Supporting Information

Schuettpelz and Pryer 10.1073/pnas.0811136106

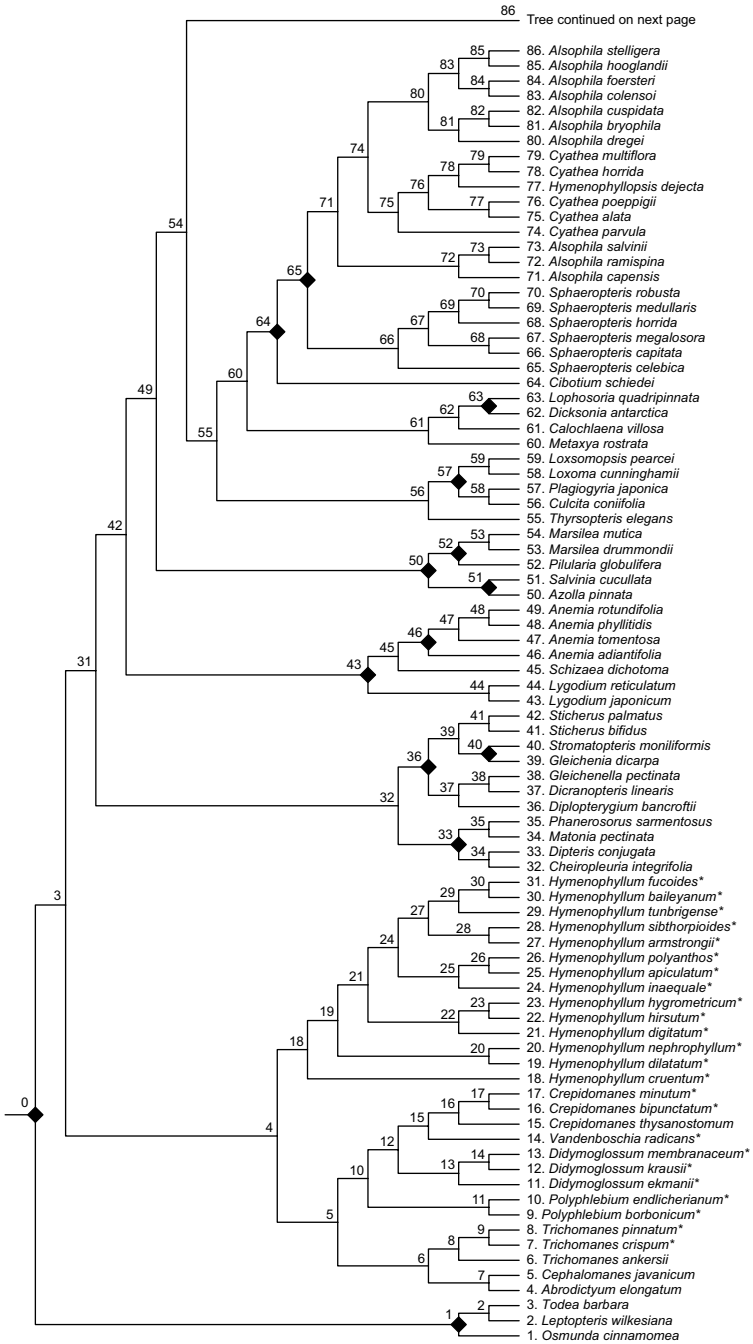

Fig. S1. Leptosporangiate fern phylogeny. Tree topology results from maximum likelihood analysis of 3 plastid genes sequenced for each of 400 leptosporangiate taxa (plus 5 eusporangiate outgroups, pruned here). Branch lengths and support values, as well as voucher information and GenBank accession numbers, are provided in Schuettpelz and Pryer [Schuettpelz E, Pryer KM (2007) Fern phylogeny inferred from 400 leptosporangiate species and 3 plastid genes. *Taxon* 56:1037–1050]. Taxon and node numbers correspond to those in Fig. 1; epiphytic species are indicated here with an asterisk following the species name. Nodes constrained by fossil ages are designated with black diamonds; justifications for these constraints appear in Table S2. Various node statistics are reported in Table S3.

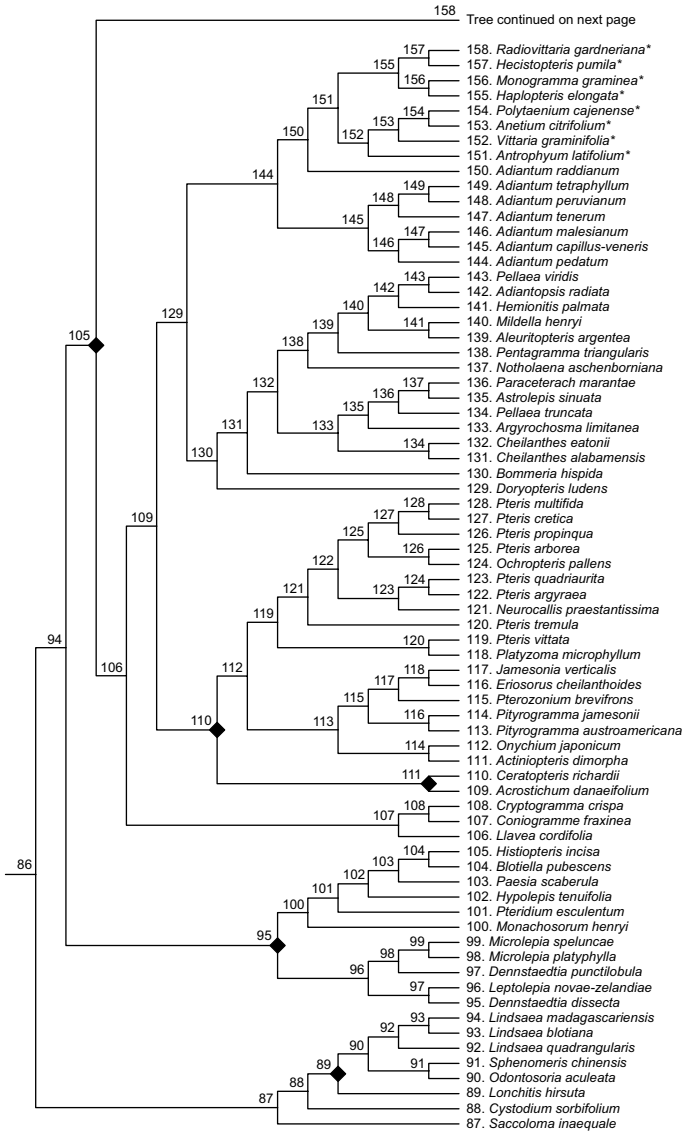

Fig. S1. Continued.

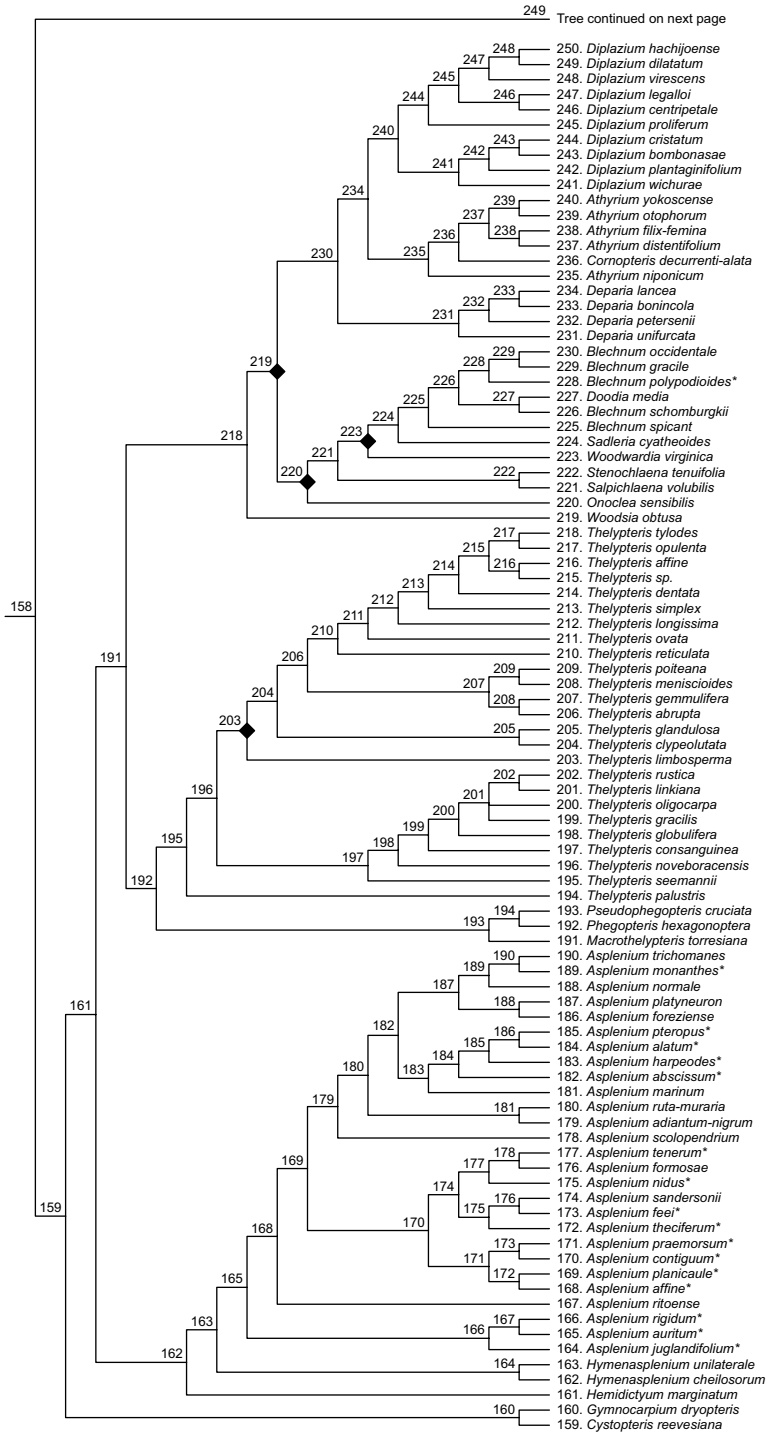

Fig. S1. Continued.

