

A global plastid phylogeny of the fern genus *Asplenium* (Aspleniaceae)

Ke-Wang Xu^{a,n}, Liang Zhang^{b,c}, Carl J. Rothfels^d, Alan R. Smith^d, Ronald Viane^e, David Lorence^f, Kenneth R. Wood^f, Cheng-Wei Chen^g, Ralf Knapp^h, Lin Zhou^c, Ngan Thi Lu^{c,i,j}, Xin-Mao Zhou^k, Hong-Jin Wei^l, Qiang Fan^a, Su-Fang Chen^a, Daniele Cicuzza^m, Xin-Fen Gao^c, Wen-Bo Liao^{a,*} and Li-Bing Zhang^{c,n,*}

^aState Key Laboratory of Biocontrol and Guangdong Provincial Key Laboratory of Plant Resources, School of Life Sciences, Sun Yat-sen University, Guangzhou; ^bKey Laboratory for Plant Diversity and Biogeography of East Asia, Kunming Institute of Botany, Chinese Academy of Sciences, Kunming; ^cCAS Key Laboratory of Mountain Ecological Restoration and Bioresource Utilization, Chengdu Institute of Biology, Chinese Academy of Sciences, P.O. Box 416, Chengdu; ^dUniversity Herbarium and Department of Integrative Biology, University of California, 1001 Valley Life Sciences Building, Berkeley, CA, 94720; ^eDepartment of Biology, Ghent University, 9000, Gent; ^fNational Tropical Botanical Garden, 3530 Papalina Road, Kalāheo, HI, 96741; ^gDivision of Silviculture, Taiwan Forestry Research Institute, Taipei; ^hMuséum national d'Histoire naturelle (MNHN, Paris, France), Steigstrasse 78, 69412, Eberbach; ⁱUniversity of Chinese Academy of Sciences, Beijing; ^jDepartment of Biology, Vietnam National Museum of Nature, Vietnam Academy of Science and Technology, 18th Hoang Quoc Viet Road, Ha Noi; ^kLaboratory of Ecology and Evolutionary Biology, State Key Laboratory for Conservation and Utilization of Bio-Resources in Yunnan, Yunnan University, Kunming; ^lShanghai Chenshan Botanical Garden, Shanghai, 201602; ^mFaculty of Science, Universiti Brunei Darussalam, Bandar Seri Begawan; ⁿMissouri Botanical Garden, 4344 Shaw Blvd, St. Louis, MO, 63110

Accepted 11 March 2019

Abstract

The infrageneric relationships and taxonomy of the largest fern genus, *Asplenium* (Aspleniaceae), have remained poorly understood. Previous studies have focused mainly on specific species complexes involving a few or dozens of species only, or have achieved a large taxon sampling but only one plastid marker was used. In the present study, DNA sequences from six plastid markers (*atpB*, *rbcL*, *rps4*, *rps4-trnS*, *trnL* and *trnL-F*) of 1030 accessions (616 of them newly sequenced here) representing c. 420 species of *Asplenium* (60% of estimated species diversity), 16 species of *Hymenasplenium*, three Diplaziopsidaceae, and four Rhachidosoraceae were used to produce the largest genus-level phylogeny yet for ferns. Our major results include: (i) *Asplenium* as broadly circumscribed is monophyletic based on our inclusion of representatives of 32 of 38 named segregate genera; (ii) 11 major clades in *Asplenium* are identified, and their relationships are mostly well-resolved and strongly supported; (iii) numerous species, unsampled in previous studies, suggest new relationships and numerous cryptic species and species complexes in *Asplenium*; and (iv) the accrued molecular evidence provides an essential foundation for further investigations of complex patterns of geographical diversification, speciation and reticulate evolution in this family.

© The Willi Hennig Society 2019.

Introduction

Asplenium L. (Aspleniaceae) is characterized by usually having erect rhizomes with radial steles, distinctly

sulcate rachises with a raised ridge in the centre and two grooves on each side, rachis-costa architecture that is characterized by a terete and alate rachis with wings that are confluent with the basiscopic pinna margin, and a base chromosome number $x = 36$ (Hayata, 1927; Bir, 1960, 1970; Mehra and Bir, 1960; Mitui et al., 1989; Murakami and Moran, 1993; Cheng and Murakami, 1998; Lin and Viane, 2013; Sundue and

*Corresponding authors.

E-mail addresses: lsslwb@mail.sysu.edu.cn (WBL);
Libing.Zhang@mobot.org (LBZ)

Rothfels, 2014). With an estimated >700 species, *Asplenium* is the most species-rich genus of ferns (Lin and Viane, 2013). It is a cosmopolitan genus with approximately 30% of its species distributed in the Neotropics, *c.* 22% in Africa, *c.* 33% in Asia, *c.* 10% in the Pacific areas including Australia and *c.* 5% in Europe (Kramer and Viane, 1990). *Asplenium* is somewhat unusual in having large numbers of both epiphytic and terrestrial species, and for having had major radiations in both tropical and north-temperate areas. Many species of the genus often occur in the forest floor, on banks of rivers, and in ravines in montane vegetation, and islands often harbour endemic species (Ohlsen et al., 2015).

Aside from some recent treatments that expand the circumscription of Aspleniaceae to include such groups as the Hemidictyaceae and Diplaziopsidaceae sensu Rothfels et al. (2012a) and PPGI (2016; e.g. Kessler and Smith, 2018), the circumscription of the family has been very stable. However, the generic classification within Aspleniaceae has changed over time: approximately 38 genera have been published within the family (Table 1; Presl, 1836; Hooker and Baker, 1874; Christ, 1897; Hayata, 1927; Copeland, 1947; Holttum, 1947; Nayar, 1970; Iwatsuki, 1975; Iwatsuki and Kato, 1975; Mickel, 1976; Pichi Sermolli, 1977; Tryon and Tryon, 1982; Bir et al., 1985; Kramer and Viane, 1990; Wu, 1999; Lin and Viane, 2013).

Molecular data consistently resolve Aspleniaceae into two well-supported clades, one corresponding to *Hymenasplenium* sensu Hayata (1927), the other to *Asplenium* s.l. (Murakami, 1995; Murakami et al., 1998, 1999a; Pinter et al., 2002; van den Heede et al., 2003; Schneider et al., 2004, 2005, 2017; Perrie and Brownsey, 2005; Schuettpelz and Pryer, 2007; Bellefroid et al., 2010; Dong et al. 2012; Rothfels et al., 2012a,b; Ohlsen et al., 2015; Lóriga et al., 2016; Sessa et al., 2018; Xu et al., 2018). Anatomical studies have shown that the stelar structure of the rhizomes in *Asplenium* is dictyostelic or radial, whereas that of *Hymenasplenium* is dorsiventral (Hayata, 1927; Bir, 1970; Iwatsuki and Kato, 1975; Smith, 1976; Mitsuta et al., 1980; Kato et al., 1990; Murakami, 1992; Umikalsom, 1992; Bercu, 2005; Gabancho and Prada, 2011; Nopun et al., 2016). In addition, the basic chromosome number of species of *Asplenium* is quite homogeneous with $x = 36$, whereas that of members of *Hymenasplenium* is $x = 39$ or rarely $x = 38$ (Manton, 1950; Manton and Sledge, 1954; Bir, 1960; Braithwaite, 1964; Lovis, 1977; Mitui et al., 1989; Cheng and Murakami, 1998; van den Heede et al., 2004; Bellefroid et al., 2010; Dong, 2011). Morphologically, species of *Hymenasplenium* have long-creeping rhizomes with very few scales except near the apex, dorsiventral steles, shiny or rarely dull stipes, simple or 1-pinnate laminae, and costae usually with several (rarely one)

basal basiscopic veins missing; in contrast, species of *Asplenium* have often erect rhizomes, rarely creeping or decumbent, dictyostelic or radial steles, dull or shiny (if the stipe colour is castaneous or black) stipes, simple to 4-pinnate laminae, and costae rarely with basal basiscopic veins lacking (Lin and Viane, 2013; Xu et al., 2018). Therefore, morphological, anatomical, cytological and molecular data all support two genera in Aspleniaceae: *Asplenium* and *Hymenasplenium*.

Within this circumscription of *Asplenium*, relationships are far from clear. The numerous and various epilithic, terrestrial and epiphytic niches occupied by members of *Asplenium* all contribute to the morphological variation in the genus, which has brought challenges to its taxonomic study (Fig. 1). Molecular studies have focused on delimiting species or reticulate evolution in species complexes involving a few or dozens of species, such as the Appalachian *Asplenium* complex (Werth et al., 1985), the New Zealand *Asplenium* complex (Shepherd et al., 2008), the *A. monanthes* complex (Dyer et al., 2012, 2013), the *A. normale* complex (Chang et al., 2013, 2018), and the *A. obovatum* and *A. adiantum-nigrum* complexes (Sessa et al., 2018). There have been only a few global molecular phylogenies of *Asplenium* using plastid markers to identify major clades in the genus. For example, 71 species of *Asplenium* worldwide were included by Schneider et al. (2004), Schuettpelz and Pryer (2007) included 27 species in their three-locus study, and some 70 species from Australasia and the southwestern Pacific in addition to species from other regions from GenBank were sampled by Ohlsen et al. (2015). Most recently, Schneider et al. (2017) sampled 825 accessions (*c.* 67% from GenBank) representing *c.* 270 species of *Asplenium*, but only *rbcL* was used and the resolution was generally poor. Also, their new data are not accessible in GenBank. Up to now, there have not been any multilocus molecular works on *Asplenium* s.l. with major relationships resolved. Also, so far very little material from southern China, Southeast Asia or the Neotropics has been included in molecular studies of the genus.

In the present study we aimed: (i) to reconstruct a global multilocus plastid phylogeny of *Asplenium* with a greatly expanded taxon sampling and with special attention paid to the material from southern China, Southeast Asia and the Neotropics; (ii) to test the monophyly of the major clades identified earlier and to identify major new clades, if any; (iii) to resolve the deep relationships among major clades; (iv) to detect new species complexes and cryptic speciation in *Asplenium* by including multiple accessions of widely distributed taxa; and (v) to build a phylogenetic foundation for future morphological and taxonomical studies of this large and complex fern genus.

Table 1

List of segregate genera often subsumed in *Asplenium* s.l. in alphabetical order; references are given in the right-hand column

Genus	References
<i>Acrasplenium</i> T.Moore (1901)*	Bull. Misc. Inform. Kew, 144
<i>Acropteridastrum</i> Fée (1850–52)*	Gen. Fil., 190
<i>Acropteris</i> Link (1833)	Handbuch, 23
<i>Amesium</i> Newman (1844)	Hist. Brit. Ferns (ed. 2), 10
<i>Antigramma</i> C.Presl (1836)	Tent. Pterid., 120
<i>Asplendictyum</i> J.Sm. (1875)	Hist. Fil., 333
<i>Asplenium</i> L. (1753)	Sp. Pl. 2, 1078
<i>Biropteris</i> Kümmerle (1922)*	Magyar Bot. Lapok. 19, 2
<i>Boniniella</i> Hayata (1927)*	Bot. Mag. (Tokyo), 706
<i>Caenopteris</i> P.J.Bergius (1786)	Acta Acad. Sci. Imp. Petrop. 6, 248–250
<i>Camptosorus</i> Link (1833)	Hort. Berol. 2, 69
<i>Ceterach</i> Willd. (1804)	Anleit. Selbststud. Bot., 578
<i>Ceterachopsis</i> (J.Sm.) Ching (1940)	Bull. Fan Mem. Inst. Biol., Bot., 8
<i>Chamaefilix</i> Hill ex Farwell (1931)	Amer. Midl. Naturalist 12, 239, 268
<i>Darea</i> Juss. (1789)	Gen. Pl., 15
<i>Dareastrum</i> Fée (1850–52)	Gen. Fil., 190
<i>Diellia</i> Brack. (1854)	U.S. Expl. Exped., Filic., 217
<i>Diplora</i> Baker (1873)*	J. Bot., 235
<i>Eremopodium</i> Trevis. (1877)*	Atti Reale Ist. Veneto Sci. Lett. Arti, ser. 6, 589
<i>Hemionitidastrum</i> Fée (1850–52)	Gen. Fil., 190
<i>Holodictyum</i> Maxon (1908)*	Contr. U.S. Natl. Herb. 10, 481
<i>Hymenasplenium</i> Hayata (1927)	Bot. Mag. (Tokyo), 712
<i>Lepichroa</i> T.Moore (1857)	Index Fil.
<i>Lobium</i> Keyserl. (1873)	Polypodiacea et Cyatheacea herbarii Bungeani recensuit Alexander Keyserling, 15
<i>Loxoscapha</i> T.Moore (1853)	Hooker's J. Bot. Kew Gard. Misc., 227
<i>Micasplenium</i> Keyserl. (1873)	Polypodiacea et Cyatheacea herbarii Bungeani recensuit Alexander Keyserling, 15
<i>Micropodium</i> Mett. (1866)*	Ann. Mus. Bot. Lugduno-Batavi, 232
<i>Neottopteridastrum</i> Fée (1850–52)	Gen. Fil., 190
<i>Neottopteris</i> J.Sm. (1841)	J. Bot. (Hooker), 409
<i>Notolepeum</i> Newman (1844)	Hist. Brit. Ferns (ed. 2), 9
<i>Onopteris</i> Neck. (1790)	Element. Bot. 3, 316.
<i>Parasplenium</i> Keyserl. (1873)	Polypodiacea et Cyatheacea herbarii Bungeani recensuit Alexander Keyserling, 15
<i>Phyllitis</i> Hill (1756)	Brit. Herb., 525
<i>Pleurosorus</i> Fée (1852)	Mém. Foug., 179
<i>Schaffneria</i> Fée (1855)	Mém. Foug., 56–57
<i>Scolopendrium</i> Adans. (1763)	Fam. Pl., 20
<i>Sinephropteris</i> Mickel (1976)	Brittonia, 326–328
<i>Tarachia</i> C.Presl (1851)	Abh. Königl. Böhm. Ges. Wiss., ser. 5, 434
<i>Thamnopteris</i> C.Presl (1836)	Tent. Pterid., 105
<i>Triphlebia</i> Baker (1886)*	Malesia, 41
× <i>Asplenoceterach</i> D.E.Mey. (1957)*	Ber. Deutsch. Bot. Ges., 61
× <i>Asplenophyllitis</i> Alston (1940)*	Proc. Linn. Soc. Lond., 139
× <i>Asplenosorus</i> Wherry (1937)*	Am. Fern J., 56
× <i>Ceterophyllitis</i> Pichi Serm. (1979)	Webbia, 208
× <i>Phyllitopsis</i> Reichst. (1981)	Bot. Helvetica, 107

Asterisks after generic names indicate that representatives are not included in this study. Hybrid genera follow at the end.

Materials and methods

Taxon sampling

In order to further test the monophyly of *Asplenium* and previously recognized segregated genera (e.g. Christensen, 1905; Mickel, 1976; Pichi Sermolli, 1977; Tryon and Tryon, 1982; Wu, 1999), we included representatives of 32 segregates in Aspleniaceae in our analysis (Appendix 1). We sampled 616 new accessions in this study, with special attention to material from

southern China, Southeast Asia and the Neotropics. All GenBank data were downloaded and 414 accessions were selected after those accessions with suspicious sequences or identifications and multiple accessions of same species with identical sequences were excluded. About 154 species were represented by multiple accessions to cover broad geographical ranges and intraspecific variations of these species. In total, we included 1030 accessions representing *c.* 420 species (60% of estimated species diversity of the genus) of *Asplenium* (1004 accessions), 16 species



Fig. 1. Representative diversity of major clades of *Asplenium*. (a) *A. ruta-muraria* (XI. *Pleurosorus* clade). (b) *A. ceterach* (II. *Phyllitis* clade). (c). *A. trichomanes* (VI. *A. trichomanes* clade: *A. trichomanes* subclade). (d) *A. normale* (VI. *A. trichomanes* clade: *A. normale* subclade). (e) *A. spatulifolium* (IV. *Tarachia* clade: *A. polyodon* subclade). (f) *A. prolongatum* (III. *Neottopteris* clade). (g) *A. fissum* (IX. *A. aegeum* clade). (h) *A. tenuifolium* (V. *Schaffneria* clade: *A. varians* subclade). (i) *A. bullatum* (X. *A. bullatum* clade). (j) *A. cuspidatum* (I. *A. erosum* clade). (k) *A. platyneuron* (V. *Schaffneria* clade: *A. incisum* subclade). (l) *A. tenerum* (III. *Neottopteris* clade). (m) *A. aethiopicum* (IV. *Tarachia* clade: *A. aethiopicum* subclade). (n) *A. delavayi* (V. *Schaffneria* clade: *A. delavayi* subclade). (o) *A. phyllitidis* (III. *Neottopteris* clade). (p) *A. harpeodes* (VIII. *Asplenium* clade). (q) *A. serratifolium* (IV. *Tarachia* clade: *A. ensiforme* subclade).

of *Hymenasplenium* (16 accessions), three Diplaziopsidaceae (four accessions) and four Rhachidosoraceae (six accessions). Diplaziopsidaceae and

Rhachidosoraceae were used as outgroups based on previous studies (Rothfels et al., 2012a,b; Wei et al., 2017). Voucher information and GenBank accession

numbers for each sampled taxon are provided in Appendix 1.

DNA extraction, amplification and sequencing

Total genomic DNA was extracted from leaves (excluding the costa and rachis as much as possible) of silica-dried material or sometimes herbarium specimens using a TIANGEN plant genomic DNA extraction kit (TIANGEN Biotech., Beijing, China) or DNeasy Plant Mini Kits (Qiagen, Germany) following the manufacturers' protocols.

Six plastid markers (the *atpB* gene, the *rbcL* gene, the *rps4* gene, the *rps4-trnS* intergenic spacer, the *trnL* intron and the *trnL-F* intergenic spacer) were selected for phylogenetic study based on their use in earlier studies of *Asplenium* and related groups (Schneider et al., 2004, 2017; Schuettpelz and Pryer, 2007; Ohlsen et al., 2015; Lóriga et al., 2016; Xu et al., 2018). The *atpB* gene was amplified with primers ESATPB172F and ESATPE45R (Schuettpelz and Pryer, 2007), and internal primers atpB-20F, atpB-249F, atpB-592R and atpB-1228R (Xu et al., 2018). The *rbcL* gene was amplified with primers *Fl* (Fay et al., 1997) and *I379R* originally designed by Zurawski et al. (1984) and modified by Wolf et al. (1999), and the internal primers 595F (Le Péchon et al., 2016) and 819R (Zhang et al., 2015). The *rps4* gene and the *rps4-trnS* intergenic spacer were amplified with primers *TRNS* (Souza-Chies et al., 1997) and an unnamed primer derived from Li and Lu (2006), and internal primers rps4-118F, rps4-911R and rps4-532R (Xu et al., 2018). The *trnL* intron and *trnL-F* intergenic spacer were amplified together using the primers FERN1 (Trewick et al., 2002), E and F (Taberlet et al., 1991), and primers trnL-F-43F and trnL-F-430R (Xu et al., 2018). The internal primers were used when amplification of the larger regions was unsuccessful. All PCR conditions followed Zhang et al. (2001). PCR products were purified and sequenced by TSINGKE Biological Technology (Chengdu & Guangzhou, China).

Sequence alignment and phylogenetic analysis

Contiguous sequences were assembled and edited using SEQUENCHER 4.1 (Gene Codes Corp., Ann Arbor, MI, USA). Sequences obtained for each marker were initially aligned with MAFFT v.7 (Katoh and Standley, 2013) and manually adjusted in BIOEDIT (Hall, 1999).

Equally weighted maximum parsimony (MP) jack-knife (JK) analyses (Farris et al., 1996) for each locus and the combined sequence data were conducted using PAUP*4.0a163 (Swofford, 2002), with insertions and deletions coded as missing data, the removal probability set to *c.* 37%, and “jac” resampling emulated analyses. One thousand replicates were performed with ten

TBR searches per replicate and a maximum of 100 trees held per TBR search.

jModelTest 0.1.1 (Guindon and Gascuel, 2003; Posada, 2008) was used to select the best-fitting model for maximum-likelihood (ML; Felsenstein, 1973) and Bayesian analyses. The Akaike information criterion (Akaike, 1974) was used to select among models instead of the hierarchical likelihood ratio test, following Pol (2004) and Posada and Buckley (2004). The best-fitting models and parameter values are provided in Table 2.

For each marker and the concatenated analysis of all nucleotide characters, ML tree searches and bootstrapping (BS) were conducted using the web server RAxML-HPC2 on TG v.7.2.8 on the Cipres web server (Miller et al., 2010), with 5000 rapid bootstrap analyses followed by a search for the best-scoring tree in a single run (Stamatakis et al., 2008).

Bayesian inference (BI) was conducted using MRBAYES 3.1.2 (Huelsenbeck and Ronquist, 2001; Ronquist and Huelsenbeck, 2003) on Cipres (Miller et al., 2010) with temperature parameter set to 0.2, and other priors set to their default values. Two independent runs, each with four chains (one cold, three heated), were conducted, each beginning with a random tree and sampling one tree every 1000 generations of 10 000 000 generations. Convergence among runs and stationarity were assessed using TRACER v.1.4 (Rambaut and Drummond, 2007), and a burnin was discarded. The remaining trees were used to calculate a 50% majority-rule consensus topology and posterior probabilities (PP).

Results

A total of 1958 new sequences (with *trnL* and *trnL-F* combined and *rps4* and *rps4-trnS* combined) were newly generated for this study (Appendix 1). The total length of the aligned sequences was 5322 bp (details concerning the datasets analysed and statistics for the resulting trees are shown in Table 3). Comparisons of tree topologies from the MP analyses of the individual markers did not identify any well-supported conflicts ($JK \geq 70\%$; Mason-Gamer and Kellogg, 1996; Zhang and Simmons, 2006). Thus, the six plastid markers were concatenated and analysed in unison. The topology of the ML tree based on the concatenated dataset (Figs 2 and 3) is mostly concordant with those based on each individual marker, but with generally increased support values. The simplified ML phylogeny of Aspleniaceae and outgroups based on the concatenated data is presented in Fig. 2 and parts of the full ML phylogeny are shown in Fig. 3a–k. The alignments and ML tree are deposited at TreeBase with study # 24494 (<http://purl.org/phylo/treebase/phyloids/study/TB2:S24494>)

Table 2
Best-fitting models and parameter values for separate (*atpB*, *rbcL*, *rps4*, *rps4* gene & *rps4-trnS* spacer and *trnL* & *trnL-F*) and concatenated plastid datasets in this study

Region	Base frequencies				Substitution model (rate matrix)										
	A	C	G	T	A-C	A-G	A-T	C-G	C-T	G-T	Ti/tv	I	G		
Plastid <i>atpB</i> gene	0.29	0.19	0.23	0.29	1.633	10.227	0.322	1.300	20.196	1.000	0.00	0.52	1.15		
Plastid <i>rbcL</i> gene	0.27	0.20	0.24	0.29	1.707	6.497	0.648	1.045	10.268	1.000	0.00	0.48	0.82		
Plastid <i>rps4</i> gene & <i>rps4-trnS</i> spacer	0.35	0.16	0.18	0.31	1.142	3.579	0.304	0.835	3.579	1.000	0.00	0.15	1.40		
Plastid <i>trnL</i> intron & <i>trnL-F</i> spacer	0.33	0.17	0.18	0.31	0.911	2.777	0.314	0.707	2.777	1.000	0.00	0.06	1.53		
Concatenated	0.31	0.18	0.20	0.30	1.188	4.160	0.385	0.826	4.990	1.000	0.00	0.35	1.21		

G, gamma distribution shape parameter; GTR, general-time-reversible model (Rodríguez et al., 1990); I, proportion of invariable sites; Ti/Tv, transition/transversion ratio; TVM, transversion model.

Aspleniaceae, *Hymenasplenium* and *Asplenium* s.l. were each maximally supported as monophyletic (MLBS $\geq 100\%$, MPJK $\geq 100\%$, PP ≥ 1.00) (Fig. 2). Based on our phylogeny (Figs 2 and 3a–k) and in consideration of macro-morphological and distribution information, we divide *Asplenium* into four superclades and 11 major clades (Fig. 2). The four superclades include the *A. erosum* superclade (MLBS: 100%, MPJK: 99%, PP: 1), the *Neottopteris* superclade (MLBS: 87%, MPJK: 83%, PP: 1), the *Asplenium* superclade (MLBS: 78%, MPJK: –, PP: 1), and the *Pleurosorus* superclade (MLBS: 100%, MPJK: 97%, PP: 1). The *A. erosum* superclade is sister to the rest, followed by the *Pleurosorus* superclade, which is sister to a clade containing the *Asplenium* and the *Neottopteris* superclades. The *Neottopteris* superclade contained two major clades, the *Asplenium* superclade contained seven major clades, whereas the other two each contained one major clade. Nine of the 11 major clades were strongly supported in all three analyses (MLBS $\geq 99\%$, MPJK $\geq 89\%$, PP ≥ 1.00), whereas two (clades V & VII) were strongly supported in two analyses (MLBS $\geq 89\%$, MPJK $\geq 64\%$ and PP ≥ 0.87). The relationships among the 11 major clades were mostly well-resolved and strongly supported. A few clades were further resolved into strongly or moderately supported subclades (Figs 2 and 3a–k).

Of the 11 major clades resolved in our study, nine were identified in earlier studies (e.g. Schneider et al., 2017). With the better resolved relationships and larger taxon sampling in our study, we divide the *Schaffneria* clade sensu Schneider et al. (2017) into three clades: the *Schaffneria* clade, the *Asplenium dareoides* clade and the *A. trichomanes* clade.

Discussion

The monophyly of Aspleniaceae and Asplenium

Despite the controversial relationships among the families (Aspleniaceae, Diplaziopsidaceae, Hemidictyaceae and Rhachidosoraceae) of eupolypods II, the monophyly of Aspleniaceae was supported by various earlier studies (Kuo et al., 2011; Rothfels et al., 2012b, 2015; Shen et al., 2017; Wei et al., 2017), a result we corroborate (Fig. 2). Morphologically, Aspleniaceae usually possess clathrate scales, rhizomes with dictyostelic, radial or dorsiventral steles, two vascular bundles C-shaped to elliptic or X-shaped, sori one per vein (“asplenioid”), and sporangial stalks that are uniseriate in the middle (our Fig. 1; Kramer and Viane, 1990; Lin and Viane, 2013; Sundue and Rothfels, 2014).

Within Aspleniaceae, *Hymenasplenium* is resolved as sister to all other members of the family, whereas all

Table 3
Data matrices and tree statistics for each of the analyses

Matrix	# Accessions	# Missing (%)	# Chars.	# PI Chars. (%)
Plastid <i>atpB</i> gene	533	72.1	1260	409 (32.5)
Plastid <i>rbcL</i> gene	879	24.4	1277	465 (36.4)
Plastid <i>rps4</i> gene & <i>rps4-trnS</i> spacer	742	51.0	1330	716 (53.8)
Plastid <i>trnL</i> intron & <i>trnL-F</i> spacer	690	75.6	1458	684 (46.9)
Concatenated	1030	49.9	5322	2274 (42.7)

Missing data include missing sequences, uncertain bases (N, R, Y, V, etc.) and gaps (-). PI, parsimony-informative.

other 32 segregate genera included in our sampling are nested within *Asplenium* (Figs 2 and 3a–k). *Asplenium* s.l. (Aspleniaceae excluding *Hymenasplenium*) is strongly supported as monophyletic.

Hybridization, polyploidization and cryptic speciation in Asplenium

Within several clades resolved in our study, such as the *Asplenium bullatum* clade, the *Neottopteris* clade, the *Pleurosorus* clade and the *Tarachia* clade, some species are resolved in multiple positions, such as *A. adiantum-nigrum* L., *A. onopteris* L., *A. rutamuraria* L., *A. wrightioides* Christ, *A. shikokianum* Makino and some bird-nest species. These patterns could be due to either misidentifications or misunderstood species boundaries resulting from hybridization, polyploidization and cryptic speciation in *Asplenium*.

Many species of *Asplenium* are well-known for frequent and extensive hybridization and polyploidy, often producing hybrids or taxa with intermediate morphology (e.g. Wagner, 1954; Walter et al., 1982; Bennert et al., 1988; Rasbach et al., 1979, 1994; Reichstein, 1981, 1994; Prelli, 1996; Shepherd et al., 2008; Bellefroid et al., 2010; Lee et al., 2015). This leads to the blurring of species boundaries and the emergence of cryptic species.

The deepest splits in Asplenium

The deepest splits in the phylogeny delimit three of the four superclades (the *A. erosum* superclade, the *Neottopteris* superclade and the *Pleurosorus* superclade). Two of these three superclades comprise nearly all the members of the segregate genera, *Caenopteris* Bergius, *Ceterach* Willd., *Ceterachopsis* (J. Sm.) Ching, *Darea* Juss. and *Loxoscaphe* T. Moore, *Neottopteris* J. Sm., *Onopteris* Neck., *Phyllitis* Hill, *Pleurosorus* Fée, and *Scolopendrium* Adans., and six of these segregates (*Ceterachopsis*, *Diellia*, *Neottopteris*, *Onopteris*, *Phyllitis*, and *Pleurosorus*) are resolved as monophyletic (see below). Therefore, our study suggests that some of those segregates could be recognized at some taxonomic rank.

The Asplenium superclade

The *Asplenium* superclade contains clades IV–X in our study (Fig. 2). This is the largest superclade and the classification of this superclade is difficult. Within this superclade, the *A. bullatum* clade is weakly resolved as sister to a clade containing the *Tarachia* clade and the remaining five clades (V–IX). However, the interpretation of the relationships within this superclade is limited due to the absence of a detailed and critical study of nuclear and morphological data.

The Neottopteris superclade

The *Neottopteris* superclade contains the *Phyllitis* clade and the *Neottopteris* clade (Fig. 2). Some representatives of each clade were included in previous studies; however, the relationships among the two clades were not well-supported (Pinter et al., 2002; Schneider et al., 2004; Ohlsen et al., 2015; Loriga et al., 2016; Schneider et al., 2017). Our analysis, with at least 127 species included, strongly supports the sister relationship between the *Phyllitis* clade and the *Neottopteris* clade. The *Neottopteris* superclade contains the segregate genera *Ceterach*, *Ceterachopsis*, *Darea*, *Loxoscaphe*, *Neottopteris* and *Phyllitis*. All species of *Ceterach*, *Ceterachopsis*, *Neottopteris* and *Phyllitis* have simple or pinnatifid laminae, whereas species of *Darea* and *Loxoscaphe* have laminae 1- to 3-pinnate and indusia opening toward the segment margins.

Major evolutionary lineages of Asplenium

The c. 420 species of *Asplenium* sampled in our study are resolved into the following 11 major clades (Fig. 2). All of these major clades also are supported by macro-morphological, and/or distribution information.

Clade I—the Asplenium erosum clade

The *Asplenium erosum* clade was recovered with high support value and is clearly sister to the rest of *Asplenium*, a result consistent with earlier phylogenetic analyses (Schneider et al., 2004, 2017; Schuettpelz and

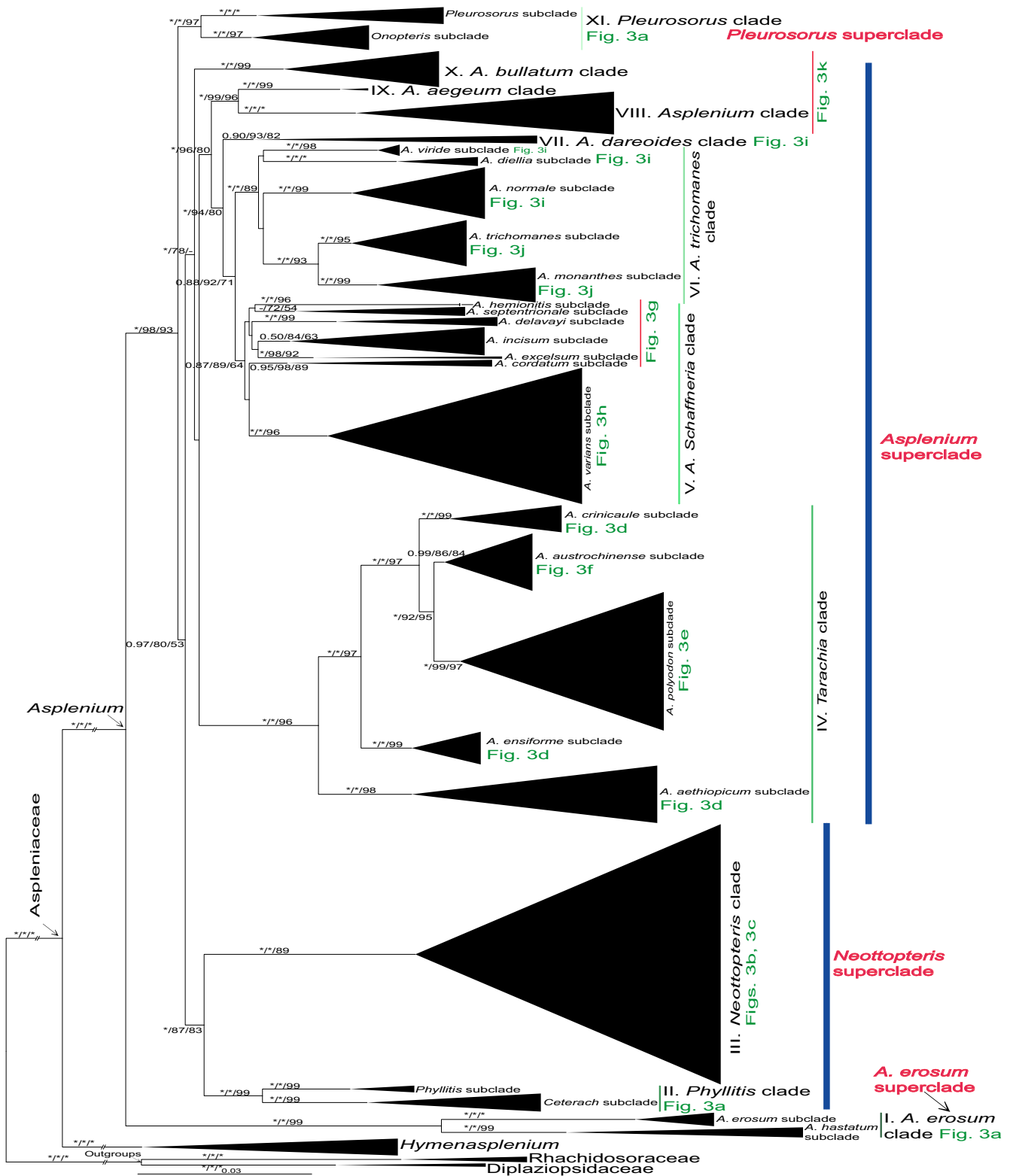


Fig. 2. Simplified maximum-likelihood phylogeny of *Asplenium* based on six plastid markers (*atpB*, *rbcl*, *trnL*, *trnL-F*, *rps4* and *rps4-trnS*). The sizes of hollow triangles are in proportion to the sampled sizes of individual clades. Support values (posterior probability, maximum-likelihood bootstrap support, and maximum parsimony jackknife support) are shown along the branches; values of 100% are indicated by asterisks.

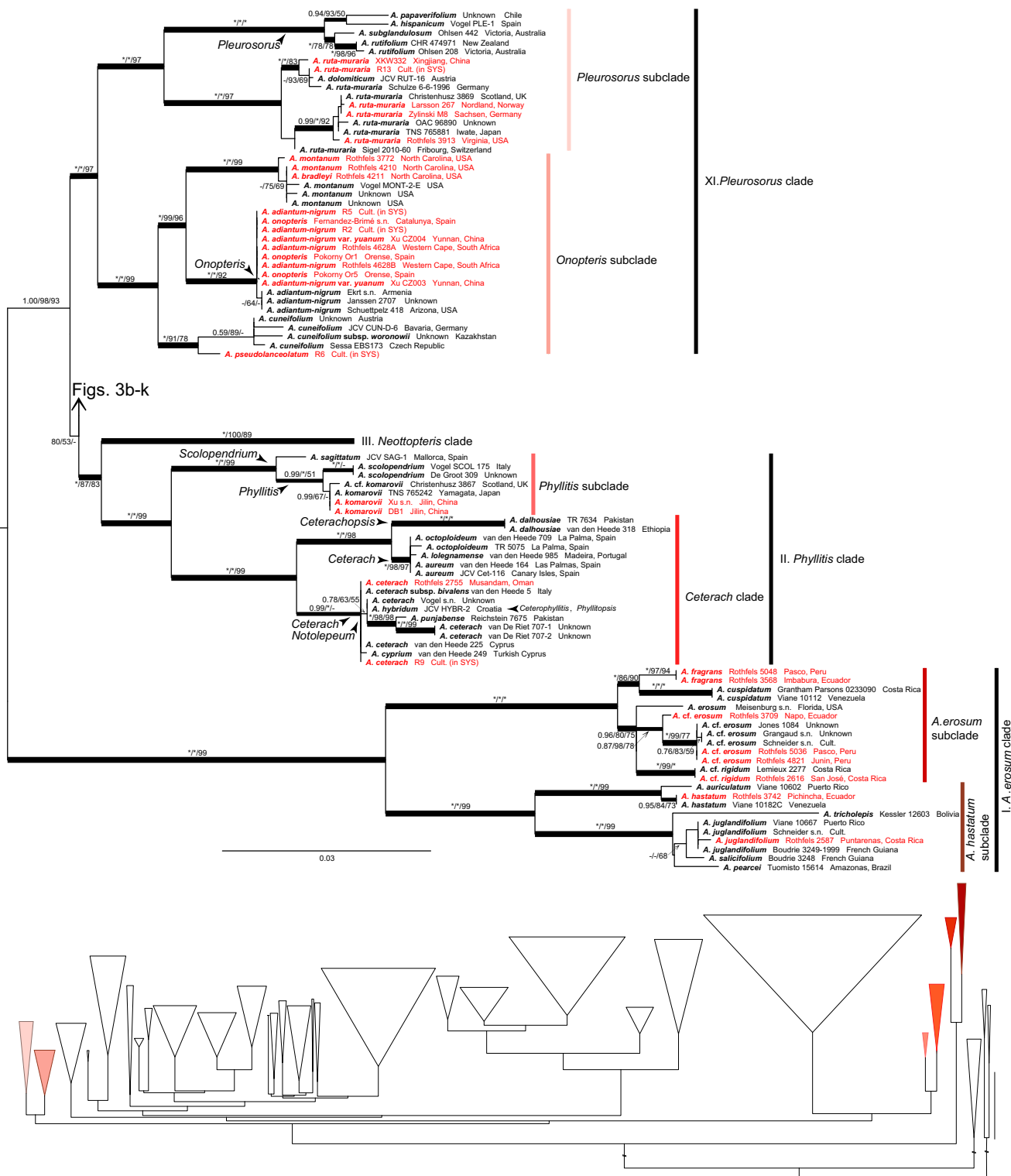


Fig. 3. Maximum-likelihood phylogeny of *Asplenium* based on six plastid markers (*atpB*, *rbcL*, *trnL*, *trnL-F*, *rps4* and *rps4-trnS*). Support values (Bayesian inference posterior probability, maximum-likelihood bootstrap support, and maximum parsimony jackknife support) are shown along the branches; values of 100% are indicated by asterisks. Voucher information and geographical provenance are indicated after the taxon name. Newly included accessions are shown in red and those from GenBank are shown in black. The clades and subclades are indicated by vertical bars.

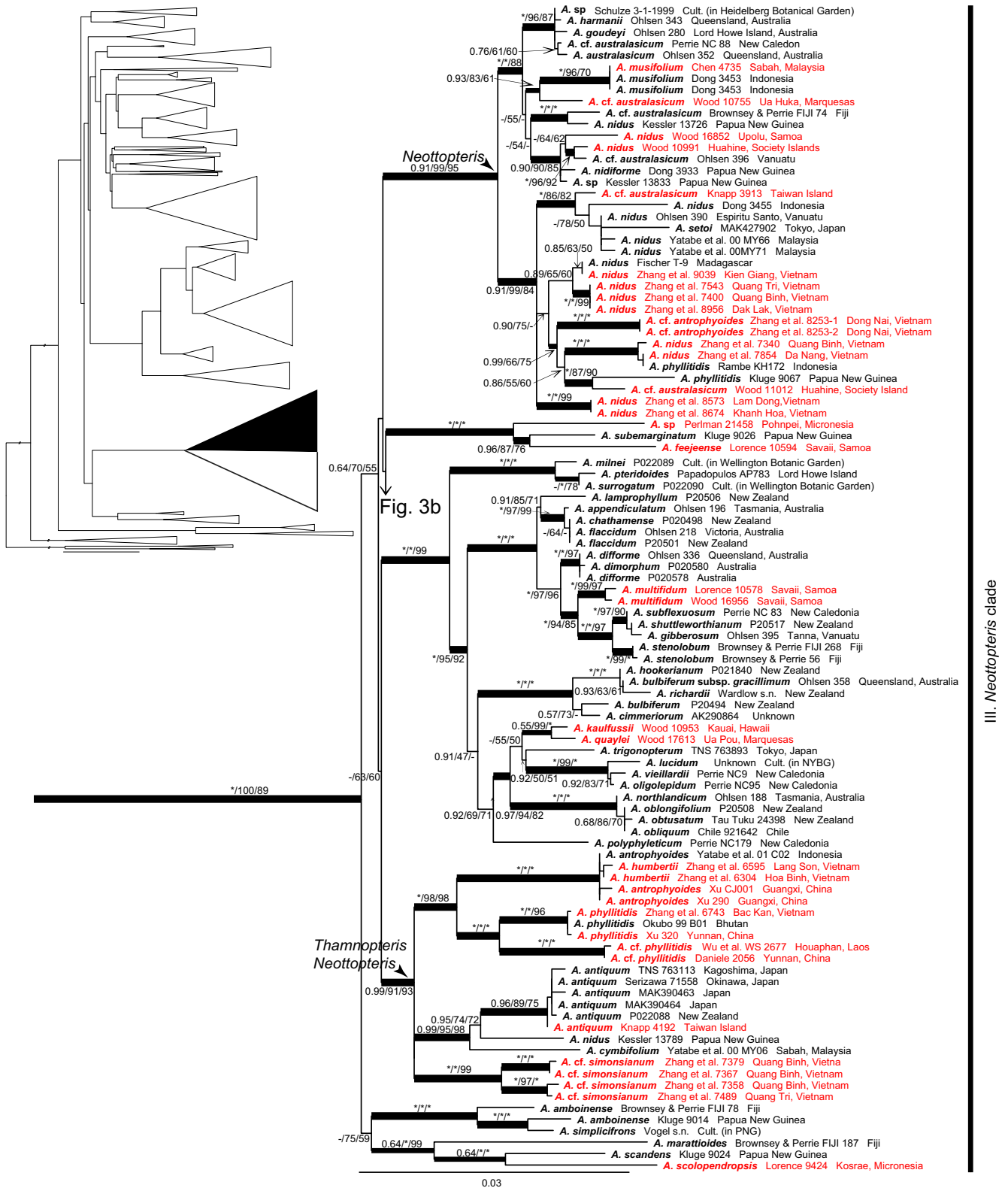


Fig. 3. Continued



Fig. 3c

III. Neopteris clade

Fig. 3. Continued

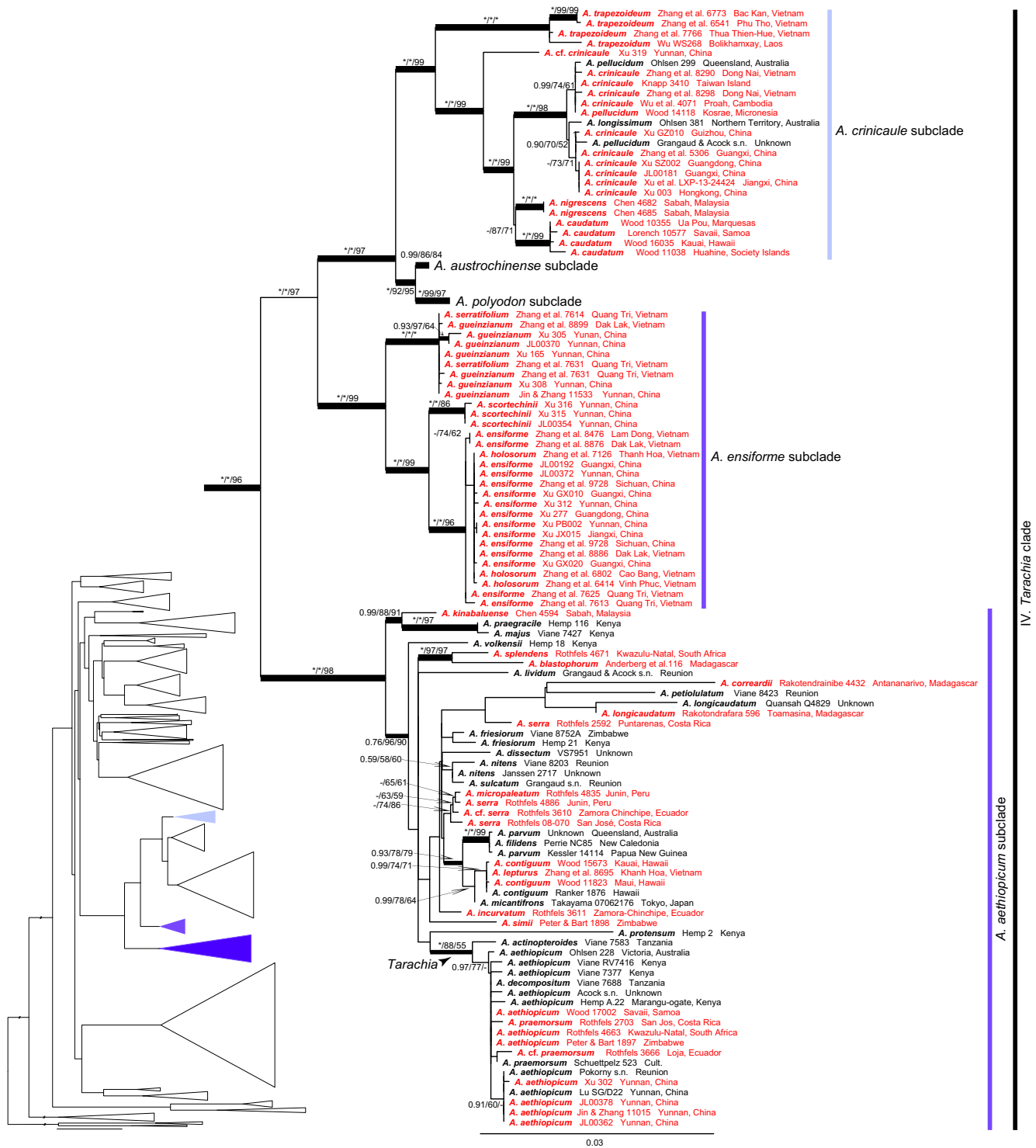


Fig. 3. Continued

Pryer, 2007; Ohlsen et al., 2015; Loriga et al., 2016). Our *A. erosum* clade corresponds the *A. auritum* clade sensu Schneider et al. (2017). The name *A. auritum* Sw. is a synonym of *A. erosum* L. No obvious

morphological synapomorphies are known for this clade except the thick leaves. Members of this clade are genetically heterogeneous and highly (probably allo) polyploid taxa with reticulate relationships, which

