This PDF version does not have an ISBN or ISSN and is not therefore effectively published (*Melbourne Code*, Art. 29.1). The printed version, however, was effectively published on 6 June 2013. Zhang, X. C., S. G. Lu, Y. X. Lin, X. P. Qi, S. Moore, F. W. Xing, F. G. Wang, P. H. Hovenkamp, M. G. Gilbert, H. P. Nooteboom, B. S. Parris, C. Haufler, M. Kato & A. R. Smith. 2013. Polypodiaceae. Pp. 758–850 *in* Z. Y. Wu, P. H. Raven & D. Y. Hong, eds., Flora of China, Vol. 2–3 (Pteridophytes). Beijing: Science Press; St. Louis: Missouri Botanical Garden Press.

POLYPODIACEAE

水龙骨科 shui long gu ke

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Plants mostly epiphytic and epilithic, a few terrestrial. Rhizomes shortly to long creeping, dictyostelic, bearing scales. Fronds monomorphic or dimorphic, mostly simple to pinnatifid or 1-pinnate (uncommonly more divided); stipes cleanly abscising near their bases or not (most grammitids), leaving short phyllopodia; veins often anastomosing or reticulate, sometimes with included veinlets, or veins free (most grammitids); indument various, of scales, hairs, or glands. Sori abaxial (rarely marginal), orbicular to oblong or elliptic, occasionally elongate, or sporangia acrostichoid, sometimes deeply embedded, sori exindusiate, sometimes covered by caducous scales (soral paraphyses) when young; sporangia with 1–3-rowed, usually long stalks, frequently with paraphyses on sporangia or on receptacle; spores hyaline to yellowish, reniform, and monolete (non-grammitids), or greenish and globose-tetrahedral, trilete (most grammitids); perine various, usually thin, not strongly winged or cristate. Mostly $x = 35, 36, 37$.

More than 50 genera and ca. 1,200 species: pantropical, a few temperate; 39 genera and 267 species (82 endemic) in China.

The Polypodiaceae s.s., as often recognized is paraphyletic, because it excludes the grammitids. Generic boundaries need clarification. Polypodiaceae contains large wholly neotropical and wholly paleotropical clades.

Molecular data show that several families recognized in FRPS, i.e., Drynariaceae, Grammitidaceae, Gymnogrammitidaceae, Loxogrammaceae, Platyceriaceae, and Pleurosoriopsidaceae, all nest within the Polypodiaceae. Five lineages are defined that can be treated as subfamilies (see Christenhusz et al., Phytotaxa 19: 18–19. 2011) as follows: Loxogrammoideae (Loxogrammaceae): genus no. 1; Drynarioideae (Crypsinoideae, Drynariaceae, Gymnogrammitidaceae): genera nos. 2–8; Platycerioideae (Platyceriaceae, Pyrrosioideae): genera nos. 9–10; Microsoroideae (incl. Crypsinoideae, Lepisorioideae): genera nos. 11–25; Polypodioideae (incl. Grammitidaceae, Pleurosoriopsidaceae): genera nos. 26–39. The status of several genera in the Microsoroideae is controversial (Kreier et al., Molec. Phylogen. Evol. 48: 1155–1167. 2008). *Microsorum* is still polyphyletic, and some new genera are to be established.

Ching Ren-chang, Fu Shu-hsia, Wang Chu-hao & Shing Gung-hsia. 1959. *Gymnogrammitis*. *In:* Ching Ren-chang, ed., Fl. Reipubl. Popularis Sin. 2: 284–285; Wu Shiew-hung. 1999. Pleurosoriopsidaceae. *In:* Wu Shiew-hung, ed., Fl. Reipubl. Popularis Sin. 4(2): 154–156; Lin Youxing, Lu Shugang & Shi Lei. 2000. Polypodiaceae. *In:* Lin Youxing, ed., Fl. Reipubl. Popularis Sin. 6(2): 7–266, 346–349; Zhang Xianchun. 2000. Drynariacae, Platyceriaceae, Grammitidaceae, and Loxogrammaceae. *In:* Lin Youxing, ed., Fl. Reipubl. Popularis Sin. 6(2): 267–335.

1a. Fronds with stellate hairs, often stellate-tomentose at least when young.
  2a. Fronds monomorphic or weakly dimorphic, fronds not with base adpressed to substrate, fertile fronds similar in form to sterile fronds differing only in relative width, usually simple, rarely hastate or pedately divided ..... 9. *Pyrrosia*
  2b. Fronds strongly dimorphic, basal fronds with basal part tightly adpressed to substrate, foliage/fertile fronds dichotomously lobed ..... 10. *Platycerium*
1b. Fronds with scales, unbranched hairs, glandular hairs, and/or forked hairs, or glabrous.
  3a. Specialized humus-collecting fronds or widened frond bases present.
    4a. Fronds usually strongly dimorphic with specialized short brown sessile humus-collecting fronds and longer pinnatisect fertile fronds ..... 4. *Drynaria*
    4b. Fronds monomorphic, fronds with broad humus-collecting base and distal deeply pinnatisect fertile portion ..... 2. *Aglaomorpha*
  3b. Specialized humus-collecting fronds or lamina bases absent.
    5a. Nectaries present along costa.
      6a. Fronds pinnatisect, stipe winged to base; segments uniformly 10–15(–20) mm wide; sporangia in discrete, orbicular sori (*Drynaria parishii*) ..... 4. *Drynaria*

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6b. Fronds pinnate, stipe and rachis terete; segments dimorphic, sterile segments 3.5–10 cm wide, fertile segments distal, 0.4–0.7 cm wide; sporangia acrostichoid, covering most of pinnule surface ..... 3. *Photinopteris*
5b. Nectaries absent.
7a. Fronds 2-pinnatifid to 4-pinnate.
8a. Fronds finely 3- or 4-pinnate, sparsely scaly ..... 8. *Gymnogrammitis*
8b. Fronds 2-pinnatifid, hairy.
9a. Lamina 1.5–8 × 0.5–1.5 cm; sori linear-oblong, along veins ..... 27. *Pleurosoriopsis*
9b. Lamina 5–25 × 2–4 cm; sori orbicular, 1 at base of pinnule (*Themelium tenuisectum*) ..... 37. *Themelium*
7b. Fronds entire, pinnately divided, or 1-pinnate, rarely palmately to pedately divided.
10a. Sporangia acrostichoid, covering most of lamina surface.
11a. Sporangia restricted to a distinctly narrowed apical extension of lamina (*Belvisia*) ..... 19. *Lepisorus*
11b. Sporangia covering whole of fertile lamina.
12a. Lamina deeply 3-lobed or pinnatilobate ..... 6. *Christopteris*
12b. Lamina entire ..... 25. *Leptochilus*
10b. Sporangia in discrete sori or coenosori, not covering lamina surface.
13a. Lamina hastate or palmately to pedately lobed.
14a. Scales opaque; paraphyses absent ..... 7. *Selliguea*
14b. Scales entirely or partly clathrate; paraphyses present.
15a. Lamina palmately 3–10-lobed, 12–30 cm; sori elongated ..... 16. *Neocheiropteris*
15b. Lamina hastate to pedately 3–5-lobed, 4–7 cm; sori suborbicular (*Lepisorus waltonii*) ..... 19. *Lepisorus*
13b. Lamina entire, pinnately lobed, or pinnate.
16a. Stipe and/or lamina margins stiffly hirsute, lamina surface often with forked or glandular hairs; spores green.
17a. Lamina simple.
18a. Sori linear, sunken in 2 grooves, parallel to midrib ..... 28. *Scleroglossum*
18b. Sori orbicular to narrowly oblong, oblique to midrib, usually superficial or slightly sunken in lamina, rarely deeply sunken.
19a. Rhizomes dorsiventral ..... 29. *Oreogrammitis*
19b. Rhizomes radial ..... 30. *Radiogrammitis*
17b. Lamina pinnately lobed to bipinnatifid.
20a. Veins in pinnae simple or forked, sori 1(or 2) on each pinna; rhizomes radial.
21a. Sori protected by folded pinnae ..... 31. *Calymmodon*
21b. Sori not protected by folded pinnae.
22a. Frond hairs medium to dark reddish brown, simple, all or most hairs more than 0.5 mm, up to 1.8 mm ..... 32. *Micropolypodium*
22b. Frond hairs pale, simple or 1- or 2-forked, less than 0.5 mm ..... 33. *Xiphopterella*
20b. Veins in pinnae pinnately branched, sori 1 to several on each pinna; rhizomes radial or dorsiventral.
23a. Pale yellowish brown simple glandular hairs and forked hairs with glandular branches, 0.1–0.2 mm, on stipe and lamina, sometimes also on rhizomes scales; no other types of hairs present ..... 34. *Chrysogrammitis*
23b. Pale yellowish brown simple glandular hairs and forked hairs with glandular branches, 0.1–0.2 mm, absent from stipe, lamina, and rhizome scales; other types of hairs present.
24a. Sori submarginal or marginal, or on abaxial surface of lamina, usually deeply sunken in lamina, sometimes superficial or very slightly sunken on abaxial surface of lamina; rhizomes dorsiventral, stipe articulate to rhizome, phyllopodia present; rhizome scales subclathrate to clathrate, with marginal hairs ..... 35. *Prosaptia*
24b. Sori on abaxial surface of lamina, superficial or very slightly sunken; rhizomes radial or dorsiventral, stipe sometimes articulate to rhizome, phyllopodia sometimes present; rhizome scales sometimes subclathrate to clathrate, sometimes with marginal hairs.
25a. Rhizomes dorsiventral, rhizome scales glabrous.
26a. Hairs on stipe up to 0.4 mm ..... 36. *Ctenopterella*
26b. Hairs on stipe up to 2 mm ..... 37. *Themelium*
25b. Rhizomes radial, all or most rhizome scales with hairs at apex and/or margin.
27a. Vein endings without hydathodes on adaxial surface of lamina, frond hairs dark reddish brown ..... 38. *Dasygrammitis*
27b. Vein endings with hydathodes on adaxial surface of lamina, frond hairs pale to medium reddish brown ..... 39. *Tomophyllum*

16b. Stipe and/or lamina margins glabrous or scaly, less often pubescent; spores brown, yellow, or whitish (greenish at time of dispersal in *Loxogramme*).
28a. Sori or coenosori elongate to linear.
29a. Sori parallel to costa in long coenosori, often discontinuous.
30a. Rhizome relatively stout, (1–)1.5–5 mm in diam., densely scaly, with closely spaced fronds; fronds monomorphic, usually with dark, clathrate scales ..... 19. *Lepisorus*
30b. Lamina usually dimorphic, without scales ..... 20. *Lemmaphyllum*
29b. Sori discrete, at angle to costa and parallel to lateral veins.
31a. Rhizome scales basifixed; spores greenish at time of dispersal ..... 1. *Loxogramme*
31b. Rhizome scales pseudopeltate or peltate; spores brown or whitish.
32a. Lamina leathery; rhizome scales opaque; spores brown (*Selliguea feei*) ..... 7. *Selliguea*
32b. Lamina herbaceous; rhizome scales clathrate; spores whitish ..... 25. *Leptochilus*
28b. Sori orbicular to elliptic, occasionally in confluent pairs.
33a. Lamina entire.
34a. Plants climbing; rhizome scales bearing a tuft of long, stiff, needlelike, reddish brown hairs abaxially near their center ..... 17. *Tricholepidium*
34b. Plants epiphytic, terrestrial, or climbing; rhizome scales glabrous, occasionally bearing a tuft of short, soft, brown hairs adaxially at point of attachment.
35a. Lamina with many conspicuous reddish linear scales on both surfaces ..... 21. *Caobangia*
35b. Lamina with scales absent or short and inconspicuous.
36a. Sori arranged in 1 line on each side of costa, discrete or sometimes ± merging into longitudinal coenosori.
37a. Rhizome scales opaque ..... 7. *Selliguea*
37b. Rhizome scales clathrate.
38a. Rhizome relatively stout, (1–)1.5–5 mm in diam., densely scaly, with closely spaced fronds; fronds monomorphic, herbaceous or papery ..... 19. *Lepisorus*
38b. Rhizome slender, up to 1.5 mm in diam., sparsely scaly, with widely spaced fronds; fronds often dimorphic (monomorphic in *Lemmaphyllum rostratum*), fleshy to thinly leathery ..... 20. *Lemmaphyllum*
36b. Sori scattered or arranged into 2–4 ± straight lines, never merging into coenosori.
39a. Paraphyses absent.
40a. Fronds articulate; rhizome scales peltate, apex obtuse (*Phymatosorus lanceus*) ..... 22. *Phymatosorus*
40b. Fronds not articulate; rhizome scales pseudopeltate, apex acute ..... 24. *Microsorum*
39b. Paraphyses present.
41a. Plants terrestrial; sori arranged into (1 or)2–4 lines on each side of midrib ..... 18. *Neolepisorus*
41b. Plants climbing; sori scattered over lamina, not in defined lines ..... 23. *Lepidomicrosorium*
33b. Lamina pinnately divided or pinnate.
42a. Lamina pinnate, at least lower part of rachis terete.
43a. Rhizome scales opaque ..... 5. *Arthromeris*
43b. Rhizome scales clathrate.
44a. Lateral pinnae articulate to rachis ..... 11. *Goniophlebium*
44b. Lateral pinnae not articulate at base.
45a. Frond not articulate at base; young sori with paraphyses present; pinna margins toothed or crenate ..... 13. *Polypodiastrum*
45b. Frond articulate at base; paraphyses absent; pinna margins entire (*Phymatosorus cuspidatus*) ..... 22. *Phymatosorus*
42b. Lamina pinnatisect to pinnatifid.
46a. Veins free, without areoles along costa.
47a. Veinlets pinnate; scales on rhizome thick, not clathrate ..... 26. *Polypodium*
47b. Veinlets forked; scales on rhizome thin, pellucid, clathrate ..... 12. *Metapolypodium*
46b. Veins anastomosing to form areoles along costa or rachis.
48a. Lamina with thick multicellular hairs on both surfaces; sporangium setose ..... 15. *Himalayopteris*
48b. Lamina glabrous, finely pubescent, or minutely scaly; sporangium glabrous.
49a. Rhizome scales opaque ..... 7. *Selliguea*
49b. Rhizome scales clathrate.
50a. Frond not articulate at base; young sori with paraphyses present; pinna margins toothed or serrate ..... 14. *Polypodiodes*
50b. Frond articulate at base; paraphyses absent; pinna margins entire ..... 22. *Phymatosorus*

1. LOXOGRAMME (Blume) C. Presl, Tent. Pterid. 214. 1836.

剑蕨属 jian jue shu

Zhang Xianchun (张宪春); Michael G. Gilbert

Antrophyum sect. *Loxogramme* Blume, Fl. Javae Filic. 73. 1829.

Rhizome very shortly to long creeping, occasionally branching; roots forming a spongy mass; scales clathrate, uniformly orange-brown to blackish, entire, elongate, basifixed. Articulation between phyllopodium and frond none, or evident but not functional, or functional. Entire plant, except for roots, lacking sclerenchyma. Lamina simple, monomorphic to dimorphic, linear, narrowly elliptic, oblanceolate, or spatulate to orbicular, entire, thinly to thickly papery, margin not cartilaginous, drying revolute or involute. Lamina surface glabrous except for minute 2-celled clavate glandular hairs. Veins regularly anastomosing with many, few, or without free included veinlets; hydathodes absent. Sori exindusiate, elongate, oblique or subparallel to costa, discrete, paraphyses multicellular, hairlike. Sporangial stalk 1- or 2-celled at base; annulus with 12–16 hardened cells. Spores greenish (at time of dispersal), globose-trilete, or ellipsoid-monolete, surface finely verrucose. $n = 35, 36$.

About 33 species: pantropical, mainly in tropical Asia, one in Central America, one on Pacific islands, four in Africa; 12 species (one endemic) in China.

Holttum (Revis. Fl. Malaya 2: 167. 1954) suggested that the lack of articulation possibly causes the fleshy nature of the fronds, which curl up in dry weather.

Molecular data consistently indicate that *Loxogramme* is sister to the rest of the Polypodiaceae.

The following taxa are excluded from the present treatment, pending further research: *Loxogramme elevata* Ching (Bull. Fan Mem. Inst. Biol., n.s., 1: 298. 1949), described from Yunnan, *L. linearis* Copeland (Philipp. J. Sci., C, 11: 45. 1916), described from Taiwan, and *Gymnogramma lanceolata* (Linnaeus) T. Moore var. *minor* Baker ex Makino (Bot. Mag. (Tokyo) 10: 178. 1896).

1a. Fronds dimorphic, sterile fronds suborbicular or obovate, 0.4–1 cm long and wide; fertile lamina 1–3 × ca. 0.5 cm ..... 1. *L. lankokiensis*
1b. Fronds mostly monomorphic, lamina 3–60 cm, if dimorphic or subdimorphic then lamina more than 10 cm.
2a. Fronds 3–10(–20) cm; spores globose-trilete.
3a. Lamina spatulate, oblanceolate, or linear-lanceolate; sori slightly sunken; rhizome scale margin slightly dentate ..... 2. *L. grammitoides*
3b. Lamina lanceolate or oblanceolate; sori superficial; rhizome scale margin entire.
4a. Rhizome thick, short; scales dark brown or black; lamina 1–2.5 cm wide ..... 5. *L. assimilis*
4b. Rhizome slender, long creeping; scales usually pale brown to brown; lamina 0.3–1 cm wide.
5a. Lamina 5–10(–20) × 0.5–1 cm ..... 3. *L. chinensis*
5b. Lamina 3–6 × 0.3–0.4 cm ..... 4. *L. acroscopa*
2b. Fronds 20–35 cm; spores ellipsoid-monolete.
6a. Rhizome long creeping, slender; fronds distant; stipe distinct, 2–5(–10) cm.
7a. Base of stipe greenish yellow or paler ..... 11. *L. salicifolia*
7b. Base of stipe glossy purplish dark brown or black ..... 12. *L. duclouxii*
6b. Rhizome short, thick, erect or creeping; fronds closely spaced or in tufts; stipe indistinct, or very short and winged.
8a. Scales thick, somewhat opaque, cells small, dense; paraphyses absent ..... 6. *L. formosana*
8b. Scales thin, transparent, cells larger; paraphyses present, usually many, dense (sparse in *L. cuspidata*).
9a. Scale cells ± as long as wide.
10a. Costa distinctly raised on adaxial surface; scales lanceolate, dark brown, 0.5–1.2 mm wide; sori 1–2 cm ..... 7. *L. avenia*
10b. Costa not so distinctly raised on adaxial surface; scales ± triangular, grayish brown, ca. 4 mm wide; sori 3–4 cm ..... 8. *L. involuta*
9b. Scale cells longer than wide.
11a. Paraphyses few, sparse; costa raised adaxially, distinct but not raised abaxially ..... 9. *L. cuspidata*
11b. Paraphyses many, dense; costa flat adaxially, raised abaxially ..... 10. *L. porcata*

1. Loxogramme lankokiensis (Rosenstock) C. Christensen, Index Filic., Suppl. 3: 125. 1934.

老街剑蕨 lao jie jian jue

Polypodium lankokiense Rosenstock, Meded. Rijks-Herb. 31: 5. 1917.

Rhizome long creeping, slender, ca. 0.5 mm in diam., densely scaly throughout; scales dark brown, thin, distinctly clathrate, lanceolate, ca. 2 × 0.5 mm, margin entire. Fronds distant, dimorphic; sterile fronds: stipe short, ca. 2 mm, fleshy, entire at margin; lamina suborbicular or obovate, 0.4–1 cm long and wide; fertile fronds: lamina oblanceolate, 1–3 × ca. 0.5 cm,

widest at apex, narrowed at base, base decurrent to 2 mm from stipe base, margin of lamina narrowly involute, apex obtuse-acute; costa distinct abaxially; veins quite invisible. Sori 2 or 3 pairs on upper part of lamina, oblong, oblique, slightly sunken into lamina, paraphyses absent. Spores globose-trilete.

Epilithic on moss-covered rocks in forested valleys; 900–1400 m. Guangdong, Guizhou (Libo), SE Xizang, Yunnan [N Thailand, Vietnam].

Loxogramme lankokiensis is one of the smallest plants in the genus and has dimorphic fronds. A similar species, *L. conferta* Copeland, is distributed in the Philippines and Borneo but has different rhizome scales.

2. Loxogramme grammitoides (Baker) C. Christensen, Index Filic., Suppl. 2: 21. 1917.

匙叶剑蕨 shi ye jian jue

Gymnogramma grammitoides Baker, J. Bot. 27: 178. 1889; *Loxogramme yigongensis* Ching & S. K. Wu; *Polypodium grammitoides* (Baker) Diels; *P. loxogramme* Mettenius var. *lamprocaulon* Rosenstock; *Selliguea grammitoides* (Baker) Christ.

Rhizome long creeping, slender, less than 1 mm in diam., densely scaly throughout; scales dark brown, clathrate, lanceolate, margin slightly dentate. Fronds closely spaced or distant, monomorphic; stipe very short or indistinct, green; lamina spatulate, oblanceolate, obovate, or linear-lanceolate, 4–10 × 0.4–1 cm, base decurrent, apex acute or obtuse; costa raised on both surfaces, veins hidden, areoles narrow, oblique, without free veinlets; lamina deep green, often glossy, paler abaxially, papery, glabrous. Sori 2–5 pairs along upper part of lamina, oblong, 0.3–1.5 cm, oblique to ± parallel to costa in narrow-fronded form, slightly sunken into lamina, paraphyses absent. Spores globose-trilete.

Epilithic or epiphytic in evergreen broad-leaved forests; 1600–2000 m (in Taiwan). Anhui, Chongqing, Fujian, Gansu, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Japan].

3. Loxogramme chinensis Ching, Sinensia 1: 13. 1929.

中华剑蕨 zhong hua jian jue

Loxogramme confertifolia Tagawa; *L. fujiansis* Ching.

Rhizome long creeping, slender, 1–1.5(–2) mm in diam., densely scaly throughout; scales pale brown to dark brown, clathrate, lanceolate, (1.5–)3–5 × ca. 1 mm wide at base, margin subentire. Fronds closely spaced or distant, monomorphic; stipe short, pale green, narrowly winged to very base, densely scaly at base; lamina yellow-green, spatulate, oblanceolate, or linear-lanceolate, 5–12(–20) × 0.5–1.2 cm, thickly papery, glabrous, base decurrent, margin slightly undulate and involute when dry, apex acute; costa raised on both surfaces, veins hidden. Sori 5–8 pairs from middle to upper part of lamina, oblong, very oblique, subparallel to costa, superficial, paraphyses absent. Spores globose-trilete.

Epilithic on moss-covered rocks or epiphytic in evergreen broad-leaved forests; 1500–1600 m (in Taiwan). Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Taiwan (Gaoxiong, Nantou, Taizhong), Xizang, Yunnan, Zhejiang [Bhutan, India, Myanmar, Nepal, Thailand, Vietnam].

4. Loxogramme acroscopa (Christ) C. Christensen, Dansk Bot. Ark. 6: 48. 1929.

顶生剑蕨 ding sheng jian jue

Polypodium acroscopum Christ, J. Bot. 9: 75. 1905.

Rhizome creeping, slender; scales pale brown, lanceolate, margin entire, cells longer than width. Fronds distant, monomorphic; stipe slender, 2–3 cm; lamina linear-lanceolate, 4–6 × 0.3–0.4 cm, base decurrent to a winged stipe, apex bluntly acute; texture thin; costa raised adaxially, veins hidden. Sori 3–5 pairs, linear, very oblique, subparallel to costa, superficial, paraphyses absent. Spores globose-trilete.

On wet rocks by streams, possibly a seasonal rheophyte; 200–500 m. S Guizhou, SE Yunnan [N Vietnam].

Loxogramme acroscopa is similar to *L. chinensis* in characters of scales and spores and so might be an ecological form of the latter.

5. Loxogramme assimilis Ching, Bull. Dept. Biol. Sun Yatsen Univ. 6: 31. 1933.

黑鳞剑蕨 hei lin jian jue

Rhizome shortly to moderately creeping, densely scaly throughout; scales dark brown or black, linear-lanceolate, ca. 5 × 2 mm, margin entire. Fronds closely spaced or distant, monomorphic; stipe short or frond subsessile, pale green, narrowly winged to very base, densely scaly at base; lamina abaxially yellow-green, adaxially deep green, linear-elliptic, 10–15(–25) × 1–2.5 cm, widest at middle, thickly papery, both surfaces glabrous, base decurrent, apex acuminate or acute; costa not distinctly raised on both surfaces; veins hidden. Sori oblong, oblique, closer to frond margin than costa, superficial, paraphyses absent. Spores globose-trilete.

Epilithic on moss-covered rocks or epiphytic in evergreen broad-leaved forests; 600–2200 m. Chongqing, Guangxi, Guizhou, Sichuan, SE Yunnan [N Vietnam].

6. Loxogramme formosana Nakai, Bot. Mag. (Tokyo) 43: 8. 1929.

台湾剑蕨 tai wan jian jue

Loxogramme ensiformis Ching; *L. grandis* Ching & Z. Y. Liu (1984), not Copeland (1908).

Rhizome short, erect, densely scaly; scales pale brown, broadly ovate, ca. 5 × 2.5 mm, margin entire, apex acuminate; cells small, dense. Fronds in tufts, monomorphic; stipe short, thick, abaxially glossy brown or purplish, 1–3 cm, flattened; lamina abaxially paler, adaxially deep green, oblanceolate, 20–35 × 3–3.5 cm, widest at upper 2/3, leathery, thick and fleshy, glabrous, base decurrent on stipe, apex acuminate; costa slightly raised on both surfaces; veins invisible, anastomosing to form elongated areoles with included veinlets. Sori confined to upper half of fronds, oblique, rather close to costa, ± sunken into lamina, paraphyses absent. Spores ellipsoid-monolete.

● Epilithic on moss-covered rocks or epiphytic in evergreen broad-leaved forests; 1600–2300 m (in Taiwan). Chongqing, Guizhou, Sichuan, Taiwan, S Yunnan.

7. Loxogramme avenia (Blume) C. Presl, Tent. Pterid. 215. 1836.

剑蕨 jian jue

Grammitis avenia Blume, Enum. Pl. Javae 2: 117. 1828.

Rhizome shortly creeping, more than 3 mm in diam., densely scaly near apex and at base of stipes; scales dark brown, lanceolate, 5–10 × 0.5–1.2 mm, margin entire. Fronds in tufts, monomorphic; stipes indistinct, dark castaneous when dry; lamina abaxially paler, adaxially green, lanceolate, 15–25 × 1–2.5 cm or more, broadest at middle to upper portion, narrowed below, thick and leathery, fleshy, abaxial surface with sparse brown, 2-celled glandular hairs, adaxially glabrous, base decurrent to 2–5 mm from base of stipe, margin recurved, apex acuminate; costa distinctly raised abaxially, hardly raised adaxially, pale green to brown; veins hardly visible on both surfaces, forming copious anastomoses. Sori 8–20 pairs, linear, 1–2 cm, 3–4 mm apart, oblique, continuous in middle between costa and margin of frond, slightly sunken into lamina; paraphyses many, dense, longer than sporangia, completely covering sori initially. Spores ellipsoid-monolete.

Epilithic on moss-covered rocks or epiphytic on tree trunks in dense evergreen forests beside streams at low elevations. Yunnan (Tengchong) [Indonesia (Java), Malaysia, Myanmar, Thailand, Vietnam].

Loxogramme avenia is very similar to *L. involuta* and *L. cuspidata*, but it differs from the former by the smaller, dark brown scales and from the latter by the abundant paraphyses.

8. Loxogramme involuta (D. Don) C. Presl, Tent. Pterid. 215. 1836.

内卷剑蕨 nei juan jian jue

Grammitis involuta D. Don, Prodr. Fl. Nepal. 14. 1825; *Gymnogramma involuta* (D. Don) Hooker.

Rhizome short, ascending to creeping, ca. 1.5 mm in diam., densely scaly; scales grayish brown, ± triangular, up to 7 × 4 mm, thin, margin entire, apex acuminate; cells dense, as long as wide. Fronds in apical tuft, monomorphic; stipe indistinct, or very short and winged; lamina abaxially paler, adaxially deep green, lanceolate, up to 35 × 4 cm, base attenuate and decurrent into stipe, apex caudate-acuminate; costa ± raised abaxially, usually flat adaxially, straw-colored or pale green; veins all hidden, anastomosing with free included veinlets; lamina curled up when dry, texture thick and fleshy, glabrous on both surfaces. Sori linear, 3–4 cm, very oblique, well spaced, continuous from near costa to frond margin, superficial; paraphyses many, dense, longer than sporangia. Spores ellipsoid-monolete.

Epilithic on moss-covered rocks or epiphytic on tree trunks in evergreen broad-leaved forests; 2000–2500 m. S Xizang, W Yunnan [India, Nepal, N Thailand, Vietnam].

9. Loxogramme cuspidata (Zenker) M. G. Price, Amer. Fern J. 74(2): 61. 1984.

西藏剑蕨 xi zang jian jue

Grammitis cuspidata Zenker, Pl. Ind. 1: t. 2. 1835; *Loxogramme tibetica* Ching & S. K. Wu.

Rhizome shortly to moderately creeping, densely scaly; scales dark brown, lanceolate, margin entire, apex long acuminate; cells dense, longer than wide. Fronds closely spaced, monomorphic; stipe narrowly winged; lamina abaxially paler, adaxially green, lanceolate, 35–40 × ca. 3 cm, widest at upper 1/3, narrowed from middle downward, thick and fleshy, curled up when dry, glabrous, attenuate at base and decurrent into stipe, apex acuminate or caudate; costa raised abaxially, distinct but not raised adaxially, straw-colored or pale green; veins hidden, anastomosing with free included veinlets. Sori linear, up to 2.5 cm, oblique, continuous from near costa to margin of frond, superficial; paraphyses few, sparse. Spores ellipsoid-monolete.

Epilithic on moss-covered rocks or epiphytic on tree trunks in evergreen broad-leaved forests; 2000–3500 m. Sichuan, Xizang, Yunnan [Bhutan, India, Nepal].

Loxogramme cuspidata is very similar to *L. involuta* but has smaller rhizome scales, which differ further in color (dark brown, not grayish brown), texture, and cell shape (longer than wide, not isodiametric).

10. Loxogramme porcata M. G. Price, Amer. Fern J. 80(1): 6. 1990.

拟内卷剑蕨 ni nei juan jian jue

Rhizome shortly creeping, densely scaly; scales grayish brown to dark brown, thin, linear-lanceolate, 5–10 × 0.5–1.2 mm, margin entire, apex acuminate; cells longer than wide. Fronds closely spaced, monomorphic; stipe indistinct, or very short and narrowly winged; lamina abaxially paler, adaxially deep green, narrowly elliptic to oblanceolate, 10–60 × 0.8–6 cm, thick and fleshy, curled up when dry, glabrous, base attenuate and decurrent onto stipe, apex long acuminate; costa raised abaxially, flat adaxially, straw-colored or pale green; veins hidden, anastomosing with free included veinlets. Sori linear, up to 6 cm, very oblique, well spaced, continuous from near costa to margin of frond, superficial; paraphyses many, dense, soft, longer than sporangia, completely covering sori at early stage. Spores ellipsoid-monolete.

Epiphytic on tree trunks in evergreen broad-leaved forests; 1200–1800 m. SE Xizang, S and W Yunnan [Bhutan, India, Myanmar, Nepal, N Thailand].

Loxogramme porcata is very similar to the sympatric *L. involuta*, since both develop abundant paraphyses, but they differ in their rhizome scales, which are 0.5–1.2 mm wide with elongated cells in *L. porcata* and paler in color, ca. 4 mm wide with ± isodiametric cells in *L. involuta*.

11. Loxogramme salicifolia (Makino) Makino, Bot. Mag. (Tokyo) 19: 138. 1905.

柳叶剑蕨 liu ye jian jue

Gymnogramma salicifolia Makino, Phan. Pter. Jap. Icon. t. 34. 1899; *Loxogramme biformis* Tagawa; *L. fauriei* Copeland.

Rhizome long creeping, ca. 2 mm in diam., rather densely scaly; scales brown or reddish brown, ovate-lanceolate, margin entire, apex acuminate. Fronds distant, subdimorphic or ob-

viously dimorphic, 15–35 cm; stipe greenish yellow to paler, 2–5(–10) cm, or frond subsessile; lamina narrowly oblanceolate to linear, 15–20(–32) × 1–1.5(–3) cm, relatively thinly textured, fleshy, base decurrent to form wings along upper part of stipe, apex acuminate; costa raised abaxially, flat adaxially; veins hidden, areoles without or with few included veinlets. Sori on upper portion of fronds, up to 10 or more pairs, 1–3 cm, very oblique to subparallel to costa, medial between costa and frond margin, slightly sunken into lamina, paraphyses absent. Spores ellipsoid-monolete.

Epilithic on moss-covered rocks or epiphytic on tree trunks in forests; 200–1800 m. Anhui, Chongqing, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Zhejiang [Japan, Korea, ?Vietnam].

Loxogramme salicifolia is almost sympatric with the following species, *L. duclouxii*, but it is not found in Yunnan and differs by the greenish yellow or paler stipe (not glossy purplish dark brown or black) and the sori medial between costa and margin (not close to the costa). *Loxogramme salicifolia* is a low-elevation species not found on the high plateau of Yunnan and Xizang. The report by Christensen (Contr. U.S. Natl. Herb. 26: 324. 1931) from Yunnan should be *L. cuspidata*; and the recent report by Chen (Fl. Yunnan. 21: 428. 2005) from Yunnan might be confused with *L. duclouxii* or *L. cuspidata*.

12. Loxogramme duclouxii Christ, Bull. Acad. Int. Géogr. Bot. 16: 140. 1907.

褐柄剑蕨 he bing jian jue

Loxogramme saziran Tagawa ex M. G. Price; *Polypodium remotefrondigera* Hayata; *P. succulentum* C. Christensen.

Rhizome long creeping, 1–1.6(–3) mm in diam., dark brown to black, sometimes smooth when scales fall; scales dark brown to black, distinctly clathrate, subulate or ovate-lanceolate, 1–1.8 × 0.5–0.7 mm, margin entire. Fronds subdimorphic, or sometimes obviously dimorphic, closely spaced or distant, stipe on obvious 1–2 mm phyllopodia; phyllopodia long; stipe up to 7 cm, glossy purplish dark brown or black when dry; base with scales ovate, 3–4 × 0.9–1.6 mm, apex acute; lamina abaxially paler, adaxially deep green, linear-oblanceolate, 10–35 × 1.5–2.5(–3.5) cm, leathery, thick and fleshy, glabrous, base decurrent onto stipe, margin involute when dry, apex acuminate or caudate; costa raised abaxially, slightly distinct and flattened adaxially; veins invisible, anastomosing to form elongate areoles usually with included veinlets. Sori confined to upper half of fronds, 10 or more pairs, 0.5–1.2 cm, usually close together, oblique, rather close to costa, ± sunken into lamina, paraphyses absent or few and short, shorter than sporangia. Spores ellipsoid-monolete.

Epilithic on moss-covered rocks or epiphytic in evergreen broad-leaved forests; 800–2500 m. Anhui, Chongqing, Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [NE India, Japan, Korea, Thailand, N Vietnam].

Loxogramme duclouxii is similar to *L. salicifolia* but differs in the distinctive glossy black stipe and sori rather close to the costa.

2. AGLAOMORPHA Schott, Gen. Fil. 4. ad t. 19. 1836.

连珠蕨属 lian zhu jue shu

Zhang Xianchun (张宪春); Michael G. Gilbert

Pseudodrynaria (C. Christensen) C. Christensen; *Psygmium* C. Presl.

Plants epiphytic, epilithic, or terrestrial. Rhizome thick, shortly to long creeping; vascular bundles 20–100, arranged in 1 or 2 flattened circles in cross section with conspicuous dorsal invaginations or protrusions; sclerenchyma strands absent. Rhizome scales appressed or spreading, pseudopeltate or rarely peltate, margin toothed or ciliate with 1- or 2-celled glandular projections. Fronds not articulate, monomorphic, usually internally dimorphic, sessile with a dilated base, frond bases imbricate or separate, forming individual nests, rachises not persistent; lamina deeply pinnatifid or subpinnate, with conspicuous nectaries situated below junctions of rachis and costae, or of costae and veins. Pinnae separating from costa and from each other by a line of abscission between costa and base of sinus, gradually smaller toward frond apex, entire, apical pinna present. Venation highly complex, with main areoles delimited by veins and connecting veins, filled with many small areoles containing excurrent and recurrent free veinlets, each veinlet terminating in a hydathode. Fertile parts similar to sterile or usually narrower. Sori small, in rows along connecting veins or veinlets, or distinctly enlarged to form soral patches, in 1 row between midrib and margin. Sporangia glabrous or sometimes with 1–3 acicular hairs. Spores with spines or small globules. $n = 36, 37$.

About 31 species: restricted to tropical Asia, from Himalaya to Taiwan, most abundantly in Malesia; two species in China.

Plants of *Aglaomorpha* mainly occur in tropical forests, forming large nests around tree trunks or on rocks. *Aglaomorpha* is like *Drynaria*, but the fronds are internally dimorphic. *Photinopteris*, possessing several unique characters, is not included here; otherwise, the delimitation is according to Roos (Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Sect 2, 85: 1–318. 1985).

1a. Fertile pinnae similar to sterile pinnae ..... 1. *A. coronans*
1b. Fertile pinnae distinctly contracted ..... 2. *A. meyeniana*

1. Aglaomorpha coronans (Wallich ex Mettenius) Copeland, Univ. Calif. Publ. Bot. 16: 117. 1929.

崖姜 ya jiang

Polypodium coronans Wallich ex Mettenius, Abh. Senckenberg. Naturf. Ges. 2: 121. 1856; *Drynaria conjugata* Beddome (1870), not T. Moore (1862); *D. coronans* (Wallich ex

Mettenius) J. Smith ex T. Moore; *D. esquirolii* C. Christensen; *Pleopeltis coronans* (Wallich ex Mettenius) Alderwerelt; *Pseudodrynaria coronans* (Wallich ex Mettenius) Ching; *Polypodium conjugatum* Baker (1868), not Poiret (1804), nor Kaulfuss (1827).

Rhizome 2–3 cm in diam. or more; rachises not persistent. Rhizome scales spreading, pseudopeltate, 5–20 × 0.5–1 mm, basal auricles short, margin toothed, apex narrowly acuminate to shortly filiform; midrib absent. Fronds with overlapping bases, monomorphic or with fertile parts slightly narrowed, sessile, dilated base lobed, upward pinnatifid up to 0.2 cm from rachis, 70–170 × 20–45 cm, glabrous; apical pinna present. Pinnae without basal constriction, 15–35 × 1.5–5 cm, margin entire, apex acute to acuminate. Sori usually present on all pinnae, in several rows between midrib and margin, one in each main areole, elongated, 1–3 mm in largest diam., slightly sunken. Sporangia glabrous. Spores verrucate, with spines.

Epiphytic, forming a ring-shaped basket around tree trunks, or epilithic, primary and secondary forests; 100–1900 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, S Xizang, S Yunnan [India, Japan (Ryukyu Islands), Laos, Malaysia (Peninsular), Myanmar, Nepal, Thailand, Vietnam].

The name *Polypodium coronans* was first introduced by Wallich (Numer. List, no. 288. 1829) but as a nomen nudum. Likewise *"Phymatodes coronans"* (C. Presl, Tent. Pterid. 198. 1836) was a nomen nudum. Neither name was therefore validly published (*Melbourne Code*, Art. 38.1(a)).

2. Aglaomorpha meyeniana Schott, Gen. Fil. 4: t. 19. 1836.

连珠蕨 lian zhu jue

Dryostachyum meyenianum (Schott) Brause; *Pleopeltis meyeniana* (Schott) Alderwerelt; *Polypodium meyenianum* (Schott) Hooker; *Psygmium elegans* C. Presl.

Rhizome shortly creeping, 2–3 cm in diam. or more; dilated frond bases imbricate; rachises not persistent. Rhizome scales spreading, pseudopeltate, 6–15 × 0.4–1(–1.3) mm, basal auricles short, apex narrowly acuminate to long filiform, strongly dentate; midrib absent. Fronds internally dimorphic, sessile, dilated base lobed, upward pinnatifid, 35–90 × 15–30 cm, glabrous or abscission vein with tufts of very short acicular hairs, apical pinna present. Sterile pinnae without basal constriction, 7.5–15 × 1.5–3.5 cm, apex rounded or acute to acuminate. Fully fertile pinnae in upper 2/3 of frond, distinctly narrowed, up to 5–20 × 0.4–0.8 cm, contracted between sori. Soral patches in 1 row along pinna midrib, protruding and beadlike, orbicular, 1–3 mm wide. Sporangia glabrous. Spores verrucate.

Epiphytic, forming a ring-shaped basket around tree trunks, or epilithic, or terrestrial, usually in exposed areas in primary forests; 100–800(–?1600) m. E and S Taiwan [Philippines].

3. PHOTINOPTERIS J. Smith, Hooker's J. Bot. Kew Gard. Misc. 3: 403. 1841.

顶育蕨属 ding yu jue shu

Zhang Xianchun (张宪春); Michael G. Gilbert

Plants epilithic. Rhizome long creeping, sclerenchyma strands absent; rhizome scales basifixed, linear-lanceolate, base auriculate, margin dentate to ciliate, apex acuminate to filiform. Fronds monomorphic, internally dimorphic, stipitate, base without basal fronds or expanded lamina, not articulate; lamina pinnate; pinnae alternate, subtended by distinct raised nectaries; lowermost pinnae rudimentary, sterile pinnae ovate; fertile pinnae linear, apical pinna present; main areoles delimited by veins and connecting veins. Sori acrostichoid, covering abaxial surface except for costa and margins. Sporangia glabrous. Spores with small globules.

One species: China, Indochina, Indonesia, Malaysia, Philippines, Thailand.

Several monotypic genera were segregated from *Photinopteris* principally by the difference in the form of the fertile pinnae. These were all included within *Aglaomorpha* by the monographer Roos (Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Sect 2, 85: 227. 1985). *Photinopteris* is maintained here pending further research, especially molecular evidence.

1. Photinopteris acuminata (Willdenow) C. V. Morton, Contr. U.S. Natl. Herb. 38: 31. 1967.

顶育蕨 ding yu jue

Acrostichum acuminatum Willdenow, Sp. Pl., ed. 4, 5: 116. 1810; *Aglaomorpha acuminata* (Willdenow) Hovenkamp; *A. speciosa* (Blume) M. C. Roos; *Lomaria speciosa* Blume; *Photinopteris speciosa* (Blume) C. Presl; *Polypodium speciosum* (Blume) Christ (1897), not Blume (1828), nor Meyen (1834).

Rhizome glaucous, long creeping, 7–20 mm in diam.; scales brown, linear-lanceolate, 3–10 × 0.2–1.2 mm, base auriculate, margin dentate to ciliate, apex narrowly acuminate to filiform-subulate. Fronds internally dimorphic, stalked; stipe 10–35 cm, with 2 rows of rudimentary pinnae; lamina pinnate, (30–)45–90 × 13–30 cm, leathery, glabrous or with sparse hairs up to 3 mm, apical pinna present, nectaries on small extensions of pinna base at basiscopic side, sometimes also at acroscopic side; sterile pinnae ovate, 7–30 × 3.5–10 cm, base cuneate, apex acuminate to caudate, stalks up to 1 cm; fertile pinnae in upper 2/3 of frond, few to several pairs, strongly narrowed, linear, 10–27 cm × 4–7 mm. Sori (coenosori) linear, covering whole abaxial surface of fertile pinnae except for costa and near margin. Spores with small globules.

Epilithic, climbing on limestone cliffs in exposed or shaded places in tropical rain forests, forming large populations, but uncommon and local; 1300–1400 m. S Yunnan [Indonesia, Laos, Malaysia, Philippines, Thailand, Vietnam].

4. DRYNARIA (Bory) J. Smith, Hooker's J. Bot. Kew Gard. Misc. 4: 60. 1841, nom. cons.

槲蕨属 hu jue shu

Zhang Xianchun (张宪春); Michael G. Gilbert

Polypodium subg. *Drynaria* Bory, Ann. Sci. Nat. (Paris) 5: 463. 1825.

Plants epiphytic, epilithic, or terrestrial. Rhizome shortly to long creeping; rhizome scales appressed or often squarrosely spreading, basifixed or peltate, margin toothed; fronds usually dimorphic, with basal and foliage frond, rarely monomorphic (basal frond absent); basal fronds sessile, orbicular to ovate-elliptic, entire to lobed up to 2/3; foliage fronds internally monomorphic or apical fertile part slightly narrowed, stalked, pinnatifid, apex often aborted, with a lateral pinna taking its place, rarely pinnate (then pinnae articulate to rachis, deciduous), hairs sometimes present, spread throughout lamina; in pinnatifid species, pinnae separating from costa and from each other by a line of abscission between costa and base of sinus; basal pinnae reduced; costae, costules, and main veins prominent abaxially, cross veins and minor venation evident, much anastomosing with occasional free included veinlets, veins forming glandular patches or nectaries along costa, usually just above costules; mature fronds without hydathodes on adaxial surface, margins cartilaginous, lamina of mature fronds scaly at first, glabrescent. Sori small, in rows along veins or connecting veins, very shallowly impressed. Sporangia glabrous or sometimes with glandular hairs. Spores with spines or small globules. n = 36, 37.

Sixteen species: paleotropical, mainly in subtropical and tropical regions, epiphytic, epilithic, or terrestrial; nine species (one endemic) in China.

1a. Foliage fronds pinnate; pinnae articulate to rachis ..... 1. *D. rigidula*
1b. Foliage fronds pinnatifid; pinnae not articulate to rachis.
2a. Basal fronds thick, not transparent; sori in 2 or more rows between costa and margin.
3a. Basal fronds orbicular, margin entire or shallowly undulate; sori small, irregularly spaced between lateral veins ..... 2. *D. bonii*
3b. Basal fronds ovate or cordate, margin distinctly lobed; sori large, in 1 or 2 rows between lateral veins.
4a. Plants 30–40 cm high; basal fronds 3–5 × 2–4 cm; sori in 1 row between lateral veins ..... 3. *D. roosii*
4b. Plants up to 100 cm high; basal fronds 20–40 × 16–32 cm; sori in 2 rows between lateral veins ..... 4. *D. quercifolia*
2b. Basal fronds thin, transparent, sometimes absent (*D. parishii*); sori in 1 row between costa and margin.
5a. Scales peltate, rigid and imbricate; foliage fronds glabrous.
6a. Basal fronds absent; foliage fronds with 5–9 pairs of pinnae ..... 5. *D. parishii*
6b. Basal fronds present; foliage fronds with 8–12 pairs of pinnae ..... 6. *D. propinqua*
5b. Scales basifixed, soft and tufted; foliage fronds often hairy.
7a. Apex of foliage fronds not aborted; margin of lamina entire, long ciliate ..... 7. *D. mollis*
7b. Apex of foliage fronds aborted; margin of lamina serrate or sinuate, glabrous or with short hairs in sinus.
8a. Basal fronds oblong-lanceolate, 5–15 × 3–6 cm; foliage fronds 7–12 cm wide; pinnae 0.5–1.2 cm wide, apex of lower pinnae rounded, of upper pinnae acute ..... 8. *D. baronii*
8b. Basal fronds ovate, 6–14 × 4–9 cm; foliage fronds 12–20 cm wide; pinnae 1.2–2 cm wide, apex of pinnae acuminate ..... 9. *D. delavayi*

1. Drynaria rigidula (Swartz) Beddome, Ferns Brit. India, t. 314. 1869.

硬叶槲蕨 ying ye hu jue

Polypodium rigidulum Swartz in Schrader, J. Bot. 1800(2): 26. 1801; *Drynaria baudouinii* E. Fournier; *D. diversifolia* (R. Brown) J. Smith; *D. gaudichaudii* (Bory) Gaudichaud; *D. pinnata* Fée; *D. rigidula* var. *koordersii* Alderwerelt; *Goniophlebium rigidulum* (Swartz) T. Moore; *Phymatodes gaudichaudii* (Bory) C. Presl; *Polypodium baudouinii* (E. Fournier) Baker; *P. diversifolium* R. Brown (Mar 1810), not Willdenow (Jun 1810); *P. gaudichaudii* Bory; *P. rigidulum* var. *vidgeni* F. M. Bailey; *P. speciosum* Blume.

Rhizome shortly creeping, 1–2 cm in diam.; scales brown to dark brown, with a lighter margin, spreading, peltate, 5–13 × 0.5–1.5 mm, margin ciliate, apex acute to acuminate; fronds dimorphic, rachises persistent; basal fronds 10–30 × 5–15 cm, lobed from 1/3–4/5, margin irregularly and finely denticulate; foliage fronds stalked, stipe up to 40 cm, not winged, with 2 rows of nectaries; lamina pinnate, 25–100(–200) × 12–50 cm, apex aborted; pinnae articulate to rachis, all equally long or smaller toward apex, 8–25(–30) × 0.5–1.5 cm, base narrowly cuneate, margin crenate to serrate, apex obtuse to acuminate, free veinlets simple or absent, hydathodes absent. Sori in 1 row between costa and margin, costal, single between veins, orbicular, sunken. Spores with short, blunt spines and globules.

Epiphytic, encircling tree trunks many times, rarely epilithic; sea level to 2000(–2400) m. Hainan, SW Yunnan [Malaysia, Myanmar, Thailand, Vietnam; tropical Australia, Pacific islands (Polynesia)].

Drynaria rigidula differs from all other species of *Drynaria* by the pinnate fronds. It is the sole member of *D.* sect. *Poronema* J. Smith, to appropriately show its isolated position.

2. Drynaria bonii Christ, Notul. Syst. (Paris) 1: 186. 1909.

团叶槲蕨 tuan ye hu jue

Drynaria meeboldii Rosenstock.

Rhizome shortly creeping, terete to dorsiventrally flattened, ca. 3 mm thick, 1–2 cm wide; scales squarrose or spreading from an appressed base, peltate, 2–12 × 1.5–3 mm, abruptly contracted from a broad base, often with a distinct, brown midrib, margin irregularly and shortly dentate at base, acumen often subulate and subentire; fronds dimorphic, glabrous; basal fronds contiguous or overlapping, often completely covering and surrounding rhizome, sessile, (4–)10–15 × (3.5–)8–12 cm, subentire to shallowly lobed; foliage fronds stalked, stipe up to 20 cm, conspicuously winged with a sinuous wing; lamina pinnatifid up to ca. 1 mm from costa, 30–70 × 20–30 cm, apex aborted; pinnae 3–7 pairs, slightly ascending, 1.5–3 cm distant, broadly lanceolate, 7–20 × 2.5–5 cm, base slightly narrowed and decurrent, margin subentire to shallowly sinuate, apex obtuse to long acuminate. Sori in 2 irregular rows between costa and margin, 2–4 rows between lateral veins. Spores with spines.

Epiphytic or epilithic on dry or muddy rocks in deciduous forests at low to middle elevations, fairly common on limestone rocks; 100–1300(–1700) m. Guangdong, Guangxi, Guizhou, Hainan, Yunnan [Cambodia, India, Malaysia, Thailand, Vietnam].

Drynaria bonii has been wrongly identified as *D. sparsisora* (Desvaux) T. Moore (*Polypodium sparsisorum* Desvaux; *P. linnei* Bory; *D. linnei* (Bory) Beddome), a species of SE Asia and Australia, which differs by the basal fronds more deeply lobed, up to 1/3, and rhizome scales with a very long acumen.

3. Drynaria roosii Nakaike, New Fl. Jap. Pterid. 841. 1992.

槲蕨 hu jue

Polypodium fortunei Kunze ex Mettenius, Abh. Senckenberg. Naturf. Ges. 2: 121. 1856, not (T. Moore) E. J. Lowe (1856); *Drynaria fortunei* (Kunze ex Mettenius) J. Smith (1857), not T. Moore (1855).

Rhizome shortly creeping, 1–2 cm in diam.; scales peltate, 7–12 × 0.8–1.5 mm, margin dentate; fronds dimorphic, glabrous; basal fronds overlapping, sessile, (2–)5–9 × (2–)3–7 cm, base cordate, shallowly lobed to 1/3, abaxially sparsely hairy; foliage fronds stalked, stipe 4–7(–13) cm, conspicuously winged; lamina pinnatifid up to 2–5 mm from costa, 20–45 × 10–15(–20) cm, apex aborted or not; pinnae 7–13 pairs, slightly ascending, lanceolate, 6–10 × (1.5–)2–3 cm, margin obscurely dentate, apex obtuse or acute. Sori in 2–4 rows between costa and margin, 1 row between lateral veins, paraphyses many, glandular. Spores with globules.

Epiphytic or epilithic, often on limestone, or on buildings; 100–1800 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan [India (Assam), N Thailand, Vietnam].

The rhizome of *Drynaria roosii* is used in traditional Chinese medicine as a medicinal herb, known as a kind of "Gu sui bu," normally derived from *Davallia*. This species was widely known as *Drynaria fortunei* (Kunze ex Mettenius) J. Smith, but this is a later homonym of *D. fortunei* T. Moore (=*Microsorum fortunei* (T. Moore) Ching.).

4. Drynaria quercifolia (Linnaeus) J. Smith, J. Bot. (Hooker) 3: 398. 1841.

栎叶槲蕨 li ye hu jue

Polypodium quercifolium Linnaeus, Sp. Pl. 2: 1087. 1753.

Rhizome shortly creeping, 2–3 cm in diam. or more; scales spreading, blackish brown, linear, 6–20 × 0.5–1 mm, pseudopeltate or peltate, toward apex strongly dentate, apex long, narrow, acute; fronds dimorphic; basal fronds sessile, 15–50 × 10–30 cm, shallowly lobed; foliage fronds stalked, stipe up to 30 cm, not or inconspicuously winged; lamina pinnatifid up to 2–5 mm from costa, 40–100 × ca. 40 cm, apex aborted; pinnae broadly lanceolate, 15–25 × 2–3.5 cm, apex acute or acuminate. Sori in 2 rows between costa and margin, regular or irregular in 2 rows between lateral veins, slightly sunken. Spores with acuminate spines.

Epiphytic, spirally climbing, occasionally epilithic or terrestrial, in various types of primary and secondary forests, plantations; sea level to 1000 m. Hainan [India, Malaysia, Nepal, New Guinea, Philippines, Sri Lanka, ?Vietnam; Australia].

5. Drynaria parishii (Beddome) Beddome, Suppl. Ferns S. Ind. 24. 1876.

小槲蕨 xiao hu jue

Pleopeltis parishii Beddome, Ferns Brit. India, t. 125. 1866; *Drynaria mutilata* Christ.

Rhizome rather long creeping, terete, ca. 1 cm in diam.; scales appressed, gray-brown, dark at middle, peltate, 4–7 × 1–1.8 mm, margin gray, long ciliate; fronds monomorphic, glabrous; basal fronds absent; foliage fronds stalked; stipe 5–10 cm, conspicuously winged to very base; lamina pinnatifid up to ca. 2 mm from costa, ca. 25 × 20 cm, apex aborted; pinnae 5–9(–11) pairs, spreading or slightly ascending, oblanceolate, 4–10 × 1–1.5(–2) cm, upper 1/3 broadest, gradually narrowed toward base, margin subentire, apex acute or acuminate; venation prominent, 2–5 rows of areoles between lateral veins, with free included veinlets. Sori in 1 row between costa and margin, close to costa, only 1 sorus between lateral veins, obviously sunken and prominent on adaxial surface.

Epiphytic or epilithic, often on tree trunks in moss forests; 500–1600 m. S and SE Yunnan [Myanmar, Thailand, Vietnam].

6. Drynaria propinqua (Wallich ex Mettenius) J. Smith, J. Bot. (Hooker) 4: 61. 1841.

石莲姜槲蕨 shi lian jiang hu jue

Polypodium propinquum Wallich ex Mettenius, Abh. Senckenberg. Naturf. Ges. 2: 120. 1856; *Drynaria propinqua* var. *mesosora* Christ.

Rhizome rather long creeping, terete, 1–2 cm in diam.; scales appressed, brown, peltate, 3–6 × 1–1.5 mm, margin dentate; fronds dimorphic, glabrous; basal fronds orbicular or ovate, 10–20 × 7–18 cm, pinnatifid up to 2/3 or more, margin irregularly dentate; foliage fronds stalked, stipe 8–20(–25) cm, slightly winged; lamina pinnatifid up to ca. 2 mm from costa, (20–)30–50(–60) × (12–)20–30 cm, apex not aborted; pinnae 7–15 pairs, margin dentate, apex acute. Sori in 1 regular row between costa and margin, close to costa. Spores verrucate and with spines.

Epiphytic or epilithic; 500–1900(–2800) m. Guangxi, Guizhou,

Sichuan, Xizang, Yunnan [Bhutan, N India, Myanmar, Nepal, Thailand, Vietnam].

7. Drynaria mollis Beddome, Ferns Brit. India, t. 216. 1866.

毛槲蕨 mao hu jue

Drynaria costulisora Ching & S. K. Wu; *D. rivalis* (Mettenius ex Baker) Christ; *D. tibetica* Ching & S. K. Wu; *Polypodium rivale* Mettenius ex Baker.

Rhizome creeping, 0.5–1(–2) cm in diam.; scales soft, tufted, basifixed, 5–11 × 0.5–1.2 mm, margin biserrate; fronds dimorphic, hairy; basal fronds sessile, 7–15 × 3–7 cm, base cordate, auriculate, pinnatilobed up to 2/3 or more, lobes 8–13 pairs, margin entire, ciliate at young stage, glabrous on both sides, lower side of costa slightly hairy and with small scales at base; foliage fronds stalked, stipe 1–3(–13) cm, conspicuously winged; lamina pinnatifid up to 0–2 mm from costa, 20–40(–50) × 7–12(–15) cm, apex not aborted; pinnae 15–18 pairs, spreading, lanceolate, 3–8 × 1–1.5(–2) cm, margin entire, densely ciliate, apex obtuse; abaxial side along costa with small scales. Sori in 1 straight row between costa and margin, 1 row between lateral veins. Spores with spines.

Epilithic on limestone rocks in *Quercus* forests, or on tree trunks in mixed forests; 2700–3400 m. Xizang, NW Yunnan [Bhutan, N India, Nepal].

8. Drynaria baronii Diels in Engler & Prantl, Nat. Pflanzenfam. 1(4): 330. 1899.

秦岭槲蕨 qin ling hu jue

Polypodium baronii Christ, Nuovo Giorn. Bot. Ital., n.s., 4: 100. 1897, not Baker (1887); *Drynaria reducta* Christ; *D. sinica* Diels; *D. sinica* var. *intermedia* Ching & S. K. Wu.

Rhizome 1–2 cm in diam., with many old persistent stipes, creeping; scales soft, tufted, basifixed, 4–11 × 0.5–1.5 mm, base auriculate, margin biserrate; fronds dimorphic, or sometimes basal fronds absent; basal fronds sessile or with very short stipe, oblong-lanceolate, 5–15 × 3–6 cm, base narrowed, not cordate, not auriculate, pinnatilobed up to 2/3 or more, lobes 10–12(–20) pairs, margin slightly dentate; foliage fronds stalked, stipe 2–10 cm, conspicuously winged; lamina pinnatifid, 22–50 × 7–12 cm, apex often aborted; pinnae 16–25(–30) pairs, spreading, lanceolate, 4–7 × 0.5–1.2 cm, margin dentate, glabrous or sparsely ciliate, apex acute; lamina sparsely hairy on both surfaces, especially along costa and veins. Sori in 1 straight row between costa and margin, close to costa, 1 row between lateral veins. Spores verrucate and with spines.

● Often terrestrial, or epilithic, rarely epiphytic on tree trunks; 1300–3800 m. Gansu, Qinghai, Shaanxi, Shanxi, Sichuan, E Xizang, NW Yunnan.

9. Drynaria delavayi Christ, Bull. Soc. Bot. France 52(Mém. 1): 22. 1905.

川滇槲蕨 chuan dian hu jue

Drynaria rivalis (Mettenius ex Baker) Christ var. *yunnanensis* Christ.

Rhizome 1–2 cm in diam., with many old persistent stipes, creeping; scales soft, tufted, basifixed, 4–10 × 0.5–1 mm, base auriculate, margin biserrate; fronds dimorphic; basal fronds sessile, ovate to oblong, 6–13(–17) × 4–10 cm, base auriculate, pinnatilobed up to 2/3 or more, lobes 5–7 pairs, margin slightly dentate; foliage fronds stalked, stipe 3–9 cm, winged; lamina pinnatifid, 25–45 × 12–18 cm, apex aborted or not; pinnae 7–13(–17) pairs, spreading, lanceolate, (5–)7.5–12(–14) × 1.5–2(–3.5) cm, margin shallowly dentate, glabrous or with few hairs, apex acute; lamina sparsely hairy on both surfaces, especially along costa and veins. Sori in 1 straight row between costa and margin, close to costa, 1 row between lateral veins. Sporangia often with glandular hairs. Spores verrucate.

Epiphytic or epilithic; 1000–1900(–4200) m. S Gansu, Qinghai, Shaanxi, Sichuan, E Xizang, NW Yunnan [Bhutan, Myanmar].

5. ARTHROMERIS (T. Moore) J. Smith, Hist. Fil. 110. 1875.

节肢蕨属 jie zhi jue shu

Lu Shugang (陆树刚); Peter H. Hovenkamp

Pleopeltis sect. *Arthromeris* T. Moore, Index Fil. 78. 1857.

Plants, epiphytic or terrestrial, medium-sized. Rhizome long creeping, densely scaly or covered with whitish bloom and sparse scales; scales whitish, brown, or black, pseudopeltate, lanceolate-attenuate, margin entire to shallowly toothed or ciliate. Fronds remote, monomorphic, articulate to rhizome on short scaly phyllopodia. Stipe straw-colored or brown, glabrous or pubescent. Lamina imparipinnate or simple, herbaceous or leathery, glabrous or pubescent, rarely scaly abaxially. Pinnae opposite or subopposite, rarely alternate, articulate to rachis, mostly sessile or subsessile, usually oblong-lanceolate, margin entire and cartilaginous, apex acuminate to caudate; costae and lateral veins distinct; veinlets obscure, reticulate to form irregularly shaped areoles with simple or forked included veinlets. Sori orbicular or elongated, in 1 regular row on each side of costa or scattered on abaxial surface of pinnae, naked, superficial, without paraphyses. Sporangia long stalked, annulus with 14–16 cells. Spores brown, ellipsoid, surfaces verrucate with often constricted, acuminate or echinate elements. $x = 12$.

About 20 species: tropical and subtropical Asia; 17 species (eight endemic) in China.

1a. Sori large, solitary between adjacent lateral veins, in 1 row on either side of costa.
2a. Pinnae distinctly stalked ..... 1. *A. tenuicauda*
2b. Pinnae sessile.

3a. Scales brown, lanceolate, acuminate at apex.
4a. Sori orbicular, solitary ..... 2. *A. wallichiana*
4b. Sori elliptic or 2 adnate together ..... 3. *A. intermedia*
3b. Scales brown, dark brown, or black, long caudate at apex.
5a. Rhizome densely scaly, scales brown; plants terrestrial ..... 4. *A. tatsienensis*
5b. Rhizome sparsely scaly and with whitish bloom, scales dark brown to black; plants epiphytic ..... 5. *A. nigropaleacea*
1b. Sori small, more than 2 between adjacent lateral veins, scattered on either side of costa.
6a. Rhizome 10–12 mm in diam.; fronds abaxially usually with whitish bloom.
7a. Pinnae sessile ..... 14. *A. wardii*
7b. Pinnae stalked.
8a. Pinnae opposite ..... 15. *A. medogensis*
8b. Pinnae alternate.
9a. Lamina abaxially with glandular hairs ..... 16. *A. caudata*
9b. Lamina abaxially without glandular hairs ..... 17. *A. salicifolia*
6b. Rhizome 3–6 mm in diam.; fronds abaxially green.
10a. Pinna apex caudate.
11a. Pinnae 5–8 pairs; lamina abaxially glabrous or pubescent ..... 9. *A. elegans*
11b. Pinnae 1–4 pairs; lamina abaxially pubescent or tomentose.
12a. Rhizome sparsely scaly, surface with whitish bloom; scales brown ..... 6. *A. himalayensis*
12b. Rhizome densely scaly, surface concealed; scales whitish ..... 7. *A. tomentosa*
10b. Pinna apex subacute to acuminate.
13a. Plants terrestrial; pinnae 10–15 cm; lamina abaxially glabrous ..... 13. *A. mairei*
13b. Plants epiphytic; pinnae 5–12 cm; lamina abaxially glabrous, pubescent, or tomentose.
14a. Pinnae (8 or)9–16 pairs; lamina abaxially tomentose.
15a. Pinnae 9–16 pairs, 5–11 cm; lamina green, abaxially tomentose ..... 10. *A. cyrtomioides*
15b. Pinnae (8 or)9 or 10(–12) pairs, 5–6 cm; lamina abaxially white tomentose ..... 8. *A. notholaenoides*
14b. Pinnae 5–8 pairs, 10–12 cm; lamina abaxially glabrous or pubescent.
16a. Lamina 15–20 cm wide, abaxially glabrous or sparsely pubescent; sori irregularly scattered in 2 or 3 ill-defined rows ..... 11. *A. lehmannii*
16b. Lamina 25–30 cm wide, abaxially densely pubescent; sori in 3–5 rows, sometimes in confluent pairs ..... 12. *A. lungtauensis*

1. Arthromeris tenuicauda (Hooker) Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2(3): 91. 1933.

狭羽节肢蕨 xia yu jie zhi jue

Polypodium tenuicaudum Hooker, Sp. Fil. 5: 90. 1864; *Arthromeris notabilis* Ching; *Pleopeltis juglandifolia* (D. Don) T. Moore var. *tenuicauda* (Hooker) Beddome; *Polypodium wallichianum* Sprengel var. *tenuicaudum* (Hooker) Hooker.

Rhizome 6–8 mm in diam., densely scaly throughout; scales brown, lanceolate, margin ciliate, apex acuminate. Stipe stramineous, 15–25 cm, glabrous; lamina imparipinnate, 35–45 × 15–25 cm; pinnae 8–12 pairs, subopposite, stalked, oblique, ovate-lanceolate, 15–25 × 2–4 cm, base cuneate, apex long acuminate; upper pinnae usually fertile and slightly narrower; lamina herbaceous, both surfaces glabrous. Sori orbicular, 1.5–2 mm in diam., in a single row on each side of costa, medial or slightly nearer costa, solitary between lateral veins.

Epiphytic on tree trunks or epilithic; 1200–2800 m. Xizang, Yunnan [NE India, N Myanmar].

2. Arthromeris wallichiana (Sprengel) Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2(3): 92. 1933.

单行节肢蕨 dan hang jie zhi jue

Polypodium wallichianum Sprengel, Syst. Veg., ed. 16, 4: 53. 1827, based on *P. juglandifolium* D. Don, Prodr. Fl. Nepal. 3. 1825, not Willdenow (1810); *Arthromeris juglandifolia* J. Smith; *Pleopeltis capitellata* (Wallich ex Mettenius) Beddome; *P. juglandifolia* T. Moore; *Polypodium capitellatum* Wallich ex Mettenius.

Rhizome 10–15 mm in diam., densely scaly throughout; scales brown, lanceolate, 10–15 × 2–3 mm, margin sparsely toothed, apex acuminate. Stipe stramineous, 15–30 cm, glabrous; lamina imparipinnate, oblong in outline, 40–70 × 30–40 cm; pinnae usually 5–10 pairs, subopposite, sessile, oblique, ovate-lanceolate, 10–20 × 2–4 cm, base rounded, margin entire or undulate, apex acuminate; lamina herbaceous or subleathery, both surfaces glabrous. Sori orbicular, 1 on each side of costa, medial or slightly nearer costa, solitary between lateral veins.

Epiphytic on tree trunks or epilithic; 1500–2500 m. Guizhou, Sichuan, Xizang, Yunnan [Bhutan, N India, N Myanmar, Nepal, N Vietnam].

3. Arthromeris intermedia Ching in C. Y. Wu, Fl. Xizang. 1: 331. 1983.

中间节肢蕨 zhong jian jie zhi jue

Rhizome ca. 10 mm in diam., densely scaly; scales brown, lanceolate, ca. 10 mm, margin entire, apex acuminate. Stipe stramineous, ca. 20 cm, glabrous; lamina imparipinnate, oblong or broadly lanceolate in outline, 30–40 × 20–25 cm; pinnae 6–8 pairs, subopposite, sessile, spreading, ovate-lanceolate, 15–20 ×

5–4 cm, fertile pinnae slightly contracted, base rounded, margin entire, apex acuminate; lamina herbaceous, abaxially pale or glaucous, adaxially green, both surfaces glabrous. Sori orbicular or elliptic, in 1 row along each side of costa, medial, usually in confluent pairs.

● Epilithic; ca. 2000 m. Xizang.

4. Arthromeris tatsienensis (Franchet & Bureau in Christ) Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2(3): 93. 1933 [*"tatsiensis"*].

康定节肢蕨 kang ding jie zhi jue

Polypodium tatsienense Franchet & Bureau in Christ, Bull. Soc. Bot. France 52(Mém. 1): 19. 1905.

Rhizome 4–7 mm in diam., densely scaly; scales brown, ca. 6 × 1.2 mm, margin irregularly toothed, apex long caudate. Stipe stramineous to castaneous, 20–30 cm, glabrous; lamina imparipinnate, oblong, 30–40 × 20–25 cm, or simple and ovate-lanceolate; pinnae (1–)3–8 pairs, subopposite, sessile, ascending to spreading, oblique, ovate-lanceolate, 15–18 × 3–4 cm, base broadly cuneate to rounded or rarely subcordate, margin entire, apex caudate; terminal pinna larger, usually narrowed from base to apex; lamina herbaceous or subleathery, abaxially pale green or glaucous, adaxially green, both surfaces glabrous. Sori orbicular, ca. 2 mm in diam., in 1 row on each side of costa, medial or slightly nearer to costa, solitary between lateral veins.

Terrestrial on dry slopes or epilithic; 1000–1600 m. Sichuan, Yunnan [Bhutan, India (Sikkim), Nepal, N Thailand].

The record of *Arthromeris tatsienensis* from Sikkim is based on the determination by Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 59. 2008) of the only collection of *"Arthromeris lungtauensis* var. *sikkimensis* S. R. Ghosh" (not validly published, *Melbourne Code*, Art. 40.7) as this species.

5. Arthromeris nigropaleacea S. G. Lu, Indian Fern J. 14: 144. 1998.

黑鳞节肢蕨 hei lin jie zhi jue

Rhizome ca. 8 mm in diam., covered with whitish bloom, sparsely scaly; scales nearly black or black, stiff, straight, broad at base, ca. 10 mm, margin irregularly toothed, apex long caudate. Stipe dark stramineous or brown, 20–25 cm, glabrous; lamina imparipinnate, oblong, 50–60 × 25–30 cm; pinnae 5 or 6 pairs, opposite, subsessile, oblique, broadly lanceolate, 15–20 × 3–4 cm, base rounded or subcordate, apex caudate-acute, terminal pinna stalked; lamina papery or herbaceous, abaxially glaucous, adaxially green, both surfaces glabrous. Sori orbicular, ca. 2 mm in diam., in 1 row on each side of costa, medial or slightly close to costa, solitary between lateral veins.

● Epiphytic on tree trunks in evergreen broad-leaved forests; ca. 1800 m. Xizang.