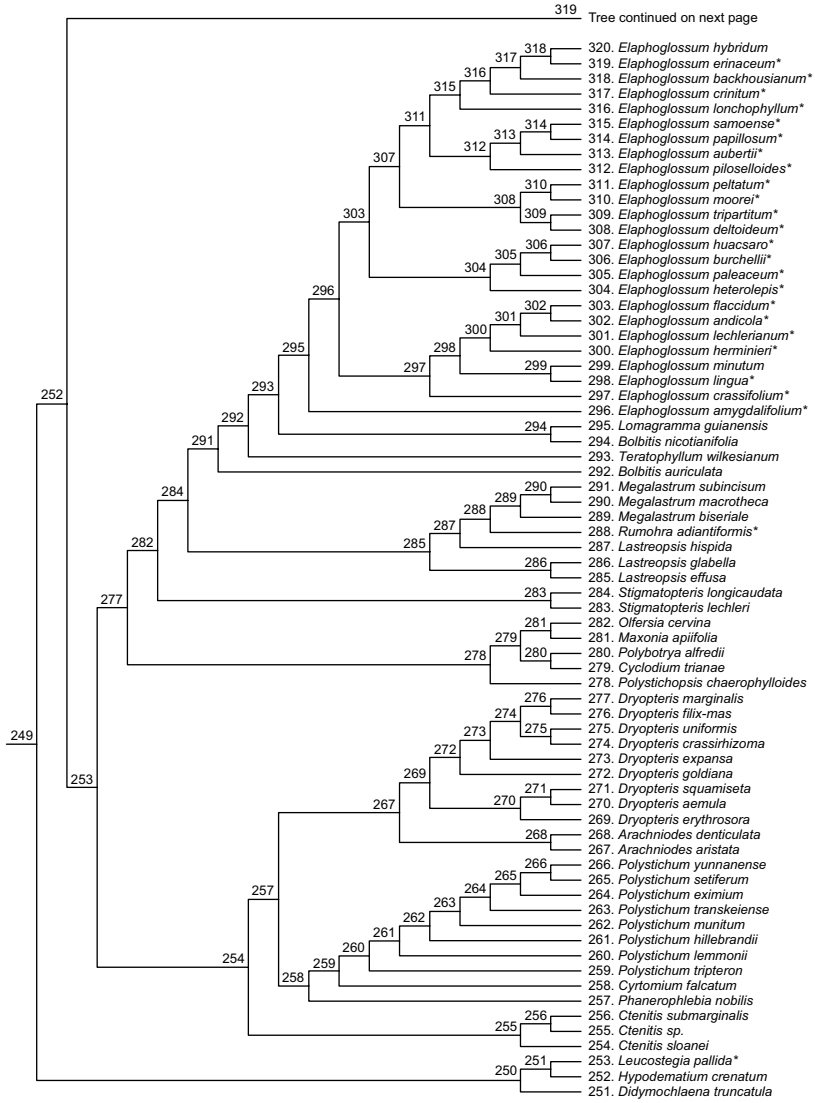

Fig. S1. Continued.

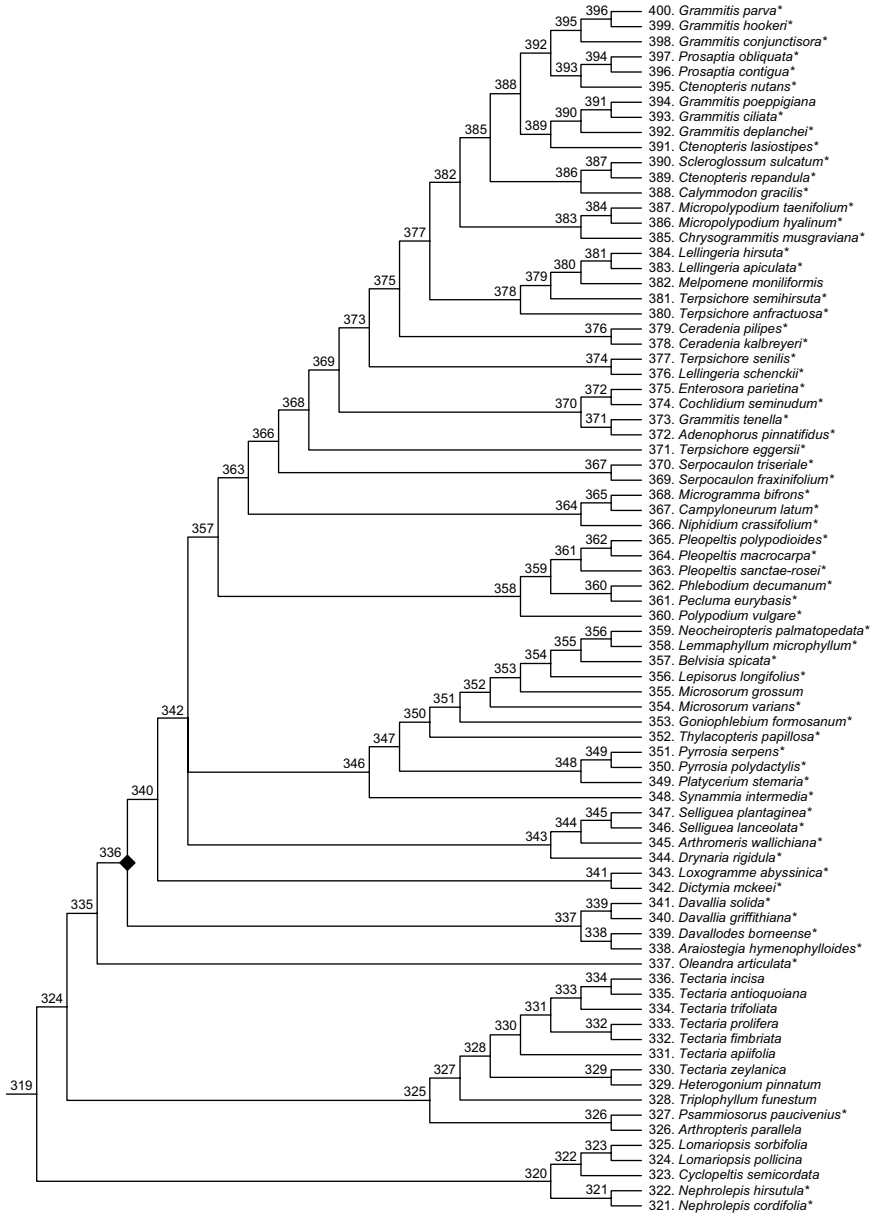

Fig. S1. Continued.

Table S1. Contributions of major vascular plant lineages to overall and epiphytic diversity

	Overall diversity		Epiphytic diversity	
Vascular plant lineage	Species	%	Species	%
Lycopods				
Quillworts	150	0.06	0	0.00
Clubmosses	380	0.14	190	0.69
Spikemosses	700	0.26	5	0.02
Ferns				
Whisk ferns	12	0.00	11	0.04
Horsetails	15	0.01	0	0.00
Ophioglossoid ferns	80	0.03	11	0.04
Marattioid ferns	150	0.06	0	0.00
Leptosporangiate ferns	9,000	3.32	2,822	10.27
Seed plants				
Ginkgo	1	0.00	0	0.00
Gnetales	80	0.03	4	0.01
Cycads	130	0.05	1	0.00
Conifers	600	0.22	0	0.00
Angiosperms	260,000	95.84	24,440	88.93
Total	271,298	100.00	27,483	100.00

Major lineages follow those of Pryer et al. (1). Overall species counts represent a relatively conservative consensus drawn from several sources (2–5). Epiphytic species counts are based on the overall species counts presented and within-lineage epiphyte percentages calculated from diversity estimates in Kress (6).