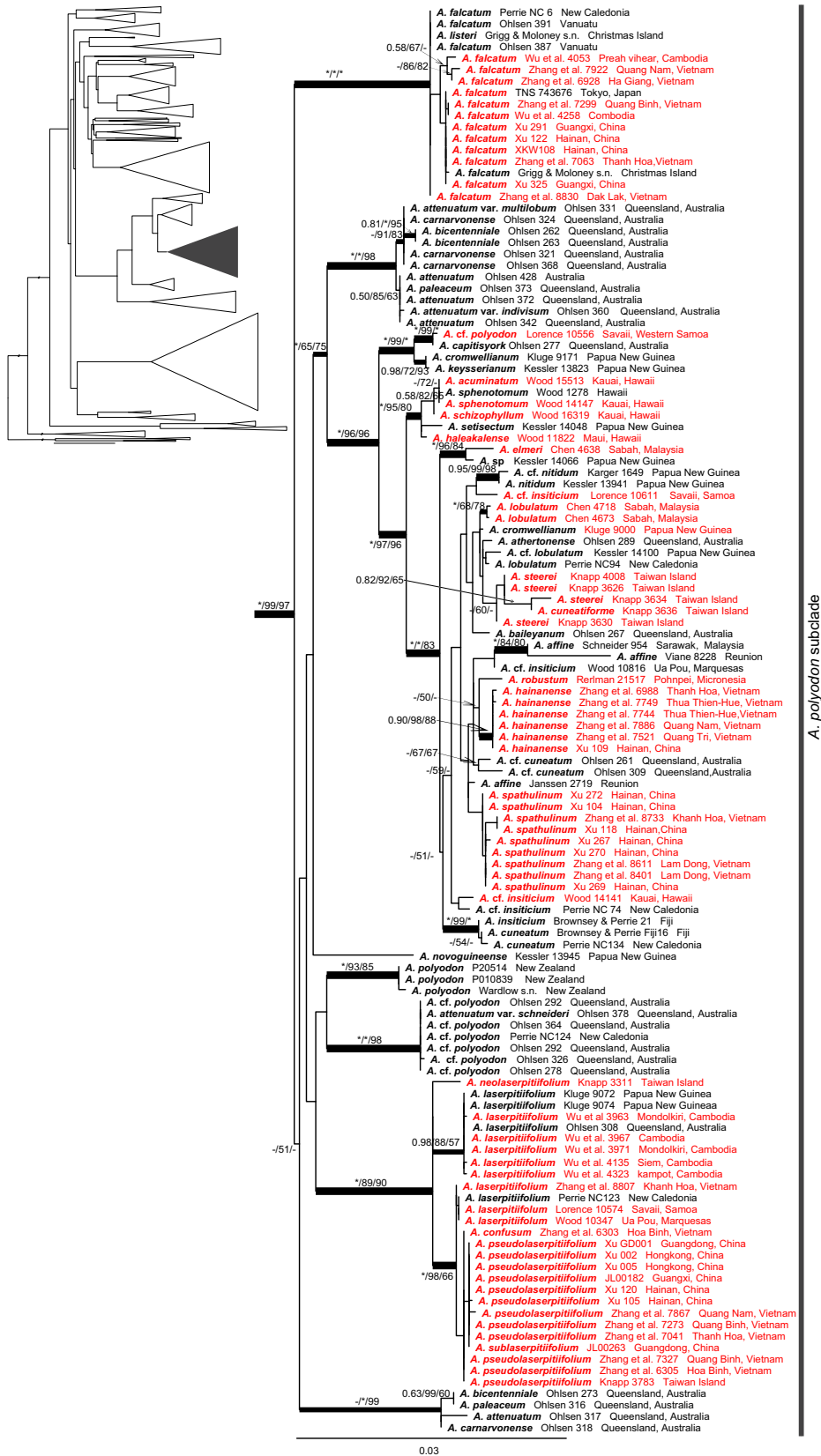


Fig. 3. Continued

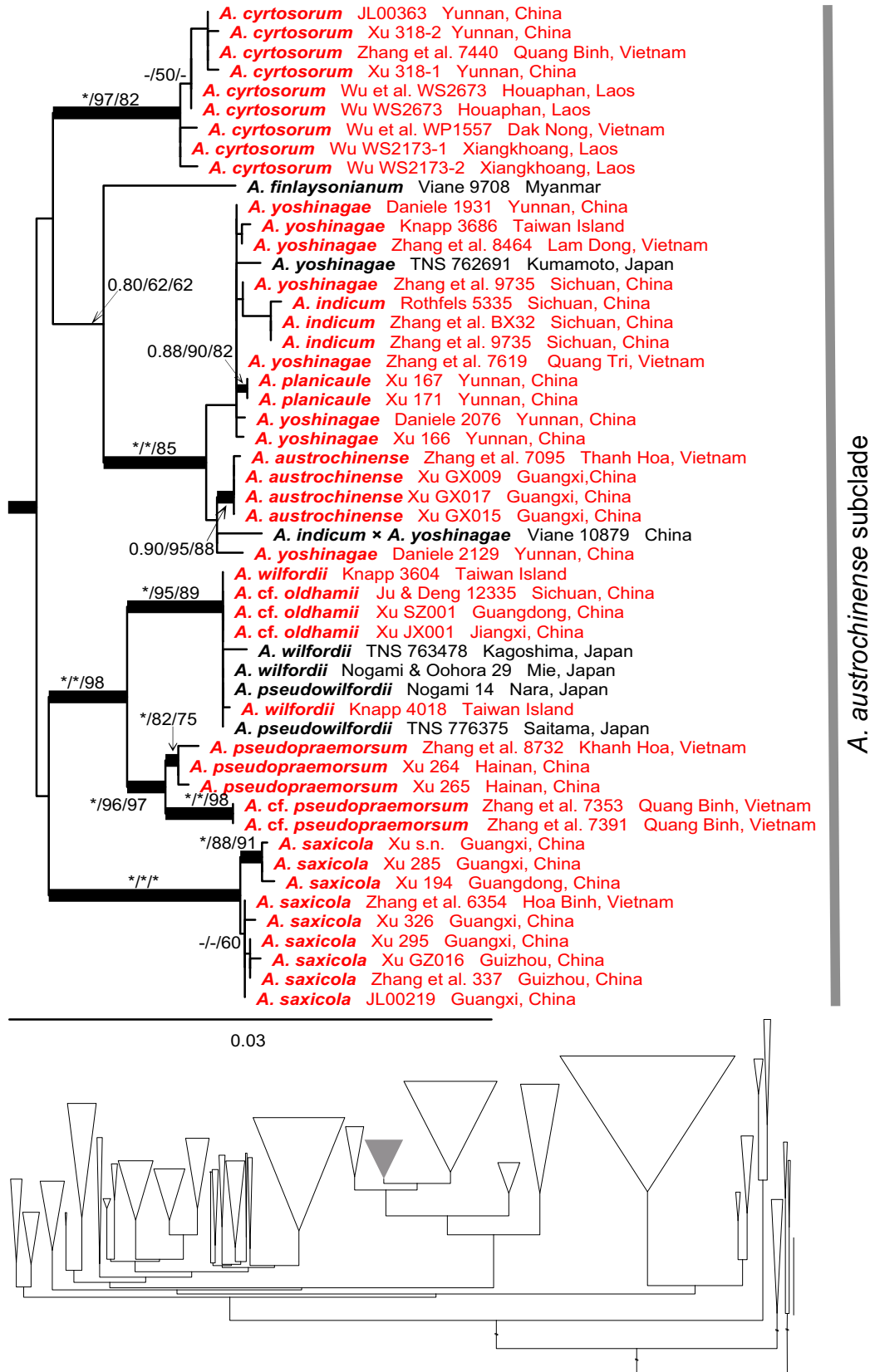


Fig. 3. Continued

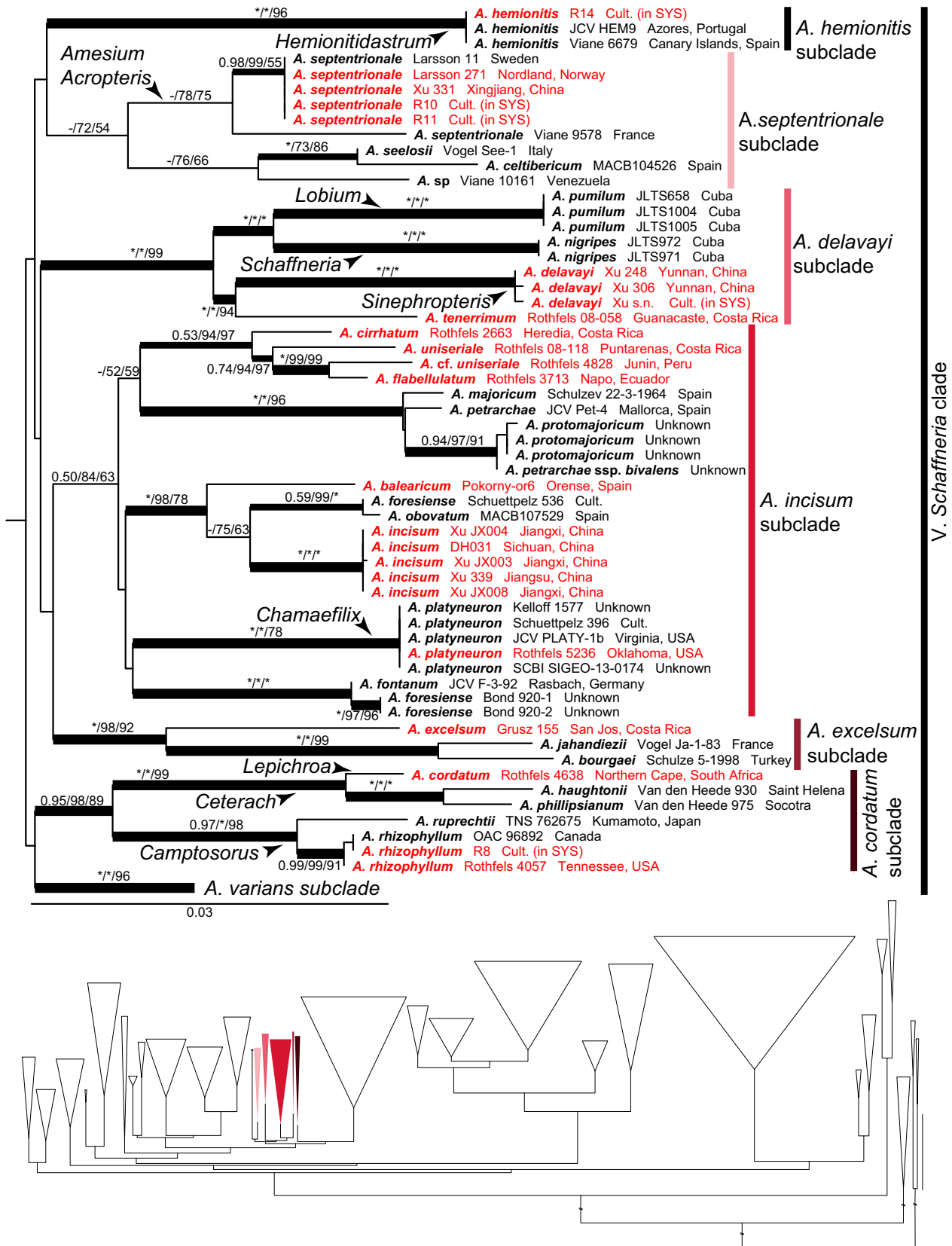


Fig. 3. Continued

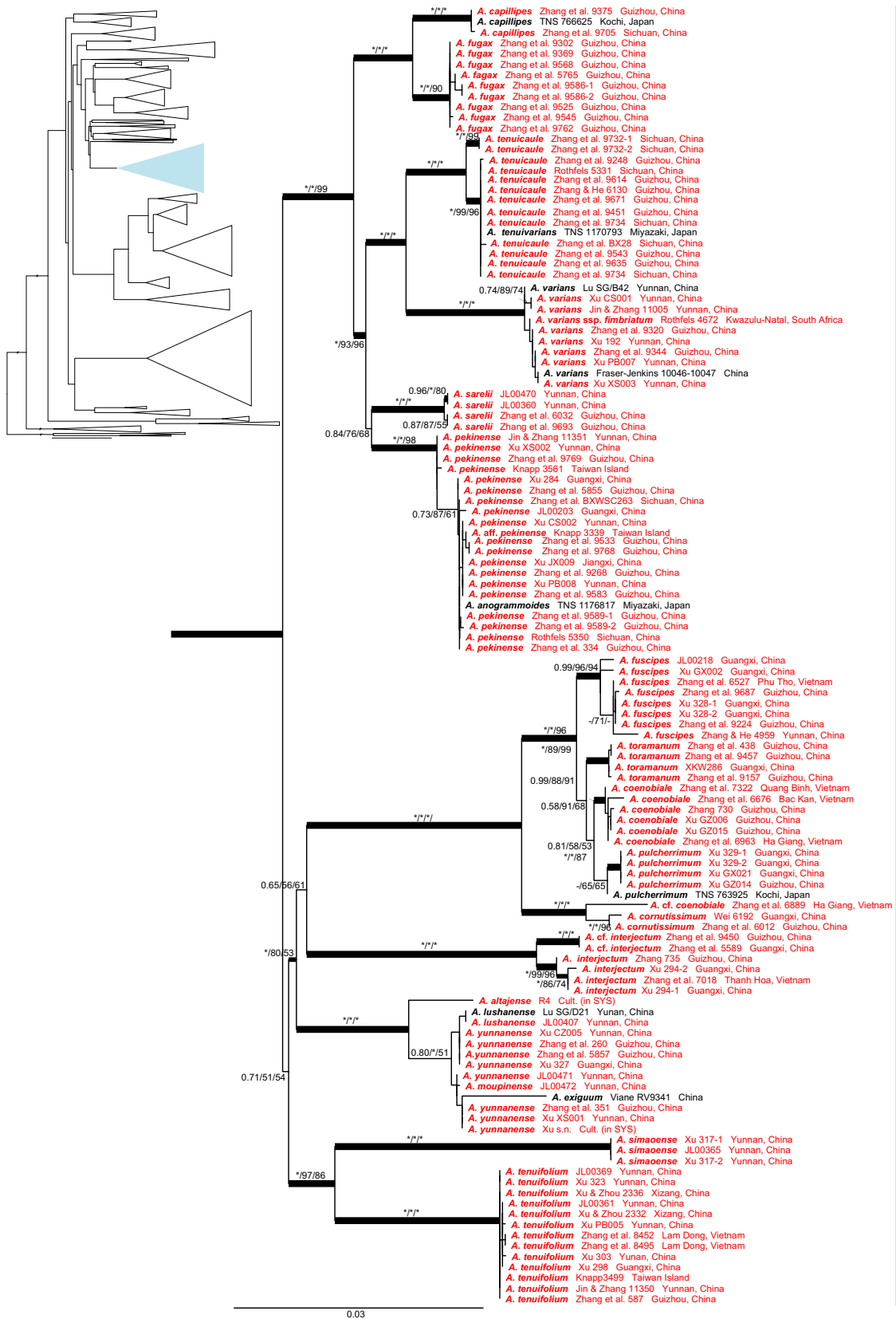


Fig. 3. Continued

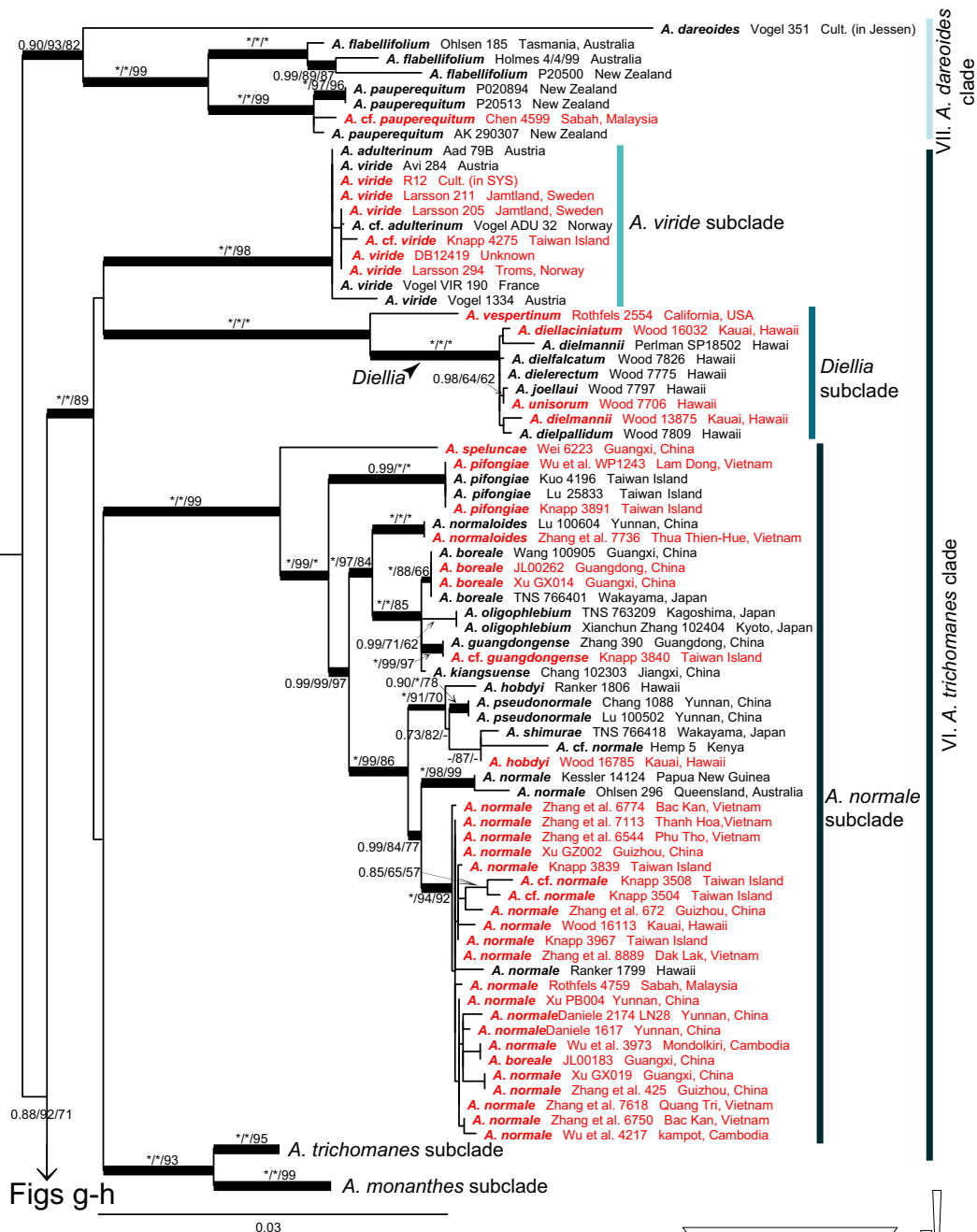


Fig. 3. Continued

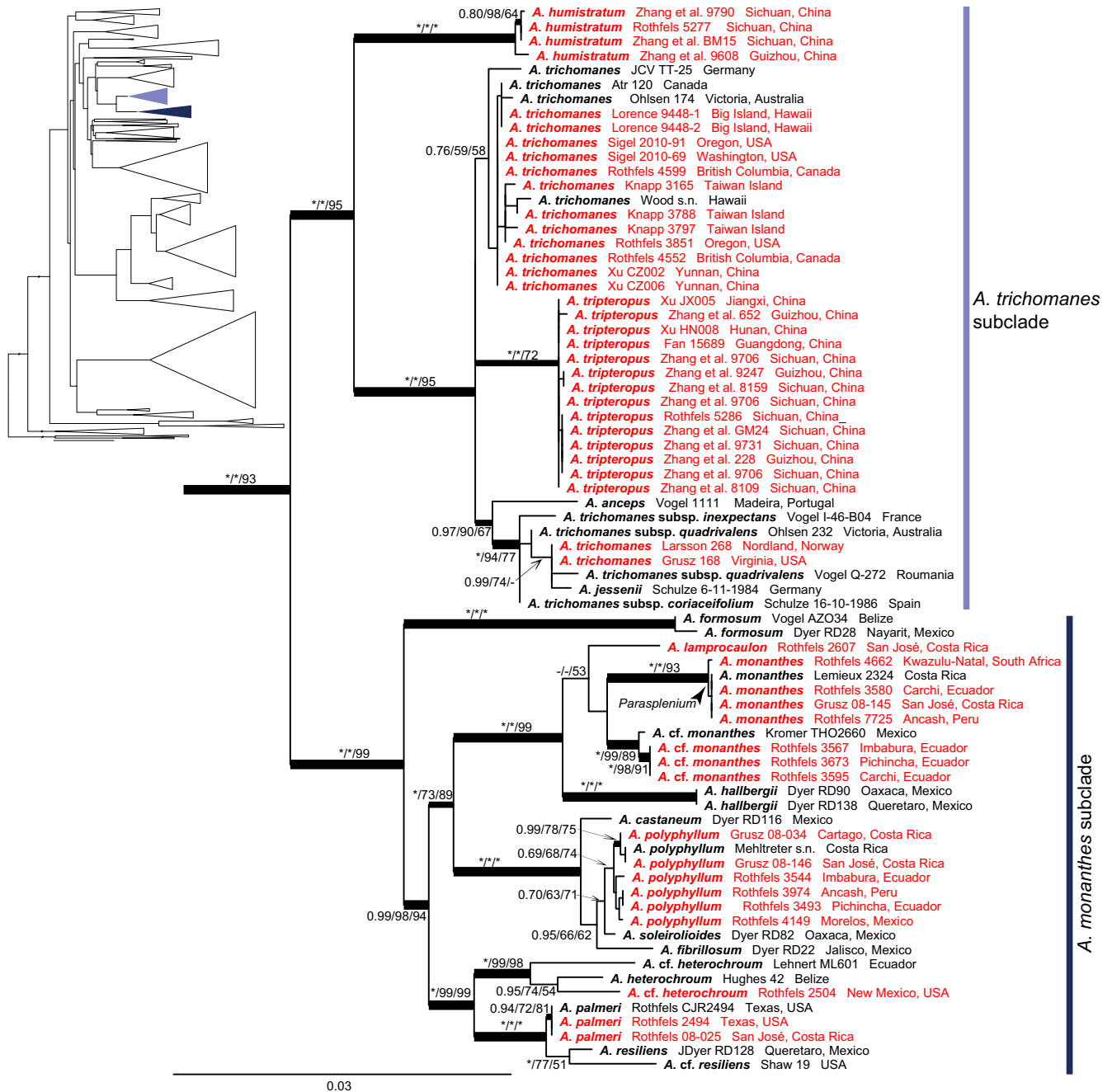


Fig. 3. Continued

a plastid phylogeny like ours cannot uncover and any diploid ancestral taxa in this clade are unknown (R. Viane, unpubl. data).

The *Asplenium erosum* clade is further resolved into two strongly supported subclades: the *A. erosum* subclade and the *A. juglandifolium* subclade. Species of the *A. erosum* subclade have 1- to 3-pinnate laminae, whereas those of the *A. hastatum* subclade have

1-imparipinnate laminae except *A. pearcei* Baker, which has a dissected lamina apex and looks like a hybrid.

Our sampling included 12 species and the size of this clade is expected to be expanded with additional taxon sampling. All species of this clade occur in the Neotropics, with one species, *A. erosum* itself, also in Africa.

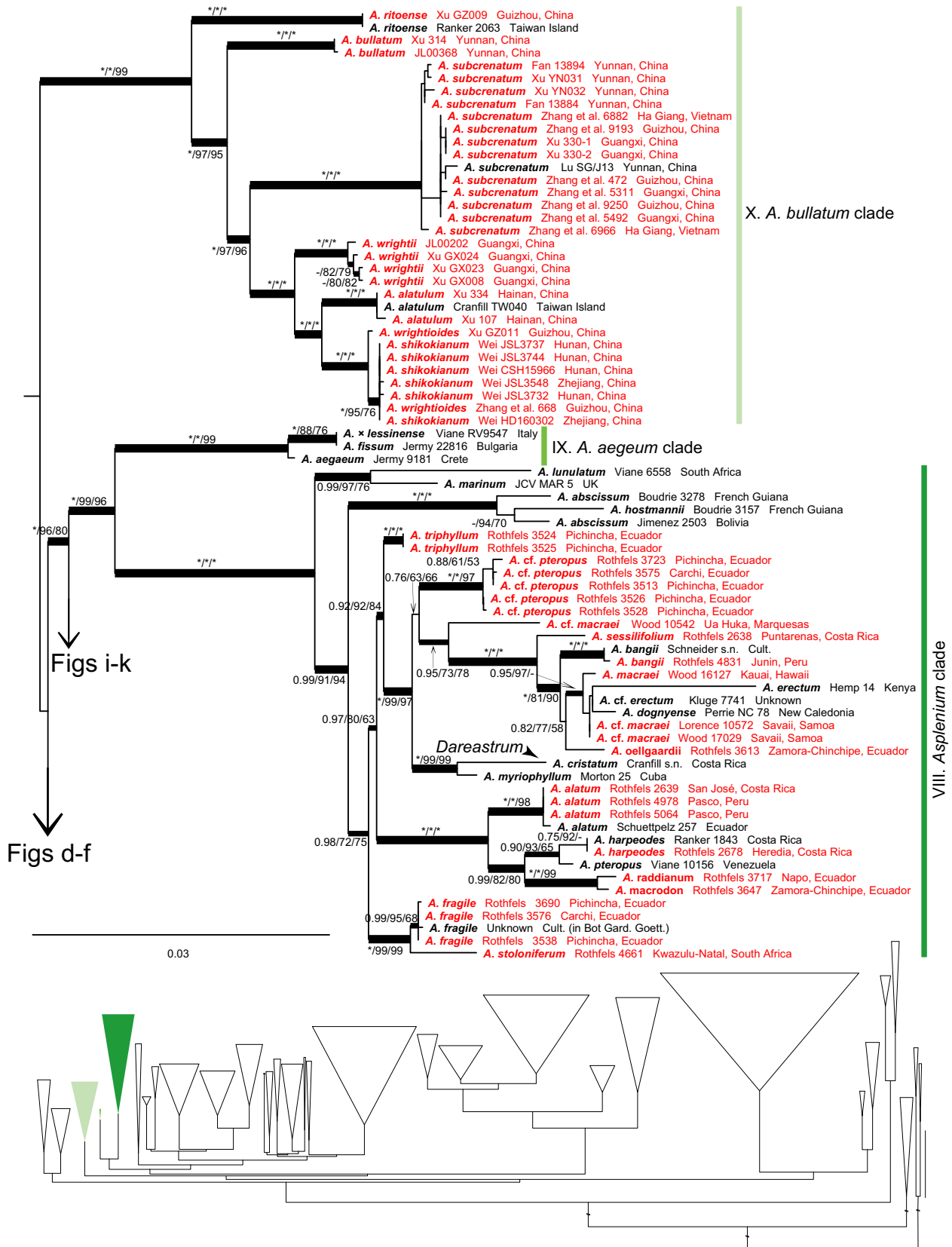


Fig. 3. Continued

Clade II—the *Phyllitis* clade

The *Phyllitis* clade is strongly supported as sister to the *Neottopteris* clade and approximates the previously recognized genera *Phyllitis*, *Ceterach* and *Ceterachopsis* (Fig. 3a). Both *Phyllitis* and *Ceterachopsis* are resolved as monophyletic, whereas *Ceterach* is paraphyletic. Species of this clade share a few morphological characters, such as simple or pinnatipartite lamina, persistent scales on the stipe, obscure anastomosing veins, and relatively thick, coriaceous laminae. The *Phyllitis* clade is further resolved into two strongly supported subclades, the *Phyllitis* subclade and the *Ceterach* subclade. Members of the *Phyllitis* subclade have simple leaves without indument, free veins and scolopendrioid (single and paired) sori, whereas members of *Ceterach* have pinnatifid leaves mostly with dense indumentum, mostly irregularly anastomosing veins, and regular asplenioid sori.

Our sampling included 14 species. They are widespread in Europe, Atlantic Islands, southwestern Asia to the Himalaya, drier parts of North, East and southern Africa, and North America (Pinter et al., 2002; van den Heede et al., 2003).

Clade III—the *Neottopteris* clade

The *Neottopteris* clade is strongly supported as sister to the *Phyllitis* clade and is disparate with respect to morphology, ecology and geographical distribution. Species have various laminar dissection (simple, 1- to 4-pinnate) and root cortex types (Schneider, 1997), and grow in various habitats (epilithic, terrestrial or epiphytic). However, most species of this clade share characters of leaf texture and leaf scales. Their laminae are leathery, subleathery or, rarely, subfleshy but thin when dried, and the abaxial side of the laminae is often sparsely covered with small brown fimbriate scales when young (Dong, 2011).

The *Neottopteris* clade is further resolved into ten strongly or moderately supported subclades, but relationships among these clades are poorly resolved (Fig. 3b,c). This clade comprises three previous segregates—*Darea*, *Loxoscaphe* and *Neottopteris*. Each of the segregates has their distinct characteristics, such as *Darea* with indusia opening toward the pinna margins, *Loxoscaphe* with marginal sori sunk in short, oblique, shallow boat-shaped cavities, and *Neottopteris* with simple fronds and anastomosing veins (Smith, 1841; Pichi Sermolli, 1977; Wu, 1999). However, none of these segregates is resolved as monophyletic in our analyses.

The clade containing *Asplenium marattioides* (Brack.) C.Chr., *A. scandens* Houlston & T.Moore and *A. scolopendropsis* F. Muell. (some of these or related taxa were placed in the former genus *Diplora* Baker), together with the clade containing *A. amboinense*

Willd. s.l. and *A. simplicifrons* F. Muell., is resolved as sister to the rest of the *Neottopteris* clade (Fig. 3b).

Members of true *Neottopteris* (the *nidus* group; the bird's nest ferns) have simple fronds and a sub-marginal commissural vein, and are resolved in several distinct clades, with most occurring in two clades: one with *A. nidus* L. s.l. and *A. australasicum* (J. Sm.) Hook. s.l., the second with *A. antrophyoides* Christ, *A. humberitii* Tardieu, *A. phyllitidis* D. Don, *A. antantiquum* Makino and other species (Fig. 3b). Material identified as *A. nidus* is resolved as polyphyletic in our analysis. *Asplenium nidus* is difficult to characterize and variable, with a lack of suitable distinguishing characters in the complex (Yatabe et al., 2001, 2009).

The position of *Asplenium gibberosum* (G. Forst.) Mett. (Fig. 3b) shows clearly that its “loxoscapoid” sorus is a feature mimicking the same sorus type in *A. theciferum* (Kunth) Mett. (Fig. 3c). *Asplenium rutifolium* Kunze, part of *Caenopteris* sensu Bergius (1782), is resolved as a member of the *A. loxoscapoides/A. theciferum* group, which contains many (auto)polyploidies (R. Viane, unpubl. data). The *A. daucifolium* Lam. group, the second part of *Caenopteris* sensu Bergius (1782), is not resolved in a clade with *A. rutifolium*, suggesting that *Caenopteris* is not monophyletic. Our results show that *A. mauritiensis* Lorence (1-pinnate, just like *A. daucifolium* var. *lineatum* (Sw.) C.V. Morton) is closely related to *A. daucifolium* (Fig. 3c). Taxa in the *A. anisophyllum* Kunze/*A. smedsii* Pic.Serm. group are all similar to each other (1-pinnate) and often difficult to identify; our results indicate their close relationships (Fig. 3c).

Three endemic species on Lord Howe Island (*A. milnei* Carruth., *A. pteridoides* Baker and *A. surrogatum* P.S. Green) form a well-supported clade, suggesting a single colonization event followed by *in situ* island speciation. This process appears not to have occurred in *Hymenasplenium*, despite its substantial distribution on islands (Xu et al., unpubl. data).

Species of this clade are found mainly in tropical and subtropical areas of Africa, Asia and the Pacific regions, with ≥ 113 species included in our study.

Clade IV—the *Tarachia* clade

The relationships of the *Tarachia* clade to the rest of the genus are not well-resolved with our data. As the largest of our major clades, it mainly comprises members of *Asplenium* ser. *Falcata* Ching & S.H. Wu (Wu, 1999; our Figs 2 and 3d–f). Members of this clade are terrestrial, epilithic or epiphytic and show much variation in lamina dissection (simple to 4-pinnate), but are consistent in having petioles covered with persistent scales.

Within the *Tarachia* clade, our samples are further resolved into five strongly supported subclades

(Fig. 2): the *A. aethiopicum* subclade, the *A. austrochinense* subclade, the *A. crinicaule* subclade, the *A. ensiforme* subclade and the *A. polyodon* subclade.

The *Tarachia* clade is largely restricted to the Old World, and members are mainly distributed in South and East Asia, the Pacific regions, Africa, and Madagascar and adjacent islands; a few species occur in the New World.

The Asplenium aethiopicum subclade

The *Asplenium aethiopicum* subclade is resolved as sister to the remaining subclades of the *Tarachia* clade (Fig. 2). Members of this subclade share the creeping or rarely suberect rhizomes with root-traces often enlarged, stipes and rachises often densely covered with brown to black scales, and leathery fronds (Mitsuta et al., 1980; Braithwaite, 1986; Crouch, 2012). This subclade contains at least *c.* 35 species in our sample and species are distributed in Africa, Madagascar, South America, South and East Asia, and Australia and adjacent islands.

The Asplenium austrochinense subclade

The *Asplenium austrochinense* subclade is strongly supported as sister to the *A. polyodon* subclade (Fig. 2). Members of this subclade vary in morphology such as lamina dissection (1- to 4-pinnate), veins (free vs. anastomosing) and gemmae (present vs. absent). Within the *Asplenium austrochinense* subclade (Fig. 3f), *A. finlaysonianum* Wall. ex Hook has anastomosing veins, whereas others have free veins. Anastomosing veins occur in other clades of *Asplenium*, such as the *Neottopteris* clade and the *Phyllitis* clade, suggesting that anastomosing veins have evolved at least three times in the genus. This subclade contains *c.* 12 species in our sample, and they are restricted to Asia, widely distributed in Central, South, and Southwest China and adjacent regions.

The Asplenium crinicaule subclade

The *Asplenium crinicaule* subclade is strongly supported as sister to a clade containing the *A. austrochinense* subclade and *A. polyodon* subclade (Fig. 2). Members of this subclade all have 1-pinnate laminae. Relationships within this subclade are well-resolved (Fig. 3d). The clade containing the simple-leaved *A. serratifolium* Li Bing Zhang & K.W. Xu and the pinnate to pinnate-pinnatifid-leaved *A. gueinzianum* Mett. ex Kuhn is resolved as sister to a clade containing species with simple leaves. All of these species have thick leaf texture. It is quite surprising that *A. gueinzianum* is not closely related to *A. yoshinagae* Makino/*A. indicum* Sledge, which it resembles morphologically.

Our sampling included *c.* nine species in the *A. crinicaule* subclade. Members in this subclade are distributed mainly in South and East Asia, and the Pacific regions including Australia, New Zealand and adjacent islands.

The Asplenium ensiforme subclade

As the second-earliest diverging lineage, the *Asplenium ensiforme* subclade is strongly supported as sister to a clade containing the *A. austrochinense* subclade, the *A. crinicaule* subclade and the *A. polyodon* subclade (Fig. 2). Members of the *A. ensiforme* subclade have stramineous stipes that are covered with scales, herbaceous laminae and abaxially with brown small scales or subglabrous. Four of the five species have simple laminae, whereas the laminae of *A. gueinzianum* Mettenius ex Kuhn is 1-pinnate to pinnate-pinnatifid. Our sampling included an estimated five species (Fig. 3d). Members of the subclade are restricted to the South and East Asia, especially in South and Southwest China and adjacent regions.

The Asplenium polyodon subclade

The *Asplenium polyodon* subclade is well-supported as sister to the *A. austrochinense* subclade (Fig. 2). Within this subclade, at least eight lineages can be identified, but relationships among them are not resolved in our study (Fig. 3e). Some species such as *A. cuneatifolium* Christ are shown to contain multiple species. Morphological characteristics uniting members of this subclade are unclear—further observations and cytological study are needed to understand the species delimitations of some complex taxa in the subclade. Our sampling included *c.* 52 species and this subclade is the most diverse subclade in the *A. tarachia* clade in our sampling. Members of this subclade are distributed mainly in Asia and the Pacific regions including Australia, New Zealand and adjacent islands.

Clade V—the *Schaffneria* clade

The *Schaffneria* clade is moderately supported as monophyletic in our analysis (Fig. 2). Members of this clade vary in laminar shape and dissection, and petiole colour. They are distributed worldwide and can be terrestrial, epilithic or epiphytic. Understanding relationships within this clade is difficult because of the complexity of features exhibited and the poorly resolved phylogeny (Fig. 3g,h).

Within the *Schaffneria* clade, the 179 accessions representing *c.* 56 species in our sampling are resolved into seven subclades: the *A. cordatum* subclade, the *A. delavayi* subclade, the *A. excelsum* subclade, the *A. hemionitis* subclade, the *A. incisum* subclade,

the *A. septentrionale* subclade and the *A. varians* subclade. All of these subclades are strongly supported as monophyletic except the *A. incisum* subclade and the *A. septentrionale* subclade whose monophyly is weakly supported, and the *A. hemionitis* subclade is monospecific in our sampling. Relationships among these seven subclades are not well-supported (Figs 2 and 3g,h), whereas relationships within each of them are mostly well-resolved.

The *Asplenium hemionitis* subclade

Our sampling included only *A. hemionitis* L. in this subclade (Fig. 3g). This species is characterized by its unusual laminar shape (entire and 5-lobed). It is a diploid, with $2n=72$, and is not known to hybridize (Queirós and Ormonde, 1987); this evidence, plus the long branch in our tree, suggests the genetic isolation of this species. This species is considered to be restricted to the western Mediterranean (Portugal, northwestern Africa) and the Macaronesian Islands (Hansen and Sunding, 1993).

The *Asplenium delavayi* subclade

Most members of the *Asplenium delavayi* subclade are characterized by having rounded pinnae with radial veins and sori. The close relationship between *A. delavayi* (Franch.) Copel. and *A. nigripes* (Fée) Hook., based on their small size, black petioles, entire, fan-shaped blades, anastomosing venation and scolopendrioid sori, was suggested by Copeland (1947) and Tardieu-Blot (1957). Lóriga et al. (2016) hypothesized that *A. pumilum* Sw. is the sister species of *A. nigripes*. Here we included *A. delavayi* and *A. tenerrimum* Mett. ex Kuhn for the first time in a molecular analysis, and our study shows that the Asian *A. delavayi* is sister to the American *A. tenerrimum*, which has deltate pinnae with linear or narrowly obovate ultimate segments, simple veins, and 1 sorus per ultimate segment, and that *A. nigripes* from a few localities in Mexico, Guatemala, Costa Rica and Cuba is sister to *A. pumilum* from tropical South America, Central America, the Caribbean islands, tropical Africa and Madagascar (Fig. 3g; Moran and Smith, 2001). Our sampling included four species in the *delavayi* subclade, distributed in South and Central America, the Caribbean islands, tropical Africa and Madagascar, and Asia (Moran and Smith, 2001; Lin and Viane, 2013).

The *Asplenium excelsum* subclade

Our sampling included three species with very disjunct distributions in the *Asplenium excelsum* subclade (Fig. 3g). *Asplenium excelsum* Lellinger, distributed in

Mesoamerica and Ecuador, is resolved as sister to *A. bourgaei* (Boiss.) Milde plus *A. jahandiezii* (Litard.) Rouy from southern Europe. Morphologically, the first species is very different from the latter two in rhizome structure, laminar dissection and scale size. *Asplenium excelsum* has very short-creeping rhizomes, (2–)3-pinnate-pinnatifid fronds and scales $5–10 \times 1.5–4$ mm, whereas the last two species have short-erect rhizomes, pinnatipartite to pinnate laminae and much smaller scales.

The *Asplenium incisum* subclade

The *Asplenium incisum* subclade does not have a clear synapomorphy, but species of this subclade do share castaneous stipe bases. The relationships within the subclade are not well-resolved, with the strongly supported (in two analyses) American lineage (*A. cirrhatum* Rich. ex Willd., *A. flabellulatum* Kunze, *A. uniseriale* Raddi, and *A. cf. uniseriale*) weakly supported as sister to the strongly supported European lineage (*A. majoricum* Litard., *A. petrarchae* DC. subsp. *petrarchae*, *A. petrarchae* subsp. *bivalens* Lovis & Reichst., and *A. protomajoricum* Pangua & Prada; Fig. 3g). This sister-relationship appears strange.

Maternal origins of a number of hybrids are confirmed in our study: *A. balearicum* Shivas (= *A. onopteris* L. \times *A. obovatum* Viv.), *A. forensiense* Legrand (= *A. fontanum* (L.) Bernh. \times *A. obovatum*), *A. protomajoricum* (= *A. fontanum* \times *A. petrarchae* subsp. *bivalens*) and *A. majoricum* (via chromosome doubling of *A. protomajoricum*; Fig. 3g).

Our sampling included c. 15 species that are mainly distributed in Asia, the Americas and Europe.

The *Asplenium septentrionale* subclade

Most members of the *Asplenium septentrionale* subclade share diminutive laminae consisting of a relatively long green petiole and a small lamina which may vary from entire to divided into two or three separate segments (Pajarón et al., 2005; Lin and Viane, 2013). Plants are strictly epilithic, often occurring in crevices of rocks, around boulders and on cliffs. The relationships within the subclade need more investigation (Fig. 3g) and it might be divided into more subclades with expanded sampling. Our sampling included c. five species distributed mainly in the Americas, northern Asia and Europe.

The *Asplenium cordatum* subclade

The *Asplenium cordatum* subclade does not have obvious diagnostic macromorphological characteristics. This subclade contains three xerophytic species of the previous satellite genus *Ceterach* and two species

of *Camptosorus*, and members of the subclade are resolved into two strongly supported lineages—the *Ceterach* lineage (*A. cordatum* (Thunb.) Sw., *A. haughtonii* (Hook.) Bir, Fraser-Jenk. & Lovis, and *A. phillipsianum* (Kümmerle) Bir, Fraser-Jenk. & Lovis) and the *Camptosorus* lineage (*A. rhizophyllum* L. and *A. ruprechtii* Sa. Kurata). Our results confirm the paraphyly of *Ceterach* discovered by Pinter et al. (2002) and van den Heede et al. (2003).

Our study further suggests a strongly supported sister-relationship between *Camptosorus* and the species of *Ceterach* from Africa, Yemen and St Helena (Fig. 3g), a new finding deviating from the results of previous studies (Schneider et al., 2004; Ohlsen et al., 2015). Morphologically, the three species of *Ceterach* in this subclade have laminae pinnate to bipinnate, densely covered with indument and veins free, whereas species of *Camptosorus* have laminae simple, laminar apex flagelliform and terminating in a gemma or rooting, and veins anastomosing (Lin and Viane, 2013).

The Asplenium varians subclade

Species of the *Asplenium varians* subclade have castaneous to black or green stipes, herbaceous and lanceolate or ovate laminae, and indusia that open toward the costa (Ching and Wu, 1985; Wu, 1999). Reticulate evolution has resulted in highly variable morphology of members of the subclade (Wang et al., 2003). This subclade was largely unsampled in earlier studies and our study reveals a series of interesting phylogenetic relationships not previously known (Fig. 3h). For example, the taxonomy of the *A. coenobiale* complex, with castaneous stipes and rachises, has been puzzling, and species of this complex are well-resolved in six clades in our phylogeny. The two very similar species *A. capillipes* Makino and *A. fugax* Christ are resolved quite distinctly apart.

Our sampling included ≥ 25 species and species of this clade are widely distributed in the northern, northwestern and southwestern parts of China and Southeast Asia, and growing in exposed rock crevices, with some species ranging into the Pacific islands and South Africa (Ching and Wu, 1985).

Clade VI—the *Asplenium trichomanes* clade

The *Asplenium trichomanes* clade is well-supported as sister to the *Schaffneria* clade (Fig. 2). Members of this clade are characterized by being epilithic and having erect or short-creeping rhizomes, 1-pinnate laminae, and slender, castaneous to dark brown stipes. This clade comprises members of the “black-stemmed” *Asplenium* group. Within the *A. trichomanes* clade, the 141 accessions representing *c.* 50 species in our sampling are resolved into five well-supported subclades:

the *A. diellia* subclade, *A. monanthes* subclade, *A. normale* subclade, *A. trichomanes* subclade and the *A. viride* subclade, and each of the subclades corresponds to a species complex (Wagner, 1952; Chang et al., 2018). The relationships among these subclades are not well-resolved (Fig. 2). Members of this clade are distributed worldwide.

The Asplenium viride subclade

The *Asplenium viride* subclade is characterized by having green stipes and rachises, and the constituent species can be easily distinguished from taxa in the *A. trichomanes* clade, which often have castaneous stipes. This clade contains only two temperate diploid species, *A. adulterinum* Milde and *A. viride* Huds. Samples of *A. adulterinum* are nest within *A. viride* with low resolution (Fig. 3i). This result could be caused by the matrilineal inheritance in the hybrid *A. adulterinum* (Lovis and Lovis, 1955). This subclade is native to northern and western North America, northern Europe and northern Asia, and they often occur in crevices of calcareous, dolomitic or serpentine rocks, usually in hilly areas or in the submontane vegetation belt (Lovis and Lovis, 1955; Lin and Viane, 2013).

