i>	JF829719	<i>Cycas panzhihuaensis</i>	AF143425
<i>Phoenix dactylifera</i>	JN375330	<i>Pinus nigra</i>	JF829732	<b>Fern</b>	
<i>Aegilops speltoides</i>	AP013107	<i>Pinus densata</i>	JF829726	<i>Polystichum munitum</i>	KP141752
<i>Bambusa oldhamii</i>	EU365401	<i>Pinus luchuensis</i>	JF829721	<i>Polystichum setiferum</i>	KP141753
<i>Ferocalamus rimosivaginus</i>	JN120789	<i>Pinus kesiya</i>	JF829720	<i>Gymnocarpium dryopteris</i>	KP141754
<i>Lolium perenne</i>	JX999996	<i>Pinus massoniana</i>	EU369319	<b>Moss</b>	
<i>Oryza rufipogon</i>	AP011076	<i>Pinus hwangshanensis</i>	EU369316	<i>Physcomitrella patens</i>	AB251495
<i>Oryza sativa</i>	JF281153	<i>Pinus cembroides</i>	AB455872	<i>Rhacocarpus purpurascens</i>	AJ622821
<i>Sorghum bicolor</i>	DQ984518	<i>Pinus fenzeliana</i>	AB455858	<i>Encalypta streptocarpa</i>	AJ622818
<i>Tripsacum dactyloides</i>	DQ984517	<i>Pinus sibirica</i>	AB455869	<i>Timmia bavarica</i>	AJ622820
<i>Triticum aestivum</i>	GU985444	<i>Picea abies</i>	KM244420		
<i>Triticum timopheevii</i>	AP013106	<i>Picea koraiensis</i>	KM244421		
<i>Zea luxurians</i>	DQ645537	<i>Picea mariana</i>	DQ358183		
<i>Zea mays</i>	AY506529	<i>Picea rubens</i>	DQ358195		
<i>Zea perennis</i>	DQ645538	<i>Picea koyamae</i>	DQ358205		
<i>Spirodela polyrhiza</i>	JQ804980	<i>Picea torano</i>	DQ358200		
<i>Butomus umbellatus</i>	KC208619	<i>Picea sitchensis</i>	DQ358198		
<i>Calycanthus floridus</i>	KC879632	<i>Picea pungens</i>	DQ358191		
<i>Liriodendron tulipifera</i>	KC821969	<i>Picea engelmannii</i>	DQ358175		
<i>Magnolia stellata</i>	KC879649	<i>Picea chihuahuana</i>	DQ358173		

\*sequenced in this study

<sup>1</sup> gymnosperm-type copy<sup>2</sup> angiosperm-type copy

**Table S3** Primers used for PCR and qPCR in this study.

Locus	PCR primers (5'-3')	Annealing temperature (°C)	Sequence length (bp)*
<b>PCR</b>			
<i>nad5-1</i> <sup>1</sup>	F: GGAAATGTTTGATGCTTCTTGGG R: CTGATCCAAAATCACCTACTCG IF‡: AAGGAAAGCGATAACGAATGG	55	1462/1084†
<i>nad5-exon2</i> <sup>2</sup>	F: CCGTAGTNATGTYAATTGTGG R: TATCCTACAAARAKACTM CC	50	1191
<i>nad5-53/509</i>	F: CCTTATCGTATTTTTGCCY R: CACACCTGTAGCGTTCGTG	53	457
<i>nad5-395/2486</i>	F: TCGGGAATAAGGGAGGAC R: TATCCTACAAARAKACTM CC	53	Failed amplification
<i>nad5-AngS</i>	F: CGACCCGCTCCTACCCAC R: CCCGCTTTCCTTTGCCAC	58	564
<b>qPCR</b>			
<i>cox1</i>	F: GCAGGGGCAATTACCATGT R: GATGCTGGTATAATATCGGGTCTC	60	94
<i>matR</i>	F: CGTTCCTCCATGAAAAACCCTA R: CCAACCCGACGATAACTAGC	59	87
<i>nad5-1ANG</i> <sup>3</sup>	F: AGGAGATCCCACGCACAG R: TAAGCGCCCTCTTGCTACC	59	80
<i>nad5-1GYN</i> <sup>4</sup>	F: CCTTTCTTCGCTTCGGTAG R: CACCGCCTGCCTTAGTAGTC	59	86
<i>rbcL</i>	F: CTTGGCAGCATTCCGAGTA R: GTACCGGTGGAAGATTACAGC	60	87
<i>matK</i>	F: CCCGAGATAAATCCCCTAGC R: AATTACTCAAAGAGCATTTCATTGG	59	93
<i>cco</i>	F: CCGATGAGGGTCAATTTCTG R: TGCTGAGAAGCGAGTAACCA	60	96
<i>cad</i>	F: CGTGACGGTTATCAGTTCGTC R: GCGCACCATCATCTTTTCA	60	106
<i>4CL</i>	F: GGAAGTGAATTTCTCGCAAGG R: AAAGGCAAATTCGATGCAA	59	103