6. Arthromeris himalayensis (Hooker) Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2(3): 99. 1933.

琉璃节肢蕨 liu li jie zhi jue

Rhizome ca. 5 mm in diam., covered with whitish bloom, sparsely scaly; scales brown, broad at base, 3–4 mm, margin ciliate or toothed, apex long caudate. Stipe stramineous or dark stramineous, 10–20 cm, glabrous; lamina imparipinnate, ovate in outline, 15–40 × 10–20 cm, or simple and ovate-lanceolate; pinnae 1–4 pairs, opposite, sessile, ± spreading, far apart, ovate or ovate-lanceolate, 8–15 × 3–5 cm, base rounded or subcordate, margin entire, broadly cartilaginous, apex caudate; lamina herbaceous or papery, both surfaces pubescent or abaxially tomentose and adaxially glabrous. Sori orbicular, small, mostly in 3 or 4 rows along costa, nearer costa, in 2 series between lateral veins, pairs sometimes ± confluent.

Epiphytic on tree trunks or epilithic; 1700–2800 m. Sichuan, Xizang, Yunnan [Bhutan, NE India, N Myanmar, Nepal].

1a. Rhizome scales with ciliate margin; lamina with both surfaces pubescent ..... 6a. var. *himalayensis*
1b. Rhizome scales with toothed margin; lamina abaxially tomentose, adaxially glabrous ..... 6b. var. *niphoboloides*

6a. Arthromeris himalayensis var. **himalayensis**

琉璃节肢蕨(原变种) liu li jie zhi jue (yuan bian zhong)

Polypodium himalayense Hooker, Sp. Fil. 5: 91. 1863; *Pleopeltis himalayensis* (Hooker) Beddome; *Polypodium venustum* Wallich ex C. B. Clarke (1880), not Desvaux (1811), nor Blume (1828).

Rhizome scales broad at base, ca. 4 mm in diam., margin ciliate. Stipe stramineous or dark stramineous, 10–20 cm, glabrous; lamina 20–40 × 10–20 cm; pinnae 1–4 pairs, ovate or ovate-lanceolate, 10–15 × 3–4 cm, base rounded or subcordate. Lamina herbaceous, both surfaces pubescent. Sori conspicuous.

Epiphytic on tree trunks; 1700–2800 m. Sichuan, Xizang, Yunnan [Bhutan, NE India, N Myanmar, Nepal].

6b. Arthromeris himalayensis var. **niphoboloides** (C. B. Clarke) S. G. Lu, Acta Bot. Yunnan. 20: 405. 1998.

灰茎节肢蕨 hui jing jie zhi jue

Polypodium venustum var. *niphoboloides* C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 567. 1880.

Rhizome scales narrowly lanceolate, 3–4 mm in diam., margin toothed. Stipe dark stramineous, 5–15 cm, glabrous; lamina 15–25 × 10–15 cm; pinnae 1 or 2 pairs, ovate-lanceolate, 8–12 × 4–5 cm, base rounded. Lamina herbaceous or papery, abaxially tomentose, adaxially glabrous. Sori buried in tomentum, hardly visible.

Epilithic; 2000–2600 m. Yunnan [Bhutan].

7. Arthromeris tomentosa W. M. Chu, Acta Bot. Yunnan., Suppl. 5: 53. 1992.

厚毛节肢蕨 hou mao jie zhi jue

Rhizome ca. 4 mm in diam., densely scaly throughout; scales brown at center, with pale or whitish margin, lanceolate, broad at base, 6–7 mm, margin toothed, apex long caudate. Stipe dark stramineous, 15–20 cm, glabrous; lamina imparipin-

nate, 20–30 × 10–15 cm, or simple and ovate to oblong; pinnae usually 1 or 2 pairs, opposite, sessile, ovate-lanceolate, 10–12 × 3–4 cm, base rounded or cordate, overlapping rachis, margin entire, apex caudate or rarely laciniate; lamina herbaceous, abaxially tomentose, adaxially glabrous. Sori orbicular, mostly in 3 or 4(or 5) rows along costa, in 2 series between lateral veins.

● Epiphytic on tree trunks; ca. 2600 m. Yunnan.

Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 60. 2008) believes that *Arthromeris tomentosa* is not separable from *A. himalayensis*.

8. Arthromeris notholaenoides V. K. Rawat & Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 59. 2008.

隐囊蕨状节肢蕨 yin nang jue zhuang jie zhi jue

Rhizome ca. 15 mm in diam., slightly glaucous, sparsely scaly; scales reddish brown, 4–6 mm, broad at peltate base, margin minutely toothed, apex long caudate. Lamina imparipinnate, oblong in outline, 20–25 cm; pinnae (8 or)9 or 10(–12) pairs, opposite, sessile, spreading, ovate, 5–6 × ca. 2 cm, base truncate to subcordate, apex acuminate; lamina abaxially densely white tomentose. Sori orbicular, small, in several rows, concealed by indumentum.

● Epiphytic; ca. 1600 m. SE Xizang.

9. Arthromeris elegans Ching, Sunyatsenia 6: 8. 1941.

美丽节肢蕨 mei li jie zhi jue

Rhizome 4–6 mm in diam., densely scaly; scales brown at center, with pale or whitish margin, ovate-lanceolate or lanceolate, broad at base, 8–12 mm, margin toothed or ciliate, apex acuminate. Stipe stramineous, 15–25 cm, glabrous; lamina imparipinnate, 25–35 × 15–20 cm; pinnae 5–8 pairs, opposite, sessile, oblique or spreading, narrowly lanceolate to elliptic, 12–16 × 1.5–2 cm, base rounded or cordate, cartilaginous margin narrow, apex long caudate; lamina herbaceous, both surfaces glabrous, or sometimes abaxially pubescent. Sori orbicular, almost confluent when mature, in 2(or 3) rows along costa, closer to costa, in 2 series between lateral veins.

Epiphytic on tree trunks; 2000–2600(–3400) m. ?Xizang, Yunnan [N Myanmar].

Two forms of *Arthromeris elegans* have been recognized: f. *elegans* with rhizome scales with toothed margins and with the lamina adaxially glabrous, and f. *pianmaensis* S. G. Lu (Acta Bot. Yunnan. 20: 406. 1998) with rhizome scales with ciliate margins and with the lamina adaxially pubescent.

10. Arthromeris cyrtomioides S. G. Lu & C. D. Xu, Acta Phytotax. Sin. 45: 83. 2007.

贯众叶节肢蕨 guan zhong ye jie zhi jue

Rhizome 5–7 mm in diam., sparsely scaly; scales castaneous or brown at center, paler toward margin, narrowly lanceolate, 4–6 mm, base broad and peltate, margin minutely toothed, apex subulate. Stipe stramineous, 8–12 cm, 2–3 mm in diam., scaly at base, pubescent upward; rachis stramineous, sparsely pubescent on both surfaces and small scales on lower surface; lamina imparipinnate, lanceolate, 30–50 × 15–20 cm; pinnae 9–16 pairs, opposite, sessile, patent, lanceolate, 5–11 × 1.5–2.5 cm, base rounded, margin entire, not cartilaginous, apex acuminate; lamina green, papery, densely tomentose abaxially, sparsely pubescent adaxially. Sori orbicular, irregularly scattered on abaxial surface of pinnae.

● Epiphytic on isolated tree trunks; ca. 2000 m. Yunnan (Longling).

11. Arthromeris lehmannii (Mettenius) Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2(3): 96. 1933.

节肢蕨 jie zhi jue

Polypodium lehmannii Mettenius, Abh. Senckenberg. Naturf. Ges. 2: 117. 1856; *Arthromeris pinnata* (Hayata) Ching; *A. tibetana* Ching; *A. tibetana* var. *glabrescens* Ching & S. K. Wu; *Pleopeltis lehmannii* (Mettenius) Beddome; *Polypodium pinnatum* Hayata; *P. quasipinnatum* Hayata.

Rhizome 4–5 mm in diam., densely or sparsely scaly and covered with whitish bloom; scales brown at center, paler toward margin, broad at peltate base, 4–6 mm, margin minutely toothed, apex long caudate. Stipe stramineous or light castaneous, 10–20 cm, glabrous; rachis stramineous, glabrous; lamina imparipinnate, oblong-ovate in outline, 30–40 × 15–20 cm; pinnae usually 5–8 pairs, subopposite, sessile, spreading or slightly ascending, straight, lanceolate, base rounded or subcordate, overlapping rachis, margin entire or undulate with cartilaginous membrane up to 1.5 mm wide, apex acuminate; teminal pinna same as lateral pinnae; lamina papery or herbaceous, green, both surfaces usually glabrous, rarely abaxially sparsely pubescent. Sori orbicular or elliptic, variable in size, mostly in 2 or 3 rows along costa, in 1 series between lateral veins. $2n = 74$.

Epiphytic on tree trunks or epilithic; 500–2900 m. Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, N India, Myanmar, Nepal, Philippines, Thailand, Vietnam].

12. Arthromeris lungtauensis Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2(3): 98. 1933.

龙头节肢蕨 long tou jie zhi jue

Polypodium lungtauense (Ching) Ching ex C. Christensen.

Rhizome 4–5 mm in diam., densely scaly throughout; scales dark brown at center, paler toward margin, ovate-lanceolate, margin toothed, apex acuminate. Stipe dark stramineous or light castaneous, 10–20 cm, glabrous; rachis and costae stramineous, pubescent; lamina imparipinnate, oblong or deltoid-lanceolate, 30–40 × 25–30 cm; pinnae 5–7 pairs, opposite, sessile, ascending to patent, lanceolate or ovate-lanceolate, 10–12 × 2–3 cm, base rounded or cordate, cartilaginous margin entire, very narrow, apex acuminate; lamina papery, both surfaces densely pubescent. Sori orbicular to elliptic, ca. 1 mm, mostly in 3–5 rows along costa, in 2 series between veins, pairs sometimes confluent.

Epiphytic on tree trunks or on rocks; 500–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang [Laos, Nepal, Vietnam].

Material of *Arthromeris lungtauensis* has been incorrectly identi-

fied as *Polypodium himalayense* Hooker (e.g., Christ, Bull. Acad. Géogr. Bot. 1902: 218. 1902; Y. C. Wu et al., Bull. Dept. Biol. Sun Yatsen Univ. 3: 306, t. 144. 1932).

13. Arthromeris mairei (Brause) Ching, Sunyatsenia 6(1): 6. 1941.

多羽节肢蕨 duo yu jie zhi jue

Polypodium mairei Brause, Hedwigia 54: 208. 1914; *Arthromeris lehmannii* (Mettenius) Ching var. *auriculata* Ching; *A. tsayuensis* Ching & Y. X. Lin; *P. lehmannii* Mettenius var. *mairei* (Brause) C. Christensen.

Rhizome 5–6 mm in diam., densely scaly; scales light brown or glaucous, ovate-lanceolate, margin ciliate, apex acuminate. Stipe stramineous or castaneous, 15–25 cm, glabrous; lamina imparipinnate, ovate-lanceolate, 30–50 × 15–25 cm; pinnae 8–12 pairs, opposite, sessile, ascending, ovate-lanceolate, 10–15 × 2–3 cm, base rounded, margin entire or undulate, apex acuminate; lamina herbaceous, both surfaces glabrous. Sori orbicular, in 2 or 3 irregular rows along costae of distal pinnae, in 2 series between veins, pairs sometimes confluent.

Terrestrial on slopes in forests; 1000–2700 m. Guangxi, Guizhou, Hubei, Jiangxi, Shanxi, Sichuan, Xizang, Yunnan [N India, Myanmar].

Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 58. 2008) suggests that *Arthromeris mairei* might not be separable from *A. moulmeinense* Beddome (1867).

14. Arthromeris wardii (C. B. Clarke) Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2(3): 94. 1933.

灰背节肢蕨 hui bei jie zhi jue

Polypodium wardii C. B. Clarke, J. Linn. Soc., Bot. 25: 99. 1889; *Arthromeris longipinna* Ching & Y. X. Lin; *Pleopeltis wardii* (C. B. Clarke) Beddome.

Rhizome 10–12 mm in diam., densely scaly throughout; scales brown, narrowly lanceolate, ovate at peltate base, 6–10 mm, margin subentire, apex acuminate. Stipe stramineous or dark stramineous, 30–40 cm, glabrous; lamina imparipinnate, ovate-lanceolate, 40–80(–120) × 30–50 cm; pinnae 5–8(–16) pairs, subopposite, sessile, spreading or ascending, ovate-lanceolate, 15–20(–30) × 4–6(–8) cm, base rounded or truncate, cartilaginous margin entire, apex caudate; lamina papery, abaxially usually glaucous, adaxially green, both surfaces glabrous. Sori orbicular, up to 2.5 mm in diam., mostly in 2(or 3) rows along costa in 1 series between veins, sometimes eventually almost confluent.

Epiphytic on tree trunks; 1800–2500 m. Xizang, Yunnan [Bhutan, N India, Myanmar, Nepal].

15. Arthromeris medogensis Ching & Y. X. Lin, Acta Phytotax. Sin. 22: 403. 1984.

墨脱节肢蕨 mo tuo jie zhi jue

Rhizome ca. 6 mm in diam., densely scaly; scales brown, ovate at base, margin ciliate, apex long caudate. Stipe stramineous, 20–30 cm, glabrous; lamina imparipinnate, 20–30 × 14–16 cm; pinnae usually 2 or 3 pairs, opposite, distinctly stalked, ascending, ovate or oblong, 11–13 × 3–4 cm, base cuneate, cartilaginous margin entire, apex caudate; lamina papery, abaxially glaucous, adaxially green, both surfaces glabrous. Sori orbicular, mostly in 3 or 4 rows along costa in 1 series between lateral veins.

● Epiphytic on tree trunks; ca. 1600 m. Xizang.

16. Arthromeris caudata Ching & Y. X. Lin, Acta Phytotax. Sin. 22: 406. 1984.

尾状节肢蕨 wei zhuang jie zhi jue

Rhizome ca. 10 mm in diam., densely scaly; scales brown, broad at base, margin ciliate, apex long caudate. Stipe stramineous at base, castaneous at upper part, 25–35 cm, glabrous; lamina imparipinnate, 50–60 × 20–25 cm; pinnae usually 6–8 pairs, alternate, shortly stalked, ascending, oblong-lanceolate, 18–22 × 4–5 cm, base cuneate, cartilaginous margin entire, broad, apex caudate; lamina papery, abaxially glaucous with sparse glandular hairs, adaxially green. Sori orbicular, mostly in 2 or 3 rows along costa in 1 series between lateral veins.

● Evergreen broad-leaved forests; ca. 1500 m. Xizang.

17. Arthromeris salicifolia Ching & Y. X. Lin, Acta Phytotax. Sin. 22: 404. 1984.

柳叶节肢蕨 liu ye jie zhi jue

Rhizome ca. 10 mm in diam., densely scaly; scales brown, ovate at base, 5–7 mm, margin shortly ciliate, apex long caudate. Stipe dark stramineous, 25–30 cm, ca. 3 mm in diam., glabrous; lamina imparipinnate, 40–50 × 15–20 cm; pinnae usually 5 or 6 pairs, alternate, shortly stalked, ascending, ovate-lanceolate, 15–20 × 3–5 cm, base attenuate into stalk, cartilaginous margin entire, apex long caudate; lamina papery, abaxially light green or glaucous, adaxially dark green. Sori mostly orbicular, ca. 1.5 mm in diam., mostly in 2 rows along costa in 1 series between veins, rarely those nearest margin in confluent pairs.

● Epiphytic on tree trunks; 1600–1900 m. Xizang.

6. CHRISTOPTERIS Copeland in Perkins, Fragm. Fl. Philipp. 188. 1905.

戟蕨属 ji jue shu

Lu Shugang (陆树刚); Peter H. Hovenkamp

Plants usually epiphytic, sometimes terrestrial, medium-sized. Rhizome long creeping, densely covered with scales; scales dark brown, linear-lanceolate, peltate at base, entire or sparsely toothed at margin, opaque, hairlike at apex. Fronds remote, articulate to rhizome, dimorphic. Sterile fronds trilobate or pinnatifid, lobes broad, entire; veins reticulate with branched included veinlets; lamina leathery, glabrous on both surfaces or scaly on abaxial surface when young, scales ovate, peltate. Fertile fronds strongly contracted, trilobate or pinnatifid; lobes linear-lanceolate. Sori covering whole abaxial surface of fertile fronds, mixed with short, simple or

branched paraphyses. Sporangia with long stalks; annulus with ca. 14 hardened cells. Spores ellipsoid, hyaline, shallowly tuberculate on surface. Chromosome number as yet unknown.

Three species: tropical Asia; one species in China.

The genus name is often given as *"Christiopteris,"* but this is not in accordance with the protologue. Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 45. 2008) includes *Christopteris* within the following genus, *Selliguea*. It is maintained by Christenhusz et al. (Phytotaxa 19: 52. 2011).

1. Christopteris tricuspis (Hooker) Christ, J. Bot. (Morot), sér. 2, 1: 273. 1908.

戟蕨 ji jue

Acrostichum tricuspe Hooker, Sp. Fil. 5: 272. 1864; *Cheiropleuria tricuspis* (Hooker) J. Smith; *Gymnopteris tricuspis* (Hooker) Beddome; *Leptochilus tricuspis* (Hooker) C. Christensen; *Selliguea tricuspis* (Hooker) Fraser-Jenkins.

Rhizome long creeping, 5–6 mm in diam., densely covered with scales; scales reddish brown, base ovate-lanceolate, 5–6 mm, margin minutely serrate, apex subulate and long caudate. Fronds remote. Stipe straw-colored or castaneous, 20–35 cm, glabrous, stipes of fertile fronds longer than those of sterile fronds. Laminae dimorphic. Sterile lamina deeply 3-lobed or pinnatilobate, lobes 20–35 × 2.5–7 cm, central lobe larger than lateral lobes, entire at margin, acuminate at apex; veins reticulate with simple or branched included veinlets, hardly visible; lamina leathery, pale green, glabrous on both surfaces. Fertile lamina with much narrower lobes, linear, 30–40 × 1–1.5 cm. Sori with simple paraphyses.

Epiphytic on tree trunks or rarely terrestrial; 500–800 m. Hainan [India (Sikkim), Malaysia, Thailand, Vietnam].

7. SELLIGUEA Bory, Dict. Class. Hist. Nat. 6: 587. 1824.

修蕨属 xiu jue shu

Lu Shugang (陆树刚); Peter H. Hovenkamp, Michael G. Gilbert

Crypsinus C. Presl; *Phymatopsis* J. Smith (1875), not Tulasne ex Treviranus (1857); *Phymatopteris* Pichi Sermolli; *Pichisermollia* Fraser-Jenkins (2008), not H. C. Monteiro (1980); *Pichisermollodes* Fraser-Jenkins & Challis.

Rhizome slender, woody, densely scaly; scales reddish brown, brown, dark brown, or nearly black, rarely whitish, opaque, ovate-lanceolate or lanceolate, margin entire, toothed, or ciliate, apex attenuate or setaceous. Fronds remote, articulate to rhizome, monomorphic or dimorphic with longer and narrower fertile fronds. Stipe usually glabrous, rarely pubescent, scaly at base. Lamina simple, hastately 3-lobed, palmately or pinnately divided, sometimes pinnatisect with adnate pinnae, herbaceous or leathery, glabrous or pubescent, rarely scaly on abaxial side. Lobes usually lanceolate, margin distinctly cartilaginous, entire, notched, or serrate, apex acuminate or obtuse. Lateral veins (in lamina or segments) distinct; veinlets anastomosing to form areoles with included free veinlets. Sori orbicular, in 1 row on either side of costa, less often linear or in many rows, usually superficial, rarely sunken on abaxial surface and raised on adaxial surface. Sporangia with long stalk, annulus with 14 hardened cells. Spores brown, ellipsoid, surface tuberculate or verrucate. $x = 12$, $n = 36, 37$.

About 75 species: tropical and subtropical Asia, Australia, Pacific islands, South Africa, and Madagascar; 48 species (29 endemic) in China.

Until relatively recently, most species of *Selliguea* were included within *Phymatopteris*, but the concept widely used for *Phymatopteris* clearly includes the type species of *Crypsinus*, *C. pyrolifolius* (Goldmann) Copeland, which is very similar to *S. rhynchophylla* in this account. Both Smith et al. (Taxon 55: 719. 2006) and Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 44. 2008) do not recognize *Phymatopteris* and include *Crypsinus* within *Selliguea*. Christenhusz et al. (Phytotaxa 19: 33. 2011) maintain *Phymatopteris* but include *Crypsinus* within *Selliguea*, a position that does not seem tenable in the light of the above observation.

Fraser-Jenkins erected the genus *Pichisermollodes* for those species with *Polypodium*-like pinnatifid to pinnate fronds with notched and toothed margins, but this genus was not accepted by Christenhusz et al.

1a. All fronds simple, linear, lanceolate, or ovate.
2a. Sori linear, between and parallel to adjacent lateral veins ..... 48. *S. feei*
2b. Sori orbicular or less often elliptic, very rarely confluent.
3a. Fronds moderately dimorphic; sterile lamina ovate, fertile lamina narrower, linear or ovate-lanceolate.
4a. Soriferous portion not or slightly contracted; sori orbicular, separate ..... 1. *S. rhynchophylla*
4b. Soriferous portion much contracted, linear; sori elongate or confluent in upper part of frond ..... 2. *S. wuliangshanense*
3b. Fronds monomorphic; lamina oblong, ovate, or linear.
5a. Margin notched.
6a. Sori sunken on abaxial surface and raised on adaxial surface ..... 9. *S. yakushimensis*
6b. Sori superficial.
7a. Lamina base truncate or cordate, or if rounded then lamina 3–6 cm wide, marginal notches sometimes indistinct.
8a. Lamina 5–15 × 2–3 cm, base cordate, apex obtuse or acute ..... 5. *S. oblongifolia*

8b. Lamina 15–25 × 3–6 cm, base rounded or truncate, apex shortly acuminate ..... 7. *S. majoensis*
7b. Lamina base cuneate to rounded, if rounded then lamina 0.5–2 cm wide.
9a. Lamina 5–7 mm wide, herbaceous ..... 12. *S. tenuipes*
9b. Lamina 10–30 mm wide, papery to leathery, less often herbaceous.
10a. Lamina base cuneate, margin indistinctly notched, apex shortly acuminate ..... 11. *S. engleri*
10b. Lamina base broadly cuneate or rounded, margin notched, apex acute or obtuse.
11a. Lamina leathery, stipe thick ..... 13. *S. omeiensis*
11b. Lamina papery or herbaceous, stipe slender ..... 15. *S. hastata*
5b. Margin entire or undulate.
12a. Lamina apex rounded, obtuse, or acute.
13a. Lamina margin entire or undulate; rhizome scales brown, margin entire ..... 4. *S. obtusa*
13b. Lamina margin notched; rhizome scales reddish brown, margin sparsely toothed ..... 5. *S. oblongifolia*
12b. Lamina apex acuminate or caudate.
14a. Rhizome sparsely scaly, surface with whitish bloom; lamina margin wide, flat, translucent ..... 3. *S. chrysotricha*
14b. Rhizome densely scaly, surface not visible; lamina margin narrow, thickened, not translucent.
15a. Lamina 30–35 cm, thin, pellucid; veinlets distinct ..... 10. *S. pellucidifolia*
15b. Lamina 8–25 cm, papery to leathery, opaque; veinlets obscure.
16a. Lamina 1.5–3 cm wide, papery, base gradually narrowed; sori medial ..... 6. *S. hainanensis*
16b. Lamina 3–6 cm wide, leathery, base truncate, rounded, or broadly cuneate; sori close to midrib.
17a. Lamina base truncate or rounded, abaxial surface glaucous ..... 7. *S. majoensis*
17b. Lamina base broadly cuneate, abaxial surface yellowish green ..... 8. *S. griffithiana*
1b. At least some fronds deeply lobed, hastately divided, palmately parted, pinnately parted, or pinnatisect.
18a. Divided fronds at most hastate, with 2 basal lateral lobes.
19a. Lamina margin entire or remotely notched; sori slightly sunken abaxially; scales yellowish brown ..... 14. *S. taiwanensis*
19b. Lamina margin regularly notched; sori superficial; scales reddish brown ..... 15. *S. hastata*
18b. At least some divided fronds palmate with more than 2 lateral lobes or pinnately divided.
20a. Fronds palmately divided with 4–6 lobes (*S. dactylina* s.l.).
21a. Stipe castaneous, scaly at base; plants 5–10 cm high, lamina 5–9 × 5–9 cm ..... 16. *S. digitata*
21b. Stipe straw-colored, glabrous; plants 20–30 cm high, lamina 10–20 × 10–15 cm.
22a. Scales narrowly lanceolate, yellowish brown, 5–7 mm, gradually narrowed from peltate base to acuminate apex ..... 17. *S. dactylina*
22b. Scales ovate, dark brown, ca. 10 mm, gradually or sometimes abruptly narrowed into long hairlike apex ..... 18. *S. chenopus*
20b. Fronds pinnately divided, lateral lobes/pinnae 1–10 pairs.
23a. Lamina margin entire.
24a. Fronds pubescent; lateral lobes 1–3 pairs, apical lobe distinctly larger than lateral lobes ..... 19. *S. trisecta*
24b. Fronds glabrous; lateral lobes 1–5(–8) pairs, apical lobe similar to lateral lobes.
25a. Fronds pinnatifid at base, lobes triangular or broadly lanceolate ..... 20. *S. oxyloba*
25b. Fronds pinnatisect at base, pinnae ovate-lanceolate ..... 21. *S. likiangensis*
23b. Lamina margin notched or toothed.
26a. Lamina margin with notches regularly placed between veins, sometimes sparse (*S. kingpingensis*).
27a. Fronds distinctly dimorphic; sori deeply sunken ..... 22. *S. trilobus*
27b. Fronds monomorphic; sori superficial.
28a. Lateral lobes 1 or 2 pairs, deltoid or subdeltoid; basal lobes spreading in trilobate lamina ..... 23. *S. cruciformis*
28b. Lateral lobes 2–8 pairs, lanceolate; basal lobes ascending or deflexed.
29a. Lateral lobes all ascending, lamina cuneate or rounded at base.
30a. Fronds hairy throughout; terrestrial ..... 24. *S. hirtella*
30b. Fronds glabrous; epiphytic.
31a. Fronds 25–50 cm; stipe usually longer than lamina ..... 25. *S. taeniata*
31b. Fronds 10–20 cm; stipe shorter than lamina.
32a. Scales black with whitish cilia at margin ..... 26. *S. kingpingensis*
32b. Scales yellowish brown or whitish, with or without ciliate margin.
33a. Scales yellowish brown with entire margin; sori medial ..... 27. *S. connexa*
33b. Scales whitish with ciliate margin; sori close to margin ..... 28. *S. daweishanensis*
29b. Lowest lobes deflexed or slightly deflexed, occasionally patent, lamina cordate or truncate at base.
34a. Scales ovate, castaneous to black; abaxial side of lamina usually sparsely scaly especially on midrib and veins ..... 29. *S. ebenipes*

34b. Scales lanceolate, brown to whitish; abaxial side of lamina without scales.
35a. Scales with broad whitish or light brown margin, or dark brown when older.
36a. Lamina glabrous on both surfaces; lobes acuminate at apex ..... 32. *S. albipes*
36b. Lamina pubescent on both surfaces; lobes obtuse at apex ..... 33. *S. pianmaensis*
35b. Scales brown or dark brown.
37a. Rhizome 8–12 mm in diam.; scale margins entire; sori sunken and medial or closer to margin ..... 30. *S. echinospora*
37b. Rhizome 2–4 mm in diam.; scale margins ciliate; sori superficial, ± close to costa.
38a. Lateral lobes 2–5 pairs, adaxially glabrous ..... 31. *S. quasidivaricata*
38b. Lateral lobes 4–7 pairs, adaxially pubescent ..... 35. *S. incisocrenata*
26b. Lamina margin usually with a sharp tooth below each notch, often with additional teeth between each pair of notches, or ± uniformly serrate and not notched.
39a. Fronds pubescent on one or both surfaces ..... 34. *S. nigrovenia*
39b. Fronds glabrous on both surfaces.
40a. Lateral lobes obtuse or acute at apex.
41a. Lamina 5–8 cm; stipe straw-colored or dark straw-colored at base ..... 36. *S. senanensis*
41b. Lamina 5–20 cm; stipe purple or castaneous at base.
42a. Lobes shallowly crenate to pinnately lobed ..... 37. *S. crenatopinnata*
42b. Lobes densely serrulate or duplicate-serrate at margin.
43a. Lateral lobes ovate-lanceolate, constricted at base ..... 38. *S. glaucopsis*
43b. Lateral lobes linear ..... 39. *S. conmixta*
40b. Lateral lobes acuminate or caudate-acuminate at apex.
44a. Lowest lobes of lamina deflexed.
45a. Lateral lobes gradually narrowed from base to apex ..... 40. *S. stracheyi*
45b. Lateral lobes ovate-lanceolate, slightly constricted at base ..... 41. *S. conjuncta*
44b. Lowest lobes of lamina ascending.
46a. Scales black without light margin but with whitish cilia on margin.
47a. Lobes obtusely serrate at margin ..... 42. *S. stewartii*
47b. Lobes sharply serrate at margin.
48a. Lamina with 4–9 pairs of lateral pinnae, cartilaginous margin straw-colored ..... 43. *S. nigropaleacea*
48b. Lamina with 2 or 3 pairs of lateral lobes, cartilaginous margin reddish ..... 44. *S. roseomarginata*
46b. Scales brown or dark brown or with a black center, with distinct, lighter, dentate or ciliate margin.
49a. Scales dark brown or castaneous; lateral veins ending in margin ..... 45. *S. tibetana*
49b. Scales brown; lateral veins not ending in margin.
50a. Marginal teeth sharply acute ..... 46. *S. malacodon*
50b. Marginal teeth up to 2 mm aristate ..... 47. *S. albidoglauca*

1. Selliguea rhynchophylla (Hooker) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 48. 2008.

喙叶假瘤蕨 hui ye jia liu jue

Polypodium rhynchophyllum Hooker, Hooker's Icon. Pl. 6: t. 954. 1854; *Crypsinus okamotoi* (Tagawa) Tagawa; *C. rhynchophyllus* (Hooker) Copeland; *Phymatodes okamotoi* Tagawa; *P. rhynchophylla* (Hooker) Ching; *Phymatopsis rhynchophylla* (Hooker) J. Smith; *Phymatopteris rhynchophylla* (Hooker) Pichi Sermolli; *Pleopeltis rhynchophylla* (Hooker) T. Moore; *Selliguea okamotoi* (Tagawa) Ralf Knapp.

Rhizome 1–2 mm in diam., densely scaly throughout; scales brown, ovate-lanceolate, ca. 5 mm, margin entire to sparsely toothed, apex acuminate. Fronds dimorphic. Sterile fronds: stipe 1–2 cm; lamina simple, ovate or oblong, 1–5 × 1–2 cm, base cordate, margin notched, apex obtuse. Lateral veins distinct. Lamina herbaceous or subleathery, both surfaces glabrous, abaxial surface usually purplish, adaxial surface green. Fertile fronds: stipe 5–10 cm; lamina linear or lanceolate, 5–20 × 1–2 cm, soriferous portion not or only slightly contracted. Sori orbicular, medial.

Epiphytic on tree trunks, crevices of rocks or on rocky slopes; 1200–2700 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [Cambodia, N India, Indonesia, Laos, Myanmar, Nepal, Philippines, Thailand, Vietnam].

2. Selliguea wuliangshanense (W. M. Chu) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

无量山假瘤蕨 wu liang shan jia liu jue

Basionym: *Phymatopteris wuliangshanensis* W. M. Chu, Acta Bot. Yunnan., Suppl. 5: 58. 1992; *Crypsinus wuliangshanensis* (W. M. Chu) X. Cheng.

Rhizome 1–2 mm in diam., densely scaly; scales pale brown, lanceolate, 3–4 × 1–1.5 mm, margin entire, apex acuminate. Fronds dimorphic. Sterile fronds: stipe 1.5–2 cm; lamina simple, orbicular or ovate, 2–3 × 1–2 cm, base cordate, margin notched, apex rounded. Lateral veins visible, veinlets obscure. Lamina herbaceous or subleathery, both surfaces glabrous, pale green. Fertile fronds: stipe stramineous, 2–5 cm, slender, glabrous; lamina lower portion ovate-lanceolate, 5–10 × 1–2 cm, base cuneate, soriferous portion contracted. Sori separate at base of soriferous part, forming a coenosorus toward apex.

● Epiphytic on tree trunks, evergreen broad-leaved forests; 2200–2500 m. Yunnan (Wuliang Shan).

3. Selliguea chrysotricha (C. Christensen) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 47. 2008.

白茎假瘤蕨 bai jing jia liu jue

Polypodium chrysotrichum C. Christensen, Contr. U.S. Natl. Herb. 26: 320. 1931; *Crypsinus chrysotrichus* (C. Christensen) Tagawa; *Phymatodes chrysotricha* (C. Christensen) Ching; *Phymatopsis chrysotricha* (C. Christensen) Ching; *Phymatopteris chrysotricha* (C. Christensen) Pichi Sermolli.

Rhizome with whitish bloom, sparsely scaly; scales brown, ovate at peltate base, margin entire, apex acuminate. Fronds ± monomorphic (fertile fronds slightly narrower and more oblong). Stipe straw-colored, 5–10 cm, glabrous; lamina simple, ovate to oblong, 5–10 × 3–6 cm, base rounded to shallowly cordate, margin entire, wide, flat, translucent, apex caudate. Veins all distinct on both surfaces. Lamina leathery, both surfaces glabrous, abaxial surface pale green, adaxial surface green and shiny. Sori orbicular, medial.

Epiphytic on tree trunks; 2200–2900 m. Yunnan [Myanmar].

Hovenkamp believes that the broad, translucent margin described for *Selliguea chrysotricha* suggests that it might prove to be better placed within *Arthromeris*.

4. Selliguea obtusa (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

圆顶假瘤蕨 yuan ding jia liu jue

Basionym: *Phymatopsis obtusa* Ching, Acta Phytotax. Sin. 9: 184. 1964; *Phymatopteris obtusa* (Ching) Pichi Sermolli.

Rhizome ca. 3 mm in diam., densely scaly; scales brown, lanceolate, ca. 5 mm, margin entire, apex acuminate. Stipe straw-colored or light brown, 6–10 cm, glabrous; lamina simple, oblong or ovate, 5–15 × 2–3 cm, base cordate, margin entire or undulate, apex rounded or obtuse. Lateral veins thick, distinct, ascending, veinlets obscure. Lamina leathery, both surfaces glabrous. Sori orbicular, close to midrib.

● Epiphytic on tree trunks or on rocks; 1400–1700 m. Guangxi, Hainan, Xizang, Yunnan.

5. Selliguea oblongifolia (S. K. Wu) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

长圆假瘤蕨 chang yuan jia liu jue

Basionym: *Phymatopsis oblongifolia* S. K. Wu, Acta Phytotax. Sin. 23: 400. 1985; *Crypsinus oblongifolius* (S. K. Wu) X. Cheng; *Phymatopteris oblongifolia* (S. K. Wu) W. M. Chu & S. G. Lu.

Rhizome ca. 3 mm in diam., densely scaly throughout; scales reddish brown, broad at peltate base, margin sparsely toothed, apex acuminate. Fronds monomorphic. Stipe straw-colored, 5–15 cm, ca. 1 mm in diam., glabrous; lamina simple, oblong or ovate, 5–15 × 2–3 cm, base cordate, margin notched, apex obtuse or acute. Lateral veins distinct on both surfaces, veinlets obscure. Lamina leathery, both surfaces glabrous. Sori orbicular, slightly near midrib.

● Epiphytic on tree trunks; ca. 1400 m. Yunnan.

6. Selliguea hainanensis (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

海南假瘤蕨 hai nan jia liu jue

Basionym: *Phymatodes hainanensis* Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2(3): 68. 1933; *Crypsinus hainanensis* (Ching) Tagawa; *Phymatopsis cunea* Ching; *P. hainanensis* (Ching) Ching; *Phymatopteris cunea* (Ching) Pichi Sermolli; *P. hainanensis* (Ching) Pichi Sermolli; *Polypodium echinosporum* C. Christensen.

Rhizome ca. 3 mm in diam., densely scaly; scales dark brown in center, paler toward margins, ovate at peltate base, ca. 3 mm, margin entire, apex subulate. Fronds monomorphic. Stipe straw-colored, 8–13 cm, ca. 1 mm in diam., glabrous; lamina simple, ovate-lanceolate, 8–15 × 1.5–3 cm, widest around middle and gradually narrowed toward both ends, base cuneate, margin entire, apex acuminate. Lateral veins visible, veinlets obscure. Lamina papery, both surfaces glabrous. Sori orbicular, slightly near midrib and slightly raised on adaxial surface.

● Epiphytic on tree trunks or on rocks in forests; 500–600 m. Hainan, Yunnan.

7. Selliguea majoensis (C. Christensen) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 48. 2008.

宽底假瘤蕨 kuan di jia liu jue

Polypodium majoense C. Christensen in H. Léveillé, Cat. Pl. Yun-Nan, 108. 1916; *Crypsinus majoensis* (C. Christensen) X. Cheng; *Phymatodes griffithiana* (Hooker) Ching var. *majoensis* (C. Christensen) Ching; *Phymatopsis majoensis* (C. Christensen) Ching; *Phymatopteris majoensis* (C. Christensen) Pichi Sermolli.

Rhizome 3–4 mm in diam., densely scaly; scales brown, lanceolate, 4–5 mm, margin entire, apex acuminate. Fronds monomorphic. Stipe straw-colored, 10–15 cm, glabrous; lamina simple, oblong, 15–25 × 3–6 cm, broadest near base, base rounded or truncate, margin entire, apex shortly acuminate. Lateral veins visible, veinlets obscure. Lamina subleathery, both surfaces glabrous, abaxial surface glaucous, adaxial surface pale green. Sori orbicular, close to midrib.

● Epiphytic on tree trunks or on rocks; 1400–1800 m. Anhui, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan.

Hovenkamp believes that *Selliguea majoensis* would be better treated as a variety of the following species, *S. griffithiana.*

8. Selliguea griffithiana (Hooker) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 47. 2008.

大果假瘤蕨 da guo jia liu jue

Polypodium griffithianum Hooker, Hooker's Icon. Pl. 10: t. 951. 1854; *Crypsinus griffithianus* (Hooker) Copeland; *Phymatodes griffithiana* (Hooker) Ching; *Phymatopsis griffithiana* (Hooker) J. Smith; *P. integerrima* Ching; *Phymatopteris griffithiana* (Hooker) Pichi Sermolli; *P. integerrima* (Ching) Bir; *Pleopeltis griffithiana* (Hooker) T. Moore.

Rhizome 3–4 mm in diam., densely scaly; scales brown, lanceolate, ca. 5 mm, margin entire, apex long acuminate. Fronds monomorphic. Stipe straw-colored, 5–15 cm, densely scaly at base, subglabrous or with hairlike scales upward; lamina simple, oblong or ovate-lanceolate, 10–25 × 3–4 cm, usually widest below middle, broadly cuneate at base, margin entire or shallowly undulate, usually revolute, apex shortly acuminate. Lateral veins distinct on both surfaces, veinlets obscure. Lamina leathery or subleathery, both surfaces glabrous, abaxial surface pale green, adaxial surface green. Sori orbicular, large, close or slightly close to midrib.

Epiphytic on tree trunks or on rocks; 1300–3200 m. Anhui, Guizhou, Sichuan, Xizang, Yunnan [Bhutan, N India, Myanmar, Nepal, Thailand, Vietnam].

9. Selliguea yakushimensis (Makino) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 46. 2008.

屋久假瘤蕨 wu jiu jia liu jue

Polypodium engleri Luerssen var. *yakushimense* Makino, Bot. Mag. (Tokyo) 23: 248. 1909; *Crypsinus yakushimensis* (Makino) Tagawa; *Phymatodes yakushimensis* (Makino) Tagawa; *Phymatopsis fukienensis* Ching; *P. yakushimensis* (Makino) H. Itô; *Phymatopteris fukienensis* (Ching) Pichi Sermolli; *P. yakushimensis* (Makino) Pichi Sermolli; *Polypodium yakushimense* (Makino) Makino & Nemoto.

Rhizome ca. 3 mm in diam., densely scaly; scales brown, lanceolate, margin entire, apex acuminate. Fronds monomorphic. Stipe straw-colored, 5–15 cm, slender, glabrous; lamina simple, linear-elliptic, 5–15 × 1–2 cm, base cuneate, margin notched, apex acuminate. Lateral veins distinct, veinlets obscure. Lamina papery, both surfaces glabrous, abaxial surface glaucous, adaxial surface green. Sori orbicular, medial, sunken on abaxial surface and raised on adaxial surface.

On muddy rocks along streams, usually rheophytic in flood zone, forests; 100–1800 m. Fujian, Guangxi, Guizhou, Hunan, Jiangxi, Taiwan, Zhejiang [Japan, Korea].

10. Selliguea pellucidifolia (Hayata) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

透明叶假瘤蕨 tou ming ye jia liu jue

Basionym: *Polypodium pellucidifolium* Hayata, Icon. Pl. Formosan. 4: 250. 1914; *Phymatopsis pellucidifolia* (Hayata) H. Itô; *Phymatopteris pellucidifolia* (Hayata) Pichi Sermolli.

Rhizome 3–4 mm in diam., densely scaly; scales ovate-lanceolate, rounded at base, margin entire, apex acuminate. Stipe light brown, 9–10 cm, glabrous; lamina simple, linear or oblanceolate, 30–35 × 2–2.2 cm, base cordate, margin entire or undulate, apex shortly acuminate. Veins all distinct. Lamina membranous, pellucid, both surfaces glabrous. Sori orbicular, small, slightly closer to midrib.

● On rocks beside streams in forests. Taiwan (Alishan).

11. Selliguea engleri (Luerssen) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 46. 2008.

恩氏假瘤蕨 en shi jia liu jue

Polypodium engleri Luerssen, Bot. Jahrb. Syst. 4(4): 361. 1883; *Crypsinus engleri* (Luerssen) Copeland; *C. engleri* var. *coriaceus* (Tagawa) Tagawa; *Phymatodes engleri* (Luerssen) Ching; *P. engleri* var. *coriacea* Tagawa; *Phymatopsis engleri* (Luerssen) H. Itô; *P. engleri* var. *coriacea* (Tagawa) Ching; *P. engleri* var. *hypoleuca* (Hayata) H. Itô; *Phymatopteris engleri* (Luerssen) Pichi Sermolli; *Polypodium engleri* var. *hypleuca* Hayata; *P. hastatum* Thunberg var. *engleri* (Luerssen) Christ.

Rhizome 3–4 mm in diam., densely scaly; scales reddish brown, linear to linear-lanceolate, 3–6 mm, margin entire, apex acuminate. Fronds monomorphic. Stipe straw-colored or light brown, 5–15(–20) cm, glabrous; lamina simple, linear or oblanceolate, 5–15(–28) × 1–3 cm, widest above middle, base cuneate, margin entire or slightly crenate, apex shortly acuminate. Lateral veins visible, veinlets obscure. Lamina papery or subleathery, stiff, both surfaces glabrous, abaxial surface usually glaucous. Sori orbicular, small, slightly closer to midrib, superficial.

Epiphytic on tree trunks or on rocks; 1000–2000 m (in Taiwan). Fujian, Guangxi, Guizhou, Jiangxi, Taiwan, Zhejiang [Japan, Korea].

12. Selliguea tenuipes (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

细柄假瘤蕨 xi bing jia liu jue

Basionym: *Phymatopsis tenuipes* Ching, Acta Phytotax. Sin. 9: 187. 1964; *Phymatopteris tenuipes* (Ching) Pichi Sermolli.

Rhizome ca. 2 mm in diam., densely scaly; scales yellowish brown, lanceolate, 3–4 mm, margin entire, apex acuminate. Stipe straw-colored, 2–4 cm, slender, glabrous; lamina simple, narrowly oblong or obovate, 3–7 cm × 5–7 mm, base rounded or broadly cuneate, margin notched, apex obtuse. Lateral veins visible, veinlets obscure. Lamina herbaceous, both surfaces glabrous, abaxial surface glaucous, adaxial surface green. Sori orbicular, small, medial, borne on upper portion of lamina.

● Epiphytic on tree trunks or on rocks; 1300–1700 m. Guizhou, Sichuan.

13. Selliguea omeiensis (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

峨嵋假瘤蕨 e mei jia liu jue

Basionym: *Phymatopsis omeiensis* Ching, Acta Phytotax. Sin. 9: 187. 1964; *Phymatopteris omeiensis* (Ching) Pichi Sermolli.

Rhizome ca. 2 mm in diam., densely scaly; scales brown, lanceolate, 3–5 mm, margin entire, apex acuminate. Fronds monomorphic. Stipe straw-colored, 3–5 cm, glabrous; lamina simple, ovate-lanceolate, 8–12 × 1–2 cm, lower part widest and sterile, base broadly cuneate or rounded, margin notched, apex acute or obtuse, upper part soriferous, slightly contracted. Lateral veins visible, veinlets obscure. Lamina leathery, both surfaces glabrous, pale green. Sori orbicular, slightly close to midrib.

● Epiphytic on rocks. Sichuan (Emei Shan).

14. Selliguea taiwanensis (Tagawa) H. Ohashi & K. Ohashi, J. Jap. Bot. 84: 308. 2009.

台湾假瘤蕨 tai wan jia liu jue

Phymatodes taiwanensis Tagawa, Acta Phytotax. Geobot. 11: 310. 1942; *Crypsinus taiwanensis* (Tagawa) Tagawa; *Phymatopsis taiwanensis* (Tagawa) Ching; *Phymatopteris taiwanensis* (Tagawa) Pichi Sermolli.

Rhizome 2–3 mm in diam., densely scaly; scales yellowish brown, lanceolate, broad at peltate base, apex long acuminate with narrow subulate tip. Stipe straw-colored, 8–16 cm, glabrous; lamina simple or trifid within one individual; simple lamina linear, 8–16 × ca. 1 cm, base cordate, margin entire or remotely notched, apex caudate; trifid lamina: central lobe much longer than lateral lobes, 16–24 × ca. 1 cm, all lobes usually slightly contracted at base, widest at middle, apex acuminate. Lateral veins visible, veinlets obscure. Sori orbicular, slight sunken on abaxial surface and raised on adaxial surface.

● Epilithic; 1700–2500 m. Taiwan.

15. Selliguea hastata (Thunberg) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 44. 2008.

金鸡脚假瘤蕨 jin ji jiao jia liu jue

Polypodium hastatum Thunberg in Murray, Syst. Veg., ed. 14, 935. 1784; *Crypsinus hastata* (Thunberg) Copeland; *Drynaria hastata* (Thunberg) Fée; *Phymatodes hastata* (Thunberg) Ching; *Phymatopsis chenkouensis* Ching; *P. hastata* (Thunberg) Kitagawa ex H. Itô; *P. hastata* f. *arenaria* (Baker) Ching; *P. hastata* f. *dolichopoda* (Diels) Ching; *P. hastata* f. *nikkoensis* (Christ ex Matsumura) H. Itô; *P. hastata* f. *pygmaea* (Maximowicz) H. Itô; *P. hastata* var. *pygmaea* (Maximowicz) Li & J. Z. Wang; *P. hastata* f. *simplex* (Christ) Ching; *P. hunyaensis* Ching; *P. rotunda* Ching; *P. shandongensis* J. X. Li & C. Y. Wang; *P. similis* Ching; *P. simplicifolia* Ching; *P. tarningensis* Ching; *Phymatopteris chenkouensis* (Ching) Pichi Sermolli; *P. hastata* (Thunberg) Pichi Sermolli; *P. hunyaensis* (Ching) Pichi Sermolli; *P. rotunda* (Ching) Pichi Sermolli; *P. simplicifolia* (Ching) Pichi Sermolli; *Pleopeltis hastata* (Thunberg) T. Moore; *Polypodium arenarium* Baker; *P. dolichopodum* Diels; *P. hastatum* var. *dolichopodum* (Diels) C. Christensen; *P. hastatum* var. *nikkoense* Christ ex Matsumura; *P. hastatum* f. *pygmaeum* Maximowicz; *P. hastatum* var. *simplex* Christ.

Rhizome 2–3 mm in diam., densely scaly throughout; scales reddish brown, lanceolate, ca. 5 mm, broad at peltate base, margin entire or sometimes sparsely toothed, apex long acuminate. Fronds monomorphic. Stipe straw-colored, 2–20 cm, 1–2 mm in diam., glabrous; lamina hastate or simple; simple lamina: ovate to linear or lanceolate, 2–20 × 1–2 cm, base cuneate or rounded, margin notched, apex acute or obtuse; hastate lamina: with 1 or 2 basal lateral lobes, sometimes one much longer than other, all lobes widest at base, apices acuminate. Costa and lateral veins distinct, veinlets obscure. Lamina papery or herbaceous, both surfaces glabrous, abaxial surface usually somewhat glaucous. Sori orbicular, large, 2–3 mm in diam., medial, superficial.

Terrestrial along paths on slopes, also on moss-covered rocks, common; near sea level to 800(–1200) m (in Taiwan). Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Japan, Korea, Philippines, Russia].

Small plants may become precociously fertile before they have developed the characteristic basal lamina lobes. Such plants have been described several times as distinct taxa.

16. Selliguea digitata (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

掌叶假瘤蕨 zhang ye jia liu jue

Basionym: *Phymatodes digitata* Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2(3): 77. 1933; *Crypsinus digitatus* (Ching) Tagawa; *Phymatopsis digitata* (Ching) Ching; *P. palmatifida* Ching & P. S. Chiu; *Phymatopteris digitata* (Ching) Pichi Sermolli; *Polypodium koi* C. Christensen.

Rhizome ca. 4 mm in diam., densely scaly throughout; scales light brown, lanceolate, ca. 5 mm, margin entire, apex acuminate. Fronds monomorphic. Stipe castaneous, 2–10 cm, scaly at base, glabrous upward; lamina palmately 2–5-lobed, 5–9 × 5–9 cm, base rounded, margin entire or undulate. Lobes linear, central lobe usually longer than lateral lobes, 5–10 × 1–1.2 cm, apex obtuse or acute. Costa distinct, lateral veins and veinlets obscure. Lamina herbaceous, both surfaces glabrous, abaxial surface glaucous, adaxial surface green. Sori orbicular, close to margin, superficial.

● Epiphytic on tree trunks on hill tops; 1000–1400 m. Guangdong, Guizhou, Zhejiang.

17. Selliguea dactylina (Christ) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

指叶假瘤蕨 zhi ye jia liu jue

Basionym: *Polypodium dactylinum* Christ, Bull. Soc. Bot. France 52(Mém. 1): 20. 1905; *Crypsinus dactylinus* (Christ) Tagawa; *Phymatodes dactylina* (Christ) Ching; *Phymatopsis dactylina* (Christ) Ching; *Phymatopteris dactylina* (Christ) Pichi Sermolli.

Rhizome 3–5 mm in diam., densely scaly throughout; scales yellowish brown, narrowly lanceolate, 5–7 mm, margin entire, apex long acuminate or setaceous. Fronds monomorphic. Stipe straw-colored, 7–10 cm, glabrous; lamina palmately 4–7-lobed, 10–20 × 10–15 cm, base cuneate or cordate, margin entire and slightly revolute. Lobes narrowly oblong, central lobe longer than lateral lobes, 5–10 × 1–1.5 cm, outermost lobes much shorter, apex obtuse or acute. Costa distinct, lateral veins and veinlets obscure. Lamina herbaceous, both surfaces glabrous, abaxial surface pale green, grayish when dried, adaxial surface green. Sori orbicular, medial or slightly close to margin.

● Epiphytic on tree trunks or on rocks; 1200–1400 m. Sichuan, Zhejiang.

18. Selliguea chenopus (Christ) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

鹅绒假瘤蕨 e rong jia liu jue

Basionym: *Polypodium chenopus* Christ, Bull. Soc. Bot.

France 52(Mém. 1): 20. 1905; *Phymatopteris chenopus* (Christ) S. G. Lu.

Rhizome 4–5 mm in diam., densely scaly throughout; scales dark brown or nearly black, gradually or abruptly narrowed upward, ca. 10 mm, broad at peltate base, margin setaceous from middle to apex. Fronds monomorphic. Stipe straw-colored, 10–15 cm, glabrous; lamina palmately 4–6-lobed, 10–20 × 10–15 cm, base cuneate or cordate, margin entire and slightly revolute. Lobes linear, central lobe longer than lateral lobes, 10–20 × 1–2 cm, apices acute or obtuse. Costa distinct, lateral veins and veinlets obscure. Lamina herbaceous, both surfaces glabrous, abaxial surface glaucous, adaxial surface green. Sori orbicular, medial or slightly close to margin.

● Epiphytic on tree trunks or on rocks; 1800–3400 m. Yunnan (Dêqên, Gongshan, Lijiang).

19. Selliguea trisecta (Baker) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 45. 2008.

三出假瘤蕨 san chu jia liu jue

Polypodium trisectum Baker, Bull. Misc. Inform. Kew 1898: 232. 1898; *Crypsinus hirsutus* Tagawa & K. Iwatsuki; *C. trisectus* (Baker) Tagawa; *Phymatodes trisecta* (Baker) Ching; *P. trisecta* var. *hirticarpa* Ching; *Phymatopsis trisecta* (Baker) Ching; *Phymatopteris trisecta* (Baker) Pichi Sermolli; *Polypodium podobasis* Christ.

Rhizome 3–4 mm in diam., densely scaly throughout; scales dark brown at center, paler toward margin, ovate-lanceolate, 4–5 × 1–1.5 mm, margin ciliate, apex acuminate. Fronds monomorphic. Stipe straw-colored, 6–12 cm, hairy throughout; lamina hastate to pinnatifid, 20–25 × 15–20 cm, base broadly cuneate or cordate, margins entire or undulate. Lateral lobes 1–3 pairs, ascending, broadly lanceolate, gradually narrowed from base to acuminate apex, apical lobe longer than lateral ones, 10–20 × 2–4 cm, ± contracted at base, apex acuminate. Costa raised on both surfaces, lateral veins distinct, veinlets obscure. Lamina herbaceous, both surfaces densely pubescent. Sori orbicular, large, medial or slightly close to costa.

Terrestrial in forests; 1600–2400 m. Guizhou (Weining), Sichuan, Yunnan [Myanmar, Thailand].

20. Selliguea oxyloba (Wallich ex Kunze) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 44. 2008.

尖裂假瘤蕨 jian lie jia liu jue

Polypodium oxylobum Wallich ex Kunze, Linnaea 24: 255. 1851; *Crypsinus kwangtungensis* (Ching) Tagawa; *C. oxylobus* (Wallich ex Kunze) Sledge; *C. pingpienensis* (Ching) Nakaike [*"pingpiensis"*]; *Phymatodes kwangtungensis* Ching; *P. oxyloba* (Wallich ex Kunze) C. Presl ex Ching; *Phymatopsis kwangtungensis* (Ching) Ching; *P. oxylobum* (Wallich ex Kunze) Ching; *P. pingpienensis* Ching; *P. suboxyloba* Ching; *P. trifida* (Beddome) J. Smith; *Phymatopteris kwangtungensis* (Ching) Pichi Sermolli; *P. oxyloba* (Wallich ex Kunze) Pichi Sermolli; *P. pingpienensis* (Ching) Pichi Sermolli; *P. suboxyloba* (Ching) Pichi Sermolli; *Pleopeltis oxyloba* (Wallich ex Kunze) Beddome; *P. trifida* Beddome; *Pleuridium oxylobum* (Wallich ex Kunze) J. Smith; *Polypodium hastatum* Thunberg var. *oxylobum* (Wallich ex Kunze) C. B. Clarke; *P. kwangtungense* (Ching) Ching ex C. Christensen; *P. longipes* Ching (1931), not Link ex Kuntze (1850), nor Fée (1872); *P. trifidum* D. Don (1825), not Withering (1796), nor Hoffmann (1790).

Rhizome 4–5 mm in diam., densely scaly throughout; scales brown at center, paler toward margin, lanceolate, ca. 5 mm, margin and sometimes surface ciliate, apex acuminate. Fronds monomorphic. Stipe straw-colored or light brown, usually 10–20 cm, densely scaly at base, glabrous upward; lamina trifid or pinnatifid, incised up to 5–15 mm from costa, 20–30 × 10–20 cm, base broadly cuneate, margin entire or undulate. Lateral lobes (1 or)2–5(–8) pairs, ascending, deltoid or broadly lanceolate, 10–15 × 1.5–5 cm, base sometimes slightly contracted, apex acuminate. Costa and lateral veins raised on both surfaces. Lamina papery, both surfaces glabrous. Sori orbicular, large, slightly closer to costa.

Epiphytic on rocks or on tree trunks in evergreen forests, or terrestrial; 1000–2700 m. Guangdong, Guangxi, Sichuan, Yunnan [N India, Myanmar, Nepal, Thailand, Vietnam].

The name *Polypodium oxylobum* was first introduced by Wallich (Numer. List, no. 294. 1829, nom. nud.).

Polypodium trifidum var. *catadromum* Christ (Notul. Syst. (Paris) 1(2): 33. 1909), described from W China, is of uncertain status and may belong here.

21. Selliguea likiangensis (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

丽江假瘤蕨 li jiang jia liu jue

Basionym: *Phymatopsis likiangensis* Ching, Acta Phytotax. Sin. 9: 190. 1964; *Crypsinus likiangensis* (Ching) Nakaike; *Phymatopteris likiangensis* (Ching) Pichi Sermolli.

Rhizome ca. 4 mm in diam., densely scaly; scales brown, lanceolate, margin and both surfaces with fibrous hairs, apex acuminate. Fronds monomorphic. Stipe light brown, ca. 15 cm, glabrous; lamina pinnate near base, upper part pinnatisect, 20–25 × 15–20 cm, base cordate, margin entire. Lateral pinnae/lobes usually 3 or 4 pairs, ovate-lanceolate, 10–12 × 2–3 cm, base contracted, widest at middle, apex acuminate. Costa and lateral veins distinct, veinlets obscure. Lamina papery, both surfaces glabrous. Sori orbicular, in 1 row or 2 irregular rows on either side of costa, slightly closer to costa.

● Epiphytic on rocks in forests; ca. 2400 m. Yunnan (Lijiang).

22. Selliguea trilobus (Houttuyn) M. G. Price, Contr. Univ. Michigan Herb. 17: 276. 1990.

三指假瘤蕨 san zhi jia liu jue

Polypodium trilobum Houttuyn, Nat. Hist. 14: 148. 1783; *Crypsinus trilobus* (Houttuyn) Copeland; *Phymatodes triloba* (Houttuyn) Ching; *P. triphylla* (Jacquin) C. Christensen & Tardieu; *Phymatopsis triloba* (Houttuyn) Ching; *Phymatopteris triloba* (Houttuyn) Pichi Sermolli; *Pleopeltis incurvata* (Blume) T. Moore; *Polypodium incurvatum* Blume; *P. triphyllum* Jacquin.

Rhizome 3–4 mm in diam., densely scaly throughout; scales castaneous at center, paler brown toward margin, ovate-lanceolate, rounded at peltate base, margin entire, apex acumi-

nate. Fronds dimorphic, rarely intermediate with upper part fertile, lower part sterile. Sterile fronds: stipe light brown, 10–20 cm, glabrous; lamina trilobate or pinnatifid, subdeltoid, rarely simple, 10–20 × 10–15 cm, margin entire; lateral lobes 1–3 pairs, ascending, broadly lanceolate, apical lobe broader, up to 4–5 cm wide; 12–15 × 2–3 cm, apex acute or obtuse; costa raised, lateral veins distinct, veinlets hardly visible. Lamina leathery, both surfaces glabrous. Fertile fronds: stipe 20–30 cm; lamina trilobate or pinnatisect with 2–4 pairs of lateral lobes; rachis narrowly winged or wingless in lower parts; lobes contracted, linear, less than 1 cm wide, apex acuminate. Sori sunken in deep cavities on abaxial side, raised on adaxial surface.

Epiphytic on tree trunks or on rocks; below 1300 m. Hainan [Indonesia, Malaysia, Philippines, Thailand, Vietnam].

23. Selliguea cruciformis (Ching) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 46. 2008.

十字假瘤蕨 shi zi jia liu jue

Polypodium cruciforme Ching, Sinensia 1: 47. 1930; *Crypsinus cruciformis* (Ching) Tagawa; *Phymatodes cruciformis* (Ching) Ching; *Phymatopsis cruciformis* (Ching) Ching; *Phymatopteris cruciformis* (Ching) Pichi Sermolli.

Rhizome 2–3 mm in diam., densely scaly throughout; scales light brown or glaucous, lanceolate, ca. 4 × 1 mm, margin entire or subentire, apex acuminate, long subulate. Fronds monomorphic. Stipe straw-colored, 2–5 cm, scaly at base, glabrous upward; lamina 3 or 5(–7)-lobed, ca. 10 × 7.5 cm, base cuneate, margin minutely notched between veins, apex obtuse; basal lobes spreading, other lateral lobes slightly smaller and ascending, subdeltoid, gradually narrowed from base to acute apex; terminal lobe large, up to 8 × 2 cm, apex rounded. Costa and lateral veins raised on both surfaces, veinlets hardly visible. Lamina papery, both surfaces glabrous, abaxial surface glaucous. Sori orbicular, in single row distal on lobes, slightly nearer to margin, sunken on abaxial surface and raised on adaxial surface.

Epiphytic on tree trunks in evergreen broad-leaved forests on hill tops. Guangdong (Longtoushan) [N Vietnam].

24. Selliguea hirtella (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

昆明假瘤蕨 kun ming jia liu jue

Basionym: *Phymatopsis hirtella* Ching, Acta Phytotax. Sin. 9: 191. 1964; *Crypsinus hirtellus* (Ching) X. Cheng; *Phymatopteris hirtella* (Ching) Pichi Sermolli.

Rhizome 3–4 mm in diam., densely scaly; scales brown at central part, paler toward edges, ovate-lanceolate, ca. 4 × 1–1.5 mm, margin and abaxial surface whitish ciliate. Fronds monomorphic. Stipe straw-colored, 8–10 cm, sparsely hairy; lamina pinnatisect, 20–25 × 15–20 cm, base cordate, margin undulate and notched. Lateral lobes 4–6 pairs, ascending, lanceolate, 6–8 × 1–2 cm, apex acuminate. Costa and lateral veins distinct, veinlets obscure. Lamina herbaceous, both surfaces pubescent. Sori orbicular, large, medial.

● Terrestrial in *Pinus yunnanensis* forests; 2000–2100 m. Yunnan (Kunming, Yuanmou).

25. Selliguea taeniata (Swartz) Parris in J. H. Beaman et al., Pl. Mt. Kinabalu, 152. 1992.

镰羽假瘤蕨 lian yu jia liu jue

Polypodium taeniatum Swartz, J. Bot. (Schrader) 1800(2): 26. 1801; *Crypsinus taeniatus* (Swartz) Copeland; *C. taeniatus* var. *palmatus* (Blume) Tagawa; *Phymatodes falcatopinnata* (Hayata) Ching; *Phymatopsis falcatopinnata* (Hayata) H. Itô; *P. palmata* (Blume) J. Smith; *P. taeniata* (Swartz) Ching; *P. taeniata* var. *palmata* (Blume) Ching; *Phymatopteris falcatopinnata* (Hayata) S. G. Lu; *P. palmata* (Blume) Pichi Sermolli; *P. taeniata* (Swartz) Pichi Sermolli; *P. taeniata* var. *palmata* (Blume) Parris; *Polypodium falcatopinnatum* Hayata; *P. palmatum* Blume; *Selliguea falcatopinnata* (Hayata) H. Ohashi & K. Ohashi; *S. taeniata* var. *palmata* (Blume) Parris.

Rhizome ca. 5 mm in diam., densely scaly; scales reddish brown or turning darker when old, lanceolate, broad at peltate base, margin entire or remotely denticulate, apex acuminate and hair-tipped. Fronds monomorphic, 25–50 × 20–30 cm. Stipe straw-colored, 15–20 cm; lamina pinnatisect, base cordate, margin notched or subentire. Lateral lobes/pinnae 2 or 3 pairs, opposite, linear-lanceolate, 12–15 × 1–1.5 cm, ascending at base, falcate (bending downward) at upper portion, apex acuminate. Costa and lateral veins distinct, veinlets obscure. Lamina herbaceous, both surfaces glabrous. Sori orbicular, large, slightly closer to costa.

100–700 m. Taiwan (Lan Yu, Pingdong) [Brunei, Indonesia, Malaysia, Philippines].

26. Selliguea kingpingensis (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

金平假瘤蕨 jin ping jia liu jue

Basionym: *Phymatopsis kingpingensis* Ching, Acta Phytotax. Sin. 9: 191. 1964; *Phymatopteris kingpingensis* (Ching) Pichi Sermolli.

Rhizome 3–4 mm in diam., with whitish bloom, sparsely scaly; scales black, lanceolate, margin whitish ciliate, apex acuminate. Fronds monomorphic. Stipe straw-colored to light brown, 10–15 cm, glabrous; lamina pinnatisect, 10–30 × 15–20 cm, base rounded, margin sparsely notched. Lateral lobes 1–8 pairs, lanceolate, 8–10 × 1–1.5 cm, base usually contracted, apex acuminate. Lateral veins distinct, veinlets obscure. Lamina herbaceous, both surfaces glabrous. Sori orbicular, slightly nearer to costa.

● Epiphytic on tree trunks in evergreen broad-leaved forests; 2000–2100 m. Yunnan (Jingping).

27. Selliguea connexa (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

耿马假瘤蕨 geng ma jia liu jue

Basionym: *Phymatodes connexa* Ching, Bull. Fan Mem. Inst. Biol., n.s., 1: 306. 1949; *Crypsinus connexus* (Ching) X. Cheng; *Phymatopsis connexa* (Ching) Ching; *Phymatopteris*

connexa (Ching) Pichi Sermolli; *Pichisermollia connexa* (Ching) Fraser-Jenkins; *Pichisermollodes connexa* (Ching) Fraser-Jenkins.

Rhizome ca. 3 mm in diam., densely scaly; scales yellowish brown, lanceolate, ca. 5 mm, margin entire, apex acuminate. Fronds monomorphic. Stipe straw-colored, 5–10 cm, glabrous; lamina pinnatisect, 15–20 × 10–15 cm, base broadly cuneate, margin notched. Lateral lobes usually 2–4 pairs, ascending, lanceolate, 5–8 cm × 8–12 mm, apex acuminate. Costa distinct, lateral veins and veinlets obscure. Lamina herbaceous, both surfaces glabrous. Sori orbicular, medial.

● Epiphytic on tree trunks in forests; 2500–3000 m. Yunnan.

28. Selliguea daweishanensis (S. G. Lu) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

大围山假瘤蕨 da wei shan jia liu jue

Basionym: *Phymatopteris daweishanensis* S. G. Lu, Fl. Reipubl. Popularis Sin. 6(2): 348. 2000; *Crypsinus daweishanensis* (S. G. Lu) X. Cheng.

Rhizome 3–4 mm in diam., densely scaly; scales whitish, lanceolate, margin with long whitish cilia, apex acuminate. Fronds close or remote, monomorphic. Stipe dark straw-colored, 8–10 cm, glabrous; lamina pinnatisect, ovate, 15–17 × 15–17 cm, base broadly cuneate to truncate, margin notched. Lateral lobes 3 or 4 pairs, lanceolate, 10–15 × 1–2 cm, base slightly contracted, apex acute or obtuse. Costa and lateral veins distinct, veinlets obscure. Lamina herbaceous, both surfaces glabrous, pale green. Sori orbicular, large, very near margins.

● Epiphytic on tree branches in evergreen broad-leaved forests; ca. 1600 m. Yunnan (Daweishan, Pingbian).

29. Selliguea ebenipes (Hooker) S. Lindsay, Edinburgh J. Bot. 66: 356. 2009.

黑鳞假瘤蕨 hei lin jia liu jue

Rhizome 3–6 mm in diam., very densely scaly; scales black at center, castaneous or dark brown at margin, ovate-lanceolate, ca. 5 mm, stiff, margin ciliate, apex acute. Fronds monomorphic. Stipe straw-colored to light purplish, often inserted on pseudopodium 5–15 cm, densely scaly at base, more sparsely scaly upward; lamina pinnatisect to within 1–5 mm of costa, ovate in outline, 20–30(–50) × 8–25 cm, base cordate, margin notched. Lateral lobes usually 3–10 pairs, lower 1 or 2 pairs deflexed, others spreading or ascending, lanceolate, 5–15 × 1–2 cm, apex acuminate. Costa and lateral veins distinct, veinlets obscure. Lamina herbaceous, abaxial surface pale green and sparsely scaly, scales brown or light brown, ovate, thin, mainly along costa, adaxial surface green, glabrous or papillate-pubescent on costa and main veins. Sori orbicular, slightly near costa.

Terrestrial or epiphytic on tree trunks or on rocks; 1900–3500 m. Hunan, Sichuan, Xizang, Yunnan [Bhutan, NE India, Nepal, Thailand].

1a. Rachis and costae glabrous ..... 29a. var. *ebenipes*
1b. Rachis and costae pubescent ..... 29b. var. *oakesii*

29a. Selliguea ebenipes var. **ebenipes**

黑鳞假瘤蕨(原变种) hei lin jia liu jue (yuan bian zhong)

Polypodium ebenipes Hooker, Sp. Fil. 5: 88. 1864; *Crypsinus ebenipes* (Hooker) Copeland; *C. ebenipes* var. *subebenipes* (Ching) K. Iwatsuki et al.; *C. nepalensis* Nakaike; *Phymatodes ebenipes* (Hooker) Ching; *Phymatopsis ebenipes* (Hooker) J. Smith; *P. subebenipes* Ching; *Phymatopteris ebenipes* (Hooker) Pichi Sermolli; *P. nepalensis* (Nakaike) Subh. Chandra; *P. subebenipes* (Ching) Pichi Sermolli; *Pichisermollia ebenipes* (Hooker) Fraser-Jenkins; *P. subebenipes* (Ching) Fraser-Jenkins; *Pichisermollodes ebenipes* (Hooker) Fraser-Jenkins; *P. subebenipes* (Ching) Fraser-Jenkins; *Pleopeltis ebenipes* (Hooker) Beddome.

Rachis and costae glabrous.

Terrestrial or epiphytic on tree trunks or on rocks; 1900–3200 m. Hunan, Sichuan, Xizang, Yunnan [Bhutan, NE India, Nepal, Thailand].

Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 49. 2008) treated *Phymatopsis subebenipes* as a distinct species (*Pichisermollia subebenipes*), including within it *Polypodium ebenipes* var. *oakesii* below.

29b. Selliguea ebenipes var. **oakesii** (C. B. Clarke) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

毛轴黑鳞假瘤蕨 mao zhou hei lin jia liu jue

Basionym: *Polypodium ebenipes* var. *oakesii* C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 564. 1880; *Phymatopteris ebenipes* var. *oakesii* (C. B. Clarke) Satija & Bir.

Rachis and costae pubescent.

Epiphytic on rocks; 2300–3500 m. Xizang, Yunnan [NE India].

30. Selliguea echinospora (Tagawa) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 46. 2008.

大叶玉山假瘤蕨 da ye yu shan jia liu jue

Phymatodes echinospora Tagawa, Acta Phytotax. Geobot. 3: 95. 1934; *Crypsinus echinosporus* (Tagawa) Tagawa; *Phymatopsis echinospora* (Tagawa) H. Itô; *Phymatopteris echinospora* (Tagawa) Pichi Sermolli.

Rhizome 8–12 mm in diam., densely scaly throughout; scales dark brown at center, brown at margin, lanceolate, 6–7 × ca. 1 mm, rounded at base, margin entire, apex acuminate. Fronds monomorphic. Stipe straw-colored, 5–15 cm, glabrous; lamina pinnatisect, 15–20 × 10–15 cm, base truncate or cordate, margin notched. Lateral lobes 5–11 pairs, lowest pair not or only slightly deflexed, upper pairs spreading, linear-lanceolate, 5–10 cm × 8–18 mm, apex acuminate. Costa and lateral veins distinct, raised on both surfaces, veinlets obscure. Lamina herbaceous, both surfaces glabrous. Sori orbicular, large, medial or slightly closer to margin, sunken in cavities on abaxial surface and raised on adaxial surface.

