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THELYPTERIDACEAE

金星蕨科 jin xing jue ke

Lin Youxing (林尤兴)[1], Li Zhongyang (李中阳)[2]; Kunio Iwatsuki[3], Alan R. Smith[4]

Plants terrestrial or on rocks. Rhizomes stout, dictyostele radially symmetrical, branched or not, erect, ascending, or long creeping, with scales at apices; scales basiflexed, lanceolate or nearly ovate, brown, thick, luminae elongate, usually with grayish white short setae on dorsal side or ciliate along margins. Fronds clustered, approximate, or remote; stipes slender, stramineous, not articulate, with 2 crescent-shaped vascular bundles at base, usually scaly at bases, distally ± with grayish white unicellular acicular hairs, rarely with multicellular long hairs or stellate hairs. Fronds monomorphic, rarely subdimorphic, oblong-lanceolate or oblanceolate, sometimes ovate or ovate-triangular, usually pinnate-pinnatifid, sometimes 3- or 4-pinnate-pinnatifid, rarely 1-pinnate; pinnae symmetrical at bases; costae grooved adaxially but grooves not confluent with rachial grooves, or raised and with dense grayish acicular hairs, with expanded tuberculate aerophores at bases of pinnae. Laminae herbaceous or papery, sometimes somewhat leathery, green or dark brown-green when dry, both sides (particularly rachises, costae, and main veins adaxially) with grayish white unicellular acicular hairs, rarely glabrous, usually with orange or reddish orange, stalked or sessile spherical or club-shaped glands, occasionally small scaly along rachises and costae abaxially. Sori orbicular, oblong, or shortly linear, dorsifixed on veins, indusiate or exindusiate; indusia orbicular-reniform, fixed by deep notch, most ± hairy, persistent or hidden in sori, caducous, or not concentrated into sori but scattered along reticulate veins and exindusiate. Sporangia long stalked, usually with hairs or glandular hairs below annuli and at distal end of sporangial stalks. Spores bilateral, rarely tetrahedral, tuberculate, echinate, granular, or usually with a winged perispore. Prothalli green, cordate or narrowly cordate, usually with broad wings, symmetrical, usually with hairs or glands. $x = 27–36$ (lacking 28).

About 20 genera and ca. 1,000 species, more at lower elevations, very few tropical species above 4500 m: widespread in all tropical and subtropical zones of the world, less common in temperate zone, particularly more common in Asia; 18 genera (one endemic) and 199 species (102 endemic) in China.

The family* is very natural and is distinguished from others by having grayish white unicellular acicular hairs and pubescence throughout the plant. However, there are many different viewpoints about generic circumscription in the family. Ching recognized 18 genera (including *Hypodematium*) in his 1963 treatment (Acta Phytotax. Sin. 8: 289–335); soon afterward, in 1978 (Ching, Acta Phytotax. Sin. 16(3): 12–13), the number of recognized genera in China grew to 20 (*Hypodematium* was removed and placed in its own family). In 1971, Holttum subdivided this family in the Paleotropics into 23 genera (Blumea 19(1): 17–52). In 1977, Pichi Sermolli, mainly following Holttum, circumscribed other genera for a total of 32 genera (Webbia 3(2): 213–512). In 1990, A. R. Smith divided the family into five genera (in Kramer & Green, Fam. Gen. Vasc. Pl. 1: 263–272), i.e., *Thelypteris* (including five subgenera), *Phegopteris*, *Pseudophegopteris*, *Macrothelypteris*, and *Cyclosorus* (including 20 subgenera). Of the many systems, those of Holttum and Pichi Sermolli divide the family most finely, with the greatest number of genera. Holttum (loc. cit.) segregated the following genera from *Cyclosorus* s.l.: *Amphineuron*, *Christella*, *Pneumatopteris*, and *Sphaerostephanos*. Recognition of these genera was based on several characters, including whether the proximal pinnae were shortened or not, and whether the sporangia and sporangial stalks bore hairs or glandular hairs. Holttum (loc. cit.) also segregated several genera (e.g., *Parathelypteris* and *Coryphopteris*) from the classical *Thelypteris* s.l., the free-veined thelypteroids, by characters that included rhizome habit, laminar glands, and chromosome base number. Smith (loc. cit.: 265) noted: "Although many of Holttum's genera seem natural (i.e., monophyletic), a combination of characters must be used to circumscribe them. Some of the characters concern minute glands and hairs and require 30 × magnification or greater for observation. Others require that complete specimens be at hand (including lower part of blade and stem). Even then, identification to genus may be difficult, as generic lines are not always sharp." The question of generic delimitation within the family needs further study, but for now we adopt Ching's system (1978), modified from Ching (1963).**

*In 1940, Ching established many new families (Sunyatsenia 5(4): 237), including Thelypteridaceae with 12 genera, but the names of these new families are nomina nuda and were not therefore validly published (*Melbourne Code*, Art. 38.1(a)). Only in 1970 were these families formally published by Pichi Sermolli.

**(1) Holttum set up the genus *Amphineuron* with mixed characters in 1971, which was also adopted by Ching in 1978. Among the 12 recognized species in the genus, three occur in China: the type species *A. opulentum*, which is similar to *Cyclosorus* in venation and lemon-yellow glands; *A. immersum*, which is similar to *Parathelypteris* species in venation; and *A. tonkinensis*, which has already been removed to a new genus, *Mesopteris*. As Holttum himself considered *Amphineuron* to be a provisional treatment, this genus is not adopted here.

(2) *Trichoneuron* Ching (Acta Phytotax. Sin. 10: 118, pl. 22. 1967) was based on a single gathering, and the collection locality was unknown. Later, this species was rediscovered by Prof. W. M. Chu in Pingbian, SE Yunnan. According to Prof. Chu's study, it belongs to the genus *Lastreopsis* (Dryopteridaceae). It is, therefore, not included here.

Using only venation, the family may be divided into 3 tribes: 1. Tribe *Thelypterideae* Ching: Veins free; with two subtypes: (1) all veinlets reaching margins or nearly reaching margins above sinuses between segments, with the bottom of sinuses not cartilaginous (e.g., *Parathelypteris*); (2) proximal pair of veinlets from adjacent segments reaching cartilaginous sinuses but not united; or acroscopic veinlet of basal pair of veinlets reaching cartilaginous sinus, basiscopic veinlet reaching margin above sinus (e.g., *Pseudocyclosorus* and *Mesopteris*); 2. Tribe *Goniopterideae* Ching: Veins

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partly combined; at least proximal pair of veinlets from adjacent segments united to form triangular areoles and this vein union producing a long or short excurrent veinlet; additional areoles may be produced in the same row, by subsequent vein unions of veinlets; excurrent veinlets may connect with more distal vein unions, or with a translucent line leading to a sinus, thus forming oblique rhomboid areoles (goniopteroid venation) (e.g., *Cyclosorus*, *Ampelopteris*), or squarish areoles (meniscioid venation) (e.g., *Pronephrium*, the areoles without included veinlets; 3. Tribe *Dictyoclineae* Ching: Veinlets between lateral veins all combined into irregular squarish or pentagonal areoles and each areole sometimes with simple or forked included veinlets.

The following taxon is excluded from the present treatment, pending further research: *Thelypteris calvata* Ching (Bull. Fan Mem. Inst. Biol. Bot. ser. 2, 1: 313. 1949), described from Guangdong.

Shing Kunghsia, Chiu Peishi, Yao Guanhu & Lin Youxin. 1999. Thelypteridaceae. *In:* Shing Kunghsia, ed., Fl. Reipubl. Popularis Sin. 4(1): 15–317, 319–353.

Key 1

1a. Veins partly or entirely reticulate.
2a. Veins entirely reticulate, with or without simple or forked included veinlets in areoles; sori scattered and attached along reticulate veins ..... 18. *Dictyocline*
2b. Veins partly reticulate (venation goniopteroid or meniscioid), areoles produced all without included veinlets; sori orbicular or shortly linear.
3a. Veins meniscioid, i.e., all veinlets joining into square or rectangular areoles; pinnae large, broadly lanceolate; sori orbicular when young and usually confluent when mature ..... 17. *Pronephrium*
3b. Veins goniopteroid, i.e., proximal pair of veinlets from adjacent segments or one pair of veinlets between veinlets of pinna joined to form into triangular areoles and producing an excurrent veinlet from these vein unions; excurrent veinlet or a line of translucent membrane at its end running to a sinus, several other pairs of veinlets connected to this excurrent vein or translucent membrane; pinnae small, narrowly lanceolate or triangular-lanceolate.
4a. Pinnae pinnatifid; one long or short translucent membranous line at bottom of sinus on segments connected with excurrent veinlet, veins except proximal pair from second to fifth pairs of veinlets connected with excurrent veinlets or translucent membranous line and forming rhombic areoles, other veinlets reaching margins above sinus; laminae usually with orange or reddish orange spherical or club-shaped glands abaxially; sori indusiate ..... 14. *Cyclosorus*
4b. Pinnae pinnatilobate or subentire, without translucent membranous line below sinus; except proximal pair of veins, other several pairs of veinlets connected with excurrent veinlet or reaching margins above sinus; laminae without glands abaxially; sori exindusiate.
5a. Plants with gemmae in pinna axils, these gemmae potentially developing into new plants; laminae covered with both simple and stellate hairs; sori orbicular or suborbicular; sporangia glabrous ..... 16. *Ampelopteris*
5b. Plants lacking gemmae; laminae with only simple hairs; sori thick and shortly linear; sporangia each with several setae at top ..... 15. *Stegnogramma*
1b. Veins free.
6a. Sori indusiate.
7a. Helophytes; lateral veins forked ..... 1. *Thelypteris*
7b. Terrestrial plants; veinlets usually simple (occasionally forked).
8a. Costae glabrous adaxially (or occasionally with sparse caducous hairs); stipes with many scales on proximal parts ..... 2. *Oreopteris*
8b. Costae with dense persistent acicular hairs adaxially; stipes with sparse scales on proximal parts.
9a. Costae rounded and raised adaxially; ends of veinlets not reaching margin; indusia small, or sometimes not developed.
10a. Laminae oblong or broadly lanceolate, 2- or 3-pinnate, proximal pair of pinnae similar in shape and size or smaller than distal ones, throughout with unicellular hairs ..... 4. *Metathelypteris*
10b. Laminae triangular-ovate, 3- or 4-pinnate, proximal pair largest, throughout with multicellular hairs ..... 5. *Macrothelypteris*
9b. Costae grooved adaxially; veinlets reaching margins; indusia large, brown.
11a. Pinnae without tuberculate aerophores at pinna bases abaxially; proximal pairs of veins reaching margins above sinus; laminae herbaceous, abaxially usually with reddish orange spherical glands ..... 3. *Parathelypteris*
11b. Pinnae each with a tuberculate aerophore at base abaxially; proximal pair of lateral veins from adjacent segments with acroscopic veinlet reaching cartilaginous bottom of sinus; laminae papery or leathery, abaxially without spherical glands ..... 12. *Pseudocyclosorus*
6b. Sori exindusiate.
12a. Sori orbicular.

13a. Laminae ovate-triangular, 3-pinnate; veinlets forked, not reaching margins; laminae throughout with multicellular long hairs ..... 5. *Macrothelypteris*
13b. Laminae narrowly oblong or lanceolate, pinnate-pinnatifid; veinlets simple and reaching margins; laminae throughout with unicellular short hairs.
14a. Rachises at pinna bases abaxially with brown tuberculate aerophores; laminae ± brown when dry; segments without cartilaginous ridge at bottom of sinuses ..... 9. *Cyclogramma*
14b. Rachises at pinna bases abaxially without brown tuberculate aerophores; laminae green when dry; segments with a cartilaginous ridge at bottom of sinuses.
15a. Plants ± with acicular hairs; pinnae pinnatifid nearly to costae; segments falcate-lanceolate, proximal pair of veinlets nearly reaching translucent membrane or margin above sinus; sori close to costules ..... 11. *Glaphyropteridopsis*
15b. Plants glabrous throughout; pinnae pinnatifid to 1/2 of distance to costae; segments triangular, proximal 3 pairs of veinlets reaching margin of translucent membrane below sinus but not joined; sori not close to costules ..... 13. *Mesopteris*
12b. Sori thick and shortly linear, or oblong.
16a. Sori thick and shortly linear; veins simple; segments entire.
17a. Laminae brown or brownish green when dry, with full spreading acicular hairs on both surfaces; proximal 1 or 2 pairs of pinnae free, distal ones adnate to costae; veinlets expanded at ends of veins and reaching margin; sori attached on middle of veinlets; sporangia each with 2–6 acicular hairs at tops ..... 10. *Leptogramma*
17b. Laminae green when dry, subglabrous on both surfaces; pinnae completely free from rachises; veinlets expanded at ends and not reaching margin; sori attached near tips of veinlets ..... 7. *Craspedosorus*
16b. Sori oblong or suborbicular; lateral veins ± forked; segments or ultimate pinnules pinnatifid.
18a. Plants small; stipes stramineous, not polished; laminae ovate-triangular or narrowly lanceolate; lateral pinnae decurrent along both sides of rachises and connected to each other; rachises and costae with more lanceolate scales, scales ciliate along margins; veinlets reaching margin ..... 6. *Phegopteris*
18b. Plants usually taller and larger; stipes reddish brown or brownish stramineous, polished; laminae oblong, rarely broadly lanceolate; lateral pinnae not decurrent and free from each other; rachises and costae without scales; veinlets not reaching margin ..... 8. *Pseudophegopteris*

Key 2 (artificial)

1a. Veins partly or almost fully connected.
2a. Veins reticulate and forming regular areoles; sori scattered and attached along reticulate veins ..... 18. *Dictyocline*
2b. Veins partly joining; sori orbicular or shortly linear.
3a. Veins meniscioid ..... 17. *Pronephrium*
3b. Veins goniopteroid.
4a. Plants of indeterminate growth, usually with gemmae in pinna axils, these gemmae potentially developing into new plants; laminae usually with mixed simple and stellate hairs ..... 16. *Ampelopteris*
4b. Plants of determinate growth; laminae with only simple hairs.
5a. Segments with an elongate translucent membrane below sinus; laminae usually with orange or reddish orange, spherical or clavate glands abaxially; sori orbicular, indusiate ..... 14. *Cyclosorus*
5b. Segments lacking translucent membranes below sinuses; laminae without glands abaxially; sori shortly linear, exindusiate ..... 15. *Stegnogramma*
1b. Veins free.
6a. Tuberculate aerophores present at pinna bases abaxially.
7a. Proximal pair of veinlets on segments or acroscopic veinlet reaching sinus, others reaching margin above sinus; laminae with only acicular hairs on both surfaces ..... 12. *Pseudocyclosorus*
7b. Veinlets on segments all reaching margins above sinus; laminae ± with mixed hooked long hairs, except with acicular hairs ..... 9. *Cyclogramma*
6b. Tuberculate aerophores lacking at pinna bases abaxially.
8a. Segments each with a cartilaginous ridge at bottom of adjacent sinus and with a transparent membranous line below that.
9a. Plants ± with acicular hairs; pinnae pinnatifid nearly to costae; segments falcate-lanceolate, proximal pair of veinlets only reaching nearby line of transparent membrane below sinus or to margins above sinus; sori close to costules ..... 11. *Glaphyropteridopsis*
9b. Plants glabrous throughout; pinnae pinnatifid to 1/2 of distance to costules; segments triangular; proximal 3 pairs of veinlets reaching transparent membranous margins below sinus but not connected; sori not close to costules ..... 13. *Mesopteris*

8b. Segments without cartilaginous ridge at bottom of sinus, lacking a translucent membranous line below that.
10a. Laminae ovate-triangular or triangular, 3- or 4-pinnate; proximal pair of pinnae largest; veinlets not reaching margins; throughout with multicellular acicular hairs ..... 5. *Macrothelypteris*
10b. Laminae oblong or broadly lanceolate, most often pinnate-pinnatifid, to 3-pinnate-pinnatifid, rarely simple or bipinnatifid; proximal pair of pinnae similar in size or smaller than more distal ones; throughout with unicellular acicular hairs.
11a. Costae densely covered with persistent grayish white acicular hairs adaxially.
12a. Costae rounded and raised adaxially; sporangia each sometimes with one multicellular hair expanded at tip on distal part of sporangial stalks ..... 4. *Metathelypteris*
12b. Costae grooved adaxially; sporangial stalks sometimes each with a sessile spherical gland on distal part or sporangia each with one seta near annulus.
13a. Veins not expanded at ends, reaching margins; sori orbicular, indusiate; sporangial stalks sometimes with 1–3 sessile spherical glands on distal parts .... 3. *Parathelypteris*
13b. Veins with minute expanded hydathodes at ends and not reaching margins; sori oblong or shortly linear, exindusiate; sporangia each usually with a seta near annulus ..... 7. *Craspedosorus*
11b. Costae without unicellular acicular hairs adaxially (occasionally with sparse caducous hairs).
14a. Rachises and costae with few small scales.
15a. Scales on rachises and costae with glands at apices, without cilia; pinnae sessile at bases, not adnate to rachises ..... 2. *Oreopteris*
15b. Scales on rachises and costae without glands at tips but ciliate below tips; pinna bases adnate to rachises and decurrent ..... 6. *Phegopteris*
14b. Rachises and costae without scales.
16a. Plants of marshes; veinlets forked; sori indusiate; sporangia each with several short setae near top of annulus ..... 1. *Thelypteris*
16b. Plants terrestrial; veinlets simple; sori exindusiate; sporangia each with several acicular hairs.
17a. Sori orbicular; veinlets not reaching margins ..... 8. *Pseudophegopteris*
17b. Sori oblong or shortly linear; veinlets reaching margins ..... 10. *Leptogramma*

1. THELYPTERIS Schmidel, Icon. Pl., ed. Keller, 3, 45. 18 Oct 1763, nom. cons., not Adanson (Jul–Aug 1763).

沼泽蕨属 zhao ze jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Lastrea Bory.

Plants small to medium-sized, of marshes and meadows. Rhizomes long creeping, black, glabrous, sparsely covered with scales at apices; scales ovate-lanceolate, with acicular hairs and unicellular glandular hairs on surfaces and along margins. Fronds remote or approximate, stipitate; stipes nearly black at bases and slightly acicular hairy, distally stramineous, glabrous; laminae oblong-lanceolate, not tapering or slightly tapering to bases, pinnate-pinnatifid, shortly acuminate at apices; pinnae mostly nearly flat-spreading, lanceolate, bases truncate, symmetrical, pinnatifid, apices acute or shortly acuminate; segments ovate-triangular or oblong, shortly pointed at apices; veins free, pinnate on segments, veinlets forked or simple, reaching margins. Laminae thickly herbaceous or somewhat leathery, both surfaces with few acicular hairs when young, glabrescent when old, costae each with a groove adaxially, abaxially raised, sometimes with few membranous small scales. Sori orbicular, dorsifixed on veinlets, located between costules and margins, in one line on each side of costules, usually ± covered by reflexed margins; indusia membranous, orbicular-reniform, greenish, deciduous or hidden in mature sori; sporangia each with 1 or 2 short capitate glandular hairs close to tops of annuli; spores bilateral, reniform, perispores transparent, echinate, exospore smooth. $x = 35$.

Four species: temperate regions of N Hemisphere, S tropical and S Africa, India, Madagascar, New Guinea, New Zealand; two species in China.

In the past, *Thelypteris* has been defined to contain most or all species in the family. More recent studies show that, using multiple additional characters, like types of hairs, glands, venation, lamina shape and dissection, indusial characters, aerophores, adaxial grooves, spores, and chromosome base numbers, natural groups can be utilized to define smaller subsets of *Thelypteris* s.l. Here, we adopt a narrow concept for classification.

1a. Plants 35–65 cm tall; fronds approximate, stipes 2–2.5 mm in diam. at bases; costae without scales abaxially ..... 1. *T. palustris*
1b. Plants 14–26 cm tall; fronds remote, stipes slender, ca. 0.5 mm in diam. at bases; costae with sparse easily deciduous, broadly ovate, brownish, membranous scales ..... 2. *T. fairbankii*

1. Thelypteris palustris Schott, Gen. Fil. t. 10. 1834.

沼泽蕨 zhao ze jue

Plants 35–65 cm tall. Rhizomes long creeping, black, glabrous or with sparse reddish brown, ovate-lanceolate scales. Fronds approximate; stipes 20–40 cm, bases black, distally dark stramineous, polished, usually glabrous, or white pubescent when young; laminae lanceolate, 22–28 × 6–9 cm or sometimes slightly wider, bases almost tapering, pinnate-pinnatifid, apices shortly acuminate and pinnatifid; pinnae ca. 20 pairs, subopposite, flat- or obliquely spreading, usually slightly reflexed; proximal pair slightly shortened, middle pinnae lanceolate, 4–5 × 1–1.2 cm, bases truncate, pinnatifid nearly to costae, apices shortly acuminate; segments 5–7 × 3–5 mm, rounded-obtuse or obtuse-pointed at apices, fertile segments usually recurved to forming points along margin. Veins pinnate in segments, lateral veins 4–6 pairs, simple or forked and reaching margins, proximal pair arising from base of costa. Laminae papery, grass-green or yellowish green when dry, glabrous on both surfaces, rachises and costae grooved adaxially, raised abaxially, glabrous on both sides or with acicular long hairs abaxially. Sori orbicular, dorsifixed at middle of veinlets, located between costa and margins; indusia small, orbicular-reniform, membranous, deciduous when mature. Spores smooth on surfaces of exospore, perispores translucent, echinate. $2n = 70$.

Meadows, reed marshes, wet shaded places in forests; 200–800 m. Hebei, Heilongjiang, Henan, N Jiangsu, Jilin, Nei Mongol, Shandong, Sichuan, Xinjiang [widely distributed in temperate regions of the N Hemisphere].

1a. Rachises, costae, and veinlets glabrous ... 1a. var. *palustris*
1b. Rachises, costae, and veinlets covered with multicellular acicular long hairs abaxially ..... 1b. var. *pubescens*

1a. Thelypteris palustris var. **palustris**

沼泽蕨(原变种) zhao ze jue (yuan bian zhong)

Acrostichum thelypteris Linnaeus, Sp. Pl. 2: 1071. 1753; *Aspidium palustre* A. Gray, nom. illeg. superfl.; *A. thelypteris* (Linnaeus) Swartz; *Athyrium thelypteris* (Linnaeus) Sprengel; *Dryopteris thelypteris* (Linnaeus) A. Gray; *Lastrea thelypteris* (Linnaeus) Bory; *Nephrodium thelypteris* (Linnaeus) Strempel; *Polypodium palustre* Salisbury (1796), not N. L. Burman (1768); *P. pterioides* Lamarck; *P. thelypteris* (Linnaeus) F. G. Weiss.

Rachises, costae, and veins all glabrous.

Meadows, reed marshes, wet shaded places in forests; 200–800 m. Hebei, Heilongjiang, Henan, Jilin, Nei Mongol, Shandong, Sichuan, Xinjiang [widely distributed in temperate regions of N Hemisphere].

1b. Thelypteris palustris var. **pubescens** (G. Lawson) Fernald, Rhodora 31: 34. 1929.

毛叶沼泽蕨 mao ye zhao ze jue

Lastrea thelypteris var. *pubescens* G. Lawson, Edinburgh New Philos. J. 19: 277. 1864.

Rachises, costae, and veinlets covered with multicellular acicular long hairs abaxially. $2n = 70$.

Wet meadows and marshes; below 800 m. Heilongjiang, N Jiangsu, Jilin, Shandong [temperate regions of E Asia and North America].

2. Thelypteris fairbankii (Beddome) Y. X. Lin, K. Iwatsuki & M. G. Gilbert, **comb. nov.**

鳞片沼泽蕨 lin pian zhao ze jue

Basionym: *Lastrea fairbankii* Beddome, Ferns Brit. India, t. 254. 1866; *Aspidium thelypteris* (Linnaeus) Swartz var. *squamigerum* Schlechtendahl; *L. thelypteris* (Linnaeus) Bory var. *squamigera* (Schlechtendahl) Beddome; *Nephrodium thelypteris* (Linnaeus) Strempel var. *squamigerum* (Schlechtendahl) Hooker [*"squamulosum"*]; *Thelypteris squamigera* (Schlechtendahl) Ching [*"squamulosa"*].

Plants small, 14–26 cm tall. Rhizomes long creeping and branched, black, apices including stipe bases with sparse membranous, brownish ovate-lanceolate scales. Fronds remote; stipes slender, 6–18 cm, black at bases, distally stramineous, glabrous; laminae oblong-lanceolate or narrowly triangular-lanceolate, 8–10 × 3–5 cm, sometimes slightly tapering at bases, pinnate-pinnatifid, shortly acuminate and pinnatifid at apices; pinnae 10–12 pairs, alternate or subopposite, middle ones linear-lanceolate, 2–3 × 0.5–0.8 cm, truncate at bases, pinnatifid, shortly pointed at apices; segments oblong or triangular-lanceolate, usually reflexed at margins, entire, obtuse at apices. Veins pinnate in segments, lateral veins forked, veinlets reaching margins. Laminae somewhat leathery, glabrous, along rachises and costae sparsely pubescent adaxially, costae with sparse brownish, membranous, easily deciduous, ovate-lanceolate scales. Sori not seen.

Marshes. S Yunnan [S India; S Africa, Pacific islands (New Zealand)].

2. OREOPTERIS Holub, Folia Geobot. Phytotax. (Praha) 4: 46. 1969.

假鳞毛蕨属 jia lin mao jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Plants medium-sized, terrestrial. Rhizomes short, erect or ascending. Fronds clustered; stipes dark stramineous, densely covered with large, thin, brown, lanceolate scales, distally gradually sparsely so; laminae oblong-lanceolate, gradually tapering to bases, pinnate-pinnatifid; proximal pinnae gradually shortened, proximal ones triangular auriculate, middle ones lanceolate, pinnatifid to narrow wings on both sides of costae. Veins pinnate, free, reaching margins. Sori orbicular, attached above middle of veinlets, far from costules; indusia orbicular-reniform, usually with glands along margins. Sporangia usually with stalked glands near annuli. Spores bilateral, reniform, perispores not evident and easily deciduous, granular. $x = 34$.

Three species: Europe, N India, E Asia to N America; two species in China.

1a. Rachises stramineous, with sparse bright brown or brownish membranous scales; laminae 20–30 cm wide, proximal 3 or 4 pairs of pinnae slightly shortened, proximal pair of pinnae triangular-lanceolate ..... 1. *O. quelpaertensis*
1b. Rachises bright brownish stramineous, with sparse brownish short hairs; laminae 6–7 cm wide at middle or distal part, proximal 8–10 pairs of pinnae gradually shortened, proximal pair of pinnae with orbicular or triangular auricles ..... 2. *O. elwesii*

1. Oreopteris quelpaertensis (Christ) Holub, Folia Geobot. Phytotax. 4: 48. 1969.

亚洲假鳞毛蕨 ya zhou jia lin mao jue

Dryopteris quelpaertensis Christ, Bull. Acad. Int. Géogr. Bot. 20: 7. 1910 [*"quelpartensis"*]; *Athyrium quelpaertensis* (Christ) Ching; *Ctenitis quelpaertensis* (Christ) H. Itô; *C. quelpaertensis* var. *yakumontana* (Masamune) H. Itô; *D. christiana* Kodama ex Koidzumi; *D. kamtschatica* Komarov; *D. oreopteris* (Ehrhart) Maxon var. *fauriei* (Christ) Miyabe & Kudô; *D. yakumontana* Masamune; *Lastrea quelpaertensis* (Christ) Copeland; *L. quelpaertensis* var. *yakumontana* (Masamune) Tagawa; *Nephrodium montanum* Baker var. *fauriei* Christ; *Thelypteris quelpaertensis* (Christ) Ching; *T. quelpaertensis* var. *yakumontana* (Masamune) Tagawa.

Plants (40–)70–105 cm tall. Rhizomes short, erect or ascending, densely covered with scales; scales bright brown, ovate-oblong-lanceolate, entire along margins, acuminate and with small club-shaped glands at apices. Fronds clustered; stipes 10–30 cm, bases dark brown, distally dark stramineous, including rachises covered with denser scales; scales bright brown or brownish, ovate, lanceolate, or linear, glandular at apices; laminae oblong-oblanceolate, (13–)50–70 × (10–)20–30 cm, gradually tapering to bases, pinnate-pinnatifid, long acuminate and pinnatifid at apices; pinnae 20–35 pairs, opposite or alternate distally, proximal 3 or 4 pairs gradually shortened, proximal pair of pinnae triangular-lanceolate; middle pinnae (5–)10–15 × 1–2.5 cm, bases truncate, pinnatifid nearly to costae, apices long acuminate; segments usually longest at pinna bases, triangular-oblong, entire or shallowly undulate and usually recurved along margins, rounded-obtuse at apices. Veinlets free, simple or forked above middle and reaching margins. Laminae herbaceous, grayish green, covered with brownish linear scales and mixed grayish white pubescence, elsewhere glabrous. Sori orbicular, attached above middle of veinlets and close to margins; indusia orbicular-reniform, brown, membranous, usually with glandular projections along margins. Spores finely granular. $2n = 68$.

Forests; 1000–1800 m. Jilin (Changbai Shan) [N and S Japan, Korea, Russia (Far East)].

The outline of *Lastrea quelpaertensis* is similar to *L. limbosperma* (Allioni) Ching, which is distributed in SW Asia, Europe, and North America, but differs by pinnae abaxially without glands, costae glabrous above the middle abaxially, and laminae slightly thickened.

2. Oreopteris elwesii (Hooker & Baker) Holttum in Nayar & Kaur, Companion Handb. Ferns Brit. India, 204. 1974.

锡金假鳞毛蕨 xi jin jia lin mao jue

Nephrodium elwesii Hooker & Baker, Syn. Fil., ed. 2, 497. 1874; *Dryopteris elwesii* (Hooker & Baker) Kuntze; *Lastrea elwesii* (Hooker & Baker) Beddome; *Thelypteris elwesii* (Hooker & Baker) Ching.

Plants 35–45 cm tall. Rhizomes creeping including stipe bases covered with brown ovate thin scales. Fronds sparse; stipes 30–32 cm, blackish brown proximally, upward to rachises bright brownish stramineous, subglabrous abaxially, along grooves pubescent adaxially; laminae oblanceolate, 30–32 × 5–7 cm, gradually tapering to bases, pinnate-pinnatifid, acuminate at apices; pinnae ca. 10 pairs, gradually reduced from middle of lamina downward, opposite or alternate, proximal pair of pinnae orbicular-auriculate, 5–8 × 5–8 mm, middle ones alternate, spreading or slightly ascending, 3–4.5 cm, to 1 cm wide, pinnatifid to 2/3 of distance to costae; segments ca. 5 × 4 mm (basal acroscopic part minutely longer), ligulate, rounded-obtuse at apices. Veinlets impressed adaxially, abaxial sides minutely raised, veinlets simple or forked, 3 or 4 pairs per segment, all reaching margins above sinuses. Laminae papery, brownish green when dry adaxially, grayish green abaxially, glabrous on both surfaces, with more orange-yellow glands abaxially. Sori attached on ends of single veinlet or acroscopic veinlet on forked veins; indusia membranous, brown, glabrous, persistent.

Streamsides in subalpine coniferous forests; ca. 3100 m. Yunnan [India (Sikkim)].

3. PARATHELYPTERIS (H. Itô) Ching, Acta Phytotax. Sin. 8: 300. 1963.

金星蕨属 jin xing jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Thelypteris sect. *Parathelypteris* H. Itô in Nakai & Honda, Nov. Fl. Jap. 4: 127. 1939; *Coryphopteris* Holttum; *Wagneriopteris* A. Löve & D. Löve.

Plants small to medium-sized, terrestrial plants, rarely in marshes or meadows. Rhizomes long creeping or short and decumbent, ascending or erect, glabrous or with scales or rusty yellow hairs. Fronds remote, approximate, or clustered; stipes stramineous or castaneous, ± polished, bases sometimes nearly black and glabrous or with spreading, grayish white, multicellular acicular hairs, distally glabrous or pubescent; laminae ovate-oblong, oblong-lanceolate, or lanceolate, tapering or not tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; lateral pinnae mostly narrowly lanceolate to linear-lanceolate, bases symmetrical, truncate or broadly cuneate, not adnate to rachises, sessile or occasionally shortly stalked, apices acuminate; proximal pinnae not

shortened or 1 to several pairs of pinnae obviously shortened, even reduced to small auricles, pinnatifid; segments mostly oblong, rectangular, or subsquare, margins entire or ± serrate, apices rounded-obtuse, sometimes pointed or with sinuslike angles. Veinlets pinnate, free, simple and all reaching margins. Laminae herbaceous or papery, when dry yellowish green, sometimes brownish green or nearly black, both surfaces ± with pubescent or acicular hairs, rarely glabrous when dry, sometimes with orange-yellow or reddish purple glands abaxially; costae grooved adaxially, densely covered with short setae, rounded and raised abaxially and usually ± with acicular hairs, rarely glabrous. Sori orbicular, medium-sized, dorsifixed at middle or near ends of veinlets, located between main veins and margins or slightly closer to margins; indusia larger, orbicular-reniform, sometimes horseshoe-shaped, when dry brown, membranous, glabrous or hairy, usually persistent. Spores bilateral, orbicular-reniform, perispores thin and transparent, corrugate, ± finely reticulate on surfaces. $x = 8, 9, 31$.

About 60 species: tropical and subtropical regions of E Asia, SE Asia to Pacific islands; 24 species (11 endemic) in China.

Parathelypteris is very similar to *Metathelypteris* in shape, but it differs by the costae grooved adaxially; the veinlets usually simple, not forked, and reaching margins; and the indusia larger and readily discerned.

The following taxa are excluded from the present treatment, pending further research: *Parathelypteris auriculata* H. G. Zhou & H. Li (Acta Bot. Yunnan. 14: 33. 1992), described from Guangxi (Wuming), and *P. jinfoshanensis* Ching & Z. Y Liu (Bull. Bot. Res., Harbin 4(3): 18. 1984), described from Sichuan (Nanchuan).

1a. Stipes stramineous, glabrous or sparsely shortly hairy near bases; sori usually attached near ends of veinlets and close to margins.
  2a. Several pairs of pinnae on proximal part of lamina clearly shortened.
    3a. Plants short and small, usually no more than 40 cm; rhizomes long creeping; middle pinnae no more than 3.5 cm; pinnae with more multicellular (usually 3–7 cells) acicular hairs abaxially along costae ..... 1. *P. beddomei*
    3b. Plants more than 40 cm tall; rhizomes stronger, creeping or ascending; middle pinnae usually over 4 cm; pinnae usually with unicellular acicular hairs abaxially along costae, sometimes with 2- or 3-celled hairs.
      4a. Pinnae 3 or 4 pairs on proximal part of lamina gradually shortened, proximal pair of pinnae 1–2 cm, not auriculate ..... 2. *P. changbaishanensis*
      4b. Pinnae 5–8 pairs on proximal part of lamina gradually shortened, proximal pair of pinnae reduced to small auricles or lacking.
        5a. Laminae without glands or occasionally with few orange-yellow spherical glands abaxially; rhizomes long creeping, subglabrous ..... 3. *P. nipponica*
        5b. Laminae with more orange-yellow spherical glands abaxially; rhizomes ascending or creeping, densely rusty yellow pubescent.
          6a. Rhizomes ascending; rachises with glaucous fine acicular hairs abaxially; indusia with dense setae ..... 4. *P. qinlingensis*
          6b. Rhizomes long creeping, densely rusty yellow hairy; rachises subentire abaxially; indusia glabrous or occasionally with 1 or 2 setae ..... 5. *P. borealis*
  2b. Proximal pinnae not shortened or slightly shortened.
    7a. Plants usually not more than 20 cm tall; middle pinnae 1.5–2 × 4–8 cm; segments 2–5 pairs; indusia horseshoe-shaped.
      8a. Pinnae subglabrous abaxially, nearly without glands; indusia larger and subglabrous, occasionally with few grayish white setae ..... 6. *P. cystopteroides*
      8b. Costae and costules abaxially with sparse grayish white fine acicular hairs and orange-yellow orbicular glands; indusia small and with more setae ..... 7. *P. grammitoides*
    7b. Plants 25–60 cm tall, or 2–3 m tall.
      9a. Plants 2–3 m tall; lateral pinnae 25–30 × 2–2.5 cm; segments 60–70 pairs per pinna; pinna glands confined to veinlets ..... 11. *P. subimmersa*
      9b. Plants 25–60 cm tall; middle pinnae 2–6 × ca. 1 cm; segments 6–20 pairs; pinnae glands scattered abaxially.
        10a. Costae glabrous abaxially; segments of fertile fronds crenate along margins ..... 8. *P. serrutula*
        10b. Costae ± with acicular hairs; segments of fertile fronds entire along margins.
          11a. Middle pinnae 2–3 cm, acute at apices; segments 6–10 pairs; proximal several pairs of pinnae minutely shortened; costae with only few acicular hairs abaxially ..... 9. *P. angustifrons*
          11b. Middle pinnae ca. 4.5 cm, acuminate at apices; segments more than 15 pairs; proximal pinnae not shortened; costae with more acicular hairs abaxially ..... 10. *P. glanduligera*
1b. Stipes in part or whole (usually up to rachis) castaneous or castaneous-brown, rarely stramineous, bases glabrous or with spreading grayish white acicular hairs; sori usually dorsifixed on middle of veinlets, located between costa and margins.

12a. Laminae without reddish purple spherical glands abaxially.
13a. Stipes with dense unicellular grayish white short acicular hairs; lamina with similar dense hairs on both surfaces ..... 20. *P. castanea*
13b. Stipes with spreading multicellular acicular long hairs at bases.
14a. Segments 2–4 sinuslike angular at apices.
15a. Rhizomes short and erect; bases of stipes mixed with few spreading multicellular long acicular hairs and, including above bases, with grayish white unicellular short setae; indusia sparsely pubescent ..... 21. *P. pauciloba*
15b. Rhizomes short, decumbent or ascending; stipes with dense spreading multicellular acicular long hairs, distally subglabrous; indusia densely shortly setaceous ..... 22. *P. angulariloba*
14b. Segments not sinuslike angular at apices.
16a. Laminae dark green or nearly black when dry; pinnae abaxially densely pubescent along costae, veins and interval sparsely shortly hairy; indusia glabrous or occasionally very sparsely pubescent when dry ..... 23. *P. nigrescens*
16b. Laminae grayish green when dry; pinnae with dense multicellular beardlike long acicular hairs; indusia densely pubescent ..... 24. *P. indochinensis*
12b. Pinnae with reddish purple spherical large glands abaxially.
17a. Stipes glabrous at bases.
18a. Laminae lanceolate; middle pinnae narrower, 0.8–1.2 cm wide, glabrous or occasionally very sparsely grayish white pubescent abaxially; indusia glabrous or with sparse short hairs; stipes castaneous-brown, never stramineous ..... 18. *P. chinensis*
18b. Laminae ovate-oblong; middle pinnae 1.3–1.6 cm wide, usually grayish white pubescent abaxially, rarely glabrous; stipes usually coetaneous, occasionally stramineous ..... 19. *P. japonica*
17b. Stipes with spreading 2- or 3-celled grayish white acicular hairs at bases.
19a. Laminae abaxially with long acicular hairs along costae.
20a. Rachises usually hairy abaxially; lateral pinnae 12–15 pairs; segments ± angular at apices, 3–6 veinlets per segment; laminae with reddish purple glands abaxially ..... 12. *P. chingii*
20b. Rachises usually glabrous abaxially, lateral pinnae 18–30 pairs; segments rounded-obtuse or rounded-truncate at apices and not angular, 7 or 8 pairs of veinlets per segment; laminae with denser reddish purple glands abaxially.
21a. Indusia with dense grayish white acicular long hairs ..... 13. *P. petelotii*
21b. Indusia glabrous or occasionally with few short setae ..... 14. *P. hirsutipes*
19b. Laminae with short hairs or subglabrous abaxially along rachises.
22a. Laminae glabrous or with few short acicular hairs abaxially; indusia glabrous or occasionally with short setae ..... 15. *P. caudata*
22b. Laminae with dense short acicular hairs abaxially; indusia hairy also.
23a. Indusia large, close to each other, densely shortly setaceous ..... 16. *P. trichochlamys*
23b. Indusia medium-sized, separate from each other, sparsely pubescent ..... 17. *P. caoshanensis*

1. Parathelypteris beddomei (Baker) Ching, Acta Phytotax. Sin. 8: 302. 1963.

长根金星蕨 chang gen jin xing jue

Nephrodium beddomei Baker in Hooker & Baker, Syn. Fil. 267. 1867; *Aspidium beddomei* (Baker) Prantl; *Dryopteris beddomei* (Baker) Kuntze; *Lastrea beddomei* (Baker) Beddome; *Thelypteris beddomei* (Baker) Ching; *Wagneriopteris beddomei* (Baker) A. Löve & D. Löve.

Plants 20–30(–40) cm tall. Rhizomes extremely long creeping, with sparse brown ovate small scales and dense brownish long hairs when young. Fronds remote or approximate; stipes slender, 4–10 cm, stramineous and glabrous; laminae oblanceolate, 15–25(–30) × 3–4(–6) cm, gradually tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 20–24(–30) pairs, alternate, sessile, obliquely spreading, proximal 7–9 pairs gradually shortened into small auricles, proximal pair of pinnae only 1–2 mm, middle pinnae lanceolate, 1.5–3.5 × 0.4–0.5 cm, bases minutely broadened, symmetrical, rounded-truncate, pinnatifid to narrow wing on both sides of costae, apices shortly acuminate; segments 10–14 pairs, oblong, entire, rounded at apices. Veins visible on both sides, veinlets pinnate, free, simple, reaching margins, 3 or 4 pairs per segment, proximal pair arising from bases of costae. Laminae herbaceous, yellowish brown when dry, abaxially with grayish white 3–7-celled fine long hairs along costae and veins, also with few orange-yellow spherical glands, adaxially with unicellular short acicular hairs along costae and veins. Sori small, 2 or 3 pairs per segment, attached near ends of veinlets, close to margins; indusia orbicular-reniform, small, brown, thickly membranous, glabrous, persistent. $2n = 62$.

Mountain meadows, streamsides, wetlands; 600–2500 m. Taiwan, Zhejiang [S India, Indonesia, Japan, Malaysia, Philippines].

Parathelypteris beddomei is similar to *P. nipponica* in outline but differs by plants thinner, rhizomes extremely slender, pinnae covered with more multicellular long acicular hairs, and growth in wet habitats.

2. Parathelypteris changbaishanensis Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 319. 1999.

长白山金星蕨 chang bai shan jin xing jue

Plants 45–60 cm tall. Rhizomes long creeping, nearly black and glabrous. Fronds approximate; stipes 15–25 cm, bases nearly black, occasionally covered with few dark brown ovate scales, distally stramineous, glabrous or sometimes with sparse grayish white fine and long hairs; laminae oblong-lanceolate, 25–35 × 8–12 cm, clearly tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 20–25 pairs, alternate, obliquely spreading, sessile, proximal 3 or 4 pairs gradually shortened, proximal pair of pinnae 1–2 cm, lanceolate and reflexed proximally; middle pinnae linear-lanceolate, 4–6 × 0.9–1.3 cm, bases minutely broadened, symmetrical, subtruncate, pinnatifid nearly to costae, apices acuminate; segments ca. 15 pairs, proximal pair slightly longer, middle ones oblong, 4–6 × 2–3 mm, sparsely shallowly and thickly serrate along margins, rounded-obtuse at apices. Veinlets visible, oblique distally, 5(or 6) pairs per segment, proximal pair arising from bases of costae. Laminae thinly herbaceous, grass-green when dry, abaxially with orange-yellow spherical glands, costae villous, sparsely so along costules; adaxially with denser appressed short acicular hairs along grooves and veins. Sori small, orbicular, 3 or 4 pairs per segment, dorsifixed above middle of veinlets, slightly closer to margins; indusia small, orbicular-reniform, grayish yellow, membranous, hairy, persistent.

● Meadows; 600–1400 m. Jilin (Changbai Shan).

Parathelypteris changbaishanensis is similar to *P. nipponica* in outline but differs by proximal 2–4 pairs of pinnae shortened, pinnae with dense orange-yellow spherical glands and villous abaxially, and growth in meadows.

3. Parathelypteris nipponica (Franchet & Savatier) Ching, Acta Phytotax. Sin. 8: 301. 1963.

中日金星蕨 zhong ri jin xing jue

Aspidium nipponicum Franchet & Savatier, Enum. Pl. Jap. 2: 242, 636. 1879; *Dryopteris nipponica* (Franchet & Savatier) C. Christensen; *Lastrea nipponica* (Franchet & Savatier) Copeland; *Thelypteris nipponica* (Franchet & Savatier) Ching; *Wagneriopteris nipponica* (Franchet & Savatier) A. Löve & D. Löve.

Plants 40–60 cm tall. Rhizomes long creeping, subglabrous. Fronds approximate; stipes 10–20 cm, bases dark brown, ± covered with reddish brown broadly ovate scales, distally bright stramineous, glabrous; laminae oblanceolate, 30–40 × 7–10 cm, gradually tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 25–33 pairs, proximal 5–7 pairs subopposite, proximally gradually reduced into small auricles, lowest ones tuberculate; middle pinnae alternate, sessile, spreading, lanceolate, 4–5 × 0.7–1.2 cm, bases slightly broadened, symmetrical, truncate, pinnatifid nearly to costae, apices acuminate; segments ca. 18 pairs, slightly obliquely spreading, oblong, 3–5 × ca. 2 mm, entire or shallowly thickly serrate, rounded-obtuse at apices. Veinlets evident, simple, 4 or 5 pairs per segment. Laminae herbaceous, grass-green when dry, abaxially with grayish white, spreading, unicellular and mixed with few multicellular acicular hairs along costae and margins, interstitial region with dense micro-glandular hairs and few orange-yellow spherical glands; adaxially subglabrous except costae and veins with short acicular hairs. Sori orbicular, medium-sized, 3 or 4 pairs per segment, dorsifixed above middle of veinlets, far from costa; indusia medium-sized, orbicular-reniform, brown, membranous, with few grayish white long acicular hairs. Spores bilateral, orbicular-reniform, perispores corrugate, exospore regularly finely reticulate. $2n = 124$.

On soil in open forests on hills, common; 400–2500 m. Fujian, Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, N Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Yunnan, Zhejiang [Japan, S Korea, Nepal].

Parathelypteris nipponica is similar to *P. novoboracensis* (Linnaeus) Ching in outline, but the latter plant, which grows along the Atlantic coast, differs in segments acute at apices and indusia glabrous at the back.

4. Parathelypteris qinlingensis Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 320. 1999.

秦岭金星蕨 qin ling jin xing jue

Plants 45–60 cm tall. Rhizomes ascending. Fronds subclustered; stipes 10–20 cm, bases dark brown, with sparse brown broadly ovate scales, distally stramineous, glabrous; laminae oblanceolate, 35–45 × 8–11 cm, gradually tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae ca. 25 pairs, proximally gradually shortened into small auricles, lowest ones tuberculate; middle pinnae alternate, spreading, sessile, lanceolate, 4–6 × ca. 1 cm, bases symmetrical and slightly broader, subtruncate, pinnatifid nearly to costae, apices long acuminate; segments ca. 18 pairs, spreading, oblong-lanceolate, 4–6 × ca. 2 mm, entire, obtuse at apices. Veinlets evident, simple, 5 or 6 pairs per segment, proximal pair arising from bases of costule. Laminae thickly herbaceous, grass-green when dry, abaxially with orange-yellow spherical glands, costae, costules, and margins with dense grayish white spreading fine acicular hairs, adaxially along grooves and veins with appressed short setae, along rachises with sparse long hairs. Sori orbicular, 3–5 pairs per segment, dorsifixed near ends of veinlets and close to margins; indusia medium-sized, orbicular-reniform, brown, membranous, with more setae, persistent. Spores bilateral, orbicular-reniform, perispores corrugate and obviously finely reticulate on surfaces, exospore finely reticulate.

● *Pinus armandii* forests, common; ca. 1800 m. Gansu, Shaanxi.

Parathelypteris qinlingensis differs from *P. nipponica* in having rhizomes ascending, fronds subclustered, pinnae with more orange-yellow spherical glands, fine acicular long hairs abaxially, and indusia densely covered with setae.

5. Parathelypteris borealis (H. Hara) K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 37. 1999.

狭脚金星蕨 xia jiao jin xing jue

Dryopteris nipponica (Franchet & Savatier) C. Christensen var. *borealis* H. Hara, Bot. Mag. (Tokyo) 48: 695. 1934; *Parathelypteris nipponica* (Franchet & Savatier) Ching var. *borealis* (H. Hara) Nakaike; *Thelypteris nipponica* (Franchet & Savatier) Ching var. *borealis* (H. Hara) H. Hara.

Plants 45–65 cm tall. Rhizomes long creeping, with dense rusty yellow hairs. Fronds approximate; stipes ca. 13 cm, stramineous, glabrous, bases with sparse brown ovate scales; laminae 25–50 × 5–11 cm; pinnae alternate, flatly spreading, sessile, proximal 7 or 8 pairs abruptly tapering into auricles, lowest ones tuberculate; middle pinnae lanceolate, 3–6 × 0.6–0.9 cm, bases slightly broadened, symmetrical, subtruncate, pinnatifid nearly to costae, apices acuminate; segments 12–18 pairs, oblong, 3–4.5 × 1.5–2 mm, entire, obtuse at apices. Veinlets evident, simple, 4 or 5 pairs per segment, proximal pairs arising from above bases of costules. Laminae herbaceous, yellowish dark green when dry, with dense orange-yellow spherical glands abaxially, with sparse grayish white fine acicular hairs along costae, costules, and margins, adaxially along grooves of costae with short hairs, elsewhere glabrous. Sori orbicular, dorsifixed near ends of veinlets and close to margins, 1–4 pairs per segment; indusia small, orbicular-reniform, brown, membranous, subglabrous. Spores bilateral, orbicular-reniform, perispores few corrugate and finely reticulate on corrugations.

Valley thickets, wet shaded places in forests, common; 400–1900 m. N Anhui, N Fujian, Guangxi, Guizhou, Hunan, Jiangxi, Shaanxi, Sichuan [Japan].

Parathelypteris borealis is very similar to *P. nipponica* in laminar outline but differs by laminae with dense orange yellow spherical glands abaxially and indusia subglabrous. It is also similar to *P. qinlingensis*, but the latter has rhizomes ascending, costae with denser long acicular hairs abaxially, and indusia with more setae.

6. Parathelypteris cystopteroides (D. C. Eaton) Ching, Acta Phytotax. Sin. 8: 302. 1963.

马蹄金星蕨 ma ti jin xing jue

Athyrium cystopteroides D. C. Eaton, Proc. Amer. Acad. Arts 4: 110. 1858; *Asplenium cystopteroides* (D. C. Eaton) Hooker; *Dryopteris abbreviatipinna* Makino & Ogata; *D. cystopteroides* (D. C. Eaton) Kodama ex Tagawa; *D. gracilescens* (Blume) Kuntze var. *abbreviata* Kodama; *Lastrea cystopteroides* (D. C. Eaton) Copeland; *Thelypteris cystopteroides* (D. C. Eaton) Ching.

Plants 7–20 cm tall. Rhizomes long creeping, branching mixed and becoming feltlike, with sparse dark brown lanceolate small scales. Fronds approximate; stipes 3–5(–13) cm, slender, dark stramineous, subglabrous; laminae lanceolate, 4–7 × ca. 1.5 cm, not tapering to bases, bipinnatipartite, acuminate and pinnatifid at apices; pinnae 7–10 pairs, alternate, spreading, stalks short, proximal pair of similar shape as distal ones, 7–10 × 6–7 mm, subtruncate at bases, pinnatifid nearly to costae, obtuse at apices; segments 2 or 3 pairs, oblong, ca. 3 × ca. 1.5 mm, proximal pair usually irregularly bilobate. Veinlets evident, simple, ca. 3 pairs per segment. Laminae herbaceous, dark green when dry, subglabrous abaxially, adaxially with sparse appressed short hairs along grooves on costae. Sori orbicular or oblong, medium-sized, 2–4 pairs per segment, dorsifixed slightly above middle of veinlets; indusia large, orbicular-reniform, brown, thickly membranous, occasionally with few grayish white setae, persistent.

On rocks in forests. Along the coast, offshore islands of Fujian, Taiwan [Japan, Korea].

7. Parathelypteris grammitoides (Christ) Ching, Acta Phytotax. Sin. 8: 302. 1963.

矮小金星蕨 ai xiao jin xing jue

Aspidium grammitoides Christ, Bull. Herb. Boissier 6: 193. 1898; *Athyrium hyalostegium* Copeland; *Dryopteris glanduligera* (Kunze) Christ var. *hyalostegia* (Copeland) H. Itô; *D. grammitoides* (Christ) C. Christensen; *Lastrea grammitoides* (Christ) Copeland; *Thelypteris glanduligera* (Kunze) Ching var. *hyalostegia* (Copeland) H. Itô; *T. grammitoides* (Christ) Ching.

Plants 10–18 cm tall. Rhizomes long creeping, apices including bases of stipes with reddish brown narrowly lanceolate small scales. Fronds approximate; stipes 3–10 cm, dark stramineous, with grayish white fine acicular hairs; laminae lanceolate, 5–8 × 2–3.5 cm, tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 6–8 pairs, alternate, subspreading, lanceolate, bases symmetrical and tapering, rounded-truncate, pinnatifid nearly to costae, apices obtuse or acute; segments 3–5 pairs, obliquely spreading, proximal pair oblong, 2–3 × 1.5–2 mm, entire, rounded at apices; distal segments gradually shortened. Veinlets visible abaxially, simple, 3 or 4 pairs per segment, proximal pair arising above bases of costules. Laminae thickly leathery, dark green when dry, with orange-yellow spherical glands abaxially, costae and costules with sparse glaucous acicular long hairs, adaxially along costal grooves with acicular hairs. Sori small, orbicular, 1–6 pairs per segment, dorsifixed near ends of veinlets, close to margins; indusia horseshoe-shaped, medium-sized, brown, thickly membranous, with more fine and long setae, persistent. Spores bilateral, orbicular-reniform, perispores corrugate, finely reticulate on corrugations.

On rocks in forests; 1000–1400 m. Taiwan [Japan, Korea, Philippines].

8. Parathelypteris serrutula (Ching) Ching, Acta Phytotax. Sin. 8: 303. 1963 [*"serrulata"*].

有齿金星蕨 you chi jin xing jue

Thelypteris serrutula Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 319. 1936.

Plants ca. 50 cm tall. Rhizomes long creeping, glabrous, apices with sparse dark brown lanceolate scales. Fronds approximate or remote; stipes ca. 25 cm, dark stramineous, subglabrous; laminae broadly lanceolate, ca. 25 × 13 cm, not tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae ca. 20 pairs, spreading, alternate or subopposite on proximal ones, subsessile, lanceolate, 5–7 × ca. 1.5 cm, bases symmetrical, subtruncate, apices acuminate; proximal pinnae slightly tapering to bases, pinnatifid nearly to costae; segments ca. 18 pairs, spreading, lanceolate, ca. 7 × 2 mm, acute at apices; segments on fertile laminae crenate along margins; sterile ones sharply lobate along margins. Veinlets evident, simple, 6 or 7 pairs per segment, proximal pair arising from bases of costules, with sparse spherical glands abaxially, glabrous, adaxial sides with dense short hairs along costal grooves and on costae. Sori medium-sized, orbicular, 5 or 6 pairs per segment, dorsifixed near ends of veinlets, close to margins; indusia small, orbicular-reniform, brown, membranous, glabrous or occasionally

sparsely hairy and deciduous when old. Spores bilateral, orbicular-reniform, perispores few, corrugate.

● Streamsides in forests; ca. 100 m. Guizhou, SW Sichuan, Zhejiang.

9. Parathelypteris angustifrons (Miquel) Ching, Acta Phytotax. Sin. 8: 302. 1963.

狭叶金星蕨 xia ye jin xing jue

Aspidium angustifrons Miquel, Ann. Mus. Bot. Lugduno-Batavi 3: 178. 1867; *Athyrium cystopteroides* D. C. Eaton var. *elatus* D. C. Eaton; *Lastrea miqueliana* Tagawa; *Thelypteris angustifrons* (Miquel) Ching.

Plants 25–35 cm tall. Rhizomes long creeping, apices including stipe bases with sparse dark brown lanceolate thick scales. Fronds approximate; stipes 10–15 cm, stramineous, subglabrous, distal parts and rachises more grayish white pubescent; laminae lanceolate, 15–20 × 3–4 cm, slightly tapering to bases, pinnate-pinnatifid or subbipinnate, acuminate and pinnatifid at apices; pinnae 10–15 pairs, alternate, spreading, sessile or very shortly stalked, proximal pair of similar shape but slightly shorter than distal ones; middle pinnae lanceolate, 2–3 × ca. 1 cm, bases ± symmetrical, truncate, pinnatifid nearly to costae or subpinnate, apices obtuse or acute; segments or pinnules 6–20 pairs, proximal 2 or 3 pairs usually free, proximal pair of pinnae larger, oblong, 4–5 × ca. 2 mm, bases cuneate, slightly adnate to costae, margins entire or thickly serrate, apices obtuse; distal pairs gradually reduced. Veinlets evident abaxially, simple, 3 or 4 pairs per segment. Laminae herbaceous, when dry dark green, with orange-yellow spherical glands abaxially, with few acicular hairs along costae and costules, adaxial sides with sparse acicular short hairs along grooves. Sori orbicular, medium-sized, 3 or 4 pairs per segment, dorsifixed at distal parts of lateral veins, close to margins; indusia orbicular-reniform, medium-sized, brown, membranous, with more setae, persistent.

On rocks in forests or on forest floor; 200–1100 m. Fujian, Taiwan [Japan].