\*Sequence length in *Pinus canariensis*.

†gymnosperm-type copy is 1462 bp, while angiosperm-type copy is 1084 bp.

‡additional internal primers designed in this study for sequencing.

<sup>1</sup>Wang, XQ., Tank, DC., Sang, T., 2000. Phylogeny and divergence times in Pinaceae: evidence from three genomes. *Mol. Biol. Evol.* 17, 773-781.

<sup>2</sup>Qiu YL, et al., 2006. Reconstructing the basal angiosperm phylogeny: evaluating information content of mitochondrial genes. *Taxon* 55: 837-856.

<sup>3</sup>Primers specific to gymnosperm-type copy

<sup>4</sup>Primers specific to angiosperm-type copy

**Table S4** Estimates of divergence times for the genus *Pinus* . Node numbers correspond to Figure S1.

Node	BEAST (MYA)			Multidivtime (MYA)		
	Mean	2.5%	97.5%	Mean	2.5%	97.5%
1	3.89	1.54	6.64	7.82	3,52	14,77
2	1.76	0.59	3.18	7.57	3,33	14,07
3	2.85	1.15	4.83	10,71	5,11	18,81
4	1.72	0.57	3.03	4.96	2,09	9,83
5	4.42	1.85	7.21	11,63	5,70	19,94
6	6.67	2.96	10.48	16,44	8,63	26,57
7	8.96	4.06	6.14	19,28	10,50	30,14
8	4.36	1.64	7.25	9.34	4,99	15,32
9	5.13	2.01	8.41	10,33	5,61	16,69
10	6.58	2.56	10.41	12,53	6,96	19,74
11	8.58	3.46	13.56	17,23	9,82	26,35
12	8.96	3.35	13.85	18,12	10,30	27,56
13	4.49	1.41	7.62	7.67	4,06	12,77
14	5.6	0.94	4.41	6.33	3,09	10,95
15	4.06	1.71	6.64	9.33	4,79	15,37
16	1.95	0.65	3.36	4.96	2,30	8,98
17	6.72	2.82	11.17	15,46	8,47	24,34
18	11.85	4.72	18.35	23,48	13,90	34,31
19	2.16	0.71	3.65	10.61	4,60	19,61
20	2.45	0.83	4.08	11,92	5,21	21,79
21	6.61	2.71	10.65	27,37	14,50	40,59
22	3.68	1.38	6.22	18,43	8,98	29,74
23	3.85	1.35	6.12	22,08	11,00	33,53
24	4.09	1.63	6.81	23,97	12,20	35,79
25	9.49	4.04	15.47	36.41	20,61	51,16
26	10.28	4.57	16.76	37,74	21,63	52,75
27	10.64	4.33	17.51	35.01	19,41	49,66
28	4.06	1.49	7.15	21.21	9,58	34,58
29	2.96	1.09	5.21	13,91	5,43	25,27
30	4.86	1.72	8.01	20.30	8,68	34,52
31	13.1	5.72	21.62	38,64	22,33	53,67
32	18.41	7.99	28.55	29,31	18,52	40,60
33	21.3	8.53	33.05	47,28	30,10	61,50
34	60.69	45.12	81.42	72,38	50,38	84,53
35	106.21	66.43	157.22	/	/	/

/, not caculated because outgroups were removed for branch length estimation in Multidivtime.