● Epiphytic on tree trunks or on rocks; 1300–2400 m. Taiwan.

31. Selliguea quasidivaricata (Hayata) H. Ohashi & K. Ohashi, J. Jap. Bot. 84: 307. 2009.

展羽假瘤蕨 zhan yu jia liu jue

Polypodium quasidivaricatum Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 446. 1911; *Crypsinus intermedius* (Ching) Tagawa; *C. quasidivaricatus* (Hayata) Copeland; *Phymatodes intermedia* Ching; *P. quasidivaricata* (Hayata) Ching; *Phymatopsis intermedia* (Ching) Ching; *P. quasidivaricata* (Hayata) H. Itô; *Phymatopteris intermedia* (Ching) Pichi Sermolli; *P. quasidivaricata* (Hayata) Pichi Sermolli; *Pichisermollia quasidivaricata* (Hayata) Fraser-Jenkins; *Pichisermollodes quasidivaricata* (Hayata) Fraser-Jenkins; *Polypodium divaricatum* Hayata (1909), not E. Fournier (1872); *P. morianum* C. Christensen.

Rhizome ca. 3 mm in diam., densely scaly throughout; scales castaneous at center, brown or light brown at margin, linear-lanceolate, ca. 5 × 1 mm, margin long ciliate, apex acuminate. Fronds monomorphic. Stipe straw-colored, 5–10 cm, glabrous; lamina pinnatisect, 10–20 × 5–15 cm, base cordate, margin notched or serrulate. Lateral lobes 2–5 pairs, lowest pair usually much deflexed, upper pairs spreading or ascending, linear-lanceolate, 5–7 × 1–1.5 cm, base slightly contracted, apex acuminate. Costa and lateral veins distinct on both surfaces, veinlets obscure. Lamina herbaceous, both surfaces glabrous. Sori orbicular, slightly near costa, superficial.

● Epiphytic on tree trunks or on rocks in forests; (1000–)2600–3200 m. Taiwan.

Selliguea quasidivaricata is very close to *S. laciniata* (Beddome) Hovenkamp, which is widely distributed from Thailand to New Guinea.

The name *Phymatopteris quasidivaricata* has been applied erroneously to a number of specimens from high mountains in Yunnan and possibly other provinces on the mainland. De Vol and C. M. Kuo (in H. L. Li et al., Fl. Taiwan 1: 177. 1975) misidentified material of this species as *Crypsinus veitchii* (Baker) Copeland.

32. Selliguea albipes (C. Christensen & Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

灰鳞假瘤蕨 hui lin jia liu jue

Basionym: *Polypodium albipes* C. Christensen & Ching, Bull. Dept. Biol. Sun Yatsen Univ. 6: 15. 1933 [*"albopes"*]; *Crypsinus albipes* (C. Christensen & Ching) Tagawa; *C. chinensis* (Ching) Tagawa; *Phymatodes albipes* (C. Christensen & Ching) Ching; *P. chinensis* Ching; *Phymatopsis albipes* (C. Christensen & Ching) Ching; *Phymatopteris albipes* (C. Christensen & Ching) Pichi Sermolli; *Pichisermollodes albipes* (C. Christensen & Ching) Fraser-Jenkins.

Rhizome 4–5 mm in diam., densely scaly throughout; scales whitish to light brown, dark when older, linear-lanceolate, 6–7 mm, margin entire, apex acuminate. Fronds monomorphic. Stipe light brown, 8–12 cm, glabrous; lamina pinnatisect, 20–25 × 10–15 cm, base truncate or cordate, margin notched. Lateral lobes 8–10 pairs, lowest pair deflexed, upper pairs spreading or ascending, lanceolate, 5–8 × 1–1.5 cm, apex acuminate. Costa distinct and raised on both surfaces, lateral veins and veinlets obscure. Lamina papery, both surfaces glabrous. Sori orbicular, near or slightly near edges, sunken on abaxial surface and raised on adaxial surface.

● Epiphytic on tree trunks. Fujian, Guangdong, Guangxi (Yaoshan), Hunan, Jiangxi, Yunnan.

33. Selliguea pianmaensis (W. M. Chu) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

片马假瘤蕨 pian ma jia liu jue

Basionym: *Phymatopteris pianmaensis* W. M. Chu, Acta Bot. Yunnan., Suppl. 5: 56. 1992; *Crypsinus pianmaensis* (W. M. Chu) X. Cheng.

Rhizome 4–5 mm in diam., densely scaly throughout; scales brown at peltate center, whitish on other parts, lanceolate, ca. 10 × 2 mm, margin entire, apex acuminate. Fronds monomorphic. Stipe straw-colored, 5–10 cm, glabrous; lamina pinnatisect, or partly pinnate with free lower lobes, 10–20 × 5–12 cm, base truncate or cordate, margin sparsely notched. Lateral lobes 5–8 pairs, lowest pair deflexed, upper pairs spreading, slightly contracted at base, lanceolate, 2–6 × 1–1.8 cm, apex obtuse. Costa distinct, lateral veins slender, hardly visible, veinlets obscure. Lamina herbaceous, both surfaces pubescent. Sori orbicular, slightly nearer to costa.

● Epiphytic on tree trunks or on rocks; ca. 2100 m. Yunnan (Lushui, Pingbian).

34. Selliguea nigrovenia (Christ) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

毛叶假瘤蕨 mao ye jia liu jue

Basionym: *Polypodium shensiense* Christ var. *nigrovenium* Christ, Bull. Acad. Int. Géogr. Bot. 16: 106. 1906; *Crypsinus nigrovenius* (Christ) K. Iwatsuki; *Phymatodes nigrovenia* (Christ) Ching; *Phymatopsis laipoensis* Ching; *P. nigrovenia* (Christ) Ching; *Phymatopteris laipoensis* (Ching) Pichi Sermolli; *P. nigrovenia* (Christ) Pichi Sermolli; *Pichisermollia nigrovenia* (Christ) Fraser-Jenkins; *Pichisermollodes nigrovenia* (Christ) Fraser-Jenkins; *Polypodium nigrovenium* (Christ) Ching (1930), not Christ (1896); *P. veitchii* Baker var. *nigrovenium* (Christ) Takeda.

Rhizome ca. 2 mm in diam., with whitish bloom, sparsely scaly; scales black or dark brown on young parts, lanceolate, ca. 3 mm, margin sparsely ciliate, apex acuminate. Fronds monomorphic. Stipe straw-colored, 4–6 cm, slender, glabrous; lamina pinnatisect, 8–10 × 5–6 cm, base shallowly cordate, margin shallowly serrate. Lateral lobes 3–5 pairs, lowest pair deflexed, lanceolate, 3–4 × ca. 1 cm, base usually contracted, apex obtuse or acute. Veins distinct on both surfaces, lateral veins tortuous. Lamina papery, abaxial surface glabrous, adaxial surface pubescent. Sori orbicular, near costa.

● Epiphytic on tree trunks or on rocks; 2500–3300 m. Hubei, Sichuan (Emei Shan), Yunnan.

35. Selliguea incisocrenata (Ching ex W. M. Chu & S. G. Lu) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

圆齿假瘤蕨 yuan chi jia liu jue

Basionym: *Phymatopteris incisocrenata* Ching ex W. M. Chu & S. G. Lu, Fl. Reipubl. Popularis Sin. 6(2): 348. 2000; *Crypsinus incisocrenatus* (Ching ex W. M. Chu & S. G. Lu) X. Cheng.

Rhizome ca. 2 mm in diam., with whitish bloom, scaly; scales dark brown, lanceolate, ca. 4 mm, margin ciliate, apex acuminate. Fronds monomorphic. Stipe straw-colored, 10–15 cm, glabrous; lamina pinnatipartite, 12–15 × 10–12 cm, base shallowly cordate, margin crenate-serrate. Lateral lobes 4–7 pairs, lowest pair deflexed, upper pairs spreading or ascending, lanceolate, 4–6 × 1.5–2 cm, apex acute. Veins distinct on both surfaces, lateral veins tortuous. Lamina papery, abaxial surface glabrous, adaxial surface pubescent. Sori orbicular, near costa.

● Epiphytic on tree trunks or on rocks; 2500–3100 m. Yunnan.

36. Selliguea senanensis (Maximowicz) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

陕西假瘤蕨 shan xi jia liu jue

Basionym: *Polypodium senanense* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 3, 31: 121. 1887; *Crypsinus shensiensis* (Christ) X. Cheng; *Phymatopsis shensiensis* (Christ) Ching; *P. veitchii* (Baker) H. Itô var. *filipes* (Christ) H. Itô; *Phymatopteris shensiensis* (Christ) Pichi Sermolli; *Polypodium shensiense* Christ; *P. shensiense* var. *filipes* Christ.

Rhizome 1.5–2 mm in diam., densely scaly throughout; scales brown or dark brown at peltate base, ovate-lanceolate, margin sparsely ciliate, apex acuminate. Fronds monomorphic. Stipe straw-colored or dark stramineous, 2–5 cm, slender, glabrous; lamina pinnatisect, 5–10 × 5–7 cm, base truncate or shallowly cordate, margin shallowly serrate. Lateral lobes 2–5 pairs, lowest pair slightly deflexed at base, 2–3 × ca. 1 cm, base usually contracted, apex obtuse or acute. Costa and lateral veins distinct on both surfaces, veinlets hardly visible. Lamina herbaceous, both surfaces glabrous, grayish green. Sori orbicular, slightly nearer to costa.

Epiphytic on tree trunks or on rocks, rarely terrestrial; 1300–3600 m. Henan, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Japan].

Crypsinus veitchii (Baker) Copeland from Japan and Korea is closely related to *Selliguea senanensis*, but the lamina lacks the deflexed basal lobes (Iwatsuki, Fl. Japan, as *Crypsinus veitchii*, http://foj.c.u-tokyo.ac.jp/gbif/foj/; accessed 4 Feb 2012).

37. Selliguea crenatopinnata (C. B. Clarke) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

紫柄假瘤蕨 zi bing jia liu jue

Basionym: *Polypodium crenatopinnatum* C. B. Clarke, J. Linn. Soc., Bot. 25: 99. 1889 [*"crenato-pinnatum"*]; *Phymatodes crenatopinnata* (C. B. Clarke) Ching; *Phymatopsis crenatopinnata* (C. B. Clarke) Ching; *Phymatopteris crenatopinnata* (C. B. Clarke) Pichi Sermolli; *Pichisermollia crenatopinnata* (C. B. Clarke) Fraser-Jenkins; *Pichisermollodes crenatopinnata* (C. B. Clarke) Fraser-Jenkins; *Pleopeltis crenatopinnata* (C. B. Clarke) Beddome; *Polypodium connatum* Christ; *P. pseudoserratum* Christ.

Rhizome ca. 2 mm in diam., densely scaly throughout; scales black at center, brown at margin, lanceolate, 2–3 mm, margin ciliate, apex acuminate. Fronds monomorphic. Stipe purplish or castaneous, 10–20 cm, glabrous; lamina pinnately (to partially bipinnately) divided almost to midrib, deltoid-ovate in outline, 5–20 × 5–10 cm, base truncate. Lateral lobes 3–8 pairs, far apart, 5–10 × 0.5–1.2 cm, base distinctly contracted, decurrent into very narrowly winged rachis, margin very shallowly crenate to irregularly incised or lobed, sometimes quite deeply lobed in more basal lobes, apex acute or obtuse. Veins distinct, veinlets usually obscure. Lamina papery, both surfaces glabrous. Sori orbicular or elliptic, medial or slightly nearer to costa.

Terrestrial in forests; 1900–2900 m. Guangxi, Guizhou, Hunan, Sichuan, Xizang, Yunnan [NE India].

38. Selliguea glaucopsis (Franchet) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

刺齿假瘤蕨 ci chi jia liu jue

Basionym: *Polypodium glaucopsis* Franchet, Bull. Soc. Bot. France 32: 29. 1885; *Crypsinus glaucopsis* (Franchet) Tagawa; *Phymatodes veitchii* (Baker) Ching var. *glaucopsis* (Franchet) Ching; *Phymatopsis glaucopsis* (Franchet) Ching; *Phymatopteris glaucopsis* (Franchet) Pichi Sermolli; *Pleopeltis glaucopsis* (Franchet) Beddome; *Polypodium veitchii* Baker var. *glaucopsis* (Franchet) C. Christensen ex Handel-Mazzetti.

Rhizome ca. 2 mm in diam., densely scaly throughout; scales castaneous at center, brown at margin, lanceolate, 2–3 mm, margin ciliate, apex acuminate. Fronds monomorphic. Stipe brown, 5–15 cm, glabrous; lamina pinnatisect, 7–15 × 5–10 cm, base cordate, margin sharply serrulate. Lateral lobes 2 or 3 pairs, closely spaced, 3–5 × 1–2 cm, contracted at base, widest at middle, apex obtuse. Lateral veins tortuous, not ending at margin, veinlets distinct. Lamina papery, both surfaces glabrous. Sori orbicular, slightly near costa.

Terrestrial or epiphytic on rocks; 2700–3700 m. Sichuan, Yunnan [N India].

39. Selliguea conmixta (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

钝羽假瘤蕨 dun yu jia liu jue

Basionym: *Phymatodes conmixta* Ching, Bull. Fan Mem. Inst. Biol., n.s., 1: 307. 1949; *Crypsinus conmixtus* (Ching) X. Cheng; *Phymatopsis conmixta* (Ching) Ching; *Phymatopteris conmixta* (Ching) Pichi Sermolli.

Rhizome ca. 2 mm in diam., densely scaly throughout; scales light brown on young parts, dark brown when older, lanceolate, margin ciliate, apex acuminate. Fronds monomorphic. Stipe purplish, 5–10 cm, glabrous; lamina partly pinnate, upper part pinnatisect, 10–15 × 5–8 cm, base shallowly cordate, margin densely serrulate or duplicate-serrulate. Lateral lobes 5–7 pairs, far apart, linear, 3–5 × 0.5–1 cm, usually not contracted at base, apex obtuse. Costa and lateral veins distinct, veinlets hardly visible. Lamina herbaceous, both surfaces glabrous. Sori elliptic or orbicular, medial or slightly nearer to costa.

● Terrestrial or epiphytic on rocks in forests; 3100–3600 m. Sichuan, Yunnan.

40. Selliguea stracheyi (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

斜下假瘤蕨 xie xia jia liu jue

Basionym: *Phymatodes stracheyi* Ching, Contr. Inst. Bot. Natl. Acad. Peiping 2(3): 83. 1933; *Crypsinus stracheyi* (Ching) Panigrahi & Patnaik; *Phymatopsis stracheyi* (Ching) Ching; *Phymatopteris stracheyi* (Ching) Pichi Sermolli; *Polypodium stracheyi* (Ching) Ching ex C. Christensen.

Rhizome ca. 3 mm in diam., densely scaly throughout; scales castaneous at center, brown at margin and apex, lanceolate, margin ciliate, apex acuminate. Fronds monomorphic. Stipe straw-colored, 5–8 cm, glabrous; lamina pinnatisect, 10–12 × 10–12 cm, base cordate, margin serrulate, not or only very shallowly notched. Lateral lobes 2–4 pairs, lowest pair ± deflexed, lanceolate, 5–7 × 1–1.5 cm, widest at base, narrowed from base, apex acuminate. Lateral veins distinct, veinlets obscure. Lamina herbaceous, both surfaces glabrous. Sori orbicular, near costa.

Epiphytic on tree trunks; 2800–3700 m. Hubei, Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal].

Baker (J. Bot. 1889: 177. 1889) treated material of this species (*Selliguea stracheyi*) as *Polypodium malacodon* Hooker; C. B. Clarke (Trans. Linn. Soc. London, Bot. 1: 563. 1880) included material of this species within *Polypodium stewartii* (Beddome) Baker.

41. Selliguea conjuncta (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

交连假瘤蕨 jiao lian jia liu jue

Basionym: *Phymatopsis conjuncta* Ching, Acta Phytotax. Sin. 9: 196. 1964; *P. wuyishanica* Ching & K. H. Shing; *Phymatopteris conjuncta* (Ching) Pichi Sermolli.

Rhizome ca. 3 mm in diam., densely scaly throughout; scales usually black at center, brown or pale brown at margin, lanceolate, 4–5 mm, margin ciliate, apex acuminate. Fronds monomorphic. Stipe straw-colored, 5–10 cm, glabrous; lamina pinnatisect, 10–15 × 6–12 cm, base cordate, margin sharply serrate. Lateral lobes 2–4 pairs, lowest pair deflexed, ovate-lanceolate, 5–8 × 1.5–2 cm, base slightly contracted, usually broadest at middle, apex acute or obtuse. Lateral veins distinct, veinlets obscure. Lamina herbaceous, both surfaces glabrous. Sori orbicular, near costa.

● Epiphytic on tree trunks or on rocks; 1500–3600 m. Anhui, Fujian, Guangxi, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, Xizang, Yunnan.

42. Selliguea stewartii (Beddome) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

尾尖假瘤蕨 wei jian jia liu jue

Basionym: *Pleopeltis stewartii* Beddome, Ferns Brit. India 1: 204. 1866; *Crypsinus stewartii* (Beddome) Copeland; *Phymatodes stewartii* (Beddome) Ching; *Phymatopsis stewartii* (Beddome) Ching; *Phymatopteris stewartii* (Beddome) Pichi Sermolli; *Pichisermollia stewartii* (Beddome) Fraser-Jenkins; *Pichisermollodes stewartii* (Beddome) Fraser-Jenkins; ?*Polypodium cyrtolobum* J. Smith ex C. B. Clarke; ?*P. malacodon* Hooker var. *majus* J. Smith ex Hooker; *P. stewartii* (Beddome) Baker.

Rhizome 3–4 mm in diam., with whitish bloom, scaly; scales uniformly castaneous or black, lanceolate, acumen whitish ciliate. Fronds remote or close. Stipe light brown, 7–10 cm, glabrous; lamina pinnatisect, 15–30 × 10–18 cm, base rounded or shallowly cordate, margin regularly obtusely serrate, rarely basal lobe forked. Lateral lobes 2–4 pairs, 10–15 × 1–2 cm, spreading and slightly contracted at base, from middle part curved toward apex of lamina, apex caudate-acuminate. Lateral veins distinct, not reaching margin, veinlets obscure. Lamina herbaceous, both surfaces glabrous. Sori orbicular, near costa.

Epiphytic on tree trunks or on rocks; 2400–3000 m. Sichuan, Xizang, Yunnan [N India, Nepal].

43. Selliguea nigropaleacea (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

乌鳞假瘤蕨 wu lin jia liu jue

Basionym: *Phymatopsis nigropaleacea* Ching, Acta Phytotax. Sin. 9: 196. 1964; *Crypsinus nigropaleaceus* (Ching) Nakaike; *Phymatopteris nigropaleacea* (Ching) S. G. Lu; *P. stewartii* (Beddome) Pichi Sermolli var. *nigropaleacea* (Ching) X. Cheng.

Rhizome 3–4 mm in diam., with whitish bloom, scaly; scales black, lanceolate, 4–5 mm, margin densely whitish ciliate, apex acuminate. Fronds close or remote. Stipe light purplish, 5–10 cm, glabrous; lamina pinnatisect, or partly pinnate with free lower lobes, 15–35 × 7–15 cm, base rounded, margin stramineous, sharply duplicate-serrate, 3–5-toothed between adjacent lateral veins. Lateral lobes 4–9 pairs, lanceolate, 5–8 × 1–1.5 cm, curved toward apex of lamina, apex acuminate. Lateral veins distinct, ending before margin, veinlets obscure. Lamina herbaceous, both surfaces glabrous. Sori orbicular, slightly nearer to costa.

● Epiphytic on tree trunks or on rocks; 2600–3800 m. Sichuan, Yunnan.

44. Selliguea roseomarginata (Ching) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

紫边假瘤蕨 zi bian jia liu jue

Basionym: *Phymatodes roseomarginata* Ching, Bull. Fan Mem. Inst. Biol., n.s., 1: 305. 1949 [*"roseo-marginata"*]; *Phymatopsis roseomarginata* (Ching) Ching; *Phymatopteris roseomarginata* (Ching) Pichi Sermolli.

Rhizome ca. 3 mm in diam., with whitish bloom, scaly; scales black, lanceolate, margin whitish ciliate, apex acuminate. Fronds remote or close. Stipe light brown, 2–4 cm, slender, glabrous; lamina pinnatisect, 5–10 × 5–7 cm, base rounded or broadly cuneate, margin densely sharply serrulate, cartilaginous, usually purple or reddish. Lateral lobes 2 or 3 pairs, curving toward apex of lamina, 2–4 × 0.5–1 cm, base decurrent, apex acuminate or caudate. Lateral veins distinct, ending before margin, veinlets obscure. Lamina herbaceous, both surfaces glabrous. Sori orbicular, medial.

● Epiphytic on tree trunks or on rocks; ca. 3200 m. Yunnan.

45. Selliguea tibetana (Ching & S. K. Wu) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

西藏假瘤蕨 xi zang jia liu jue

Basionym: *Phymatopsis tibetana* Ching & S. K. Wu, Fl. Xizang. 1: 325. 1983; *Crypsinus tibetanus* (Ching & S. K. Wu) Nakaike; *Phymatopteris tibetana* (Ching & S. K. Wu) W. M. Chu; *Pichisermollia tibetana* (Ching & S. K. Wu) Fraser-Jenkins; *Pichisermollodes tibetana* (Ching & S. K. Wu) Fraser-Jenkins.

Rhizome 3–4 mm in diam., densely scaly throughout; scales black at peltate center, reddish brown on other parts, ovate-lanceolate, margin ciliate, apex acuminate. Fronds monomorphic. Stipe light purplish, 15–20 cm, glabrous; lamina pinnatisect, oblong-deltoid, 15–20 × 15–18 cm, base truncate or shallowly cordate, margin shallowly serrate. Lateral lobes 3–6 pairs, lanceolate, 8–10 × 1.5–2 cm, apex acuminate. Lateral veins distinct on both surfaces and ending at margin, veinlets hardly visible. Lamina herbaceous, both surfaces glabrous, abaxial surface pale green. Sori orbicular, near costa.

● Epiphytic on tree trunks; 2400–3400 m. Xizang, Yunnan.

46. Selliguea malacodon (Hooker) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

芒刺假瘤蕨 mang ci jia liu jue

Basionym: *Polypodium malacodon* Hooker, Sp. Fil. 5: 87. 1864; *Crypsinus cartilagineoserratus* (Ching & S. K. Wu) Nakaike; *C. malacodon* (Hooker) Copeland; *Phymatodes malacodon* (Hooker) Ching; *Phymatopsis cartilagineoserrata* Ching & S. K. Wu; *P. malacodon* (Hooker) Ching; *Phymatopteris cartilagineoserrata* (Ching & S. K. Wu) S. G. Lu; *P. malacodon* (Hooker) Pichi Sermolli; *Pichisermollia malacodon* (Hooker) Fraser-Jenkins; *Pichisermollodes malacodon* (Hooker) Fraser-Jenkins; *Pleopeltis malacodon* (Hooker) Beddome (1883), not Beddome (1876).

Rhizome ca. 3 mm in diam., densely scaly throughout; scales black or dark brown at center, pale brown toward edges, lanceolate, ca. 4 mm, margin toothed, apex acuminate. Fronds monomorphic. Stipe purplish or straw-colored, 5–10 cm, glabrous; lamina pinnatisect, 10–15 × 8–14 cm, base cordate, margin serrulate or duplicate-serrate, with sharply pointed teeth. Lateral lobes usually 1–3 pairs, lowest pair slightly deflexed at base and bending upward at apex, 5–7 × 1.5–2 cm, apex acute. Costa and lateral veins usually tortuous, veinlets hardly visible. Lamina subleathery, both surfaces glabrous, abaxial surface pale green, adaxial surface green. Sori orbicular, medial or slightly nearer to costa.

● Epiphytic on rocks; ca. 3200 m. Xizang.

The type of *Phymatopsis cartilagineoserrata* is a good match with that of *Selliguea malacodon*, which has rhizome scales with a light ciliate margin and curved pinnae with sharply aristate teeth. Chinese material previously named as *Phymatopteris malacodon* is here included within the following species, *S. albidoglauca*.

47. Selliguea albidoglauca (C. Christensen) S. G. Lu, Hovenkamp & M. G. Gilbert, **comb. nov.**

弯弓假瘤蕨 wan gong jia liu jue

Basionym: *Polypodium albidoglaucum* C. Christensen, Index Filic., Suppl. 1906–1912: 58. 1912, based on *Polypodium austrosinicum* Christ, Bull. Acad. Int. Géogr. Bot. 16: 107. 1906, not *Polypodium austrosinicum* Christ ex C. Christensen, Index Filic. 512. 1906.

Rhizome ca. 3 mm in diam., densely scaly; scales dark brown at center, light brown at margin, shiny, ovate-lanceolate, margin ciliate, apex acuminate. Fronds monomorphic. Stipe straw-colored, 1–4 cm, slender, glabrous; lamina pinnatisect, triangular in outline, 4–8 × 3–6 cm, base cordate, margin with up to 2 mm aristate teeth. Lateral lobes 1 or 2 pairs, lowest pair curved, deflexed at base, bending at apex, spreading or slightly ascending further up, 2–3 × 1–1.5 cm, apex obtuse or acute. Lateral veins distinct, veinlets hardly visible. Lamina herbaceous, both surfaces glabrous. Sori near costa.

Epiphytic on tree trunks or on rocks; 2800–3700 m. Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal].

The material here included within *Selliguea albidoglauca* was treated as *Phymatopteris malacodon* (= *S. malacodon*) in FRPS. It differs from the type of that species by the lack of the aristate marginal teeth of the lamina, characteristic of *S. malacodon* s.s. Chinese material of the true *S. malacodon* was named *P. cartilagineoserrata*.

The choice of epithet for this taxon depends on the priority of *Polypodium austrosinicum* Christ versus *P. austrosinicum* Christ ex C. Christensen (a replacement name for *P. henryi* Christ, here treated as a synonym of *Microsorum fortunei* (T. Moore) Ching), both published in 1906. The only direct indication of priority is the action of Christensen who claimed priority for the latter, published in his own work, and published the replacement name *P. albidoglaucum* for the former. In the absence of other information on the exact publication dates, this has to be accepted, and the correct epithet for this taxon is that of Christensen.

48. Selliguea feei Bory, Dict. Class. Hist. Nat. 15: pl. opp. p. 344. 1829.

修蕨 xiu jue

Pleopeltis feei (Bory) Alderwerelt; *Polypodium feei* (Bory) Mettenius; *P. pedunculatioides* Ching.

Rhizome ca. 4 mm in diam., densely scaly when young; scales reddish brown, ovate-lanceolate, 6–8 mm, peltate at base, margin entire, apex acuminate. Fronds remote, slightly dimorphic. Sterile fronds: stipe 18–20 cm. Lamina 15–20 × 7–9 cm, base broadly cuneate, margin entire, apex acute. Veins reticulate, lateral veins raised on abaxial surface, veinlets obscure. Lamina leathery, both surfaces glabrous. Fertile fronds: stipe 20–35 cm; lamina ovate, 13–20 × ca. 3 cm, base cuneate, apex acuminate. Sori reddish brown, linear, ca. 3 mm in diam., borne between adjacent lateral veins.

Epiphytic on tree trunks; below 1200 m. Guangdong [Indonesia, Malaysia, Philippines; Pacific islands (Polynesia)].

The place of publication is often given as the same as for the genus (Dict. Class. Hist. Nat. 6: 588. 1824), but the name *Selliguea feei* was not mentioned until the publication of the plate in 1829.

8. GYMNOGRAMMITIS Griffith, Icon. Pl. Asiat. 2: t. 129, f. 1. 1849; Notul. Pl. Asiat. 2: 608. 1849.

雨蕨属 yu jue shu

Zhang Xianchun (张宪春); Hans P. Nooteboom

Rhizome shortly creeping. Roots restricted to ventral side; scales not hairy but with marginal setae at least in distal part, not toothed, smooth adaxially, basifixed with cordate base and much overlapping basal lobes. Fronds monomorphic; stipe articulate to phyllopodia, grooved, glabrous or with few scales; lamina compound, 3- or 4-pinnate toward base and in middle part, toward base deltoid and broadest or elongate, often narrowed, glabrous; pinnae linear-triangular; pinnules of at least larger pinnae anadromous; pinnules or pinna lobes linear-oblong; ultimate segments or lobes obtuse or acute without a pronounced tooth. Rachis adaxially grooved. Lamina axes glabrous. Veins in ultimate lobes simple, not reaching margin; false veins not present. Sori exindusiate, frequently single on a segment, facing midveins at bending point.

One species: E and SE Asia.

Ching (Acta Phytotax. Sin. 16(3): 4; 16(4): 32. 1978) pointed out that the resemblance of *Gymnogrammitis* to the Davalliaceae, where this genus was previously placed, is superficial and suggested that it belongs in the Polypodiaceae. Recent molecular phylogeny has confirmed this and shown that the closest relationship is to the Selligueoid lineage of the Polypodiaceae.

1. Gymnogrammitis dareiformis (Hooker) Ching ex Tardieu & C. Christensen, Notul. Syst. (Paris) 6: 2. 1937.

雨蕨 yu jue

Polypodium dareiforme Hooker, Sec. Cent. Ferns, t. 24. 1860 [*"dareaeforme"*]; *Araiostegia dareiformis* (Hooker) Copeland; *Davallia dareiformis* (Hooker) Levinge ex C. B. Clarke; *Leucostegia dareiformis* (Hooker) Beddome; *P. dareiformioides* Ching.

Rhizome short, 4–5 mm in diam. excluding scales; scales light brown, without pale border, 2–10 mm, evenly narrowed toward apex. Stipe dark brown, 4–15 cm; lamina 3- or 4-pinnate toward base and in middle part, triangular and broadest toward base, or elongate, often narrowed toward base, 7–37 × 7–22 cm, glabrous; longest stalk 2–6 mm; longest pinnae 4.5–20 × 1.5–6 cm; longest pinnules or pinna lobes 15–40 × 6–25 mm; ultimate pinnules linear-oblong, lobed almost to midrib; ultimate segments 0.5–5 × 0.5–1 mm.

Epiphytic on moss-covered tree trunks, epilithic in evergreen forests; 1200–2600 m. Guangxi, Guizhou, Hainan, Hunan, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand].

9. PYRROSIA Mirbel in Lamarck & Mirbel, Hist. Nat. Vég. 3. 471; 5: 91. 1802.

石韦属 shi wei shu

Lin Youxing (林尤兴), Zhang Xianchun (张宪春); Peter H. Hovenkamp

Apalophlebia C. Presl; *Drymoglossum* C. Presl, nom. cons.; *Neoniphopsis* T. Nakai; *Niphobolus* Kaulfuss; *Oetosis* Necker ex Kuntze; *Polycampium* C. Presl; *Saxiglossum* Ching.

Plants epiphytic and epilithic, small to medium-sized. Rhizomes shortly to long creeping, densely scaly. Fronds monomorphic or dimorphic, remote or clustered, covered with stellate hairs; lamina simple, rarely hastate or palmately to pedately divided; main veins distinct; lateral veins obliquely spreading, distinct or obscure; veinlets distinct or obscure and joined into different types of areoles, these with included veinlets, mostly ending with an adaxial hydathode. Sori orbicular, borne at ends of included veinlets, in 1 to several rows on each side of main veins, sometimes confluent into linear coenosori, exindusiate, sometimes with stellate paraphyses. Sporangia sessile to long stalked. Spore elliptic, variously ornamented. $x = 37$.

About 60 species: mostly in tropical Asia extending north to the Himalaya, C China, and Japan, east to New Zealand and Henderson Island plus five species in Africa and Madagascar; 32 species (six endemic) in China.

1a. Sori (coenosori) longitudinally elongated.
  2a. Fronds strongly dimorphic: sterile fronds distinctly wider, 1–7 × 1–2 cm, fertile fronds 4–16 × 0.3–1.5 cm, sori superficial ..... 31. *P. piloselloides*
  2b. All fronds linear, 3–9 cm × 1.5–3.5 mm, thickly fleshy, fertile fronds almost orbicular in cross section with sori deeply embedded in a groove in lamina ..... 32. *P. angustissima*
1b. All sori orbicular or only slightly elongated.
  3a. Rhizome scales basifixed, base cordate, rhizome tissue uniformly sclerified, without distinct sclerified strands; sori with few (ca. 10) sporangia.
    4a. Lamina narrowly elliptic, widest at middle, base cuneate ..... 1. *P. stigmosa*
    4b. Lamina obovate to oblanceolate, widest above middle, base gradually decurrent ..... 2. *P. costata*
  3b. Rhizome scales pseudopeltate or peltate, rhizome tissue centrally parenchymatous, with or without sclerified strands; sori with more than 10 sporangia.

5a. Sori in a single row between midrib and margin ..... 3. *P. linearifolia*
5b. Sori in several rows between midrib and margin.
6a. Sori in distinct pits, with central bundle of stellate paraphyses.
7a. Rhizome scales broadly lanceolate, margins entire; lamina strap-shaped, up to 60 cm ..... 4. *P. longifolia*
7b. Rhizome scales linear-lanceolate, margins ciliate; lamina linear-lanceolate, 1–25 cm (*P. lanceolata* s.l.).
8a. Fronds distinctly dimorphic: sterile fronds: stipe up to 1–1.5 cm, lamina 1–6 × 0.8–2 cm; fertile fronds subsessile, lamina 8–25 × 0.5–0.8 cm ..... 5. *P. adnascens*
8b. Fronds monomorphic or subdimorphic.
9a. Lamina subglabrous, with sparse indument, abaxial surface green ..... 6. *P. nuda*
9b. Lamina with thick and persistent indument, abaxial surface gray ..... 7. *P. lanceolata*
6b. Sori superficial, without central bundle of paraphyses.
10a. Indument loose, with narrow stellate rays; fronds strongly dimorphic: sterile lamina 1.5–2 × 1.2–1.5 cm, base cordate to rounded or occasionally cuneate; fertile lamina 5–7 × 0.3–1.1 cm, base cuneate to gradually attenuate ..... 8. *P. nummulariifolia*
10b. Indument appressed with hairs with wide stellate rays; fronds not or only weakly dimorphic.
11a. Fronds sessile or only shortly and usually indistinctly stipitate, lamina base gradually decurrent.
12a. Indument of sterile parts with only one type of stellate hair, these with rays always very unequal in length, lamina linear-lanceolate ..... 25. *P. assimilis*
12b. Indument of sterile parts dimorphic, with curled and straight rays, latter mostly uniform in length.
13a. Rhizome scales pseudopeltate, 5–7.4 mm, margins entire to dentate ..... 26. *P. mannii*
13b. Rhizome scales peltate, 2–5 mm, margins ciliate (*P. porosa* s.l.).
14a. Fronds very long, narrow, lamina margins revolute over sori; sori ± scattered, sporangia sessile or subsessile ..... 27. *P. stenophylla*
14b. Fronds wider or shorter, lamina margins involute, exposing sori; sori densely packed, sporangia stalks 0.5–1 × as long as capsule (*P. porosa* s.l.).
15a. Indument monomorphic; rhizome scales 2–3 mm ..... 29. *P. davidii*
15b. Indument dimorphic; rhizome scales 3.5–7 mm.
16a. Fronds 0.5–1 cm wide, indument on abaxial surface appressed ..... 28. *P. tonkinensis*
16b. Fronds (0.7–)1.2–3.6 cm wide, indument on abaxial surface not appressed ..... 30. *P. porosa*
11b. Fronds distinctly stipitate, lamina base cuneate or truncate.
17a. Rhizome long creeping; fronds distant.
18a. Rhizome filiform, less than 1 mm in diam.; fronds slightly falcate; rays of stellate hairs of superficial layer deep brown and unequal in length, usually each with one long acicular ray directed away from lamina ..... 9. *P. laevis*
18b. Rhizome 1–4 mm in diam.; fronds not falcate; rays of stellate hairs of superficial layer whitish to grayish brown or brown, appressed.
19a. Indumentum with an upper layer of stellate hairs with boat-shaped rays and a lower layer of hairs with woolly rays.
20a. Sterile lamina 4–6 cm wide, apex caudate ..... 10. *P. heteractis*
20b. Sterile lamina 2–3 cm wide, apex obtuse or rounded ..... 11. *P. eberhardtii*
19b. Indumentum with a single layer of stellate hairs with boat-shaped rays.
21a. Stellate hairs in two sizes, some much larger than others; margins of rhizome scales entire, glabrous ..... 12. *P. ensata*
21b. Stellate hairs all similar in size; margins of rhizome scales ciliate.
22a. Lamina (1.5–)3–6(–10.5) cm, lateral veinlets indistinct, hydathodes deeply sunken ..... 13. *P. petiolosa*
22b. Lamina (5–)10–20 cm; lateral veins distinct, hydathodes superficial or slightly sunken ..... 14. *P. lingua*
17b. Rhizome shortly creeping; fronds close together.
23a. Lamina deeply hastately or pedately lobed; rhizome scales peltate.
24a. Lamina hastately 3–5-lobed ..... 15. *P. hastata*
24b. Lamina pedately 6–8-lobed ..... 16. *P. polydactylos*
23b. Lamina simple or at most with a few short lobes at base; rhizome scales pseudopeltate.
25a. Rhizome scales with acumen entire and glabrous ..... 17. *P. flocculosa*
25b. Rhizome scales with acumen dentate or ciliate.
26a. Indument dense, persistent; lamina base asymmetrical to strongly asymmetrical, truncate.
27a. Indument with monomorphic, wide, flat rays, lamina base strongly asymmetrical ..... 18. *P. sheareri*
27b. Indument with dimorphic rays, straight ones narrow; lamina base slightly asymmetrical .... 19. *P. drakeana*
26b. Indument thin, often not persistent; lamina base equal or slightly unequal, cuneate (*P. subfurfuracea* s.l.).
28a. Indument brown, persistent, thicker than below, upper layer to 2 mm in diam. ..... 20. *P. boothii*

28b. Indument grayish, fugacious or persistent, upper layer to 1.3 mm in diam.
29a. Lamina base cuneate or truncate, stipe distinct, (4–)15–31 cm.
30a. Rhizome scales 6.5–11 × 0.7–1.3 mm ..... 21. *P. bonii*
30b. Rhizome scales ca. 2 × 1 mm ..... 22. *P. similis*
29b. Lamina base very gradually narrowed, stipe indistinctly set off from lamina, less than 15 cm.
31a. Indument persistent, dense in mature fronds, lamina 6.5–11 cm wide; rhizome scale acumen entire, glabrous ..... 23. *P. subfurfuracea*
31b. Indument fugacious, sparse or absent in mature fronds, lamina 2–5 cm wide; rhizome scale acumen ciliate ..... 24. *P. calvata*

1. Pyrrosia stigmosa (Swartz) Ching, Bull. Chin. Bot. Soc. 1: 67. 1935.

柱状石韦 zhu zhuang shi wei

Polypodium stigmosum Swartz in Schrader, J. Bot. 1800(2): 21. 1801; *Apalophlebia venosa* (Blume) C. Presl; *Cyclophorus stigmosus* (Swartz) Desvaux; *Niphobolus stigmosus* (Swartz) T. Moore; *N. venosa* Blume; *Pyrrosia chinensis* Mirbel.

Plants 25–65 cm tall. Rhizome shortly elongated, 4–4.5 mm in diam., in cross section without sclerenchyma strands; phyllopodia 1–2 cm apart, lateral buds basal on phyllopodia. Scales basifixed, 2.6–6 × 0.9–1.6 mm, base dentate; acumen brown, entire or dentate. Fronds monomorphic, stipitate; stipe 9–22 cm, (0.16–)0.25–0.67 × as long as lamina; lamina widest around middle, 2–5.8 × 18–60 cm, base cuneate, apex acute to acuminate, occasionally rounded or obtuse. Hydathodes distinct, superficial. Indument persistent, dimorphic, dense, light grayish brown; upper layer with hairs ca. 0.5 mm in diam., with appressed, boat-shaped rays, lower layer with mainly woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia sessile.

On tree trunks of broad-leaved forests; 200–1200 m. Xizang, Yunnan [Cambodia, India, Indonesia, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam].

The presence of *Pyrrosia stigmosa* within the Flora area is questioned by one of us (Hovenkamp), who believes that the record might have been based on misidentifications of the following species, *P. costata*, as has been known to happen.

2. Pyrrosia costata (Wallich ex C. Presl) Tagawa & K. Iwatsuki, Acta Phytotax. Geobot. 22: 100. 1967.

下延石韦 xia yan shi wei

Niphobolus costatus Wallich ex C. Presl, Tent. Pterid. 202. 1836; *Apalophlebia costata* (Wallich ex C. Presl) C. Presl; *Cyclophorus beddomeanus* (Giesenhagen) C. Christensen, nom. illeg. superfl.; *Niphobolus beddomeanus* Giesenhagen, nom. illeg. superfl.; *N. beddomeanus* f. *fallax* Giesenhagen; *Polypodium costatum* Hooker (1863), not Kunze (1834), nor Mettenius (1857); *Pyrrosia beddomeana* (Giesenhagen) Ching, nom. illeg. superfl.

Plants 20–50 cm tall. Rhizome short, up to 5 mm in diam., in cross section without sclerenchyma strands; phyllopodia close together, lateral buds basal on phyllopodia. Scales basifixed, 8–10 mm, basal margin often with glands on long teeth; acumen entire, shiny, brown. Fronds monomorphic, substipitate or estipitate; stipe 1–5 cm; lamina widest at middle, 23–50 × 2.5–6 cm, base very gradually narrowed, apex acuminate. Hydathodes distinct, ± superficial. Indument persistent, dense, grayish brown; dimorphic; upper layer composed of hairs 0.4–1.9 mm in diam., with appressed, narrowly boat-shaped rays, lower layer with mainly woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia sessile or on short stalks to 0.25 × as long as capsule.

On tree trunks or rocks in forests; 300–2000 m. Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand, Vietnam].

Chinese representatives of this species have been erroneously identified as *Pyrrosia stigmosa* (Y. C. Wu et al., Bull. Dept. Biol. Sun Yatsen Univ. 3: 340, t. 161. 1932; Ching & Wu, Fl. Xizang. 1: 327. 1983) and as *P. princeps* (Mettenius) C. V. Morton (Shing & Iwatsuki, J. Jap. Bot. 72: 76. 1997).

3. Pyrrosia linearifolia (Hooker) Ching, Bull. Chin. Bot. Soc. 1: 48. 1935.

线叶石韦 xian ye shi wei

Niphobolus linearifolius Hooker, Sec. Cent. Ferns, t. 58. 1861; *Cyclophorus linearifolius* (Hooker) C. Christensen; *Neoniphopsis linearifolia* (Hooker) Nakai; *Polypodium linearifolium* (Hooker) Hooker; *Pyrrosia linearifolia* f. *cristata* Akasawa; *P. linearifolia* monstr. *cristata* (Akasawa) Nakaike; *P. linearifolia* var. *heterolepis* Tagawa.

Plants 3–10 cm tall. Rhizome long creeping, 1–1.8 mm in diam., in cross section with 5–20 scattered sclerenchyma strands; phyllopodia 0.5–1(–1.5) cm apart, lateral buds close to phyllopodia. Scales peltate, 2.2–5 × 0.5–1 mm, base entire or ciliate; acumen light brown, ciliate. Fronds monomorphic, sessile, 3–8 × 0.2–0.3 cm, base ± gradually narrowed, apex obtuse or rounded. Hydathodes ± distinct, usually in a marginal row, distinctly sunken. Indument persistent, dimorphic, loose, brown; upper layer with hairs 0.5–2.2 mm in diam., with erect-spreading, acicular rays, hairs with mainly woolly rays often present only between sori. Sori superficial, without central bundle of paraphyses. Sporangia with stalks as long as capsule.

On rocks or tree trunks of slopes, on roofs of houses at low elevations; 800–1400 m (in Taiwan). Jilin, Taiwan [Japan, Korea].

4. Pyrrosia longifolia (N. L. Burman) Morton, J. Wash. Acad. Sci. 36: 168. 1946.

南洋石韦 nan yang shi wei

Acrostichum longifolium N. L. Burman, Fl. Indica, 228. 1768; *Candollea longifolia* (N. L. Burman) Mirbel; *Cyclophorus acrostichoides* (G. Forster) C. Presl; *C. induratus* Christ;

C. longifolius (N. L. Burman) Desvaux; *C. macropodus* (Baker) C. Christensen; *C. scolopendrium* Desvaux; *Niphobolus acrostichoides* (G. Forster) Beddome (1868), not Kaulfuss (1824); *N. longifolius* (N. L. Burman) Sprengel; *N. scolopendrium* (Desvaux) T. Moore; *Polypodium acrostichoides* G. Forster; *P. macropoda* Baker; *Pyrrosia acrostichoides* (G. Forster) Ching; *P. coccideisquamata* Gilli; *P. macropoda* (Baker) Ching.

Plants 20–50 cm tall. Rhizome long creeping, 1.8–2.7 mm in diam., in cross section with many scattered sclerenchyma strands; phyllopodia 2–6 cm apart, lateral buds alternating with phyllopodia. Scales peltate, 1–3.4 × 0.6–1.5 mm, shiny brown or blackish with a distinct, light colored, entire margin. Fronds monomorphic, distinctly to indistinctly stipitate; stipe 1.5–5 cm; lamina strap-shaped, 16–60 × 1–3 cm, often ± narrowed in fertile part, base ± gradually narrowed, apex acute to rounded. Hydathodes absent. Indument sometimes fugacious, monomorphic, sparse or thin; hairs 0.3–0.4 mm in diam., with appressed, boat-shaped rays. Sori sunken, with central bundle of stellate paraphyses. Sporangia with stalks up to 2 × as long as capsule.

On tree trunks or shaded wet rocks in forests; 300–1400 m. Hainan, Yunnan [Cambodia, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Singapore, Thailand, Vietnam; SW Asia, Australia, Pacific islands].

Small plants of *Pyrrosia longifolia* can be superficially similar to *P. lanceolata* or *P. nuda* but are best distinguished by the completely entire rhizome scales (ciliate in *P. lanceolata* and *P. nuda*).

5. Pyrrosia adnascens (Swartz) Ching, Bull. Chin. Bot. Soc. 1: 45. 1935.

贴生石韦 tie sheng shi wei

Polypodium adnascens Swartz, Syn. Fil. 25, 222. 1806; *Cyclophorus adnascens* (Swartz) Desvaux; *C. pustulosus* Christ; *Niphobolus adnascens* (Swartz) Kaulfuss; *Pyrrosia adnascens* f. *calcicola* K. H. Shing.

Rhizome long creeping, ca. 1 mm thick, in cross section usually with a single, central sclerenchyma strand; phyllopodia 1–2 cm apart, lateral buds alternating with phyllopodia. Scales peltate, 3–5 × ca. 1 mm, base entire to ciliate; acumen light brown, often with a distinct hyaline margin, ciliate. Fronds dimorphic. Sterile fronds: stipe 1–1.5 cm; lamina 1–6 × 0.8–2 cm, base cuneate, apex rounded. Fertile fronds very gradually narrowed at base to a stipe of up to 5 cm; lamina 8–25 × 0.45–0.8 cm, apex obtuse to acute. Hydathodes rarely present, few and indistinct. Indument monomorphic, mostly sparse, whitish to brown; hairs 0.2–1.2 mm with spreading to appressed, boat-shaped to ± acicular rays. Sori distinctly sunken, with a distinct central bundle of stellate paraphyses. Sporangia with stalks 1.5–2 × as long as capsule.

On tree trunks or rocks; sea level to 1300 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Cambodia, N India, Nepal, Thailand, Vietnam].

The whole plant is used in traditional Chinese medicine.

Reviewer Ralf Knapp notes that, in Taiwan, this taxon is included in a broadly defined *Pyrrosia lanceolata* (e.g., Yang & Liu, Man. Taiwan Vasc. Pl. 6: 96. 2002; Knapp, Ferns Fern Allies Taiwan, 338. 2011).

Polypodium pertusum Roxburgh ex Hooker (Exot. Fl. 3: t. 162. 1827) is a *Pyrrosia*, probably belonging here.

6. Pyrrosia nuda (Giesenhagen) Ching, Bull. Chin. Bot. Soc. 1: 70. 1935.

裸叶石韦 luo ye shi wei

Niphobolus nudus Giesenhagen, Niphobolus, 149. 1901; *Cyclophorus nudus* (Giesenhagen) C. Christensen.

Plants 10–20 cm tall. Rhizome long creeping, 1.2–2.1 mm in diam., in cross section usually with a single, central sclerenchyma strand; phyllopodia 1–2 cm apart, lateral buds alternating with phyllopodia. Scales peltate, 3.9–7.8 × 0.3–1.3 mm, base entire to ciliate; acumen light brown, often with a distinct hyaline margin, ciliate; short, orbicular to ovate scales usually present. Fronds subdimorphic. Stipes 1–4 cm; lamina widest below or at middle, 10–25 × 1–1.8 cm, base attenuate, decurrent, apex long caudate. Fertile fronds narrower. Hydathodes rarely present, few and indistinct. Indument monomorphic, sparse, whitish to brown; hairs 0.2–1.2 mm with erect-spreading to appressed, boat-shaped to ± acicular rays. Sori sunken, with a distinct central bundle of stellate paraphyses. Sporangia with stalks 1.5–2 × as long as capsule.

On tree trunks in forests; 500–1500 m. Hainan, Sichuan, Yunnan [Bhutan, N India, Myanmar, Nepal].

7. Pyrrosia lanceolata (Linnaeus) Farwell, Amer. Midl. Naturalist 12: 245. 1930.

披针叶石韦 pi zhen ye shi wei

Acrostichum lanceolatum Linnaeus, Sp. Pl. 2: 1067. 1753; *A. dubium* Poiret; *Candollea lanceolata* (Linnaeus) Mirbel; *Cyclophorus cornutus* Copeland; *C. giesenhagenii* (Christ) C. Christensen; *C. glaber* Desvaux; *C. lanceolatus* (Linnaeus) Alston; *C. spissus* (Bory ex Willdenow) Desvaux; *C. stellatus* Copeland; *C. varius* (Kaulfuss) Gaudichaud; *C. vittarioides* C. Presl; *Dendroglossa lanceolata* (Linnaeus) C. Presl; *Gymnopteris lanceolata* (Linnaeus) T. Moore; *Niphobolus adnascens* (Swartz) Kaulfuss var. *spissum* (Bory ex Willdenow) Keyserling; *N. adnascens* var. *varius* (Kaulfuss) Keyserling; *N. caudata* Kaulfuss; *N. giesenhagenii* Christ; *N. glaber* (Desvaux) Kaulfuss, nom. illeg. superfl.; *N. lanceolatus* (Linnaeus) Trimen (1886), not (Linnaeus) Keyserling (1873); *N. spissus* (Bory ex Willdenow) Kaulfuss; *N. varius* Kaulfuss; *N. vittarioides* T. Moore (1861), not C. Presl (1836); *Polypodium dubium* Kuhn (1868), not Roxburgh (1844), nor (H. Karsten) Hooker (1864); *P. pachyderma* Baker; *P. spissum* Bory ex Willdenow; *P. vittarioides* Wallich ex Mettenius; *Pyrrosia caudata* (Kaulfuss) Ching; *P. cornuta* (Copeland) Tagawa; *P. pachyderma* (Baker) Ching; *P. stellata* (Copeland) Parris; *P. varia* (Kaulfuss) Farwell.

Plants 5–12 cm. Rhizome long creeping, 1.2–2.1 mm in diam., in cross section usually with a single, central sclerenchyma strand; phyllopodia 1–2 cm apart, lateral buds alternating with phyllopodia. Scales peltate, 3.4–7.8 × 0.3–1.3 mm, base entire to ciliate; acumen light brown, often with a distinct hyaline margin, ciliate; short, orbicular to ovate scales usually present. Fronds monomorphic, up to 0.5–1 cm stipitate; lamina widest at ca. middle, 4–14 × ca. 0.6 cm, base attenuate, long

decurrent, apex obtuse. Hydathodes rarely present, few and indistinct. Indument persistent, monomorphic, dense, whitish or brown; hairs 0.2–1.2 mm with erect-spreading to appressed, boat-shaped to ± acicular rays. Sori sunken, with a distinct central bundle of stellate paraphyses. Sporangia with stalks 1.5–2 × as long as capsule.

On rocks or tree trunks of rain forests; 700–2000 m. Xizang, Yunnan [Bangladesh, Bhutan, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Indian Ocean islands (Réunion)].

8. Pyrrosia nummulariifolia (Swartz) Ching, Bull. Chin. Bot. Soc. 1: 47. 1935.

钱币石韦 qian bi shi wei

Acrostichum nummulariifolium Swartz, Syn. Fil. 191, 419. 1806; *A. obovatum* Blume; *Cyclophorus nummulariifolius* (Swartz) C. Christensen; *C. nummulariifolius* var. *obovatus* (Blume) Bonaparte; *C. nummulariifolius* var. *rufus* Alderwerelt; *C. obovatus* (Blume) Alderwerelt; *Galeoglossa nummulariifolia* (Swartz) C. Presl; *G. obovata* (Blume) C. Presl; *Gymnopteris nummulariifolia* (Swartz) C. Presl; *Niphobolus nummulariifolius* (Swartz) J. Smith; *N. obovatus* (Blume) Kunze; *Polypodium nummulariifolium* (Swartz) Mettenius; *P. obovatum* (Blume) Mettenius; *Pyrrosia nummulariifolia* var. *rufa* (Alderwerelt) Ching; *P. obovata* (Blume) Ching.

Plants small, 2–7 cm tall. Rhizome long creeping, 0.6–1.6 mm in diam., in cross section sometimes with a single, central sclerenchyma strand; phyllopodia 0.5–1.5 cm apart, lateral buds between or opposite to phyllopodia. Scales peltate, 3.3–5.7 × 0.3–0.7 mm, base entire to ciliate; acumen light brown, ciliate; short, ± orbicular to ovate scales regularly present. Fronds strongly dimorphic, distinctly to indistinctly stipitate. Sterile fronds: ± sessile or up to 2 cm stipitate; lamina elliptic to ovate, 1.5–2 × 1.2–1.5 cm, base cordate to rounded or occasionally cuneate, apex rounded. Fertile fronds: stipe up to 2.5 cm; lamina elliptic to obovate, 5–7 × 0.3–1.1 cm, base cuneate to gradually attenuate. Hydathodes absent. Indument persistent, dimorphic, dense, brown, lower layer mostly whitish; upper layer composed of hairs 0.7–1.4 mm in diam., with erect-spreading, acicular rays, usually distinctly raised above a lower layer with mainly woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks 1–1.5 × as long as capsule.

On rocks; 400–1100 m. Yunnan [Bhutan, India, Indonesia, Myanmar, Philippines, Thailand].

9. Pyrrosia laevis (J. Smith ex Beddome) Ching, Bull. Chin. Bot. Soc. 1: 52. 1935.

平滑石韦 ping hua shi wei

Niphobolus laevis J. Smith ex Beddome, Ferns Brit. India, t. 161. 1866; *Cyclophorus laevis* (J. Smith ex Beddome) C. Christensen; *Polypodium breve* J. Small; *P. laeve* (J. Smith ex Beddome) Baker (1892), not Mettenius ex Kuhn (1869); *P. laeve* Mettenius ex Kuhn; *P. jaintense* C. B. Clarke; *Pyrrosia jaintensis* (C. B. Clarke) Ching.

Plants 8–13 cm tall. Rhizome long creeping, 0.9–1 mm in diam., in cross section with up to 10 scattered sclerenchyma strands; phyllopodia 1–3 cm apart, lateral buds close to phyllopodia. Scales peltate, 3.1–4 × 0.3–0.6 mm, base entire; acumen light brown, entire or occasionally with long cilia near apex; shorter, orbicular to ovate scales regularly present. Fronds monomorphic, stipitate; stipe 0.5–2 cm, up to 0.25(–0.33) × as long as lamina; lamina widest below middle, 5–11 × 1–1.8 cm, base cuneate to narrowly cuneate, apex narrowly acute to acuminate. Hydathodes indistinct, ± superficial. Indument persistent, dimorphic, thin, light grayish brown; upper layer often fugacious, hairs 0.4–0.5 mm in diam., with appressed, boat-shaped or acicular rays, often with a distinct dorsal spine, lower layer with mainly woolly rays. Sori superficial, without central bundle of paraphyses; sporangia with stalks up to ± as long as capsule.

On rocks in forests; ca. 1200 m. Yunnan [India, Myanmar].

The name *Polypodium laeve* Mettenius ex Kuhn was based on a different type from that of *Niphobolus laevis* and made no reference to Beddome.

10. Pyrrosia heteractis (Mettenius ex Kuhn) Ching, Bull. Chin. Bot. Soc. 1: 57. 1935.

纸质石韦 zhi zhi shi wei

Polypodium heteractis Mettenius ex Kuhn, Linnaea 36: 140. 1869; *Cyclophorus heteractis* (Mettenius ex Kuhn) C. Christensen; *C. heteractis* var. *minor* C. Christensen; *Niphobolus heteractis* (Mettenius ex Kuhn) J. Smith; *Pyrrosia fuohaiensis* Ching & K. H. Shing; *P. heteractis* var. *minor* (C. Christensen) Ching; *P. latifolia* Ching & S. K. Wu; *P. lingua* (Thunberg) Farwell var. *heteractis* (Mettenius ex Kuhn) Hovenkamp.

Plants 10–30 cm tall. Rhizome long creeping, 1.2–3.7 mm in diam., in cross section with a few sclerenchyma strands; phyllopodia (0.5–)2–8 cm apart, lateral buds alternating with phyllopodia. Scales peltate, usually distinctly spreading, 5–9.5 × 0.9–2 mm, base dark at attachment, entire to irregularly dentate; acumen shiny, light brown, with long, curly marginal as well as superficial cilia; short, ± ovate scales occasionally present. Fronds weakly dimorphic, stipitate. Sterile fronds: stipe 4–14 cm; lamina widest at or below middle, 14–25 × 4–7.5 cm, base truncate to ± cuneate, apex acuminate or occasionally apiculate. Fertile fronds similar or somewhat narrower. Hydathodes distinct, ± superficial. Indument persistent, dimorphic, dense, whitish to grayish brown; upper layer with hairs 0.4–0.8 mm in diam., with appressed, boat-shaped rays, lower layer with woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks 0.75–1 × as long as capsule.

On tree trunks, rocks, and rocky crevices in forests; 1200–2600 m. Guangxi, Hainan, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Thailand, Vietnam].

The Chinese specimens of *Pyrrosia heteractis* are distinct from *P. lingua* in the wider and distinctly more spreading rhizome scales and the often wider lamina.

11. Pyrrosia eberhardtii (Christ) Ching, Bull. Chin. Bot. Soc. 1: 59. 1935.

琼崖石韦 qiong ya shi wei

Cyclophorus eberhardtii Christ, J. Bot. (Morot), ser. 2, 1: 270. 1908; *Pyrrosia oblonga* Ching.

Plants 6–20 cm tall. Rhizome long creeping, 1.2–3.7 mm in diam., in cross section with a few sclerenchyma strands; phyllopodia (0.5–)2–8 cm apart, lateral buds alternating with phyllopodia. Scales peltate, (5–)7–8(–9.5) × 0.9–1.6 mm, base entire to irregularly dentate; acumen shiny, light brown, with long, curly marginal as well as superficial cilia. Fronds subdimorphic, stipitate. Sterile fronds: stipe 4–12 cm; lamina widest at or below middle, 4–12 × 2–3 cm, base cuneate, apex obtuse to rounded. Fertile fronds longer and narrower. Hydathodes distinct, ± superficial, rarely distinctly sunken or absent. Indument persistent, dimorphic, dense, whitish to grayish brown; upper layer with hairs 0.4–0.8 mm in diam., with appressed, boat-shaped rays, lower layer with woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks 0.75–1 × as long as capsule.

On tree trunks or rocks in forests; 1000–1700 m. ?Guangdong, Hainan [Thailand, Vietnam].

12. Pyrrosia ensata Ching ex K. H. Shing, J. Jap. Bot. 72: 28. 1997.

剑叶石韦 jian ye shi wei

Plants 10–30 cm tall. Rhizome long creeping, 1.2–3.7 mm in diam., in cross section sometimes with a single, central sclerenchyma strand; phyllopodia (0.5–)2–8 cm apart, lateral buds alternating with phyllopodia. Scales peltate, (2.2–)4–9.5 × 0.7–1.6 mm, base entire to irregularly dentate; acumen shiny, light brown, entire. Fronds dimorphic, stipitate. Sterile fronds: stipe 1–6 cm; lamina widest at middle, 13–24 × 1.6–3 cm, base cuneate, decurrent, apex long acuminate. Fertile fronds usually much longer and narrower. Hydathodes distinct, superficial, rarely distinctly sunken. Indument persistent, dimorphic, light to grayish brown, thin; hairs 0.3–0.5 mm in diam., with appressed, boat-shaped upper rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks 0.75–1 × as long as capsule.

● On tree trunks of evergreen broad-leaved forests; 800–1800 m. Xizang, Yunnan.

Pyrrosia ensata is known from few collections, with a distinct frond shape and nearly or completely entire scales to set them apart from *P. lingua*.

13. Pyrrosia petiolosa (Christ) Ching, Bull. Chin. Bot. Soc. 1: 59. 1935.

有柄石韦 you bing shi wei

Polypodium petiolosum Christ, Nuovo Giorn. Bot. Ital., n.s., 4: 96. 1897; *Cyclophorus petiolosus* (Christ) C. Christensen; *Niphobolus petiolosa* (Christ) Diels.

Plants 5–15 cm tall. Rhizome long creeping, 1–2.5 mm in diam.; phyllopodia 0.5–2.5 cm apart, in cross section with few scattered sclerenchyma strands, lateral buds alternating with phyllopodia. Scales peltate, 2.2–4.4 × 0.6–1 mm, base entire to dentate; acumen dull brown with a shiny black spot near attachment, ciliate. Fronds slightly dimorphic, stipitate. Sterile fronds: stipe 1–16 cm, (0.06–)0.2–1.5 × as long as lamina; lamina 1.5–7(–10.5) × 0.7–2.2(–3.3) cm, widest near middle, base cuneate to attenuate, apex acute to rounded. Fertile fronds: stipe 0.5–12 cm, 0.5–1.5 × as long as lamina, 1–8.5 × 0.5–2 cm. Hydathodes distinct, distinctly sunken. Indument persistent, monomorphic, dense, light gray to brown; hairs 0.4–0.6 mm in diam., with appressed, boat-shaped rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks 1–2 × as long as capsule.

Mostly on dry and open rocks; 200–2200 m. Guizhou, Hebei, Henan, Hubei, Jiangsu, Jilin, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Korea, Mongolia, Russia].

The whole plant is used in traditional Chinese medicine.

14. Pyrrosia lingua (Thunberg) Farwell, Amer. Midl. Naturalist 12: 302. 1931.

石韦 shi wei

Acrostichum lingua Thunberg in Murray, Syst. Veg., ed. 14, 928. 1784; *Cyclophorus bodinieri* H. Léveillé; *C. lingua* (Thunberg) Desvaux; *C. lingua* var. *angustifrons* Hayata; *C. lingua* var. *attenuata* Rosenstock; *C. martinii* (Christ) C. Christensen; *C. taiwanensis* (Christ) C. Christensen; *Niphobolus lingua* Sprengel; *N. martinii* Christ; *Polycampium lingua* (Thunberg) C. Presl; *Polypodium lingua* (Thunberg) Swartz; *P. taiwanense* Christ; *Pyrrosia caudifrons* Ching, Boufford & Shing; *P. martinii* (Christ) Ching; *P. medogensis* Ching & S. K. Wu.

Plants 10–30 cm tall. Rhizome long creeping, 1.2–3.7 mm in diam., in cross section sometimes with a single, central sclerenchyma strand; phyllopodia (0.5–)2–8 cm apart, lateral buds alternating with phyllopodia. Scales peltate, (2.2–)4–9.5 × 0.7–1.6 mm, base entire to irregularly dentate; acumen shiny light brown, with long, curly marginal cilia; short, ± ovate scales occasionally present. Fronds subdimorphic, stipitate. Sterile fronds: stipe 1–30 cm, lamina (5–)10–20 × 1.5–7 cm, base ± gradually attenuate, apex shortly acuminate to long caudate. Fertile fronds: stipe 1.5–25 cm; lamina widest at or below middle, 5.5–22 × 0.8–3 cm. Hydathodes distinct, ± superficial, rarely distinctly sunken. Indument persistent, monomorphic, thin, light to grayish brown; hairs 0.3–0.5 mm in diam., with appressed, boat-shaped rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks 0.75–1 × as long as capsule.

On tree trunks in forests or on rather dry rocks; 100–1900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Liaoning, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Myanmar, Vietnam].

The whole plant is used in traditional Chinese medicine.

Pyrrosia caudifrons was based on a number of specimens showing an extreme within a continuous variation from *P. lingua*. No character distinguishes them other than a lamina apex that is slightly more protracted than is usual in *P. lingua*.

15. Pyrrosia hastata (Houttuyn) Ching, Bull. Chin. Bot. Soc. 1: 48. 1935.

戟叶石韦 ji ye shi wei

Acrostichum hastatum Houttuyn, Nat. Hist. 2(14): 68. 1783; *Cyclophorus hastatus* (Houttuyn) C. Christensen; *C. tricuspis* (Swartz) Desvaux ex T. Moore, nom. illeg. superfl.;

Niphobolus hastatus (Houttuyn) Kunze; *N. tricuspe* (Swartz) J. Smith, nom. illeg. superfl.; *Polycampium hastatum* (Houttuyn) C. Presl; *Polypodium tricuspe* Swartz; *Pyrrosia tricuspis* (Swartz) Tagawa, nom. illeg. superfl.

Plants 10–20 cm tall or taller. Rhizome short, up to ca. 5 mm in diam., in cross section with many scattered sclerenchyma strands; phyllopodia close together, lateral buds basal on phyllopodia. Scales peltate, 1.5–2.5 × 0.5–0.9 mm, blackish with a distinct light margin, ciliate. Fronds monomorphic, stipitate; stipe 4–23 cm, 1.5–2 × as long as lamina; lamina widest near base, 6–12 × 6–9 cm, pedately lobed to ca. 4/5 in 3–5 divisions; middle lobe up to 1.5–3.5 cm wide, lateral ones increasingly smaller; lamina base truncate to cordate, often slightly unequal, slightly decurrent. Hydathodes distinct, superficial to slightly sunken, without central bundle of paraphyses. Indument persistent, monomorphic, dense, brown; hairs 0.3–0.5(–0.8) mm in diam., with appressed, boat-shaped rays. Sori superficial, without central bundle of paraphyses. Sporangia sessile.

On tree trunks or wet moss-covered rocks in forests. Anhui [Japan, Korea].

The occurrence of *Pyrrosia hastata* within the Flora area is based on a collection of a single frond of doubtful origin.

16. Pyrrosia polydactylos (Hance) Ching, Bull. Chin. Bot. Soc. 1: 48. 1935 [*"polydactylis"*].

槭叶石韦 qi ye shi wei

Polypodium polydactylon Hance, J. Bot. 21: 269. 1883; *Cyclophorus polydactylos* (Hance) C. Christensen; *Niphobolus polydactylos* (Hance) Giesenhagen ex Diels [*"polydactylon"*]; *Pyrrosia* ×*pseudopolydactylis* Serizawa.

Plants 15–40 cm tall. Rhizome short, 4–6 mm in diam., in cross section with many scattered sclerenchyma strands; phyllopodia contiguous, lateral buds basal on phyllopodia. Scales blackish with a light margin, peltate, 1.5–2.1 × 0.6–0.9 mm, ciliate. Fronds monomorphic, stipitate; stipe 15–30 cm, ± 1–2.5 × as long as lamina; lamina 8–18 × 10–17.5 cm, base cordate-truncate to cuneate, sometimes unequally narrowed into dilated stipe; lamina pedately divided to 4/5 into 6–8 divisions, middle one 6–14 × 1–2 cm, lateral ones increasingly smaller. Hydathodes distinct, slightly to distinctly sunken. Indument persistent, monomorphic, dense, grayish brown; hairs 0.5–1 mm in diam., with ± appressed, narrowly boat-shaped rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks to 0.67 × as long as capsule.

● On rocks or tree trunks, also terrestrial; 200–2100 m. Taiwan.

17. Pyrrosia flocculosa (D. Don) Ching, Bull. Chin. Bot. Soc. 1: 66. 1935.

卷毛石韦 juan mao shi wei

Polypodium flocculosum D. Don, Prodr. Fl. Nepal. 1. 1825; *Apalophlebia flocculosa* (D. Don) C. Presl; *Cyclophorus annamensis* (Christ) C. Christensen; *C. flocculosus* (D. Don) C. Christensen; *C. rhomboidalis* Bonaparte; *Niphobolus annamensis* Christ; *N. flocculosus* (D. Don) Sprengel; *Pyrrosia mollis* (Kunze) Ching f. *rhomboidalis* (Bonaparte) C. Christensen & Tardieu; *P. rhomboidalis* (Bonaparte) Ching.

Plants 25–50 cm tall. Rhizome short, 3.4–6 mm in diam.; in cross section with 10 to ca. 25 scattered sclerenchyma strands; phyllopodia close together, lateral buds basal on phyllopodia. Scales pseudopeltate, 4–5.7 × 0.5–1 mm, base entire to irregularly dentate; acumen dull brown to blackish, dentate, entire toward apex. Fronds monomorphic, stipitate; stipe 6–20 cm, 0.25–1 × as long as lamina; lamina widest around or below middle, often slightly lyrate, 9–32 × 1.3–7.8 cm, base cuneate to truncate, occasionally ± cordate, apex acuminate, occasionally acute. Hydathodes distinct, superficial to distinctly sunken. Indument persistent, dimorphic, thin to dense, light dirty grayish; upper layer with hairs 0.3–2.2 mm in diam., with spreading to appressed, boat-shaped to acicular rays, lower layer with mainly woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks 0.33–1 × as long as capsule.

On tree trunks or rocks in forests; sea level to 700 m. Guangxi, Yunnan [Bangladesh, Bhutan, India, Kashmir, Myanmar, Nepal, Thailand, Vietnam].

18. Pyrrosia sheareri (Baker) Ching, Bull. Chin. Bot. Soc. 1: 64. 1935.

庐山石韦 lu shan shi wei

Polypodium sheareri Baker, J. Bot. 13: 201. 1875; *Cyclophorus drakeanus* (Franchet) C. Christensen f. *maximus* Y. C. Wu; *C. grandissimus* Hayata; *C. inaequalis* (Christ) C. Christensen; *C. sheareri* (Baker) C. Christensen; *C. sheareri* f. *maxima* (Y. C. Wu) C. Christensen; *Niphobolus inaequalis* Christ; *N. sheareri* (Baker) Diels; *Pyrrosia grandissima* (Hayata) Ching; *P. nanchuanensis* Ching.

Plants 20–50 cm tall. Rhizome short (rarely shortly elongated), 2.4–7 mm in diam., in cross section with many scattered sclerenchyma strands; phyllopodia contiguous, rarely ca. 0.5 cm apart, lateral buds basal on phyllopodia. Scales dull brown to blackish, pseudopeltate, 2.7–4.7 × 0.7–1.2 mm, ciliate. Fronds monomorphic, stipitate; stipe 3.5–5 cm; lamina widest near base, 10–30 × 2.5–6 cm, base cordate-truncate to ± cuneate, often unequal, apex acuminate. Hydathodes distinct, distinctly sunken. Indument persistent, monomorphic, dense, brown to grayish brown; hairs 0.3–0.5(–1) mm in diam., with appressed, boat-shaped rays. Sori superficial, without central bundle of paraphyses. Sporangia on stalks to 0.5 × as long as capsule.