1. Pryer KM, et al. (2004) Phylogeny and evolution of ferns (monilophytes) with a focus on the early leptosporangiate divergences. *Am J Bot* 91:1582–1598.
2. Judd WS, Campbell CS, Kellogg EA, Stevens PF, Donoghue MJ (2002) *Plant Systematics: A Phylogenetic Approach, Second Edition* (Sinauer Associates, Sunderland).
3. Mabberley DJ (1997) *The Plant Book: A Portable Dictionary of the Vascular Plants* (Cambridge Univ Press, Cambridge).
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Table S2. Fossil age constraints utilized in this study of epiphytic fern diversification

Node	Age, Ma	Stem group assignment	Stratum	Justification
0	= 299.0	Osmundaceous ferns (taxa 1–3)	Permian	The oldest osmundaceous fern fossils [e.g., *Grammatopteris* and *Rastropteris* (1–4)] are from the Permian. Representatives belonging to the clade that includes all other extant leptosporangiates [e.g., *Oligocarpia* and *Szea* (5)] also first appear in this stratum. Thus, it would seem that the earliest divergence among extant leptosporangiate ferns occurred near the Carboniferous/Permian boundary. The products of the Carboniferous leptosporangiate radiation (6–8) are not readily assignable to extant lineages.
1	≥ 199.6	*Osmunda* (taxon 1)	Upper Triassic	*Osmunda* fossils have been described from the Upper Triassic (3), marking its divergence from the other osmundaceous fern genera.
33	≥ 228.0	Matoniaceae (taxa 34–35)	Middle Triassic	*Tomaniopteris* fossils assignable to the Matoniaceae are described from the Middle Triassic (9), marking the divergence between the Matoniaceae and Dipteridaceae.
36	≥ 99.6	Gleicheniaceae subclade (taxa 39–42)	Albian	A fossil *Gleichenia* (10) is definitively assignable to the clade consisting of *Gleichenia*, *Sticherus*, and *Stromatopteris* (today the genus *Gleichenia* is more narrowly defined).
40	≥ 89.3	*Stromatopteris* (taxon 40)	Turonian	Two analyses of morphological data (10, 11) found the fossil genus *Boodlepteris* to be sister to the extant genus *Stromatopteris*.
43	≥ 167.7	*Lygodium* (taxa 43–44)	Bajocian	A sister group relationship has been demonstrated between the fossil *Stachypteris* (12) and the extant genus *Lygodium* (13).
46	≥ 136.4	*Anemia* subclade (taxa 47–49)	Valanginian	There is considerable evidence for the inclusion of the fossils *Pelletixia* and *Ruffordia* within the *Anemia* crown group (13–15), as sister to 1 of the 2 primary clades. Thus, these Lower Cretaceous fossils provide a minimum age for diversification within *Anemia*.
50	≥ 140.2	Marsileaceae (taxa 52–54)	Berriasian	The fossil *Regnellites* [most conservatively from Berriasian strata (16)] is allied to Marsileaceae, and is therefore used to constrain the divergence of this family from the Salviniaceae.
51	≥ 83.5	*Azolla* (taxon 50)	Santonian	Based on the presence of megaspore floats, the fossil *Glomerisporites* is assigned to the *Azolla* lineage, and marks the divergence between *Azolla* and *Salvinia* (17).
52	≥ 83.5	*Pilularia* (taxon 52)	Santonian	The fossil *Regnellidium upatoensis* (18) is assignable to the extant genus *Regnellidium* [not sampled here, but sister to *Pilularia* (19)]. It is used here to constrain the divergence between *Pilularia* and *Marsilea*.
57	≥ 112.0	Loxomataceae (taxa 58–59)	Aptian	The fossil *Loxsomopteris* is considered to be a stem group member of the Loxomataceae (20).
63	≥ 112.0	*Lophosoria* (taxon 63)	Aptian	The fossils *Lophosoria cupulatus* (21) and *Conantiopteris* (22) are allied to extant *Lophosoria*.
64	≥ 145.5	Scaly tree ferns (taxa 65–86)	Upper Jurassic	Species of *Cyathocaulis* [including Upper Jurassic *C. naktongensis* and *C. yabei* (23)] are stem members of the scaly tree fern clade (22), a position that is supported by the presence of a medullated dictyostele.
65	≥ 93.5	*Cyathea*/*Alsophila* clade (taxa 71–86)	Cenomanian	Spores like those of the fossil *Kuylisporites* are found only in some species of *Cyathea* and *Alsophila* (24, 25), marking the divergence between these and the other scaly tree fern genus, *Sphaeropteris*.
89	≥ 99.6	Lindsaeoids (taxa 90–94)	Albian	Based on root anatomy, an unnamed fossil is assignable to the lindsaeoids (26).
95	≥ 70.6	*Dennstaedtia*/*Leptolepia*/*Microlepia* clade (taxa 95–99)	Campanian	The fossil genus *Microlepiopsis* (27) is allied to this dennstaedtioid clade.
105	≥ 93.5	Pteroids (taxa 106–158)	Cenomanian	A fossil *Pteris* (28) is assignable to the Pteridaceae stem (not necessarily the extant genus *Pteris*).
110	≥ 65.5	*Ceratopteris*/*Acrostichum* clade (taxa 109–110)	Maastrichtian	A fossil *Acrostichum* (29) is assignable to the *Ceratopteris*/*Acrostichum* clade (not necessarily the extant genus *Acrostichum*).
111	≥ 37.2	*Ceratopteris* (taxon 110)	Bartonian	The fossil spore genus *Magnastriatites*, with a first occurrence in the Eocene, is allied to *Ceratopteris* (14).
203	≥ 33.9	Cyclosoroids (taxa 204–218)	Eocene	*Cyclosorus* fossils from the Eocene are assignable to this large clade within the Thelypteridaceae (30, 31).
219	≥ 37.2	Athyrioids (taxa 231–250)	Bartonian	Based on anatomical features, the fossil genus *Makopteris* is assignable to the athyrioid clade (32).
220	≥ 55.8	*Onoclea* (taxon 220)	Paleocene	Nearly complete fossils assignable to *Onoclea sensibilis* (an extant species) have been recovered from the Paleocene (33).

Node	Age, Ma	Stem group assignment	Stratum	Justification
223	≥ 55.8	*Woodwardia* (taxon 223)	Paleocene	Fossils assignable to *Woodwardia* are known from throughout the Tertiary, beginning in the Paleocene (31).
336	≥ 33.9	Polygrammoids (taxa 342–400)	Eocene	The oldest fossil definitively assignable to the Polypodiaceae is *Protodrynaria* (34), marking the divergence of this family from the Davalliaceae.

The 24 age constraints employed here were drawn primarily from 2 recent studies (35, 36), but were refined and augmented based on further evaluation; the current study, and these earlier studies, all relied heavily on detailed reviews of the fern fossil record (31, 37–40). The listed nodes (to which the 24 constraints were applied in our most likely phylogeny; see Fig. S1) were identified based on stem group assignments of fossils; ages reflect the strata from which these fossils were recovered. Fossils were almost always used to apply minimum-age constraints [corresponding to the upper boundary ages of the source strata (41)] to nodes subtending their phylogenetic positions [as identified using an apomorphy-based approach (36)]. However, for analytical reasons, the root (node 0; see Fig. S1) of the phylogeny was fixed (at the lower boundary of the stratum from which applicable fossils were recovered). Note that many fern fossils were not utilized as age constraints in this study, either because of uncertainty as to their phylogenetic position or redundancy in their application (e.g., if an older constraint was already applied to a more derived node).

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Table S3. Age, diversification rate, and other statistics for all resolved leptosporangiate nodes