The Diellia subclade

The *Diellia* subclade approximates the segregated genus *Diellia* Brack, characterized by having marginal sori and laminae with anastomosing veins. Interestingly, our results show that members of *Diellia* are most closely related to *A. vespertinum* Maxon which has sori along costae and free veins, and is endemic to southern California and northern Baja California (Fig. 3i). No previous study has proposed a close affinity between *A. vespertinum* and *Diellia*. Morphologically, *A. vespertinum* has sori that are on basioscopic and acrosopic sides of pinnae and close to costa with free veins, whereas species of *Diellia* are generally with marginal sori co-occurring with anastomosing vein. Yet there are some interesting exceptions including *A. leucostegioides* having medial sori (different from the rest of *Diellia*) and *A. diellaciniatum* (and occasionally others) with veins mostly free. Soral position can vary in different populations of the same species of *Diellia*. Sometimes *A. vespertinum* has pinna shapes reminiscent of *A. dielfalcatum* and *A. dielirectum* of *Diellia*.

The sister-relationship between the Californian *A. vespertinum* and the Hawaiian *Diellia* and our overall phylogeny of the genus suggest that *Diellia* had a Californian ancestry, which is comparable to the silver-swords origin and radiation (*Argyroxiphium* DC., *Dubautia* Gaudich., *Wilkesia* A. Gray; Asteraceae; Hind et al., 1996), a pattern observed also in some mints,

sanicles, violets, Hawaiian chamaesyces and lineages of the carnation family (Baldwin and Wagner, 2010).

Our sampling included eight species in this subclade. Most members in the *A. trichomanes* clade have castaneous stipes, which support the Wagner (1952) hypothesis of the origin of *Diellia* within the ‘black-stemmed’ rock spleenworts.

All members of *Diellia* occur only on the Hawaiian islands, suggesting *in situ* island speciation. This is a second case of island radiations in *Asplenium*, comparable to a smaller radiation on the Lord Howe Island (clade III; Fig. 3b). Such *in situ* island speciation has rarely been documented in ferns, such as the New Zealand *Polystichum* Roth (Dryopteridaceae; Perrie et al., 2003), a few polyploids of *Asplenium* in New Zealand (Shepherd et al., 2008), three endemics in *Oreogrammitis* Copel. and ten in *Adenophorus* Gaudich. (Polypodiaceae) in the Hawaiian islands (Sundue et al., 2014), and a few species of *Hymenophyllum* Sm. (Hymenophyllaceae) on New Caledonia (Del Rio et al., 2017).

The *Asplenium normale* subclade

The *Asplenium normale* subclade is characterized by having castaneous to dark brown stipes and rachises without brown membranous wings or finger-like papillae (Lin and Viane, 2013). It comprises members of the *A. normale* complex and one species, *A. speluncae* Christ, with simple laminae, and contains ≥ 14 species. The distribution of the *A. normale* subclade ranges from East Africa, Madagascar and throughout the Indian Ocean, Southeast Asia, northern Australia, Pacific islands to Hawaii, South and Central China, and Japan (Chang et al., 2013, 2018).

The *Asplenium trichomanes* subclade

The *Asplenium trichomanes* subclade is characterized by having castaneous to dark brown stipes and rachises with two or three brown membranous wings or finger-like papillae (Lin and Viane, 2013). This subclade is well-supported as sister to the *A. monanthes* subclade (Fig. 3j). *Asplenium trichomanes* itself is resolved as polyphyletic in our analysis and species circumscription within the *A. trichomanes* complex is difficult. Diploid to hexaploid cytotypes are found in the complex, and they are hard to distinguish from one another morphologically (Tigerschild, 1981; Moran, 1982). This subclade contains *c.* 11 taxa. They are wide-ranging, occurring in North America, Asia, Australia, New Zealand and Europe.

The *Asplenium monanthes* subclade

The *Asplenium monanthes* subclade is resolved as sister to the *A. trichomanes* subclade (Fig. 3j). This

subclade presents a complex group that consists of ≥ 22 terrestrial and saxicolous species, of which 16 species were included in our sampling. Species of this subclade are distributed mainly in the Neotropics from southern North America, through Central and South America with its highest diversity in southern Mexico (Mickel and Smith, 2004; Dyer et al., 2012).

Clade VII—the *A. dareoides* clade

The *Asplenium dareoides* clade is resolved as sister to a clade containing the *A. trichomanes* clade and the *Schaffneria* clade (Figs 2 and 3i). *Asplenium dareoides* has no closely related species within its range (South America), and is resolved as sister to the other members of this clade but on a long branch. Both *A. flabellifolium* and *A. pauperequitum* are resolved as monophyletic but appear to each contain more than one species based on our analysis (Fig. 3i). Species of this clade are distributed in Pacific regions especially in Australia, New Zealand and their adjacent islands, with only one species—*A. dareoides*—occurring in Chile and Argentina of South America. This subclade thus represents a striking disjunction between the Pacific regions and South America.

Clade VIII—the *Asplenium* clade

The *Asplenium* clade is strongly supported as sister to the *Aegeum* clade (Figs 2 and 3k). Species of this clade generally share stipe and rachis ridges often with wings on both sides connecting adjacent pinnae, 1-pinnate linear-lanceolate laminae, trapeziform to oblong pinnae, and asymmetrical pinna bases. Our sampling included *c.* 24 species, and species of this clade are distributed mainly in South America, with some species ranging to Africa, Europe and Pacific regions.

Clade IX—the *Asplenium aegeum* clade

The *Asplenium aegeum* clade is well-resolved as sister to the *Asplenium* clade (Figs 2 and 3k). Members of this clade share the following features: (i) petioles are brown at the base and stramineous above; (ii) laminae are 2- to 3-pinnate; (iii) ultimate segments are short, narrow and parallel-sided; and (iv) all the three alpine species are diploid (Tutin et al., 1964; Brownsey, 1976; Rasbach et al., 1979). Members of the clade are terrestrial and often occur in humid, shaded crevices and gullies in montane areas at elevations usually >1500 m above sea level (Tutin et al., 1964; Brownsey, 1976). This clade contains *A. aegaeum* Lovis, Reichst. & Greuter, *A. fissum* Willd. and one hybrid *A. ×lessinense* Vida & Reichst., patchily distributed in south-central and southeastern Europe (Tutin et al., 1964; Rasbach et al., 1979).

Clade X—the *Asplenium bullatum* clade

Relationships within the *Asplenium bullatum* clade are unresolved in our study. The constituent species share few morphological characters, such as the colour of the rachis (dull green to greenish stramineous) and the semiterete rachises that are narrowly winged on both sides. However, these characteristics also are found in other clades of *Asplenium*, such as in members of the *A. varians* subclade. Although the indusia of *A. ritoense* Hayata opens toward the pinna margins, it is closely related to the remaining members of the clade with indusia opening toward the costa. This fact might support the view that *A. shikokianum* Makino is of a hybrid origin (Shimura and Matsumoto, 1976). Lin and Viane (2013) treated 11 morphologically similar taxa as synonyms of *A. wrightii* D.C. Eaton ex Hook. However, in our phylogeny, at least four of these (*A. subcrenatum* Ching ex S.H. Wu, *A. wrightii*, *A. alatulum* Ching and *A. wrightioides* Christ) are well-supported as distinct (Fig. 3k). Our sampling included an estimated eight species and species of this clade are restricted to South and East Asia.

Clade XI—the *Pleurosorus* clade

The *Pleurosorus* clade mainly comprises members of the segregate genera *Pleurosorus* Fée and *Onopteris* Neck. and their relatives, and contains *c.* 15 species distributed worldwide. Species in this clade are generally small in stature (to 40 cm) and occur mainly on hillsides, often growing in the shelter of rocks, typically in dry exposed habitats (Sleep, 1966; Given, 1972; Salvo, 1982; Nogueira and Ormonde, 1986).

Onopteris and *Pleurosorus* are resolved as two distinct subclades in our analysis (Fig. 3a). The *Onopteris* subclade is characterized by having the *Aspidium*-type pattern of development of the gametophytes (Prada et al., 1995). Within the *Onopteris* subclade, *A. ×bradleyi* D.C. Eaton is resolved in a clade composed of the *A. montanum* Willd. accessions, suggesting that *A. montanum* is the maternal parent of *A. ×bradleyi*. Our study supports the origin of the allotetraploid *A. adiantum-nigrum* L. through hybridization between *A. onopteris* L. (maternal donor) and *A. cuneifolium* Viv. (Shivas, 1969).

Within the *Pleurosorus* subclade, the *Asplenium ruta-muraria* complex is resolved as sister to *Pleurosorus* and this is supported by their similar frond morphology. The *A. ruta-muraria* complex has fimbriate indusia, whereas *Pleurosorus* has no indusia. The *A. ruta-muraria* complex appears to contain multiple species, and this supports earlier observations (e.g. Schneller and Holderegger, 1996). Morphologically, most species except *A. ruta-muraria* s.l. in this subclade are covered with silver to red-brown nonglandular hairs.

Acknowledgements

This research was partially supported by grants from the Basic Work Special Project of the National Ministry of Science and Technology of China (#2013FY111500) and from Pilot Work of the fourth National survey on Chinese Materia Medica Resources (#2017-2019) to W.-B.L., the National Natural Science Foundation of China (#31628002) to L.-B.Z., the scholarships from the China Scholarship Council (201706380093) and the Zhang Hong-Da (Chang Hung-Ta) Science Foundation at Sun Yat-Sen University to K.-W.X., the National Natural Science Foundation of China (#31400196) and from Kunming Institute of Botany, Chinese Academy of Sciences to L.Z., the Glory Light International Fellowship for Chinese Botanists at Missouri Botanical Garden to X.-M.Z. and the CAS-TWAS President's Fellowship for International Ph.D. Students to N.T.L. Samantha Fernandez-Brimé, Ester Gaya, Amanda Grusz, Anders Larsson, Lisa Pokorny, Erin Sigel and Sloper Zylinski generously contributed material to this study. We thank Lei Jiang for help with fieldwork, Layne Huiet for assistance with materials, and Hong-Zhi Kong for voucher images, John Game, Robbin Moran and anonymous reviewers for helpful comments.

References

- Akaike, H., 1974. A new look at the statistical model identification. *IEEE Trans. Automat. Contr.* 19, 716–723.
- Baldwin, G.B., Wagner, W.L., 2010. Hawaiian angiosperm radiations of North American origin. *Ann. Bot.* 105, 849–879.
- Bellefroid, E., Rambe, S.K., Leroux, O., Viane, R.L.L., 2010. The base number of 'loxoscapoid' *Asplenium* species and its implication for cytoevolution in Aspleniaceae. *Ann. Bot.* 106, 157–171.
- Bennert, H.W., Rasbach, H., Rasbach, K., Reichstein, T., 1988. *Asplenium ×rosselloi* (= *A. balearicum* × *A. onopteris*; Aspleniaceae), a new fern hybrid from Menorca, Balearic Islands. *Willdenowia* 17, 181–192.
- Bercu, R., 2005. Contributions to the anatomy of *Asplenium ruta-muraria*. *Stud. Bot. Hung.* 36, 13–20.
- Bergius, B., 1782. *Caenopteris*, novvm filicibvs genvs descriptvm. *Acta Acad. Sci. Imp. Petrop.* 6: 248–250.
- Bir, S.S., 1960. Cytological observations on the East Himalayan members of *Asplenium*. *Linn. Curr. Sci.* 29, 445–447.
- Bir, S.S., 1970. Anatomical observations on some Indian members of asplenioid ferns. *Proc. Ind. Nat. Sci. Acad.* 36, 275–287.
- Bir, S.S., Fraser-Jenkins, C.R., Lovis, J.D., 1985. *Asplenium punjabense* sp. nov. and its significance for the status of *Ceterach* and *Ceterachopsis*. *Fern Gaz.* 13, 53–63.
- Braithwaite, A.F., 1964. A new type of apogamy in ferns. *New Phytol.* 63, 293–305.
- Braithwaite, A.F., 1986. The *Asplenium aethiopicum* complex in South Africa. *Bot. J. Linn. Soc.* 93, 343–378.
- Brownsey, P.J., 1976. The origins of *Asplenium creticum* and *A. haussknechtii*. *New Phytol.* 76, 523–542.
- Cameron, E.K., De Lange, P.J., Perrie, L.R., Brownsey, P.J., Campbell, H.J., Taylor, G.A., Given, D.R., Bellingham, R.M., 2006. A new location for the poor knights spleenwort (*Asplenium pauperequitum*, Aspleniaceae) on the Forty Fours, Chatham Islands, New Zealand. *NZ J. Bot.* 44, 199–209.

- Chang, Y.-F., Li, J., Lu, S.-G., Schneider, H., 2013. Species diversity and reticulate evolution in the *Asplenium normale* complex (Aspleniaceae) in China and adjacent areas. *Taxon* 62, 673–687.
- Chang, Y.-F., Ebihara, A., Lu, S.-G., Liu, H.-M., Schneider, H., 2018. Integrated taxonomy of the *Asplenium normale* complex (Aspleniaceae) in China and adjacent areas. *J. Pl. Res.* 131, 573–587.
- Cheng, X., Murakami, N., 1998. Cytotaxonomic study of genus *Hymenasplenium* (Aspleniaceae) in Xishuangbanna, Southwestern China. *J. Pl. Res.* 111, 495–500.
- Ching, R.C., Wu, S.H., 1985. Studies on *Asplenium varians* Wall. ex Hook. et Grev. and confused species. *Acta Phytotax. Sin.* 23, 1–10.
- Christ, H., 1897. *Die Farnkrauter der Erde*. Verlag Von Gustav Fischer, Jena.
- Christensen, C.F.A., 1905. *Index Filicum: sive, enumeratio omnium generum specierumque Filicum et Hydropteridum ab anno 1753 ad finem anni 1905 descriptorum*. H. Hagerup, Hafniae.
- Copeland, E.B., 1947. *Genera Filicum: The Genera of Ferns*. Chronica Botanica Co., Waltham.
- Crouch, N.R., 2012. *Ferns of Southern Africa: A Comprehensive Guide*. Struik Nature, Cape Town, South Africa.
- De Groot, G.A., During, H.J., Maas, J.W., Schneider, H., Vogel, J.C., Erkens, R.H., 2011. Use of *rbcL* and *trnL-F* as a two-locus DNA barcode for identification of NW-European ferns: an ecological perspective. *PLoS ONE* 6, e16371.
- Del Rio, C., Hennequin, S., Rouhan, G., Ebihara, A., Lowry, P.P. II, Dubuisson, J., Gaudeul, M., 2017. Origins of the fern genus *Hymenophyllum* (Hymenophyllaceae) in New Caledonia: multiple independent colonizations from surrounding territories and limited in-situ diversification. *Taxon* 66, 1041–1064.
- Dong, S.Y., 2011. Taxonomic studies on *Asplenium* sect. *Thamnopteris* (Aspleniaceae) I: cytological observations. *Am. Fern J.* 101, 156–171.
- Dong, S.Y., Wei, L.L., Chao, Y.S., 2012. A new species of *Asplenium* section *Thamnopteris* (Aspleniaceae) from Indonesia. *Blumea* 57, 190–194.
- Dyer, R.J., Savolainen, V., Schneider, H., 2012. Apomixis and reticulate evolution in the *Asplenium monanthes* fern complex. *Ann. Bot.* 110, 1515–1529.
- Dyer, R.J., Pellicer, J., Savolainen, V., Leitch, I.J., Schneider, H., 2013. Genome size expansion and the relationship between nuclear DNA content and spore size in the *Asplenium monanthes* fern complex (Aspleniaceae). *BMC Plant Biol.* 13, 219.
- Ebihara, A., Nitta, J.H., Ito, M., 2010. Molecular species identification with rich floristic sampling: DNA barcoding the pteridophyte flora of Japan. *PLoS ONE* 5, e15136.
- Ebihara, A., Nakato, N., Saito, Y., Oka, T., Minamitani, T., 2014. New records of *Asplenium varians* (Aspleniaceae) and two new hybrids in Japan. *Acta Phytotax. Geobot.* 65, 53–65.
- Farris, J.S., Albert, V.A., Källersjö, M., Lipscomb, D., Kluge, A.G., 1996. Parsimony jackknifing outperforms neighbor-joining. *Cladistics* 12, 99–124.
- Fay, M.F., Swensen, S.M., Chase, M.W., 1997. Taxonomic affinities of *Medusagyne oppositifolia* (Medusagynaceae). *Kew. Bull.* 52, 111–120.
- Felsenstein, J., 1973. Maximum likelihood and minimum-steps methods for estimating evolutionary trees from data on discrete characters. *Syst. Biol.* 22, 240–249.
- Gabancho, L.R., Prada, C., 2011. The genus *Hymenasplenium* (Aspleniaceae) in Cuba, including new combinations for the neotropical species. *Am. Fern J.* 101, 265–281.
- Gastony, G.J., Johnson, W.P., 2001. Phylogenetic placements of *Loxoscaphe thecifera* (Aspleniaceae) and *Actiniopteris radiata* (Pteridaceae) based on analysis of *rbcL* nucleotide sequences. *Am. Fern J.* 91, 197–213.
- Given, D.R., 1972. *Pleurosorus rutifolius* (R. Br.) Fée (Aspleniaceae) in New Zealand. *NZ J. Bot.* 10, 495–506.
- Guindon, S., Gascuel, O., 2003. A simple, fast, and accurate algorithm to estimate large phylogenies by maximum likelihood. *Syst. Biol.* 52, 696–704.
- Hall, T.A., 1999. BioEdit: a user-friendly biological sequence alignment editor and analysis program for Windows 95/98/NT. *Nucl. Acids Symp. Ser.* 41, 95–98.
- Hansen, A., Sunding, P., 1993. *Flora of Macaronesia, checklist of vascular plants: IV. Sommerfeltia* 17, 1–298.
- Hayata, B., 1927. On the systematic importance of the stelar system in the Filicales. I. *Bot. Mag.* 41, 697–718.
- van den Heede, C.J., Pajarón, S., Pangua, E., Viane, R.L., 2004. *Asplenium ceterach* and *A. octoploideum* on the Canary Islands (Aspleniaceae, Pteridophyta). *Am. Fern J.* 94, 81–111.
- Hind, D.J.N., Beentje, H.J., 1996 (eds.). *Compositae: Systematics*. Proceedings of the International Compositae Conference, Kew, 1994., vol. 1. Royal Botanic Garden, Kew.
- Hennequin, S., Kessler, M., Lindsay, S., Schneider, H., 2014. Evolutionary patterns in the assembly of fern diversity on the oceanic Mascarene Islands. *J. Biogeogr.* 41, 1651–1663.
- Holtttum, R.E., 1947. A revised classification of leptosporangiate ferns. *J. Linn. Soc., Bot.* 53, 123–158.
- Hooker, W.J., Baker, J.G., 1874. *Synopsis Filicum*, 2nd edn. Robert Hardwicke, London.
- Huelsenbeck, J.P., Ronquist, F., 2001. MRBAYES: Bayesian inference of phylogenetic trees. *Bioinformatics* 17, 754–755.
- Hunt, H.V., Ansell, S.W., Russell, S.J., Schneider, H., Vogel, J.C., 2009. Genetic diversity and phylogeography in two diploid ferns, *Asplenium fontanum* subsp. *fontanum* and *A. petrarcae* subsp. *bivalens*, in the western Mediterranean. *Mol. Ecol.* 18, 4940–4954.
- Hunt, H.V., Ansell, S.W., Russell, S.J., Schneider, H., Vogel, J.C., 2011. Dynamics of polyploid formation and establishment in the allotetraploid rock fern *Asplenium majoricum*. *Ann. Bot.* 108, 143–157.
- Igea, J., Bogarín, D., Papadopulos, A.S., Savolainen, V., 2014. A comparative analysis of island floras challenges taxonomy-based biogeographical models of speciation. *Evolution* 69, 482–491.
- Iwatsuki, K., 1975. Taxonomic studies of Pteridophyta X-13. *Asplenium* sect. *Hymenasplenium*. *Acta Phytotax. Geobot.* 27, 39–55.
- Iwatsuki, K., Kato, M., 1975. Stele structure of *Asplenium unilaterale* and allied species. *Kalikasan* 4, 165–174.
- James, K.E., Schneider, H., Ansell, S.W., Evers, M., Robba, L., Uszynski, G., Pedersen, N., Newton, A.E., Russell, S.J., Vogel, J.C., Kilian, A., 2008. Diversity arrays technology (DArT) for pan-genomic evolutionary studies of non-model organisms. *PLoS ONE* 3, e1682.
- Kato, M., Nakato, N., Akiyama, S., Iwatsuki, K., 1990. The systematic position of *Asplenium cardiophyllum* (Aspleniaceae). *Bot. Mag.* 103, 461–468.
- Katoh, K., Standley, D.M., 2013. MAFFT multiple sequence alignment software version 7: improvements in performance and usability. *Mol. Biol. Evol.* 30, 772–780.
- Kessler, M., Smith, A.R., 2018. Prodrum of a fern flora for Bolivia. XXIX. Aspleniaceae. *Phytotaxa* 344, 259–280.
- Kramer, K.U., Viane, R., 1990. Aspleniaceae. In: Kubitzki, K., Kramer, K.U., Green, P.S. (Eds.), *The Families and Genera of Vascular Plants*, vol. 1, Pteridophytes and Gymnosperms. Springer, Berlin, pp. 52–57.
- Kuo, L.Y., Li, F.W., Chiou, W.L., Wang, C.N., 2011. First insights into fern *matK* phylogeny. *Mol. Phylog. Evol.* 59, 556–566.
- Le Péchon, T., He, H., Zhang, L., Zhou, X.-M., Gao, X.-F., Zhang, L.-B., 2016. Using a multilocus phylogeny to test morphology-based classifications of one of the largest fern genera *Polystichum* (Dryopteridaceae). *BMC Evol. Biol.* 16, 55.
- Lee, C.S., Lee, K., Yeau, S.H., Chung, K.S., 2015. Two new and one unrecorded natural hybrids between *Asplenium ruprechtii* and related taxa (Aspleniaceae). *Korean J. Pl. Taxon.* 45, 362–368.
- Leroux, O., Bagniewska-Zadworna, A., Rambe, S.K., Knox, J.P., Marcus, S.E., Bellefroid, E., Stubbe, D., Chabbert, B., Habrant, A., Claeys, M., Viane, R.L.L., 2010. Non-lignified helical cell wall thickenings in root cortical cells of Aspleniaceae (Polypodiales): histology and taxonomical significance. *Ann. Bot.* 107, 195–207.

- Li, C.-X., Lu, S.-G., 2006. Relationship of *Asplenium yunnanense* and *A. lushanense* inferred from the sequence analysis of chloroplast *rbcL*, *trnL-F* and *rps4-trnS*. *Acta Phytotax. Sin.* 44, 296–303.
- Li, C.-X., Lu, S.-G., Sun, X.-Y., Yang, Q., 2011. Phylogenetic positions of the enigmatic Asiatic fern genera *Diplaziospis* and *Rhachidosorus* from analyses of four plastid genes. *Am. Fern J.* 101, 142–155.
- Li, F.W., Kuo, L.Y., Chang, Y.H., Hsu, T.C., Hung, H.C., Chiou, W.L., Rothfels, C.J., Huang, Y.M., 2016. *Asplenium pifongiae* (Aspleniaceae: Polypodiales), a new species from Taiwan. *Syst. Bot.* 41, 24–31.
- Lin, Y.-X., Viane, R., 2013. Aspleniaceae. In: Wu, Z.-Y., Raven, P.H., Hong, D.-Y. (Eds.), *Flora of China*. Vol. 2–3. Science Press/ Missouri Botanical Garden Press, Beijing and St. Louis, pp. 267–316.
- Lóriga, J., Regalado, L., Prada, C., Schneider, H., Heinrichs, J., 2016. Phylogenetic relationships of two Cuban spleenworts with unusual morphology: *Asplenium (Schaffneria) nigripes* and *Asplenium punilum* (Aspleniaceae, leptosporangiate ferns). *Plant Syst. Evol.* 303, 1–12.
- Lovis, J.D., 1977. Evolutionary patterns and processes in ferns. *Adv. Bot. Res.* 4, 230–424.
- Lovis, J.D., Lovis, J.V., 1955. *Asplenium adulterinum* and its probable parents. *Proc. Bot. Soc. Br. Isl.* 1, 389–390.
- Manton, I., 1950. Problems of Cytology and Evolution in the Pteridophyta. Cambridge University Press, New York.
- Manton, I., Sledge, W.A., 1954. Observations on the cytology and taxonomy of the pteridophyte flora of Ceylon. *Phil. Trans. R. Soc. B* 238, 127–185.
- Mason-Gamer, R.J., Kellogg, E.A., 1996. Testing for phylogenetic conflict among molecular data sets in the tribe Triticeae (Gramineae). *Syst. Biol.* 45, 524–545.
- Mehra, P.N., Bir, S.S., 1960. Cytological observation on *Asplenium cheilosorum* Kunze. *Cytologia* 25, 17–27.
- Mickel, J.T., 1976. *Sinephropteris*, a new genus of scolopendrioid ferns. *Brittonia* 28, 326–328.
- Mickel, J.T., Smith, A.R., 2004. The pteridophytes of Mexico. *Mem. New York Bot. Gard.* 88, 1–1055.
- Miller, M.A., Pfeiffer, W., Schwartz, T., 2010. Creating the CIPRES Science Gateway for inference of large phylogenetic trees. In: Proceedings of the Gateway Computing Environments Workshop (GCE), 14 November 2010, New Orleans, LA, pp. 1–8.
- Mitsuta, S., Kato, M., Iwatsuki, K., 1980. Stelar structure of Aspleniaceae. *Bot. Mag.* 93, 275–289.
- Mitui, K., Murakami, N., Iwatsuki, K., 1989. Chromosomes and systematics of *Asplenium* Sect. *Hymenasplenium* (Aspleniaceae). *Am. J. Bot.* 76, 1689–1697.
- Moran, R.C., 1982. The *Asplenium trichomanes* complex in the United States and adjacent Canada. *Am. Fern J.* 72, 5–11.
- Moran, R.C., Smith, A.R., 2001. Phylogeographic relationships between neotropical and African-Madagascan pteridophytes. *Brittonia* 53, 304–351.
- Murakami, N., 1992. Stelar structure of *Asplenium obtusifolium* and its allied species in the New World tropics, with comparison to the Asian members of *Asplenium* sect. *Hymenasplenium*. *Bot. Mag.* 105, 135–147.
- Murakami, N., 1995. Systematics and evolutionary biology of the fern genus *Hymenasplenium* (Aspleniaceae). *J. Pl. Res.* 108, 257–268.
- Murakami, N., Hatanaka, S.I., 1988. Chemotaxonomic studies of *Asplenium* sect. *Hymenasplenium* (Aspleniaceae). *J. Pl. Res.* 101, 353–372.
- Murakami, N., Moran, R.C., 1993. Monograph of the Neotropical species of *Asplenium* sect. *Hymenasplenium* (Aspleniaceae). *Ann. Missouri Bot. Gard.* 80, 1–38.
- Murakami, N., Nogami, S., Watanabe, M., Iwatsuki, K., 1999a. Phylogeny of Aspleniaceae inferred from *rbcL* nucleotide sequences. *Am. Fern J.* 89, 232–243.
- Murakami, N., Watanabe, M., Yokoyama, J., Yatabe, Y., Iwasaki, H., Serizawa, S., 1999b. Molecular taxonomic study and revision of the three Japanese species of *Asplenium* sect. *Thamnopteris*. *J. Pl. Res.* 112, 15–25.
- Mynssen, C.M., Vasco, A., Moran, R.C., Sylvestre, L.S., Rouhan, G., 2016. Desmophlebiaceae and Desmophlebium: a new family and genus of Eupolypod II ferns. *Taxon* 65, 19–34.
- Nayar, B.K., 1970. A phylogenetic classification of the homosporous ferns. *Taxon* 19, 229–236.
- Nogueira, I., Ormonde, J., 1986. *Asplenium*. In: Castroviejo, S. (Eds.), *Flora Iberica*. Consejo Superior de Investigaciones Científicas, Madrid, Spain, vol. 1, pp. 90–104.
- Nopun, P., Traiperm, P., Boonkerd, T., Jenjittikul, T., 2016. Systematic importance of rhizome stelar anatomy in selected Monilophytes from Thailand. *Taiwania* 61, 175–184.
- Ohlsen, D.J., Perrie, L.R., Shepherd, L.D., Brownsey, P.J., Bayly, M.J., 2015. Phylogeny of the fern family Aspleniaceae in Australasia and the south-western Pacific. *Austral. Syst. Bot.* 27, 355–371.
- Pajarón, S., Quintanilla, L.G., Pangua, E., 2005. Isozymic contribution to the systematics of the *Asplenium seelosii* group. *Syst. Bot.* 30, 52–59.
- Papadopulos, A.S., Baker, W.J., Crayn, D., Butlin, R.K., Kynast, R.G., Hutton, I., Savolainen, V., 2011. Speciation with gene flow on Lord Howe Island. *Proc. Natl Acad. Sci. USA* 108, 13 188–13 193.
- Perrie, L.R., Brownsey, P.J., 2005. Insights into the biogeography and polyploid evolution of New Zealand *Asplenium* from chloroplast DNA sequence data. *Am. Fern J.* 95, 1–21.
- Perrie, L.R., Brownsey, P.J., Lockhart, P.J., Brown, E.A., Large, M.F., 2003. Biogeography of temperate Australasian *Polystichum* ferns as inferred from chloroplast sequence and AFLP. *J. Biogeogr.* 30, 1729–1736.
- Perrie, L.R., Shepherd, L.D., De Lange, P.J., Brownsey, P.J., 2010. Parallel polyploid speciation: distinct sympatric gene-pools of recurrently derived allo-octoploid *Asplenium* ferns. *Mol. Ecol.* 19, 2916–2932.
- Pichi Sermolli, R.E.G., 1977. Tentamen Pteridophytorum genera in taxonomicum ordinem redigendi. *Webbia* 31, 313–512.
- Pinter, I., Bakker, F., Barrett, J., Cox, C., Gibby, M., Henderson, S., Morgan-Richards, M., Rumsey, F., Russell, S., Trewick, S. et al., 2002. Phylogenetic and biosystematic relationships in four highly disjunct polyploid complexes in the subgenera *Ceterach* and *Phyllitis* in *Asplenium* (Aspleniaceae). *Org. Divers. Evol.* 2, 299–311.
- Pol, D., 2004. Empirical problems of the hierarchical likelihood ratio test for model selection. *Syst. Biol.* 53, 949–962.
- Posada, D., 2008. JModelTest: phylogenetic model averaging. *Mol. Biol. Evol.* 25, 1253–1256.
- Posada, D., Buckley, T.R., 2004. Model selection and model averaging in phylogenetics: advantages of Akaike information criterion and Bayesian approaches over likelihood ratio tests. *Syst. Biol.* 53, 793–808.
- PPGI, 2016. A community-derived classification for extant lycophytes and ferns. *J. Syst. Evol.* 54, 563–603.
- Prada, C., Pangua, E., Pajarón, S., Herrero, A., Escuder, A., Rubio, A., 1995. A comparative study of gametophyte morphology, gametangial ontogeny and sex expression in the *Asplenium adiantum-nigrum* complex (Aspleniaceae, Pteridophyta). *Ann. Bot. Fennici* 32, 107–115.
- Prelli, R.E.M.Y., 1996. *Asplenium ×jacksonii* rediscovered in the wild (Aspleniaceae: Pteridophyta). *Fern Gaz.* 15, 83–86.
- Presl, K.B., 1836. Tentamen Pteridographiae: seu Genera Filicacearum Praesertim Juxta Venarum Decursum et Distributionem Exposita. Typis Filiorum Theophili Haase, Pragae.
- Queirós, M., Ormonde, J., 1987. Contribuição para o conhecimento citotaxonómico da flora dos Açores: III. *Rev. Biol. Univ. Aveiro* 1, 31–46.
- Rambaut, A., Drummond, A.J., 2007. Tracer 1.4. Available at: <http://beast.bio.ed.ac.uk/Tracer>

- Rasbach, H., Rasbach, K., Reichstein, T., Schneller, J.J., Vida, G., 1979. *Asplenium xlessiniense* Vida et Reichst. in den Bayerischen Alpen und seine Fähigkeit zur spontanen Chromosomenverdoppelung. *Ber. Bayer. Bot. Ges.* 50, 23–27.
- Rasbach, H., Reichstein, T., Viane, R.L., 1994. *Asplenium chihuahuense* (Aspleniaceae, Pteridophyta), an allohexaploid species and the description of a simplified hybridization technique. *Am. Fern J.* 84, 11–40.
- Reichstein, T., 1981. Hybrids in European Aspleniaceae (Pteridophyta). *Bot. Helv.* 91, 89–139.
- Reichstein, T., 1994. *Asplenium adiantum-nigrum* L. subsp. *yuanum* (Ching) Viane, Rasbach, Reichstein & Schneller stat. nov., and the status of *A. woronowii* Christ (Aspleniaceae, Pteridophyta). *Candollea* 49, 281–328.
- Rodriguez, F.J.L.O.J., Oliver, J.L., Marin, A., Medina, J.R., 1990. The general stochastic model of nucleotide substitution. *J. Theor. Biol.* 142, 485–501.
- Ronquist, F., Huelsenbeck, J.P., 2003. MrBayes 3: Bayesian phylogenetic inference under mixed models. *Bioinformatics* 19, 1572–1574.
- Rothfels, C.J., Sundue, M.A., Kuo, L.Y., Larsson, A., Kato, M., Schuettelpelz, E., Pryer, K.M., 2012a. A revised family-level classification for eupolypod II ferns (Polypodiidae: Polypodiales). *Taxon* 61, 515–533.
- Rothfels, C.J., Larsson, A., Kuo, L.Y., Korall, P., Chiou, W.L., Pryer, K.M., 2012b. Overcoming deep roots, fast rates, and short internodes to resolve the ancient rapid radiation of eupolypod II ferns. *Syst. Biol.* 61, 490–509.
- Rothfels, C.J., Li, F.W., Sigel, E.M., Huiet, L., Larsson, A., Burge, D.O., Ruhsam, M., Deyholos, M., Soltis, D.E., Stewart, C.N. et al., 2015. The evolutionary history of ferns inferred from 25 low-copy nuclear genes. *Am. J. Bot.* 102, 1089–1107.
- Salvo, A.E., 1982. Revision del genero *Asplenium* L., subgenera *Pleurosorus* (Fee) Salvo, Prada & Diaz. *Candollea* 37, 457–484.
- Schneider, H., 1997. Root anatomy of Aspleniaceae and the implications for systematics of this fern family. *Fern Gaz.* 15, 160–168.
- Schneider, H., Russell, S.J., Cox, C.J., Bakker, F., Henderson, S., Rumsey, F., Barrett, J., Gibby, M., Vogel, J.C., 2004. Chloroplast phylogeny of asplenioid ferns based on *rbcL* and *trnL-F* spacer sequences (Polypodiidae, Aspleniaceae) and its implications for biogeography. *Syst. Bot.* 29, 260–274.
- Schneider, H., Ranker, T.A., Russell, S.J., Cranfill, R., Geiger, J.M., Agurajua, R., Wood, K.R., Grundmann, M., Kloberdanz, K., Vogel, J.C., 2005. Origin of the endemic fern genus *Diella* coincides with the renewal of Hawaiian terrestrial life in the Miocene. *Proc. R. Soc. B.* 272, 455–460.
- Schneider, H., Navarro-Gomez, A., Russell, S.J., Ansell, S., Grundmann, M., Vogel, J., 2013. Exploring the utility of three nuclear regions to reconstruct reticulate evolution in the fern genus *Asplenium*. *J. Syst. Evol.* 51, 142–153.
- Schneider, H., Liu, H.-M., Chang, Y.-F., Ohlsen, D., Perrie, L.R., Shepherd, L., Kessler, M., Karger, D.N., Hennequin, S., Marquardt, J. et al., 2017. Neo- and Paleopolyploidy contribute to the species diversity of *Asplenium*—the most species-rich genus of ferns. *J. Syst. Evol.* 55, 353–364.
- Schneller, J.J., Holderegger, R., 1996. Genetic variation in small, isolated fern populations. *J. Veg. Sci.* 7, 113–120.
- Schuettelpelz, E., Pryer, K.M., 2007. Fern phylogeny inferred from 400 leptosporangiate species and three plastid genes. *Taxon* 56, 1037–1050.
- Schulze, G., Treutlein, J., Wink, M., 2001. Phylogenetic relationships between *Asplenium bourgaei* (Boiss.) Milde and *A. jahandiezii* (Litard.) Rouy inferred from morphological characters and *rbcL* sequences. *Pl. Biol.* 3, 364–371.
- Sessa, E.B., Vicent, M., Chambers, S.M., Gabriel y Galán, J.M., 2018. Evolution and reciprocal origins in Mediterranean ferns: the *Asplenium obovatum* and *A. adiantumnigrum* complexes. *Ann. Missouri Bot. Gard.* 103, 175–187.
- Shen, H., Jin, D.-M., Shu, J.-P., Zhou, X.-L., Lei, M., Wei, R., Shang, H., Wei, H.-J., Zhang, R., Liu, L. et al., 2017. Large-scale phylogenomic analysis resolves a backbone phylogeny in ferns. *GigaScience* 7, 1–11.
- Shepherd, L.D., Perrie, L.R., Brownsey, P.J., 2007. Fire and ice: volcanic and glacial impacts on the phylogeography of the New Zealand forest fern *Asplenium hookerianum*. *Mol. Ecol.* 16, 4536–4549.
- Shepherd, L.D., Holland, B.R., Perrie, L.R., 2008. Conflict amongst chloroplast DNA sequences obscures the phylogeny of a group of *Asplenium* ferns. *Mol. Phylog. Evol.* 48, 176–187.
- Shimura, Y., Matsumoto, S., 1976. Study on the hybridity of *Asplenium shikokianum*. *J. Jap. Bot.* 51, 235–244.
- Shivas, M.G., 1969. A cytotoxic study of the *Asplenium adiantum-nigrum* complex. *British Fern Gaz.* 10, 68–80.
- Sleep, A., 1966. Some cytotoxic problems in the fern genera *Asplenium* and *Polystichum*. Doctoral dissertation, University of Leeds, Leeds, UK.
- Smith, J., 1841. An arrangement and definition of the genera of ferns with observations on the affinities of each genus. *J. Bot. (Hooker)* 3, 409.
- Smith, A.R., 1976. *Diplazium delitescens* and the neotropical species of *Asplenium* sect. *Hymenasplenium*. *Am. Fern J.* 66, 116–120.
- Souza-Chies, T.T., Bittar, G., Nadot, S., 1997. Phylogenetic analysis of Iridaceae with parsimony and distance methods using the plastid gene *rps4*. *Plant Syst. Evol.* 204, 109–123.
- Stamatakis, A., Hoover, P., Rougemont, J., 2008. A rapid bootstrap algorithm for the RAxML Web servers. *Syst. Biol.* 57, 758–771.
- Sundue, M.A., Rothfels, C.J., 2014. Stasis and convergence characterize morphological evolution in eupolypod II ferns. *Ann. Bot.* 113, 35–54.
- Sundue, M.A., Parris, B.S., Ranker, T.A., Smith, A.R., Fujimoto, E.L., Zamora-Crosby, D., Clifford, W.M., Chioue, W.L., Chen, C.W., Germinal, R., Regina, Y.H., Jefferson, P., 2014. Global phylogeny and biogeography of grammitid ferns (Polypodiaceae). *Mol. Phylog. Evol.* 81, 195–206.
- Swofford, D., 2002. PAUP*4.0a163: Phylogenetic Analysis Using Parsimony. Sinauer Associates, Sunderland, MA.
- Taberlet, P., Gielly, L., Pautou, G., Bouvet, J., 1991. Universal primers for amplification of three non-coding regions of chloroplast DNA. *Pl. Mol. Biol.* 17, 1105–1109.
- Tardieu-Blot, M.L., 1957. Sur un *Antigramma* de Madagascar et sur la repartition géographique des genres *Antigramma* et *Schaffneria*. *Naturaliste Malgache* 9, 29–32.
- Thiers, B., 2015 [continuously updated]: Index herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's virtual herbarium [online]. Available at <http://sweetgum.nybg.org/ih/> [accessed 1 August 2018].
- Tigerschiold, E., 1981. The *Asplenium trichomanes* complex in East central Sweden. *Nord. J. Bot.* 1, 12–16.
- Trewick, S.A., Morgan-Richards, M., Russell, S.J., Henderson, S., Rumsey, F.J., Pinter, I., Barrett, J.A., Gibby, M., Vogel, J.C., 2002. Polyploidy, phylogeography and Pleistocene refugia of the rock fern *Asplenium ceterach*: evidence from chloroplast DNA. *Mol. Ecol.* 11, 2003–2012.
- Tryon, R.M., Tryon, A.F., 1982. Ferns and Allied Plants, with Special Reference to Tropical America. Springer, New York, pp. 1–857.
- Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M., Webb, D.A., 1964. *Flora Europaea*, Vol. 1. Cambridge University Press, Cambridge, New York.
- Umikalsom, Y., 1992. Anatomical studies of the Malaysian Aspleniaceae and Athyriaceae. *Bot. J. Linn. Soc.* 110, 111–119.
- Wagner, W.H. Jr, 1952. The fern genus *Diellia*, its structure, affinities, and taxonomy. *Univ. Calif. Publ. Bot.* 26, 1–212.
- Wagner, W.H. Jr, 1954. Reticulate evolution in the Appalachian *Asplenium*. *Evolution* 8, 103–118.
- Walter, K.S., Wagner, W.H. & Wagner, F.S. (1982) Ecological, biosystematic, and nomenclatural notes on Scott's spleenwort, × *Asplenosorus ebenoides*. *Am. Fern J.* 6, 5–75.
- Wang, Z.-R., Wang, K.-Q., Zhang, F., Hou, X., 2003. A biosystematic study on *Asplenium sarelii* complex. *Acta Bot. Sinica* 45, 1–14.

- Wei, R., Yan, Y.-H., Harris, A.J., Kang, J.-S., Shen, H., Xiang, Q.-P., Zhang, X.-C., 2017. Plastid phylogenomics resolve deep relationships among eupolypod II ferns with rapid radiation and rate heterogeneity. *Genome Biol. Evol.* 9, 1646–1657.
- Werth, C.R., Guttman, S.I., Eshbaugh, W.H., 1985. Electrophoretic evidence of reticulate evolution in the Appalachian *Asplenium* complex. *Syst. Bot.* 10, 184–192.
- Wolf, P.G., Sipes, S.D., White, M.R., Martines, M.L., Pryer, K.M., Smith, A.R. & Ueda, K. (1999) Phylogenetic relationships of the enigmatic fern families Hymenophylloidsaceae and Lophosoriaceae: evidence from rbcL nucleotide sequences. *Plant Syst. Evol.* 219, 263–270.
- Wu, S.-H., 1999. Aspleniaceae. In: Wu, Z.-Y. (Ed.), *Flora Reipublicae Popularis Sinicae*. Science Press, Beijing, Vol. 6, pp. 3–127.
- Xu, K.-W., Zhou, X.-M., Yin, Q.-Y., Zhang, L., Lu, N.T., Knapp, R., Luong, T.T., He, H., Fan, Q., Zhao, W.-Y. *et al.*, 2018. A global plastid phylogeny uncovers extensive cryptic speciation in the fern genus *Hymenasplenium* (Aspleniaceae). *Mol. Phylog. Evol.* 127, 203–216.
- Yamada, K., Yatabe-Kakugawa, Y., Hori, K., Murakami, N., 2016. Asymmetric Hybrid Formation Revealed by Artificial Crossing Experiments between *Asplenium setoi* from the Ogasawara and Ryukyu islands, Japan. *Acta Phytotax. Geobot.* 67, 147–158.
- Yatabe, Y., Masuyama, S., Darnaedi, D., Murakami, N., 2001. Molecular systematics of the *Asplenium nidus* complex from Mt. Halimun National Park, Indonesia: evidence for reproductive isolation among three sympatric rbcL sequence types. *Am. J. Bot.* 88, 1517–1522.
- Yatabe, Y., Shinohara, W., Matsumoto, S., Murakami, N., 2009. Patterns of hybrid formation among cryptic species of bird-nest fern, *Asplenium nidus* complex (Aspleniaceae), in West Malesia. *Bot. J. Linn. Soc.* 160, 42–63.
- Zhang, L.-B., Comes, H.P. & Kadereit, J.W. (2001) Phylogeny and Quaternary history of the European montane/alpine endemic *Soldanella* (Primulaceae) based on ITS and AFLP variation. *Am. J. Bot.* 88, 2331–2345.
- Zhang, L., Rothfels, C.J., Ebihara, A., Schuettpelz, E., Le Péchon, T., Kamau, P., He, H., Zhou, X.-M., Prado, J., Field, A., Yatskievych, G., Gao, X.-F., Zhang, L.-B., 2015. A global plastid phylogeny of the brake fern genus *Pteris* (Pteridaceae) and related genera in the Pteridoideae. *Cladistics* 31, 406–423.
- Zhang, L.-B., Simmons, M.P., 2006. Phylogeny and delimitation of the Celastrales inferred from nuclear and chloroplast genes. *Syst. Bot.* 31, 107–121.
- Zuniga, J.D., Gostel, M.R., Mulcahy, D.G., Barker, K., Hill, A., Sedaghatpour, M., Vo, S.Q., Funk, V.A., Coddington, J.A., 2017. Data Release: DNA barcodes of plant species collected for the Global Genome Initiative for Gardens Program, National Museum of Natural History, Smithsonian Institution. *PhytoKeys* 88, 119.
- Zurawski, G., Clegg, M.T. & Brown, A.H.D. (1984) The nature of nucleotide sequence divergence between barley and maize chloroplast DNA. *Genetics* 106, 735–749.
- (Schuettpelz & Pryer, 2007). *Asplenium actinopteroide* Peter, *Viane* 7583 (GENT), Tanzania: *atpB*—, *rbcL* GU929848, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium acuminatum* Hook. & Arn., *Wood* 15513 (PTBG), Kauai, Hawaii: *atpB* MK826365, *rbcL*—, *rps4* & *rps4-trnS* MK827432, *trnL* intron & *trnL-F* spacer—. *Asplenium adiantum-nigrum* L., *Janssen* 2707, Unknown: *atpB*—, *rbcL* KF992423, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hennequin et al., 2014). *Asplenium adiantum-nigrum* L., *Rothfels* 4628A (UC), Western Cape, South Africa: *atpB* MK826367, *rbcL* MK826924, *rps4* & *rps4-trnS* MK827434, *trnL* intron & *trnL-F* spacer MK827932. *Asplenium adiantum-nigrum* L., *Rothfels* 4628B (UC), Western Cape, South Africa: *atpB* MK826366, *rbcL* MK826923, *rps4* & *rps4-trnS* MK827433, *trnL* intron & *trnL-F* spacer MK827931. *Asplenium adiantum-nigrum* L., *Schuettpelz* 418 (DUKE), Arizona, USA: *atpB* EF463324, *rbcL* EF463143, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpelz & Pryer, 2007). *Asplenium adiantum-nigrum* L., *Xu* R2, Cult. in SYS: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827114, *trnL* intron & *trnL-F* spacer—. *Asplenium adiantum-nigrum* L., *Xu* R5, Cult. in SYS: *atpB* MK826089, *rbcL*—, *rps4* & *rps4-trnS* MK827116, *trnL* intron & *trnL-F* spacer MK827668. *Asplenium adiantum-nigrum* var. *yuanum* (Ching) Ching, *Xu* CZ003 (SYS), Yunnan, China: *atpB* MK826114, *rbcL* MK826603, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827689. *Asplenium adiantum-nigrum* var. *yuanum* (Ching) Ching, *Xu* CZ004 (SYS), Yunnan, China: *atpB* MK826118, *rbcL* MK826607, *rps4* & *rps4-trnS* MK827139, *trnL* intron & *trnL-F* spacer MK827691. *Asplenium adulterinum* Milde, *Aad* 79B (BM), Austria: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* EF645628, *trnL* intron & *trnL-F* spacer EF645612 (James et al., 2008).
- Asplenium adulterinum* Milde, Vogel ADU-32 (BM), Norway: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer JX475139 (Schneider et al., 2013). *Asplenium aegaeum* Lovis, Reichst. & Greuter, *Jermy* 9181 (BM), Crete: *atpB*—, *rbcL* AY300103, *rps4* & *rps4-trnS* AY549774, *trnL* intron & *trnL-F* spacer AY300050 (Schneider et al., 2004). *Asplenium aethiopicum* (Burm.f.) Bech., Grangaud & Acock s.n., Unknown: *atpB*—, *rbcL* KF992424, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hennequin et al., 2014). *Asplenium aethiopicum* (Burm.f.) Bech., *Hemp* A. 22 (BM), Marangu-ogate, Kenya: *atpB*—, *rbcL* AF240654, *rps4* & *rps4-trnS* AY549823, *trnL* intron & *trnL-F* spacer AF240666 (Pinter et al., 2002). *Asplenium aethiopicum* (Burm.f.) Bech., *Jin & Zhang* 11015 (CDBI), Yunnan, China: *atpB* MK826295, *rbcL* MK826798, *rps4* & *rps4-trnS* MK827320, *trnL* intron & *trnL-F* spacer MK827828. *Asplenium aethiopicum* (Burm.f.) Bech., *JL00362* (SYS), Yunnan, China: *atpB* MK826061, *rbcL* MK826559, *rps4* & *rps4-trnS* MK827086, *trnL* intron & *trnL-F* spacer MK827646. *Asplenium aethiopicum* (Burm.f.) Bech., *JL00378* (SYS), Yunnan, China: *atpB* MK826046, *rbcL* MK826545, *rps4* & *rps4-trnS* MK827062, *trnL* intron & *trnL-F* spacer MK827633. *Asplenium aethiopicum* (Burm.f.) Bech., *Lu* SG/D22 (PYU), Yunnan, China: *atpB*—, *rbcL* AY725029, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer (Li & Lu, 2006). *Asplenium aethiopicum* (Burm.f.) Bech., *Ohlsen* 228 (MELU), Victoria, Australia: *atpB*—, *rbcL* KP774922, *rps4* & *rps4-trnS* KP835452, *trnL* intron & *trnL-F* spacer KP835385 (Ohlsen et al. 2015). *Asplenium aethiopicum* (Burm.f.) Bech., *Peter & Bart* 1897 (MO), Zimbabwe: *atpB* MK826491, *rbcL*—, *rps4* & *rps4-trnS* MK827564, *trnL* intron & *trnL-F* spacer MK827614. *Asplenium aethiopicum* (Burm.f.) Bech., *Pokorny* s.n. (DUKE), Reunion, France: *atpB* MK826511, *rbcL*—, *rps4* & *rps4-trnS* MK827587, *trnL* intron & *trnL-F* spacer—. *Asplenium aethiopicum* (Burm.f.) Bech., *Rothfels* 4663 (UC), Kwa-zulu-Natal, South Africa: *atpB* MK826368, *rbcL* MK826925, *rps4* & *rps4-trnS* MK827435, *trnL* intron & *trnL-F* spacer MK827933. *Asplenium aethiopicum* (Burm.f.) Bech., *Viane* 7377 (GENT), Kenya: *atpB*—, *rbcL* GU929846, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium aethiopicum* (Burm.f.) Bech., *Viane* RV7416 (GENT), Kenya: *atpB*—, *rbcL* GU586821, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Bellefroid et al.,

Appendix 1

List of taxa sampled, GenBank accession numbers, references, and voucher information (– indicates accessions with missing data). Herbarium acronyms follow Index Herbariorum (Thiers, 2015).