On tree trunks or rocks in forests beside streams; near sea level to 2500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Vietnam].

19. Pyrrosia drakeana (Franchet) Ching, Bull. Chin. Bot. Soc. 1: 65. 1935.

毡毛石韦 zhan mao shi wei

Polypodium drakeanum Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 7: 165. 1883; *Cyclophorus drakeanus* (Franchet) C. Christensen; *Niphobolus drakeanus* Diels; *N. drakeanus* f. *elongata* Christ ex Diels; *Pyrrosia pseudodrakeana* K. H. Shing.

Plants 25–70 cm tall. Rhizome short or occasionally shortly elongated, 2–7 mm in diam., in cross section with many scattered sclerenchyma strands; phyllopodia contiguous or up to 2.5 cm apart, lateral buds on or close to internodes. Scales pseudopeltate, 2.5–11 × 0.6–1.3 mm, base entire to ciliate; acumen dull brown to blackish with a straw-colored margin, dentate to ciliate. Fronds monomorphic, stipitate; stipe 10–30 cm, (0.1–)2 × as long as lamina; lamina widest below or at middle, 12–36 × 4–8(–10) cm, base truncate to ± abruptly cuneate, usually asymmetrical, sometimes with an obtuse, short tooth on one side, apex obtuse, acute, or acuminate. Hydathodes distinct, superficial to slightly prominent. Indument persistent, dense, brown, dimorphic, upper layer of hairs (0.8–)1–1.6 mm in diam., with acicular rays, ± mixed with a lower layer with woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia sessile or with stalks up to 0.5 × as long as capsule.

Mixed forests on mountain slopes, on tree trunks, on rocks or rocky cliffs, on slopes, beside streams; 1000–3600 m. Gansu, Guangxi, Guizhou, Henan, Hubei, Shaanxi, Sichuan, Xizang, Yunnan [India].

The name *Pyrrosia intermedia* Goy was mistakenly applied to this species by Shing (Amer. Fern J. 73(3): 78. 1983). *Pyrrosia pseudodrakeana* was distinguished by a more appressed indument with smaller hairs with boat-shaped rays; but this represents just one extreme of a gradual variation, and it cannot be reliably distinguished.

20. Pyrrosia boothii (Hooker) Ching, Bull. Chin. Bot. Soc. 1: 66. 1935.

冯氏石韦 feng shi shi wei

Polypodium boothii Hooker, Sp. Fil. 5: 53. 1863; *Cyclophorus boothii* (Hooker) C. Christensen; *C. subvelutinus* (Christ) C. Christensen; *Niphobolus boothii* (Hooker) Beddome; *N. subvelutina* Christ; *Pyrrosia fengiana* Ching; *P. subvelutina* (Christ) Ching.

Plants 30–70 cm tall. Rhizome short or occasionally shortly elongated, to ca. 8 mm thick, in cross section with many scattered sclerenchyma strands; phyllopodia close, lateral buds situated basal on phyllopodia. Scales pseudopeltate, to 11 × 1.5 mm, base entire to ciliate; acumen brown, dentate to shortly ciliate. Fronds monomorphic, stipitate; stipes 15–30 cm, 0.5–1 × as long as lamina; lamina widest at middle, 20–36 × 4.5–8 cm, base cuneate and slightly decurrent, apex ± acuminate. Hydathodes distinct, superficial or sunken. Indument dimorphic, brown; upper layer not very dense, hairs to 2 mm in diam., with acicular rays, lower layer densely covering lamina, with mainly woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks 0.5–0.75 × as long as capsule.

On rocks in forests; 1600–2100 m. Xizang, Yunnan [Bhutan, India].

Pyrrosia boothii can be distinguished from *P. drakeana* by the longer rhizome scales, which are dentate, at most shortly ciliate, the shorter stipe, and often the longer fronds, with equal, cuneate base.

21. Pyrrosia bonii (Christ ex Giesenhagen) Ching, Bull. Chin. Bot. Soc. 1: 67. 1935.

波氏石韦 bo shi shi wei

Niphobolus bonii Christ ex Giesenhagen, Niphobolus, 120. 1901; *Cyclophorus bonii* (Christ ex Giesenhagen) C. Christensen; *Pyrrosia shennongensis* K. H. Shing; *P. subtruncata* Ching.

Plants 30–50 cm tall. Rhizome short or occasionally shortly elongated, 2–6.8 mm in diam., in cross section with many scattered sclerenchyma strands; phyllopodia contiguous or up to 2.5 cm apart, lateral buds on or close to phyllopodia. Scales pseudopeltate, 6.5–11 × 0.7–1.3 mm, base entire to ciliate; acumen dull brown, ciliate. Fronds monomorphic, stipitate; stipe 4–31 cm, (0.1–)0.2–1 × as long as lamina; lamina widest at ca. middle, 15–30 × 3.5–4.5 cm, base usually symmetrical, cuneate and slightly decurrent, apex shortly acuminate. Hydathodes distinct, superficial. Indument persistent or fugacious, dimorphic, thin or occasionally dense, dirty grayish; upper layer with hairs 0.8–1.3 mm in diam., with erect-spreading, acicular rays, ± mixed with a lower layer with mainly woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks 1–1.5 × as long as capsule.

On rocks in forests; 300–1100 m. Guangxi, Guizhou [Vietnam].

22. Pyrrosia similis Ching, Bull. Chin. Bot. Soc. 1: 56. 1935.

相似石韦 xiang si shi wei

Plants 25–45 cm tall. Rhizome shortly elongated, 2–3 mm in diam., in cross section with many scattered sclerenchyma strands; phyllopodia up to 0.5 cm apart, lateral buds basal on phyllopodia. Scales pseudopeltate, ca. 2 × 1 mm, dentate. Fronds monomorphic, stipitate; stipe 8–22 cm; lamina widest below middle, 15–25 × 3.5–5 cm, base rounded-cuneate, apex attenuate to long caudate. Hydathodes distinct, superficial. Indument persistent, dimorphic, dense, light grayish brown; upper layer with sparse hairs with appressed, narrow rays, ca. 0.5 mm in diam., and sparse, similar but larger and darker hairs, lower layer with dense woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia stalked.

● On open calcareous rocks or in forest soils; 700–1200 m. Guangxi, Guizhou, Sichuan.

Hovenkamp included *Pyrrosia similis* as a synonym of *P. bonii*, but *P. similis* has significantly smaller rhizome scales (ca. 2 × 1 mm as opposed to 6.5–11 × 0.7–1.3 mm) and an apparently different indumentum with appressed narrow rays and two sizes of hairs.

23. Pyrrosia subfurfuracea (Hooker) Ching, Bull. Chin. Bot. Soc. 1: 68. 1935.

绒毛石韦 rong mao shi wei

Polypodium subfurfuraceum Hooker, Sp. Fil. 5: 52. 1863; *Cyclophorus subfurfuraceus* (Hooker) C. Christensen; *Niphobolus subfurfuraceus* (Hooker) Beddome.

Plants 40–60 cm. Rhizome short or occasionally shortly elongated, 2–6.8 mm in diam., in cross section with many scattered sclerenchyma strands; phyllopodia contiguous or up to 2.5 cm apart, lateral buds situated basal on or close to phyllopodia. Scales pseudopeltate, 6.5–11 × 0.7–1.3 mm, base entire to ciliate; acumen dull brown, entire. Fronds monomorphic, subsessile to stipitate; stipe up to 15 cm, (0.1–)0.2–1 × as long as lamina; lamina widest at ca. middle, 45–60 × 6.5–11 cm,

base long decurrent, apex shortly acuminate. Hydathodes distinct, superficial. Indument persistent or fugacious, dimorphic, thin or occasionally dense, dirty grayish; upper layer with hairs 0.8–1.3 mm in diam., with erect-spreading, acicular rays, ± mixed with a lower layer with mainly woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks 0.5–1 × as long as capsule.

700–2000 m. Xizang, Yunnan [Bhutan, India, Vietnam].

24. Pyrrosia calvata (Baker) Ching, Bull. Chin. Bot. Soc. 1: 62. 1935.

光石韦 guang shi wei

Polypodium calvatum Baker, J. Bot. 17: 304. 1879; *Cyclophorus calvatus* (Baker) C. Christensen; *C. esquirolii* H. Léveillé; *Niphobolus calvatus* (Baker) Diels; *Pyrrosia pseudocalvata* Ching, Boufford & K. H. Shing.

Plants 25–70 cm tall. Rhizome short or occasionally shortly elongated, 2–6.8 mm in diam., in cross section with many scattered sclerenchyma strands; phyllopodia contiguous or up to 2.5 cm apart, lateral buds on or close to phyllopodia. Scales pseudopeltate, 6.5–11 × 0.7–1.3 mm, base entire to ciliate; acumen dull brown, ciliate. Fronds monomorphic, stipitate; stipe 6–15 cm, (0.1–)0.2–1 × as long as lamina; lamina widest at ca. middle, 25–60 × 2–5 cm, base narrowly cuneate and long decurrent, apex long acuminate. Hydathodes distinct, superficial. Indument mostly fugacious, dimorphic, thin or occasionally dense, dirty grayish; upper layer with hairs 0.8–1.3 mm in diam., with erect-spreading, acicular rays, ± mixed with a lower layer with mainly woolly rays. Sori superficial. Sporangia with stalks ca. 1 × as long as capsule.

● On tree trunks or rocks in forests; 400–1800 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan, Zhejiang.

The whole plant is used in traditional Chinese medicine as an astringent and to promote diuresis.

25. Pyrrosia assimilis (Baker) Ching, Bull. Chin. Bot. Soc. 1: 49. 1935.

相近石韦 xiang jin shi wei

Polypodium assimile Baker, J. Bot. 13: 201. 1875; *Cyclophorus assimilis* (Baker) C. Christensen; *C. assimilis* f. *lobata* C. Christensen; *C. assimilis* var. *mollifrons* Handel-Mazzetti; *Niphobolus assimilis* (Baker) Diels; *Pyrrosia assimilis* f. *lobata* (C. Christensen) Ching; *P. assimilis* var. *longissima* Ching; *P. dimorpha* X. H. Guo & S. B. Zhou (2005), not (Copeland) Parris (1980).

Plants 5–15(–20) cm tall. Rhizome shortly elongated, not grooved ventrally, (0.5–)1.8–2.2 mm in diam., in cross section with 10–20 or sometimes more scattered sclerenchyma strands; phyllopodia 0.2–0.5 cm apart, lateral buds alternating with phyllopodia. Scales peltate, 1.6–5.8 × 0.7–1.1 mm, base entire to denticulate; acumen dull brown to blackish with a lighter margin, dentate. Fronds monomorphic, sessile, linear, 6–20 × 0.2–1 cm. Hydathodes distinct, sunken. Indument monomorphic, sparse; hairs 0.5–1.8 mm in diam., with erect-spreading, acicular rays of very unequal length. Sori superficial, without central bundle of paraphyses. Sporangia with stalks up to 1 × as long as capsule.

● On shaded wet rocks in forests on slopes; 200–1000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hunan, Jiangxi, Sichuan, Xinjiang, Yunnan, Zhejiang.

The apparent earlier homonym "*Polypodium assimile* Kunze" (Linnaea 23: 275. 1850) is a nomen nudum and was not therefore validly published (*Melbourne Code*, Art. 38.1(a)). *Pyrrosia dimorpha* (2005) was based on material from Anhui with most fronds dichotomously once or more divided, mostly near the apex.

26. Pyrrosia mannii (Giesenhagen) Ching, Bull. Chin. Bot. Soc. 1: 55. 1935.

蔓氏石韦 man shi shi wei

Niphobolus mannii Giesenhagen, Niphobolus, 107. 1901.

Plants 10–30 cm tall. Rhizome short, 2.6–3.3 mm in diam., in cross section with few to ca. 20 scattered sclerenchyma strands; phyllopodia contiguous, lateral buds basal on phyllopodia. Scales pseudopeltate, 5–7.4 × 0.5–1.2 mm, base entire; acumen straw-colored, entire to dentate. Fronds monomorphic, not or indistinctly up to 3 cm stipitate; lamina widest at or above middle, 15–30 × 1–2 cm, base gradually narrowed, apex acute to narrowly acuminate. Hydathodes distinct, sunken to ± superficial. Indument persistent, dimorphic, dense, brown; hairs (0.5–)0.8–2 mm in diam., with erect-spreading, acicular rays, ± mixed with hairs with mainly woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia sessile.

On tree trunks, rotting wood, or rocks in forests; 1700–2300 m. Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand].

27. Pyrrosia stenophylla (Beddome) Ching, Bull. Chin. Bot. Soc. 1: 55. 1935.

狭叶石韦 xia ye shi wei

Niphobolus fissus Blume var. *stenophyllus* Beddome, Suppl. Ferns Brit. Ind. 92. 1892; *Cyclophorus stenophyllus* (Beddome) C. Christensen; *Niphobolus stenophyllus* (Beddome) Giesenhagen; *Pyrrosia linearis* Ching & S. K. Wu; *P. porosa* (C. Presl) Hovenkamp var. *stenophylla* (Beddome) Hovenkamp; *P. tibetica* Ching; *P. tibetica* var. *angustata* Ching.

Plants 20–30 cm tall. Rhizome shortly elongated, 1.6–3.1 mm in diam., in cross section with few to many sclerenchyma strands; phyllopodia 0.3–0.7 cm apart, lateral buds alternating with phyllopodia. Scales peltate, 3.5–6.8 × 0.7–1.2 mm, base entire to dentate, acumen light brown, dentate; short, ± orbicular to ovate scales occasionally present. Fronds monomorphic, not or indistinctly to 1–3 cm stipitate; lamina widest above middle, (5–)20–40 × 0.5–1.5 cm, base gradually narrowed, apex acute to acuminate. Hydathodes distinct, superficial. Indument persistent, dimorphic, thin, brown or lower layer whitish; hairs 0.2–1.6 mm in diam., with erect-spreading to appressed, acicular rays, usually ± mixed with hairs with mainly woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia sessile or with stalks up to 0.33 × as long as capsule.

On tree trunks or rocks in forests; 1200–1800 m. Xizang, Yunnan [Bhutan, India, Myanmar, Nepal].

28. Pyrrosia tonkinensis (Giesenhagen) Ching, Bull. Chin. Bot. Soc. 1: 55. 1935.

中越石韦 zhong yue shi wei

Niphobolus tonkinensis Giesenhagen, Niphobolus, 144. 1901; *Cyclophorus tonkinensis* (Giesenhagen) C. Christensen; *Pyrrosia porosa* (C. Presl) Hovenkamp var. *tonkinensis* (Giesenhagen) Hovenkamp.

Plants 10–40 cm tall. Rhizome shortly elongated, 1.6–3.1 mm in diam., in cross section with few to many sclerenchyma strands; phyllopodia 0.3–0.7 cm apart, lateral buds alternating with phyllopodia. Scales peltate 3.6–6.2 × 0.5–1.3 mm, base entire to dentate; acumen light brown, dentate. Fronds monomorphic, sessile or indistinctly stipitate; lamina widest above middle, 8–22 × 0.5–1 cm, base gradually narrowed, apex acute to acuminate. Hydathodes distinct, superficial. Indument persistent, dimorphic, dense, brown or lower layer whitish; hairs 0.2–0.8 mm in diam., with acicular rays appressed to a layer with mainly woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia with stalks 0.5–1 × as long as capsule.

On tree trunks or rocks in forests; near sea level to 1600 m. Guangdong, Guangxi, Guizhou, Hainan, Yunnan [Laos, Thailand, Vietnam].

29. Pyrrosia davidii (Giesenhagen ex Diels) Ching, Acta Phytotax. Sin. 10: 301. 1965.

华北石韦 hua bei shi wei

Niphobolus davidii Giesenhagen ex Diels, Nat. Pflanzenfam. 1(4): 325. 1899, based on *Polypodium davidii* Baker, Ann. Bot. (Oxford) 5: 472. 1891, not Franchet (1887); *Cyclophorus davidii* (Giesenhagen ex Diels) H. Léveillé; *C. gralla* (Giesenhagen) C. Christensen; *C. matsudai* Hayata; *C. pekinensis* C. Christensen, nom. illeg. superfl.; *C. pekinensis* f. *minor* C. Christensen; *C. subfissus* Hayata; *C. transmorrisonensis* Hayata; *Niphobolus gralla* Giesenhagen; *Pyrrosia gralla* (Giesenhagen) Ching; *P. matsudai* (Hayata) Tagawa; *P. nudicaulis* Ching; *P. pekinensis* (C. Christensen) Ching, nom. illeg. superfl.; *P. subfissa* (Hayata) Ching; *P. transmorrisonensis* (Hayata) Ching.

Plants 5–20 cm tall. Rhizome shortly elongated, 1.6–3.1 mm in diam., in cross section with few to many sclerenchyma strands; phyllopodia 0.3–0.7 cm apart, lateral buds alternating with phyllopodia. Scales peltate, 1.4–6.8 × 0.5–2.1 mm, base entire to ciliate; acumen light brown to dull blackish with a distinct lighter margin, ciliate to dentate. Fronds monomorphic, not or indistinctly up to 5 cm stipitate; lamina widest above middle, 3–15 × 0.5–1.5(–2) cm, base gradually narrowed, apex acute to acuminate. Hydathodes distinct, superficial. Indument persistent, nearly or completely monomorphic, sparse to dense, hairs 0.2–1.6 mm in diam. Sori superficial, without central bundle of paraphyses. Sporangia with stalks up to as long as capsule.

● On tree trunks in forests, on shaded and wet rocks of slopes; 200–3400 m. Gansu, Guizhou, Hebei, Henan, Hubei, Hunan, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan.

The name *Pyrrosia davidii* is sometimes restricted to small forms with an appressed indument from the northern part of the range (Shing & Iwatsuki, J. Jap. Bot. 72: 2. 1997), but there is no sharp distinction between these and larger forms. *Pyrrosia davidii* is closely related to *P. porosa* and might be better treated as a synonym of *P. porosa* var. *porosa*, representing forms with an almost monomorphic indument.

30. Pyrrosia porosa (C. Presl) Hovenkamp, Blumea 30: 208. 1984.

柔软石韦 rou ruan shi wei

Niphobolus porosus C. Presl, Tent. Pterid. 202. 1836; *Cyclophorus acrocarpus* (Christ & Giesenhagen) C. Christensen; *C. alcicornu* Christ; *C. malacophyllus* C. Christensen; *C. pekinensis* C. Christensen; *C. porosus* (C. Presl) C. Presl; *C. sticticus* (Kunze) C. Christensen; *C. xiphioides* (Christ) C. Christensen; *N. acrocarpus* Christ & Giesenhagen; *N. sticticus* Kunze; *N. sticticus* var. *major* Christ; *N. xiphioides* Christ; *Polypodium mollissimum* Christ (1899), not Fée (1866); *P. porosum* (C. Presl) Mettenius; *P. sticticum* (Kunze) Mettenius; *Pyrrosia mollis* (Kunze) Ching f. *alcicornu* (Christ) Ching; *P. mollis* var. *mollissima* Ching; *P. porosa* var. *mollissima* (Christ) K. H. Shing; *P. scolopendrina* Ching; *P. stictica* (Kunze) Holttum.

Plants 7–25 cm tall. Rhizome shortly elongated, 1.6–3.1 mm in diam., cross section with few to many sclerenchyma strands; phyllopodia 0.3–0.7 cm apart, lateral buds alternating with phyllopodia. Scales peltate, narrowly ovate to lanceolate, 1.4–6.8 × 0.5–2.1 mm, base entire to ciliate; acumen light brown to dull blackish with a distinct lighter margin, ciliate to dentate. Fronds monomorphic, sessile or indistinctly stipitate; lamina widest above middle, 10–23 × 0.7–2.5 cm, base gradually narrowed, apex acute to acuminate. Hydathodes distinct, superficial. Indument persistent, dimorphic, very sparse to dense, brown or lower layer whitish; hairs 0.2–1.6 mm in diam., with erect-spreading to appressed, acicular rays, usually ± mixed with hairs with mainly woolly rays. Sori superficial, without central bundle of paraphyses. Sporangia sessile or with stalks to as long as capsule.

On tree trunks or rocks in forests; 900–2600 m. Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam].

The epithet *"porosum"* was introduced by Wallich as *Polypodium porosum* (Numer. List, no. 266. 1829, nom. nud.). *Pyrrosia porosa* has often been confused with *P. mollis* (Kunze) Ching from Indochina and Malesia. All references to *P. mollis* from China refer to *P. porosa*.

31. Pyrrosia piloselloides (Linnaeus) M. G. Price, Kalikasan 3: 176. 1974.

抱树石韦 bao shu shi wei

Pteris piloselloides Linnaeus, Sp. Pl., ed. 2, 2: 1530. 1762; *Drymoglossum piloselloides* (Linnaeus) C. Presl; *Elaphoglossum piloselloides* (Linnaeus) Keyserling; *Lemmaphyllum piloselloides* (Linnaeus) Luerssen; *Notholaena piloselloides* (Linnaeus) Kaulfuss; *Oetosis piloselloides* (Linnaeus) Kuntze; *Pter-*

opsis piloselloides (Linnaeus) Desveaux; *Taenitis piloselloides* (Linnaeus) R. Brown.

Rhizome long creeping, slender, up to 1 mm in diam., densely scaly throughout; scales peltate, orbicular to triangular, up to 1 × 0.8 mm, pale brown with dark central portion, base irregularly ciliate at margin. Fronds strongly dimorphic. Sterile fronds sessile to shortly stipitate, lamina 1–7 × 1–2 cm, thickly succulent, apex rounded or obtuse; both surfaces sparsely stellate hairy; veins invisible, venation reticulate, areoles usually with recurrent free veinlets. Fertile fronds narrower, 4–16 × 0.3–1.5 cm; sori near margin. Spores light brown, perispore warty and with conical spinelike protuberances.

Mostly on tree trunks, often on exposed bare parts. Guangxi, Hainan, Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam].

Forms with forked fertile fronds are widespread but uncommon. The indumentums can be very sparse, and collections of *Pyrrosia piloselloides* are occasionally misidentified as *Lemmaphyllum carnosum* (Wallich ex J. Smith) C. Presl, which is superficially very similar but lacks stellate hairs.

It has been suggested that *Pyrrosia piloselloides* is conspecific with *P. heterophylla* (Linnaeus) M. G. Price (Kalikasan 3: 177. 1973), type from Sri Lanka, which has priority.

32. Pyrrosia angustissima (Giesenhagen ex Diels) Tagawa & K. Iwatsuki, Acta Phytotax. Geobot. 26: 171. 1975.

石蕨 shi jue

Niphobolus angustissimus Giesenhagen ex Diels in Engler & Prantl, Nat. Pflanzenfam. 1(4): 326. 1899, based on *Polypodium angustissimum* Baker, Ann. Bot. (Oxford) 5: 472. 1891, not Fée (1873); *Cyclophorus cavalerianus* (Christ) C. Christensen; *C. sasakii* Hayata; *C. taeniodes* C. Christensen; *N. cavalerianus* Christ; *Saxiglossum angustissimum* (Giesenhagen ex Diels) Ching; *S. sasakii* (Hayata) Tagawa; *S. taeniodes* (C. Christensen) Ching; *S. taeniodes* var. *sasakii* (Hayata) Masamune ex Satomi.

Rhizome long creeping, slender, up to 1.2 mm in diam., densely scaly throughout; scales peltate, linear-triangular, up to 8.8 × 0.5–0.8 mm, base irregularly lobed to rounded, margin minutely dentate, reddish brown or pale brown with dark central portion. Stipe short with lamina decurrent nearly to base; laminae linear, 3–9 cm × 1.5–3.5 mm, thickly leathery, margins involute, apex obtuse or acute; both surfaces stellate hairy, hairs rather caducous adaxially; veins invisible, venation reticulate, with 1 or 2 rows of areoles on each side of costa, often including free veinlets in each areole. Sori on free veinlets outside areoles, usually confluent at maturity, often covered by revolute lamina margin. Spores yellowish brown, perispore slightly wrinkled, with half-spherical globules.

On moss-covered tree trunks or on rocks by streams or in forests; 500–2000 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Shanxi, Taiwan, Zhejiang [Japan, Thailand].

10. PLATYCERIUM Desvaux, Mém. Soc. Linn. Paris 6: 213. 1827.

鹿角蕨属 lu jiao jue shu

Zhang Xianchun (张宪春); Michael G. Gilbert

Plants epiphytic or occasionally epilithic, of very striking appearance, solitary or in clusters. Rhizome thick, shortly creeping, concealed by roots and fronds; scales large, basifixed to peltate, mostly with a thickened dark central portion, margin ciliate, concolorous or pale brown; fronds clustered, extremely dimorphic; lamina fleshy, leathery, covered with stellate hairs when young; costa none, main veins conspicuous, dichotomously branched, usually several on each lobe or branch, minor veins visible or concealed, much anastomosing with free included veinlets. Basal fronds persistent, base strongly appressed to substrate, entire or forked several times; fertile foliage fronds in pairs, simple to variously dichotomously forked, erect to pendulous. Sori forming large soral patches, paraphyses many, stellate. Spores 64 per sporangium, or 8 (*P. ridleyi* Christ), monolete, smooth. $x = 37$.

Fifteen species: SE Asia (eight species), Africa and Madagascar (six species), one isolated species in South America; one species in China.

Platycerium bifurcatum (Cavanilles) C. Christensen and *P. alcicorne* Desvaux are often cultivated. Plants of this splendid tropical genus are much sought for horticultural purposes; the wild population of *P. wallichii* in Yunnan is almost extinct. It is a nationally protected plant in China.

Platycerium together with *Pyrrosia* forms a natural monophyletic clade in Polypodiaceae which has long been recognized by the characteristic stellate hairs and thick fleshy lamina. Molecular phylogeny studies also support this relationship.

1. Platycerium wallichii Hooker, Gard. Chron. 765. 1858.

绿孢鹿角蕨 lü bao lu jiao jue

Alcicornium wallichii (Hooker) Underwood.

Rhizome thick, fleshy, shortly creeping; scales basifixed to peltate, pale with dark brown central portion, stiff, ca. 10 × 0.4 mm, margin entire. Basal fronds up to 40 cm or more, as wide as long, 3–5 times dichotomously lobed, lobes equal in length, obtuse or acute, margin entire; main veins and secondary veins raised on both surfaces, smaller ones hardly visible, main veins dichotomous, secondary ones forming network, smaller ones more copiously anastomosing; very thick and fleshy near base, more than 1 cm thick, thin and green at upper portion. Foliage fronds in pairs, 25–70 cm, subsessile, pendulous, lower portion divided into 3 uneven main lobes, upper portion of inner lobe repeatedly dichotomously branching, only outer small lobe not fertile; main veins distinct, dichotomous, smaller ones hardly visible, copiously anastomosing with included veinlets; thick, densely covered with stellate

hairs; margin of lamina entire. Soral patches 2, large, at base of first sinus of 2 main lobes, mixed with stellate paraphyses. Spores 64 per sporangium, green.

Epiphytic on tree trunks and large branches up to great heights from the ground, in tropical lowland rain forests; 200–1000 m. W Yunnan (Yingjiang, at border with Myanmar) [E India, Malaysia, Myanmar, Thailand].

11. GONIOPHLEBIUM (Blume) C. Presl, Tent. Pterid. 185. 1836.

棱脉蕨属 leng mai jue shu

Lu Shugang (陆树刚); Peter H. Hovenkamp

Polypodium sect. *Goniophlebium* Blume, Fl. Javae Filic. 132. 1830; *P.* subg. *Goniophlebium* (Blume) C. Christensen; *Schellolepis* J. Smith.

Plants epiphytic, medium-sized. Rhizome long creeping, densely scaly; scales brown to dark brown, pseudopeltate, lanceolate, clathrate, base broad, apex narrowly acuminate. Fronds remote, monomorphic; stipe straw-colored, long, glabrous; lamina imparipinnate, oblong in outline; lateral pinnae 20–40 pairs, far apart, at least basal ones articulate, lanceolate or linear-lanceolate, herbaceous, glabrous or pubescent, rarely scaly, margins toothed or incised; veins anastomosing to form 2 or 3 rows of areoles on either side of costa, each areole with a simple included veinlet, which starts from basiscopic lateral vein, outer veinlets free. Sori orbicular, in 1 row on either side of costa, borne on simple included veinlets in costal areoles, ± sunken on abaxial surface and raised on adaxial surface. Paraphyses present only when young, peltate, clathrate, toothed at margin. Sporangia long stalked, annulus with 12 hardened cells. Spores yellow, ellipsoid, with obscure aperture, exospore with tuberculate surface, perispore pellucid. $x = 37$.

About 20 species: mainly in tropical Asia; two species in China.

The type species is *Goniophlebium subauriculatum*. Pichi Sermolli (Webbia 28: 465. 1973) attempted to redefine *Goniophlebium* with *G. articulatum* C. Presl as the type, thus excluding Blume's section and creating a later homonym.

1a. Rhizome green or brown; scales ovate-lanceolate, margins ciliate; lateral pinnae with 4–5 mm stalks, base cuneate ..... 1. *G. persicifolium*
1b. Rhizome glaucous underneath scales; scales linear-lanceolate, margins entire; lateral pinnae sessile, base cordate or subcordate, auriculate on both sides or on acroscopic side only ..... 2. *G. subauriculatum*

1. Goniophlebium persicifolium (Desvaux) Beddome, Suppl. Ferns S. Ind. 21. 1876 [*"persicaefolium"*].

棱脉蕨 leng mai jue

Polypodium persicifolium Desvaux, Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5: 316. 1811; *Goniophlebium grandidens* (Kunze ex Mettenius) Fée; *G. ponapense* Copeland; *G. rotense* Hosokawa; *P. colpothrix* Kunze; *P. grandidens* Kunze ex Mettenius; *P. integriore* Copeland; *P. koningsbergeri* Alderwerelt; *P. persicifolium* var. *mettenii* Rosenstock; *P. phlebodioides* Copeland; *Schellolepis persicifolia* (Desvaux) Pichi Sermolli.

Rhizome green or brown, 5–7 mm in diam., densely scaly; scales dark brown, ovate-lanceolate, 3–4 × 1.5–2 mm, margin toothed. Stipe straw-colored or brownish, 30–40 cm, 3–4 mm in diam., densely scaly at base, distally minutely scaly or glabrescent upward. Lamina broadly lanceolate in outline, up to 150 × 40 cm; lateral pinnae 10–30 pairs, ascending, 4–5 cm apart, ± falcate, linear-lanceolate, up to 20 × 2.5 cm, cuneate at base, with 5–7 mm stalks, margin toothed and cartilaginous, apex caudate-acuminate; pinnae gradually smaller distally, terminal pinna same as lateral pinnae, up to 15 cm; lamina herbaceous or subleathery, green, glabrous. Sori orbicular, borne on simple included veinlets in costal areoles, in 1 row on each side of costa, medial or costular, distinctly sunken on abaxial surface and raised on adaxial surface.

Epiphytic on tree trunks; 700–1000 m. Hainan (Baoting, Diaoluo Shan, Jianfeng Ling) [SE India, Indonesia, Malaysia, New Guinea, Philippines, Thailand, Vietnam; Pacific islands].

Beddome (Ferns Brit. India, 79, t 79. 1865) treated material of this taxon as *Goniophlebium cuspidatum* (D. Don) C. Presl.

2. Goniophlebium subauriculatum (Blume) C. Presl, Tent. Pterid. 186. 1836.

穴果棱脉蕨 xue guo leng mai jue

Polypodium subauriculatum Blume, Enum. Pl. Javae 2: 133. 1828; *Goniophlebium molle* Beddome; *Marginaria subauriculata* (Blume) Nakai ex H. Itô; *Polypodiastrum molle* (Beddome) Ching; *Polypodium beddomei* Baker; *Schellolepis subauriculata* (Blume) J. Smith.

Rhizome 6–8 mm in diam., glaucous underneath scales, densely scaly at least at apex; scales dark brown, narrowly lanceolate, ca. 5 × 0.7 mm, margin toothed. Stipe straw-colored or brown, 25–35 cm, base densely scaly, distally minutely scaly or glabrescent; rachis pale brown, minutely scaly throughout; lamina lanceolate in outline, 80–100 × 30–40 cm; lateral pinnae 30–40 pairs, sessile, linear, basal pinnae usually slightly shorter than next above, deflexed or spreading; middle pinnae subopposite, spreading or slightly ascending, straight or slightly falcate, 14–20 × ca. 2 cm, base subcordate or truncate, rounded auriculate on both sides, gradually narrowing from base to long attenuate apex, margin serrate, upper pinnae progressively smaller; terminal pinna 5–10 cm, basal portion irregularly lobed; lamina herbaceous or thinly leathery, green, glabrous or pubescent when young. Sori orbicular, at tip of simple in-

cluded veinlets in costal areoles, in 1 row on each side of costa, distinctly sunken on abaxial surface and raised on adaxial surface.

Epiphytic on tree trunks; 500–1300 m. Yunnan (Jinhong, Mengla) [Indonesia, Malaysia, New Guinea, Philippines, Thailand, Vietnam; NE Australia, Pacific islands].

12. METAPOLYPODIUM Ching, Acta Phytotax. Sin. 16(4): 28. 1978.

篦齿蕨属 bi chi jue shu

Lu Shugang (陆树刚); Peter H. Hovenkamp

Plants epiphytic, medium-sized. Rhizome long creeping, densely covered with scales; scales dark brown, lanceolate, base broad and reddish brown ciliate, acuminate at apex. Fronds remote. Stipe stramineous, articulate to rhizome. Lamina narrowly lanceolate, deeply pinnatifid or pinnatisect at lower part. Lateral lobes more than 30 pairs, narrowly lanceolate, spreading or slightly deflexed at lower pairs. Veins free, not forming costal areoles; veinlets forked. Sori orbicular, in a single row on each side of costa, paraphyses absent.

Two species: Asia, from SW China to Indochina and Himalaya; two species in China.

Christenhusz et al. (Phytotaxa 19: 36. 2011) and Lindsay and Middleton (http://rbg-web2.rbge.org.uk/thaiferns/factsheets/index.php#M; accessed 2 Apr 2012) include *Metapolypodium* within *Goniophlebium*.

1a. Rachis abaxially straw-colored; lamina with basal lobes deflexed ..... 1. *M. manmeiense*
1b. Rachis abaxially castaneous; lamina with basal lobes not or very slightly deflexed ..... 2. *M. microrhizoma*

1. Metapolypodium manmeiense (Christ) Ching, Acta Phytotax. Sin. 16(4): 29. 1978.

篦齿蕨 bi chi jue

Polypodium manmeiense Christ, Bull. Herb. Boissier 6: 870. 1898; *Goniophlebium manmeiense* (Christ) Rödl-Linder; *Metapolypodium kingpingense* Ching & W. M. Chu; *Polypodiodes manmeiense* (Christ) Fraser-Jenkins; *Polypodium pseudodimidiatum* Christ; *P. scalare* Christ; *P. simulans* Baker.

Rhizome long creeping, 2–3 mm in diam., densely covered with scales; scales dark brown, lanceolate, broad at base, remotely ciliate at margin, acuminate at apex. Fronds remote. Stipe straw-colored or brown at base, 8–12 cm, densely scaly at base, glabrous upward. Lamina narrowly lanceolate, 20–30 × 5–7 cm, deeply pinnatifid, pinnae usually decurrent to next lobes by very narrow wings of rachis in lower part, with rather abruptly narrowing acuminate apex. Lateral lobes 20–30 pairs, narrowly lanceolate, spreading except base with one pair deflexed and slightly shortened, incised-undulate at margins, acute to obtuse at apex. Rachis and costa straw-colored. Veins free, veinlets forked, terminally veinlets ending in elliptic hydathodes inside margin of lobes. Lamina herbaceous, green, glabrous. Sori orbicular, in 1 row on each side of costa, medial, superficial or sunken in cavities on abaxial surface.

Epiphytic on tree trunks or on rocks; 1000–2500 m. Guizhou, Sichuan, Yunnan [Cambodia, NE India, Laos, N Myanmar, Thailand, Vietnam].

2. Metapolypodium microrhizoma (C. B. Clarke ex Baker) S. G. Lu & L. H. Yang, J. Wuhan Bot. Res. 28(4): 509. 2010.

栗柄篦齿蕨 li bing bi chi jue

Polypodium microrhizoma C. B. Clarke ex Baker in Hooker & Baker, Syn. Fil., ed. 2, 511. 1874; *Goniophlebium fieldingianum* (Kunze ex Mettenius) T. Moore; *G. microrhizoma* (C. B. Clarke ex Baker) Beddome; *Polypodiodes microrhizoma* (C. B. Clarke ex Baker) Ching; *Polypodium fieldingianum* Kunze ex Mettenius; *P. microrhizoma* var. *xerophyticum* Mehra; *P. taliense* Christ.

Rhizome long creeping, 2–3 mm in diam., densely covered with scales; scales dark brown, ovate-lanceolate, broad at base, peltate, margin denticulate, apex acuminate. Fronds remote. Stipe straw-colored at base, shiny and castaneous on lower side (as is rachis), 8–12 cm, slender, glabrous. Lamina deeply pinnatifid or pinnatisect at lower portion, lanceolate in outline, 20–30 × 5–8 cm, base slightly shortened, apex pinnatilobate-acuminate. Segments/pinnae 15–30 pairs, spreading, lanceolate, 4–5 cm × 6–8 mm, base connected by a narrow wing along rachis, distantly incised-serrate at margin, apex acute or obtuse; basal ones not or very slightly deflexed, slightly shorter than next above. Veins visible, without areoles on both sides of rachis, anastomosing to form 1 row of areoles on each side of costa, each containing a simple included veinlet. Lamina thinly papery or membranous, green, glabrous on both surfaces, rachis castaneous abaxially, straw-colored and grooved adaxially, glabrous, nearly wingless in lowest portion. Sori orbicular or oblong, terminal on included veinlets, in 1 row on each side of costa, medial, ± sunken.

Terrestrial in forests, epiphytic on tree trunks, or on rocky slopes; 2300–3300 m. Sichuan, Taiwan, Xizang, Yunnan [Bhutan, N India, N Myanmar, Nepal, N Thailand].

De Vol and Kuo (Fl. Taiwan 1: 202. 1975) treated material of *Polypodiodes microrhizoma* as *Polypodium atkinsonii* C. Christensen.

13. POLYPODIASTRUM Ching, Acta Phytotax. Sin. 16(4): 27. 1978.

拟水龙骨属 ni shui long gu shu

Lu Shugang (陆树刚); Peter H. Hovenkamp

Plants medium-sized, epiphytic. Rhizome long creeping, densely scaly; scales brown to dark brown, lanceolate, clathrate.

Fronds remote. Stipe articulate to rhizome at base. Lamina pinnate. Pinnae ca. 10 pairs, sessile, lanceolate to narrowly lanceolate, upper pinnae usually decurrent at base. Veins anastomosing to form 1–3 rows of areoles on each side of costa, each costal areole containing an included free veinlet. Lamina herbaceous, glabrous or minutely scaly on abaxial side. Sori orbicular, terminal on included veinlets of costal areoles, in 1 row on each side of costa; sporangia long stalked, annulus with 12–20 hardened cells. Paraphyses scalelike, clathrate, fugacious; spores ellipsoid, surface coarsely verrucate. $x = 37$.

About eight species: tropical and subtropical Asia and Oceania; three species in China.

Christenhusz et al. (Phytotaxa 19: 38. 2011) and Lindsay and Middleton (http://rbg-web2.rbge.org.uk/thaiferns/factsheets/index.php#P; accessed 2 Apr 2012) include *Polypodiastrum* within *Goniophlebium*.

1a. Rhizome densely scaly; lateral pinnae deflexed or spreading, decurrent at base; costa straw-colored, veinlets invisible ..... 1. *P. dielseanum*
1b. Rhizome sparsely scaly and with whitish bloom; lateral pinnae ascending, rounded or cordate at base; costa brown, veinlets visible.
2a. Lateral pinnae rounded at base, not overlapping rachis ..... 2. *P. argutum*
2b. Lateral pinnae cordate at base, overlapping rachis ..... 3. *P. mengtzeense*

1. Polypodiastrum dielseanum (C. Christensen) Ching, Acta Phytotax. Sin. 16(4): 28. 1978.

川拟水龙骨 chuan ni shui long gu

Polypodium dielseanum C. Christensen, Index Filic. 522. 1906, based on *P. leuconeuron* Diels, Bot. Jahrb. Syst. 29: 203. 1900, not (Fée) Christ (1900); *Goniophlebium dielseanum* (C. Christensen) Rödl-Linder; *P. meyii* Christ [*"meyi"*]; *P. wilsonii* Christ.

Rhizome long creeping, ca. 5 mm in diam., densely scaly; scales brown, ovate-lanceolate, minutely denticulate at margins, acuminate at base. Fronds remote. Stipe straw-colored, 20–30 cm, densely scaly at base, upward glabrous, rachis and lower part of costa pubescent on both surfaces; lamina pinnate, ovate-lanceolate in outline, 40–60 × 15–25 cm; lateral pinnae 20–30 pairs, basal pinna deflexed, upper pinnae spreading, linear-lanceolate, 10–15 × 0.8–1.2 cm, base adnate and somewhat dilated, margin crenate-serrate, apex acuminate or obtuse; veins anastomosing to form 1 row of areoles on each side of costa, each with included veinlet. Lamina herbaceous, green, abaxial surface with sparse brown ovate-lanceolate scales. Sori orbicular, in 1 row on each side of costa, terminal on included veinlets, medial.

Epiphytic on tree trunks or on rocks; 1500–2100 m. Guizhou, Sichuan, Yunnan [NE India].

2. Polypodiastrum argutum (Wallich ex Hooker) Ching, Acta Phytotax. Sin. 16(4): 28. 1978.

尖齿拟水龙骨 jian chi ni shui long gu

Rhizome long creeping, 3–4 mm in diam., sparsely scaly and with whitish bloom; scales brown, ovate-lanceolate, base broad and peltate, margin sparsely toothed, apex acuminate. Fronds remote. Stipe straw-colored, 10–15 cm, scaly at base, glabrous upward. Lamina ovate lanceolate in outline, 40–50 × 15–25 cm. Lateral pinnae 15–20 pairs, sessile, ovate-lanceolate, 10–15 × 1.5–2.5 cm, base rounded, margin serrate or denticulate, apex acuminate; terminal pinna distinct; veins anastomosing to form 2 or 3 areoles on each side of costa, each costal areole containing a simple free included veinlet, other free veinlet ending inside margin of lobes, visible on both surfaces. Lamina herbaceous, abaxially yellowish green, adaxially dark green, both surfaces glabrous except for minute scales abaxially. Sori orbicular, terminal on included veinlets of costal areoles, in 1 row on each side of costa, medial or slightly closer to costa, superficial.

Epiphytic on tree trunks or on rocks; 2300–2700 m. Guangxi, Guizhou, Xizang, Yunnan [Bhutan, NE India, Myanmar, Thailand, Nepal].

The epithet *"argutum"* was first used by Wallich (Numer. List, no. 308. 1829, nom. nud.).

1a. Pinnae 15–20 pairs, ovate-lanceolate, margin crenate-serrate; sori medial ..... 2a. var. *argutum*
1b. Pinnae fewer and narrower, margin denticulate; sori closer to costa ..... 2b. var. *angustum*

2a. Polypodiastrum argutum var. **argutum**

尖齿拟水龙骨(原变种) jian chi ni shui long gu (yuan bian zhong)

Polypodium argutum Wallich ex Hooker, Sp. Fil. 5: 32. 1864; *Goniophlebium argutum* (Wallich ex Hooker) Beddome; *Schellolepis arguta* (Wallich ex Hooker) J. Smith.

Pinnae 15–20 pairs, ovate-lanceolate, margin crenate-serrate. Sori medial.

Epiphytic on tree trunks or on rocks; 2300–2700 m. Guangxi, Guizhou, Xizang, Yunnan [Bhutan, NE India, Myanmar, Thailand, Nepal].

2b. Polypodiastrum argutum var. **angustum** Ching & S. K. Wu in C. Y. Wu, Fl. Xizang. 1: 299. 1983.

狭羽拟水龙骨 xia yu ni shui long gu

Pinnae fewer and narrower, margin denticulate. Sori closer to costa.

● Epiphytic on tree trunks; 2300–2400 m. Xizang.

3. Polypodiastrum mengtzeense (Christ) Ching, Acta Phytotax. Sin. 16(4): 28. 1978.

蒙自拟水龙骨 meng zi ni shui long gu

Polypodium mengtzeense Christ, Bull. Herb. Boissier 6:

869. 1898; *Goniophlebium mengtzeense* (Christ) Rödl-Linder; *Marginaria taiwaniana* (Hayata) Nakai ex H. Itô; *Polypodiastrum taiwanianum* (Hayata) Ching; *Polypodium argutum* Wallich ex Hooker f. *khasianum* C. B. Clarke; *P. argutum* var. *mengtzeense* (Christ) Christ; *P. aspersum* Baker; *P. taiwanianum* Hayata.

Rhizome long creeping, 4–5 mm in diam., covered with whitish bloom and sparse scales; scales dark brown, ovate-lanceolate, peltate at broad base, irregularly toothed at margin, acuminate at apex. Fronds remote. Stipe pale straw-colored, 10–20 cm, scaly at base, glabrous upward. Lamina ovate-lanceolate, pinnate with distinct terminal pinna, 50–70 × 15–20 cm. Lateral pinnae 15–25 pairs, subopposite, sessile, lanceolate, 10–15 × 1.5–2 cm, base obliquely cordate, ± rounded auriculate, overlapping rachis, margin serrate, apex acuminate. Veins anastomosing to form 1 or 2 rows of areoles on each side of costa, each costal areole containing a simple free veinlet, other veinlets free, ending inside margin of teeth. Lamina herbaceous, yellowish green, glabrous on both surfaces except sparsely scaly on abaxial side of rachis and costa. Sori orbicular, in 1 row on each side of costa, terminal on included veinlets, medial or slightly closer to costa.

Epiphytic on tree trunks or on rocks; 1500–2500 m. Guangdong, Guangxi, Guizhou, Taiwan, Yunnan [NE India, Laos, Nepal, Philippines, Thailand, Vietnam].

Material of this species (*Polypodiastrum mengtzeense*) was treated by Wu (Sunyatsenia 3: 266, pl. 124. 1932) as *Polypodium argutum* Wallich ex Hooker.

14. POLYPODIODES Ching, Acta Phytotax. Sin. 16(4): 26. 1978.

水龙骨属 shui long gu shu

Lu Shugang (陆树刚); Peter H. Hovenkamp

Plants medium-sized. Rhizome long creeping, mostly densely scaly, with whitish bloom when scales sparse; scales brown to dark brown, lanceolate to ovate-lanceolate, clathrate, peltate at broad base, margin entire, denticulate, or ciliate, apex acuminate or hair-shaped. Fronds remote, articulate to rhizome; stipe straw-colored or brown, scaly at base; lamina deeply pinnatisect, oblong-lanceolate in outline; segments 10–60 pairs, narrowly lanceolate, bases confluent through narrowly winged rachis, rarely lowermost free, margin toothed or serrulate, apex acuminate. Veins usually anastomosing to form a row of very narrow areoles on each side of costa and 1 or 2 rows of much broader areoles along each side of costules, latter each including a free veinlet. Lamina herbaceous, glabrous or pubescent, usually minutely scaly abaxially. Sori orbicular, in single rows on each side of costules, each at end of included veinlet, superficial or sunken, paraphyses soon lost; sporangia long stalked, annulus with 12–19 hardened cells; spores ellipsoid, surface coarsely verrucate. $x = 37$.

About 17 species: mostly confined to tropical and subtropical Asia; 11 species (three endemic) in China.

Christenhusz et al. (Phytotaxa 19: 38. 2010) and Lindsay and Middleton (http://rbg-web2.rbge.org.uk/thaiferns/factsheets/index.php#P; accessed 2 Apr 2012) include *Polypodiodes* within *Goniophlebium*.

The following taxa are excluded from the present treatment, pending further research: *Polypodiodes falcipinnula* S. K. Wu & J. Murata (Acta Phytotax. Sin. 39: 70. 2001), described from Yunnan, and *P. paramoena* Ching & Y. X. Lin (Acta Phytotax. Sin. 22: 400. 1984), described from Xizang.

1a. Rhizome covered with whitish bloom and sparse scales or scales only present on very young part; segment margins entire.
  2a. Lamina abaxially glabrous.
    3a. Rhizome scales usually absent; lamina adaxially pubescent only along rachis and costae ..... 1. *P. formosana*
    3b. Rhizome scales black, linear-subulate and with a broad brown base; lamina adaxially more uniformly pubescent ..... 2. *P. raishaensis*
  2b. Lamina abaxially pubescent.
    4a. Rachis wings 2–3 mm wide; segments 0.5–1 cm wide ..... 3. *P. niponica*
    4b. Rachis wings ca. 5 mm wide; segments 1.2–1.4 cm wide ..... 4. *P. wattii*
1b. Rhizome usually densely scaly, without whitish bloom; segment margins usually incised to serrate.
  5a. Rhizome scales light brown, 8–9 mm ..... 5. *P. bourretii*
  5b. Rhizome scales brown to dark brown or black, 2–5 mm.
    6a. Rhizome scales linear-subulate, relatively sparse; segment margins entire ..... 3. *P. niponica*
    6b. Rhizome scales wider, usually concealing rhizome; segment margins incised to serrate.
      7a. Lamina linear-lanceolate in outline; lateral segments up to 40–60 pairs.
        8a. Scales black and subulate at upper part, brown at broad base, margin ciliate; fronds subglabrous ..... 6. *P. lachnopus*
        8b. Scales brown, lanceolate, margin irregularly denticulate; fronds pubescent on both sides ..... 7. *P. pseudolachnopus*
      7b. Lamina ovate-lanceolate in outline; lateral segments usually 10–20 pairs.
        9a. Segment margins densely double-serrate.
          10a. Rhizome scales ovate-lanceolate, brown, margin entire ..... 8. *P. subamoena*
          10b. Rhizome scales narrowly lanceolate, black, apex hairlike, margin denticulate ..... 9. *P. hendersonii*

9b. Segment margins incised or incised-serrate.
11a. Rhizome 2–4 mm in diam., scales black; lamina segments 5–7 mm wide; sori close to costa ..... 10. *P. chinensis*
11b. Rhizome 5–7 mm in diam., scales dark brown; lamina segments 15–20 mm wide; sori medial ..... 11. *P. amoena*

1. Polypodiodes formosana (Baker) Ching, Acta Phytotax. Sin. 16(4): 27. 1978.

台湾水龙骨 tai wan shui long gu

Polypodium formosanum Baker, J. Bot. 23: 105. 1885; *Goniophlebium formosanum* (Baker) Rödl-Linder; *Marginaria formosana* (Baker) Nakai ex H. Itô; *P. liukiuense* Christ.

Rhizome long creeping, ca. 4 mm in diam., covered with whitish bloom; scales fugacious, only present on very young parts, brown, ovate-lanceolate, margin entire, apex acuminate. Fronds remote. Stipe straw-colored, 15–20 cm, glabrous. Lamina oblong, 30–50 × 10–15 cm, cordate at base, pinnatipartite, apex acuminate or caudate. Segments 20–30 pairs, narrowly lanceolate, 5–8 × 0.8–1 cm, entire at margin, acuminate at apex; lowest segments usually deflexed. Veins anastomosing to form 1 or 2 rows of areoles on each side of costa with included veinlets. Lamina herbaceous, green, abaxial surface glabrous or subglabrous, adaxial surface pubescent, hairs on rachis and costa more dense. Sori orbicular, terminal on included veinlets, in 1 row on each side of costa, medial.

Epiphytic on tree trunks or on rocks; 200–1200 m. Fujian, Taiwan [Japan].

2. Polypodiodes raishaensis (Rosenstock) S. G. Lu, Taiwania 50: 140. 2005 [*"raishanensis"*].

大叶水龙骨 da ye shui long gu

Polypodium raishaense Rosenstock, Hedwigia 56: 346. 1915; *Marginaria pseudoformosana* Tagawa; *M. raishaensis* (Rosenstock) Nakai ex H. Itô.

Rhizome long creeping, ca. 3 mm in diam., covered with whitish bloom; scales sparse, black, linear-subulate with a broad, brown base. Fronds remote. Stipe and rachis glossy, turning brown when mature. Lamina oblong, 30–55 × 10–15 cm, pinnatipartite. Segments spreading, 4.5–8 cm, adnate to rachis by a narrow wing, margin entire, abaxial surface glabrous, pubescent on margin and on adaxial surface; lower segments shortened and deflexed. Veins anastomosing to form 1 or 2 rows of areoles on each side of costa with included veinlets. Lamina herbaceous. Sori orbicular, small, closely spaced, borne near costa in costal areoles at end of free veinlets.

● Epiphytic on tree trunks or on rocks; (200–)800–1600 m. Taiwan.

3. Polypodiodes niponica (Mettenius) Ching, Acta Phytotax. Sin. 16(4): 27. 1978.

日本水龙骨 ri ben shui long gu

Polypodium niponicum Mettenius, Ann. Mus. Bot. Lugduno-Batavi 2: 222. 1866; *Goniophlebium niponicum* (Mettenius) Beddome; *Marginaria niponica* (Mettenius) Nakai ex H. Itô; *M. transpianensis* (Yamamoto) H. Itô; *Polypodiodes transpianensis* (Yamamoto) Saiki; *Polypodium bodinieri* Christ; *P. longkyense* Rosenstock; *P. silvestrii* Christ; *P. transpianense* Yamamoto.

Rhizome long creeping, gray-green, ca. 5 mm in diam., sparsely covered with whitish bloom and scales; scales dark brown, narrowly lanceolate with ovate base, margin denticulate, apex acuminate. Stipe straw-colored, 5–15 cm, pubescent. Lamina oblong-lanceolate, 30–40 × 10–13 cm, pinnatipartite, cordate at base, pinnatilobate-acuminate at apex. Segments 15–25 pairs, linear-oblong, 3–5 × 0.5–1 cm, entire at margin, acute or obtuse at apex; lowest ones often subfree, slightly shortened and deflexed. Veins anastomosing to form 1 row of areoles at each side of rachis and each side of costa, veinlets invisible. Lamina herbaceous, gray-green, pubescent on both surfaces or more densely so abaxially with short, whitish, 2- or 3-celled, soft hairs. Sori orbicular, in 1 row on each side of costa, terminal on included veinlets in costal areoles, nearer to costa than to margin.

Epiphytic on tree trunks or on rocks; 300–1800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [NE India, Japan, Vietnam].

Material of *Polypodiodes niponica* from Taiwan with the rhizomes lacking the whitish bloom and with very narrow scales has been separated as *P. transpianensis*.

The authors have not seen material of *Polypodiodes niponica* var. *glandulosa* P. S. Wang (Pterid. Fl. Guizhou, 517. 2001).

4. Polypodiodes wattii (Beddome) Ching, Acta Phytotax. Sin. 16(4): 27. 1978.

光茎水龙骨 guang jing shui long gu

Polypodium niponicum Mettenius var. *wattii* Beddome, J. Bot. 26: 235. 1888; *Goniophlebium niponicum* (Mettenius) Beddome var. *wattii* (Beddome) Beddome; *Polypodiodes niponica* (Mettenius) Ching var. *wattii* (Beddome) W. M. Chu & S. G. Lu; *Polypodium niponicum* var. *laevipes* Franchet ex Christ; *P. wattii* (Beddome) Tagawa.

Rhizome fleshy, long creeping, 5–7 mm in diam., covered with whitish bloom, scales only present on growing tip or at base of stipes; scales dark brown, lanceolate, margin minutely serrate, apex acuminate. Stipe dark straw-colored, 5–15 cm, pubescent. Lamina pinnatipartite, oblong in outline, 20–30 × 8–10 cm, wings of rachis ca. 5 mm on each side, truncate to cordate at base, caudate at apex. Segments 15–20 pairs, 4–5 × 1.2–1.4 cm, entire at margin, obtuse at apex; lowest ones subspreading to slightly deflexed. Veins anastomosing to form 2 or 3 rows of areoles on each side of costa and 1 row of areoles on each side of rachis, costal areoles with included free veinlets. Lamina herbaceous, yellowish green or gray-green, pubescent and whitish shortly hairy on both surfaces or more densely so abaxially. Sori orbicular, in 1 row on each side of costa, terminal on included veinlets, slightly closer to costa.

Epiphytic on tree trunks or on rocks; 1300–3000 m. Sichuan, Xizang, Yunnan [NE India, N Myanmar, Vietnam].

5. Polypodiodes bourretii (C. Christensen & Tardieu) W. M. Chu in P. S. Wang, Guizhou Sci. 2: 12. 1985.

滇越水龙骨 dian yue shui long gu

Polypodium bourretii C. Christensen & Tardieu, Notul. Syst. (Paris) 8: 183. 1939; *Goniophlebium bourretii* (C. Christensen & Tardieu) X. C. Zhang; *P. wangii* Ching (1949), not C. Christensen (1934).

Rhizome long creeping, ca. 4 mm in diam., densely covered with scales; scales light brown, linear-subulate, clathrate, ca. 10 mm, broad at base with minutely serrate margin, upper part acuminate with entire margin, apex hairlike. Fronds remote. Stipe straw-colored, 10–15 cm, slender, glabrous. Lamina pinnatipartite, pinnatifid-acuminate at apex, oblong-lanceolate in outline, 20–40 × 8–14 cm, base cordate and slightly narrowed. Segments 20–30 pairs, linear-lanceolate, 4–7 cm × 6–8 mm, base broad and connected by narrow wings along midrib, margin remotely incised, apex acute; basal pair subdeflexed and slightly shorter than next upper pairs. Veins anastomosing to form 1 row of areoles on each side of costa and of rachis. Lamina herbaceous, grayish green, adaxial side sparsely covered with long, appressed, septate, whitish hairs, abaxial side densely pubescent with short hairs. Sori orbicular, in 1 row on each side of costa, closer to costa.

Epiphytic on tree trunks or on rocks; 600–1500 m. S Guizhou, SE Yunnan [Vietnam].

6. Polypodiodes lachnopus (Wallich ex Hooker) Ching, Acta Phytotax. Sin. 16(4): 27. 1978.

濑水龙骨 lai shui long gu

Polypodium lachnopus Wallich ex Hooker, Hooker's Icon. Pl. t. 952. 1854; *Goniophlebium lachnopus* (Wallich ex Hooker) J. Smith; *Schellolepis lachnopus* (Wallich ex Hooker) J. Smith.

Rhizome long creeping, 5–6 mm in diam., densely covered with scales; scales broad and brown at base with ciliate margin, upper part black, subulate with entire margin. Fronds remote. Stipe straw-colored, 5–8 cm, glabrous. Lamina pinnatipartite, linear-lanceolate in outline, 40–60 × 5–7 cm, base cordate, apex acuminate. Segments 40–50 pairs, lanceolate, 2–3 cm × 5–7 mm, margin toothed, apex acute or obtuse; basal one or two pairs slightly shorter and deflexed. Veins reticulate to form 1 row of narrow areoles along each side of rachis and 1 row of large areoles along each side of costa, each areole containing a simple included veinlet, other veins free. Lamina papery or herbaceous, green, glabrous or subglabrous except rachis covered with hairs, abaxial surface sparsely scaly. Sori orbicular, terminal on included veinlets, in 1 row on each side of costa, medial.

Epiphytic on tree trunks; 1700–2000 m. Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal].

A collection of this species (*Polypodiodes lachnopus*) was listed by Christ (Bull. Herb. Boissier 6: 869. 1898) as *Polypodium yunnanense* Franchet.

7. Polypodiodes pseudolachnopus S. G. Lu, Acta Phytotax. Sin. 37: 294. 1999.

假毛柄水龙骨 jia mao bing shui long gu

Rhizome long creeping, 5–6 mm in diam., densely covered with scales; scales brown, lanceolate, peltate at base, margin irregularly denticulate, apex acuminate. Fronds remote. Stipe straw-colored, 10–15 cm, sparsely pubescent. Lamina pinnatipartite, linear-lanceolate, 40–50(–70) × 6–8 cm, base cordate, apex acuminate. Segments 40–60 pairs, lanceolate, 4–5 cm × 5–10 mm, margin toothed, apex acute or obtuse. Veins anastomosing to form 1 row of narrow areoles along each side of rachis and 1 row of large areoles along each side of costa, each costal areole containing a simple included veinlet. Lamina papery, green, pubescent on both surfaces and scaly abaxially; rachis straw-colored, more densely hairy. Sori orbicular, in 1 row on each side of costa, slightly close to costa.

● Epiphytic on tree trunks or on rocks; 1800–3000 m. Sichuan, Xizang, Yunnan.

Material of *Polypodiodes pseudolachnopus* was first identified as *Polypodium lachnopus* Wallich ex Hooker (Ching, Icon. Fil. Sin. 2: ad pl. 95. 1934; Shing in W. T. Wang, Vasc. Pl. Hengduan Mt. 1: 161. 1993).

8. Polypodiodes subamoena (C. B. Clarke) Ching, Acta Phytotax. Sin. 16(4): 27. 1978.

假友水龙骨 jia you shui long gu

Polypodium subamoenum C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 550. 1880; *Goniophlebium subamoenum* (C. B. Clarke) Beddome.

Rhizome long creeping, 2–3 mm in diam., densely covered with scales; scales brown or dark brown, ovate-lanceolate, broad at base, peltate, margin entire, apex acuminate. Fronds remote. Stipe stramineous, 5–10 cm, glabrous. Lamina pinnatipartite, ovate-lanceolate in outline, 15–20 × 5–8 cm, base cordate, apex caudate. Segments 10–15(–20) pairs, linear, 3–4 cm × 8–10 mm, margin double-serrate, apex obtuse or acute; lowest pairs shorter and deflexed. Veins visible, anastomosing to form 1 row of areoles along rachis and 1 or 2 rows of areoles on each side of costa, costal areoles containing a simple included veinlet. Lamina herbaceous, green, abaxial surface scaly, adaxial surface glabrous. Sori orbicular, in 1 row on each side of costa, terminal on included veinlets, close to costa.

Epiphytic on tree trunks or on rocks; 2400–3300 m. Xizang, Yunnan [N India, Nepal].

Polypodium intermedium Ching & S. K. Wu ex K. H. Shing (Acta Phytotax. Sin. 31: 574. 1993 [*"intermeldium"*]), described from Yunnan, was compared in the protologue with *P. subamoenum* (*Polypodiodes subamoena*).

9. Polypodiodes hendersonii (Beddome) Fraser-Jenkins, New Sp. Syndr. Indian Pteridol. 202. 1997.

喜马拉雅水龙骨 xi ma la ya shui long gu

Goniophlebium hendersonii Beddome, Suppl. Ferns S. Ind. 21. 1876 [*"Hendersoni"*], based on *Polypodium hendersonii* Atkinson ex Hooker & Baker, Syn. Fil., ed. 2, 511. 1874,

not E. J. Lowe (1858); *Polypodiodes atkinsonii* (C. Christensen) Ching; *Polypodium atkinsonii* C. Christensen.

Rhizome long creeping, 3–4 mm in diam., densely covered with scales; scales black, linear-lanceolate, broad at base, peltate, margin toothed, apex hairlike. Fronds remote. Stipe straw-colored, 8–12 cm, glabrous. Lamina pinnatipartite or pinnatisect at lower portion, lanceolate in outline, 20–25 × 5–8 cm, base cordate, apex acuminate. Segments 20–25 pairs, lanceolate, 3–4 × ca. 1 cm, margin serrate, apex acuminate, upper segments spreading or oblique, lowest pair deflexed. Veins visible, anastomosing to form 1 row of areoles along rachis and costa, costal areoles containing a simple included veinlet. Lamina papery, green, abaxial surface scaly, adaxial surface glabrous. Sori orbicular, in 1 row on each side of costa, terminal on included veinlets, medial.

Epiphytic on tree trunks or on rocks; 2000–3300 m. Xizang [India (Sikkim), Nepal].

Polypodium atkinsonii was published in 1906 as a replacement name for *P. hendersonii* Atkinson ex Hooker & Baker (1874), not E. J. Lowe (1858). Beddome validated the epithet *"hendersonii"* under *Goniophlebium* in 1876, and this has priority outside *Polypodium*.

10. Polypodiodes chinensis (Christ) S. G. Lu, Acta Bot. Yunnan. 21: 24. 1999.

中华水龙骨 zhong hua shui long gu

Polypodium subamoenum C. B. Clarke var. *chinense* Christ, Nuovo Giorn. Bot. Ital., n.s., 4: 99. 1897; *Goniophlebium amoenum* J. Smith var. *chinense* (Christ) Rödl-Linder; *G. chinense* (Christ) X. C. Zhang; *P. amoenum* Wallich ex Mettenius var. *chinense* (Christ) Ching; *P. amoenum* var. *tongolense* C. B. Clarke [*"tonglense"*]; *P. amoenum* var. *xerophyticum* Mehra & Bir.

Rhizome long creeping, 2–3 mm in diam., densely covered with scales; scales black, ovate-lanceolate, margin sparsely toothed, apex acuminate. Fronds remote. Stipe straw-colored, 10–20 cm, glabrous. Lamina pinnatipartite or pinnatisect at lower portion, ovate-lanceolate or broadly lanceolate in outline, 15–25 × 7–10 cm, base cordate, apex caudate. Segments 15–25 pairs, linear-lanceolate, 3–5 cm × 5–7 mm, margin serrate, apex acuminate; basal pairs slightly shorter and deflexed. Veins reticulate, costa visible, straw-colored, veinlets invisible. Lamina herbaceous, subglabrous on both surfaces, scaly abaxially. Sori small, orbicular, terminal on included veinlets, close to costa.

● Epiphytic on rocks or on tree trunks; 900–2800 m. Anhui, Gansu, Guangdong, Guizhou, Hebei, Henan, Hubei, Jiangxi, Shaanxi, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang.

While Rödl-Linder (Blumea 34(2): 391. 1990) treated material of this species (*Polypodiodes chinensis*) as a hairy variety of the following species (*P. amoena*), Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 43. 2008) suggested that it merely represents more hairy populations of *P. amoena* not worthy of formal recognition; he also indicated that he regards *Polypodium yunnanense* Franchet as part of this taxon if recognized as a distinct species and thus providing the oldest species epithet. However, the concept used here is based on a different set of characters from those discussed by Fraser-Jenkins. The names *Polypodium pseudo-amoenum* Ching and *Polypodiodes pseudo-amoenum* (Ching) Ching have been applied to this taxon but have never been validated. The former was first mentioned as a synonym in the protologue of *Polypodium amoenum* var. *chinense* (Christ) Ching. The name *Polypodium pseudo-amoenum* var. *pilosum* Ching is also invalid (*Melbourne Code,* Art. 35.1).

11. Polypodiodes amoena (Wallich ex Mettenius) Ching, Acta Phytotax. Sin. 16(4): 27. 1978.

友水龙骨 you shui long gu

Rhizome 5–7 mm in diam., densely covered with scales; scales dark-brown, lanceolate, base broad, margin denticulate, apex acuminate. Stipe straw-colored or castaneous, (5–)30–40 cm, glabrous. Lamina pinnatisect, ovate-lanceolate in outline, (11–)40–50 × (4–)20–25 cm, base slightly narrowed, apex acuminate. Segments 20–25 pairs, lanceolate, 10–13 × 1.5–2 cm, connected along rachis by a 1.5–4 mm wide wing, margin shallowly crenate to subserrate, apex acuminate; basal 1 or 2 pairs of segments often deflexed. Veins forming 1 or 2 rows of areoles along each side of rachis and costa. Lamina thickly papery, green, both surfaces glabrous or pubescent, abaxial surface scaly. Sori orbicular, medial.

Epiphytic on rocks or on tree trunks; 1000–2500 m. Anhui, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

The collection *Purdom 32* (Tai-pei-shan) was identified by R. C. Ching as a dwarf "northern form" of *Polypodiodes amoena*. It has fronds with the stipe ca. 5 cm, lamina ca. 11 × 4 cm, and ca. 16 pairs of segments with obtuse apices.

Polypodium daochengense Ching & S. K. Wu (Acta Phytotax. Sin. 31: 574. 1993), described from Sichuan, was compared in the protologue to *P. amoenum* (*Polypodiodes amoena*), where it was differentiated primarily by its smaller size.

1a. Stipe castaneous; lamina narrowly lanceolate in outline, basal segments spreading ..... 11b. var. *duclouxii*

1b. Stipe straw-colored; lamina ovate-lanceolate in outline; basal 1 or 2 pairs of segments deflexed.

2a. Lamina with both surfaces glabrous ..... 11a. var. *amoena*

2b. Lamina with both surfaces hairy or at least pubescent on rachis and costa ..... 11c. var. *pilosa*

11a. Polypodiodes amoena var. **amoena**

友水龙骨(原变种) you shui long gu (yuan bian zhong)

Polypodium amoenum Wallich ex Mettenius, Abh. Senckenberg. Naturf. Ges. 2: 131. 1856; *Goniophlebium amoenum* (Wallich ex Mettenius) Beddome; *G. amoenum* var. *arisanense* (Hayata) Rödl-Linder; *G. amoenum* var. *latedeltoideum* (Christ) Rödl-Linder; *G. yunnanense* (Franchet) Beddome; *Marginaria arisanensis* (Hayata) Nakai ex H. Itô; *Polypodiodes yunnanensis* (Franchet) Fraser-Jenkins; *Polypodium amoenum* var. *latedeltoideum* Christ; *P. arisanense* Hayata; *P. bonatianum* Brause; *P. valdealatum* Christ; *P. yunnanense* Franchet; *Schellolepis amoena* (Wallich ex Mettenius) J. Smith.

Stipe and rachis straw-colored. Lamina ovate-lanceolate in outline, basal 1 or 2 pairs of segments often deflexed, both surfaces glabrous.

Epiphytic on tree trunks or on rocks; 1000–2500 m. Anhui, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

The binomial was first used by Wallich (Numer. List, no. 290. 1829). *"Marginaria amoena"* (C. Presl, Tent. Pterid. 188. 1836) also belongs here. Both names are nomina nuda and were not therefore validly published (*Melbourne Code*, Art. 38.1(a)).

11b. Polypodiodes amoena var. **duclouxii** (Christ) Ching ex S. G. Lu, Fl. Reipubl. Popularis Sin. 6(2): 25. 2000.

红秆水龙骨 hong gan shui long gu

Polypodium duclouxii Christ, Notul. Syst. (Paris) 1: 34. 1909; *Polypodium amoenum* var. *duclouxii* (Christ) Ching.

Stipe and abaxial surface of costae castaneous. Lamina narrowly lanceolate in outline, basal segments spreading; veinlets slender and indistinct, both surfaces glabrous.

● Epiphytic on tree trunks or on rocks; 2000–2500 m. Sichuan, Yunnan.

11c. Polypodiodes amoena var. **pilosa** (C. B. Clarke & Baker) S. R. Ghosh, Pterid. Fl. E. India, 590. 2004.

柔毛水龙骨 rou mao shui long gu

Polypodium amoenum f. *pilosum* C. B. Clarke & Baker, J. Linn. Soc., Bot. 24: 417. 1888 [*"pilosa"*]; *Goniophlebium amoenum* var. *pilosum* (C. B. Clarke & Baker) X. C. Zhang; *Polypodiodes amoena* f. *pilosa* (C. B. Clarke & Baker) Ching; *Polypodium amoenum* var. *pilosum* Rosenstock (1914), not *P. amoenum* f. *pilosum* C. B. Clarke & Baker (1888).

Stipe and rachis straw-colored. Lamina ovate-lanceolate in outline, basal 1 or 2 pairs of segments often deflexed, both surfaces hairy at least on rachis and costa.

Epiphytic on tree trunks or on rocks; 1500–2500 m. Guizhou, Hubei, Sichuan, Xizang, Yunnan, Zhejiang [NE India, Nepal].