		Reconstructed habit					Estimated diversification rate, net speciation events per million years	
		Proportional likelihood			Species			
Node	Best age, Ma	Terrestrial	Epiphytic	Decision	Estimated total	Sampled	Extinction rate = 0.0	Extinction rate = 0.9
0	299.0	0.9651	0.0349	Terrestrial	9,000	400	0.0281	0.0226
1	199.6	0.9702	0.0298	Terrestrial	68	3	0.0176	0.0099
2	75.4	0.9913	0.0087	Terrestrial	45	2	0.0413	0.0217
3	280.1	0.9691	0.0309	Terrestrial	8,933	397	0.0300	0.0241
4	185.1	0.1017	0.8983	Epiphytic	630	28	0.0311	0.0222
5	147.3	0.0381	0.9619	Epiphytic	315	14	0.0344	0.0233
6	135.1	0.0864	0.9136	Epiphytic	113	5	0.0298	0.0181
7	112.5	0.4620	0.5380	Ambiguous	45	2	0.0277	0.0145
8	94.8	0.0954	0.9046	Epiphytic	68	3	0.0371	0.0209
9	45.0	0.0045	0.9955	Epiphytic	45	2	0.0692	0.0363
10	131.7	0.0014	0.9986	Epiphytic	203	9	0.0351	0.0228
11	42.6	0.0007	0.9993	Epiphytic	45	2	0.0731	0.0384
12	127.3	0.0003	0.9997	Epiphytic	158	7	0.0343	0.0217
13	89.7	0.0004	0.9996	Epiphytic	68	3	0.0392	0.0221
14	64.1	0.0005	0.9995	Epiphytic	45	2	0.0486	0.0255
15	117.8	0.0009	0.9991	Epiphytic	90	4	0.0323	0.0190
16	91.5	0.0130	0.9870	Epiphytic	68	3	0.0385	0.0217
17	58.0	0.0018	0.9982	Epiphytic	45	2	0.0537	0.0282
18	41.9	0.0001	0.9999	Epiphytic	315	14	0.1207	0.0817
19	40.8	0.0000	1.0000	Epiphytic	293	13	0.1222	0.0822
20	29.2	0.0000	1.0000	Epiphytic	45	2	0.1066	0.0560
21	37.8	0.0000	1.0000	Epiphytic	248	11	0.1274	0.0844
22	33.8	0.0000	1.0000	Epiphytic	68	3	0.1042	0.0587
23	23.5	0.0000	1.0000	Epiphytic	45	2	0.1323	0.0694
24	30.6	0.0000	1.0000	Epiphytic	180	8	0.1469	0.0942
25	23.7	0.0000	1.0000	Epiphytic	68	3	0.1486	0.0837
26	10.1	0.0000	1.0000	Epiphytic	45	2	0.3086	0.1620
27	26.3	0.0000	1.0000	Epiphytic	113	5	0.1532	0.0930
28	22.9	0.0000	1.0000	Epiphytic	45	2	0.1361	0.0714
29	25.6	0.0000	1.0000	Epiphytic	68	3	0.1376	0.0775
30	24.4	0.0000	1.0000	Epiphytic	45	2	0.1277	0.0670
31	276.4	0.9846	0.0154	Terrestrial	8,303	369	0.0301	0.0241
32	262.2	0.9872	0.0128	Terrestrial	248	11	0.0184	0.0122
33	228.0	0.9853	0.0147	Terrestrial	90	4	0.0167	0.0098
34	56.2	0.9950	0.0050	Terrestrial	45	2	0.0554	0.0291
35	114.1	0.9861	0.0139	Terrestrial	45	2	0.0273	0.0143
36	120.2	0.9981	0.0019	Terrestrial	158	7	0.0363	0.0230
37	97.2	0.9978	0.0022	Terrestrial	68	3	0.0362	0.0204
38	34.2	0.9991	0.0009	Terrestrial	45	2	0.0910	0.0478
39	100.0	0.9987	0.0013	Terrestrial	90	4	0.0381	0.0224
40	89.3	0.9984	0.0016	Terrestrial	45	2	0.0349	0.0183
41	3.8	1.0000	0.0000	Terrestrial	45	2	0.8215	0.4313
42	264.6	0.9929	0.0071	Terrestrial	8,055	358	0.0314	0.0251
43	218.4	0.9909	0.0091	Terrestrial	158	7	0.0200	0.0126
44	22.5	0.9991	0.0009	Terrestrial	45	2	0.1387	0.0728
45	163.0	0.9922	0.0078	Terrestrial	113	5	0.0247	0.0150
46	136.4	0.9922	0.0078	Terrestrial	90	4	0.0279	0.0164
47	28.3	0.9992	0.0008	Terrestrial	68	3	0.1242	0.0700
48	5.7	1.0000	0.0000	Terrestrial	45	2	0.5511	0.2893
49	234.7	0.9988	0.0012	Terrestrial	7,898	351	0.0353	0.0282
50	186.8	0.9943	0.0057	Terrestrial	113	5	0.0216	0.0131
51	102.7	0.9915	0.0085	Terrestrial	45	2	0.0303	0.0159
52	88.6	0.9939	0.0061	Terrestrial	68	3	0.0397	0.0224
53	18.0	0.9997	0.0003	Terrestrial	45	2	0.1731	0.0909
54	223.2	0.9995	0.0005	Terrestrial	7,785	346	0.0370	0.0296
55	186.7	0.9997	0.0003	Terrestrial	720	32	0.0315	0.0227
56	175.9	0.9989	0.0011	Terrestrial	113	5	0.0229	0.0139
57	152.1	0.9973	0.0027	Terrestrial	90	4	0.0250	0.0147
58	92.6	0.9949	0.0051	Terrestrial	45	2	0.0336	0.0176
59	38.9	0.9983	0.0017	Terrestrial	45	2	0.0801	0.0421

Node	Best age, Ma	Reconstructed habit: Proportional likelihood: Terrestrial	Reconstructed habit: Proportional likelihood: Epiphytic	Reconstructed habit: Decision	Species: Estimated total	Species: Sampled	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.0	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.9
60	170.8	0.9998	0.0002	Terrestrial	608	27	0.0335	0.0238
61	168.6	0.9997	0.0003	Terrestrial	90	4	0.0226	0.0133
62	143.3	0.9980	0.0020	Terrestrial	68	3	0.0246	0.0138
63	135.2	0.9971	0.0029	Terrestrial	45	2	0.0230	0.0121
64	168.3	0.9995	0.0005	Terrestrial	518	23	0.0330	0.0232
65	93.5	0.9999	0.0001	Terrestrial	495	22	0.0589	0.0414
66	88.1	0.9996	0.0004	Terrestrial	135	6	0.0478	0.0297
67	30.5	1.0000	0.0000	Terrestrial	113	5	0.1321	0.0802
68	5.1	1.0000	0.0000	Terrestrial	45	2	0.6057	0.3180
69	28.3	1.0000	0.0000	Terrestrial	68	3	0.1245	0.0702
70	22.8	1.0000	0.0000	Terrestrial	45	2	0.1364	0.0716
71	86.8	1.0000	0.0000	Terrestrial	360	16	0.0598	0.0410
72	53.9	0.9995	0.0005	Terrestrial	68	3	0.0653	0.0368
73	32.6	0.9997	0.0003	Terrestrial	45	2	0.0955	0.0502
74	82.8	0.9999	0.0001	Terrestrial	293	13	0.0602	0.0405
75	49.2	1.0000	0.0000	Terrestrial	135	6	0.0856	0.0532
76	47.1	1.0000	0.0000	Terrestrial	113	5	0.0856	0.0519
77	44.1	0.9999	0.0001	Terrestrial	45	2	0.0706	0.0371
78	43.4	1.0000	0.0000	Terrestrial	68	3	0.0811	0.0457
79	40.2	0.9999	0.0001	Terrestrial	45	2	0.0774	0.0406
80	55.5	1.0000	0.0000	Terrestrial	158	7	0.0787	0.0498
81	41.4	0.9999	0.0001	Terrestrial	68	3	0.0851	0.0479
82	24.5	0.9999	0.0001	Terrestrial	45	2	0.1269	0.0666
83	53.5	1.0000	0.0000	Terrestrial	90	4	0.0711	0.0419
84	22.7	0.9998	0.0002	Terrestrial	45	2	0.1375	0.0722
85	45.2	0.9998	0.0002	Terrestrial	45	2	0.0688	0.0361
86	191.0	0.9997	0.0003	Terrestrial	7,065	314	0.0428	0.0341
87	179.9	0.9991	0.0009	Terrestrial	180	8	0.0250	0.0161
88	167.1	0.9983	0.0017	Terrestrial	158	7	0.0261	0.0165
89	151.0	0.9967	0.0033	Terrestrial	135	6	0.0279	0.0173
90	47.0	0.9991	0.0009	Terrestrial	113	5	0.0858	0.0521
91	27.0	0.9997	0.0003	Terrestrial	45	2	0.1152	0.0605
92	10.7	1.0000	0.0000	Terrestrial	68	3	0.3286	0.1852
93	4.2	1.0000	0.0000	Terrestrial	45	2	0.7361	0.3864
94	165.6	0.9998	0.0002	Terrestrial	6,885	306	0.0492	0.0392
95	119.3	0.9994	0.0006	Terrestrial	248	11	0.0404	0.0268
96	72.2	0.9992	0.0008	Terrestrial	113	5	0.0558	0.0339
97	25.7	0.9996	0.0004	Terrestrial	45	2	0.1212	0.0636
98	47.0	0.9994	0.0006	Terrestrial	68	3	0.0749	0.0422
99	9.7	1.0000	0.0000	Terrestrial	45	2	0.3200	0.1680
100	106.3	0.9992	0.0008	Terrestrial	135	6	0.0396	0.0246
101	71.7	0.9998	0.0002	Terrestrial	113	5	0.0562	0.0341
102	67.1	0.9999	0.0001	Terrestrial	90	4	0.0567	0.0334
103	62.9	0.9999	0.0001	Terrestrial	68	3	0.0560	0.0315
104	52.9	0.9997	0.0003	Terrestrial	45	2	0.0589	0.0309
105	163.2	0.9997	0.0003	Terrestrial	6,638	295	0.0497	0.0395
106	110.8	0.9998	0.0002	Terrestrial	1,193	53	0.0577	0.0427
107	58.5	0.9994	0.0006	Terrestrial	68	3	0.0602	0.0339
108	44.3	0.9995	0.0005	Terrestrial	45	2	0.0702	0.0369
109	106.7	1.0000	0.0000	Terrestrial	1,125	50	0.0594	0.0439
110	100.3	0.9998	0.0002	Terrestrial	450	20	0.0540	0.0376
111	62.1	0.9985	0.0015	Terrestrial	45	2	0.0502	0.0263
112	56.2	1.0000	0.0000	Terrestrial	405	18	0.0945	0.0653
113	53.8	1.0000	0.0000	Terrestrial	158	7	0.0812	0.0513
114	24.3	0.9998	0.0002	Terrestrial	45	2	0.1283	0.0674
115	44.7	0.9999	0.0001	Terrestrial	113	5	0.0902	0.0547
116	2.4	1.0000	0.0000	Terrestrial	45	2	1.2813	0.6726
117	29.4	0.9999	0.0001	Terrestrial	68	3	0.1198	0.0675
118	7.6	1.0000	0.0000	Terrestrial	45	2	0.4075	0.2139
119	51.3	1.0000	0.0000	Terrestrial	248	11	0.0939	0.0623
120	46.7	0.9999	0.0001	Terrestrial	45	2	0.0667	0.0350