10. Parathelypteris glanduligera (Kunze) Ching, Acta Phytotax. Sin. 8: 301. 1963.

金星蕨 jin xing jue

Plants 35–50(–60) cm tall. Rhizomes long creeping, glabrous, apices with sparse lanceolate scales. Fronds approximate; stipes 15–20(–30) cm, stramineous, ± with short hairs or sometimes glabrous; laminae lanceolate or broadly lanceolate, 18–30 × 7–13 cm, not tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae ca. 15 pairs, flat or obliquely spreading, alternate or subopposite proximally, sessile, lanceolate or linear-lanceolate, 4–7 × 1–1.5 cm, bases symmetrical and slightly broadened, or proximal pair slightly tapering to bases, truncate, pinnatifid nearly to costae, apices acuminate; segments 15–20 pairs or more, spreading, oblong-lanceolate, 5–6 × ca. 2 mm, entire, rounded-obtuse or obtuse-pointed at apices; proximal pair, particularly acroscopic one, longer. Veins evident, lateral veins simple, 5–7 pairs per segment, proximal pair arising from above base of costules. Laminae herbaceous, when dry grass-green or sometimes dark green; pinnae, except for orange-yellow spherical glands, glabrous or shortly pubescent abaxially, adaxially with dense acicular hairs along grooves on costae, veins occasionally with few short acicular hairs, rachises ± grayish white pubescent. Sori small, orbicular, 4 or 5 pairs per segment, dorsifixed near ends of lateral veins, close to margins; indusia medium-sized, orbicular-reniform, brown, thickly membranous, with sparse grayish white setae, persistent. Spores bilateral, orbicular-reniform, perispores corrugate and regularly finely reticulate. $2n$ = 144.

Open forests, beneath *Phyllostachys pubescens*; sea level to 1500 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [N India, Japan, S Korea, Nepal, Vietnam].

1a. Pinnae abaxially subglabrous, except for sparse grayish white acicular hairs along costae, adaxially with short acicular hairs along costae, occasionally with few appressed short acicular hairs along veins ..... 10a. var. *glanduligera*

1b. Pinnae abaxially more densely pubescent, along costae with fine acicular hairs, adaxially with sparse appressed fine acicular hairs along veins and in intercostal areas except for acicular hairs along costal grooves ..... 10b. var. *puberula*

10a. Parathelypteris glanduligera var. **glanduligera**

金星蕨(原变种) jin xing jue (yuan bian zhong)

Aspidium glanduligerum Kunze, Analecta Pteridogr. 44. 1837; *A. gracilescens* Blume var. *glanduligerum* (Kunze) Franchet & Savatier; *Christella glanduligera* (Kunze) H. Léveillé; *Dryopteris glanduligera* (Kunze) Christ; *D. gracilescens* (Blume) Kuntze var. *glanduligera* (Kunze) C. Christensen; *D. repentula* C. B. Clarke ex Christ; *Lastrea glanduligera* (Kunze) T. Moore; *L. gracilescens* Hooker var. *glanduligera* (Kunze) Beddome; *Nephrodium glanduligera* (Kunze) Makino; *N. gracilescens* (Blume) Hooker var. *glanduligera* (Kunze) Baker; *Thelypteris glanduligera* (Kunze) Ching.

Pinnae abaxially subglabrous, except for sparse grayish white acicular hairs along costae and main veins, adaxially with short acicular hairs along costae, occasionally with few appressed short acicular hairs along veins.

Forests; sea level to 1500 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [N India, Japan, S Korea, Vietnam].

10b. Parathelypteris glanduligera var. **puberula** (Ching) Ching ex K. H. Shing, Fl. Jiangxi 1: 199. 1993.

微毛金星蕨 wei mao jin xing jue

Thelypteris glanduligera var. *puberula* Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 323. 1936.

Pinnae abaxially densely pubescent, along costae with

finer acicular hairs, adaxially also with sparse appressed fine acicular hairs along veins and in intercostal areas, acicular hairs along costal grooves.

● Wet shaded places beneath *Phyllostachys pubescens*; 200–1000 m. Anhui, Jiangsu, Jiangxi.

11. Parathelypteris subimmersa (Ching) Ching, Acta Phytotax. Sin. 8: 303. 1963.

海南金星蕨 hai nan jin xing jue

Thelypteris subimmersa Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 306. 1936.

Plants 2.6–3 m tall. Rhizomes strong, woody and ascending. Fronds approximate; stipes nearly to 1 m, thick, ca. 1 cm in diam., bases with thick lanceolate scales, distally with sparse short setae, dark stramineous; laminae large, oblong-lanceolate, 160–200 × 50–60 cm, bases nearly tapering or sometimes proximal pair of pinnae slightly shortened, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae mostly subopposite, spreading, sessile; middle pinnae linear-lanceolate, 25–30 × 2–2.5 cm, bases symmetrical, truncate, pinnatifid and reaching both narrow wings of costae, apices caudate-acuminate; segments 60–70 pairs, flatly spreading, pectinately arranged, linear, 8–10 × 2.2–2.5 mm, entire, rounded or acute at apices. Veins evident, lateral veins simple, 12–14 pairs per segment, proximal pair arising from base of costules, all reaching margins above sinuses or basal acroscopic veinlet close to sinus. Laminae papery, when dry grass-green, pinnae abaxially ± with yellow spherical small glands along veins, elsewhere glabrous, adaxially along grooves with dense grayish white fine and long acicular hairs and along veins sparsely shortly hairy. Sori orbicular, medium-sized, dorsifixed at middle of lateral veins, 8–10 pairs per segment; indusia orbicular-reniform, somewhat leathery, glabrous, sulfur-colored glands along margins, persistent. Spores orbicular-reniform, perispores echinate.

● On wet sandy soils in forests on slopes. W Hainan.

Parathelypteris subimmersa is similar to *Amphineuron immersum*, which grows in Malaysia. The latter differs in having pinnae broader (3–3.3 cm), segments with dense grayish white fine and long acicular hairs abaxially. Owing to more complex characters on *Amphineuron*, except that the plant of this species is particularly large and strong, other characters do not differ, so it is listed here.

12. Parathelypteris chingii K. H. Shing & J. F. Cheng, Jiangxi Sci. 8(3): 44. 1990.

秦氏金星蕨 qin shi jin xing jue

Plants 35–60(–75) cm tall. Rhizomes short and erect. Fronds clustered; stipes 15–30 cm, bases occasionally with lanceolate scales and sparsely grayish white multicellular spreading acicular hairs, dark brown proximally, distally brownish stramineous, sparsely shortly hairy or subglabrous; laminae oblong-lanceolate, 20–30 × 10–13 cm, not tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 12–15 pairs, sessile, spreading, proximal ones not shortened, reflexed, pinnae from middle of lamina downward lanceolate, 5–8 × 1.4–1.7 cm, bases slightly broadened, rounded-truncate, symmetrical, pinnatifid and reaching both narrow wings of costae, apices acuminate; segments 8–15 pairs, proximal ones oblong, 4–8 × 3–4 mm, slightly tapering to and rounded-truncate at apices, sometimes angular and entire on sides. Veins evident, lateral veins simple, 3–5 pairs per segment, proximal pair arising from high above base of costules. Laminae thickly herbaceous, when dry grass-green or dark green, abaxially with sparse reddish purple spherical glands, along costae and veins with more grayish white spreading acicular hairs, adaxially along grooves with dense acicular hairs and appressed short setae, also mixed with multicellular spreading acicular hairs. Sori orbicular, dorsifixed at middle of veinlets between costules and margins, 2–5 pairs per segment; indusia large, orbicular-reniform, brown, thickly membranous and separated from each other and with grayish white acicular hairs.

● Wet places in dense valley forests, forests at foot of mountains; 300–500 m. N Fujian, Guangdong, S Jiangxi.

Parathelypteris chingii is similar to *P. japonica* but differs by plants shorter and smaller, stipes with spreading acicular hairs at bases, pinnae with spreading fine and long acicular hairs abaxially, and indusia separated from each other.

1a. Plants 35–60 cm tall; pinnae sessile, abaxially along costae and veins with grayish white acicular hairs, and adaxially along costal grooves with appressed short setae and multicellular acicular hairs, rachises with denser acicular hairs ..... 12a. var. *chingii*

1b. Plants to 75 cm tall; proximal pinnae stalked, along costae and veins with dense short hairs except long acicular hairs abaxially, rachises with dense setae adaxially, with sparse grayish white fine and long acicular hairs abaxially ..... 12b. var. *major*

12a. Parathelypteris chingii var. **chingii**

秦氏金星蕨(原变种) qin shi jin xing jue (yuan bian zhong)

Plants 35–60 cm tall. Pinnae sessile, abaxially along costae and veins with grayish white acicular hairs, adaxially along costal grooves with appressed short setae and multicellular acicular hairs.

● Wet places in dense valley forests; 300–500 m. N Fujian, S Jiangxi.

12b. Parathelypteris chingii K. H. Shing var. **major** (Ching) K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 46. 1999.

大羽金星蕨 da yu jin xing jue

Thelypteris angulariloba Ching var. *major* Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 325. 1936.

Plants to 75 cm tall. Proximal pinnae stalked, along costae and veins with dense short hairs except for long acicular hairs abaxially; rachises with dense setae adaxially, with sparse grayish white fine and long acicular hairs abaxially.

● Wet shaded places in forests at foot of mountains. Guangdong.

13. Parathelypteris petelotii (Ching) Ching, Acta Phytotax. Sin. 8: 303. 1963.

长毛金星蕨 chang mao jin xing jue

Thelypteris petelotii Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 326. 1963; *Coryphopteris petelotii* (Ching) Holttum; *Lastrea petelotii* (Ching) Tagawa.

Plants to 70 cm tall. Rhizomes thick and erect, ± trunklike. Fronds clustered; stipes ca. 30 cm, with sparse scales at bases and with dense grayish white multicellular acicular hairs, distally castaneous-brown and subglabrous; laminae oblong-lanceolate, ca. 40 × 15 cm, slightly tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae ca. 20 pairs, alternate, sessile, proximal ones somewhat shortened, reflexed, lanceolate, ca. 10 × 2–2.5 cm, bases truncate, symmetrical, pinnatifid nearly to costae, apices long acuminate; segments 20–40 pairs, spreading, segments below middle narrowly rectangular, ca. 1 × 0.3 cm, shallowly undulate or usually sparsely bluntly serrate along margins, slightly bent distally, rounded at apices. Veins evident on both sides, lateral veins simple, 6–8 pairs per segment, proximal pair arising from base of costules. Laminae herbaceous, dark green when dry, with dense reddish purple spherical glands abaxially, costae and veins with dense grayish white multicellular acicular hairs; adaxially spreading appressed pubescent throughout; rachises dark stramineous, pubescent adaxially, glabrous abaxially. Sori orbicular, dorsifixed at middle of lateral veins, 3–6 pairs per segment; indusia large, orbicular-reniform, thickly membranous, brown, with spreading grayish white long acicular hairs throughout, persistent.

Evergreen forests; ca. 1500 m. S Guangxi [N Vietnam].

14. Parathelypteris hirsutipes (C. B. Clarke) Ching, Acta Phytotax. Sin. 8: 301. 1963.

毛脚金星蕨 mao jiao jin xing jue

Nephrodium gracilescens (Blume) Hooker var. *hirsutipes* C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 514. 1880; *Coryphopteris hirsutipes* (C. B. Clarke) Holttum; *Dryopteris gracilescens* (Blume) Kuntze var. *chinensis* Christ; *D. hirsutipes* (C. B. Clarke) C. Christensen; *Lastrea hirsutipes* (C. B. Clarke) Beddome; *Thelypteris hirsutipes* (C. B. Clarke) Ching.

Plants 35–60 cm tall. Rhizomes erect, strong, cylindric. Fronds clustered; stipes 10–20(–30) cm, proximal part dark brown, bases with dense grayish brown multicellular spreading acicular long hairs (when dry easily fallen) and few dark brown lanceolate scales, distally dark stramineous and subglabrous; laminae narrowly oblong, 25–30 × 9–14 cm, slightly tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 20–25 pairs, alternate, spreading, proximal 3 or 4 pairs shortened; middle pinnae lanceolate, 5–8 × 1–1.5 cm, bases truncate, symmetrical, pinnatifid nearly to costae, apices caudate-acuminate; segments 15–18 pairs, spreading, rectangular, 4.5–6.5 × 2–3 mm, entire or slightly undulate at margins, rounded at apices. Veins visible on both sides, lateral veins simple, 5–8 pairs per segment, proximal pair arising from bases of or slightly above costules. Laminae herbaceous, dark green when dry, abaxially with denser reddish purple spherical glands and costae and veins with denser multicellular acicular hairs, adaxially spreading appressed pubescent throughout; rachises stramineous and sparsely pubescent on both sides. Sori orbicular, dorsifixed at middle of lateral veins, 1–5 pairs per segment; indusia large, orbicular-reniform, thickly membranous, brown, glabrous or occasionally sparsely shortly setaceous.

Seasonal rain forests or mixed forests on mountains; 1400–1600 m. SE Yunnan [N India, Myanmar].

15. Parathelypteris caudata Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 320. 1999.

尾羽金星蕨 wei yu jin xing jue

Plants 50–80 cm tall. Rhizomes erect, thick and short. Fronds clustered; stipes 20–40 cm, bases nearly black and with grayish brown, spreading multicellular acicular hairs and few brown lanceolate scales, distally castaneous-brown, subglabrous or grooves with brownish acicular hairs; laminae oblong-lanceolate, 30–40 × 10–20 cm, slightly tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 20–25 pairs, alternate, spreading, sessile, proximal ones shortened, reflexed; largest pinna pair lanceolate, 4.5–9 × 1.2–2 cm, bases slightly tapering, rounded-truncate, symmetrical, pinnatifid and reaching narrow wing on both sides of costae, apices caudate or acuminate; segments 20–28 pairs, spreading, linear-lanceolate to rectangular, 5–9 × 2.5–3 mm, undulate-crenate or thickly serrate at margins, rounded or rounded-truncate at apices. Veins evident abaxially, lateral veins simple, 6–9 pairs per segment, proximal pair arising from base of or slightly above costules. Laminae papery or thickly herbaceous, when dry dark green, abaxially with reddish purple spherical glands, usually glabrous or along rachises, costae, and veins sparsely grayish brown pubescent; adaxially with appressed reddish brown hairs, rachises and costal grooves with grayish brown acicular hairs. Sori orbicular, medium-sized, dorsifixed at middle of veinlets, 5–7 pairs per segment; indusia large, orbicular-reniform, brown, thickly membranous, glabrous or occasionally shortly setaceous.

● Mossy forests or bamboo forests in subalpine areas on mountains; 1700–1900 m. Guangxi, S Yunnan, and E China (exact locality unknown).

16. Parathelypteris trichochlamys Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 320. 1999.

毛盖金星蕨 mao gai jin xing jue

Plants to 50 cm tall. Rhizomes erect, short. Fronds clustered; stipes 18–20 cm, with acicular hairs and dark brown linear-lanceolate scales, distally castaneous-red and including rachises and costae with dense short acicular hairs; laminae 26–30 × ca. 6 cm, not tapering to bases, apices acuminate and pinnatifid; middle pinnae narrowly lanceolate, 5–6 × ca. 1 cm, bases slightly tapering and truncate, symmetrical, slightly bent distally, pinnatifid and reaching both narrow wings, apices acuminate; segments ca. 16 pairs, oblong-triangular, 4–4.5 × ca. 3 mm, margins entire and usually recurved when dry, slightly tapering to apices, apices obtuse. Veins evident, lateral veins simple, ca. 5 pairs per segment, proximal pair arising from

slightly above base of costules. Laminae thickly herbaceous, when dry brownish green, abaxially with sparse reddish purple spherical glands, with dense short acicular hairs on both surfaces. Sori orbicular, dorsifixed at middle of lateral veins; indusia medium-sized, orbicular-reniform, close to each other, brown, thickly membranous, with dense short setae, persistent.

● Wet places in thickets, common. W Guangdong (Dang Shan, Huaiji).

17. Parathelypteris caoshanensis Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 50, 321. 1999 [*"Cyclosorus" caoshanensis*, p. 321].

草山金星蕨 cao shan jin xing jue

Plants ca. 38 cm tall. Rhizomes erect, black, short. Fronds clustered; stipes 14–18 cm, bases dark brown, with dense spreading acicular long hairs and few lanceolate scales, distally castaneous red and to rachises with dense unicellular short acicular hairs; laminae 20–22 × ca. 9 cm, nearly tapering to bases, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 11–15 pairs, alternate (proximal ones subopposite), oblique distally, shortly stalked, proximal pair shortened or slightly shortened; middle ones lanceolate, ca. 6 × 1 cm, bases rounded-truncate, symmetrical, pinnatifid nearly to costae, apices acuminate; segments ca. 18 pairs, ones below middle oblong, ca. 5 × 2.5 mm, entire along margins, rounded at apices. Veins evident, lateral veins simple, ca. 6 pairs per segment, proximal pair arising from near base of costules. Laminae herbaceous, dark brown when dry, abaxially with spreading short acicular hairs throughout and including veins with reddish purple spherical glands, adaxially with spreading hairs throughout. Sori orbicular, dorsifixed slightly above bases of lateral veins; indusia medium-sized, orbicular-reniform, brown, thinly herbaceous, separated from each other, sparsely pubescent, persistent.

● Wet soil of valley forests. Taiwan (Caoshan, Taibei).

On one page of the protologue (appendix, p. 321), the name is cited as *"Cyclosorus" caoshanensis*, but this is obviously a typographical error. It appears under the generic heading *Parathelypteris* with six other species of *Parathelypteris*, whereas numerous species of *Cyclosorus* appear later (pp. 331–350); it is not included in the index under *Cyclosorus* (p. 364); and the name appears as *P. caoshanensis* in the synopsis (p. ii), key (p. 32), main text (p. 50), and index (p. 377).

18. Parathelypteris chinensis (Ching) Ching, Acta Phytotax. Sin. 8: 303. 1963.

中华金星蕨 zhong hua jin xing jue

Plants 57–80 cm tall. Rhizomes short and decumbent or ascending. Fronds approximate; stipes 27–40 cm, bases nearly black, with sparse lanceolate scales, distally castaneous-brown or reddish brown, glabrous, polished; laminae lanceolate, 30–40 × 8–12 cm, not tapering to bases, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae ca. 18 pairs, opposite or alternate distally, obliquely spreading, sessile, proximal pair not shortened; middle ones narrowly lanceolate, 5–7 × 0.8–1.2 cm, bases truncate, symmetrical, pinnatifid and reaching both narrow wings on costae, apices acuminate; segments 18–24 pairs, spreading, oblong or triangular-oblong, 3–5 × 2–3 mm, entire along margins, obtuse at apices. Veins evident, lateral veins simple, 4 or 5(or 6) pairs per segment, proximal pair arising from slightly above base of costules. Laminae herbaceous, brownish green when dry, usually glabrous except for reddish orange spherical glands; adaxially pubescent along costae. Sori orbicular, dorsifixed at middle of lateral veins, ca. 3 pairs per segment; indusia large, orbicular-reniform, brown, membranous, nearly touching one another, usually glabrous, persistent.

● Valley forests, thickets; 700–2100 m. S Anhui, N Fujian, Guangdong, S Guangxi, Guizhou, W Hunan, Jiangxi, S Sichuan, Yunnan, Zhejiang.

1a. Laminae glabrous except for reddish orange glands abaxially; sori nearly touching each other, indusia glabrous ..... 18a. var. *chinensis*
1b. Laminae with sparse glands abaxially on costae, costae, veins, and intercostal areas sparsely shortly hairy; sori ± separated from each other; indusia with sparse short hairs ..... 18b. var. *trichocarpa*

18a. Parathelypteris chinensis var. **chinensis**

中华金星蕨(原变种) zhong hua jin xing jue (yuan bian zhong)

Thelypteris chinensis Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 311. 1936; *Aspidium parathelypteris* Christ; *Dryopteris japonica* (Baker) C. Christensen var. *elongata* Rosenstock; *D. parathelypteris* (Christ) C. Christensen; *T. parathelypteris* (Christ) Ching.

Laminae glabrous except for reddish orange glands abaxially; sori nearly touching each other, indusia glabrous.

● Wet shaded places in valley forests; 700–1000 m. S Anhui, N Fujian, Guangdong, S Guangxi, W Hunan, Jiangxi, S Sichuan, Zhejiang.

18b. Parathelypteris chinensis var. **trichocarpa** Ching ex K. H. Shing & J. F. Cheng, Jiangxi Sci. 8(3): 44. 1990.

毛果金星蕨 mao guo jin xing jue

Laminae with sparse glands abaxially on costae, costae, veins, and intercostal areas with sparse short acicular hairs; sori ± separated from each other; indusia with sparse short hairs.

● Valley forests, thickets; 700–2100 m. Guizhou, Jiangxi, Yunnan.

19. Parathelypteris japonica (Baker) Ching, Acta Phytotax. Sin. 8: 301. 1963.

光脚金星蕨 guang jiao jin xing jue

Plants 55–70 cm tall. Rhizomes short, decumbent or ascending. Fronds approximate or subclustered; stipes 25–35 cm, bases nearly black, with sparse reddish brown lanceolate scales, distally dark brown-castaneous or castaneous-brown or wholly stramineous, glabrous; laminae ovate-oblong, 30–35 × 17–20 cm, not tapering at bases, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 15–20 pairs, spreading, proximal 3 or 4 pairs of pinnae longer, opposite or subopposite, sessile; middle pinnae lanceolate, 8–10 × 1.3–1.6 cm, bases subtruncate, symmetrical, pinnatifid and reaching both narrow wings on costae,

apices acuminate; segments 25–30 pairs, lanceolate and slightly falcate, 5–7 × ca. 2.6 mm, entire, apices obtuse or acute. Veins evident, lateral veins simple, 8 or 9(or 10) pairs per segment, proximal pair arising from near base of costules. Laminae herbaceous, dark green when dry, abaxially along costae, costae (sometimes including lateral veins) and margins with grayish white sparse pubescence and more reddish brown globose large glands, adaxially along costal grooves with dense acicular hairs, rachises with appressed short acicular hairs. Sori orbicular, dorsifixed slightly above middle of lateral veins, 3 or 4 pairs per segment; indusia large, orbicular-reniform, brownish, membranous, grayish white pubescent or glabrous, persistent. $2n = 124$.

Forests; 200–2000 m. Anhui, N Fujian, Guizhou, Hunan, N Jiangsu, Jiangxi, W Sichuan, Taiwan, N Yunnan, S and W Zhejiang [Japan, S Korea].

1a. Stipes and rachises nearly black at bases, distally castaneous-brown; indusia somewhat glaucous, pubescent ..... 19a. var. *japonica*
1b. Stipes and rachises stramineous, pinnae abaxially and indusia glabrous ... 19b. var. *glabrata*

19a. Parathelypteris japonica var. **japonica**

光脚金星蕨(原变种) guang jiao jin xing jue (yuan bian zhong)

Nephrodium japonicum Baker, Ann. Bot. (Oxford) 5: 318. 1891; *Christella japonica* (Baker) H. Léveillé; *Coryphopteris japonica* (Baker) L. J. He & X. C. Zhang; *Dryopteris japonica* (Baker) C. Christensen; *Lastrea japonica* (Baker) Copeland; *Parathelypteris japonica* var. *musashiensis* (Hiyama) Ching; *Thelypteris japonica* (Baker) Ching; *T. japonica* var. *musashiensis* Hiyama; *Wagneriopteris japonica* (Baker) A. Löve & D. Löve.

Stipes and rachises nearly black at bases, distally castaneous-brown, pinnae abaxially and indusia sparsely pubescent, indusia more glaucous, pubescent.

Shaded places in forests; 200–2000 m. N Fujian, Guizhou, N Jiangsu, Jiangxi, W Sichuan, Taiwan [Japan, S Korea].

19b. Parathelypteris japonica var. **glabrata** (Ching) K. H. Shing, Fl. Jiangxi 1: 201. 1993.

光叶金星蕨 guang ye jin xing jue

Thelypteris japonica var. *glabrata* Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 313. 1936.

Stipes and rachises stramineous, pinnae abaxially and indusia glabrous.

Forests. Jiangxi [Japan, S Korea].

20. Parathelypteris castanea (Tagawa) Ching, Acta Phytotax. Sin. 8: 302. 1963.

台湾金星蕨 tai wan jin xing jue

Dryopteris castanea Tagawa, Acta Phytotax. Geobot. 4: 132. 1935; *Thelypteris castanea* (Tagawa) Ching.

Plants ca. 70 cm tall. Rhizomes short and ascending, black. Fronds clustered; stipes with bases black, distally castaneous-brown, polished, throughout covered with dense glaucous short acicular hairs; laminae narrowly oblong, ca. 30 × ca. 14 cm, bases not tapering, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 15–17 pairs, opposite or alternate distally, spreading, sessile, proximal several pairs not shortened, lanceolate, ± falcate, 7–8 × ca. 1.4 cm, bases slightly tapering, truncate, pinnatifid and reaching narrow wings on both sides, apices acuminate; segments 15–18 pairs, ca. 6 × 2.8 mm, entire, apices rounded. Veins visible, lateral veins simple, 6 or 7 pairs per segment, proximal pair arising from base of costules. Laminae herbaceous, dark brown when dry, pinnae with dense grayish white short acicular hairs on both surfaces, hairs along costae denser and longer; rachises brown, grayish white pubescent abaxially. Sori orbicular, dorsifixed above middle of lateral veins, slightly closer to margins, 1 pair per segment; indusia smaller, orbicular-reniform, brown, membranous, densely pubescent, persistent.

Wet places in forests. Taiwan [Japan].

Some authors treat this name as a synonym of the preceding species, *Parathelypteris japonica* (e.g., see Knapp, Ferns Fern Allies Taiwan, 416. 2011, as *Thelypteris japonica*).

21. Parathelypteris pauciloba Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 321. 1999.

阔片金星蕨 kuo pian jin xing jue

Plants 30–35 cm tall. Rhizomes short and erect, black. Frond clustered; stipes 12–14 cm, slender, bases nearly black, mixed with grayish white setae and few spreading multicellular long hairs, distally castaneous brown and with grayish white setae; laminae oblong, 17–22 × 9–12 cm, not tapering at bases, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 10–12 pairs, alternate, sessile, proximal pinnae not shortened, 5–6.5 × 1.2–1.6 cm, bases slightly tapering, truncate, symmetrical, pinnatifid and reaching broad wing on both sides of costae, apices acuminate; pinnae 5–8 pairs, approximate, rectangular, 5–7 × ca. 5 mm, apices rounded or rounded-truncate and with 2–4 angles. Veinlets evident, lateral veins simple, 3 or 4 pairs per segment, proximal pair arising from above base of costules. Laminae herbaceous, when dry deep green, abaxially with sparse short setae along costae, adaxially with sparse appressed short hairs, hairs along costal grooves denser; rachises stramineous, with dense short setae. Sori orbicular, 1 or 2 per segment, dorsifixed at slightly high places at middle of lateral veins, in one row on each side of costules; indusia medium-sized, orbicular-reniform, brown, thickly membranous, slightly pubescent, persistent.

● Wet soil at streamsides in forests; ca. 800 m. N Fujian.

Parathelypteris pauciloba is similar to *P. angulariloba*, but the latter differs in having rhizomes short and erect, stipes throughout with grayish white short setae and mixed few spreading multicellular long acicular hairs, costae with sparse unicellular short setae abaxially, and indusia slightly pubescent.

22. Parathelypteris angulariloba (Ching) Ching, Acta Phytotax. Sin. 8: 304. 1963.

钝角金星蕨 dun jiao jin xing jue

Thelypteris angulariloba Ching, Bull. Fan Mem. Inst.

Biol., Bot. 6: 323. 1936; *Coryphopteris angulariloba* (Ching) L. J. He & X. C. Zhang; *Lastrea angulariloba* (Ching) Tagawa; *L. simozawae* (Tagawa) Tagawa; *Parathelypteris simozawae* (Tagawa) Ching; *T. simozawae* Tagawa; *Wagneriopteris angulariloba* (Ching) A. Löve & D. Löve.

Plants 30–60 cm tall. Rhizomes short, decumbent or ascending, nearly black. Fronds subclustered; stipes 10–30 cm, bases nearly black, with dense spreading multicellular acicular hairs, distally castaneous-red or castaneous-brown, subglabrous; laminae narrowly oblong, 17–30 × 6–12 cm, bases not tapering, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae ca. 20 pairs, alternate, proximal pair not reduced, ± reflexed; middle pinnae lanceolate or linear-lanceolate, 5–6 × 0.7–1.5 cm, bases truncate, ± symmetrical, sessile, pinnatifid and reaching 1/3–1/2, apices acuminate and pinnatifid or sometimes entire; segments 8–12 pairs, rectangular or subsquare, 3–5 × ca. 3.5 mm, entire, apices rounded or rounded-truncate and with 2–4 blunt angles. Veins evident, lateral veins simple, 2 or 3(or 4) pairs per segment, proximal pair arising from above base of costules. Laminae thickly herbaceous, greenish when dry, abaxially along costae and main veins with multicellular short acicular hairs, sometimes with mixed orange capitate glands; adaxially along costal grooves with acicular hairs, elsewhere glabrous. Sori orbicular, dorsifixed at middle of lateral veins, 1 or 2 pairs per segment; indusia medium-sized, orbicular-reniform, brown, thickly membranous, with dense grayish white short setae, persistent.

Streamsides in valley forests, shaded wet places in thickets; 400–1100 m. N and SE Fujian, N and SE Guangdong, E Guangxi, Taiwan [Japan].

23. Parathelypteris nigrescens Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 321. 1999.

黑叶金星蕨 hei ye jin xing jue

Plants 50–70 cm tall. Rhizomes short and erect, black. Fronds clustered; stipes 20–35 cm, nearly black on proximal part and with spreading grayish white multicellular long acicular hairs, distally castaneous-brown and sparsely pubescent; laminae oblong or narrowly oblong, 30–38 × 12–15 cm, bases not tapering, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 15–18 pairs, spreading, alternate, proximal ones sometimes stalked, proximal pair not shortened; middle pinnae lanceolate, slightly falcate, 8–11 × 1.2–1.5 cm, bases truncate, symmetrical, pinnatifid and reaching narrow wings on both sides of costae, apices long acuminate; segments 15–20 pairs, obliquely spreading, narrowly ligulate, 5–7 × 3–3.5 mm, entire along both sides, rounded-obtuse at apices. Veins visible, lateral veins simple, 5 or 6 pairs per segment, proximal pair arising from base of costules. Laminae herbaceous, dark green when dry, or blackish brown, abaxially with sparse short hairs, costae densely pubescent, adaxially along costae with dense short acicular hairs. Sori orbicular, dorsifixed at middle of lateral veins; indusia medium-sized, orbicular-reniform, brown, membranous, separated from each other, entire or occasionally with 1 or 2 hairs, persistent or deciduous.

● Streamsides in valley forests; 1000–1200 m. Guangxi, Yunnan.

24. Parathelypteris indochinensis (Christ) Ching, Acta Phytotax. Sin. 8: 304. 1963.

滇越金星蕨 dian yue jin xing jue

Dryopteris indochinensis Christ, J. Bot. (Morot), ser. 2, 1: 263. 1908; *Lastrea indochinensis* (Christ) Tagawa; *Thelypteris indochinensis* (Christ) Ching.

Plants ca. 60 cm tall. Rhizomes short and decumbent. Fronds subclustered; stipes ca. 30 cm, proximal part black, polished, with denser grayish white multicellular long acicular hairs, distally castaneous-brown, sparsely pubescent; laminae oblong, ca. 30 × 20–40 cm, bases not tapering, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae ca. 15 pairs, spreading, alternate, sessile, proximal pair not shortened; middle pinnae lanceolate, 10–12 × ca. 2 cm, bases not tapering, truncate, symmetrical, pinnatifid and reaching narrow wings on both sides of costae, apices acuminate; segments ca. 24 pairs, linear-lanceolate, slightly falcate, slightly tapering to apices, rounded-truncate, entire. Veins evident, lateral veins simple, 6 or 7 pairs per segment, proximal pair arising above base of costules. Laminae herbaceous, when dry grayish green, abaxially with dense multicellular barblike long hairs, adaxially along costal grooves with dense long acicular hairs, main veins slightly setaceous or subglabrous, rachises with dense long acicular hairs adaxially. Sori orbicular, dorsifixed at middle of lateral veins, 5 or 6 pairs per segment; indusia smaller, orbicular-reniform, brown, membranous, separated from each other, densely pubescent, persistent.

Shaded wet places in valley forests. S Guangxi, S Yunnan [border of Vietnam].

4. METATHELYPTERIS (H. Itô) Ching, Acta Phytotax. Sin. 8: 305. 1963.

凸轴蕨属 tu zhou jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Thelypteris sect. *Metathelypteris* H. Itô in Nakai & Honda, Nov. Fl. Jap. 4: 137. 1939.

Plants small to medium-sized, terrestrial. Rhizomes short, decumbent, ascending or erect, rarely long creeping, covered with brown lanceolate scales and glaucous short hairs or subglabrous. Fronds approximate or clustered; stipes ± dark brown at bases, distally stramineous, glabrous or sparsely hairy; laminae oblong, lanceolate, or ovate-triangular, pinnate-pinnatifid, rarely tripinnate, if latter then pinnules separated from each other, never connected with narrow wing along costae, apices acuminate and pinnatifid. Laminae herbaceous or thinly herbaceous, when dry usually green, both surfaces ± with grayish white unicellular (rarely multicellular) acicular hairs, hairs denser along rachises and costae, pinnae usually glandless abaxially, rarely orange-red spherical glandular, costae rounded and raised adaxially, never grooved. Veinlets pinnate, simple or forked, oblique distally, not reaching

margins. Sori small, orbicular, attached above middle of veinlets; indusia medium-sized, orbicular-reniform, each attached at a sinus, membranous, usually green, when dry grayish yellow or brownish, persistent. Spores bilateral, perispores corrugate, usually foveolate; exospore with finely reticulate surfaces. $x = 35$.

About 12 species: S Asia, S China to Japan, Madagascar, Malesia; 11 species (five endemic) in China.

The following taxon is excluded from the present treatment, pending further research: *Metathelypteris glandulosa* H. G. Zhou & H. Li (Acta Bot. Yunnan. 14: 34. 1992), described from Guangxi.

1a. Pinnae with orange-red spherical glands or eglandular abaxially, costae with grayish white multicellular acicular hairs abaxially.
  2a. Pinnae glandular abaxially, abaxially with unicellular short acicular hairs along lateral veins and intercostal areas ..... 10. *M. glandulifera*
  2b. Pinnae without glands, with grayish white multicellular spreading long acicular hairs on both surfaces ..... 11. *M. flaccida*
1b. Pinnae without orange-red spherical glands abaxially, costae with grayish white unicellular acicular hairs or subglabrous abaxially.
  3a. Laminae ovate-triangular.
    4a. Laminae bipinnatipartite, segments entire ..... 6. *M. deltoideofrons*
    4b. Laminae pinnate-pinnatifid or 3-pinnate to 3-pinnate-pinnatifid.
      5a. Laminae oblong, except for costae long villous adaxially, elsewhere glabrous; indusia glabrous ..... 9. *M. wuyishanica*
      5b. Laminae ovate-triangular, hairy on both surfaces; also hairy at indusia.
        6a. Proximal pinnae sessile or with 0.5–1 mm stalk, pinnules rounded-obtuse or acute at apices, sessile ..... 7. *M. hattorii*
        6b. Proximal pinnae with 3.5–5 mm stalk, pinnules long acuminate-caudate at apices, stalk 4–7 mm ..... 8. *M. petiolulata*
  3b. Laminae oblong or lanceolate.
    7a. Laminae thick, papery or thinly herbaceous; plants taller and larger, usually 75–95 cm tall or more; pinnae glabrous abaxially, or costae and costules occasionally with sparse acicular short hairs ..... 1. *M. singalanensis*
    7b. Laminae thinner, herbaceous or thinly herbaceous; plants smaller and shorter, no more than 65 cm tall; pinnae ± with short acicular hairs or glabrous abaxially.
      8a. Pinnae glabrous abaxially, or at most with hairs along costae, costae occasionally with very sparse acicular hairs.
        9a. Proximal pinnae usually not shortened, also not tapering to bases; laminae adaxially with dense grayish white acicular hairs along rachises and costae; veinlets usually simple, occasionally forked ..... 2. *M. gracilescens*
        9b. Laminae with proximal 1 or 2 pairs of pinnae ± shortened, pinna bases clearly tapering; laminae adaxially with grayish white short acicular hairs along rachises and costae; veinlets on pinnules of proximal pinnae usually forked, simple distally ..... 3. *M. adscendens*
      8b. Pinnae abaxially at least with denser short acicular hairs along costae.
        10a. Pinnae arrangement sparser, proximal ones 2–4 cm from each other, bases clearly tapering; segments entire or usually with densely crenate sinuses, or pinnatifid ..... 4. *M. laxa*
        10b. Pinnae arrangement denser, proximal ones 1–2 cm from each other, bases nearly tapering, segments usually entire, at most shallowly undulate ..... 5. *M. uraiensis*

1. Metathelypteris singalanensis (Baker) Ching, Acta Phytotax. Sin. 8: 306. 1963.

鲜绿凸轴蕨 xian lü tu zhou jue

Nephrodium singalanense Baker, J. Bot. 18: 212. 1880; *Dryopteris media* Alderwerelt; *D. singalanensis* (Baker) C. Christensen; *Lastrea singalanensis* (Baker) Beddome; *Thelypteris singalanensis* (Baker) Ching.

Plants 75–95 cm tall. Rhizomes thick and short, erect, apices including stipe bases with dense scales; scales brown, linear-lanceolate, caudate at apices. Fronds clustered; stipes 30–50 cm, stramineous, glabrous above bases, polished; laminae lanceolate to broadly lanceolate, 30–70 × 20–30 cm, bases ± tapering, rounded-truncate, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 15–25 pairs, spreading or oblique distally, sessile, proximal pair usually slightly shortened, distal ones linear-lanceolate, sometimes falcate, 12–18 × 2–3.5 cm, bases subtruncate, pinnatifid nearly to costae, apices caudate-acuminate; segments 20–30 pairs, basiscopic ones on costae longer than acroscopic ones, oblong, 8–15 × 3–5 mm, entire or serrate along margins, apices blunt-pointed. Veinlets evident, simple or forked on proximal segments, 6–10(–12) pairs, not reaching margins. Laminae papery, when dry green or yellowish green, glabrous abaxially, or sometimes with sparse short acicular hairs along costae and costules, adaxially with grayish white short acicular hairs along rachises and costae. Sori small, glandular, attached on ends of lateral veins or middle of acroscopic vein on forked lateral veins; indusia small, orbicular-reniform, membranous, when dry brownish yellow, sometimes sinuate along margins, glabrous or sparsely capitate shortly hairy. $2n = 144$.

Streamsides in forests; 800–1000 m. SE Hainan [Indonesia, Malaysia, Thailand].

2. Metathelypteris gracilescens (Blume) Ching, Acta Phytotax. Sin. 8: 305. 1963.

凸轴蕨 tu zhou jue

Aspidium gracilescens Blume, Enum. Pl. Javae 2: 155. 1828; *Dryopteris arisanensis* Rosenstock; *D. gracilescens* (Blume) Kuntze; *D. sublaxa* Hayata; *Lastrea gracilescens* (Blume) T. Moore (1858), not Hooker (1857); *Nephrodium gracilescens* (Blume) Hooker; *Thelypteris gracilescens* (Blume) Ching.

Plants 40–60 cm tall. Rhizomes short, decumbent or ascending, apices including stipe bases covered with reddish brown lanceolate small scales. Fronds subclustered; stipes 15–30 cm, stramineous or tan, glabrous or with sparse short hairs; laminae narrowly oblong, 20–30 × 6.5–10 cm, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 15–18 pairs, subopposite or alternate distally, spreading, proximal 1 or 2 pairs not shortened, tapering to bases, reflexed proximally, sessile; middle ones linear-lanceolate, 4–6.5 × 1–1.4 cm, bases tapering, subtruncate, pinnatifid and reaching narrow wings on both sides of costae, apices acuminate; segments 12–15 pairs, oblique distally, oblong, 4–6 × 2–4 mm, entire or slightly undulate-crenate distally, apices rounded-obtuse. Veinlets evident abaxially, simple, occasionally forked, 5 or 6 pairs per segment, proximal pair arising from above base of costules. Laminae herbaceous, yellowish green when dry, abaxially glabrous or costae adaxially with sparse short hairs, adaxially with dense grayish white short acicular hairs, also veins with sparse similar hairs adaxially. Sori small, orbicular, 3 or 4 pairs per segment, dorsifixed at middle of lateral veinlets, located between costules and margins; indusia small, orbicular-reniform, membranous, brownish, glabrous, persistent or sometimes deciduous.

On soil in dense forests on mountains; 1000–2500 m. Taiwan, Yunnan [Indonesia, S Japan, Malaysia, Philippines; Pacific islands (Polynesia)].

3. Metathelypteris adscendens (Ching) Ching, Acta Phytotax. Sin. 8: 306. 1963.

微毛凸轴蕨 wei mao tu zhou jue

Thelypteris adscendens Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 332. 1936.

Plants 25–50 cm tall. Rhizomes short, decumbent, with sparse short hairs and brown ovate-lanceolate scales. Fronds clustered or approximate; stipes 10–25 cm, stramineous, glabrous above bases; laminae 15–25 × 8–12 cm, ± tapering to bases, pinnate-pinnatifid, apices long acuminate and pinnatifid; pinnae 10–15 pairs, alternate, sessile, proximal 1 or 2 pairs ± shortened, bases slightly tapering; middle ones narrowly lanceolate, 4–6 × 1–1.5 cm, pinnatifid and reaching narrow wings on both sides of costae, long acuminate at apices, sometimes slightly caudate; segments 10–14 pairs, spreading, approximate, oblong-lanceolate, 4–6 × ca. 2.5 mm, entire or densely serrate in sinus along margins on proximal segments, rounded-obtuse at apices. Veins visible, veinlets usually forked on proximal segments, distal ones simple, 3–5 pairs per segment, proximal pair arising from slightly higher above base of costules, not reaching margins. Laminae herbaceous, when dry green, glabrous on both surfaces, only occasionally with sparse short hairs along both sides of costae. Sori small, orbicular, 2–4(or 5) pairs per segment, attached near ends of lateral veins, close to margins; indusia small, orbicular-reniform, membranous, green, or brownish when dry, glabrous or occasionally with several short hairs, usually deciduous when mature.

● Valley forests; 200–700(–?1800) m. Fujian, Guangdong, Guangxi, Taiwan.

4. Metathelypteris laxa (Franchet & Savatier) Ching, Acta Phytotax. Sin. 8: 306. 1963.

疏羽凸轴蕨 shu yu tu zhou jue

Aspidium laxum Franchet & Savatier, Enum. Pl. Jap. 2: 237. 1876; *Dryopteris laxa* (Franchet & Savatier) C. Christensen; *D. macarthyi* (Baker) C. Christensen; *Lastrea laxa* (Franchet & Savatier) Copeland; *Nephrodium laxum* (Franchet & Savatier) Diels; *N. macarthyi* Baker; *Thelypteris laxa* (Franchet & Savatier) Ching.

Plants 30–60 cm tall. Rhizomes long, decumbent or ascending, with sparse grayish white short hairs and reddish brown lanceolate scales, similar indument on stipe bases. Fronds approximate; stipes 10–35 cm, stramineous, above bases subglabrous; laminae narrowly oblong, 15–35 × 10–18 cm, bases nearly tapering, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 8–18 pairs, subopposite, linear-lanceolate, 5–9 × 1–2 cm, bases truncate, ± symmetrical, sessile, pinnatifid and reaching narrow wings on both sides of costae; segments oblong-lanceolate, middle ones 4–8 × 2–3 mm, entire or densely crenate-sinuate, or parted into small segments, obtuse-pointed or acute at apices. Veins visible, veinlets forked on segments on proximal pinnae, others simple, 5–7 pairs per segment, proximal pair arising above base of costules, not reaching margins. Laminae herbaceous, green when dry, abaxially with spreading hairs throughout, adaxially with acicular hairs along rachises, costae, and veins. Sori small, orbicular, 4–6 pairs per segment, attached on ends of veinlets or acroscopic vein on forked veinlets, close to margins; indusia small, orbicular-reniform, membranous, green, when dry grayish yellow, sparsely pubescent.

Forests on mountains, dense valley forests; near sea level to 800 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, S Korea].

5. Metathelypteris uraiensis (Rosenstock) Ching, Acta Phytotax. Sin. 8: 306. 1963.

乌来凸轴蕨 wu lai tu zhou jue

Plants 30–40 cm tall. Rhizomes short, decumbent or ascending, apices including stipe bases with sparse deep brown small scales and grayish white short acicular hairs. Fronds subclustered; stipes 14–20 cm, stramineous, glaucous, shortly hairy; laminae oblong-lanceolate, 16–22 × 8–15 cm, not tapering to bases, pinnate-pinnatifid, apices long acuminate and pinnatifid; pinnae 12–15 pairs, opposite or distal ones alternate, sessile,

proximal pair usually slightly shortened, bases slightly tapering, reflexed, above several pairs linear-lanceolate, 4–8 × 1.2–1.7 cm, bases tapering, rounded-truncate, symmetrical, pinnatifid and reaching narrow wings on both sides of costae, apices caudate-acuminate; segments 14–20 pairs, spreading, approximate, oblong-lanceolate, 4–7 × 2–3 mm, entire or sometimes undulate along margins, rounded-obtuse at apices. Veins evident abaxially, veinlets usually forked, or distal ones simple, 5–7 pairs per segment, proximal pair arising from above base of costules. Laminae thinly herbaceous, when dry yellowish green, abaxially with grayish white short hairs, hairs along rachises and costae denser, adaxially densely covered with grayish yellow acicular hairs along rachises and costae. Sori small, orbicular, 2–4 pairs per segment, attached near ends of lateral veins, close to margins; indusia small, orbicular-reniform, membranous, green, when dry brownish, sometimes lacerate along margins and acicular hairy, persistent. $2n = 124$.

Streamsides in valley forests, broad-leaved forests on slopes; 400–1700 m. N Guangdong, Taiwan, SE Xizang, W Yunnan [Japan, Philippines].

1a. Proximal pair of pinnae slightly shortened, bases slightly tapering, lateral veins forked on proximal pinnae, intercostal areas abaxially with short hairs ..... 5a. var. *uraiensis*
1b. Proximal pair of pinnae of similar shape and size as distal ones, lateral veins simple, occasionally forked, pinnae abaxially, except for grayish white short acicular hairs along rachises and costae, glabrous ..... 5b. var. *tibetica*

5a. Metathelypteris uraiensis var. **uraiensis**

乌来凸轴蕨(原变种) wu lai tu zhou jue (yuan bian zhong)

Dryopteris uraiensis Rosenstock, Hedwigia 56: 341. 1915; *D. hirsutisquama* Hayata; *Lastrea uraiensis* (Rosenstock) Copeland; *Macrothelypteris uraiensis* (Rosenstock) A. Löve & D. Löve; *Thelypteris uraiensis* (Rosenstock) Ching.

Proximal pair of pinnae slightly shortened, bases slightly tapering; lateral veins forked on segments of proximal pinnae, intercostal areas abaxially with short hairs.

Streamsides in valley forests; 400–1600 m. N Guangdong, Taiwan, W Yunnan [Japan, Philippines].

5b. Metathelypteris uraiensis var. **tibetica** (Ching & S. K. Wu) K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 67. 1999.

西藏凸轴蕨 xi zang tu zhou jue

Metathelypteris tibetica Ching & S. K. Wu, Fl. Xizang. 1: 166. 1983.

Proximal pair of pinnae of similar shape and size as distal ones; lateral veins simple, occasionally forked, pinnae abaxially, except for grayish white short acicular hairs along rachises and costae, glabrous.

● Broad-leaved forests on slopes; ca. 1700 m. SE Xizang (Mêdog).

6. Metathelypteris deltoideofrons Ching ex W. M. Chu & S. G. Lu, Fl. Yunnan. 20: 720. 2006.

三角叶凸轴蕨 san jiao ye tu zhou jue

Plants 23–55 cm tall. Rhizomes short, ascending, including stipe bases with grayish white acicular hairs and few brown linear-lanceolate small scales. Fronds approximate; stipes 10–30 cm, stramineous, subglabrous above bases; laminae ovate-triangular, 13–30 × 10–16 cm, broadest at bases, pinnate-pinnatifid, long acuminate and pinnatifid at apices; pinnae 10–14 pairs, spreading, proximal ones subopposite, distal ones alternate, proximal pinnae largest, bent distally, linear-lanceolate, 5–9.5 × 1.2–2.2 cm, bases truncate, sessile, pinnatifid and reaching narrow wings on both sides of costae, apices long acuminate; segments 12–20 pairs, 5–10 × 2–3 mm, entire, obtuse-pointed at apices. Veins evident abaxially, lateral veins simple or forked, 5 or 6 pairs per segment, not reaching margins. Laminae thinly herbaceous, when dry yellowish green, with grayish white short acicular hairs on both surfaces, hairs along rachises and costae denser. Sori small, orbicular, attached near ends of lateral veins, close to margins; indusia small, orbicular-reniform, thinly membranous, green, when dry grayish brown, with dense acicular hairs, persistent.

● Rock crevices at streamsides, streamsides in bamboo forests; 600–2200 m. Hunan, Yunnan.

The FRPS account of *Metathelypteris* misidentified material of *M. deltoideofrons* as *M. decipiens* (C. B. Clarke) Ching. Here, we follow Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 592. 2008) and treat the latter as a synonym of species no. 11, *M. flaccida*.

7. Metathelypteris hattorii (H. Itô) Ching, Acta Phytotax. Sin. 8: 306. 1963 [*"hattori"*].

林下凸轴蕨 lin xia tu zhou jue

Dryopteris hattorii H. Itô, Bot. Mag. (Tokyo) 99: 359. 1935 [*"hattori"*]; *D. laxa* (Franchet & Savatier) C. Christensen var. *dilatata* Koidzumi; *Lastrea hattorii* (H. Itô) Tagawa; *L. laxa* (Franchet & Savatier) Copeland var. *dilatata* (Koidzumi) Honda; *Thelypteris hattorii* (H. Itô) Tagawa; *T. nemoralis* Ching.

Plants 30–60 cm tall. Rhizomes short, decumbent, apices including stipe bases densely covered with reddish brown lanceolate scales and grayish white setae. Fronds approximate; stipes 15–30 cm, bases dark brown, stramineous above bases, subglabrous; laminae ovate-triangular, 15–35 × 14–26 cm, broadest at bases, bases rounded-truncate, 3-pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 12–16 pairs, proximal ones subopposite, distal ones alternate, sessile, or proximal pinnae sometimes with 0.5–1 mm stalks; proximal pair not shortened, of similar shape and size as distal ones, lanceolate, 10–15 × 2.5–3.5 cm, pinnae not tapering to base except for proximal 2 pairs, rounded-truncate at bases, pinnate-pinnatifid, acuminate at apices; pinnules ca. 16 pairs, subopposite, pinnae distal to middle ones connected to each other by narrow wings, proximal ones oblong-lanceolate, 2.5–3 × ca. 1 cm, bases decurrent, sessile, separated from each other, pinnatifid to ca. 2/3, apices rounded-obtuse or acute; segments oblong, 3.5–4 × ca. 2.4 mm, entire, rounded-obtuse at apices. Veins not evident,

lateral veins simple or forked, 2 or 3 pairs per segment, not reaching margins. Laminae herbaceous, when dry green, densely grayish white pubescent on both surfaces. Sori small, orbicular, usually 1 per segment, attached near ends of acroscopic veinlets on bases and close to margins; indusia small, orbicular-reniform, membranous, when dry grayish brown, sparsely pubescent, persistent.

Valley forests; 100–1700 m. S Anhui, N Fujian, N Guangxi, Hunan, Jiangxi, SW Sichuan, Zhejiang [Japan].

8. Metathelypteris petiolulata Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 321. 1999.

有柄凸轴蕨 you bing tu zhou jue

Plants 55–65 cm tall. Rhizomes short and decumbent. Fronds subclustered; stipes 23–30 cm, dark brown, with dense grayish white acicular hairs, distally stramineous, subglabrous, polished. Laminae ovate-triangular, 30–40 cm, broadest at bases and similar in size as length, bases broadly cordate, 3-pinnate to 4-pinnatifid, apices acuminate and pinnatifid; pinnae 10–12 pairs, ascending, proximal ones opposite or subopposite, stalk 3.5–5 cm, distal ones alternate, sessile; proximal pair largest, triangular-lanceolate, 17–22 × 10–12 cm, bases subtruncate, 2-pinnate to 2-pinnate-pinnatifid, apices caudate-acuminate; pinnules 10–15 pairs, alternate or subopposite, approximate, short stalks of proximal several pairs 4–7 mm, distal ones sessile, basiscopic pinnules of costae longer than acroscopic ones, but proximal pair of pinnules slightly shortened sometimes, above ones lanceolate, 6–7 × ca. 2.5 cm, bases broadly cuneate, pinnatifid, apices caudate-acuminate; pinnules of 2-pinnate laminae ca. 10 pairs, proximal 2 or 3 pairs slightly shortened, narrowly oblong, 6–15 × 3–4 mm, bases adnate to costules, decurrent, connected to each other by narrow wings, margins lobed to 1/2 of distance to costule, apices rounded-obtuse or acute; segments 4 or 5 pairs, triangular, entire, obtuse-pointed at apices. Veins not evident, lateral veins usually forked, 2–6 pairs per ultimate pinnule or segment and not reaching margins. Laminae thinly herbaceous, when dry yellowish green, with sparse grayish white short hairs on both surfaces. Sori orbicular, 1–5 pairs per pinnule or segment, attached near ends of acroscopic vein of forked veins, slightly closer to margins; indusia small, orbicular-reniform, membranous, green, with short hairs, persistent.

● Shaded wet places in valley forests; 800–1500 m. Anhui, Fujian, NW Jiangxi, S Zhejiang.

Metathelypteris petiolulata is similar to *M. hattorii* but differs by its laminae broader, 3-pinnate to 3-pinnate-pinnatifid, proximal pinnae and pinnules of 1-pinnate laminae stalked, and apices of pinnules of 1-pinnate laminae caudate-acuminate.

9. Metathelypteris wuyishanica Ching, Wuyi Sci. J. 1: 5. 1981.

武夷山凸轴蕨 wu yi shan tu zhou jue

Plants to 40 cm tall. Rhizomes short and erect. Fronds clustered; stipes ca. 20 cm, stramineous, bases with dense dark brown lanceolate scales and glaucous acicular hairs, distally glabrous; laminae oblong, ca. 25 × 15 cm, 2-pinnate-pinnatifid, apices acuminate; pinnae ca. 10 pairs, spreading, proximal pair similar in size as above ones, oblong-lanceolate, ca. 7 × 3 cm, shortly stalked, pinnatifid; pinnules ca. 14 pairs, basiscopic ones on costae longer than acroscopic ones, lanceolate, ca. 2 × 0.5 cm, bases connected by narrow wings, pinnatifid, apices obtuse-pointed; acroscopic segments ca. 1.2 × 0.3 cm, pinnatilobate. Laminae thinly herbaceous, when dry brownish, except costae villous adaxially, elsewhere glabrous. Sori small, 4 or 5 pairs per pinnule; indusia small, orbicular-reniform, brown, glabrous, deciduous.

● Shaded places among rocks in mountain thickets. Fujian, Zhejiang.

10. Metathelypteris glandulifera Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 322. 1999.

有腺凸轴蕨 you xian tu zhou jue

Plants 50–60 cm tall. Rhizomes long creeping, apices including stipe bases with deep brown linear-lanceolate scales and grayish white acicular hairs. Fronds approximate; stipes 20–30 cm, stramineous, above bases with similar hairs but sparsely so and with few scales; laminae oblong-lanceolate, ca. 30 × 14–16 cm, nearly tapering to bases, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 10–14 pairs, spreading, subopposite, sessile, lanceolate, 7–8 × 1–1.5 cm, bases slightly tapering, rounded-truncate, pinnatifid nearly to costae, apices long acuminate; segments ca. 17 pairs, spreading, lanceolate, sometimes falcate, 1–1.2 × ca. 0.3 cm, bases decurrent, connected to each other by narrow wings, margins crenate, apices rounded-obtuse or acute. Veins not evident, lateral veins forked, 8–10 pairs per segment, proximal pair arising above bases of costae and not reaching margins. Laminae herbaceous, when dry dark green, abaxially covered with grayish white multicellular acicular hairs along rachises, costae, and costules, lateral veins and intercostal areas covered with short unicellular acicular hairs, mixed with small orange-red globose glands, adaxially densely grayish white acicular hairy along rachises and costae, hairs along veins sparse. Sori small, orbicular, 6 or 7 pairs per segment, attached near ends of acroscopic vein of forked lateral veins; sporangia each with 4 or 5 globose small glands along both sides of annuli; indusia orbicular-reniform, greenish, when dry grayish brown, membranous, subentire, not easily seen when mature.

● Dense forests. N Guangxi.

The lamina outline of *Metathelypteris glandulifera* is extremely similar to that of *M. flaccida*, but the pinnae are covered with orange-red globose glands abaxially; the sporangia also have a few similar glands along both sides of the annuli, and the pinnae are covered with unicellular short acicular hairs along veinlets and intercostal areas.

11. Metathelypteris flaccida (Blume) Ching, Acta Phytotax. Sin. 8: 306. 1963.

薄叶凸轴蕨 bao ye tu zhou jue

Aspidium flaccidum Blume, Enum. Pl. Javae 2: 161. 1828; *Dryopteris flaccida* (Blume) Kuntze; *D. gracilescens* (Blume) Kuntze var. *decipiens* (C. B. Clarke) Alderwerelt; *Lastrea flaccida* (Blume) T. Moore; *L. gracilescens* Hooker var. *decipiens* (C. B. Clarke) Beddome; *Metathelypteris decipiens* (C. B. Clarke) Ching; *Nephrodium flaccidum* (Blume) Hooker; *N. gracilescens* (Blume) Hooker var. *decipiens* C. B. Clarke;

Thelypteris decipiens (C. B. Clarke) Ching; *T. flaccida* (Blume) Ching.