15. HIMALAYOPTERIS W. Shao & S. G. Lu, Novon 21: 91. 2011.

锡金假瘤蕨属 xi jin jia liu jue shu

Lu Shugang (陆树刚); Michael G. Gilbert

Plants epiphytic. Rhizome long creeping, fronds remote; rhizome scales linear-lanceolate, central portion castaneous, margin brown and somewhat ciliolate, apex acuminate. Fronds monomorphic, deciduous; stipe straw-colored, very slender; lamina deeply pinnatifid to partly pinnate, rachis narrowly winged or lower part wingless; lateral lobes oblong-lanceolate, apex acute, with conspicuous main veins and distinct lateral veins, costal areoles in 1 or 2 series, each areole with a single (usually) simple, excurrent veinlet ending in a hydathode, lowest lateral lobe somewhat decurrent; margins with distinct small incisions or notches; lamina thinly leathery, with thick multicellular trichomes on both surfaces; apical part of lamina fertile. Sori in a single series in lower areoles. Sporangia setose. $x = 37$.

One species: Bhutan, China, India (Sikkim), Nepal.

1. Himalayopteris erythrocarpa (Mettenius ex Kuhn) W. Shao & S. G. Lu, Novon 21: 91. 2011.

锡金假瘤蕨 xi jin jia liu jue

Polypodium erythrocarpum Mettenius ex Kuhn, Linnaea 36: 135. 1869; *Crypsinus erythrocarpus* (Mettenius ex Kuhn) Tagawa; *Goniophlebium erythrocarpum* (Mettenius ex Kuhn) Beddome; *Phymatodes erythrocarpa* (Mettenius ex Kuhn) Ching; *Phymatopsis erythrocarpa* (Mettenius ex Kuhn) Ching; *Phymatopteris erythrocarpa* (Mettenius ex Kuhn) Pichi Sermolli; *Pichisermollia erythrocarpa* (Mettenius ex Kuhn) Fraser-Jenkins; *Pichisermollodes erythrocarpa* (Mettenius ex Kuhn) Fraser-Jenkins.

Rhizome 2–3(–5) mm in diam., covered with whitish bloom and sparse scales; scales black or dark brown, lanceolate, ciliate at margin, acuminate at apex. Fronds 1–3 cm apart. Stipe straw-colored, 5–15 cm, pubescent. Lamina deeply pinnatifid to pinnate in lower part, 10–15 × 5–10 cm, cordate at base. Lateral lobes 5–7(–10) pairs, lanceolate, 1–5 × 0.8–1.5 cm, slightly contracted at base, margin crenate-serrate and ciliate, apex obtuse or acute. Costa and lateral veins distinct, veinlets obscure. Lamina papery, green, densely hairy on both surfaces. Sori orbicular, slightly nearer to costa.

Epiphytic on tree trunks; 2700–2800 m. Xizang (Mêdog) [Bhutan, N India, Nepal].

The extensive generic synonymy is a clear indication of the problems that there have been in placing *Polypodium erythrocarpum* within a genus.

16. NEOCHEIROPTERIS Christ, Bull. Soc. Bot. France 52(Mém. 1): 21. 1905.

扇蕨属 shan jue shu

Zhang Xianchun (张宪春); Hans P. Nooteboom

Cheiropteris Christ (1898), not *Chiropteris* J. G. Kurr ex H. G. Bronn (1858).

Plants terrestrial, medium-sized. Rhizome long creeping, rather thick, densely scaly; scales brown, iridescent, clathrate, ovate-lanceolate, margin dentate. Fronds distant. Stipe stramineous, longer than lamina; lamina trifid, or palmately lobed, base attenuate,

middle segment longer; segments lanceolate, papery, glabrous, with small brown scales when young, margin entire; main veins raised, small veinlets obscure. Sori oblong to elongate, parallel to costa; paraphyses present, clathrate and peltate. Spores verrucate.

● Two species: SW China.

Neocheiropteris has been more widely delineated but Du and Cheng (Pl. Diversity Resources 33: 261–268. 2011) restricted it to just the following two species.

1a. Fronds palmately lobed into 8–10 segments ..... 1. *N. palmatopedata*
1b. Fronds trifid ..... 2. *N. triglossa*

1. Neocheiropteris palmatopedata (Baker) Christ, Bull. Soc. Bot. France 52(Mém. 1): 21. 1905.

扇蕨 shan jue

Polypodium palmatopedatum Baker, Bull. Misc. Inform. Kew 1898: 232. 1898; *Cheiropteris henryi* Christ; *C. palmatopedata* (Baker) Christ; *Microsorum palmatopedatum* (Baker) Nooteboom.

Rhizome creeping; scales slightly spreading, ovate or triangular, broadest below middle, 3–7 × 2–3 mm, clathrate or subclathrate, cells longitudinally rectangular, central region bearing multiseptate hairs at least when young, margin denticulate, apex acute. Fronds not or only slightly dimorphic; stipe 10–40 cm; lamina pedately dissected, reniform to suborbicular in outline, 12–30 × 20–40 cm, herbaceous, abaxial surface without acicular hairs, with short glandular hairs, base cuneate, margin entire or undulate, first connecting vein forming 1 row of small primary costal areoles parallel to costa, other (sometimes irregularly shaped) larger areoles in 1 row between 2 veins, dichotomously branched near margin, or below middle. Sori separate, 1 sorus in, or just outside, each primary costal areole, generally close to costa, at most halfway to margin, elongate, superficial or slightly sunken, solitary on a connective vein or on intersection of a vein and a connective vein, or just outside a connective vein, 3–8 mm.

● Rocky places in forests; 1500–2700 m. Guizhou, Sichuan, Yunnan.

2. Neocheiropteris triglossa (Baker) Ching, Bull. Fan Mem. Inst. Biol. 4: 108. 1933.

三叉扇蕨 san cha shan jue

Polypodium triglossum Baker, Bull. Misc. Inform. Kew 1898: 232. 1898; *Neolepisorus triglossus* (Baker) Ching; *Selliguea triphylla* Christ.

Rhizome creeping; scales densely set, ferruginous, broadly lanceolate, margin minutely toothed. Fronds not or slightly dimorphic; stipe brown, slender, 30–45 cm, glabrous; lamina trisect into ascending lanceolate segments, middle one up to 40 cm, two lateral segments somewhat shorter, 4–5.5 cm wide, gradually tapering toward both ends, herbaceous/papery, abaxially pale and with sparse scales near costa, adaxially green and glabrous; scales adpressed, dark brown, peltate, ovate-cuspidate, membranous; lamina margins entire or slightly undulate; venation prominent, lateral veins parallel, erect-spreading, extending almost to margin, intermediate veinlets anastomosing copiously into small hexagonal areoles with free included veinlets. Sori small, oblong, superficial, uniseriate or tending to be biseriate along costa between main veins.

● Rocky places in forests. Yunnan.

Neocheiropteris triglossa is very rare and may be extinct in the field. It is perhaps a natural hybrid between *N. palmatopedata* and *Lepisorus macrosphaerus* (Baker) Ching.

17. TRICHOLEPIDIUM Ching, Acta Phytotax. Geobot. 29: 41. 1978.

毛鳞蕨属 mao lin jue shu

Zhang Xianchun (张宪春); Hans P. Nooteboom

Rhizome thick, stiff, climbing, densely scaly when young, later glabrescent; scales adpressed, brown, orbicular, peltate, clathrate, with a tuft of stiff long hairs at middle on abaxial side, easily caducous. Fronds clustered to distant, subsessile or with stipe; lamina simple, lanceolate, or loriform, widest at middle, herbaceous or thickly stiffly papery, green or yellow green, glabrous, margin entire or undulate; midrib prominent, veinlets anastomosing, distinct, free included veinlets ending in distinct ovate hydathodes adaxially. Sori orbicular, superficial, or slightly sunken, 1–3 irregular rows on each side of midrib; paraphyses peltate, clathrate.

One variable species: widely distributed from Indonesia and Malesia to E Himalaya, Indochina, and S China.

1. Tricholepidium normale (D. Don) Ching, Acta Phytotax. Geobot. 29: 43. 1978.

毛鳞蕨 mao lin jue

Polypodium normale D. Don, Prodr. Fl. Nepal. 1. 1825; *Lepisorus chapaensis* C. Christensen & Tardieu; *Microsorum normale* (D. Don) Ching; *M. subnormale* (Nakai) H. Itô; *Neocheiropteris normalis* (D. Don) Tagawa; *Neolepisorus normalis* (D. Don) Ching; *Phymatodes subnormalis* Nakai; *Pleopeltis normalis* (D. Don) T. Moore; *P. subnormalis* Alderwerelt; *Polypodium longifrons* Wallich ex Hooker & Greville; *P. maculosum* Christ; *P. subnormale* (Alderwerelt) C. Christensen; *Tricholepidium angustifolium* Ching; *T. angustifolium* var. *falcatolineare* Ching; *T. angustifolium* var. *lanceolatum* (Ching & S. K. Wu) Y. X. Ling; *T. chapaense* (C. Christensen & Tardieu) Ching; *T. intermedium* Ching; *T. lanceolatum* Ching & S. K.

Wu; *T. maculosum* (Christ) Ching; *T. maculosum* var. *subnormale* (Alderwerelt) Ching; *T. mutense* Ching & S. K. Wu; *T. pteropodum* Ching; *T. subnudum* Ching & S. K. Wu; *T. tibeticum* Ching & S. K. Wu; *T. venosum* Ching.

Rhizome thick, creeping; scales adpressed, brown or pale brown, orbicular, with a tuft of hairs at middle on adaxial side. Fronds close or distant; stipe thick, short or frond subsessile, scaly at base; lamina green or yellow-green, lanceolate to loriform, 35–60 × 2–4 cm, widest at middle, herbaceous or thickly papery, glabrous, margin entire or undulate; midrib prominent, veins forming 2 or 3 irregular areoles on each side of midrib, distinct, free included veinlets ending with hydathodes, veinlets at margin of laminae free. Sori orbicular, superficial, or slightly sunken, in 1–3 irregular rows on each side of midrib; paraphyses peltate, clathrate.

Climbing on rocks or tree trunks in wet forests; 900–2600 m. Guangxi, Xizang, Yunnan [Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Thailand, Vietnam].

18. NEOLEPISORUS Ching, Bull. Fan Mem. Inst. Biol., Bot. 10: 11. 1940.

盾蕨属 dun jue shu

Zhang Xianchun (张宪春); Hans P. Nooteboom

Plants terrestrial or epilithic, small to medium-sized; rhizome long creeping; scales pseudopeltate, sometimes peltate, ovate to lanceolate, sometimes orbicular, margin entire or denticulate. Fronds distant, monomorphic; stipe long, scaly; lamina usually simple, entire, sometimes lobed or irregularly lobed, or hastate, herbaceous or papery, scaly; veins anastomosing, areoles regular or irregular, simple to complex, free included veinlets simple or forked. Sori in 1 or 2 rows on either side of midrib, or in 1 row between 2 lateral veins, oblong or orbicular to confluent, sometimes linear or slightly irregular; paraphyses peltate, clathrate or simple uniseriate hairs with glandular apical cells.

Species number uncertain, perhaps seven: NE India east to Japan and the Philippines; five species (one endemic) in China.

1a. Paraphyses simple uniseriate hairs with glandular apical cells.
  2a. Rhizome slender; fronds far apart; sori in 1 (irregular) row parallel to costa ..... 4. *N. fortunei*
  2b. Rhizome thick; fronds clustered; sori in 2 irregular rows between each pair of veins (occasionally in part confluent) over surface of lamina ..... 5. *N. zippelii*
1b. Paraphyses clathrate, peltate scales.
  3a. Lamina broader at or near base, often shallowly pinnatifid to bipinnatifid, gradually narrowed to apex ..... 1. *N. ovatus*
  3b. Fronds broader at or near middle, gradually narrowed to base.
    4a. Lateral veins prominent, smaller veins obscure; spore surface shallowly wavy ..... 2. *N. ensatus*
    4b. Veins prominent; spore surface irregularly rugose ..... 3. *N. minor*

1. Neolepisorus ovatus (Wallich ex Beddome) Ching, Acta Phytotax. Sin. 9: 99. 1964.

卵叶盾蕨 luan ye dun jue

Pleopeltis ovata Wallich ex Beddome, Ferns Brit. India, t. 157. 1866, based on *Polypodium ovatum* Wallich ex Hooker & Greville, Icon. Filic. 1: t. 41. 1827, not Thunberg (1768).

Rhizome creeping; scales ovate-lanceolate, margin sparsely denticulate, long acuminate. Fronds distant; stipe 10–20 cm, densely scaly; lamina irregularly pinnatifid, 3-lobed, ovate-lobed, or ovate, 7–12 cm wide, base cuneate to rounded, margin entire, apex acuminate; texture thickly papery, abaxial surface scaly, adaxial surface glabrous; midrib prominent, lateral veins obvious, veinlets anastomosing, free included veinlets forked. Sori orbicular, in 2–4 irregular rows on each side or midrib; covered by paraphyses when young.

Limestone areas, forests; ca. 1500 m. Anhui, Chongqing, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang [Vietnam].

The earliest name for this taxon, *Polypodium ovatum*, was a later homonym of *P. ovatum* Thunberg (1768). T. Moore (Index Fil. 78. 1857) published "*Pleopeltis ovata* (Wallich) T. Moore," but this is a nom. nud. as there is reference only to Wallich's unpublished manuscript name and no mention of Hooker & Greville. Beddome provided a plate with analysis and reference to Wallich ex Hooker & Greville.

Neolepisorus ovatus is a variable species, with fronds that are sometimes irregularly lobed. Four forms have been proposed:

Neolepisorus ovatus f. *ovatus* (*Microsorum ensatum* (Thunberg) H. Itô var. *phyllomanes* (Christ) Tagawa; *M. phyllomanes* (Christ) Koidzumi; *Neocheiropteris phyllomanes* (Christ) Ching; *Neolepisorus basicordatus* P. S. Wang; *N. crenatus* S. F. Wu; *N. cuneatus* S. F. Wu; *N. dengii* Ching & P. S. Wang; *N. emeiensis* Ching & K. H. Shing; *N. lancifolius* Ching & K. H. Shing; *N. phyllomanes* (Christ) Ching; *N. sinensis* Ching; *N. tsaii* Ching & K. H. Shing; *Polypodium phyllomanes* Christ). Lamina ovate, margin entire. Anhui, Chongqing, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang.

Neolepisorus ovatus f. *deltoideus* (Handel-Mazzetti) Ching (Acta Phytotax. Sin. 9: 99. 1964, based on *Polypodium hemitomum* Hance var. *deltoideum* Handel-Mazzetti, Symb. Sin. 6: 44. 1929, based on *Polypodium deltoideum* Baker, J. Bot. 26: 230. 1880, not Swartz (1788), nor Liebmann (1849); *Neocheiropteris phyllomanes* f. *deltoidea* (Handel-Mazzetti) Ching; *Neolepisorus dengii* f. *hastatus* Ching & P. S. Wang; *N. emeiensis* f. *dissectus* Ching & K. H. Shing; *N. ovatus* f. *monstrosus* Ching & K. H. Shing; *N. phyllomanes* f. *deltoideus* (Handel-Mazzetti) Ching; 三角叶盾蕨 san jiao ye dun jue). Lamina deltoid with irregular lobes at lower part. Forests. Chongqing, Guizhou, Sichuan.

Neolepisorus ovatus f. *doryopteris* (Christ) Ching (Acta Phytotax.

Sin. 9: 99. 1964; *Polypodium phyllomanes* var. *doryopteris* Christ, Bull. Acad. Int. Géogr. Bot. 11: 214. 1902; *Neocheiropteris phyllomanes* var. *doryopteris* (Christ) Ching; *Neolepisorus phyllomanes* var. *doryopteris* (Christ) Ching; 蟹爪盾蕨 xie zhua dun jue). Lamina broadly ovate, bipinnatifid at base, lobes linear-lanceolate. Guizhou.

Neolepisorus ovatus f. **truncatus** (Ching & P. S. Wang) L. Shi & X. C. Zhang, **comb. nov.** (Basionym: *Neolepisorus truncatus* Ching & P. S. Wang, Acta Phytotax. Sin. 21: 270. 1983; *N. truncatus* f. *laciniatus* Ching & K. H. Shing; 截基盾蕨 jie ji dun jue). Lamina ovate-lanceolate, undivided, base truncate, with a yellow line between each pair of lateral veins. Limestone areas; ca. 1500 m. Guangxi, Guizhou [Vietnam].

The authors have not seen material of *Neolepisorus ovatus* f. *gracilis* Ching & K. H. Shing (Acta Phytotax. Sin. 21: 269. 1983), described from Guangxi.

2. Neolepisorus ensatus (Thunberg) Ching, Bull. Fan Mem. Inst. Biol., Bot. 10: 14. 1940.

盾蕨 dun jue

Polypodium ensatum Thunberg, Trans. Linn. Soc. London 2: 341. 1794; *Microsorum ensatum* (Thunberg) H. Itô; *M. reticulatum* Ching ex L. Shi; *Neocheiropteris ensata* (Thunberg) Ching f. *izuensis* (Sa. Kurata & Satake) Serizawa; *N. ensata* var. *izuensis* Sa. Kurata & Satake; *N. ensata* f. *monstrifera* (Tagawa) Okuyama; *N. ensata* var. *platyphyllus* (Tagawa) Tagawa ex Ohwi; *N. ensata* f. *undulatodentata* Sugimoto; *Neolepisorus cuneatus* S. F. Wu; *N. ensatus* f. *monstriferus* Tagawa; *N. ensatus* f. *platyphyllus* (Tagawa) Ching & K. H. Shing; *N. ensatus* var. *platyphyllus* Tagawa; *Pleopeltis ensata* (Thunberg) Beddome.

Rhizome long creeping, 2–5 mm in diam.; scales pale brown, pseudopeltate, ovate to ovate-lanceolate, 2–6 × 0.5–1.5 mm, membranous, clathrate, margin irregularly toothed, apex acuminate. Fronds not or slightly dimorphic, 3–6 cm apart; stipe 20–30 cm; lamina elliptic-lanceolate to broadly elliptic, 15–50 × 4–7 cm, papery, both surfaces with small adpressed scales when young, base cuneate, apex acuminate; veins copiously anastomosing, free included veinlets forked. Sori orbicular to oblong, arranged in (1 or)2–4 rows on each side of midribs, covered with small peltate paraphyses when young.

Epiphytic in lowland forests; 1400–1800 m (in Taiwan). Guizhou, Sichuan, Taiwan, Yunnan [NE India, Japan, S Korea, Philippines].

3. Neolepisorus minor W. M. Chu, Acta Bot. Yunnan. 1(2): 95. 1979.

小盾蕨 xiao dun jue

Neolepisorus tenuipes Ching & K. H. Shing.

Rhizome long creeping, ca. 2 mm in diam.; scales brown, broadly lanceolate, acuminate. Fronds distant; stipe slender, 1.5–9 cm, ca. 1 mm in diam., scaly; lamina simple, pale green, ovate to ovate-lanceolate, 6–18 × 2–3.5 cm, thin, papery, base cuneate, apex acuminate; veins copiously anastomosing. Sori large, orbicular, arranged in 1 or 2 rows between 2 lateral veins, covered with paraphyses when young.

● Shaded forests, on limestone rocks; 400–1600 m. SE Yunnan, ?Zhejiang.

The record of *Neolepisorus minor* from Zhejiang is based on the treatment of the genus in Fl. Zhejiang (1: 320. 1993).

4. Neolepisorus fortunei (T. Moore) Li Wang, Bot. J. Linn. Soc. 162: 36. 2010.

江南星蕨 jiang nan xing jue

Drynaria fortunei T. Moore, Gard. Chron. 708. 1855; *Lepisorus fortunei* (T. Moore) C. M. Kuo; *L. undulatus* Ching & Z. Y. Liu; *Microsorum chinense* (Mettenius ex Kuhn) Fraser-Jenkins; *M. excelsum* Ching & S. K. Wu; *M. fortunei* (T. Moore) Ching; *M. henryi* (Christ) C. M. Kuo; *M. takedae* (Nakai) H. Itô; *Phymatodes takedae* Nakai; *Polypodium austrosinicum* Christ ex C. Christensen; *P. chinense* Mettenius ex Kuhn; *P. fortunei* (T. Moore) E. J. Lowe (1856), not Kunze ex Mettenius (1856); *P. henryi* Christ; *P. normale* D. Don var. *polysorum* Baker; *P. takedae* (Nakai) C. Christensen.

Rhizome 2–5 mm in diam., not white waxy. Scales pseudopeltate, appressed, ovate or triangular, 2.5–5 × 1.5–2 mm, margin entire or denticulate (basal margin often eroded), apex acute (but often broken), clathrate or subclathrate (but hyaline margin at base), cells longitudinally rectangular (toward apex), central region glabrous. Fronds not or slightly dimorphic; stipe 0.5–22 cm, 1.5–3.8 mm in diam.; lamina simple, narrowly elliptic to linear, 24–90 × 2–6 cm, herbaceous, base narrowly decrescent, margin undulate, apex acute or acuminate. Veins ± sunken and instinct. Sori separate, in 1 (irregular) row parallel to costa, orbicular, superficial or slightly sunken; paraphyses simple uniseriate hairs with glandular apical cells.

Epilithic or epiphytic often beside streams in forests; 200–1800 (–2500) m. Anhui, Gansu, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Malaysia (Peninsular), Myanmar, Vietnam].

5. Neolepisorus zippelii (Blume) Li Wang, Bot. J. Linn. Soc. 162: 36. 2010.

显脉星蕨 xian mai xing jue

Polypodium zippelii Blume, Fl. Javae. Filic. 172. 1847; *Colysis zippelii* (Blume) J. Smith; *Microsorum luzonicum* (Copeland) Tagawa; *M. zippelii* (Blume) Ching; *Neocheiropteris zippelii* (Blume) Bosman; *Polypodium heterocarpum* Blume var. *zippelii* (Blume) Baker; *P. luzonicum* Copeland (1906), not *P. luzonense* C. Presl (1825); *P. oxyphyllum* Kunze.

Rhizome shortly creeping, cylindrical, thick, 4–5 mm in diam., not white waxy. Scales 4–6 × 1–2 mm, margin denticulate to dentate, apex acute, clathrate or subclathrate, central region glabrous. Phyllopodia ± distinct, ca. 10 mm or more apart. Fronds not or slightly dimorphic; stipe 0.8–8 cm, 0.8–3.2 mm in diam., winged for a considerable part; lamina simple, narrowly elliptic to narrowly obovate, 40–65 × 6–8 cm, herbaceous (to firmly herbaceous), base narrowly decrescent, margin entire, apex acuminate, abaxial surface without acicular hairs; veins prominent and distinct, 4–13 mm apart, ± straight or zigzag, dichotomously branched near margin, connecting veins 3–7 between adjacent secondary veins, catadromous, smaller veins ± sunken and indistinct, or prominent and distinct, variously anastomosing, free veinlets simple to once or twice

forked. Sori separate, in 2 irregular rows between each pair of veins (occasionally in part confluent) over surface of lamina, orbicular, 1.5–2 mm in diam., or length 2–4 mm, superficial or slightly sunken, on whole surface of lamina, predominantly on connective veins, absent in marginal areoles, generally present in costal areoles; paraphyses simple uniseriate hairs with glandular top cells.

Epiphytic, or epilithic on sandstone or limestone in dense wet forests. Guangdong, Guangxi, Guizhou, Hainan, Yunnan [India, Indonesia, Malaysia, Philippines, Thailand].

19. LEPISORUS (J. Smith) Ching, Bull. Fan Mem. Inst. Biol. 4: 47. 1933.

瓦韦属 wa wei shu

Qi Xinping (齐新萍), Zhang Xianchun (张宪春), Lin Youxing (林尤兴); Michael G. Gilbert, Peter H. Hovenkamp

Drynaria sect. *Lepisorus* J. Smith, Bot. Mag. 72. Comp. 13. 1846; *Belvisia* Mirbel; *Drymotaenium* Makino; *Hymenolepis* Kaulfuss (1824), not Cassini (1817); *Macroplethus* C. Presl; *Platygyria* Ching & S. K. Wu.

Plants epiphytic or epilithic, rarely terrestrial. Rhizomes creeping, ± terete or slightly flattened, densely scaly when young, sometimes naked when old, sometimes with white waxlike covering; scales blackish brown, opaque or clathrately transparent, ovate, orbicular, or broadly lanceolate to subulate-lanceolate, entire to deeply serrate. Fronds simple, remote or closely spaced, monomorphic, less often ± dimorphic; stipe usually short, base sparsely scaly, upper part smooth, mostly straw-colored, less often dark brown; lamina mostly lanceolate, less often narrowly lanceolate to linear or auriculate to pedately lobed, margin entire or undulate, often revolute when dried, mostly leathery or papery, less often herbaceous when dried, both surfaces glabrous or abaxially sparsely scaly. Midrib obvious, lateral veins often obscure, veinlets reticulate, areoles with simple or forked included veinlets, sometimes with hydathodes at ends. Sori large, orbicular or elliptic, sometimes confluent into linear coenosori, in 1 row on each side of midrib, superficial or sometimes deeply impressed, covered with paraphyses when young; paraphyses peltate, entire or denticulate, less often stellate or scalelike, often brown at center, pale at margin; lumina large, transparent. Sporangia usually leptosporangiate: long stalked, subpyriform, annulus longitudinal, consisting of 14 conspicuously thickened cells; less often sporangia platygyroid: subspherical, annulus of much wider thin-walled cells. Spores ellipsoid, without perispore, surface mostly rugose or undulate, less often smooth, tuberculate, or foveolate. $2n = 39, 46, 50, 52, 70, 74, 94, 95, 100, 148, 150$.

About 80 species; mainly in E Asia, a few in Africa, one species in Hawaii; 49 species (23 endemic) in China.

The type species is *Lepisorus nudus* (Hooker) Ching (*Pleopeltis nuda* Hooker, described from Nepal), not, as sometimes indicated, *L. thunbergianus* (Kaulfuss) Ching, which was not included in J. Smith's original treatment of *Drynaria* sect. *Lepisorus*.

Lepisorus is complex both cytologically and morphologically with many taxa still inadequately known. Because of this, we have treated species conservatively. Though relatively recently described, the genus has become well established, especially as molecular studies have shown that the similarity to the genus *Pleopeltis* Humboldt & Bonpland ex Willdenow is probably the result of morphological convergence and that the two genera belong to phylogenetically distinct lines. These same studies (e.g., Li Wang et al., Molec. Phylogen. Evol. 54: 211–225. 2010) demonstrated that two older, but much smaller, genera, *Belvisia* and *Drymotaenium*, nest within *Lepisorus*. *Lepisorus* has been formally proposed for conservation against these competing earlier names.

1a. Lamina clearly differentiated into a much wider basal vegetative portion and a much narrower apical fertile portion almost completely covered by a pair of linear sori.
2a. Lamina narrowly lanceolate, upper parts gradually attenuate into narrow fertile part, herbaceous when dry .... 1. *L. mucronatus*
2b. Lamina ovate-lanceolate or elliptic, upper parts abruptly contracted into narrow fertile part, papery or leathery when dry.
3a. Stipe very short to almost absent; lamina leathery with undulate margins when dried, fertile tip 2–3 mm wide; sori covering entire abaxial surface of fertile tip when mature ..... 2. *L. henryi*
3b. Stipe 2–5 cm; lamina papery with straight margins when dried, fertile tip 5–10 mm wide; sori separated from midrib by a narrow sterile zone ..... 3. *L. annamensis*
1b. Lamina mostly with little or no differentiation between vegetative and fertile portions, sometimes sori restricted to apical portion but this only slightly narrower and sori not covering surface.
4a. Sori linear or merged into linear coenosori when mature.
5a. Sori a pair of continuous linear coenosori each within a longitudinal groove alongside midrib; lamina linear ..... 5. *L. miyoshianus*
5b. Sori superficial, not inserted within any grooves, often discontinuous toward base of lamina; lamina lanceolate.
6a. Rhizome scales 1–1.3 × 0.3–0.45 mm; sori linear, tip of fertile lamina abruptly narrowed ..... 4. *L. sinensis*
6b. Rhizome scales 2–4 × 0.7–1 mm; sori initially separate, confluent into interrupted coenosori when mature, tip of fertile lamina more gradually narrowed.
7a. Lamina 0.4–0.8 cm wide; paraphyses with margins colorless, entire or erose ..... 22. *L. subconfluens*
7b. Lamina 1–2.5 cm wide; paraphyses with margins brown and spiny ..... 24. *L. confluens*

4b. Sori orbicular or elliptic, separate.
8a. Rhizome long creeping, wirelike, to 1 mm in diam.; lamina 0.3–1.5 cm in width.
9a. Paraphyses to 0.2 mm in diam., very thick, with almost opaque lumina ..... 6. *L. ussuriensis*
9b. Paraphyses 0.3–0.5 mm in diam., very thin, with transparent square lumina ..... 7. *L. pseudoussuriensis*
8b. Rhizome shortly to long creeping, not wirelike, (1–)1.5–4 mm in diam.; lamina lanceolate to linear lanceolate, margin entire, auriculate or laminae hastate, width various.
10a. Rhizome scales opaque in center, never spreading.
11a. Rhizome shortly creeping, leaves caespitose ..... 8. *L. tosaensis*
11b. Rhizome long creeping, leaves remote.
12a. Lamina linear-lanceolate, 2–5 mm wide, margin strongly revolute, protruding where covering sori so frond like a string of beads (moniliform).
13a. Lamina to 15 cm; paraphyses with lumina dense and opaque ..... 9. *L. lewisii*
13b. Lamina more than 20 cm; paraphyses with lumina square and transparent ..... 10. *L. monilisorus*
12b. Lamina linear-lanceolate to lanceolate, more than 5 mm in width, rarely less than 5 mm, margin not or only slightly revolute and lamina never moniliform.
14a. Paraphyses stellate, lumina dense; rhizome scales without paler margins.
15a. Laminae loriform, 40–70 cm, widest at middle ..... 23. *L. medogensis*
15b. Laminae lanceolate, less than 30 cm, widest 1/3–1/2 of length from base.
16a. Sori confluent, lamina apex constricted; rhizome scales ± transparent ..... 24. *L. confluens*
16b. Sori separate, lamina apex not constricted; rhizome scales opaque ..... 25. *L. sordidus*
14b. Paraphyses orbicular, lumina dense or square; rhizome scales with paler margins.
17a. Stipe base dark; scales thick; lamina sometimes moniliform due to protruding sori.
18a. Lamina linear-lanceolate, apex not constricted ..... 11. *L. heterolepis*
18b. Lamina lanceolate, apex constricted, sori restricted to constricted part ..... 12. *L. luchunensis*
17b. Stipe base straw-colored or chestnut-brown; scales brown to dark brown, thin; lamina not moniliform.
19a. Rhizome scales glossy; lumina of paraphyses square ..... 13. *L. lineariformis*
19b. Rhizome scales dull and not iridescent; lumina of paraphyses small and polygonal.
20a. Stipes mostly chestnut-brown; paraphyses 0.15–0.30 mm in diam. ..... 14. *L. obscurevenulosus*
20b. Stipes straw-colored; paraphyses more than 0.3 mm in diam.
21a. Lamina broadly lanceolate, abaxial surface distinctly scaly; rhizome thick, scales dark brown.
22a. Lamina widest at middle, abaxial surface densely scaly; sori costular, close to each other ..... 15. *L. oligolepidus*
22b. Lamina widest at lower 1/3, abaxial surface more sparsely scaly; sori medial and remote ..... 16. *L. suboligolepidus*
21b. Lamina lanceolate, leaf indument often absent; rhizome much slender, scales brown.
23a. Rhizome scales ovate-lanceolate, with only a narrow opaque band in center, otherwise transparent.
24a. Scales yellow-brown, ± spreading, only with a narrow opaque band at center ..... 17. *L. elegans*
24b. Scales brown, imbricate, with ± opaque band ..... 18. *L. contortus*
23b. Rhizome scales lanceolate, with a broad opaque band in center part and narrow transparent margins.
25a. Rhizome scales chestnut to black in center, margins serrate; distal sori often confluent ..... 22. *L. subconfluens*
25b. Rhizome scales brown in center, margins entire or denticulate; sori not confluent.
26a. Rhizome scale apex not filiform; lamina widest below middle ..... 19. *L. thunbergianus*
26b. Rhizome scale apex long and filiform; lamina widest at middle.
27a. Lamina linear, 0.3–0.5 cm wide ..... 20. *L. angustus*
27b. Lamina lanceolate, 0.5–1.8 cm wide ..... 21. *L. tibeticus*
10b. Rhizome scales translucent or transparent in center, spreading or adpressed.
28a. Rhizome scales with lumina dense and translucent, margin entire, rarely denticulate; paraphyses orbicular.
29a. Rhizome scales lanceolate, persistent, with distinctly paler margins; plants summer green.
30a. Rhizome scales with orbicular base and acute apex, closely appressed to rhizome, 1–2 mm, not overlapping, rhizome surface exposed, white farinose ..... 35. *L. bicolor*
30b. Rhizome scales gradually acuminate, overlapping, 2.5–4 mm, rhizome surface hidden.
31a. Rhizome scales lanceolate, distinctly bicolored, dark brown center contrasting with white margins ..... 36. *L. morrisonensis*

31b. Rhizome scales broadly lanceolate, margin only slightly paler than center ..... 37. *L. scolopendrium*
29b. Rhizome scales ovate or lanceolate, caducous, or if scales persistent then lamina to 4 cm wide, scales not distinctly bicolored; plants evergreen.
32a. Rhizome scales ovate to acuminately ovate, margin entire, lumina isodiametric.
33a. Sori submarginal; scales ovate, thin, 2–3 mm ..... 26. *L. macrosphaerus*
33b. Sori subcostular or medial; scales ovate to acuminately ovate, thick, less than 2 mm.
34a. Sori small, close, medial or subcostular, generally extending to below middle of lamina; lamina margins undulate when dry ..... 27. *L. marginatus*
34b. Sori large, distant, medial, generally not extending below middle of lamina; lamina margins not undulate when dry.
35a. Lamina 1.5–4 cm wide; rhizome scales 1.2–2 × 1–1.3 mm; paraphyses brown ..... 28. *L. asterolepis*
35b. Lamina 1–2 cm wide; rhizome scales ca. 1 × 1 mm; paraphyses pale brown ..... 29. *L. kawakamii*
32b. Rhizome scales lanceolate or ovate-lanceolate, margin entire or denticulate, lumina rectangular, rarely isodiametric.
36a. Rhizome scales ovate-lanceolate, margin denticulate; leaves widest at base ..... 30. *L. megasorus*
36b. Rhizome scales lanceolate, margin entire; leaves widest at or below middle.
37a. Lamina more than 4 cm wide; rhizome scales pale brown ..... 31. *L. kuchenensis*
37b. Lamina 1–3 cm wide; rhizome scales brown to dark brown.
38a. Rhizome scale margin yellow-brown, center dark brown, central lumina small and square ..... 32. *L. subsessilis*
38b. Rhizome scale margin pale brown, center brown, central lumina large and rectangular.
39a. Sori nearer costa; leaves less than 30 cm; rhizome 1.5–2 mm in diam. ..... 33. *L. nudus*
39b. Sori nearer margin; leaves up to 65 cm; rhizome 2–4 mm in diam. ..... 34. *L. affinis*
28b. Rhizome scales lanceolate, transparent, clathrate, margin denticulate; paraphyses stellate or lanceolate.
40a. Paraphyses stellate, small in diam., lumina small, often opaque; lamina leathery, evergreen, venation hidden, young leaves always red or with red costa.
41a. Lamina linear, less than 5 mm wide, margin strongly revolute, protruding around mature sori so frond moniliform; paraphyses opaque ..... 38. *L. eilophyllus*
41b. Lamina linear, or lanceolate, (2–)10–20 mm wide, margin straight, not revolute; paraphyses transparent or opaque.
42a. Lamina loriform; sori marginal ..... 39. *L. loriformis*
42b. Lamina lanceolate; sori medial.
43a. Lamina broadly lanceolate, 2–5 cm wide ..... 40. *L. sublinearis*
43b. Lamina lanceolate, less than 2 cm wide.
44a. Rhizome erect; leaves clustered ..... 41. *L. cespitosus*
44b. Rhizome creeping; leaves remote ..... 42. *L. pseudonudus*
40b. Paraphyses lanceolate, rhomboidal or deeply stellate, margin spiny, lumina uniformly large and transparent; lamina membranous, summer green, venation distinct, lamina never red or partly red.
45a. Sporangia with broad, unthickened platygyroid annulus, ± indehiscent.
46a. Lamina lanceolate or oblong-lanceolate, never enlarged at base ..... 48. *L. clathratus*
46b. Lamina hastate, pedatifid, or auriculate at base, sometimes only some fronds enlarged at base ..... 49. *L. waltonii*
45b. Sporangia with normal, narrow, thickened annulus cells.
47a. Rhizome scales lanceolate, 3.5–7 × 0.7–1.2 mm at base, 2.5–6 × as long as wide; areoles oblong or irregularly elongated, longer than wide.
48a. Rhizome with both hairs and scales, ca. 4 mm in diam.; lamina thick, 1.9–2 cm wide ..... 43. *L. tricholepis*
48b. Rhizome with few or no hairs, 1.5–3 mm in diam.; lamina 0.8–1.5 cm wide.
49a. Lamina membranous or thinly herbaceous, narrowly lanceolate; rhizome scales black, iridescent, 3.5–7 × 0.7–1 mm ..... 48. *L. clathratus*
49b. Lamina thickly papery, lanceolate; rhizome scales brown, brittle, 3–3.5 × 0.9–1.2 mm ..... 44. *L. crassipes*
47b. Rhizome scales broadly lanceolate, 1.8–2.5 × 0.8–1.5 mm, less than 2.5 × as long as wide; areoles polygonal, ± as long as wide.
50a. Lamina 5–14 × 0.4–1.2 cm; rhizome scales < 2 × 1 mm, paraphysis margins with long thick curved spines ..... 45. *L. albertii*
50b. Lamina > 14 × 1–2 cm; rhizome scales 2–2.5 × 1.1–1.5 mm, paraphysis margins not like above.
51a. Lamina papery or membranous, both surfaces brown, pale brown or pale green when dried, stipe 2–10 cm; paraphyses 0.4–0.5 mm, 2–3 × as long as wide ..... 46. *L. thaipaiensis*

51b. Lamina thickly papery to thinly leathery, abaxially gray-green, adaxially yellow- or dark green, or both surfaces light green when dried, stipe 0.4–5 cm; paraphyses 0.8–1 mm, ± as long as wide ..... 47. *L. likiangensis*

1. Lepisorus mucronatus (Fée) Li Wang, Bot. J. Linn. Soc. 162: 35. 2010.

尖嘴蕨 jian zui jue

Hymenolepis mucronata Fée, Mém. Foug. 5: 82 1852; *Acrostichum spicatum* Linnaeus f. var. *schneideri* F. M. Bailey; *Belvisia callifolia* (Christ) Copeland; *B. formosana* (Ogata) Ching; *B. melanesica* Brownlie; *B. minor* (Copeland) Copeland; *B. mucronata* (Fée) Copeland; *B. vaupelii* (Hieronymus ex C. Christensen) Copeland; *Hymenolepis callifolia* Christ; *H. formosana* Ogata; *H. minor* Copeland; *H. mucronata* f. *australiensis* C. Christensen; *H. mucronata* f. *graminifolia* (Rosenstock) C. Christensen; *H. mucronata* f. *helocharidioides* C. Christensen; *H. mucronata* f. *latior* C. Christensen; *H. mucronata* var. *nigropunctata* C. Christensen; *H. spicata* (Linnaeus f.) C. Presl var. *bakhuizenii* Alderwerelt; *H. spicata* var. *graminifolia* Rosenstock; *H. spicata* f. *longipaleacea* Alderwerelt; *H. spicata* var. *novoguineensis* Rosenstock; *H. spicata* f. *schneideri* (F. M. Bailey) Alderwerelt; *H. spicata* var. *squamulifera* Alderwerelt; *H. vaupelii* Hieronymus ex C. Christensen; *Macroplethus callifolius* (Christ) Tagawa; *M. mucronatus* (Fée) Tagawa; *M. vaupelii* (Hieronymus ex C. Christensen) Tagawa.

Rhizome shortly creeping, ca. 3 mm in diam.; scales lanceolate, margin long serrate. Fronds rather closely spaced; stipe variable in length, frond subsessile or stipe up to 7 cm; lamina pale brown when dried, sterile lower part narrowly lanceolate, 10–30 × (1–)3–4 cm, herbaceous, both surfaces glabrous, base attenuate and long decurrent, margins entire, apex gradually narrowed into fertile tip 3–12 × 0.1–0.3 cm with slightly recurved margins when dried. Main vein raised on both surfaces, veinlets faintly visible. Sori linear, fully covering abaxial surface of lamina when mature; paraphyses peltate and laterally affixed, stellate, margin denticulate, ca. 0.2 mm in diam.

On tree trunks in forests; 600–1600 m. C and S Taiwan, Yunnan [Bhutan, Cambodia, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Pacific islands].

2. Lepisorus henryi (Hieronymus ex C. Christensen) Li Wang, Bot. J. Linn. Soc. 162: 35. 2010.

隐柄尖嘴蕨 yin bing jian zui jue

Hymenolepis henryi Hieronymus ex C. Christensen, Dansk Bot. Ark. 6: 67. 1929; *Belvisia henryi* (Hieronymus ex C. Christensen) Raymond; *Macroplethus henryi* (Hieronymus ex C. Christensen) Tagawa.

Rhizomes shortly creeping, ca. 3 mm in diam.; scales dark brown, lanceolate, margins long serrate at base, entire toward apex. Fronds rather closely spaced, subsessile or very shortly stipitate; lamina with sterile lower part ovate-lanceolate or elliptic, 20–30 × 3–5 cm, leathery when dry, both surfaces glabrous, base attenuate and long decurrent nearly to articulation of stipe, margin slightly undulate, apex abruptly contracted into fertile tip 6–30 × 0.2–0.3 cm. Main vein raised on both sides, veinlets obscure. Sori linear, covering abaxial surface of fertile tip when mature; paraphyses peltate, stellate, 0.2–0.3 mm in diam., margin denticulate.

On tree trunks or moss-covered rocks in forests; 100–1500 m. Yunnan [India, Nepal, Thailand, N Vietnam].

3. Lepisorus annamensis (C. Christensen) Li Wang, Bot. J. Linn. Soc. 162: 35. 2010.

显脉尖嘴蕨 xian mai jian zui jue

Hymenolepis annamensis C. Christensen, Dansk Bot. Ark. 6: 68. 1929; *Belvisia annamensis* (C. Christensen) Tagawa; *Macroplethus annamensis* (C. Christensen) Tagawa.

Rhizome shortly creeping, ca. 3 mm in diam.; scales brown, lanceolate, dentate near base, entire at apex. Fronds rather closely spaced; stipe 2–5 cm, narrowly winged; lamina pale brown to brown when dried, sterile lower parts ovate-lanceolate or narrowly elliptic, 15–50 × 3.5–4.5 cm, papery, base cuneate, decurrent, margin entire, apex contracted to linear fertile part; fertile part 6–20 × 0.5–1 cm. Main vein strong, raised on both sides, veinlets faintly visible. Sori linear, leaving a narrow sterile zone free near midrib; paraphyses peltate, stellate, margin denticulate, 0.2–0.3 mm in diam.

Among moss on shaded and wet tree trunks in forests; 800–1100 m. Hainan [Laos, Thailand, Vietnam].

4. Lepisorus sinensis (Christ) Ching, Bull. Fan Mem. Inst. Biol. 4: 63. 1933.

中华瓦韦 zhong hua wa wei

Neurodium sinense Christ, Bull. Herb. Boissier 6: 880. 1898; *Lemmaphyllum sinense* (Christ) C. Christensen; *Lepisorus vittarioides* Ching; *Paltonium sinense* (Christ) C. Christensen; *Pleopeltis sinensis* (Christ) Copeland; *Polypodium neurodioides* C. Christensen.

Plants 5–25 cm tall. Rhizomes creeping, 1.5–2 mm in diam., densely scaly; scales brown, iridescent, lanceolate or ovate-lanceolate, 1–1.3 × 0.3–0.45 mm, margin dentate, apex attenuate but not filiform, central part with ± opaque band, marginal lumina large and transparent. Fronds 0.2–2 cm apart; stipe straw-colored, 1–3 cm, 1–1.5 mm in diam.; lamina pale brown, pale grayish, or greenish, lanceolate, 15–30 × (0.2–)0.7–2 cm, widest 1/3–1/2 from base, papery or thickly papery when dried, both surfaces glabrous or with scattered orbicular or lanceolate scales, base attenuate, decurrent, apex long caudate; costa raised, veinlets obscure or slightly visible. Sori linear, on abruptly attenuate distal 1/3(–1/2) of lamina, close to margin, linear, sometimes lower part interrupted; paraphyses orbicular, sometimes slightly stellate, 2.5–3.5 mm in diam., transparent, lumina irregular.

On moss-covered tree trunks or rocks in evergreen broad-leaved forests; 1200–1900(–3600) m. SE Yunnan [Bhutan, Myanmar, Thailand, Vietnam].

Lepisorus sinensis is a very distinct species that can be easily

recognized by the linear sori. *Lepisorus vittarioides* is only known from the type specimen, which Ching cited when he described *L. sinensis*, and it differs from *L. sinensis* by the narrow lamina. We found there were no other differences between these two species. *"Vittaria henryi"* is a nomen nudum cited in the protologue of *L. vittarioides* and was not therefore validly published (*Melbourne Code*, Art. 38.1(a)).

5. Lepisorus miyoshianus (Makino) Fraser-Jenkins & Subh. Chandra, Taxon. Revis. Indian Subcontinental Pteridophytes, 37. 2008.

丝带蕨 si dai jue

Taenitis miyoshiana Makino, Bot. Mag. (Tokyo) 12: 26. 1898; *Drymotaenium miyoshianum* (Makino) Makino; *D. nakaii* Hayata; *Monogramma robusta* (Christ) C. Christensen; *Pleurogramme robusta* Christ.

Rhizomes short and decumbent, 2.5–3.5 mm in diam., densely scaly; scales mostly dark brown, triangular-lanceolate, 2–3.5(–5) × 0.8–1.5 mm, base cordate, margins denticulate; lumina small, most opaque, marginal 1 or 2 rows of cells brownish, transparent. Fronds clustered, normally pendulous; stipe straw-colored, 0.2–0.4 cm; lamina narrowly linear, "Vittaria"-like, 15–60 × 0.2–0.4 cm, firm, leathery, glabrous, usually strongly revolute. Veinlets obscure, anastomosing, 1 or 2 rows of areoles on both sides of broad costa and with a few included simple veinlets. Sori located within a pair of longitudinal grooves on each side of and close to costa, linear, continuous; paraphyses peltate, stellate, margin denticulate. 0.1–0.2 mm in diam. Annulus of 14(–16) thick-walled cells. Spores bilateral, elliptic, transparent and smooth.

On tree trunks in forests; 600–2600 m. Guangdong, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [NE India, Japan].

6. Lepisorus ussuriensis (Regel & Maack) Ching, Bull. Fan Mem. Inst. Biol. 4: 91. 1933.

乌苏里瓦韦 wu su li wa wei

Plants 10–15 cm tall. Rhizome slender and creeping, wirelike, 1–1.5 mm in diam., densely scaly, older parts naked; scales dark brown, basifixed with a tuft of hairs at point of attachment, lanceolate, 2–2.5 × 0.4–0.8 mm; lumina at base large and transparent, slightly isodiametric, upward abruptly narrowed, rectangular, cell wall thickened, base subrounded, margin denticulate, apex acuminate or extended into long awn. Fronds (0.3–)2–4 cm apart; stipe straw-colored or brownish to dark brown, 2–8 cm, 0.5–0.8 mm in diam., smooth and glabrous; lamina linear-lanceolate, (4–)8–25 × 0.3–1.5 cm, widest 1/3–1/2 way from base, stiffly papery to subleathery, abaxially glabrous or with scattered scales, base cuneate, decurrent, margin slightly revolute, apex shortly acuminate or obtuse; costa raised on both sides, veinlets obscure. Sori along distal 1/3–1/2 of lamina, midway between costa and margins or nearer costa, orbicular; paraphyses dark brown, stellate or suborbicular, less than 0.3 mm in diam., lumina irregular, transparent or opaque.

In rock crevices in forests or shaded slopes; 700–1700 m. Anhui, Hebei, Heilongjiang, Henan, Jiangxi, Jilin, Liaoning, Shandong, Zhejiang [Japan, Korea, Russia].

The very thin rhizomes of this and the next species, *Lepisorus pseudoussuriensis*, are more like those seen in *Lemmaphyllum* and quite different from other species in *Lepisorus*.

1a. Lamina 1–1.5 cm wide, abaxially glabrous, apex shortly acuminate or obtuse; rhizome scales with apex extended into long awn ..... 6a. var. *ussuriensis*

1b. Lamina 0.3–1 cm wide, abaxially with ovate scales, apex acuminate; rhizome scales with apex acuminate ..... 6b. var. *distans*

6a. Lepisorus ussuriensis var. **ussuriensis**

乌苏里瓦韦(原变种) wu su li wa wei (yuan bian zhong)

Pleopeltis ussuriensis Regel & Maack, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 4: 175. 1861; *Polypodium lineare* N. L. Burman var. *ussuriense* (Regel & Maack) C. Christensen; *P. ussuriense* (Regel & Maack) Regel.

Rhizome scales with apex extended into long awn. Lamina 15–25 × 1–1.5 cm, abaxially glabrous, apex shortly acuminate or obtuse.

In rock crevices in forests or shaded slopes; 700–1700 m. Anhui, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Shandong [Japan, Korea, Russia].

6b. Lepisorus ussuriensis var. **distans** (Makino) Tagawa, Acta Phytotax. Geobot. 11: 236. 1942.

远叶瓦韦 yuan ye wa wei

Polypodium lineare var. *distans* Makino, Bot. Mag. (Tokyo) 15: 60–61. 1901; *Lepisorus distans* (Makino) Ching; *P. annuifrons* Makino var. *distans* (Makino) Nakai; *P. distans* (Makino) Makino (1906), not Kaulfuss (1824), nor D. Don (1825), nor Raddi (1825).

Rhizome scales adpressed, apex acuminate Lamina linear-lanceolate, 8–20 × 0.3–1 cm, abaxially with caducous, adpressed, 0.3–0.5 mm, ovate scales, apex acuminate.

Anhui, Jiangxi, Shandong, Zhejiang [Japan, Korea].

7. Lepisorus pseudoussuriensis Tagawa, Acta Phytotax. Geobot. 5: 110. 1936.

拟乌苏里瓦韦 ni wu su li wa wei

Lepisorus angustifrons Tagawa.

Plants 10–20 cm tall. Rhizomes slender and decumbent, wirelike, ca. 1 mm in diam., densely scaly; scales appressed, deep brown, narrowly lanceolate, 2–4 × 0.4–0.8 mm, basifixed with a tuft of hairs on point of attachment, base broadly ovate, upward attenuate, margin shortly serrate, apex extended into long awn; lumina large, isodiametric, middle ones subrectangular, walls slightly thickened. Fronds remote; stipe brown, 1.2–5(–12) cm; lamina brown on both surfaces when dried, linear-lanceolate, 10–20 × 0.3–1 cm, widest at middle, papery, with a few scattered scales, leaf scales with transparent oblong lumina, lamina base cuneate, decurrent, margin flat and straight or slightly revolute, apex shortly acuminate; costa raised on both sides, veinlets obscure. Sori along lower 1/3 of laminae, midway between costa and margins or nearer costa, elliptic;

paraphyses brown, suborbicular, 0.3–0.4 mm in diam.; lumina large, subsquare, transparent.

● On tree trunks or moss-covered rocks in forests; 1000–3000 m. Taiwan.

Lepisorus pseudoussuriensis is most closely related to the preceding species, *L. ussuriensis*. They can be distinguished easily by the paraphyses, the former has these with square transparent lumina, which are very rare in this genus. These two species also have different distributions.

8. Lepisorus tosaensis (Makino) H. Itô, J. Jap. Bot. 11: 93. 1935.

阔叶瓦韦 kuo ye wa wei

Polypodium tosaense Makino, Bot. Mag. (Tokyo) 27: 127. 1913; *Lepisorus infraplanicostalus* (Hayata) Ching; *L. paohuashanensis* Ching; *L. sinicus* Ching & Z. Y. Liu; *Polypodium hoozanense* Hayata; *P. infraplanicostale* Hayata; *P. lineare* N. L. Burman var. *caudatum* Makino; *P. morii* Hayata.

Plants 15–30 cm tall. Rhizomes short and decumbent, less than 3 cm, 2–3 mm in diam., apex densely scaly, remainder soon naked; scales basifixed, deep brown with paler margins, iridescent when young, lanceolate or broadly lanceolate, 2–3.5 × 0.7–1.1 mm; most lumina opaque, marginal 1 or 2 rows of cells brownish, transparent. Fronds clustered; stipe straw-colored, 1–3(–5) cm, 1–1.5 mm in diam.; lamina brownish or grayish green when dried, lanceolate or linear-lanceolate, both ends attenuate, (10–)13–20 × 1–2 cm, widest at middle, leathery, both surfaces glabrous, base cuneate, decurrent, apex acuminate; costa raised on both sides, veinlets obscure. Sori on distal half of lamina, costular, rarely midway between costa and margins, orbicular, 3–7 mm in diam.; paraphyses orbicular, brownish with central lumina small and opaque or iridescent with lumina large and transparent. Spore surface foveolate.

On tree trunks or rocks in forests, in limestone crevices; sea level to 1000 m. Anhui, Chongqing, Guangdong, Guangxi, Guizhou, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Japan, Korea, Vietnam].

This is a very difficult species to define, and many specimens have been misidentified as *Lepisorus thunbergianus*. We found that *L. tosaensis* can be distinguished from *L. thunbergianus* by the short rhizome, iridescent young scales, and much larger transparent lumina of the leaf scales. This species is always distributed at elevations less than 1000 m, while *L. thunbergianus* is found at relatively higher elevations.

Lepisorus paohuashanensis differs from *L. tosaensis* by the much smaller fronds, 3–7 × 0.4–0.6 cm, but this is just an extreme form within variable populations.

9. Lepisorus lewisii (Baker) Ching, Bull. Fan Mem. Inst. Biol. 4: 65. 1933.

庐山瓦韦 lu shan wa wei

Polypodium lewisii Baker, J. Bot. 13: 201. 1875.

Plants 9–15 cm tall. Rhizomes slender and creeping, densely scaly; scales deep brown with paler margins, lanceolate, margins denticulate; central lumina opaque, marginal 1 or 2 rows of lumina brownish, transparent. Fronds closely spaced; stipe straw-colored, 0.5–2 cm or frond subsessile; lamina yellowish or brownish gray when dried, linear, 6–15 × 0.2–0.4 cm, leathery when dried, base slightly attenuate and decurrent, margin strongly revolute, wrapped around sori, thus frond distinctly moniliform, apex obtuse; costa raised on both sides, veinlets obscure. Sori elliptic, on distal half of lamina, midway between costa and margins, deeply sunken in mesophyll; paraphyses brown, entire; lumina larger, transparent.

● On soil or rock crevices beside streams in forests; 300–1200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Zhejiang.

Lepisorus lewisii is a distinct species with the linear lamina distinctly moniliform when fertile and the rhizome scales imbricate, with opaque centers.

10. Lepisorus monilisorus (Hayata) Tagawa, Acta Phytotax. Geobot. 11: 303. 1942.

拟芰瓦韦 ni ji wa wei

Polypodium lineare N. L. Burman var. *monilisorum* Hayata, Icon. Pl. Formosan. 4: 248. 1914.

Rhizome long creeping, ca. 1.5 mm in diam.; scales overlapping, partially caducous, brown, lanceolate, 2–4 × 0.5–1 mm, with broad opaque center, margin dentate, with 1 row of transparent lumina. Fronds ca. 1 cm apart; lamina usually linear, 15–20 × 0.4–0.6(–1) cm, widest at middle, leathery or thinly leathery, sparsely scaly; venation hidden. Sori restricted to distal 1/2 or narrowed apex, medial, orbicular, ca. 2.5 mm in diam., usually protruding beyond margin to give moniliform appearance; paraphyses iridescent, orbicular, 0.3–0.5 mm in diam., with square transparent lumina.

● On trunks; (600–)1600–3100 m. Taiwan.

A distinct species with laminae mostly less than 0.5 cm wide and moniliform due to the projecting beadlike sori, rarely laminae more than 0.5 cm wide and sori not beyond leaf margin. The most useful character is the transparent paraphysis with square lumina.

11. Lepisorus heterolepis (Rosenstock) Ching, Bull. Fan Mem. Inst. Biol. 4: 86. 1933.

异叶瓦韦 yi ye wa wei

Polypodium lineare N. L. Burman var. *heterolepis* Rosenstock, Repert. Spec. Nov. Regni Veg. 12: 247. 1913; *Pleopeltis heterolepis* (Rosenstock) Tagawa & K. Iwatsuki; *Polypodium heterolepis* (Rosenstock) C. Christensen; *P. loriforme* Wallich ex Mettenius var. *heterolepis* (Rosenstock) C. Christensen.

Plants 15–30 cm tall. Rhizomes creeping, ca. 2 mm in diam., densely scaly when young, later naked; scales black, lanceolate, 2.5–4.5 × 0.7–1.2 mm, margin dentate, very thick in texture, opaque except for marginal 1 or 2 rows of paler, transparent cells. Fronds ca. 0.5 cm apart; stipe straw-colored, more than 2 cm, 0.5–1 mm in diam., base with black scales; lamina grayish green when dried, linear-lanceolate, 15–30 × ca. 0.5 cm, widest at middle, leathery, with sparse, scattered small scales, base attenuate and decurrent nearly to base of stipe, margin distinctly revolute and distally undulate, apex shortly caudate; costa raised on both sides, veinlets obscure. Sori along distal 1/3 of lamina, midway between costa and margins, sub-

elliptic, ca. 2 mm in diam., extending margins to give frond a moniliform appearance; paraphyses brown, orbicular, 0.4–0.7 mm in diam., margin entire; central lumina small, thick and opaque, marginal lumina transparent. Spores monolete, surface reticulate.

● On tree trunks or rocks in forests; ca. 2300 m. Yunnan.

12. Lepisorus luchunensis Y. X. Lin, Fl. Reipubl. Popularis Sin. 6(2): 346. 2000.

绿春瓦韦 lü chun wa wei

Plants ca. 25 cm tall. Rhizomes creeping, 1.5–2.5 mm in diam., densely scaly at tip; scales black, narrowly lanceolate, 2.8–3.5 × 0.5–1 mm, very thick in texture, basifixed, margin with long spines, apex long acuminate; lumina fine and dense, opaque, apex long acuminate. Fronds ca. 1 cm apart; stipe straw-colored, ca. 2 cm, 1–1.5 mm in diam., base covered with black scales; lamina grayish brown when dried, narrowly lanceolate, 15–25 × 0.4–0.8(–1) cm, widest 1/3–1/2 way from base, softly leathery, both surfaces smooth, base attenuate, decurrent, apex long caudate; costa raised, veinlets obscure. Sori on narrow distal part of lamina, close to margin and usually protruding beyond when mature, rarely not, elliptic or orbicular, 2–3 mm in diam.; paraphyses orbicular, 0.25–0.35 mm in diam., margins with long and strong spines; center opaque, lumina walls thickened.

● On tree trunks in evergreen broad-leaved forests; 1500–1600 m. Yunnan (Lüchun).

13. Lepisorus lineariformis Ching & S. K. Wu, Fl. Xizang. 1: 309. 1983.

线叶瓦韦 xian ye wa wei

Lepisorus nyalamensis Ching & S. K. Wu.

Plants 10–20 cm tall. Rhizomes long and creeping, 1.5–2 mm in diam., densely scaly; scales dark brown with pale margins, iridescent, lanceolate, 2–3 × 0.5–1 mm, very thin, margin denticulate, scales with narrow opaque black belt in center, sometimes completely transparent, marginal 2 or 3 rows of cells subrectangular, transparent. Fronds 0.5–1 cm apart; stipe straw-colored, 0.5–3 cm, 0.5–1 mm in diam.; lamina greenish when dried, linear or linear-lanceolate, 10–25 × 0.3–0.5(–4) cm, widest at middle, thinly leathery, sparsely scattered with small scales, leaf scales with distinct and large lumina, base attenuate, decurrent, margin flat or only slightly revolute, apex acuminate; costa raised on both sides, veinlets obscure. Sori on distal 1/3–1/2 of lamina, midway between costa and margins, orbicular, 2–3.5 mm in diam.; paraphyses brown, orbicular; lumina transparent, almost square.

On tree trunks or rocks in evergreen broad-leaved forests; (200–) 800–2700(–3200) m. Xizang (Mêdog), Yunnan [India, Nepal].

A distinct species with iridescent scales and paraphyses with transparent square lumina.

Lepisorus lineariformis and *L. nyalamensis* differed only in lamina form, linear for the former and lanceolate for the latter. We checked more specimens and found that leaf shape is not a stable character, even within a population.

14. Lepisorus obscurevenulosus (Hayata) Ching, Bull. Fan Mem. Inst. Biol. 4: 76. 1933.

粤瓦韦 yue wa wei

Polypodium obscurevenulosum Hayata, Icon. Pl. Formosan. 5: 322. 1915 ["*obscure-venulosus*"].

Plants 10–20(–30) cm tall. Rhizomes creeping, 2–2.5 mm in diam., densely scaly when young, soon naked; scales brown when young, becoming dark with age, broadly lanceolate, 2–4 × 0.9–1.3 mm, margin entire, scales with narrow central band of deep brown and opaque lumina, most other lumina transparent. Fronds ca. 1 cm apart; stipe usually chestnut-brown or straw-colored, 1–5(–7) cm, 1–1.3 mm in diam.; lamina greenish or yellowish green when dried, lanceolate or broadly lanceolate, 12–30 × 1–2.5(–3.5) cm, normally widest 1/3 from base, thinly leathery when dried, abaxially sparsely scaly along sides of main veins, base cuneate, decurrent, apex long caudate; costa raised on both sides, veinlets obscure. Sori orbicular, up to 5 mm in diam. when mature, very closely spaced, slightly contracted after maturity; paraphyses pale brown at middle, orbicular, 0.15–0.3 mm in diam.; lumina large.

On tree trunks or rocks in forests; 300–2500 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Vietnam].

The chestnut-brown stipes often used to distinguish this species are not reliable as the stipes are sometimes straw-colored. The rhizome scales fall off to leave dark long-creeping naked rhizomes; the young scales have only a narrow dark band in the center and broad transparent light brown margins; and the paraphyses are quite small, light brown, 0.15–0.3 mm in diam.

"Polypodium suprapunctatum" (Ching, Bull. Fan Mem. Inst. Biol. 4: 76. 1933) belongs here but was merely cited as a synonym and was not therefore validly published (*Melbourne Code*, Art. 36.1(c)). *Goniophlebium caudiceps* T. Moore (Gard. Chron., n.s., 25: 234. 1886; *Polypodium caudiceps* (T. Moore) G. Nicholson), described from cultivated material supposed to have come from Taiwan, was treated as a synonym of *Lepisorus obscurevenulosus* in the first edition of Fl. Taiwan but was not mentioned in the second edition. If this placement is correct then a new combination in *Lepisorus* based on *G. caudiceps* would have priority.

15. Lepisorus oligolepidus (Baker) Ching, Bull. Fan Mem. Inst. Biol. 4: 80. 1933.

稀鳞瓦韦 xi lin wa wei

Polypodium oligolepidum Baker, Gard. Chron., n.s., 14: 494. 1880; *Lepisorus ellipticus* Ching; *Pleopeltis oligolepida* (Baker) Á. Löve & D. Löve; *Polypodium lineare* N. L. Burman var. *oligolepidum* (Baker) Christ; *P. trabeculatum* Copeland.

Plants 10–20 cm tall. Rhizomes creeping, to 10 cm, 2–3 mm in diam., densely scaly; scales brown, sometimes with paler margins, lanceolate, 2.5–5 × up to 1 mm, very thick in center, margins serrate, central lumina opaque, marginal 1 or 2 rows of lumina brownish, transparent. Fronds 1–1.5 cm apart; stipe straw-colored, to 1(–3) cm, robust, 1–1.5 mm in diam.; lamina yellowish green, lanceolate to ovate-lanceolate, 8–18 × 1.5–3.5 cm, widest 1/3–1/2 from base, softly leathery when dried, abaxially densely scaly, scales deep brown, lanceolate, 1–

2 × 0.4–0.5 mm, lumina usually transparent, adaxially glabrous, base cuneate, decurrent, apex acuminate; costa robust, raised on both sides, veinlets obscure. Sori on distal half of lamina, slightly closer to costa, orbicular or elliptic, up to 4–5 mm in diam., sterile at ends, contiguous; paraphyses deep brown, orbicular, 0.4–0.6 mm in diam. center thick and dark. Spores tuberculate.

Shaded places on slopes or tree trunks or rock crevices in forests; 200–2300 m. Anhui, Chongqing, Fujian, Guangdong, ?Guangxi, Guizhou, ?Henan, Hunan, Jiangxi, ?Shaanxi, Sichuan, ?Xizang, Yunnan, Zhejiang [India, ?Myanmar, Japan].

Lepisorus oligolepidus is a distinct species in *Lepisorus* identifiable by the broadly lanceolate fronds, less than 20 cm, abaxially rather densely covered with small scales, the large subcostular sori, very closely spaced, and the usually relatively thick rhizome, to 10 cm, with thick, dark, linear-lanceolate scales.

16. Lepisorus suboligolepidus Ching, Bull. Fan Mem. Inst. Biol. 4: 77. 1933.

拟鳞瓦韦 ni lin wa wei

Pleopeltis suboligolepidus (Ching) Tagawa & K. Iwatsuki.

Plants 15–28 cm tall. Rhizomes creeping, to 10 cm, 1.8–2.5 mm in diam., densely scaly; scales brown, sometimes with paler margins, lanceolate, 2.5–5 × up to 1 mm, margins serrate, center opaque, marginal 1 or 2 rows of cells transparent or not. Fronds closely spaced; stipe straw-colored, 1.5–2(–3) cm, 1–1.5 mm in diam.; lamina grayish yellow when dried, lanceolate, 15–28 × 1.5–2.5 cm, normally widest 1/3 from base, distal 1/3 abruptly attenuate, ± hard and leathery, both surfaces subglabrous, or abaxial surface occasionally sparsely scaly, scales lanceolate or suborbicular, transparent, lamina base attenuate, decurrent, apex long acuminate; costa robust, raised on both sides, veinlets faintly visible. Sori usually along distal part of lamina, midway between costa and margins or nearer costa, orbicular, 2.5–3 mm in diam.; paraphyses brown, orbicular, nearly polygonal in shape, 0.4–0.6 mm in diam., center thick and dark. Spores verrucose.

On tree trunks or rocks on forested slopes; 1000–3200 m. Guizhou (Luodian, Taijing), Hubei, Sichuan, Taiwan, Yunnan [N India].

Lepisorus suboligolepidus can be distinguished from *L. oligolepidus* by the sparser leaf scales, the lamina usually widest 1/3 from base, and the sori relatively small, not close to each other. This species is also close to *L. tibeticus*; however, the lamina of *L. suboligolepidus* is broadly lanceolate, not lanceolate or linear-lanceolate, and the rhizome scales linear-lanceolate, thick, with the transparent marginal lumina much larger.

17. Lepisorus elegans Ching & W. M. Chu, Acta Bot. Yunnan., Suppl. 5: 55. 1992.

片马瓦韦 pian ma wa wei

Plants 13–23 cm tall. Rhizomes creeping, 1.5–2 mm in diam., densely scaly; scales spreading, yellow-brown, broadly lanceolate, 2.7–3.5 × ca. 1 mm, thin, almost transparent, margin entire, apex awned; lumina large, nearly shortly square to square, occasionally with a narrow opaque brown band. Fronds 0.5–2 cm apart; stipe straw-colored to deep brown, 1–5 cm, 0.5–1.2 mm in diam.; lamina abaxially grayish green when dried, adaxially green, lanceolate, both ends attenuate, (12–)15–25 × 1–2 cm, leathery or thinly leathery, glabrous on both surfaces, base cuneate, slightly decurrent, apex long caudate; costa raised on both sides, veinlets obscure. Sori restricted to distal 1/3–1/2 of lamina, midway between costa and margins, orbicular, 2–3 mm in diam.; paraphyses brown, orbicular, 0.3–0.5 mm in diam., margins with awn-spines; lumina small, usually opaque, sometimes transparent.

● On tree trunks in forests; 2000–2500 m. Yunnan (Lushui, Pianma).

Lepisorus elegans is closely allied to *L. thunbergianus*. It differs by the spreading, yellow-brown rhizome scales, which are almost transparent, only sometimes with a narrow opaque central band, in contrast to the overlapping, dark, opaque, rhizome scales of *L. thunbergianus*.

18. Lepisorus contortus (Christ) Ching, Bull. Fan Mem. Inst. Biol. 4: 90. 1933.

扭瓦韦 niu wa wei

Polypodium lineare N. L. Burman var. *contortum* Christ, Nuovo Giorn. Bot. Ital., n.s., 4: 98. 1897; *Lepisorus crassirhizoma* Ching & Z. Y. Liu; *L. jinfoshanensis* Ching & Z. Y. Liu; *Pleopeltis contorta* (Christ) Alston & Bonner; *Polypodium contortum* (Christ) Christ; *P. lineare* f. *contortum* (Christ) Takeda.

Plants 10–25 cm tall. Rhizomes long and creeping, 1.5–2.5 mm in diam., densely scaly when young, rhizome later naked; scales pale brown with narrow dark opaque central band, lanceolate, 2–4 × 0.6–1.5 mm, polished, margins entire or serrate. Fronds 0.5–2 cm apart; stipe normally straw-colored, less often brown, (1–)2–5(–6) cm, 0.8–1.5 mm in diam.; lamina abaxially grayish yellow-green, adaxially greenish, linear-lanceolate to lanceolate, (9–)15–25 × 0.4–1.5 cm, widest at middle, softly thinly leathery, base cuneate, decurrent, margin revolute when dried, apex shortly acuminate; costa raised on both sides, veinlets obscure. Sori restricted to distal 1/2, slightly closer to costa, orbicular or slightly ovate; paraphyses brown at center, orbicular, 0.3–0.5 mm in diam., lumina dense, thick, opaque or transparent.

On tree trunks or rocks in forests; (700–)2000–3500 m. Anhui, Chongqing, ?Fujian, Gansu, Henan, Hubei, Jiangxi, Shaanxi, Sichuan, Yunnan, ?Zhejiang [Bhutan, N India, Nepal].

19. Lepisorus thunbergianus (Kaulfuss) Ching, Bull. Fan Mem. Inst. Biol. 4: 88. 1933.

瓦韦 wa wei

Pleopeltis thunbergianus Kaulfuss, Wesen Farrenkr. 113. 1827, based on *Polypodium lineare* Thunberg in Murray, Syst. Veg., ed. 14, 934. 1784, not N. L. Burman (1768); *Drynaria subspathulata* Hooker; *Lepisorus calcifer* Ching & Z. Y. Liu; *L. linearifolius* Ching & Z. Y. Liu; *L. myriosorus* Ching; *L. nanchuanensis* Ching; *L. pygmaeus* Ching & Z. Y. Liu; *L. simulans* Ching & Z. Y. Liu; *L. thunbergianus* var. *subspathulatus* (Hooker) Ching; *Pleopeltis linearis* T. Moore var. *thunbergianum* (Kaulfuss) Takeda; ?*Polypodium lineare* var. *abbreviatum* Christ; *P. lineare* var. *subspathulatum* (Hooker) Takeda.