Asplenium abscissum Willd., *Boudrie* 3278 (BM), French Guiana: *atpB*—, *rbcL* AY300102, *rps4* & *rps4-trnS* AY549768, *trnL* intron & *trnL-F* spacer AY300049 (Schneider et al., 2005). *Asplenium abscissum* Willd., *Jimenez* 2503 (LPB), Bolivia: *atpB* EF463323, *rbcL* EF463142, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—

- 2010). *Asplenium aethiopicum* (Burm.f.) Bech., *Wood 17002* (PTBG), Savaii, Samoa: *atpB* MK826369, *rbcL* MK826926, *rps4* & *rps4-trnS* MK827436, *trnL* intron & *trnL-F* spacer MK827934. *Asplenium aethiopicum* (Burm.f.) Bech., *Xu 302* (SYS), Yunnan, China: *atpB* MK826207, *rbcL* MK826686, *rps4* & *rps4-trnS* MK827216, *trnL* intron & *trnL-F* spacer MK827748. *Asplenium affine* Sw., *Janssen 2719* (P), Reunion: *atpB* EF463325, *rbcL* EF463144, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettelpelz & Pryer, 2007). *Asplenium affine* Sw., *Schneider 954* (SAR), Sarawak: *atpB*—, *rbcL* AY300104, *rps4* & *rps4-trnS* AY549826, *trnL* intron & *trnL-F* spacer AY300051 (Schneider et al., 2004). *Asplenium affine* Sw., *Viane 8228* (GENT), Reunion: *atpB*—, *rbcL* GU929857, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium affine* Swartz, *Kessler 14066* (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774940, *rps4* & *rps4-trnS* KP835438, *trnL* intron & *trnL-F* spacer KP835388 (Ohlsen et al. 2015). *Asplenium alatum* Ching, *Cranfill TW040* (UC), Taiwan: *atpB*—, *rbcL* AY549730, *rps4* & *rps4-trnS* AY549766, *trnL* intron & *trnL-F* spacer AY549833 (Schneider et al., 2005). *Asplenium alatum* Ching, *Xu 107* (SYS), Hainan, China: *atpB* MK826108, *rbcL*—, *rps4* & *rps4-trnS* MK827133, *trnL* intron & *trnL-F* spacer MK827685. *Asplenium alatum* Ching, *Xu 334* (SYS), Hainan, China: *atpB* MK826223, *rbcL* MK826703, *rps4* & *rps4-trnS* MK827232, *trnL* intron & *trnL-F* spacer MK827761. *Asplenium alatum* Humb. & Bonpl. ex Willd., *Rothfels 2639* (DUKE), San José, Costa Rica: *atpB* MK826497, *rbcL* MK827047, *rps4* & *rps4-trnS* MK827572, *trnL* intron & *trnL-F* spacer MK828039. *Asplenium alatum* Humb. & Bonpl. ex Willd., *Rothfels 4978* (UC), Pasco, Peru: *atpB* MK826370, *rbcL* MK826927, *rps4* & *rps4-trnS* MK827437, *trnL* intron & *trnL-F* spacer MK827935. *Asplenium alatum* Humb. & Bonpl. ex Willd., *Rothfels 5064* (UC), Pasco, Peru: *atpB* MK826371, *rbcL* MK826928, *rps4* & *rps4-trnS* MK827438, *trnL* intron & *trnL-F* spacer MK827936. *Asplenium alatum* Humb. & Bonpl. ex Willd., *Schuettelpelz 257* (DUKE), Ecuador: *atpB* EF463326, *rbcL* EF463145, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettelpelz & Pryer, 2007). *Asplenium altajense* (Kom.) Grubov, *Xu R4*, Cult. in SYS: *atpB* MK826088, *rbcL*—, *rps4* & *rps4-trnS* MK827115, *trnL* intron & *trnL-F* spacer—. *Asplenium amboinense* Willd., *Brownsey & Perrie FIJI 78* (WELT), Fiji: *atpB*—, *rbcL* KP774914, *rps4* & *rps4-trnS* KP851899, *trnL* intron & *trnL-F* spacer KP835355 (Ohlsen et al. 2015). *Asplenium amboinense* Willd., *Kluge 9014* (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774888, *rps4* & *rps4-trnS* KP872959, *trnL* intron & *trnL-F* spacer KP835372 (Ohlsen et al. 2015). *Asplenium anceps* Lowe ex Hook. & Grev., *Vogel 1111* (BM), Madeira: *atpB*—, *rbcL* AY300105, *rps4* & *rps4-trnS* AY549795, *trnL* intron & *trnL-F* spacer AY300052 (Schneider et al., 2004). *Asplenium angustum* Sw., *Boudrie 3254* (BM), French Guiana: *atpB*—, *rbcL* AY300106, *rps4* & *rps4-trnS* AY549822, *trnL* intron & *trnL-F* spacer AY300053 (Schneider et al., 2004). *Asplenium anisophyllum* Kunze, *Viane 8775* (GENT), Zimbabwe: *atpB*—, *rbcL* GU929837, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium annobonense* Hieron. ex Mildbr., *Velayos et al. 11601* (MO), Guinea: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827566, *trnL* intron & *trnL-F* spacer—. *Asplenium anogrammoides* Christ, *TNS: 1176817* (TNS), Miyazaki, Japan: *atpB*—, *rbcL* AB853879, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2014). *Asplenium antiquum* Makino, *Knapp 4192* (P), Taiwan Island: *atpB*—, *rbcL* MK826886, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827904. *Asplenium antiquum* Makino, *MAK390463* (MAK), Japan: *atpB*—, *rbcL* LC144888, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Yamada et al., 2016). *Asplenium antiquum* Makino, *MAK390464* (MAK), Japan: *atpB*—, *rbcL* LC144889, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Yamada et al., 2016). *Asplenium antiquum* Makino, *P022088* (WELT), New Zealand: *atpB*—, *rbcL* EU240033, *rps4* & *rps4-trnS* EU240020, *trnL* intron & *trnL-F* spacer EU240028 (Shepherd et al., 2008). *Asplenium antiquum* Makino, *Serizawa 71558* (AICH), Okinawa, Japan: *atpB*—, *rbcL* AB013236, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Murakami et al., 1999a). *Asplenium antiquum* Makino, *TNS: 763113* (TNS), Kagoshima, Japan: *atpB*—, *rbcL* AB574851, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium antrophyoides* Christ, *Xu 290* (SYS), Guangxi, China: *atpB* MK826186, *rbcL* MK826665, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827730. *Asplenium antrophyoides* Christ, *Xu CJ001* (SYS), Guangxi, China: *atpB* MK826160, *rbcL*—, *rps4* & *rps4-trnS* MK827173, *trnL* intron & *trnL-F* spacer MK827719. *Asplenium antrophyoides* Christ, *Yatabe et al.01-C02* (KYO), Indonesia: *atpB*—, *rbcL* AB097604, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Yatabe et al., 2009). *Asplenium* cf. *antrophyoides* Christ, *Zhang et al. 8253-1* (CDBI, MO, VNMMN), Dong Nai, Vietnam: *atpB*—, *rbcL* MK826889, *rps4* & *rps4-trnS* MK827399, *trnL* intron & *trnL-F* spacer MK827907. *Asplenium* cf. *antrophyoides* Christ, *Zhang et al. 8253-2* (CDBI, MO, VNMMN), Dong Nai, Vietnam: *atpB* MK826355, *rbcL* MK826909, *rps4* & *rps4-trnS* MK827419, *trnL* intron & *trnL-F* spacer MK827920. *Asplenium appendiculatum* (Labill.) C.Presl., *Ohlssen 196* (MELU), Tasmania, Australia: *atpB*—, *rbcL* KP774870, *rps4* & *rps4-trnS* KP835458, *trnL* intron & *trnL-F* spacer KP851900 (Ohlsen et al. 2015). *Asplenium athertonense* S.B. Andrews, *Ohlssen 289* (BRI, MELU), Queensland, Australia: *atpB*—, *rbcL* KP774875, *rps4* & *rps4-trnS* KP835426, *trnL* intron & *trnL-F* spacer KP835399 (Ohlsen et al. 2015). *Asplenium attenuatum* R.Br. var. *schneideri* F.M. Bailey, *Ohlssen 378* (MELU), Queensland, Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218772, *trnL* intron & *trnL-F* spacer KP218799 (Ohlsen et al. 2015). *Asplenium attenuatum* R.Br., *Ohlssen 317* (BRI, MELU), Queensland, Australia: *atpB*—, *rbcL* KP774918, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ohlsen et al. 2015). *Asplenium attenuatum* R.Br., *Ohlssen 342* (BRI, MELU), Queensland, Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218753, *trnL* intron & *trnL-F* spacer KP218788 (Ohlsen et al. 2015). *Asplenium attenuatum* R.Br., *Ohlssen 372* (MELU), Queensland, Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218762, *trnL* intron & *trnL-F* spacer KP218801 (Ohlsen et al. 2015). *Asplenium attenuatum* R.Br., *Ohlssen 428* (MELU), Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218777, *trnL* intron & *trnL-F* spacer KP218797 (Ohlsen et al. 2015). *Asplenium attenuatum* var. *indivisum* F. Muell., *Ohlssen 360* (BRI, MELU), Queensland, Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218756, *trnL* intron & *trnL-F* spacer KP218803 (Ohlsen et al. 2015). *Asplenium attenuatum* var. *multilobum* F. Muell., *Ohlssen 331* (BRI, MELU), Queensland, Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218755, *trnL* intron & *trnL-F* spacer KP218807 (Ohlsen et al. 2015). *Asplenium aureum* Cav., *JCV Cet-116* (BM), Tenerife, Canary Isles: *atpB*—, *rbcL* AF240642, *rps4* & *rps4-trnS* AY549767, *trnL* intron & *trnL-F* spacer AF525258 (Pinter et al., 2002). *Asplenium aureum* Cav., *Van den heede 164* (GENT), Gran Canaria, Los Tilos: *atpB*—, *rbcL* AF538311, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY160993 (Van den heede et al., 2003). *Asplenium australasicum* (J. Sm.) Hook., *Brownsey & Perrie FIJI 74* (WELT), Fiji: *atpB*—, *rbcL* KP774913, *rps4* & *rps4-trnS* KP851898, *trnL* intron & *trnL-F* spacer KP835368 (Ohlsen et al. 2015). *Asplenium* cf. *australasicum* (J. Sm.) Hook. (original det. as *A. australasicum* by R. Knapp), *Knapp 3913* (P), Taiwan Island: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827785. *Asplenium australasicum* (J. Sm.) Hook., *Ohlssen 396* (MELU), Vanuatu: *atpB*—, *rbcL* KP774851, *rps4* & *rps4-trnS* KP835443, *trnL* intron & *trnL-F* spacer KP835366 (Ohlsen et al. 2015). *Asplenium australasicum* Hook., *Ohlssen 352* (BRI, MELU), Queensland, Australia: *atpB*—, *rbcL* KP774871, *rps4* & *rps4-trnS* KP835450, *trnL* intron & *trnL-F* spacer KP835357 (Ohlsen et al. 2015). *Asplenium australasicum* Hook., *Perrie NC 88* (WELT), New Caledonia: *atpB*—, *rbcL* KP774904, *rps4* & *rps4-trnS* KP835432, *trnL* intron & *trnL-F* spacer KP835354 (Ohlsen et al. 2015). *Asplenium australasicum* Hook., *Wood 11012* (PTBG), Huahine, Society Island: *atpB* MK826373, *rbcL* MK826930, *rps4* & *rps4-trnS* MK827440, *trnL* intron & *trnL-F* spacer—. *Asplenium* cf.

australasicum Hook., *Wood 10755* (PTBG), Ua Huka, Marquesas: *atpB* MK826372, *rbcL* MK826929, *rps4* & *rps4-trnS* MK827439, *trnL* intron & *trnL-F* spacer—. *Asplenium austrochinense* Ching, Xu GX009 (SYS), Guangxi, China: *atpB* MK826155, *rbcL*—, *rps4* & *rps4-trnS* MK827168, *trnL* intron & *trnL-F* spacer—. *Asplenium austrochinense* Ching, Xu GX015 (SYS), Guangxi, China: *atpB* MK826173, *rbcL* MK826651, *rps4* & *rps4-trnS* MK827184, *trnL* intron & *trnL-F* spacer MK827723. *Asplenium austrochinense* Ching, Xu GX017 (SYS), Guangxi, China: *atpB* MK826163, *rbcL* MK826642, *rps4* & *rps4-trnS* MK827176, *trnL* intron & *trnL-F* spacer—. *Asplenium austrochinense* Ching, Zhang et al. 7095 (CDBI, VNMN), Thanh Hoa, Vietnam: *atpB* MK826329, *rbcL* MK826874, *rps4* & *rps4-trnS* MK827388, *trnL* intron & *trnL-F* spacer—. *Asplenium baileyianum* (Domin) Watts, *Ohlsen 267* (BRI, MELU), Queensland, Australia: *atpB*—, *rbcL* KP774943, *rps4* & *rps4-trnS* KP835408, *trnL* intron & *trnL-F* spacer KP639687 (Ohlsen et al. 2015). *Asplenium balearicum* Shivas, *Pokorny OR6* (DUKE), Orense, Spain: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827554, *trnL* intron & *trnL-F* spacer—. *Asplenium bangii* Hieron., *Rothfels 4831* (UC), Junin, Peru: *atpB* MK826374, *rbcL* MK826931, *rps4* & *rps4-trnS* MK827441, *trnL* intron & *trnL-F* spacer MK827937. *Asplenium bangii* Hieron., *Schneider s.n.* (GOET), Cult.: *atpB* EF463332, *rbcL* EF463150, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Schuettelpelz & Pryer, 2007). *Asplenium barteri* Hook., *Van der Burgt 1620* (MO), Sierra Leone: *atpB*—, *rbcL* MK827041, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium* cf. *barteri* Hook., Zhang et al. 7778 (CDBI, VNMN), Thua Thien-Hue, Vietnam: *atpB*—, *rbcL* MK826753, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium* cf. *barteri* Hook., Zhang et al. 8511 (CDBI, PHH), Lam Dong, Vietnam: *atpB*—, *rbcL* MK826790, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium bicentenniale* D.L. Jones, *Ohlsen 262* (BRI, MELU), Queensland, Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218757, *trnL* intron & *trnL-F* spacer KP218790 (Ohlsen et al. 2015). *Asplenium bicentenniale* D.L. Jones, *Ohlsen 263* (MELU), Queensland, Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218754, *trnL* intron & *trnL-F* spacer KP218789 (Ohlsen et al. 2015). *Asplenium bicentenniale* D.L. Jones, *Ohlsen 273* (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774944, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Ohlsen et al. 2015). *Asplenium bipartitum* Bory ex Willd., *Hennequin 358*, Unknown: *atpB*—, *rbcL* KF992427, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Hennequin et al., 2014). *Asplenium bipinnatifidum* Baker, *Brownsey & Perrie FIJI 78* (WELT), Fiji: *atpB*—, *rbcL* KP774915, *rps4* & *rps4-trnS* KP872963, *trnL* intron & *trnL-F* spacer KP835379 (Ohlsen et al. 2015). *Asplenium bipinnatifidum* Baker, *Kluge 9037* (UZH), Papua New Guinea: *atpB*—, *rbcL* KP851875, *rps4* & *rps4-trnS* KP835416, *trnL* intron & *trnL-F* spacer KP835369 (Ohlsen et al. 2015). *Asplenium bipinnatifidum* Baker, *Ohlsen 394* (MELU), Tanna, Vanuatu: *atpB*—, *rbcL* KP774891, *rps4* & *rps4-trnS* KP835415, *trnL* intron & *trnL-F* spacer KP835370 (Ohlsen et al. 2015). *Asplenium blastophorum* Hieron., *Anderberg et al. 116* (MO), Madagascar: *atpB*—, *rbcL* MK826914, *rps4* & *rps4-trnS* MK827423, *trnL* intron & *trnL-F* spacer MK827925. *Asplenium boltonii* Schelpe, *Janssen 2712* (P, REU), Unknown: *atpB*—, *rbcL* KF992428, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Hennequin et al., 2014). *Asplenium boreale* (Ohwi ex Sa. Kurata) Nakaike, *JL00262* (SYS), Guangdong, China: *atpB* MK826064, *rbcL* MK826562, *rps4* & *rps4-trnS* MK827089, *trnL* intron & *trnL-F* spacer MK827648. *Asplenium boreale* (Ohwi ex Sa. Kurata) Nakaike, Renxiang Wang 100905 (HITBC), Guangxi, China: *atpB*—, *rbcL* JX152735, *rps4* & *rps4-trnS* JQ724284, *trnL* intron & *trnL-F* spacer JQ724200 (Chang et al., 2013). *Asplenium boreale* (Ohwi ex Sa. Kurata) Nakaike, *TNS: 766401* (TNS), Wakayama, Japan: *atpB*—, *rbcL* AB574853, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Ebihara et al., 2010). *Asplenium boreale* (Ohwi ex Sa. Kurata) Nakaike, Xu GX014 (SYS), Guangxi, China: *atpB* MK826174, *rbcL* MK826652, *rps4* & *rps4-trnS* MK827185, *trnL* intron & *trnL-F* spacer MK827724. *Asplenium bourgaei* Boiss., *Schulze 5-1998* (HEID), Turkey: *atpB*—, *rbcL* AF318591, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Schulze et al., 2001). *Asplenium bulbiferum* G.Forst., *P20494* (WELT), New Zealand: *atpB*—, *rbcL* AY283226, *rps4* & *rps4-trnS* EF418432, *trnL* intron & *trnL-F* spacer AY283204 (Perrie & Brownsey, 2005). *Asplenium bulbiferum* subsp. *gracillimum* (Colenso) Brownsey, *Ohlsen 358* (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774908, *rps4* & *rps4-trnS* KP835435, *trnL* intron & *trnL-F* spacer KP835373 (Ohlsen et al. 2015). *Asplenium bullatum* Wall. ex Mett., *JL00368* (SYS), Yunnan, China: *atpB* MK826049, *rbcL* MK826549, *rps4* & *rps4-trnS* MK827074, *trnL* intron & *trnL-F* spacer MK827637. *Asplenium bullatum* Wall. ex Mett., Xu 314 (SYS), Yunnan, China: *atpB* MK826208, *rbcL* MK826687, *rps4* & *rps4-trnS* MK827217, *trnL* intron & *trnL-F* spacer MK827749. *Asplenium capillipes* Makino, *TNS: 766625* (TNS), Kochi, Japan: *atpB*—, *rbcL* AB574854, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Ebihara et al., 2010). *Asplenium capillipes* Makino, Zhang et al. 9375 (CDBI), Guizhou, China: *atpB* MK826354, *rbcL* MK826908, *rps4* & *rps4-trnS* MK827418, *trnL* intron & *trnL-F* spacer—. *Asplenium capillipes* Makino, Zhang et al. 9705 (CDBI), Sichuan, China: *atpB* MK826236, *rbcL* MK826716, *rps4* & *rps4-trnS* MK827244, *trnL* intron & *trnL-F* spacer—. *Asplenium capitiosum* D.L. Jones, *Ohlsen 277* (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774854, *rps4* & *rps4-trnS* KP835424, *trnL* intron & *trnL-F* spacer KP639686 (Ohlsen et al. 2015). *Asplenium carnarvonense* Brownsey, *Ohlsen 318* (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774855, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Ohlsen et al. 2015). *Asplenium carnarvonense* Brownsey, *Ohlsen 321* (MELU), Queensland, Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218760, *trnL* intron & *trnL-F* spacer KP218785 (Ohlsen et al. 2015). *Asplenium carnarvonense* Brownsey, *Ohlsen 324* (MELU), Queensland, Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218775, *trnL* intron & *trnL-F* spacer KP218796 (Ohlsen et al. 2015). *Asplenium carnarvonense* Brownsey, *Ohlsen 368* (MELU), Queensland, Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218776, *trnL* intron & *trnL-F* spacer KP218786 (Ohlsen et al. 2015). *Asplenium carruthersii* Baker, *Brownsey & Perrie FIJI 73* (WELT), Fiji: *atpB*—, *rbcL* KP774917, *rps4* & *rps4-trnS* KP835417, *trnL* intron & *trnL-F* spacer KP835374 (Ohlsen et al. 2015). *Asplenium castaneum* Schldtl. & Cham., *Dyer RD116* (BM), Mexico: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* JQ767711, *trnL* intron & *trnL-F* spacer JQ767828 (Dyer et al., 2012). *Asplenium caudatum* G.Forst., *Lorench 10577* (PTBG), Savaii, Samoa: *atpB* MK826438, *rbcL* MK826997, *rps4* & *rps4-trnS* MK827510, *trnL* intron & *trnL-F* spacer MK827991. *Asplenium caudatum* G.Forst., *Wood 10355* (PTBG), Ua Pou, Marquesas: *atpB* MK826440, *rbcL* MK826999, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827993. *Asplenium caudatum* G.Forst., *Wood 11038* (PTBG), Huahine, Society Islands: *atpB* MK826439, *rbcL*—, *rps4* & *rps4-trnS* MK827512, *trnL* intron & *trnL-F* spacer MK827992. *Asplenium caudatum* G.Forst., *Wood 16035* (PTBG), Kauai, Hawaii: *atpB* MK826375, *rbcL* MK826932, *rps4* & *rps4-trnS* MK827442, *trnL* intron & *trnL-F* spacer MK827938. *Asplenium caudatum* G.Forst., *Rerlman 21458* (PTBG, UC), Pohnpei, Micronesia: *atpB*—, *rbcL* MK826998, *rps4* & *rps4-trnS* MK827511, *trnL* intron & *trnL-F* spacer—. *Asplenium celtibericum* Rivas Mart., *MACB104526* (MACB), Spain: *atpB*—, *rbcL* KU753803, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Unpublished). *Asplenium ceterach* L., *Rothfels 2755* (DUKE), Musandam, Oman: *atpB* MK826510, *rbcL*—, *rps4* & *rps4-trnS* MK827585, *trnL* intron & *trnL-F* spacer—. *Asplenium ceterach* L., *Van De Riet 707* (EB), Unknown: *atpB*—, *rbcL* HQ676494, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer HQ676516 (De Groot et al., 2011). *Asplenium ceterach* L., *Van De Riet 707* (EB), Unknown: *atpB*—, *rbcL* HQ676494, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer HQ676516 (De Groot et al., 2011). *Asplenium ceterach* L., *Van den heede 225* (GENT), Cyprus: *atpB*—, *rbcL* AF538313, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY162334 (Van den heede et al., 2003). *Asplenium ceterach* L., *Vogel*

s.n., Unknown: *atpB*—, *rbcL* AF240643, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AF240658 (Pinter et al., 2002). *Asplenium ceterach* L., Xu R9, Cult. in SYS: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827118, *trnL* intron & *trnL-F* spacer MK827670. *Asplenium ceterach* subsp. *bivalens* (D.E.Mey.) Greuter & H.M. Burdet, *Van den heede 5* (GENT), Italy: *atpB*—, *rbcL* AF538312, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY162329 (Van den heede et al., 2003). *Asplenium chathamense* Brownsey, *P020498* (WELT), New Zealand: *atpB*—, *rbcL* DQ186552, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Cameron et al., 2006). *Asplenium christii* Hieron., *Viane 7453* (GENT), Kenya: *atpB*—, *rbcL* GU929840, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium cimmericum* Brownsey & de Lange, *AK290864*, Unknown: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer GQ377156 (Perrie et al., 2010). *Asplenium cirrhatum* Rich. ex Willd., *Rothfels 2663* (DUKE), Heredia, Costa Rica: *atpB* MK826503, *rbcL*—, *rps4* & *rps4-trnS* MK827578, *trnL* intron & *trnL-F* spacer MK828044. *Asplenium coenobiale* Hance, Xu GZ006 (SYS), Guizhou, China: *atpB* MK826165, *rbcL* MK826644, *rps4* & *rps4-trnS* MK827178, *trnL* intron & *trnL-F* spacer—. *Asplenium coenobiale* Hance, Xu GZ015 (SYS), Guizhou, China: *atpB* MK826151, *rbcL* MK826637, *rps4* & *rps4-trnS* MK827164, *trnL* intron & *trnL-F* spacer—. *Asplenium coenobiale* Hance, Zhang 730 (CDBI, MO), Guizhou, China: *atpB* MK826376, *rbcL* MK826933, *rps4* & *rps4-trnS* MK827443, *trnL* intron & *trnL-F* spacer MK827939. *Asplenium coenobiale* Hance, Zhang et al. 6676 (CDBI, MO, VNMN), Bac Kan, Vietnam: *atpB* MK826316, *rbcL* MK826862, *rps4* & *rps4-trnS* MK827378, *trnL* intron & *trnL-F* spacer—. *Asplenium coenobiale* Hance, Zhang et al. 6963 (CDBI, MO, VNMN), Ha Giang, Vietnam: *atpB* MK826270, *rbcL* MK826772, *rps4* & *rps4-trnS* MK827297, *trnL* intron & *trnL-F* spacer—. *Asplenium coenobiale* Hance, Zhang et al. 7322 (CDBI, VNMN), Quang Binh, Vietnam: *atpB* MK826248, *rbcL* MK826751, *rps4* & *rps4-trnS* MK827277, *trnL* intron & *trnL-F* spacer MK827803. *Asplenium* cf. *complanatum* Hook., *Ravelonarivo & Augustin 3447* (MO), Madagascar: *atpB*—, *rbcL* MK826913, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827924. *Asplenium compressum* Sw., *Viane 8852* (GENT), Saint Helena: *atpB*—, *rbcL* GU929836, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium confusum* Tardieu & Ching, Zhang et al. 6303 (CDBI, MO, VNMN), Hoa Binh, Vietnam: *atpB*—, *rbcL* MK826848, *rps4* & *rps4-trnS* MK827366, *trnL* intron & *trnL-F* spacer MK827872. *Asplenium contiguum* Kaulf., *Ranker 1876* (COLO), Hawaii: *atpB* EF463328, *rbcL* EF463147, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpelz & Pryer, 2007). *Asplenium contiguum* Kaulf., *Wood 11823* (PTBG), Maui, Hawaii: *atpB* MK826442, *rbcL* MK827001, *rps4* & *rps4-trnS* MK827514, *trnL* intron & *trnL-F* spacer MK827995. *Asplenium contiguum* Kaulf., *Wood 15673* (PTBG), Kauai, Hawaii: *atpB* MK826441, *rbcL* MK827000, *rps4* & *rps4-trnS* MK827513, *trnL* intron & *trnL-F* spacer MK827994. *Asplenium cordatum* (Thunb.) Sw., *Rothfels 4638* (UC), Northern Cape, South Africa: *atpB* MK826381, *rbcL* MK826938, *rps4* & *rps4-trnS* MK827448, *trnL* intron & *trnL-F* spacer MK827942. *Asplenium cornutissimum* X.C. Zhang & R.H. Jiang, *Wei 6192* (CSH), Guangxi, China: *atpB* MK826364, *rbcL* MK826922, *rps4* & *rps4-trnS* MK827431, *trnL* intron & *trnL-F* spacer MK827930. *Asplenium cornutissimum* X.C. Zhang & R.H. Jiang, Zhang et al. 6012 (CDBI), Guizhou, China: *atpB*—, *rbcL* MK826821, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827847. *Asplenium correadii* Tardieu, *Rakotendrainibe 4432* (MO), Antananarivo, Madagascar: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827943. *Asplenium crenatum* Desv., *Brownsey & Perrie FIJI 16* (WELT), Fiji: *atpB*—, *rbcL* KP774903, *rps4* & *rps4-trnS* KP851896, *trnL* intron & *trnL-F* spacer KP835389 (Ohlsen et al. 2015). *Asplenium* cf. *crenatum* Desv., *Ohlsen 309* (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774945, *rps4* & *rps4-trnS* KP835436, *trnL* intron & *trnL-F* spacer KP835400

(Ohlsen et al. 2015). *Asplenium crenatum* Desv., *Perrie NC 134* (WELT), New Caledonia: *atpB*—, *rbcL* KP774897, *rps4* & *rps4-trnS* KP835465, *trnL* intron & *trnL-F* spacer KP835390 (Ohlsen et al. 2015). *Asplenium crinicaule* Hance, *JL00181* (SYS), Guangxi, China: *atpB* MK826062, *rbcL* MK826560, *rps4* & *rps4-trnS* MK827087, *trnL* intron & *trnL-F* spacer MK827647. *Asplenium crinicaule* Hance, Knapp 3410 (P), Taiwan Island: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827257, *trnL* intron & *trnL-F* spacer—. *Asplenium crinicaule* Hance, *Wu et al. 4071* (MO), Proah, Cambodia: *atpB* MK826382, *rbcL* MK826939, *rps4* & *rps4-trnS* MK827449, *trnL* intron & *trnL-F* spacer—. *Asplenium crinicaule* Hance, Xu 24424 (SYS), Jiangxi, China: *atpB* MK826228, *rbcL* MK826708, *rps4* & *rps4-trnS* MK827237, *trnL* intron & *trnL-F* spacer MK827765. *Asplenium crinicaule* Hance, Xu GZ010 (SYS), Guizhou, China: *atpB* MK826157, *rbcL*—, *rps4* & *rps4-trnS* MK827170, *trnL* intron & *trnL-F* spacer MK827716. *Asplenium crinicaule* Hance, Xu HK003 (SYS), Hongkong, China: *atpB* MK826076, *rbcL* MK826573, *rps4* & *rps4-trnS* MK827101, *trnL* intron & *trnL-F* spacer MK827657. *Asplenium crinicaule* Hance, Xu SZ002 (SYS), Guangdong, China: *atpB* MK826072, *rbcL* MK826569, *rps4* & *rps4-trnS* MK827097, *trnL* intron & *trnL-F* spacer MK827653. *Asplenium crinicaule* Hance, Zhang et al. 5306 (CDBI), Guangxi, China: *atpB* MK826310, *rbcL* MK826813, *rps4* & *rps4-trnS* MK827334, *trnL* intron & *trnL-F* spacer MK827840. *Asplenium crinicaule* Hance, Zhang et al. 8290 (CDBI, MO, VNMN), Dong Nai, Vietnam: *atpB*—, *rbcL* MK826884, *rps4* & *rps4-trnS* MK827396, *trnL* intron & *trnL-F* spacer—. *Asplenium crinicaule* Hance, Zhang et al. 8298 (CDBI, MO, VNMN), Dong Nai, Vietnam: *atpB* MK826356, *rbcL* MK826910, *rps4* & *rps4-trnS* MK827420, *trnL* intron & *trnL-F* spacer MK827921. *Asplenium* cf. *crinicaule* Hance, Xu 319 (SYS), Yunnan, China: *atpB* MK826197, *rbcL* MK826676, *rps4* & *rps4-trnS* MK827206, *trnL* intron & *trnL-F* spacer MK827739. *Asplenium cristatum* Lam., *Cranfill s.n.* (UC), Costa Rica: *atpB*—, *rbcL* AY549731, *rps4* & *rps4-trnS* AF425146, *trnL* intron & *trnL-F* spacer AY549834 (Schneider et al., 2005). *Asplenium cromwellianum* Rosenst., *Kluge 9000* (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774933, *rps4* & *rps4-trnS* KP835441, *trnL* intron & *trnL-F* spacer KP639691 (Ohlsen et al. 2015). *Asplenium cromwellianum* Rosenst., *Kluge 9171* (UZH), Papua New Guinea: *atpB*—, *rbcL* KP774877, *rps4* & *rps4-trnS* KP851897, *trnL* intron & *trnL-F* spacer KP835404 (Ohlsen et al. 2015). *Asplenium* cf. *cuneatum* Desv., Ohlsen 261 (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774931, *rps4* & *rps4-trnS* KP835427, *trnL* intron & *trnL-F* spacer KP835382 (Ohlsen et al. 2015). *Asplenium currorii* Hook., 79-2824 (GENT), Ivory Coast: *atpB*—, *rbcL* GU929845, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium cuspidatum* Lam., *Grantham & Parsons 0233090* (UC), Costa Rica: *atpB*—, *rbcL* AY300111, *rps4* & *rps4-trnS* AY549760, *trnL* intron & *trnL-F* spacer AY300058 (Schneider et al., 2004). *Asplenium cuspidatum* Lam., *Viane 10112* (GENT), Venezuela: *atpB*—, *rbcL* GU929872, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium cymbifolium* Christ., *Yatabe et al. 00-MY06* (KYO), Sabah, Malaysia (Cult. in UKM): *atpB*—, *rbcL* AB097593, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Yatabe et al., 2009). *Asplenium cyrtosorum* K.W. Xu, Li Bing Zhang & W.B. Liao, *JL00363* (SYS), Yunnan, China: *atpB*—, *rbcL* MK826547, *rps4* & *rps4-trnS* MK827072, *trnL* intron & *trnL-F* spacer MK827635.

Asplenium cyrtosorum K.W. Xu, Li Bing Zhang & W.B. Liao, *Wu et al. WP-1557* (MO), Dak Nong, Vietnam: *atpB*—, *rbcL* MK826917, *rps4* & *rps4-trnS* MK827426, *trnL* intron & *trnL-F* spacer—. *Asplenium cyrtosorum* K.W. Xu, Li Bing Zhang & W.B. Liao, *Wu et al. WS-2673* (MO), Houaphan, Laos: *atpB*—, *rbcL* MK826992, *rps4* & *rps4-trnS* MK827505, *trnL* intron & *trnL-F* spacer MK827988. *Asplenium cyrtosorum* K.W. Xu, Li Bing Zhang & W.B. Liao, *Wu WS-2173* (MO), Xiangkhoang, Laos: *atpB*—, *rbcL* MK826991, *rps4* & *rps4-trnS* MK827504, *trnL* intron & *trnL-F* spacer—. *Asplenium cyrtosorum* K.W. Xu, Li Bing Zhang & W.B.

Liao, Wu WS2173 (MO), Xiangkhoang, Laos: *atpB* MK826361, *rbcl* MK826919, *rps4* & *rps4-trnS* MK827428, *trnL* intron & *trnL-F* spacer—. *Asplenium cyrtosorum* K.W. Xu, Li Bing Zhang & W.B. Liao, Wu WS2673 (MO), Houaphan, Laos: *atpB* MK826360, *rbcl* MK826918, *rps4* & *rps4-trnS* MK827427, *trnL* intron & *trnL-F* spacer—. *Asplenium cyrtosorum* K.W. Xu, Li Bing Zhang & W.B. Liao, Xu 318 (SYS), Yunnan, China: *atpB* MK826196, *rbcl* MK826675, *rps4* & *rps4-trnS* MK827205, *trnL* intron & *trnL-F* spacer MK827738. *Asplenium cyrtosorum* K.W. Xu, Li Bing Zhang & W.B. Liao, Xu 318-2 (SYS), Yunnan, China: *atpB* MK826205, *rbcl* MK826684, *rps4* & *rps4-trnS* MK827214, *trnL* intron & *trnL-F* spacer MK827746. *Asplenium cyrtosorum* K.W. Xu, Li Bing Zhang & W.B. Liao, Zhang et al. 7440 (CDBI, VNMN), Quang Binh, Vietnam: *atpB* MK826258, *rbcl*—, *rps4* & *rps4-trnS* MK827286, *trnL* intron & *trnL-F* spacer MK827813. *Asplenium dalhousiae* Hook., TR 7634 (GENT), Pakistan: *atpB*—, *rbcl* AF240641, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AF525254 (Pinter et al., 2002). *Asplenium dalhousiae* Hook., Van den heede 318 (GENT), Ethiopia: *atpB*—, *rbcl* AF538317, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY161000 (Van den heede et al., 2003). *Asplenium dareoides* Desv., Vogel 351 (BM), Cult. (in Jessen): *atpB*—, *rbcl* AY300112, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300059 (Schneider et al., 2004). *Asplenium daucifolium* Lam., Hennequin R149 (BM, REU), Reunion: *atpB*—, *rbcl* KF992430, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hennequin et al., 2014). *Asplenium daucifolium* var. *lineatum* (Sw.) C.V. Morton, Viane RV8220 (GENT), Reunion: *atpB*—, *rbcl* GU586808, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Bellefroid et al., 2010). *Asplenium decompositum* Peter, Viane 7688 (GENT), Tanzania: *atpB*—, *rbcl* GU929847, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium decorum* Kuntze, Kluge 9108 (UZH), Papua New Guinea: *atpB*—, *rbcl* KP774892, *rps4* & *rps4-trnS* KP835429, *trnL* intron & *trnL-F* spacer KP835352 (Ohlsen et al. 2015). *Asplenium delavayi* (Franch.) Copel., Cult. in SYS, Yunnan, China: *atpB* MK826139, *rbcl* MK826705, *rps4* & *rps4-trnS* MK827228, *trnL* intron & *trnL-F* spacer MK827703. *Asplenium delavayi* (Franch.) Copel., Cult. in SYS (SYS), Yunnan, China: *atpB* MK826219, *rbcl*—, *rps4* & *rps4-trnS* MK827152, *trnL* intron & *trnL-F* spacer—. *Asplenium delavayi* (Franch.) Copel., Xu 306 (SYS), Yunnan, China: *atpB* MK826206, *rbcl* MK826685, *rps4* & *rps4-trnS* MK827215, *trnL* intron & *trnL-F* spacer MK827747. *Asplenium diellectum* Viane, Wood 7775 (PTBG), Hawaii: *atpB*—, *rbcl* AY549737, *rps4* & *rps4-trnS* AY549786, *trnL* intron & *trnL-F* spacer AY549840 (Schneider et al., 2005). *Asplenium dielfalcatum* Viane, Wood 7826 (PTBG), Hawaii: *atpB*—, *rbcl* AY549738, *rps4* & *rps4-trnS* AY549787, *trnL* intron & *trnL-F* spacer AY549841 (Schneider et al., 2005). *Asplenium dielactinatum* Viane, Wood 16032 (PTBG), Kauai, Hawaii: *atpB* MK826444, *rbcl* MK827003, *rps4* & *rps4-trnS* MK827516, *trnL* intron & *trnL-F* spacer MK827996. *Asplenium dielmannii* Viane, Perlman SP18502 (PTBG), Hawaii: *atpB*—, *rbcl* AY549739, *rps4* & *rps4-trnS* AY549788, *trnL* intron & *trnL-F* spacer AY549842 (Schneider et al., 2005). *Asplenium dielmannii* Viane, Wood 13875 (PTBG), Kauai, Hawaii: *atpB* MK826445, *rbcl*—, *rps4* & *rps4-trnS* MK827517, *trnL* intron & *trnL-F* spacer MK827997 (Schneider et al., 2005). *Asplenium dielpallidum* N. Snow, Wood 7809 (PTBG), Hawaii: *atpB*—, *rbcl* AY549740, *rps4* & *rps4-trnS* AY549789, *trnL* intron & *trnL-F* spacer AY549843 (Schneider et al., 2005). *Asplenium difforme* R.Br., Ohlsen 336 (MELU), Queensland, Australia: *atpB*—, *rbcl* KP774873, *rps4* & *rps4-trnS* KP835454, *trnL* intron & *trnL-F* spacer KP835364 (Ohlsen et al. 2015). *Asplenium difforme* R.Br., P020578 (WELT), Australia: *atpB*—, *rbcl* AY641800, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY641793 (Unpublished). *Asplenium dimorphum* Kunze, P020580 (WELT), Australia: *atpB*—, *rbcl* AY641802, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY641795 (Unpublished). *Asplenium dissectum* C.Chr., VS7951 (Silwood Park DNA Bank), Unknown: *atpB*—, *rbcl* KM495080, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Igea et al., 2014). *Asplenium dognyense* Rosenst., Perrie NC 78 (WELT), New Caledonia: *atpB*—, *rbcl* KP774895, *rps4* & *rps4-trnS* KP835464, *trnL* intron & *trnL-F* spacer KP851901 (Ohlsen et al. 2015). *Asplenium dolomiticum* (Lovis & Reichst.) Á. Löve & D. Löve, JCV RUT-16 (BM), Austria: *atpB*—, *rbcl* AF525273, *rps4* & *rps4-trnS* AY549763 (Schneider et al., 2005), *trnL* intron & *trnL-F* spacer AF525242 (Pinter et al., 2002). *Asplenium dregeanum* Kuntze, Viane 2753 (GENT), Cameroon: *atpB*—, *rbcl* GU929839, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium elliottii* C.H. Wright, Hemp 4 (BM), Kenya: *atpB*—, *rbcl* AY549753, *rps4* & *rps4-trnS* AY549817, *trnL* intron & *trnL-F* spacer AY549857 (Schneider et al., 2005). *Asplenium elliottii* C.H. Wright, Viane 7685 (GENT), Tanzania: *atpB*—, *rbcl* GU929835, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium elmeri* Christ, Chen 4638 (TAIF), Sabah, Malaysia: *atpB* MK826386, *rbcl* MK826943, *rps4* & *rps4-trnS* MK827453, *trnL* intron & *trnL-F* spacer MK827947. *Asplenium emarginatum* P. Beauv., Nick Mundy 123-124 (BM), Gabon, Africa: *atpB*—, *rbcl* AF525266, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AF525243 (Pinter et al., 2002). *Asplenium ensiforme* Wall. ex Hook. & Grev., JL00192 (SYS), Guangxi, China: *atpB* MK826067, *rbcl* MK826565, *rps4* & *rps4-trnS* MK827092, *trnL* intron & *trnL-F* spacer—. *Asplenium ensiforme* Wall. ex Hook. & Grev., JL00372 (SYS), Yunnan, China: *atpB* MK826052, *rbcl*—, *rps4* & *rps4-trnS* MK827077, *trnL* intron & *trnL-F* spacer—. *Asplenium ensiforme* Wall. ex Hook. & Grev., Xu 277 (SYS), Guangdong, China: *atpB* MK826132, *rbcl*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium ensiforme* Wall. ex Hook. & Grev., Xu 312 (SYS), Yunnan, China: *atpB*—, *rbcl* MK826689, *rps4* & *rps4-trnS* MK827218, *trnL* intron & *trnL-F* spacer—. *Asplenium ensiforme* Wall. ex Hook. & Grev., Xu GX010 (SYS), Guangxi, China: *atpB* MK826156, *rbcl* MK826641, *rps4* & *rps4-trnS* MK827169, *trnL* intron & *trnL-F* spacer—. *Asplenium ensiforme* Wall. ex Hook. & Grev., Xu GX020 (SYS), Guangxi, China: *atpB* MK826143, *rbcl* MK826629, *rps4* & *rps4-trnS* MK827156, *trnL* intron & *trnL-F* spacer MK827707. *Asplenium ensiforme* Wall. ex Hook. & Grev., Xu JX015 (SYS), Jiangxi, China: *atpB* MK826159, *rbcl*—, *rps4* & *rps4-trnS* MK827172, *trnL* intron & *trnL-F* spacer MK827718. *Asplenium ensiforme* Wall. ex Hook. & Grev., Xu PB002 (SYS), Yunnan, China: *atpB* MK826086, *rbcl* MK826583, *rps4* & *rps4-trnS* MK827112, *trnL* intron & *trnL-F* spacer MK827667. *Asplenium ensiforme* Wall. ex Hook. & Grev., Zhang et al. 7613 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB* MK826330, *rbcl* MK826876, *rps4* & *rps4-trnS* MK827390, *trnL* intron & *trnL-F* spacer—. *Asplenium ensiforme* Wall. ex Hook. & Grev., Zhang et al. 7625 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB* MK826327, *rbcl* MK826872, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium ensiforme* Wall. ex Hook. & Grev., Zhang et al. 8476 (CDBI, MO), Lam Dong, Vietnam: *atpB*—, *rbcl* MK826740, *rps4* & *rps4-trnS* MK827266, *trnL* intron & *trnL-F* spacer—. *Asplenium ensiforme* Wall. ex Hook. & Grev., Zhang et al. 8876 (CDBI, MO, PHH), Dak Lak, Vietnam: *atpB*—, *rbcl* MK826823, *rps4* & *rps4-trnS* MK827342, *trnL* intron & *trnL-F* spacer—. *Asplenium ensiforme* Wall. ex Hook. & Grev., Zhang et al. 8886 (CDBI, MO, PHH), Dak Lak, Vietnam: *atpB*—, *rbcl* MK826825, *rps4* & *rps4-trnS* MK827344, *trnL* intron & *trnL-F* spacer—. *Asplenium ensiforme* Wall. ex Hook. & Grev., Zhang et al. 9728 (CDBI), Sichuan, China: *atpB*—, *rbcl* MK826826, *rps4* & *rps4-trnS* MK827345, *trnL* intron & *trnL-F* spacer—. *Asplenium ensiforme* Wall. ex Hook. & Grev., Zhang et al. 9728 (CDBI), Sichuan, China: *atpB* MK826238, *rbcl* MK826718, *rps4* & *rps4-trnS* MK827246, *trnL* intron & *trnL-F* spacer MK827773. *Asplenium erectum* Bory ex Willd., Hemp 14 (BM), Kenya: *atpB*—, *rbcl* AY300113, *rps4* & *rps4-trnS* AY549770, *trnL* intron & *trnL-F* spacer AY300060 (Schneider et al., 2004). *Asplenium* cf. *erectum* Bory ex Willd., Kluge7741 (GOET, UC), Unknown: *atpB*—, *rbcl* KF992431, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hennequin et al., 2014). *Asplenium erosum* L., Meisenburg s.n. (FLAS), Florida, USA:

atpB—, *rbcL* KX397706, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium* cf. *erosum* L., *Rothfels* 3709 (DUKE), Napo, Ecuador: *atpB* MK826536, *rbcL* MK826544, *rps4* & *rps4-trnS* MK827609, *trnL* intron & *trnL-F* spacer MK828057. *Asplenium* cf. *erosum* L., *Grangaud* & *Acock s.n.*, Unknown: *atpB*—, *rbcL* KF992426, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hennequin et al., 2014). *Asplenium* cf. *erosum* L., *Jones* 1084 (TUR), Unknown: *atpB* KM114080, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished).