Plants 40–60 cm tall. Rhizomes thick and short, erect, with deep brown linear-lanceolate scales. Fronds clustered; stipes 15–30 cm, bases dark brown, with similar scales and grayish white short acicular hairs, distally stramineous and sparsely shortly hairy; laminae oblong-lanceolate, 25–40 × 12–16 cm, nearly tapering to bases, 2-pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 10–15 pairs, spreading, subopposite, sessile; proximal ones lanceolate, 7–9 × 2–2.5 cm, bases ± tapering, rounded-truncate, pinnate-pinnatifid, apices caudate-acuminate; pinnules 10–15 pairs, spreading, lanceolate, 1–1.5 × 0.3–0.5 cm, bases decurrent to form narrow wing along costae, pinnatifid to 1/2–2/3 distance to costae, apices rounded-obtuse; segments 5–7 pairs, triangular-lanceolate, 1–2 × ca. 1 mm, entire, obtuse-pointed at apices. Veins not evident, lateral veins simple or forked, 2 or 3 pairs per segment, proximal pair arising from base of costules, not reaching margins. Laminae thinly herbaceous, when dry yellowish green, with dense spreading multicellular acicular hairs on both surfaces. Sori small, orbicular, 1 per segment, attached above middle of acroscopic vein of forked lateral veins; indusia small, orbicular-reniform, membranous, greenish, when dry grayish brown, glabrous or occasionally with few acicular hairs along margins, persistent. $2n = 140$.

Streamsides in forests; 700–1800 m. Guizhou, SW Yunnan [Bhutan, India, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka, Thailand, N Vietnam].

5. MACROTHELYPTERIS (H. Itô) Ching, Acta Phytotax. Sin. 8: 308. 1963.

针毛蕨属 zhen mao jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Thelypteris sect. *Macrothelypteris* H. Itô in Nakai & Honda, Nov. Fl. Jap. 4: 141. 1939.

Plants medium-sized, terrestrial, sometimes treelike, to 4 m tall. Rhizomes thick and short, erect, ascending or decumbent, with brown lanceolate long scales; scales thick, with acicular cilia along margins. Fronds clustered; stipes stramineous or reddish brown, glabrous, or with similar scales and after fallen with remaining lunate marks; laminae large, ovate-triangular, 3- or 4-pinnate-pinnatifid; pinnae and pinnules oblique or spreading and connected to each other by narrow wings along costae or costules; veins pinnate, free, lateral veins simple, sometimes forked. Laminae herbaceous or somewhat papery, yellowish green when dry, costae and costules rounded and raised adaxially, ± hairy on both sides and intercostal areas, rarely glabrous, hairs slender, grayish white acicular, unicellular or consisting of several cells, except above hairs along rachises, usually also with brown multicellular acicular thick hairs and few lanceolate or subulate thick scales and remaining protruding marks after scales fallen. Sori small, attached near ends of veinlets, exindusiate or with small and usually deciduous indusia; sporangia sometimes with shortly stalked capitate hairs near annuli. Spores bilateral, elliptic-reniform; perispores transparent and corrugate, echinate or minutely foveolate; exospore finely reticulate. $x = 31$.

About ten species: warmer parts of mainland Asia, NE Australia, Malesia, Pacific islands; seven species (one endemic) in China.

1a. Rachises and costae covered with scales abaxially; scales inflated or incrassate at bases, leaving rough marks after falling.
  2a. Plants 1–1.4 m tall; costae and costules with scales incrassate and not inflated at bases ..... 3. *M. setigera*
  2b. Plants 3–4 m tall, costae and costules covered with inflated bases of scales abaxially.
    3a. Scales on rachises denser, scales on costae entire ..... 1. *M. ornata*
    3b. Scales on rachises sparse, scales on costae with dense acicular hairs along margins ..... 2. *M. polypodioides*
1b. Rachises and costae without scales abaxially, or with grayish white hairs, or glabrous.
  4a. Pinnae glabrous or with unicellular acicular hairs.
    5a. Laminae herbaceous, when dry yellowish green; pinnules oblique distally and intersecting with costae at sharp angle; pinnae glabrous abaxially, at most with sparse acicular hairs along costae ..... 4. *M. oligophlebia*
    5b. Laminae thinly herbaceous, grass-green or dark green when dry; pinnules spreading and intersecting with costae at right angle; pinnae with more spreading acicular hairs abaxially ..... 5. *M. viridifrons*
  4b. Pinnae with spreading multicellular acicular hairs abaxially.
    6a. Laminae herbaceous, pinnules oblique distally and intersecting with costae at sharp angle; proximal pinnae with 2–2.5 cm stalks; hairs abaxially denser and elongate and 2.5–3 mm ..... 6. *M. torresiana*
    6b. Laminae thinly herbaceous, pinnules spreading and intersecting with costae at right angle; pinnae subsessile; hairs abaxially sparse and short and 1.5–2 mm ..... 7. *M. contingens*

1. Macrothelypteris ornata (Wallich ex J. Smith) Ching, Acta Phytotax. Sin. 8: 309. 1963.

树形针毛蕨 shu xing zhen mao jue

Phegopteris ornata Wallich ex J. Smith, Hist. Fil. 233. 1875, based on *Polypodium ornatum* Wallich ex Beddome, Ferns S. India 56, t. 171. 1864, not Klotzsch (1847); *Dryopteris ornata* (Wallich ex J. Smith) C. Christensen; *Lastrea ornata* (Wallich ex J. Smith) Copeland; *Nephrodium ornatum* (Wallich ex J. Smith) Christ; *Thelypteris ornata* (Wallich ex J. Smith) Ching.

Plants 3–4 m or more tall. Rhizomes erect, cylindric, with

dense scales; scales brownish, ciliate along margins, long subulate and thick. Fronds clustered; stipes 60–100 cm, thick, ca. 2.5 cm in diam., stramineous, polished, bases with similar scales as on rhizomes, distally scales sparser, after falling leaving tuberculate or lunate rough marks; laminae large, triangular-ovate, long and wide, to above 2 m, not tapering to bases, 4-pinnatifid, acuminate and pinnatifid at apices; pinnae 18–25 pairs, subopposite, spreading, proximal ones stalked, oblong-lanceolate, ca. 60 × 30 cm, 3-pinnatifid, acuminate at apices; pinnules of 1-pinnate laminae large, spreading, shortly stalked, lanceolate, 10–16 × 3–4 cm, bases truncate, symmetrical, pinnate-pinnatifid, apices acuminate. Pinnules of 2-pinnate laminae 18–25 pairs, subopposite, spreading, sessile, lanceolate, slightly falcate, 1.5–2 × ca. 0.4 cm, bases decurrent, connected to each other by narrow wing along costae, pinnatifid to 1/2 or more of distance to costules, apices pointed; segments 10–12 pairs, crenatelike or triangular, oblique distally, entire. Veins pinnate, veinlets 2 or 3 pairs per segment, forked, not evident. Laminae herbaceous, when dry yellowish green, abaxial sides with multicellular acicular hairs along costules and main veins, costae with sparse linear-lanceolate scales abaxially, scales inflated at bases, persistent, adaxial sides with short acicular hairs along costae. Sori small, orbicular, 1 pair per segment, attached near top of basal acroscopic veinlets; indusia not developed. $2n = 62$.

Forests in river valleys of subtropical regions. SE Xizang, W Yunnan [Bhutan, India, Nepal, Thailand].

The nomenclatural history of this taxon is confusing. The epithet was introduced as a nomen nudum by Wallich (Numer. List, no. 327. 1829). Fée (Mém. Foug. 5: 243. 1852) made the combination *"Phegopteris ornata"* based on Wallich's name but provided no further information, so this name is another nomen nudum and was likewise not validly published (*Melbourne Code*, Art. 38.1(a)). Beddome (1864) provided the first actual description in his account of *Polypodium ornatum* in 1864, but unfortunately this name is a later homonym and is therefore illegitimate. The earliest legitimate name appears to be that of J. Smith in 1875, as his combination can be indirectly associated with Beddome's description through his citation of Wallich.

2. Macrothelypteris polypodioides (Hooker) Holttum, Blumea 17: 29. 1969.

栊椤针毛蕨 suo luo zhen mao jue

Alsophila polypodioides Hooker in Nightingale, Oceanic Sketches, 131. 1835; *Cheilanthes gigantea* Cesati; *Dryopteris brunneovillosa* C. Christensen; *D. leucolepis* (C. Presl) Maxon; *Lastrea leucolepis* C. Presl; *Macrothelypteris leucolepis* (C. Presl) Ching; *Phegopteris cheilanthoides* (Baker) Alderwerelt; *Polypodium cheilanthoides* Baker; *Thelypteris leucolepis* (C. Presl) Ching.

Plants ca. 1.5 m tall. Rhizomes short, decumbent, thick, with ascending apex. Fronds tufted; stipes ca. 80 cm, pale, dull, basal half at least bearing copious slender hairs and scales; scales thin, pale, linear, bearing copious very slender unicellular hairs and sometimes a few of more than one cell, base of scales thick and dark, of larger ones flat, of smaller ones terete, leaving warts when scales fall; main rachises pale, hairy as stipe, with many small warts abaxially; laminae ca. 80 cm; basal 2 or 3 pairs of pinnae to 35 × 15 cm, upper ones gradually shortened; basal pinnules of lower pinnae somewhat shortened; pinna rachis hairy adaxially, with narrow pale scales abaxially; largest pinnules sessile, ca. 10 × 2.5 cm, acuminate at apices, almost at right angle to pinna rachis, segments all with broad bases connected by a very narrow wing along costae; costae densely hairy adaxially (sparsely hairy on costules), abaxially with very narrow pale scales, short capitate hairs also present; segments almost at right angles to costae, larger ones deeply lobed. Veinlets forked or shortly pinnate, laminae adaxially bearing capitate hairs. Sori small, on acroscopic branch of a vein; indusium small, persistent, bearing many short capitate hairs; sporangia with 2 or 3 similar capitate hairs near annulus; spores not winged, surface apparently minutely and irregularly granular.

Forest margins; 700–2100 m. Taiwan [Papua New Guinea, Philippines, Thailand; Australia, Pacific islands].

3. Macrothelypteris setigera (Blume) Ching, Acta Phytotax. Sin. 8: 309. 1963.

刚鳞针毛蕨 gang lin zhen mao jue

Cheilanthes setigera Blume, Enum. Pl. Javae 2: 138. 1828; *Aspidium setigerum* (Blume) Kuhn (1869), not Swartz (1829); *C. stenophylla* Kunze; *Dryopteris backeri* Alderwerelt; *D. setigera* (Blume) Kuntze; *Hypolepis setigera* (Blume) Hooker; *Nephrodium setigerum* (Blume) Baker (1867), not C. Presl (1825); *Thelypteris setigera* (Blume) Ching.

Plants 1–1.4 m tall. Rhizomes thick and ascending, with dense brownish linear-lanceolate scales; scales ca. 1 cm, thick, with sparse hairs along margins. Fronds clustered; stipes 50–60 cm or more, stramineous, bases with similar scales as rhizomes, distally sparse, scales inflated at bases and remaining as tuberculate rough marks after falling; laminae oblong-lanceolate, 50–80 × 30–50 cm, tapering at bases, 3-pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 14–18 pairs, subopposite, spreading, sessile or subsessile, proximal pair larger, broadly lanceolate, 15–30 × 5–15 cm, bases truncate, symmetrical, bipinnate, apices acuminate; pinnules of 1-pinnate laminae 20–30 pairs or more, sessile, spreading, lanceolate, 2.5–7 × 0.5–1.5 cm, symmetrical at bases, pinnatisect, acuminate at apices; pinnules of bipinnate laminae 12–20 pairs, lanceolate, 2.5–7 × 1.5–2.5 mm, bases decurrent, connected to each other by narrow wings, entire or sharply lobate, margins usually recurved, obtuse at apices. Veinlets not evident, simple or forked, 3–5 per ultimate pinnule. Laminae herbaceous, brownish when dry, abaxially including costae and costules with more glaucous multicellular acicular hairs, adaxially with acicular hairs along costae, rachises with hard scales. Sori small, orbicular, attached above middle of veinlets, wrapped by recurved margins; indusia small, deciduous or hidden in mature sori.

Tropical rain forests. Taiwan [Indonesia, Malaysia].

4. Macrothelypteris oligophlebia (Baker) Ching, Acta Phytotax. Sin. 8: 308. 1936.

针毛蕨 zhen mao jue

Plants 60–150 cm tall. Rhizomes short and ascending, including stipe bases with deep brown lanceolate marginally

sparsely hairy scales. Stipes 30–70 cm, stramineous, glabrous above bases; laminae triangular-ovate, similar in length to stipes, 30–45 cm wide at proximal part, not tapering at bases, 3-pinnatifid, acuminate and pinnatifid at apices; pinnae ca. 14 pairs, oblique distally, alternate, or proximal ones opposite, stalks to 2 cm or more, proximal pair larger, oblong-lanceolate, ca. 20 × 5 cm, slightly tapering to bases, acuminate and pinnatifid at apices; second pair and above pinnae gradually reduced distally, not tapering to bases, with stalks 1–1.5 cm, bipinnatifid; pinnules 15–20 pairs, 3.5–8 × 1–2.5 cm, lanceolate, bases rounded-truncate, symmetrical, sessile (proximal ones shortly stalked), ± decurrent (distal ones connected to each other by narrow wing), pinnatifid nearly to costules, apices acuminate; segments 10–15 pairs, spreading, 5–12 × 2–3.5 mm, bases connected to each other by narrow wings, margins entire or sharply lobate, apices obtuse or bluntly pointed. Veins evident abaxially, veinlets simple or forked on sharply lobate segments, 4–8 pairs per segment. Laminae herbaceous, when dry grass-green, glabrous on both surfaces, with orange-yellow transparent capitate glandular hairs abaxially, or along costules and near ends of costae with few unicellular acicular hairs, adaxially with grayish white short acicular hairs along costae and costules, usually with reddish purple spots on costae. Sori small, orbicular, 3–6 pairs per segment, attached near ends of veinlets; indusia small, orbicular-reniform, grayish green, glabrous, deciduous when mature or hidden in sori.

Streamsides in valleys, wet soil at forest margins. S Anhui, Fujian, Guangdong, N Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Taiwan, Zhejiang [Japan, S Korea].

1a. Pinnae glabrous on both surfaces ..... 4a. var. *oligophlebia*
1b. Pinnae along costae and costules all with grayish white unicellular acicular short hairs abaxially ..... 4b. var. *elegans*

4a. Macrothelypteris oligophlebia var. **oligophlebia**

针毛蕨(原变种) zhen mao jue (yuan bian zhong)

Nephrodium oligophlebium Baker, J. Bot. 13: 291. 1875; *Aspidium oligophlebium* (Baker) Christ; *Dryopteris oligophlebia* (Baker) C. Christensen; *Hypolepis punctata* (Thunberg) Mettenius ex Kuhn var. *henryi* Christ; *Lastrea oligophlebia* (Baker) Copeland; *Macrothelypteris torresiana* (Gaudichaud) Ching var. *calvata* (Baker) Holttum; *N. setigerum* C. Presl var. *calvatum* Baker; *Thelypteris oligophlebia* (Baker) Ching; *T. torresiana* (Gaudichaud) Alston var. *calvata* (Baker) K. Iwatsuki; *T. uliginosa* (Kunze) Ching var. *calvata* (Baker) K. Iwatsuki.

Pinnae glabrous on both surfaces.

Streamsides in valleys, wet soil at forest margins; 400–800 m. S Anhui, N Guangxi, S Henan, Hubei, Hunan, S Jiangsu, Jiangxi, Zhejiang [Japan].

4b. Macrothelypteris oligophlebia var. **elegans** (Koidzumi) Ching, Acta Phytotax. Sin. 8: 309. 1963.

雅致针毛蕨 ya zhi zhen mao jue

Dryopteris elegans Koidzumi, Bot. Mag. (Tokyo) 38: 108. 1924; *Lastrea oligophlebia* var. *elegans* (Koidzumi) Tagawa; *L. uliginosa* Newman var. *elegans* (Koidzumi) K. Iwatsuki; *Macrothelypteris changshaensis* Ching; *M. oligophlebia* var. *changshaensis* (Ching) K. H. Shing; *Thelypteris oligophlebia* var. *elegans* (Koidzumi) Ching; *T. uliginosa* var. *elegans* (Koidzumi) K. Iwatsuki.

Pinnae along costae and costules with grayish white unicellular short acicular hairs abaxially. 2*n* = 62, 124.

Streamsides in valleys, forest margins, on slopes and plains at low elevations. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Taiwan, Zhejiang [Japan, S Korea].

5. Macrothelypteris viridifrons (Tagawa) Ching, Acta Phytotax. Sin. 8: 310. 1963.

翠绿针毛蕨 cui lü zhen mao jue

Thelypteris viridifrons Tagawa, J. Jap. Bot. 12: 747. 1936; *Dryopteris elegans* Koidzumi var. *subtripinnata* Tagawa; *D. oligophlebia* (Baker) C. Christensen var. *subtripinnata* (Tagawa) H. Itô; *Lastrea oligophlebia* (Baker) Copeland var. *subtripinnata* (Tagawa) Ohwi; *L. viridifrons* (Tagawa) Tagawa; *T. oligophlebia* (Baker) Ching var. *subtripinnata* (Tagawa) H. Itô.

Plants 60–110 cm tall. Rhizomes short and erect, with reddish brown hairy lanceolate scales at apices. Fronds clustered; stipes 30–50 cm, stramineous, bases with grayish white short acicular hairs, distally glabrous; laminae similar in length to stipes or slightly longer, 20–50 cm wide, not tapering to bases, 3-pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 10–12 pairs, alternate or subopposite, oblique distally, stalks 1.5–5 cm, proximal pair largest, oblong-lanceolate, 24–30 × ca. 10 cm, bases slightly tapering, rounded-truncate, apices acuminate; second pair of pinnae (distally all pinnae) of similar shape as proximal pair, but not tapering to bases, gradually reduced, shortly stalked, 2-pinnate-pinnatifid; pinnules of 1-pinnate parts of laminae 10–15 pairs, alternate, spreading, proximal pair slightly shortened, distal ones oblong-lanceolate, 5–6.5 × 2.5–3 cm, bases truncate, shortly stalked, pinnate-pinnatifid, apices acuminate; pinnules of 2-pinnate parts of lamina 10–15 pairs, lanceolate, 1–1.5 × 0.4–0.7 cm, bases rounded-truncate and decurrent, connected to each other on both sides by narrow wings, pinnate lobate or pinnatifid to 2/3 of distance to costules, obtuse or bluntly pointed at apices; segments elliptic, ca. 2.5 × 1.5 mm, entire or slightly undulate along margins, rounded at apices. Veins visible, veinlets simple, 2 or 3 pairs per segment. Laminae thickly herbaceous, when dry grass-green, with more spreading acicular hairs abaxially, adaxially with more short acicular hairs along costules; rachises stramineous, glabrous abaxially, polished. Sori small, orbicular, 1 or 2 per segment, attached near ends of proximal veinlets; indusia small, orbicular-reniform, green, membranous, with 1 or 2 villous-hairs and deciduous after maturity. 2*n* = 124.

Shaded wet places in forests in mountain valleys; ca. 800 m. Anhui, N Fujian, Guizhou (Nayong), Hunan, S Jiangsu, Jiangxi, Zhejiang [Japan, S Korea].

6. Macrothelypteris torresiana (Gaudichaud) Ching, Acta Phytotax. Sin. 8: 310. 1963.

普通针毛蕨 pu tong zhen mao jue

Polystichum torresianum Gaudichaud, Voy. Uranie, Bot. 8:

333. 1828; *Aspidium mollissimum* Christ; *A. uliginosum* Kunze; *Dryopteris lasiocarpa* Hayata; *D. mollissima* (Christ) C. Christensen; *D. oligophlebia* (Baker) C. Christensen var. *lasiocarpa* (Hayata) Nakai; *D. tenericaulis* (Wallich ex Hooker) Ching; *D. uliginosa* (Kunze) C. Christensen; *Lastrea oligophlebia* (Baker) Copeland var. *lasiocarpa* (Hayata) H. Itô ex M. Mizushima; *L. tenericaulis* (Wallich ex Hooker) T. Moore; *L. torresiana* (Gaudichaud) T. Moore; *Nephrodium tenericaule* (Wallich ex Hooker) Hooker; *Polypodium tenericaule* Wallich ex Hooker; *P. trichodes* J. Smith; *Thelypteris oligophlebia* (Baker) Ching var. *lasiocarpa* (Hayata) H. Itô; *T. torresiana* (Gaudichaud) Alston; *T. uliginosa* (Kunze) Ching.

Plants 60–150 cm tall. Rhizomes short, erect or ascending, with dense reddish brown hairy linear-lanceolate scales at apices. Fronds clustered; stipes 30–70 cm, grayish green, when dry stramineous, bases shortly hairy, distally subglabrous; laminae triangular-ovate, 30–80 × 20–50 cm, not tapering at bases, 3-pinnate, acuminate and pinnatifid at apices; pinnae ca. 15 pairs, subopposite, stalks 2–2.5 cm; proximal pairs largest, oblong-lanceolate, 10–30 × 4–12 cm, bases slightly tapering, acroscopic sides parallel with rachises, 2-pinnate, apices acuminate; pinnules of 1-pinnate laminae 15–20 pairs, alternate, distal ones ± adnate to costae and decurrent and connected to each other, proximal several pairs shortly stalked, lanceolate, 3–10 × 0.8–2 cm, rounded-truncate at bases, pinnatifid, acuminate at apices; segments 10–15 pairs, approximate, lanceolate, 4–12 × 2–3 mm, bases connected to each other by narrow wings, margins entire or often sharply lobate, apices obtuse or bluntly pointed; second pair of pinnae of similar shape as proximal pair, but not tapering at bases and gradually shortened. Veins not evident, veinlets simple or forked on sharply lobate segments, 3–7 pairs per segment. Laminae herbaceous, when dry dark brownish green, with more grayish white multicellular spreading long acicular hairs and capitate short glands abaxially, adaxially with short hairs along costae and costules, rachises and costae stramineous, glabrous abaxially, adaxially with multicellular slender hairs. Sori small, 2–6 pairs per segment, attached near ends of veinlets; indusia small, orbicular-reniform, greenish, hidden in mature sori. Sporangia each with 2 or 3 capitate short hairs at top. 2*n* = 144, 186.

Wet places in mountain valleys; sea level to 1000 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Myanmar, Nepal, Philippines, Vietnam; tropical and subtropical regions of America, Australia, Pacific islands].

7. Macrothelypteris contingens Ching, Acta Phytotax. Sin. 8: 310. 1963.

细裂针毛蕨 xi lie zhen mao jue

Plants ca. 1 m tall. Rhizomes short and erect, with dark brown lanceolate scales. Fronds clustered; stipes ca. 50 cm, stramineous, distally glabrous; laminae ovate-lanceolate, similar in length as stipes, 15–30 cm proximally, not tapering to bases, 3-pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae ca. 15 pairs, opposite, distal ones alternate, spreading, subsessile; proximal pair of pinnae broadly lanceolate, 14–18 × 8–9 cm, bases slightly tapering, truncate, pinnate-pinnatifid, apices acuminate; pinnules of 1-pinnate laminae 15–20 pairs, connected to each other, spreading, proximal ones opposite, distal ones alternate, oblong-lanceolate, 3–4 × ca. 1 cm, bases connected along both sides by narrow wings, partite, acuminate at apices; segments 12–15 pairs, approximate, or obliquely spreading, elliptic, 3.5–4.2 × ca. 2.2 mm, bases decurrent and connected to each other by narrow wings, margins sharply lobate into 3 or 4 crenations, apices rounded; second pair of pinnae of similar size as proximal pair, but not tapering at bases. Veins visible, veinlets 2- or 3-forked, occasionally simple, 3 or 4 pairs per segment. Laminae thinly herbaceous, green when dry, with sparse whitish multicellular spreading acicular hairs abaxially, adaxially with similar short acicular hairs but sparse, costae stramineous, glabrous or subglabrous abaxially, hairy adaxially. Sori small, orbicular, 3 or 4 pairs per segment, attached near ends on acroscopic veinlets forked; indusia small, not very prominent.

● Wet soil in forests in mountain valleys; 900–1100 m. S Yunnan, S Zhejiang.

6. PHEGOPTERIS (C. Presl) Fée, Mém. Foug. 5: 242. 1852.

卵果蕨属 luan guo jue shu

Lin Youxing (林尤兴); Alan R. Smith

Polypodium [par.] *Phegopteris* C. Presl, Tent. Pterid. 179. 1836.

Plants mid- and small-sized, terrestrial. Rhizome long creeping or short and erect, densely covered with brown scales and whitish acicular hairs. Fronds remote or clustered; stipe stramineous, shiny, slender, base scaly; scales brown, lanceolate and sparsely long hairy along margins; lamina bipinnatifid or pinnate-pinnatifid, ovate-triangular or narrowly lanceolate; pinnae connected to each other by a narrow wing along rachis, or proximal 1–3 pairs free, proximal pinnae not shortened or basal pair only slightly shortened, or proximal several pairs gradually reduced to auricles; veins pinnate, lateral veins simple or forked, veinlets reaching margins; lamina herbaceous or soft papery, with whitish acicular hairs on both surfaces, rachis, costae, and costules rounded and raised on both sides and similarly with dense acicular hairs, sometimes mixed with a few forked hairs, with more brownish hairs and lanceolate, ciliate scales abaxially. Sori orbicular to oblong, borne above middle of ultimate veins, exindusiate or indusia very small and vestigial; sporangia often with a few short acicular hairs or capitate hairs near annulus. Spores bilateral, reniform, perispores winged, thin, and transparent, granular on surfaces. *x* = 30.

Four species: widely distributed throughout the N temperate zone, one species in SE Asia; three species (one endemic) in China.

Phegopteris is monophyletic and differs from *Pseudophegopteris* in its smaller stature, stramineous stipes, laminae usually triangular or

narrowly lanceolate, proximal pinna bases decurrent and adnate to each other by a rachis wing, veinlets reaching margin, sparsely ciliate scales on abaxial side of rachises, and costae sparsely ciliate. *Phegopteris* is primarily N temperate and circumboreal, while *Pseudophegopteris* is tropical and subtropical and restricted to the Paleotropics.

The following taxa are excluded from the present treatment, pending further research: *Phegopteris amaurophylla* Christ (Bull. Herb. Boissier 7(1): 14. 1899), described from Yunnan, and *P. somae* (Hayata) Tagawa (Acta Phytotax. Geobot. 7: 75. 1938; *Dryopteris somae* Hayata, Icon. Pl. Formosan. 5: 287. 1915 [*"somai"*]), described from Taiwan.

1a. Rhizome short, erect; lamina lanceolate, pinnae connected to each other by narrow wings; most pinnae below middle of blade gradually shortened, proximal pair of pinnae reduced to auricles ..... 3. *P. decursive-pinnata*
1b. Rhizome long creeping; lamina ± triangular, proximal 1–3 pairs of pinnae free, not tapering proximally, or basal pair slightly shortened, distal pinnae connected to each other by narrow rachis wing.
2a. Lamina triangular, length and width subequal or length slightly longer than width, proximal pair of pinnae largest and often reflexed downward ..... 1. *P. connectilis*
2b. Lamina narrowly triangular, length almost 2 times width, proximal 1–3 pairs of pinnae free, proximal pair slightly shortened, spreading or slightly ascending ..... 2. *P. tibetica*

1. Phegopteris connectilis (Michaux) Watt, Canad. Naturalist Geol., n.s., 3: 159. 1866 [*"connectile"*].

卵果蕨 luan guo jue

Polypodium connectile Michaux, Fl. Bor.-Amer. 2: 271. 1803; *Aspidium phegopteris* (Linnaeus) Baumgarten; *Dryopteris phegopteris* (Linnaeus) C. Christensen; *Gymnocarpium phegopteris* (Linnaeus) Newman; *Nephrodium phegopteris* (Linnaeus) Prantl; *Phegopteris polypodioides* Fée; *P. vulgaris* Mettenius; *Polypodium phegopteris* Linnaeus; *Polystichum phegopteris* (Linnaeus) Roth; *Thelypteris phegopteris* (Linnaeus) Slosson.

Plants 25–40 cm tall. Rhizome long creeping, with bright brown, ovate-lanceolate thin scales at apex. Fronds remote; stipe dark brown at base, stramineous distally, 15–30 cm, sparsely scaly, nearly smooth; lamina bipinnatifid, deltoid, 13–20 × 10–18 cm, acuminate and pinnatifid at apex; pinnae ca. 10 pairs, usually opposite, spreading, lanceolate, 5–9 × 1–2 cm, basal pair largest, bases slightly or not tapering, free from second pair of pinnae, slightly deflexed, apices acuminate; segments oblong, entire, undulate, or lobed along margins, rounded or obtuse at apices; distal pinnae gradually shortened, bases connected along rachises by triangular wings. Veins pinnate, lateral veins simple or occasionally forked. Fronds herbaceous or papery, drying gray-green or yellowish green, with sparse gray-white acicular hairs on both surfaces, ± with small scales along rachises and costae; scales brownish, ovate-lanceolate and ciliate along margins. Sori ovate-orbicular or orbicular, borne at or near ends of ultimate veins and close to margins. Sporangia with 1 or 2 hairs near annulus. $2n = 60, 90$.

Forests, shrublands; 1200–3600 m. Guizhou, Heilongjiang, Henan, Jilin, Liaoning, Shaanxi, Sichuan, Taiwan, Yunnan [widely distributed in temperate regions of the N Hemisphere, south to mountains of C Asia and the Himalaya].

Phegopteris connectilis is similar to *P. hexagonoptera* (Michaux) Fée, which occurs in North America only. In *P. connectilis*, the proximal pinnae taper to their bases, the proximal and subbasal pinnae are not connected by decurrent wings along the rachis, the laminae are thinly herbaceous and sparsely shortly hairy on both surfaces, and the lateral veins are mostly simple. *Phegopteris hexagonoptera* has the proximal pair of pinnae connected to the next pair by a wing along the rachis, shorter laminar hairs (less than 0.25 mm vs. mostly 0.3–0.5 mm or longer in *P. connectilis*), and ultimate veins forked or pinnate.

2. Phegopteris tibetica Ching, Fl. Xizang. 1: 161. 1983.

西藏卵果蕨 xi zang luan guo jue

Plants ca. 45 cm tall. Rhizome not seen. Stipe dark brown at base, distally stramineous, 24–27 cm, with triangular-lanceolate scales, rounded abaxially, nearly smooth or with short hairs, grooved and with acicular hairs adaxially; lamina pinnate-pinnatifid, oblong, 18–20 × 10–14 cm, base not decurrent, apex acuminate and pinnatifid; pinnae 13–15 pairs, proximal 2 or 3 pairs free, spreading or slightly obliquely spreading, 5–7 × ca. 2 cm (basal one pair slightly shortened), oblong-lanceolate, slightly tapering to bases, ± adnate to rachis, pinnatifid; segments oblong, entire along margins (or occasionally undulate-crenate on long segments), sparsely ciliate, rounded-obtuse at apices; pinnae above middle gradually shortened, linear-lanceolate, bases decurrent and connected to each other along rachis by narrow wings. Veins pinnate, lateral veins forked or simple and reaching margins. Fronds herbaceous, drying deep green, rachises raised abaxially, adaxially with grooves with dense acicular hairs, rachises and costae with acicular hairs on both sides and mixed with a few forked hairs, with sparse brownish narrowly lanceolate scales abaxially, scales sparsely long ciliate along margins, subglabrous between veins on both surfaces. Sori orbicular or nearly so, borne subterminally on ultimate veins and close to margins, exindusiate. Sporangia each occasionally with 1 or 2 hairs near annulus.

● *Abies* forests; ca. 3600 m. Xizang (Bomi).

Phegopteris tibetica is most similar to *P. connectilis*, but the laminar length is 2 times the width, proximal 2 or 3 pairs of pinnae usually not connected at bases by a rachis wing, basal pair of pinnae slightly shortened, and laminae glabrous between veins on both surfaces.

3. Phegopteris decursive-pinnata (H. C. Hall) Fée, Mém. Foug. 5: 242. 1852.

延羽卵果蕨 yan yu luan guo jue

Polypodium decursive-pinnatum H. C. Hall, Nieuwe Verh. Eerste Kl. Kon. Ned. Inst. Wetensch. Amsterdam 5: 204. 1836; *Aspidium decursive-pinnatum* (H. C. Hall) Kunze; *Dryopteris decursive-pinnata* (H. C. Hall) Kuntze; *Lastrea decurrens* J. Smith; *L. decursive-pinnata* (H. C. Hall) J. Smith; *Leptogramma decursive-pinnata* (H. C. Hall) J. Smith; *Nephrodium decursive-pinnatum* (H. C. Hall) Baker; *Thelypteris decursive-pinnata* (H. C. Hall) Ching.

Plants 30–60 cm tall. Rhizome short and erect, including base of stipe with reddish brown, ciliate, narrowly lanceolate scales. Fronds clustered; stipe stramineous, 10–25 cm; lamina lanceolate, 20–50 × 5–12 cm, gradually tapering to base, bipinnatifid or pinnate and toothed along margins, acuminate and pinnatifid at apex; pinnae 20–30 pairs, alternate, obliquely spreading, middle ones largest, narrowly lanceolate, 2.5–6 × ca. 1 cm, broad and decurrent at bases, connected by orbicular auricles or triangular wings between pinnae, pinnatifid to 1/3–1/2 of distance to costules, acuminate at apices; segments obliquely spreading, ovate-triangular, entire, obtuse at apices; pinnae gradually shortened to both ends, basal one pair of pinnae often shortened into small auricles. Veins pinnate, lateral veins simple and reaching margins. Fronds herbaceous, along rachis, costae, and veins with whitish unicellular acicular short hairs on both sides, abaxial side with forked and stellate hairs, abaxial side of rachises and costae with sparse brownish, hairlike or lanceolate, ciliate scales. Sori suborbicular, borne at or near ends of ultimate veins, 2 or 3 per segment, sometimes with tufts of stalked forked hairs in center when young. Sporangia each sometimes with 1 or 2 short hairs near annulus. $2n = 60, 90, 120$.

Along rivers on fluvial plains, lower montane regions of hills, forests by roadsides; sea level to 2000 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, S Korea, N Vietnam].

Phegopteris decursive-pinnata is very different from other species of the genus in having short, erect rhizomes and narrowly lanceolate laminae, but it can spread by long-creeping rhizomes. Because of these characters, Iwatsuki removed it from *Thelypteris* sect. *Phegopteris* and treated it and some species that we place in *Pseudophegopteris*, as well as other species, in *T.* sect. *Lastrea* (Bory) Alston. Three ploidal levels are known, but these numbers do not clearly correlate with differing morphologies.

7. CRASPEDOSORUS Ching & W. M. Chu, Acta Phytotax. Sin. 16(4): 24. 1978.

边果蕨属 bian guo jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Plants medium-sized, terrestrial. Rhizomes erect, including stipe bases with scales and short rough hairs; scales reddish brown, ovate-lanceolate, ciliate and densely shortly hairy. Fronds clustered; stipes greenish, with dense divided grayish white transparent acicular fine long hairs; laminae broadly lanceolate, not tapering at bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae large, but proximal pair of pinnae not shortened, lanceolate, pinnatifid; segments with semitransparent membranous narrow edge and undulate along margins, when dry usually reflexed and not easily seen; costae grooved adaxially, abaxially rounded; veins free, veinlets on segments simple (occasionally forked at middle), slightly inflated at ends and not reaching margins; vein type similar to *Pseudocyclosorus*, i.e., acroscopic veinlet of basal pair of veins reaching excartilaginous sinuses, basiscopic veinlet reaching margins above sinus. Laminae herbaceous, along rachises and costae setaceous and mixed with short rough hairs. Sori oblong, attached below ends of veinlets and close to margins, exindusiate. Sporangia glabrous or usually with only one short acicular hair near annulus. Spores echinate.

● One species: China.

Craspedosorus is clearly closely related to *Leptogramma*. They both are very similar in laminar outline, segment shape, venation, and sori, but *Craspedosorus* is larger, with more pinnae that are free from rachises (except for distal ones) and pinnatifid nearly to costae; veinlets not reaching margins, segments slightly undulate along margins and with translucent membranous narrow edges (usually reflexed when dry and not easily seen); sori short and thick, oblong, attached near ends of veinlets and closer to margins; and sporangia glabrous or each with one short acicular hair. In the opinion of Thelypteridaceae co-author Alan R. Smith, these diagnostic characters are not enough to separate *Craspedosorus* from *Leptogramma*.

1. Craspedosorus sinensis Ching & W. M. Chu, Acta Phytotax. Sin. 16(4): 26. 1978.

边果蕨 bian guo jue

Stegnogramma sinensis (Ching & W. M. Chu) L. J. He & X. C. Zhang.

Plants to 1.1 m tall. Stipes ca. 40 cm, glabrous above bases; laminae broadly lanceolate, ca. 65 × 22 cm, not tapering at bases, pinnate-pinnatifid; pinnae ca. 25 pairs, sessile, alternate, middle ones lanceolate, ca. 14 × 2.5 cm, bases truncate on acroscopic sides and parallel with costae, basiscopic sides obliquely truncate, pinnatifid to above 2/3 of distance to costule, apices acuminate; segments ca. 20 pairs, middle ones oblong-lanceolate, ca. 1 cm (proximal 3 or 4 pairs slightly shorter), ca. 5 mm wide, with translucent membranous narrow edge along margins and slightly undulate, usually reflexed when dry, obtuse or bluntly pointed at apices. Veinlets in segments 5–9 pairs, simple or occasionally forked at middle, slightly thickened at end and not reaching margins. Laminae herbaceous, green when dry, abaxially glabrous, adaxially with long setae and mixed short rough hairs on rachises and costae. Sori oblong, attached slightly below end of veinlets and close to margins, costules with broad sterile space on both sides; sporangia each usually with one short acicular hair near annulus.

● Shaded thickets; 1400–1500 m. NE Yunnan.

8. PSEUDOPHEGOPTERIS Ching, Acta Phytotax. Sin. 8: 313. 1963.

紫柄蕨属 zi bing jue shu

Lin Youxing (林尤兴); Alan R. Smith

Plants medium-sized, terrestrial. Rhizome short and erect, long creeping to ascending, apex with brown lanceolate scales.

Fronds clustered, sparse or remote; stipe castaneous or red-brown, less often stramineous or tan, shiny, base sometimes with whitish acicular hairs, sometimes mixed with stellate hairs, distally often glabrescent and smooth; lamina pinnate-pinnatifid to bipinnate-pinnatifid, lanceolate, oblong-lanceolate, oblong, or ovate, tapering or not to base, acuminate and pinnatifid at apex; pinnae usually opposite or subopposite, spreading or obliquely spreading, pinnae below middle not adnate to rachis, sessile or shortly stalked, lanceolate or triangular-lanceolate, bases often broadened, truncate, symmetrical or not, sometimes hastate, apices acuminate; basiscopic segments sometimes longer than acroscopic segments, and basal segments on both sides sometimes prolonged; costae raised on both sides, usually same color as stipes and rachises or lighter colored, abaxially glabrous or with whitish acicular hairs, hairy adaxially; veins free, lateral veins simple or forked, each with a clavate hydathode at end and not reaching margin. Sori oblong, ovate, or suborbicular, borne at middle or above middle, exindusiate. Sporangia glabrous or with short hairs just below annulus. Spores bilateral, orbicular-reniform, perispores thin and transparent, reticulate or foveolate on surfaces, exospore smooth. $x = 31$.

About 25 species: tropical and subtropical Asia, east to the Pacific islands, to the west reaching to W Africa; 12 species (four endemic) in China.

Citations of *Pseudophegopteris paludosa* (Blume) Ching from China (Ching, Acta Phytotax. Sin. 8: 315. 1963; Tsai & Shieh, Fl. Taiwan, ed. 2, 1: 401. 1994), a species known with certainty only from Malesia (Holttum, Blumea 17: 91. 1969; Fl. Males., Ser. 2, 1: 347. 1981), perhaps apply to specimens of *P. pyrrhorhachis* or *P. hirtirachis*, which are two closely related and similar species.

1a. Stipes stramineous, bases including abaxial sides of rachises and costae with whitish acicular hairs mixed with irregularly forked or stellate hairs.
  2a. Stipes same size or slightly shorter than laminae, 15–30 cm; pinnae with sparse acicular hairs adaxially ..... 1. *P. levingei*
  2b. Stipes equal to 1/4 of laminae in length, 8–10 cm; pinnae except costae with sparse acicular hairs adaxially, otherwise glabrous ..... 2. *P. brevipes*
1b. Stipes red-castaneous or castaneous, or if stramineous or brown-stramineous then bases of stipe, abaxial sides of rachis, and costae never with mixed acicular hairs.
  3a. Basal pair of pinnules or segments on proximal pinnae, particularly basiscopic one, clearly longer than adjacent one and also lobed or incised; pinna base asymmetrically hastate.
    4a. Laminae not tapering to base, i.e., proximal 1 or 2 pairs of pinnae largest; pinnae all sessile ..... 3. *P. yigongensis*
    4b. Laminae ± tapering to base, i.e., proximal 1 or 2 pairs of pinnae smaller than distal ones.
      5a. Pinnae below middle shortly stalked ..... 4. *P. tibetana*
      5b. Pinnae all sessile.
        6a. Rhizome long creeping; stipes nearly same length as or slightly shorter than laminae; laminae papery, drying brownish green, glabrous on both surfaces ..... 5. *P. aurita*
        6b. Rhizome shortly creeping to ascending; stipes much shorter than laminae; laminae thinly herbaceous, drying yellowish green, with fine acicular hairs on both surfaces ..... 6. *P. subaurita*
  3b. Basal pair of pinnules or segments on proximal pinnae same shape and size as distal pinnules/segments on same pinna, or at most slightly inflated; pinnae symmetrically hastate at base, or seemingly not hastate.
    7a. Stipes stramineous, occasionally tan; plants 90–120 cm tall; laminae 60–80 × 20–30 cm; segments toothed along margins ..... 12. *P. microstegia*
    7b. Stipes red-castaneous, castaneous-brown, or reddish brown, never stramineous or brown-stramineous; segments entire along margins.
      8a. Laminae less than 20 cm wide, pinnate-pinnatifid.
        9a. Sori near end of acroscopic veinlet of a forked pair and closer to margin; sporangia lacking hairs; pinnae subglabrous on abaxial surfaces between veins ..... 10. *P. zayuensis*
        9b. Sori at middle of ultimate veins, between costae and segment margins; sporangia with 1 or 2 seta(e) below annulus; pinnae with sparse fine acicular hairs on abaxial surfaces between veins ..... 11. *P. rectangularis*
      8b. Laminae wider than 20 cm, pinnate-pinnatisect with pinnules often toothed or lobed, or 2-pinnate-pinnatifid.
        10a. Laminae broadly ovate, proximal pair of pinnae largest, 30–45 × 13–20 cm, pinnules pinnatifid nearly to costules ..... 9. *P. yunkweiensis*
        10b. Laminae oblong or oblong-lanceolate, proximal pair of pinnae same size as ones above or slightly shorter, 10–20 × 2.5–7 cm, pinnules pinnatifid to 1/2 of distance to costule.
          11a. Rhizome long creeping; laminae with sparse acicular short hairs or sometimes glabrous on abaxial surfaces; sporangia glabrous ..... 7. *P. pyrrhorhachis*
          11b. Rhizome short, ascending; laminae with dense acicular short hairs on abaxial surfaces; sporangia each with 2 or more hairs ..... 8. *P. hirtirachis*

1. Pseudophegopteris levingei (C. B. Clarke) Ching, Acta Phytotax. Sin. 8: 314. 1963.

星毛紫柄蕨 xing mao zi bing jue

Gymnogramma aurita Hooker var. *levingei* C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 568. 1880 [*"levingii"*]; *Dryopteris levingei* (C. B. Clarke) C. Christensen; *D. purdomii* C. Christensen; *G. levingei* (C. B. Clarke) Baker; *Lastrea levingei*

(C. B. Clarke) Copeland; *Leptogramma aurita* (Hooker) Beddome var. *levingei* (C. B. Clarke) Beddome; *Phegopteris levingei* (C. B. Clarke) Tagawa; *Thelypteris levingei* (C. B. Clarke) Ching.

Plants 60–80 cm tall. Rhizome long creeping, with reddish brown, broadly lanceolate scales and whitish acicular hairs. Fronds remote; stipe stramineous, 15–30 cm, with sparse similar scales on proximal parts and denser whitish acicular hairs and few irregularly forked stellate hairs; lamina pinnate-pinnatisect, lanceolate or oblong-lanceolate, 35–60 × 5–15 cm, slightly tapering at base, acuminate and pinnatifid at apex; pinnae to ca. 20 pairs, opposite, sessile, pinnae above middle approximate, proximal 2 or 3 pairs remote from each other, gradually shortened downward, basal pair of pinnae smallest, 2–5 cm, others 3–8(–11) × 1.5–2.5 cm, lanceolate, bases truncate, ± symmetrical, pinnatisect nearly to costae, apices acuminate; segments 8–15 pairs per pinna, opposite, obliquely spreading, approximate, oblong, 1–1.3 × 0.3–0.5 cm, slightly broader at base, connected to each other by a narrow wing, entire, crenate, or occasionally lobed along margins of larger segments, obtuse at apices. Veins visible on both sides, lateral veins simple or forked, 5–7 per segment, basal pair arising from above bases of main veins. Laminae herbaceous, drying dark green, abaxial surfaces with dense whitish acicular hairs and a few stellate short hairs along costae and veins, also ± hairy between veins, adaxial surfaces with sparse acicular hairs, hairs denser along rachises. Sori suborbicular or oblong, 3–5(–7) pairs per segment, borne at or above middle of ultimate veins and closer to margin. Sporangia each with 1–3 hairs ca. 0.2 mm below annulus. $2n = 124$.

Forests beside streams, thickets; 1300–3100 m. SE Gansu, SC Shaanxi, C Sichuan, Taiwan, E and S Xizang, NW Yunnan [Afghanistan, Bhutan, N India, Kashmir, Pakistan].

Pseudophegopteris levingei is similar to *P. bukoensis* (Tagawa) Holttum, but the latter is larger in outline, with laminae 2-pinnate-pinnatifid, pinnae and pinnules oblong, pinnules incised to 2/3 of distance to costules, and costae with more stellate hairs abaxially.

Reviewer Ralf Knapp provided the record for Taiwan. Information about this taxon and a taxon previously cited for Taiwan, *Pseudophegopteris aurita*, will be included in Knapp's Supplement to the Ferns and Fern Allies of Taiwan, to be published in 2013.

2. Pseudophegopteris brevipes Ching & S. K. Wu, Fl. Xizang. 1: 163. 1983.

短柄紫柄蕨 duan bing zi bing jue

Plants 50–60 cm tall. Rhizome long creeping, including base of stipe with sparse whitish long hairs and reddish brown scales; scales ovate-lanceolate, thinly membranous, apices hair-like, hairy on back and margins. Fronds remote; stipe stramineous, 8–20 cm, with sparse whitish acicular and a few stellate hairs, hairs denser in grooves adaxially; lamina 40–45 × 12–16 cm, gradually tapering to base, pinnate-pinnatifid, pinnatifid and acuminate at apex; pinnae ca. 20 pairs, opposite or subopposite, spreading, sessile, proximal 2 pairs of pinnae slightly shortened, basal pair shortest, ovate-lanceolate, 3.5–5 cm, above ones lanceolate, 6–8 × ca. 2 cm, bases widest and ± symmetrical, truncate, pinnatisect nearly to costae, apices acuminate and entire; segments to ca. 12 pairs, approximate, spreading, oblong, 8–9 × ca. 4.5 mm, hairy along margins, obtuse at apices. Veins slender, visible adaxially, lateral veins forked, 4 or 5 pairs per segment, basal pair arising from above bases of costae. Laminae thinly herbaceous, drying deep green or dark brown-green, with sparse whitish hairs, hairs denser along costae and veins and mixed with a few irregularly forked stellate hairs, adaxial surfaces with sparse acicular hairs along costae, rachises stramineous, sparsely hairy. Sori oblong, 2–4 pairs per segment, borne near ends of forked veinlets and close to margins. Sporangia each with hairs below annulus.

● In rock crevices in valleys; ca. 2300 m. SE Xizang (Zayü).

3. Pseudophegopteris yigongensis Ching, Fl. Xizang. 1: 165. 1983.

易贡紫柄蕨 yi gong zi bing jue

Plants 60–75 cm tall. Rhizome long creeping, with lanceolate hairy scales. Fronds remote; stipe blackish brown at base, brown-stramineous and shiny distally, 30–40 cm, bases villous, distally glabrous; lamina narrowly oblong or narrowly lanceolate, 25–35 × 6–10 cm, base not tapering, pinnate-pinnatifid (basal pinnules on proximal pair of pinnae often pinnate), apex pinnatifid and acuminate; pinnae 9–12 pairs, opposite, spreading, distal pinnae decurrent and connected, middle pinnae ± decurrent and adnate to rachis but not connected to each other, proximal 1 or 2 pairs of pinnae largest, sessile and not decurrent, 7–9 × ca. 4.5 cm, bases asymmetrical, pinnatifid, apices long acuminate; basiscopic pinna segments longer than acroscopic ones, particularly basal basiscopic one, to 3–4 cm, pinnatifid, other segments entire. Veins visible on both sides, lateral veins simple or forked, 4–6 pairs per segment. Laminae thinly herbaceous, drying yellowish green, abaxially villous along veins, subglabrous adaxially, rachises stramineous and sparsely villous. Sori oblong, borne at middle or above middle of ultimate veinlets, 2–4 pairs per segment. Sporangia each with 2–4 acicular hairs below annulus.

● Dense forests; ca. 2500 m. SE Xizang (Bomi, Yigong).

Pseudophegopteris yigongensis is somewhat similar to *P. levingei*, differing in the fewer lateral pinnae, proximal two pairs much larger than distal ones, and laminae sparingly villous abaxially.

4. Pseudophegopteris tibetana Ching & S. K. Wu, Fl. Xizang. 1: 164. 1983.

西藏紫柄蕨 xi zang zi bing jue

Plants 85–90 cm tall. Rhizome long creeping, with sparse dark brown lanceolate scales. Fronds remote; stipe red-castaneous at base, shiny, 15–40 cm, base with a few scales and acicular hairs; lamina lanceolate, (15–)45–50 × (4–)12–16 cm, slightly tapering proximally, pinnate-pinnatifid (pinnules on proximal pair of pinnae often lobed), pinnatifid and long acuminate at apex; pinnae 4–17 pairs, ± opposite or subopposite, pinnae above middle ± adnate to rachis, pinnae below middle shortly stalked, proximal 1 or 2 pairs of pinnae obliquely triangular, (2–)7–7.5 × 1.5–3 cm, bases asymmetrical, pinnatifid, apices acuminate; basiscopic segments largest, oblong-lanceolate, ca. 2 × 0.4–1 cm, pinnatifid, other segments entire; dis-

tal pinnae lanceolate, to 8 × 2–2.2 cm, symmetrical, pinnatifid to 1/2 distance to costae or less, acuminate at apices; segments oblong, entire. Veins visible abaxially, lateral veins forked or simple, 2–6 pairs per segment, basal pair arising from bases of costae. Fronds papery, drying yellowish green, abaxial surfaces with sparse hairs along veins and margins, rachises stramineous to brown, sparsely villous, hairs denser adaxially. Sori oblong, borne above middle of ultimate veinlets, 2–4 pairs per segment. Sporangia each with a seta below annulus.

● Dense forests; ca. 2100 m. SE Xizang.

The distinctness of *Pseudophegopteris tibetana* relative to *P. aurita* and *P. yigongensis* needs more study.

5. Pseudophegopteris aurita (Hooker) Ching, Acta Phytotax. Sin. 8: 314. 1963.

耳状紫柄蕨 er zhuang zi bing jue

Gymnogramma aurita Hooker, Icon. Pl. 10: t. 974. 1854; *Aspidium auritum* (Hooker) Christ; *Dryopteris aurita* (Hooker) C. Christensen; *Grammitis aurita* (Hooker) T. Moore; *Leptogramma aurita* (Hooker) Beddome; *Nephrodium auritum* (Hooker) Handel-Mazzetti; *Phegopteris aurita* (Hooker) J. Smith; *Polypodium auritum* (Hooker) E. J. Lowe; *Thelypteris aurita* (Hooker) Ching.

Plants 40–100 cm tall. Rhizome long creeping, with scales at apex; scales brown, narrowly lanceolate, 3–4 mm, ciliate along margins. Fronds remote; stipe red-castaneous or brownish at least toward base, shiny, 20–60 cm; lamina ovate-lanceolate, 20–70 × 15–30 cm, slightly tapering to base, pinnate-pinnatifid, pinnatifid and acuminate at apex; pinnae 10–18 pairs, opposite, spreading, sessile, proximal 1 or 2 pairs of pinnae slightly shortened, lanceolate, distal pinnae 7–15 × 2–4 cm, bases hastate, asymmetrical, pinnatifid nearly to costae, apices acuminate, pinnae above middle ± symmetrical at base and adnate to rachis; segments (10–)15–20 pairs, spreading, basiscopic segments of pinnae longer than acroscopic ones, basal pair largest, particularly basiscopic one more oblique, lanceolate, 2.5–4 × 0.7–1 cm, margins pinnately lobed or crenate, apices acuminate, acroscopic ones shorter, parallel to rachis, oblong, 1–2 cm, entire or shallowly undulate, obtuse at apices. Veins visible abaxially, lateral veins forked or simple, 5–7 pairs per segment, basal pair arising from bases of costules. Laminae thickly herbaceous, drying brown-green, with short hairs along both sides of costae or only adaxially, laminae otherwise glabrous, rachises smooth abaxially, with dense short hairs adaxially. Sori oblong or sometimes ovate-orbicular, borne above middle of ultimate veinlets, far from costules, 2–5 pairs per segment. Sporangia each with hairs below annulus. $2n = 62, 124$.

Forests beside streams on high mountains; 1200–2000 m. Chongqing, C Fujian, C Guizhou, S and W Jiangxi, SE Xizang, W Yunnan [Bhutan, NE India, Indonesia, Japan, Malaysia, N Myanmar, Nepal, Papua New Guinea, Philippines, N Vietnam].

A widespread species, *Pseudophegopteris aurita* varies considerably in frond size, and hence in laminar dissection, over its range. Specimens outside of China tend to be considerably larger.

6. Pseudophegopteris subaurita (Tagawa) Ching, Acta Phytotax. Sin. 8: 315. 1963.

光轴紫柄蕨 guang zhou zi bing jue

Dryopteris subaurita Tagawa, Acta Phytotax. Geobot. 1: 157. 1932; *Phegopteris subaurita* (Tagawa) Tagawa; *Thelypteris subaurita* (Tagawa) Ching.

Plants 50–120 cm tall. Rhizome shortly creeping to ascending, apex and stipe base with dense brown linear-lanceolate hairy scales. Fronds clustered or slightly spaced; stipe red-castaneous at least at base, 10–35 cm, abaxially sparsely hairy, adaxially with dense hairs along groove; lamina oblong-lanceolate, 40–55(–100) × 15–30 cm, tapering at base, pinnate-pinnatifid, pinnatifid and long acuminate at apex; pinnae 15–20 pairs, opposite, obliquely spreading, sessile, basal pair of pinnae smallest, narrowly triangular, 2–6 × 3–6 cm, more distal pinnae gradually longer, second pair 8–15 × ca. 2 cm (excluding basalmost segments), triangular-lanceolate, bases abruptly widened to 7 cm, asymmetrically hastate, pinnatifid nearly to costules, apices acuminate; segments 15–25 pairs per pinna, opposite, obliquely spreading, basal pair clearly longer than distal pairs, particularly basiscopic one pinnatifid and more oblique, lanceolate, to ca. 4 × 1.2 cm, tapering to an acute apex, acroscopic one parallel to rachis, to 4 cm, more distal segments to 3 × ca. 0.8 cm, oblong, margins crenate to lobed, distal segments entire, obtuse or subacute at apices. Veins visible abaxially, lateral veins simple or forked on proximal larger segments, basal pair arising from bases of costae. Fronds herbaceous, drying yellowish green, with fine acicular hairs on both surfaces, hairs along costae and veins denser abaxially. Sori suborbicular to oblong, borne at middle or above middle (closer to margin) of ultimate veins. Sporangia each often with 1 or 2 short hairs below annulus. $2n = 62$.

Forests beside streams, open areas in thickets; 200–1000 m. N and S Taiwan [Japan (Ryukyu Islands)].

Pseudophegopteris subaurita is closely related to *P. pyrrhorhachis* and to *P. aurita* but is seemingly absent from mainland China.

7. Pseudophegopteris pyrrhorhachis (Kunze) Ching, Acta Phytotax. Sin. 8: 313. 1963 [*"pyrrhorachis"*].

紫柄蕨 zi bing jue

Plants 80–100 cm tall. Rhizome long creeping, scaly at apex. Fronds approximate or sparse; stipe red-castaneous, shiny, 20–40 cm, base with short hairs and few lanceolate scales, distally glabrous; lamina oblong-lanceolate, 60–70 × 20–35 cm, somewhat tapered to base, pinnate-pinnatifid, acuminate at apex; pinnae 15–20 pairs, opposite, sessile, proximal pinnae narrowly lanceolate, middle pinnae larger, 13–20 × 2.5–5 cm, bases slightly broadened, rounded-truncate, proximal 1–3 pairs sometimes slightly shortened, pinnatifid, shortly acuminate at apices; pinnules 15–25 pairs, opposite, spreading, lanceolate and slightly falcate, 1.5–2.5 × 0.5–0.8 cm, bases slightly broadened and adnate to costae, connected to each other by a narrow wing, lobed to 1/2 distance to costae, apices shortly acuminate; segments triangular-oblong, acuminate and entire at apices. Veins hidden, pinnate on segments, 2–4 pairs per segment, basal pair arising from above base of costules. Fronds herbaceous, drying dark brown-green, abaxial surfaces with sparse short acicular hairs, hairs along costae, costules, and

veins denser, adaxially with short setae along costules and veins; rachises and costae reddish brown, glabrous or sparsely shortly hairy. Sori suborbicular or ovate, 1 or 2 per segment, borne above middle of veinlets and close to margins, arranged in an irregular row on each side of costules. Sporangia glabrous or each with 1 or 2 hairs below annulus. 2*n* = 62, 124, 186.