Plants 8–20 cm tall. Rhizomes creeping, 1.5–2.5 mm in diam., densely scaly when young, later naked; scales brown, lanceolate, 2–4 × 0.4–1 mm wide, margin usually denticulate, opaque except for marginal 1 or 2 rows of transparent lumina. Fronds 0.5–2 cm apart; stipe straw-colored, 1–3(–5) cm, ca. 1 mm in diam., base with 4 vascular bundles arranged in a rectangle; lamina yellowish green or greenish to brown, linear-lanceolate or narrowly lanceolate, (5–)10–18 × 0.5–1.3 cm, widest 1/3 from base, leathery or thinly leathery, with sparse scattered, opaque or transparent leaf scales, base attenuate, decurrent, apex acuminate; costa raised on both sides, veinlets obscure. Sori restricted to distal 1/2 of lamina, orbicular or elliptic, 1.5–3 mm in diam., nearly confluent after maturity; paraphyses brown, orbicular, 0.3–0.5 mm in diam., lumina small, central ones thickened, opaque or transparent. Spore surface with large and shallowly reticulate ornamentation. $2n = 50$, 51, 75, 76, 100, 101, 102, 103 (diploid, triploid, tetraploid, with irregular meiosis in some triploid plants).

On tree trunks or rocks on forested slopes; near sea level to 2000 m. Anhui, Chongqing, Fujian, Gansu, Guizhou, Hainan, Hebei, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, NE India, Japan, Kashmir, Korea, Nepal, Philippines].

20. Lepisorus angustus Ching, Bull. Fan Mem. Inst. Biol. 4: 86. 1933.

狭叶瓦韦 xia ye wa wei

Lepisorus thunbergianus (Kaulfuss) Ching var. *angustus* (Ching) Sa. Kurata; *Polypodium caudatoattenuatum* (Takeda) C. Christensen; *P. lineare* N. L. Burman f. *caudatoattenuatum* Takeda.

Plants 12–25 cm tall. Rhizomes long and creeping, 1.5–2 mm in diam., densely scaly; scales brown with paler margins, lanceolate, 2–3.5 × 0.5–0.9 mm, margin slightly denticulate, apex often long and filiform, center opaque, marginal 1 or 2 rows of lumina elongate, transparent. Fronds closely spaced; stipe straw-colored, 1.5–3 cm, 0.8–1.2 mm in diam., base with 4 vascular bundles; lamina greenish or yellowish green to grayish green when dried, narrowly lanceolate, (10–)15–25 × 0.3–0.5 cm, widest at middle, leathery, abaxially sparsely scaly, scales small, lanceolate, transparent or with center opaque, base attenuate, long decurrent, margin straight or slightly sinuate, apex long acuminate; costa raised on both sides, veinlets obscure. Sori on distal half of lamina, slightly closer to costa, elliptic, orbicular, or shortly club-shaped, 1.5–2 mm in diam.; paraphyses deep brown, suborbicular, 0.2–0.35 mm in diam., central lumina dense, thick, opaque or transparent. Spore surface foveolate.

● On tree trunks or rocks in forests; (900–)2000–2800(–3500) m. Anhui, Chongqing, Gansu, Guangxi, Henan, Hubei, Hunan, Shaanxi, Sichuan, Xizang, Yunnan, S Zhejiang.

Lepisorus angustus is allied to the *L. thunbergianus* complex, differing only by the linear lamina. Material from Yichang transplanted into a greenhouse produced lanceolate new leaves, so the status of this species needs further study.

21. Lepisorus tibeticus Ching & S. K. Wu, Fl. Xizang. 1: 311. 1983.

西藏瓦韦 xi zang wa wei

Lepisorus niger Ching; *L. pseudoangustus* Ching.

Plants 15–35 cm tall. Rhizomes creeping, 1.5–2.5 mm in diam., densely scaly; scales brown with pale margins, linear-lanceolate, 3–5 × 0.7–1.2 mm, margin entire or denticulate, apex often long and filiform, opaque except for marginal 1 or 2 rows of paler, transparent lumina. Fronds 0.5–1.5 cm apart; stipe straw-colored, 1–5 cm, 1–1.5 mm in diam., base with 3 vascular bundles arranged in a triangle; lamina grayish green to grayish yellow, linear-lanceolate to lanceolate, 12–33 × 0.5–1.8 cm, widest at middle, thinly leathery when dried, sparsely scaly, scales small, opaque or transparent, base attenuate, long decurrent, margin straight or slightly revolute, apex long caudate; costa raised on both sides, veinlets obscure. Sori on distal 1/2–2/3 of lamina, midway between costa and margins, orbicular or elliptic, 2–4 mm in diam.; paraphyses brown, suborbicular, 0.3–0.5 mm in diam., margin entire; lumina dense, center thickened, opaque or transparent. Spore surface deeply and sparsely foveolate.

● On tree trunks or in rock crevices in dense forests; 1900–3700 m. Sichuan, Xizang, Yunnan.

Lepisorus contortus, *L. thunbergianus*, and *L. tibeticus* are widely distributed species in China, closely allied to each other and very difficult to distinguish. *Lepisorus tibeticus* is relatively large with laminae usually 22–33 cm, whereas the lamina is not more than 18 cm in *L. thunbergianus*. The rhizome scales of *L. thunbergianus* are linear-lanceolate, and opaque except for one or two rows of transparent lumina at margin, while the scales of *L. contortus* have a broad base and are transparent except for one or two rows of opaque lumina in center. We checked more specimens and found *L. contortus* and *L. thunbergianus* to be altitudinally vicarious, the former at higher elevations relative to the latter. *Lepisorus tibeticus* is a more difficult species to define: the scales are linear-lanceolate, often with a long and filiform apex, while the size of the opaque center varies continuously with elevation. For convenience we have treated the specimens from montane forest in Sichuan, Yunnan, and Xizang as *L. tibeticus*.

22. Lepisorus subconfluens Ching, Bull. Fan Mem. Inst. Biol. 4: 85. 1933.

连珠瓦韦 lian zhu wa wei

Pleopeltis subconfluens (Ching) Tagawa & K. Iwatsuki.

Plants 15–27 cm tall. Rhizomes long and creeping, ca. 2 mm in diam., densely scaly; scales bicolored, chestnut to black with pale margins, lanceolate, 2–3 × 0.5–1 mm, margins serrate, central lumina opaque, marginal 1 or 2 rows of lumina transparent. Fronds remote; stipe straw-colored, 0.5–5 cm; lamina yellowish green when dried, linear, 10–20 × 0.4–0.8 cm, leathery when dried, margin slightly revolute; costa raised on both sides, veinlets obscure. Sori elliptic or orbicular, ± confluent into a pair of linear coenosori when mature; paraphyses brown with colorless margins, suborbicular, margins entire or erose.

On tree trunks or rocks in mixed forests; 2600–3600 m. Yunnan [NE India].

Lepisorus subconfluens is a poorly known species of uncertain status and relationships.

23. Lepisorus medogensis Ching & Y. X. Lin, Acta Phytotax. Sin. 22: 401. 1984.

墨脱瓦韦 mo tuo wa wei

Lepisorus zosterifolius Ching & Y. X. Lin.

Plants ca. 60 cm. Rhizomes creeping, ca. 2 mm in diam., densely scaly; scales black, lanceolate, 2–3.5 × 0.7–1 mm, very thick; lumina totally opaque. Fronds ca. 0.5 cm apart; stipe straw-colored, 8–13 cm, ca. 1 mm in diam.; lamina grayish green on both surfaces when dried, linear-lanceolate, 40–70 × 0.6–2 cm, stiffly papery, glabrous, base attenuate, decurrent, margin undulate, apex attenuate, long caudate; costa raised on both sides; veinlets indistinct. Sori almost throughout lamina, midway between costa and margins, elliptic or orbicular; paraphyses dark, stellate, 0.2–0.3 mm in diam., opaque and thick.

● On tree trunks; ca. 1800 m. Xizang (Mêdog).

Lepisorus medogensis is similar to *L. loriformis*, but the scales are appressed and opaque, not spreading, transparent, and iridescent, and the sori are midway between the costa and the margins, not close to the margins. The types of *L. zosterifolius* and *L. medogensis* are from the same collection and differ only in lamina width: 0.5–0.9 cm wide for *L. zosterifolius*, 1.2–2 cm for *L. medogensis*. The rhizome scales and paraphyses are identical, so *L. zosterifolius* is not accepted.

24. Lepisorus confluens W. M. Chu, Acta Bot. Yunnan., Suppl. 5: 55. 1992.

汇生瓦韦 hui sheng wa wei

Lepisorus iridescens Ching & Y. X. Lin.

Plants 10–25 cm tall. Rhizomes long and creeping, 2–4 mm in diam., densely scaly; scales brown to deep brown, iridescent, lanceolate, 2–4 × 0.7–1 mm, almost transparent, margins serrate, apex acuminate; lumina oblong. Fronds up to 1 cm apart; stipe straw-colored or brown, 0.3–5 cm; lamina brown, grayish green or pale green when dried, narrowly lanceolate, (15–)20–30 × 1–2.5 cm, widest nearly 1/3–1/2 from base, distal up to 1/3 abruptly attenuate and fertile, thinly leathery when dried, both surfaces glabrous or sparsely scaly, base cuneate, decurrent, margin flatly straight or slightly revolute, apex long caudate; costa raised on both sides, veinlets obscure. Sori restricted to narrowed apex, medial or slightly closer to costa, elliptic to shortly linear at beginning, confluent into linear interrupted coenosorus when mature; paraphyses deep brown, stellate, 0.35–0.5 mm in diam., scalelike, margins brown and spiny; lumina large.

● On tree trunks in evergreen broad-leaved forests; 2200–2600 m. Yunnan.

A distinctive species that can be distinguished by the linear coenosori, the overlapping, iridescent, almost transparent rhizome scales, and the stellate paraphyses.

25. Lepisorus sordidus (C. Christensen) Ching, Bull. Fan Mem. Inst. Biol. 4: 78. 1933.

黑鳞瓦韦 hei lin wa wei

Polypodium sordidum C. Christensen, Contr. U.S. Natl. Herb. 26: 320. 1931; *Lepisorus sordidus* f. *rostrata* Ching.

Plants 20–40 cm tall. Rhizomes shortly creeping, 2.5–3 mm in diam., densely scaly; scales narrowly lanceolate, 2.5–4 × 0.5–1 mm; lumina usually thick and totally opaque, sometimes thin and transparent. Fronds closely spaced; stipe straw-colored, 3–12 cm, thick, ca. 2 mm in diam.; lamina grayish green, ovate-lanceolate, widest 1/3 from base, both ends abruptly narrowed, 20–35 × 2–3 cm, nearly softly leathery, both surfaces smooth when dried, base decurrent, apex long caudate; costa raised on both sides, veinlets obscure. Sori restricted to distal 1/3 on narrow distal part of lamina, orbicular, ca. 4 mm in diam., midway between costa and margins; paraphyses dark brown, peltate, rounded-stellate, 0.2–0.3 mm in diam., margin with long and strong spines; lumina opaque, thick and dark colored, or thin and brown.

On trunks of broad-leaved trees beside streams; 1200–1400 m. Sichuan, Yunnan [India].

Lepisorus sordidus is a very rare species in China. The dark and opaque rhizome scales and stellate paraphyses are as in *L. medogensis*, but it differs by the broadly lanceolate leaves. The collections from Mt. Emei usually have the scales and paraphyses thin and brown in color.

26. Lepisorus macrosphaerus (Baker) Ching, Bull. Fan Mem. Inst. Biol. 4: 73. 1933.

大瓦韦 da wa wei

Polypodium macrosphaerum Baker, Bull. Misc. Inform. Kew 1895: 55. 1895; *Lepisorus macrosphaerus* f. *maximus* (Ching) Y. X. Lin; *L. macrosphaerus* var. *maximus* Ching; *L. macrosphaerus* f. *minimus* (Ching) Y. X. Lin; *L. macrosphaerus* var. *minimus* Ching; *Pleopeltis macrosphaera* (Baker) Panigrahi & Patnaik; *Polypodium intramarginale* Baker ex Christ.

Plants usually 20–40 cm tall. Rhizomes long creeping, 2.2–3 mm in diam., densely scaly; scales caducous, basifixed, brown, ovate or acuminately ovate, 2–3 × 1–2 mm, margin entire, apex obtuse; central lumina subrectangular, luminal walls thickened and dark colored, marginal lumina polygonal, colored. Fronds 0.5–2 cm apart; stipe mostly straw-colored, 3–16 cm, 1–2 mm in diam.; lamina abaxially gray-green or brownish, adaxially yellowish green or brown, lanceolate or narrowly lanceolate, (7–)20–40 × (0.7–)1.5–5 cm, widest at middle, thickly leathery, with small sparse scales, base cuneate, decurrent, margin straight or slightly undulate, apex shortly acuminate; costa raised on both sides, veinlets normally obscure. Sori marginal or submarginal, orbicular or elliptic, much raised on abaxial surface of lamina, depressed on adaxial surface of lamina; paraphyses brown, orbicular, 0.5–0.8 mm in diam., margin entire.

● On tree trunks or rocks in forests; 900–3400 m. Guizhou, Hubei, Sichuan, Xizang, Yunnan.

27. Lepisorus marginatus Ching, Fl. Tsinling. 2: 233. 1974.

有边瓦韦 you bian wa wei

Plants 18–25 cm tall. Rhizomes creeping, brown, 2–2.5 mm in diam., densely scaly and softly brown hairy when young, later naked except near phyllopodia; scales brown with a dark apex, basifixed or peltate, broadly acuminately ovate, 0.5–1.5 mm long and wide, margin entire; lumina fine and

dense, bases with usually adherent soft hairs. Fronds 0.2–3 cm apart; stipe straw-colored, 1–7(–10) cm, 1–1.5 mm in diam., smooth; lamina yellowish green on both surfaces when dried, narrowly lanceolate, 15–25 × 2–3(–4) cm, widest at middle, abaxially ± with small adnate brown ovate scales, adaxially glabrous, base attenuate, decurrent, margin narrowly callose, ± revolute and undulate when dried, apex acuminate; costa raised on both sides, veinlets obscure. Sori midway between costa and margins, orbicular or elliptic, 2.5–4 mm in diam., closely spaced, much raised on abaxial surface, depressed on adaxial surface; paraphyses brown, orbicular, 0.3–0.5 mm in diam.

● On tree trunks or rocks in forests; 900–2800 m. Chongqing, Gansu, Guizhou (Weining), Hebei, Henan, Hubei, Shaanxi, Shanxi, Sichuan.

28. Lepisorus asterolepis (Baker) Ching ex S. X. Xu, Fl. Jiangxi 1: 310. 1993.

星鳞瓦韦 xing lin wa wei

Polypodium asterolepis Baker, J. Bot. 26: 230. 1888; *Lepisorus longipes* Ching & Z. Y. Liu; *L. macrosphaerus* (Baker) Ching var. *asterolepis* (Baker) Ching; *P. excavatum* Bory ex Willdenow var. *asterolepis* (Baker) C. Christensen; *P. macrosphaerum* Baker var. *asterolepis* (Baker) C. Christensen.

Plants 12–28 cm tall. Rhizomes long and creeping, 1.8–3 mm in diam., mostly naked and brown, densely scaly when young; scales basifixed, brown with paler margins, acuminately ovate to ovate, 1.2–2 × 0.8–1.5 mm, margin entire; lumina uniformly small and dense, transparent. Fronds 0.5–2 cm apart; stipe straw-colored, 3–7(–15) cm, 1–2 mm in diam.; lamina normally yellow or yellowish on both surfaces when dried, broadly lanceolate, (10–)15–30 × 1.2–4 cm, widest 1/3 from base, leathery, glabrous, or occasionally with sparse adnate scales, base abruptly attenuate, cuneate and decurrent, margin usually flat or slightly undulate, apex rounded-obtuse; costa raised on both sides, veinlets faintly visible. Sori on distal half of lamina, midway between costa and margins, orbicular or elliptic, 3–4 mm in diam., raised abaxially and sunken adaxially; paraphyses brown, orbicular, 0.4–0.55 mm in diam., transparent.

On tree trunks or rocks in forests; 700–2000(–3500) m. Anhui, Chongqing, Fujian, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang [S India, Japan, Nepal].

The combination *Lepisorus asterolepis* was not validated in the place of publication usually given (Fl. Jiangsu 1: 74. 1977) as there was no reference to the basionym.

29. Lepisorus kawakamii (Hayata) Tagawa, Acta Phytotax. Geobot. 5(2): 109. 1936.

鳞瓦韦 lin wa wei

Polypodium kawakamii Hayata, Bot. Mag. (Tokyo) 23: 77. 1909.

Rhizome long creeping, 2–3 mm in diam., with scales caducous, mainly at apex and near phyllopodia; scales ovate or acuminately ovate, 1–1.2 × 1–1.1 mm, basifixed, margin entire, apex acuminate; lumina uniformly small. Fronds 0.5–1.5 cm apart; stipe 7–15 cm, 1.5–2 mm in diam.; lamina linear-lanceolate, 25–40 × 1–2 cm, widest at or below middle, leathery or softly leathery, scales orbicular or lanceolate; veinlets obscure. Sori medial or sometimes nearer margin, 3–4.5 mm in diam.; paraphyses orbicular, 0.5–0.7 mm in diam., usually very thin.

● On tree trunks in forests; 1700–2700 m. Taiwan.

Lepisorus kawakamii has often been treated as a synonym of *L. megasorus*. The two species can be distinguished as follows: in *L. kawakamii* the lamina is linear-lanceolate, the rhizome scales are usually ovate or acuminately ovate with entire margins, and the paraphyses are small, thin, and pale brown, while in *L. megasorus* the lamina is lanceolate, widest near the base, the rhizome scales are lanceolate with denticulate margins, and the paraphyses are relatively large, thick and brown. Sometimes, the scales in *L. kawakamii* are lanceolate, but the linear-lanceolate lamina, thin paraphyses, and much closer sori are reliable markers for this species.

30. Lepisorus megasorus (C. Christensen) Ching, Bull. Fan Mem. Inst. Biol. 4: 79. 1933.

长柄瓦韦 chang bing wa wei

Polypodium megasorum C. Christensen, Index Filic. 544. 1906, based on *Polypodium macrosorum* Baker, J. Bot. 23: 106. 1885, not Fée (1850); *P. hypochrysum* Hayata.

Rhizome long creeping, 2–4 mm in diam., usually naked except for scales at apex and near phyllopodia; scales brown with paler margins, ovate-lanceolate, 2–4 × 1–1.5 mm, basifixed, broad base contrasting with long acuminate apex, margin minutely denticulate; lumina subrhomboid to rectangular. Fronds 0.5–2 cm apart; stipe straw-colored to deep brown, 5–25 cm, 1–2 mm in diam.; lamina lanceolate, 15–40 × 1.5–4 cm, widest toward base, leathery or softly leathery, with scales orbicular or lanceolate; lumina brown and hyaline; veinlets obscure. Sori midway between costa and margins, 3–3.5 mm in diam.; paraphyses 0.5–0.8 mm in diam.

● On tree trunks in forests; 500–1900 m. Taiwan.

31. Lepisorus kuchenensis (Y. C. Wu) Ching, Bull. Fan Mem. Inst. Biol. 4: 69. 1933.

瑶山瓦韦 yao shan wa wei

Polypodium kuchenense Y. C. Wu, Bull. Dept. Biol. Sun Yatsen Univ. 3: 276. 1932; *Pleopeltis kuchenensis* (Y. C. Wu) Á. Löve & D. Löve.

Plants 15–30 cm tall. Rhizomes long and creeping, flattened when dry, 3–5 mm wide, strong, persistently scaly; scales appressed, brownish, lanceolate, 3–5 × 1.3–2 mm, clathrate, membranous, margins slightly undulate; lumina subsquare, isodiametric. Fronds 1–2 cm apart; stipe straw-colored or brownish, 2–10 cm, 1–2 mm in diam.; lamina deep brown on both surfaces or abaxially greenish and adaxially grayish green when dried, broadly lanceolate, (12–)20–30 × 3.5–6 cm, widest 1/3–1/2 from base, normally membranous, less often herbaceous or thinly papery, scales not easily seen, base attenuate or abruptly attenuate, decurrent, margin flat, straight or slightly undulate, apex acute or long caudate; costa raised on both sides, veinlets obviously visible. Sori midway between costa and margins, orbicular or elliptic, 4–6 mm in diam.; paraphyses brown, orbicular, 0.4–0.8 mm in diam.; lumina large.

● On tree trunks, forests on wet rocky cliffs; 1200–1700 m. Guangxi, Guizhou, ?Taiwan, Yunnan.

A very rare and distinct species, distinguished by the broadly lanceolate fronds, large medial sori, and large, pale brown scales.

The occurrence in Taiwan is based on a single collection from 1940 (*Imaseki 70500* (TNS)), and it has not been possible to relocate this taxon in Taiwan (Knapp, Ferns Fern Allies Taiwan, 464, 785. 2011).

32. Lepisorus subsessilis Ching & Y. X. Lin, Fl. Reipubl. Popularis Sin. 6(2): 347. 2000.

短柄瓦韦 duan bing wa wei

Plants 10–25 cm tall. Rhizomes creeping, 2–2.5 mm in diam., densely scaly, persistent only at apex and near phyllopodia; scales bicolored, deep brown with brownish to nearly colorless margins, lanceolate, 2.5–4 × 0.8–1.5 mm, basifixed, margins erose, apex shortly acuminate; middle lumina nearly isodiametric, transparent. Fronds 0.5–1.5 cm apart; stipe ± deep brown, 0.5–1.5 cm, hard and smooth; lamina pale green when fresh, abaxially grayish brown, adaxially deep brown when dried, narrowly lanceolate, 18–30 × 1–2.5 cm, widest at or below middle, thinly leathery, with scales orbicular or narrowly lanceolate, lumina brown, hyaline, base cuneate, decurrent, margin slightly revolute, apex shortly acuminate; costa raised on both sides, veinlets obscure. Sori on distal half of lamina, closer to margin, orbicular, 2–3 mm in diam.; paraphyses brown, orbicular, 0.3–0.5 mm in diam.; lumina small, thick-walled, transparent.

● On limestone rocks in shaded areas of forests; 800–1000 m. Guangdong, Guangxi (Fengshan).

Lepisorus subsessilis is a rare species, endemic to limestone areas, with bicolored rhizome scales, with brown margins and darker center, and leathery, evergreen fronds that distinguish it from species of *L.* sect. *Pachyphyllon* S. L. Yu.

33. Lepisorus nudus (Hooker) Ching, Bull. Fan Mem. Inst. Biol. 4: 83. 1933.

裸叶瓦韦 luo ye wa wei

Pleopeltis nuda Hooker, Exot. Fl. 1: t. 63. 1823; *Drynaria nuda* (Hooker) Fée; *Lepisorus gyirongensis* Ching & S. K. Wu; *L. leiopteris* (Kunze) Bir & Trikha; *Phymatodes nuda* (Hooker) J. Smith; *Pleopeltis leiopteris* (Kunze) Sarn. Singh & Panigrahi; *Polypodium leiopteris* Kunze; *P. nudiusculum* Kunze; *P. nudum* (Hooker) Kunze.

Plants 15–23 cm tall. Rhizomes slender and creeping, 1.5–2 mm in diam., densely scaly; scales ± dark brown, ovate-lanceolate, 2–3 × 0.6–1.2 mm, basifixed, margin entire, apex shortly acuminate; middle lumina elongate, wall thickened, transparent. Fronds 0.5–1 cm apart; stipe deep brown, 1–5 cm, 0.8–1 mm in diam., smooth; lamina gray-green or brown on both surfaces when dried, lanceolate, 15–30 × 0.1–2 cm, widest at middle, softly leathery or leathery, very sparsely scaly, base cuneate and decurrent, margin flat and straight or slightly recurved, apex shortly acuminate. Main veins raised on both sides, veinlets obscure. Sori along distal 1/3 of lamina, slightly closer to costa, suborbicular, 2–2.5 mm in diam., slightly raised abaxially and sunken adaxially; paraphyses deep brown, orbicular, 0.4–0.55 mm in diam.; middle lumina subsquare and transparent.

On rocks in forests; 1500–2400 m. Xizang (Jilong), Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Sri Lanka, Thailand].

34. Lepisorus affinis Ching, Acta Phytotax. Sin. 8: 169–170. 1959.

海南瓦韦 hai nan wa wei

Lepisorus longifolius Ching (1959), not (Blume) Holttum (1955); *L. longus* Ching.

Plants 67–70 cm tall. Rhizomes long and creeping, 2–4 mm in diam., densely scaly at tip; scales brownish, ovate-lanceolate, 2.5–4 × 1–1.5 mm, basifixed, base broadly rounded, margin entire, apex acuminate; lumina isodiametric, brownish, transparent. Fronds 0.5–2 cm apart; stipe straw-colored to deep brown, 2–15 cm, 1.5–2 mm in diam., hard and smooth; base with 3 vascular bundles arranged in a triangle; lamina deep brown or gray-green on both surfaces when dried, lanceolate or linear-lanceolate, 20–65 × 1–3.2 cm, widest at or below middle, leathery or sometimes soft leathery, scales orbicular or lanceolate, lumina brown, base narrowly cuneate and decurrent, margin entire, apex obtuse or acuminate; costa raised on both sides, veinlets obscure. Sori closer to margin, orbicular or elliptic, 3–4 mm in diam.; paraphyses 0.35–0.5 mm in diam.

● On tree trunks in forests; 900–1700 m. Hainan (Qiongzhong).

Lepisorus longus was distinguished from *L. affinis* by its narrow fronds. The widths of fronds are variable even on one rhizome, and the rhizome scales, epidermis, and spore ornamentation show very little difference; thus, *L. longus* is treated as a synonym of *L. affinis*.

35. Lepisorus bicolor (Takeda) Ching, Bull. Fan Mem. Inst. Biol. 4: 66. 1933.

二色瓦韦 er se wa wei

Polypodium excavatum Bory ex Willdenow var. *bicolor* Takeda, Notes Roy. Bot. Gard. Edinburgh 8: 279, 281. 1915; *Pleopeltis bicolor* (Takeda) Sledge.

Plants 15–30(–35) cm tall. Rhizomes creeping, strong, 3–4 mm in diam., surface exposed between scales, white farinose; scales closely appressed, bicolored, nearly black with much paler brown margins, broadly ovate-lanceolate, ca. 1 × 1 mm, margins brownish and with irregular sharp spines, apex acuminate; lumina fine and dense; scales at rhizome apex denser, lanceolate, 1–2 × 0.7–1.2 mm. Fronds closely spaced or remote; stipe (1–)2–3.5(–8) cm, robust, 1.3–1.5 mm in diam., sparsely scaly; lamina brownish or gray-green on both surfaces when dried, lanceolate, widest 1/3–1/2 from base, both ends attenuate, (8–)10–28(–35) × 1–4 cm, herbaceous or thinly papery, abaxially with sparse adnate scales, adaxially glabrous, base cuneate, long decurrent, margin flatly straight and entire, apex acuminate or obtuse; costa raised on both sides, veinlets normally obscure. Sori usually along distal half of lamina, or near end of lamina, closer to costa, elliptic or suborbicular, 2–5 mm in diam.; paraphyses black, suborbicular, 0.5–0.8 mm in diam., membranous, margins erose; central lumina large and transparent, with marginal lumina irregular, cell walls brown, thickened.

In rock crevices beside streams in forests, at roadsides on mountain slopes; 1000–3300 m. Guizhou, Sichuan, Xizang, Yunnan [N India, Nepal].

Lepisorus bicolor is very common in montane forests in SW China, particularly Yunnan. The rhizome scales are of two types: those on the mature rhizome are very small and closely appressed; those at the rhizome apex are much larger and lanceolate. The bicolored scales resemble those of the following species, but *L. morrisonensis* has the rhizome concealed by uniformly large scales with white, not brown, margins.

Christ (Bull. Herb. Boissier 6: 876. 1898) treated material of *Lepisorus bicolor* as *Polypodium oligolepidum* Baker.

36. Lepisorus morrisonensis (Hayata) H. Itô, J. Jap. Bot. 11: 92. 1935.

白边瓦韦 bai bian wa wei

Polypodium morrisonense Hayata, Bot. Mag. (Tokyo) 23: 77. 1909.

Plants 10–30 cm tall. Rhizomes creeping, strong, densely scaly; scales deep brown, broadly lanceolate; middle lumina small, square to rectangular, cell walls thickened, cell cavities narrow, opaque, margins brownish and transparent and usually erose, apex acuminate, attached by one point. Fronds normally closely spaced; stipe straw-colored, 1–3 cm, sparsely scaly; lamina when dried greenish on both surfaces or abaxially yellowish, adaxially gray-green, narrowly elliptic-lanceolate, widest at middle, 12–30 × 1–3 cm, herbaceous to thickly papery, base attenuate, decurrent, margin flat and straight, apex acuminate or shortly acute; costa raised on both sides, abaxially sparsely scaly; veinlets visible. Sori orbicular, slightly closer to costa; paraphyses brown, orbicular; lumina large, transparent.

On tree trunks or rocks in forests; 1300–4100 m. Sichuan, Taiwan, Xizang, Yunnan [Bhutan, N India, Nepal].

Collections named as *Lepisorus morrisonensis* from Yunnan have peltate, distinctly clathrate rhizome scales with dark brown walls and a transparent lumen.

37. Lepisorus scolopendrium (Buchanan-Hamilton ex Ching) Mehra & Bir, Res. Bull. Panjab Univ. Sci., n.s., 15: 168. 1964 [*"scolopendrius"*].

棕鳞瓦韦 zong lin wa wei

Lepisorus excavatus (Bory ex Willdenow) Ching var. *scolopendrium* Buchanan-Hamilton ex Ching, Bull. Fan Mem. Inst. Biol. 4: 69. 1933, based on *Polypodium scolopendrium* Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 1. 1825, not *P. scolopendria* N. L. Burman, Fl. Indica, 232. 1768; *Drynaria sesquipedalis* J. Smith, nom. illeg. superfl.; *Lepisorus paleparaphysus* Y. X. Lin; *L. sesquipedalis* Fraser-Jenkins, nom. illeg. superfl.; *L. virescens* Ching & S. K. Wu; *Pleopeltis scolopendrium* (Buchanan-Hamilton ex Ching) Alston & Bonner; *Polypodium excavatum* Bory ex Willdenow var. *concolor* Takeda.

Plants 15–30 cm tall. Rhizomes creeping, strong, 3–6 mm in diam., densely scaly; scales appressed, brown, lanceolate, 4–6 × 0.8–3 mm, thin in texture, margin entire, apex acuminate; lumina subsquare and transparent. Fronds 0.2–2 cm apart; stipe straw-colored, 2–3(–5) cm, 1–2 mm in diam., sparsely scaly at base; lamina reddish brown on both surfaces when dried, narrowly lanceolate, 12–45 × (1–)1.5–4.5 cm, widest at or below middle, herbaceous or thinly papery, abaxially with small, lanceolate, scales on costa, bicolored, margin ± flat, straight or slightly undulate, apex acute or long caudate-acuminate; costa raised on both sides, veinlets slightly visible. Sori usually along distal half of lamina, close to costa, orbicular or elliptic, 2–3 mm in diam.; paraphyses usually brown, sometimes colorless on immature fronds, orbicular, 0.5–0.7 mm in diam., margin entire.

On tree trunks or rocks in forests; (500–)1400–2800(–3200) m. Guizhou, Hainan, Sichuan, ?Taiwan, Xizang, Yunnan [Bhutan, N India, Nepal].

The original name, *Polypodium scolopendrium*, must be considered a homonym of *P. scolopendria*, the basionym of *Phymatosorus scolopendria* (N. L. Burman) Pichi Sermolli. The epithet was validated at varietal rank by Ching and later elevated to species rank by Mehra and Bir. Smith published *Drynaria sesquipedalis* as an intended new name for *Polypodium scolopendrium* Buchanan-Hamilton ex D. Don, not of N. L. Burman, but included *Pleopeltis nuda* Hooker, thus making it illegitimate. Fraser-Jenkins missed this when publishing *Lepisorus sesquipedalis* to use for this taxon. Bir and Trikha (Amer. Fern J. 64(2): 54. 1974) chose *L. leiopteris* (Kunze) Bir & Trikha as the name for this taxon, but Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 38. 2008) claims that *Polypodium leiopteris* is a synonym of *L. nudus*.

Lepisorus virescens was separated from *L. scolopendrium* by having the lamina less than 20 cm, thin in texture, and with narrowly attenuate base merging into an indistinct stipe and the plagiotropic, oblong sori, closer to the costa than to the margin. We checked more specimens and observed living plants and found that there is considerable variation in these leaf characters, such that they cannot be used to distinguish taxa. *Lepisorus virescens* is just a juvenile form of *L. scolopendrium*. *Lepisorus paleparaphysus* was distinguished from *L. scolopendrium* by the nearly colorless paraphyses. We checked more specimens and found colorless paraphyses present within other species of this section, especially in immature laminae.

38. Lepisorus eilophyllus (Diels) Ching, Bull. Fan Mem. Inst. Biol. 4: 65. 1933.

高山瓦韦 gao shan wa wei

Polypodium eilophyllum Diels, Bot. Jahrb. Syst. 29: 204. 1900, based on *P. involutum* Baker, J. Bot. 27: 177. 1889, not Desvaux (1811), nor Mettenius (1856); *Lepisorus neolewisii* K. H. Shing; *L. pseudolewisii* K. H. Shing.

Plants 15–37 cm tall. Rhizomes creeping, strong, 2–3 mm in diam., densely scaly, sometimes becoming naked with age; scales spreading, dark brown with narrow, transparent, colorless margins, iridescent, lanceolate with broadly ovate base, 2–3.5 × 0.5–1.2 mm; lumina mostly opaque, small, square at base, oblong at apex, cell walls thickened. Fronds remote or closely spaced; stipe straw-colored, frond sessile or stipe up to 2(–3) cm, 1.1–1.5 mm in diam., sparsely scaly; lamina reddish brown, gray-brown, or greenish on both surfaces when dried, linear, 12–30(–40) × 0.2–0.4 cm, usually widest 1/3 from base, herbaceous or thinly papery, abaxially with sparse adnate scales, base attenuate, decurrent, margins strongly or slightly revolute when

dried, apex shortly acuminate; costa raised on both sides, veinlets slightly visible. Sori restricted to distal 1/3–1/2 of lamina, slightly closer to costa, orbicular or elliptic, 1–2 mm in diam., protruding to give lamina moniliform appearance; paraphyses brown, orbicular, 0.2–0.3 mm in diam., margin entire; central lumina large, transparent, entire.

On tree trunks or rocks in forests; 1000–3300 m. Gansu, Guizhou, Hubei, Sichuan, Xizang, Yunnan [N India, Thailand].

A distinct species in *Lepisorus* by the spreading and partly transparent rhizome scales, and the linear, moniliform, thickly leathery lamina.

Material of *Lepisorus eilophyllus* was variously treated by Christ as *Polypodium lewisii* Baker (Nuovo Giorn. Bot. Soc. Ital., n.s., 4: 97. 1897; and by Diels, Bot. Jahrb. Syst. 29: 204. 1901), *P. lineare* Thunberg (1784), not N. L. Burman (1768) (Bull. Soc. Bot. France 52(Mém. 1): 14. 1905), and *P. contortum* (Christ) Christ (Bot. Gaz. 51: 347. 1911).

39. Lepisorus loriformis (Wallich ex Mettenius) Ching, Bull. Fan Mem. Inst. Biol. 4: 81. 1933.

带叶瓦韦 dai ye wa wei

Plants 20–30 cm tall. Rhizomes long creeping, 1–2 mm in diam., densely scaly; scales spreading, dark or light brown, iridescent, ovate-lanceolate, 2.2–6 × 0.8–1.5 mm, brittle, base broadly ovate, margin denticulate, apex long acuminate; lumina isodiametric at base, and oblong at apex, large and transparent. Fronds clustered, to 0.5 cm apart; stipe 0–7 cm, 0.8–1 mm in diam.; lamina yellowish on both surfaces when dried, linear, (13–)20–60 × 0.2–2.5 cm, widest at middle, softly leathery to thickly leathery, abaxially sparsely scaly, scales lanceolate, transparent; lamina margins strongly revolute when dried, apex acuminate; costa raised on both sides, red when fresh, veinlets obscure. Sori close to margin and usually covered by undulate, revolute margin, subovate, orbicular, or shortly clavate, 1.5–3 mm in diam.; paraphyses nearly black, irregularly stellate, 0.15–0.3 mm in diam., transparent, margin with long spines.

On tree trunks or in rock crevices in forests; 2000–3000 m. Gansu, Hubei, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, N India, Myanmar, Nepal].

A distinct species with spreading and transparent rhizome scales, red new leaves, mature leaves with a red costa when fresh, marginal sori, and stellate paraphyses.

1a. Lamina 20–40 × 0.5–2.5 cm ..... 39a. var. *loriformis*
1b. Lamina 30–60 × 0.2–0.5 cm ..... 39b. var. *steniste*

39a. Lepisorus loriformis var. **loriformis**

带叶瓦韦(原变种) dai ye wa wei (yuan bian zhong)

Polypodium loriforme Wallich ex Mettenius, Abh. Senckenberg. Naturf. Ges. 2: 92. 1856; *Drynaria loriformis* (Wallich ex Mettenius) J. Smith; *Lepisorus xiphiopteris* (Baker) W. M. Chu ex Y. X. Lin; *L. yunnanensis* Ching; *Pleopeltis loriformis* (Wallich ex Mettenius) T. Moore; *Polypodium excavatum* Bory ex Willdenow var. *loriforme* (Wallich ex Mettenius) C. Christensen; *P. lineare* N. L. Burman var. *loriforme* (Wallich ex Mettenius) Takeda; *P. mengtzeanum* Baker; *P. subimmersum* Baker; *P. subimmersum* f. *mengtzeanum* (Baker) Takeda; *P. xiphiopteris* Baker.

Rhizome 1.5–2 mm in diam.; scales dark or light brown, 2.2–5 × (0.5–)0.8–1.5 mm. Lamina linear-lanceolate, 20–40 × 0.5–2.5 cm, widest at middle. Sori 2–3 mm in diam.; paraphyses 0.2–0.3 mm in diam.

● On tree trunks or in rock crevices in forests; 2000–2700 m. Gansu, Hubei, Shaanxi, Sichuan, Yunnan.

The name was first used by Wallich (Numer. List, no. 271. 1829, nom. nud.).

39b. Lepisorus loriformis var. **steniste** (C. B. Clarke) Ching, Bull. Fan Mem. Inst. Biol. 4: 82. 1933.

舌叶瓦韦 she ye wa wei

Polypodium lineare var. *steniste* C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 559. 1880; *Lepisorus steniste* (C. B. Clarke) Y. X. Lin; *Pleopeltis linearis* T. Moore var. *steniste* (C. B. Clarke) Beddome; *Polypodium lineare* f. *steniste* (C. B. Clarke) Takeda; *P. loriforme* f. *angustifrons* (Takeda) C. Christensen; *P. loriforme* var. *steniste* (C. B. Clarke) C. Christensen; *P. oblongisorum* C. Christensen; *P. subintegrum* Baker; *P. subimmersum* f. *angustifrons* Takeda.

Rhizome 1–1.5 mm in diam.; scales light brown, 3–6 × 1–1.2 mm. Lamina linear, 30–60 × 0.2–0.5 cm. Sori 1.5–2 mm in diam.; paraphyses 0.15–0.3 mm in diam.

On tree trunks or rocks in forests. Xizang, Yunnan [N India, Myanmar, Nepal].

Lepisorus loriformis and *L. steniste* differ only in lamina width, the former with laminae 0.5–2.5 cm wide and the latter not more than 0.5 cm. These two species are sympatric, and the former usually occur at higher elevations, so species rank has not been accepted. This is not accepted by Li Wang et al. (Molec. Phylogen. Evol. 54: 221. 2010) whose molecular analysis placed the two taxa within different well-supported subclades.

40. Lepisorus sublinearis (Baker ex Takeda) Ching, Bull. Fan Mem. Inst. Biol. 4: 78. 1933.

滇瓦韦 dian wa wei

Polypodium sublineare Baker ex Takeda, Notes Roy. Bot. Gard. Edinburgh 8: 276. 1915; *Lepisorus lancifolius* Ching; *Pleopeltis sublinearis* (Baker ex Takeda) Tagawa & K. Iwatsuki.

Plants 15–25 cm tall. Rhizomes creeping, strong, 1.8–2.5 mm in diam., densely scaly, sometimes becoming naked when old; scales adpressed, lanceolate with broadly ovate base, 2.5–4 × 0.8–1.2 mm, clathrate, thin and brittle, base ovate, margin denticulate, apex long acuminate, lumina large and transparent, isodiametric at base, and oblong at apex. Fronds up to 1 cm apart; stipe straw-colored, (1–)2.5–5.5 cm, 0.8–1.5 mm in diam.; lamina grayish green or brownish on both surfaces when dried, broadly lanceolate, 14–30 × 1.4–5 cm, widest 1/3–1/2 from base, softly leathery, abaxially sparsely scaly; scales lanceolate, transparent, base attenuate, decurrent, apex shortly acu-

minate; costa raised on both sides, veinlets obscure. Sori on distal half of lamina, midway between costa and margins or nearer costa, orbicular, 3–4 mm in diam.; paraphyses brown, stellate, 0.3–0.35 mm in diam.; lumina transparent.

On tree trunks or rocks in forests; 1800–2500(–3000) m. Yunnan [Bhutan, N India, Nepal, Vietnam].

Lepisorus sublinearis can distinguished by the broadly lanceolate fronds and medial sori. *Lepisorus lancifolius* is known only from the type specimen from Yangbi and cannot be separated by leaf shape, scales, or paraphyses and so is not accepted.

41. Lepisorus cespitosus Y. X. Lin, Fl. Reipubl. Popularis Sin. 6(2): 347. 2000.

丛生瓦韦 cong sheng wa wei

Plants 15–25 cm tall. Rhizomes short and decumbent, 2–2.5 mm in diam., densely scaly; scales deep brown, lanceolate with broadly ovate base, 3–4.5 × 0.9–1.2 mm, margin denticulate, apex long acuminate; lumina small, subsquare, thick in texture, transparent, thick-walled. Fronds clustered; stipe straw-colored, frond subsessile or stipe up to 0.5 cm; lamina when dried abaxially grayish green or yellowish, adaxially brownish, lanceolate, (13–)25–30 × 1.2–2 cm, widest at or below middle, leathery or softly leathery, abaxially sparsely scaly, scales brown, lanceolate, small, margin denticulate, lumina thick and indistinct, base attenuate and decurrent nearly to base of stipe, margin flat and straight or slightly undulate, apex attenuate, long caudate; costa raised on both sides, veinlets obscure. Sori medial or closer to margin, orbicular, 3–4 mm in diam.; paraphyses deep brown, stellate, opaque.

● On tree trunks or rocks in evergreen broad-leaved forests; 1600–2000 m. Xizang.

Lepisorus cespitosus is only known from the type from Mêdog. The fronds are similar to those of *L. loriformis*; however, the scales, leaf scales, and thick-walled paraphyses all differ.

42. Lepisorus pseudonudus Ching, Bull. Fan Mem. Inst. Biol. 4: 83. 1933.

长瓦韦 chang wa wei

Lepisorus bilouensis Ching & Y. X. Lin ex K. H. Shing.

Plants 15–20 cm tall. Rhizomes creeping, 1.5–2.5 mm in diam., densely scaly; scales spreading, deep brown, iridescent, transparent, lanceolate with broadly ovate base, 2.5–8 × 0.6–1.6 mm, clathrate, margins with thick and long spines, apex long caudate. Fronds up to 1 cm apart; stipe straw-colored or sometimes reddish including on main veins, 2.5–5 cm, 1–1.5 mm in diam.; lamina abaxially grayish green or brownish, adaxially grayish green when dried, oblanceolate to almost linear, 10–25(–35) × (0.3–)0.5–1.5 cm, widest from middle to apical 1/3, thickly leathery, scales rarely seen, lanceolate, with transparent lumina, lamina base attenuate, long decurrent, margin narrowly revolute, apex long caudate; costa raised on both sides, veinlets obscure. Sori throughout lower 1/3 of lamina, midway between costa and margins, orbicular or elliptic; paraphyses brown, stellate with long digitate spines, 0.3–0.5 mm in diam.; lumina dense, thick and indistinct.

On tree trunks or rocks in forests; 2300–4200 m. Gansu, Sichuan, Xizang, Yunnan [Bhutan, NE India, Nepal].

43. Lepisorus tricholepis K. H. Shing & Y. X. Lin, Fl. Reipubl. Popularis Sin. 6(2): 346. 2000.

软毛瓦韦 ruan mao wa wei

Plants ca. 30 cm tall. Rhizomes long and creeping, ca. 4 mm in diam., densely scaly and brown villous, roots also densely very long villous; scales deep brown, triangular-lanceolate, 2–3 × 0.8–1.2 mm, usually with a tuft of hairs, margin with long and thick spines; lumina large, transparent. Fronds ± closely spaced; stipe straw-colored, 5–13 cm; lamina yellow-brown on both surfaces when dried, linear-lanceolate, 17–25 × 1.9–2 cm, thick and fleshy, softly leathery when dried, base attenuate, decurrent, apex shortly acuminate; costa raised on both sides, veinlets obscure. Sori closer to costa, orbicular; paraphyses brown, deeply stellate, margin with long and thick spines, 0.5–0.8 mm in diam.; lumina large.

● In rock crevices on high mountains; 3500–3800 m. Xizang.

44. Lepisorus crassipes Ching & Y. X. Lin, Acta Bot. Yunnan. 5: 18. 1983.

粗柄瓦韦 cu bing wa wei

Lepisorus hsiawutaiensis Ching & S. K. Wu; *L. kansuensis* Ching & S. K. Wu; *L. ligulatus* Ching & S. K. Wu; *L. maowenensis* Ching & S. K. Wu; *L. patungensis* Ching & S. K. Wu; *L. shanyangensis* Ching & Y. X. Lin; *L. sungpanensis* Ching & Y. X. Lin.

Plants 7–21 cm tall. Rhizomes creeping, 2–3 mm in diam., densely scaly; scales dark brown, iridescent, lanceolate to ovate-lanceolate, 3–3.5 × 0.9–1.2 mm, clathrate, brittle, sometimes with a tuft hair, margin with long and thick spines, apex long acute; lumina polygonal, isodiametric, transparent. Fronds closely spaced, to 1 cm apart; stipe straw-colored, 0.5–6 cm, ca. 1 mm in diam., smooth; lamina grayish brown to gray-green on both surfaces or abaxially brownish when dried, lanceolate or linear-lanceolate, 4–20 × 0.5–1.5 cm, widest at or slightly below middle, thinly papery to thinly leathery, base cuneate, decurrent, margin straight, flat or slightly revolute, apex obtuse to bluntly acuminate; costa raised on both sides, veinlets obscure. Sori along distal 1/2–2/3 of lamina, ± equidistant between costa and margin or nearer costa, orbicular or suborbicular, ca. 2 mm in diam., clearly separated; paraphyses dark brown, small, stellate or lanceolate, margins with long spines; lumina large and transparent, irregular or oblong.

● On tree trunks in forests or rocks along roadsides at forest margins; 1700–2300 m. Gansu, Hebei, Hubei, Qinghai, Shaanxi, Sichuan.

45. Lepisorus albertii (Regel) Ching, Acta Bot. Yunnan. 5: 20. 1983.

天山瓦韦 tian shan wa wei

Polypodium albertii Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 7: 620. 1881; ?*Lepisorus clathratus* (C. B. Clarke)

Ching var. *papakense* (Masamune) Tagawa; ?*L. papakensis* (Masamune) Ching & Y. X. Lin; *L. pumilus* Ching & S. K. Wu; *P. lineare* N. L. Burman var. *albertii* (Regel) C. Christensen; ?*P. papakense* Masamune.

Plants 5–10 cm tall. Rhizomes creeping, 2–3 mm in diam., densely scaly; scales deep brown, lanceolate with broadly ovate base, to 2 × 1 mm, margin with long and thick spines, apex extended into long awn; lumina subsquare or shortly rectangular, large and transparent. Fronds to 1 cm apart; stipe (1–)2–10 cm, slender, ca. 1 mm in diam., smooth; lamina greenish to dark green or grayish brown or yellowish on both surfaces when dried, linear-lanceolate, 5–22(–29) × 0.4–2(–2.6) cm, widest at middle, herbaceous to papery, glabrous or abaxially sparsely scaly, base cuneate, decurrent, margin flat and straight or slightly undulate, apex obtuse; costa raised on both sides, veinlets obscure. Sori along distal 1/3–1/2 of lamina, slightly closer to costa, ± orbicular, ca. 2 mm in diam.; paraphyses deep brown, stellate or lanceolate, margins with long, thick spines; lumina large and transparent, irregular or oblong.

● In shaded and wet rock crevices of mountain slopes or on tree trunks of forests; 1500–2900(–4300?) m. Gansu, Hebei, Henan, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan.

Christ (Bull. Soc. Bot. France 52(Mém. 1): 14. 1905) identified collections of this species as *Polypodium lineare* Thunberg (1784), not N. L. Burman (1768) (= *Lepisorus thunbergianus*). Collections from Taiwan have been misidentified as *L. clathratus*.

In photographs *Lepisorus papakensis* (Masamune) Ching & Y. X. Lin (*Polypodium papakense* Masamune) from Taiwan is very similar to species no. 47, *L. likiangensis*. It needs further investigation.

46. Lepisorus thaipaiensis Ching & S. K. Wu, Acta Bot. Yunnan. 5: 8. 1983.

太白瓦韦 tai bai wa wei

Lepisorus henanensis Ching & S. K. Lin; *L. venosus* Ching & S. K. Wu.

Plants 10–20 cm tall. Rhizomes creeping, ca. 2 mm in diam., densely scaly; scales spreading, brown or dark brown, ovate-lanceolate, 2–2.5 × 1.1–1.5 mm, clathrate, margin spiny, apex with a long sharp awn; lumina isodiametrically polygonal, oblong toward apex. Fronds clustered or remote; stipe straw-colored, 2–10 cm, ca. 1 mm in diam.; lamina grayish green on both surfaces when dried, lanceolate, 18–30 × 1.5–2.5 cm, widest at or below middle, papery or membranous, abaxially sparsely scaly, base cuneate, margin flat and straight, apex shortly acuminate. Main veins raised abaxially, adaxially flat or slightly raised or depressed in limited places, veinlets obscure. Sori along distal 1/3–2/3 of lamina, midway between costa and margin, suborbicular, ca. 2 mm in diam.; paraphyses irregularly stellate or lanceolate, margin with long and thick spines; lumina irregular, large and transparent.

● On rocks or tree trunks; 2000–2800 m. Henan, Qinghai, Shaanxi.

Lepisorus thaipaiensis is very similar to *L. likiangensis* but is found at lower elevations, has a much thinner lamina, and sori usually distributed along distal 1/3–1/2 of lamina while those of *L. likiangensis* can extend almost to the base.

47. Lepisorus likiangensis Ching & S. K. Wu, Acta Bot. Yunnan. 5: 12. 1983.

丽江瓦韦 li jiang wa wei

Lepisorus coaetaneus Ching & Y. X. Lin; *L. shansiensis* Ching & Y. X. Lin; *L. shensiensis* Ching & S. K. Wu.

Plants 8–18 cm tall. Rhizomes long and creeping, 2–2.5 mm in diam., densely scaly; scales spreading, dark brown or brown, ovate, 2–3 × 1.5–2 mm, margin with long and thick spines, apex with long awn; lumina large, isometrically polygonal. Fronds remote or approximate; stipe straw-colored, 0.4–5 cm; lamina when dried gray-green on abaxial surface, yellow-green or deep brown on adaxial surface, or brownish or greenish on both surfaces, linear-lanceolate or lanceolate, (7–)15–30 × (0.6–)1–2.5 cm, widest at middle, thickly papery or thinly leathery, glabrous on both surfaces or abaxially sparsely scaly, base cuneate and decurrent, margins flat and straight, apex obtuse; main veins raised on both sides, veinlets obscure or raised on both sides. Sori often extending almost to base of lamina, midway between costa and margins or slightly closer to costa, elliptic or suborbicular, 2–3 mm in diam.; paraphyses deep brown, broadly lanceolate, 0.8–1 mm, as long as wide, margins with long and thick spines; lumina large and transparent.

● In shaded, wet rock crevices of slopes, on rocky cliffs beside streams; 2400–3500 m. Gansu, Guizhou, Qinghai, Shaanxi, Sichuan.

In photographs *Lepisorus papakensis* (Masamune) Ching & Y. X. Lin (*Polypodium papakense* Masamune) from Taiwan is very similar to this species. It has also been treated as a synonym of *L. albertii* and needs further investigation.

48. Lepisorus clathratus (C. B. Clarke) Ching, Bull. Fan Mem. Inst. Biol. 4: 71. 1933.

网眼瓦韦 wang yan wa wei

Polypodium clathratum C. B. Clarke, Trans. Linn. Soc. London, Bot. 2: 559. 1880; *Lepisorus clathratus* var. *namegatae* Sa. Kurata; *L. namegatae* (Sa. Kurata) Ching & Y. X. Lin; *L. nepalensis* K. Iwatsuki; *L. petiolatus* Ching & Y. X. Lin; *L. pseudoclathratus* Ching & S. K. Wu; *L. soulieanus* (Christ) Ching & S. K. Wu; *L. variabilis* Ching & S. K. Wu; *Platygyria kongtingensis* Ching & Y. X. Lin; *P. muliensis* Ching & S. K. Wu; *P. soulieana* (Christ) X. C. Zhang & Q. R. Liu; *P. variabilis* Ching & S. K. Wu; *Pleopeltis clathrata* (C. B. Clarke) Beddome; *P. clathrata* var. *namegatae* (Sa. Kurata) Ohwi; *Polypodium soulieanum* Christ.

Plants 5–17 cm tall. Rhizomes long and creeping, 1.5–3 mm in diam., densely scaly; scales ± deep brown, lanceolate to ovate, 3.5–7 × 0.7–1 mm, brittle, transparent, base ovate, margins shortly dentate, apex shortly acute; basal lumina isodiametric, ± square, distal ones subrectangular. Fronds remote or ± closely spaced; stipe straw-colored, 0.7–6.3 cm, slender, less than 1 mm in diam.; lamina greenish or brownish green on both surfaces when dried, lanceolate, both ends attenuate, 4–20 ×

0.8–1.5(–2) cm, widest at or below middle, herbaceous to submembranous, almost glabrous, base cuneate, slightly decurrent, margin flat and straight, apex bluntly acuminate to gradually long attenuate; costa slightly raised on both sides, veinlets ± visible. Sori along 7/8 of length, midway between costa and margins, suborbicular, 2–2.5 mm in diam.; paraphyses dark brown, stellate or lanceolate, margin with long spines; lumina large and transparent. Sporangia leptosporangiate: dehiscent with narrow annulus of very thick-walled cells, or platygyroid: indehiscent with wide annulus of thin-walled cells.

On tree trunks in broad-leaved evergreen forests, in rock crevices on open slopes, or stony riverbanks; 2000–4300 m. Guangxi, Qinghai, Sichuan, Xizang [Bhutan, India, Japan, Kashmir, Nepal].

A very wide interpretation has been taken for *Lepisorus clathratus* ± following Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 41–42. 2008) as accepted by Li Wang et al. (Phylogeography of the Sino-Himalayan Fern *Lepisorus clathratus* on "The Roof of the World." 2011. PLoS ONE 6(9): e25896. doi:10.1371/journal.pone.0025896; accessed 28 May 2012).

Lepisorus soulieanus had been placed in a different genus, *Platygyria*, on the basis of the distinctive sporangium annulus of broad, pale, thin-walled cells, but this is not a consistent feature with some collections showing a range from these to normal leptosporangiate annuli. There are no other characters that allow a clear separation between the two taxa. *Lepisorus petiolatus* was primarily separated on the basis of the long slender stipe, but this also is a very variable feature with no obvious discontinuity to justify the recognition of distinct taxa.

49. Lepisorus waltonii (Ching) S. L. Yu, Acta Phytotax. Sin. 35: 343. 1997.

掌状扇蕨 zhang zhuang shan jue

Neocheiropteris waltonii Ching, Hooker's Icon. Pl. 32: t. 3158. 1932; *Lepisorus sinuatus* (Ching & S. K. Wu) S. L. Yu; *Platygyria inaequibasis* Ching & S. K. Wu; *P. sinuata* Ching & S. K. Wu; *P. waltonii* (Ching) Ching & S. K. Wu; *Polypodium clathratum* C. B. Clarke var. *lobatum* Takeda.

Plants up to 13 cm tall. Rhizomes creeping, 2–2.5 mm in diam., black, densely scaly; scales brown, ovate or ovate-lanceolate, clathrate, thin and fragile, margin with long spines; lumina transparent, isodiametric, oblong toward apex. Fronds remote or ± closely spaced; stipe straw-colored, 3–7 cm, angular, ca. 1 mm in diam.; lamina very variable, hastate to pedately 3–5-lobed, 4–7(–12) × 2–3 cm, middle lobe 3–6 × 0.5–0.8 cm, sometimes only some fronds enlarged at base, others 4–12 × 1–2 cm, membranous, abaxially sparsely scaly, scales ovate-lanceolate, lumina transparent, isodiametric, base broadly cuneate to subcordate, or auriculate, shortly decurrent, margin slightly undulate, apex obtuse; midrib raised abaxially, veinlets obscure. Sori close to costa, elliptic to suborbicular, ca. 2 mm in diam.; paraphyses ± black, almost ovate to subrhomboidal, lumina transparent, isodiametric. Sporangia platygyroid: spherical, indehiscent, annulus with broad, thin-walled cells. Spores ellipsoid, surface smooth.

Epilithic; 3400–5000 m. Sichuan, Xizang, Yunnan [N India, N Nepal].

Hemsley (J. Linn. Soc., Bot. 35: 206. 1902) treated material of this species as *Polypodium hastatum* Thunberg.

Platygyria inaequibasis was separated by Zhang et al (Acta Phytotax. Sin. 41: 401–415. 2003) on the basis of the less-developed lamina base, rather broader rhizome scales, and lanceolate paraphyses with more regular lumina. The considerable variation within *Lepisorus waltonii* is such that we have followed Yu and Lin (Acta Phytotax. Sin. 35: 343. 1997) who included that species within *L. waltonii*.

20. LEMMAPHYLLUM C. Presl, Epimel. Bot. 157. 1851.

伏石蕨属 fu shi jue shu

Lin Youxing (林尤兴); Peter H. Hovenkamp, Michael G. Gilbert

Lepidogrammitis Ching.

Plants small, epiphytic or epilithic, often forming dense mats. Rhizomes slender and creeping, covered with scales; scales ovate-lanceolate, entire or lower part irregularly toothed, almost stellate, clathrate. Fronds remote, monomorphic or dimorphic; stipe articulate, often short to almost absent; sterile lamina orbicular to obovate, elliptic, lanceolate, or oblanceolate, subfleshy, hard leathery when dried, glabrous or subglabrous or sparsely scaly, margin entire; fertile lamina linear or linear-oblanceolate. Veins reticulate, usually obscure, main vein obscure, free included veinlets usually toward main vein, simple or forked. Sori linear or circular, in 1 row parallel with main vein, but normally apices of fronds sterile, covered with peltate paraphyses when young; paraphyses clathrate, margin denticulate; annuli of sporangia consisting of ca. 14 thick-walled cells. Spores yellow, ellipsoid, monolete, transparent or subtransparent, surface prominently tuberculate, tubercles often irregular, ± fused to give foveolate surface. $x = 12(36)$.

Up to nine species: center of diversity in S China, with a few species also occurring in India, Japan, Korea, Malaysia, Myanmar, Philippines, and Thailand; five species (two endemic) in China.

Molecular data (Li Wang et al., Bot. J. Linn. Soc. 162: 36. 2010) showed the strong case for including *Lepidogrammitis* within *Lemmaphyllum*. Hovenkamp is of the opinion that it is not practicable to differentiate between most species previously recognized within this genus and that only 2 entities should be recognized within the Flora area: *L. carnosum* s.s. including species 1 and 2, and *L. carnosum* var. *rostratum* including species 3–5 of this account (Fl. Males., Ser. 2, 3: 72–76. 1998).

1a. Sporangia in ± continuous linear coenosori, parallel with main vein; fronds always strongly dimorphic.
  2a. Sterile fronds suborbicular, ovate-orbicular, or obovate, 1.6–3.5 × 1.2–1.5 cm, subsessile or with stipe to 0.4 cm; rhizome scales with toothed bases ..... 1. *L. microphyllum*

2b. Sterile fronds narrowly elliptic or ovate-lanceolate, 4–12 × 2.5–4 cm; stipe normally 1.5–5 cm; rhizome scales often with entire bases ..... 2. *L. carnosum*
1b. Sporangia in discrete, circular or elliptic sori; fronds monomorphic or dimorphic (*L. rostratum* s.l.).
3a. Fertile fronds ovate to elliptic, 2–2.5 cm wide, similar in form to sterile fronds ..... 3. *L. rostratum*
3b. Fertile fronds lanceolate, narrowly oblong, or oblanceolate to spatulate, mostly 0.4–1 cm wide, narrower than sterile fronds.
4a. Sterile lamina 3–10 cm, erect to pendulous ..... 4. *L. diversum*
4b. Sterile lamina 1–3 cm, often adpressed to substrate ..... 5. *L. drymoglossoides*

1. Lemmaphyllum microphyllum C. Presl, Epimel. Bot. 236. 1851.

伏石蕨 fu shi jue

Plants to 6 cm tall. Rhizomes pale green, sparsely scaly; scales clathrate, lower part ± rounded, margins irregularly branched, apex subulate. Fronds remote, dimorphic; sterile fronds subsessile or with stipe 2–4 mm; lamina orbicular, ovate, or obovate, 1.6–2.5(–5) × 1.2–1.5 cm, base rounded or cuneate, margin entire, apex rounded to subacute; fertile fronds: stipe 3–8 mm; lamina oblong or narrowly lanceolate, 3.5–6(–8) × 2–4 cm, margins revolute when dried. Veins reticulate, with simple included veinlets. Sporangia in linear coenosori, between costa and margin, covered with paraphyses when young.

On trees trunks in forests or rocks in forests; sea level to 1500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou (Libo), Hainan, Hubei, Jiangxi, Taiwan, Yunnan, Zhejiang [NE India, Japan, S Korea, Vietnam].

Lemmaphyllum microphyllum is recorded from NE India (B. Singh et al., J. Threatened Taxa 3: 2288. 2012) but without indication of variety.

According to Knapp (Ferns Fern Allies Taiwan, 464. 2011), the frond size and lamina shape of *Lemmaphyllum microphyllum* is variable throughout Taiwan.

1a. Sterile frond suborbicular or ovate-orbicular, base rounded or broadly cuneate, subsessile ..... 1a. var. *microphyllum*
1b. Sterile frond ovate or obovate to narrowly orbicular, base shortly cuneate and decurrent, with longer stipe ..... 1b. var. *obovatum*

1a. Lemmaphyllum microphyllum var. **microphyllum**

伏石蕨(原变种) fu shi jue (yuan bian zhong)

Drymoglossum microphyllum (C. Presl) C. Christensen; *Taenitis microphylla* (C. Presl) Mettenius.

Sterile fronds subsessile; lamina suborbicular or ovate-orbicular, base rounded or broadly cuneate.

On tree trunks in forests or on rocks in forests; sea level to 1500 m. Anhui, Fujian, Guangdong, Guangxi, Hubei, Jiangxi, Taiwan, Yunnan, Zhejiang [Japan, S Korea, Vietnam].

1b. Lemmaphyllum microphyllum var. **obovatum** (Harrington) C. Christensen, Dansk Bot. Ark. 6: 47. 1929.

倒卵伏石蕨 dao luan fu shi jue

Drymoglossum carnosum J. Smith ex Hooker var. *obovatum* Harrington, J. Linn. Soc., Bot. 16: 33. 1877; *D. nobukoanum* Makino; *D. obovatum* (Harrington) Christ; *D. obovatum* var. *lutchuense* Nakai; *Lemmaphyllum microphyllum* var. *lutchuense* (Nakai) C. Christensen; *L. microphyllum* var. *nobukoanum* (Makino) Tagawa; *L. nobukoanum* (Makino) Ching.

Sterile fronds with stipe 2–4 mm; lamina ovate or obovate to narrowly orbicular, base shortly cuneate and decurrent.

● On tree trunks. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan.

The illustration labeled *Lepidogrammitis drymoglossoides* (= *Lemmaphyllum drymoglossoides*) in X. Cheng & Y. Jiao (Native Ferns Fern Allies Yunnan China, 273. 2007) is *L. microphyllum* as indicated by the distinctive coenosori. The two taxa are otherwise rather similar.

2. Lemmaphyllum carnosum (Wallich ex J. Smith) C. Presl, Epimel. Bot. 158. 1851.

肉质伏石蕨 rou zhi fu shi jue

Drymoglossum carnosum Wallich ex J. Smith in Hooker, Gen. Fil. t. 78 A. 1841; *Lemmaphyllum chui* Saiki.

Plants to 15 cm tall. Rhizome ca. 1 mm in diam., densely scaly; scales ovate with caudate apex, margin entire. Fronds dimorphic. Sterile fronds: stipe 0.5–2(–5) cm, scaly at base; lamina broadly elliptic-lanceolate, ca. 10 × 2.5–3.8 cm, base cuneate and decurrent, apex bluntly acuminate. Fertile fronds: stipe 3–6(–8) cm; lamina narrowly oblong, up to 10(–15) × 0.4–0.5 cm. Sporangia in linear coenosori, eventually covering entire surface except costa and margin.

On tree trunks or rocks in forests; 1500–2900 m. Guizhou, Sichuan, Yunnan [India, Nepal, Thailand, Vietnam].

Lemmaphyllum carnosum is superficially very similar to *Pyrrosia piloselloides* (Linnaeus) M. G. Price. The two are separated by the stellate hairs of the *Pyrrosia*, which are sometimes very sparse.

3. Lemmaphyllum rostratum (Beddome) Tagawa in H. Hara, Fl. E. Himalaya, 493. 1966.

骨牌蕨 gu pai jue

Pleopeltis rostrata Beddome, Ferns Brit. India, t. 159. 1867, based on *Polypodium rostratum* Hooker, Icon. Pl. 6: t. 953. 1854, not N. L. Burman (1768); *Lemmaphyllum carnosum* (Wallich ex J. Smith) C. Presl var. *rostratum* (Beddome) Hooker ex Hovenkamp; *L. pyriforme* (Ching) Ching; *Lepidogrammitis pyriformis* (Ching) Ching; *L. rostrata* (Beddome) Ching; *L. subrostratum* (C. Christensen) Ching; *Phymatopsis rostrata* (Beddome) J. Smith; *Polypodium pyriforme* Ching; *P. subrostratum* C. Christensen.

Plants to 10 cm tall. Rhizomes ca. 1 mm in diam., green, covered with scales; scales subulate-lanceolate, margin denticu-

late. Fronds remote, monomorphic; lamina lanceolate or elliptic, 6–10 × 2–2.5 cm, fleshy, leathery when dried, pale brown, both surfaces subglabrous, base cuneate and decurrent, margin entire, apex acuminate. Costa raised on both surfaces, veinlets slightly visible, with simple or forked included veinlets. Sori orbicular, usually above broadest parts of lamina, in 1 row on each side of main vein, covered with peltate paraphyses when young.

On tree trunks or rocks in forests; 200–2000(–2500) m. Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Japan, Laos, Myanmar, Nepal, Thailand, Vietnam].

4. Lemmaphyllum diversum (Rosenstock) Tagawa, Acta Phytotax. Geobot. 14: 9. 1949.

披针骨牌蕨 pi zhen gu pai jue

Polypodium diversum Rosenstock, Hedwigia 56: 346. 1915; *Lemmaphyllum adnascens* Ching; *L. christensenii* Ching; *L. intermedium* (Ching) Li Wang; *Lepidogrammitis adnascens* (Ching) Ching; *L. christensenii* (Ching) Ching; *L. diversa* (Rosenstock) Ching; *L. elongata* Ching; *L. intermedium* Ching; *L. kansuensis* Ching.

Plants 3–10 cm tall. Rhizomes to 1.5 mm in diam., sparsely to densely scaly; scales brown, subulate-lanceolate, margin denticulate. Fronds remote, ± dimorphic; stipe straw-colored, 0.5–3 cm, smooth; sterile fronds not very different from fertile fronds, stipe 0.2–1.5 cm, lamina oblong or narrowly to broadly lanceolate, 3.5–10 × 0.5–2.5 cm, when dried subleathery, brown or grayish green, glabrous or abaxially sparsely scaly, base cuneate and decurrent, margin entire, slightly revolute when dried, apex rounded to bluntly acuminate. Fertile fronds: stipe 1.2–4 cm; lamina mostly similar to that of sterile frond but longer and narrower, sometimes narrowly oblong, 5–16 × 0.3–2.8 cm, apex obtuse or shortly acute; costa raised on both sides, veinlets not obvious. Sporangia in discrete sori in 1 line on each side of midrib, sori mostly orbicular, occasionally elliptic and up to 3–4 mm, sometimes some confluent when mature.

● On rocks in forests or by forest margins, thickets beside streams; 700–2200 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang.

The whole plant is used in traditional Chinese medicine for inflammation, arthralgia, and bleeding due to surgery, trauma, etc.

Lemmaphyllum diversum has been variously misidentified as *L. subrostratum* (C. Christensen) Ching (Tagawa, Acta Phytotax. Geobot. 5: 112. 1936), *Lepidogrammitis rostrata* (Beddome) Ching (De Vol & Kou, Fl. Taiwan 1: 183, t. 63. 1975), and *Polypodium megasorum* C. Christensen (Hayata, Icon. Pl. Formosan. 8: 153. 1919). "*Polypodium chingii* C. Christensen" is a herbarium name that was included in the synonymy of *Lemmaphyllum christensenii*.

5. Lemmaphyllum drymoglossoides (Baker) Ching, Bull. Fan Mem. Inst. Biol. 4: 100. 1933.

抱石莲 bao shi lian

Polypodium drymoglossoides Baker, J. Bot. 25: 171. 1887; *Goniophlebium moupinense* (Franchet) Beddome; *Lepidogrammitis drymoglossoides* (Baker) Ching; *P. cyclophyllum* Baker; *P. moupinense* Franchet.

Plants to ca. 6 cm tall. Rhizomes slender and creeping, scales brown, subulate-lanceolate, margin denticulate. Fronds remote, dimorphic; sterile fronds subsessile, lamina orbicular to obovate, 1–2 cm or slightly longer, often adpressed to substrate, base cuneate, margin entire, apex rounded. Fertile fronds subsessile or shortly stipitate, lamina ligulate or oblanceolate, 3–6 × less than 1 cm, fleshy, when dried leathery, abaxially sparsely scaly, adaxially smooth, base attenuate. Sporangia in discrete sori, sori orbicular, in 1 row on each side of main vein, medial between costa and margin.

● On shaded wet tree trunks or rocks; 200–1400 m. Widely distributed in provinces of Changjiang Valley: Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Shanxi.

The whole plant is used in traditional Chinese medicine.

Lemmaphyllum drymoglossoides has been confused with *L. microphyllum*, which has a similar habit, but it can be distinguished by the discrete sori in contrast to the linear coenosori of *L. microphyllum*.