Figure S1

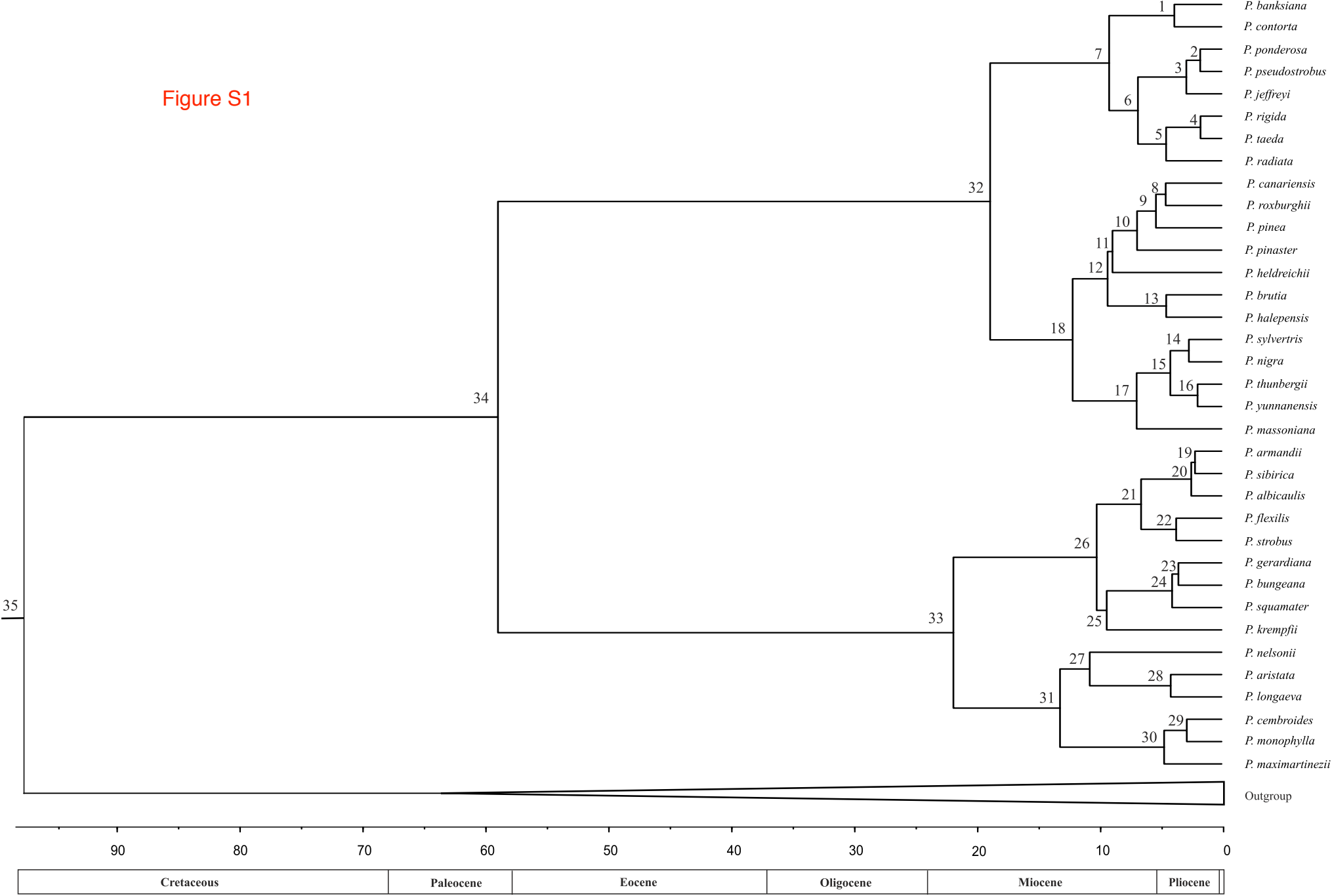


Figure S2