Forests beside streams; 800–3000 m. Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [Bhutan, N India, Myanmar, Nepal, Sri Lanka, Vietnam].

1a. Laminae abaxially with dense short acicular hairs along costae, costules, and veins, sparsely hairy between veins ..... 7a. var. *pyrrhorhachis*
1b. Laminae abaxially glabrous or at most with extremely short capitate hairs along rachises, costae, and costules, glabrous between veins ..... 7b. var. *glabrata*

7a. Pseudophegopteris pyrrhorhachis var. **pyrrhorhachis**

紫柄蕨(原变种) zi bing jue (yuan bian zhong)

Polypodium pyrrhorhachis Kunze, Linnaea 24: 257. 1851; *Dryopteris laterepens* (E. W. Trotter ex Hope) C. Christensen; *Lastrea pyrrhorhachis* (Kunze) Copeland; *Macrothelypteris pyrrhorhachis* (Kunze) Pichi Sermolli; *Nephrodium brunneum* Handel-Mazzetti; *N. distans* Diels (1899), not Hooker (1862); *Phegopteris brunnea* Wallich ex J. Smith; *P. distans* Mettenius; *P. pyrrhorhachis* (Kunze) Tagawa; *Polypodium distans* D. Don (1825), not Kaulfuss (1824); *P. distans* var. *adnatum* C. B. Clarke; *P. laterepens* E. W. Trotter ex Hope; *Thelypteris brunnea* (Handel-Mazzetti) Ching; *T. pyrrhorhachi*s (Kunze) B. K. Nayar & S. Kaur.

Laminae abaxially with dense short acicular hairs along costae, costules, and veins, often hairy between veins.

Forests beside streams; 800–2400 m. Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [Bhutan, N India, Myanmar, Nepal, Sri Lanka, Vietnam].

"Polypodium brunneum" (Wallich, Numer. List, no. 333. 1829) belongs here but is a nomen nudum and was not therefore validly published (*Melbourne Code*, Art. 38.1(a)).

7b. Pseudophegopteris pyrrhorhachis var. **glabrata** (C. B. Clarke) Holttum, Blumea 17: 24. 1969.

光叶紫柄蕨 guang ye zi bing jue

Polypodium distans var. *glabrata* C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 544. 1880; *Phegopteris distans* var. *glabrata* (C. B. Clarke) Beddome; *P. pyrrhorhachis* var. *glabrata* (C. B. Clarke) Tagawa; *Thelypteris brunnea* var. *glabrata* (C. B. Clarke) Ching.

Lamina abaxially glabrous or with extremely short capitate hairs along rachises, costae, and costules, lacking hairs between veins.

Forests beside streams; below 3000 m. N Guizhou, W Hubei, Sichuan, Yunnan [N India, Myanmar, SW regions of Himalaya].

8. Pseudophegopteris hirtirachis (C. Christensen) Holttum, Blumea 17: 22. 1969.

密毛紫柄蕨 mi mao zi bing jue

Dryopteris hirtirachis C. Christensen in H. Léveillé, Fl. Kouy-Tchéou, 49. 1915; *Dryopteris christii* H. Léveillé (1915), not C. Christensen (1905); *Phegopteris pyrrhorhachis* (Kunze) Tagawa var. *hirtirachis* (C. Christensen) Tagawa; *Pseudophegopteris pyrrhorhachis* (Kunze) Ching var. *hirtirachis* (C. Christensen) Ching; *Thelypteris brunnea* (Handel-Mazzetti) Ching var. *hirtirachis* (C. Christensen) Ching; *T. pyrrhorhachis* (Kunze) B. K. Nayar & S. Kaur subsp. *hirtirachis* (C. Christensen) Fraser-Jenkins.

Plants to 1 m. Rhizome ascending, stipe base with brown lanceolate scales. Fronds somewhat clustered; stipe red-castaneous, shiny, 20–55 cm, base with scales and whitish hairs; lamina oblong, mostly 50–80 × 15–35 cm, slightly tapering at base, 2-pinnate-pinnatifid, acuminate and pinnatifid at apex; pinnae opposite to subopposite, sessile, lanceolate, middle pinnae largest, 9–20 cm or more, mostly 2–6 cm wide, slightly asymmetrical, acute at apices, proximal 1 or 2 pairs shortened, proximal pair 3–10 cm, pinnatifid or pinnatisect; pinnules 12–20 pairs per pinna, opposite, spreading, basiscopic ones on proximal pinnae slightly longer than acroscopic ones, 0.8–3.5 × 0.5–0.8 cm, bases broadened and adnate to costae, connected to each other by narrow wings, apices shortly acuminate to obtuse, basal pair of pinnules same size or slightly longer, toothed to pinnatifid to 1/2 distance to costules; segments triangular-oblong, entire to dentate, obtuse to acute at apices. Veins visible on both sides, lateral veins simple or forked, mostly 4–15 or more pairs per pinnule, basal pair arising above bases of costules. Laminae herbaceous, drying deep green or brownish green, abaxial surfaces with dense short whitish hairs along costae, costules, veins, and between veins, adaxially with appressed thick short hairs along rachises, costae, and costules, rachises castaneous or red-castaneous and with sparse to dense, short, spreading hairs abaxially. Sori suborbicular to oblong, near ends of ultimate veinlets. Sporangia each usually with 2 or more short hairs below annulus.

Forests beside streams; 1500–2000 m. N Guangdong, N Guangxi, S Guizhou, C Sichuan, Taiwan, W Yunnan [NE India, Nepal].

Pseudophegopteris hirtirachis is similar to *P. pyrrhorhachis* in laminar outline but differs in its rhizomes shorter and ascending, rachises with short, spreading hairs abaxially, costules and costae with dense whitish short acicular hairs abaxially, and sporangia with 2 or more short hairs.

9. Pseudophegopteris yunkweiensis (Ching) Ching, Acta Phytotax. Sin. 6: 315. 1963.

云贵紫柄蕨 yun gui zi bing jue

Thelypteris yunkweiensis Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 274. 1936; *Phegopteris yunkweiensis* (Ching) Tagawa.

Plants to 1.5 m tall. Rhizome stout (short and ascending?, not seen). Stipe red-castaneous, shiny, 40–55 cm, base with dense brown, ovate-lanceolate, hairy scales, distally glabrous; lamina ovate, ca. 100 × 40–60 cm, not tapering to base, 2-

pinnate-pinnatifid, apex acuminate and pinnatifid; pinnae 10 or more pairs, opposite, or distal ones subopposite and more oblique, sessile or proximal ones shortly stalked, proximal pair largest, 30–45 × 13–20 cm, oblong-lanceolate, bases symmetrical or basal several pinnules shortened acroscopically, pinnate-pinnatifid, acuminate at apices, basiscopic pinnules not elongate relative to more distal pinnules; pinnules 15–25 pairs per pinnae, 2.5–3 cm apart, alternate, spreading, mostly free from each other, sessile or narrowly adnate to costae, distalmost ones connected by a narrow wing, lanceolate, 6–13 × 1.4–2.4 cm, truncate at bases, pinnatifid 3/4–4/5 distance to costules, acute at apices; segments 15–20 pairs, falcate-lanceolate, margins crenate or entire distally, apices acute or obtuse; veins visible on both sides, especially adaxially, lateral veins forked, 4–7 pairs per segment. Laminae herbaceous, drying dark green, rachises and costae reddish, costules stramineous, abaxially with sparse acicular hairs or glabrescent along rachises, costae, and costules, with denser acicular hairs adaxially along costae and costules, glabrous on both surfaces on and between veins. Sori suborbicular or slightly oblong, borne at middle of lateral veins between costae and margins, 3–6 pairs per segment. Sporangia glabrous.

Forests beside streams. N Guizhou (Zunyi), SE Yunnan (Mengzi) [N Vietnam].

10. Pseudophegopteris zayuensis Ching & S. K. Wu, Fl. Xizang. 1: 164. 1983 [*"zayüensis"*].

察隅紫柄蕨 cha yu zi bing jue

Plants ca. 85 cm tall. Rhizome not seen. Stipe reddish brown, shiny, ca. 30 cm, scaly at base; scales reddish brown, linear-lanceolate, glabrous, or occasionally with a few long hairs dorsally, including rachises with sparse whitish acicular hairs; lamina to ca. 55 × 16 cm, slightly tapering at base, pinnate-pinnatifid, shortly acuminate and pinnatifid at apex; pinnae ca. 25 pairs, opposite or subopposite, proximal 1 or 2 pairs sessile, spreading, proximal pair shortest, ca. 5 cm, middle pinnae ca. 8 × 1.5–2 cm, linear-lanceolate, truncate and symmetrical at bases, pinnatifid to 3/4 of distance to costae, acute at apices; segments ca. 20 pairs per pinna, rectangular, 7–8 × 4–5 mm, entire. Veins visible abaxially, 4 or 5 pairs per segment, basal pair arising from above base of costules. Laminae thinly papery, drying green, subglabrous on both surfaces between veins, costae at bases red-castaneous abaxially, distally stramineous, shiny, with sparse acicular hairs. Sori orbicular, borne near tips of acroscopic vein of forked lateral vein pair and close to margin. Sporangia glabrous.

● Broad-leaved forests; ca. 2100 m. S Xizang.

This species is known only from the type.

Pseudophegopteris zayuensis is closely related to *P. tibetana*, differing primarily by the basiscopic basal pinnule on proximal pinnae not being strongly elongate and the glabrous sporangia. More collections are needed to evaluate the importance of these differences.

11. Pseudophegopteris rectangularis (Zollinger) Holttum, Blumea 17: 19. 1969.

对生紫柄蕨 dui sheng zi bing jue

Polypodium rectangulare Zollinger, Syst. Verz. 37, 48. 1854; *Dryopteris moussetii* Rosenstock; *Phegopteris moussetii* (Rosenstock) Alderwerelt; *P. oppositipinna* Alderwerelt; *Polypodium distans* Kaulfuss var. *minor* C. B. Clarke; *Pseudophegopteris oppositipinna* (Alderwerelt) Ching; *Thelypteris oppositipinna* (Alderwerelt) Ching; *T. rectangularis* (Zollinger) B. K. Nayar & S. Kaur.

Plants 40–70 cm tall. Rhizome short, suberect. Fronds clustered; stipe red-castaneous, shiny throughout, 10–30 cm, with short spreading acicular hairs, base with narrowly lanceolate, brownish, sparsely hairy, thin scales; lamina narrowly oblong-lanceolate, 30–50 × 7–12 cm, slightly tapering and with pinnae more spaced proximally, pinnate-pinnatifid; pinnae ca. 20 pairs, opposite to subopposite, spreading, sessile and distal ones becoming narrowly adnate to rachis, proximal 1–3 pairs slightly shortened, to 3 cm, basal segments of proximal pinnae not significantly elongate or lobed, distal pinnae lanceolate, 4–7 × 0.8–1.8 cm, pinnately lobed to 3/4 of distance to costae, acuminate at apices; segments 12–20 pairs per pinna, obliquely spreading, oblong-triangular, entire along margins, obtuse at apices. Veins visible, lateral veins simple or occasionally forked, 3–5 pairs per segment, basal pair arising from above base of costules, acroscopic one of a pair running toward sinus but not reaching margin. Laminae herbaceous, drying greenish, adaxial surfaces nearly smooth except for hairs along costae, abaxial surfaces with sparse to many acicular hairs to 0.5 mm, hairs along costae denser, also sometimes with a few capitate short hairs between veins, rachises red-castaneous and with denser acicular hairs. Sori suborbicular, borne at middle or near tips of lateral veins, 2–4 pairs per segment. Sporangia each usually with 1 or 2 acicular hairs below annulus. $2n = 124$.

Forests beside streams; 1000–1500 m. N Guangxi, SE Xizang, SE and W Yunnan [Bhutan, NE India, Indonesia, Malaysia, Nepal].

"*Dryopteris oppositipinna*Alderwerelt" (Bull. Jard. Bot. Buitenzorg, sér. 2, 16: 24. 1914) is invalid (*Melbourne Code*, Art. 36.1(c)).

12. Pseudophegopteris microstegia (Hooker) Ching, Fl. Xizang. 1: 162. 1983.

禾杆紫柄蕨 he gan zi bing jue

Nephrodium microstegium Hooker, Sp. Fil. 1: 119. 1862; *Lastrea microstegia* (Hooker) Beddome; *Pseudophegopteris pallida* (Ching) Ching; *Thelypteris brunnea* (Handel-Mazzetti) Ching var. *pallida* Ching.

Plants 90–120 cm tall. Rhizome long creeping, with sparse, appressed, brownish, broadly lanceolate scales. Fronds remote; stipe stramineous, occasionally brown-stramineous, 30–40 cm, base with sparse brownish lanceolate scales, distally glabrous; lamina 60–80 × 20–30 cm, tapering proximally, pinnate-pinnatifid, pinnatifid and acuminate at apex; pinnae 20–25 pairs, subopposite, obliquely spreading or spreading, sessile, proximal pinnae linear-lanceolate, 10–15 × 2–3 cm, bases truncate, apices acute, proximal 2 or 3 pairs sometimes slightly shortened, 7–10 cm, pinnatifid nearly to costae; segments ca. 25 pairs per pinna, opposite, spreading, basal pair of segments same shape and size as more distal ones, oblong, 1–1.5 × ca. 0.5 cm, coarsely dentate or entire along margins, sparsely ciliate,

obtuse or truncate at apices. Veins visible abaxially, lateral veins forked, 6 or 7 pairs per segment, basal pair arising from above base of costules. Laminae thinly herbaceous, drying greenish, both surfaces with short hairs along costae and veins, hairs denser adaxially, rachises stramineous, adaxially densely hirsute along groove. Sori orbicular to slightly oblong, borne at middle of acroscopic vein of lateral vein pair. Sporangia glabrous.

Evergreen broad-leaved forests; 2300–2400 m. Chongqing (Nanchuan), C Sichuan, S and SE Xizang, NW and SE Yunnan [NE India].

Pseudophegopteris microstegia is very similar to *P. pyrrhorhachis* (and treated as a synonym of that by Holttum, 1969), differing mainly in the stramineous stipes and rachises and laminae abaxially glabrous except on rachises and costae. The purported differences need further study.

9. CYCLOGRAMMA Tagawa, Acta Phytotax. Geobot. 7: 52. 1938.

钩毛蕨属 gou mao jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Plants medium-sized, terrestrial. Rhizomes short and strong, erect or long creeping, with grayish white unicellular short acicular hairs and few thick scales; scales brown, broadly lanceolate and with acicular and hooked hairs or along margins. Fronds clustered or sparse; stipes ± hairy or subglabrous; laminae oblong or broadly lanceolate, acuminate or pinnatifid at apices; pinnae large, alternate or opposite, lanceolate, proximal several pairs sometimes shortened into auricles, sessile or occasionally shortly stalked, middle pinnae pinnatifid; segments large, lanceolate or suboblong, entire, rounded-obtuse or obtusely pointed at apices. Veins pinnate, free, lateral ones simple, reaching margins above sinuses. Laminae herbaceous or papery, when dry brownish green or nearly brown, both surfaces ± with grayish white unicellular short acicular hairs and few hooked thick long hairs, aerophores present at bases of pinnae and abaxially on rachises. Sori small, consisting of few sporangia, orbicular, dorsifixed at middle or below middle of veinlets, arranged in one row on each side of costules, exindusiate; sporangia shortly stalked and with 1–3 erect short setae or hooked hairs on both sides of annuli near top. Spores bilateral, orbicular-reniform, perispores clearly echinate or corrugate on surfaces, exospore smooth. $x = 9$.

About ten species: mainly in mountains of subtropical regions; nine species (seven endemic) in China.

1a. Laminae clearly tapering to bases, i.e., proximal 1 to several pairs of pinnae shortened, proximal one auriculate.
  2a. Proximal 2–5 pairs of pinnae gradually shortened, proximal 1 or 2 pairs of pinnae auriculate, less than 1 cm.
    3a. Plants to more than 100 cm tall; rhizomes short and erect; adaxially with sparse appressed short hairs on intercostal areas, rachises with thick and long acicular hairs and with remaining marks after hairs fallen; sporangia each with 1 or 2 setae near top of annulus ..... 1. *C. auriculata*
    3b. Plants 60–70 cm tall; rhizomes long creeping; adaxially subglabrous on intercostal area, hairs on both sides of rachises leaving tubercular marks after fallen; sporangia glabrous ..... 2. *C. omeiensis*
  2b. Proximal 1–3 pairs of pinnae gradually shortened or abruptly shortened, proximal pair of pinnae not auriculate, 2–4 cm.
    4a. Proximal pair of pinnae abruptly shortened; adaxially subglabrous on intercostal areas; sori dorsiflexed at middle of veinlets, located between costae and margins and not confluent when mature ..... 3. *C. leveillei*
    4b. Proximal 2 or 3 pairs of pinnae gradually shortened; adaxially with sparse appressed short acicular hairs; sori dorsifixed near bases of veinlets and close to costules, ± confluent when mature ..... 4. *C. costularisora*
1b. Laminae not tapering to bases, i.e., proximal pair of pinnae similar in size to distal ones.
  5a. Smaller aerophores not clearly present at bases of pinnae on rachises.
    6a. Rhizomes long creeping or ascending; pinnae with sparse short acicular hairs abaxially, adaxially with dense short acicular hairs along costae; sori dorsifixed below middle of veinlets and slightly close to costules ..... 8. *C. flexilis*
    6b. Rhizomes short and erect; pinnae with dense short acicular hairs abaxially, adaxially with dense short acicular hairs along costae and mixed with few long acicular hairs; sori dorsifixed above middle of veinlets and far from costules ..... 9. *C. tibetica*
  5b. Aerophores linear-lanceolate to triangular-lanceolate at bases of pinnae on rachises.
    7a. Pinnae from middle clearly shortly stalked; sori dorsiflexed at middle or above middle and far from costules ..... 5. *C. maguanensis*
    7b. Pinnae not stalked; sori dorsifixed below middle of veinlets and slightly close to costules.
      8a. Rhizomes short and erect; laminae papery; sporangia usually glabrous; plants 1.3–2.2 m tall ..... 6. *C. neoauriculata*
      8b. Rhizomes long creeping; laminae herbaceous; sporangia each with 1 or 2 short setae; plants less than 1 m tall ..... 7. *C. chunii*

1. Cyclogramma auriculata (J. Smith) Ching, Acta Phytotax. Sin. 8: 317. 1963.

耳羽钩毛蕨 er yu gou mao jue

Phegopteris auriculata J. Smith, Hist. Fil. 4: 233. 1875; *Cyclogramma himalayensis* (C. Christensen) Tagawa; *C. simulans* (Ching) Tagawa; *Cyclosorus auriculatus* (J. Smith) C. M. Kuo; *Dryopteris auriculata* (J. Smith) Ching (1931), not (Lin-

naeus) Kuntze (1891); *D. himalayensis* C. Christensen; *D. squamistipes* (C. B. Clarke) C. Christensen; *Glaphyropteris simulans* (Ching) H. Itô; *Lastrea himalayensis* (C. Christensen) Copeland; *L. simulans* (Ching) Copeland; *Polypodium appendiculatum* Hoffmann var. *squamistipes* C. B. Clarke; *P. auriculatum* (J. Smith) Wallich ex Hooker (1863), not Linnaeus (1753); *P. subvillosum* T. Moore; *Thelypteris auriculata* (J. Smith) K. Iwatsuki; *T. simulans* Ching; *T. squamistipes* (C. B. Clarke) Ching; *T. subvillosa* (T. Moore) Ching.

Plants to more than 1 m tall. Rhizomes short and erect, black, with scales or glabrous when old. Fronds clustered; stipes strong, 10–20(–30) cm, bases black, with grayish white acicular hairs and scales; scales dark brown, oblong-triangular, both surfaces and margins setaceous, distally deep stramineous and to rachises with similar hairs; laminae oblong-lanceolate, (60–) 90–130 × 20–30 cm, gradually tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 30–50 pairs, opposite or distal ones sometimes alternate, spreading, sessile, proximal 3–5 pairs of pinnae gradually shortened, proximal ones auriculate, only ca. 1 cm; middle pinnae linear-lanceolate, 12–20 × 1.5–2.5 cm, bases not tapering, rounded-truncate, pinnatifid to 3/4–4/5 of distance to costae, apices acuminate; segments 20–30 pairs, oblong, 5–10 × 4–6.5 mm, margins entire and sparsely acicular hairy, apices rounded-obtuse. Veinlets visible, simple, 10–12 pairs per segment, proximal pair arising from bases of costules. Laminae herbaceous or subpapery, when dry brownish green, abaxially with dense hooked long hairs along costae and slightly pubescent along costules, elsewhere subglabrous, costae grooved adaxially and with dense long acicular hairs, with sparse appressed short hairs on intercostal areas, abaxial sides of rachises with hairy brown aerophores. Sori orbicular and dorsifixed below middle of veinlets and close to costules, 8–10 pairs per segment; sporangia each with 1 or 2 setae near top. $2n = 144$.

Streamsides in evergreen broad-leaved forests; 1600–2800 m. E Taiwan, Yunnan [Bhutan, N India, Indonesia, Myanmar, Nepal].

2. Cyclogramma omeiensis (Baker) Tagawa, Acta Phytotax. Geobot. 7: 53. 1938.

峨眉钩毛蕨 e mei gou mao jue

Polypodium omeiense Baker, J. Bot. 26: 229. 1888; *Cyclosorus omeiensis* (Baker) C. M. Kuo; *Dryopteris omeiensis* (Baker) C. Christensen; *Glaphyropteris omeiensis* (Baker) H. Itô; *Lastrea omeiensis* (Baker) Copeland; *Leptogramma omeiensis* (Baker) Tagawa; *Nephrodium omeiense* (Baker) Diels; *Thelypteris omeiensis* (Baker) Ching.

Plants 60–70 cm tall. Rhizomes long creeping. Fronds remote; stipes 15–20 cm, subglabrous above bases; laminae oblong-lanceolate, 45–50 × ca. 20 cm, tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 25–28 pairs, alternate, obliquely spreading, sessile, proximal 2 or 3 pairs of pinnae clearly shortened, proximal pair of pinnae only ca. 1 cm or shorter; middle pinnae linear-lanceolate, 9–12 × ca. 2 cm, bases not tapering and rounded-truncate, symmetrical, pinnatifid nearly to costae, apices long acuminate with 1.5–2 cm tail; segments 15–22 pairs, falcate-lanceolate, 7–12 × 3–4 mm, entire, obtuse or acute at apices. Veins evident abaxially, veinlets simple, 11 or 12 pairs per segment, proximal pair arising above base of costules and all reaching margins above sinus. Laminae papery, brownish when dry, abaxially with sparse thick long acicular hairs along costae, slightly shortly hairy along costules, adaxially with dense short acicular hairs along grooves and mixed hooked thick long hairs, with similar hairs along costules; rachises with denser thick long hairs, pinnae with brown aerophores at bases abaxially. Sori small, orbicular, dorsifixed below middle of veinlets and close to costules, 10 or 11 pairs per segment; sporangia glabrous.

● Grassy slopes, streamsides in forests; 900–1700 m. Sichuan, Yunnan.

3. Cyclogramma leveillei (Christ) Ching, Acta Phytotax. Sin. 8: 317. 1963.

狭基钩毛蕨 xia ji gou mao jue

Dryopteris leveillei Christ, Bull. Acad. Int. Géogr. Bot. 20: 176. 1909; *D. izuensis* Kodama; *Leptogramma izuensis* (Kodama) H. Itô; *Thelypteris leveillei* (Christ) C. M. Kuo.

Plants 45–100 cm tall. Rhizomes long creeping, including stipe bases with lanceolate hairy brown thick scales and grayish white acicular hairs. Fronds approximate; stipe 15–45 cm, bases brown, distally stramineous, with sparse short hairs or subglabrous; laminae oblong-lanceolate, 30–55 × 12–20 cm, abruptly tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 12–20 pairs, proximal ones usually opposite, spreading or sometimes reflexed; middle pinnae alternate, obliquely spreading; proximal pair clearly shortened, oblong-lanceolate, 2–4 × 1–1.5 cm, bases clearly tapering, apices shortly caudate-acuminate; second pair and more distal pinnae of similar length or slightly shortened; middle ones 7–13 × 1.5–2 cm, pinnatifid to 3/4 of distance to costae; segments 12–18 pairs, oblong or subelliptic, 6–8 × 4–5 mm, entire, rounded at apices. Veins evident abaxially, veinlets simple, 6–10 pairs per segment, proximal pairs arising above bases of costules and all reaching margins above sinus. Laminae herbaceous, brownish green after drying, abaxially with denser spreading grayish white acicular setae along costae and costules, slightly villous or glabrous on intercostal areas, adaxially with dense short hairs along costal grooves, sparsely shortly hairy along costules and with few long acicular hairs near apices, rachises with dense short acicular hairs on both sides and at intervals mixed with hooked thick long hairs, abaxially with brown aerophores. Sori small, orbicular, dorsifixed at middle of veinlets, 5–7 pairs per segment; sporangia each usually with 2 or 3 setae near top. Perispores irregularly spinulose, exospore smooth.

Humus on rocks in forests; 600–2100 m. Fujian, N Guangdong, Guizhou, Sichuan, Taiwan, Yunnan [Japan].

Cyclogramma leveillei is similar to *C. omeiensis*, both have been treated as one species in the past. However, the former species differs in having only the proximal pair of pinnae shortened, 2–4 cm, never auriculate, adaxial sides with only short acicular hairs along costae, abaxial sides with spreading acicular hairs, and everywhere without hooked hairs; and the sporangia each with 2 or 3 setae near tops. We conclude that it is appropriate to treat the two as distinct species.

4. Cyclogramma costularisora Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 322. 1999.

无量山钩毛蕨 wu liang shan gou mao jue

Plants ca. 65 cm tall. Rhizomes short and thick, decumbent or ascending, including stipe bases with sparse brown ovate-triangular hairy scales and grayish white dense short hairs. Fronds approximate; stipes 25–28 cm, bases blackish brown, distally stramineous, polished and sparsely grayish white shortly hairy; laminae oblong-lanceolate, 35–40 × 10–16 cm, tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 14–20 pairs, alternate or proximal ones subopposite, proximal 2 or 3 pairs of pinnae gradually shortened and reflexed, proximal pair shortest, but similarly shaped, ca. 2 cm; middle pinnae linear-lanceolate, 6.5–9.5 × 1.5–2 cm, bases not tapering, rounded-truncate, pinnatifid to 4/5 of distance to costae, apices caudate or entire; segments ca. 14 pairs, oblong, 6–8 × 3–3.5 mm, entire along margins and ± recurved proximally, rounded at apices. Veins evident, veinlets simple, ca. 8 pairs per segment, proximal pair arising from base of costules and all reaching margins above sinus. Laminae herbaceous, glabrous or brownish green, abaxially including costae and costules with dense short acicular hairs, adaxially with dense short hairs along costal grooves and with sparse long acicular hairs along costules, with sparse appressed short hairs on intercostal areas, rachises with dense short acicular hairs and sparse long acicular hairs, abaxially with brown aerophores. Sori orbicular, attached near bases of veinlets and extremely close to costules, 6 or 7 pairs per segment and confluent when mature. Sporangia each with 1 or 2 setae at tops.

● Shaded wet streamsides in forests; ca. 2400 m. SW Yunnan (Jingdong).

5. Cyclogramma maguanensis Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 322. 1999.

马关钩毛蕨 ma guan gou mao jue

Plants ca. 80 cm tall. Rhizomes creeping. Fronds approximate; stipes ca. 37 cm, bases blackish brown, with dense grayish white short hairs and occasionally with brown hairy thick small scales, distally stramineous, with sparse acicular hairs or subglabrous when old; laminae lanceolate, ca. 43 × 25 cm, not tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae ca. 12 pairs, alternate, or several proximal pairs opposite or subopposite, pinnae below middle 1–3 mm stalked, lanceolate, 12–14 × 2.5–3 cm, subtruncate at bases, pinnatifid to 4/5 of distance to costae, long acuminate at apices; segments ca. 20 pairs, oblong, 8–12 × 5–6 mm, entire along margins and slightly recurved when dry, rounded-obtuse at apices. Veins evident abaxially, veinlets simple, ca. 12 pairs per segment, proximal pair arising from above base of costules and all reaching margins above sinus. Laminae herbaceous, when dry dark green abaxially, with grayish white acicular hairs along costae and veins, adaxially yellowish green, with dense appressed short acicular hairs along costal grooves, with dense hooked hairs on both sides of rachises, abaxially with brown triangular-lanceolate aerophores. Sori orbicular, dorsifixed at middle or above middle of veinlets, slightly above costules, 7–9 pairs per segment; sporangia each with 2–4 setae near annuli, setae hooked.

● Shaded wet places in forests on slopes; ca. 1000 m. SE Yunnan.

6. Cyclogramma neoauriculata (Ching) Tagawa, Acta Phytotax. Geobot. 7: 53. 1938.

滇东钩毛蕨 dian dong gou mao jue

Dryopteris neoauriculata Ching, Bull. Fan Mem. Inst. Biol. 2: 196. 1931; *Thelypteris neoauriculata* (Ching) Ching.

Plants 1.3–2.2 m tall. Rhizomes thick and short, erect. Fronds clustered; stipes 70–120 cm, bases brown, with deep brown triangular-lanceolate shortly hairy scales and glaucous short acicular hairs, distally dark stramineous, distally with grayish white hooked long hairs, rachises similarly hairy; laminae narrowly oblong, 60–100 cm or more, 25–40 cm wide, bases not tapering, pinnate-pinnatifid, apices acuminate and pinnatifid; pinnae 25–30 pairs, distal ones alternate, proximal ones subopposite, spreading, linear-lanceolate, 15–20 × 3–3.5 cm, broadly cuneate at bases, pinnatifid nearly to costae, caudate-acuminate at apices; segments ca. 23 pairs, spreading, middle ones oblong-lanceolate, 11–14 mm (proximal 1 or 2 pairs slightly shortened), 5–6 mm wide, entire, rounded-obtuse at apices. Veinlets evident abaxially, simple, 10–15 pairs per segment, proximal pair arising from slightly higher above base of costules and all reaching margins above sinuses. Laminae papery, brownish green when dry, subglabrous on both surfaces or with sparse short acicular hairs abaxially, rachises grooved adaxially, with dense hooked long hairs on both sides, abaxially with occasional small brown lanceolate scales, pinna bases abaxially with brown linear-lanceolate aerophores. Sori orbicular, smaller, attached below middle of veinlets and close to costules, 7–12 pairs per segment; sporangia glabrous.

● Open forests on mountain slopes; ca. 1800 m. Yunnan.

7. Cyclogramma chunii (Ching) Tagawa, Acta Phytotax. Geobot. 7: 55. 1938.

焕镛钩毛蕨 huan yong gou mao jue

Thelypteris chunii Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 284. 1936.

Plants 70–105 cm tall. Rhizomes strong, long creeping, nearly black, including stipe bases with brown triangular-lanceolate scales and grayish white short hairs. Fronds subapproximate; stipes 30–50 cm, bases dark brown, distally stramineous, subglabrous; laminae oblong-lanceolate, 40–55 × 20–25 cm, pinnae not deflexed at bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae 12–18 pairs, alternate, obliquely spreading, or proximal ones opposite, spreading, sessile, linear-lanceolate, 10–15 × 2–3 cm, bases slightly tapering, rounded-truncate, pinnatifid to 3/4 of distance to costae, apices shortly caudate-acuminate; segments 16–20 pairs, oblong-lanceolate, 8–12 × 4–7 mm, entire, rounded-obtuse at apices. Veins not evident, veinlets simple, 10–11 pairs per segment, proximal pair arising from slightly higher above base of costules, or basiscopic veinlets arising from base of costules and all reaching margins above sinuses. Laminae thinly herbaceous, when dry

brownish green, abaxially with acicular short hairs along costae and costules, adaxially with short hairs along costal grooves, rachises with dense hooked hairs, pinna bases abaxially with deep brown, linear-lanceolate or linear-bent aerophores. Sori small, orbicular, attached below middle of veinlets and slightly close to costules, 7–10 pairs per segment; sporangia each with 1 or 2 short setae near top of annuli.

● On rocks in forests in mountain valleys. SW Guangdong (Xinyi).

8. Cyclogramma flexilis (Christ) Tagawa, Acta Phytotax. Geobot. 7: 55. 1938.

小叶钩毛蕨 xiao ye gou mao jue

Aspidium flexile Christ, Bull. Acad. Int. Géogr. Bot. 11: 252. 1902; *A. melanorhizum* Christ (1901), not Desvaux (1827); *Dryopteris flexilis* (Christ) C. Christensen; *D. omeiensis* (Baker) C. Christensen var. *flexilis* (Christ) C. Christensen; *D. subthelypteris* Christ ex C. Christensen; *Thelypteris flexilis* (Christ) Ching.

Plants 30–60 cm tall. Rhizomes long creeping or ascending, black, with sparse black-brown hairy lanceolate scales. Fronds approximate; stipes 10–30 cm, bases black, with sparse blackish brown triangular-lanceolate scales and dense glaucous short acicular hairs, distally stramineous and subglabrous; laminae narrowly lanceolate, 20–30(–40) × 6–10(–14) cm, not tapering to bases, pinnate-pinnatifid, caudate and long acuminate and pinnatifid at apices; pinnae 12–20 pairs, alternate or proximal ones opposite, obliquely spreading, sessile; proximal ones linear-lanceolate, 3.5–8 × 0.8–2.5 cm, bases symmetrical, rounded-truncate, pinnatifid and reaching narrow wings of both sides, apices shortly caudate-acuminate; segments 7–13(–15) pairs, oblong, 4–12 × 2–4 mm, margins entire, apices rounded-obtuse. Veins evident abaxially, veinlets simple, 4–9 pairs per segment, proximal pair arising from above base of costules and all reaching margins above sinuses. Laminae papery, when dry dark green, abaxially with glaucous short hairs, hairs along costae and costules dense and mixed with few acicular long hairs, adaxially with dense short acicular hairs along costal grooves, rachises with dense short acicular hairs on both sides, abaxial sides mixed with few thick and long acicular hairs and with smaller brownish tuberculate aerophores. Sori small, orbicular, attached below middle of veinlets and slightly closer to costules, 4–6 pairs per segment; sporangia each with 1 or 2(or 3) short setae near tops.

● Forests on limestone; 300–1400 m. Guizhou, Sichuan.

9. Cyclogramma tibetica Ching & S. K. Wu, Fl. Xizang. 1: 157. 1983.

西藏钩毛蕨 xi zang gou mao jue

Plants ca. 75 cm tall. Rhizomes short and erect, including stipe bases with sparse scales and short hairs. Fronds clustered; stipes ca. 30 cm, dark brown proximally, distally to rachises brownish stramineous, shortly hairy distally; laminae lanceolate, ca. 45 × 18 cm, nearly tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae ca. 20 pairs, above middle alternate, spreading or proximal ones subopposite, reflexed, sessile, linear-lanceolate, 8–9.5 × 1.4–1.7 cm, nearly flat-truncate and slightly narrowed at base, pinnatifid nearly to costae, acuminate or caudate at apices; segments ca. 20 pairs, oblong, entire along margins. Veins evident abaxially, veinlets simple, 8 or 9 pairs per segment, proximal pair arising from base of costules and all reaching margins above sinuses. Laminae papery, when dry dark green abaxially, adaxially somewhat brown, both surfaces including rachises with dense short acicular hairs and few thick and long acicular hairs. Sori orbicular, dorsifixed slightly above middle of veinlets; sporangia each with 1(sometimes 2) hooked hairs near top.

● Broad-leaved forests; ca. 1500 m. SE Xizang (Mêdog).

10. LEPTOGRAMMA J. Smith, J. Bot. (Hooker) 4: 51. 1841.

茯蕨属 fu jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Plants medium-sized, terrestrial. Rhizomes short and erect or ascending, with sparse scales; scales ovate-oblong or lanceolate, reddish brown, hairy. Fronds clustered; stipes deep stramineous, with sparse scales proximally, throughout with grayish white, mostly unicellular acicular long hairs and unicellular short setae; laminae oblong, hastate, or lanceolate, pinnate-pinnatifid; pinnae 7 or 8 pairs (or more), oblique or spreading, lanceolate, bases rounded or truncate, symmetrical, usually sessile, apices obtuse or acuminate; proximal 1 or 2 pairs or several pairs of pinnae free, distally ± adnate to rachises, proximal pair not or slightly shortened, sometimes prolonged, costae grooved adaxially, pinnae pinnatifid and usually reaching 1/2–2/3 of distance to costae; segments orbicular or oblong, entire and rounded at apices. Veinlets free, 3–6 pairs per segment, not forked, reaching margins, rarely reaching sinus. Laminae herbaceous or papery, when dry dark brown or brownish green, usually with acicular hairs or short setae on both surfaces, or with both mixed. Sori elongate, borne along veinlets, length slightly shorter than veinlets, exindusiate; sporangia each with 2–6 erect setae at top; spores bilateral, reniform, echinate on surfaces. $x = 36$.

About 15 species: tropical and subtropical areas of Asia, west to Africa; nine species (six endemic) in China.

"Leptogramma intermedia" (Ching in C. F. Zhang, Fl. Zhejiang 1: 154. 1993) was not validly published because no Latin description or diagnosis, or reference to such, was provided (*Melbourne Code*, Art. 39.1). It does not appear to represent a distinct species.

1a. Proximal pair of pinnae longer than distal ones, hence laminae hastate ..... 1. *L. tottoides*
1b. Proximal pair of pinnae similar length as distal ones or slightly shorter, laminae not hastate.
2a. Proximal free pinnae with short stalks.

3a. Laminae not tapering to bases; free pinnae 5 pairs; sporangia each with 3 or 4 setae near top ..... 2. *L. scallanii*
3b. Laminae slightly tapering to bases; free pinnae 9 pairs; sporangia each with 1 or 2 setae near top ..... 3. *L. pozoi*
2b. All pinnae sessile.
4a. Stipes dark brown; laminae somewhat leathery and brown when dry; free pinnae 7–9 pairs ..... 4. *L. huishuiensis*
4b. Stipes stramineous or deep stramineous; laminae herbaceous and greenish to deep green when dry (rarely dark brown); free pinnae 1–7 pairs.
5a. Laminae dark brown when dry; pinnae without hairs on intercostal areas ..... 5. *L. yahanensis*
5b. Laminae greenish to deep green when dry, with hairs on intercostal areas.
6a. Rhizomes ascending; laminae yellowish green when dry ..... 6. *L. jinfoshanensis*
6b. Rhizomes erect; laminae greenish to deep green when dry.
7a. Laminae greenish when dry; sporangia subglabrous near tops ..... 7. *L. centrochinensis*
7b. Laminae deep green when dry; sporangia each with 2–4 setae near top.
8a. Pinnae with sparse acicular hairs adaxially, abaxially pubescent throughout ..... 8. *L. himalaica*
8b. Pinnae with dense acicular hairs on both surfaces ..... 9. *L. sinica*

1. Leptogramma tottoides H. Itô, Bot. Mag. (Tokyo) 49: 434. 1935.

小叶茯蕨 xiao ye fu jue

Cyclosorus tottoides (H. Itô) C. M. Kuo; *Leptogramma caudata* Ching; *L. totta* (Schlechtendahl) J. Smith var. *tottoides* (H. Itô) H. Itô; *Stegnogramma tottoides* (H. Itô) K. Iwatsuki; *Thelypteris caudata* (Ching) C. F. Reed.

Plants 17–32 cm tall. Rhizomes short and erect, including stipe bases with sparse reddish brown broadly lanceolate scales and grayish white acicular hairs. Fronds clustered; stipes 10–17 cm, slender, dark stramineous, throughout with sparse unicellular acicular long hairs; laminae 1-pinnate, hastate-lanceolate, 14–20 × 4–6 cm, bases hastate and broadest, apices acuminate; pinnae 16–20 pairs, subopposite and spreading, subsessile, proximal 2 or 3 pairs free, distal ones ± adnate to rachises, proximal pair largest, spreading, oblong-lanceolate, 2–3 × ca. 1 cm, truncate and symmetrical at bases, pinnatifid to 1/2 distance to costae, obtuse or shortly acute at apices; segments 4–6 pairs, ovate-orbicular, entire; second pair of pinnae abruptly shortened, 1.5–2 cm, of similar shape as proximal pair, middle pairs of pinnae of similar size and shape, bases adnate to rachises but free from each other, distal pinnae slightly shorter than middle ones, bases connected to each other by broad wings, entire or crenate proximally. Veinlets evident, 3 or 4 pairs per segment, simple, proximal pair arising from far above base of costules and acroscopic one reaching sinus or margins of sinus, basiscopic one reaching margin far above sinus. Laminae thinly herbaceous, dark brown when dry, pinnae throughout with acicular hairs adaxially, abaxially including rachises with spreading grayish white acicular fine hairs, veins sparsely puberulent. Sori linear, usually attached on proximal half on proximal pair of veinlets; sporangia each with 3 or 4 setae near top.

● On rocks in forests; 800–2500 m. Fujian, Guizhou, Jiangxi, Taiwan, Zhejiang.

2. Leptogramma scallanii (Christ) Ching, Sinensia 7: 101. 1936.

峨眉茯蕨 e mei fu jue

Asplenium scallanii Christ, Boll. Soc. Bot. Ital. 1901: 296. 1901; *Dryopteris scallanii* (Christ) C. Christensen; *Stegnogramma scallanii* (Christ) K. Iwatsuki.

Plants 20–30 cm tall. Rhizomes short and erect, including proximal parts of stipes with sparse reddish brown lanceolate, hairy scales and dense acicular hairs. Fronds clustered; stipes 5–10 cm, dark stramineous, with dense acicular long hairs distally; laminae 1-pinnate, oblong, 14–20 × 5–7 cm, bases not tapering, apices acuminate and pinnatifid; pinnae 10–14 pairs, alternate, proximal 3–5 pairs shortly stalked, similar in size to distal ones; middle pinnae lanceolate, 2.5–4 × 0.7–1 cm, bases subtruncate, symmetrical, pinnatifid to 1/3–1/2 of distance to costae, apices acuminate or shortly acuminate; segments ca. 10 pairs, ovate-orbicular, entire, separated from each other by obtriangular sinuses. Veins evident, 4 or 5 pairs of veinlets per segment, proximal pair arising from above base of costules, acroscopic veinlet reaching sinuses. Laminae papery, when dry brownish green, adaxially with 1 or 2 acicular hairs along costae and veinlets, abaxially with sparse acicular thick hairs along costae and costules. Sori oblong or linear, attached on abaxial sides along veinlets, 1 or 2 pairs per segment. Sporangia each with 2 or 3 setae near top.

Wet places in forests, on rocks in ravines; 400–1400 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang [N Vietnam].

3. Leptogramma pozoi (Lagasca) Heywood, Repert. Spec. Nov. Regni Veg. 64: 19. 1961.

毛叶茯蕨 mao ye fu jue

Hemionitis pozoi Lagasca, Nov. Gen. Pl. 33. 1816; *Cyclosorus pozoi* (Lagasca) C. M. Kuo; *Gymnogramma totta* Schlechtendahl; *G. totta* var. *mollissima* Kunze; *Lastrea africana* (Desvaux) Ching; *Leptogramma africana* (Desvaux) Nakai ex Mori; *L. mollissima* (Kunze) Ching; *L. pozoi* subsp. *mollissima* (Kunze) Nakaike; *L. totta* (Schlechtendahl) J. Smith; *Polypodium africanum* Desvaux; *P. totta* Willdenow (1810), not Thunberg (1800); *Stegnogramma mollissima* (Kunze) Fraser-Jenkins; *S. pozoi* (Lagasca) K. Iwatsuki; *Thelypteris mollissima* (Kunze) Thapa; *T. pozoi* (Lagasca) C. V. Morton.

Plants 35–45 cm tall. Rhizomes short and erect, with brown lanceolate hairy scales. Fronds clustered; stipes ca. 13 cm, stramineous, bases with brown scales, distally with grayish white acicular hairs; laminae lanceolate, 20–28 × 10–13 cm, slightly tapering proximally, pinnate-pinnatifid, pinnate-acuminate at apices; lateral free pinnae 9 pairs, proximal pinnae

shortly stalked, proximal pair of similar shape and size and reflexed; middle pinnae lanceolate, ca. 6 × 1.5 cm, bases truncate, pinnatifid to 1/2 of distance to costae, apices long caudate; segments rectangular, entire, obtuse-rounded at apices. Veinlets evident, simple, basiscopic vein of proximal pair arising from costae, acroscopic vein arising from base of costules and reaching margin. Laminae herbaceous, deep green when dry, costae and veins with acicular hairs, also with acicular short hairs on intercostal areas of both surfaces. Sori narrowly ovate, attached on middle or proximal parts of veinlets and slightly closer to bases. Sporangia each with 1 or 2 setae near annuli. 2*n* = 144.

Lower mountain areas; 300–600 m. SE Taiwan (Lan Yu) [S India, Indonesia, Japan, Sri Lanka; Africa].

Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 195. 2008) believes *Thelypteris mollissima* is a strictly Asian taxon that should be separated from the Macronesian and African *T. pozoi*. This is not accepted here.

4. Leptogramma huishuiensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 323. 1999.

惠水茯蕨 hui shui fu jue

Plants to 33 cm tall. Rhizomes not seen. Stipes 10–13 cm, dark brown, bases with sparse brown lanceolate scales, distally with dense grayish white acicular long hairs; laminae lanceolate, 12–25 × 5–10 cm, slightly tapering to bases, pinnate-pinnatifid, pinnatifid-acuminate at apices; lateral free pinnae 7–9 pairs, sessile, distal pinnae adnate to rachises, proximal pair of similar shape and size as distal ones; middle pinnae lanceolate, ca. 5 cm, truncate at bases, pinnatifid to 1/2 of distance to costae, acuminate at apices; segments ca. 12 pairs per pinna, oblong, entire, separated from each other by obtriangular sinuses, obtuse at apices. Laminae somewhat leathery, when dry dark brown, rachises, costae, and veinlets with dense acicular hairs abaxially, adaxial sides with short setae, abaxially with sparse short setae on intercostal areas. Sori narrowly ovate, attached on middle to proximal parts along veinlets. Sporangia each with more than 3 setae near top.

● Guizhou (Huishui).

5. Leptogramma yahanensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 324. 1999.

雅安茯蕨 ya an fu jue

Plants to 18 cm tall. Rhizomes short and erect, including stipe bases with sparse reddish brown lanceolate, hairy scales and acicular hairs. Stipes 5–6 cm, throughout with acicular hairs; laminae broadly lanceolate, 10–12 × ca. 4 cm, not tapering to bases, 1-pinnate, acuminate at apices; pinnae ca. 10 pairs, alternate except for proximal pair, others ± adnate to rachises; middle pinnae lanceolate and slightly falcate, 2–2.5 × 0.7–0.8 cm, undulate or crenate, shortly acuminate at apices. Veins evident, veinlets 2 pairs per group, proximal pair arising from far above base of costules, acroscopic veinlet reaching sinus. Laminae herbaceous, when dry dark brown, adaxially subglabrous except with sparse, short hairs along costae, abaxially with spreading acicular long hairs along costae and costules. Sori linear, attached on middle on acroscopic veinlet of each group. Sporangia each with 2 or 3 setae near top.

● On rocks in forests; ca. 1000 m. SW Sichuan (Ya'an).

6. Leptogramma jinfoshanensis Ching & Z. Y. Liu, Bull. Bot. Res., Harbin 4(3): 17. 1984.

金佛山茯蕨 jin fo shan fu jue

Plants 30–35 cm tall. Rhizomes ascending. Fronds clustered; stipes ca. 22 cm, stramineous, with dense grayish white lanceolate acicular hairs; laminae lanceolate, ca. 30 × 8–18 cm, 1-pinnate, pinnatifid-acuminate at apices; free-pinnae 3–7 pairs, sessile, truncate, proximal pair of similar shape and size as distal ones, bases slightly tapering, apices caudate; middle pinnae lanceolate, 7–8 × ca. 1.5 cm, truncate at bases, pinnatifid to 1/2–2/3 of distance to costae, long caudate at apices; segments rectangular, with acicular hairs on intercostal areas of both surfaces, with dense acicular setae along rachises and veins, entire, rounded at apices. Veins evident, veinlets reaching margins above sinuses, 4 or 5 pairs per segment. Laminae herbaceous, when dry yellowish green, all with acicular hairs on both surfaces. Sori ovate, attached near bases of veinlets. Sporangia each with 2–4 acicular hairs near top.

● On wet rocks in broad-leaved forests; ca. 1800 m. Chongqing (Nanchuan).

7. Leptogramma centrochinensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 323. 1999.

华中茯蕨 hua zhong fu jue

Plants 30–35 cm tall. Rhizomes short and erect, including stipe bases with sparse broadly lanceolate hairy scales and acicular short hairs. Fronds clustered; stipes 8–14 cm, deep stramineous, above bases with dense short hairs and mixed with few acicular long hairs; laminae lanceolate, 18–24 × ca. 6 cm, 1-pinnate, acuminate at apices; pinnae 14–16 pairs, alternate, spreading, sessile, proximal pair not shortened and of similar shape and size as distal ones, proximal 2 pairs free, distal ones ± adnate to rachises; middle ones broadly lanceolate, 3–3.5 × ca. 1 cm, bases truncate, symmetrical (proximal pair of pinnae slightly broad and basal basiscopic one cuneate), pinnatifid to 1/2 of distance to costae, apices shortly acuminate; segments 7 or 8 pairs, broadly ovate, entire, separated by obtriangular sinuses. Veins evident, (3 or)4 pairs of veinlets per segment, proximal pair (basiscopic veinlet) arising from bases of costae and all reaching margins above sinuses. Laminae herbaceous, when dry greenish, adaxially throughout with appressed acicular hairs, abaxially pubescent along costae and costules and with acicular short hairs along rachises. Sori orbicular or oblong, attached on middle of veinlets. Sporangia subglabrous.

● Wet places in open forests. W Hubei.

8. Leptogramma himalaica Ching, Sinensia 7: 100. 1936.

喜马拉雅茯蕨 xi ma la ya fu jue

Leptogramma yunnanensis Ching; *Stegnogramma himalaica* (Ching) K. Iwatsuki; *Thelypteris himalaica* (Ching) C. F. Reed.

Plants 30–35 cm tall. Rhizomes short and erect. Fronds clustered; stipes to 20 cm, grayish stramineous proximally, densely pubescent and with 1 or 2 reddish brown lanceolate hairy scales, distally stramineous, polished and subglabrous; laminae lanceolate, 22–26 × 6.5–8 cm, not tapering to bases, 1-pinnate, acuminate at apices; pinnae 12–16 pairs, opposite, distal ones alternate, sessile, proximal 2 or 3 pairs free, distal ones ± adnate to rachises; middle pinnae lanceolate, 3–3.5 × ca. 1 cm, bases truncate, symmetrical, pinnatifid to 1/3 of distance to costae, apices shortly pointed or acute; segments 6–8 pairs, ovate, separated by obtriangular sinuses. Veins evident, 3 pairs per segment, proximal pair arising above base of costules and all reaching sinuses. Laminae herbaceous, when dry dark green, pinnae with sparse acicular hairs adaxially, abaxially pubescent throughout. Sori linear, attached on middle of veinlets. Sporangia each with 3 or 4 setae near top.

Shaded places by rocks or slopes; 2100–2500 m. Xizang, NW Yunnan [N India].

9. Leptogramma sinica Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 323. 1999.

中华茯蕨 zhong hua fu jue

Plants 16–23 cm tall. Rhizomes short and erect, including stipe bases with sparse reddish brown ovate-lanceolate hairy scales and grayish white unicellular acicular long hairs. Fronds clustered; stipes 5–7 cm, slender, deep stramineous; laminae oblong-ovate, 11–16 × 5–7 cm, not tapering to bases, 1-pinnate, apices pinnatifid-acuminate; pinnae 7–14 pairs, alternate, proximal pair not shortened, sessile, second pair and more distal pairs ± adnate to rachis; middle pinnae broadly lanceolate, 2.6–4 × ca. 1 cm, acroscopic bases truncate, basiscopic bases rounded, pinnatifid to 1/2 distance to costae, apices shortly acuminate; segments 7–11 pairs, oblong, entire, separated by obtriangular-sinuses. Veins evident, 4 or 5 pairs per segments, proximal pair arising above base of costules, acroscopic vein reaching sinuses. Laminae herbaceous, when dry dark green, both surfaces with dense acicular hairs on intercostal areas, except with acicular hairs along costae and veins. Sori linear, attached along veinlets, 2 or 3 pairs per segment, free from each other. Sporangia each with 2 or 3 setae near top.

● In shade and on wet rocks in forested ravines; ca. 800 m. Guizhou, Hunan.

11. GLAPHYROPTERIDOPSIS Ching, Acta Phytotax. Sin. 8: 320. 1963.

方杆蕨属 fang gan jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Plants medium-sized to large, terrestrial, ± with acicular hairs. Rhizomes short and thick, decumbent or ascending, sessile, with sparse scales. Fronds clustered or approximate; stipes strong, with sparse brown lanceolate scales at bases; laminae elliptic, not tapering to bases, pinnate-pinnatifid; pinnae large, linear-lanceolate, sessile, free, opposite or subopposite, pinnatifid nearly to costae; rachises rectangular abaxially, flat, glabrous or with sparse short hairs, when dry reddish, costae grooved adaxially and densely hairy abaxially; segments large, falcate-lanceolate. Veins free, pinnate on segments, veinlets simple, prominent and reaching margins, proximal pair only reaching nearby line of transparent membrane below sinus or to margins above sinuses. Laminae herbaceous, papery or leathery, when dry yellowish green, rachises and costae ± with grayish white long hairs on both sides, not glandular. Sori orbicular, attached at bases of veinlets, in a row on each side close to costules, usually confluent into a line when mature, exindusiate or indusiate. Sporangia usually with acicular hairs near tops. Spores elliptic, bilateral, irregularly echinate or small tuberculate on surfaces. $x = 12(36)$.

Twelve species: Bhutan, China, N India, S Japan, N Myanmar, Nepal, Philippines, N Vietnam; 11 species (ten endemic) in China.

1a. Sori exindusiate.
  2a. Sporangia glabrous ..... 1. *G. erubescens*
  2b. Sporangia bearing hairs ..... 2. *G. sichuanensis*
1b. Sori indusiate.
  3a. Sori obviously indusiate.
    4a. Indusia glabrous ..... 8. *G. jinfushanensis*
    4b. Indusia with acicular hairs.
      5a. Rachises, costae, veins, and intercostal areas all glabrous abaxially ..... 9. *G. glabrata*
      5b. Rachises, costae, veins, and intercostal areas abaxially all with dense acicular hairs.
        6a. Laminae glabrous adaxially on intercostal area, sporangia glabrous ..... 10. *G. villosa*
        6b. Laminae adaxially with short setae on intercostal area, sporangia bearing dense acicular hairs ..... 11. *G. rufostraminea*
  3b. Sori with small scale-shaped indusia, usually obscured by mature sporangia and not easily seen.
    7a. Sporangia glabrous.
      8a. Plants over 1 m tall; proximal pair of veins from adjacent segments reaching bottom of sinuses ..... 3. *G. mollis*
      8b. Plants normally 50–60 cm tall; proximal pair of lateral veins on segments reaching margins above sinuses ..... 4. *G. emeiensis*
    7b. Sporangia bearing hairs.
      9a. Proximal pair of veinlets on segments reaching both sides of bottom of sinuses; rachises, veins, and intercostal areas glabrous ..... 5. *G. eriocarpa*

9b. Proximal pair of veinlets on segments reaching margins above sinuses; rachises, veins, and intercostal areas ± with short setae or acicular hairs.
10a. Rachises, costae, and veins all with dense long acicular hairs, laminae only with short setae abaxially, glabrous on intercostal areas; Sichuan ..... 6. *G. splendens*
10b. Rachises with sparse short setae abaxially, costae and veins with sparse long setae, laminae with sparse setae on veins and intercostal areas; Yunnan ..... 7. *G. pallida*

1. Glaphyropteridopsis erubescens (Wallich ex Hooker) Ching, Acta Phytotax. Sin. 8: 320. 1963.

方杆蕨 fang gan jue

Polypodium erubescens Wallich ex Hooker, Sp. Fil. 4: 236. 1862; *Asplenium distans* D. Don var. *cadieri* Christ; *Cyclosorus erubescens* (Wallich ex Hooker) C. M. Kuo; *Dryopteris braineoides* (Baker) C. Christensen; *D. erubescens* (Wallich ex Hooker) C. Christensen; *D. reflexa* Ching; *Glaphyropteris erubescens* (Wallich ex Hooker) Fée; *Lastrea erubescens* (Wallich ex Hooker) Copeland; *Nephrodium braineoides* (Baker) Diels; *N. erubescens* (Wallich ex Hooker) Diels; *Phegopteris erubescens* (Wallich ex Hooker) J. Smith; *Polypodium braineoides* Baker; *Thelypteris erubescens* (Wallich ex Hooker) Ching.