21. CAOBANGIA A. R. Smith & X. C. Zhang, Novon 12: 546. 2002.

高平蕨属 gao ping jue shu

Zhang Xianchun (张宪春); Alan R. Smith

Rhizomes long creeping, filiform, sparingly branched, approximately terete, dorsiventral with 2 rows of dorsal fronds, rather sparsely set with roots, not ant-inhabited, densely scaly; scales dark red-brown, lacking hairs at bases (non-comose), acicular and subentire from peltately attached, clathrate, dentate bases. Fronds shortly stipitate to subsessile; stipe lacking obvious articulation lines or swellings at bases, with scales similar to those of lamina; lamina herbaceous to papery, monomorphic to slightly dimorphic in size and shape (sterile seemingly often shorter and more rounded at base, but equaling fertile in width), narrowly elliptic (fertile) to ovate (sterile), dark green-brown when dried, stellate hairs lacking, densely scaly on both sides with persistent red-brown, hairlike scales; scales with peltate, clathrate, laciniate-margined bases and very long, uniformly red-brown, non-clathrate dentate to laciniate tips. Venation: midribs distinct, sclerenchymatous (darkened, but hidden by red-brown scales), main lateral veins indistinct or distinct only in basal 1/5 or less in cleared fronds, 10–13 per side, anastomosing and forming irregular areoles (1 row of large areoles adjacent to midrib, 0–2 additional rows of smaller areoles toward margins, areoles with occasional free veinlets, these simple (not forked), almost always recurrent, sunken, not or only faintly visible adaxially, hydathodes lacking. Sori in single rows within larger areoles, midway between midrib and each margin, orbicular, not confluent, ± obscured by acicular scales especially when sporangia are immature. Sporangia stalked, lacking paraphyses, with 16–19 hardened annulus cells, mixed with acicular scales; spores monolete, whitish, papillate to rugose.

One species: China, Vietnam.

Caobangia is a monotypic genus, easily identified by its very distinctive hairlike scales. Molecular evidence shows that it is most closely related to *Lemmaphyllum* where it was included by Li Wang et al. (Bot. J. Linn. Soc. 162: 36. 2010).

1. Caobangia squamata A. R. Smith & X. C. Zhang, Novon 12: 549. 2002.

高平蕨 gao ping jue

Lemmaphyllum squamatum (A. R. Smith & X. C. Zhang) Li Wang.

Rhizomes 1–1.5 mm in diam., 2–5 cm between stipe bases, densely covered with many ascending and outwardly curved, overlapping scales; scales dark red-brown, acicular from a clathrate, laciniate, peltate base, 5–8 × 0.4–0.8 mm, scale tips uniseriate for 1–2 mm. Fronds up to 7.5 × 1.8 cm; stipe mostly 1–20 mm, with scales similar to those of lamina; lamina entire, monomorphic or slightly dimorphic in size and shape. Sterile lamina 1–4 × 1–1.5 cm; fertile lamina 4–8 × 1–1.8 cm, narrowly elliptic to narrowly ovate, base cuneate, apex rounded; sterile fronds broadly elliptic to broadly oblong, acute at base, rounded at tip, ca. 1/2 length of fertile fronds or less, densely covered (but some laminar tissue visible between overlapping scales) on both sides with persistent, hairlike scales, these red-brown, mostly 5–10 mm, acicular from peltate, clathrate, dentate-margined bases; acicular tips uniformly red-brown and non-clathrate, with up to ca. 10 teeth per side; teeth up to 0.3 mm, scales extending up to 5 mm beyond lamina margins, curved and ascending to spreading. Sori in single rows midway between midrib and each margin, orbicular, up to ca. 10 on each side of midrib, up to 2 mm in diam., obscured by acicular scales.

On limestone ridges, rare, epilithic on slightly shaded limestone rocks; ca. 800 m. Guangxi [N Vietnam].

22. PHYMATOSORUS Pichi Sermolli, Webbia 28: 457. 1973.

瘤蕨属 liu jue shu

Lu Shugang (陆树刚); Hans P. Nooteboom

Plants epiphytic or terrestrial. Rhizome long creeping, fleshy, scaly; scales brown, dark brown, or nearly black, orbicular, ovate, or ovate-lanceolate, usually thin, peltate, distinctly clathrate. Fronds remote, articulate to rhizome at base. Stipe usually straw-colored, scaly at base, glabrous upward. Lamina deeply pinnatipartite or pinnate, rarely simple, lobes broadly lanceolate, herbaceous or leathery, both surfaces glabrous, margin entire, apex acuminate or obtuse; veins anastomosing to form areoles with simple or forked included veinlets. Sori orbicular or oblong, in 1 row on each side of midrib or irregularly scattered on either side of midrib, superficial or sunken on abaxial surface and raised on adaxial surface, without paraphyses. Spores yellow, ellipsoid, surface shallowly and coarsely rugose. $n = 36, 37$; $2n = 72, 74$.

About 13 species: Old World tropics, neophytes in tropical America; six species (one endemic) in China.

1a. Lamina pinnate, rachis terete except sometimes for narrowly winged apical portion; pinnae mostly with distinct stalks ..... 1. *P. cuspidatus*
1b. Lamina simple or pinnatipartite to pinnatisect with bases of lateral lobes merging into broadly winged rachis.
2a. Lamina simple, ovate; stipe slender (ca. 1 mm in diam.) ..... 2. *P. lanceus*
2b. Lamina pinnatipartite or pinnatisect.
3a. Lamina with lateral lobes (10–)20–30(–40) pairs ..... 3. *P. longissimus*
3b. Lamina with lateral lobes usually 3–10 pairs.
4a. Lamina papery, dark green; veins distinct on both surfaces ..... 4. *P. membranifolius*
4b. Lamina leathery, yellowish green; veins obscure on both surfaces.
5a. Rhizome 3–5 mm in diam.; scales ovate-lanceolate with apex acuminate, margin toothed; sori in 1 row or in 2 irregular rows along each side of costa ..... 5. *P. scolopendria*
5b. Rhizome 6–10 mm in diam.; scales orbicular, margin entire; sori in 1 row on each side of midrib ..... 6. *P. hainanensis*

1. Phymatosorus cuspidatus (D. Don) Pichi Sermolli, Webbia 31: 249. 1977.

光亮瘤蕨 guang liang liu jue

Polypodium cuspidatum D. Don, Prodr. Fl. Nepal. 2. Jan–Feb 1825; *Microsorum cuspidatum* (D. Don) Tagawa; *M. lucidum* Copeland; *Phymatodes cuspidata* (D. Don) J. Smith; *P. lucida* Ching; *Phymatosorus lucidus* Pichi Sermolli; *Polypodium lucidum* Roxburgh (1844), not Richard (1792).

Rhizome pale green, 10–20 mm in diam., sparsely scaly; scales dark brown at center, paler toward margin, orbicular, peltate, clathrate, entire. Stipe straw-colored, 30–50 cm, glabrous except for scaly base. Lamina imparipinnate, 30–50 × 20–25 cm; rachis terete; lateral pinnae 8–15 pairs, ± ascending, linear-lanceolate, 15–20(–25) × 2–3.5 cm, herbaceous or leathery, both surfaces glabrous; base cuneate with 5–10 mm stalk, margin entire, apex acuminate to attenuate; midrib raised on both surfaces, straw-colored; veinlets obscure. Sori orbicular, in 1 row on each side of costa, medial, nearly superficial. Spore surface with minute spheres.

Epiphytic or epilithic on dry sandstone rocks or on tree trunks; 200–1600 m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Xizang, Yunnan [India, Laos, Myanmar, Nepal, Thailand, Vietnam].

Phymatodes cuspidata monstr. *dichotoma* H. G. Zhou & H. Li (Guihaia 11: 42. 1991) is based on a form with abnormal fronds.

2. Phymatosorus lanceus (Ching & Chu H. Wang) S. G. Lu, Guihaia 19: 28. 1999.

矛叶瘤蕨 mao ye liu jue

Phymatodes lancea Ching & Chu H. Wang, Acta Phytotax. Sin. 8: 170. 1959.

Rhizome dark brown, 5–8 mm in diam., sparsely scaly; scales ovate, 2–2.5 mm, peltate, clathrate, base cordate, apex obtuse. Stipe brown, 4.5–7 cm, ca. 1 mm in diam. Lamina simple, oblong, 10–12 × 2–2.2 cm, leathery, both surfaces glabrous, base broadly cuneate, margin entire, apex obtuse; midrib raised on both surfaces, lateral veins slender and obscure, veinlets obscure. Sori orbicular, in 1 row on each side of midrib, abaxially sunken and adaxially raised.

● Epiphytic on tree trunks. Hainan.

3. Phymatosorus longissimus (Blume) Pichi Sermolli, Webbia 28: 459. 1973.

多羽瘤蕨 duo yu liu jue

Polypodium longissimum Blume, Enum. Pl. Javae 2: 127. 1828; *Colysis longissima* (Blume) J. Smith; *Microsorum rubidum* (Kunze) Copeland; *Phymatodes longissima* (Blume) J. Smith; *Phymatosorus suisha-stagnalis* (Hayata) Pichi Sermolli; *Pleopeltis longissima* (Blume) T. Moore; *Polypodium rubidum* Kunze; *P. suisha-stagnale* Hayata.

Rhizome 8–10 mm in diam., sparsely scaly; scales ovate-lanceolate, ca. 3 mm, peltate, clathrate, base rounded, margin irregularly toothed, apex acuminate. Stipe straw-colored, 35–100 cm, up to 10 mm in diam. near base, glabrous, upper portion winged. Lamina pinnatifid or pinnatisect at lower portion, oblong in outline, 40–100(–130) × 25–30(–50) cm; lateral lobes (10–)20–30(–40) pairs, ascending, linear-lanceolate, usually 8–12 × 1–2.5 cm, herbaceous or leathery, both surfaces glabrous, base slightly narrowed and decurrent to rachis, margin entire or crisped, apex acuminate or obtuse; lateral veins and veinlets obscure, areoles with included veinlets. Sori orbicular to ellipsoid, in 1 row on each side of midrib, slightly nearer to midrib, abaxially sunken and adaxially raised.

In rather wet places; low elevations. Hainan, Hong Kong, Taiwan (Pingdong, Taidong), Yunnan [India, Indonesia, Japan, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands (Polynesia)].

4. Phymatosorus membranifolius (R. Brown) S. G. Lu, Guihaia 19: 27. 1999.

显脉瘤蕨 xian mai liu jue

Polypodium membranifolium R. Brown, Prodr. 147. 1810; *Microsorum membranifolium* (R. Brown) Ching; *M. nigrescens* (Blume) Copeland; *Phymatodes nigrescens* (Blume) J. Smith; *P. nigrescens* var. *variabilis* (Ching) C. Christensen & Tardieu; *P. variabilis* Ching; *Phymatosorus nigrescens* (Blume) Pichi Sermolli; *P. variabilis* (Ching) Pichi Sermolli; *Pleopeltis nigrescens* (Blume) Carruthers; *Polypodium nigrescens* Blume.

Rhizome 10–15 mm in diam., scaly; scales brown, orbicular or oblong, peltate, thin, margin irregularly toothed, apex rounded. Stipe straw-colored, 30–40(–50) cm, ca. 5 mm in diam., glabrous. Lamina usually pinnatifid, rarely pinnately ternate, dark green, 50–80 × 30–40 cm, or simple, 15–25 × 4–5 cm; lateral lobes usually (2 or)3–10(–12) pairs, ascending, broadly lanceolate, 15–20 × 3–4 cm, papery, both surfaces glabrous, base somewhat narrowed, margin subentire, apex caudate-acuminate; veins all distinct, areoles with forked included veinlets. Sori orbicular, ca. 4 mm in diam., in 1 row on each side of midrib, medial, abaxially distinctly hollow and adaxially distinctly raised.

Terrestrial or on rocks in tropical rain forests; 200–1200 m. Hainan, Taiwan, Yunnan [Cambodia, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands (Polynesia)].

Beddome (Ferns S. India, t. 176. 1864) named material of *Phymatosorus membranifolius* as *Pleopeltis longissima* (Blume) T. Moore.

5. Phymatosorus scolopendria (N. L. Burman) Pichi Sermolli, Webbia 28: 460. 1973.

瘤蕨 liu jue

Polypodium scolopendria N. L. Burman, Fl. Indica, 232. 1768; *Chrysopteris phymatodes* Link, nom. illeg. superfl.; *Drynaria phymatodes* Fée, nom. illeg. superfl.; *D. vulgaris* (C. Presl) J. Smith; *Microsorum scolopendria* (N. L. Burman) Copeland; *Phymatodes scolopendria* (N. L. Burman) Ching; *P. vulgaris* C. Presl; *Pleopeltis phymatodes* T. Moore, nom. illeg. superfl.; *Polypodium phymatodes* Linnaeus, nom. illeg. superfl.

Rhizome 3–5 mm in diam., sparsely scaly; scales dark brown, ovate-lanceolate, peltate, clathrate, margin toothed, apex long acuminate. Stipe straw-colored or light chestnut, usually 20–30 cm, glabrous. Lamina usually pinnatifid, 35–45 × 30–35 cm, rarely simple or pinnately 3-lobed, rachis with wings ± as wide as lobes; lateral lobes usually 3–5 pairs, lanceolate, 12–20 × 2–3 cm, leathery, both surfaces glabrous, margin entire, apex acuminate; midrib raised on both surfaces, veins indistinct, areoles with many included veinlets ending in raised point. Sori orbicular, in 1 row or 2 irregular rows on each side of midrib, abaxially deeply hollowed and adaxially distinctly raised. Spore surface minutely echinate.

On rocks or on tree trunks; low elevations. Guangdong, Hainan, Taiwan [India, Japan (Ryukyu Islands), Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Pacific islands (Polynesia)].

6. Phymatosorus hainanensis (Nooteboom) S. G. Lu, Bull. Natl. Mus. Nat. Sci., Taichung 11: 147. 1998.

阔鳞瘤蕨 kuo lin liu jue

Microsorum hainanense Nooteboom, Blumea 42: 325. 1997.

Rhizome 6–10 mm in diam., sparsely to densely scaly; scales dark brown, orbicular, ca. 4 × 4 mm, peltate, clathrate, margin irregularly obscurely toothed. Stipe straw-colored, 20–

30 cm, glabrous. Lamina pinnatifid, 30–40 × 15–20 cm, or 3-lobed, base broadly cuneate, rachis with wings ± as wide as lobes; lateral lobes usually 2–5 pairs, lanceolate, 10–15 × 2–3 cm, leathery, abaxially with very sparse and very small black scales, adaxially glabrous, margin entire, apex acute or obtuse; midrib raised on both surfaces, without lateral veins, areoles with included veinlets. Sori orbicular, large, in 1 row on either side of costa, slightly nearer to midrib, abaxially sunken and adaxially raised.

Forests, on tree trunks or rocks; sea level to 900 m. Hainan [India, Vietnam].

23. LEPIDOMICROSORIUM Ching & K. H. Shing, Bot. Res. Contrib. Inst. Bot. Inst. Acad. Sin. 1: 1. 1983.

鳞果星蕨属 lin guo xing jue shu

Zhang Xianchun (张宪春); Hans P. Nooteboom

Plants small to medium-sized, terrestrial when young and then climbing on tree trunks or rock surfaces. Rhizome long creeping up to 1 m or up to 2–3 m, densely scaly; scales reddish brown, transparent, lanceolate, clathrate, margin sparsely denticulate, long acuminate. Fronds distant; stipe present or fronds subsessile; laminae variable in shape, lanceolate, linear-lanceolate, or polymorphic, fronds on lower part of rhizome like *Hedera* leaves, toward apex becoming linear-lanceolate, base from cordate to truncate and narrowly cuneate; lamina herbaceous to papery, glabrous except for small clathrate scales on adaxial side of midribs; midribs prominent, veinlets not clear, anastomosing, free included veinlets simple or forked. Sori small, orbicular, densely scattered; paraphyses uniseriate, 3–6-celled or in part peltate (especially in young sori).

About three species: distributed mainly in C and SW China, also to N Vietnam and E Himalayan regions; three species in China.

In other treatments, all species of *Lepidomicrosorium* have been included within *Microsorum superficiale* (e.g., Nooteboom, Blumea 42: 366. 1997).

1a. Paraphyses hairlike, uniseriate with glandular apex ..... 3. *L. superficiale*
1b. Paraphyses peltate, clathrate.
2a. Fronds normally under 10 cm, lamina triangular or lanceolate, base deeply cordate or dilated; lamina thickly papery, venation obscure ..... 1. *L. buergerianum*
2b. Fronds generally more than 20 cm, lamina linear-lanceolate, base cuneate or attenuate; lamina herbaceous, venation distinct ..... 2. *L. subhemionitideum*

1. Lepidomicrosorium buergerianum (Miquel) Ching & K. H. Shing ex S. X. Xu in J. F. Cheng & G. F. Zhu, Fl. Jiangxi 1: 322. 1993.

鳞果星蕨 lin guo xing jue

Polypodium buergerianum Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 170. 1867; *Lepidomicrosorium asarifolium* Ching & K. H. Shing; *L. brevipes* Ching & K. H. Shing; *L. emeicola* Ching & K. H. Shing; *L. hederaceum* (Christ) Ching; *L. lanceolatum* Ching & P. S. Wang; *L. latibasis* Ching & K. H. Shing; *L. microsorioides* (W. M. Chu) Ching & W. M. Chu; *L. subhastatum* (Baker) Ching; *L. subsessile* Ching & K. H. Shing; *L. suijiangense* Ching & W. M. Chu; *L. yiliangense* Ching & K. H. Shing; *Leptochilus buergerianus* (Miquel) Bosman; *Microsorum buergerianum* (Miquel) Ching; *M. buergerianum* f. *laciniatum* Ching; *M. buergerianum* var. *ohwianum* (Tagawa) Tagawa; *M. ohwianum* Tagawa; *M. subhastatum* (Baker) Ching; *M. subhastatum* var. *longifrons* (Takeda) Ching; *Neocheiropteris subhastata* (Baker) Tagawa; *Neolepisorus microsorioides* W. M. Chu; *Polypodium buergerianum* var. *stipitatum* Takeda, nom. illeg. superfl.; *P. hederaceum* Christ; *P. subhastatum* Baker; *P. subhastatum* var. *hederaceum* (Christ) Takeda; *P. subhastatum* var. *longifrons* Takeda; *P. superficiale* Blume var. *chinense* Rosenstock.

Rhizome long creeping and climbing, 1.5–2.5 mm in diam., with circumvascular sheaths only in cortex; scales brown or dark brown, lanceolate, 1.5–4.5 × 0.5–1 mm, margin denticulate. Fronds distant, subsessile or with stipe up to 9 cm and stramineous; fronds polymorphic: fronds on ground or lower part of rhizome like leaves of *Hedera*, base cordate and auriculate, or truncate, or cuneate; fronds on upper parts of rhizome lanceolate, base rounded or decurrent; lamina 10–20 cm, 1.5–5 cm wide at lower part, texture thickly papery, green, venation obscure, beneath with small scales on midribs; midribs prominent on both surfaces. Sori superficial, orbicular or in part elongate, occasionally in part confluent, 1–1.5 mm in diam., or length 2–2.5 mm, scattered on adaxial surface of fertile leaves; paraphyses uniseriate, (3 or)4- or 5-celled or in part peltate (especially in young sori).

Forests, terrestrial, climbing on rocks or tree trunks; 400–2000 m. Chongqing, Gansu, Guangxi, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang [Japan, N Vietnam].

2. Lepidomicrosorium subhemionitideum (Christ) P. S. Wang in P. S. Wang & X. Y. Wang, Pterid. Fl. Guizhou, 382. 2001.

滇鳞果星蕨 dian lin guo xing jue

Polypodium subhemionitideum Christ, Bull. Herb. Boissier 7: 5. 1899; *Lepidomicrosorium caudifrons* Ching & W. M. Chu; *L. crenatum* Ching & K. H. Shing; *L. emeiense* Ching & K. H. Shing; *L. hongchunpingense* Ching & K. H. Shing; *L. hongchunpingense* var. *laceratum* Ching & K. H. Shing; *L. hunanense* Ching & K. H. Shing; *L. laojunense* Ching & K. H.

Shing; *L. lineare* Ching & K. H. Shing; *L. longshengense* Ching & K. H. Shing; *L. undulatum* Ching & P. S. Chiu; *Leptochilus subhemionitideus* (Christ) Bosman; *Microsorum hymenodes* (Kunze) Ching var. *marginale* (Takeda) Ching; *M. jinfoshanense* Ching & Z. Y. Liu; *M. rubripes* Ching & W. M. Chu; *Neocheiropteris sapaensis* V. N. Tu; *Polypodium hymenodes* Kunze var. *marginale* Takeda; *P. superficiale* Blume var. *attenuatum* Rosenstock.

Rhizome long creeping and climbing, 1–4 mm in diam., with circumvascular sheaths only or with circumvascular sheaths and scattered strands of sclerenchyma in cortex; scales brown, lanceolate, 1.5–5 × 0.5–1.5 mm, margin denticulate. Fronds distant; stipe reddish brown or pale brown, up to 10 cm; lamina linear-lanceolate, 25–40 cm, 2.5–5 cm wide at middle part, base cuneate or narrowly cuneate and decurrent, margin entire or undulate, apex acuminate to caudate; texture herbaceous, venation distinct, dark green, abaxially with few small scales on midribs; midribs prominent on both surfaces. Sori superficial, orbicular or oblong, sometimes in part confluent, 1–2 mm in diam., or length ca. 2.5 mm, scattered on adaxial surface of fertile leaves; paraphyses uniseriate, (4 or)5- or 6-celled or in part peltate (especially in young sori).

In dense forests, climbing on rocks or tree trunks; 700–2000 m. Guangxi, Hunan, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Vietnam].

There has been confusion between *Lepidomicrosorium subhemionitideum* and *Polypodium hymenodes* Kunze due to an unacceptable lectotypification of Kunze's name with the collection *A. Henry 9265B*, the type collection of *Polypodium subhemionitideum*, which was not collected until much later than Kunze's publication. *Polypodium hymenodes* is here included within *Microsorum membranaceum*.

3. Lepidomicrosorium superficiale (Blume) Li Wang, Bot. J. Linn. Soc. 162: 36. 2010.

表面星蕨 biao mian xing jue

Polypodium superficiale Blume, Enum. Pl. Javae 2: 123. 1828; *Colysis superficialis* (Blume) J. Smith; *Lepidomicrosorium angustifolium* Ching & K. H. Shing; *L. nanchuanense* Ching & Z. Y. Liu; *L. sichuanense* Ching & K. H. Shing; *Microsorum brachylepis* (Baker) Nakaike; *M. masaskei* (Nakai) H. Itô; *M. ovalifolium* Ching & S. K. Wu; *M. simulans* Ching & Z. Y. Liu; *M. superficiale* (Blume) Ching; *M. superficiale* var. *semilinearis* C. B. Clarke; *M. takhtajanii* V. N. Tu; *M. tibeticum* Ching & S. K. Wu; *Neocheiropteris ningpoensis* (Baker) Bosman; *N. superficialis* (Blume) Bosman; *Phymatodes masaskei* Nakai; *Pleopeltis superficialis* (Blume) Beddome; *P. superficialis* var. *latifrons* Beddome; *Polypodium brachylepis* Baker; *P. buergerianum* Miquel var. *ningpoense* (Baker) Takeda; *P. masaskei* (Nakai) Ogata; *P. nigrocinctum* Christ; *P. ningpoense* Baker; *P. superficiale* var. *anguinum* Christ.

Rhizome 1–5 mm in diam., dorsiventrally flattened, not white waxy, bearing scales and hairs. Scales pseudopeltate, appressed or distinctly spreading or slightly spreading, ovate or narrowly ovate or triangular, 1–6.5 × 0.5–2.5 mm, margin entire or denticulate or dentate (sometimes with small triangular lobes), apex acute or rounded, clathrate, subclathrate, or clathrate except for hyaline marginal region, cells longitudinally rectangular, central region bearing multiseptate hairs at least when young or central region glabrous. Fronds not or slightly dimorphic. Lamina simple, narrowly elliptic to narrowly ovate to narrowly deltoid to linear, 3–40(–60) × 0.5–6 cm, herbaceous to subleathery, base truncate-decrescent to narrowly decrescent, margin entire to sinuate to undulate, apex acute to acuminate. Sori separate, sometimes forming 2–8 irregular rows between veins or in 2 (irregular) rows between each pair of lateral veins (occasionally in part confluent), orbicular (or in part slightly elongate), 1–2.5 mm in diam., superficial or slightly sunken.

Epiphytic or epilithic; 200–2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Indonesia (Java, Sumatra), Japan, Laos, Malaysia (Peninsular), Myanmar, Nepal, Thailand, Vietnam].

Nooteboom (Blumea 42: 366. 1997) included *Lepidomicrosorium buergerianum* and *L. subhemionitideum* within *L. superficiale*, but those taxa are here treated as distinct on the basis of the presence of paraphyses.

24. MICROSORUM Link, Hort. Berol. 2: 110. 1833.

星蕨属 xing jue shu

Zhang Xianchun (张宪春); Hans P. Nooteboom

Kaulinia B. K. Nayar.

Plants medium-sized, mainly epiphytic or epilithic, rarely terrestrial. Rhizome thick, fleshy, white waxy or not, creeping, with peltate or pseudopeltate clathrate or subclathrate scales. Fronds dimorphic or not, simple or pinnatifid; lamina leathery or herbaceous, veinlets anastomosing, free included veinlets forked, ending in hydathode. Sori scattered and sometimes forming 2–8 irregular rows between veins, often some connate, elongate on veinlets, without scalelike paraphyses. Spores verrucate or irregularly rugate.

About 40 species: mainly in tropical Asia, few to Africa; five species in China.

There is debate as to the exact delimitation of *Microsorum*, as molecular data indicates that it is not monophyletic (Kreier et al., Molec. Phylogen. Evol. 48: 1155–1167. 2008). Li Wang et al. (Bot. J. Linn. Soc. 162: 28–38. 2010) confirmed this and have transferred one species to *Lepidomicrosorium* and two to *Neolepisorus*. These will key out to *Microsorum* in the key to genera, so they have been included within the following key to species. X. C. Zhang has recently resurrected the genus *Kaulinia* and transferred *M. insigne* to it (Lycophytes Ferns China, 627. 2012).

1a. Fronds normally pinnate or forked, sometimes simple; rhizome often dorsiventrally flattened, closely attached to rocky substrate.

2a. Fronds normally pinnate, occasionally trilobate or simple; stipe and costa abaxially not scaly; spores covered with abundant globules ..... 4. *M. insigne*
2b. Fronds normally trilobate or simple; stipe and costa abaxially scaly; spores covered with abundant globules and irregular spines ..... 5. *M. pteropus*
1b. Fronds simple, entire, lanceolate; rhizome usually cylindrical, often more loosely attached and epiphytic.
3a. Rhizome slender; fronds far apart.
4a. Scales spreading, broadly lanceolate, gradually narrowing toward apex ..... *Lepidomicrosorium superficiale* (see p. 830)
4b. Scales appressed, ovate-deltoid, acuminate at apex ..... *Neolepisorus fortunei* (see p. 807)
3b. Rhizome thick; fronds clustered.
5a. Lateral veins prominent, raised prominently, almost from main veins to margin.
6a. Fronds thinly herbaceous; stipe with edges, cross section subtriangular; scales on rhizomes slightly spreading, ovate to triangular; sori small, scattered or irregularly confluent ..... 1. *M. membranaceum*
6b. Fronds papery; stipe cylindric; scales on rhizomes prominently spreading, lanceolate; sori large, in 2 regular rows between adjacent main veins ..... *Neolepisorus zippelii* (see p. 807)
5b. Lateral veins obscure.
7a. Fronds linear-lanceolate, gradually narrowed toward apex; scales on rhizome appressed or slightly spreading, broadly ovate, ca. 3 mm, broad at base, rounded, acuminate at apex; apical cell of paraphyses not enlarged ..... 2. *M. punctatum*
7b. Fronds oblanceolate, acuminate at apex; scales on rhizome prominently spreading, lanceolate, 3–4 mm, gradually narrowed toward apex; apical cell of paraphyses often large and curved ..... 3. *M. steerei*

1. Microsorum membranaceum (D. Don) Ching, Bull. Fan Mem. Inst. Biol. 4(10): 309. 1933.

膜叶星蕨 mo ye xing jue

Polypodium membranaceum D. Don, Prodr. Fl. Nepal. 2. 1825; *Colysis membranacea* (D. Don) J. Smith (1857), not (Blume) C. Presl (1849); *Lepidomicrosorium hymenodes* (Kunze) L. Shi & X. C. Zhang; *Microsorum hymenodes* (Kunze) Ching; *Pleopeltis grandifolia* (Wallich ex Christ) T. Moore; *P. membranacea* (D. Don) T. Moore ex Beddome; *Polypodium grandifolium* Wallich ex Christ; *P. hymenodes* Kunze; *P. hymenodes* var. *sparsisorum* Takeda, nom. illeg. superfl.; *P. membranaceum* var. *grandifolium* (Wallich ex Christ) Alderwerelt; *P. transparens* C. Presl ex Ettingshausen.

Rhizome creeping, thick, 3–10 mm in diam., dorsiventrally flattened or subcylindrical, not white waxy. Scales pseudopeltate, ovate or triangular, 1.5–9 × 1–3 mm, margin entire, apex acute, clathrate except for hyaline marginal region, central region bearing multiseptate hairs at least when young. Fronds not or slightly dimorphic. Stipe up to 15 cm, 3–5 mm in diam. Lamina simple, ovate to elliptic or narrowly so to linear, (5–) 25–110 × (1–)5–15 cm, membranous, base narrowly decrescent, stipe winged for a considerable part, margin entire, apex acuminate. Veins prominent and distinct. Sori separate, on whole surface of lamina, sometimes forming 2–8 irregular rows between veins or some connate, elongate on veinlets, orbicular or elongate, 1–2 mm in diam., or length ca. 2.5 mm, superficial or slightly sunken.

Epilithic, rarely epiphytic or terrestrial in evergreen or deciduous broad-leaved (sub)tropical forests, often in valleys or ravines; 500–2600 m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

The fronds of *Microsorum membranaceum* are shed seasonally.

The authors have not seen material of *Microsorum membranaceum* var. *carinatum* W. M. Chu & Z. R. He (Acta Bot. Yunnan. 22: 257. 2000), described from Sichuan. *"Phymatodes grandifolia"* (C. Presl, Tent. Pterid. 198. 1836, nom. nud.) was not validly published (*Melbourne Code*, Art. 38.1(a)).

2. Microsorum punctatum (Linnaeus) Copeland, Univ. Calif. Publ. Bot. 16: 111. 1929.

星蕨 xing jue

Acrostichum punctatum Linnaeus, Sp. Pl., ed. 2, 2: 1524. 1763; *Phymatodes lingulata* (Swartz) C. Presl; *Pleopeltis punctata* (Linnaeus) Beddome; *Polypodium lingulatum* Swartz; *P. punctatum* (Linnaeus) Swartz (1801), not Thunberg (1784).

Rhizome shortly creeping, subcylindrical, thick, 4–8 mm in diam., white waxy beneath scales. Scales pseudopeltate (sometimes peltate), appressed or slightly spreading, ovate or narrowly ovate or triangular, 1.5–8 × 0.5–3 mm, margin entire to denticulate to dentate, apex acute, clathrate or subclathrate, cells small, ± isodiametric or cells longitudinally rectangular, central region bearing multiseptate hairs at least when young or central region glabrous. Fronds not or slightly dimorphic. Stipe present or absent and lamina decurrent to its base. Lamina simple, narrowly obovate or narrowly ovate to narrowly elliptic to linear, 10–175 × 1.5–15 cm, herbaceous to subleathery (sometimes leathery), base narrowly decrescent, stipe winged for a considerable part to cuneate-decrescent or truncate to obtuse to cordate, auriculate, margin entire or undulate, apex acute to acuminate to rounded. Veins ± sunken and indistinct, or prominent and distinct. Sori separate, small, many, mostly irregularly scattered on smallest veinlets, in up to 8 irregular rows between costa and margin, up to 3 rows between adjacent costules, or some connate, elongate on veinlets, orbicular or elongate, superficial or slightly sunken, on whole surface of lamina or absent from basal parts; paraphyses with apical cell not enlarged.

Epiphytic, but also epilithic or terrestrial in various types of forests, sometimes in savanna but also in wet places; sea level to 700 m (in Taiwan). Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Sichuan, Taiwan, Yunnan [India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa (widespread), Australia, Indian Ocean islands (Mascarene Islands), Madagascar, Pacific islands].

Microsorum punctatum is a very widespread and variable species; see Nooteboom (Blumea 42: 353–354. 1997) for a more complete synonymy. Linnaeus's type, "Habitat in China. J. Fothergill," appears to have been lost.

3. Microsorum steerei (Harrington) Ching, Bull. Fan Mem. Inst. Biol. 4(10): 306. 1933.

广叶星蕨 guang ye xing jue

Polypodium steerei Harrington, J. Linn. Soc., Bot. 16: 32. 1877; *P. aspidistrifrons* Hayata; *P. playfairii* Baker; *P. tonkinense* Baker.

Rhizome subcylindrical, 3–5 mm in diam., (often) white waxy beneath scales. Scales pseudopeltate, apically densely set, otherwise sparsely set, distinctly spreading, narrowly ovate or triangular, 2.5–4(–8) × 0.5–1.5 mm, margin denticulate, clathrate or subclathrate, central region glabrous. Fronds not or slightly dimorphic. Stipe up to 7 cm, 0.5–1.5 mm in diam. Lamina simple, narrowly elliptic to narrowly obovate to linear, 10–40 × 1.5–5 cm, subleathery, base narrowly decrescent, stipe winged for a considerable part, margin entire, apex acuminate. Veins ± sunken and indistinct, or sunken and distinct. Sori separate, mostly irregularly scattered, sometimes forming 2–8 irregular rows between veins, orbicular, superficial or slightly sunken; paraphyses often with apical cell large and curved.

On limestone rocks, lowland forests; 300–1000 m (in Taiwan). Guangxi, Guizhou, C Taiwan [Vietnam].

4. Microsorum insigne (Blume) Copeland, Univ. Calif. Publ. Bot. 16: 112. 1929.

羽裂星蕨 yu lie xing jue

Polypodium insigne Blume, Enum. Pl. Javae 2: 127. 1828; *Colysis dilatata* (Wallich ex Beddome) J. Smith; *C. insigne* (Blume) J. Smith; *Kaulinia dilatata* (Wallich ex Beddome) B. K. Nayar & Kaur; *K. hancockii* (Baker) B. K. Nayar; *K. insignis* (Blume) X. C. Zhang; *Microsorum dilatatum* (Wallich ex Beddome) Sledge; *M. hancockii* (Baker) Ching; *Pleopeltis dilatata* Wallich ex Beddome; *P. insignis* (Blume) Beddome; *Polypodium anceps* (Christ) C. Christensen; *P. dilatatum* Wallich ex Hooker (1864), not Hofmann (1795); *P. europhyllum* C. Christensen; *P. hancockii* Baker; *Selliguea anceps* Christ.

Rhizome 2–11 mm in diam., dorsiventrally flattened or subcylindrical, not white waxy, closely attached to substrate. Scales pseudopeltate, apically densely set, otherwise sparsely set, appressed or distinctly spreading, ovate or narrowly ovate or triangular, (2–)2.5–7.5 × 0.5–2.5(–3) mm, margin entire to denticulate (occasionally with small triangular lobes), clathrate or subclathrate, central region glabrous. Fronds not or slightly dimorphic. Stipe 0–10 cm, terete or carinate, lamina decurrent to its base. Lamina simple or pinnatifid, simple lamina narrowly ovate to narrowly obovate, 2.5–65 × 0.5–6.5 cm, thinly herbaceous, base narrowly decrescent, stipe winged for a considerable part, margin entire, apex acute to acuminate. Lamina of dissected frond 8–110 × 3–55 cm, widest below middle to near middle, 0.5–5 cm wide between lobes at place of longest lobes, lobes 1–12(–14) on each side, longest lobes widest from base to ca. middle; apical lobe similar to upper lateral lobes or shorter to longer than upper lateral lobes. Veins prominent and distinct, smaller veins ± sunken and indistinct, variously anastomosing, free veinlets simple or once forked. Sori separate, mostly irregularly scattered, sometimes forming 2–8 irregular rows between veins or some connate, elongate along veinlets, orbicular or elongate, superficial or slightly sunken.

Usually epilithic, sometimes epiphytic, in primary and secondary forests, in or along streams or waterfalls, in undergrowth of shrubs, twice reported from caves, shaded, mossy, muddy, and wet places; 600–800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Indonesia, Japan, Malaysia (Peninsular), Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

Sometimes the laminae of *Microsorum insigne* are simple, not lobed, and the stipes are terete to carinate; but there are no other corresponding morphology and distribution patterns supporting the separation of these plants as two species.

5. Microsorum pteropus (Blume) Copeland, Univ. Calif. Publ. Bot. 16: 112. 1929.

有翅星蕨 you chi xing jue

Polypodium pteropus Blume, Enum. Pl. Javae 2: 125, add. 3. 1828; *Colysis pteropus* (Blume) Bosman; *C. tridactyla* (Wallich ex Hooker & Greville) J. Smith; *C. zosteriformis* (Wallich ex Mettenius) J. Smith; *Drynaria tridactyla* (Wallich ex Hooker & Greville) Fée; *Kaulinia pteropus* (Blume) B. K. Nayar; *K. pteropus* var. *minor* (Beddome) B. K. Nayar & S. Kaur; *K. zosteriformis* (Wallich ex Mettenius) B. K. Nayar & S. Kaur; *Microsorum brassii* Copeland; *M. paucijugum* (Alderwerelt) K. Iwatsuki & M. Kato; *M. pteropus* f. *minor* (Beddome) Ching; *M. pteropus* var. *minor* (Beddome) C. Christensen & Tardieu; *M. pteropus* var. *zosteriformis* (Wallich ex Mettenius) S. Kaur & Subh. Chandra; *M. zosteriforme* (Wallich ex Mettenius) Ching; *Phymatodes tridactyla* (Wallich ex Hooker & Greville) C. Presl; *Pleopeltis pteropus* (Blume) T. Moore; *P. pteropus* var. *minor* Beddome; *P. pteropus* var. *zosteriformis* (Wallich ex Mettenius) Beddome; *P. tridactyla* (Wallich ex Hooker & Greville) T. Moore; *P. zosteriformis* (Wallich ex Mettenius) Beddome; *Polypodium aquaticum* Christ; *P. paucijugum* Alderwerelt; *P. pteropus* var. *minor* (Beddome) Y. C. Wu, K. Wong & Pong; *P. raapii* Alderwerelt; *P. tridactylon* Wallich ex Hooker & Greville; *P. udum* Christ; *P. zosteriforme* Wallich ex Mettenius.

Rhizome 0.5–5 mm in diam., dorsiventrally flattened, not white waxy, closely attached to substrate. Scales pseudopeltate, narrowly ovate or triangular, 1.5–5 × 0.4–1 mm, margin entire, apex acute, clathrate or subclathrate, central region bearing multiseptate hairs at least when young. Fronds not or slightly dimorphic. Stipe present, up to 12 cm, 1–2 mm in diam. Lamina simple, forked, trifid or pinnatifid, narrowly elliptic, 3.5–30 × 0.2–5.5 cm, thinly herbaceous to membranous, abaxial surface often densely covered with clavate hairs, base narrowly decrescent and winged on stipe for a considerable part, margin entire, apex acute to acuminate; veins prominent and distinct, 3–7 mm apart, ± straight or zigzag, dichotomously branched from ca. middle to near margin, connecting veins 1–6 between adjacent secondary veins, anadromous, smaller veins ± sunken and indistinct, or prominent and distinct, each main areole usually in-

cluding a number of smaller areoles, smaller veins variously anastomosing, free veinlets simple or once or twice forked. Sori separate, irregularly scattered, sometimes forming 2–8 irregular rows between veins, orbicular or in part elongate, superficial or slightly sunken, absent in marginal areoles, generally absent from costal areoles; paraphyses simple, uniseriate hairs with glandular top cells.

On wet rocks along or in streams, often under water in rainy season; 200–1200 m. Fujian, Guangxi, Guizhou, Hainan, Hong Kong, Hunan, Jiangxi, Taiwan, Yunnan [India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam].

Microsorum pteropus sometimes has the sori ± in one row between the veins. The venation consists of large areoles extending nearly to the margin on both sides of the costa.

25. LEPTOCHILUS Kaulfuss, Enum. Filic. 147. 1824.

薄唇蕨属 bao chun jue shu

Zhang Xianchun (张宪春); Hans P. Nooteboom

Colysis C. Presl; *Dendroglossa* C. Presl; *Gymnopteris* C. Presl (1836), not Bernhardi (1799); *Myuropteris* C. Christensen.

Plants epilithic, terrestrial, or epiphytic, sometimes low climbing, small to medium-sized, with long creeping rhizome; scales pseudopeltate or peltate, dark brown, ovate-lanceolate, clathrate or subclathrate, margin entire or toothed, apex acuminate. Fronds remote, articulate, monomorphic or dimorphic; lamina simple, entire, palmately lobed, digitate, pinnatifid, or pinnate with pinnae adnate to rachis, herbaceous to thinly leathery; veins anastomosing, secondary veins prominent, almost reaching margin; usually 1 or 2, sometimes more, rows of areoles between adjacent secondary veins, with ex- or recurrent free veins; fertile fronds similar to sterile ones or sometimes much contracted with lamina ± absent. Sori usually between adjacent secondary veins, orbicular or elongate to linear, sometimes sporangia acrostichoid; spores hyaline to light brown, ellipsoid, aperture 1/4–3/4 of spore length; surface shallowly tuberculate, usually plane with abundant spherical deposits, sometimes with short echinate elements. n = 36, 2n = 72, 108, 144, 216.

About 25 “indistinct” species: Asia; 13 species (two endemic) in China.

Most species have linear sori on tertiary veins parallel to secondary veins, or orbicular to elongate sori in *Leptochilus hemionitideus*. The delimitation between *Colysis* and *Leptochilus* is not obvious, and the two genera were merged by Nooteboom (Blumea 42: 261–294. 1997).

1a. Lamina pinnatifid or digitately lobed.
  2a. Lamina digitately to pedately lobed or sometimes 2- or 3-forked, rarely with occasional simple lamina ..... 10. *L. digitatus*
  2b. Lamina pinnately lobed.
    3a. Lamina regularly deeply pinnatifid ..... 9. *L. ellipticus*
    3b. Lamina ± irregularly lobed near base only.
      4a. Lamina broadly triangular-lanceolate or hastate, with 1 or 2(–6) pairs of lanceolate, horizontally spreading lobes, abaxial surface sparsely scaly when young ..... 7. *L. ×hemitomus*
      4b. Lamina triangular-lanceolate, with 1–3 pairs of irregular lobes, abaxial surface glabrous ..... 8. *L. ×shintenensis*
1b. Lamina entire and slightly undulate.
  5a. Fertile fronds linear with lamina ± absent.
    6a. Rhizome flattened, scales sparse, small, narrowly lanceolate, peltate, roots absent or rare at young age, root hairs on rhizome ..... 11. *L. axillaris*
    6b. Rhizome flattened or rounded, scales dense, large, broadly lanceolate, pseudopeltate, roots always present, sometimes sparse.
      7a. Sterile fronds lanceolate or oblong-lanceolate, 10–50 × 2.5–11 cm, base decurrent, apex acute or acuminate; phyllopodia ± distinct ..... 12. *L. decurrens*
      7b. Sterile fronds ovate or triangular, 2–7 × 1.5–4 cm, base cordate, apex obtuse; phyllopodia obscure ..... 13. *L. cantoniensis*
  5a. Fertile fronds with obvious lamina, often as wide as in sterile fronds.
    8a. Sori orbicular to elongate, in interrupted lines.
      9a. Fertile fronds monomorphic; stipe 1–4 cm ..... 1. *L. hemionitideus*
      9b. Fertile fronds dimorphic; stipe 4–10 cm ..... 2. *L. ×beddomei*
    8b. Sori linear, continuous.
      10a. Leaves dimorphic ..... 3. *L. pedunculatus*
      10b. Leaves monomorphic.
        11a. Lamina abaxial surface with small scales and scale-shaped soral paraphyses ..... 4. *L. wrightii*
        11b. Lamina abaxial surface without small scales and scale-shaped soral paraphyses.
          12a. Fronds elliptical or ovate-lanceolate; lamina normally rather abruptly narrowed below middle, venation indistinct ..... 5. *L. henryi*
          12b. Fronds narrowly linear; lamina gradually decurrent nearly to base, venation distinct ..... 6. *L. leveillei*

1. Leptochilus hemionitideus (C. Presl) Nooteboom, Blumea 42: 285. 1997.

断线蕨 duan xian jue

Selliguea hemionitidea C. Presl, Tent. Pterid. 216. 1836; *Colysis hemionitidea* (C. Presl) C. Presl; *Drynaria hemionitidea* (C. Presl) J. Smith; *Leptochilus decurrens* Blume subsp. *hemionitideus* (C. Presl) Fraser-Jenkins; *Microsorum ensato-sessilifrons* (Hayata) H. Itô; *M. hemionitideum* (C. Presl) Copeland; *Pleopeltis hemionitidea* (C. Presl) T. Moore; *Polypodium ensato-sessilifrons* Hayata; *P. hemionitideum* (C. Presl) Wallich ex Mettenius.

Rhizome 2–4 mm in diam., dorsiventrally flattened; scales pseudopeltate, narrowly ovate or triangular, 2–4 × 0.7–1.2 mm, clathrate or subclathrate, central region bearing multiseptate hairs at least when young or glabrous, margin denticulate. Fronds not or only slightly dimorphic; stipe winged for a considerable part; lamina simple, narrowly ovate to narrowly obovate, 28–60 × 3–8.5 cm, thinly herbaceous, abaxial surface without acicular hairs, base very narrowly cuneate, margin entire, apex acute or acuminate; lateral veins ± straight, prominent and distinct, (6–)7.6–14 mm apart, dichotomously branched near margin, connecting veins 4–7 between adjacent veins, anadromous, veinlets generally forming 2–4 prominent and distinct areoles, free veinlets simple or once forked. Sori orbicular or elongate, in 1 discontinuous line between each pair of veins, superficial or slightly sunken, absent from basal 30%–50% of lamina, 1–4(–7) per veinlet.

Terrestrial on stones in streams, in dry evergreen forests, on wet ground in stream beds in dense forests, locally common; 700–2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Japan, Nepal, Thailand].

The epithet was first introduced by Wallich as *Polypodium hemionitideum* (Numer. List, no. 284. 1829, nom. nud.).

2. Leptochilus ×beddomei (Manickam & Irudayaraj) X. C. Zhang & Nooteboom, **comb. nov.**

异叶线蕨 yi ye xian jue

Basionym: *Colysis ×beddomei* Manickam & Irudayaraj, Taxon 46: 267. 1997; *C. diversifolia* W. M. Chu (1979), not *Leptochilus diversifolius* (Blume) C. Christensen (1906).

Rhizome long creeping, reddish brown, densely scaly; scales reddish brown, peltate, ovate-lanceolate, base subrounded, margin sparsely denticulate, apex acuminate. Fronds monomorphic to dimorphic, sometimes fertile fronds also dimorphic, distant; stipe 4–10 cm, narrowly winged; lamina broadly lanceolate to oblanceolate, 30–50 × 3–7 cm, papery, glabrous, base long decurrent to base of stipes, apex acuminate; lateral veins prominent, veinlets forming 3 or 4 large areoles between 2 adjacent lateral veins, free included veinlets simple or forked. Sori separate, orbicular or oblong to linear, definitely connate, in 1 regular row between adjacent lateral veins.

800–1200 m. SE Yunnan [India, Myanmar].

The fertile fronds of *Colysis diversifolia* are of two kinds, sometimes like those of *C. hemionitidea*, and sometimes narrowed like those of *Leptochilus decurrens*. Manickam and Irudayaraj made a good case for these plants representing a hybrid between them.

3. Leptochilus pedunculatus (Hooker & Greville) Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 62. 2008.

具柄线蕨 ju bing xian jue

Ceterach pedunculatum Hooker & Greville, Icon. Filic. 1: t. 5. 1827; *Colysis bonii* Ching; *C. fluviatila* (Lauterbach) Ching; *C. intermedia* Ching & Chu H. Wang; *C. membranacea* (Blume) C. Presl; *C. pedunculata* (Hooker & Greville) Ching; *C. saxicola* H. G. Zhou & Hua Li; *C. wui* Ching; *Grammitis membranacea* Blume; *Gymnogramma membranacea* (Blume) Hooker; *Leptochilus macrophyllus* (Blume) Nooteboom var. *fluviatilis* (Lauterbach) Nooteboom; *L. macrophyllus* var. *pedunculatus* (Hooker & Greville) Nooteboom; *Pleopeltis fluviatilis* (Lauterbach) Alderwerelt; *Polypodium bonii* (Ching) Christ; *P. fluviatile* Lauterbach; *P. pedunculatum* (Hooker & Greville) Mettenius; *P. wui* C. Christensen; *Selliguea membranacea* (Blume) Blume; *S. pedunculata* (Hooker & Greville) C. Presl.

Rhizome slender, creeping, densely scaly, roots many; scales brown, ovate-lanceolate, 1.4–3.8 × 0.2–1 mm, margin sparsely denticulate, apex acuminate. Fronds subdimorphic, distant; stipe stramineous, 5–35 cm; lamina oblong or ovate-lanceolate, 15–25 × 2–7 cm, herbaceous, glabrous, base abruptly narrowed into narrowly winged stipe, margin entire or slightly undulate, apex acuminate or obtuse; lateral veins oblique, veinlets forming 2 rows of areoles between 2 adjacent lateral veins, free included veinlets 1- or 2-forked. Sori linear, ranging from midvein to margin of lamina, 1 row between lateral veins.

On rocks in forests or terrestrial. Guangxi, Hainan, Yunnan [India, Indonesia, Thailand, Vietnam].

4. Leptochilus wrightii (Hooker & Baker) X. C. Zhang, Lycophytes Ferns China, 656. 2012.

褐叶线蕨 he ye xian jue

Gymnogramma wrightii Hooker & Baker, Sp. Fil. 5: 160. 1864 [*"Gymnogramme"*]; *Colysis hokouensis* Ching; *C. longifrons* Tagawa; *C. megalolepis* Tagawa; *C. subsessilifolia* Ching; *C. wrightii* (Hooker & Baker) Ching; *C. wrightii* f. *laciniata* Sa. Kurata; *C. wrightii* monstr. *laciniata* (Sa. Kurata) Nakaike; *Leptochilus macrophyllus* (Blume) Nooteboom var. *wrightii* (Hooker & Baker) Nooteboom; *Polypodium kusukusense* Hayata; *P. wrightii* (Hooker & Baker) Mettenius ex Diels; *P. wrightii* var. *lobatum* Rosenstock.

Rhizome long creeping, densely scaly; scales brown, ovate-lanceolate, 1.4–6.2 × 0.2–1.2 mm, margin denticulate, apex acuminate. Fronds distant; stipe short, 1–3 cm, or fronds subsessile; lamina oblanceolate, 20–25 cm, 2–4.5 cm wide at middle, herbaceous, dark brown, adaxial surface of costa with small scales, base decurrent into winged stipe, margin shallowly undulate, apex acuminate to caudate; veinlets forming 2 rows of areoles between 2 adjacent lateral veins, free included veinlets simple or forked. Sori linear, 1 row between 2 adjacent lateral veins, from midvein up to margin of lamina, with scale-

shaped soral paraphyses.

Shaded forests, terrestrial or epiphytic; 100–1400 m. Fujian, Guangxi, Hong Kong, Jiangxi, Taiwan, Yunnan [Japan, Vietnam].

5. Leptochilus henryi (Baker) X. C. Zhang, Lycophytes Ferns China, 654. 2012.

矩圆线蕨 ju yuan xian jue

Gymnogramma henryi Baker, J. Bot. 25: 171. 1887; *Colysis henryi* (Baker) Ching; *C. lioui* Ching [*"liouiii"*]; *Polypodium henryi* (Baker) C. Christensen; *P. monchangense* C. Christensen; *Selliguea cochlearis* Christ; *S. henryi* (Baker) Christ.

Rhizome slender, long creeping; scales brown, ovate-lanceolate, 1.7–5 × 0.2–2.1 mm, margin sparsely denticulate, apex acuminate. Fronds monomorphic, or subdimorphic, distant; stipe stramineous, 5–35 cm; lamina ovate or ovate-lanceolate, 15–50 × 3–11 cm, herbaceous, glabrous, base abruptly narrowed into narrow wings along stipe, margin entire or slightly undulate, apex acuminate or obtuse; veinlets forming 2 rows of areoles between 2 adjacent lateral veins, free included veinlets simple or 1- or 2-forked. Sori linear, 1 regular row between lateral veins, up to margin of lamina, without paraphyses.

● Shaded forests; below 100–1300 m. Chongqing, Fujian, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang.

6. Leptochilus leveillei (Christ) X. C. Zhang & Nooteboom, **comb. nov.**

绿叶线蕨 lü ye xian jue

Basionym: *Selliguea leveillei* Christ, Bull. Acad. Int. Géogr. Bot. 16: 236. 1906; *Colysis leveillei* (Christ) Ching; *C. leveillei* f. *angusta* (C. Christensen) Ching; *C. leveillei* f. *major* (C. Christensen) Ching; *Polypodium leveillei* (Christ) C. Christensen; *P. leveillei* f. *angustum* C. Christensen; *P. leveillei* f. *majus* C. Christensen.

Rhizome slender, long creeping; scales brown, ovate-lanceolate, 1.1–4.4 × 0.3–1 mm, margin sparsely denticulate, apex acuminate. Fronds monomorphic or slightly dimorphic, distant; stipe stramineous, 4–8 cm; lamina linear or linear-lanceolate, 20–40 cm, 0.8–4 cm wide at middle, herbaceous, glabrous, gradually decurrent nearly to base, margin slightly undulate, apex long acuminate or caudate; veinlets forming 2 rows of areoles between 2 adjacent lateral veins, free included veinlets simple or forked. Sori linear, 1 regular row between lateral veins, up to margin of lamina, without paraphyses.

● Wet forests; 400–1300 m. Fujian, Guangdong, Guangxi, Guizhou.

This combination was previously published by X. C. Zhang (Lycophytes Ferns China, 654. 2012) but not validly so because *Colysis leveillei* was cited instead of the basionym, *Selliguea leveillei* (*Melbourne Code*, Art. 41.5).

Leptochilus leveillei is very similar to *L. wrightii* but without paraphyses.

7. Leptochilus ×hemitomus (Hance) Nooteboom, Blumea 42: 293. 1997.

胄叶线蕨 zhou ye xian jue

Polypodium hemitomum Hance, J. Bot. 21: 269. 1883; *Colysis hemitoma* (Hance) Ching; *C. hemitoma* f. *integra* Ching ex S. H. Fu; *P. cavaleriei* Rosenstock; *P. phyllomanes* Christ var. *hemitomum* (Hance) Christ.

Rhizome slender, long creeping; scales dark brown, ovate-lanceolate, 1–4.6 × 0.2–1 mm, margin denticulate, apex long acuminate. Fronds monomorphic or slightly dimorphic, distant; stipe pale brown, 5–30 cm; lamina simple to irregularly pinnatifid lobed, ovate, broadly deltoid-lanceolate, or sagittate, 10–25 × 3–15 cm, herbaceous, glabrous, base truncate, apex long acuminate; lobes when present 1–3 pairs, linear-lanceolate, 3–10 × 0.6–1.8 cm, margin undulate; veinlets forming 2 rows of areoles between 2 adjacent lateral veins, free included veinlets simple or forked. Sori linear, 1 regular row between lateral veins, up to margin of lamina, sometimes incompletely covered by peltate paraphyses when young.

Valley forests. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Zhejiang [Japan, Indonesia, Malaysia, Vietnam].

Nooteboom (Blumea 42: 294. 1997) regarded *Leptochilus ×hemitomus* as a hybrid between *L. macrophyllus* (Blume) Nooteboom and *L. ellipticus* on the basis of the irregular frond shape and abortive sporangia.

8. Leptochilus ×shintenensis (Hayata) X. C. Zhang & Nooteboom, **comb. nov.**

新店线蕨 xin dian xian jue

Basionym: *Polypodium ×shintenense* Hayata, Icon. Pl. Formosan. 8: 154. 1919, pro sp.; *Colysis elliptica* (Thunberg) Ching f. *simplex* Ching; *C. ×shintenensis* (Hayata) H. Itô; *C. simplicifrons* (Christ) Tagawa; *C. wrightii* (Hooker) Ching var. *lacerata* Nakai; *Polypodium ellipticum* Thunberg var. *simplicifrons* Christ.

Rhizome slender, long creeping, 3–5 mm in diam.; scales dark brown, ovate-lanceolate, 1–4.6 × 0.2–1 mm, margin denticulate, apex long acuminate. Fronds monomorphic, distant; stipe stramineous, 15–40 cm; lamina triangular-lanceolate, 25–50 × 3–5 cm, herbaceous, glabrous, base attenuate, margin entire or undulate, or with 1–3 pairs of lobes near base; lobes linear or linear-lanceolate, 3–10 × 0.6–1.8 cm; veinlets forming 2 rows of areoles between 2 adjacent lateral veins, free included veinlets simple or forked. Sori linear, 1 regular row between lateral veins, up to margin of lamina.

Terrestrial in dense wet forests; 100–1000 m. Taiwan [Japan].

Nooteboom (Blumea 42: 293. 1997) included *Leptochilus ×shintenensis* within the preceding species.

9. Leptochilus ellipticus (Thunberg) Nooteboom, Blumea 42: 283. 1997.

线蕨 xian jue

Rhizome slender, long creeping, 2–10 mm in diam., somewhat flattened; scales dark brown, ovate-lanceolate, 1.1–7.6 × 0.6–2.3 mm, margin sparsely denticulate, apex acuminate. Fronds subdimorphic, distant; stipe stramineous, 6.5–48 cm; rachis usually winged, to 3.2 cm wide; lamina pinnate to deeply

pinnatifid, oblong-ovate or ovate-lanceolate in outline, 17–70 × 8–22(–50) cm, herbaceous to papery, dark brown, glabrous, base narrowly cuneate and decurrent, margin entire to distinctly undulate-repand; lobes 3–14 pairs, linear to narrowly lanceolate or elliptic, 4.5–24 × 0.9–3.8 cm, apex long acuminate; fertile fronds usually with longer stipes, narrower pinnae or lobes, papery; lateral veins often rather crooked and ill defined, forming 2 or 3 irregularly arranged areoles, free included veinlets often forked. Sori linear, sometimes interrupted, one between each pair of lateral veins. 2*n* = 72.

Forests, on slopes or rocks, sometimes wet; 100–2500 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Japan, Korea, Myanmar, Nepal, Philippines, Thailand, Vietnam].

Colysis elliptica (Thunberg) Ching f. *furcans* (Tutcher) Ching (Bull. Fan Mem. Inst. Biol. 4(10): 335. 1933; *Gymnogramma elliptica* (Thunberg) Baker var. *furcans* Tutcher, J. Linn. Soc., Bot. 37: 69. 1904; *Polypodium ellipticum* Thunberg var. *furcans* (Tutcher) Ching; *P. pothifolium* Mettenius var. *furcans* (Tutcher) Ching) is based on a form of *Leptochilus ellipticus* with serrate basal pinnae and deeply divided distal pinnae.

1a. Fronds pinnatifid to a broadly winged rachis, margin distinctly undulate-repand ..... 9c. var. *flexilobus*
1b. Fronds pinnate to pinnatisect to narrowly winged rachis, margin entire or sometimes indistinctly slightly undulate.
2a. Pinnae 5–9(–14) pairs.
3a. Plants 30–50 cm, fronds subdimorphic, papery, veins and veinlets indistinct, largest lobe 7–12 × 0.9–1.6 cm, rhizome 2.5–4.5 mm wide ..... 9a. var. *ellipticus*
3b. Plants 70–100 cm, fronds monomorphic, herbaceous, veins and veinlets distinct, largest lobe 13–24 × 1.7–2.8 cm, rhizome 5–10 mm wide ..... 9b. var. *pothifolius*
2b. Pinnae 2–5 pairs.
4a. Lamina thinly leathery, 17–30 cm, less than 12 cm wide, largest lobe 5–8 × 1.4–2.2 cm ..... 9d. var. *longipes*
4b. Lamina herbaceous, 40–70 × 12–22 cm, largest lobe 11–18 × 1.7–3.7 cm ..... 9e. var. *pentaphyllus*

9a. Leptochilus ellipticus var. **ellipticus**

线蕨(原变种) xian jue (yuan bian zhong)

Polypodium ellipticum Thunberg in Murray, Syst. Veg., ed. 14, 935. 1784; *Colysis boisii* Ching; *C. elliptica* (Thunberg) Ching; *C. morsei* (Ching) Ching; *Gymnogramma elliptica* (Thunberg) Baker; *Polypodium ellipticum* f. *brevis* Y. C. Wu; *P. morsei* Ching; *Selliguea coraiensis* Christ; *S. elliptica* (Thunberg) Beddome.

Rhizome 2.5–4.5 mm in diam.; scales dark brown. Fronds subdimorphic, 30–50 cm; stipe 6.5–48 cm; rachis terete to narrowly winged; lamina deeply pinnatifid, oblong-ovate or ovate-lanceolate, 20–70 × 8–22 cm, herbaceous, margin entire or sometimes indistinctly slightly undulate; lobes 5–9 pairs, linear or linear-lanceolate, largest lobe 7–12 × 0.9–1.6 cm, apex long acuminate.

Forests, on slopes or rocks beside streams; 100–2500 m. Anhui, Fujian, Guangxi, Guizhou, Hainan, Hong Kong, Hunan, Jiangsu, Jiangxi, Taiwan, Yunnan, Zhejiang [Japan, S Korea, Vietnam].

9b. Leptochilus ellipticus var. **pothifolius** (Buchanan-Hamilton ex D. Don) X. C. Zhang, Lycophytes Ferns China, 653. 2012.

宽羽线蕨 kuan yu xian jue

Hemionitis pothifolia Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 13. 1825; *Colysis elegans* Sa. Kurata; *C. elliptica* var. *pothifolia* (Buchanan-Hamilton ex D. Don) Ching; *C. flavescens* (Ching) Nakaike, S. Matsumoto & V. L. Gurung; *C.* ×*kiusiana* Sa. Kurata; *C. leptophylla* H. Itô; *C. pothifolia* (Buchanan-Hamilton ex D. Don) C. Presl; *C. pothifolia* f. *bipinnatifida* H. Itô; *C. pothifolia* monstr. *bipinnatifida* (H. Itô) Nakaike; *C. pothifolia* var. *membranacea* Nakai; *Leptochilus pothifolius* (Buchanan-Hamilton ex D. Don) Fraser-Jenkins; *Polypodium ellipticum* var. *pothifolium* (Buchanan-Hamilton ex D. Don) Makino; *P. flavescens* Ching; *Selliguea pothifolia* (Buchanan-Hamilton ex D. Don) J. Smith.

Rhizome very thick, 5–10 mm in diam. Fronds large, 70–100 cm; rachis terete to narrowly winged; lamina pinnate to pinnatisect, margin entire or sometimes indistinctly slightly undulate; pinnae (5–)7–14 pairs, largest lobe 13–24(–31) × (0.3–)1.7–2.8(–3.6) cm.

Forests, on rocks. Chongqing, Fujian, Guangxi, Guizhou, Hainan, Hong Kong, Hunan, Jiangxi, Taiwan, Yunnan, Zhejiang [Bhutan, India, Japan, Myanmar, Nepal, Philippines, Thailand, Vietnam].

9c. Leptochilus ellipticus var. **flexilobus** (Christ) X. C. Zhang, Lycophytes Ferns China, 652. 2012.

曲边线蕨 qu bian xian jue

Polypodium flexilobum Christ, Bull. Acad. Int. Géogr. Bot. 1904: 107. 1904; *Colysis dissimilialata* (Bonaparte) Ching; *C. elliptica* var. *flexiloba* (Christ) L. Shi & X. C. Zhang; *C. flexiloba* (Christ) Ching; *C. flexiloba* var. *undulatocrenata* (Ching) Ching; *C. latiloba* Ching; *C. sanjiangensis* H. G. Zhou & Hua Li; *Polypodium dissimilialatum* Bonaparte; *P. ellipticum* var. *undulatorepandum* C. Christensen; *P. flexilobum* var. *undulatocrenatum* Ching; *Selliguea elliptica* var. *flagellaris* Christ.

Rhizome 2–2.5 mm in diam. Rachis broadly winged, up to 3.2 cm wide; lamina pinnatifid 18–25 × 12–22 cm, herbaceous, margin distinctly undulate-repand to crisped; lobes 6 or 7 pairs, lanceolate, distinctly narrowed at base, largest lobe 5–12 × 0.9–1.6 cm widest above base.

Forests. Chongqing, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [Vietnam].

9d. Leptochilus ellipticus var. **longipes** (Ching) Nooteboom, **comb. nov.**

长柄线蕨 chang bing xian jue

Basionym: *Colysis longipes* Ching, Bull. Fan Mem. Inst. Biol. 4(10): 332. 1933; *C. elliptica* var. *longipes* (Ching) L. Shi & X. C. Zhang; *Leptochilus longipes* (Ching) X. C. Zhang.

Fronds small. Rachis terete to narrowly winged; lamina pinnate to pinnatisect, 17–30 × less than 12 cm, thinly leathery, yellow-green, thick, margin entire or sometimes indistinctly slightly undulate; pinnae 2–3(–5) pairs, deltoid, largest lobe 5–8 × 1.4–2.2 cm; veinlets sometimes obscure.

● On wet rocks in forests. Hainan.

9e. Leptochilus ellipticus var. **pentaphyllus** (Baker) X. C. Zhang & Nooteboom, **comb. nov.**

滇线蕨 dian xian jue

Basionym: *Gymnogramma pentaphylla* Baker, Bull. Misc. Inform. Kew 1898: 233. 1898; *Colysis elliptica* var. *pentaphylla* (Baker) L. Shi & X. C. Zhang; *C. longisora* (Baker) Ching; *C. pentaphylla* (Baker) Ching; *G. longisora* Baker; *Polypodium ellipticum* var. *pentaphyllum* (Baker) C. Christensen; *P. longisorum* (Baker) C. Christensen; *P. mediosorum* Ching; *Selliguea pentaphylla* (Baker) Christ.

Rhizome scales spreading, large, pale brown and shiny, membranous. Rachis terete to narrowly winged; lamina pinnate to pinnatisect 40–70 × 12–22 cm, herbaceous, margin entire or sometimes indistinctly slightly undulate; pinnae 2–5(–8) pairs, largest lobes 11–18 × 1.7–3.7(–5) cm.

● Forests; 500–1500 m. Guangdong, Guangxi, Guizhou, Xizang, Yunnan.

10. Leptochilus digitatus (Baker) Nooteboom, Blumea 42: 282. 1997.

掌叶线蕨 zhang ye xian jue

Gymnogramma digitata Baker, J. Bot. 28: 267. 1890; *Colysis digitata* (Baker) Ching; *C. digitata* f. *annamensis* (Christ) Ching; *C. digitata* f. *cadieri* (Christ) Ching; *C. digitata* f. *laciniata* Ching; *C. triphylla* Ching & Chu H. Wang; *Polypodium ampelideum* Christ; *P. annamense* Christ; *P. cadieri* Christ; *P. digitatum* (Baker) C. Christensen; *P. podopterum* Christ.

Rhizome slender, long creeping, 3–5 mm in diam.; scales narrowly ovate or triangular, 1.5–6.6 × 1–1.7 mm, margin denticulate, apex long acuminate to hairlike. Fronds not or only slightly dimorphic; stipe stramineous, 20–30 cm; lamina pedately divided, trifid, unequally trifid, or simple, 8–18 × 8–26 cm, widest below middle, thinly herbaceous, base cuneate-decrescent to cuneate, margin entire or undulate; longest lobes widest below middle; apical lobe 10–18 × 1.5–4 cm; veins ± sunken and indistinct, or prominent and distinct, free included veinlets simple or once forked. Sori linear, 1 row between each pair of lateral veins, superficial or slightly sunken, on whole surface of lamina.

On rocks by streams, or climbing on lower tree trunks; sea level to 1400 m. Guangdong, Guangxi, Guizhou, Hainan, Yunnan [Vietnam].

Rarely, some or all of the fertile fronds of *Leptochilus digitatus* have very narrow linear lobes; sometimes simple leaves occur.

11. Leptochilus axillaris (Cavanilles) Kaulfuss, Enum. Filic. 147. 1824.

薄唇蕨 bao chun jue

Acrostichum axillare Cavanilles, Anales Hist. Nat. 1: 101. 1799; *Gymnopteris axillaris* (Cavanilles) C. Presl; *G. variabilis* (Hooker) Beddome var. *axillaris* (Cavanilles) Beddome; *Leptochilus platyphyllus* Copeland.

Rhizome 1.5–3.5 mm in diam., dorsiventrally flattened, bearing scales and hairs, with only circumvascular sheaths; vascular bundles 7–15; roots absent, root hairs on rhizome; scales sparse, peltate, distinctly spreading, narrowly ovate or triangular, broadest at middle, 0.5–2 × 0.1–0.2 mm, margin denticulate; phyllopodia 3–80 mm apart, ± distinct. Sterile fronds: stipe 2–9 cm, 0.9–1.5 mm in diam.; lamina narrowly elliptic or narrowly ovate, 9–36 × 1.1–6.5 cm, 3–10 × as long as broad, with short glandular hairs, base narrowly decrescent, stipe winged for a considerable part to cuneate-decrescent to cuneate to cordate, auriculate, margin entire. Fertile fronds: stipe 2–7 cm; lamina simple, linear, 15–30 × 0.1–0.5 cm; veins 7–10 mm apart, prominent and distinct, zigzag, each costal areole giving rise to 2 lateral veins, thus lateral veins seemingly branching at or near costa, costal areole bordered by several smaller areoles; a prominent basiscopic (or sometimes acroscopic) connecting vein dichotomously branching off near costa; connecting veins catadromous, 2–4 between adjacent secondary veins; smaller veins prominent and distinct; free veinlets simple or once forked, usually in- and excurrent. Sori acrostichoid, superficial or slightly sunken; paraphyses present.

Epiphytic at low levels in forests. Guizhou, Yunnan [Bangladesh, India, Indonesia, Malaysia, Myanmar, New Guinea, Philippines, Thailand].

12. Leptochilus decurrens Blume, Enum. Pl. Javae 2: 206. 1828.

似薄唇蕨 si bao chun jue

Acrostichum lanceolatum (Fée) Hooker (1864), not Linnaeus (1753), nor Roxburgh (1816); *A. listeri* Baker; *A. variabile* Hooker; *A. variabile* var. *laciniatum* Hooker; *Anapausia decurrens* (Blume) C. Presl; *Campium decurrens* (Blume) Copeland; *C. laciniatum* Copeland; *C. lanceolatum* (Fée) Copeland; *Colysis decurrens* (Blume) Panigrahi; *C. evrardii* Tardieu; *C. poilanei* C. Christensen & Tardieu; *Dendroglossa zeylanica* (Fée) Copeland; *Gymnopteris dichotomophlebia* Hayata; *G. feei* T. Moore; *G. feei* f. *anomala* Beddome; *G. feei* var. *pinnatifida* Beddome; *G. feei* var. *trilobata* Beddome; *G. wallichiana* C. Presl; *Leptochilus hilocarpus* Fée; *L. laciniatus* (Hooker) Ching; *L. laciniatus* var. *simplex* Ching; *L. lanceolatus* Fée; *L. listeri* (Baker) C. Christensen; *L. thwaitesianus* Fée; *L. zeylanicus* Fée; *Paraleptochilus decurrens* (Blume) Copeland; *P. decurrens* var. *lanceolata* (Fée) R. D. Dixit.