Asplenium cf. *erosum* L., *Rothfels* 4821 (UC), Junin, Peru: *atpB* MK826385, *rbcL* MK826942, *rps4* & *rps4-trnS* MK827452, *trnL* intron & *trnL-F* spacer MK827946. *Asplenium* cf. *erosum* L., *Rothfels* 5036 (UC), Pasco, Peru: *atpB* MK826383, *rbcL* MK826940, *rps4* & *rps4-trnS* MK827450, *trnL* intron & *trnL-F* spacer MK827944. *Asplenium* cf. *erosum* L., *Schneider s.n.* (GOET), Cult.: *atpB* EF463327, *rbcL* EF463146, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpeitz & Pryer, 2007). *Asplenium excelsum* Lellinger, *Grusz* 155 (DUKE), San José, Costa Rica: *atpB* MK826501, *rbcL* MK827050, *rps4* & *rps4-trnS* MK827576, *trnL* intron & *trnL-F* spacer MK828042. *Asplenium exiguum* Bedd., *Viane* RV9341 (GENT), China: *atpB*—, *rbcL* GU586826, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Bellefroid et al., 2010). *Asplenium falcatum* Lam., *Grigg* & *Moloney s.n.* (MELU), Christmas Island, Australia: *atpB*—, *rbcL* KP774938, *rps4* & *rps4-trnS* KP851892, *trnL* intron & *trnL-F* spacer KP639698 (Ohlsen et al. 2015). *Asplenium falcatum* Lam., *Ohlsen* 387 (MELU), Vanuatu: *atpB*—, *rbcL* KP851874, *rps4* & *rps4-trnS* KP851887, *trnL* intron & *trnL-F* spacer KP851905 (Ohlsen et al. 2015). *Asplenium falcatum* Lam., *Ohlsen* 391 (MELU), Vanuatu: *atpB*—, *rbcL* KP774887, *rps4* & *rps4-trnS* KP835418, *trnL* intron & *trnL-F* spacer KP851906 (Ohlsen et al. 2015). *Asplenium falcatum* Lam., *Perrie* NC 6 (WELT), New Caledonia: *atpB*—, *rbcL* KP774878, *rps4* & *rps4-trnS* KP851886, *trnL* intron & *trnL-F* spacer KP835391 (Ohlsen et al. 2015). *Asplenium falcatum* Lam., *TNS*: 743676 (TNS), Tokyo, Japan: *atpB*—, *rbcL* AB574867, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium falcatum* Lam., *Wu* et al. 4053 (MO), Preah vihear, Cambodia: *atpB* MK826409, *rbcL* MK826966, *rps4* & *rps4-trnS* MK827477, *trnL* intron & *trnL-F* spacer MK827966. *Asplenium falcatum* Lam., *Wu* et al. 4258 (MO), Cambodia: *atpB* MK826358, *rbcL* MK826915, *rps4* & *rps4-trnS* MK827424, *trnL* intron & *trnL-F* spacer MK827926. *Asplenium falcatum* Lam., *Xu* 108 (SYS), Hainan, China: *atpB* MK826096, *rbcL*—, *rps4* & *rps4-trnS* MK827124, *trnL* intron & *trnL-F* spacer MK827676. *Asplenium falcatum* Lam., *Xu* 122 (SYS), Hainan, China: *atpB* MK826100, *rbcL* MK826591, *rps4* & *rps4-trnS* MK827127, *trnL* intron & *trnL-F* spacer MK827679. *Asplenium falcatum* Lam., *Xu* 291 (SYS), Guangxi, China: *atpB* MK826185, *rbcL* MK826664, *rps4* & *rps4-trnS* MK827195, *trnL* intron & *trnL-F* spacer MK827729. *Asplenium falcatum* Lam., *Xu* 325 (SYS), Guangxi, China: *atpB* MK826202, *rbcL* MK826681, *rps4* & *rps4-trnS* MK827211, *trnL* intron & *trnL-F* spacer MK827744. *Asplenium falcatum* Lam., *Zhang et al.* 6928 (CDBI, MO, VNMN), Ha Giang, Vietnam: *atpB* MK826279, *rbcL* MK826781, *rps4* & *rps4-trnS* MK827303, *trnL* intron & *trnL-F* spacer—, *Asplenium falcatum* Lam., *Zhang et al.* 7063 (CDBI, MO, VNMN), Thanh Hoa, Vietnam: *atpB* MK826335, *rbcL* MK826881, *rps4* & *rps4-trnS* MK827395, *trnL* intron & *trnL-F* spacer MK827901. *Asplenium falcatum* Lam., *Zhang et al.* 7299 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB* MK826333, *rbcL* MK826879, *rps4* & *rps4-trnS* MK827393, *trnL* intron & *trnL-F* spacer MK827899. *Asplenium falcatum* Lam., *Zhang et al.* 7922 (CDBI, MO, VNMN), Quang Nam, Vietnam: *atpB* MK826252, *rbcL* MK826756, *rps4* & *rps4-trnS* MK827280, *trnL* intron & *trnL-F* spacer MK827807. *Asplenium falcatum* Lam., *Zhang et al.* 8830 (CDBI, MO, PHH), Dak Lak, Vietnam: *atpB*—, *rbcL* MK826844, *rps4* & *rps4-trnS* MK827361, *trnL* intron & *trnL-F* spacer MK827868. *Asplenium feei* Kunze ex Fée, *NYBG* 393/94A (BM), Unknown: *atpB*—, *rbcL* AF525267, *rps4* & *rps4-trnS* AY549818 (Schneider et al., 2005), *trnL* intron & *trnL-F*

spacer AF525244 (Pinter et al., 2002). *Asplenium feejeense* Brack., *Lorence* 10594 (PTBG), Savaii, Samoa: *atpB* MK826447, *rbcL* MK827005, *rps4* & *rps4-trnS* MK827519, *trnL* intron & *trnL-F* spacer MK827999. *Asplenium fibrillosum* Pringle & Davenp., *Dyer* RD22 (BM), Jalisco, Mexico: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* JQ767713, *trnL* intron & *trnL-F* spacer JQ767830 (Dyer et al., 2012). *Asplenium filidens* Brownlie, *Perrie* NC 85 (WELT), New Caledonia: *atpB*—, *rbcL* KP774876, *rps4* & *rps4-trnS* KP835431, *trnL* intron & *trnL-F* spacer KP835396 (Ohlsen et al. 2015). *Asplenium finlaysonianum* Wallich ex Hooker, *Viane* 9708 (GENT), Myanmar: *atpB*—, *rbcL* GU929856, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium fissum* Kit. ex Willd., *Jermy* 22816 (BM), Bulgaria: *atpB*—, *rbcL* AY300114, *rps4* & *rps4-trnS* AY549775, *trnL* intron & *trnL-F* spacer AY300061 (Schneider et al., 2004). *Asplenium flabellifolium* Cav., *Holmes* 4/4/99 (BM), Australia: *atpB*—, *rbcL* AY300115, *rps4* & *rps4-trnS* AY549779, *trnL* intron & *trnL-F* spacer AY300062 (Schneider et al., 2004). *Asplenium flabellifolium* Cav., *Ohlsen* 185 (MELU), Tasmania, Australia: *atpB*—, *rbcL* KP774850, *rps4* & *rps4-trnS* KP835460, *trnL* intron & *trnL-F* spacer KP851902 (Ohlsen et al. 2015). *Asplenium flabellifolium* Cav., *P20500* (WELT), New Zealand: *atpB*—, *rbcL* AY283227, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY283209 (Perrie & Brownsey, 2005). *Asplenium flabellulatum* Kunze, *Rothfels* 3713 (DUKE), Napo, Ecuador: *atpB* MK826521, *rbcL*—, *rps4* & *rps4-trnS* MK827598, *trnL* intron & *trnL-F* spacer MK827627. *Asplenium flaccidum* G.Forst., *Ohlsen* 218 (MELU), Victoria, Australia: *atpB*—, *rbcL* KP774910, *rps4* & *rps4-trnS* KP835459, *trnL* intron & *trnL-F* spacer KP835363 (Ohlsen et al. 2015). *Asplenium flaccidum* G.Forst., *P20501* (WELT), New Zealand: *atpB*—, *rbcL* AY283228, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY283210 (Perrie & Brownsey, 2005). *Asplenium fontanum* (L.) Bernh., *JCV* F-3-92 (BM), Rasbach, Germany: *atpB*—, *rbcL* AF525268, *rps4* & *rps4-trnS* AY549806 (Schneider et al., 2005), *trnL* intron & *trnL-F* spacer AF525239 (Pinter et al., 2002). *Asplenium foresiense* Legrand, *Bond* 920 (EB), Unknown: *atpB*—, *rbcL* HQ676493, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer HQ676515 (De Groot et al., 2011). *Asplenium foresiense* Le Grand, *Schuettpeitz* 536 (GOET), Cult.: *atpB* EF463330, *rbcL* EF463148, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpeitz & Pryer, 2007). *Asplenium formosae* H. Christ, *Knapp* 4124 (P), Taiwan Island: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827788. *Asplenium formosae* H. Christ, *Ranker* 2071 (COLO), Taiwan: *atpB* EF463331, *rbcL* EF463149, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpeitz & Pryer, 2007). *Asplenium formosae* H. Christ, *Xu* 012 (SYS), Hainan, China: *atpB* MK826107, *rbcL* MK826598, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827684. *Asplenium formosae* H. Christ, *Xu* 103 (SYS), Hainan, China: *atpB* MK826106, *rbcL* MK826597, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—, *Asplenium formosae* H. Christ, *Xu* 106 (SYS), Hainan, China: *atpB* MK826109, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—, *Asplenium formosae* H. Christ, *Xu* 116 (SYS), Hainan, China: *atpB* MK826112, *rbcL* MK826601, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827688. *Asplenium formosae* H. Christ, *Zhang et al.* 7507 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB* MK826328, *rbcL* MK826873, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827895. *Asplenium formosae* H. Christ, *Zhang et al.* 8005 (CDBI, MO, VNMN), Quang Nam, Vietnam: *atpB* MK826276, *rbcL* MK826778, *rps4* & *rps4-trnS* MK827301, *trnL* intron & *trnL-F* spacer—, *Asplenium formosae* H. Christ, *Zhang et al.* 8798 (CDBI, MO, PHH), Khanh Hoa, Vietnam: *atpB*—, *rbcL* MK826840, *rps4* & *rps4-trnS* MK827357, *trnL* intron & *trnL-F* spacer MK827863. *Asplenium formosum* Willd., *Dyer* RD28 (BM), Nayarit, Mexico: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* JQ767718, *trnL* intron & *trnL-F* spacer JQ767835 (Dyer et al., 2012). *Asplenium formosum* Willd., *Vogel* AZO34 (BM), Belize: *atpB*—, *rbcL* AY300116, *rps4* & *rps4-trnS* AY549796, *trnL* intron & *trnL-F* spacer AY300063 (Schneider

et al., 2004). *Asplenium fragile* C. Presl, Cult. in Bot. Gard. Goett. (GOET): *atpB*—, *rbcl* AY549733, *rps4* & *rps4-trnS* AY549772, *trnL* intron & *trnL-F* spacer AY549836 (Schneider et al., 2005). *Asplenium fragile* C. Presl, *Rothfels* 3538 (DUKE), Pichincha, Ecuador: *atpB* MK826528, *rbcl* MK827058, *rps4* & *rps4-trnS* MK827602, *trnL* intron & *trnL-F* spacer—. *Asplenium fragile* C. Presl, *Rothfels* 3576 (DUKE), Carchi, Ecuador: *atpB* MK826517, *rbcl*—, *rps4* & *rps4-trnS* MK827594, *trnL* intron & *trnL-F* spacer MK827625. *Asplenium fragile* C. Presl, *Rothfels* 3690 (DUKE), Pichincha, Ecuador: *atpB* MK826535, *rbcl* MK827061, *rps4* & *rps4-trnS* MK827608, *trnL* intron & *trnL-F* spacer MK827632. *Asplenium friesiorum* C. Chr., *Hemp* 21 (BM), Kenya: *atpB*—, *rbcl* AY549756, *rps4* & *rps4-trnS* AY549828, *trnL* intron & *trnL-F* spacer AY549860 (Schneider et al., 2005). *Asplenium friesiorum* C. Chr., *Viane* 8752A (GENT), Zimbabwe: *atpB*—, *rbcl* GU929850, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium fugax* Christ, *Zhang et al.* 5765 (CDBI), Guizhou, China: *atpB*—, *rbcl* MK826822, *rps4* & *rps4-trnS* MK827341, *trnL* intron & *trnL-F* spacer MK827848. *Asplenium fugax* Christ, *Zhang et al.* 9302 (CDBI, MO), Guizhou, China: *atpB* MK826387, *rbcl* MK826944, *rps4* & *rps4-trnS* MK827454, *trnL* intron & *trnL-F* spacer MK827948. *Asplenium fugax* Christ, *Zhang et al.* 9369 (CDBI, MO), Guizhou, China: *atpB* MK826388, *rbcl* MK826945, *rps4* & *rps4-trnS* MK827455, *trnL* intron & *trnL-F* spacer—. *Asplenium fugax* Christ, *Zhang et al.* 9525 (CDBI), Guizhou, China: *atpB* MK826280, *rbcl* MK826782, *rps4* & *rps4-trnS* MK827304, *trnL* intron & *trnL-F* spacer—. *Asplenium fugax* Christ, *Zhang et al.* 9545 (CDBI), Guizhou, China: *atpB*—, *rbcl* MK826827, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827851. *Asplenium fugax* Christ, *Zhang et al.* 9568 (CDBI), Guizhou, China: *atpB* MK826271, *rbcl* MK826773, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium fugax* Christ, *Zhang et al.* 9586 (CDBI), Guizhou, China: *atpB* MK826284, *rbcl* MK826786, *rps4* & *rps4-trnS* MK827309, *trnL* intron & *trnL-F* spacer—. *Asplenium fugax* Christ, *Zhang et al.* 9762 (CDBI), Guizhou, China: *atpB* MK826297, *rbcl* MK826800, *rps4* & *rps4-trnS* MK827322, *trnL* intron & *trnL-F* spacer MK827829. *Asplenium fugax* Christ, *Zhang et al.* 9586 (CDBI, MO), Guizhou, China: *atpB* MK826377, *rbcl* MK826934, *rps4* & *rps4-trnS* MK827444, *trnL* intron & *trnL-F* spacer—. *Asplenium fuscipes* Bak., *JL00218* (SYS), Guangxi, China: *atpB* MK826070, *rbcl* MK826567, *rps4* & *rps4-trnS* MK827095, *trnL* intron & *trnL-F* spacer MK827651. *Asplenium fuscipes* Bak., *Xu* 328-1 (SYS), Guangxi, China: *atpB* MK826212, *rbcl* MK826693, *rps4* & *rps4-trnS* MK827222, *trnL* intron & *trnL-F* spacer MK827754. *Asplenium fuscipes* Bak., *Xu* 328-2 (SYS), Guangxi, China: *atpB* MK826213, *rbcl* MK826694, *rps4* & *rps4-trnS* MK827223, *trnL* intron & *trnL-F* spacer MK827755. *Asplenium fuscipes* Bak., *Xu* GX002 (SYS), Guangxi, China: *atpB* MK826161, *rbcl*—, *rps4* & *rps4-trnS* MK827174, *trnL* intron & *trnL-F* spacer—. *Asplenium fuscipes* Bak., *Zhang & He* 4959 (CDBI), Yunnan, China: *atpB* MK826380, *rbcl* MK826937, *rps4* & *rps4-trnS* MK827447, *trnL* intron & *trnL-F* spacer MK827941. *Asplenium fuscipes* Bak., *Zhang et al.* 6527 (CDBI, MO, VNMN), Phu Tho, Vietnam: *atpB* MK826319, *rbcl*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium fuscipes* Bak., *Zhang et al.* 9224 (CDBI), Guizhou, China: *atpB* MK826344, *rbcl* MK826898, *rps4* & *rps4-trnS* MK827408, *trnL* intron & *trnL-F* spacer MK827915. *Asplenium fuscipes* Bak., *Zhang et al.* 9687 (CDBI), Guizhou, China: *atpB*—, *rbcl* MK826817, *rps4* & *rps4-trnS* MK827337, *trnL* intron & *trnL-F* spacer MK827843. *Asplenium gemmiferum* Schrad., *Hemp* 9 (BM), Kenya: *atpB*—, *rbcl* AY300117, *rps4* & *rps4-trnS* AY549819, *trnL* intron & *trnL-F* spacer AY300064 (Schneider et al., 2004). *Asplenium gibberosum* (G. Forst.) Mett., *Ohlsen* 395 (MELU), Tanna, Vanuatu: *atpB*—, *rbcl* KP774924, *rps4* & *rps4-trnS* KP851895, *trnL* intron & *trnL-F* spacer KP835378 (Ohlsen et al. 2015). *Asplenium goudeyi* D.L. Jones, *Ohlsen* 280 (MELU), Lord Howe Island, Australia: *atpB*—, *rbcl* KP774856, *rps4* & *rps4-trnS* KP835449, *trnL* intron & *trnL-F* spacer KP835371 (Ohlsen et al. 2015). *Asplenium griffithianum* Hook., *Fujita et al.* (FU), Kagoshima Japan: *atpB*—, *rbcl* AB574857, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium griffithianum* Hook., *JL00359* (SYS), Yunnan, China: *atpB* MK826058, *rbcl* MK826556, *rps4* & *rps4-trnS* MK827083, *trnL* intron & *trnL-F* spacer MK827643. *Asplenium griffithianum* Hook., *Murakami* J93-001 (KYO), Kagoshima, Japan: *atpB*—, *rbcl* AB013252, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Murakami et al., 1999b). *Asplenium griffithianum* Hook., *Murakami* J93-001 (TI), Kagoshima, Japan: *atpB*—, *rbcl* AB014688, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Murakami et al., 1999a). *Asplenium griffithianum* Hook., *Xu* 297-1 (SYS), Guangxi, China: *atpB* MK826190, *rbcl* MK826669, *rps4* & *rps4-trnS* MK827199, *trnL* intron & *trnL-F* spacer MK827732. *Asplenium griffithianum* Hook., *Xu* 297-2 (SYS), Guangxi, China: *atpB* MK826191, *rbcl* MK826670, *rps4* & *rps4-trnS* MK827200, *trnL* intron & *trnL-F* spacer MK827733. *Asplenium griffithianum* Hook., *Xu* GZ013 (SYS), Guizhou, China: *atpB* MK826153, *rbcl* MK826639, *rps4* & *rps4-trnS* MK827166, *trnL* intron & *trnL-F* spacer MK827714. *Asplenium griffithianum* Hook., *Zhang et al.* 6485 (CDBI, MO, VNMN), Hanoi, Vietnam: *atpB*—, *rbcl* MK826837, *rps4* & *rps4-trnS* MK827354, *trnL* intron & *trnL-F* spacer MK827861. *Asplenium griffithianum* Hook., *Zhang et al.* 6556 (CDBI, VNMN), Phu Tho, Vietnam: *atpB* MK826317, *rbcl* MK826863, *rps4* & *rps4-trnS* MK827380, *trnL* intron & *trnL-F* spacer MK827886. *Asplenium griffithianum* Hook., *Zhang et al.* 6961 (CDBI, MO, VNMN), Ha Giang, Vietnam: *atpB* MK826305, *rbcl* MK826808, *rps4* & *rps4-trnS* MK827329, *trnL* intron & *trnL-F* spacer MK827836. *Asplenium griffithianum* Hook., *Zhang et al.* 7005 (CDBI, VNMN), Thanh Hoa, Vietnam: *atpB*—, *rbcl* MK826818, *rps4* & *rps4-trnS* MK827338, *trnL* intron & *trnL-F* spacer MK827844. *Asplenium griffithianum* Hook., *Zhang et al.* 7321 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB* MK826322, *rbcl* MK826867, *rps4* & *rps4-trnS* MK827384, *trnL* intron & *trnL-F* spacer MK827889. *Asplenium guangdongense* Yan Fen Chang & H. Schneid., *Guocheng Zhang* 390 (HITBC), Guangdong, China: *atpB*—, *rbcl*—, *rps4* & *rps4-trnS* KY979546, *trnL* intron & *trnL-F* spacer KY979524 (Chang et al., 2018). *Asplenium guangdongense* Yan Fen Chang & H. Schneid. (*Asplenium* aff. *boreale* (Ohwi ex Sa. Kurata) Nakaike determined by Ralf Knapp), *Knapp* 3840 (P), Taiwan Island: *atpB*—, *rbcl* MK826727, *rps4* & *rps4-trnS* MK827255, *trnL* intron & *trnL-F* spacer MK827782. *Asplenium gueinzianum* Mett., *Jin & Zhang* 11533 (CDBI), Yunnan, China: *atpB* MK826298, *rbcl* MK826801, *rps4* & *rps4-trnS* MK827323, *trnL* intron & *trnL-F* spacer MK827830. *Asplenium gueinzianum* Mett., *JL00370* (SYS), Yunnan, China: *atpB* MK826051, *rbcl* MK826551, *rps4* & *rps4-trnS* MK827076, *trnL* intron & *trnL-F* spacer MK827639. *Asplenium gueinzianum* Mett., *Xu* 165 (SYS), Yunnan, China: *atpB* MK826079, *rbcl* MK826576, *rps4* & *rps4-trnS* MK827104, *trnL* intron & *trnL-F* spacer MK827660. *Asplenium gueinzianum* Mett., *Xu* 305 (SYS), Yunan, China: *atpB* MK826218, *rbcl* MK826699, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827757. *Asplenium gueinzianum* Mett., *Xu* 308 (SYS), Yunnan, China: *atpB* MK826209, *rbcl* MK826690, *rps4* & *rps4-trnS* MK827219, *trnL* intron & *trnL-F* spacer MK827751. *Asplenium gueinzianum* Mett., *Zhang et al.* 7631 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB* MK826340, *rbcl* MK826797, *rps4* & *rps4-trnS* MK827319, *trnL* intron & *trnL-F* spacer MK827827. *Asplenium gueinzianum* Mett., *Zhang et al.* 8899 (CDBI, MO, PHH), Dak Lak, Vietnam: *atpB*—, *rbcl* MK826836, *rps4* & *rps4-trnS* MK827353, *trnL* intron & *trnL-F* spacer MK827860. *Asplenium hainanense* Ching, *Xu* 109 (SYS), Hainan, China: *atpB* MK826097, *rbcl* MK826588, *rps4* & *rps4-trnS* MK827125, *trnL* intron & *trnL-F* spacer MK827677. *Asplenium hainanense* Ching, *Zhang et al.* 6988 (CDBI, MO, VNMN), Thanh Hoa, Vietnam: *atpB* MK826338, *rbcl* MK826892, *rps4* & *rps4-trnS* MK827402, *trnL* intron & *trnL-F* spacer—. *Asplenium hainanense* Ching, *Zhang et al.* 7521 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB* MK826257, *rbcl* MK826761, *rps4* & *rps4-trnS*

MK827285, *trnL* intron & *trnL-F* spacer MK827812. *Asplenium hainanense* Ching, Zhang et al. 7744 (CDBI, MO, VNMN), Thua Thien-Hue, Vietnam: *atpB* MK826246, *rbcL* MK826749, *rps4* & *rps4-trnS* MK827275, *trnL* intron & *trnL-F* spacer MK827801. *Asplenium hainanense* Ching, Zhang et al. 7749 (CDBI, MO, VNMN), Thua Thien-Hue, Vietnam: *atpB* MK826324, *rbcL* MK826869, *rps4* & *rps4-trnS* MK827386, *trnL* intron & *trnL-F* spacer MK827891. *Asplenium hainanense* Ching, Zhang et al. 7886 (CDBI, MO, VNMN), Quang Nam, Vietnam: *atpB* MK826250, *rbcL* MK826754, *rps4* & *rps4-trnS* MK827279, *trnL* intron & *trnL-F* spacer MK827805. *Asplenium haleakalense* W.H. Wagner, Wood 11822 (PTBG), Maui, Hawaii: *atpB* MK826463, *rbcL* MK827018, *rps4* & *rps4-trnS* MK827534, *trnL* intron & *trnL-F* spacer MK828011. *Asplenium hallbergii* Mickel & Beitel, Dyer RD138 (BM), Queretaro, Mexico: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* JQ767731, *trnL* intron & *trnL-F* spacer JQ767850 (Dyer et al., 2012). *Asplenium hallbergii* Mickel & Beitel, Dyer RD90 (BM), Oaxaca, Mexico: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* JQ767721, *trnL* intron & *trnL-F* spacer JQ767838 (Dyer et al., 2012). *Asplenium harmanii* D.L. Jones, Ohlsen 343 (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774866, *rps4* & *rps4-trnS* KP835457, *trnL* intron & *trnL-F* spacer KP835375 (Ohlsen et al. 2015). *Asplenium harpeodes* Kunze, Ranker 1843 (COLO), Costa Rica: *atpB* EF463341, *rbcL* EF463155, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpelz & Pryer, 2007). *Asplenium harpeodes* Kunze, Rothfels 2678 (DUKE), Heredia, Costa Rica: *atpB* MK826500, *rbcL*—, *rps4* & *rps4-trnS* MK827575, *trnL* intron & *trnL-F* spacer—. *Asplenium haughtonii* Bir, Fraser-Jenk. & Lovis, Van den heede 930 (GENT), Saint Helena: *atpB*—, *rbcL* AF538321, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY158248 (Van den heede et al., 2003). *Asplenium hemionitis* L., JCV HEM-9 (BM), Azores: *atpB*—, *rbcL* AF240648, *rps4* & *rps4-trnS* AY549799, *trnL* intron & *trnL-F* spacer AF240663 (Pinter et al., 2002). *Asplenium hemionitis* L., Viane 6679 (GENT), Canary Islands, Spain: *atpB*—, *rbcL* GU929859, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium hemionitis* L., Xu R14, Cult. in SYS: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827123, *trnL* intron & *trnL-F* spacer MK827675. *Asplenium heterochroum* Kunze, Hughes 42 (BM), Belize: *atpB*—, *rbcL* AY549745, *rps4* & *rps4-trnS* AY549776, *trnL* intron & *trnL-F* spacer AY549849 (Schneider et al., 2005). *Asplenium* cf. *heterochroum* Kunze, Lehnert ML601 (BM), Ecuador: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* JQ767734, *trnL* intron & *trnL-F* spacer JQ767855 (Dyer et al., 2012). *Asplenium* cf. *heterochroum* Kunze, Rothfels 2504 (DUKE), New Mexico, USA: *atpB* MK826505, *rbcL*—, *rps4* & *rps4-trnS* MK827580, *trnL* intron & *trnL-F* spacer MK827615. *Asplenium hobdyi* W.H. Wagner, Ranker 1806 (COLO), Hawaii: *atpB*—, *rbcL* AY549736, *rps4* & *rps4-trnS* AY549785, *trnL* intron & *trnL-F* spacer AY549839 (Schneider et al., 2005). *Asplenium hobdyi* W.H. Wagner, Wood 16785 (PTBG), Kaua'i, Hawaii: *atpB* MK826451, *rbcL* MK827009, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK828003. *Asplenium holosorum* Christ, Zhang et al. 6414 (CDBI, MO, VNMN), Vinh Phuc, Vietnam: *atpB* MK826302, *rbcL* MK826805, *rps4* & *rps4-trnS* MK827327, *trnL* intron & *trnL-F* spacer MK827833. *Asplenium holosorum* Christ, Zhang et al. 6802 (CDBI, MO, VNMN), Cao Bang, Vietnam: *atpB* MK826265, *rbcL* MK826767, *rps4* & *rps4-trnS* MK827292, *trnL* intron & *trnL-F* spacer MK827819. *Asplenium holosorum* Christ, Zhang et al. 7126 (CDBI, MO, VNMN), Thanh Hoa, Vietnam: *atpB* MK826277, *rbcL* MK826779, *rps4* & *rps4-trnS* MK827302, *trnL* intron & *trnL-F* spacer—. *Asplenium hookerianum* Wall., P021840 (WELT), New Zealand: *atpB*—, *rbcL* EF418426, *rps4* & *rps4-trnS* EF418429, *trnL* intron & *trnL-F* spacer EF418217 (Shepherd et al., 2007). *Asplenium hostmannii* Hieron., Boudrie 3157 (BM), French Guiana: *atpB*—, *rbcL* AY300120, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300067 (Schneider et al., 2004). *Asplenium humbertii* Tardieu, Zhang et al. 6304 (CDBI, MO, VNMN), Hoa Binh, Vietnam: *atpB*—, *rbcL* MK826849, *rps4* & *rps4-trnS* MK827367, *trnL* intron & *trnL-F* spacer MK827873. *Asplenium humbertii* Tardieu, Zhang et al. 6595 (CDBI, MO, VNMN), Lang Son, Vietnam: *atpB*—, *rbcL* MK826861, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827884. *Asplenium humistratum* Ching ex H.S. Kung, Rothfels 5277 (UC, CDBI), Sichuan, China: *atpB* MK826414, *rbcL* MK826972, *rps4* & *rps4-trnS* MK827483, *trnL* intron & *trnL-F* spacer MK827971. *Asplenium humistratum* Ching ex H.S. Kung, Zhang et al. 9608 (CDBI), Guizhou, China: *atpB* MK826281, *rbcL*—, *rps4* & *rps4-trnS* MK827305, *trnL* intron & *trnL-F* spacer—. *Asplenium humistratum* Ching ex H.S. Kung, Zhang et al. 9790 (CDBI), Sichuan, China: *atpB* MK826353, *rbcL* MK826907, *rps4* & *rps4-trnS* MK827417, *trnL* intron & *trnL-F* spacer MK827919. *Asplenium humistratum* Ching ex H.S. Kung, Zhang et al. BM15 (CDBI), Sichuan, China: *atpB* MK826234, *rbcL* MK826714, *rps4* & *rps4-trnS* MK827243, *trnL* intron & *trnL-F* spacer MK827770. *Asplenium hybridum* (Milde) Bange, JCV HYBR-2 (BM), Croatia: *atpB*—, *rbcL* AF240644, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AF525250 (Pinter et al., 2002). *Asplenium incisum* Thunb., Cult. in NYBG (UC): *atpB*—, *rbcL* AY549749, *rps4* & *rps4-trnS* AY549808, *trnL* intron & *trnL-F* spacer AY549853 (Schneider et al., 2005). *Asplenium incisum* Thunb., Xu 339 (SYS), Jiangsu, China: *atpB* MK826243, *rbcL* MK826723, *rps4* & *rps4-trnS* MK827251, *trnL* intron & *trnL-F* spacer MK827777. *Asplenium incisum* Thunb., Xu JX003 (SYS), Jiangxi, China: *atpB* MK826147, *rbcL* MK826633, *rps4* & *rps4-trnS* MK827160, *trnL* intron & *trnL-F* spacer MK827711. *Asplenium incisum* Thunb., Xu JX004 (SYS), Jiangxi, China: *atpB* MK826146, *rbcL* MK826632, *rps4* & *rps4-trnS* MK827159, *trnL* intron & *trnL-F* spacer MK827710. *Asplenium incisum* Thunb., Xu JX008 (SYS), Jiangxi, China: *atpB* MK826164, *rbcL* MK826643, *rps4* & *rps4-trnS* MK827177, *trnL* intron & *trnL-F* spacer—. *Asplenium incurvatum* Fee, Rothfels 3611 (DUKE), Zamora-Chinchipe, Ecuador: *atpB* MK826519, *rbcL* MK827053, *rps4* & *rps4-trnS* MK827596, *trnL* intron & *trnL-F* spacer MK828049. *Asplenium indicum* Sledge, Rothfels 5335 (UC, CDBI), Sichuan, China: *atpB* MK826417, *rbcL* MK826975, *rps4* & *rps4-trnS* MK827486, *trnL* intron & *trnL-F* spacer MK827974. *Asplenium indicum* Sledge, Zhang et al. 9735 (CDBI), Sichuan, China: *atpB* MK826242, *rbcL* MK826722, *rps4* & *rps4-trnS* MK827250, *trnL* intron & *trnL-F* spacer MK827776. *Asplenium indicum* Sledge, Zhang et al. BX32 (CDBI), Sichuan, China: *atpB* MK826231, *rbcL* MK826711, *rps4* & *rps4-trnS* MK827240, *trnL* intron & *trnL-F* spacer MK827767. *Asplenium insiticium* Brack., Brownsey & Perrie 21 (WELT), Fiji: *atpB*—, *rbcL* KP774864, *rps4* & *rps4-trnS* KP835463, *trnL* intron & *trnL-F* spacer KP851903 (Ohlsen et al. 2015). *Asplenium* cf. *insiticium* Brack., Lorence 10611 (PTBG), Savaii, Samoa: *atpB* MK826454, *rbcL*—, *rps4* & *rps4-trnS* MK827525, *trnL* intron & *trnL-F* spacer—. *Asplenium* cf. *insiticium* Brack., Wood 10816 (PTBG), Ua Pou, Marquesas: *atpB* MK826453, *rbcL* MK827011, *rps4* & *rps4-trnS* MK827524, *trnL* intron & *trnL-F* spacer—. *Asplenium* cf. *insiticium* Brack., Perrie NC 74 (WELT), New Caledonia: *atpB*—, *rbcL* KP774899, *rps4* & *rps4-trnS* KP835470, *trnL* intron & *trnL-F* spacer KP835401 (Ohlsen et al. 2015). *Asplenium* cf. *insiticium* Brack., Wood 14141 (PTBG), Kauai, Hawaii: *atpB* MK826452, *rbcL* MK827010, *rps4* & *rps4-trnS* MK827523, *trnL* intron & *trnL-F* spacer—. *Asplenium interjectum* Christ, Xu 294-1 (SYS), Guangxi, China: *atpB* MK826193, *rbcL* MK826672, *rps4* & *rps4-trnS* MK827202, *trnL* intron & *trnL-F* spacer MK827735. *Asplenium interjectum* Christ, Xu 294-2 (SYS), Guangxi, China: *atpB* MK826194, *rbcL* MK826673, *rps4* & *rps4-trnS* MK827203, *trnL* intron & *trnL-F* spacer MK827736. *Asplenium interjectum* Christ, Zhang 735 (CDBI, MO), Guizhou, China: *atpB* MK826378, *rbcL* MK826935, *rps4* & *rps4-trnS* MK827445, *trnL* intron & *trnL-F* spacer—. *Asplenium interjectum* Christ, Zhang et al. 7018 (CDBI, MO, VNMN), Thanh Hoa, Vietnam: *atpB*—, *rbcL* MK826875, *rps4* & *rps4-trnS* MK827389, *trnL* intron & *trnL-F* spacer MK827896. *Asplenium* cf. *interjectum* Christ, Zhang et al. 5589 (CDBI), Guangxi, China: *atpB* MK826307, *rbcL* MK826810, *rps4* & *rps4-trnS* MK827331, *trnL* intron & *trnL-F* spacer—.

Asplenium cf. *interjectum* Christ, Zhang et al. 9450 (CDBI), Guizhou, China: *atpB* MK826346, *rbcL* MK826900, *rps4* & *rps4-trnS* MK827410, *trnL* intron & *trnL-F* spacer—. *Asplenium jahandiezii* Rouy, *Vogel Ja-1-83* (BM), France: *atpB*—, *rbcL* AY300121, *rps4* & *rps4-trnS* AY549780, *trnL* intron & *trnL-F* spacer AY300068 (Schneider et al., 2004). *Asplenium jessenii* H.M. Liu & H. Schneid., *Schulze 6-11-1984* (HEID), Germany: *atpB*—, *rbcL* AF318596, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schulze et al., 2001). *Asplenium joellai* N. Snow, *Wood 7797* (PTBG), Hawaii: *atpB*—, *rbcL* AY549742, *rps4* & *rps4-trnS* AY549791, *trnL* intron & *trnL-F* spacer AY549845 (Schneider et al., 2005). *Asplenium juglandifolium* Lam., *Boudrie M 3249-1999* (BM), French Guiana: *atpB*—, *rbcL* AF525269, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AF525245 (Pinter et al., 2002). *Asplenium juglandifolium* Lam., *Rothfels 2587* (DUKE), Puntarenas, Costa Rica: *atpB* MK826499, *rbcL* MK827049, *rps4* & *rps4-trnS* MK827574, *trnL* intron & *trnL-F* spacer MK828041. *Asplenium juglandifolium* Lam., *Schneider s.n.* (GOET), Cult.: *atpB* EF463333, *rbcL* EF463151, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpelz & Pryer, 2007). *Asplenium juglandifolium* Lam., *Viane 10667* (GENT), Puerto Rico: *atpB*—, *rbcL* GU929870, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium kauffussii* Schltdl., *Wood 10953* (PTBG), Kauai, Hawaii: *atpB* MK826455, *rbcL*—, *rps4* & *rps4-trnS* MK827526, *trnL* intron & *trnL-F* spacer MK828004. *Asplenium keysserianum* Rosenst., Kessler 13823 (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774936, *rps4* & *rps4-trnS* KP835467, *trnL* intron & *trnL-F* spacer KP835403 (Ohlsen et al. 2015). *Asplenium kiansuense* Ching & Y.X. Jin, *Yanfen Chang 102303* (HITBC), Jiangxi, China: *atpB*—, *rbcL* JX152738, *rps4* & *rps4-trnS* JQ724309, *trnL* intron & *trnL-F* spacer JQ724224 (Chang et al., 2013). *Asplenium kinabaluense* Holttum, *Chen 4594* (TAIF, UC), Sabah, Malaysia: *atpB* MK826389, *rbcL* MK826946, *rps4* & *rps4-trnS* MK827456, *trnL* intron & *trnL-F* spacer MK827949. *Asplenium* cf. *komarovii* Akasawa, *Christenhusz 3867* (TUR), Scotland, UK: *atpB* EF463346, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpelz & Pryer, 2007). *Asplenium komarovii* Akasawa, *DB1* (SYS), Jilin, China: *atpB* MK826181, *rbcL* MK826659, *rps4* & *rps4-trnS* MK827191, *trnL* intron & *trnL-F* spacer—. *Asplenium komarovii* Akasawa, *TNS: 765242* (TNS), Yamagata, Japan: *atpB*—, *rbcL* AB574874, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium komarovii* Akasawa, *Xu s.n.* (SYS), Jilin, China: *atpB* MK826124, *rbcL* MK826612, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium kukkonenii* Viane & Reichst., *Viane 10784* (GENT), China: *atpB*—, *rbcL* GU929863, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium lamprocaulon* Fée, *Rothfels 2607* (DUKE), San José, Costa Rica: *atpB* MK826498, *rbcL* MK827048, *rps4* & *rps4-trnS* MK827573, *trnL* intron & *trnL-F* spacer MK828040. *Asplenium lamprophyllum* Carse, *P20506* (WELT), New Zealand: *atpB*—, *rbcL* AY283230, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY283214 (Perrie & Brownsey, 2005). *Asplenium laserpitiiifolium* Lam., *Kluge 9072* (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774883, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ohlsen et al. 2015). *Asplenium laserpitiiifolium* Lam., *Kluge 9074* (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774935, *rps4* & *rps4-trnS* KP835407, *trnL* intron & *trnL-F* spacer KP835405 (Ohlsen et al. 2015). *Asplenium laserpitiiifolium* Lam., *Lorenz 10574* (PTBG), Savaii, Samoa: *atpB* MK826457, *rbcL* MK827013, *rps4* & *rps4-trnS* MK827528, *trnL* intron & *trnL-F* spacer MK827613. *Asplenium laserpitiiifolium* Lam., *Ohlsen 308* (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774867, *rps4* & *rps4-trnS* KP851894, *trnL* intron & *trnL-F* spacer KP835398 (Ohlsen et al. 2015). *Asplenium laserpitiiifolium* Lam., *PerrieNC123* (WELT), New Caledonia: *atpB*—, *rbcL* KP774894, *rps4* & *rps4-trnS* KP835462, *trnL* intron & *trnL-F* spacer KP835402 (Ohlsen et al. 2015). *Asplenium laserpitiiifolium* Lam., *Wood 10347* (PTBG), Ua Pou, Marquesas: *atpB* MK826456, *rbcL* MK827012, *rps4* & *rps4-trnS* MK827527, *trnL* intron & *trnL-F* spacer MK828005. *Asplenium laserpitiiifolium* Lam., *Wu et al.* 3963 (MO), Mondolkiri, Cambodia: *atpB* MK826411, *rbcL* MK826968, *rps4* & *rps4-trnS* MK827479, *trnL* intron & *trnL-F* spacer MK827968. *Asplenium laserpitiiifolium* Lam., *Wu et al.* 3967 (MO), Cambodia: *atpB* MK826359, *rbcL* MK826916, *rps4* & *rps4-trnS* MK827425, *trnL* intron & *trnL-F* spacer MK827927. *Asplenium laserpitiiifolium* Lam., *Wu et al.* 3971 (MO), Mondolkiri, Cambodia: *atpB* MK826410, *rbcL* MK826967, *rps4* & *rps4-trnS* MK827478, *trnL* intron & *trnL-F* spacer MK827967. *Asplenium laserpitiiifolium* Lam., *Wu et al.* 4135 (MO), Siem, Cambodia: *atpB* MK826362, *rbcL* MK826920, *rps4* & *rps4-trnS* MK827429, *trnL* intron & *trnL-F* spacer MK827928. *Asplenium laserpitiiifolium* Lam., *Wu et al.* 4323 (MO), kampot, Cambodia: *atpB* MK826412, *rbcL* MK826969, *rps4* & *rps4-trnS* MK827480, *trnL* intron & *trnL-F* spacer MK827969. *Asplenium laserpitiiifolium* Lam. Unknown: *atpB*—, *rbcL* JX068694, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ohlsen et al. 2015). *Asplenium lepturus* J.Sm., *Zhang et al.* 8695 (CDBI, MO, PHH), Khanh Hoa, Vietnam: *atpB* MK826272, *rbcL* MK826774, *rps4* & *rps4-trnS* MK827298, *trnL* intron & *trnL-F* spacer—. *Asplenium lessiense* Vida & Reichst., *Viane RV9547* (GENT), Italy: *atpB*—, *rbcL* GU586827, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Bellefroid et al., 2010). *Asplenium listeri* C.Chr., *Grigg & Moloney s.n.* (MELU), Christmas Island, Australia: *atpB*—, *rbcL* KP774934, *rps4* & *rps4-trnS* KP851891, *trnL* intron & *trnL-F* spacer KP639696 (Ohlsen et al. 2015). *Asplenium lividum* Mett.ex Kuhn, Grangaud & Acock s.n. (BM), Reunion: *atpB*—, *rbcL* KF992432, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hennequin et al., 2014). *Asplenium lobulatum* Mett., *Chen 4673* (TAIF), Sabah, Malaysia: *atpB* MK826391, *rbcL* MK826948, *rps4* & *rps4-trnS* MK827458, *trnL* intron & *trnL-F* spacer MK827951. *Asplenium lobulatum* Mett., *Chen 4718* (TAIF, UC), Sabah, Malaysia: *atpB* MK826390, *rbcL* MK826947, *rps4* & *rps4-trnS* MK827457, *trnL* intron & *trnL-F* spacer MK827950. *Asplenium lobulatum* Mett., *Perrie NC 94* (WELT), New Caledonia: *atpB*—, *rbcL* KP774886, *rps4* & *rps4-trnS* KP835439, *trnL* intron & *trnL-F* spacer KP835394 (Ohlsen et al. 2015). *Asplenium* cf. *lobulatum* Mett., *Kessler 14100* (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774939, *rps4* & *rps4-trnS* KP835440, *trnL* intron & *trnL-F* spacer KP639692 (Ohlsen et al. 2015). *Asplenium longicaudatum* Bonap., *A.L. Rakotondrifara 596* (MO), Madagascar: *atpB*—, *rbcL* MK826912, *rps4* & *rps4-trnS* MK827422, *trnL* intron & *trnL-F* spacer MK827923. *Asplenium longicaudatum* Bonap., *Quansah Q4829* (BM), Unknown: *atpB*—, *rbcL* KF992437, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hennequin et al., 2014). *Asplenium longissimum* Blume, *Ohlsen 381* (MELU), Northern Territory, Australia: *atpB*—, *rbcL* KP774919, *rps4* & *rps4-trnS* KP835422, *trnL* intron & *trnL-F* spacer KP639699 (Ohlsen et al. 2015). *Asplenium loxoscapoides* Baker, *Bellefroid EB325* (GENT), Kenya: *atpB*—, *rbcL* GU586802, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Bellefroid et al., 2010). *Asplenium loxoscapoides* Baker, *Viane RV7549* (GENT), Tanzania: *atpB*—, *rbcL* GU586803, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Bellefroid et al., 2010). *Asplenium lucidum* G.Forst., Cult. in NYBG: (UC): *atpB*—, *rbcL* JX068695, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schneider et al., 2005). *Asplenium lunulatum* Sw., *Viane 6558* (GENT), South Africa: *atpB*—, *rbcL* GU929867, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium lushmanense* C. Chr., *Lu SG/D21* (PYU), Yunan, China: *atpB*—, *rbcL* AY545481, *rps4* & *rps4-trnS* AY725042, *trnL* intron & *trnL-F* spacer AY725033 (Li & Lu, 2006). *Asplenium macraei* Hook. & Grev., *Wood 16127* (PTBG), Kauai, Hawaii: *atpB* MK826458, *rbcL* MK827014, *rps4* & *rps4-trnS* MK827529, *trnL* intron & *trnL-F* spacer MK828006. *Asplenium macrodon* Fée, *Rothfels 3647* (DUKE), Zamora-Chinchipe, Ecuador: *atpB* MK826533, *rbcL*—, *rps4* & *rps4-trnS* MK827606, *trnL* intron & *trnL-F* spacer MK828055. *Asplenium* cf. *macraei* Hook. & Grev., *Wood 10542* (PTBG), Ua Huka, Marquesas: *atpB* MK826460, *rbcL* MK827016, *rps4* & *rps4-trnS* MK827531, *trnL* intron & *trnL-F* spacer MK828008. *Asplenium* cf.