Plants 2–3 m tall or more. Rhizomes stout, decumbent, woody and glabrous. Fronds clustered; stipes 1–2 m, thicker than 1 cm, ribbed, throughout glabrous, stramineous and often reddish; laminae 100–200 × 25–50 cm, not tapering to bases, pinnate-pinnatifid or subbipinnate, acuminate and pinnatifid at apices; pinnae 40–50 pairs per frond, opposite, sessile, proximal several pairs strongly oblique distally, bases tapering; middle pinnae spreading, linear, (10–)20–30 or more × (1.5–)2.5–4 cm, bases truncate and close to costae, pinnatifid nearly to both lateral narrow wings of costae, apices acuminate; segments many (ca. 50 pairs), pectinately arranged, spreading, linear-lanceolate, slightly falcate, 1.4–2 × ca. 0.4 cm, slightly broadened to bases, entire, separated by narrow sinuses, pointed at apices. Veins evident, costae grooved adaxially, pubescent, abaxially rounded and raised, glabrous or sometimes sparsely hairy, veinlets 12–23 pairs per segment, simple, proximal pair arising from base of costules and reaching both sides of rounded sinuses. Laminae papery, when dry greenish or yellowish green, pinnae glabrous adaxially, with 1 or 2 acicular hairs along margins, or sparsely hairy abaxially; rachises rectangular abaxially, flat, stramineous or reddish, with grayish white acicular hairs when young and then deciduous. Sori orbicular, 10–15 pairs per segment, attached at bases of veinlets, close to both sides of costules and in 1 row on each side, confluent into lines when mature, exindusiate. Sporangia glabrous.

Forests in ravines of low mountains; 800–2000 m. Guizhou, Sichuan, Taiwan, Yunnan [Bhutan, N India, S Japan, Kashmir, N Myanmar, Nepal, Pakistan, Philippines, N Vietnam].

"Glaphyropteridopsis erubescens var. *mollis"* (Ching, Vasc. Pl. Hengduan Mount. 1: 97. 1993) was not validly published because no Latin description or diagnosis, or reference to such, was provided and no type was indicated (*Melbourne Code*, Art. 39.1 and 40.1). The name *"Christella erubescens"* (H. Léveillé, Fl. Kouy-Tchéou, 474–476. 1915) belongs here but is a nomen nudum and was not therefore validly published (Art. 38.1(a)).

Thelypteris ×*erubesquirolica* W. C. Shieh & J. L. Tsai (J. Sci. Engin. 24: 7. 1987), described from Taiwan (Nantou), appears to be a presumed hybrid between *Glaphyropteridopsis erubescens* and *Pseudocyclosorus esquirolii*.

2. Glaphyropteridopsis sichuanensis Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 324, 131. 1999 [*"sichanensis,"* p. 324].

四川方杆蕨 si chuan fang gan jue

Plants to 1.2 m tall. Rhizomes strong, creeping, dark brown, woody, hard. Fronds approximate; stipes ca. 60 cm, dark brown, with brown lanceolate scales, distally stramineous, glabrous; laminae broadly lanceolate, ca. 60 × 30 cm, slightly tapering to bases, pinnate-pinnatifid, pinnatifid-acuminate at apices; lateral free pinnae to 25 pairs, proximal ones subopposite, distal ones alternate, sessile, spreading; middle pinnae oblong-lanceolate, ca. 17 × 1.5 cm, flatly truncate at bases, pinnatifid nearly to costae, pinnatifid-acuminate at apices; segments ca. 40 pairs, lanceolate, ca. 1 × 0.4 cm, entire, separated by small interval, apices slightly bent distally and acute; proximal pair extremely elongated, acroscopic one to 2 cm. Veins evident, raised abaxially, proximal pair of veinlets arising from base of costules, acroscopic veins reaching bottom of sinuses, basiscopic one reaching margin above sinus, 15 or 16 pairs of veinlets per segment. Laminae papery, when dry brownish, with acicular long hairs on intercostal areas abaxially, glabrous on intercostal areas adaxially, setose along margins; rachises with sparse acicular hairs abaxially, costae and veins with dense long acicular hairs, with dense acicular setae along both sides of grooves of rachises and costae, with sparse appressed short setae along both sides of longitudinal grooves adaxially of costae, abaxial sides of veins subglabrous. Sori orbicular, attached at bases of veinlets and close to costules, 8–12 pairs per segment, exindusiate. Sporangia bearing fine acicular hairs.

● Sichuan.

3. Glaphyropteridopsis mollis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 324. 1999.

柔弱方杆蕨 rou ruo fang gan jue

Plants ca. 1.5 m tall. Rhizomes creeping, thick, ca. 1.5 cm, dark brown, woody and hard. Fronds approximate; stipes ca. 80 cm, dark brown, distally deep stramineous and glabrous; laminae broadly lanceolate, ca. 62 × 38 cm, pinnatifid-acuminate at apices; proximal pinnae nearly not shortened, pinnate-pinnatifid; free pinnae ca. 31 pairs, opposite, spreading, sessile; middle pinnae lanceolate, ca. 20 × 2.5 cm, pinnatifid and subcuneate at bases, pinnatifid and long acuminate at apices; segments ca. 31 pairs, lanceolate, ca. 12 × 4–4.5 mm, entire, acute at apices; proximal pair extremely elongated to 2 cm. Veins visible on both sides, costae raised abaxially, adaxially impressed, 15–17 pairs of veinlets per segment, proximal pair arising from base of costules and all reaching bottom of sinuses. Laminae dark brown when dry, abaxially with acicular hairs along rachises,

costae, veins, and intercostal areas, adaxially with dense short setae only along costae and elsewhere glabrous. Sori orbicular and attached at bases of veinlets and close to costules; indusia small, bearing hairs. Sporangia glabrous.

● Broad-leaved forests; 800–900 m. Sichuan (Emei Shan).

4. Glaphyropteridopsis emeiensis Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 324. 1999.

峨眉方杆蕨 e mei fang gan jue

Plants ca. 80 cm tall. Rhizomes not seen. Stipes ca. 40 cm, stramineous, glabrous; laminae lanceolate, ca. 70 × 20–25 cm, pinnate-pinnatifid, pinnatifid-acuminate at apices; lateral free pinnae ca. 25 pairs, obliquely spreading, proximal ones subopposite, distal ones alternate, subsessile; middle pinnae lanceolate, ca. 13 × 1.7 cm, truncate at bases, pinnatifid, pinnatifid-acuminate at apices; segments ca. 30 pairs, ca. 3 mm wide, entire, obtuse-pointed at apices; proximal pair (particularly acroscopic one) extremely elongated. Veins visible on both sides, adaxially impressed, costules raised abaxially, veinlets 12 pairs per pinna, proximal pair arising from closely above base of costules and all reaching margins above sinuses. Laminae dark green or green when dry, papery, rachises, costae, veins, and abaxial sides of intercostal areas all with dense acicular hairs, adaxially with dense short hairs along grooves of costae, veins, intercostal areas, and margins with short setae. Sori orbicular and attached on proximal parts of veinlets, close to costules, indusiate and hairy. Sporangia hairy.

● Mixed forests at roadsides, rock crevices by streams; 1800–1900 m. Sichuan (Emei Shan).

5. Glaphyropteridopsis eriocarpa Ching, Acta Phytotax. Sin. 8: 321. 1963.

毛囊方杆蕨 mao nang fang gan jue

Plants to 1.2 m tall. Rhizomes strong and decumbent, subwoody and glabrous. Fronds subapproximate; stipes ca. 50 cm, stramineous, glabrous; laminae narrowly oblong, ca. 70 × 27 cm, not tapering to bases, pinnate-pinnatifid and reaching both lateral narrow wings of costae, acuminate and pinnatifid at apices; pinnae 25–30 pairs, opposite or subopposite, sessile, spreading, proximal several pairs not shortened, reflexed, bases tapering; middle pinnae linear-lanceolate, ca. 17 × 2 cm, bases truncate and to 3 cm wide, symmetrical, pinnatifid to both lateral narrow wings of costae, apices long acuminate; segments 25–30 pairs, spreading, lanceolate, ca. 9 mm (proximal pair to 1.5 cm), ca. 3 mm wide, gradually broadened to bases, entire, acute at apices. Veins evident, 11 or 12 pairs of veinlets per segment, proximal pair arising from base of costules and all reaching both sides near sinuses. Laminae papery, greenish or dark green when dry, rachises adaxially with hairs, costae, veins, and abaxial surfaces of intercostal areas all glabrous. Sori orbicular, 6–9 pairs per segment, attached at bases of veinlets and in rows close to costules, indusia scaly and small. Sporangia each with acicular hairs near top.

● Forests in ravines; 700–1500 m. Chongqing (Nanchuan).

6. Glaphyropteridopsis splendens Ching, Acta Phytotax. Sin. 8: 322. 1963.

大叶方杆蕨 da ye fang gan jue

Plants ca. 1.2 m tall. Rhizomes strong, decumbent, subwoody and glabrous. Fronds subapproximate; stipes ca. 50 cm, deeply grooved, glabrous, stramineous; laminae narrowly oblong, ca. 80 × 28 cm, not tapering to bases, pinnate-pinnatifid nearly to costae, acuminate and pinnatifid at apices; pinnae ca. 30 pairs or more, opposite or subopposite, sessile, proximal several pairs not shortened; middle pinnae linear-lanceolate, ca. 21 × 2.5 cm, (ca. 3.5 cm wide at bases), bases symmetrical, acroscopic sides truncate and close to rachises, basiscopic sides rounded, pinnatifid nearly to costae, apices long acuminate; segments 35–40 pairs, spreading, lanceolate and slightly falcate, ca. 1.2 × 0.4 cm (proximal pair 1.6–2 cm), gradually broadened to bases and gradually tapering and pointed at apices and entire, separated by obtriangular sinuses. Veins visible, ca. 14 pairs per segment, simple, proximal pair arising from base of costules and reaching margins above sinuses. Laminae thinly herbaceous, green when dry, pinnae adaxially with short setae along costules, abaxially with dense grayish white acicular hairs along rachises, costae, and veins; rachises stramineous, rectangular. Sori orbicular, 10–12 pairs per segment, attached at bases of veinlets, in one row on each side of costules; indusia scalelike, small, hairy. Sporangia hairy near tops.

● On rocks in forests; ca. 600 m. Sichuan (Emei Shan).

7. Glaphyropteridopsis pallida Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 325. 1999.

灰白方杆蕨 hui bai fang gan jue

Plants ca. 82 cm tall. Rhizomes decumbent, woody, with 1 or 2 brown broadly lanceolate thick scales. Fronds sparse; stipes ca. 28 cm, stramineous, grooved adaxially, glabrous throughout; laminae oblong, ca. 56 × 22 cm, slightly tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae ca. 26 pairs, sessile, opposite, distal ones alternate, spreading, close, without interval, proximal pair slightly shortened and slightly reflexed, ca. 10 cm, tapering to bases; second pair of pinnae falcate-lanceolate, ca. 12 × 2.4 cm, bases truncate and close to rachises, pinnatifid nearly to costae, apices acuminate; segments ca. 28 pairs, spreading, separated by narrow interval, falcate-lanceolate, ca. 1.3 cm (basal acroscopic one longer), ca. 0.3 cm wide, entire, pointed at apices. Veins fine, not evident, veinlets 10–12 pairs per segment, proximal pair reaching margins above sinuses. Laminae papery when dry, greenish, adaxially with dense setae along grooves of rachises, veins and intercostal areas with sparse hairs, abaxially with dense long setae along costae and veins, occasionally sparsely hairy on intercostal areas. Sori orbicular, 4 or 5 pairs per segment, attached at bases of veinlets and in one row on each side of costules; indusia small and hairy. Sporangia each with 1 or 2 acicular hairs near tops.

● Shaded wet places in mixed forests on limestone mountains; ca. 1500 m. NE Yunnan.

8. Glaphyropteridopsis jinfushanensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 325. 1999.

金佛山方杆蕨 jin fo shan fang gan jue

Plants ca. 1.5 m tall. Rhizomes decumbent. Fronds ap-

proximate; stipes ca. 54 cm, ca. 1 cm in diam. at bases, dark brown, distally grayish brown and glabrous; laminae broadly lanceolate, ca. 100 × 40 cm, pinnate-pinnatifid, pinnatifid at apices; free lateral pinnae usually ca. 32 pairs, spreading, sessile, proximal 5 pinnae abruptly reduced and hastate; middle pinnae narrowly lanceolate, ca. 25 × 3 cm, rounded-cuneate at bases, pinnatifid nearly to costae, acuminate at apices; segments more than 40 pairs, lanceolate, ca. 1.5 × 0.4 cm, entire, acute at apices. Veins evident, costae raised on both sides, veinlets 10 or 11 pairs per segment, proximal pair arising from base of costules, acroscopic veinlet reaching bottom of sinuses, basiscopic one reaching margins above sinuses. Laminae papery when dry, deep green, glabrous on both surfaces of intercostal areas, abaxially with long hairs along apices of costae, costules, and veinlets with sparse appressed short setae, adaxially with dense strong setae along rachises, costae, and veins. Sori orbicular, attached above middle part of veinlets and close to margins; indusia large, leathery, brown, glabrous, persistent.

● Mixed forests by streams; ca. 800 m. Chongqing (Jinfo Shan).

9. Glaphyropteridopsis glabrata Ching & W. M. Chu ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 325. 1999.

光滑方杆蕨 guang hua fang gan jue

Plants ca. 85 m tall. Rhizomes creeping, glabrous. Fronds sparse; stipes ca. 35 cm, bases dark brown, distally stramineous, grooved adaxially, glabrous throughout; laminae oblong, ca. 50 × 20 cm, slightly tapering to bases, pinnate-pinnatifid, acuminate and pinnatifid at apices; pinnae ca. 30 pairs, opposite, sessile, proximal 2 pairs slightly shortened, 7–10 cm, tapering to bases, third pair of pinnae linear-lanceolate, ca. 12 × 1.5 cm, bases widest, truncate, pinnatifid nearly to costae, apices acuminate; segments ca. 35 pairs, spreading, proximal pair longest (9–11 mm), distal ones triangular-lanceolate, ca. 7 × 3 mm, entire and pointed at apices. Veins evident, veinlets 9 or 10 pairs per segment, proximal pair reaching margins above sinuses. Laminae herbaceous, green when dry, glabrous except for adaxially along grooves of rachises. Sori orbicular, attached at bases of veinlets and in one row on each side of costules; indusia bearing acicular hairs. Sporangia each with 1–3 acicular hairs near top.

● Mixed forest margins in valleys; 1500–1800 m. NE Yunnan.

10. Glaphyropteridopsis villosa Ching & W. M. Chu ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 325. 1999.

柔毛方杆蕨 rou mao fang gan jue

Plants ca. 65 cm tall. Rhizomes not seen. Stipes ca. 34 cm, stramineous, grooved adaxially, with sparse brown scales, glabrous; laminae broadly lanceolate, ca. 32 × 20 cm, not tapering to bases, pinnate-pinnatifid, acuminate at apices; pinnae 24 pairs, sessile, pinnae below middle opposite, spreading, distal ones alternate, obliquely spreading, proximal 2 pairs not shortened, reflexed, of similar size as distal ones, but cuneate at bases; distal pinnae lanceolate, ca. 10 × 1.6 cm, bases widest, rounded-cuneate, pinnatifid nearly to costae, apices acuminate; segments ca. 25 pairs, falcate-lanceolate, ca. 7 mm (basal acroscopic one ca. 1 cm), ca. 2.5 mm wide, pointed at apices. Veins not evident, veinlets ca. 9 pairs per segment, basal acroscopic veinlet reaching bottom of sinuses, basiscopic one reaching margins above sinuses. Laminae papery, grayish green when dry, abaxially with dense grayish white acicular hairs along costae, veins, and intercostal areas, adaxially densely hairy along costae, glabrous on intercostal areas. Sori orbicular, 5–7 pairs per segment, attached near bases of veinlets and in one row on each side of costules; indusia bearing long hairs. Sporangia glabrous.

● In shade and wet limestone crevices; ca. 700 m. Yunnan.

11. Glaphyropteridopsis rufostraminea (Christ) Ching, Acta Phytotax. Sin. 8: 321. 1963.

粉红方杆蕨 fen hong fang gan jue

Aspidium rufostramineum Christ, Bull. Soc. Bot. France 52(Mém. 1): 36. 1905; *Dryopteris rufostraminea* (Christ) C. Christensen; *Thelypteris rufostraminea* (Christ) Ching.

Plants 50–100 cm tall. Rhizomes creeping, glabrous. Fronds approximate; stipes 20–40 cm, stramineous, glabrous and usually reddish; laminae oblong-lanceolate, 40–50 × 18–25 cm, not tapering to bases, pinnate-pinnatifid nearly to costae, acuminate and pinnatifid at apices; pinnae 20–28 pairs, opposite or distally subalternate, sessile, spreading or slightly obliquely bent distally, linear-lanceolate, long acuminate at apices; proximal 1 or 2 pairs slightly shortened and reflexed, bases tapering; middle pinnae 10–16 × 1.2–2 cm, wider at bases and subtruncate, pinnatifid nearly to costae; segments 30–35 pairs, spreading, linear-falcate, 6–10 × 2–2.5 mm; proximal pair longer, entire, obtuse-pointed or acute at apices. Veins evident, veinlets 8–10 pairs per segment, proximal pair arising from base of costules and reaching margins above sinuses. Laminae papery, when dry yellow-green, abaxially with dense long acicular hairs along rachises, costae, veins, and intercostal areas, adaxially only with short setae. Sori orbicular, 3–5 pairs per segment, attached at bases of veinlets and in one row on each side of costules; indusia bearing acicular hairs. Sporangia bearing acicular hairs.

● Forest margins, roadsides; 1300–1500 m. Chongqing, Guizhou, Hubei, Sichuan, Yunnan.

12. PSEUDOCYCLOSORUS Ching, Acta Phytotax. Sin. 8: 322. 1963.

假毛蕨属 jia mao jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Trigonospora Holttum.

Plants medium-sized. Rhizomes creeping, decumbent or erect, bases with sparse lanceolate brown scales. Fronds remote,

approximate or clustered; stipes usually with sparse short hairs, stramineous; laminae pinnate-pinnatifid, proximal pinnae gradually shortened into auricle, hastate or abruptly contracted into tubercule, pinnae attached to rachises and at base abaxially each usually with a dark brown tuberculate aerophore. Veinlets free, costules raised on both sides, proximal pair on adjacent segments sometimes reaching cartilaginous sinuses, rarely connivent, but usually acroscopic veinlet reaching sinus and basiscopic one reaching margin above sinus. Laminae usually deep green when dry, usually papery, sometimes herbaceous or leathery, laminae adaxially with dense appressed setae along costal grooves, sparsely setaceous also along veins, abaxially mostly with acicular hairs on intercostal areas, rarely glabrous. Sori orbicular, usually attached at middle of veinlets, sometimes at distal or proximal parts; indusia orbicular-reniform, thick, usually brown, persistent, with fine hairs or glabrous, sometimes glandular. Spores normally monolete, rarely trilete, exospore echinate, perispore cristate. $x = 35, 36$.

About 50 species: tropical and subtropical regions; 38 species (31 endemic) in China.

Pseudocyclosorus tibeticus Ching & Y. X. Lin (Acta Phytotax. Sin. 22: 201. 1984) was described from Xizang (Mêdog) but is excluded from the present treatment, pending further studies. It is similar to *P. tylodes*.

1a. Proximal pinnae not gradually reduced, not tuberculate.
  2a. Spores monolete.
    3a. Laminae abaxially glabrous on intercostal areas ..... 35. *P. latilobus*
    3b. Laminae abaxially with fine and long acicular hairs on intercostal areas ..... 36. *P. guangxianensis*
  2b. Spores trilete.
    4a. Proximal pair of veinlets on segments reaching bottom of sinus ..... 37. *P. ciliatus*
    4b. Proximal acroscopic veinlet on segment reaching bottom of sinus, others reaching margin above sinus ..... 38. *P. caudipinnus*
1b. Proximal pinnae abruptly reduced into aerophores or auricles or hastate.
  5a. Proximal pinnae abruptly reduced to brown aerophores.
    6a. Basal acroscopic veinlet on segments of middle pinnae reaching bottom of sinus, basiscopic one reaching margin above sinus.
      7a. Plants over 100 cm tall; laminae abaxially with acicular fine hairs on intercostal areas; indusia hairy ..... 4. *P. xinpingensis*
      7b. Plants only 25–58 cm tall; laminae abaxially lacking hairs on intercostal areas; indusia glabrous ..... 5. *P. torrentis*
    6b. Proximal pair of veinlets on segments of middle pinnae reaching bottom of sinus.
      8a. Sori attached on distal parts of veinlets and close to margins ..... 3. *P. cavaleriei*
      8b. Sori attached on proximal parts of veinlets and close to costules.
        9a. Plants small; lateral pinnae ca. 13 × 1–1.4 cm, segments ca. 2 mm wide ..... 1. *P. tylodes*
        9b. Plants large; lateral pinnae length and width over 15 cm and 2 cm respectively, segments ca. 4 mm wide ..... 2. *P. tuberculifer*
  5b. Proximal pinnae gradually reduced into auricles or hastate.
    10a. Rachises, costae, and veins with only fine hairs abaxially, at most with 1 or 2 acicular hairs at apices.
      11a. Pinnae obliquely spreading.
        12a. Plants ca. 1.2 m tall; fronds ca. 100 × 30 cm; middle pinnae ca. 25 × 3 cm; segments over 35 pairs, more than 1.2 cm ..... 33. *P. obliquus*
        12b. Plants 90–110 cm tall; fronds 70–85 × ca. 20 cm; middle pinnae 10–15 × 1.2–2 cm; segments fewer than 30 pairs, length less than 9 mm ..... 34. *P. subochthodes*
      11b. Pinnae spreading.
        13a. Indusia with fine hairs ..... 32. *P. damingshanensis*
        13b. Indusia glabrous.
          14a. Sori attached on middle of veinlets ..... 29. *P. tsoi*
          14b. Sori attached above middle of veinlets.
            15a. Veins simple, not forked and glandular abaxially ..... 30. *P. emeiensis*
            15b. Veins forked, without glands abaxially ..... 31. *P. furcatovenulosus*
    10b. Rachises ± with long acicular hairs abaxially, costae and veins usually with acicular hairs abaxially, sometimes glabrous.
      16a. Indusia glabrous.
        17a. Pinnae linear and oblique distally.
          18a. Pinnae extremely oblique distally, basal acroscopic segments clearly elongated; indusia glandular ..... 19. *P. falcilobus*
          18b. Pinnae slightly oblique distally, basal acroscopic segments not clearly elongated; indusia without glands ..... 20. *P. lushanensis*

17b. Pinnae not linear, spreading, at least proximal pinnae spreading.
19a. Costae and veins not glandular abaxially.
20a. Laminae abaxially with fine hairs on intercostal areas ..... 26. *P. stramineus*
20b. Laminae abaxially glabrous on intercostal areas.
21a. Basal segments on proximal pinnae entire along margins ..... 27. *P. duclouxii*
21b. Basal segments on proximal several pairs of pinnae lobed along margins ..... 28. *P. jijiangensis*
19b. Costae and veins glandular abaxially.
22a. Laminae abaxially hairy on intercostal areas.
23a. Plants to 140 cm tall; laminae ca. 100 cm, pinnae ca. 17 × 2–2.5 cm; segments separated from each other by broad intervals, abaxially with sparse short hairs along costae and veins ..... 24. *P. qingchengensis*
23b. Plants ca. 90 cm tall; laminae ca. 50 cm; pinnae 9–13 × ca. 1.5 cm; segments separated from each other by narrow intervals, abaxially with mixed sparse setae and fine hairs along costae and veins ..... 25. *P. angustipinnus*
22b. Laminae abaxially glabrous on intercostal areas.
24a. Sori attached above middle of veinlets and close to margins ..... 23. *P. submarginalis*
24b. Sori attached on middle of veinlets.
25a. Pinnae lanceolate, basal acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus ..... 21. *P. esquirolii*
25b. Pinnae linear-lanceolate, basal pair of veinlets all reaching bottom of sinus ..... 22. *P. linearis*

16b. Indusia with hairs.
26a. Pinnae extremely oblique distally, basal basiscopic segments clearly contracted or not contracted.
27a. Pinna bases contracted basiscopically.
28a. Plants 40–110 cm tall; pinnae 1.4–1.5 cm wide in middle, costae slightly grooved adaxially and with appressed acicular hairs, not shiny ..... 6. *P. subfalcilobus*
28b. Plants only 25–40 cm tall; pinnae 9–10 mm wide in middle, costae rounded and raised adaxially, subglabrous and shiny ..... 7. *P. pseudofalcilobus*
27b. Pinna bases not contracted.
29a. Rachises, costae, and veins with mixed sparse long acicular hairs and short fine hairs abaxially, and glabrous on intercostal areas abaxially ..... 8. *P. dehuaensis*
29b. Rachises, costae, and veins with dense long acicular hairs abaxially only and hairy on intercostal area ..... 9. *P. guangxiensis*
26b. Pinnae spreading or slightly obliquely spreading, proximal pair of segments or acroscopic one clearly elongated.
30a. Sori attached below middle of veinlets and close to costules.
31a. Fronds dimorphic; pinna bases with segments not clearly elongate, acroscopic veinlet of pinna basal pair reaching bottom of sinus ..... 10. *P. shuangbaiensis*
31b. Fronds monomorphic; pinna bases with segments clearly elongate, proximal veinlets of segments all reaching bottom of sinuses ..... 11. *P. dulongjiangensis*
30b. Sori attached on middle of veinlets.
32a. Laminae abaxially with fine setae on intercostal areas ..... 12. *P. canus*
32b. Laminae abaxially lacking fine setae on intercostal areas.
33a. Indusia with only few fine hairs.
34a. Proximal 7–9 pairs of pinnae abruptly reduced into linear auricles, proximal ones tuberculate; laminae abaxially glabrous on intercostal areas ..... 18. *P. paraochthodes*
34b. Proximal 3 pairs of pinnae abruptly reduced and hastate.
35a. Pinnae (particularly acroscopic ones) obviously broadened at their bases, margins pinnatifid; segments 11–14 × 5–6 mm; laminae herbaceous; sori attached above middle of veinlets ..... 16. *P. gongshanensis*
35b. Pinnae narrowed at their bases; segments ca. 9 × 3 mm; laminae papery; sori attached on middle of veinlets ..... 17. *P. pseudorepens*
33b. Indusia with dense hairs.
36a. Proximal pinnae mostly reduced and hastate or auriculate ..... 15. *P. zayuensis*
36b. Proximal 2 or 3 pairs of pinnae reduced and hastate.

37a. Lateral pinnae to 30 pairs, spreading ..... 13. *P. fugongensis*
37b. Lateral pinnae ca. 17 pairs, proximal pair slightly reflexed, others ascending distally ..... 14. *P. lushuiensis*

1. Pseudocyclosorus tylodes (Kunze) Ching, Acta Phytotax. Sin. 8: 323. 1963.

假毛蕨 jia mao jue

Aspidium tylodes Kunze, Linnaea 24: 281. 1851 [*"xylodes"*]; *Cyclosorus tylodes* (Kunze) Panigrahi; *Dryopteris ochthodes* (Kunze) C. Christensen var. *tylodes* (Kunze) C. Christensen; *D. tylodes* (Kunze) Christ; *Lastrea ochthodes* (Kunze) T. Moore var. *tylodes* (Kunze) Beddome; *L. tylodes* (Kunze) T. Moore [*"xylodes"*]; *Nephrodium prolixum* (Willdenow) Desvaux var. *tylodes* (Kunze) Baker; *N. tylodes* (Kunze) Baker; *Thelypteris tylodes* (Kunze) Ching.

Plants to 1.2 m tall. Rhizomes erect, apices and bases of stipes with sparse brown lanceolate scales. Fronds clustered; stipes 25–40 cm, grayish brown at bases, distally deep straminеous and glabrous; laminae oblong-lanceolate, 45–80 × ca. 24 cm, slightly tapering to bases, pinnate-pinnatifid, acuminate-pinnatifid at apices; proximal 5–10 pairs of pinnae abruptly reduced into tuberculate aerophores; normal pinnae ca. 34 pairs, alternate, oblique distally, sessile; middle pinnae lanceolate, ca. 13 × 1.2–1.4 cm, long acuminate at apices, proximal pinnae tapering to bases, pinnae above middle slightly tapering to bases and broadly cuneate, pinnatifid; segments 40–45 pairs, obliquely spreading, ca. 5 × 1.5–2 mm, entire, pointed or obtuse-pointed at apices. Veinlets evident on both sides, 9 or 10 pairs per segment, proximal pair arising from base of costules and all reaching sinuses. Laminae firmly papery when dry, brownish, costae with acicular hairs, elsewhere glabrous. Sori orbicular, attached below middle of veinlets and close to costules; indusia orbicular-reniform, thick, glabrous, persistent.

Forests by streams or on rocks; 800–4300 m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, E and S Taiwan, E and S Xizang, Yunnan [India, Myanmar, N Philippines, Sri Lanka, N Thailand, Vietnam].

In Kunze's protologue, the epithet *"xylodes"* is considered to be a misprint; it was printed as *"tylodes"* on pages 244 and 283. For further discussion on the spelling, see Holttum and Grimes (Kew Bull. 34: 504. 1980).

The name *Nephrodium prolixum* (Willdenow) Desvaux has been misapplied to material of this taxon by Dunn and Tutcher (Bull. Misc. Inform. Kew, Addit. Ser. 10: 348. 1920).

2. Pseudocyclosorus tuberculifer (C. Christensen) Ching, Acta Phytotax. Sin. 8: 324. 1963 [*"tuberculiferus"*].

瘤羽假毛蕨 liu yu jia mao jue

Dryopteris tuberculifera C. Christensen, Contr. U.S. Natl. Herb. 2: 275. 1931; *Thelypteris tuberculifera* (C. Christensen) Ching.

Plants more than 2 m tall. Rhizomes erect, firm, apices with dense brownish lanceolate scales. Fronds clustered; stipes 100–130 cm, brownish, sparsely scaly, distally glabrous; laminae broadly oblong-lanceolate, ca. 100 × 45 cm, tapering to bases, pinnate-pinnatifid, acuminate at apices; proximal to 15 pairs of pinnae abruptly reduced into brown aerophores, middle normal pinnae 28–30 pairs, proximal ones opposite or subopposite, spreading, distally alternate, obliquely spreading, sessile; middle pinnae linear-lanceolate, 20–30 × 2.2–3 cm, linear-acuminate at apices; proximal pinnae slightly tapering, cuneate, distal pinnae slightly broadened to bases, rounded-cuneate, pinnatifid and reaching broad wings on both sides; segments 35–45 pairs, oblique distally, slightly bent, subfalcate, 8–14 × ca. 4 mm, entire, acute at apices. Veins evident, raised on both sides, veinlets 11–15 pairs per segment, proximal pair reaching bottom of sinuses. Laminae papery when dry and brownish green, rachises and costae with sparse acicular hairs at apices abaxially, costae with dense appressed setae along grooves abaxially, elsewhere glabrous. Sori orbicular, attached below middle of veinlets and close to costules; indusia orbicular-reniform, thick, brown, glabrous, persistent.

Gravelly soil by streams; 600–1900 m. Guangdong, Guangxi, Yunnan [N India (Sikkim)].

3. Pseudocyclosorus cavaleriei (H. Léveillé) Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 143. 1999.

青岩假毛蕨 qing yan jia mao jue

Christella cavaleriei H. Léveillé, Fl. Kouy-Tchéou, 474. 1915.

Rachises subrectangular; middle pinnae spreading, alternate, ca. 18 × 3 cm, pinnate-pinnatifid, pinnatifid-acuminate at apices; segments ca. 35 pairs, separated by broad sinuses, lanceolate, ca. 1 × 0.4 cm, acute at apices; proximal pair clearly elongated, to 1.5 cm, proximal pair on segments reaching bottom of sinuses. Sori orbicular, attached above middle of veinlets and close to margins, ca. 10 pairs per segment.

● Guizhou (Guiyang).

The present authors have not seen a complete specimen of *Pseudocyclosorus cavaleriei*. The type of *P. cavaleriei* was collected by Cavalerie on 5 August 1903, from Guiyang Ging-yan (Tsin Gai), Guizhou province, no. *1244* (E). It has the middle part of the lamina and seven pairs of pinnae. Ching examined the specimen and identified it as *Dryopteris tylodes* in 1931. The species was included within *Thelypteris esquirolii* (Christ) Ching by Holttum in 1936 and later in *P. esquirolii* (species no. 21 in this account) (Holttum & Grimes, Kew Bull. 34: 514–515. 1980).

The subrectangular rachises, opposite pinnae, and proximal pair of veinlets reaching bottom of sinuses suggest that the species should not be included in *Pseudocyclosorus esquirolii*, but is instead closer to *P. tylodes*. However, the sori attached on distal parts of veinlets and close to margins are different from those of specimens of *P. tylodes*. So, it is here treated as an independent species, and we hope that more specimens of this species will be collected for study.

4. Pseudocyclosorus xinpingensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 326. 1999.

新平假毛蕨 xin ping jia mao jue

Plants to 110 cm tall. Rhizomes ascending, brown. Fronds

clustered; stipes ca. 54 cm, deep stramineous, with fine hairs; lamina lanceolate, ca. 57 × 22 cm, slightly tapering to bases, pinnate-pinnatifid, acuminate-pinnatifid at apices; lateral pinnae ca. 25 pairs, alternate, spreading, shortly stalked, proximal 3 pairs of pinnae abruptly reduced into black aerophores; middle pinnae narrowly lanceolate, ca. 14 × 1.4 cm, slightly tapering to bases, acuminate at apices; lowest several pinnae clearly shortened, pinnatifid; segments ca. 24 pairs, ca. 9 × 5 mm, entire, acute at apices. Veins clearly raised on both sides, veinlets 9 pairs per segment, proximal pair arising from base of costules, basiscopic veinlet reaching margin of sinus, acroscopic one reaching bottom of sinus. Laminae green when dry, papery, rachises with sparse short setae abaxially, adaxially with dense short setae, costae and veins with sparse short setae abaxially, costae with sparse appressed short hairs adaxially, veinlets with 1 or 2 setae, intercostal areas acicular hairy abaxially of and glabrous adaxially, setaceous along margins. Sori attached on middle of veinlets, 6 or 7 pairs per segment; indusia large, brown, membranous, hairy, persistent.

● Shade of mossy forests on mountain summits; ca. 2300 m. Yunnan (Xinping).

5. Pseudocyclosorus torrentis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 326. 1999.

急梳假毛蕨 ji shu jia mao jue

Plants 25–58 cm tall. Rhizomes erect. Fronds clustered; stipes 13–23 cm, stramineous, bases with brown scales, distally with acicular hairs abaxially. Laminae oblong-lanceolate, 10–15 × 7–10 cm, bases slightly tapering, proximal 2 or 3 pairs abruptly reduced to auricles, or tuberculate, pinnate-pinnatifid, apices pinnatifid-acuminate; lateral normal pinnae ca. 10 pairs; middle pinnae lanceolate, 4–6 × ca. 0.5 cm, bases broadened due to one pair of segments elongated, pinnatifid, pinnatifid-acuminate at apices; segments ca. 11 pairs, lanceolate, ca. 4 × 2.5 mm, entire, acute at apices. Laminae dark brown when dry, papery; abaxial sides of rachises with sparse setae on distal half, adaxial sides densely setaceous along grooves, abaxial sides of costae and veins glabrous; adaxial sides of costules with appressed short setae, glabrous on both veinlets and intercostal areas, with few short setae along margins. Veins evident, raised on both sides, veinlets 4 or 5 pairs per segment, basal basiscopic veinlet arising from above base of costules and reaching margins above sinuses, acroscopic veinlet arising from base of costules and reaching bottom of sinuses. Sori orbicular and attached on proximal parts of veinlets and close to main veins, 1–3 pairs per segment; indusia brown, thick, glabrous, persistent.

● 800–1500 m. Yunnan (on route from Yingjiang to Ruili).

6. Pseudocyclosorus subfalcilobus Ching ex K. H. Shing, Acta Phytotax. Sin. 31: 571. 1993.

光脉假毛蕨 guang mai jia mao jue

Plants 40–55(–110) cm tall. Rhizomes short and erect or decumbent, dark brown, sparsely scaly. Fronds clustered; stipes 10–20 cm, bases with sparse lanceolate brown scales and dense acicular hairs, stramineous; laminae narrowly ovate, 15–30 × 5–13 cm, pinnatifid; proximal 2 or 3 pairs of pinnae abruptly reduced and hastate, normal lateral pinnae extremely oblique distally, narrowly lanceolate, 11–13 pairs, alternate, shortly stalked; middle pinnae 5–8 × 1–1.5 cm, bases cuneate, not symmetrical, pinnatifid nearly to narrow wings on both sides of costae, pinnatifid and long caudate at apices; segments 11–15 pairs, ligulate, 5–8 × 2–3 mm, entire, shortly pointed at apices; basal basiscopic segments much smaller than acroscopic ones. Costules raised adaxially, visible abaxially, veinlets not evident, 5–8 pairs per segment, basal acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae papery when dry, dark brown, both surfaces with dense long acicular hairs along rachises and costae, abaxial sides of costules and margins acicular hairy, adaxial sides of costules appressed shortly hairy. Sori orbicular, attached below middle of veinlets and close to costules, 6–8 pairs per segment; indusia orbicular-reniform, thickly membranous, brown, shortly hairy, persistent.

● Shaded wet rocks or sandy beaches by margins of evergreen broad-leaved forests on slopes; 1300–1500 m. NW Yunnan (Gongshan: Dulongjiang Valley).

7. Pseudocyclosorus pseudofalcilobus W. M. Chu, Acta Bot. Yunnan., Suppl. 5: 46. 1992.

似镰羽假毛蕨 si lian yu jia mao jue

Plants 25–40 cm tall. Rhizomes creeping, firm. Fronds clustered; stipes 10–15 cm, stramineous, glabrous; laminae narrowly lanceolate, 20–35 × ca. 8 cm, proximal 1 or 2 pairs of pinnae abruptly reduced into auricles, pinnate-pinnatifid, pinnatifid-acuminate at apices; normal free pinnae 10–15 pairs, subopposite, oblique distally, sessile; middle pinnae narrowly lanceolate, ca. 5 × 1 cm, tapering to bases, 1-pinnatifid, pinnatifid and acuminate-caudate at apices; segments ca. 12 pairs, ligulate, ca. 5 × 2 mm, acute at apices. Veins evident on both sides, veinlets 6–8 pairs per segment, basal acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae somewhat leathery, deep green when dry; rachises and veins all with setae and short hairs abaxially, adaxial sides of costae subglabrous with dense appressed setae along grooves, elsewhere glabrous. Sori attached below middle of veinlets and close to costules, ca. 8 pairs per segment; indusia orbicular-reniform, brown, papery, persistent, densely finely hairy.

● Sandy beaches at margins of evergreen broad-leaved forests on slopes; ca. 1300 m. NW Yunnan (Gongshan: Dulongjiang).

8. Pseudocyclosorus dehuaensis Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 326. 1999.

德化假毛蕨 de hua jia mao jue

Plants 85–95 cm tall. Rhizomes decumbent. Fronds few; stipes 20–25 cm, glabrous; laminae lanceolate, 60–70 × ca. 15 cm, proximal 4–10 pairs reduced and hastate; normal pinnae 20–25 pairs, pinnate-pinnatifid; middle pinnae narrowly lanceolate, ca. 10 × 1.5 cm, oblique distally, sessile, alternate, caudate-acuminate at apices; proximal several pairs slightly narrowed at bases, pinnae above middle slightly broadened at bases and rounded-cuneate, 1-pinnatifid; segments 20–25 pairs, subrectangular, ca. 6 × 3 mm, entire, obtuse-pointed at apices. Costae

raised on both sides, veinlets not evident, 8 or 9 pairs per segment and all arising above base of costules, basal acroscopic vein reaching bottom of sinus, basiscopic vein reaching margin above sinus. Laminae dark green when dry, papery, with dense appressed acicular hairs along rachises, abaxial sides of costae and veins with mixed spreading acicular hairs and short setae, adaxial sides of costae densely setaceous along grooves, veinlets sparsely setaceous, glabrous on intercostal areas of both sides. Sori orbicular, attached on middle of veinlets; indusia orbicular-reniform, brown, thick, with few fine long hairs, persistent.

● Streamsides in forests; ca. 700 m. Fujian (Dehua).

9. Pseudocyclosorus guangxiensis Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 327. 1999.

广西假毛蕨 guang xi jia mao jue

Plants ca. 60 cm tall. Rhizomes not seen. Stipes ca. 8.5 cm, deep stramineous, bases sparsely scaly, distally densely acicular hairy; laminae narrowly lanceolate, ca. 50 × 10 cm, proximal 4 or 5 pairs of pinnae gradually reduced and hastate; middle normal pinnae ca. 25 pairs, alternate, extremely oblique distally, sessile, pinnate-pinnatifid; middle pinnae narrowly lanceolate, ca. 7 × 1 cm, pinnatifid nearly to costae; segments ca. 18 pairs, acroscopic one of basal pair of pinnae slightly elongated, ca. 6 mm, others ca. 4 × 2 mm, bent, entire, acuminate at apices. Costules raised on both sides, veinlets not evident, 5 or 6 pairs per segment. Laminae dark green when dry, papery; rachises, costae, and veinlets all with dense long acicular hairs abaxially, adaxially densely setaceous along costal grooves, costules occasionally with 1 or 2 setae, finely hairy on intercostal areas abaxially. Sori orbicular, attached on middle of veinlets; indusia orbicular-reniform, papery, brown, persistent, acicular hairy.

● On shaded rocks by streamsides; ca. 300 m. Guangxi (Fusui).

10. Pseudocyclosorus shuangbaiensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 327. 1999.

双柏假毛蕨 shuang bai jia mao jue

Plants ca. 90 cm tall. Rhizomes creeping. Fronds remote; dimorphic; fertile stipes to 43 cm, stramineous, sparsely brown scaly and glabrous; laminae oblong-lanceolate, ca. 50 × 18 cm, proximal 1 or 2 pairs of pinnae slightly shortened, pinnate-pinnatifid, acuminate at apices; lateral pinnae ca. 20 pairs, spreading, alternate, subsessile; middle pinnae narrowly lanceolate, ca. 9 × 1.4 cm, not narrowed to bases, pinnatifid, pinnatifid and long caudate-acuminate at apices; segments ca. 25 pairs, lanceolate, slightly bent, ca. 4 × 3 mm, entire, obtuse-pointed at apices; sterile fronds smaller, proximal 4 pairs of pinnae abruptly reduced into auricles. Veins evident on both sides, 7 or 8 pairs of veinlets per segment, proximal pair arising from above base of costules, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark green when dry, papery; rachises and costae with dense acicular hairs on both sides, acicular hairy on veins and abaxial surface of intercostal areas, adaxially occasionally with 1 or 2 acicular hairs and glabrous on intercostal areas, shortly setaceous along margins. Sori orbicular and attached below middle of veinlets and close to costules, 7 or 8 pairs per segment; indusia brown, membranous and hairy, persistent.

● Evergreen broad-leaved forests; ca. 2100 m. Yunnan (Shuangbai).

11. Pseudocyclosorus dulongjiangensis W. M. Chu, Acta Bot. Yunnan., Suppl. 5: 44. 1992.

独龙江假毛蕨 du long jiang jia mao jue

Rhizomes creeping, dark brown and firm. Stipes ca. 8 cm, stramineous, sparsely scaly proximally. Laminae lanceolate, ca. 110 cm, pinnatifid-acuminate at apices; proximal 12 pairs reduced and hastate; middle normal pinnae ca. 23 pairs, spreading, alternate, sessile, ca. 15 × 2.6 cm, pinnatifid, acuminate at apices; segments more than 30 pairs, subrectangular, proximal pair of pinnae elongate, spreading, others slightly bent distally; proximal segments 1.2–1.5 × ca. 0.4 cm, entire, obtuse-pointed at apices. Costules raised on both sides, 8 or 9 pairs per segment, proximal pair reaching bottom of sinus. Laminae green when dry, thinly papery, abaxially with acicular hairs along rachises, costae, veins, and intercostal areas, adaxially with appressed setae along costal grooves, costules and veinlets sparsely hairy, setaceous along margins. Sori orbicular, attached below middle of veinlets and close to costules; indusia orbicular-reniform, persistent, glandular and finely hairy.

● Margins of evergreen broad-leaved forests on mountain slopes; 1200–1500 m. NW Yunnan (Gongshan: Dulongjiang).

12. Pseudocyclosorus canus (Baker) Holttum & Jeff W. Grimes, Kew Bull. 34: 509. 1980.

长根假毛蕨 chang gen jia mao jue

Nephrodium canum Baker in Hooker & Baker, Syn. Fil. 267. 1867; *Cyclosorus canus* (Baker) S. Lindsay; *Dryopteris cana* (Baker) Kuntze; *D. repens* C. Christensen; *N. repens* C. Hope (1899), not Baillon (1874); *Pseudocyclosorus medogensis* Ching & S. K. Wu; *P. repens* (C. Christensen) Ching; *Thelypteris cana* (Baker) Ching; *T. repens* (C. Christensen) Ching.

Plants more than 1 m tall. Rhizomes suberect and subglabrous. Fronds clustered; stipes 15–20 cm, stramineous or brownish, with sparse brown scales and dense setae; laminae oblong-lanceolate, 40–80 × 13–25 cm, pinnatifid-acuminate at apices; proximal pairs of pinnae reduced and hastate or auriculate; normal pinnae 20–25 pairs, alternate, sessile, spreading, pinnate-pinnatifid; middle pinnae narrowly lanceolate, pinnatifid and long acuminate; proximal pair of segments slightly elongate, spreading, 7–14 × 1.6–2.4 cm, pinnatifid nearly to costae; segments 20–28 pairs, subligulate, slightly bent, 7–12 × 2.5–4 mm, entire, acute. Veins raised on both sides, visible, 8–12 pairs of veinlets per segment, proximal pair arising from bases or above base of costules, acroscopic vein reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae thinly papery or herbaceous, dark green or greenish when dry; abaxial sides of rachises, costae, and veins all with acicular hairs, adaxially with dense appressed setae along grooves, sparsely setaceous along veins, shortly hairy on intercostal areas on both surfaces. Sori orbicular, attached on middle veinlets; indusia orbicular-reniform, brown, persistent, hairy.

Broad-leaved forests on mountain slopes; 900–2800 m. SE Xizang (Mêdog) [Bhutan, N India, Kashmir, Nepal].

"Pseudocyclosorus pectinatus" (Ching ex K. H. Shing, Vasc. Pl. Hengduan Mount. 1: 98. 1993 [*"pectinata"*]) is conspecific with *P. canus* but was not validly published because no Latin description or diagnosis, or reference to such, was provided (*Melbourne Code*, Art. 39.1).

13. Pseudocyclosorus fugongensis Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 327. 1999.

福贡假毛蕨 fu gong jia mao jue

Plants to 1.3 m tall. Rhizomes not seen. Stipes ca. 50 cm, dark brown, deep stramineous distally and glabrous; laminae broadly lanceolate, ca. 85 × 20 cm, abruptly tapering to bases, pinnatifid-acuminate at apices; proximal 2 pairs of pinnae reduced and hastate; middle normal pinnae ca. 30 pairs, alternate, spreading, sessile, pinnate-pinnatifid; middle pinnae lanceolate, 12–15 × ca. 1.5 cm, bases not narrowed, rounded-truncate, pinnatifid nearly to costae, apices long acuminate; segments ca. 25 pairs, lanceolate, ca. 7 × 3 mm, entire, acute at apices. Veins evident, costules raised on both sides, veinlets 8(or 9) pairs per segment, proximal pair arising from base of costules, acroscopic vein reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark green when dry, papery, abaxially along rachises, costae, veins, and intercostal areas all with long acicular hairs, adaxially along costal grooves with appressed setae, costae appressed shortly hairy, veinlets each with 1 or 2 setae, glabrous on intercostal areas. Sori orbicular, attached on middle of veinlets; indusia orbicular-reniform, thickly membranous, brown, densely shortly hairy, persistent.

● Evergreen broad-leaved forests on mountain slopes; ca. 1800 m. Yunnan (Fugong).

Pseudocyclosorus fugongensis differs from *P. canus* mainly in intercostal areas glabrous adaxially and laminae with 2 pairs of reduced pinnae proximally.

14. Pseudocyclosorus lushuiensis Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 327. 1999.

泸水假毛蕨 lu shui jia mao jue

Plants to 70 cm tall. Rhizomes erect. Fronds clustered; stipes to 32 cm, stramineous; laminae ovate-lanceolate, ca. 38 × 18 cm, pinnatifid-acuminate at apices; proximal 3 pairs of pinnae reduced into auricles, one pair reduced and hastate; middle normal pinnae ca. 17 pairs, proximal ones subopposite, distal ones alternate, shortly stalked, except for proximal pair slightly reflexed, others ascending distally, pinnate-pinnatifid; pinnae lanceolate, bent or falcate distally; middle pinnae ca. 13 × 2 cm, pinnatifid; segments ca. 26 pairs per pinna, subrectangular, bent distally, ca. 6 × 3 mm, entire, acute at apices. Costules raised on both sides, ca. 10 pairs of veinlets per segment, clearly visible. Laminae dark green when dry, papery; rachises, costae, and costules all with dense acicular hairs and pubescence abaxially, adaxial side of costae with dense appressed setae along grooves, veinlets and along margins sparsely setaceous, costules shortly hairy adaxially, intercostal areas with dense acicular fine hairs abaxially. Sori orbicular, attached on middle of veinlets; indusia orbicular-reniform, brown, hairy and persistent.

● Evergreen broad-leaved forests; ca. 2200 m. Yunnan (Lushui).

15. Pseudocyclosorus zayuensis Ching & S. K. Wu, Fl. Xizang. 1: 168. 1983.

察隅假毛蕨 cha yu jia mao jue

Plants 1–1.5 m tall. Rhizomes short and decumbent, subglabrous. Fronds clustered; stipes 10–30 cm, stramineous, with sparse brown scales proximally, distally shortly setaceous and easily deciduous when brushed; laminae oblong-lanceolate, 90–120 × 20–30 cm, proximal pairs of pinnae reduced and hastate or auriculate, pinnatifid-acuminate at apices; middle normal pinnae ca. 22 pairs, spreading, alternate, linear-lanceolate, bases not tapering, truncate, sessile or extremely shortly stalked, pinnatifid nearly to costae, apices acuminate; segments ca. 30 pairs, obliquely spreading, subligulate, 8–9 × ca. 3 mm, slightly bent, entire, obtuse-pointed at apices. Veins evident, costules evident and raised on both sides, 9 or 10 pairs of veinlets per segment, simple, proximal pair arising above base of costules, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae green or dark green when dry, papery; abaxially with dense acicular hairs along rachises, costae, costules, and on intercostal areas, densely setaceous along costal grooves adaxially, hairs sparser on veins. Sori orbicular, attached on middle of veinlets, ca. 9 pairs per segment; indusia orbicular-reniform, brown, with acicular hairs, persistent.

● Evergreen broad-leaved forests, streamsides; 2000–2200 m. SE Xizang (Zayü), Yunnan (Gongshan).

16. Pseudocyclosorus gongshanensis Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 328. 1999.

贡山假毛蕨 gong shan jia mao jue

Plants to 1 m tall. Rhizomes not seen. Stipes ca. 23 cm, bases brownish, distally stramineous, glabrous; laminae broadly lanceolate, ca. 70 × 30 cm, proximal 3 pairs of pinnae reduced and hastate, pinnate-pinnatifid, pinnatifid-acuminate at apices; middle normal pinnae ca. 20 pairs, alternate, spreading, lanceolate, 15–17 × 2.5–3 cm, bases truncate, sessile, pinnatifid, apices acuminate; segments more than 25 pairs, broadly ligulate, 11–14 × 5–6 mm, rounded-obtuse at apices; proximal pair of segments (particularly acroscopic one) clearly elongated, slightly lobed along margins. Veins evident abaxially, raised on both sides, 10–12 pairs of veinlets per segment, acroscopic veinlet of basal pair reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae greenish when dry, herbaceous, abaxially with dense acicular hairs along rachises, costae, veins, and intercostal areas and mixed glands; adaxially densely setaceous along costal grooves, appressed shortly hairy on costules, glabrous on intercostal areas. Sori orbicular, attached above middle of veinlets, 7 or 8 pairs per segment; indusia orbicular-reniform, membranous, brown, with 1 or 2 short hairs, persistent.

● Margins of evergreen broad-leaved forests on slopes; ca. 1400 m. Yunnan (Gongshan).

Pseudocyclosorus gongshanensis is similar to *P. pseudorepens* but differs in the proximal pair of segments on each pinna much larger than more distal ones, lobed along margins, and the sori attached on middle of veinlets.

17. Pseudocyclosorus pseudorepens Ching ex K. H. Shing, Acta Phytotax. Sin. 31: 571. 1993.

毛脉假毛蕨 mao mai jia mao jue

Plants 90–110 cm tall. Rhizomes decumbent, woody. Fronds approximate; stipes ca. 40 cm, stramineous, subglabrous; laminae lanceolate, 40–70 × 15–20 cm, pinnate-pinnatifid, pinnatifid-acuminate at apices; proximal 3 pairs of pinnae reduced and hastate; middle normal pinnae ca. 20 pairs, obliquely spreading, alternate, sessile, ca. 14 × 2 cm, slightly tapering to bases, pinnatifid nearly to costae, pinnatifid and long caudate at apices; segments ca. 25 pairs, sublanceolate, ca. 9 × 3 mm, entire, rounded-obtuse at apices. Veins visible, costules raised on both sides, 9–11 pairs of veinlets per segment, oblique distally, proximal pair arising above base of costules, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark green when dry, papery; abaxially with long acicular hairs along rachises, costae, veins, and on intercostal areas, adaxially with dense setae along costal grooves, costules finely hairy adaxially, on veinlets and along margins with 1 or 2 setae. Sori orbicular, attached on middle of veinlets; indusia orbicular-reniform, brown, occasionally finely hairy, persistent.

● On rocks by streams; 2200–2500 m. Yunnan (Gongshan).

18. Pseudocyclosorus paraochthodes Ching ex K. H. Shing & J. F. Cheng, Jiangxi Sci. 8(3): 43. 1990.

武宁假毛蕨 wu ning jia mao jue

Plants to 1.2 m tall. Rhizomes decumbent, dark brown. Fronds approximate; stipes 8–10 cm, dark brown proximally, distally stramineous, glabrous; laminae oblong-lanceolate or broadly lanceolate, ca. 110 × 26–35 cm, abruptly narrowed at bases, pinnate-pinnatifid, pinnatifid-acuminate at apices; normal lateral pinnae 28–30 pairs, extremely shortly stalked, alternate, obliquely spreading, proximal 7–9 pairs abruptly reduced into small linear auricles, proximal one reduced, tuberculate; middle pinnae linear-lanceolate, ca. 20 cm, broadly cuneate at bases, pinnatifid nearly to costae, long acuminate-caudate at apices; segments ca. 35 pairs, oblique distally, sublanceolate, 8–10 × ca. 3 mm, entire, acute at apices. Veins evident abaxially, 9 or 10 pairs of veinlets per segment, acroscopic veinlet of proximal pair arising above base of costules and reaching bottom of sinus, basiscopic veinlet arising from base of costule and reaching margin above sinus. Laminae green when dry, papery; abaxially with sparse acicular hairs along rachises, along costae and veins with mixed acicular setae and fine hairs; adaxially with dense acicular setae along grooves of rachises and costae, costules with dense appressed short hairs adaxially, veinlets and along margins with 1 or 2 setae. Sori orbicular, attached on middle of veinlets, 7 or 8 pairs per segment; indusia orbicular-reniform, thick, brown, finely long hairy, persistent.

● Rock crevices. Jiangxi (Wuning).

19. Pseudocyclosorus falcilobus (Hooker) Ching, Acta Phytotax. Sin. 8: 324. 1963.

镰片假毛蕨 lian pian jia mao jue

Lastrea falciloba Hooker, Hooker's J. Bot. Kew Gard. Misc. 9: 337. 1857; *Aspidium falcilobum* (Hooker) Hooker; *Cyclosorus falcilobus* (Hooker) L. J. He & X. C. Zhang; *Dryopteris falciloba* (Hooker) C. Christensen; *Glaphyropteris falciloba* (Hooker) H. Itô; *Nephrodium falcilobum* (Hooker) Hooker; *Thelypteris falciloba* (Hooker) Ching.

Plants 65–80 cm tall. Rhizomes erect, woody, apices and bases of stipes with brown lanceolate scales. Fronds clustered; stipes 6–10 cm, bases dark brown, distally stramineous, glabrous; laminae lanceolate, 60–70 × 14–18 cm, proximally abruptly narrowed, pinnate-pinnatifid, pinnatifid-acuminate at apices; proximal 3–6 pairs of pinnae reduced into small auricles, middle normal pinnae 36–38 pairs, very oblique distally, alternate or subopposite, sessile, linear-lanceolate, 12–13 × 1–1.2 cm, cuneate at bases, pinnatifid nearly to costae, long acuminate at apices; segments 22–25 pairs, falcate-lanceolate, oblique distally, 5–7 × 2–2.5 mm, entire, acute at apices; basal acroscopic one particularly elongated to 1 cm. Veins visible adaxially, costules raised on both sides, veinlets extremely oblique distally, 9 or 10 pairs per segment, proximal pair arising from base of costule, acroscopic veinlet reaching bottom sinus, basiscopic one reaching margin above sinus. Laminae dark green when dry, papery; abaxially with acicular setae along rachises, costae, and veins, glabrous on intercostal areas, adaxially with appressed setae along grooves of costae and veins, margins subglabrous. Sori orbicular, attached on middle of veinlets; indusia orbicular-reniform, thick, brown, glandular, persistent.

On rocky soil at watersides in valleys; 300–1100 m. Fujian, Guangdong, Guangxi, Hainan, S and SW Yunnan, Zhejiang [India, Japan, Laos, Myanmar, Thailand, Vietnam].