Rhizome 2.5–3 mm in diam., dorsiventrally flattened, with

only scattered strands of sclerenchyma (rarely also in ca. 6 bundle sheaths); sclerenchyma strands 20–100; roots densely set; scales pseudopeltate (sometimes peltate), densely set, slightly spreading, narrowly ovate or triangular, broadest below middle, 2–5 × 0.3–1 mm, margin denticulate; central region bearing multiseptate hairs at least when young, or central region glabrous; phyllopodia 1–7 mm apart, ± distinct. Sterile fronds: stipe 0–18 cm, base with 2 longitudinal ridges; lamina narrowly ovate to ovate (to narrowly obovate), 10–50 × 2.5–11 cm, abaxial surface with short glandular hairs, base decurrent almost to base of stipe, 1.2–1.7 mm in diam. Fertile fronds: stipe present, 14–50 cm; lamina linear to narrowly ovate to ovate, 0.1–1 cm wide; lateral veins 5–12 mm apart, prominent and distinct, ± straight or zigzag, dichotomously branched near margin, or below middle; no prominent veinlet situated parallel to veins, or each costal areole giving rise to 2 lateral veins, thus lateral veins seemingly branching at or near costa, costal areole bordered by several smaller areoles, no prominent connecting basiscopic vein branching off near costa; connecting veins anadromous, 3–8 between adjacent secondary veins; smaller veins ± sunken and indistinct. Sori acrostichoid, on whole surface of lamina; paraphyses present.

Epilithic or epiphytic on trunk bases, sometimes terrestrial, often on rocks beside streams in forests; 100–1800 m. Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Bhutan, India, Indonesia, Malaysia, Malesia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands (Christmas Island)].

Nooteboom (Blumea 42: 282. 1997) suggested that *Leptochilus trifidus* Alderwerelt is a hybrid between *L. decurrens* and *Colysis macrophyllus* (Blume) C. Presl. The combination *"Bolbitis laciniata"* (Abeywickrama, Ceylon J. Sci., Sect. A, Bot. 13: 22. 1956) was not validly published because a full and direct reference to the author and place of valid publication of the basionym was not provided (*Melbourne Code*, Art. 41.5).

13. Leptochilus cantoniensis (Baker) Ching, Bull. Fan Mem. Inst. Biol. 4(10): 343. 1933.

心叶薄唇蕨 xin ye bao chun jue

Gymnogramma cantoniense Baker, Hooker's Icon. Pl. 17: t. 1685. 1887; *Campium cantoniense* (Baker) Ching; *Christopteris cantoniensis* (Baker) Christ; *Dendroglossa cantoniensis* (Baker) Copeland; *Drymoglossum cordatum* Christ; *Leptochilus cordatus* (Christ) Ching; *Myuropteris cordata* (Christ) C. Christensen; *Polypodium cantoniense* (Baker) Baker.

Rhizome 1–2 mm in diam., rounded, with only scattered strands of sclerenchyma; sclerenchyma strands 10–50; roots sparsely set; scales pseudopeltate, densely set, slightly spreading, ovate or triangular, broadest below middle, 1.5–2.5 × 0.5–1 mm, margin entire or denticulate, apex acute, center with multiseptate hairs at least when young; phyllopodia obscure. Fronds strongly dimorphic; stipe present, 1–11 cm, 0.5–1 mm in diam.; lamina simple, ovate to deltoid, 2–7 × 1.5–4 cm, 1.6–2 × as long as broad, thinly herbaceous to herbaceous, base truncate to truncate-decrescent to cordate, auriculate, margin entire, apex rounded. Fertile fronds: stipe 12–30 cm; lamina linear, 1.5–15 × 0.1–0.5 cm; each costal areole giving rise to 2 lateral veins, thus lateral veins seemingly branching at or near costa, costal areole bordered by several smaller areoles; veins 1–2 mm apart, ± sunken and indistinct, zigzag, dichotomously branched near margin, a prominent basiscopic (or sometimes acroscopic) connecting vein dichotomously branching off near costa, 2 or 3 between adjacent secondary veins, smaller veins ± sunken and indistinct, marginal vein absent. Sori acrostichoid; paraphyses present, simple uniseriate hairs with glandular terminal cells.

On rocks along streams. Guangdong, Hainan [Vietnam].

26. POLYPODIUM Linnaeus, Sp. Pl. 2: 1082. 1753.

多足蕨属 duo zu jue shu

Lu Shugang (陆树刚); Christopher Haufler

Plants epiphytic or epilithic, small to medium-sized. Rhizome long creeping, covered with scales; scales brown, lanceolate or narrowly lanceolate, clathrate or centrally clathrate. Fronds usually remote, articulate at base, monomorphic. Lamina broadly lanceolate, simple, pinnatifid, truncate at base, pinnatilobed at apex. Lateral segments more than 5 pairs, lanceolate, ± falcate, entire to incised at margins. Veins free, veinlets forked. Sori orbicular, in 1 row on either side of costa, borne on acroscopic branch of a free forked veinlet; sporangia long stalked, annulus with ca. 20 hardened cells. Spores yellow, ellipsoid, surface verrucate. $x = 37$.

About ten species: throughout the N temperate zone, ranging from temperate Europe and N Asia to North America; two species in China.

Ten uncertain taxa, not included in the following key, are listed at the end of the account.

1a. Segments oblique, 3–4 cm; sori lacking sporangiasters, medial or slightly closer to costa ..... 1. *P. vulgare*
1b. Segments spreading, 2–2.5 cm; sori bearing sporangiasters, much nearer to margin than to costa ..... 2. *P. sibiricum*

1. Polypodium vulgare Linnaeus, Sp. Pl. 2: 1085. 1753.

欧亚水龙骨 ou ya shui long gu

Rhizome long creeping, 3–4 mm in diam., densely scaly; scales pale brown, lanceolate with ovate peltate base, 4–5 mm, margin toothed, apex acuminate. Fronds remote. Stipe straw-colored, 5–10 cm, densely scaly at base, glabrescent upward. Lamina pinnatifid or pinnatisect, oblong-lanceolate in outline, 10–20 × 5–7 cm, herbaceous or subleathery, glabrous, apex shortly caudate. Segments 12–15 pairs, oblique, lanceolate, 3–4 × 0.5–0.8 cm, decurrent to adjacent lobes by very narrowly winged rachis, margin toothed, apex obtuse or acute. Veinlets hardly visible. Sori medial or slightly closer to costa.

Epilithic; ca. 1900 m. Xinjiang [Russia; Europe].

Available evidence demonstrates that *Polypodium vulgare* does not occur in Japan or North America.

2. Polypodium sibiricum Siplivinsky, Novosti Sist. Vyssh. Rast. 11: 329. 1974.

东北水龙骨 dong bei shui long gu

Rhizome wide creeping, 2–3 mm in diam., densely scaly; scales brown, lanceolate, 3–4 mm, margin remotely toothed, apex acuminate. Fronds remote. Stipe straw-colored, 5–8 cm, glabrous. Lamina deeply pinnatifid or pinnatisect, oblong-lanceolate in outline, 10–20 × 3–5 cm, subleathery, yellowish green abaxially, grayish green adaxially, glabrous, apex acuminate or caudate. Segments 12–16 pairs, spreading, narrowly lanceolate, 2–2.5 × 0.5–0.6 cm, usually decurrent to adjacent lobes by narrowly winged rachis, apex obtuse or acute. Veins free, veinlets terminating with hydathode near margin, invisible abaxially, hardly visible adaxially. Sori near margin; sporangia interspersed with 40 or fewer sporangiasters, normally without glandular hairs.

Epiphytic on tree trunks or epilithic. Hebei, Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Mongolia, Russia; North America].

This taxon has traditionally been identified as *Polypodium virginianum* Linnaeus (Sp. Pl. 2: 1085. 1753), but investigations indicate that *P. virginianum* is confined to E North America, whereas *P. sibiricum* ranges from the boreal forests of Canada west into N Japan, across China, and into Siberia (Haufler & Windham, Amer. Fern J. 81: 6–22. 1991; Haufler & Wang, Amer. J. Bot. 78: 624–629. 1991).

Uncertain taxa

Polypodium grandiceps G. Nicholson (Ill. Dict. Gard. 4: 592. 1888), described from Taiwan.

Polypodium griseonigrum Baker (Bull. Misc. Inform. Kew 1895: 55. 1895 [*"griseo-nigrum"*]), described from Yunnan.

Polypodium lobatum Hudson var. *hupehense* Pampanini (Nuovo Giorn. Bot. Ital., n.s., 22: 252. 1915), described from Hubei.

Polypodium mathewii Tutcher (J. Linn. Soc., Bot. 37. 68. 1905), described from Shandong.

Polypodium micropteris Baker (Bull. Misc. Inform. Kew 1906: 14. 1906), not C. Christensen (1905), described from Yunnan.

Polypodium muliense Ching ex K. H. Shing (Acta Phytotax. Sin. 31: 573. 1993), described from Sichuan.

Polypodium nervopilosum K. H. Shing (Acta Phytotax. Sin. 31: 573. 1993), described from Sichuan.

Polypodium obtusifrons Hayata (Icon. Pl. Formosan. 4: 250. 1914), described from Taiwan.

Polypodium rosthornii Diels (Bot. Jahrb. Syst. 29(2): 205. 1900), described from China ("Kin-shan").

Polypodium trichophyllum Baker (Bull. Misc. Inform. Kew 1906: 13. 1906), described from Yunnan.

27. PLEUROSORIOPSIS Fomin, Izv. Kievsk. Bot. Sada 11: 8. 1930.

睫毛蕨属 jie mao jue shu

Xing Fuwu (邢福武), Wang Faguo (王发国); Masahiro Kato

Plants small, epiphytic or epilithic. Rhizome slender, long creeping, with ca. 2 vascular bundles, densely covered by long rufous linear hairs and long and narrow linear scales at apex. Fronds distant; stipe straw-colored, slender, densely covered with hairs similar to those of rhizome, with 1 terete vascular bundle; lamina bipinnatifid, papery, both surfaces densely covered with brown nodose hairs, densely ciliate at margin; pinnules subligulate, entire or subentire, apex obtuse; veins free, with 1 veinlet per lobe, ending inframarginally. Sori linear-oblong, along veins; sporangia shortly stalked, annulus consisting of 14(–16) thick-walled cells; spores reniform, bilateral, transparent, smooth-surfaced, perispore thin.

One species: China, Japan, Korea, Russia.

1. Pleurosoriopsis makinoi (Maximowicz ex Makino) Fomin, Izv. Kievsk. Bot. Sada 11: 8. 1930.

睫毛蕨 jie mao jue

Gymnogramma makinoi Maximowicz ex Makino, Bot. Mag. (Tokyo) 8: 481. 1894; *Anogramma makinoi* (Maximowicz ex Makino) Christ.

Rhizome densely covered with long rufous linear hairs and also a few deciduous linear scales near apex, hairs 2–6 mm. Stipe 1.5–3 cm, densely hairy; hairs brown or rufous, nodose, 0.3–0.6 mm; lamina lanceolate in outline, 1.5–8 × 0.5–1.5 cm, dark green when dry, base cuneate, margin densely ciliate, apex obtuse; pinnae 4–7 pairs, alternate, distant, oblique, shortly stalked, triangular-ovate, basal pair slightly shorter; middle pinnae 5–15 × 4–8 mm, base obliquely cuneate, pinnatipartite, apex obtuse; pinnules 1–3 pairs, alternate, oblique, subligulate or spatulate, 2–3 × ca. 1 mm, entire or subentire, apex obtuse. Sori linear-oblong, short, along veins except their ends, often confluent.

In wet moss communities in forests, on rocks, tree trunks, wet places; 800–2700 m. Gansu, Guizhou (Fanjing Shan, Hezhang), Heilongjiang, Liaoning, Shanxi, Sichuan, Yunnan [Japan, Korea, Russia].

28. SCLEROGLOSSUM Alderwerelt, Bull. Jard. Bot. Buitenzorg, sér. 2, 7: 37. 1912.

革舌蕨属 ge she jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Plants small, epiphytic. Rhizomes radial, with stipes in whorls; scales not clathrate, glabrous. Stipe not articulate to rhizome, phyllopodia absent. Lamina linear to linear-oblanceolate, base long attenuate, margin entire, apex acute to obtuse; lateral veins hidden, invisible, free, endings without hydathodes on adaxial surface of lamina. Sori linear, deeply sunken in 2 grooves, 1 on each side of midrib, ± parallel to margin and midrib. Sporangia glabrous.

About seven species: Sri Lanka and China to Australia and Pacific islands; one species in China.

1. Scleroglossum sulcatum (Kuhn) Alderwerelt, Bull. Jard. Bot. Buitenzorg, Sér. 2, 7: 39. 1912.

革舌蕨 ge she jue

Vittaria sulcata Kuhn, Linnaea 36: 68. 1869; *Taeniopsis sulcata* (Kuhn) Beddome.

Stipe glabrous or nearly so. Lamina linear to linear-oblanceolate, 1.5–5.5 × 0.3–0.4 cm, long attenuate to form a wing at base, apex acute to obtuse; midrib distinctly prominent abaxially, grooved adaxially; lateral veins invisible even with transmitted light, ascending, mostly forked or irregularly branched, extending beyond sorus; hairs absent to sparse, usually visible abaxially on midrib and margin (but lost when old), inconspicuous on both surfaces, if present then simple and forked, pale to medium reddish brown, 0.1–0.3 mm. Sori ± medial between midrib and margin; grooves 0.3–0.6 mm from margin, 0.8–1.2 mm apart, inner edge of groove usually acute and somewhat produced over sori, outer edge attenuate toward margin, mouth of groove obliquely opening toward margin.

On moss-covered tree trunks in dense mountain forests; 800–1500 m. Hainan, N Taiwan [Borneo, Indonesia, Malaysia, New Guinea, Philippines, Sri Lanka. Thailand, Vietnam; Pacific islands].

Material of this species has been misidentified as *Scleroglossum pusillum* (Blume) Alderwerelt (*Vittaria pusilla* Blume; *Taenitis pusilla* (Blume) Mettenius ex Miquel) (e.g., FRPS 6(2): 321. 2000).

29. OREOGRAMMITIS Copeland, Philipp. J. Sci., C, 12: 64. 1917.

滨禾蕨属 bin he jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Plants small, epiphytic, seldom petrophytic. Rhizomes dorsiventral, with stipes in 2 rows; scales not clathrate, brown or reddish brown, glabrous. Stipe articulate or not, phyllopodia present or not. Lamina usually entire, rarely slightly crenulate; veins simple or 1- or 2-forked, free, vein endings sometimes with a hydathode on adaxial surface of lamina. Sori usually superficial or slightly sunken in shallow depressions on lamina, sometimes deeply sunken, on acroscopic vein branch unless veins simple, in 2 rows, 1 on each side of midrib. First-developed sporangia usually with 1–4 simple hairs at apex adjacent to annulus, rarely glabrous; later-developed sporangia glabrous. Hairs usually simple eglandular, either solitary or tufted, and rarely 1- or 2-forked with eglandular branches.

About 110 species: Sri Lanka and China to Australia and Pacific islands; seven species (two endemic) in China.

1a. Mature lamina glabrous in apical half, or only with very sparse hairs.
  2a. Sori superficial, or slightly sunken; sporangia setose ..... 1. *O. adspersa*
  2b. Sori deeply sunken; sporangia glabrous ..... 5. *O. nuda*
1b. Mature lamina with hairs in apical half, at least on midrib.
  3a. Lateral veins distinct ..... 6. *O. reinwardtii*
  3b. Lateral veins hidden.
    4a. Lamina usually less than 6 cm; stipe usually less than 1 cm.
      5a. Stipe hairs dark reddish brown, 0.1–0.2 mm ..... 3. *O. dorsipila*
      5b. Stipe hairs pale to dark red-brown, 0.2–1.8 mm ..... 7. *O. sinohirtella*
    4b. Lamina usually more than 8 cm; stipe more than 1 cm.
      6a. Stipe hairs up to 1.2 mm; lateral veins 1- or 2-forked, acroscopic branch extending beyond sorus ..... 2. *O. congener*
      6b. Stipe hairs up to 0.5 mm; lateral veins 1-forked, acroscopic branch not extending beyond sorus ..... 4. *O. hainanensis*

1. Oreogrammitis adspersa (Blume) Parris, Gard. Bull. Singapore 58: 255. 2007.

无毛滨禾蕨 wu mao bin he jue

Grammitis adspersa Blume, Fl. Javae Filic. 115. 1830; *G. malaica* (Alderwerelt) Tagawa; *Polypodium malaicum* Alderwerelt.

Stipe very short, up to 0.5 cm, with occasional to scattered simple solitary and forked short hairs when young; phyllopodia absent. Lamina linear to narrowly elliptic, 2–6 × 0.3–0.7 cm, cuneate or attenuate to form wing almost to base, glabrous or with occasional to sparse hairs on younger laminae at base, margin entire, sometimes undulate, apex acute or bluntly obtuse; midrib prominent abaxially at base, less so adaxially, gradually flattened toward apex, dark brown in basal part, brown in apical part; lateral veins hidden, visible in younger fronds with transmitted light, simple, or when soriferous 1-forked with a short acroscopic branch not extending beyond sorus, endings with hydathodes; hairs absent or only in younger fronds, when present hairs simple, solitary, or rarely forked, pale brown, up to 0.2 mm, mainly on both sides of basal midrib and margin,

absent or nearly so on other parts. Sori orbicular to oval, superficial, quite close to midrib. Sporangia setose.

Among moss on tree trunks in dense wet mountain forests; 1200–1800 m. Hainan, Taiwan (Pingdong) [Borneo, Indonesia, Malaysia, New Guinea, Philippines, Thailand, Vietnam; Pacific islands].

2. Oreogrammitis congener (Blume) Parris, Gard. Bull. Singapore 58: 257. 2007.

南亚滨禾蕨 nan ya bin he jue

Grammitis congener Blume, Enum. Pl. Javae 2: 115. 1828.

Stipe 1–4 cm, covered with 2 different kinds of simple solitary hairs; shorter hairs whitish brown, up to 0.3 mm, dense on nearly whole stipe; longer hairs medium to dark reddish brown, up to 1.2 mm, usually sparsely confined to apical part of stipe; phyllopodia present. Lamina linear-elliptic, 8–15.5 × 0.5–1 cm, gradually narrowed downward to acuminate base, margin entire, sometimes slightly undulate, apex obtuse or acute; hairs mainly simple, solitary, rarely tufted, not tufted on margin, dark reddish brown, occasional to scattered abaxially on lamina, usually slightly denser on midrib, sparse adaxially on lamina; midrib brown or dark brown at base, prominent abaxially, plane or nearly so adaxially; lateral veins hidden, invisible even with transmitted light, 1- or 2-forked, acroscopic branch usually simple, extending beyond sorus, basiscopic branch forked, endings with hydathodes. Sori orbicular to oval, superficial, near midrib. Sporangia setose.

On moss on tree trunks in wet dense mountain forests; 500–1800 m. Taiwan [Borneo, Cambodia, Indonesia, Malaysia, Philippines, Thailand, Vietnam].

3. Oreogrammitis dorsipila (Christ) Parris, Gard. Bull. Singapore 58: 259. 2007.

短柄滨禾蕨 duan bing bin he jue

Polypodium dorsipilum Christ, Monsunia 1: 59. 1900; *Grammitis dorsipila* (Christ) C. Christensen & Tardieu.

Stipe 0.1–0.4 cm, with dense short simple solitary dark reddish brown hairs 0.1–0.2 mm; phyllopodia absent. Lamina narrowly oblanceolate to linear-oblanceolate, 1.4–6.1 × 0.2–0.4 cm, gradually attenuate or cuneate to stipe, margin entire, apex bluntly acute to obtuse; midrib brown or dark brown, slightly prominent abaxially, sometimes slightly prominent adaxially; lateral veins hidden, 1-forked, acroscopic branch shorter than basiscopic branch, extending beyond sorus or not, endings with sometimes indistinct hydathodes; hairs sparse to frequent on all parts of lamina, simple, solitary, dark reddish brown, 0.1–0.5 mm. Sori orbicular or elliptic, superficial, close to midrib. Sporangia setose.

Usually epiphytic on tree trunks or rupestral beside streams in mountain forests; 600–1200 m. ?Fujian, Guangdong, ?Guangxi, ?Jiangxi, ?Zhejiang [Cambodia, Japan, Laos, Thailand, Vietnam].

Grammitis fenicis of Fl. Taiwan (ed. 2, 1: 527. 1994) is not *G. fenicis* Copeland (Univ. Calif. Publ. Bot. 18: 224. 1942; *Oreogrammitis fenicis* (Copeland) Parris), nor is it *G. dorsipila* as in FRPS (6(2): 318. 2000). In the Fl. Taiwan description, the solitary, rather than tufted, marginal hairs rule out *G. fenicis*, and the non-setose sporangia rule out both *G. fenicis* and *G. dorsipila*. Further studies are needed.

4. Oreogrammitis hainanensis Parris, **sp. nov.**

海南滨禾蕨 hai nan bin he jue

Type: China. Hainan: Five Finger Mountain [Wuzhi Shan], 1830 m, 30 Jan 1923, *E. Smith 1548* (holotype, K!; isotype, SING!).

Oreogrammitis hainanensis resembles *O. reinwardtii* in having the acroscopic vein branch very short and not extending beyond the sorus, but it differs in having the veins invisible and stipe hairs shorter. It differs from *O. sinohirtella* in having a longer stipe and lamina and mostly shorter stipe hairs.

Stipe 11–16 mm, with dense simple solitary pale to dark reddish brown hairs 0.1–0.5 mm; phyllopodia absent. Lamina narrowly elliptic, 7.2–11 × 0.7–0.8 cm, gradually attenuate or cuneate to stipe, margin entire, apex acute to acuminate; midrib brown, slightly prominent abaxially, plane to grooved adaxially; lateral veins hidden, 1-forked, acroscopic branch shorter than basiscopic branch, not extending beyond sorus, endings with hydathodes; hairs occasional to scattered on all parts of lamina, simple, solitary, medium reddish brown, 0.1–2.6 mm. Sori orbicular or elliptic, superficial, close to midrib. Sporangia setose.

● Rupestral in mountain forests; 700–1400 m. Hainan.

5. Oreogrammitis nuda (Tagawa) Parris, Gard. Bull. Singapore 58: 264. 2007.

长孢滨禾蕨 chang bao bin he jue

Grammitis nuda Tagawa, Acta Phytotax. Geobot. 10: 284. 1941.

Stipe sessile or very short, up to 0.4 mm, with sparse short simple tufted hairs up to 0.1 mm; phyllopodia absent. Lamina linear to linear-oblong, 3–10 × 0.3–0.6 cm, almost glabrous on both surfaces, sometimes with occasional to sparse solitary to tufted simple and forked pale brown hairs on margin and abaxial side of midrib (mostly only in young fronds), base narrowly attenuate to cuneate, margin entire, apex bluntly obtuse to slightly emarginate; midribs distinct and prominent on both sides, usually brown on adaxial surface, brown or more often dark brown on abaxial surface; lateral veins hidden, simple or 1-forked when soriferous, acroscopic branch not extending beyond sorus, endings with hydathodes. Sori medial or slightly nearer to midrib, elliptic to linear-oblong, or sometimes slightly recurved, sunken and distinctly prominent on adaxial surface of lamina. Sporangia glabrous.

● Among moss on tree trunks in dense mountain forests; ca. 100 m. Taiwan (Pingdong).

6. Oreogrammitis reinwardtii (Blume) Parris, Gard. Bull. Singapore 58: 266. 2007.

毛滨禾蕨 mao bin he jue

Grammitis reinwardtii Blume, Enum. Pl. Javae Add. 2. 1828; *Polypodium reinwardtii* (Blume) C. Presl.

Stipe 0.8–2 cm, with frequent to dense simple solitary medium reddish brown hairs 1–2.5 mm; phyllopodia usually absent, rarely present. Lamina narrowly elliptic, 3.5–10 × 0.6–

1.2 cm, base cuneate, margin entire, sometimes undulate, or slightly crenulate, apex acute to obtuse; midrib brown, prominent on both sides at least in basal part; lateral veins visible, sometimes simple when sterile, 1-forked when soriferous, acroscopic branch not extending beyond sorus, much shorter than basiscopic branch, endings with hydathodes; hairs simple, solitary, dark reddish brown, up to 2 mm, occasional to frequent, on all parts of lamina. Sori orbicular or oval, superficial, close to midrib. Sporangia setose.

Epiphytic on tree trunks in mossy forests; 1300–1700 m. Taiwan (Hualian, Pingdong, Taidong) [Borneo, Indonesia, Malaysia, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Pacific islands].

7. Oreogrammitis sinohirtella Parris, **sp. nov.**

隐脉滨禾蕨 yin mai bin he jue

Type: China. Guangdong: Ts'ung-hwa District, Cheung Uk village, Sam Kok Shan, 1–16 Mar 1935, *W. T. Tsang 24913* (holotype, E! [barcode 00194227]; isotype, LU).

Oreogrammitis sinohirtella resembles *O. reinwardtii* in having the acroscopic vein branch very short and not extending beyond the sorus, but it differs in having the veins invisible. It differs from *O. hainanensis* in having a shorter stipe and lamina and mostly longer stipe hairs.

Stipe 0.3–1.1 cm, with dense simple solitary pale to dark reddish brown hairs 0.2–1.8 mm; phyllopodia absent. Lamina narrowly elliptic to narrowly oblanceolate, 1.4–5.4 × 0.2–0.7 cm, gradually attenuate or cuneate to stipe, margin entire, apex obtuse to acute; midrib brown to dark brown, slightly prominent abaxially, sometimes slightly prominent adaxially; lateral veins hidden, 1-forked, acroscopic branch shorter than basiscopic branch, not extending beyond sorus, endings with hydathodes; hairs sparse to dense on all parts of lamina, simple, solitary, medium to dark reddish brown, 0.1–3.1 mm. Sori orbicular or elliptic, superficial, close to midrib. Sporangia setose.

Rupestral in mountain forests; 700–1400 m. ?Fujian, Guangdong, Guangxi, Guizhou, Hunan, ?Jiangxi, ?Zhejiang [Thailand, Vietnam].

30. RADIOGRAMMITIS Parris, Gard. Bull. Singapore 58: 240. 2007.

辐禾蕨属 fu he jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Plants small, epiphytic, seldom petrophytic. Rhizomes radial, with stipes in whorls; scales not clathrate, pale to dark reddish brown or yellowish brown, glabrous, sometimes absent. Stipe not articulate, phyllopodia absent. Lamina entire or rarely slightly crenulate; veins simple or 1- or 2-forked, free, endings sometimes with a hydathode on adaxial surface of lamina, or not. Sori superficial or slightly sunken in broad shallow depressions on lamina, on acroscopic vein branch unless fertile veins simple, in 2 rows, 1 each side of midrib. First-developed sporangia usually with 1–3 simple hairs at apex adjacent to annulus, rarely glabrous; later-developed sporangia glabrous. Hairs simple eglandular, either solitary or tufted.

About 28 species: Sri Lanka and China to Australia and Pacific islands; four species (two endemic) in China.

1a. Lamina margin with only solitary hairs ..... 3. *R. setigera*
1b. Lamina margin with solitary and/or tufted hairs.
  2a. Rhizomes without scales; marginal hairs pale to medium reddish brown, tufted, in 2 lengths ..... 1. *R. alepidota*
  2b. Rhizomes with scales; marginal hairs dark reddish brown, simple and tufted, ± all same length.
    3a. Vein endings with hydathodes on adaxial side of lamina, veins 1-forked, branches ± equal in length ..... 2. *R. moorei*
    3b. Vein endings without hydathodes on adaxial side of lamina, veins 1-forked, acroscopic branch much shorter than basiscopic branch ..... 4. *R. taiwanensis*

1. Radiogrammitis alepidota (M. G. Price) Parris, Gard. Bull. Singapore 58: 241. 2007.

无鳞辐禾蕨 wu lin fu he jue

Grammitis alepidota M. G. Price, Philipp. Agric. 57: 34. 1973.

Rhizome without scales, densely hairy. Stipe 0.3–1.2 cm, with frequent to dense pale reddish brown solitary or tufted hairs, obscurely of 2 lengths, up to 2 mm in longer hairs, 0.1–0.3 mm in shorter hairs. Lamina linear, linear-oblong, linear-elliptic, or linear-oblanceolate, 2–5.5 × 0.2–0.6 cm, base attenuate to narrowly cuneate, margin entire or slightly crenulate, apex bluntly obtuse or rounded; midrib slightly prominent on both surfaces, brown to dark brown; lateral veins obscurely visible, or ± hidden in older fronds, simple, extending beyond sorus, ending with an obscure hydathode; hairs on all parts of lamina solitary, or tufted, 2 lengths, longer hairs 0.8–2.5 mm, shorter hairs 0.1–2.5 mm, mainly solitary (rarely tufted) on both surfaces, tufted in 2 lengths on margin, scattered to dense on abaxial surface, frequent to dense on margin, sparse to frequent on adaxial surface. Sori orbicular or oval, superficial, very close to midrib. Sporangia glabrous.

Evergreen mossy broad-leaved forests, usually epiphytic on tree trunks or sometimes on rocks; 1300–1500 m. Taiwan (Hualian, Pingdong) [Philippines, Vietnam].

2. Radiogrammitis moorei Parris & Ralf Knapp, **sp. nov.**

牟氏辐禾蕨 mu shi fu he jue

Type: China. Taiwan: Taidong, Lan Yu, Mt. Hungtou, 22°03′N 121°32′E, 400–500 m, 8 Aug 2004, *Shih-Wen Chung 7242* (holotype, TAIF! [herbarium no. 211637]).

Radiogrammitis moorei has tufted marginal hairs similar to those of *R. jagoriana* (Mettenius ex Kuhn) Parris, but it

differs in having hydathodes at the vein endings and much shorter stipe hairs.

Rhizome with scales. Stipe less than 1 cm, with dense dark reddish brown simple solitary and tufted hairs 0.1–0.2 mm. Lamina narrowly oblanceolate, 3.7–7 × 0.4–0.7 cm, base long attenuate, margin entire, apex bluntly acute; midrib slightly prominent abaxially, slightly prominent to prominent adaxially, concolorous with lamina on both sides; lateral veins invisible, 1-forked, acroscopic branch extending beyond sorus, ± as long as basiscopic branch, ending with a pale hydathode; hairs dark reddish brown, solitary on both surfaces of lamina, solitary and tufted on both sides of midrib and on margin, not of 2 lengths, scattered to dense on abaxial surface, dense on margin, sparse to scattered on adaxial surface, 0.1–0.8 mm. Sori broadly elliptic, slightly sunken, adjacent to midrib, not extending more than halfway to margin. Sporangia setose.

● Epiphytic on tree trunks in wet broad-leaved forests; 400–600 m. Taiwan.

Material of this species has been misidentified as *Grammitis fenicis* Copeland. For more details, including keys, see Knapp (Ferns Fern Allies Taiwan, 240, 245, 458, 747–748. 2011).

3. Radiogrammitis setigera (Blume) Parris, Gard. Bull. Singapore 58: 244. 2007.

刚毛辐禾蕨 gang mao fu he jue

Polypodium setigerum Blume, Enum. Pl. Javae 2: 123. 1828; *Grammitis intromissa* (Christ) Parris; *G. latifolia* De Vol; *P. intromissum* Christ.

Rhizome with scales. Stipe 1.5–2.5 cm, with frequent to dense solitary medium to dark reddish brown hairs 3–4 mm. Lamina linear to broadly linear, 10–15 × 0.9–1.2 cm, base cuneate, margin entire, sometimes slightly undulate, apex acute or obtuse; lateral veins hidden, but visible with transmitted light at least in young fronds, 1- or 2-forked, endings with hydathodes; hairs simple and tufted, reddish brown, up to 3 mm, sparse to frequent on margin and abaxial surface, occasional to scattered on adaxial surface. Sori orbicular, superficial or shallowly depressed, nearer midrib than margin. Sporangia setose.

Epiphytic on tree trunks in dense wet mountain forests; 1400–1600 m. Taiwan [Borneo, Indonesia, New Guinea, Philippines].

4. Radiogrammitis taiwanensis Parris & Ralf Knapp, **sp. nov.**

台湾辐禾蕨 tai wan fu he jue

Type: China. Taiwan: Yilan, Yingtzuling, 24°55′N 121°48′E, 900 m, 12 Jan 2002, *Pi-Fong Lu 2999* (holotype, TAIF! [herbarium no. 158145]).

Radiogrammitis taiwanensis has tufted marginal hairs similar to those of *R. jagoriana* (Mettenius ex Kuhn) Parris but shorter; *R. taiwanensis* never has the lateral veins prominent, while in *R. jagoriana* they are sometimes ± prominent on either or both sides of the lamina.

Rhizome with scales. Stipe less than 1 cm, with dense simple, mainly solitary, sometimes tufted, medium to dark reddish brown hairs, not of 2 lengths, up to 0.8 mm. Lamina linear or linear-oblong to narrowly oblanceolate, 2–9 × 0.3–0.6 cm, base long attenuate, margin entire, apex bluntly acute to obtuse; midrib visible on both surfaces, distinctly prominent abaxially, plane or slightly prominent adaxially at base; lateral veins hidden, even by transmitted light, 1-forked, acroscopic branch not extending beyond sorus, much shorter than basiscopic branch, endings without hydathodes; hairs simple, dark reddish brown or nearly so, usually solitary (rarely tufted) on both surfaces, solitary and tufted on margins, scattered to dense, usually 0.2–0.7 mm, up to 2 mm for some on abaxial surface of lamina. Sori orbicular or oval, superficial or shallowly depressed, close to midrib, extending more than halfway to margin. Sporangia setose.

● Epiphytic or on moss-covered rocks; 800–1600 m. Taiwan.

Material of this species has been misidentified as *Grammitis jagoriana* (Mettenius ex Kuhn) Tagawa (e.g., FRPS 6(2): 316. 2000) and *G. fenicis* Copeland. For more details, including keys, see Huang (Fl. Taiwan, ed. 2, 1: 526–529. 1994) and Knapp (Ferns Fern Allies Taiwan, 240, 245, 458, 747–748, 750–751. 2011).

31. CALYMMODON C. Presl, Tent. Pterid. 203. 1836.

荷包蕨属 he bao jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Plectopteris Fée.

Plants small, epiphytic. Rhizomes radial, with stipes in whorls; scales not clathrate, pale reddish brown, glabrous or with 1 or more hairs at apex. Stipe very short, ± winged to base, not articulate; phyllopodia absent. Lamina attenuate gradually to apex and base, deeply pinnately divided to narrow wing along rachis; pinnae entire, with 1 simple vein, each vein ending with a hydathode, often very indistinct, on adaxial surface of lamina; fertile pinnae folded toward lamina apex and covering sori. Sori oval or elliptic, 1 sorus per pinna. Sporangia glabrous. Hairs simple eglandular, and 1- or 2-forked with eglandular branches.

About 30 species: Sri Lanka and China to Australia and Pacific islands; three species in China.

1a. Lamina with hairs occasional to scattered on all parts, hairs on abaxial surface of lamina 0.5–1 mm ..... 2. *C. gracilis*
1b. Lamina glabrous or sparsely hairy, hairs absent from abaxial surface of lamina or 0.1–0.2 mm.
2a. Hairs on abaxial surface of rachis 0.1–0.2 mm, adaxial surface of rachis glabrous or with hairs ca. 0.1 mm ..... 1. *C. asiaticus*
2b. Hairs on abaxial surface of rachis 0.1–0.8 mm, adaxial surface of rachis with hairs 0.1–0.9 mm ..... 3. *C. ordinatus*

1. Calymmodon asiaticus Copeland, Philipp. J. Sci. 38: 154. 1929.

短叶荷包蕨 duan ye he bao jue

Lamina narrowly elliptic to narrowly lanceolate, 1.2–4.6 × 0.2–0.6 cm; sterile pinnae narrowly oblong to narrowly oblanceolate, 2–5 × 0.4–1.1 mm, obtuse to acute at apex, separated by their width or more; fertile pinnae slightly and gradually shortened upward, usually distinctly shorter than sterile ones; rachis prominent on both sides, concolorous to dark brown; lateral veins ± visible; hairs simple and 1- or 2-forked, pale brown, 0.1–0.2 mm, occasional to scattered, mainly abaxially on rachis and margins.

On moss-covered tree trunks and rocks in dense mountain forests; 400–2500 m. Guangxi, Hainan [Malaysia, Thailand, Vietnam].

2. Calymmodon gracilis (Fée) Copeland, Philipp. J. Sci. 34: 266. 1927.

疏毛荷包蕨 shu mao he bao jue

Plectopteris gracilis Fée, Mém. Foug. 5: 230. 1852.

Lamina linear, linear-lanceolate, or linear-oblanceolate, 5–14 × 0.4–0.7 cm; sterile pinnae oblong, narrowly oblong, or oblong-oblanceolate, 2.5–5 × 1–1.8 mm, rounded or bluntly obtuse at apex, separated by their width or less; fertile pinnae similar in length to sterile ones; rachis prominent on both sides, brown to dark brown; lateral veins ± visible; hairs simple and 1-forked, pale to medium brown, occasional to scattered, on all parts of lamina, 0.3–1.4 mm.

On moss-covered tree trunks in dense wet mountain forests; 500–1800 m. E Taiwan [Borneo, Indonesia, Malaysia, Philippines, Thailand, Vietnam].

3. Calymmodon ordinatus Copeland, Philipp. J. Sci. 34: 267. 1927.

姬荷包蕨 ji he bao jue

Lamina linear, linear-elliptic, or linear-lanceolate, 2.3–7 × 0.4–0.8 cm; sterile pinnae narrowly oblanceolate or narrowly oblong, 2.8–5.5 × 0.8–1.8 mm, obtuse to bluntly acute at apex, separated by their width or more; fertile pinnae slightly and gradually shortened upward, usually distinctly shorter than sterile ones; rachis prominent on both sides (at least in basal 2/3 part), brown; lateral veins ± visible or sometimes hidden; hairs absent in old fronds, but usually visible, when present hairs simple and 1- or 2-forked, pale brown, occasional to scattered on all parts of lamina, 0.1–0.9 mm.

Epiphytic on moss-covered tree trunks in dense mountain forests; 400–2500 m. Taiwan [Philippines].

Material of this species has been misidentified as *Calymmodon cucullatus* (Nees & Blume) C. Presl (e.g., Fl. Taiwan, ed. 2, 1: 520–521. 1994).

32. MICROPOLYPODIUM Hayata, Bot. Mag. (Tokyo) 42: 341. 1928.

锯蕨属 ju jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Plants small, epiphytic, or sometimes petrophytic. Rhizomes radial, with stipes in whorls; scales not clathrate, reddish brown, glabrous. Stipe not articulate, phyllopodia absent. Lamina pinnate or deeply pinnately divided to narrow wing along rachis; veins hidden, but visible with transmitted light, lateral veins simple, each vein ending with a hydathode on adaxial surface of lamina. Sori superficial, 1 per pinna. Sporangia glabrous. Hairs simple eglandular, medium to dark reddish brown.

Three species: Bhutan, China, N India, Japan, Nepal, Philippines, Vietnam; two species in China.

1a. Rachis concolorous with lamina or pale to medium brown on abaxial side ..... 1. *M. okuboi*
1b. Rachis dark brown on abaxial side ..... 2. *M. sikkimense*

1. Micropolypodium okuboi (Yatabe) Hayata, Bot. Mag. (Tokyo) 42: 341. 1928.

锯蕨 ju jue

Polypodium okuboi Yatabe, Bot. Mag. (Tokyo) 5: 35. 1891; *Grammitis okuboi* (Yatabe) Ching; *Micropolypodium pseudotrichomanoides* (Hayata) Hayata; *P. pseudocucullatum* Rosenstock; *P. pseudotrichomanoides* Hayata; *Xiphopteris okuboi* (Yatabe) Copeland.

Stipe short, rarely up to 1.5 cm, glabrous or with occasional to scattered hairs up to 1.5 mm. Lamina linear to oblong-lanceolate, 2–15 × 0.3–0.6 cm, up to 25 × 0.8 cm, gradually attenuate toward base to form wing on stipe, apex obtuse or acute; pinnae oblong or ovate-oblong (middle pinnae), 1.8–3.2 × 0.8–1.8 mm, sometimes slightly falcate, entire, or seldom with 2–4 teeth on acroscopic margin, acute to rounded at apex; rachis prominent on abaxial side, slightly grooved on adaxial side, concolorous with lamina or pale to medium brown on both sides; hairs occasional to scattered on all parts of lamina, similar to those on stipe. Sori orbicular to elliptic, close to rachis.

Moss-covered tree trunks, rocks in mountain forests; 1000–2700 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Taiwan, Zhejiang [Japan].

2. Micropolypodium sikkimense (Hieronymus) X. C. Zhang, Fl. Reipubl. Popularis Sin. 6(2): 305. 2000.

锡金锯蕨 xi jin ju jue

Polypodium sikkimense Hieronymus, Hedwigia 44: 97. 1905; *Ctenopteris sikkimensis* (Hieronymus) C. Christensen & Tardieu; *Grammitis sikkimensis* (Hieronymus) Ching; *Xiphopteris sikkimensis* (Hieronymus) Copeland.

Stipe short, up to 1.5 cm, with frequent to dense hairs up to 1.6 mm. Lamina linear, 4–16 × 0.4–0.6 cm, base gradually shortened, apex obtuse or acute; pinnae horizontal or inclined, oblong, oblong-lanceolate, or oblong-oblanceolate, 2–3.5 × 0.8–1.8 mm, decurrent to neighboring pinnae, sometimes slightly falcate, entire or nearly so, obtuse, rounded, or rarely truncate at apex; rachis prominent on abaxial side, plane to slightly grooved on adaxial side, pale to dark brown on adaxial side, dark brown on abaxial side; hairs occasional to frequent on all parts of lamina, up to 1.8 mm. Sori orbicular, close to rachis.

Epiphytic or petrophytic; 2200–3600 m. Guangxi, Guizhou, Hunan, Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal, Vietnam].

33. XIPHOPTERELLA Parris, Gard. Bull. Singapore 58: 249. 2007.

剑羽蕨属 jian yu jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Plants small, epiphytic. Rhizomes radial, with stipes in whorls; scales not clathrate, pale reddish brown, glabrous. Stipe not articulate, phyllopodia absent. Lamina pinnately divided; lateral veins 1-forked when fertile, free, each vein ending with a hydathode on adaxial surface. Sori superficial, 1 per pinna. Sporangia glabrous. Hairs simple eglandular and 1- or 2-forked with eglandular branches.

About seven species: Borneo, China, Indonesia, Malaysia, New Guinea, Vietnam; one species in China.

1. Xiphopterella devolii S. J. Moore, Parris & W. L. Chiou, Bot. Stud. 54: 2013.

剑羽蕨 jian yu jue

Stipe sessile or nearly so. Lamina linear, linear-elliptic, or linear-oblanceolate, 2–7 × 0.5–0.9 cm, attenuate to form a wing at base, apex acute; pinnae inclined or ascending, broadly to narrowly triangular, slightly oblique or falcate, up to 5 mm, entire, or with a small blunt tooth at base of acroscopic margin; rachis prominent on abaxial side, grooved on adaxial side, pale to medium brown, or pale yellowish brown; lateral veins hidden, invisible even with transmitted light, simple in sterile pinnae, forked in fertile pinnae, acroscopic branch not extending beyond sorus; hairs visible in younger fronds, mainly occasional to scattered on abaxial side of rachis and at base of lamina, simple or more commonly 1- or 2-forked, pale, up to 0.3 mm. Sori orbicular to oval.

Epiphytic on tree trunks in dense forests; 900–1600 m. Fujian, Guangdong, Guangxi, Taiwan, Zhejiang [Vietnam].

Ctenopterella cornigera (Baker) Parris (Gard. Bull. Singapore 58: 235. 2007; *Polypodium cornigerum* Baker in Hooker & Baker, Syn. Fil., ed. 2, 508. 1874; *Micropolypodium cornigerum* (Baker) X. C. Zhang) is a species endemic to Sri Lanka. Chinese plants usually identified as *Micropolypodium cornigerum* (or *Grammitis cornigera* (Baker) Ching or *Xiphopteris cornigera* (Baker) Copeland) belong to a separate species found in SE China and Vietnam.

34. CHRYSOGRAMMITIS Parris, Kew Bull. 53: 909. 1998.

金禾蕨属 jin he jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Plants small, epiphytic. Rhizomes dorsiventral, with stipes in 2 rows; scales not clathrate, reddish brown or yellowish brown, glabrous or with glandular hairs on margin. Stipe not articulate, phyllopodia absent. Lamina deeply pinnately divided to narrow wing along rachis; veins on pinnae pinnately branched, free; vein endings without hydathodes on adaxial surface of lamina. Sori superficial, more than 1 per pinna. Sporangia glabrous. Hairs pale yellowish brown, simple glandular and 1- or 2-forked with glandular branches.

Two species: Sri Lanka and China to Pacific islands; one species in China.

1. Chrysogrammitis glandulosa (J. Smith) Parris, Kew Bull. 53: 912. 1998.

金禾蕨 jin he jue

Ctenopteris glandulosa J. Smith, Hist. Fil. 185. 1875; *C. merrittii* (Copeland) Tagawa; *C. subcorticola* Tagawa; *Polypodium merrittii* Copeland.

Stipe 2–8 mm, with frequent to dense, simple and forked, glandular hairs 0.1–0.2 mm. Lamina linear to narrowly elliptic, 3–10 × 0.6–10 mm, base attenuate, apex bluntly acute; pinnae inclined or widely ascending; longest pinnae oblong to triangular, 4–7 × 2–2.5 mm, decurrent on basiscopic margin at base, lobed, acuminate to acute at apex; lobes 1–3 pairs in longest pinnae, longest lobes 0.8–1.6 × 0.3–0.8 mm; rachis prominent on both sides, dark brown or brown; costa and veins obscure, but visible with transmitted light; hairs similar to those on stipe on all parts of lamina, occasional to scattered on abaxial surface, occasional to sparse or absent on adaxial surface and margin. Sori orbicular or slightly oval, 1–3 per row on longest pinnae, 1 per lobe.

On moss-covered tree trunks in dense wet mountain forests; 1400–1800 m. Taiwan (Hualian, Pingdong, Taidong) [Borneo, Indonesia, Malaysia, Philippines, Sri Lanka].

35. PROSAPTIA C. Presl, Tent. Pterid. 165. 1836.

穴子蕨属 xue zi jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Ctenopteris Blume ex Kunze.

Plants small to medium-sized, epiphytic, rarely petrophytic. Rhizomes dorsiventral, with stipes in 2 rows; scales subclathrate to clathrate, reddish brown, dark reddish brown, brown, dark brown, or dark grayish brown, with simple eglandular hairs, sometimes also with 1- or 2-forked hairs with eglandular branches on margin, sometimes simple eglandular hairs also on abaxial surface. Stipe articulate to rhizome, phyllopodia present. Lamina pinnatifid to pinnate; pinnae entire to lobed; venation free, pinnately branched in pinnae, veins simple or rarely 1-forked, vein endings without hydathodes on adaxial surface of lamina; hairs simple eglandular, solitary or tufted, or 1- or 2-forked with eglandular branches. Sori 1 to several per pinna, 1 per vein, usually sunken in marginal or submarginal pouches, or depressed in cavities on abaxial surface of lamina, sometimes on surface of lamina or slightly sunken in shallow depressions. Sporangia glabrous.

About 60 species: Sri Lanka and China to Australia and Pacific islands; seven species in China.

1a. Sori superficial or slightly sunken ..... 5. *P. nutans*
1b. Sori deeply sunken.
2a. Mouth of soral cavity opening toward lamina margin; mature sporangia extending beyond margin.
3a. Fronds pinnate or pinnately divided to narrow wing less than 0.5 mm wide along rachis; sori marginal ..... 3. *P. contigua*
3b. Fronds not pinnate, pinnately divided to wing 1–2 mm wide along rachis; sori submarginal ..... 7. *P. urceolaris*
2b. Mouth of soral cavity not opening toward lamina margin; mature sporangia not extending beyond margin.
4a. Soral cavity with distinct prominent edge.
5a. Soral cavity ± circular to broadly elliptic, rim higher on side nearest to costa ..... 4. *P. intermedia*
5b. Soral cavity elliptic to narrowly elliptic, rim of even height ..... 6. *P. obliquata*
4b. Soral cavity without prominent edge.
6a. Fronds pinnately divided to wing 2–3 mm wide along rachis ..... 1. *P. barathrophylla*
6b. Fronds pinnate or deeply pinnately divided to narrow wing less than 0.5 mm wide along rachis ..... 2. *P. celebica*

1. Prosaptia barathrophylla (Baker) M. G. Price, Contr. Univ. Michigan Herb. 17: 276. 1990.

海南穴子蕨 hai nan xue zi jue

Polypodium barathrophyllum Baker, J. Bot. 29: 107. 1891.

Stipe very short or fronds subsessile, up to 1 cm, moderately covered with hairs; hairs simple, solitary, dark reddish brown, up to 0.8 mm. Lamina linear-elliptic, 12–35 × 1.6–3 cm, gradually narrowing toward both ends, pinnately divided to wing 2–3 mm wide along rachis; pinnae inclined or widely ascending, oblong-lanceolate to oblong-triangular, entire, sometimes slightly undulate, acute or bluntly obtuse at apex, basal ones gradually shortened to form a broad wavy wing almost to base; middle pinnae largest, up to 15 × 5 mm; rachis prominent on abaxial side, slightly prominent to grooved on adaxial side, medium brown or darker; costae indistinct; veins hidden, but visible with transmitted light, simple; hairs simple, solitary, seldom tufted, seldom forked, dark reddish brown, sparse to frequent on margin and abaxial surface, occasional to sparse or absent on adaxial surface. Sori up to 8 pairs per pinna, orbicular to oval, medial or slightly closer to margin, sunk in cavities without prominent edges, rim of cavity without hairs.

Dense evergreen forests; 1000–1500 m. Hainan [Borneo, Cambodia, Indonesia, Malaysia, Philippines, Thailand, Vietnam].

Specimens in Chinese herbaria identified as *Prosaptia khasyana* (Hooker) C. Christensen & Tardieu are *P. barathrophylla* or *P. intermedia*. *Prosaptia khasyana* does not occur in China.

2. Prosaptia celebica (Blume) Tagawa & K. Iwatsuki, Acta Phytotax. Geobot. 24: 61. 1969.

南亚穴子蕨 nan ya xue zi jue

Polypodium celebicum Blume, Enum. Pl. Javae 2: 127. 1828; *Ctenopteris celebica* (Blume) Copeland.

Stipe 1–3 cm, densely covered with simple solitary dark reddish brown hairs up to 1.7 mm. Lamina narrowly elliptic, 12–32 × 4–6.5 cm, acuminate, pinnate or deeply pinnately divided to narrow wing less than 0.5 mm wide along rachis; pinnae spreading, approximate, linear to linear-lanceolate from a dilated base, entire or slightly undulate, acute or obtuse at apex; middle pinnae largest, 25–32 × 3–4 mm, gradually shortened to basal ones, several basal pairs abbreviated; rachis medium brown or darker, terete at base, distinctly prominent on both sides; costa of pinna obscure, only slightly prominent on abaxial surface; veins simple, hidden, visible with transmitted light; hairs dark brown, simple, solitary or rarely tufted, or forked, up to 1.5 mm, mainly on both sides of rachis (dense and shorter adaxially, scattered to frequent abaxially) and margin (sparse to scattered), occasional to scattered abaxially and occasional adaxially on costae, absent on lamina or occasional to scattered abaxially and occasional adaxially. Sori sunken in obliquely elliptic cavities, in a medial row on each side of costa, slightly prominent on adaxial surface, up to 20 pairs on 1 pinna, rim of cavity not prominent, with a ring of hairs around it.

Epiphytic on moss-covered tree trunks in evergreen forests; 1400–1500 m. Taiwan (Pingdong) [Borneo, Indonesia, Malaysia, Philippines, Thailand].

3. Prosaptia contigua (G. Forster) C. Presl, Tent. Pterid. 166. 1836.

缘生穴子蕨 yuan sheng xue zi jue

Trichomanes contiguum G. Forster, Fl. Ins. Austr. 84. 1786; *Ctenopteris contigua* (G. Forster) Holttum; *Davallia contigua* (G. Forster) Sprengel; *Lecanopteris formosana* Hayata; *Polypodium contiguum* (G. Forster) J. Smith.

Stipe 2–6 cm, with hairs frequent to dense, short, spreading, simple and 1-forked, solitary, medium to dark reddish brown, up to 0.5 mm. Lamina linear-elliptic, 10–30 × 2–4 cm, acuminate, cuneate or gradually attenuate downward to an undulate and narrow wing along stipe, pinnate or deeply pinnately divided to narrow wing less than 0.5 mm wide along rachis; pinnae widely ascending; largest pinnae linear to narrowly lanceolate, 1.2–3 × 0.2–0.4 cm, dilated at base, obtuse at apex; margins of pinnae entire when sterile, crenate toward soriferous portion when fertile; rachis medium brown or darker, terete at base; costa slightly prominent on both surfaces, or sometimes obscure; veins hidden, usually simple, or rarely 1-forked; hairs simple, solitary or sometimes tufted, and 1- or 2-forked, dark reddish brown, up to 0.6 mm, scattered to frequent on abaxial side of rachis, dense and shorter adaxially, occasional to scattered on abaxial side of costae and margin, occasional to sparse on adaxial side of costae and lamina, hairs absent or occasional to scattered abaxially on lamina. Sori 1 per tooth and/or 1 at apex of pinna, 1–6 on each pinna, sunken in marginal urceolate cavities opening outward, rim of cavity usually with some short simple hairs on abaxial side, very sparse or absent on adaxial side.

On tree trunks and moss-covered rocks in dense mountain forests; 400–2000 m. Guangdong, Hainan, Taiwan, Yunnan [Borneo, S India, Indonesia, Malaysia, New Guinea, Philippines, Sri Lanka, Thailand; Australia, Pacific islands].

4. Prosaptia intermedia (Ching) Tagawa, J. Jap. Bot. 25: 115. 1950.

中间穴子蕨 zhong jian xue zi jue

Polypodium urceolare Hayata var. *intermedium* Ching, Bull. Dept. Biol. Sun Yatsen Univ. 6: 32. 1933; *Prosaptia urceolaris* (Hayata) Copeland var. *intermedia* (Ching) Ching.

Stipe very short, ca. 0.2 cm, with hairs dense, simple, solitary, medium to dark reddish brown, very short, ca. 0.1 mm. Lamina deeply pinnately divided to wing 0.5–1.3 mm wide along rachis, narrowly elliptic, 11–18 × 1.5–2.1 cm, base long attenuate, apex bluntly acute to acute; pinnae ascending; middle pinnae largest, narrowly triangular-oblong to narrowly oblong, 7–14 × 2–3 mm, sessile to slightly surcurrent above, decurrent below at base, entire or slightly crenulate in soral area, bluntly acute to acute at apex; rachis concolorous with lamina; costae slightly prominent and concolorous with lamina on both surfaces; veins hidden, simple; hairs simple and 1–3-forked, solitary, medium reddish brown, sparse to scattered on abaxial side of rachis, dense on adaxial side, occasional to sparse on margin and abaxial side of costae, sparse to scattered on adaxial side of costae, scattered to frequent abaxially on lamina in soral area, sometimes only on rim of soral cavities. Sori ± circular to broadly elliptic, deeply sunken in cavities in lamina with rim 0.2–0.6 mm high, higher on side nearest costa, slightly prominent on adaxial surface, 2–5 in a medial row on each side of costa.

On moss-covered tree trunks in dense mountain forests; 700–1800 m. Guangdong, Guangxi, Hainan, Yunnan [Vietnam].

5. Prosaptia nutans (Blume) Mettenius, Reise Novara 1: 214. 1870.

俯垂穴子蕨 fu chui xue zi jue

Polypodium nutans Blume, Enum. Pl. Javae 2: 128. 1828; *Ctenopteris nutans* (Blume) J. Smith.

Stipe 2–3 cm, with scattered to frequent hairs, hairs mainly simple, solitary, sometimes tufted, sometimes 1- or 2-forked, medium to dark reddish brown, very short, ca. 0.2 mm. Lamina deeply pinnately divided to narrow wing less than 0.5 mm wide along rachis, linear or narrowly elliptic, 9–15 × 1.2–2.5 cm, base long attenuate, apex acuminate; pinnae subhorizontal or slightly ascending; middle pinnae largest or nearly so, linear or subulate, 6–13 × 1.8–2.2 mm, dilated to slightly decurrent at base, entire or slightly undulate, obtuse at apex; rachis brown to dark brown, terete at base; costae ± prominent on adaxial side, plane and indistinct on abaxial side, brown or slightly dark brown; veins hidden, simple; hairs simple, solitary, sometimes tufted, and 1–3-forked, slightly darker and longer than stipe hairs, sparse to frequent on abaxial side of rachis, frequent to dense on adaxial side, sometimes occasional to sparse on margin and both sides of costae and lamina. Sori oval or elongate, superficial or slightly sunken, slightly prominent on adaxial surface, 3–7 in a medial row on each side of costa.

On moss-covered tree trunks in dense wet mountain forests; ca. 2500 m. Taiwan [Borneo, Indonesia, Malaysia, New Guinea, Philippines].

6. Prosaptia obliquata (Blume) Mettenius, Reise Novara 1: 214. 1870.

密毛穴子蕨 mi mao xue zi jue

Polypodium obliquatum Blume, Enum. Pl. Javae 2: 128. 1828; *Cryptosorus obliquatus* (Blume) J. Smith; *Ctenopteris obliquata* (Blume) Copeland; *Grammitis obliquata* (Blume) Hasskarl.

Stipe 0.6–5 cm, with hairs frequent to dense, short, simple and 1-forked, solitary, dark reddish brown, up to 0.4 mm. Lamina elliptic or narrowly elliptic, 10–30 × 2–4 cm, pinnate or deeply pinnately divided to narrow wing less than 0.5 mm wide along rachis, acuminate at apex, gradually shortened downward to form small deltoid or semicircular pinnae; middle pinnae largest, linear to linear-lanceolate, 10–27 × 1.8–2.7 mm, dilated at base, entire or slightly undulate, acute or obtuse at apex; rachis terete at least at base, distinctly prominent on both surfaces of lamina; costa of pinna ± prominent on both surfaces; veins hidden, simple; hairs simple, seldom tufted, sometimes 1–3-forked, dark reddish brown, up to 0.4 mm, sparse to dense on abaxial side of rachis, dense on adaxial side, occasional to scattered on margin, occasional to sparse on both sides of costae

and lamina. Sori sunken in elliptic, oblique cavities on abaxial surface of lamina, prominent on adaxial surface, in a medial row on each side of costa, less than 8 pairs on 1 pinna, rim of cavity distinctly and evenly prominent, not fringed with hairs.

Epiphytic on tree trunks in dense wet forests, also on moss-covered rocks; 200–1800 m. Hainan, Taiwan [Borneo, S India, Indonesia, Malaysia, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

7. Prosaptia urceolaris (Hayata) Copeland, Philipp. J. Sci. 40: 311. 1929.

台湾穴子蕨 tai wan xue zi jue

Polypodium urceolare Hayata, Icon. Pl. Formosan. 5: 324. 1915.

Stipe 1–2 cm, with hairs scattered, simple, medium to dark reddish brown, up to 1.5 mm. Lamina linear-elliptic, 5–25 × 0.8–2.5 cm, gradually attenuate toward base, pinnately divided to wing 1–2 mm wide along rachis, apex acute to acuminate; pinnae approximate, subspreading, narrowly oblong, slightly dilated at base, entire in sterile pinnae, crenate-undulate toward apex on margin in fertile ones, obtuse or rounded at apex, sometimes rounded-truncate; middle pinnae largest, 6–15 × 2–3 mm; lower several pairs of pinnae gradually shortened, remote, abbreviate, deltoid or rounded; rachis slightly prominent on both sides, medium brown or darker; costa indistinct; veins quite hidden, simple, invisible even with transmitted light; hairs simple, solitary or rarely tufted, or rarely 1-forked, medium to dark reddish brown, scattered on both sides of rachis, sparse on margin and abaxial surface of lamina, occasional on adaxial surface. Sori deeply sunken in submarginal urceolate cavities opening obliquely outward, 2–5 on each side of pinna, rim of cavity prominent at least on basal side, with hairs along rim (sometimes lost in old fronds).

On moss-covered tree trunks in dense mountain forests, also on moss-covered rocks; 600–2200 m. Taiwan [Philippines].

36. CTENOPTERELLA Parris, Gard. Bull. Singapore 58: 234. 2007.

小蒿蕨属 xiao hao jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Plants small to medium-sized, epiphytic. Rhizomes dorsiventral, with stipes in 2 rows; scales not clathrate, reddish brown to pale brown, glabrous. Stipe not articulate, phyllopodia absent. Lamina pinnate or deeply pinnately divided to narrow wing along rachis; veins on pinnae pinnately branched, free, each vein ending with a hydathode, sometimes indistinct, on adaxial surface of lamina. Sori more than 1 per pinna, orbicular to oval, superficial or slightly sunken in shallow depressions on lamina. Sporangia glabrous. Hairs simple eglandular, and 1- or 2-forked with eglandular branches.

About 12 species: Africa to Pacific islands; one species in China.

1. Ctenopterella blechnoides (Greville) Parris, Gard. Bull. Singapore 58: 235. 2007.

小蒿蕨 xiao hao jue

Grammitis blechnoides Greville, Ann. Mag. Nat. Hist., ser. 2, 1: 320. 1848; *Ctenopteris blechnoides* (Greville) W. H. Wagner & Grether; *C. moultonii* (Copeland) C. Christensen & Tardieu; *Polypodium decorum* Brackenridge; *P. moultonii* Copeland.

Stipe up to 0.8 mm, with hairs sparse to dense, short, up to 0.4 mm, simple and 1- or 2-forked, dark reddish brown. Lamina linear-oblong or linear-elliptic, 12–20 × 2–3 cm, base attenuate to cuneate, apex acuminate; pinnae horizontal, inclined, or widely ascending; middle pinnae longest, linear, linear-oblong, or very narrowly triangular, 12–17 × 1.8–2.7 mm, entire, obtuse at apex; basal pinnae shortened, narrowly to broadly triangular; rachises brown to dark brown, terete (at least in basal half); costae prominent on both sides, brown to dark brown; veins hidden, inconspicuous even with transmitted light; hairs simple and 1- or 2-forked, dark brown, up to 0.4 mm, occasional to scattered on both sides of rachis, occasional to sparse or absent on both surfaces of lamina and on margin at maturity, simple hairs surrounding receptacle obscured when sporangia are mature.

Epiphytic on tree trunks in dense forests; 600–800 m. Hainan [Borneo, Cambodia, S India, Indonesia, Malaysia, New Guinea, Philippines, Singapore, Sri Lanka, Thailand; Australia, Pacific islands].

37. THEMELIUM (T. Moore) Parris, Kew Bull. 52: 737. 1997.

蒿蕨属 hao jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Polypodium sect. *Themelium* T. Moore, Index Fil. 71. 1857.

Plants small to medium-sized, epiphytic. Rhizomes dorsiventral, with stipes in 2 rows; scales clathrate or not, medium to dark reddish brown, dark brown, or dark gray, glabrous. Stipe subarticulate or not articulate, phyllopodia absent. Lamina pinnately divided to bipinnatifid; veins in pinnae pinnately branched, free, each vein ending with a hydathode on adaxial surface. Sori more than 1 per pinna, orbicular to oval, superficial or slightly sunken in shallow depressions in lamina. Sporangia glabrous. Hairs simple eglandular.

About 20 species: Indonesia to Pacific islands; two species in China.

1a. Pinnae entire; mature lamina glabrous except at base ..... 1. *T. blechnifrons*
1b. Pinnae deeply pinnatifid; mature lamina with hairs on rachis ..... 2. *T. tenuisectum*

1. Themelium blechnifrons (Hayata) Parris, Kew Bull. 59: 224. 2004.

蒿蕨 hao jue

Polypodium decrescens Christ var. *blechnifrons* Hayata, Icon. Pl. Formosan. 4: 245. 1914; *Cryptosorus decrescens* (Christ) Nakai ex H. Itô var. *blechnifrons* (Hayata) Nakai ex H. Itô.

Stipe 0.3–2.3 cm, sometimes subarticulate, with dense solitary simple medium to dark reddish brown hairs up to 2 mm. Lamina deeply pinnately divided to narrow wing along rachis, narrowly elliptic, 5–21 × 1.2–5 cm, gradually or rather abruptly shortened to form a wavy or crenate wing to base, apex acuminate or acute; pinnae inclined or widely ascending; middle pinnae largest or nearly so, linear to linear-lanceolate, 7–28 × 2–5 mm, dilated at base, entire, sometimes slightly undulate; rachis brown to dark brown, distinctly prominent on abaxial surface, variable (plane, slightly prominent, or grooved) on adaxial surface; costae hidden and invisible; veins hidden, but visible with transmitted light in younger fronds, simple; hairs confined to basal part of lamina, or to very young laminae, similar to those of stipe, up to 1.5 mm, occasional to scattered on abaxial side of rachis and sometimes on margins, occasional to sparse on adaxial side of rachis and both sides of lamina adjacent to rachis. Sori orbicular, oval, or oblong, slightly sunken in shallow depressions, in a medial row on each side of costa.

On moss-covered tree trunks and moss-covered rocks, terrestrial on steep slopes, in dense mountain forests; 500–2300 m. Taiwan [Philippines].

Material of this species has been misidentified as *Ctenopteris curtisii* (Baker) Copeland (e.g., FRPS 6(2): 308. 2000).

2. Themelium tenuisectum (Blume) Parris, Kew Bull. 52: 740. 1997.

细叶蒿蕨 xi ye hao jue

Polypodium tenuisectum Blume, Enum. Pl. Javae 2: 134. 1828; *Ctenopteris tenuisecta* (Blume) J. Smith; *Grammitis tenuisecta* (Blume) Ching.

Stipe 2–3 cm, sometimes subarticulate, with frequent to dense solitary simple dark reddish brown hairs up to 2 mm. Lamina deeply bipinnatifid, linear-oblong to linear-lanceolate, 5–25 × 2–4 cm, apex acuminate, basal normal pinnae slightly shorter, and abruptly shortened to some obliquely orbicular or deltoid pinnae; middle pinnae largest or nearly so, linear to narrowly oblong, 0.8–2 × 0.3–0.5 cm; pinnules linear-triangular, 2–4 × 0.5–1.2 mm, with 1 vein per pinnule, usually with 1 or 2 hairs on apical margin; rachis dark brown, terete at least at base, usually with a very narrow wing connecting adjacent pinnae; veins in pinnules simple, visible or indistinct, extending beyond sorus or not; hairs similar to those on stipe, mainly on rachis (scattered to frequent on abaxial side, scattered on adaxial side), 1 or 2 or none on apical margin of pinnule, sometimes occasional to sparse on abaxial side of costae, absent from both surfaces of lamina and margin (except at apex). Sori orbicular, superficial, 1 at base of pinnule.

Epiphytic on tree trunks in mossy mountain forests; 1400–1700 m. Taiwan (Pingdong, Taidong) [Borneo, Indonesia, Malaysia, New Guinea, Philippines, Thailand; Pacific islands].

38. DASYGRAMMITIS Parris, Gard. Bull. Singapore 58: 238. 2007.

毛禾蕨属 mao he jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Plants small to medium-sized, epiphytic. Rhizomes radial, with stipes in whorls; scales not clathrate, medium to dark reddish brown, with marginal hairs. Stipe not articulate, phyllopodia absent. Lamina deeply pinnately divided to narrow wing along rachis; veins on pinnae pinnately branched, free; vein endings without hydathodes on adaxial surface of lamina. Sori more than 1 per pinna, orbicular to oval, superficial or slightly sunken in broad shallow depressions on lamina. Sporangia glabrous. Hairs simple, eglandular, dark reddish brown; 1- or 2-forked hairs with eglandular branches sometimes also present.

About six species: Sri Lanka to Pacific islands; one species in China.

1. Dasygrammitis mollicoma (Nees & Blume) Parris, Gard. Bull. Singapore 58: 239. 2007.

毛禾蕨 mao he jue

Polypodium mollicomum Nees & Blume, Nova Acta Phys.-Med. Caes. Leop.-Carol. Nat. Cur. 11: 121. 1823; *Ctenopteris mollicoma* (Nees & Blume) Kunze.

Stipe 5–12 mm, with dense hairs up to 3 mm. Lamina narrowly elliptic or linear-oblong, 3–8 × 0.7–1.2 cm, base attenuate, apex attenuate or acuminate; pinnae inclined or widely ascending; middle pinnae largest or nearly so, narrowly oblong, 4–7 × 1–2 mm, entire; rachis dark brown, slightly prominent on both sides at base; costae and veins hidden; hairs on all parts of leaf simple, solitary, 1–3-forked hairs sometimes also present on abaxial side, hairs on adaxial surface and margin longer, up to 2.5 mm, those on abaxial surface shorter (only 1/2–2/3 in length). Sori orbicular.

Moss-covered tree trunks in dense wet mountain forests; 1400–1900 m. Taiwan (Pingdong, Taidong) [Borneo, Indonesia, Malaysia, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

39. TOMOPHYLLUM (E. Fournier) Parris, Gard. Bull. Singapore 58: 245. 2007.

裂禾蕨属 lie he jue shu

Shannjye Moore (牟善杰); Barbara S. Parris

Polypodium sect. *Tomophyllum* E. Fournier, Ann. Sci. Nat., Bot., sér. 5, 18: 283. 1873.

Plants small to medium-sized, epiphytic. Rhizomes radial, stipes in whorls; scales not clathrate, reddish brown, glabrous or with apical and/or marginal hairs. Stipe not articulate, phyllopodia absent. Lamina pinnate or deeply pinnately divided to narrow wing along rachis; veins in pinnae pinnately branched, simple, free, each vein ending with a hydathode on adaxial surface. Sori more than 1 per pinna. Sporangia glabrous. Hairs simple eglandular; 1–3-forked hairs with eglandular branches sometimes also present.

About 22 species: India, Nepal, Sri Lanka to Australia and Pacific islands; one species in China.

1. Tomophyllum donianum (Sprengel) Fraser-Jenkins & Parris, Taxon. Revis. Indian Subcontinental Pteridophytes, 75. 2008.

裂禾蕨 lie he jue

Polypodium donianum Sprengel, Syst. Veg. 4: 54. 1827; *P. convolutum* Baker; *P. hayatai* Masamune; *P. sinicum* Christ; *P. subfalcatum* Blume var. *sinicum* (Christ) C. Christensen; *P. tenellum* D. Don (1824), not G. Forster (1786); *P. tenuissimum* Hayata (Sep 1914), not Copeland (Feb 1914); *Tomophyllum sinicum* (Christ) Parris.

Stipe 1–2 cm, with dense pale to medium reddish brown or pale yellowish brown solitary simple hairs up to 2.4 mm. Lamina linear or narrowly elliptic, 4–28 × 0.8–2.1 cm, gradually reduced to a very narrow wing at base, apex attenuate; pinnae inclined or widely ascending, linear to oblong-lanceolate, 6–14 × 2–6 mm, decurrent at basiscopic base; margin serrate, incised-serrate, or incised-crenate; rachis slightly prominent on both sides, brown to slightly dark brown; costae obscure; veins ± hidden, but visible with transmitted light, not extending beyond sori; hairs on all parts of lamina, pale reddish brown or pale yellowish brown, solitary, simple, and sometimes 1–3-forked, up to 2.2 mm, scattered to frequent on abaxial side of rachis and lamina, sparse to frequent on adaxial side of rachis, sparse to scattered on abaxial side of costae and occasional to sparse on adaxial side of costae and of lamina, occasional to scattered on margins. Sori orbicular, superficial, 1 per each marginal serration, 2–4 in a medial row on each side of costa.

On moss-covered tree trunks and rocks in dense mountain forests; 1400–3200 m. Anhui, Guizhou, Hunan, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, N India, Nepal].

Material of this species has been misidentified as *Ctenopteris subfalcata* (Blume) Kunze (e.g., FRPS 6(2): 306. 2000).