macraei Hook. & Grev., *Lorence 10572* (PTBG), Savaii, Samoa: *atpB* MK826446, *rbcL* MK827004, *rps4* & *rps4-trnS* MK827518, *trnL* intron & *trnL-F* spacer MK827998. *Asplenium* cf. *macraei* Hook. & Grev., *Wood 17029* (PTBG), Savaii, Samoa: *atpB* MK826459, *rbcL* MK827015, *rps4* & *rps4-trnS* MK827530, *trnL* intron & *trnL-F* spacer MK828007. *Asplenium majoricum* Litard., *Schulze 22-3-1964* (HEID), Spain: *atpB*—, *rbcL* AF318587, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schulze et al., 2001). *Asplenium majus* (Hieron.) Pic.Serm., *Viane 7427* (GENT), Kenya: *atpB*—, *rbcL* GU929853, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium mannii* Hook., *Croix 2010* (BM), Malawi: *atpB*—, *rbcL* AY300124, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300071 (Schneider et al., 2004). *Asplenium marattioides* (Brack.) C.Chr., *Brownsey & Perrie FIJI 187* (WELT), Fiji: *atpB*—, *rbcL* KP774861, *rps4* & *rps4-trnS* KP851889, *trnL* intron & *trnL-F* spacer KP835365 (Ohlsen et al. 2015). *Asplenium marinum* L. *JCV MAR-5* (BM), UK: *atpB*—, *rbcL* AF240647, *rps4* & *rps4-trnS* AY549773, *trnL* intron & *trnL-F* spacer AF240662 (Pinter et al., 2002). *Asplenium mauritiensis* Lorence, *Lindsay 13* (E), Unknown: *atpB*—, *rbcL* KF992433, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hennequin et al., 2014). *Asplenium micantifrons* (Tuy.) Tuy. ex H.Ohba, *Takayama 07062176* (MAK), Tokyo, Japan: *atpB*—, *rbcL* AB574861, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium micropaleatum* M. Kessler & A.R. Sm., *Rothfels 4835* (UC), Junin, Peru: *atpB* MK826393, *rbcL* MK826950, *rps4* & *rps4-trnS* MK827460, *trnL* intron & *trnL-F* spacer MK827953. *Asplenium milnei* Carruth., *P022089* (WELT), Cult. in Wellington Botanic Gardens: *atpB*—, *rbcL* EU240032, *rps4* & *rps4-trnS* EU240022, *trnL* intron & *trnL-F* spacer EU240030 (Shepherd et al., 2008). *Asplenium monanthes* L., *Grusz 08-145* (DUKE), San José, Costa Rica: *atpB* MK826493, *rbcL* MK827043, *rps4* & *rps4-trnS* MK827568, *trnL* intron & *trnL-F* spacer MK828036. *Asplenium monanthes* L., *Lemieux 2324* (COLO), Costa Rica: *atpB* EF463335, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettelpelz & Pryer, 2015). *Asplenium monanthes* L., *Rothfels 3580* (DUKE), Carchi, Ecuador: *atpB* MK826518, *rbcL* MK826541, *rps4* & *rps4-trnS* MK827595, *trnL* intron & *trnL-F* spacer MK827626. *Asplenium monanthes* L., *Rothfels 4662* (UC), Kwazulu-Natal, South Africa: *atpB* MK826394, *rbcL* MK826951, *rps4* & *rps4-trnS* MK827461, *trnL* intron & *trnL-F* spacer MK827954. *Asplenium monanthes* L., *Rothfels 7725* (BM or DUKE), Ancash, Peru: *atpB* MK826479, *rbcL* MK827029, *rps4* & *rps4-trnS* MK827552, *trnL* intron & *trnL-F* spacer MK828023. *Asplenium* cf. *monanthes* L., *Kromer THO2660* (BM), Mexico: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* JQ767789, *trnL* intron & *trnL-F* spacer JQ767906 (Dyer et al., 2012). *Asplenium* cf. *monanthes* L., *Rothfels 3567* (DUKE), Imbabura, Ecuador: *atpB* MK826516, *rbcL*—, *rps4* & *rps4-trnS* MK827592, *trnL* intron & *trnL-F* spacer MK828048. *Asplenium* cf. *monanthes* L., *Rothfels 3595* (DUKE), Carchi, Ecuador: *atpB* MK826530, *rbcL* MK827060, *rps4* & *rps4-trnS* MK827603, *trnL* intron & *trnL-F* spacer MK828053. *Asplenium* cf. *monanthes* L., *Rothfels 3673* (DUKE), Pichincha, Ecuador: *atpB* MK826520, *rbcL* MK827054, *rps4* & *rps4-trnS* MK827597, *trnL* intron & *trnL-F* spacer MK828050. *Asplenium montanum* Willd., *Rothfels 3772* (DUKE), North Carolina, USA: *atpB* MK826524, *rbcL* MK827056, *rps4* & *rps4-trnS* MK827601, *trnL* intron & *trnL-F* spacer MK828052. *Asplenium montanum* Willd., *Rothfels 4210* (DUKE), North Carolina, USA: *atpB* MK826489, *rbcL* MK827039, *rps4* & *rps4-trnS* MK827563, *trnL* intron & *trnL-F* spacer MK828032. *Asplenium montanum* Willd., *Rothfels 4211* (DUKE), North Carolina, USA: *atpB* MK826490, *rbcL* MK827040, *rps4* & *rps4-trnS* MK827063, *trnL* intron & *trnL-F* spacer MK828033. *Asplenium montanum* Willd., *Vogel MONT-2-E* (BM), USA: *atpB*—, *rbcL* AY300126, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300073 (Schneider et al., 2004). *Asplenium montanum* Willd., USA: *atpB*—, *rbcL* JX068696, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium montanum* Willd., USA:

atpB—, *rbcL* JX068807, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium moupinense* Franch., *JL00472* (SYS), Yunnan, China: *atpB* MK826056, *rbcL* MK826555, *rps4* & *rps4-trnS* MK827081, *trnL* intron & *trnL-F* spacer MK827642. *Asplenium multifidum* Brack., *Lorence 10578* (PTBG), Savaii, Samoa: *atpB* MK826462, *rbcL* MK827017, *rps4* & *rps4-trnS* MK827533, *trnL* intron & *trnL-F* spacer MK828010. *Asplenium multifidum* Brack., *Wood 16956* (PTBG), Savaii, Samoa: *atpB* MK826461, *rbcL*—, *rps4* & *rps4-trnS* MK827532, *trnL* intron & *trnL-F* spacer MK828009. *Asplenium musifolium* Mett., *Chen 4735* (TAIF, UC), Sabah, Malaysia: *atpB* MK826396, *rbcL* MK826953, *rps4* & *rps4-trnS* MK827463, *trnL* intron & *trnL-F* spacer MK827956. *Asplenium musifolium* Mett., *Dong 3453*, Indonesia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer KT363982 (Unpublished). *Asplenium musifolium* Mett., *Dong 3453*, Indonesia: *atpB*—, *rbcL* KT363964, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium myriophyllum* (Sw.) C. Presl, *Morton 25* (UC), Cuba: *atpB*—, *rbcL* AY300127, *rps4* & *rps4-trnS* AY549769, *trnL* intron & *trnL-F* spacer AY300074 (Schneider et al., 2004). *Asplenium neolaserpitifolium* Tardieu & Ching, *Knapp 3311* (P, HAST), Taiwan Island: *atpB* MK826395, *rbcL* MK826952, *rps4* & *rps4-trnS* MK827462, *trnL* intron & *trnL-F* spacer MK827955. *Asplenium nidiforme* Alderw., *Dong 3933*, Papua New Guinea: *atpB*—, *rbcL* KT363965, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium nidiforme* Alderw., *Kessler 13833* (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774921, *rps4* & *rps4-trnS* KP835448, *trnL* intron & *trnL-F* spacer KP835353 (Ohlsen et al. 2015). *Asplenium nidus* L., *Dong 3455*, Indonesia: *atpB*—, *rbcL* KT363966, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium nidus* L., *Fischer T-9* (UC), Madagascar: *atpB* EF463336, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettelpelz & Pryer, 2007). *Asplenium nidus* L., *Kessler 13726* (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774889, *rps4* & *rps4-trnS* KP835428, *trnL* intron & *trnL-F* spacer KP835367 (Ohlsen et al. 2015). *Asplenium nidus* L., *Kessler 13789* (UZH), Papua New Guinea: *atpB*—, *rbcL* KP774928, *rps4* & *rps4-trnS* KP872960, *trnL* intron & *trnL-F* spacer KP872961 (Ohlsen et al. 2015). *Asplenium nidus* L., *Ohlsen 390* (MELU), Espiritu Santo, Vanuatu: *atpB*—, *rbcL* KP774907, *rps4* & *rps4-trnS* KP835411, *trnL* intron & *trnL-F* spacer KP835376 (Ohlsen et al. 2015). *Asplenium nidus* L., *Wood 10991* (PTBG), Huahine, Society Islands: *atpB* MK826337, *rbcL* MK826891, *rps4* & *rps4-trnS* MK827401, *trnL* intron & *trnL-F* spacer MK827909. *Asplenium nidus* L., *Wood 16852* (PTBG), Upolu, Samoa: *atpB* MK826040, *rbcL* MK826890, *rps4* & *rps4-trnS* MK827400, *trnL* intron & *trnL-F* spacer MK827908. *Asplenium nidus* L., *Yatabe et al. 00-MY66* (KYO), Malaysia: *atpB*—, *rbcL* AB097596, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Yatabe et al., 2009). *Asplenium nidus* L., *Yatabe et al. 00MY71* (KYO), Malaysia: *atpB*—, *rbcL* AB097597, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Yatabe et al., 2009). *Asplenium nidus* L., *Zhang et al. 7340* (CDBI, MO, VNMM), Quang Binh, Vietnam: *atpB* MK826244, *rbcL* MK826747, *rps4* & *rps4-trnS* MK827273, *trnL* intron & *trnL-F* spacer MK827799. *Asplenium nidus* L., *Zhang et al. 7400* (CDBI, MO, VNMM), Quang Binh, Vietnam: *atpB* MK826249, *rbcL* MK826752, *rps4* & *rps4-trnS* MK827278, *trnL* intron & *trnL-F* spacer MK827804. *Asplenium nidus* L., *Zhang et al. 7543* (CDBI, MO, VNMM), Quang Tri, Vietnam: *atpB*—, *rbcL* MK826851, *rps4* & *rps4-trnS* MK827369, *trnL* intron & *trnL-F* spacer MK827876. *Asplenium nidus* L., *Zhang et al. 7854* (CDBI, MO, VNMM), Da Nang, Vietnam: *atpB* MK826251, *rbcL* MK826755, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827806. *Asplenium nidus* L., *Zhang et al. 8573* (CDBI, MO, PHH), Lam Dong, Vietnam: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827379, *trnL* intron & *trnL-F* spacer MK827885. *Asplenium nidus* L., *Zhang et al. 8674* (CDBI, MO, PHH), Khanh Hoa, Vietnam: *atpB* MK826255, *rbcL* MK826759, *rps4* & *rps4-trnS* MK827283, *trnL* intron & *trnL-F* spacer MK827810. *Asplenium*

nidus L., Zhang et al. 8956 (CDBI, MO, PHH), Dak Lak, Vietnam: *atpB* MK826289, *rbcL* MK826792, *rps4* & *rps4-trnS* MK827314, *trnL* intron & *trnL-F* spacer MK827823. *Asplenium nidus* L., Zhang et al. 9039 (CDBI, MO, PHH), Kien Giang, Vietnam: *atpB* MK826263, *rbcL* MK826766, *rps4* & *rps4-trnS* MK827290, *trnL* intron & *trnL-F* spacer MK827817. *Asplenium nigrescens* Blume, Chen 4682 (TAIF, UC), Sabah, Malaysia: *atpB* MK826397, *rbcL* MK826954, *rps4* & *rps4-trnS* MK827464, *trnL* intron & *trnL-F* spacer—. *Asplenium nigrescens* Blume, Chen 4685 (TAIF, UC), Sabah, Malaysia: *atpB* MK826392, *rbcL* MK826949, *rps4* & *rps4-trnS* MK827459, *trnL* intron & *trnL-F* spacer MK827952. *Asplenium nigripes* (Fée) Hook., *JLTS971* = *JL709* (M), Cuba: *atpB*—, *rbcL* KX856359, *rps4* & *rps4-trnS* KX856365, *trnL* intron & *trnL-F* spacer KX856354 (Lóriga et al., 2016). *Asplenium nigripes* (Fée) Hook., *JLTS972* (no voucher), Cuba: *atpB*—, *rbcL* KX856360, *rps4* & *rps4-trnS* KX856366, *trnL* intron & *trnL-F* spacer KX856355 (Lóriga et al., 2016). *Asplenium nitens* Sw., Janssen 2717 (P, REU), Unknown: *atpB*—, *rbcL* KF992435, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hennequin et al., 2014). *Asplenium nitens* Sw., Viane 8203 (GENT), Reunion: *atpB*—, *rbcL* GU929849, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium nitidum* Sw., Kessler 13941 (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774881, *rps4* & *rps4-trnS* KP835468, *trnL* intron & *trnL-F* spacer KP835393 (Ohlsen et al. 2015). *Asplenium* cf. *nitidum* Sw., Karger 1649 (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP851873, *rps4* & *rps4-trnS* KP835469, *trnL* intron & *trnL-F* spacer KP835384 (Ohlsen et al. 2015). *Asplenium normale* D. Don, *Cicuzza 1617* (HITBC), Yunnan, China: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827265, *trnL* intron & *trnL-F* spacer MK827793. *Asplenium normale* D. Don, *Cicuzza 2174* (HITBC), Yunnan, China: *atpB*—, *rbcL* MK826734, *rps4* & *rps4-trnS* MK827260, *trnL* intron & *trnL-F* spacer MK827787. *Asplenium normale* D. Don, *JL00183* (SYS), Guangxi, China: *atpB* MK826066, *rbcL* MK826564, *rps4* & *rps4-trnS* MK827091, *trnL* intron & *trnL-F* spacer MK827650. *Asplenium normale* D. Don, Kessler 14124 (UZH), Papua New Guinea: *atpB*—, *rbcL* KP774925, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer KP872962 (Ohlsen et al. 2015). *Asplenium normale* D. Don (original det. as *A. normale* by R. Knapp), Knapp 3504 (P), Taiwan Island: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827780. *Asplenium normale* D. Don (original det. as *A. normale* by R. Knapp), Knapp 3508 (P), Taiwan Island: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827779. *Asplenium normale* D. Don, Knapp 3839 (P), Taiwan Island: *atpB*—, *rbcL* MK826735, *rps4* & *rps4-trnS* MK827261, *trnL* intron & *trnL-F* spacer MK827789.

Asplenium normale D. Don, Knapp 3967 (P), Taiwan Island: *atpB*—, *rbcL* MK826736, *rps4* & *rps4-trnS* MK827262, *trnL* intron & *trnL-F* spacer MK827790. *Asplenium normale* D. Don, Ohlsen 296 (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774926, *rps4* & *rps4-trnS* KP835419, *trnL* intron & *trnL-F* spacer KP851904 (Ohlsen et al. 2015). *Asplenium normale* D. Don, Ranker 1799 (COLO), Hawaii: *atpB*—, *rbcL* AY549735, *rps4* & *rps4-trnS* AY549784, *trnL* intron & *trnL-F* spacer AY549838 (Schneider et al., 2005). *Asplenium normale* D. Don, Rothfels 4759 (UC), Sabah, Malaysia: *atpB* MK826398, *rbcL* MK826955, *rps4* & *rps4-trnS* MK827465, *trnL* intron & *trnL-F* spacer MK827957. *Asplenium normale* D. Don, Wood 16113 (PTBG), Kauai, Hawaii: *atpB* MK826464, *rbcL* MK827019, *rps4* & *rps4-trnS* MK827535, *trnL* intron & *trnL-F* spacer MK828012. *Asplenium normale* D. Don, Wu et al. 3973 (MO), Mondolkiri, Cambodia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827468, *trnL* intron & *trnL-F* spacer MK827960. *Asplenium normale* D. Don, Wu et al. 4217 (MO), Kampot, Cambodia: *atpB* MK826363, *rbcL* MK826921, *rps4* & *rps4-trnS* MK827430, *trnL* intron & *trnL-F* spacer MK827929. *Asplenium normale* D. Don, Xu GX019 (SYS), Guangxi, China: *atpB* MK826144, *rbcL* MK826630, *rps4* & *rps4-trnS* MK827157, *trnL* intron & *trnL-F* spacer MK827708. *Asplenium normale* D. Don, Xu GZ002 (SYS), Guizhou,

China: *atpB* MK826172, *rbcL* MK826650, *rps4* & *rps4-trnS* MK827183, *trnL* intron & *trnL-F* spacer MK827722. *Asplenium normale* D. Don, Xu PB004 (SYS), Yunnan, China: *atpB* MK826141, *rbcL* MK826627, *rps4* & *rps4-trnS* MK827154, *trnL* intron & *trnL-F* spacer MK827705. *Asplenium normale* D. Don, Zhang et al. 425 (CDBI, MO), Guizhou, China: *atpB* MK826400, *rbcL* MK826957, *rps4* & *rps4-trnS* MK827467, *trnL* intron & *trnL-F* spacer MK827959. *Asplenium normale* D. Don, Zhang et al. 6544 (CDBI, MO, VNMN), Phu Tho, Vietnam: *atpB*—, *rbcL* MK826832, *rps4* & *rps4-trnS* MK827349, *trnL* intron & *trnL-F* spacer MK827856. *Asplenium normale* D. Don, Zhang et al. 672 (CDBI, MO), Guizhou, China: *atpB* MK826399, *rbcL* MK826956, *rps4* & *rps4-trnS* MK827466, *trnL* intron & *trnL-F* spacer MK827958. *Asplenium normale* D. Don, Zhang et al. 6750 (CDBI, MO, VNMN), Bac Kan, Vietnam: *atpB* MK826283, *rbcL* MK826785, *rps4* & *rps4-trnS* MK827308, *trnL* intron & *trnL-F* spacer MK827821. *Asplenium normale* D. Don, Zhang et al. 6774 (CDBI, MO, VNMN), Bac Kan, Vietnam: *atpB* MK826300, *rbcL* MK826803, *rps4* & *rps4-trnS* MK827325, *trnL* intron & *trnL-F* spacer MK827832. *Asplenium normale* D. Don, Zhang et al. 7113 (CDBI, MO, VNMN), Thanh Hoa, Vietnam: *atpB*—, *rbcL* MK826883, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827903. *Asplenium normale* D. Don, Zhang et al. 7618 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB* MK826326, *rbcL* MK826871, *rps4* & *rps4-trnS* MK827387, *trnL* intron & *trnL-F* spacer MK827894. *Asplenium normale* D. Don, Zhang et al. 8889 (CDBI, MO, PHH), Dak Lak, Vietnam: *atpB*—, *rbcL* MK826833, *rps4* & *rps4-trnS* MK827350, *trnL* intron & *trnL-F* spacer MK827857. *Asplenium* cf. *normale* D. Don, Hemp 5 (BM), Kenya: *atpB*—, *rbcL* AY300128, *rps4* & *rps4-trnS* AY549783, *trnL* intron & *trnL-F* spacer AY300075 (Schneider et al., 2004). *Asplenium normaloides* Yan Fen Chang & Schneider, Shugang Lu 100604 (HITBC), Yunnan, China: *atpB*—, *rbcL* JX152742, *rps4* & *rps4-trnS* JQ724278, *trnL* intron & *trnL-F* spacer JQ724194 (Chang et al., 2013). *Asplenium normaloides* Yan Fen Chang & Schneider, Zhang et al. 7736 (CDBI, MO, VNMN), Thua Thien-Hue, Vietnam: *atpB* MK826308, *rbcL* MK826811, *rps4* & *rps4-trnS* MK827332, *trnL* intron & *trnL-F* spacer MK827838. *Asplenium northlandicum* (Brownsey) Ogle, Ohlsen 188 (MELU), Tasmania, Australia: *atpB*—, *rbcL* KP774874, *rps4* & *rps4-trnS* KP835423, *trnL* intron & *trnL-F* spacer KP835358 (Ohlsen et al. 2015). *Asplenium novoguineense* Rosenst., Kessler 13945 (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774942, *rps4* & *rps4-trnS* KP835442, *trnL* intron & *trnL-F* spacer KP639689 (Ohlsen et al. 2015). *Asplenium obliquum* G.Forst., Chile 921642 (BM), Chile: *atpB*—, *rbcL* AY300129, *rps4* & *rps4-trnS* AY549812, *trnL* intron & *trnL-F* spacer AY300076 (Schneider et al., 2004). *Asplenium oblongifolium* Colenso, P20508 (WELT), New Zealand: *atpB*—, *rbcL* AY283231, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY283216 (Perrie & Brownsey, 2005). *Asplenium obovatum* Viv., MACB107529 (MACB), Spain: *atpB*—, *rbcL* KU753802, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium obtusatum* G.Forst., Tau Tuku 24.3.98 (BM), New Zealand: *atpB*—, *rbcL* AY300130, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300077 (Schneider et al., 2004). *Asplenium octoploideum* Viane & van den heede, Van den heede 709 (GENT), La Palma: *atpB*—, *rbcL* AF538316, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY161003 (Van den heede et al., 2003). *Asplenium octoploideum* Viane & Van den heede, TR 5075 (GENT), La Palma, Canary Isles: *atpB*—, *rbcL* AF240640, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AF525259 (Pinter et al., 2002). *Asplenium oellgaardii* Stolze, Rothfels 3613 (DUKE), Zamora-Chinchipe, Ecuador: *atpB* MK826532, *rbcL*—, *rps4* & *rps4-trnS* MK827605, *trnL* intron & *trnL-F* spacer MK827631. *Asplenium oldhami* Hance, Ju & Deng 12335 (CDBI), Sichuan, China: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827375, *trnL* intron & *trnL-F* spacer MK827881. *Asplenium oldhami* Hance, Nogami & Oohora 29 (KYO), Mie, Japan: *atpB*—, *rbcL* AB014695, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Murakami et al., 1999b). *Asplenium oldhami* Hance, Xu JX001

(SYS), Jiangxi, China: *atpB* MK826148, *rbcL* MK826634, *rps4* & *rps4-trnS* MK827161, *trnL* intron & *trnL-F* spacer MK827712. *Asplenium oldhami* Hance, *Xu SZ001* (SYS), Guangdong, China: *atpB* MK826073, *rbcL* MK826570, *rps4* & *rps4-trnS* MK827098, *trnL* intron & *trnL-F* spacer MK827654. *Asplenium oligolepidum* C.Chr., *Perrie NC 95* (WELT), New Caledonia: *atpB*—, *rbcL* KP774893, *rps4* & *rps4-trnS* KP835445, *trnL* intron & *trnL-F* spacer KP835361 (Ohlsen et al. 2015). *Asplenium oligophlebium* Baker, *TNS: 763209* (TNS), Kagoshima, Japan: *atpB*—, *rbcL* AB574864, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium oligophlebium* Baker, *Xianchun Zhang 102404* (HITBC), Kyoto, Japan: *atpB*—, *rbcL* JX152751, *rps4* & *rps4-trnS* JQ724310, *trnL* intron & *trnL-F* spacer JQ724225 (Chang et al., 2013). *Asplenium onopteris* L., *Fernandez-Brimé s.n.* (DUKE), Catalunya, Spain: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827586, *trnL* intron & *trnL-F* spacer—. *Asplenium onopteris* L., *Pokorny OR1* (DUKE), Orense, Spain: *atpB* MK826482, *rbcL* MK827032, *rps4* & *rps4-trnS* MK827556, *trnL* intron & *trnL-F* spacer MK828025. *Asplenium onopteris* L., *Pokorny OR5* (DUKE), Orense, Spain: *atpB* MK826481, *rbcL* MK827031, *rps4* & *rps4-trnS* MK827555, *trnL* intron & *trnL-F* spacer MK828024. *Asplenium pachyklamys* C.Chr., *Chen 4712* (TAIF, UC), Sabah, Malaysia: *atpB* MK826401, *rbcL* MK826958, *rps4* & *rps4-trnS* MK827469, *trnL* intron & *trnL-F* spacer MK827961. *Asplenium paleaceum* R. Br., *Ohlsen 373* (MELU), Queensland, Australia: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KP218763, *trnL* intron & *trnL-F* spacer KP218802 (Ohlsen et al. 2015). *Asplenium paleaceum* R.Br., *Ohlsen 316* (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774941, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ohlsen et al. 2015). *Asplenium palmeri* Maxon, *Rothfels 08-025* (DUKE), San José, Costa Rica: *atpB* MK826042, *rbcL* MK826539, *rps4* & *rps4-trnS* MK827064, *trnL* intron & *trnL-F* spacer MK827617. *Asplenium palmeri* Maxon, *Rothfels 2494* (DUKE), Texas, USA: *atpB* MK826506, *rbcL*—, *rps4* & *rps4-trnS* MK827581, *trnL* intron & *trnL-F* spacer MK828046. *Asplenium palmeri* Maxon, *Rothfels CJR2494* (BM), Texas, USA: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* JQ767792, *trnL* intron & *trnL-F* spacer JQ767909 (Dyer et al., 2012). *Asplenium parvum* Watts, *Australia, QLD, Mt Baldy* (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774869, *rps4* & *rps4-trnS* KP835451, *trnL* intron & *trnL-F* spacer KP835383 (Ohlsen et al. 2015). *Asplenium parvum* Watts, *Kessler 14114* (UZH), Papua New Guinea: *atpB*—, *rbcL* KP774863, *rps4* & *rps4-trnS* KP835434, *trnL* intron & *trnL-F* spacer KP835395 (Ohlsen et al. 2015). *Asplenium pauperequitum* Brownsey & P.J. Jacks., *AK 290307* (AK), New Zealand: *atpB*—, *rbcL* DQ186550, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer DQ186547 (Cameron et al., 2006). *Asplenium pauperequitum* Brownsey & P.J. Jacks., *Chen 4599* (TAIF, UC), Sabah, Malaysia: *atpB* MK826419, *rbcL* MK826977, *rps4* & *rps4-trnS* MK827488, *trnL* intron & *trnL-F* spacer MK827976. *Asplenium pauperequitum* Brownsey & P.J. Jacks., *P020894* (WELT), New Zealand: *atpB*—, *rbcL* DQ186553, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer DQ186549 (Cameron et al., 2006). *Asplenium pauperequitum* Brownsey & P.J. Jacks., *P20513* (WELT), New Zealand: *atpB*—, *rbcL* AY283233, *rps4* & *rps4-trnS* KP888648, *trnL* intron & *trnL-F* spacer KP888649 (Perrie & Brownsey, 2005). *Asplenium pekinense* Hance, *Jin & Zhang 11351* (CDBI), Yunnan, China: *atpB* MK826296, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *JL00203* (SYS), Guangxi, China: *atpB* MK826069, *rbcL* MK826566, *rps4* & *rps4-trnS* MK827094, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Knapp 3339* (P), Taiwan Island: *atpB*—, *rbcL* MK826724, *rps4* & *rps4-trnS* MK827252, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Knapp 3561* (P), Taiwan Island: *atpB*—, *rbcL* MK826726, *rps4* & *rps4-trnS* MK827253, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Rothfels 5350* (UC, CDBI), Sichuan, China: *atpB* MK826418, *rbcL* MK826976, *rps4* & *rps4-trnS* MK827487, *trnL* intron & *trnL-F* spacer MK827975. *Asplenium pekinense* Hance, *Xu 284* (SYS), Guangxi, China: *atpB* MK826183, *rbcL* MK826662, *rps4* & *rps4-trnS* MK827193, *trnL* intron & *trnL-F* spacer MK827727. *Asplenium pekinense* Hance, *Xu CS002* (SYS), Yunnan, China: *atpB* MK826121, *rbcL*—, *rps4* & *rps4-trnS* MK827142, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Xu JX009* (SYS), Jiangxi, China: *atpB* MK826149, *rbcL* MK826635, *rps4* & *rps4-trnS* MK827162, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Xu PB008* (SYS), Yunnan, China: *atpB* MK826117, *rbcL* MK826606, *rps4* & *rps4-trnS* MK827138, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Xu XS002* (SYS), Yunnan, China: *atpB* MK826116, *rbcL* MK826605, *rps4* & *rps4-trnS* MK827137, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Zhang et al. 334* (CDBI, MO), Guizhou, China: *atpB* MK826406, *rbcL* MK826963, *rps4* & *rps4-trnS* MK827474, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Zhang et al. 5855* (CDBI), Guizhou, China: *atpB* MK826309, *rbcL* MK826812, *rps4* & *rps4-trnS* MK827333, *trnL* intron & *trnL-F* spacer MK827839. *Asplenium pekinense* Hance, *Zhang et al. 9268* (CDBI), Guizhou, China: *atpB* MK826347, *rbcL* MK826901, *rps4* & *rps4-trnS* MK827411, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Zhang et al. 9533* (CDBI), Guizhou, China: *atpB* MK826288, *rbcL* MK826791, *rps4* & *rps4-trnS* MK827313, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Zhang et al. 9583* (CDBI), Guizhou, China: *atpB* MK826266, *rbcL* MK826768, *rps4* & *rps4-trnS* MK827293, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Zhang et al. 9589* (CDBI), Guizhou, China: *atpB* MK826292, *rbcL* MK826795, *rps4* & *rps4-trnS* MK827317, *trnL* intron & *trnL-F* spacer MK827826. *Asplenium pekinense* Hance, *Zhang et al. 9768* (CDBI), Guizhou, China: *atpB*—, *rbcL* MK826839, *rps4* & *rps4-trnS* MK827356, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Zhang et al. 9769* (CDBI), Guizhou, China: *atpB*—, *rbcL* MK826799, *rps4* & *rps4-trnS* MK827321, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Zhang et al. BXWSC* (CDBI), Sichuan, China: *atpB* MK826230, *rbcL* MK826710, *rps4* & *rps4-trnS* MK827239, *trnL* intron & *trnL-F* spacer—. *Asplenium pekinense* Hance, *Zhang et al. 9589* (CDBI, MO), Guizhou, China: *atpB* MK826379, *rbcL* MK826936, *rps4* & *rps4-trnS* MK827446, *trnL* intron & *trnL-F* spacer MK827940. *Asplenium pellucidum* Lam., *Grangaud & Acock s.n.* (BM), Reunion: *atpB*—, *rbcL* KF992436, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hennequin et al., 2014). *Asplenium pellucidum* Lam., *Ohlsen 299* (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774853, *rps4* & *rps4-trnS* KP835421, *trnL* intron & *trnL-F* spacer KP835386 (Ohlsen et al. 2015). *Asplenium pellucidum* Lam., *Wood 14118* (PTBG), Kosrae, Micronesia: *atpB* MK826465, *rbcL*—, *rps4* & *rps4-trnS* MK827536, *trnL* intron & *trnL-F* spacer MK828013. *Asplenium petiolulatum* Hieron., *Viane 8423* (GENT), Reunion: *atpB*—, *rbcL* GU929851, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium petrarchae* DC., *JCV PET-4* (BM), Mallorca, Spain: *atpB*—, *rbcL* AF525271, *rps4* & *rps4-trnS* AY549804 (Schneider et al., 2005), *trnL* intron & *trnL-F* spacer AF525249 (Pinter et al., 2002). *Asplenium petrarchae* subsp. *bivalens* Lovis & Reichst., Unknown: *atpB*—, *rbcL* KP774883, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hunt et al., 2011). *Asplenium phillipsianum* (Kümmerle) Bir, *Fraser-Jenk. & Lovis, Van den heede 975* (GENT), Socotra: *atpB*—, *rbcL* AF538320, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY164268 (Van den heede et al., 2003). *Asplenium phyllitidis* D. Don, *Okubo 99-B01* (KYO), Bhutan: *atpB*—, *rbcL* AB042146, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Yatabe et al., 2001). *Asplenium phyllitidis* D. Don, *Xu 320* (SYS), Yunnan, China: *atpB* MK826199, *rbcL* MK826678, *rps4* & *rps4-trnS* MK827208, *trnL* intron & *trnL-F* spacer MK827741. *Asplenium phyllitidis* D. Don, *Zhang et al. 6743* (CDBI, MO, VNMN), Bac Kan, Vietnam: *atpB* MK826320, *rbcL* MK826865, *rps4* & *rps4-trnS* MK827382, *trnL* intron & *trnL-F* spacer MK827887. *Asplenium phyllitidis* D. Don, *Kluge 9067* (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774906, *rps4* & *rps4-trnS* KP851888, *trnL* intron & *trnL-F* spacer

KP835359 (Ohlsen et al. 2015). *Asplenium phyllitidis* D. Don, *Siti Khadijah Rambe KH172* (GENT), Indonesia: *atpB*—, *rbcl* GU586812, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Bellefroid et al., 2010). *Asplenium* cf. *phyllitidis* D. Don, *Cicuzza 2056* (HITBC), Yunnan, China: *atpB*—, *rbcl* MK826739, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827794. *Asplenium* cf. *phyllitidis* D. Don, *Wu et al. WS-2677* (MO), Houaphan, Laos: *atpB*—, *rbcl* MK826970, *rps4* & *rps4-trnS* MK827481, *trnL* intron & *trnL-F* spacer MK827970. *Asplenium pifongiae* L.-Y. Kuo, F.W. Li & Y.H. Chang, *Knapp 3503* (P), Taiwan Island: *atpB*—, *rbcl* MK826725, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827778. *Asplenium pifongiae* L.-Y. Kuo, F.W. Li & Y.H. Chang, *Li-Yaung Kuo 4196* (TAIF), Taiwan Island: *atpB*—, *rbcl* KT868824, *rps4* & *rps4-trnS* KT868830, *trnL* intron & *trnL-F* spacer KT868826 (Li et al., 2016). *Asplenium pifongiae* L.-Y. Kuo, F.W. Li & Y.H. Chang, *Pi-Fong Lu 25833* (TAIF), Taiwan Island: *atpB*—, *rbcl* KT868825, *rps4* & *rps4-trnS* KT868831, *trnL* intron & *trnL-F* spacer KT868827 (Li et al., 2016). *Asplenium pifongiae* L.-Y. Kuo, F.W. Li & Y.H. Chang, *Wu et al. WP1243* (MO), Lam Dong, Vietnam: *atpB*—, *rbcl* —, *rps4* & *rps4-trnS* MK827470, *trnL* intron & *trnL-F* spacer MK827962. *Asplenium planicaule* Wall., *Xu 167* (SYS), Yunnan, China: *atpB* MK826080, *rbcl* MK826578, *rps4* & *rps4-trnS* MK827106, *trnL* intron & *trnL-F* spacer MK827662. *Asplenium planicaule* Wall., *Xu 171* (SYS), Yunnan, China: *atpB* MK826081, *rbcl* MK826579, *rps4* & *rps4-trnS* MK827107, *trnL* intron & *trnL-F* spacer MK827663. *Asplenium platyneuron* (L.) Britton, Sterns & Poggenb., *JCV PLATY-1b* (BM), Virginia, USA: *atpB*—, *rbcl* AF525272, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AF525240 (Pinter et al., 2002). *Asplenium platyneuron* (L.) Britton, Sterns & Poggenb., *Kelloff 1577* (NMNH), Unknown: *atpB*—, *rbcl* MF349464, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Zúñiga et al. 2017). *Asplenium platyneuron* (L.) Britton, Sterns & Poggenb., *Rothfels 5236* (UC), Oklahoma, USA: *atpB* MK826402, *rbcl* MK826959, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827963. *Asplenium platyneuron* (L.) Britton, Sterns & Poggenb., *SCBI-SIGEO-13-0174*, Unknown: *atpB*—, *rbcl* KP644122, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium platyneuron* (L.) Britton, Sterns & Poggenb., *Schuettpelz 396* (DUKE), Cult.: *atpB* EF463339, *rbcl*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpelz & Pryer, 2007). *Asplenium* cf. *polyodon* G.Forst., *Ohlsen 278*, Queensland: *atpB*—, *rbcl*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer KP218805 (Ohlsen et al. 2015). *Asplenium* cf. *polyodon* G.Forst., *Ohlsen 292* (BRI,MELU), Queensland, Australia: *atpB*—, *rbcl*—, *rps4* & *rps4-trnS* KP218778, *trnL* intron & *trnL-F* spacer KP218798 (Ohlsen et al. 2015). *Asplenium* cf. *polyodon* G.Forst., *Ohlsen 292* (MELU), Queensland, Australia: *atpB*—, *rbcl* KP774937, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ohlsen et al. 2015). *Asplenium* cf. *polyodon* G.Forst., *Ohlsen 326* (BRI, MELU), Queensland, Australia: *atpB*—, *rbcl*—, *rps4* & *rps4-trnS* KP218761, *trnL* intron & *trnL-F* spacer KP218791 (Ohlsen et al. 2015). *Asplenium* cf. *polyodon* G.Forst., *Ohlsen 364* (BRI, MELU), Queensland, Australia: *atpB*—, *rbcl*—, *rps4* & *rps4-trnS* KP218771, *trnL* intron & *trnL-F* spacer KP218806 (Ohlsen et al. 2015). *Asplenium polyodon* G.Forst., *P010839* (WELT), New Zealand: *atpB*—, *rbcl* KM821534, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium polyodon* G.Forst., *P20514* (WELT), New Zealand: *atpB*—, *rbcl* AY283234, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY283220 (Perrie & Brownsey, 2005). *Asplenium* cf. *polyodon* G.Forst., *Perrie NC 124* (WELT), New Caledonia: *atpB*—, *rbcl* KP774900, *rps4* & *rps4-trnS* KP835433, *trnL* intron & *trnL-F* spacer KP835397 (Ohlsen et al. 2015). *Asplenium polyodon* G.Forst., *Wardlow s.n.* (BM), New Zealand: *atpB*—, *rbcl* AY300133, *rps4* & *rps4-trnS* AY549829, *trnL* intron & *trnL-F* spacer AY300080 (Schneider et al., 2004). *Asplenium* cf. *polyodon* D.L. Jones, *Lorence 10556* (PTBG), Ua Pou, Marquesas: *atpB* MK826466, *rbcl* MK827020, *rps4* & *rps4-trnS* MK827537, *trnL* intron & *trnL-F* spacer—, *Asplenium polyphylicum* Compton, *Perrie NC179* (WELT), New Caledonia: *atpB*—, *rbcl* KP774852, *rps4* & *rps4-trnS* KP835446, *trnL* intron & *trnL-F* spacer KP835362 (Ohlsen et al. 2015). *Asplenium polyphyllum* Bertol., *Grusz 08-034* (DUKE), Cartago, Costa Rica: *atpB* MK826043, *rbcl*—, *rps4* & *rps4-trnS* MK827065, *trnL* intron & *trnL-F* spacer MK827618. *Asplenium polyphyllum* Bertol., *Grusz 08-146* (DUKE), San José, Costa Rica: *atpB* MK826045, *rbcl* MK826540, *rps4* & *rps4-trnS* MK827067, *trnL* intron & *trnL-F* spacer MK827620. *Asplenium polyphyllum* Bertol., *Mehlreter s.n.* (BM), Costa Rica: *atpB*—, *rbcl*—, *rps4* & *rps4-trnS* JQ767796, *trnL* intron & *trnL-F* spacer JQ767915 (Dyer et al., 2012). *Asplenium polyphyllum* Bertol., *Rothfels 3493* (DUKE), Pichincha, Ecuador: *atpB* MK826512, *rbcl*—, *rps4* & *rps4-trnS* MK827588, *trnL* intron & *trnL-F* spacer MK827621. *Asplenium polyphyllum* Bertol., *Rothfels 3544* (DUKE), Imbabura, Ecuador: *atpB* MK826515, *rbcl*—, *rps4* & *rps4-trnS* MK827591, *trnL* intron & *trnL-F* spacer MK827624. *Asplenium polyphyllum* Bertol., *Rothfels 3974* (BM), Ancash, Peru: *atpB* MK826480, *rbcl* MK827030, *rps4* & *rps4-trnS* MK827553, *trnL* intron & *trnL-F* spacer—, *Asplenium polyphyllum* Bertol., *Rothfels 4149* (DUKE), Morelos, Mexico: *atpB* MK826487, *rbcl* MK827037, *rps4* & *rps4-trnS* MK827561, *trnL* intron & *trnL-F* spacer MK828030. *Asplenium praegracile* Rosent., *Hemp 116* (BM), Kenya: *atpB*—, *rbcl* AY300134, *rps4* & *rps4-trnS* AY549825, *trnL* intron & *trnL-F* spacer AY300081 (Schneider et al., 2004). *Asplenium praemorsum* Sw., *Rothfels 2703* (DUKE), San José, Costa Rica: *atpB* MK826496, *rbcl* MK827046, *rps4* & *rps4-trnS* MK827571, *trnL* intron & *trnL-F* spacer—, *Asplenium praemorsum* Sw., *Schuettpelz 523* (GOET), Cult.: *atpB* EF463340, *rbcl* EF463154, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpelz & Pryer, 2007). *Asplenium* cf. *praemorsum* Sw., *Rothfels 3666* (DUKE), Loja, Ecuador: *atpB* MK826534, *rbcl*—, *rps4* & *rps4-trnS* MK827607, *trnL* intron & *trnL-F* spacer MK828056. *Asplenium preussii* Hieron., *Viane 8798* (GENT), Zimbabwe: *atpB*—, *rbcl* GU929838, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium prolongatum* Hook., *TNS: 764386* (TNS), Kumamoto, Japan: *atpB*—, *rbcl* AB574868, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium prolongatum* Hook., *Viane 9657* (GENT), Myanmar: *atpB*—, *rbcl* GU929832, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium prolongatum* Hook., *Xu & Zhou 2416* (CDBI), Xizang, China: *atpB*—, *rbcl* MK826857, *rps4* & *rps4-trnS* MK827374, *trnL* intron & *trnL-F* spacer—, *Asplenium prolongatum* Hook., *Xu 117* (SYS), Hainan, China: *atpB* MK826111, *rbcl* MK826600, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827687. *Asplenium prolongatum* Hook., *Xu 123* (SYS), Hainan, China: *atpB* MK826099, *rbcl* MK826590, *rps4* & *rps4-trnS* MK827126, *trnL* intron & *trnL-F* spacer MK827678. *Asplenium prolongatum* Hook., *Xu 300* (SYS), Guangxi, China: *atpB* MK826187, *rbcl* MK826666, *rps4* & *rps4-trnS* MK827196, *trnL* intron & *trnL-F* spacer—, *Asplenium prolongatum* Hook., *Xu 321* (SYS), Yunnan, China: *atpB* MK826198, *rbcl* MK826677, *rps4* & *rps4-trnS* MK827207, *trnL* intron & *trnL-F* spacer MK827740. *Asplenium prolongatum* Hook., *Xu HK001* (SYS), Hongkong, China: *atpB* MK826074, *rbcl* MK826571, *rps4* & *rps4-trnS* MK827099, *trnL* intron & *trnL-F* spacer MK827655. *Asplenium prolongatum* Hook., *Xu s.n.* (SYS), Guangxi, China: *atpB* MK826126, *rbcl* MK826614, *rps4* & *rps4-trnS* MK827145, *trnL* intron & *trnL-F* spacer MK827694. *Asplenium prolongatum* Hook., *Zhang et al. 401* (CDBI, MO), Guizhou, China: *atpB* MK826403, *rbcl* MK826960, *rps4* & *rps4-trnS* MK827471, *trnL* intron & *trnL-F* spacer MK827964. *Asplenium prolongatum* Hook., *Zhang et al. 6428* (CDBI, MO, VNMN), Vinh Phuc, Vietnam: *atpB*—, *rbcl* MK826841, *rps4* & *rps4-trnS* MK827358, *trnL* intron & *trnL-F* spacer MK827864. *Asplenium prolongatum* Hook., *Zhang et al. 6448* (CDBI, MO, VNMN), Vinh Phuc, Vietnam: *atpB* MK826293, *rbcl* MK826796, *rps4* & *rps4-trnS* MK827318, *trnL* intron & *trnL-F* spacer—, *Asplenium prolongatum* Hook., *Zhang et al. 6627* (CDBI, MO, VNMN), Lang Son, Vietnam: *atpB* MK826321, *rbcl* MK826866, *rps4* & *rps4-*

trnS MK827383, *trnL* intron & *trnL-F* spacer MK827888. *Asplenium prolongatum* Hook., Zhang et al. 7129 (CDBI, MO, VNMN), Thanh Hoa, Vietnam: *atpB* MK826275, *rbcL* MK826777, *rps4* & *rps4-trnS* —, *trnL* intron & *trnL-F* spacer—. *Asplenium prolongatum* Hook., Zhang et al. 8175 (CDBI), Guizhou, China: *atpB*—, *rbcL* MK826847, *rps4* & *rps4-trnS* MK827364, *trnL* intron & *trnL-F* spacer—. *Asplenium prolongatum* Hook., Zhang et al. 9309 (CDBI), Guizhou, China: *atpB* MK826350, *rbcL* MK826904, *rps4* & *rps4-trnS* MK827414, *trnL* intron & *trnL-F* spacer MK827918. *Asplenium prolongatum* Hook., Zhang et al. 9603 (CDBI), Guizhou, China: *atpB* MK826269, *rbcL* MK826771, *rps4* & *rps4-trnS* MK827296, *trnL* intron & *trnL-F* spacer—. *Asplenium protensum* Schrad., Hemp 2 (BM), Kenya: *atpB*—, *rbcL* AY300135, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300082 (Schneider et al., 2004). *Asplenium protomajoricum* Pangua & Prada, Unknown: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer FJ456852 (Hunt et al., 2011). *Asplenium protomajoricum* Pangua & Prada, Unknown: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer GU017743 (Hunt et al., 2011). *Asplenium protomajoricum* Pangua & Prada, Unknown: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer GU017744 (Hunt et al., 2011). *Asplenium pseudolanceolatum* Fomin, Xu 176, Cult. in SYS: *atpB* MK826090, *rbcL*—, *rps4* & *rps4-trnS* MK827117, *trnL* intron & *trnL-F* spacer—. *Asplenium pseudolaserpitiiifolium* Ching, JL00182 (SYS), Guangxi, China: *atpB* MK826065, *rbcL* MK826563, *rps4* & *rps4-trnS* MK827090, *trnL* intron & *trnL-F* spacer MK827649. *Asplenium pseudolaserpitiiifolium* Ching, Knapp 3783 (P), Taiwan Island: *atpB*—, *rbcL* MK826738, *rps4* & *rps4-trnS* MK827264, *trnL* intron & *trnL-F* spacer MK827792. *Asplenium pseudolaserpitiiifolium* Ching, Xu 105 (SYS), Hainan, China: *atpB* MK826105, *rbcL* MK826596, *rps4* & *rps4-trnS* MK827132, *trnL* intron & *trnL-F* spacer MK827683. *Asplenium pseudolaserpitiiifolium* Ching, Xu 120 (SYS), Hainan, China: *atpB* MK826102, *rbcL* MK826593, *rps4* & *rps4-trnS* MK827129, *trnL* intron & *trnL-F* spacer MK827681. *Asplenium pseudolaserpitiiifolium* Ching, Xu GD001 (SYS), Guangdong, China: *atpB* MK826085, *rbcL*—, *rps4* & *rps4-trnS* MK827111, *trnL* intron & *trnL-F* spacer MK827666. *Asplenium pseudolaserpitiiifolium* Ching, Xu HK002 (SYS), Hongkong, China: *atpB* MK826075, *rbcL* MK826572, *rps4* & *rps4-trnS* MK827100, *trnL* intron & *trnL-F* spacer MK827656. *Asplenium pseudolaserpitiiifolium* Ching, Xu HK005 (SYS), Hongkong, China: *atpB* MK826078, *rbcL* MK826575, *rps4* & *rps4-trnS* MK827103, *trnL* intron & *trnL-F* spacer MK827659. *Asplenium pseudolaserpitiiifolium* Ching, Zhang et al. 6305 (CDBI, VNMN), Hoa Binh, Vietnam: *atpB*—, *rbcL* MK826846, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827871. *Asplenium pseudolaserpitiiifolium* Ching, Zhang et al. 7041 (CDBI, MO, VNMN), Thanh Hoa, Vietnam: *atpB* MK826336, *rbcL* MK826882, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827902. *Asplenium pseudolaserpitiiifolium* Ching, Zhang et al. 7273 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB* MK826339, *rbcL* MK826893, *rps4* & *rps4-trnS* MK827403, *trnL* intron & *trnL-F* spacer MK827910. *Asplenium pseudolaserpitiiifolium* Ching, Zhang et al. 7327 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB*—, *rbcL* MK826784, *rps4* & *rps4-trnS* MK827307, *trnL* intron & *trnL-F* spacer MK827820. *Asplenium pseudolaserpitiiifolium* Ching, Zhang et al. 7867 (CDBI, VNMN), Quang Nam, Vietnam: *atpB* MK826313, *rbcL* MK826858, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium pseudolaserpitiiifolium* Ching, Zhang et al. 8807 (CDBI, MO, PHH), Khanh Hoa, Vietnam: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827867. *Asplenium pseudonormale* W.M. Chu & X.C. Zhang ex W.M. Chu, Shugang Lu 100502 (HITBC), Yunnan, China: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* JQ724276, *trnL* intron & *trnL-F* spacer JQ724192 (Chang et al., 2018). *Asplenium pseudonormale* W.M. Chu & X.C. Zhang ex W.M. Chu, Yanfen Chang 1088 (HITBC), Yunnan, China: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* KY979541, *trnL* intron & *trnL-F* spacer KY979519 (Chang et al., 2018). *Asplenium pseudopraemorsum* Ching, Xu 264 (SYS),