20. Pseudocyclosorus lushanensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 328. 1999.

庐山假毛蕨 lu shan jia mao jue

Plants 40–50 cm tall. Rhizomes decumbent, with sparse scales. Fronds approximate; stipes 13–18 cm, bases sparsely brown scaly, distally glabrous, deep stramineous; laminae lanceolate, 20–32 × 10–13 cm, tapering proximally, pinnate-pinnatifid, pinnatifid-acuminate at apices; proximal 2 pairs of pinnae reduced into auricles; middle normal pinnae 16–18 pairs, proximal ones subopposite, distal ones alternate, obliquely spreading, sessile, narrowly lanceolate, 6.7–7.5 × ca. 1.2 cm, bases not narrowed, truncate, pinnatifid nearly to costae, apices long acuminate; segments ca. 17 pairs, obliquely spreading, lanceolate, 4–5 × ca. 7 mm, entire, obtuse-pointed at apices. Veins evident, costules raised on both sides, ca. 6 pairs of veinlets per segment. Laminae dark green when dry, papery; abaxially with sparse setae and fine short hairs along rachises, costae, and veins, glabrous on intercostal areas, adaxially densely setaceous along costal grooves, hairs sparser along veins but mixed with few glands. Sori orbicular, attached on middle of veinlets; indusia orbicular-reniform, brown, glandular and with 1 or 2 fine hairs, persistent.

● Streamsides in forests; ca. 600 m. Fujian, Jiangxi (Jinggangshan, Lushan).

21. Pseudocyclosorus esquirolii (Christ) Ching, Acta Phytotax. Sin. 8: 324. 1963.

西南假毛蕨 xi nan jia mao jue

Dryopteris esquirolii Christ, Bull. Acad. Int. Géogr. Bot. 17: 144. 1907; *Cyclosorus esquirolii* (Christ) C. M. Kuo; *D. eberhardtii* Christ; *Thelypteris esquirolii* (Christ) Ching.

Plants to 1.5 m tall. Rhizomes creeping. Fronds remote; stipes deep stramineous, glabrous above bases. Laminae broadly oblong-lanceolate, ca. 130 × 30 cm, tapering to bases, pinnate-pinnatifid, pinnatifid-acuminate at apices; pinnae proximal 9–11 pairs alternate, gradually reduced to triangular auricles, distal pairs alternate, sessile, spreading, lanceolate, 15–20 × 2–2.3 cm, bases rounded-truncate, symmetrical, pinnatifid nearly to costae, apices long caudate-acuminate; segments 30–35 pairs, spreading, lanceolate, 9–10 × 2.5–3 mm, entire, obtuse or acute at apices; proximal pair (particularly acroscopic one) clearly elongated. Veins visible, costae raised on both sides, 8–12 pairs of veinlets per segment, proximal pair arising from base of costules, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark green when dry, papery, glabrous on both surfaces of intercostal areas, abaxially acicular hairy along rachises and costae, adaxially densely appressed-setaceous along costal grooves, with 1 or 2 setae on veins and margins. Sori orbicular, attached on middle of veinlets, 10–12 pairs per segment; indusia orbicular-reniform, thickly membranous, brown, glabrous, persistent.

On rocks by streams in valleys, in bamboo by streams; 400–2100 m. Fujian, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [N India, Myanmar, Nepal, Thailand].

"Christella esquirolii" (H. Léveillé, Fl. Kouy-Tchéou, 474. 1915, nom. nud.) belongs here.

Thelypteris ×*erubesquirolica* W. C. Shieh & J. L. Tsai (J. Sci. Engin. 24: 7. 1987), described from Taiwan (Nantou), appears to be a presumed hybrid between *Pseudocyclosorus esquirolii* and *Glaphyropteridopsis erubescens*.

22. Pseudocyclosorus linearis Ching & K. H. Shing ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 328. 1999.

线羽假毛蕨 xian yu jia mao jue

Plants more than 1.6 m tall. Rhizomes not seen. Stipes ca. 30 cm, bases dark brown, distally stramineous, glabrous; laminae lanceolate, ca. 140 × 40 cm, pinnate-pinnatifid, pinnatifid-acuminate at apices; proximal 9 pairs of pinnae abruptly reduced into auricles, middle normal pinnae more than 30 pairs, alternate, obliquely spreading, sessile, linear-lanceolate, ca. 20 × 2.3 cm, not broadened at bases, pinnatifid, pinnatifid-acuminate at apices; segments ca. 40 pairs, ligulate, 9–11 × ca. 5 mm, acute at apices. Veins not evident, ca. 12 pairs of veinlets per segment, proximal pair reaching bottom of sinus. Laminae dark green when dry, herbaceous; abaxially setaceous along rachises, glabrous along costae, veins densely glandular, adaxially densely setaceous along costal grooves, with 1 or 2 setae on veinlets, with few fine hairs along costules. Sori orbicular, attached on middle of veinlets; indusia orbicular-reniform, brown, thick, persistent, glabrous.

● Mixed forests by streams; ca. 900 m. Sichuan (Emei Shan).

Pseudocyclosorus linearis is similar to *P. esquirolii* but differs in the pinnae linear-lanceolate and the proximal pair of veinlets on segments reaching bottom of sinus.

23. Pseudocyclosorus submarginalis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 328. 1999.

边囊假毛蕨 bian nang jia mao jue

Plants to 75 cm tall. Rhizomes creeping, woody, firm. Fronds remote; stipes ca. 23 cm, deep stramineous, bases with sparse deep brown lanceolate scales, distally glabrous; laminae broadly lanceolate, ca. 50 × 25 cm, abruptly narrowed proximally, pinnate-pinnatifid, pinnatifid-acuminate at apices; proximal 3 pairs of pinnae reduced and hastate; middle normal pinnae ca. 21 pairs, alternate, spreading, sessile, 12–14 × 1.5–1.7 cm, bases nearly tapering, truncate, pinnatifid nearly to costae, apices pinnatifid and long acuminate; segments ca. 22 pairs, obliquely spreading, lanceolate, ca. 7 × 4 mm, entire, rounded-obtuse at apices. Veins raised on both sides, 7–9 pairs of veinlets per segment, proximal pair arising above base of costules, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae greenish when dry, thinly papery; abaxially sparsely long acicular hairy along rachises, glabrous along costae, sparsely finely hairy and glandular along veins, adaxially with dense appressed setae along costal grooves, sparsely setaceous along veinlets. Sori orbicular, attached above middle of veinlets or closer to margins; indusia orbicular-reniform, brown, glabrous, persistent.

● Sichuan.

Pseudocyclosorus submarginalis is similar to *P. esquirolii* but differs in the plants smaller, laminae ca. 50 cm, proximal pair of veinlets on segment arising above base of costules, and sori attached above middle of veinlets and close to margins.

24. Pseudocyclosorus qingchengensis Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 329. 1999.

青城假毛蕨 qing cheng jia mao jue

Plants to 1.4 m tall. Rhizomes creeping, woody, firm, dark brown, sparsely scaly; scales lanceolate, deep brown, fragile and easily deciduous. Fronds remote; stipes 32–37 cm, bases dark brown, distally stramineous, glabrous; laminae lanceolate, ca. 100 × 30 cm, abruptly narrowed at bases, pinnate-pinnatifid, pinnatifid-acuminate at apices; proximal 3–6 pairs of pinnae reduced and hastate; middle normal pinnae ca. 30 pairs, proximal ones subopposite, distal ones alternate, sessile, narrowly lanceolate, 12–19 × ca. 2.5 cm, truncate at bases, pinnatifid, pinnatifid-acuminate at apices; segments ca. 37 pairs, 8–10 × ca. 3 mm, entire, obtuse-pointed at apices. Veins evident, costules raised on both sides, ca. 12 pairs of veinlets per segment, proximal pair arising above base of costules, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark green when dry, papery; abaxially with long acicular hairs along rachises, sparsely shortly hairy along costae and veins, densely shortly hairy on intercostal areas, adaxially with dense appressed setae along costal grooves, with 1 or more setae along veins and glabrous on intercostal areas. Sori orbicular, attached on middle of veinlets; indusia orbicular-reniform, brown, thick, glabrous, persistent.

● Forests on slopes, wet shaded forests by streams. Guangxi (Longsheng), Sichuan (Guanxian, Qingchengshan).

Pseudocyclosorus qingchengensis is similar to *P. esquirolii* in laminar outline but differs by the proximal pair of segments on larger pinnae clearly elongate, proximal pair of veinlets arising from above base of costules, and laminae with dense short hairs on intercostal areas abaxially.

25. Pseudocyclosorus angustipinnus Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 159, 329. 1999 [*"angustpinnus,"* p. 329].

狭羽假毛蕨 xia yu jia mao jue

Plants to 90 cm tall. Rhizomes creeping, dark brown, woody, apices with brown scales. Fronds remote; stipes ca. 35 cm, bases dark brown, sparsely scaly, distally stramineous and glabrous; laminae lanceolate, ca. 50 × 16 cm, pinnate-pinnatifid, pinnatifid-acuminate at apices; proximal pair of pinnae reduced into auricles, second pair slightly shorter than above normal ones; normal pinnae ca. 25 pairs, spreading, alternate, sessile, lanceolate, 8–9 × ca. 1.5 cm, rounded-truncate at bases, pinnatifid nearly to costae, long acuminate at apices; segments ca. 20 pairs, ca. 6 × 3 mm, entire, rounded-obtuse at apices. Veins evident on both sides, costules raised on both sides, ca. 10 pairs of veinlets per segment, proximal pair arising above base of costules, acroscopic vein reaching bottom of sinus, basiscopic ones reaching margin above sinus. Laminae grayish green when dry, papery; abaxially with dense long acicular hairs along rachises, sparsely setaceous and with fine short hairs along costae and veins, also finely hairy on intercostal areas, adaxially densely appressed-setaceous along costal grooves, sparsely setaceous along veins, glabrous on intercostal areas. Sori orbicular, attached above middle of veinlets and close to margins, brown, thick, glabrous, persistent.

● Wet forests; ca. 1000 m. Guizhou (Fanjing Shan).

Pseudocyclosorus angustipinnus is similar to *P. esquirolii* but differs by the laminae hairy on intercostal area abaxially and the sori on distal parts of veinlets.

26. Pseudocyclosorus stramineus Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 159, 329. 1999 [*"straminea,"* p. 329].

禾杆假毛蕨 he gan jia mao jue

Plants ca. 1.2 m tall. Rhizomes not seen. Stipes ca. 36 cm, with dense acicular hairs. Laminae lanceolate, ca. 65 × 20 cm, tapering to both ends, pinnate-pinnatifid; proximal ca. 8 pairs of pinnae reduced and hastate; normal pinnae more than 25 pairs, alternate, spreading, sessile, narrowly lanceolate, ca. 13 × 1.7 cm, not tapering to bases, 1-pinnatifid, pinnatifid-acuminate at apices; segments more than 30 pairs, lanceolate, ca. 7 × 4 mm, entire, acute at apices. Veins raised on both sides, ca. 9 pairs of veinlets per segment, proximal pair arising above base of costules, basiscopic veinlet reaching to margin above sinus, acroscopic one reaching bottom of sinus. Laminae dark brown when dry, papery; rachises with dense long acicular hairs on both sides, along abaxial sides of costae sparsely acicular hairy, with appressed short setae along veins adaxially, with 1 or 2 setae along veinlets and margins. Sori orbicular and attached on middle of veinlets, ca. 7 pairs per segment; indusia orbicular-reniform, brown, thick, glabrous, persistent.

● W Yunnan.

27. Pseudocyclosorus duclouxii (Christ) Ching, Acta Phytotax. Sin. 8: 324. 1963.

苍山假毛蕨 cang shan jia mao jue

Dryopteris duclouxii Christ, Bull. Acad. Int. Géogr. Bot. 17: 139. 1907; *Thelypteris duclouxii* (Christ) Ching.

Plants to 2 m tall. Rhizomes creeping. Fronds remote; stipes ca. 55 cm, with sparse appressed ovate scales, distally with sparse grayish white short hairs; laminae ca. 150 × 35 cm, abruptly narrowed to bases, pinnate-pinnatifid, pinnatifid-acuminate at apices; proximal pairs of pinnae reduced to triangular auricles; middle normal pinnae ca. 45 pairs, obliquely spreading, alternate, sessile, lanceolate, 18–20 × 3–3.5 cm, truncate at bases, pinnatifid to broad wing on both sides of costae, long pinnatifid-acuminate at apices; segments ca. 40 pairs, spreading, proximal one 10–12 × ca. 4 mm, entire or not clearly undulate-crenate, acuminate at apices. Veins evident on both sides, 11–13 pairs of veinlets per segment, proximal pair arising from base of costules, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark brown when dry, herbaceous; abaxially with dense acicular hairs along rachises, sparsely shortly hairy along costae and veins, adaxially densely appressed-setaceous along costal grooves, sparsely setaceous along veins and margins, glabrous on both surfaces on intercostal areas. Sori orbicular, attached above middle of veinlets and close to margins; indusia small, orbicular-reniform, brownish, thickly membranous, glabrous, persistent.

● Streamsides. W Yunnan (Dali: Cangshan).

28. Pseudocyclosorus jijiangensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 330. 1999.

綦江假毛蕨 qi jiang jia mao jue

Plants to 40 cm tall. Rhizomes decumbent, sparsely brown scaly. Fronds approximate; stipes ca. 14 cm, stramineous, sparsely brown scaly on bases, distally glabrous; laminae ovate-lanceolate, ca. 28 × 17 cm, abruptly narrowed at bases, pinnate-pinnatifid, pinnatifid-acuminate at apices; proximal 2 pairs of pinnae reduced and hastate, reflexed, middle normal pinnae ca. 16 pairs, proximal ones opposite, distal ones alternate, sessile, slightly oblique distally, lanceolate, 8.5–9 × ca. 2 cm, broadened and truncate at bases, pinnatifid, long pinnatifid-acuminate at apices; segments 22–24 pairs, pinnatifid nearly to costae, lanceolate, except for proximal pair, all obliquely spreading distally, proximal pair clearly elongated, ca. 6 × 3 mm, proximal pair of segments on lowest 2 pairs of pinnae pinnate-lobate and undulate, acuminate at apices, others all obtuse-pointed and entire. Veins evident, 6 or 7 pairs of veinlets per segment, proximal pair arising above base of costules, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark green when dry, papery; abaxially sparse long acicular hairy along rachises, sparsely setaceous along costae and veins, adaxially densely appressed-setaceous along

costal grooves, sparsely setaceous along veins and margins, glabrous on intercostal areas on both surfaces. Sori orbicular, attached above middle of veinlets or slightly closer to margins; indusia orbicular-reniform, brownish, membranous, persistent, glabrous.

● Raised land by wells. Chongqing (Qijiang).

29. Pseudocyclosorus tsoi Ching, Fl. Fujian. 1: 619. 1982.

景烈假毛蕨 jing lie jia mao jue

Plants 75–150 cm tall. Rhizomes ascending, with dense brown broadly lanceolate scales on apices. Fronds subclustered; stipes 20–50 cm, dark brown at bases and sparsely scaly, distally stramineous and glabrous; laminae oblong-lanceolate, 50–100 × 20–30 cm, abruptly narrowed at bases, pinnate-pinnatifid, pinnatifid-acuminate at apices; proximal pairs of pinnae becoming auricles or hastate; middle normal pinnae 20–25 pairs, spreading, sessile, alternate, narrowly lanceolate, 15–18 × 1.5–3 cm, slightly broadened at bases and broadly cuneate, pinnatifid nearly to costae, pinnatifid and long acuminate at apices; segments 20–30 pairs, oblique distally, lanceolate, proximal pair clearly elongated to ca. 15 mm, distal ones 7–12 × 2–4 mm, entire, obtuse-pointed at apices. Veins evident on both sides, costules raised, 9–12 pairs of veinlets per segment, proximal pair arising from base of costules, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark green when dry, papery; abaxially finely hairy along rachises, costae, and veins, adaxially densely appressed-setaceous along costal grooves, sparsely setaceous on apices of costae, veinlets, and margins, glabrous on intercostal areas. Sori orbicular, attached on middle of veinlets; indusia orbicular-reniform, brownish, thickly membranous, glabrous, persistent.

● Wetlands in valleys, streamsides; 500–700 m. Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Zhejiang.

30. Pseudocyclosorus emeiensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 330. 1999.

峨眉假毛蕨 e mei jia mao jue

Plants to 100 cm tall. Rhizomes not seen. Stipes 15–20 cm, stramineous, glabrous; laminae lanceolate, 80–90 × ca. 20 cm, pinnate-pinnatifid; proximal 4 pairs of pinnae reduced and hastate; middle normal pinnae ca. 20 pairs, spreading, alternate, narrowly lanceolate, 12–14 × ca. 1.4 cm, bases rounded-truncate, sessile, pinnatifid, remote from each other; segments ca. 30 pairs, narrowly ligulate, ca. 5 × 2 mm, margins undulate on distal half; proximal pair of segments not clearly elongated. Veins evident on both sides, ca. 8 pairs of veinlets per segment, simple, basal acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark green when dry, firmly papery; rachises subglabrous proximally, with few setae distally, setae denser adaxially on rachises, abaxially finely shortly hairy on costae, costules with appressed soft hairs and glands, adaxially with dense setae along grooves of costae, sparsely hairy on veins, glabrous on intercostal areas on both surfaces. Sori orbicular and attached above middle of veinlets; indusia orbicular-reniform, brown, thick, glabrous, persistent.

● Streamsides, under *Larix* trees; ca. 700 m. Sichuan (Emei Shan).

31. Pseudocyclosorus furcatovenulosus Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 330. 1999 [*"furcato-venulosus"*].

叉脉假毛蕨 cha mai jia mao jue

Plants to 130 cm tall. Rhizomes creeping. Stipes ca. 20 cm, bases brown and sparsely scaly, distally stramineous and glabrous; laminae ca. 100 × 40 cm, pinnate-pinnatifid; proximal 6 pairs of pinnae abruptly reduced and hastate; middle normal pinnae to 28 pairs, spreading, alternate, sessile, lanceolate, ca. 20 × 2.5–3 cm, truncate at bases, acuminate at apices, pinnatifid; segments more than 30 pairs, lanceolate, to ca. 16 × 7 mm, shallowly pinnatifid. Veins evident abaxially, 11–13 pairs of veinlets per segment and usually furcate, basal acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark green when dry, papery; abaxially subglabrous along rachises and costae, sparsely shortly hairy along veins, adaxially densely setaceous along costal grooves, finely hairy along veins and with 1 or 2 setae along veinlets, glabrous on intercostal areas. Sori nearly orbicular, attached above middle of veinlets and closer to margins; indusia orbicular-reniform, papery, brown, glabrous, persistent.

● Forests of *Phyllostachys pubescens* on S slopes. Sichuan (Junlian).

32. Pseudocyclosorus damingshanensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 162, 330. 1999 [*"daminshanensis,"* p. 330].

大明山假毛蕨 da ming shan jia mao jue

Plants ca. 64 cm tall. Rhizomes decumbent, dark brown. Fronds clustered; stipes ca. 14 cm, bases brown and sparsely brown scaly, distally stramineous and glabrous; laminae lanceolate, ca. 32 × 23 cm, tapering to both ends, pinnate-pinnatifid; proximal 3 pairs of pinnae gradually reduced and hastate; middle normal pinnae ca. 17 pairs, spreading, alternate, sessile, narrowly lanceolate, ca. 11 × 1.7 cm, pinnatifid; segments ca. 20 pairs, lanceolate, ca. 8 × 3 mm, entire, acute at apices. Veins raised on both sides, ca. 8 pairs of veinlets per segment, proximal pair arising above base of costules, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark green when dry, thinly papery; abaxially with few fine short hairs along costae and veins and mixed with 1 or 2 setae, adaxially densely long setaceous along rachises and costal grooves, except for few short hairs also with few setae along costae, glabrous on intercostal areas. Sori orbicular, attached on middle of veinlets, 4 or 5 pairs per segment; indusia brown, thick, with fine hairs, persistent.

● Guangxi (Daming Shan).

33. Pseudocyclosorus obliquus Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 331. 1999.

斜展假毛蕨 xie zhan jia mao jue

Plants ca. 1.2 m tall. Rhizomes not seen. Stipes ca. 30 cm, brown and glabrous; laminae oblong-lanceolate, ca. 100 × 30

cm, tapering to both ends, pinnate-pinnatifid; lower 4 pairs of pinnae abruptly reduced and hastate; middle normal pinnae ca. 20 pairs, extremely oblique distally, alternate, narrowly lanceolate, ca. 25 × 3 cm, acuminate at apices, entire, pinnatifid; segments more than 35 pairs per pinna, lanceolate, 1.2–1.5 × ca. 0.3 cm, entire, acuminate at apices, basal acroscopic one slightly elongated. Veins visible on both sides and all raised, ca. 11 pairs of veinlets per segment, proximal veinlet arising from base of costules and reaching margin above sinus, acroscopic one arising above base of costules and reaching bottom of sinus. Laminae grayish green when dry, papery; abaxially with short setae along rachises, subglabrous along costae and veins, adaxially densely setaceous along costal grooves, sparsely hairy along veins and margins, glabrous on intercostal areas on both sides. Sori orbicular and attached on distal parts of veinlets, ca. 9 pairs per segment; indusia orbicular-reniform, brown, thick, glabrous, persistent.

● Streamsides. Guangxi (Lingui).

34. Pseudocyclosorus subochthodes (Ching) Ching, Acta Phytotax. Sin. 8: 325. 1963.

普通假毛蕨 pu tong jia mao jue

Thelypteris subochthodes Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 305. 1936; *Cyclosorus subochthodes* (Ching) L. J. He & X. C. Zhang; *Dryopteris eberhardtii* Christ var. *glabrata* Christ; *Lastrea subochthodes* (Ching) Tagawa.

Plants 90–110 cm tall. Rhizomes short and decumbent, dark brown, sparsely scaly. Fronds approximate or clustered; stipes 20–25 cm, bases dark brown and sparsely scaly, distally stramineous and glabrous; laminae oblong-lanceolate, 70–85 × ca. 20 cm, abruptly narrowed at bases, pinnate-pinnatifid, pinnatifid-acuminate at apices; proximal 3 or 4 pairs of pinnae abruptly reduced into triangular auricles; middle normal pinnae 26–28 pairs, subopposite or alternate, obliquely spreading, sessile, lanceolate, 10–15 × 1.2–2 cm, not or slightly narrowed to bases, rounded-cuneate, pinnatifid nearly to costae, pinnatifid and long acuminate at apices; segments 28–30 pairs, lanceolate, acroscopic one on proximal pair slightly elongated, others 7–9 × 2–3.5 mm, entire, acute or acuminate at apices. Veins evident on both sides, costules raised, 9 or 10 pairs of veinlets per segment, proximal pair arising above bases of costae, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae grayish green when dry, papery, glabrous on both intercostal areas, abaxially subglabrous or sparsely shortly hairy along rachises, costae, and veins, adaxially densely appressed-setaceous along costal grooves and with 1 or 2 setae along veins. Sori orbicular, attached above middle of veinlets and slightly closer to margin; indusia orbicular-reniform, thickly membranous, glabrous, persistent.

Wet places in mixed forests, rocks in valleys; 200–2000 m. S Anhui, Fujian, Guangdong, SE Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

35. Pseudocyclosorus latilobus (Ching) Ching, Acta Phytotax. Sin. 8: 324. 1963.

阔片假毛蕨 kuo pian jia mao jue

Thelypteris latiloba Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 303. 1936.

Caudex not seen; base of stipes missing, remainder slightly flushed red, glabrous, ca. 25 cm. Laminae ca. 80 cm; pinnae over 20 pairs; basal pinnae slightly reduced and more widely spaced, frond apex not seen. Largest pinnae ca. 16 × 3 cm; aerophores not enlarged; basal acroscopic segments sometimes elongate, basal basiscopic segments of several lower pinnae reduced, edges lobed to 2 mm from costae; segments hardly falcate, oblong or oblong-lanceolate, 1.2–1.7 × ca. 0.6 cm, entire or shallowly undulate, acute at apices; costules ca. 7 mm apart. Veins ca. 11 pairs per segments, concolorous, slender, not prominent. Laminae herbaceous; abaxially rachis with sparse hairs, costae with short spreading hairs near base only, short capitate hairs on distal part, this distribution repeated on costules which also bear some much-reduced scales consisting of 2 cells; adaxially costae densely hairy, costules with sparse short hairs and scattered long ones. Sori small, attached above middle of veinlets and close to margins; indusia pale, firm, with very short capitate hairs on edge; stalks of sporangia slender, sometimes with a sessile spherical cell.

● C Guizhou (Ziyun).

36. Pseudocyclosorus guangxianensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 331. 1999.

灌县假毛蕨 guan xian jia mao jue

Plants to 80 cm tall. Rhizomes decumbent, dark brown, woody, firm. Fronds approximate; stipes ca. 30 cm, brown proximally, distally stramineous and glabrous; laminae lanceolate, ca. 55 × 24 cm, tapering proximally, pinnate-pinnatifid, pinnatifid-acuminate at apices; free pinnae ca. 20 pairs, slightly obliquely spreading, sessile, subopposite, proximal 2 or 3 pairs of pinnae slightly shortened; middle ones lanceolate, ca. 12 × 1.9 cm, bases subcuneate, pinnatifid nearly to costae, pinnatifid-acuminate at apices; segments ca. 23 pairs, lanceolate, ca. 7 × 4 mm, entire, obtuse-pointed at apices; basal acroscopic segment particularly elongated (to 1 cm). Veins evident on both sides, costules raised abaxially, ca. 9 pairs of veinlets, proximal pair arising above bases of costae, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae greenish red when dry, subherbaceous; abaxially with sparse acicular long hairs along rachises, hairs denser along costae and veins, fine and long acicular hairy on intercostal area, adaxially with dense appressed short setae along rachises and costal grooves, subglabrous along veins, hairy along margins, glabrous on intercostal areas. Sori orbicular and attached below middle of veinlets and closer to costules; indusia orbicular-reniform, hairy, brown, persistent. Sporangia each with 2 or 3 erect acicular hairs.

● Shaded places in forests; ca. 1200 m. Sichuan (Guanxian: Qincheng Shan).

37. Pseudocyclosorus ciliatus (Wallich ex Bentham) Ching, Acta Phytotax. Sin. 8: 324. 1963.

溪边假毛蕨 xi bian jia mao jue

Aspidium ciliatum Wallich ex Bentham, Fl. Hongk. 455.

1861; *Dryopteris calcarata* (Blume) Kuntze var. *sericea* (J. Scott ex Beddome) C. Christensen; *D. ciliata* (Wallich ex Bentham) C. Christensen; *D. pseudocalcarata* C. Christensen; *Lastrea calcarata* (Blume) T. Moore var. *ciliata* (Wallich ex Bentham) Beddome; *L. calcarata* var. *sericea* (J. Scott ex Beddome) Beddome; *L. ciliata* (Wallich ex Bentham) Hooker (1857), not Liebmann (1849), nor C. Presl (1851); *L. sericea* J. Scott ex Beddome; *Nephrodium calcaratum* (Blume) Hooker var. *ciliatum* (Wallich ex Bentham) Baker; *N. calcaratum* var. *sericeum* (J. Scott ex Beddome) Alderwerelt; *Polypodium tenerum* Roxburgh; *Thelypteris ciliata* (Wallich ex Bentham) Ching; *T. sericea* (J. Scott ex Beddome) C. F. Reed; *T. tenera* (Roxburgh) C. V. Morton ex Fraser-Jenkins; *Trigonospora ciliata* (Wallich ex Bentham) Holttum.

Plants 20–40 cm tall. Rhizomes short and erect, subglabrous. Fronds clustered; stipes 8–25 cm, dark brown, with sparse ovate-lanceolate scales, distally stramineous, throughout densely grayish white acicular hairy; laminae lanceolate, 12–15 × 7–8 cm, slightly narrowed to bases, pinnate-pinnatifid, pinnatifid-acuminate at apices; pinnae ca. 15 pairs, proximal pair slightly shortened, opposite, reflexed, others ascending distally, alternate, sessile, lanceolate, 3.5–5 × 0.8–1.5 cm, broadly cuneate at bases, pinnatilobate to 1/4–1/3 of distance to costae, pinnatifid-acuminate at apices; segments 9–12 pairs, subtriangular-lanceolate, 1.5–4 × 1–1.5 mm (basal acroscopic one to 6 mm), entire, obtuse at apices. Veins evident on both sides, 4–6 pairs of veinlets per segment, proximal pair arising above base of costules, acroscopic veinlet reaching bottom of sinus, basiscopic one reaching margin above sinus, sometimes 2 veinlets joined and elongated to bottom of sinus. Laminae dark brown when dry, firmly papery, glabrous on both intercostal areas, with dense acicular hairs on both sides of rachises and costae, sparsely setaceous along both sides of veinlets. Sori orbicular and attached on proximal parts of veinlets and close to costules; indusia orbicular-reniform, dark brown, thickly membranous, with dense acicular hairs, persistent. Spores trilete.

Wetlands in mountain valleys, rock crevices by streams; 100–900 m. Guangdong, Guangxi, Hainan, Yunnan [Bhutan, N India, Indonesia, Malaysia, Myanmar, Nepal, Singapore, Sri Lanka, Thailand, Vietnam].

38. Pseudocyclosorus caudipinnus (Ching) Ching, Acta Phytotax. Sin. 8: 324. 1963.

尾羽假毛蕨 wei yu jia mao jue

Thelypteris caudipinna Ching, Bull. Fan Mem. Inst. Biol., Bot. 6: 288. 1936.

Plants ca. 55 cm tall. Rhizomes not seen. Stipes ca. 28 cm; laminae broadly lanceolate, ca. 27 × 15 cm, pinnatifid-acuminate at apices, bases not narrowed, pinnate-pinnatifid; pinnae 11–13 pairs, proximal 8 or 9 pairs opposite, distal ones alternate, proximal pair reflexed proximally, middle pinnae spreading, distal ones obliquely spreading, sessile; middle pinnae lanceolate, 7–8 × ca. 1.5 cm, not narrowed to bases, pinnatifid nearly to costae, pinnatifid and long acuminate at apices; segments ca. 15 pairs, broadly lanceolate, basal acroscopic one slightly elongated, others ca. 5 × 4 mm, entire, obtuse-pointed at apices. Veins evident, basal acroscopic veinlet on segments reaching bottom of sinus, basiscopic one reaching margin above sinus. Laminae dark brown when dry, papery; abaxially rachises, costae, and veins with long hairs, finely hairy on intercostal areas, adaxially with dense, appressed setae along costal grooves, sparsely setaceous along veins, glabrous on intercostal areas. Sori orbicular, attached above middle of veinlets and closer to margins; indusia orbicular-reniform, brown, hairy, persistent. Spores trilete.

● Hainan.

13. MESOPTERIS Ching, Acta Phytotax. Sin. 16(4): 21. 1978.

龙津蕨属 long jin jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Plants large, terrestrial, glabrous throughout. Rhizomes long creeping, dark brown, woody, including stipe bases with dense dark brown lanceolate scales. Fronds remote; stipes strong, glabrous above bases, without tuberculate aerophores; laminae pinnate-pinnatifid; terminal pinna of similar shape and size as proximal lateral ones, stalked; segments pointed at apices, proximal 2.5 pairs forming sharp triangular elongate and translucent membranes at sinuses, connivent at or just below sinuses, keels protruding (arching) on abaxial laminar surfaces. Laminae firmly papery when dry, dark brown, subglabrous on both surfaces. Sori orbicular, exindusiate, not close to costules; sporangia glabrous.

One species: China, N Vietnam.

Thelypteridaceae author Alan R. Smith prefers to follow Holttum and treat the one species of *Mesopteris* within *Amphineuron* (here subsumed within *Cyclosorus*). The present authors note that from the recent molecular phylogeny (He Lijuan, Molec. Phylogen. Evol., ined.) *Mesopteris* is not clustered together with *Amphineuron* species or other genera. While it is clearly a member of *Cyclosorus* s.l., it should be recognized as a separate genus, just as *Glaphyropteridopsis* and *Pseudocyclosorus* are here treated as separate genera.

1. Mesopteris tonkinensis (C. Christensen) Ching, Acta Phytotax. Sin. 16(4): 22. 1978.

龙津蕨 long jin jue

Dryopteris tonkinensis C. Christensen, Bull. Mus. Natl. Hist. Nat., sér. 2, 6: 102. 1934; *Amphineuron tonkinense* (C. Christensen) Holttum; *Cyclosorus tonkinensis* (C. Christensen) L. J. He & X. C. Zhang; *Thelypteris tonkinensis* (C. Christensen) Ching.

Plants to 2 m tall. Stipes angular, to 1.2 m; laminae large, pinnate-pinnatifid, narrowly elliptic, 50–80 × ca. 40 cm; lateral pinnae to 30 pairs, 30–40 × ca. 2 cm, pinnatifid, proximal ones

subopposite, distal ones alternate, obliquely spreading, abaxially ± with minute golden, spherical glands; veinlets 8–10 pairs per segment. Sori orbicular, in 1 or more lines along each side of costae, usually arranged in 2–5 irregular lines, not close to costules, or attached on proximal pair of veinlets and close to costules; sterile on distal veinlets.

On wet rocks in open forests on limestone mountains; ca. 100 m. SW Guangxi (Longjin) [N Vietnam].

14. CYCLOSORUS Link, Hort. Berol. 2: 128. 1833.

毛蕨属 mao jue shu

Lin Youxing (林尤兴), Li Zhongyang (李中阳); Kunio Iwatsuki

Amphineuron Holttum; *Christella* H. Léveillé; *Pneumatopteris* Nakai; *Sphaerostephanos* J. Smith.

Plants usually medium-sized, terrestrial. Rhizomes creeping to erect, scaly (sometimes also hairy). Fronds distant to clustered; laminae usually oblong-lanceolate, narrowed or not to bases, pinnate to pinnate-pinnatifid; middle pinnae usually linear-lanceolate, subentire to deeply lobed, sometimes with swollen aerophores at bases abaxially; apical pinnae usually more lobed; proximal pinnae sometimes shortened; segments entire or rarely crenate; veinlets simple or rarely forked, proximal one or more pairs on adjacent segments anastomosing with an excurrent veinlet from uniting point to sinus membrane, other veinlets to sinus membrane or margin above sinus. Laminae herbaceous to papery, both surfaces usually hairy along costae and veins, abaxial surface sometimes glandular. Sori orbicular, usually at middle of veinlets; indusia orbicular-reniform, membranous, glabrous or hairy, sometimes glandular, persistent. Sporangia usually bearing hairs or glands. Spores oblong-reniform, cristate, with wings or echinate. $x = 36$.

About 250 species: distributed throughout tropical and subtropical regions of the Old World, most in Asia; several species also in the New World; 40 species (ten endemic) in China.

"Christella sadlerioidea" (H. Léveillé, Fl. Kouy-Tchéou, 475. 1915) is a nomen nudum and was not therefore validly published (*Melbourne Code*, Art. 38.1(a)). Léveillé recorded *C. urophylla* (Mettenius) H. Léveillé (Fl. Kouy-Tchéou, 476. 1915; *Phegopteris urophylla* Mettenius, Abh. Senckenberg. Naturf. Ges. 2: 310. 1858; *Aspidium urophyllum* (Mettenius) Christ; *Dryopteris urophylla* (Mettenius) C. Christensen; *Goniopteris urophylla* (Mettenius) Beddome; *Nephrodium urophyllum* (Mettenius) Beddome; *Polypodium urophyllum* (Mettenius) Wallich ex Hooker; *Thelypteris urophylla* (Mettenius) K. Iwatsuki) from Guizhou, but there is no other record of this Malaysian species from China.

The following taxa are excluded from the present treatment, pending further research: *Cyclosorus lunganensis* Ching (Wuyi Sci. J. 1: 5. 1981), described from Fujian, *C. oppositipinnus* Ching & Z. Y. Liu (Bull. Bot. Res., Harbin 4(3): 15. 1984), described from Sichuan, and *C. subdentatus* Ching (Wuyi Sci. J. 1: 4. 1981), described from Fujian.

1a. Aquatic plants; costae with ovate scales abaxially ..... 1. *C. interruptus*
1b. Terrestrial plants; costae without scales or rarely with lanceolate scales abaxially.
2a. Pinnae with sessile spherical glands abaxially, or pustular between veins when dried; sporangia bearing sessile glands on capsules; spores yellow to light brown.
3a. Pinnae without glands but pustular between veins when dried; segments truncate at apices ..... 2. *C. truncatus*
3b. Pinnae with sessile spherical glands abaxially and not pustular; segments acute or obtuse at apices.
4a. Sporangia bearing hairs on capsules; rhizomes creeping ..... 3. *C. productus*
4b. Sporangia glabrous; rhizomes erect or suberect.
5a. Proximal pinnae gradually shortened; pinnae almost glabrous abaxially ..... 4. *C. latebrosus*
5b. Proximal pinnae abruptly shortened; pinnae hairy abaxially.
6a. Proximal pinnae narrowed at bases; middle pinnae with basal segments not elongate; indusia large, thickly membranous ..... 5. *C. heterocarpus*
6b. Proximal pinnae not narrowed at bases; middle pinnae with basal segments elongate; indusia small, membranous ..... 6. *C. taiwanensis*
2b. Pinnae without glands or with ellipsoid/clavate glands abaxially; sporangia bearing glands on stalks or without glands; spores brown to black.
7a. Proximal veinlets on each segment sterile; veinlets with minute yellow glands abaxially.
8a. Veinlets 1 pair beneath sinus; pinnae lobed 1/2–2/3 toward costae ..... 7. *C. opulentus*
8b. Veinlets ca. 2.5 pairs beneath sinus; pinnae lobed 1/3–1/2 toward costae ..... 8. *C. terminans*
7b. Proximal veinlets on each segment usually fertile; veinlets without such minute yellow glands.
9a. Veinlets 1–1.5(–2) pairs beneath sinus; laminae herbaceous to papery.
10a. Rachises distally with scales; lowest pinnae shortened to ca. 1 cm ..... 9. *C. crinipes*
10b. Rachises distally without scales; lowest pinnae much longer than 1 cm.
11a. Proximal pinnae narrowed at bases, with shortened basal segments ..... 10. *C. shimenensis*
11b. Proximal pinnae not narrowed or slightly so at bases, with basal segments not shortened.
12a. Basal pinnae ± reduced; pinnae lanceolate or oblanceolate.
13a. Plants 20–80 cm tall; pinnae without glands abaxially; veinlets ca. 1.5 pairs beneath sinus ..... 11. *C. dentatus*
13b. Plants to 20 cm tall; pinnae with glands abaxially; veinlets 1 pair beneath sinus.

14a. Pinnae with dense, short acicular hairs; hairs on indusia no longer than diam. of sori; glands abaxially small ..... 12. *C. subacutus*
14b. Pinnae with sparse acicular hairs; hairs on indusia longer than diam. of sori; glands abaxially large ..... 13. *C. parvifolius*
12b. Proximal pinnae not reduced or slightly so; pinnae linear-lanceolate.
15a. Pinnae without glands abaxially; rhizomes creeping or erect.
16a. Rhizomes erect; excurrent veinlet short, sometimes obscure ..... 14. *C. siamensis*
16b. Rhizomes creeping; excurrent veinlet long and evident.
17a. Sporangia bearing glands on stalks; acicular hairs on indusia shorter than diam. of sori ..... 15. *C. procurrens*
17b. Sporangia lacking conspicuous glands; acicular hairs on indusia longer than diam. of sori ..... 16. *C. molliusculus*
15b. Pinnae glandular abaxially; rhizomes creeping.
18a. Pinnae with long clavate glands; proximal pinnae narrowed at bases ..... 17. *C. cylindrothrix*
18b. Pinnae with ellipsoid glands or capitate glandular hairs; proximal pinnae not narrowed at bases.
19a. Laminae much longer than stipes; veinlets 10–16 pairs per segment ..... 18. *C. procerus*
19b. Laminae no longer than stipes; veinlets 4–8 pairs per segment.
20a. Pinnae with glands abaxially; veinlets 5–8 pairs per segment; pinnae wider than 1 cm .... 19. *C. parasiticus*
20b. Pinnae with glandular hairs abaxially; veinlets 4–6 pairs per segment; pinnae usually narrower than 1 cm ..... 20. *C. pygmaeus*
9b. Veinlets 2 or more pairs beneath sinus; laminae papery.
21a. Sporangia bearing hairs on capsules and eglandular.
22a. Middle pinnae 1–2 cm wide; proximal pinnae not decrescent at bases ..... 21. *C. hirtisorus*
22b. Middle pinnae 2–3.5 cm wide; proximal pinnae decrescent at bases ..... 22. *C. attenuatus*
21b. Sporangia lacking hairs but with glands (rarely eglandular).
23a. Rhizomes and stipe bases with ovate scales; pinnae with setae along costules; veinlets usually over 6 pairs beneath sinus ..... 23. *C. articulatus*
23b. Rhizomes and stipe bases with ovate-lanceolate to linear-lanceolate scales; pinnae subglabrous or with acicular hairs along costules; veinlets 2–5 pairs beneath sinus.
24a. Sporangia bearing large spherical red glands on stalks; pinnae with minute hairs or subglabrous abaxially.
25a. Rhizomes erect; veinlets ca. 2 pairs beneath sinus ..... 24. *C. papilio*
25b. Rhizomes creeping; veinlets ca. 3 pairs beneath sinus ..... 25. *C. evolutus*
24b. Sporangia bearing ellipsoid or clavate, golden or reddish orange glands on stalks (rarely eglandular); pinnae usually ± hairy abaxially.
26a. Lateral pinnae lobed to 1/3 toward costae, sometimes subentire; pinnae with dense, capitate glandular hairs abaxially ..... 26. *C. latipinnus*
26b. Lateral pinnae usually more lobed; pinnae usually without glandular hairs.
27a. Pinnae eglandular abaxially (sometimes with glandular hairs).
28a. Veinlets ca. 2 pairs beneath sinus; middle pinnae with elongate basal acroscopic segment ..... 27. *C. acuminatus*
28b. Veinlets more numerous; middle pinnae with normal or shortened basal acroscopic segment.
29a. Rhizomes shortly creeping; proximal pinnae not shortened or 1 or 2 pairs slightly shortened.
30a. Veinlets 5–8 pairs per segment; middle pinnae usually less than 1.5 cm wide ..... 28. *C. nanxiensis*
30b. Veinlets 8–11 pairs per segment; middle pinnae usually more than 2 cm wide.
31a. Lateral pinnae usually more than 12 pairs; sori orbicular ..... 29. *C. scaberulus*
31b. Lateral pinnae usually less than 12 pairs; sori usually slightly elongate ..... 30. *C. calvescens*
29b. Rhizomes long creeping; proximal 3 or more pairs of pinnae shortened.
32a. Pinnae with long acicular hairs abaxially; proximal shortened pinnae caudate at apices ..... 31. *C. hokouensis*
32b. Pinnae without hairs abaxially; proximal shortened pinnae acute or obtuse at apices.
33a. Sporangia without glands; proximal shortened pinnae with basal segments not enlarged ..... 32. *C. gustavii*
33b. Sporangia bearing glands on stalks; proximal shortened pinnae with enlarged basal segments ..... 33. *C. wulingshanensis*
27b. Pinnae glandular abaxially.
34a. Veinlets ca. 2 pairs beneath sinus; rhizomes erect to suberect ..... 34. *C. jinghongensis*

34b. Veinlets more than 2 pairs beneath sinus; rhizomes shortly to long creeping.
35a. Pinnae with ellipsoid glands throughout (along and between veins) abaxially ..... 35. *C. jaculosus*
35b. Pinnae with clavate glands abaxially.
36a. Veinlets ca. 3 pairs beneath sinus; lateral pinnae oblanceolate; glands sparse ..... 36. *C. ensifer*
36b. Veinlets more than 3 pairs beneath sinus; lateral pinnae linear-lanceolate or lanceolate; glands dense.
37a. Veinlets straight and oblique; pinnae linear-lanceolate, lobed to 1/3 toward costae, sometimes only serrate ..... 37. *C. aridus*
37b. Veinlets usually spreading and curved; pinnae lanceolate, usually more lobed than above.
38a. Pinnae subglabrous abaxially; proximal pinnae decurrent toward bases ..... 38. *C. cuneatus*
38b. Pinnae densely hairy abaxially; proximal pinnae truncate or rounded at bases.
39a. Rhizomes 2–3 mm in diam.; fronds distant; proximal shortened pinnae not or slightly narrower than middle ones ..... 39. *C. fukienensis*
39b. Rhizomes 5–10 mm in diam.; fronds approximate; proximal shortened pinnae much narrower than middle ones ..... 40. *C. subelatus*

1. Cyclosorus interruptus (Willdenow) H. Itô, Bot. Mag. (Tokyo) 51: 714. 1937.

毛蕨 mao jue

Pteris interrupta Willdenow, Phytographia, 13. 1794; *Aspidium gongylodes* Schkuhr; *A. unitum* (Linnaeus) Swartz var. *glabrum* Mettenius; *A. unitum* var. *hirsutum* Mettenius; *Cyclosorus gongylodes* (Schkuhr) Link; *C. gongylodes* var. *glaber* (Mettenius) Ching; *C. gongylodes* var. *hirsutus* (Mettenius) Farwell; *Dryopteris gongylodes* (Schkuhr) Kuntze; *D. gongylodes* var. *hirsuta* (Mettenius) C. Christensen; *D. interrupta* (Willdenow) Ching; *Nephrodium gongylodes* (Schkuhr) Schott; *Thelypteris gongylodes* (Schkuhr) Small; *T. interrupta* (Willdenow) K. Iwatsuki.

Plants 40–100 cm tall. Rhizomes long creeping, black, including bases of stipes with sparse ovate-lanceolate scales. Fronds distant; stipes 20–60 cm, bases black, distally stramineous; laminae 20–50 × 10–20 cm, bases not narrowed, apices caudate with apical pinna similar to lateral ones; lateral pinnae 10–25 pairs, linear-lanceolate, 5–10 × ca. 1 cm, shortly stalked, bases rounded-truncate, lobed 1/4–1/2 toward costae, apices acuminate; segments 20–30 pairs on middle pinnae, triangular, 3–5 × 2–4 mm, apices pointed; veinlets 6–10 pairs, proximal pair anastomosing, next 0.5–1 pair running to sinus membrane. Laminae somewhat leathery, reddish when dried, subglabrous adaxially, abaxially with acicular hairs and reddish orange sessile spherical glands along veins and several membranous broadly ovate scales along costae. Sori orbicular, medial to submarginal, proximal 1 or 2 pairs of veins sterile; indusia sparsely hairy. Sporangia bearing spherical reddish orange glands on stalks. Spores sparsely minutely echinulate. $2n = 72, 144$.

Swamps, wetlands; near sea level to 500 m. Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Taiwan, S Yunnan [throughout tropical and subtropical regions of the world].

According to recent molecular study by Smith and Cranfill (Amer. Fern J. 92(2): 131–149. 2002), *Cyclosorus interruptus* is distantly related to other species in this genus but is quite close to *Ampelopteris prolifera*. This relationship requires further study.

2. Cyclosorus truncatus (Poiret) Farwell, Amer. Midl. Naturalist 12: 259. 1931.

截裂毛蕨 jie lie mao jue

Plants 0.6–2 m tall. Rhizomes erect, stipes throughout with brown ovate-lanceolate scales. Fronds clustered; stipes 20–50 cm; laminae oblong-lanceolate, 40–150 × 20–40 cm, bases abruptly narrowed, apices acuminate; pinnae 20–35 pairs, proximal 2–6 pairs abruptly shortened, middle pinnae linear, 12–30 × 1–2.5 cm, bases rounded-truncate and usually slightly narrowed on proximal pinnae, lobed 1/4–1/2 toward costae, apices long acuminate; aerophores beneath pinna bases swollen; segments 25–40 pairs, rectangular, 3–6 × 2–4 mm, margins usually dentate, apices truncate or rounded-truncate; veinlets 4–10 pairs, proximal 1 or 2 pairs anastomosing, next pair running to sinus membrane. Laminae papery, yellowish green or grayish green and pustular between veins when dried, glabrous on both surfaces. Sori orbicular, medial; indusia membranous, glabrous. Sporangia bearing light yellow glands on capsules. Spores dark yellow, irregularly thinly cristate or with small wings.

Streamsides, wet places in forests; 100–1300 m. S Fujian, Guangdong, Guangxi, S Guizhou, Hainan, S Hunan, Taiwan, SE Xizang, S Yunnan [India, Indonesia, Japan, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; N Australia, Pacific islands (Polynesia)].

1a. Pinnae 1.5–2.5 cm wide, lobed 1/3–1/2 toward costae ..... 2a. var. *truncatus*
1b. Pinnae 1–1.5 cm wide, lobed to 1/3 toward costae ..... 2b. var. *angustipinnus*

2a. Cyclosorus truncatus var. **truncatus**

截裂毛蕨(原变种) jie lie mao jue (yuan bian zhong)

Polypodium truncatum Poiret, Encycl. 5: 534. 1804; *Cyclosorus pustulifer* Ching ex K. H. Shing [*"pustuliferus"*]; *C. truncatus* var. *acutiloba* Ching; *C. truncatus* f. *kwashotensis* (Hayata) H. Itô; *C. truncatus* f. *laevifrons* (Hayata) H. Itô; *C. truncatus* f. *sublaevifrons* (Tagawa) H. Itô; *Dryopteris kwashotensis* Hayata; *D. laevifrons* Hayata; *D. laevifrons* var. *kwashotensis* (Hayata) Tagawa; *D. sublaevifrons* Tagawa; *D. truncata* (Poiret) Kuntze; *Nephrodium truncatum* (Poiret) C. Presl; *Pneumatopteris truncata* (Poiret) Holttum; *Polystichum truncatum* (Poiret) Gaudichaud; *Thelypteris truncata* (Poiret) K. Iwatsuki; *T. truncata* f. *kwashotensis* (Hayata) C. F. Reed; *T.*

truncata f. *laevifrons* (Hayata) C. F. Reed; *T. truncata* f. *sublaevifrons* (Tagawa) C. F. Reed.

Plants 0.6–2 m tall. Middle pinnae 18–30 × 1.5–2.5 cm, lobed 1/3–1/2 toward costae; veinlets 6–10 pairs per segment, proximal 1 or 2 pairs anastomosing, next pair running to sinus membrane. 2*n* = 72, 144.

Streamsides, wet places in forests; 100–1300 m. S Fujian, Guangdong, Guangxi, S Guizhou, Hainan, S Hunan, Taiwan, SE Xizang, S Yunnan [India, Indonesia, Japan, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; N Australia, Pacific islands (Polynesia)].

In FRPS (4(1): 257. 1999), K. H. Shing mentioned that many specimens from China with broadened pinna bases differed from the type. Although both broadened and narrowed pinna bases exist, all of the Chinese specimens are ± different in general outline from the type. More detailed studies are needed.

2b. Cyclosorus truncatus var. **angustipinnus** Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 218. 1938.

线羽截裂毛蕨 xian yu jie lie mao jue

Cyclosorus angustipinnus (Ching) K. H. Shing.

Plants 0.6–1 m tall. Middle pinnae 12–18 × 1–1.5 cm, lobed to 1/3 toward costae; veinlets 4–6 pairs per segment, proximal pair anastomosing, next pair running to sinus membrane.

● Wet places in forests; 400–600 m. Hainan.

Compared with the typical variety, *Cyclosorus truncatus* var. *angustipinnus* has a smaller laminar outline, narrower pinnae, and fewer anastomosing veinlets. According to Holttum (Blumea 21(2): 314. 1973), it might be a diploid.

3. Cyclosorus productus (Kaulfuss) Ching, Bull. Fan Mem. Inst. Biol., Bot. 10: 248. 1941.

兰屿大叶毛蕨 lan yu da ye mao jue

Aspidium productum Kaulfuss, Enum. Filic. 237. 1824; *Cyclosorus kotoensis* (Hayata) W. C. Shieh; *C. truncatus* (Poiret) Farwell var. *kotoensis* (Hayata) H. Itô; *Dryopteris kotoensis* Hayata; *D. producta* (Kaulfuss) C. Christensen; *Sphaerostephanos kotoensis* (Hayata) Holttum ex C. M. Kuo; *S. productus* (Kaulfuss) Holttum; *Thelypteris kotoensis* (Hayata) K. Iwatsuki; *T. producta* (Kaulfuss) C. F. Reed.

Plants ca. 100 cm tall. Rhizomes shortly creeping, including bases of stipes with dark brown linear-lanceolate scales. Fronds approximate; stipes ca. 20 cm, stramineous; laminae ca. 100 × 30 cm, bases narrowed, apices acuminate; pinnae ca. 30 pairs, proximal ca. 10 pairs abruptly shortened with lowest 1 pair ca. 5 mm; middle pinnae linear-lanceolate, ca. 20 × 1.5–2 cm, bases truncate, lobed 1/3–1/2 toward costae, apices long acuminate; segments 30–40 pairs on middle pinnae, oblong, ca. 3 × 3 mm, subacute or obtuse at apices; veinlets 6–8 pairs per segment, proximal 1.5 pairs anastomosing, next pair running to sinus membrane. Laminae papery, shortly pubescent and with several acicular hairs on both surfaces along costae and veins, abaxially also with sessile spherical yellow glands. Sori orbicular, medial; indusia glandular and shortly hairy. Sporangia bearing several hairs and sessile spherical glands on capsules, and similar glands on stalks. Spores light brown, echinate or cristate. 2*n* = 72.

Forest margins, slopes of ravines; 100–400 m. SE Taiwan (Lan Yu) [Philippines].

4. Cyclosorus latebrosus (Kunze ex Mettenius) Ching, Bull. Fan Mem. Inst. Biol., Bot. 10: 245. 1941.

阴生毛蕨 yin sheng mao jue

Aspidium latebrosum Kunze ex Mettenius, Abh. Senckenberg. Naturf. Ges. 2: 388. 1858; *Sphaerostephanos latebrosus* (Kunze ex Mettenius) Holttum.

Plants 50–100 cm tall. Rhizomes erect. Fronds clustered; stipes 5–10 cm, dark stramineous, bases with sparse brown lanceolate scales; laminae 40–90 × 20–30 cm, bases gradually narrowed, apices acuminate; pinnae 30–40 pairs, proximal ca. 10 pairs gradually shortened with lowest one ca. 5 mm, slightly reflexed; middle pinnae lanceolate, 10–18 × 1–2 cm, bases broadly cuneate to truncate, lobed 1/2–2/3 toward costae, apices acuminate; aerophores beneath pinna bases slightly swollen; segments 20–30 pairs on middle pinnae, oblong, 5–8 × 3–4 mm, entire, obtuse at apices; veinlets 6–8 pairs, proximal pair anastomosing, next 0.5–1 pair running to sinus membrane. Laminae papery, reddish brown when dried, adaxially with sparse short acicular hairs along costae and veins, abaxial surface with yellow sessile spherical glands throughout and almost glabrous. Sori orbicular, medial; indusia glabrous, sometimes glandular. Sporangia bearing yellow spherical glands on capsules. Spores light brown, densely echinulate.

Wet places in dense forests; 300–400 m. S Yunnan (Jinping) [Bangladesh, Indonesia, Malaysia, Philippines].

"Cyclosorus glabellus" (Ching ex W. M. Chu & S. G. Lu, Fl. Yunnan. 20: 608. 2006) belongs here but was not validly published because no Latin description or diagnosis, or reference to such, was provided and no type was indicated (*Melbourne Code*, Art. 39.1 and 40.1).

5. Cyclosorus heterocarpus (Blume) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 180. 1938.

异果毛蕨 yi guo mao jue

Aspidium heterocarpon Blume, Enum. Pl. Javae 2: 155. 1828; *Dryopteris heterocarpa* (Blume) Kuntze; *Nephrodium heterocarpum* (Blume) T. Moore; *Sphaerostephanos heterocarpus* (Blume) Holttum; *Thelypteris heterocarpa* (Blume) C. V. Morton.

Plants 60–120 cm tall. Rhizomes erect, with brown lanceolate scales. Fronds clustered; stipes 10–20 cm, bases dark brown and scaly, dark stramineous distally; laminae 40–100 × 20–30 cm, bases abruptly narrowed, apices acuminate to caudate; pinnae 20–40 pairs, sessile, proximal 5–10 pairs shortened and auriculate with lowest 1 pair tuberculate; proximal pinnae narrowed toward bases; middle pinnae linear-lanceolate, 10–16 × 1–1.5 cm, bases truncate, lobed 1/2–2/3 toward costae, apices long acuminate; aerophores beneath pinna bases slightly swollen; segments 20–30 pairs, 4–5 × 2–2.5 mm, entire, apices obtuse; veinlets 6–9 pairs, proximal pair anastomosing, some-

times next vein running to sinus membrane. Laminae herbaceous, brownish green when dried, with short hairs along costae on both surfaces and along veins adaxially, also golden sessile spherical glands abaxially (sometimes also adaxially). Sori orbicular, medial; indusia slightly hairy, sometimes glandular. Sporangia bearing spherical glands on capsules. Spores light brown, densely echinulate. 2*n* = 72.

Wet places in forests; 100–1100 m. Guangdong, Guangxi, Hainan [Indonesia, Malaysia, Philippines, Thailand, Vietnam; Australia, Pacific islands (Polynesia)].

6. Cyclosorus taiwanensis (C. Christensen) H. Itô, Bot. Mag. (Tokyo) 51. 728. 1937.

台湾毛蕨 tai wan mao jue

Dryopteris taiwanensis C. Christensen, Index Filic. 297. 1905; *Aspidium lobulatum* Christ (1904), not Blume (1828); *D. subhispidula* Rosenstock; *Sphaerostephanos taiwanensis* (C. Christensen) Holttum ex C. M. Kuo; *Thelypteris taiwanensis* (C. Christensen) K. Iwatsuki.