Node	Best age, Ma	Reconstructed habit: Proportional likelihood: Terrestrial	Reconstructed habit: Proportional likelihood: Epiphytic	Reconstructed habit: Decision	Species: Estimated total	Species: Sampled	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.0	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.9
121	24.9	1.0000	0.0000	Terrestrial	203	9	0.1857	0.1207
122	19.7	1.0000	0.0000	Terrestrial	180	8	0.2280	0.1463
123	10.8	1.0000	0.0000	Terrestrial	68	3	0.3273	0.1845
124	3.0	1.0000	0.0000	Terrestrial	45	2	1.0242	0.5377
125	19.3	1.0000	0.0000	Terrestrial	113	5	0.2086	0.1266
126	16.4	1.0000	0.0000	Terrestrial	45	2	0.1896	0.0995
127	18.6	1.0000	0.0000	Terrestrial	68	3	0.1896	0.1068
128	6.6	1.0000	0.0000	Terrestrial	45	2	0.4703	0.2469
129	92.7	0.9996	0.0004	Terrestrial	675	30	0.0628	0.0451
130	81.2	0.9996	0.0004	Terrestrial	338	15	0.0631	0.0430
131	52.7	0.9998	0.0002	Terrestrial	315	14	0.0961	0.0651
132	42.8	1.0000	0.0000	Terrestrial	293	13	0.1166	0.0785
133	37.1	1.0000	0.0000	Terrestrial	135	6	0.1137	0.0706
134	27.0	0.9999	0.0001	Terrestrial	45	2	0.1152	0.0605
135	28.2	1.0000	0.0000	Terrestrial	90	4	0.1348	0.0794
136	21.9	1.0000	0.0000	Terrestrial	68	3	0.1608	0.0906
137	20.4	1.0000	0.0000	Terrestrial	45	2	0.1527	0.0802
138	34.8	1.0000	0.0000	Terrestrial	158	7	0.1256	0.0794
139	26.0	1.0000	0.0000	Terrestrial	135	6	0.1620	0.1006
140	24.5	1.0000	0.0000	Terrestrial	113	5	0.1647	0.1000
141	21.4	1.0000	0.0000	Terrestrial	45	2	0.1456	0.0765
142	23.6	1.0000	0.0000	Terrestrial	68	3	0.1494	0.0842
143	20.3	1.0000	0.0000	Terrestrial	45	2	0.1532	0.0804
144	80.3	0.9952	0.0048	Terrestrial	338	15	0.0639	0.0435
145	66.9	0.9999	0.0001	Terrestrial	135	6	0.0629	0.0391
146	64.6	0.9999	0.0001	Terrestrial	68	3	0.0545	0.0307
147	49.2	0.9996	0.0004	Terrestrial	45	2	0.0633	0.0332
148	61.1	0.9998	0.0002	Terrestrial	68	3	0.0576	0.0325
149	21.0	0.9998	0.0002	Terrestrial	45	2	0.1485	0.0780
150	74.4	0.9506	0.0494	Terrestrial	203	9	0.0620	0.0403
151	45.7	0.0019	0.9981	Epiphytic	180	8	0.0985	0.0632
152	41.0	0.0002	0.9998	Epiphytic	90	4	0.0928	0.0546
153	29.6	0.0000	1.0000	Epiphytic	68	3	0.1188	0.0669
154	18.9	0.0000	1.0000	Epiphytic	45	2	0.1646	0.0864
155	34.4	0.0000	1.0000	Epiphytic	90	4	0.1105	0.0651
156	22.1	0.0000	1.0000	Epiphytic	45	2	0.1407	0.0739
157	25.8	0.0000	1.0000	Epiphytic	45	2	0.1209	0.0635
158	116.7	0.9975	0.0025	Terrestrial	5,445	242	0.0678	0.0536
159	103.1	0.9998	0.0002	Terrestrial	2,070	92	0.0674	0.0513
160	72.2	0.9984	0.0016	Terrestrial	45	2	0.0431	0.0226
161	100.7	0.9998	0.0002	Terrestrial	2,025	90	0.0687	0.0523
162	92.6	0.9942	0.0058	Terrestrial	675	30	0.0628	0.0451
163	57.7	0.9103	0.0897	Terrestrial	653	29	0.1003	0.0717
164	19.7	0.9970	0.0030	Terrestrial	45	2	0.1580	0.0830
165	41.9	0.6074	0.3926	Ambiguous	608	27	0.1364	0.0971
166	23.6	0.0136	0.9864	Epiphytic	68	3	0.1490	0.0840
167	6.2	0.0000	1.0000	Epiphytic	45	2	0.5022	0.2636
168	35.9	0.6190	0.3810	Ambiguous	540	24	0.1561	0.1103
169	34.9	0.6166	0.3834	Ambiguous	518	23	0.1590	0.1120
170	33.5	0.0607	0.9393	Epiphytic	225	10	0.1408	0.0925
171	23.5	0.0004	0.9996	Epiphytic	90	4	0.1621	0.0954
172	19.8	0.0000	1.0000	Epiphytic	45	2	0.1575	0.0827
173	7.2	0.0000	1.0000	Epiphytic	45	2	0.4348	0.2283
174	18.1	0.0001	0.9999	Epiphytic	135	6	0.2326	0.1444
175	16.5	0.0001	0.9999	Epiphytic	68	3	0.2135	0.1203
176	12.7	0.0038	0.9962	Epiphytic	45	2	0.2454	0.1288
177	17.4	0.0001	0.9999	Epiphytic	68	3	0.2020	0.1138
178	9.4	0.0079	0.9921	Epiphytic	45	2	0.3323	0.1744
179	33.5	0.8963	0.1037	Terrestrial	293	13	0.1490	0.1003
180	32.1	0.9250	0.0750	Terrestrial	270	12	0.1527	0.1020
181	25.6	0.9812	0.0188	Terrestrial	45	2	0.1216	0.0638

Node	Best age, Ma	Reconstructed habit: Proportional likelihood: Terrestrial	Reconstructed habit: Proportional likelihood: Epiphytic	Reconstructed habit: Decision	Species: Estimated total	Species: Sampled	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.0	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.9
182	29.6	0.9258	0.0742	Terrestrial	225	10	0.1597	0.1049
183	18.0	0.7314	0.2686	Ambiguous	113	5	0.2241	0.1360
184	15.3	0.0067	0.9933	Epiphytic	90	4	0.2486	0.1464
185	13.7	0.0003	0.9997	Epiphytic	68	3	0.2565	0.1445
186	7.5	0.0000	1.0000	Epiphytic	45	2	0.4140	0.2174
187	26.9	0.9601	0.0399	Terrestrial	113	5	0.1499	0.0910
188	17.7	0.9958	0.0042	Terrestrial	45	2	0.1755	0.0921
189	24.7	0.9605	0.0395	Terrestrial	68	3	0.1428	0.0804
190	19.5	0.9441	0.0559	Terrestrial	45	2	0.1599	0.0840
191	95.6	1.0000	0.0000	Terrestrial	1,350	60	0.0682	0.0509
192	68.5	0.9999	0.0001	Terrestrial	630	28	0.0840	0.0600
193	45.9	0.9997	0.0003	Terrestrial	68	3	0.0767	0.0432
194	24.2	0.9998	0.0002	Terrestrial	45	2	0.1289	0.0677
195	57.0	1.0000	0.0000	Terrestrial	563	25	0.0989	0.0701
196	53.6	1.0000	0.0000	Terrestrial	540	24	0.1044	0.0737
197	44.3	0.9998	0.0002	Terrestrial	180	8	0.1017	0.0652
198	11.3	1.0000	0.0000	Terrestrial	158	7	0.3867	0.2445
199	5.7	1.0000	0.0000	Terrestrial	135	6	0.7455	0.4630
200	4.2	1.0000	0.0000	Terrestrial	113	5	0.9710	0.5894
201	3.4	1.0000	0.0000	Terrestrial	90	4	1.1066	0.6514
202	2.5	1.0000	0.0000	Terrestrial	45	2	1.2404	0.6512
203	46.4	0.9999	0.0001	Terrestrial	360	16	0.1119	0.0766
204	33.3	1.0000	0.0000	Terrestrial	338	15	0.1540	0.1049
205	19.7	0.9999	0.0001	Terrestrial	45	2	0.1579	0.0829
206	27.4	1.0000	0.0000	Terrestrial	293	13	0.1819	0.1224
207	18.0	1.0000	0.0000	Terrestrial	90	4	0.2117	0.1246
208	6.8	1.0000	0.0000	Terrestrial	45	2	0.4613	0.2422
209	4.7	1.0000	0.0000	Terrestrial	45	2	0.6639	0.3485
210	25.9	1.0000	0.0000	Terrestrial	203	9	0.1784	0.1159
211	19.0	1.0000	0.0000	Terrestrial	180	8	0.2367	0.1519
212	16.3	1.0000	0.0000	Terrestrial	158	7	0.2679	0.1694
213	15.0	1.0000	0.0000	Terrestrial	135	6	0.2801	0.1739
214	10.8	1.0000	0.0000	Terrestrial	113	5	0.3721	0.2258
215	10.6	1.0000	0.0000	Terrestrial	90	4	0.3601	0.2120
216	3.7	1.0000	0.0000	Terrestrial	45	2	0.8370	0.4394
217	9.4	1.0000	0.0000	Terrestrial	45	2	0.3309	0.1737
218	92.0	1.0000	0.0000	Terrestrial	720	32	0.0640	0.0461
219	89.8	1.0000	0.0000	Terrestrial	698	31	0.0652	0.0468
220	77.8	0.9998	0.0002	Terrestrial	248	11	0.0619	0.0411
221	59.8	1.0000	0.0000	Terrestrial	225	10	0.0789	0.0518
222	49.1	0.9997	0.0003	Terrestrial	45	2	0.0634	0.0333
223	57.1	1.0000	0.0000	Terrestrial	180	8	0.0788	0.0505
224	47.1	1.0000	0.0000	Terrestrial	158	7	0.0927	0.0586
225	44.2	0.9999	0.0001	Terrestrial	135	6	0.0954	0.0592
226	37.2	0.9994	0.0006	Terrestrial	113	5	0.1084	0.0658
227	31.9	0.9997	0.0003	Terrestrial	45	2	0.0975	0.0512
228	12.3	0.9326	0.0674	Terrestrial	68	3	0.2870	0.1617
229	1.8	0.9999	0.0001	Terrestrial	45	2	1.6921	0.8883
230	78.4	0.9999	0.0001	Terrestrial	450	20	0.0691	0.0481
231	24.7	0.9998	0.0002	Terrestrial	90	4	0.1542	0.0908
232	9.2	1.0000	0.0000	Terrestrial	68	3	0.3813	0.2148
233	6.8	1.0000	0.0000	Terrestrial	45	2	0.4559	0.2393
234	68.4	0.9999	0.0001	Terrestrial	360	16	0.0760	0.0520
235	42.6	0.9999	0.0001	Terrestrial	135	6	0.0988	0.0614
236	35.9	0.9999	0.0001	Terrestrial	113	5	0.1123	0.0681
237	19.0	1.0000	0.0000	Terrestrial	90	4	0.2007	0.1181
238	5.3	1.0000	0.0000	Terrestrial	45	2	0.5897	0.3096
239	16.3	1.0000	0.0000	Terrestrial	45	2	0.1912	0.1004
240	47.3	0.9999	0.0001	Terrestrial	225	10	0.0999	0.0656
241	33.5	0.9999	0.0001	Terrestrial	90	4	0.1137	0.0669
242	17.5	1.0000	0.0000	Terrestrial	68	3	0.2006	0.1131