Hainan, China: *atpB* MK826130, *rbcL* MK826618, *rps4* & *rps4-trnS* MK827149, *trnL* intron & *trnL-F* spacer MK827696. *Asplenium pseudopraemorsum* Ching, Xu 265 (SYS), Hainan, China: *atpB* MK826129, *rbcL* MK826617, *rps4* & *rps4-trnS* MK827148, *trnL* intron & *trnL-F* spacer MK827695. *Asplenium pseudopraemorsum* Ching, Zhang et al. 8732 (CDBI, MO, PHH), Khanh Hoa, Vietnam: *atpB*—, *rbcL* MK826842, *rps4* & *rps4-trnS* MK827359, *trnL* intron & *trnL-F* spacer MK827865. *Asplenium* cf. *pseudopraemorsum* Ching, Zhang et al. 7353 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB* MK826260, *rbcL* MK826763, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium* cf. *pseudopraemorsum*, Zhang et al. 7391 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB* MK826325, *rbcL* MK826870, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827892. *Asplenium pseudowilfordii* Tagawa, Nogami 14 (KYO), Nara, Japan: *atpB*—, *rbcL* AB014696, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Murakami et al., 1999b). *Asplenium pseudowilfordii* Tagawa, TNS: 776375 (TNS), Saitama, Japan: *atpB*—, *rbcL* AB574869, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium pteridoides* Baker, Papadopulos AP783 (NSW), Lord Howe Island: *atpB*—, *rbcL* JF950802, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Papadopulos et al., 2011). *Asplenium pteropus* Kaulf., Viane 10156 (GENT), Venezuela: *atpB*—, *rbcL* GU929866, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium* cf. *pteropus* Kaulf., Rothfels 3513 (DUKE), Pichincha, Ecuador: *atpB* MK826513, *rbcL*—, *rps4* & *rps4-trnS* MK827589, *trnL* intron & *trnL-F* spacer MK827622. *Asplenium* cf. *pteropus* Kaulf., Rothfels 3526 (DUKE), Pichincha, Ecuador: *atpB* MK826526, *rbcL*—, *rps4* & *rps4-trnS* MK827069, *trnL* intron & *trnL-F* spacer—. *Asplenium* cf. *pteropus* Kaulf., Rothfels 3528 (DUKE), Pichincha, Ecuador: *atpB* MK826527, *rbcL* MK827057, *rps4* & *rps4-trnS* MK827070, *trnL* intron & *trnL-F* spacer MK827629. *Asplenium* cf. *pteropus* Kaulf., Rothfels 3575 (DUKE), Carchi, Ecuador: *atpB* MK826529, *rbcL* MK827059, *rps4* & *rps4-trnS* MK827071, *trnL* intron & *trnL-F* spacer MK827630. *Asplenium* cf. *pteropus* Kaulf., Rothfels 3723 (DUKE), Pichincha, Ecuador: *atpB* MK826522, *rbcL* MK827055, *rps4* & *rps4-trnS* MK827599, *trnL* intron & *trnL-F* spacer—. *Asplenium pulcherrimum* (Baker) Ching, TNS: 763925 (TNS), Kochi, Japan: *atpB*—, *rbcL* AB574855, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium pulcherrimum* (Baker) Ching, Xu 329-1 (SYS), Guangxi, China: *atpB* MK826215, *rbcL* MK826696, *rps4* & *rps4-trnS* MK827225, *trnL* intron & *trnL-F* spacer—. *Asplenium pulcherrimum* (Baker) Ching, Xu 329-2 (SYS), Guangxi, China: *atpB* MK826216, *rbcL* MK826697, *rps4* & *rps4-trnS* MK827226, *trnL* intron & *trnL-F* spacer—. *Asplenium pulcherrimum* (Baker) Ching, Xu GX021 (SYS), Guangxi, China: *atpB* MK826167, *rbcL* MK826646, *rps4* & *rps4-trnS* MK827179, *trnL* intron & *trnL-F* spacer—. *Asplenium pulcherrimum* (Baker) Ching, Xu GZ014 (SYS), Guizhou, China: *atpB* MK826152, *rbcL* MK826638, *rps4* & *rps4-trnS* MK827165, *trnL* intron & *trnL-F* spacer—. *Asplenium pumilum* Sw., JLTS1004 = JL719 (M), Cuba: *atpB*—, *rbcL* KX856361, *rps4* & *rps4-trnS* KX856367, *trnL* intron & *trnL-F* spacer KX856356 (Lóriga et al., 2016). *Asplenium pumilum* Sw., JLTS1005 (no voucher), Cuba: *atpB*—, *rbcL* KX856362, *rps4* & *rps4-trnS* KX856368, *trnL* intron & *trnL-F* spacer KX856357 (Lóriga et al., 2016). *Asplenium pumilum* Sw., JLTS658 (no voucher), Cuba: *atpB*—, *rbcL* KX856363, *rps4* & *rps4-trnS* KX856369, *trnL* intron & *trnL-F* spacer KX856358 (Lóriga et al., 2016). *Asplenium quayleyi* Br., Wood 17613 (PTBG), Ua Pou, Marquesas: *atpB* MK826467, *rbcL*—, *rps4* & *rps4-trnS* MK827538, *trnL* intron & *trnL-F* spacer MK828014. *Asplenium raddianum* Gaudich., Rothfels 3717 (DUKE), Napo, Ecuador: *atpB* MK826537, *rbcL*—, *rps4* & *rps4-trnS* MK827610, *trnL* intron & *trnL-F* spacer MK828058. *Asplenium resiliens* Kunze, J.Dyer RD128 (BM), Queretaro, Mexico: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* JQ767810, *trnL* intron & *trnL-F* spacer JQ767932 (Dyer et al., 2012). *Asplenium* cf. *resiliens* Kunze, Shaw 19 (ISC), USA: *atpB*—, *rbcL* AY549746, *rps4* & *rps4-trnS* AY549800, *trnL* intron & *trnL-F*

spacer AY549850 (Schneider et al., 2005). *Asplenium rhizophyllum* L., OAC 96892, Ontario, Canada: *atpB*—, *rbcL* KF186530, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium rhizophyllum* L., Rothfels 4057 (US), Tennessee, USA: *atpB* MK826486, *rbcL* MK827036, *rps4* & *rps4-trnS* MK827560, *trnL* intron & *trnL-F* spacer MK828029. *Asplenium rhizophyllum* L., Xu R8, Cult. in SYS: *atpB* MK826091, *rbcL* MK826585, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827669. *Asplenium richardii* Hook. f., Wardlow s.n. (BM), New Zealand: *atpB*—, *rbcL* AY300138, *rps4* & *rps4-trnS* AY549810, *trnL* intron & *trnL-F* spacer AY300085 (Schneider et al., 2004). *Asplenium rigidum* Sw., Lemieux 2277 (COLO), Costa Rica: *atpB* EF463342, *rbcL* EF463156, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettelpelz & Pryer, 2007). *Asplenium rigidum* Sw., Rothfels 2616 (DUKE), San José, Costa Rica: *atpB* MK826502, *rbcL* MK827051, *rps4* & *rps4-trnS* MK827577, *trnL* intron & *trnL-F* spacer MK828043. *Asplenium ritoense* Hayata, Ranker 2063 (COLO), Taiwan: *atpB* EF463343, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettelpelz & Pryer, 2007). *Asplenium ritoense* Hayata, Xu GZ009 (SYS), Guizhou, China: *atpB* MK826158, *rbcL*—, *rps4* & *rps4-trnS* MK827171, *trnL* intron & *trnL-F* spacer MK827717. *Asplenium robustum* Blume, Rehlman 21517 (PTBG), Pohnpei, Micronesia: *atpB* MK826443, *rbcL* MK827002, *rps4* & *rps4-trnS* MK827515, *trnL* intron & *trnL-F* spacer—. *Asplenium ruprechtii* Sa. Kurata, TNS: 762675 (TNS), Kumamoto, Japan: *atpB*—, *rbcL* AB574871, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium rutifolium* (Bergius) Kunze, Bellefroid EB240 (GENT), Zimbabwe: *atpB*—, *rbcL* GU586806, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Bellefroid et al., 2010). *Asplenium rutifolium* (Bergius) Kunze, Rothfels 4673 (UC), Kwazulu-Natal, South Africa: *atpB* MK826404, *rbcL* MK826961, *rps4* & *rps4-trnS* MK827472, *trnL* intron & *trnL-F* spacer—. *Asplenium sagittatum* (DC.) Bunge, JCV SAG-1 (BM), Mallorca, Spain: *atpB*—, *rbcL* AF240646, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AF525261 (Pinter et al., 2002). *Asplenium sampsonii* Hance, Cult. in SYS (SYS), Guangxi, China: *atpB* MK826225, *rbcL* MK826706, *rps4* & *rps4-trnS* MK827234, *trnL* intron & *trnL-F* spacer MK827763. *Asplenium sampsonii* Hance, Cult. in SYS (SYS), Guangxi, China: *atpB* MK826226, *rbcL* MK826707, *rps4* & *rps4-trnS* MK827235, *trnL* intron & *trnL-F* spacer—. *Asplenium sampsonii* Hance, Cult. in SYS (SYS), Guangxi, China: *atpB* MK826227, *rbcL*—, *rps4* & *rps4-trnS* MK827236, *trnL* intron & *trnL-F* spacer MK827764. *Asplenium sampsonii* Hance, Xu 283 (SYS), Guangxi, China: *atpB*—, *rbcL* MK826660, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827725. *Asplenium sampsonii* Hance, Zhang et al. 871 (CDBI, MO), Guizhou, China: *atpB* MK826405, *rbcL* MK826962, *rps4* & *rps4-trnS* MK827473, *trnL* intron & *trnL-F* spacer—. *Asplenium sandersonii* Hook., Hemp A. 12 (BM), Weru-Weru, Kenya: *atpB*—, *rbcL* AF525274, *rps4* & *rps4-trnS* AY549820 (Schneider et al., 2005), *trnL* intron & *trnL-F* spacer AF525247 (Pinter et al., 2002). *Asplenium sandersonii* Hook., Viane 7719A (GENT), Tanzania: *atpB*—, *rbcL* GU929841, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium sandersonii* Hook., Viane RV7228 (GENT), Ethiopia: *atpB*—, *rbcL* GU586811, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Bellefroid et al., 2010). *Asplenium sarelii* Hook., JL00360 (SYS), Yunnan, China: *atpB* MK826059, *rbcL* MK826557, *rps4* & *rps4-trnS* MK827084, *trnL* intron & *trnL-F* spacer MK827644. *Asplenium sarelii* Hook., JL00470 (SYS), Yunnan, China: *atpB* MK826054, *rbcL* MK826553, *rps4* & *rps4-trnS* MK827079, *trnL* intron & *trnL-F* spacer MK827640. *Asplenium sarelii* Hook., Zhang et al. 6032 (CDBI), Guizhou, China: *atpB* MK826274, *rbcL* MK826776, *rps4* & *rps4-trnS* MK827300, *trnL* intron & *trnL-F* spacer—. *Asplenium sarelii* Hook., Zhang et al. 9693 (CDBI), Guizhou, China: *atpB* MK826318, *rbcL* MK826864, *rps4* & *rps4-trnS* MK827381, *trnL* intron & *trnL-F* spacer—. *Asplenium saxicola* Rosenstock, JL00219 (SYS), Guangxi, China: *atpB* MK826071, *rbcL* MK826568, *rps4* & *rps4-trnS* MK827096, *trnL* intron & *trnL-F* spacer MK827652. *Asplenium saxicola* Rosenstock, Xu 285 (SYS), Guangxi, China: *atpB* MK826184, *rbcL* MK826663, *rps4* & *rps4-trnS* MK827194, *trnL* intron & *trnL-F* spacer MK827728. *Asplenium saxicola* Rosenstock, Xu 295 (SYS), Guangxi, China: *atpB* MK826192, *rbcL* MK826671, *rps4* & *rps4-trnS* MK827201, *trnL* intron & *trnL-F* spacer MK827734. *Asplenium saxicola* Rosenstock, Xu 326 (SYS), Guangxi, China: *atpB* MK826201, *rbcL* MK826680, *rps4* & *rps4-trnS* MK827210, *trnL* intron & *trnL-F* spacer MK827743. *Asplenium saxicola* Rosenstock, Xu GZ016 (SYS), Guizhou, China: *atpB* MK826150, *rbcL* MK826636, *rps4* & *rps4-trnS* MK827163, *trnL* intron & *trnL-F* spacer MK827713. *Asplenium saxicola* Rosenstock, Xu s.n. (SYS), Guangxi, China: *atpB* MK826127, *rbcL* MK826615, *rps4* & *rps4-trnS* MK827146, *trnL* intron & *trnL-F* spacer—. *Asplenium saxicola* Rosenstock, Zhang et al. 337 (CDBI, MO), Guizhou, China: *atpB* MK826407, *rbcL* MK826964, *rps4* & *rps4-trnS* MK827475, *trnL* intron & *trnL-F* spacer—. *Asplenium saxicola* Rosenstock, Zhang et al. 6354 (CDBI, MO, VNMN), Hoa Binh, Vietnam: *atpB* MK826290, *rbcL* MK826793, *rps4* & *rps4-trnS* MK827315, *trnL* intron & *trnL-F* spacer MK827824. *Asplenium saxicola* Rosenstock, Zhao 194 (SYS), Guangdong, China: *atpB* MK826128, *rbcL* MK826616, *rps4* & *rps4-trnS* MK827147, *trnL* intron & *trnL-F* spacer—. *Asplenium scalare* Rosenst., KH155 (GENT), Malaysia: *atpB*—, *rbcL* GU929830, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium scandens* J.Sm., Kluge 9024 (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774880, *rps4* & *rps4-trnS* KP835413, *trnL* intron & *trnL-F* spacer KP835350 (Ohlsen et al. 2015). *Asplenium schizophyllum* C.Chr., Wood 16319 (PTBG), Kaua'i, Hawaii: *atpB* MK826468, *rbcL* MK827021, *rps4* & *rps4-trnS* MK827539, *trnL* intron & *trnL-F* spacer MK828015. *Asplenium scolopendrium* L., De Groot 309 (EB), Unknown: *atpB*—, *rbcL* HQ676496, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer HQ676518 (De Groot et al., 2011). *Asplenium scolopendrium* L., Vogel SCOL-175 (BM), Italy: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer JX475143 (Schneider et al., 2013). *Asplenium scolopendropsis* F.Muell., Lorence 9424 (PTBG), Kosrae, Micronesia: *atpB* MK826469, *rbcL*—, *rps4* & *rps4-trnS* MK827540, *trnL* intron & *trnL-F* spacer MK828016. *Asplenium scortechinii* Bedd., JL00354 (SYS), Yunnan, China: *atpB* MK826057, *rbcL*—, *rps4* & *rps4-trnS* MK827082, *trnL* intron & *trnL-F* spacer—. *Asplenium scortechinii* Bedd., Xu 315 (SYS), Yunnan, China: *atpB* MK826210, *rbcL* MK826691, *rps4* & *rps4-trnS* MK827220, *trnL* intron & *trnL-F* spacer MK827752. *Asplenium scortechinii* Bedd., Xu 316 (SYS), Yunnan, China: *atpB*—, *rbcL* MK826688, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827750. *Asplenium seelosii* Leyb., Vogel SEE-1 (BM), Italy: *atpB*—, *rbcL* AY300140, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300087 (Schneider et al., 2004). *Asplenium septentrionale* (L.) Hoffm., Larsson 11 (UPS), Sweden: *atpB* JF832152, *rbcL* JF832054, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Rothfel et al., 2012). *Asplenium septentrionale* (L.) Hoffm., Larsson 271 (DUKE), Nordland, Norway: *atpB* MK826477, *rbcL* MK827027, *rps4* & *rps4-trnS* MK827550, *trnL* intron & *trnL-F* spacer—. *Asplenium septentrionale* (L.) Hoffm., Viane 9578 (GENT), France: *atpB*—, *rbcL* GU929860, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium septentrionale* (L.) Hoffm., Xu 331 (SYS), Xingjiang, China: *atpB* MK826220, *rbcL* MK826700, *rps4* & *rps4-trnS* MK827229, *trnL* intron & *trnL-F* spacer MK827758. *Asplenium septentrionale* (L.) Hoffm., Xu R10, Cult. in SYS: *atpB* MK826092, *rbcL* MK826586, *rps4* & *rps4-trnS* MK827119, *trnL* intron & *trnL-F* spacer MK827671. *Asplenium septentrionale* (L.) Hoffm., Xu R11, Cult. in SYS: *atpB* MK826093, *rbcL*—, *rps4* & *rps4-trnS* MK827120, *trnL* intron & *trnL-F* spacer MK827672. *Asplenium serra* Langsd. & Fisch., Rothfels 08-070 (DUKE), San José, Costa Rica: *atpB* MK826508, *rbcL*—, *rps4* & *rps4-trnS* MK827583, *trnL* intron & *trnL-F* spacer MK828047. *Asplenium serra* Langsd. & Fisch., Rothfels 2592 (DUKE), Puntarenas, Costa Rica: *atpB* MK826495, *rbcL* MK827045, *rps4* & *rps4-trnS*

MK827570, *trnL* intron & *trnL-F* spacer MK828038. *Asplenium serra* Langsd. & Fisch., *Rothfels* 4886 (UC), Junin, Peru: *atpB* MK826408, *rbcl* MK826965, *rps4* & *rps4-trnS* MK827476, *trnL* intron & *trnL-F* spacer MK827965. *Asplenium* cf. *serra* Langsd. & Fisch., *Rothfels* 3610 (DUKE), Zamora-Chinchipe, Ecuador: *atpB* MK826531, *rbcl* MK826543, *rps4* & *rps4-trnS* MK827604, *trnL* intron & *trnL-F* spacer MK828054. *Asplenium serratifolium* Li Bing Zhang & K.W. Xu, Zhang et al. 7614 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB* MK826331, *rbcl* MK826877, *rps4* & *rps4-trnS* MK827391, *trnL* intron & *trnL-F* spacer MK827897. *Asplenium serratifolium* Li Bing Zhang & K.W. Xu, Zhang et al. 7631 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB* MK826294, *rbcl* MK826894, *rps4* & *rps4-trnS* MK827404, *trnL* intron & *trnL-F* spacer MK827911. *Asplenium serratum* L., Boudrie 3253 (BM), French Guiana: *atpB*—, *rbcl* AY300141, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300088 (Schneider et al., 2004). *Asplenium serratum* L., Schulze 3-1-1999 (HEID), Cult. in Heidelberg Botanical Garden: *atpB*—, *rbcl* AF318602, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Schulze et al., 2001).

Asplenium serricula Fée, Knapp 3312 (P), Taiwan Island: *atpB*—, *rbcl*—, *rps4* & *rps4-trnS* MK827272, *trnL* intron & *trnL-F* spacer MK827798. *Asplenium sessilifolium* Desv., *Rothfels* 2638 (DUKE), Puntarenas, Costa Rica: *atpB* MK826494, *rbcl* MK827044, *rps4* & *rps4-trnS* MK827569, *trnL* intron & *trnL-F* spacer MK828037. *Asplenium setisectum* Brause, Kessler 14048 (UZH, UC), Papua New Guinea: *atpB*—, *rbcl* KP774932, *rps4* & *rps4-trnS* KP835466, *trnL* intron & *trnL-F* spacer KP639688 (Ohlsen et al. 2015). *Asplenium setoi* N. Murakami & Serizawa, MAK427902 (MAK), Tokyo, Japan: *atpB*—, *rbcl* LC137791, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Yamada et al., 2016). *Asplenium shikokianum* Makino, Wei CSH 15966 (SYS), Hunan, China: *atpB* MK826177, *rbcl* MK826655, *rps4* & *rps4-trnS* MK827187, *trnL* intron & *trnL-F* spacer—. *Asplenium shikokianum* Makino, Wei HD160302 (SYS), Zhejiang, China: *atpB* MK826175, *rbcl* MK826653, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium shikokianum* Makino, Wei JSL3548 (SYS), Zhejiang, China: *atpB* MK826176, *rbcl* MK826654, *rps4* & *rps4-trnS* MK827186, *trnL* intron & *trnL-F* spacer—. *Asplenium shikokianum* Makino, Wei JSL3732 (SYS), Hunan, China: *atpB* MK826179, *rbcl* MK826657, *rps4* & *rps4-trnS* MK827189, *trnL* intron & *trnL-F* spacer—. *Asplenium shikokianum* Makino, Wei JSL3737 (SYS), Hunan, China: *atpB* MK826180, *rbcl* MK826658, *rps4* & *rps4-trnS* MK827190, *trnL* intron & *trnL-F* spacer—. *Asplenium shikokianum* Makino, Wei JSL3744 (SYS), Hunan, China: *atpB* MK826178, *rbcl* MK826656, *rps4* & *rps4-trnS* MK827188, *trnL* intron & *trnL-F* spacer—. *Asplenium shimurae* (H. Itô) Nakaike, TNS: 766418 (TNS), Wakayama, Japan: *atpB*—, *rbcl* AB574876, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Ebihara et al., 2010). *Asplenium shuttleworthianum* Kunze, P20517 (WELT), New Zealand: *atpB*—, *rbcl* AY283235, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY283223 (Perrie & Brownsey, 2005). *Asplenium simaoense* K.W. Xu, Li Bing Zhang & W. B. Liao, JL00365 (SYS), Yunnan, China: *atpB* MK826048, *rbcl* MK826548, *rps4* & *rps4-trnS* MK827073, *trnL* intron & *trnL-F* spacer MK827636. *Asplenium simaoense* K.W. Xu, Li Bing Zhang & W. B. Liao, Xu 317-1 (SYS), Yunnan, China: *atpB* MK826203, *rbcl* MK826682, *rps4* & *rps4-trnS* MK827212, *trnL* intron & *trnL-F* spacer—. *Asplenium simaoense* K.W. Xu, Li Bing Zhang & W. B. Liao, Xu 317-2 (SYS), Yunnan, China: *atpB* MK826204, *rbcl* MK826683, *rps4* & *rps4-trnS* MK827213, *trnL* intron & *trnL-F* spacer MK827745. *Asplenium simii* A. F. Braithw. & Schelpe, Peter & Bart 1898 (MO), Zimbabwe: *atpB* MK826492, *rbcl*—, *rps4* & *rps4-trnS* MK827565, *trnL* intron & *trnL-F* spacer MK828034. *Asplenium* cf. *simonsianum* Hook., Zhang et al. 7358 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB* MK826261, *rbcl* MK826764, *rps4* & *rps4-trnS* MK827288, *trnL* intron & *trnL-F* spacer MK827815. *Asplenium* cf. *simonsianum* Hook., Zhang et al. 7489 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB* MK826341, *rbcl*

MK826895, *rps4* & *rps4-trnS* MK827405, *trnL* intron & *trnL-F* spacer MK827912. *Asplenium* cf. *simonsianum* Hook., Zhang et al. 7367 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB* MK826254, *rbcl* MK826758, *rps4* & *rps4-trnS* MK827282, *trnL* intron & *trnL-F* spacer MK827809. *Asplenium* cf. *simonsianum* Hook., Zhang et al. 7379 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB* MK826323, *rbcl* MK826868, *rps4* & *rps4-trnS* MK827385, *trnL* intron & *trnL-F* spacer MK827890. *Asplenium simplicifrons* F.Muell., Vogel s.n. (BM), Cult. in PNG: *atpB*—, *rbcl* AY300142, *rps4* & *rps4-trnS* AY549815, *trnL* intron & *trnL-F* spacer AY300089 (Schneider et al., 2004). *Asplenium smedsii* Pic.Ser., Hemp 13 (BM), Kenya: *atpB*—, *rbcl* AY300143, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300090 (Schneider et al., 2004). *Asplenium smedsii* Pic.Ser., Viane 7707 (GENT), Tanzania: *atpB*—, *rbcl* GU929834, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Leroux et al., 2011). *Asplenium soleirolloides* A.R. Sm., Dyer RD82, Oaxaca, Mexico: *atpB*—, *rbcl*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer JQ767935 (Dyer et al., 2013). *Asplenium spathulinum* Kunze, Xu 104 (SYS), Hainan, China: *atpB* MK826104, *rbcl* MK826595, *rps4* & *rps4-trnS* MK827131, *trnL* intron & *trnL-F* spacer MK827682. *Asplenium spathulinum* Kunze, Xu 118 (SYS), Hainan, China: *atpB* MK826110, *rbcl* MK826599, *rps4* & *rps4-trnS* MK827134, *trnL* intron & *trnL-F* spacer MK827686. *Asplenium spathulinum* Kunze, Xu 267 (SYS), Hainan, China: *atpB* MK826134, *rbcl* MK826620, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827699. *Asplenium spathulinum* Kunze, Xu 269 (SYS), Hainan, China: *atpB* MK826136, *rbcl* MK826622, *rps4* & *rps4-trnS* MK827150, *trnL* intron & *trnL-F* spacer MK827701. *Asplenium spathulinum* Kunze, Xu 270 (SYS), Hainan, China: *atpB* MK826135, *rbcl* MK826621, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827700. *Asplenium spathulinum* Kunze, Xu 272 (SYS), Hainan, China: *atpB* MK826133, *rbcl* MK826619, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827698. *Asplenium spathulinum* Kunze, Zhang et al. 8401 (CDBI, PHH), Lam Dong, Vietnam: *atpB* MK826306, *rbcl* MK826809, *rps4* & *rps4-trnS* MK827330, *trnL* intron & *trnL-F* spacer MK827837. *Asplenium spathulinum* Kunze, Zhang et al. 8611 (CDBI, MO, PHH), Lam Dong, Vietnam: *atpB* MK826291, *rbcl* MK826794, *rps4* & *rps4-trnS* MK827316, *trnL* intron & *trnL-F* spacer MK827825. *Asplenium spathulinum* Kunze, Zhang et al. 8733 (CDBI, MO, PHH), Khanh Hoa, Vietnam: *atpB*—, *rbcl* MK826824, *rps4* & *rps4-trnS* MK827343, *trnL* intron & *trnL-F* spacer MK827849. *Asplenium speluncae* Christ, Wei 6223 (CSH), Guangxi, China: *atpB* MK826420, *rbcl* MK826978, *rps4* & *rps4-trnS* MK827489, *trnL* intron & *trnL-F* spacer MK827977. *Asplenium sphenotomum* Hillebr., Wood 1278 (F), Hawaii: *atpB*—, *rbcl* AY300144, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300091 (Schneider et al., 2004). *Asplenium sphenotomum* Hillebr., Wood 14147 (PTBG), Kauai, Hawaii: *atpB* MK826470, *rbcl* MK827022, *rps4* & *rps4-trnS* MK827541, *trnL* intron & *trnL-F* spacer MK828017. *Asplenium splendens* Kunze, *Rothfels* 4671 (UC), Kwazulu-Natal, South Africa: *atpB* MK826421, *rbcl* MK826979, *rps4* & *rps4-trnS* MK827490, *trnL* intron & *trnL-F* spacer MK827978. *Asplenium squamulatum* Blume, KH94 (GENT), Indonesia: *atpB*—, *rbcl* GU929831, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Leroux et al., 2011). *Asplenium steerei* Harr., Knapp 3626 (P), Taiwan Island: *atpB*—, *rbcl* MK826728, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827783. *Asplenium steerei* Harr., Knapp 3630 (P), Taiwan Island: *atpB*—, *rbcl* MK826729, *rps4* & *rps4-trnS* MK827256, *trnL* intron & *trnL-F* spacer MK827784. *Asplenium steerei* Harr., Knapp 3634 (P), Taiwan Island: *atpB*—, *rbcl*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827781. *Asplenium cuneatiforme* Christ, Knapp 3636 (P), Taiwan Island: *atpB*—, *rbcl* MK826731, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827786. *Asplenium steerei* Harr., Knapp 4008 (P), Taiwan Island: *atpB*—, *rbcl* MK826730, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium stenolobum* C.Chr., Brownsey & Perrie 56 (WELT), Fiji: *atpB*—, *rbcl* KP774916, *rps4* & *rps4-trnS* KP851876, *trnL* intron & *trnL-F* spacer

KP835345 (Ohlsen et al. 2015). *Asplenium stenolobum* C.Chr., Brownsey & Perrie FIJI 268 (WELT), Fiji: *atpB*—, *rbcL* KP774859, *rps4* & *rps4-trnS* KP851885, *trnL* intron & *trnL-F* spacer KP835347 (Ohlsen et al. 2015). *Asplenium stoloniferum* Bory, Rothfels 4661 (UC), KwaZulu-Natal, South Africa: *atpB* MK826422, *rbcL* MK826980, *rps4* & *rps4-trnS* MK827491, *trnL* intron & *trnL-F* spacer MK827979. *Asplenium subcrenatum* Ching ex S.H. Wu, Fan 13884 (SYS), Yunnan, China: *atpB* MK826053, *rbcL* MK826552, *rps4* & *rps4-trnS* MK827078, *trnL* intron & *trnL-F* spacer—. *Asplenium subcrenatum* Ching ex S.H. Wu, Fan 13894 (SYS), Yunnan, China: *atpB* MK826082, *rbcL* MK826580, *rps4* & *rps4-trnS* MK827108, *trnL* intron & *trnL-F* spacer MK827664. *Asplenium subcrenatum* Ching ex S.H. Wu, Lu SG/J13 (PYU), Yunnan, China: *atpB*—, *rbcL* AY725031, *rps4* & *rps4-trnS* AY725044, *trnL* intron & *trnL-F* spacer AY725032 (Li & Lu, 2006). *Asplenium subcrenatum* Ching ex S.H. Wu, Xu 330-1 (SYS), Guangxi, China: *atpB* MK826211, *rbcL* MK826692, *rps4* & *rps4-trnS* MK827221, *trnL* intron & *trnL-F* spacer MK827753. *Asplenium subcrenatum* Ching ex S.H. Wu, Xu 330-2 (SYS), Guangxi, China: *atpB* MK826214, *rbcL* MK826695, *rps4* & *rps4-trnS* MK827224, *trnL* intron & *trnL-F* spacer MK827756. *Asplenium subcrenatum* Ching ex S.H. Wu, Xu YN031 (SYS), Yunnan, China: *atpB* MK826168, *rbcL* MK826647, *rps4* & *rps4-trnS* MK827180, *trnL* intron & *trnL-F* spacer MK827720. *Asplenium subcrenatum* Ching ex S.H. Wu, Xu YN032 (SYS), Yunnan, China: *atpB* MK826170, *rbcL* MK826648, *rps4* & *rps4-trnS* MK827181, *trnL* intron & *trnL-F* spacer MK827721. *Asplenium subcrenatum* Ching ex S.H. Wu, Zhang et al. 472 (CDBI, MO), Guizhou, China: *atpB* MK826434, *rbcL* MK826993, *rps4* & *rps4-trnS* MK827506, *trnL* intron & *trnL-F* spacer MK827989. *Asplenium subcrenatum* Ching ex S.H. Wu, Zhang et al. 5311 (CDBI, MO), Guangxi, China: *atpB* MK826304, *rbcL* MK826807, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827835. *Asplenium subcrenatum* Ching ex S.H. Wu, Zhang et al. 5492 (CDBI, MO), Guangxi, China: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827363, *trnL* intron & *trnL-F* spacer MK827870. *Asplenium subcrenatum* Ching ex S.H. Wu, Zhang et al. 6882 (CDBI, MO, VNMN), Ha Giang, Vietnam: *atpB*—, *rbcL* MK826828, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827852. *Asplenium subcrenatum* Ching ex S.H. Wu, Zhang et al. 6966 (CDBI, VNMN), Ha Giang, Vietnam: *atpB* MK826278, *rbcL* MK826780, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Asplenium subcrenatum* Ching ex S.H. Wu, Zhang et al. 9193 (CDBI), Guizhou, China: *atpB* MK826343, *rbcL* MK826897, *rps4* & *rps4-trnS* MK827407, *trnL* intron & *trnL-F* spacer MK827914. *Asplenium subcrenatum* Ching ex S.H. Wu, Zhang et al. 9250 (CDBI), Guizhou, China: *atpB* MK826348, *rbcL* MK826902, *rps4* & *rps4-trnS* MK827412, *trnL* intron & *trnL-F* spacer MK827916. *Asplenium submarginatum* Rosenst., Kluge 9026 (UZH, UC), Papua New Guinea: *atpB*—, *rbcL* KP774923, *rps4* & *rps4-trnS* KP835447, *trnL* intron & *trnL-F* spacer KP835360 (Ohlsen et al. 2015). *Asplenium subflexuosum* Rosenst., Perrie NC 83 (WELT), New Caledonia: *atpB*—, *rbcL* KP774905, *rps4* & *rps4-trnS* KP835414, *trnL* intron & *trnL-F* spacer KP835377 (Ohlsen et al. 2015). *Asplenium sublaserpitifolium* Ching ex Tardieu & Ching, JL00263 (SYS), Guangdong, China: *atpB* MK826063, *rbcL* MK826561, *rps4* & *rps4-trnS* MK827088, *trnL* intron & *trnL-F* spacer—. *Asplenium sublongum* Ching ex S.H. Wu, Cult. in CSH, Hainan, China: *atpB* MK826222, *rbcL* MK826702, *rps4* & *rps4-trnS* MK827231, *trnL* intron & *trnL-F* spacer MK827760. *Asplenium sublongum* Ching ex S.H. Wu, Cult. in CSH, Hainan, China: *atpB* MK826224, *rbcL* MK826704, *rps4* & *rps4-trnS* MK827233, *trnL* intron & *trnL-F* spacer MK827762. *Asplenium sublongum* Ching ex S.H. Wu, Zhang et al. 7334 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB* MK826285, *rbcL* MK826787, *rps4* & *rps4-trnS* MK827310, *trnL* intron & *trnL-F* spacer—. *Asplenium sublongum* Ching ex S.H. Wu, Zhang et al. 7630 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB*—, *rbcL* MK826850, *rps4* & *rps4-trnS* MK827368, *trnL* intron & *trnL-F* spacer MK827874. *Asplenium sublongum* Ching ex S.H. Wu, Zhang et al. 8649 (CDBI, MO, PHH), Lam Dong, Vietnam: *atpB* MK826256, *rbcL* MK826760, *rps4* & *rps4-trnS* MK827284, *trnL* intron & *trnL-F* spacer MK827811. *Asplenium sublongum* Ching ex S.H. Wu, Zhang et al. 8865 (CDBI, PHH), Dak Lak, Vietnam: *atpB*—, *rbcL* MK826834, *rps4* & *rps4-trnS* MK827351, *trnL* intron & *trnL-F* spacer MK827858. “*Asplenium sulcatum* Lam.”, Grangaud s.n. (BM), Reunion: *atpB*—, *rbcL* KF992441, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Hennequin et al., 2014). *Asplenium surrogatum* P.S. Green, P022090 (WELT), Cult. in Wellington Botanic Gardens: *atpB*—, *rbcL* EU240034, *rps4* & *rps4-trnS* EU240024, *trnL* intron & *trnL-F* spacer EU240029 (Shepherd et al., 2008). *Asplenium* sp, Viane 10161 (GENT), Venezuela: *atpB*—, *rbcL* GU929858, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium tenerimum* Mett. ex Kuhn, Rothfels 08-058 (DUKE), Guanacasté, Costa Rica: *atpB* MK826044, *rbcL*—, *rps4* & *rps4-trnS* MK827066, *trnL* intron & *trnL-F* spacer MK827619. *Asplenium tenerum* G. Forst., Brownsey & Perrie FIJI 14 (WELT), Fiji: *atpB*—, *rbcL* KP774912, *rps4* & *rps4-trnS* KP851884, *trnL* intron & *trnL-F* spacer KP851911 (Ohlsen et al. 2015). *Asplenium tenerum* G. Forst., Kluge 9110 (UZH), Papua New Guinea: *atpB*—, *rbcL* KP774890, *rps4* & *rps4-trnS* KP835430, *trnL* intron & *trnL-F* spacer KP835351 (Ohlsen et al. 2015). *Asplenium tenerum* G. Forst., Knapp 2415 (P), Taiwan Island: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827612. *Asplenium tenerum* G. Forst., Knapp 3658 (P), Taiwan Island: *atpB*—, *rbcL* MK826741, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827795. *Asplenium tenerum* G. Forst., Lorence 10573 (PTBG), Savaii, Samoa: *atpB* MK826448, *rbcL* MK827006, *rps4* & *rps4-trnS* MK827520, *trnL* intron & *trnL-F* spacer MK828000. *Asplenium tenerum* G. Forst., Lorence 10573 (PTBG), Savaii, Samoa: *atpB* MK826471, *rbcL* MK827023, *rps4* & *rps4-trnS* MK827542, *trnL* intron & *trnL-F* spacer MK828018. *Asplenium tenerum* G. Forst., Ohlsen 265 (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774858, *rps4* & *rps4-trnS* KP835437, *trnL* intron & *trnL-F* spacer KP835346 (Ohlsen et al. 2015). *Asplenium tenerum* G. Forst., Ranker 1964 (COLO), Moorea: *atpB* EF463347, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpelz & Pryer, 2008). *Asplenium tenerum* G. Forst., Schneider 1140 (SAR), Borneo: *atpB*—, *rbcL* AY300145, *rps4* & *rps4-trnS* AY549814, *trnL* intron & *trnL-F* spacer AY300092 (Schneider et al., 2004). *Asplenium tenerum* G. Forst., Siti Khadijah Rambe KH174 (GENT), Indonesia: *atpB*—, *rbcL* GU586810, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Bellefroid et al., 2010). *Asplenium tenerum* G. Forst., TNS: 774845 (TNS), Tokyo, Japan: *atpB*—, *rbcL* AB574877, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium tenerum* G. Forst., Wood 17586 (PTBG), Ua Pou, Marquesas: *atpB* MK826449, *rbcL* MK827007, *rps4* & *rps4-trnS* MK827521, *trnL* intron & *trnL-F* spacer MK828001. *Asplenium tenerum* G. Forst., Wood 17586 (PTBG), Ua Pou, Marquesas: *atpB* MK826472, *rbcL* MK827024, *rps4* & *rps4-trnS* MK827543, *trnL* intron & *trnL-F* spacer MK828019. *Asplenium tenerum* G. Forst., Wu et al. 4220 (MO), Kampot, Cambodia: *atpB* MK826424, *rbcL* MK826982, *rps4* & *rps4-trnS* MK827493, *trnL* intron & *trnL-F* spacer—. *Asplenium tenerum* G. Forst., Wu et al. 4315 (MO), Kampot, Cambodia: *atpB* MK826423, *rbcL* MK826981, *rps4* & *rps4-trnS* MK827492, *trnL* intron & *trnL-F* spacer MK827980. *Asplenium tenerum* G. Forst., Xu 119 (SYS), Hainan, China: *atpB* MK826101, *rbcL* MK826592, *rps4* & *rps4-trnS* MK827128, *trnL* intron & *trnL-F* spacer MK827680. *Asplenium tenerum* G. Forst., Zhang et al. 6542 (CDBI, MO, VNMN), Phu Tho, Vietnam: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827850. *Asplenium tenerum* G. Forst., Zhang et al. 7231 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB* MK826332, *rbcL* MK826878, *rps4* & *rps4-trnS* MK827392, *trnL* intron & *trnL-F* spacer MK827898. *Asplenium tenerum* G. Forst., Zhang et al. 7331 (CDBI, MO, VNMN), Quang Binh, Vietnam: *atpB* MK826286, *rbcL* MK826788, *rps4* & *rps4-trnS* MK827311, *trnL* intron & *trnL-F*