Plants 60–120 cm tall. Rhizomes suberect to erect, including bases of stipes with brown ovate-lanceolate scales. Fronds clustered; stipes 10–20 cm, dark stramineous; laminae broadly lanceolate, 50–100 × 20–30 cm, bases abruptly narrowed, apices acuminate; pinnae 30–45 pairs, proximal 4–6 pairs abruptly shortened and auriculate with lowest 1 pair subtuberculate; middle pinnae linear-lanceolate, 10–18 × 0.8–1.2 cm, bases truncate, apices long acuminate; lobed ca. 1/2 toward costae; aerophores beneath pinna bases slightly swollen; segments 25–35 pairs, 3–5 × 2–2.5 mm, basal acroscopic ones longer, subrectangular, entire, obtuse at apices; veinlets 5–8 pairs per segment, proximal pair anastomosing, next 0.5–1 pair running to sinus membrane. Laminae papery, brownish green when dried, both surfaces with short acicular hairs along costae and veins, adaxially with short hairs and yellow sessile spherical glands throughout. Sori orbicular, medial or inframedial; indusia shortly hairy and glandular. Sporangia bearing sessile spherical glands on capsules. Spores yellow to light brown, densely echinulate. 2*n* = 72.

Streamsides, wet places in dense forests; 200–700 m. Fujian, Guangdong, Guangxi, Jiangxi, Taiwan [S Japan].

7. Cyclosorus opulentus (Kaulfuss) Nakaike, Enum. Pterid Jap., Filic. 277. 1975.

腺脉毛蕨 xian mai mao jue

Aspidium opulentum Kaulfuss, Enum. Filic. 238. 1824; *Amphineuron opulentum* (Kaulfuss) Holttum; *Aspidium extensum* Blume; *Cyclosorus extensus* (Blume) H. Itô; *Dryopteris extensa* (Blume) Kuntze; *Nephrodium extensum* (Blume) T. Moore; *N. opulentum* (Kaulfuss) C. Presl; *Thelypteris extensa* (Blume) C. V. Morton; *T. opulenta* (Kaulfuss) Fosberg.

Plants 60–100 cm tall. Rhizomes shortly creeping, apices and bases of stipes with dark brown linear-lanceolate scales. Fronds approximate; stipes ca. 30 cm, brownish; laminae 30–60 × 20–30 cm, bases not narrowed or slightly so, apices caudate; pinnae 10–20 pairs, almost sessile; proximal pair of pinnae slightly shortened; middle pinnae linear-lanceolate, 15–25 × 1–2 cm, bases rounded-truncate (or slightly cuneate on proximal pinnae), lobed 1/2–2/3 toward costae, apices long acuminate; segments 25–40 pairs, middle ones subfalcate, 4–8 × 2–3 mm, entire, subacute to obtuse at apices; veinlets 8–10 pairs, proximal pair anastomosing or only connivent, sometimes next vein running to sinus membrane. Laminae herbaceous, yellowish green when dried, with several acicular hairs along veins on both surfaces, minute hairs and many minute yellow spherical glands along veins abaxially, also minute hairs between veins abaxially. Sori orbicular, submarginal, usually sterile on proximal 1 or 2 pairs of veins; indusia glabrous or glandular along margins. Sporangia bearing golden spherical glands on stalks. Spores cristate.

Streamsides in forests or thickets; 100–300 m. Hainan [S India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand; E Africa, tropical America, N Australia, Micronesia].

8. Cyclosorus terminans (J. Smith ex Hooker) K. H. Shing, Pl. Sci. Res. (India) 20(1–2): 25. 1998.

顶育毛蕨 ding yu mao jue

Nephrodium terminans J. Smith ex Hooker, Sp. Fil. 4: 73. 1862; *Amphineuron terminans* (J. Smith ex Hooker) Holttum; *Thelypteris terminans* (J. Smith ex Hooker) Panigrahi.

Plants 40–100 cm tall. Rhizomes long creeping, including bases of stipes with brown linear-lanceolate scales. Fronds distant; stipes 20–55 cm, dark stramineous; laminae deltoid-lanceolate, 20–45 × 20–40 cm, bases not narrowed or slightly so, apices caudate with an apical pinna similar to lateral ones; lateral pinnae 10–15 pairs, subsessile; middle pinnae linear-lanceolate, 15–25 × 1–1.8 cm (usually narrowed toward bases), bases rounded-truncate, lobed 1/3–1/2 toward costae, apices long acuminate; segments 20–35 pairs, triangular, 3–4 × 3–4 mm, subacute or obtuse at apices; veinlets 6–8 pairs, proximal pair anastomosing, next 1–1.5 pairs running to sinus membrane. Laminae papery, brownish green or yellowish green when dried, adaxially shortly hairy along costae and veins, abaxial surface with short hairs along costae and veins, also with minute spherical sessile yellow glands along veins. Sori orbicular, marginal, sterile on proximal 2 or 3 pairs of veins, sometimes only top 2 or 3 veins fertile; indusia glabrous. Sporangia bearing golden glands on stalks. Spores cristate. 2*n* = 144.

Wet places in forests or thickets; 200–500 m. Hainan [India, Indonesia, Japan, Malesia, Myanmar, Thailand, Vietnam; Africa, N Australia, Pacific islands (Micronesia, Polynesia)].

The epithet is derived from *"Aspidium terminans"* (Wallich, Numer. List, no. 386. 1829; Kunze, Linnaea 23: 230. 1850), which is a nomen nudum and was not therefore validly published (*Melbourne Code*, Art. 38.1(a)).

9. Cyclosorus crinipes (Hooker) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 179. 1938.

鳞柄毛蕨 lin bing mao jue

Nephrodium crinipes Hooker, Sp. Fil. 4: 71. 1862; *Christella crinipes* (Hooker) Holttum; *Dryopteris crinipes* (Hooker) Kuntze; *Thelypteris crinipes* (Hooker) K. Iwatsuki.

Plants 0.5–1.5 m tall. Rhizomes erect, apices with dense dark brown lanceolate scales. Fronds clustered; stipes 20–40 cm, dark stramineous, with dense scales from bases to rachises; laminae 30–120 × 25–45 cm, bases abruptly narrowed, apices acuminate; pinnae 20–45 pairs, proximal 3–5 pairs shortened, triangular-auriculate, lowest one ca. 1 × 1 cm; middle pinnae linear-lanceolate, 10–25 × 1–1.5 cm, bases truncate, lobed 1/2–2/3 toward costae, apices long acuminate; segments ca. 30 pairs, oblong, 3–5 × ca. 3 mm, entire, apices obtuse; veinlets 7–9 pairs, proximal 1–1.5 pairs anastomosing, next pair running to sinus membrane. Laminae papery, grayish green when dried, with several acicular hairs along veins adaxially, with short acicular hairs along costae and veins abaxially, also with minute hairs and minute glands throughout. Sori orbicular, medial; indusia shortly hairy. Sporangia bearing reddish orange glands on stalks. Spores dark brown, echinate. $2n = 72$.

Wet forest margins, wet places in forests; 100–1300 m. S Guangdong, S Guangxi, S Guizhou, Hainan, SE Xizang, S Yunnan [Bhutan, India, Indonesia, Laos, Myanmar, Nepal, Thailand, Vietnam].

10. Cyclosorus shimenensis K. H. Shing & C. M. Zhang, Keys Vasc. Pl. Wuling Mts. 565. 1995.

石门毛蕨 shi men mao jue

Cyclosorus wangmoensis K. H. Shing & P. S. Wang.

Plants 40–100 cm tall. Rhizomes shortly creeping, with dark brown lanceolate scales and setae. Fronds approximate; stipes 20–50 cm, dark stramineous; laminae 20–50 × 12–30 cm, bases slightly narrowed, apices acuminate to caudate; pinnae 10–15 pairs, shortly stalked, proximal 1 or 2 pairs sometimes slightly shortened; middle pinnae falcate-lanceolate, 8–15 × 1.5–2.5 cm, bases rounded-cuneate (decurrent on proximal pinnae), lobed 2/3–3/4 toward costae, apices long acuminate; segments 20–30 pairs on middle pinnae, proximal segments shortened or missing on proximal pinnae; middle segments falcate-lanceolate, 4–10 × 3–4 mm, obtuse or subacute at apices; veinlets 6–12 pairs, proximal pair anastomosing, excurrent veinlets usually obsolete on basal segments, next 0.5–1 pair running to sinus membrane. Laminae papery, grayish green when dried, with short acicular hairs along costae and veins and minute hairs between veins adaxially, shortly hairy throughout abaxially. Sori small, medial or supramedial; indusia shortly hairy. Sporangia with reddish orange glands on stalks. Spores dark brown, sparingly cristate.

● Wet places in forests, semi-open forest margins; 300–1000 m. Chongqing, Guizhou, Hunan.

The epithet was misspelled as *"simenensis"* in FRPS (4(1): 171, 195. 1999).

The types of *Cyclosorus sinodentatus* Ching & Z. Y. Liu and *C. macrophyllus* Ching & Z. Y. Liu both have features intermediate between *C. shimenensis* and *C. dentatus*. There are only a few gatherings of *C. sinodentatus* other than the type. They are all rarely fertile. *Cyclosorus macrophyllus* is represented by only one gathering (the type), lacking fertile sori. These two taxa might be hybrids.

11. Cyclosorus dentatus (Forsskål) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 206. 1938.

齿牙毛蕨 chi ya mao jue

Polypodium dentatum Forsskål, Fl. Aegypt.-Arab. 185. 1775; *Christella dentata* (Forsskål) Brownsey & Jermy; *Cyclosorus angustus* Ching (1982), not (Copeland) Ching (1941); *C. fengii* Ching ex K. H. Shing; *C. jiulungshanensis* P. S. Chiu & G. Yao ex Ching; *C. mekongensis* Ching ex K. H. Shing; *C. mianningensis* Ching ex K. H. Shing; *C. paradentatus* Ching ex K. H. Shing; *C. pingshanensis* Ching & H. S. Kung ex K. H. Shing; *C. proximus* Ching; *C. shapingbaensis* Ching ex K. H. Shing; *C. stenopes* Ching & K. H. Shing; *C. wangii* Ching; *Dryopteris dentata* (Forsskål) C. Christensen; *D. oblancifolia* Tagawa; *Thelypteris dentata* (Forsskål) E. P. St. John.

Plants (20–)40–60(–100) cm tall. Rhizomes suberect to shortly creeping, apices including bases of stipes with brown linear-lanceolate scales. Fronds subclustered; stipes (5–)10–20(–35) cm, bases dark brown, stramineous distally; laminae (10–)15–40(–60) × 10–20 cm, bases slightly narrowed, apices acuminate; lateral pinnae 10–20 pairs, proximal 2 or 3 pairs slightly shortened; middle pinnae lanceolate to oblanceolate, 5–10 × (0.8–)1–2 cm, bases rounded-truncate, lobed 1/2–2/3 toward costae, apices acuminate; segments 10–20 pairs, rectangular or oblong, 3–5 × 3–4 mm (basal acroscopic one slightly longer, sometimes crenate), rounded-obtuse at apices; veinlets 5–8 pairs per segment, proximal pair anastomosing, next 0.5–1 pair running to sinus membrane. Laminae herbaceous to papery, brownish green when dried, shortly hairy adaxially, along veins with several acicular hairs, densely puberulent abaxially, sometimes with glandular hairs. Sori orbicular, medial; indusia shortly hairy. Sporangia bearing minute golden glands on stalks. Spores brown, irregularly cristate. $2n = 72, 144, 288$.

Habitat variable, usually semi-open to open places; near sea level to 2800 m. Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, SE Xizang, Yunnan, S Zhejiang [N Africa, tropical America, tropical and subtropical Asia].

The type of *Cyclosorus longqishanensis* K. H. Shing (FRPS 4(1): 337. 1999) has features intermediate between *C. dentatus* and *C. acuminatus*. Only one gathering (the type) with few sori has been collected. This taxon might be a hybrid.

The type of *Cyclosorus wenzhouensis* K. H. Shing & C. F. Zhang (FRPS 4(1): 341. 1999) resembles *C. dentatus* but differs in having a larger laminar outline and 2 pairs of veinlets joined beneath the sinuses. Only one gathering (the type) with irregular spores has been collected. This taxon might be a hybrid.

12. Cyclosorus subacutus Ching, Fl. Fujian. 1: 598. 1982.

短尖毛蕨 duan jian mao jue

Plants 15–20 cm tall. Rhizomes short, suberect, with dense dark brown lanceolate scales at apices. Fronds clustered; stipes 3–7 cm, stramineous; laminae 8–14 × 3.5–6 cm, bases slightly narrowed, apices acuminate; pinnae 6–12 pairs, sessile, proximal 2 or 3 pairs slightly shortened; middle ones oblong-lanceolate to oblong-oblanceolate, 2–3 × ca. 1 cm, bases truncate, lobed 1/2–2/3 toward costae, apices acuminate or acute; segments 6–10 pairs on middle pinnae, oblong, 2–3 × ca. 2 mm (basal acroscopic one slightly longer), entire, obtuse at apices; veinlets 3–5 pairs, proximal pair anastomosing with an excurrent veinlet running to sinus membrane. Laminae herbaceous, grayish green or brownish green when dried, adaxially with

dense short acicular hairs along costae, with sparse acicular hairs along veins and shorter hairs between veins; abaxial surface with dense short thin acicular hairs and golden to orange small glands. Sori small, orbicular, medial; indusia densely hairy. Sporangia bearing golden to orange glands on stalks. Spores with long to short wings.

● Semi-open places by forest margins; near sea level to 100 m. Fujian, Guangdong, Jiangxi, ?Taiwan, S Zhejiang.

Cyclosorus subacutus differs from *C. dentatus* in being much smaller plants and having glandular hairs abaxially, but in other aspects, the two species are quite similar. Knapp (Ferns Fern Allies Taiwan, 2011) did not record this species for Taiwan.

13. Cyclosorus parvifolius Ching, Fl. Fujian. 1: 598. 1982.

小叶毛蕨 xiao ye mao jue

Plants 10–20 cm tall. Rhizomes suberect to shortly creeping, with sparse brown lanceolate scales at apices. Fronds clustered; stipes 3–8 cm, stramineous; laminae 6–10 × 3–5 cm, bases slightly narrowed, apices acuminate; pinnae 5–8 pairs, sessile, proximal 1 or 2 pairs slightly shortened; middle ones oblong-lanceolate to broadly lanceolate, 1.5–2.5 × 0.5–1 cm, bases broadly cuneate to subtruncate, slightly projected on acroscopic side, lobed 1/3–1/2 toward costae, apices obtuse or subacute; segments 5 or 6 pairs on middle pinnae, subrectangular, 2–3 × 2–3 mm, entire, obtuse at apices; veinlets 3 or 4 pairs, proximal 1 pair anastomosing with an excurrent veinlet running to sinus membrane. Laminae herbaceous, yellowish green when dried, with several thin short acicular hairs on both surfaces, and reddish orange glands along veins abaxially. Sori orbicular, at end of basal veins and usually confluent; indusia with short thin acicular hairs. Sporangia bearing reddish orange glands on stalks. Spores with short wings.

● Fujian.

Cyclosorus parvifolius resembles *C. parasiticus* and differs only in being much smaller in stature. The spores are not well developed.

14. Cyclosorus siamensis (Tagawa & K. Iwatsuki) Panigrahi, Res. J. Pl. Environm. 9: 67. 1993.

泰国毛蕨 tai guo mao jue

Thelypteris siamensis Tagawa & K. Iwatsuki, Acta Phytotax. Geobot. 22: 101. 1967; *Christella siamensis* (Tagawa & K. Iwatsuki) Holttum.

Plants 70–100 cm tall. Rhizomes erect, apices along with stipe bases with dense linear-lanceolate brown scales. Fronds clustered; stipes 20–40 cm, stramineous, subglabrous or with sparse pale long acicular hairs distally; laminae 50–70 × 30–40 cm, bases not narrowed or slightly so, apices acuminate; lateral pinnae 25–35 pairs, middle ones linear-lanceolate, 10–20 × 1.5–2 cm, bases broadly cuneate or truncate, sessile, lobed 2/3–4/5 toward costae, apices long acuminate; segments 20–30 pairs on middle pinnae, oblong, 5–8 × ca. 3 mm, obtuse at apices, basal acroscopic ones usually longer and crenate; veinlets 6–12 pairs, proximal pair anastomosing or sometimes only connivent, distal veins ending before margin and above sinus. Laminae herbaceous, yellowish green when dried, with pale long acicular hairs along rachises, costae, and veins on both surfaces. Sori orbicular, medial; indusia with dense pale acicular hairs. Sporangia bearing golden glands on stalks. Spores echinate or tuberculate.

Wet places in forests; 1300–1400 m. ?Taiwan, S Yunnan (Jinping) [?NE India, Thailand].

The character of veinlets not reaching the margin is unique in this species of *Cyclosorus* but also occurs in *Metathelypteris*. The connivent veinlets resemble those of *Pseudocyclosorus*. The systematic position of this species requires more study.

15. Cyclosorus procurrens (Mettenius) Copeland, Fern Fl. Philipp. 2: 340. 1960.

无腺毛蕨 wu xian mao jue

Aspidium procurrens Mettenius, Ann. Mus. Bot. Lugduno-Batavi 1: 231. 1864; *Cyclosorus kweichowensis* Ching ex K. H. Shing; *C. laui* Ching; *Dryopteris procurrens* (Mettenius) Kuntze; *Nephrodium procurrens* (Mettenius) Baker; *Thelypteris procurrens* (Mettenius) C. F. Reed.

Plants 35–100 cm tall. Rhizomes shortly creeping, including bases of stipes with sparse brown lanceolate scales. Fronds approximate; stipes 15–40 cm, brown at bases, distally dark stramineous; laminae 20–60 × 15–25 cm, bases not narrowed or slightly so, apices long acuminate; pinnae 15–25 pairs, sessile, proximal 1 or 2 pairs sometimes slightly shortened and reflexed; middle pinnae linear-lanceolate, 10–18 × 1.5–2 cm, bases truncate, lobed ca. 2/3 toward costae, apices long acuminate; segments 20–30 pairs on middle pinnae, subfalcate-oblong, 4–8 × 3–4 mm (basal acroscopic one longer), obtuse at apices; veinlets 6–10 pairs, proximal pair anastomosing, next 0.5–1 pairs running to sinus membrane. Laminae herbaceous to papery, yellowish green to brownish green when dried, with sparse short acicular hairs adaxially, abaxial surface with dense pale acicular hairs. Sori orbicular, medial; indusia densely hairy. Sporangia bearing reddish orange glands on stalks. Spores winged or otherwise ornamented.

Semi-open places by forest margins, thickets; 300–1400 m. Guangdong, Guangxi, S Guizhou, Hainan, Taiwan, S Yunnan [S India, Indonesia, Malaysia, Myanmar, Philippines].

Cyclosorus procurrens is quite similar to *C. parasiticus* and differs only in being eglandular on the pinnae. But there are many intermediate specimens. Holttum (Kew Bull. 31: 309. 1976) regarded *C. procurrens* as a synonym of *C. parasiticus*. This treatment seems reasonable but we cannot confirm it. Based on similar morphology, these two species probably belong to the same complex.

16. Cyclosorus molliusculus (Wallich ex Kuhn) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 196. 1938.

美丽毛蕨 mei li mao jue

Aspidium molliusculum Wallich ex Kuhn, Bot. Zeitung (Berlin) 26: 41. 1868; *Cyclosorus acutilobus* Ching ex K. H. Shing; *C. densissimus* Ching ex K. H. Shing; *Thelypteris molliuscula* (Wallich ex Kuhn) K. Iwatsuki.

Plants 40–100 cm tall. Rhizomes shortly to long creeping, including bases of stipes with dark brown lanceolate scales. Fronds approximate to distant; stipes 20–40 cm, stramineous; laminae 30–80 × 15–30 cm, bases not narrowed or slightly so, apices acuminate; lateral pinnae 10–20 pairs, sessile, proximal

1–3 pairs slightly shortened and reflexed; middle pinnae linear-lanceolate, 8–15 × 1–2.5 cm, bases truncate, lobed 2/3–4/5 toward costae, apices long acuminate; segments 20–25 pairs, middle ones lanceolate, 5–11 × 3–4 mm (basal acroscopic one longer and crenate), obtuse at apices; veinlets simple (occasionally forked on basal segment), 6–12(–14) pairs, proximal pair anastomosing, next vein running to sinus membrane. Laminae herbaceous, yellowish green when dried, both surfaces particularly along costae and veins with sparse slender acicular hairs, adaxially with several short acicular hairs between veins. Sori orbicular, supramedial, proximal pair usually confluent; indusia small, with acicular hairs. Sporangia without conspicuous glands. Spores brown, with long fimbriate wings.

Semi-open places by forest margins, roadsides, thickets; 100–1600 m. Guangxi, S Guizhou, S Yunnan [India, Myanmar, Nepal, Thailand].

According to Iwatsuki (Fl. Thailand 3: 424. 1988) and K. H. Shing (FRPS 4(1): 198. 1999), *Cyclosorus molliusculus* is distributed from SW China to Thailand. However, the present authors found that the specimens from S Yunnan, although similar in outline, are quite different from those from SE Xizang, Nepal, and N India. It may be questionable to use this name to represent the plants from Guangxi, Guizhou, and S Yunnan. As this problem cannot be resolved here, for the purposes of this treatment, we temporarily follow the treatments of Shing (loc. cit.) and Lu (Fl. Yunnan. 20: 605. 2006).

17. Cyclosorus cylindrothrix (Rosenstock) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 199. 1938.

柱腺毛蕨 zhu xian mao jue

Dryopteris cylindrothrix Rosenstock, Repert. Spec. Nov. Regni Veg. 12: 246. 1913; *Christella cylindrothrix* (Rosenstock) Holttum; *Cyclosorus parasiticus* (Linnaeus) Farwell var. *cylindrothrix* (Rosenstock) Tardieu & C. Christensen; *Thelypteris cylindrothrix* (Rosenstock) K. Iwatsuki.

Plants 40–80 cm tall. Rhizomes shortly to long creeping. Fronds usually distant; stipes 20–40 cm, stramineous or reddish, proximal part with linear-lanceolate scales; laminae deltoid-lanceolate, 30–40 × ca. 20 cm, bases not narrowed, apices acuminate; lateral pinnae 15–25 pairs, sessile; proximal pinnae slightly reflexed, not or slightly shortened, proximal several pinnae narrowed toward their bases; middle pinnae linear-lanceolate, 9–15 × 1.5–2.5 cm, slightly auriculate on acroscopic bases, bases truncate, lobed 2/3–3/4 toward costae, apices long acuminate; segments ca. 30 pairs on middle pinnae, 4–6 × 2–3 mm, obtuse at apices; veinlets 6–10 pairs, proximal pair anastomosing with a short excurrent veinlet running to sinus membrane. Laminae herbaceous to papery, yellowish green or grayish green when dried, abaxially with short acicular hairs and many golden thin clavate glands throughout, with short acicular hairs along costae and veins and between veins adaxially. Sori orbicular, medial or supramedial; indusia with sparse short hairs and golden clavate glands. Sporangia bearing similar glands on stalks. Spores with wings.

SE Xizang (Mêdog) [Bhutan, N India, N Myanmar, Nepal, Thailand].

This is a new record for China.

Cyclosorus cylindrothrix has only one gathering from China, and the rhizome is lacking. The description of rhizomes, stipe bases, and scales are according to Holttum (Kew Bull. 31: 308. 1976).

18. Cyclosorus procerus (D. Don) S. Lindsay & D. J. Middleton, Nordic J. Bot. 30: 308. 2012.

高毛蕨 gao mao jue

Nephrodium procerum D. Don, Prodr. Fl. Nepal. 6. 1825; *Aspidium procerum* (D. Don) Sprengel; *Christella appendiculata* Holttum; *Cyclosorus appendiculatus* Panigrahi (1993), not (Blume) Ching (1941); *C. dulongjiangensis* W. M. Chu; *N. appendiculatum* C. Presl (1851), not Schott (1834); *Thelypteris procera* (D. Don) Fraser-Jenkins.

Plants 60–120 cm tall. Rhizomes long creeping, including stipe bases with brown lanceolate scales. Fronds distant; stipes 20–40 cm, stramineous; laminae 40–90 × 20–30 cm, bases slightly narrowed, apices acuminate; lateral pinnae 20–30 pairs, proximal 2–5 pairs slightly shortened; middle pinnae lanceolate, 8–18 × 1.5–4 cm, bases truncate, lobed 4/5 or more toward costae, apices long acuminate; segments 20–30 pairs, lanceolate, 10–15 × 2–3 mm, entire (basal acroscopic segment longer and crenate), pointed or acute at apices; veinlets 10–15 pairs, basal pair anastomosing. Laminae herbaceous, yellowish green when dried, with sparse long pale acicular hairs along abaxial surface of rachises and both sides of veins, and minute yellow glands along veins abaxially, glabrous between veins on both surfaces. Sori orbicular, submarginal; indusia very small, glabrous or with several long acicular hairs. Sporangia bearing small orange glands on stalks. Spores variously winged, tuberculate, or echinate.

Semi-open places in sparse forests, roadsides; 1100–2400 m. SE Xizang, W Yunnan [Bhutan, N India, Nepal, Thailand].

K. H. Shing (FRPS 4(1): 202. 1999) mentioned that the type of *Cyclosorus dulongjiangensis* might be a hybrid and needed further research. We have examined the type in PYU, and the spores appeared well developed; thus, the spores of this species do not support its putative hybrid status.

19. Cyclosorus parasiticus (Linnaeus) Farwell, Amer. Midl. Naturalist 12: 259. 1931.

华南毛蕨 hua nan mao jue

Polypodium parasiticum Linnaeus, Sp. Pl. 2: 1090. 1793; *Aspidium parasiticum* (Linnaeus) Swartz; *Christella parasitica* (Linnaeus) H. Léveillé; *Cyclosorus aureoglandulosus* Ching & K. H. Shing; *C. damingshanensis* Ching ex K. H. Shing; *C. excelsior* Ching & K. H. Shing; *C. hainanensis* Ching; *C. orientalis* Ching ex K. H. Shing; *C. rupicola* Ching & K. H. Shing; *C. xunwuensis* Ching ex K. H. Shing & J. F. Cheng; *C. yandongensis* Ching & K. H. Shing; *Dryopteris parasitica* (Linnaeus) Kuntze; *Nephrodium parasiticum* (Linnaeus) Desvaux; *Thelypteris parasitica* (Linnaeus) Tardieu.

Plants (30–)50–70(–100) cm tall. Rhizomes shortly to long creeping, including stipe bases with dark brown lanceolate scales. Fronds approximate to distant; stipes (10–)20–30(–40) cm, stramineous; laminae (20–)30–50(–60) × (8–)15–25(–35) cm, bases not narrowed (sometimes slightly narrowed), apices

caudate-acuminate; lateral pinnae 10–15(–20) pairs, proximal 1 or 2 pairs reflexed; middle pinnae lanceolate, (5–)10–15(–20) × (0.5–)1–1.5 cm, bases truncate, lobed 1/2–2/3 toward costae, apices long acuminate; segments 20–25 pairs, 3–4 × ca. 3 mm (basal acroscopic one longer, sometimes crenate), obtuse to subacute at apices; veinlets 5–8 pairs, simple (ca. 10 pairs on basal acroscopic segment, occasionally forked), proximal pair anastomosing, sometimes next vein running to sinus membrane. Laminae herbaceous, brownish green or yellowish green when dried, with thin acicular hairs throughout on both surfaces, and reddish orange glands throughout abaxially. Sori orbicular, medial; indusia densely hairy. Sporangia bearing reddish orange glands on stalks. Spores with wings. $2n = 72, 108, 144$.

Semi-open places in thickets, roadsides; near sea level to 1900 m. Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [N India, Indonesia, Japan, Korea, Laos, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

The authors have not seen material of *Cyclosorus parasiticus* var. *formosanus* Ching (Bull. Fan Mem. Inst. Biol., Bot. 8: 205. 1938; *Thelypteris parasitica* var. *formosana* (Ching) C. F. Reed), described from Taiwan.

The type of *Cyclosorus brevipes* Ching ex K. H. Shing (FRPS 4(1): 336. 1999) is partly bipinnate-pinnatifid with veins and glands similar to those of *C. parasiticus*. It has no sori and only one gathering has been collected. This taxon might be a hybrid.

The type of *Cyclosorus pauciserratus* Ching & C. F. Zhang (Bull. Bot. Res., Harbin 3(3): 8. 1983) has no mature sori. Only one gathering has been made. This taxon might represent a young frond of *C. parasiticus*.

The types of *Cyclosorus contractus* Ching ex K. H. Shing (FRPS 4(1): 333. 1999) and *C. parvilobus* Ching ex K. H. Shing (FRPS 4(1): 338. 1999) both have the features intermediate between *C. acuminatus* and *C. parasiticus*. Each species has only one gathering (the type) with no sori collected. These two taxa might be hybrids.

Cyclosorus ×*intermedius* W. C. Shieh & J. L. Tsai (J. Sci. Engin. 24: 8. 1987) is endemic to Taiwan. It is the putative hybrid between *C. dentatus* and *C. parasiticus*.

20. Cyclosorus pygmaeus Ching & C. F. Zhang, Bull. Bot. Res., Harbin 3(3): 5. 1983.

矮毛蕨 ai mao jue

Cyclosorus chengii Ching ex K. H. Shing & J. F. Cheng.

Plants 15–40 cm tall. Rhizomes suberect, with brown lanceolate scales. Fronds clustered; stipes 5–15 cm, stramineous; laminae equal to stipes or slightly shorter in length, 5–15 × 3–7 cm, bases not narrowed, apices acuminate; pinnae ca. 10 pairs, sessile, proximal pinnae lanceolate, 1.5–4 × 0.3–0.7 cm, bases truncate, lobed ca. 1/2 toward costae, apices acuminate; segments oblong, obtuse or subtruncate at apices; veinlets 4–6 pairs per segment, proximal pair anastomosing, others to margin above sinus. Laminae herbaceous when dry, yellowish green, with short acicular hairs on both surfaces, and many glandular hairs abaxially. Sori small, submarginal, proximal pair usually confluent; indusia with short thin acicular hairs. Sporangia bearing reddish orange glands on stalks. Spores with short wings.

● Among rocks along streams, wet forest margins; below 100–800 m. Jiangxi, Zhejiang.

21. Cyclosorus hirtisorus (C. Christensen) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 221. 1938.

毛囊毛蕨 mao nang mao jue

Dryopteris hirtisora C. Christensen, Contr. U.S. Natl. Herb. 26: 277. 1931; *D. hirticarpa* Ching; *Sphaerostephanos hirtisorus* (C. Christensen) Holttum; *Thelypteris hirtisora* (C. Christensen) K. Iwatsuki.

Plants 60–100 cm tall. Rhizomes long creeping, with ovate-lanceolate dark brown scales. Fronds distant; stipes 20–50 cm, dark brown and sparsely scaly at bases, dark stramineous distally; laminae 40–70 × 20–40 cm, bases slightly or not narrowed, apices caudate with a large apical pinna; pinnae 10–15 pairs, stalked, proximal pair abruptly reduced to 2–5 cm or sometimes longer; middle pinnae linear, 10–25 × 1–2 cm, bases broadly cuneate to truncate, lobed to 1/3 toward costae or only serrate, apices long acuminate; segments 30–45 pairs, triangular or oblong, 2–4 × ca. 4 mm, subacute or pointed at apices; veinlets 7–10 pairs, quite oblique, proximal 1 or 2 pairs anastomosing, next 1.5–2.5 pairs running to sinus membrane. Laminae papery, brownish green when dried, on both surfaces with acicular hairs along costae and veins, also with minute hairs between veins abaxially. Sori orbicular, medial; indusia densely hairy. Sporangia bearing several hairs on capsules. Spores with fimbriate wings.

Wet places in forests, semi-open forest margins; 500–1800 m. Guangxi, S Yunnan [Laos, Myanmar, Thailand].

22. Cyclosorus attenuatus Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 341. 1999.

下延毛蕨 xia yan mao jue

Cyclosorus mollissimus Ching ex K. H. Shing.

Plants 50–100 cm tall. Rhizomes shortly creeping, including stipe bases with lanceolate dark brown scales. Fronds approximate; stipes 25–45 cm, stramineous; laminae 30–70 × 20–40 cm, bases not narrowed or slightly so, apices caudate; lateral pinnae 10–20 pairs, lanceolate, middle pinnae 8–20 × 2–3.5 cm, bases cuneate to truncate, apices long acuminate; proximal pinnae slightly shortened, shortly decurrent toward bases, shortly stalked; apical pinnae similar to lateral ones with several longer segments at bases; middle pinnae lobed to 1/3 toward costae, sometimes only crenate; segments 25–40 pairs, falcate-triangular, 2–5 × ca. 3 mm, entire, obtuse or acute at apices; veinlets 6–10 pairs, proximal 2–5 pairs anastomosing, next 1–1.5 pairs running to sinus membrane. Laminae papery, grayish green when dried, with several acicular hairs along costae adaxially, abaxial surface with dense long acicular hairs, and short hairs between veins. Sori orbicular, medial; indusia densely hairy. Sporangia bearing several hairs on capsules. Spores shortly and thickly cristate.

● Wet places in forests, forest margins; 300–1100 m. SE Yunnan.

23. Cyclosorus articulatus (Houlston & T. Moore) Panigrahi, Res. J. Pl. Environ. 9: 66. 1993.

节状毛蕨 jie zhuang mao jue

Nephrodium articulatum Houlston & T. Moore, Gard. Mag. Bot. 3: 293. 1851; *Christella euphlebia* (Ching) Holttum; *Cyclosorus euphlebius* Ching; *C. laetestrigosus* (C. B. Clarke) Ching; *C. nigrescens* Ching ex K. H. Shing; *C. transitorius* Ching ex K. H. Shing; *C. yunnanensis* Ching ex K. H. Shing; *N. glandulosum* J. Smith var. *laetestrigosum* C. B. Clarke; *Pronephrium articulatum* (Houlston & T. Moore) Holttum; *Thelypteris articulata* (Houlston & T. Moore) Tagawa & K. Iwatsuki; *T. euphlebia* (Ching) C. F. Reed.

Plants 0.6–1.5 m tall. Rhizomes massive, shortly creeping, including stipe bases with brown ovate-lanceolate scales and brown setae. Fronds clustered to approximate; stipes 20–60 cm, bases blackish brown, dark stramineous distally with setae; laminae 40–100 × 20–40 cm, bases slightly narrowed, apices acuminate to caudate; lateral pinnae 10–25 pairs, proximal 1 or 2 pairs slightly shortened, shortly stalked, bases cuneate and decurrent; middle pinnae almost sessile, sterile pinnae 15–20 × 2–5 cm (fertile ones narrower), lanceolate, bases rounded-truncate, lobed to 1/4 toward costae or shallowly serrate, apices acuminate or caudate; aerophores beneath pinna bases slightly swollen; segments/serrations 25–40 pairs on middle pinnae, triangular, 1–3 × ca. 3 mm, obtuse at apices; veinlets 6–12 pairs, proximal 2–6 pairs anastomosing with usually interrupted excurrent veinlet, next 1–3 pairs to prominent sinus membrane. Laminae papery, brownish green or reddish green when dried, adaxially with brown or pale setae along costae, abaxial surface with sparse setae along costae and veins (sometimes also between veins). Sori orbicular, medial or supramedial; indusia glabrous. Sporangia bearing minute light yellow glands on stalks. Spores brown, echinate.

Wet places in forests, forest margins; 200–1100 m. Guangxi, S Guizhou, SE Xizang, S Yunnan [India, Sri Lanka, Thailand, Vietnam].

24. Cyclosorus papilio (C. Hope) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 214. 1938.

蝶状毛蕨 die zhuang mao jue

Nephrodium papilio C. Hope, J. Bombay Nat. Hist. Soc. 12: 625. 1899; *Christella papilio* (C. Hope) Holttum; *Dryopteris papilio* (C. Hope) C. Christensen; *Thelypteris papilio* (C. Hope) K. Iwatsuki.

Plants 60–120 cm tall. Rhizomes erect, including stipe bases with brown ovate-lanceolate scales. Fronds clustered; stipes 10–20 cm, dark stramineous or reddish; laminae 40–110 × 20–30 cm, bases gradually narrowed, apices acuminate to caudate; lateral pinnae 30–40 pairs, sessile, proximal 5–10 pairs gradually shortened, triangular, often hastate with basal segment elongate on both sides of rachises; middle pinnae linear-lanceolate, 10–18 × 1.5–2 cm, bases truncate, lobed 2/5–1/2 toward costae, apices long acuminate; segments 20–25 pairs on middle pinnae, oblong, 3–5 × 3–4 mm (basal acroscopic one slightly longer), entire, obtuse at apices; veinlets 5–8 pairs, proximal pair anastomosing, next 1–1.5 pairs running to sinus membrane. Laminae papery, grayish green when dried, adaxially with sparse acicular hairs along costae and veins, abaxial surface subglabrous. Sori orbicular, medial; indusia shortly hairy. Sporangia bearing large reddish orange spherical glands on stalks. Spores echinate. $2n = 72, 216$.

Wet places in forests, on rocks in streams or beside streams; 500–2400 m. S Sichuan, Taiwan, SE Xizang, Yunnan [N India, Kashmir, Nepal, Sri Lanka].

25. Cyclosorus evolutus (C. B. Clarke & Baker) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 219. 1938.

展羽毛蕨 zhan yu mao jue

Nephrodium amboinense C. Presl var. *evolutum* C. B. Clarke & Baker, J. Linn. Soc., Bot. 24: 417. 1888 [*"evoluta"*]; *Christella evoluta* (C. B. Clarke & Baker) Holttum; *Cyclosorus chingii* Z. Y. Liu ex Ching & Z. Y. Liu; *C. flaccidus* Ching & Z. Y. Liu; *Dryopteris evoluta* (C. B. Clarke & Baker) C. Christensen; *N. evolutum* (C. B. Clarke & Baker) Beddome; *Thelypteris evoluta* (C. B. Clarke & Baker) Tagawa & K. Iwatsuki.

Plants 60–120 cm tall. Rhizomes shortly to long creeping, including stipe bases with dark brown lanceolate scales. Stipes 15–40 cm, dark stramineous; laminae 40–80 × 20–40 cm, bases abruptly narrowed, apices caudate with a large apical pinna; lateral pinnae 10–20 pairs, proximal 1–5 pairs abruptly shortened, proximal pair triangular-auriculate, ca. 3 × 2 cm or longer, reflexed, sometimes hastate; middle pinnae lanceolate, 12–20 × (1.5–)2–4 cm, bases truncate to rounded-truncate, sessile or subsessile, lobed 1/5–1/3 toward costae, sometimes only crenate, apices long acuminate or caudate; segments 20–30 pairs per pinna on middle pinnae, ovate or oblong, 2–6 × 5–7 mm, obtuse at apices; veinlets 7–9 pairs per segment, proximal 1.5–3 pairs anastomosing, next 1–3 pairs running to sinus membrane. Laminae papery, grayish green when dried, subglabrous or glabrous on both surfaces (rarely shortly hairy). Sori orbicular, inframedial or medial; indusia glabrous or shortly hairy. Sporangia bearing large reddish orange spherical glands on stalks. Spores thickly cristate.

Wet places in dense forests; 300–1600 m. Chongqing, Guangxi, Guizhou, Hunan, Yunnan [India, Thailand].

There are several specimens of *Cyclosorus evolutus* with short hairs on the abaxial surface; but other characteristics are similar to the type, so no infraspecific name is given here.

26. Cyclosorus latipinnus (Bentham) Tardieu, Notul. Syst. (Paris) 7: 73. 1938.

宽羽毛蕨 kuan yu mao jue

Aspidium molle Swartz var. *latipinnum* Bentham, Fl. Hongk. 455. 1861; *A. latipinnum* (Bentham) Hance; *Christella latipinna* (Bentham) H. Léveillé; *Cyclosorus decipiens* Ching; *C. grossodentatus* Ching ex K. H. Shing; *C. nanpingensis* Ching; *C. oblanceolatus* K. H. Shing & C. F. Zhang; *C. papilionaceus* K. H. Shing & C. F. Zhang; *C. paralatipinnus* Ching ex K. H. Shing; *Dryopteris latipinna* (Bentham) Kuntze; *D. parasitica* (Linnaeus) Kuntze var. *latipinna* (Bentham) C. Christensen; *Nephrodium latipinnum* (Bentham) Hooker ex Baker; *Thelypteris latipinna* (Bentham) K. Iwatsuki.

Plants (15–)20–40(–60) cm tall. Rhizomes shortly creeping, dark brown, apices and stipe bases with sparse brown linear-lanceolate scales. Fronds approximate; stipes 5–20 cm; laminae 10–30 × 5–15 cm, bases narrowed, apices caudate with a large and deeper lobed apical pinna; lateral pinnae 4–10 pairs, proximal 1–4 pairs shortened with lowest pair ca. 1 × 0.5 cm, triangular-auriculate; middle pinnae lanceolate or oblanceolate, 3–10 × 1.5–2 cm, bases rounded-truncate, lobed 1/4–1/3 toward costae, sometimes subentire, apices acuminate or acute; segments 10–20 pairs, 1–3 × ca. 3 mm, entire, obtuse at apices; veinlets 5 or 6 pairs, proximal pair anastomosing, next 0.5–1 pair running to sinus membrane, excurrent veinlet usually interrupted. Laminae herbaceous, yellowish green when dried, shortly hairy along costae and veins adaxially, abaxial surface with very minute hairs and several reddish orange glands along veins, also with capitate glandular hairs throughout. Sori orbicular, medial, proximal pair usually confluent; indusia shortly hairy. Sporangia bearing reddish orange glands on stalks. Spores brown, large, irregularly small tuberculate and echinate.

Wet or semi-open forest margins, beside streams; near sea level to 1300 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, N and S Taiwan, S Yunnan, S Zhejiang [India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Pacific islands (Polynesia)].

According to the author's study, *Cyclosorus latipinnus* is a species of variable size, not always a small plant as described in FRPS (4(1): 227. 1999), so many names are treated as synonyms here. Characters such as venation, capitate glandular hairs, and spore ornamentation are similar.

Holttum (Kew Bull. 31: 324. 1976; Fl. Males., Ser. 2, 1. 1982) treated both *Cyclosorus latipinnus* and *C. jaculosus* as synonyms of *Christella subpubescens* (Blume) Holttum (*Aspidium subpubescens* Blume; *Cyclosorus subpubescens* (Blume) Ching; *Thelypteris subpubescens* (Blume) K. Iwatsuki), which makes *C. subpubescens* a complex and confused species. We found that *C. jaculosus* and *C. latipinnus* are two distinct species, so the application of the name *C. subpubescens* is questionable. Pending detailed studies of the type, we maintain the use of the name *C. latipinnus*.

27. Cyclosorus acuminatus (Houttuyn) Nakai in Thunberg, Misc. Pap. Japan. Pl. 15. 1935.

渐尖毛蕨 jian jian mao jue

Plants (20–)40–60(–80) cm tall. Rhizomes long creeping, apices including stipe bases with brown lanceolate scales. Fronds distant; stipes (10–)20–30(–40) cm, stramineous to brown; laminae (10–)30–50(–60) × 10–25 cm, bases not narrowed or slightly so, apices caudate to acuminate; lateral pinnae (5–)10–20 pairs, shortly stalked; middle pinnae linear-lanceolate to lanceolate, (5–)8–15(–18) × (0.5–)0.8–1.5(–2) cm, bases truncate or shallowly cordate, lobed 1/2–2/3 toward costae, apices acuminate to acute; segments (10–)15–30 pairs, 2–5 × 2–4 mm, basal acroscopic one (sometimes also basiscopic one) longer, sharply pointed or acute at apex; veinlets 6–10 pairs, simple (sometimes forked on basal acroscopic segment), proximal pair anastomosing, next (0.5–)1–1.5 pairs running to sinus membrane. Laminae papery to subleathery, grayish green when dried, both surfaces with short acicular hairs along costae and veins, also with minute hairs throughout. Sori orbicular, submarginal; indusia shortly hairy or subglabrous. Sporangia bearing reddish orange glands on stalks. Spores dark brown, densely cristate. 2*n* = 72, 108, 144, 216.

Semi-open places in thickets, grasslands, farmland margins, roadsides; near sea level to 1700 m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Philippines].

Two forms have been recognized from Taiwan: *Cyclosorus acuminatus* f. *ensipinnus* (Hayata) H. Itô (Bot. Mag. (Tokyo) 51: 712. 1937; *Dryopteris sophoroides* (Thunberg) Kuntze f. *ensipinna* Hayata, Icon. Pl. Formosan. 4: 180–181. 1914) and *C. acuminatus* f. *pilosus* H. Itô (Bot. Mag. (Tokyo) 51: 712. 1937).

1a. Proximal pinnae not shortened, acuminate at apices ..... 27a. var. *acuminatus*
1b. Proximal several pinna pairs slightly shortened, acute at apices ..... 27b. var. *kuliangensis*

27a. Cyclosorus acuminatus var. **acuminatus**

渐尖毛蕨(原变种) jian jian mao jue (yuan bian zhong)

Polypodium acuminatum Houttuyn, Nat. Hist. 2(14): 181. 1783; *Aspidium sophoroides* (Thunberg) Swartz; *Christella acuminata* (Houttuyn) Holttum; *C. sophoroides* (Thunberg) H. Léveillé; *Cyclosorus cangnanensis* K. H. Shing & C. F. Zhang; *C. ciliensis* K. H. Shing; *C. dissitus* Ching ex K. H. Shing; *C. glabrescens* Ching ex K. H. Shing; *C. kuizhouensis* K. H. Shing; *C. nanchuanensis* Ching & Z. Y. Liu; *C. sinoacuminatus* Ching & Z. Y. Liu; *C. sophoroides* (Thunberg) Tardieu; *C. subacuminatus* Ching ex K. H. Shing & J. F. Cheng; *C. subcoriaceous* Ching ex K. H. Shing; *Dryopteris acuminata* (Houttuyn) Nakai; *D. sinica* Christ; *D. sophoroides* (Thunberg) Kuntze; *Nephrodium sophoroides* (Thunberg) Desvaux; *P. sophoroides* Thunberg; *P. unitum* Thunberg (1784), not Linnaeus (1759); *Thelypteris acuminata* (Houttuyn) C. V. Morton.

Proximal pinnae usually not shortened, acuminate at apices; laminae with usually 2 pairs of veinlets beneath sinus.

Semi-open places in thickets, grasslands, farmland margins, roadsides; near sea level to 1700 m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Philippines].

The type of *Cyclosorus abbreviatus* Ching & K. H. Shing ex K. H. Shing & J. F. Cheng (Jiangxi Sci. 8(3): 45. 1990) has features intermediate between *C. acuminatus* var. *acuminatus* and *C. aridus*. This taxon might be a hybrid.

The type of *Cyclosorus yuanjiangensis* Ching ex K. H. Shing (FRPS 4(1): 335. 1999) has features intermediate between *C. acuminatus* var. *acuminatus* and *C. procurrens*. Only one gathering with rare mature sori has been collected. This taxon might be a hybrid.

The type of *Cyclosorus zhangii* K. H. Shing (FRPS 4(1): 340. 1999) has features intermediate between *C. acuminatus* var. *acuminatus* and *C. parasiticus*. Only one gathering (the type) without mature sori has been collected. This taxon might be a hybrid.

The type of *Cyclosorus tarningensis* Ching (Wuyi Sci. J. 1: 4. 1981) might be an irregular plant of *C. acuminatus* var. *acuminatus*. The spores of the two species appear similar.

The type of *Cyclosorus nanchuanensis* Ching & Z. Y. Liu (Bull. Bot. Res., Harbin 4(3): 14. 1984) has not been examined by us, but it seems quite similar to *C. acuminatus* var. *acuminatus* according to the photo. Thus, this taxon is synonymized here, pending further study.

27b. Cyclosorus acuminatus var. **kuliangensis** Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 192. 1938.

鼓岭渐尖毛蕨 gu ling jian jian mao jue

Christella acuminata monstr. *kuliangensis* (Ching) Nakaike; *C. acuminata* var. *kuliangensis* (Ching) C. M. Kuo; *Cyclosorus kuliangensis* (Ching) K. H. Shing; *Thelypteris acuminata* var. *kuliangensis* (Ching) K. Iwatsuki.

Pinnae usually 4–8 pairs, oblanceolate; proximal several pinnae enlarged at apices and abruptly acute; veinlets usually 1.5 pairs below sinuses.

● Semi-open places in thickets, grasslands, farmland margins, roadsides; near sea level to 1200 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Yunnan, Zhejiang.

The types of *Cyclosorus paracuminatus* Ching ex K. H. Shing & J. F. Cheng (Jiangxi Sci. 8(3): 46. 1990) resemble this variety in general outline but have orange glands abaxially and lack sori. Only one gathering (the type) without sori has been collected. This taxon might be a hybrid.

Cyclosorus acuminatus var. *acuminatoides* W. C. Shieh & J. L. Tsai (J. Sci. Engin. 24: 8. 1987) is endemic to Taiwan. This variety is a probable hybrid between *C. acuminatus* var. *acuminatus* and *C. acuminatus* var. *kuliangensis*.

28. Cyclosorus nanxiensis Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 343. 1999.

南溪毛蕨 nan xi mao jue

Plants 40–100 cm tall. Rhizomes shortly creeping, including stipe bases with dense dark brown linear-lanceolate scales. Fronds approximate; stipes 15–30 cm, dark stramineous or reddish; laminae 25–70 × 20–30 cm, proximally slightly narrowed, apices acuminate to caudate; lateral pinnae 10–18 pairs, subsessile, proximal 1 or 2 pairs shortened; middle pinnae 5–15 × 1–2 cm, sterile ones usually broader, lanceolate, bases subtruncate or broadly cuneate, lobed to 1/2 toward costae or only serrate, apices long acuminate; segments 15–25 pairs on middle pinnae, oblong, 2–5 × ca. 3 mm, subacute or obtuse at apices; veinlets 5–8 pairs, proximal 1.5–2.5 pairs anastomosing, next 1–1.5 pairs running to sinus membrane. Laminae papery, brownish green or grayish green when dried, adaxially shortly hairy along costae and veins, abaxially with sparse short hairs along costae and veins, with minute hairs throughout. Sori orbicular, medial, proximal pair sometimes confluent; indusia subglabrous or minutely hairy. Sporangia bearing orange glands on stalks. Spores shortly cristate or echinate.

● Wet places in forests; 100–700 m. SE Yunnan (Hekou).

29. Cyclosorus scaberulus Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 223. 1938.

糙叶毛蕨 cao ye mao jue

Christella scaberula (Ching) Holttum; *Thelypteris scaberula* (Ching) C. F. Reed.

Plants 70–100 cm tall. Rhizomes shortly creeping, with dark brown linear-lanceolate scales. Fronds approximate; stipes 30–45 cm, dark stramineous, subglabrous or with sparse scales to middle of rachises; laminae 40–60 × 15–30 cm, bases not narrowed or slightly narrowed, apices caudate to acuminate; pinnae 10–20 pairs, subsessile; middle pinnae 8–15 × 1.5–2.5 cm, lobed 1/3–2/5 toward costae, lanceolate, bases rounded-truncate, apices long acuminate; segments 20–35 pairs on middle pinnae, triangular, 3–4 × 2–4 mm, obtuse or acute at apices; veinlets 8–11 pairs, proximal 2 pairs anastomosing, next 1–1.5 pairs running to sinus membrane. Laminae papery, grayish green to brownish green when dried, adaxially with several acicular hairs along costae and veins, also with minute hairs between veins, abaxial surface with minute hairs throughout (sometimes with several scales on costae). Sori orbicular, medial to supramedial; indusia glabrous or shortly hairy. Sporangia bearing reddish orange glands on stalks. Spores echinate or shortly cristate. $2n = 72$.

● Nearby streams, wet places in dense forests; 700–1200 m. Hainan.

30. Cyclosorus calvescens Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 225. 1938.

光羽毛蕨 guang yu mao jue

Christella calvescens (Ching) Holttum; *Cyclosorus sanduensis* K. H. Shing & P. S. Wang; *Thelypteris calvescens* (Ching) C. F. Reed.

Plants 60–100 cm tall. Rhizomes shortly creeping, including stipe bases with dark brown lanceolate scales. Fronds approximate; stipes 20–50 cm, dark stramineous; laminae ovate-lanceolate, 40–60 × 20–35 cm, bases not narrowed or slightly so, apices caudate with a long apical pinna; lateral pinnae 10–15 pairs, middle ones 15–20 × 2–3 cm, bases cuneate (decurrent on proximal pinnae), shortly stalked, lobed 1/4–1/3 toward costae, apices long acuminate; proximal 1 or 2 pairs shortened to less than 1/2 length of middle pinnae or sometimes longer; segments 20–30 pairs on middle pinnae, triangular, entire, obtuse or subacute at apices; veinlets 8–10 pairs, proximal 1.5–2 pairs anastomosing, next 1.5–2.5 pairs running to sinus membrane. Laminae papery, grayish green or brownish green when dried, adaxially with sparse acicular hairs along costae and veins, abaxial surface subglabrous. Sori orbicular or elongate, medial; indusia subglabrous. Sporangia bearing orange or golden glands on stalks. Spores irregularly cristate or echinate.

Wet places in forests; 300–1600 m. Guangxi, S Guizhou, S Yunnan [Vietnam].

31. Cyclosorus hokouensis Ching, Bull. Fan Mem. Inst. Biol., n.s., 1: 289. 1949.

河口毛蕨 he kou mao jue

Christella hokouensis (Ching) Holttum; *Thelypteris hokouensis* (Ching) C. F. Reed.

Plants 0.8–1.3 m tall. Rhizomes long creeping, dark brown, including stipe bases with sparse dark brown lanceolate scales and brown setae. Fronds distant; stipes 10–15 cm, dark stramineous; laminae 70–120 × 20–35 cm, bases abruptly nar-

rowed, apices caudate; pinnae 20–35 pairs, proximal 5–15 pairs abruptly reduced into hastate pinnae with caudate apices, proximal pair ca. 1 × 0.5 cm; middle pinnae linear-lanceolate, 10–18 × 1–2 cm, bases truncate, lobed 1/4–1/3 toward costae, apices long acuminate; segments 20–30 pairs on middle pinnae, oblong, 2–5 × ca. 3 mm, entire, subacute at apices; veinlets 8–11 pairs, proximal 2 or 3 pairs anastomosing, next 1–1.5 pairs running to sinus membrane. Laminae papery, brownish green when dried, with dense acicular hairs along costae on both surfaces, with several acicular hairs along veins adaxially, with dense acicular hairs throughout and several capitate glandular hairs abaxially. Sori orbicular, medial; indusia hairy. Sporangia with small reddish orange glands on stalks. Spores with short wings.

Semi-open forests, wet places in forests, forest margins; 100–1100 m. SW Guangxi, SE Yunnan [E India].

The type of *Cyclosorus caii* Ching ex K. H. Shing (FRPS 4(1): 346. 1999) has features intermediate between *C. hokouensis* and *C. aridus*. Only one gathering (3 sheets of the type) with rare fertile sori has been collected. This taxon might be a hybrid.

32. Cyclosorus gustavii (Beddome) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 215. 1938.

古斯塔毛蕨 gu si ta mao jue

Nephrodium gustavii Beddome, J. Bot. 31: 227. 1893; *Christella gustavii* (Beddome) Holttum.

Plants 50–100 cm tall. Rhizomes long creeping, including stipe bases with linear-lanceolate dark brown scales, similar scales on stipe bases. Fronds distant; stipes 15–25 cm, dark stramineous; laminae 40–80 × 25–35 cm, bases gradually narrowed, apices caudate with a large apical pinna; lateral pinnae 10–15 pairs, lanceolate, 12–18 × 2–3 cm, lobed ca. 1/3 toward costae, bases truncate to broadly cuneate, almost sessile, apices acuminate; apical pinnae similar to lateral ones; proximal 3–5 pairs of lateral pinnae gradually shortened, lowest pair ca. 2 cm; segments 20–30 pairs on middle pinnae, 3–4 × 3–4 mm, entire, obtuse at apices; veinlets 6–12 pairs, proximal 2 or 3 pairs anastomosing, next 1–1.5 pairs running to sinus membrane. Laminae papery, grayish green when dried, with several acicular hairs along costae and veins adaxially, with short acicular hairs along veins and minute hairs between veins abaxially. Sori orbicular, medial; indusia shortly hairy. Sporangia lacking conspicuous glands. Spores brown with long fimbriate wings.

Wet places in forests; 600–1000 m. W Yunnan [India, Thailand].

Cyclosorus gustavii has only two gatherings from W Yunnan, so our knowledge about it is quite limited. The distinction between this species and *C. assamicus* (Beddome) Ching, which also occurs in NE India, is not obvious. Here, we follow the treatment in Fl. Yunnan. (20: 613. 2006).

33. Cyclosorus wulingshanensis C. M. Zhang, Keys Vasc. Pl. Wuling Mts. 567. 1995.

武陵毛蕨 wu ling mao jue

Cyclosorus leipoensis Ching & H. S. Kung ex K. H. Shing.

Plants 70–120 cm tall. Rhizomes long creeping, with lanceolate dark brown scales and setae. Stipes 10–30 cm, dark stramineous; laminae 60–100 × 15–30 cm, bases gradually narrowed, apices acuminate to caudate; lateral pinnae 15–25 pairs, proximal 3–6 pairs gradually shortened, sometimes hastate with longer basal acroscopic segments, lowest pair 1.5–3 × ca. 2 cm; middle pinnae lanceolate, 10–18 × 1.5–2.5 cm, bases rounded-truncate, lobed 1/4–2/5 toward costae, apices long acuminate; segments 25–35 pairs on middle pinnae, 2–5 × ca. 3 mm (basal acroscopic segment longer), obtuse at apices; veinlets 6–9 pairs, proximal 1.5–2 pairs anastomosing, next 0.5–1 pair running to sinus membrane. Laminae papery, grayish green when dried, adaxially with sparse short acicular hairs along costae (occasionally along veins), abaxial surface subglabrous except for several short acicular hairs on costae. Sori orbicular, medial; indusia subglabrous. Sporangia bearing golden to orange glands on stalks. Spores thickly cristate.