Node	Best age, Ma	Reconstructed habit: Proportional likelihood: Terrestrial	Reconstructed habit: Proportional likelihood: Epiphytic	Reconstructed habit: Decision	Species: Estimated total	Species: Sampled	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.0	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.9
243	12.4	1.0000	0.0000	Terrestrial	45	2	0.2515	0.1320
244	20.1	1.0000	0.0000	Terrestrial	135	6	0.2099	0.1303
245	16.2	1.0000	0.0000	Terrestrial	113	5	0.2488	0.1510
246	10.8	1.0000	0.0000	Terrestrial	45	2	0.2878	0.1511
247	8.9	1.0000	0.0000	Terrestrial	68	3	0.3941	0.2221
248	7.8	1.0000	0.0000	Terrestrial	45	2	0.3976	0.2088
249	98.9	0.9787	0.0213	Terrestrial	3,375	150	0.0751	0.0584
250	96.0	0.9766	0.0234	Terrestrial	68	3	0.0367	0.0207
251	64.8	0.8963	0.1037	Terrestrial	45	2	0.0481	0.0252
252	96.5	0.9757	0.0243	Terrestrial	3,308	147	0.0768	0.0596
253	81.8	0.9999	0.0001	Terrestrial	1,508	67	0.0810	0.0607
254	77.2	0.9999	0.0001	Terrestrial	540	24	0.0725	0.0512
255	17.5	0.9998	0.0002	Terrestrial	68	3	0.2017	0.1136
256	2.4	1.0000	0.0000	Terrestrial	45	2	1.2866	0.6754
257	67.8	1.0000	0.0000	Terrestrial	473	21	0.0807	0.0564
258	34.9	0.9999	0.0001	Terrestrial	225	10	0.1355	0.0890
259	30.8	1.0000	0.0000	Terrestrial	203	9	0.1500	0.0974
260	26.6	1.0000	0.0000	Terrestrial	180	8	0.1692	0.1086
261	17.4	1.0000	0.0000	Terrestrial	158	7	0.2506	0.1585
262	16.2	1.0000	0.0000	Terrestrial	135	6	0.2608	0.1620
263	15.6	1.0000	0.0000	Terrestrial	113	5	0.2580	0.1566
264	15.2	1.0000	0.0000	Terrestrial	90	4	0.2499	0.1471
265	14.1	1.0000	0.0000	Terrestrial	68	3	0.2492	0.1404
266	12.5	1.0000	0.0000	Terrestrial	45	2	0.2499	0.1312
267	59.4	0.9999	0.0001	Terrestrial	248	11	0.0811	0.0537
268	36.1	0.9997	0.0003	Terrestrial	45	2	0.0863	0.0453
269	30.3	1.0000	0.0000	Terrestrial	203	9	0.1523	0.0990
270	21.0	1.0000	0.0000	Terrestrial	68	3	0.1680	0.0947
271	16.9	1.0000	0.0000	Terrestrial	45	2	0.1839	0.0965
272	27.9	1.0000	0.0000	Terrestrial	135	6	0.1512	0.0939
273	24.9	1.0000	0.0000	Terrestrial	113	5	0.1616	0.0981
274	12.5	1.0000	0.0000	Terrestrial	90	4	0.3048	0.1794
275	10.3	1.0000	0.0000	Terrestrial	45	2	0.3035	0.1593
276	9.9	1.0000	0.0000	Terrestrial	45	2	0.3148	0.1653
277	80.2	1.0000	0.0000	Terrestrial	968	43	0.0771	0.0565
278	65.8	0.9996	0.0004	Terrestrial	113	5	0.0613	0.0372
279	26.3	1.0000	0.0000	Terrestrial	90	4	0.1446	0.0851
280	23.3	1.0000	0.0000	Terrestrial	45	2	0.1337	0.0702
281	25.1	1.0000	0.0000	Terrestrial	45	2	0.1242	0.0652
282	78.5	1.0000	0.0000	Terrestrial	855	38	0.0772	0.0562
283	11.5	0.9999	0.0001	Terrestrial	45	2	0.2698	0.1416
284	67.0	0.9998	0.0002	Terrestrial	810	36	0.0897	0.0650
285	61.6	0.9995	0.0005	Terrestrial	158	7	0.0709	0.0448
286	19.1	0.9998	0.0002	Terrestrial	45	2	0.1632	0.0857
287	47.4	0.9935	0.0065	Terrestrial	113	5	0.0850	0.0516
288	40.5	0.9750	0.0250	Terrestrial	90	4	0.0939	0.0553
289	5.8	1.0000	0.0000	Terrestrial	68	3	0.6120	0.3449
290	4.9	1.0000	0.0000	Terrestrial	45	2	0.6380	0.3349
291	46.3	0.9982	0.0018	Terrestrial	653	29	0.1250	0.0894
292	43.3	0.9966	0.0034	Terrestrial	630	28	0.1329	0.0948
293	40.7	0.9868	0.0132	Terrestrial	608	27	0.1405	0.1001
294	35.7	0.9939	0.0061	Terrestrial	45	2	0.0872	0.0458
295	32.7	0.0593	0.9407	Epiphytic	563	25	0.1724	0.1221
296	17.4	0.0000	1.0000	Epiphytic	540	24	0.3227	0.2279
297	13.3	0.0000	1.0000	Epiphytic	158	7	0.3295	0.2084
298	11.1	0.0000	1.0000	Epiphytic	135	6	0.3795	0.2357
299	6.7	0.0043	0.9957	Epiphytic	45	2	0.4661	0.2447
300	4.2	0.0000	1.0000	Epiphytic	90	4	0.9107	0.5361
301	3.6	0.0000	1.0000	Epiphytic	68	3	0.9885	0.5570
302	2.7	0.0000	1.0000	Epiphytic	45	2	1.1363	0.5965
303	14.7	0.0000	1.0000	Epiphytic	383	17	0.3576	0.2462