spacer—. *Asplenium tenerum* G. Forst., Zhang et al. 7524 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB*—, *rbcL* MK826853, *rps4* & *rps4-trnS* MK827371, *trnL* intron & *trnL-F* spacer MK827877. *Asplenium tenerum* G. Forst., Zhang et al. 7725 (CDBI, MO, VNMN), Thua Thien-Hue, Vietnam: *atpB* MK826245, *rbcL* MK826748, *rps4* & *rps4-trnS* MK827274, *trnL* intron & *trnL-F* spacer MK827800. *Asplenium tenerum* G. Forst., Zhang et al. 7987 (CDBI, MO, VNMN), Quang Nam, Vietnam: *atpB* MK826253, *rbcL* MK826757, *rps4* & *rps4-trnS* MK827281, *trnL* intron & *trnL-F* spacer MK827808. *Asplenium tenerum* G. Forst., Zhang et al. 8019 (CDBI, MO, VNMN), Quang Nam, Vietnam: *atpB* MK826315, *rbcL* MK826860, *rps4* & *rps4-trnS* MK827377, *trnL* intron & *trnL-F* spacer MK827883. *Asplenium tenerum* G. Forst., Zhang et al. 8324 (CDBI, MO, VNMN), Lam Dong, Vietnam: *atpB*—, *rbcL* MK826887, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827905. *Asplenium tenerum* G. Forst., Zhang et al. 8324 (CDBI, MO, VNMN), Lam Dong, Vietnam: *atpB* MK826357, *rbcL* MK826911, *rps4* & *rps4-trnS* MK827421, *trnL* intron & *trnL-F* spacer MK827922. *Asplenium tenerum* G. Forst., Zhang et al. 8492 (CDBI, MO, PHH), Lam Dong, Vietnam: *atpB*—, *rbcL* MK826829, *rps4* & *rps4-trnS* MK827346, *trnL* intron & *trnL-F* spacer MK827853. *Asplenium tenerum* G. Forst., Zhang et al. 8529 (CDBI, MO, VNMN), Lam Dong, Vietnam: *atpB*—, *rbcL* MK826888, *rps4* & *rps4-trnS* MK827398, *trnL* intron & *trnL-F* spacer MK827906. *Asplenium tenerum* G. Forst., Zhang et al. 8982 (CDBI, MO, PHH), Dak Lak, Vietnam: *atpB* MK826273, *rbcL* MK826775, *rps4* & *rps4-trnS* MK827299, *trnL* intron & *trnL-F* spacer—. *Asplenium tenuicaule* Hayata, Rothfels 5331 (UC, CDBI), Sichuan, China: *atpB* MK826415, *rbcL* MK826973, *rps4* & *rps4-trnS* MK827484, *trnL* intron & *trnL-F* spacer MK827972. *Asplenium tenuicaule* Hayata, Zhang & He 6130 (CDBI), Guizhou, China: *atpB*—, *rbcL* MK826843, *rps4* & *rps4-trnS* MK827360, *trnL* intron & *trnL-F* spacer MK827866. *Asplenium tenuicaule* Hayata, Zhang et al. 9248 (CDBI), Guizhou, China: *atpB* MK826349, *rbcL* MK826903, *rps4* & *rps4-trnS* MK827413, *trnL* intron & *trnL-F* spacer MK827917. *Asplenium tenuicaule* Hayata, Zhang et al. 9451 (CDBI), Guizhou, China: *atpB*—, *rbcL* MK826820, *rps4* & *rps4-trnS* MK827340, *trnL* intron & *trnL-F* spacer MK827846. *Asplenium tenuicaule* Hayata, Zhang et al. 9543 (CDBI), Guizhou, China: *atpB* MK826268, *rbcL* MK826770, *rps4* & *rps4-trnS* MK827295, *trnL* intron & *trnL-F* spacer—. *Asplenium tenuicaule* Hayata, Zhang et al. 9614 (CDBI), Guizhou, China: *atpB*—, *rbcL* MK826831, *rps4* & *rps4-trnS* MK827348, *trnL* intron & *trnL-F* spacer MK827855. *Asplenium tenuicaule* Hayata, Zhang et al. 9635 (CDBI), Guizhou, China: *atpB* MK826287, *rbcL* MK826789, *rps4* & *rps4-trnS* MK827312, *trnL* intron & *trnL-F* spacer MK827822. *Asplenium tenuicaule* Hayata, Zhang et al. 9671 (CDBI), Guizhou, China: *atpB* MK826247, *rbcL* MK826750, *rps4* & *rps4-trnS* MK827276, *trnL* intron & *trnL-F* spacer MK827802. *Asplenium tenuicaule* Hayata, Zhang et al. 9732 (CDBI), Sichuan, China: *atpB*—, *rbcL* MK826854, *rps4* & *rps4-trnS* MK827372, *trnL* intron & *trnL-F* spacer MK827878. *Asplenium tenuicaule* Hayata, Zhang et al. 9732 (CDBI), Sichuan, China: *atpB* MK826240, *rbcL* MK826720, *rps4* & *rps4-trnS* MK827248, *trnL* intron & *trnL-F* spacer MK827774. *Asplenium tenuicaule* Hayata, Zhang et al. 9734 (CDBI), Sichuan, China: *atpB*—, *rbcL* MK826855, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827879. *Asplenium tenuicaule* Hayata, Zhang et al. 9734 (CDBI), Sichuan, China: *atpB* MK826241, *rbcL* MK826721, *rps4* & *rps4-trnS* MK827249, *trnL* intron & *trnL-F* spacer MK827775. *Asplenium tenuicaule* Hayata, Zhang et al. BX28 (CDBI), Sichuan, China: *atpB* MK826232, *rbcL* MK826712, *rps4* & *rps4-trnS* MK827241, *trnL* intron & *trnL-F* spacer MK827768. *Asplenium tenuiculum* Rosenst., Perrie NC 220 (WELT), New Caledonia: *atpB*—, *rbcL* KP774862, *rps4* & *rps4-trnS* KP835444, *trnL* intron & *trnL-F* spacer KP835356 (Ohlsen et al. 2015). *Asplenium tenuifolium* D. Don, Jin & Zhang 11350 (CDBI), Yunnan, China: *atpB*—, *rbcL* MK826838, *rps4* & *rps4-trnS* MK827355, *trnL* intron & *trnL-F* spacer MK827862. *Asplenium tenuifolium* D. Don, JL00361 (SYS), Yunnan, China: *atpB* MK826060, *rbcL* MK826558, *rps4* & *rps4-trnS* MK827085, *trnL* intron & *trnL-F* spacer MK827645. *Asplenium tenuifolium* D. Don, JL00369 (SYS), Yunnan, China: *atpB* MK826050, *rbcL* MK826550, *rps4* & *rps4-trnS* MK827075, *trnL* intron & *trnL-F* spacer MK827638. *Asplenium tenuifolium* D. Don, Knapp 3499 (P), Taiwan Island: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827254, *trnL* intron & *trnL-F* spacer—. *Asplenium tenuifolium* D. Don, Xu & Zhou 2332 (CDBI), Xizang, China: *atpB* MK826312, *rbcL* MK826815, *rps4* & *rps4-trnS* MK827335, *trnL* intron & *trnL-F* spacer MK827842. *Asplenium tenuifolium* D. Don, Xu & Zhou 2336 (CDBI), Xizang, China: *atpB*—, *rbcL* MK826819, *rps4* & *rps4-trnS* MK827339, *trnL* intron & *trnL-F* spacer MK827845. *Asplenium tenuifolium* D. Don, Xu 298 (SYS), Guangxi, China: *atpB* MK826189, *rbcL* MK826668, *rps4* & *rps4-trnS* MK827198, *trnL* intron & *trnL-F* spacer MK827731. *Asplenium tenuifolium* D. Don, Xu 303 (SYS), Yunnan, China: *atpB* MK826217, *rbcL* MK826698, *rps4* & *rps4-trnS* MK827227, *trnL* intron & *trnL-F* spacer—. *Asplenium tenuifolium* D. Don, Xu 323 (SYS), Yunnan, China: *atpB* MK826195, *rbcL* MK826674, *rps4* & *rps4-trnS* MK827204, *trnL* intron & *trnL-F* spacer MK827737. *Asplenium tenuifolium* D. Don, Xu PB005 (SYS), Yunnan, China: *atpB* MK826142, *rbcL* MK826628, *rps4* & *rps4-trnS* MK827155, *trnL* intron & *trnL-F* spacer MK827706. *Asplenium tenuifolium* D. Don, Zhang et al. 587 (CDBI, MO), Guizhou, China: *atpB* MK826425, *rbcL*—, *rps4* & *rps4-trnS* MK827494, *trnL* intron & *trnL-F* spacer—. *Asplenium tenuifolium* D. Don, Zhang et al. 8452 (CDBI, MO, PHH), Lam Dong, Vietnam: *atpB* MK826262, *rbcL* MK826765, *rps4* & *rps4-trnS* MK827289, *trnL* intron & *trnL-F* spacer MK827816. *Asplenium tenuifolium* D. Don, Zhang et al. 8495 (CDBI, MO, PHH), Lam Dong, Vietnam: *atpB* MK826282, *rbcL* MK826783, *rps4* & *rps4-trnS* MK827306, *trnL* intron & *trnL-F* spacer—. *Asplenium tenuivarians* Z.R. Wang ex Ebihara, TNS: 1170793 (TNS), Miyazaki, Japan: *atpB*—, *rbcL* AB853886, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2014). *Asplenium theciferum* (Kunth) Mett., Gastony 12-97-101 (IND), Tanzania: *atpB*—, *rbcL* AF336099, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Gastony & Johnson, 2001). *Asplenium theciferum* (Kunth) Mett., Hemp 20 (BM), Kenya: *atpB*—, *rbcL* AY300123, *rps4* & *rps4-trnS* AY549821, *trnL* intron & *trnL-F* spacer AY300070 (Schneider et al., 2004). *Asplenium theciferum* (Kunth) Mett., Rothfels 2702 (DUKE), San José, Costa Rica: *atpB* MK826509, *rbcL*—, *rps4* & *rps4-trnS* MK827584, *trnL* intron & *trnL-F* spacer—. *Asplenium theciferum* (Kunth) Mett., Schuettpelz 258 (DUKE), Ecuador: *atpB* EF463348, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Rothfel et al., 2012). *Asplenium theciferum* (Kunth) Mett., Schuettpelz 258 (DUKE), Ecuador: *atpB* JF832153, *rbcL* JF832055, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpelz & Pryer, 2007). *Asplenium thunbergii* Kunze, Zhang et al. 6353 (CDBI, MO, VNMN), Hoa Binh, Vietnam: *atpB* MK826299, *rbcL* MK826802, *rps4* & *rps4-trnS* MK827324, *trnL* intron & *trnL-F* spacer MK827831. *Asplenium thunbergii* Kunze, Zhang et al. 7065 (CDBI, MO, VNMN), Thanh Hoa, Vietnam: *atpB* MK826334, *rbcL* MK826880, *rps4* & *rps4-trnS* MK827394, *trnL* intron & *trnL-F* spacer MK827900. *Asplenium thunbergii* Kunze, Zhang et al. 7487 (CDBI, MO, VNMN), Quang Tri, Vietnam: *atpB* MK826259, *rbcL* MK826762, *rps4* & *rps4-trnS* MK827287, *trnL* intron & *trnL-F* spacer MK827814. *Asplenium toramanum* Makino, Xu 286 (SYS), Guangxi, China: *atpB* MK826182, *rbcL* MK826661, *rps4* & *rps4-trnS* MK827192, *trnL* intron & *trnL-F* spacer MK827726. *Asplenium toramanum* Makino, Zhang et al. 438 (CDBI, MO), Guizhou, China: *atpB* MK826426, *rbcL* MK826983, *rps4* & *rps4-trnS* MK827495, *trnL* intron & *trnL-F* spacer MK827981. *Asplenium toramanum* Makino, Zhang et al. 9157 (CDBI), Guizhou, China: *atpB* MK826342, *rbcL* MK826896, *rps4* & *rps4-trnS* MK827406, *trnL* intron & *trnL-F* spacer MK827913. *Asplenium toramanum* Makino, Zhang et al. 9457 (CDBI), Guizhou, China: *atpB* MK826267, *rbcL* MK826769, *rps4* & *rps4-trnS* MK827294, *trnL* intron & *trnL-F*

spacer—. *Asplenium trapezoideum* Ching, *Wu* WS-268 (MO), Bolikhamxay, Laos: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827496, *trnL* intron & *trnL-F* spacer—. *Asplenium trapezoideum* Ching, Zhang et al. 6541 (CDBI, MO, VNMN), Phu Tho, Vietnam: *atpB*—, *rbcL* MK826830, *rps4* & *rps4-trnS* MK827347, *trnL* intron & *trnL-F* spacer MK827854. *Asplenium trapezoideum* Ching, Zhang et al. 6773 (CDBI, MO, VNMN), Bac Kan, Vietnam: *atpB*—, *rbcL* MK826845, *rps4* & *rps4-trnS* MK827362, *trnL* intron & *trnL-F* spacer MK827869. *Asplenium trapezoideum* Ching, Zhang et al. 7766 (CDBI, MO, VNMN), Thua Thien-Hue, Vietnam: *atpB* MK826314, *rbcL* MK826859, *rps4* & *rps4-trnS* MK827376, *trnL* intron & *trnL-F* spacer MK827882. *Asplenium trichomanes* L., *Atr* 120 (BM), Canada: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* EF645629, *trnL* intron & *trnL-F* spacer EF645613 (James et al., 2008). *Asplenium trichomanes* L., *Grusz* 168 (DUKE), Virginia, USA: *atpB* MK826041, *rbcL* MK827042, *rps4* & *rps4-trnS* MK827567, *trnL* intron & *trnL-F* spacer MK828035. *Asplenium trichomanes* L., *JCV* TT-25 (BM), Germany: *atpB*—, *rbcL* AF525276, *rps4* & *rps4-trnS* AY549793 (Schneider et al., 2005), *trnL* intron & *trnL-F* spacer AF525237 (Pinter et al., 2002). *Asplenium trichomanes* L., *Knapp* 3165 (P), Taiwan Island: *atpB*—, *rbcL* MK826742, *rps4* & *rps4-trnS* MK827267, *trnL* intron & *trnL-F* spacer—. *Asplenium trichomanes* L., *Knapp* 3788 (P), Taiwan Island: *atpB*—, *rbcL* MK826743, *rps4* & *rps4-trnS* MK827268, *trnL* intron & *trnL-F* spacer MK827796. *Asplenium trichomanes* L., *Knapp* 3797 (P), Taiwan Island: *atpB*—, *rbcL* MK826744, *rps4* & *rps4-trnS* MK827269, *trnL* intron & *trnL-F* spacer MK827797. *Asplenium trichomanes* L., *Larsson* 268 (DUKE), Nordland, Norway: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827549, *trnL* intron & *trnL-F* spacer—. *Asplenium trichomanes* L., *Lorence* 9448 (PTBG), Big Island, Hawaii: *atpB* MK826450, *rbcL* MK827008, *rps4* & *rps4-trnS* MK827522, *trnL* intron & *trnL-F* spacer MK828002. *Asplenium trichomanes* L., *Lorence* 9448 (PTBG), Big Island, Hawaii: *atpB* MK826473, *rbcL* MK827025, *rps4* & *rps4-trnS* MK827544, *trnL* intron & *trnL-F* spacer MK828020. *Asplenium trichomanes* L., *Ohlsen* 174 (MELU), Victoria, Australia: *atpB*—, *rbcL* KP774920, *rps4* & *rps4-trnS* KP835412, *trnL* intron & *trnL-F* spacer KP851912 (Ohlsen et al. 2015). *Asplenium trichomanes* L., *Rothfels* 3851 (DUKE), Oregon, USA: *atpB* MK826538, *rbcL*—, *rps4* & *rps4-trnS* MK827611, *trnL* intron & *trnL-F* spacer MK828059. *Asplenium trichomanes* L., *Rothfels* 4552 (UBC), British Columbia, Canada: *atpB* MK826427, *rbcL* MK826984, *rps4* & *rps4-trnS* MK827497, *trnL* intron & *trnL-F* spacer MK827982. *Asplenium trichomanes* L., *Rothfels* 4599 (UBC), British Columbia, Canada: *atpB* MK826428, *rbcL* MK826985, *rps4* & *rps4-trnS* MK827498, *trnL* intron & *trnL-F* spacer MK827983. *Asplenium trichomanes* L., *Sigel* 2010-69 (DUKE), Washington, USA: *atpB* MK826485, *rbcL* MK827035, *rps4* & *rps4-trnS* MK827559, *trnL* intron & *trnL-F* spacer MK828028. *Asplenium trichomanes* L., *Sigel* 2010-91 (DUKE), Oregon, USA: *atpB* MK826474, *rbcL* MK827026, *rps4* & *rps4-trnS* MK827545, *trnL* intron & *trnL-F* spacer MK828021. *Asplenium trichomanes* L., *Wood* s.n. (PTBG), Hawaii: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer JX475144 (Schneider et al., 2013). *Asplenium trichomanes* L., *Xu* CZ002 (SYS), Yunnan, China: *atpB* MK826113, *rbcL* MK826602, *rps4* & *rps4-trnS* MK827135, *trnL* intron & *trnL-F* spacer—. *Asplenium trichomanes* L., *Xu* CZ006 (SYS), Yunnan, China: *atpB* MK826140, *rbcL* MK826626, *rps4* & *rps4-trnS* MK827153, *trnL* intron & *trnL-F* spacer MK827704. *Asplenium trichomanes* subsp. *inexpectans* Lovis, *Vogel* I-46-B04, France: *atpB*—, *rbcL* AY549743, *rps4* & *rps4-trnS* AY549792, *trnL* intron & *trnL-F* spacer AY549846 (Schneider et al., 2005). *Asplenium trichomanes* subsp. *quadrivalens* D.E. Mey., *Ohlsen* 232 (MELU), Victoria, Australia: *atpB*—, *rbcL* KP774868, *rps4* & *rps4-trnS* KP835410, *trnL* intron & *trnL-F* spacer KP851907 (Ohlsen et al. 2015). *Asplenium trichomanes* subsp. *quadrivalens* D.E. Mey., *Vogel* Q-272 (BM), Roumania: *atpB*—, *rbcL* AY549744, *rps4* & *rps4-trnS* AY549794, *trnL* intron & *trnL-F* spacer AY549847 (Schneider et al., 2005). *Asplenium trichomanes* var. *centrochinense* Christ, *Schulze* 16-10-1986 (HEID), Spain: *atpB*—, *rbcL* AF318597, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schulze et al., 2001). *Asplenium trigonopterum* Kunze, *TNS*: 763893 (TNS), Tokyo, Japan: *atpB*—, *rbcL* AB574880, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium triphyllum* C. Presl, *Rothfels* 3524 (DUKE), Pichincha, Ecuador: *atpB* MK826514, *rbcL*—, *rps4* & *rps4-trnS* MK827590, *trnL* intron & *trnL-F* spacer MK827623. *Asplenium triphyllum* C. Presl, *Rothfels* 3525 (DUKE), Pichincha, Ecuador: *atpB* MK826525, *rbcL*—, *rps4* & *rps4-trnS* MK827068, *trnL* intron & *trnL-F* spacer MK827628. *Asplenium tripteropus* Nakai, *Fan* 15689 (SYS), Guangdong, China: *atpB* MK826229, *rbcL* MK826709, *rps4* & *rps4-trnS* MK827238, *trnL* intron & *trnL-F* spacer MK827766. *Asplenium tripteropus* Nakai, *Rothfels* 5286 (UC, CDBI), Sichuan, China: *atpB* MK826416, *rbcL* MK826974, *rps4* & *rps4-trnS* MK827485, *trnL* intron & *trnL-F* spacer MK827973. *Asplenium tripteropus* Nakai, *Xu* HN008 (SYS), Hunan, China: *atpB* MK826162, *rbcL*—, *rps4* & *rps4-trnS* MK827175, *trnL* intron & *trnL-F* spacer—. *Asplenium tripteropus* Nakai, *Xu* JX005 (SYS), Jiangxi, China: *atpB* MK826145, *rbcL* MK826631, *rps4* & *rps4-trnS* MK827158, *trnL* intron & *trnL-F* spacer MK827709. *Asplenium tripteropus* Nakai, Zhang et al. 228 (CDBI, MO), Guizhou, China: *atpB* MK826429, *rbcL* MK826986, *rps4* & *rps4-trnS* MK827499, *trnL* intron & *trnL-F* spacer—. *Asplenium tripteropus* Nakai, Zhang et al. 652 (CDBI, MO), Guizhou, China: *atpB* MK826430, *rbcL* MK826987, *rps4* & *rps4-trnS* MK827500, *trnL* intron & *trnL-F* spacer MK827984. *Asplenium tripteropus* Nakai, Zhang et al. 8109 (CDBI), Sichuan, China: *atpB*—, *rbcL* MK826816, *rps4* & *rps4-trnS* MK827336, *trnL* intron & *trnL-F* spacer—. *Asplenium tripteropus* Nakai, Zhang et al. 8159 (CDBI), Sichuan, China: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827365, *trnL* intron & *trnL-F* spacer—. *Asplenium tripteropus* Nakai, Zhang et al. 9247 (CDBI), Guizhou, China: *atpB* MK826345, *rbcL* MK826899, *rps4* & *rps4-trnS* MK827409, *trnL* intron & *trnL-F* spacer—. *Asplenium tripteropus* Nakai, Zhang et al. 9706 (CDBI), Sichuan, China: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827893. *Asplenium tripteropus* Nakai, Zhang et al. 9706 (CDBI), Sichuan, China: *atpB* MK826237, *rbcL* MK826717, *rps4* & *rps4-trnS* MK827245, *trnL* intron & *trnL-F* spacer MK827772. *Asplenium tripteropus* Nakai, Zhang et al. 9731 (CDBI), Sichuan, China: *atpB*—, *rbcL* MK826852, *rps4* & *rps4-trnS* MK827370, *trnL* intron & *trnL-F* spacer—. *Asplenium tripteropus* Nakai, Zhang et al. 9731 (CDBI), Sichuan, China: *atpB* MK826239, *rbcL* MK826719, *rps4* & *rps4-trnS* MK827247, *trnL* intron & *trnL-F* spacer—. *Asplenium tripteropus* Nakai, Zhang et al. GM24 (CDBI), Sichuan, China: *atpB* MK826233, *rbcL* MK826713, *rps4* & *rps4-trnS* MK827242, *trnL* intron & *trnL-F* spacer MK827769. *Asplenium uniseriale* Raddi, *Rothfels* 08-118 (DUKE), Puntarenas, Costa Rica: *atpB* MK826507, *rbcL*—, *rps4* & *rps4-trnS* MK827582, *trnL* intron & *trnL-F* spacer MK827616. *Asplenium* cf. *uniseriale* Raddi, *Rothfels* 4828 (UC), Junin, Peru: *atpB* MK826431, *rbcL* MK826988, *rps4* & *rps4-trnS* MK827501, *trnL* intron & *trnL-F* spacer MK827985. *Asplenium unisorum* (W.H. Wagner) Viane, *Wood* 7706 (PTBG), Hawaii: *atpB*—, *rbcL* AY549741, *rps4* & *rps4-trnS* AY549790, *trnL* intron & *trnL-F* spacer AY549844 (Schneider et al., 2005). *Asplenium variabile* Hook., *Mundy* 82 (BM), Gabon: *atpB*—, *rbcL* AY300146, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300093 (Schneider et al., 2004). *Asplenium varians* subsp. *fimbriatum* Schelpe, *Rothfels* 4672 (UC), Kwazulu-Natal, South Africa: *atpB* MK826432, *rbcL* MK826989, *rps4* & *rps4-trnS* MK827502, *trnL* intron & *trnL-F* spacer MK827986. *Asplenium varians* Wall. ex Hook. & Grev., *Fraser-Jenkins* 10046-10047 (BM), China: *atpB*—, *rbcL* AY300147, *rps4* & *rps4-trnS* AY549802, *trnL* intron & *trnL-F* spacer AY300094 (Schneider et al., 2004). *Asplenium varians* Wall. ex Hook. & Grev., *Jin & Zhang* 11005 (CDBI), Yunnan, China: *atpB*—, *rbcL* MK826835, *rps4* & *rps4-trnS* MK827352, *trnL* intron & *trnL-F* spacer MK827859. *Asplenium varians* Wall. ex Hook. & Grev., *Lu* SG/B42 (PYU), Yunnan, China: *atpB*—, *rbcL* AY545478, *rps4* & *rps4-trnS*

AY725039, *trnL* intron & *trnL-F* spacer AY725035 (Li & Lu, 2006). *Asplenium varians* Wall. ex Hook. & Grev., *Xu* 192 (SYS), Yunnan, China: *atpB* MK826137, *rbcL* MK826623, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—, *Asplenium varians* Wall. ex Hook. & Grev., *Xu* CS001 (SYS), Yunnan, China: *atpB* MK826120, *rbcL* MK826609, *rps4* & *rps4-trnS* MK827141, *trnL* intron & *trnL-F* spacer—, *Asplenium varians* Wall. ex Hook. & Grev., *Xu* PB007 (SYS), Yunnan, China: *atpB* MK826087, *rbcL* MK826584, *rps4* & *rps4-trnS* MK827113, *trnL* intron & *trnL-F* spacer—, *Asplenium varians* Wall. ex Hook. & Grev., *Xu* XS003 (SYS), Yunnan, China: *atpB* MK826115, *rbcL* MK826604, *rps4* & *rps4-trnS* MK827136, *trnL* intron & *trnL-F* spacer MK827690. *Asplenium varians* Wall. ex Hook. & Grev., Zhang et al. 9320 (CDBI), Guizhou, China: *atpB* MK826351, *rbcL* MK826905, *rps4* & *rps4-trnS* MK827415, *trnL* intron & *trnL-F* spacer—, *Asplenium varians* Wall. ex Hook. & Grev., Zhang et al. 9344 (CDBI), Guizhou, China: *atpB* MK826352, *rbcL* MK826906, *rps4* & *rps4-trnS* MK827416, *trnL* intron & *trnL-F* spacer—, *Asplenium vespertinum* Maxon, Rothfels 2554 (DUKE), California, USA: *atpB* MK826504, *rbcL* MK827052, *rps4* & *rps4-trnS* MK827579, *trnL* intron & *trnL-F* spacer MK828045. *Asplenium vieillardii* Mett., Perrie NC 9 (WELT), New Caledonia: *atpB*—, *rbcL* KP774911, *rps4* & *rps4-trnS* KP835409, *trnL* intron & *trnL-F* spacer KP835348 (Ohlsen et al. 2015). *Asplenium viride* Huds., Avi 284 (BM), Austria: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* EF645622, *trnL* intron & *trnL-F* spacer EF645606 (James et al., 2008). *Asplenium viride* Huds., DB12419 (UC), Unknown: *atpB* MK826413, *rbcL* MK826971, *rps4* & *rps4-trnS* MK827482, *trnL* intron & *trnL-F* spacer—, *Asplenium* cf. *viride* Huds. (original det. as *A. viride* by R. Knapp), Taiwan Island: *atpB*—, *rbcL* MK826885, *rps4* & *rps4-trnS* MK827397, *trnL* intron & *trnL-F* spacer—, *Asplenium viride* Huds., Larsson 205 (DUKE), Jamtland, Sweden: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827548, *trnL* intron & *trnL-F* spacer—, *Asplenium viride* Huds., Larsson 211 (DUKE), Jamtland, Sweden: *atpB* MK826476, *rbcL*—, *rps4* & *rps4-trnS* MK827547, *trnL* intron & *trnL-F* spacer MK828022. *Asplenium viride* Huds., Larsson 294 (DUKE), Troms, Norway: *atpB* MK826475, *rbcL*—, *rps4* & *rps4-trnS* MK827546, *trnL* intron & *trnL-F* spacer—, *Asplenium viride* Huds., Vogel 1334 (BM), Austria: *atpB*—, *rbcL* AY549734, *rps4* & *rps4-trnS* AY549782, *trnL* intron & *trnL-F* spacer AF525238 (Schneider et al., 2005). *Asplenium viride* Huds., Vogel VIR-190 (BM), France: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer JX475145 (Schneider et al., 2013). *Asplenium viride* Huds., Xu R12, Cult. in SYS: *atpB* MK826094, *rbcL*—, *rps4* & *rps4-trnS* MK827121, *trnL* intron & *trnL-F* spacer MK827673. *Asplenium vit-taeforme* Cav., Chen 4762 (TAIF, UC), Sabah, Malaysia: *atpB* MK826433, *rbcL* MK826990, *rps4* & *rps4-trnS* MK827503, *trnL* intron & *trnL-F* spacer MK827987. *Asplenium volkensii* Hieron., Hemp 18 (BM), Kenya: *atpB*—, *rbcL* AY300148, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300095 (Schneider et al., 2004). *Asplenium vulcanicum* Blume, KH136 (GENT), Indonesia: *atpB*—, *rbcL* GU929829, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Leroux et al., 2011). *Asplenium wilfordii* Mett. ex Kuhn, Knapp 3604 (P), Taiwan Island: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827270, *trnL* intron & *trnL-F* spacer—, *Asplenium wilfordii* Mett. ex Kuhn, Knapp 4018 (P), Taiwan Island: *atpB*—, *rbcL* MK826737, *rps4* & *rps4-trnS* MK827263, *trnL* intron & *trnL-F* spacer MK827791. *Asplenium wilfordii* Mettenius ex Kuhn, TNS: 763478 (TNS), Kagoshima, Japan: *atpB*—, *rbcL* AB574883, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Ebihara et al., 2010). *Asplenium wrightii* D.C. Eaton ex Hook., JL00202 (SYS), Guangxi, China: *atpB* MK826068, *rbcL*—, *rps4* & *rps4-trnS* MK827093, *trnL* intron & *trnL-F* spacer—, *Asplenium wrightii* D.C. Eaton ex Hook., Xu GX008 (SYS), Guangxi, China: *atpB* MK826154, *rbcL* MK826640, *rps4* & *rps4-trnS* MK827167, *trnL* intron & *trnL-F* spacer MK827715. *Asplenium wrightii* D.C. Eaton ex Hook., Xu GX023 (SYS), Guangxi, China: *atpB* MK826084, *rbcL* MK826582, *rps4* & *rps4-trnS* MK827110, *trnL* intron & *trnL-F* spacer

MK827665. *Asplenium wrightii* D.C. Eaton ex Hook., Xu GX024 (SYS), Guangxi, China: *atpB* MK826083, *rbcL* MK826581, *rps4* & *rps4-trnS* MK827109, *trnL* intron & *trnL-F* spacer—, *Asplenium wrightioides* Christ, Xu GZ011 (SYS), Guizhou, China: *atpB* MK826171, *rbcL* MK826649, *rps4* & *rps4-trnS* MK827182, *trnL* intron & *trnL-F* spacer—, *Asplenium wrightioides* Christ, Zhang et al. 668 (CDBI, MO), Guizhou, China: *atpB* MK826435, *rbcL* MK826994, *rps4* & *rps4-trnS* MK827507, *trnL* intron & *trnL-F* spacer—, *Asplenium yoshinagae* Makino, Cicuzza 1931 (HITBC), Yunnan, China: *atpB*—, *rbcL* MK826745, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—, *Asplenium yoshinagae* Makino, Cicuzza 2076 (HITBC), Yunnan, China: *atpB*—, *rbcL* MK826732, *rps4* & *rps4-trnS* MK827258, *trnL* intron & *trnL-F* spacer—, *Asplenium yoshinagae* Makino, Cicuzza 2129 (HITBC), Yunnan, China: *atpB*—, *rbcL* MK826733, *rps4* & *rps4-trnS* MK827259, *trnL* intron & *trnL-F* spacer—, *Asplenium yoshinagae* Makino, Knapp 3686 (P), Taiwan Island: *atpB*—, *rbcL* MK826746, *rps4* & *rps4-trnS* MK827271, *trnL* intron & *trnL-F* spacer—, *Asplenium yoshinagae* Makino, TNS: 762691 (TNS), Kumamoto, Japan: *atpB*—, *rbcL* AB574885, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Ebihara et al., 2010). *Asplenium yoshinagae* × *Asplenium indicum* Viane, Viane 10879 (GENT), China: *atpB*—, *rbcL* GU929855, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Leroux et al., 2011). *Asplenium yoshinagae* Makino, Xu 166 (SYS), Yunnan, China: *atpB*—, *rbcL* MK826577, *rps4* & *rps4-trnS* MK827105, *trnL* intron & *trnL-F* spacer MK827661. *Asplenium yoshinagae* Makino, Zhang et al. 7619 (CDBI, MO, VNMMN), Quang Tri, Vietnam: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827875. *Asplenium yoshinagae* Makino, Zhang et al. 8464 (CDBI, MO, PHH), Lam Dong, Vietnam: *atpB* MK826264, *rbcL*—, *rps4* & *rps4-trnS* MK827291, *trnL* intron & *trnL-F* spacer MK827818. *Asplenium yoshinagae* Makino, Zhang et al. 9735 (CDBI), Sichuan, China: *atpB*—, *rbcL* MK826856, *rps4* & *rps4-trnS* MK827373, *trnL* intron & *trnL-F* spacer MK827880. *Asplenium yunnanense* Franch., JL00407 (SYS), Yunnan, China: *atpB* MK826123, *rbcL* MK826611, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827692. *Asplenium yunnanense* Franch., JL00471 (SYS), Yunnan, China: *atpB* MK826055, *rbcL* MK826554, *rps4* & *rps4-trnS* MK827080, *trnL* intron & *trnL-F* spacer MK827641. *Asplenium yunnanense* Franch., Xu 327 (SYS), Guangxi, China: *atpB* MK826200, *rbcL* MK826679, *rps4* & *rps4-trnS* MK827209, *trnL* intron & *trnL-F* spacer MK827742. *Asplenium yunnanense* Franch., Xu CZ005 (SYS), Yunnan, China: *atpB* MK826122, *rbcL* MK826610, *rps4* & *rps4-trnS* MK827143, *trnL* intron & *trnL-F* spacer—, *Asplenium yunnanense* Franch., Xu XS001 (SYS), Yunnan, China: *atpB* MK826119, *rbcL* MK826608, *rps4* & *rps4-trnS* MK827140, *trnL* intron & *trnL-F* spacer—, *Asplenium yunnanense* Franch., Zhang et al. 260 (CDBI, MO), Guizhou, China: *atpB* MK826436, *rbcL* MK826995, *rps4* & *rps4-trnS* MK827508, *trnL* intron & *trnL-F* spacer—, *Asplenium yunnanense* Franch., Zhang et al. 351 (CDBI, MO), Guizhou, China: *atpB* MK826437, *rbcL* MK826996, *rps4* & *rps4-trnS* MK827509, *trnL* intron & *trnL-F* spacer MK827990. *Asplenium yunnanense* Franch., Zhang et al. 5857 (CDBI), Guizhou, China: *atpB* MK826303, *rbcL* MK826806, *rps4* & *rps4-trnS* MK827328, *trnL* intron & *trnL-F* spacer MK827834. *Asplenium yunnanense* Franch., Unknown: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer GU017745 (Hunt et al., 2011). *Asplenium adiantum-nigrum* L., Ekrt s.n., Armenia: *atpB*—, *rbcL* KR233930, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Unpublished). *Asplenium auriculatum* Sw., Viane 10602 (GENT), Puerto Rico: *atpB*—, *rbcL* GU929868, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Leroux et al., 2011). *Asplenium cuneifolium* subsp. *woronowii* (Christ) Viane, Rasbach, Reichst. & Schneller, Kazakhstan: *atpB*—, *rbcL* JX068695, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer GU017746 (Unpublished). *Asplenium cuneifolium* Viv., JCV CUN-D-6 (BM), Bavaria, Germany: *atpB*—, *rbcL* AF525265, *rps4* & *rps4-trnS* AY549762 (Schneider et al., 2005), *trnL* intron & *trnL-F* spacer AF525241 (Pinter et al., 2002). *Asplenium*

- cuneifolium* Viv., *Sessa EBS173*, Czech Republic: *atpB*—, *rbcL* KR233933, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer— (Unpublished). *Asplenium cuneifolium* Viv., Austria: *atpB*—, *rbcL* JX068694, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer GU017747 (Unpublished). *Asplenium cypricum* Viane & van den heede, *Van den heede 249* (GENT), Turkish Cyprus: *atpB*—, *rbcL* AF538314, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY162337 (Van den heede et al., 2003). *Asplenium fragrans* Sw., *Rothfels 3568* (DUKE), Imbabura, Ecuador: *atpB*—, *rbcL*—, *rps4* & *rps4-trnS* MK827593, *trnL* intron & *trnL-F* spacer—. *Asplenium fragrans* Sw., *Rothfels 5048* (UC), Pasco, Peru: *atpB* MK826384, *rbcL* MK826941, *rps4* & *rps4-trnS* MK827451, *trnL* intron & *trnL-F* spacer MK827945. *Asplenium hastatum* Klotzsch ex Kunze, *Rothfels 3742* (DUKE), Pichincha, Ecuador: *atpB* MK826523, *rbcL* MK826542, *rps4* & *rps4-trnS* MK827600, *trnL* intron & *trnL-F* spacer MK828051. *Asplenium hastatum* Klotzsch ex Kunze, *Viane 10182C* (GENT), Venezuela: *atpB*—, *rbcL* GU929869, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Asplenium hispanicum* Greuter & Burdet, *Vogel PLE-1* (BM), Spain: *atpB* —, *rbcL* AY300119, *rps4* & *rps4-trnS* AY549764, *trnL* intron & *trnL-F* spacer AY300066 (Schneider et al., 2004). *Asplenium lolegnansense* (Gibby & Lovis) Viane, *Van den heede 985* (GENT), Madeira: *atpB*—, *rbcL* AF538315, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY160998 (Van den heede et al., 2003). *Asplenium papaverifolium* (Kunze) Viane, Unknown, Chile: *atpB*—, *rbcL* JX068707, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium pearcei* Baker, *Tuomisto 15614* (TUR), Amazonas, Brazil: *atpB* KM114064, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium punjabense* Bir, Fraser-Jenk. & Lovis, *Reichstein 7675* (GENT), Pakistan: *atpB*—, *rbcL* AF538318, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY162340 (Van den heede et al., 2003). *Asplenium ruta-muraria* L., *Christenhusz 3869* (TUR), Scotland, UK: *atpB* EF463344, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schuettpelz & Pryer, 2007). *Asplenium ruta-muraria* L., *Larsson 267* (DUKE), Nordland, Norway: *atpB* MK826478, *rbcL* MK827028, *rps4* & *rps4-trnS* MK827551, *trnL* intron & *trnL-F* spacer—. *Asplenium ruta-muraria* L., OAC 96890, Unknown: *atpB*—, *rbcL* KF186529, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium ruta-muraria* L., *Rothfels 3913* (DUKE), Virginia, USA: *atpB* MK826483, *rbcL* MK827033, *rps4* & *rps4-trnS* MK827557, *trnL* intron & *trnL-F* spacer MK828026. *Asplenium ruta-muraria* L., *Schulze 6-6-1996* (HEID), Germany: *atpB*—, *rbcL* AF318598, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schulze et al., 2001). *Asplenium ruta-muraria* L., *Sigel 2010-60* (DUKE), Fribourg, Switzerland: *atpB* MK826484, *rbcL* MK827034, *rps4* & *rps4-trnS* MK827558, *trnL* intron & *trnL-F* spacer MK828027. *Asplenium ruta-muraria* L., *TNS: 765881* (TNS), Iwate, Japan: *atpB*—, *rbcL* AB574872, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ebihara et al., 2010). *Asplenium ruta-muraria* L., *Xu 332* (SYS), Xingjiang, China: *atpB* MK826221, *rbcL* MK826701, *rps4* & *rps4-trnS* MK827230, *trnL* intron & *trnL-F* spacer MK827759. *Asplenium ruta-muraria* L., *Xu R13*, Cult. in SYS: *atpB* MK826095, *rbcL* MK826587, *rps4* & *rps4-trnS* MK827122, *trnL* intron & *trnL-F* spacer MK827674. *Asplenium ruta-muraria* L., *Zylinski M8* (DUKE), Freistaat Sachsen, Germany: *atpB* MK826488, *rbcL* MK827038, *rps4* & *rps4-trnS* MK827562, *trnL* intron & *trnL-F* spacer MK828031. *Asplenium salicifolium* L., *Boudrie 3248* (BM), French Guiana: *atpB*—, *rbcL* AY300139, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer AY300086 (Schneider et al., 2004). *Asplenium subglandulosum* Salvo, Prada & T.E. Diaz, *Ohlsen 442* (MELU), Victoria, Australia: *atpB*—, *rbcL* KP774929, *rps4* & *rps4-trnS* KP835456, *trnL* intron & *trnL-F* spacer KP851909 (Ohlsen et al. 2015). *Asplenium subglandulosum* (Hook. & Grev.) Salvo, *CHR: 474971* (CHR), New Zealand: *atpB*—, *rbcL* KT626833, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Unpublished). *Asplenium subglandulosum* (Hook. & Grev.) Salvo, *Ohlsen 208* (MELU), Victoria, Australia: *atpB*—, *rbcL* KP774860, *rps4* & *rps4-trnS* KP835453, *trnL* intron & *trnL-F* spacer KP851908 (Ohlsen et al. 2015). *Asplenium tricholepis* Rosenst., *Kessler 12603* (UC), Bolivia: *atpB*—, *rbcL* AY549729, *rps4* & *rps4-trnS* AY549761, *trnL* intron & *trnL-F* spacer AY549832 (Schneider et al., 2005).
- Hymenasplenium apogamum* (N. Murak. & Hatan.) N. Murak. & Hatan., *Xu 101* (SYS), Hainan, China: *atpB* MK826098, *rbcL* MK826589, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Hymenasplenium cheilosorum* (Kunze ex Mett.) Tagawa, *Schater 55* (GOET), Yunnan, China: *atpB* EF463350, *rbcL* JF832071, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Rothfel et al., 2012). *Hymenasplenium cheilosorum* (Kunze ex Mett.) Tagawa, *Xu 102* (SYS), Hainan, China: *atpB* MK826103, *rbcL* MK826594, *rps4* & *rps4-trnS* MK827130, *trnL* intron & *trnL-F* spacer—(Xu et al., 2018). *Hymenasplenium cheilosorum* (Kunze ex Mett.) Tagawa, *Xu 299* (SYS), Guangxi, China: *atpB* MK826188, *rbcL* MK826667, *rps4* & *rps4-trnS* MK827197, *trnL* intron & *trnL-F* spacer—. *Hymenasplenium chingii* K.W. Xu, Li Bing Zhang & W.B. Liao, *Xu YN030* (SYS), Yunnan, China: *atpB* MK826169, *rbcL*—, *rps4* & *rps4-trnS* —, *trnL* intron & *trnL-F* spacer—. *Hymenasplenium excisum* (C. Presl) S. Lindsay, *Brownsey & Perrie FIJI 190* (WELT), Fiji: *atpB*—, *rbcL* KP774884, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Ohlsen et al. 2015). *Hymenasplenium excisum* (C. Presl) S. Lindsay, *Xu 268* (SYS), Hainan, China: *atpB* MK826131, *rbcL*—, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827697. *Hymenasplenium obscurum* (Blume) Tagawa, *Xu HK004* (SYS), Hongkong, China: *atpB* MK826077, *rbcL* MK826574, *rps4* & *rps4-trnS* MK827102, *trnL* intron & *trnL-F* spacer MK827658. *Hymenasplenium retusulum* (Ching) Viane & S.Y. Dong, *JL00371* (SYS), Yunnan, China: *atpB* MK826047, *rbcL* MK826546, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827634. *Hymenasplenium triquetrum* (N. Murak. & R.C. Moran) L. Regalado & Prada L. *Sylvestre 2208* (RB), Brazil: *atpB*—, *rbcL* KT329398, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Mynssen et al., 2016). *Hymenasplenium unilaterale* (Lam.) Hayata, *Siti Khadijah Rambe KH165* (GENT), Malaysia: *atpB*—, *rbcL* GU586829, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Bellefroid et al., 2010). *Hymenasplenium unilaterale* (Lam.) Hayata, *Viane 8344* (GENT), Reunion: *atpB*—, *rbcL* GU929873, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Leroux et al., 2011). *Hymenasplenium wangpeishanii* Li Bing Zhang & K.W. Xu, *Xu GZ003* (SYS), Guizhou, China: *atpB* MK826166, *rbcL* MK826645, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—. *Hymenasplenium wangpeishanii* Li Bing Zhang & K.W. Xu, *Zhang et al. 5863* (CDBI), Guizhou, China: *atpB* MK826311, *rbcL* MK826814, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer MK827841. *Hymenasplenium wangpeishanii* Li Bing Zhang & K.W. Xu, *Zhang et al. BM03* (CDBI), Sichuan, China: *atpB* MH065482, *rbcL* MH065410, *rps4* & *rps4-trnS* MH065321, *trnL* intron & *trnL-F* spacer MH065558 (Xu et al., 2018). *Hymenasplenium wildii* (F.M. Bailey) D.J. Ohlsen, *Ohlsen 246* (MELU), Queensland, Australia: *atpB*—, *rbcL* KP774927, *rps4* & *rps4-trnS* KP851877, *trnL* intron & *trnL-F* spacer KP851919 (Ohlsen et al. 2015).
- Diplaziopsis brunoniana* (Wall.) W.M. Chu, *SG LU/BN10* (PYU), Yunnan, China: *atpB* JN168038, *rbcL* JN168014, *rps4* & *rps4-trnS* JN168088, *trnL* intron & *trnL-F* spacer—(Li et al., 2011). *Diplaziopsis cavalieriana* (Christ) C. Chr., *SG LU/CQ1* (PYU), Sichuan, China: *atpB* JN168039, *rbcL* JN168015, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Li et al., 2011). *Diplaziopsis cavalieriana* (Christ) C. Chr., *SG LU/XCB13* (PYU), Yunnan, China: *atpB*—, *rbcL* JN168016, *rps4* & *rps4-trnS* JN168089, *trnL* intron & *trnL-F* spacer—(Li et al., 2011). *Homalosorus pycnocarpus* (Spreng.) Pic. Serm., *Cranfill s.n.* (UC), Unknown: *atpB* JF832168, *rbcL* JF832070, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Schneider et al., 2005). *Rhachidosorus blotianus* Ching, *SG LU/B46* (PYU), Yunnan, China: *atpB* JN168044, *rbcL* JN168022, *rps4* & *rps4-trnS* JN168097, *trnL* intron & *trnL-F* spacer—(Li et al., 2011). *Rhachidosorus consimilis* Ching, *SG LU/J21* (PYU), Yunnan, China: *atpB* JN168047, *rbcL*

JN168025, *rps4* & *rps4-trnS* JN168100, *trnL* intron & *trnL-F* spacer—(Li et al., 2011). *Rhachidosorus consimilis* Ching, *SG LU/MLP25* (PYU), Yunnan, China: *atpB* JN168046, *rbcL* JN168024, *rps4* & *rps4-trnS* JN168099, *trnL* intron & *trnL-F* spacer—(Li et al., 2011). *Rhachidosorus consimilis* Ching, *SG LU/YY33* (PYU), Yunnan, China: *atpB* JN168045, *rbcL* JN168023, *rps4* & *rps4-trnS* JN168098,

trnL intron & *trnL-F* spacer—(Li et al., 2011). *Rhachidosorus mesosorus* (Makino) Ching, *Matsumoto s.n.* (DUKE), Cult.: *atpB*—, *rbcL* JF832084, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Rothfels et al., 2012). *Rhachidosorus pulcher* (Tagawa) Ching, *Chen 441* (TNU), Taiwan Island: *atpB*—, *rbcL* JF303971, *rps4* & *rps4-trnS*—, *trnL* intron & *trnL-F* spacer—(Li et al., 2011).