Node	Best age, Ma	Reconstructed habit: Proportional likelihood: Terrestrial	Reconstructed habit: Proportional likelihood: Epiphytic	Reconstructed habit: Decision	Species: Estimated total	Species: Sampled	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.0	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.9
304	5.5	0.0000	1.0000	Epiphytic	90	4	0.6896	0.4060
305	5.3	0.0000	1.0000	Epiphytic	68	3	0.6640	0.3742
306	4.9	0.0000	1.0000	Epiphytic	45	2	0.6303	0.3309
307	14.2	0.0000	1.0000	Epiphytic	293	13	0.3508	0.2361
308	5.1	0.0000	1.0000	Epiphytic	90	4	0.7406	0.4360
309	4.4	0.0000	1.0000	Epiphytic	45	2	0.7060	0.3706
310	4.9	0.0000	1.0000	Epiphytic	45	2	0.6380	0.3349
311	9.2	0.0000	1.0000	Epiphytic	203	9	0.5030	0.3268
312	8.4	0.0000	1.0000	Epiphytic	90	4	0.4537	0.2671
313	7.7	0.0000	1.0000	Epiphytic	68	3	0.4588	0.2585
314	7.0	0.0000	1.0000	Epiphytic	45	2	0.4448	0.2335
315	5.8	0.0000	1.0000	Epiphytic	113	5	0.6948	0.4217
316	5.5	0.0000	1.0000	Epiphytic	90	4	0.6934	0.4082
317	5.1	0.0000	1.0000	Epiphytic	68	3	0.6846	0.3858
318	4.1	0.0010	0.9990	Epiphytic	45	2	0.7575	0.3977
319	92.5	0.8763	0.1237	Ambiguous	1,800	80	0.0736	0.0557
320	88.7	0.8736	0.1264	Ambiguous	113	5	0.0454	0.0276
321	6.8	0.0005	0.9995	Epiphytic	45	2	0.4579	0.2404
322	67.5	0.9580	0.0420	Terrestrial	68	3	0.0521	0.0294
323	17.1	0.9991	0.0009	Terrestrial	45	2	0.1820	0.0955
324	66.1	0.3484	0.6516	Ambiguous	1,688	75	0.1019	0.0769
325	61.1	0.4205	0.5795	Ambiguous	248	11	0.0789	0.0523
326	25.4	0.3984	0.6016	Ambiguous	45	2	0.1224	0.0643
327	50.4	0.8710	0.1290	Ambiguous	203	9	0.0916	0.0595
328	31.9	0.9986	0.0014	Terrestrial	180	8	0.1411	0.0906
329	26.9	0.9995	0.0005	Terrestrial	45	2	0.1157	0.0607
330	24.6	0.9999	0.0001	Terrestrial	135	6	0.1712	0.1063
331	16.5	1.0000	0.0000	Terrestrial	113	5	0.2445	0.1484
332	13.6	1.0000	0.0000	Terrestrial	45	2	0.2291	0.1203
333	11.7	1.0000	0.0000	Terrestrial	68	3	0.3003	0.1692
334	2.7	1.0000	0.0000	Terrestrial	45	2	1.1749	0.6168
335	63.6	0.0285	0.9715	Epiphytic	1,440	64	0.1034	0.0774
336	60.4	0.0017	0.9983	Epiphytic	1,418	63	0.1086	0.0812
337	19.4	0.0000	1.0000	Epiphytic	90	4	0.1965	0.1157
338	12.0	0.0000	1.0000	Epiphytic	45	2	0.2601	0.1366
339	14.3	0.0000	1.0000	Epiphytic	45	2	0.2177	0.1143
340	55.8	0.0001	0.9999	Epiphytic	1,328	59	0.1164	0.0868
341	40.2	0.0001	0.9999	Epiphytic	45	2	0.0774	0.0406
342	44.0	0.0000	1.0000	Epiphytic	1,283	57	0.1468	0.1092
343	31.9	0.0000	1.0000	Epiphytic	90	4	0.1192	0.0702
344	12.0	0.0000	1.0000	Epiphytic	68	3	0.2923	0.1647
345	7.4	0.0000	1.0000	Epiphytic	45	2	0.4230	0.2221
346	43.3	0.0000	1.0000	Epiphytic	270	12	0.1134	0.0758
347	42.5	0.0000	1.0000	Epiphytic	248	11	0.1134	0.0752
348	35.1	0.0000	1.0000	Epiphytic	68	3	0.1003	0.0565
349	23.0	0.0000	1.0000	Epiphytic	45	2	0.1353	0.0710
350	35.1	0.0000	1.0000	Epiphytic	180	8	0.1284	0.0824
351	31.9	0.0000	1.0000	Epiphytic	158	7	0.1367	0.0865
352	30.0	0.0000	1.0000	Epiphytic	135	6	0.1406	0.0873
353	27.0	0.0008	0.9992	Epiphytic	113	5	0.1493	0.0906
354	19.6	0.0000	1.0000	Epiphytic	90	4	0.1945	0.1145
355	17.3	0.0000	1.0000	Epiphytic	68	3	0.2035	0.1147
356	10.7	0.0000	1.0000	Epiphytic	45	2	0.2918	0.1532
357	43.0	0.0000	1.0000	Epiphytic	923	41	0.1426	0.1043
358	39.2	0.0000	1.0000	Epiphytic	135	6	0.1076	0.0668
359	37.0	0.0000	1.0000	Epiphytic	113	5	0.1088	0.0660
360	30.7	0.0000	1.0000	Epiphytic	45	2	0.1015	0.0533
361	14.2	0.0000	1.0000	Epiphytic	68	3	0.2487	0.1401
362	9.7	0.0000	1.0000	Epiphytic	45	2	0.3220	0.1690
363	42.0	0.0000	1.0000	Epiphytic	788	35	0.1422	0.1030
364	39.8	0.0000	1.0000	Epiphytic	68	3	0.0883	0.0498

Node	Best age, Ma	Reconstructed habit: Proportional likelihood: Terrestrial	Reconstructed habit: Proportional likelihood: Epiphytic	Reconstructed habit: Decision	Species: Estimated total	Species: Sampled	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.0	Estimated diversification rate, net speciation events per million years: Extinction rate = 0.9
365	36.2	0.0000	1.0000	Epiphytic	45	2	0.0861	0.0452
366	40.0	0.0000	1.0000	Epiphytic	720	32	0.1473	0.1061
367	15.5	0.0000	1.0000	Epiphytic	45	2	0.2007	0.1054
368	31.2	0.0000	1.0000	Epiphytic	675	30	0.1865	0.1337
369	30.6	0.0000	1.0000	Epiphytic	653	29	0.1889	0.1351
370	21.7	0.0000	1.0000	Epiphytic	90	4	0.1753	0.1032
371	13.5	0.0000	1.0000	Epiphytic	45	2	0.2313	0.1214
372	20.9	0.0000	1.0000	Epiphytic	45	2	0.1491	0.0783
373	26.9	0.0000	1.0000	Epiphytic	563	25	0.2093	0.1483
374	23.0	0.0000	1.0000	Epiphytic	45	2	0.1353	0.0710
375	25.2	0.0000	1.0000	Epiphytic	518	23	0.2206	0.1554
376	16.0	0.0000	1.0000	Epiphytic	45	2	0.1946	0.1022
377	25.0	0.0000	1.0000	Epiphytic	473	21	0.2186	0.1529
378	23.3	0.0000	1.0000	Epiphytic	113	5	0.1731	0.1051
379	16.5	0.0000	1.0000	Epiphytic	90	4	0.2301	0.1355
380	12.4	0.0009	0.9991	Epiphytic	68	3	0.2838	0.1599
381	9.9	0.0000	1.0000	Epiphytic	45	2	0.3151	0.1654
382	23.4	0.0000	1.0000	Epiphytic	360	16	0.2216	0.1518
383	22.2	0.0000	1.0000	Epiphytic	68	3	0.1587	0.0894
384	9.5	0.0000	1.0000	Epiphytic	45	2	0.3295	0.1730
385	22.3	0.0000	1.0000	Epiphytic	293	13	0.2234	0.1503
386	19.8	0.0000	1.0000	Epiphytic	68	3	0.1778	0.1002
387	17.6	0.0000	1.0000	Epiphytic	45	2	0.1772	0.0930
388	20.7	0.0000	1.0000	Epiphytic	225	10	0.2279	0.1497
389	17.3	0.0000	1.0000	Epiphytic	90	4	0.2197	0.1293
390	14.4	0.0000	1.0000	Epiphytic	68	3	0.2439	0.1374
391	6.5	0.0076	0.9924	Epiphytic	45	2	0.4775	0.2507
392	13.9	0.0000	1.0000	Epiphytic	135	6	0.3024	0.1878
393	9.7	0.0000	1.0000	Epiphytic	68	3	0.3635	0.2049
394	2.5	0.0000	1.0000	Epiphytic	45	2	1.2258	0.6435
395	9.8	0.0000	1.0000	Epiphytic	68	3	0.3576	0.2015
396	8.2	0.0000	1.0000	Epiphytic	45	2	0.3802	0.1996

Node numbers correspond to those in Fig. 1 and Fig. S1. Best age estimates result from penalized likelihood analysis of our most likely phylogeny (incorporating 24 fossil age constraints; see Table S2). Proportional likelihoods for each habit are from our ancestral state reconstructions across the most likely tree—decisions were made using a threshold of 2 log-likelihood units. Estimated species totals are based strictly on our proportional sampling (see *Materials and Methods* in the main text), but should generally correspond to "actual" totals estimated from the literature (especially for well sampled clades; see Table 1). Estimated diversification rates were calculated both in the absence of extinction and under a high relative extinction rate, following Magallón and Sanderson [Magallón S, Sanderson MJ (2001) Absolute diversification rates in angiosperm clades. *Evolution* 55:1762–1780], using our best age estimates and the "estimated" total number of species in each clade.

Table S4. Age, diversification rate, and other statistics for 32 key leptosporangiate nodes

					Reconstructed habit			Species			Diversification rate, net speciation events per million years			
		Age (Ma)			Proportional likelihood			Total			Extinction rate = 0.0		Extinction rate = 0.9	
Node	Name	Best	25–75%	0–100%	Terrestrial	Epiphytic	Decision	Estimated	Actual	Sampled	Estimated	Actual	Estimated	Actual
0	Leptosporangiates	299.0	299.0–299.0	299.0–299.0	0.9651	0.0349	Terrestrial	9,000	9,000	400	0.0281	0.0281	0.0226	0.0226
1	Osmundaceous ferns (Osmundales)	199.6	199.6–199.6	199.6–199.6	0.9702	0.0298	Terrestrial	68	20	3	0.0176	0.0115	0.0099	0.0051
4	Filmy ferns (Hymenophyllales)	185.1	190.4–174.7	209.5–158.5	0.1017	0.8983	Epiphytic	630	600	28	0.0311	0.0308	0.0222	0.0219
5	Trichomanoids	147.3	152.0–141.0	165.6–125.8	0.0381	0.9619	Epiphytic	315	300	14	0.0344	0.0340	0.0233	0.0229
18	Hymenophylloids	41.9	50.5–40.8	64.2–33.5	0.0001	0.9999	Epiphytic	315	300	14	0.1207	0.1195	0.0817	0.0806
32	Gleichenioids (Gleicheniales)	262.2	264.1–259.0	269.9–253.9	0.9872	0.0128	Terrestrial	248	150	11	0.0184	0.0165	0.0122	0.0104
43	Schizaeoids (Schizaeales)	218.4	225.7–216.6	234.4–204.3	0.9909	0.0091	Terrestrial	158	160	7	0.0200	0.0201	0.0126	0.0127
49	Core leptosporangiates	234.7	241.6–235.4	249.1–225.2	0.9988	0.0012	Terrestrial	7,898	8,070	351	0.0353	0.0354	0.0282	0.0283
50	Heterosporous ferns (Salviniales)	186.8	194.7–184.9	207.2–164.4	0.9943	0.0057	Terrestrial	113	100	5	0.0216	0.0209	0.0131	0.0125
55	Tree ferns (Cyatheales)	186.7	196.8–182.2	212.9–155.2	0.9997	0.0003	Terrestrial	720	670	32	0.0315	0.0311	0.0227	0.0223
65	Scaly tree ferns	93.5	93.5–93.5	112.7–32.5	0.9999	0.0001	Terrestrial	495	600	22	0.0589	0.0610	0.0414	0.0434
86	Polypods (Polypodiales)	191.0	200.5–192.6	207.2–179.1	0.9997	0.0003	Terrestrial	7,065	7,300	314	0.0428	0.0430	0.0341	0.0343
90	Lindsaeoids	47.0	52.9–46.3	62.6–42.4	0.9991	0.0009	Terrestrial	113	190	5	0.0858	0.0970	0.0521	0.0626
95	Dennstaedtioids	119.3	131.4–117.3	146.2–100.3	0.9994	0.0006	Terrestrial	248	180	11	0.0404	0.0377	0.0268	0.0242
106	Pteroids	110.8	121.1–112.4	144.6–101.6	0.9998	0.0002	Terrestrial	1,193	1,000	53	0.0577	0.0561	0.0427	0.0412
112	Pteridoids	56.2	63.9–57.4	77.3–49.6	1.0000	0.0000	Terrestrial	405	350	18	0.0945	0.0919	0.0653	0.0628
130	Cheilanthoids	81.2	88.3–79.3	100.4–69.6	0.9996	0.0004	Terrestrial	338	350	15	0.0631	0.0636	0.0430	0.0435
144	Adiantoids	80.3	86.4–79.2	107.6–72.4	0.9952	0.0048	Terrestrial	338	280	15	0.0639	0.0616	0.0435	0.0413
151	Vittarioids	45.7	49.2–44.7	67.5–39.1	0.0019	0.9981	Epiphytic	180	120	8	0.0985	0.0896	0.0632	0.0548
158	Eupolypods	116.7	127.7–117.1	144.9–105.6	0.9975	0.0025	Terrestrial	5,445	5,900	242	0.0678	0.0685	0.0536	0.0543
159	Eupolypods II	103.1	114.4–103.3	126.5–96.8	0.9998	0.0002	Terrestrial	2,070	2,600	92	0.0674	0.0696	0.0513	0.0535
163	Asplenioids	57.7	63.7–58.0	71.2–51.0	0.9103	0.0897	Terrestrial	653	700	29	0.1003	0.1015	0.0717	0.0729
192	Thelypteroids	68.5	77.8–68.2	91.8–47.7	0.9999	0.0001	Terrestrial	630	950	28	0.0840	0.0900	0.0600	0.0659
221	Blechnoids	59.8	66.6–59.6	77.9–55.8	1.0000	0.0000	Terrestrial	225	200	10	0.0789	0.0770	0.0518	0.0499
230	Athyrioids	78.4	87.8–76.4	101.2–59.8	0.9999	0.0001	Terrestrial	450	600	20	0.0691	0.0727	0.0481	0.0518
249	Eupolypods I	98.9	111.5–100.8	127.9–88.2	0.9787	0.0213	Terrestrial	3,375	3,300	150	0.0751	0.0749	0.0584	0.0581
253	Dryopteroids	81.8	93.8–83.9	108.6–72.4	0.9999	0.0001	Terrestrial	1,508	1,700	67	0.0810	0.0824	0.0607	0.0622
295	Elaphoglossoids	32.7	38.0–33.0	44.6–28.6	0.0593	0.9407	Epiphytic	563	700	25	0.1724	0.1791	0.1221	0.1287
327	Tectarioids	50.4	57.9–50.6	68.6–42.1	0.8710	0.1290	Ambiguous	203	200	9	0.0916	0.0914	0.0595	0.0593
337	Davallioids	19.4	22.6–19.0	29.7–14.7	0.0000	1.0000	Epiphytic	90	65	4	0.1965	0.1797	0.1157	0.1007
340	Polygrammoids	55.8	64.3–55.6	76.9–48.3	0.0001	0.9999	Epiphytic	1,328	1,200	59	0.1164	0.1146	0.0868	0.0850
368	Grammitids	31.2	36.5–30.9	43.0–25.6	0.0000	1.0000	Epiphytic	675	600	30	0.1865	0.1828	0.1337	0.1300

Node numbers correspond to those in Fig. 1 and Fig. S1, with node names following Schuettpelz and Pryer (1); the 7 extant leptosporangiate orders are indicated in parentheses. Best age estimates result from penalized likelihood analysis of our most likely phylogeny (incorporating 24 fossil age constraints; see Table S2); interquartile and complete age ranges summarize the results of penalized likelihood analyses of 100 bootstrap trees (note that some age ranges are very small because of the proximity of a fossil constraint). Proportional likelihoods for each habit are from our ancestral state reconstructions across the most likely tree—decisions were made using a threshold of 2 log-likelihood units. Estimated species totals are based strictly on our proportional sampling (see *Materials and Methods* in the main text); actual totals are also estimates, but from the literature [primarily from Smith et al. (2)]. Diversification rates were calculated both in the absence of extinction and under a high relative extinction rate [following Magallón and Sanderson (3)], using our best age estimates and the "estimated" and "actual" total number of species in each clade. Statistics for all nodes resolved in our most likely phylogeny (see Fig. S1) are reported in Table S3.

1. Schuettpelz E, Pryer KM (2007) Fern phylogeny inferred from 400 leptosporangiate species and three plastid genes. *Taxon* 56:1037–1050.
2. Smith AR, et al. (2006) A classification for extant ferns. *Taxon* 55:705–731.
3. Magallón S, Sanderson MJ (2001) Absolute diversification rates in angiosperm clades. *Evolution* 55:1762–1780.

Table S5. Summary of tests for a constant rate of diversification

Plot(s)	Most likely timetree	Bootstrap timetrees	
		Constant (#)	Not constant (#)
Total	Not constant	9	91
Epiphytic	Not constant	2	98
Ambiguous	Constant	43	57
Terrestrial	Constant	81	19

Rate constancy was assessed by fitting exponential curves to plots of divergences through time (see Fig. 2) drawn from our 101 dated phylogenies. Diversification rate was deemed "not constant" when an exponential distribution could be rejected ($P < 0.05$; see *Materials and Methods* in the main text).

Table S6. Summary of absolute diversification rates estimated for leptosporangiate fern nodes

		Diversification rate, net speciation events per million years					
		Extinction rate = 0.0			Extinction rate = 0.9		
Nodes	N	Median	25–75%	0–100%	Median	25–75%	0–100%
Overall							
Total	397	0.1355	0.0733–0.2346	0.0167–1.6921	0.0802	0.0458–0.1430	0.0098–0.8883
Epiphytic	134	0.1877	0.1209–0.3295	0.0298–1.2258	0.1115	0.0733–0.1907	0.0181–0.6435
Ambiguous	11	0.1019	0.0736–0.1561	0.0277–0.2241	0.0643	0.0523–0.1103	0.0145–0.1360
Terrestrial	252	0.1064	0.0628–0.1853	0.0167–1.6921	0.0652	0.0397–0.1081	0.0098–0.8883
Since K/T boundary							
Total	308	0.1598	0.1141–0.2908	0.0481–1.6921	0.0985	0.0670–0.1620	0.0252–0.8883
Epiphytic	125	0.2007	0.1353–0.3416	0.0486–1.2258	0.1157	0.0815–0.2032	0.0255–0.6435
Ambiguous	7	0.1364	0.0916–0.1590	0.0789–0.2241	0.0971	0.0595–0.1120	0.0523–0.1360
Terrestrial	176	0.1506	0.0979–0.2513	0.0481–1.6921	0.0900	0.0609–0.1510	0.0252–0.8883
Since PETM							
Total	288	0.1702	0.1242–0.3044	0.0589–1.6921	0.1026	0.0703–0.1688	0.0309–0.8883
Epiphytic	120	0.2064	0.1383–0.3559	0.0692–1.2258	0.1218	0.0825–0.2075	0.0363–0.6435
Ambiguous	6	0.1462	0.1147–0.1753	0.0916–0.2241	0.1037	0.0631–0.1180	0.0595–0.1360
Terrestrial	162	0.1560	0.1137–0.2684	0.0589–1.6921	0.0943	0.0655–0.1587	0.0309–0.8883

Summary statistics are based on diversification rates calculated for all nodes resolved in the most likely chronogram (see Fig. 1 and Fig. S1). Diversification rates were calculated both in the absence of extinction and under a high relative extinction rate, following Magallón and Sanderson [Magallón S, Sanderson MJ (2001) Absolute diversification rates in angiosperm clades. *Evolution* 55:1762–1780], using our best age estimates and the estimated number of species in each clade. Rates for each individual node are reported in Table S3.