● Wet places in forests, forest margins; 300–2100 m. Chongqing, Guangxi, W Hunan, S Sichuan, SE Xizang, Yunnan.

34. Cyclosorus jinghongensis Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 337. 1999.

景洪毛蕨 jing hong mao jue

Cyclosorus baiseensis Ching ex K. H. Shing; *C. oppositus* Ching ex K. H. Shing; *C. pumilus* Ching ex K. H. Shing.

Plants 30–80 cm tall. Rhizomes erect to suberect, apices including stipe bases with dark brown lanceolate scales. Fronds clustered; stipes 5–20 cm, stramineous; laminae 25–60 × 8–18 cm, bases gradually narrowed, apices acuminate to caudate; pinnae 10–20 pairs, proximal 3–5 pairs gradually shortened, proximal pair ca. 1 × 1 cm; middle pinnae lanceolate, 5–10 × 1–2 cm, bases subtruncate, lobed ca. 1/3 toward costae, apices acuminate; segments 15–20 pairs, subsquare, 2–4 × ca. 3 mm, entire, obtuse at apices; veinlets 5–7 pairs, proximal 1–1.5 pairs anastomosing, next 1–1.5 pairs running to sinus membrane. Laminae herbaceous, grayish green when dried, veins with sparse short hairs on both surfaces, abaxial surface with reddish orange glands along and between veins. Sori orbicular, medial; indusia shortly hairy. Sporangia bearing reddish orange glands on stalks. Spores thinly cristate.

Wet places in forests, semi-open places by forest margins; 200–1000 m. Guangxi, Hainan, S Yunnan [Thailand, Vietnam].

35. Cyclosorus jaculosus (Christ) H. Itô, Bot. Mag. (Tokyo) 51: 725. 1937.

闽台毛蕨 min tai mao jue

Aspidium jaculosum Christ, Bull. Herb. Boissier, sér. 2, 4: 615. 1904; *Christella jaculosa* (Christ) Holttum; *C. subarida* (Tatewaki & Tagawa) Holttum ex C. M. Kuo; *Cyclosorus aureoglandulifer* Ching ex K. H. Shing; *C. houi* Ching; *C. pararidus* Ching ex K. H. Shing; *C. simillimus* Ching ex K. H. Shing; *C. sparsisorus* Ching ex K. H. Shing; *C. subaridus* Tatewaki & Tagawa; *Dryopteris jaculosa* (Christ) C. Christensen; *Nephrodium jaculosum* (Christ) Hayata; *Thelypteris houi* (Ching) C. F. Reed; *T. jaculosa* (Christ) Panigrahi; *T. subarida* (Tatewaki & Tagawa) C. F. Reed.

Plants 40–100 cm tall. Rhizomes long creeping, dark brown, including stipe bases with dark brown lanceolate scales. Fronds distant; stipes 5–30 cm, dark stramineous; laminae 30–90 × 10–30 cm, bases gradually narrowed, apices caudate to acuminate; pinnae 20–30 pairs, proximal 3–8 pairs gradually shortened with lowest pair ca. 1.5 × 1.5 cm; middle pinnae lanceolate, 6–18 × 1–2 cm, bases rounded-truncate, lobed 1/3–1/2 toward costae, apices long acuminate; segments 15–30 pairs, triangular-oblong, 3–5 × ca. 3 mm, margins sometimes crenate on proximal ones, rounded-obtuse to subacute at apices; veinlets 5–8 pairs, proximal 1–1.5 pairs anastomosing, next 1–1.5 pairs running to sinus membrane. Laminae papery, brownish green to grayish green when dried, adaxially with several acicular hairs along costae and veins and minute hairs between veins, abaxial surface with dense minute hairs and many reddish orange glands throughout. Sori orbicular, medial; indusia glabrous or with sparse minute hairs. Sporangia bearing reddish orange glands on stalks. Spores shortly cristate and echinate. 2*n* = 72.

Streamsides, wet places in forests, semi-open places; near sea level to 1200 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, S Jiangxi, Taiwan, Yunnan, S Zhejiang [Bhutan, India, Japan, Nepal, Vietnam].

36. Cyclosorus ensifer (Tagawa) W. C. Shieh, J. Sci. Engin. 13: 42. 1976.

广叶毛蕨 guang ye mao jue

Dryopteris ensifera Tagawa, Acta Phytotax. Geobot. 6: 89. 1937; *Christella ensifera* (Tagawa) Holttum ex C. M. Kuo; *Cyclosorus gaoxiongensis* Ching ex K. H. Shing; *C. subnamburensis* Ching ex K. H. Shing; *Thelypteris ensifera* (Tagawa) K. Iwatsuki.

Plants 25–40 cm tall. Rhizomes shortly to long creeping, with dark brown linear-lanceolate scales. Fronds approximate to distant; stipes 10–15 cm, dark stramineous; laminae 15–30 × 5–10 cm, bases slightly narrowed, apices caudate; lateral pinnae 4–10 pairs, proximal 1 or 2 pairs shortened, ca. 1 cm or longer; middle pinnae oblanceolate, 3–10 × 1–2 cm, bases truncate to shallowly cordate, lobed 1/3–1/2 toward costae, apices acuminate; segments 8–20 pairs, 3–8 × ca. 3 mm (basal acroscopic one longer and crenate), acute at apices; veinlets 6–10 pairs, simple (sometimes forked on longer segments), proximal 2 pairs anastomosing, next pair running to sinus membrane. Laminae papery, adaxially with several acicular hairs along costae and veins, also with dense minute hairs along and between veins, abaxial surface with several acicular hairs and several clavate glands along veins, and dense minute hairs along and between veins. Sori orbicular, medial; indusia shortly hairy. Sporangia bearing clavate glands on stalks. Spores cristate. 2*n* = 72.

● Wet places in forests; near sea level to 700 m. S and SE Taiwan.

37. Cyclosorus aridus (D. Don) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 194. 1938.

干旱毛蕨 gan han mao jue

Aspidium aridum D. Don, Prodr. Fl. Nepal. 4. 1825; *Christella arida* (D. Don) Holttum; *Cyclosorus acutissimus* Ching ex K. H. Shing & J. F. Cheng; *C. serrifer* Ching ex K. H. Shing; *Dryopteris arida* (D. Don) Kuntze; *Nephrodium aridum* (D. Don) J. Smith; *Thelypteris arida* (D. Don) C. V. Morton.

Plants (30–)50–100(–150) cm tall. Rhizomes long creeping, including stipe bases with sparse brown lanceolate scales. Fronds distant; stipes 10–35 cm; laminae (20–)40–80(–120) × (10–)15–35 cm, bases abruptly or gradually narrowed, apices caudate to acuminate; pinnae 15–40 pairs, proximal 2–10 pairs shortened; middle pinnae linear-lanceolate, (5–)10–18 × 1–2 cm, bases truncate, lobed to 1/3 toward costae or sometimes only dentate, apices long acuminate; segments 20–40 pairs on middle pinnae, triangular, 1–3 × ca. 3 mm, entire, acute or pointed at apices; veinlets 6–12 pairs, much oblique, proximal 2 or 3 pairs anastomosing, next 1 or 2 pairs running to sinus membrane. Laminae papery to somewhat leathery, brownish green or yellowish green when dried, adaxially subglabrous except for several short acicular hairs along costae, abaxial surface with short acicular hairs along costae and veins, also with yellow or orange clavate glands along veins. Sori orbicular, medial; indusia glandular, sometimes hairy. Sporangia bearing yellow or orange clavate glands on stalks. Spore with long wings or ridged folds. 2*n* = 72.

Wet or semi-open places, usually among tall grasses; near sea level to 2500 m. S Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Kashmir, Malesia, Nepal, Philippines, Vietnam; Australia, Pacific islands].

K. H. Shing mentioned in FRPS (4(1): 278. 1999) that *Cyclosorus subaridus* represented a small form of *C. aridus*. However, after careful examination, we found that *C. subaridus* resembles the type of *C. jaculosus*, and it is here included in synonymy of that species.

The type of *Cyclosorus medogensis* Ching & S. K. Wu (Fl. Xizang. 1: 171. 1983) resembles this species but differs by deeper lobed segments and less anastomosing veins. Its type has quite rare fertile sori. Only one gathering (the type) has been collected. This taxon might be a hybrid.

The type of *Cyclosorus omeigensis* Ching (Bull. Fan Mem. Inst. Biol., n.s., 1: 289. 1949; *Christella omeigensis* (Ching) Holttum; *Thelypteris omeigensis* (Ching) C. F. Reed) has features intermediate between *Cyclosorus aridus* and *Pronephrium penangianum*. Only one gathering (the type) lacking fertile sori has been collected. This taxon might be a hybrid.

The type of *Cyclosorus pseudoaridus* Ching ex K. H. Shing (FRPS 4(1): 278. 1999) has features intermediate between *C. aridus* and *C. acuminatus*. Only one gathering (the type) with rare fertile sori has been collected. This taxon might be a hybrid.

38. Cyclosorus cuneatus Ching ex K. H. Shing, Fl. Reipubl. Popularis Sin. 4(1): 347. 1999.

狭基毛蕨 xia ji mao jue

Cyclosorus clavatus K. H. Shing.

Plants 0.8–1.5 m tall. Rhizomes long creeping, including stipe bases with sparse dark brown lanceolate scales and brown short setae. Fronds distant; stipes 30–60 cm, dark stramineous; laminae 50–90 × 30–40 cm, bases not or slightly narrowed, apices caudate with a large apical pinna; lateral pinnae 4–12

pairs, proximal ones stalked; proximal pair sometimes shortened to ca. 3 cm; middle pinnae lanceolate, 15–22 × 2.5–3.5 cm, bases cuneate, lobed 1/4–1/3 toward costae, apices long acuminate; segments 30–40 pairs on middle pinnae, falcate-triangular, 3–5 × 4–5 mm, obtuse or subacute at apices; veinlets 8–12 pairs, proximal 2 pairs anastomosing with usually an interrupted excurrent veinlet, next 2 or 3 pairs running to sinus membrane. Laminae papery, grayish green when dried, acicular hairy along costae (sometimes also veins) adaxially, abaxially with golden clavate glands and minute hairs along veins. Sori orbicular or slightly elongate, medial or inframedial; indusia with sparse short hairs. Sporangia bearing clavate glands on stalks. Spores with fimbriate wings.

Wet places in dense forests; 600–700 m. Chongqing, Guangxi, Guizhou [Vietnam].

39. Cyclosorus fukienensis Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 209. 1938.

福建毛蕨 fu jian mao jue

Christella fukienensis (Ching) Holttum; *Cyclosorus dehuaensis* Ching & K. H. Shing; *C. fraxinifolius* Ching & K. H. Shing; *C. luoqingensis* Ching & C. F. Zhang; *C. nanlingensis* Ching ex K. H. Shing & J. F. Cheng; *C. paucipinnus* Ching & C. F. Zhang ex K. H. Shing; *Thelypteris fukienensis* (Ching) C. F. Reed.

Plants 40–100 cm tall. Rhizomes long creeping, including stipe bases with dark brown lanceolate scales and setae. Fronds distant; stipes 10–30 cm; laminae 30–80 × 15–30 cm, bases gradually narrowed or slightly so, apices caudate with a medium-sized to large apical pinna; pinnae 5–15 pairs, shortly stalked or almost sessile, proximal 1–5 pairs gradually shortened, or sometimes only 1 pair slightly shortened; middle pinnae lanceolate, 10–18 × 1.5–3 cm, bases truncate or broadly cuneate, lobed 1/5–1/3 toward costae, apices acuminate; segments 20–30 pairs on middle pinnae, 2–4 × 3–5 mm, obtuse or subtruncate at apices; veinlets 5–10 pairs, proximal 2 pairs anastomosing, next 1.5–2 pairs running to sinus membrane. Laminae papery, grayish green or brownish green when dried, with short acicular hairs along costae and veins and minute hairs between veins on both surfaces, also with golden clavate glands along veins abaxially. Sori orbicular, medial; indusia shortly hairy, sometimes glandular. Sporangia bearing golden to reddish orange clavate glands on stalks. Spores with short fimbriate wings.

● Wet places in forests, forest margins; near sea level to 1100 m. Fujian, N Guangdong, S Hunan, S Jiangxi, S Zhejiang.

The type of *Cyclosorus grandissimus* Ching & K. H. Shing (Fl. Fujian. 1: 599. 1982) has features intermediate between *C. fukienensis* and *C. aridus*. Only one gathering (the type) with rare sori has been collected. This taxon might be a hybrid.

The type of *Cyclosorus hirtipes* K. H. Shing & C. F. Zhang (FRPS 4(1): 345–346. 1999) has features intermediate between *C. fukienensis* and *C. acuminatus*. Only one gathering (the type) with rare fertile sori has been collected. This taxon might be a hybrid.

40. Cyclosorus subelatus (Baker) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 224. 1938.

巨型毛蕨 ju xing mao jue

Nephrodium subelatum Baker, Bull. Misc. Inform. Kew 1906: 11. 1906; *Christella subelata* (Baker) Holttum; *Dryopteris subelata* (Baker) C. Christensen; *Thelypteris subelata* (Baker) K. Iwatsuki.

Plants 0.6–1.5 m tall. Rhizomes shortly or long creeping, massive and woody, including stipe bases with dark brown lanceolate scales. Fronds approximate or distant; stipes 10–30 cm, bases dark brown, stramineous distally; laminae 50–120 × 30–40 cm, bases narrowed, apices caudate; pinnae 15–30 pairs, shortly stalked or almost sessile, proximal 2–10 pairs gradually shortened and narrowed, proximal pair ca. 1 cm; middle pinnae lanceolate, 10–20 × 2–3.5 cm, bases rounded-truncate, lobed 1/4–1/3 toward costae, apices long acuminate; segments 20–35 pairs on middle pinnae, oblong, 2–5 × 3–5 mm, entire, obtuse to subacute at apices; veinlets 8–12 pairs, proximal 1 or 2 pairs anastomosing, next 1–3 pairs running to sinus membrane. Laminae papery, brownish green when dried, with short acicular hairs along costae and veins on both surfaces, also with clavate glands along veins and also minute hairs between veins abaxially. Sori orbicular, medial or supramedial; indusia shortly hairy. Sporangia bearing orange to golden clavate glands on stalks. Spores with medium-sized to long fimbriate wings.

Wet places in forests, semi-open forest margins; 200–1500 m. Guangxi, S Yunnan [India, Laos, Myanmar, N Thailand].

The type of *Cyclosorus elatus* Ching ex K. H. Shing (FRPS 4(1): 342. 1999), not (Mettenius ex Kuhn) Alston (1956), has features intermediate between *C. subelatus* and *C. dentatus*. Only one gathering (the type) with mostly sterile sori has been collected. This taxon might be a hybrid.

15. STEGNOGRAMMA Blume, Enum. Pl. Javae 2: 172. 1828.

溪边蕨属 xi bian jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Plants medium-sized, on soil. Rhizomes short, erect or ascending, with dense unicellular or multicellular long hairs and sparse brown setaceous lanceolate scales. Fronds clustered; stipes dark brown, bases scaly and with grayish white unicellular or multiseparated acicular long hairs; laminae oblong-lanceolate or broadly lanceolate, not narrowed to bases or slightly so, 1-pinnate, pinnatifid-acuminate at apices; pinnae ca. 10 pairs, spreading, sessile or very shortly stalked on proximal several pairs, distal ones ± adnate to rachises, lanceolate or ovate-lanceolate, rounded-cuneate or truncate at bases, subopposite, undulate or crenate along margins, or lobed to 1/3 of distance to costule, shortly acute or rounded-obtuse at apices, sometimes acuminate, both surfaces ± with hairs, costae obviously raised abaxially, grooved adaxially, with dense acicular hairs. Veins goniopteroid, 3–5 pairs of veinlets per

segment, proximal 1–3(–5) pairs joining to form triangular areoles, proximal pair arising above bases of costules, distally veins all reaching margin above sinuses. Laminae herbaceous, dark brown-green when dry, abaxially with grayish white acicular hairs, adaxially sparsely setaceous; usually with multicellular long hairs and short hairs along rachises. Sori linear, attached along veins, exindusiate or sometimes indusiate; sporangia bearing erect short hairs, sometimes glabrous; spores bilateral, elliptic, sharply echinate.

More than ten species: SW China, India, Malesia, Myanmar, Vietnam; six species (five endemic) in China.

1a. Veinlets 3 or 4 pairs, joined on both sides of costules and forming 2 lines of tetragonal areoles ..... 1. *S. dictyoclinoides*
1b. Veinlets 1 or 2 pairs joined on both sides of costules and forming 1–3 triangular or irregular areoles.
2a. Sporangia glabrous ..... 2. *S. xingwenensis*
2b. Sporangia bearing short hairs.
3a. Laminae with many short setae remaining at attachments of sori after sori fallen ..... 3. *S. cyrtomioides*
3b. Laminae with remaining glandlike objects at attachments of sori after sori fallen.
4a. Pinnae broadly ovate-lanceolate, margins lobed to 1/3 of distance to costule, bases truncate, apices shortly acute, proximal 3 or 4 pairs of pinnae shortened and reflexed; endemic to Yunnan (Gongshan) ..... 4. *S. latipinna*
4b. Pinnae lanceolate, acuminate at apices, or ovate-lanceolate, rounded-obtuse, margins undulate or lobate, bases rounded-cuneate, proximal pinnae not or slightly shortened.
5a. Proximal pinnae slightly shortened, lanceolate, broadest on mid to lower part, acuminate and bent distally, glabrous on intercostal areas of abaxial surface of pinnae; endemic to Chongqing (Jinyun Shan) ..... 5. *S. diplazioides*
5b. Proximal several pinnae shortened, narrowly ovate-lanceolate, broadest at bases, rounded-obtuse at apices, setaceous on intercostal areas of abaxial surface of lamina; Chongqing, Sichuan, Yunnan ..... 6. *S. jinfoshanensis*

1. Stegnogramma dictyoclinoides Ching, Sinensia 7: 92. 1936.

屏边溪边蕨 ping bian xi bian jue

Cyclosorus dictyoclinoides (Ching) C. M. Kuo; *Thelypteris dictyoclinoides* (Ching) C. M. Kuo.

Plants ca. 50 cm tall. Rhizomes short and thick, ascending, almost scaly. Fronds clustered; stipes 15–23 cm, dark stramineous, glabrous on bases, throughout with spreading grayish white acicular hairs and short hairs; laminae broadly lanceolate, 15–25 × 7–10 cm, 1-pinnate, pinnatifid-acuminate at apices; pinnae 7 or 8 pairs, spreading, proximal 1 or 2 pairs free, sessile, slightly shortened, distal ones adnate to rachises and connected by narrow wings, apical ones connected by broad wings; proximal pinnae oblong-lanceolate, 3–4 × ca. 1.5 cm, bases truncate or rounded-cuneate, symmetrical, margins crenate, apices shortly acuminate; middle pinnae of similar shape as proximal ones, ca. 5 × 2 cm, bases adnate to rachises; costae raised on both sides. Veins evident, 3 or 4 pairs of veinlets joining into areoles, areoles in 2 lines, 4 or 5 per line, subsquare or pentagonal and with an excurrent veinlet arising from joining point ± tortuous, proximal pair of veinlets arising from far above bases of costules. Laminae herbaceous, dark brown-green when dry, both surfaces with dense grayish white acicular long hairs along rachises, costae, and veins. Sori linear, attached along veinlets (sometimes attached along excurrent veins), exindusiate. Sporangia each with 1 or 2 erect acicular hairs near top.

Streamsides in forests, steep forested slopes; 1200–2000 m. S and SE Taiwan, SE Yunnan [N Vietnam].

2. Stegnogramma xingwenensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 286, 350. 1999 [*"xinwenensis,"* p. 350].

兴文溪边蕨 xing wen xi bian jue

Plants ca. 50 cm tall. Rhizomes erect, with dense brown short hairs at margins, lanceolate scales at apices. Fronds clustered; stipes 14–20 cm, dark stramineous, with scales and throughout with mixed grayish white different-sized acicular hairs; laminae lanceolate, 30–40 × ca. 10 cm, slightly narrowed to bases, 1-pinnate, pinnatifid-acuminate at apices; pinnae 10–14 pairs, alternate, obliquely spreading, almost sessile, except for proximal several pairs of pinnae slightly reduced others ± adnate to rachises; proximal pinnae slightly reduced, ovate-lanceolate, ca. 4 × 1.5 cm, bases rounded-cuneate, not symmetrical, apices shortly acute; middle pinnae lanceolate, ca. 6 × 1.8 cm, bases rounded-cuneate, margins pinnately lobed, apices acuminate; costae raised on both sides. Veins evident, veinlets obliquely spreading, 1 or 2 veinlets joining into 2 or 3 triangular or subrhomboid areoles. Laminae grayish green when dry, herbaceous, both surfaces with dense appressed setae along veins, with sparse short hairs abaxially, glabrous adaxially. Sori linear, attached along veinlets, exindusiate; sporangia glabrous.

● Forests at roadsides; ca. 1300 m. Sichuan (Xingwen).

3. Stegnogramma cyrtomioides (C. Christensen) Ching, Sinensia 7: 95. 1936.

贯众叶溪边蕨 guan zhong ye xi bian jue

Dryopteris stegnogramme (Blume) C. Christensen var. *cyrtomioides* C. Christensen, Acta Horti Gothob. 1: 56. 1924.

Plants 28–50 cm tall. Rhizomes short and erect, with dense hairy brown narrowly lanceolate scales and multicellular acicular long hairs. Fronds clustered; stipes 8–25 cm, stramineous, with sparse scales on bases, throughout with dense grayish white multicellular long acicular hairs when young, hairs gradually fallen when old; laminae lanceolate, 15–25 × 4–8 cm, not narrowed to bases, 1-pinnate, pinnatifid-acuminate at apices; pinnae 8–10 pairs, alternate, spreading, proximal pair slightly shortened, proximal 3 or 4 pairs free, sessile, distal ones ± adnate to rachises; middle pinnae ovate-oblong, 2–3.5 × ca.

1.5 cm, bases broader, rounded-truncate, symmetrical, margins subentire or slightly undulate, apices shortly acute. Veins evident, 2 or 3 pairs of veinlets between veinlets, proximal pair joining, sometimes an excurrent veinlet arising at this union and connected to an acroscopic veinlet of second pair, forming a triangular plus a rhomboid areole. Laminae yellow-green, herbaceous or papery, abaxial surface on intercostal areas shortly hairy, adaxially setaceous along margins and apices; along abaxial side of rachises with dense multicellular long acicular hairs, shortly hairy along abaxial sides of costae and veins, setaceous adaxially. Sori linear, attached along veinlets, exindusiate, remaining clustered and with erect short hairs at attached places of sori after fallen; sori with 2 or 3 short hairs.

● Scrub; 600–1500 m. Guizhou, Sichuan.

4. Stegnogramma latipinna Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 350. 1999.

阔羽溪边蕨 kuo yu xi bian jue

Plants ca. 70 cm tall. Rhizomes short, erect, including stipe bases with dense setaceous brown lanceolate scales and spreading multicellular grayish white acicular long hairs. Fronds clustered; stipes 20–24 cm, dark stramineous, sparsely setaceous at bases; laminae 30–35 × 10–13 cm, slightly narrowed to bases, 1-pinnate, pinnatifid-acuminate at apices; pinnae 10–12 pairs, alternate, spreading, sessile, proximal ones free from rachises, distal ones ± adnate to rachises and completely combined near apical part; middle pinnae broadly lanceolate, ca. 7 × 2.2 cm, bases rounded-truncate and slightly broadened, not symmetrical, lobed to 1/4 of distance to costule, apices shortly acuminate; segments ovate-triangular, ca. 4 × 4 mm, entire, obtuse-rounded at apices. Veins evident, 4 or 5 pairs of veinlets per segment, proximal 2 pairs (sometimes 1.5 pairs) joining by their ends, veinlets of proximal pair arising far above base of costules. Laminae dark green when dry, herbaceous, abaxial surface with acicular hairs along rachises, costae, veins, and intercostal areas, adaxially with dense setae along rachises, costae, and veins, sparsely setaceous along margins, glabrous on intercostal areas. Sori linear, attached along veinlets, exindusiate; sporangia each with 3 or 4 erect acicular hairs near apices.

● Streamsides in forests; 2300–2500 m. NW Yunnan (Gongshan).

5. Stegnogramma diplazioides Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 351. 1999.

缙云溪边蕨 jin yun xi bian jue

Plants ca. 60 cm tall. Rhizomes strong, suberect, with dark brown shortly hairy lanceolate scales and few multicellular translucent acicular hairs at apices. Fronds clustered; stipes 25–30 cm, dark stramineous on proximal part and sparsely scaly, distally stramineous, throughout shortly setaceous; laminae oblong-lanceolate, 25–34 × 10–12 cm, almost or slightly narrowed to bases, 1-pinnate, pinnatifid-acuminate at apices; pinnae 10–14 pairs (proximal 5 or 6 pairs free from rachises), subopposite, sessile, spreading, proximal pair slightly shortened (ca. 4.5 cm), above one lanceolate, 5–6 × ca. 1.5 cm, bases rounded-cuneate and slightly narrowed, sessile, distal ones of similar shape, but ± adnate to rachises at bases, distal ones gradually reduced and completely adnate to rachises at bases, entire or slightly undulate. Veins evident, veinlets oblique distally, veinlets ca. 3 pairs, bent, proximal 2 pairs (sometimes 1.5 pairs) joining by their ends, proximal pair arising far above base of costules. Laminae greenish when dry, somewhat papery, abaxially with sparse short hairs on laminae, adaxially glabrous, setaceous along margins, with unicellular long setae along abaxial side of rachises, shortly setaceous along costae and veins, with dense appressed setae along adaxial side of costae, sparsely setaceous along veins. Sori linear, attached along veinlets; indusia shortly setaceous near apices of sporangia.

● Beneath bamboo on sunny slopes. Chongqing (Beibei, Jinyun Shan).

6. Stegnogramma jinfoshanensis Ching & Z. Y. Liu, Bull. Bot. Res., Harbin 3(4): 13. 1983.

金佛山溪边蕨 jin fo shan xi bian jue

Plants 35–40 cm tall. Rhizomes short and ascending, including stipe bases with dense multicellular acicular hairs and hairy reddish brown lanceolate scales. Fronds clustered; stipes 10–20 cm, grayish brown, with sparse scales and spreading multicellular acicular hairs mixed with unicellular setae on proximal part; laminae lanceolate, 18–27 × 5.2–7 cm, not or slightly narrowed to bases, 1-pinnate, pinnatifid-acuminate at apices; pinnae 8–12 pairs, alternate, obliquely spreading, sessile, proximal 3 or 4 pairs free, distal ones ± adnate to rachises; middle pinnae broadly lanceolate, 4–5 × ca. 1.6 cm, bases broadened, subtruncate, symmetrical, margins crenate or pinnatilobate, apices acute or obtuse. Veins evident, veinlets 3 or 4 pairs, proximal 1.5 pairs joining by their ends, proximal pair arising from far above base of costules. Laminae grayish green or greenish when dry, thinly papery, abaxially with short acicular hairs on intercostal areas, adaxially usually shortly hairy on intercostal areas, with unicellular long setae along both sides of rachises, shortly hairy along costae and veins, with dense appressed setae along adaxial side of costae and sparsely setaceous along veins. Sori linear, attached along veinlets, usually confluent at apices, exindusiate, with remaining glandlike material at attachment of sori; sporangia setaceous near apices.

● Shaded thickets at foot of limestone mountains; ca. 2500 m. Chongqing, Sichuan, Yunnan.

16. AMPELOPTERIS Kunze, Bot. Zeitung (Berlin) 6: 114. 1848.

星毛蕨属 xing mao jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Plants trailing, in soil. Rhizomes long creeping, stipe bases with sparse hairy dark brown scales. Fronds clustered or approximate; stipes subglabrous; laminae lanceolate; rachises usually prolonged, whiplike and rooting on soil and forming a new plant, 1-

pinnate; pinnae ca. 30 pairs; pinna axils often with gemmae producing a 1-pinnate small lamina. Veins evident, veinlets obliquely spreading and joining by their ends, a tortuous excurrent veinlet connected with veinlets of every pair to marginal sinus and forming a line of oblique square areoles. Laminae papery, greenish or dark brown-green, with forked or simple short hairs along both sides of rachises and intercostal areas, glabrous when old. Sori suborbicular or oblong, exindusiate. Sporangia glabrous. Spores elliptic, monolete, perispore thin and translucent, minutely reticulate and with small spines.

One species: tropical and subtropical regions of the Old World.

1. Ampelopteris prolifera (Retzius) Copeland, Gen. Fil. 144. 1947.

星毛蕨 xing mao jue

Hemionitis prolifera Retzius, Observ. Bot. 6: 36. 1791; *Abacopteris prolifera* (Retzius) W. C. Shieh; *Ampelopteris elegans* Kunze; *Aspidium proliferum* (Retzius) Hieronymus (1895), not R. Brown (1810); *Cyclosorus prolifer* (Retzius) Tardieu & C. Christensen; *Dryopteris prolifera* (Retzius) C. Christensen; *Goniopteris prolifera* (Retzius) C. Presl; *Meniscium proliferum* (Retzius) Swartz; *Phegopteris luxurians* (Kunze) Mettenius; *P. prolifera* (Retzius) Kuhn (1879), not (Kaulfuss) Mettenius (1856); *Polypodium luxurians* Kunze; *P. proliferum* (Retzius) Hooker (1864), not Kaulfuss (1824); *Thelypteris prolifera* (Retzius) C. F. Reed.

Plants ca. 1 m tall. Stipe bases with sparse dark brown stellate-hairy lanceolate scales. Stipes stramineous, firm, ca. 40 cm; laminae lanceolate, bases slightly narrowed; pinnae spreading, subopposite, subsessile, lanceolate, 5–10(–15) × ca. 2 cm, bases rounded-truncate, margins undulate, apices shortly pointed. Sori attached on middle of veinlets, usually confluent when mature. $n = 36$.

On sandy floodplains by streams in sunny areas; 100–1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [tropical and subtropical regions of the world except the Americas].

The young fronds are eaten as a vegetable.

17. PRONEPHRIUM C. Presl, Epimel. Bot. 258. 1851.

新月蕨属 xin yue jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Abacopteris Fée.

Plants, medium-sized, in soil. Rhizomes long creeping, or short and decumbent, with sparse usually hairy brown scales. Fronds remote or approximate; stipes glabrous except at bases, but often (particularly when young) ± with unicellular acicular hairs; laminae usually 1-imparipinnate, sometimes simple or ternate; pinnae large, usually 3–10(–15) pairs, terminal pinna free, of similar shape as lateral ones, proximal pair not or slightly shortened, lanceolate, bases rounded or cuneate, subsessile or shortly stalked, not adnate to rachises, margins entire or thickly serrate, apices acuminate; costae evident, veinlets mostly obliquely spreading; venation meniscioid, i.e., veinlets joining into oblique square areoles between veinlets, an excurrent veinlet arising from joining point of every pair of veinlets continuous or interrupted and with hydathodes at apices. Laminae herbaceous or papery, sometimes somewhat leathery, green or dark brown when dry, often reddish (at least abaxially along rachises, costae and veinlets), usually ± with acicular and hooked hairs (at least abaxially along along rachises and costae), abaxially usually foveolate on intercostal areas. Sori orbicular, in 2 lines between veinlets, one per veinlet, if attached on distal part of veinlets then usually confluent when mature, rarely spreading throughout abaxial surface of pinnae, exindusiate or indusiate, hairy or glabrous; sporangia glabrous or with acicular hairs. Spores bilateral, reniform, perispore transparent or translucent, perispore ridged corrugate, verrucate, or echinate. $x = 36$.

Sixty-one species: tropical and subtropical regions of Asia; 18 species (eight endemic) in China.

The following taxon is excluded from the present treatment, pending further research: *Pronephrium fengkaiensis* B. S. Wang & S. H. Shi (Acta Sci. Nat. Univ. Sunyatseni 29: 72. 1990).

1a. Plants with hooked hairs throughout.
2a. Laminae simple, strongly dimorphic, sterile laminae cordate or hastate (i.e., occasionally with one pair of small auricles proximally), sori spreading throughout abaxially on mature laminae ..... 1. *P. simplex*
2b. Laminae ternate or pinnate (occasionally simple, proximally rounded or cuneate), monomorphic, sometimes dimorphic, sori arranged in lines when mature.
3a. Laminae ternate (sometimes with 2 pairs of lateral pinnae), green when dry ..... 2. *P. triphyllum*
3b. Laminae pinnate and with multiple pairs of lateral pinnae, green or reddish when dry.
4a. Rhizomes short and decumbent; fronds approximate, pinnae distally usually with axillary buds in their axils ..... 3. *P. cuspidatum*
4b. Rhizomes long creeping; fronds remote, pinnae distally lacking buds in their axils.
5a. Proximal pinnae obviously reduced; pinna apices abruptly narrowed into a long tail 2–4 cm ..... 4. *P. megacuspe*
5b. Proximal pinnae usually largest; pinna apices not narrowed or caudate.
6a. Apical pinnae lobed throughout ..... 5. *P. insularis*

6b. Apical pinnae entire (at most crenate along margins).
7a. Laminae oblong to ovate-rounded, lateral pinnae smaller than ca. 9 × 2 cm ..... 6. *P. longipetiolatum*
7b. Laminae triangular, lateral pinnae ca. 15 × 3 cm, proximal pair of pinnae largest ..... 7. *P. parishii*
1b. Plants without hooked hairs on every part.
8a. Sori exindusiate or with very small indusia.
9a. Laminae normally greenish when dry; pinnae linear-lanceolate, margins regularly and sharply serrate, pinna lobes triangular ..... 8. *P. penangianum*
9b. Laminae ± purplish red when dry; pinnae ovate-lanceolate, margins entire or slightly undulate.
10a. Pinnae narrowly ovate, broadest at bases and rounded-cuneate; laminae completely glabrous on both surfaces; sori ovate and confluent when mature; Xizang ..... 9. *P. medogensis*
10b. Pinnae lanceolate, broadest at middle, costae and veins with short hairs; sori orbicular and not confluent when mature; throughout China.
11a. Laminae abaxially with only sparse short hairs along rachises and costae, elsewhere glabrous; sori with small indusia ..... 10. *P. lakhimpurense*
11b. Laminae abaxially with acicular hairs along rachises, costae, veins, and intercostal areas; sori exindusiate ..... 11. *P. hirsutum*
8b. Sori obviously indusiate.
12a. Pinnae broadly linear-lanceolate, bases not or slightly narrowed, margins regularly serrate.
13a. Sporangia glabrous; indusia occasionally with one or two short hairs ..... 12. *P. nudatum*
13b. Sporangia and indusia all with hairs.
14a. Stipes throughout with acicular setae, laminae abaxially with dense acicular long hairs along costae, veins, and on intercostal areas ..... 13. *P. setosum*
14b. Stipes glabrous, laminae abaxially with only sparse hairs along costae and veins ..... 14. *P. yunguiensis*
12b. Pinnae ovate-lanceolate or falcate, bases cuneate, margins entire or irregularly undulate-crenate.
15a. Rhizomes short and decumbent; plants smaller; lateral pinnae 2 or 3 pairs, pinnae ca. 7 × 2–2.5 cm ..... 15. *P. gracilis*
15b. Rhizomes long creeping; plants much larger; lateral pinnae more than 4 pairs, more than ca. 15 × 3 cm.
16a. Laminae abaxially with sparse short hairs along costae and veins ..... 16. *P. gymnopteridifrons*
16b. Laminae abaxially with dense long hairs along costae, veins, and intercostal areas.
17a. Pinnae ovate-lanceolate, bases rounded-cuneate; laminae not foveolate on intercostal areas, with unicellular acicular hairs; sori attached on middle of veinlets, not confluent when mature ..... 17. *P. macrophyllum*
17b. Pinnae oblong-lanceolate, bases cuneate; laminae obviously foveolate abaxially on intercostal areas, with dense multicellular articulate long hairs; sori attached on distal part of veinlets and confluent when mature ..... 18. *P. hekouensis*

1. Pronephrium simplex (Hooker) Holttum, Blumea 20: 122. 1972.

单叶新月蕨 dan ye xin yue jue

Meniscium simplex Hooker, London J. Bot. 1: 294. 1842; *Abacopteris simplex* (Hooker) Ching; *Aspidium simplex* (Hooker) Hance; *Asplenium simple*x (Hooker) Hance; *Cyclosorus simplex* (Hooker) Copeland; *Dryopteris simplex* (Hooker) C. Christensen; *Nephrodium simplex* (Hooker) Diels; *Phegopteris simplex* (Hooker) Mettenius; *Polypodium simplex* (Hooker) E. J. Lowe (1858), not N. L. Burman (1768), nor Swartz (1801); *Thelypteris simplex* (Hooker) K. Iwatsuki.

Plants 30–40 cm tall. Rhizomes long creeping, with sparse, dark brown lanceolate scales and hooked hairs at apices. Fronds remote, simple, dimorphic; sterile stipes 14–18 cm, stramineous, occasionally with 1 or 2 scales at bases, distally with dense hooked short hairs, sometimes with acicular long hairs; laminae elliptic-lanceolate, 15–20 × 4–5 cm, entire or undulate. Veins visible, oblique distally, parallel to each other, one subrectangular areole between veinlets, above with 2 lines of subsquare areoles. Laminae papery when dry, with hooked short hairs on both surfaces, denser hairs along rachises and veins sometimes with long acicular hairs. Fertile fronds much taller than sterile ones; stipes 30–35 cm; laminae lanceolate, 5–10 × 8–15 cm, entire, bases cordate, apices long acuminate; veins and hairs same as those on sterile fronds. Sori attached on veinlets, orbicular when young, exindusiate, spreading throughout abaxial surface of pinnae when mature.

Forests by streams, forests in valleys; sea level to 1500 m. Fujian, Guangdong, Hainan, Taiwan, SE Yunnan [Japan, Vietnam].

The correct position of *Abacopteris simplex* var. *trifoliata* Ching (Bull. Fan Mem. Inst. Biol., Bot. 10: 10. 1940; *Cyclosorus simplex* var. *trifoliata* (Ching) T. J. Liu; *Thelypteris simplex* var. *trifoliata* (Ching) C. F. Reed), described from Fujian, is not known.

2. Pronephrium triphyllum (Swartz) Holttum, Blumea 20: 122. 1972.

三羽新月蕨 san yu xin yue jue

Meniscium triphyllum Swartz in Schrader, J. Bot. 1800(2): 16. 1801; *Abacopteris triphylla* (Swartz) Ching; *Cyclosorus*

triphyllus (Swartz) Tardieu; *Dryopteris triphylla* (Swartz) C. Christensen; *Nephrodium triphyllum* (Swartz) Diels; *Phegopteris triphylla* (Swartz) Mettenius; *Thelypteris triphylla* (Swartz) K. Iwatsuki.

Plants 20–50 cm tall. Rhizomes long creeping, blackish brown, with dense white hooked short hairs and brown hairy lanceolate scales. Fronds monomorphic or dimorphic; stipes 10–40 cm, dark stramineous, bases with sparse scales and throughout with dense curved short hairs; laminae ovate-triangular, 12–20 × 7–11 cm, rounded at bases, ternate, long acuminate at apices; lateral pinnae 1 pair (rarely 2 pairs), oblique distally, opposite, oblong-lanceolate, 5–9 × 1.5–2.5 cm, bases rounded or rounded-cuneate, stalk 1–2 mm, margins entire, apices shortly acuminate; terminal pinna very large, lanceolate, 15–18 × 3–3.5 cm, bases rounded or rounded-cuneate, stalk 6–12 mm, margins entire or undulate, apices acuminate. Veins evident abaxially, veinlets obliquely spreading and parallel, veins in middle of pinnae usually 8 or 9 pairs oblique or spreading, veinlet pairs joining by their ends and forming triangular areoles, an excurrent veinlet arising from joining point connected with veinlets of others forming subsquare areoles. Laminae firmly papery, adaxially glabrous except for dense hooked hairs in costal grooves, abaxially with hooked hairs along costae and veinlets and also with scattered hooked hairs on intercostal areas. Fertile fronds slightly taller than sterile ones, stipes longer, pinnae narrower. Sori attached on veinlets, orbicular when young, becoming narrowly ovate and confluent, exindusiate; sporangia each with 2 hooked hairs.

Forests; 100–600 m. Fujian, Guangdong, Guangxi, Taiwan, SE Yunnan [India, Indonesia, Japan, S Korea, Sri Lanka, Malaysia, Myanmar; NE Australia].

The correct position of *Abacopteris triphylla* var. *simplicifolia* Ching (Bull. Fan Mem. Inst. Biol., Bot. 8: 243. 1938) is not known. *Cyclosorus* ×*pseudoliukiuensis* (Serizawa) Ralf Knapp (Ferns Fern Allies Taiwan, 445. 2011; *Thelypteris* ×*pseudoliukiuensis* Serizawa) is the putative hybrid between *Pronephrium triphyllum* (as *C. triphyllus*) and the following species, *P. cuspidatum* (as *C. liukiuensis*).

3. Pronephrium cuspidatum (Blume) Holttum, Blumea 20: 123. 1972.

顶芽新月蕨 ding ya xin yue jue

Meniscium cuspidatum Blume, Enum. Pl. Javae 2: 114. 1828; *Abacopteris cuspidata* (Blume) Ching; *A. liukiuensis* (Christ ex Matsumura) Tagawa; *Cyclosorus cuspidatus* (Blume) Copeland; *C. liukiuensis* (Christ ex Matsumura) Masamune; *Dryopteris cuspidata* (Blume) Christ; *D. liukiuense* (Christ ex Matsumura) C. Christensen; *M. liukiuense* Christ ex Matsumura; *Nephrodium clavivenum* Yabe ex Matsumura & Hayata; *Phegopteris cuspidata* (Blume) Mettenius; *Thelypteris liukiuensis* (Christ ex Matsumura) K. Iwatsuki.

Plants ca. 1 m tall. Rhizomes short and decumbent, with dark brown scales; scales lanceolate, sparsely shortly hairy. Fronds approximate; stipes 15–35 cm, bases with dark brown scales and hooked hairs, distally glabrous; laminae ovate, 25–30 cm, 1-imparipinnate; lateral pinnae 2–4 pairs, oblanceolate, 8–14 × 2–3.5 cm, cuneate or narrowly rounded at bases, shortly stalked, usually with a gemma in axil, entire or undulate-crenate at margins, caudate-acuminate at apices; terminal pinna larger than lateral ones. Laminae papery when dry, brown and tinged scarlet. Veinlets obvious, 6–8 pairs regularly joining into areoles, excurrent veinlets usually not reaching next pair of joined veins. Sori orbicular or elongate, attached on middle of veinlets, usually confluent and spreading throughout pinna surface, exindusiate.

Dense forests on low mountains. Taiwan [Japan, Malaysia; Pacific islands (Solomon Islands)].

Knapp (Ferns Fern Allies Taiwan, 444. 2011) does not treat *Cyclosorus cuspidatus* and *C. liukiuensis* as conspecific, accepting only *C. liukiuensis* for Taiwan. *Dryopteris cuspidata* var. *epigea* Copeland (Philipp. J. Sci. 3: 278. 1908), described from Guangdong (Tai Mo Shan), may belong here.

4. Pronephrium megacuspe (Baker) Holttum, Blumea 20: 122. 1972.

微红新月蕨 wei hong xin yue jue

Polypodium megacuspe Baker, J. Bot. 28: 266. 1890; *Abacopteris sampsonii* (Baker) Ching; *P. sampsonii* Baker; *Pronephrium sampsonii* (Baker) Ching ex K. H. Shing.

Plants 50–70 cm tall. Rhizomes creeping, blackish brown, with dense hooked hairs and hairy brown lanceolate scales. Fronds remote; stipes 25–35 cm, stramineous, sparsely hairy at bases, distally sparsely setaceous; laminae oblong, 25–35 × ca. 30 cm, slightly narrowed to bases, 1-imparipinnate, caudate-pointed at apices; lateral pinnae 5 or 6 pairs, alternate, proximal pair slightly shortened, shortly stalked, others sessile, oblique distally, lanceolate, 12–14 × ca. 2.5 cm, cuneate at bases, entire or undulate, caudate-acuminate at apices; terminal pinna of similar shape as lateral ones, but very large, stalk 2–4 mm. Veins evident, veinlets oblique distally and parallel, veinlets subobliquely spreading and forming triangular areoles at bases between veinlets, distally forming a line of V-shaped areoles, with an expanded hydathode at excurrent vein arising from joining point. Laminae papery when dry, reddish, abaxial surface with more hooked hairs along and short hairs when young, fallen when old and with few remaining on rachises and veins only. Sori attached above middle of veinlets and confluent when mature and forming a horizontal, equidistant row between veinlets, exindusiate; sporangia bearing hairs when young.

Dense forests, along streams, wetlands; 100–400 m. Guangdong, Guangxi, Jiangxi, S Taiwan, Yunnan [Japan, Thailand, Vietnam].

5. Pronephrium insularis (K. Iwatsuki) Holttum, Blumea 20: 123. 1972.

岛生新月蕨 dao sheng xin yue jue

Abacopteris insularis K. Iwatsuki, Acta Phytotax. Geobot. 18: 6. 1959; *Cyclosorus insularis* (K. Iwatsuki) C. M. Kuo; *Thelypteris insularis* (K. Iwatsuki) K. Iwatsuki.

Rhizomes long creeping, with dense hooked hairs and sparsely hairy triangular-lanceolate scales. Fronds remote; stipes 10–15 cm, with linear-lanceolate scales at bases; laminae triangular or ovate, 20–35 × 15–25 cm, terminal pinna very large, linear-lanceolate, bases pinnatifid; lateral pinnae 4–7 pairs, lanceolate, bases rounded-obtuse, not symmetrical, apices acu-

minate; proximal pinnae stalked. Sori orbicular, well separated, attached on middle of veinlets, exindusiate.

Forests; ca. 1000 m. E Taiwan [Japan].

6. Pronephrium longipetiolatum (K. Iwatsuki) Holttum, Blumea 20: 123. 1972.

长柄新月蕨 chang bing xin yue jue

Abacopteris longipetiolata K. Iwatsuki, Acta Phytotax. Geobot. 18: 11. 1959; *Cyclosorus longipetiolatus* (K. Iwatsuki) C. M. Kuo; *Thelypteris longipetiolata* (K. Iwatsuki) K. Iwatsuki.

Plants 30–50 cm tall. Rhizomes long and decumbent, with dense hooked hairs and scales; scales narrowly triangular-lanceolate, sparsely hairy on surface and margins, acuminate at apices. Fronds remote; stipes 10–30 cm, stramineous, with hooked hairs, bases slightly scaly; laminae subdimorphic, oblong to ovate-oblong, 15–20 × 9–14 cm, imparipinnate; terminal pinna very large; lateral pinnae 2–4 pairs, oblong to lanceolate, 5–9 × 1.5–2 cm, bases rounded-cuneate, obviously shortly stalked, margins entire or irregularly undulate, apices acuminate to shortly caudate-acuminate; terminal pinna oblong-lanceolate, 9–13 × 2.5–4 cm, usually not symmetrical, long stalked, shortly caudate-acuminate at apices; rachises and costae with sparse hooked hairs on both sides. Veinlets not obviously raised abaxially and slightly oblique distally, veinlets forming areoles and spreading an excurrent veinlet from joining point. Sori attached on middle of veinlets, confluent when mature, exindusiate, hooked-hairy on sporangia.

● Forests; 200–500 m. S and SE Taiwan.

7. Pronephrium parishii (Beddome) Holttum, Blumea 20: 123. 1972.

羽叶新月蕨 yu ye xin yue jue

Meniscium parishii Beddome, Ferns Brit. Ind. t. 184. 1866; *Abacopteris triphylla* (Swartz) Ching var. *parishii* (Beddome) Ching; *Cyclosorus parishii* (Beddome) Tardieu; *M. triphyllum* Swartz var. *parishii* (Beddome) Beddome; *Pronephrium triphyllum* (Swartz) Holttum var. *parishii* (Beddome) Nakaike; *Thelypteris triphylla* (Swartz) K. Iwatsuki var. *parishii* (Beddome) K. Iwatsuki.

Plants 30–50 cm tall. Rhizomes long creeping, blackish brown, with dense white hooked short hairs and brown hairy lanceolate scales. Fronds monomorphic or dimorphic; stipes 10–40 cm, dark stramineous, bases with sparse scales and throughout with dense hooked hairs; laminae ovate-triangular, 25–30 × 10–15 cm, long acuminate at apices; lateral pinnae 2–5 pairs (fertile laminae sometimes ternate), oblique distally, subopposite, oblong-lanceolate; proximal pair of pinnae longest, 6–15 × 2–3 cm, stalk 1–2 mm, rounded or rounded-cuneate at bases, entire, shortly acuminate at apices; distal pinnae adnate to rachises and decurrent; terminal pinna ca. 20 × 3–4 cm, margins undulate, usually with 1 or 2 free small auricles at bases, acuminate at apices. Veins evident abaxially, veinlets obliquely spreading and parallel, in middle of lateral pinnae usually 8 or 9 pairs, oblique or spreading, veinlet pairs joining by theirs ends and forming triangular areoles, an excurrent veinlet arising from joining point connected with veinlets of others forming subsquare areoles. Laminae firmly papery, adaxially glabrous except for dense hooked hairs in costal grooves, abaxially with hooked hairs along costae and veinlets and also with scattered hooked hairs on intercostal areas. Sori attached on veinlets, orbicular when young, becoming narrowly ovate and confluent, exindusiate; sporangia each with 2 hooked hairs.

Forests; 200–500 m. Taiwan [S India, Japan, Malaysia, Myanmar, Sri Lanka].

8. Pronephrium penangianum (Hooker) Holttum, Blumea 20: 110. 1972.

披针新月蕨 pi zhen xin yue jue

Polypodium penangianum Hooker, Sp. Fil. 5: 13. 1863 [*"panangianum"*]; *Abacopteris penangiana* (Hooker) Ching; *Aspidium porphyrophlebium* Christ; *A. rampans* (Baker) Christ; *Christella porphyrophlebia* (Christ) H. Léveillé; *Dryopteris porphyrophlebia* (Christ) C. Christensen; *D. rampans* (Baker) C. Christensen; *Goniopteris penangiana* (Hooker) Beddome; *Nephrodium rampans* Baker; *Thelypteris penangiana* (Hooker) C. F. Reed; *T. porphyrophlebia* (Christ) C. F. Reed; *T. rampans* (Baker) C. F. Reed.

Plants 1–2 m tall. Rhizomes long creeping, dark brown, ca. 1.2 cm in diam., occasionally with 1 or 2 brown lanceolate scales. Fronds remote; stipes ca. 1 m, dark brown, distally reddish brown, glabrous; laminae oblong-lanceolate, 40–80 × 25–40 cm, 1-imparipinnate; lateral pinnae 10–15 pairs, obliquely spreading, alternate, stalked, broadly linear, pinnae from proximal middle part 20–30 × 2–2.7 cm, broadly cuneate at bases, sharply cartilaginous-serrate or teethlike along margins, acuminate at apices; pinnae distally slightly shortened; terminal pinna of similar shape and size as lateral pinnae, stalks ca. 1 cm. Veinlets evident abaxially, spreading and parallel to each other, 9 or 10 pairs, joining by theirs ends and forming triangular areoles between veinlets, an excurrent veinlet arising from joining point connected with more distal veinlets (sometimes interrupted) and forming 2 rows of elongated square areoles, distal 2 or 3 pairs of veinlets free and reaching margins. Laminae papery when dry, dark brown or reddish brown, glabrous throughout. Sori orbicular, attached on middle or proximal middle of veinlets and in 2 rows between veinlets, 6 or 7 per row, exindusiate.

Sparse forests, shaded streamsides; 900–3600 m. Guangdong, Guangxi, Guizhou, S Henan, Hubei, Hunan, Jiangxi, Sichuan, Zhejiang [Bhutan, India, Kashmir, Nepal, Pakistan].

Pronephrium penangianum is used as a medicinal herb at Emei Shan, Sichuan. The fronds are used in traditional Chinese medicine for irregular menstruation.

9. Pronephrium medogensis Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 351. 1999.

墨脱新月蕨 mo tuo xin yue jue

Plants to 2 m tall. Rhizomes long creeping. Fronds remote; stipes ca. 1 m, occasionally sparsely scaly at bases, dark stramineous; laminae oblong-lanceolate or ovate-oblong, 80–100 cm, 1-imparipinnate, acuminate at apices; lateral pinnae 8–12 pairs, subobliquely spreading, narrowly lanceolate, ca. 25 × 3–

3.5 cm, broadest at bases and subrounded, long caudate-acuminate at apices, sessile; terminal pinna of similar shape as proximal ones. Veins visible adaxially, raised abaxially, costae prominent; lateral veinlets subobliquely spreading and parallel to each other, neighboring ones joining with each other into V-shaped areoles, excurrent veins very short. Laminae somewhat leathery when dry, reddish, rachises, costae, and intercostal areas glabrous throughout. Sori orbicular, attached above middle of veinlets and confluent when mature, exindusiate.

● Monsoon forests; ca. 700 m. Xizang (Beibeng, Mêdog).

10. Pronephrium lakhimpurense (Rosenstock) Holttum, Blumea 20: 110. 1972.

红色新月蕨 hong se xin yue jue

Dryopteris lakhimpurensis Rosenstock, Meded. Rijks-Herb. 31: 7. 1917; *Abacopteris rubra* (Ching) Ching; *Cyclosorus rubrus* (Ching) Tardieu ex Tardieu & C. Christensen; *D. rubra* Ching; *Meniscium cuspidatum* Blume var. *longifrons* Wallich ex C. B. Clarke; *Polypodium urophyllum* Wallich ex Hooker & Baker var. *khasianum* C. B. Clarke; *Thelypteris lakhimpurensis* (Rosenstock) K. Iwatsuki; *T. rubra* (Ching) K. Iwatsuki.

Plants ca. 1.5 m tall. Rhizomes long creeping. Fronds remote; stipes 80–90 cm, occasionally with 1 or 2 scales at bases, dark stramineous; laminae oblong-lanceolate or ovate-oblong, 60–85 cm, 1-imparipinnate, acuminate at apices; lateral pinnae 8–12 pairs, subobliquely spreading, pinnae on proximal to middle part broadly lanceolate, 24–32 × 4–6 cm, stalk ca. 2 mm, somewhat rounded at bases, entire or undulate, shortly caudate-pointed at apices; terminal pinna of similar shape as proximal ones, stalk 1.5–2 cm. Veins slender, evident abaxially, veinlets subobliquely spreading and parallel to each other, veinlets 13–17 pairs, subobliquely spreading, proximal pairs joined to form triangular areoles, distally every pair of veinlets connected with excurrent veinlet forming 2 rows of rhomboid areoles, excurrent veinlets reaching or near joining point of above pair of veinlets. Laminae thinly papery or herbaceous, dark brown, glabrous on both surfaces, occasionally with 1 or 2 short setae abaxially, rachises, costae, and veins with sparse short hairs. Sori orbicular, attached on middle or above middle part of veinlets and arranged in 2 rows, occasionally confluent when mature, exindusiate.

Valleys, streamsides in forests; 300–1600 m. Fujian, Guangdong, Guangxi, Jiangxi, Sichuan, Yunnan [Bhutan, N India, Nepal, N Thailand, Vietnam].

11. Pronephrium hirsutum Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 305, 351. 1999 [*"Pronrphrium,"* p. 351].

针毛新月蕨 zhen mao xin yue jue

Plants 60–100 cm tall. Rhizomes long creeping, with sparse ovate-lanceolate brown scales. Fronds remote; stipes 25–70 cm, sparsely brown scaly at bases, stramineous; laminae lanceolate, 30–50 × 15–30 cm, 1-imparipinnate; lateral pinnae 4–8 pairs, alternate, sessile, proximal pair reduced; middle pinnae oblong-lanceolate, 10–25 × 2–5 cm, bases rounded-cuneate, margins entire or slightly undulate, apices acuminate; terminal pinna much larger than lateral ones, ovate-lanceolate, 15–25(–30) × 2.5–5.5(–6.5) cm, stalk 1–4 cm, bases not symmetrical and slightly decurrent on one lateral side, rounded-cuneate, margins undulate or crenate, apices long acuminate. Veins evident abaxially, costules thick and raised, veinlets obliquely spreading and parallel to each other, veinlets obliquely spreading, proximal pair joining into triangular areoles between veinlets, distally every pair joining into areoles, excurrent veinlet not reaching joining point of above pair, with dense short setae along veins. Laminae papery or herbaceous when dry, dark green, reddish, or dark red, veins reddish abaxially, rachises, costae, and veins and abaxial intercostal areas all with dense acicular hairs, abaxial surface with sparse short setae along costae and veins, with 1 or 2 occasional setae on intercostal areas. Sori orbicular, attached on middle or above middle part of veinlets, not confluent when mature, exindusiate.

● Gregarious on shaded wet precipitous slopes, wetlands by rivers, marshlands. Chongqing, Fujian, Guangdong, Guizhou, Yunnan.

12. Pronephrium nudatum (Roxburgh) Holttum, Blumea 20: 111. 1972.

大羽新月蕨 da yu xin yue jue

Polypodium nudatum Roxburgh, Calcutta J. Nat. Hist. 4: 491. 1844; *Abacopteris multilineata* (Wallich ex Hooker) Ching; *Aspidium moulmeinense* (Beddome) Christ; *A. multilineatum* (Wallich ex Hooker) Christ (1897), not Mettenius (1858); *Christella moulmeinense* (Beddome) H. Léveillé; *Cyclosorus moulmeinensis* (Beddome) Tardieu & C. Christensen; *C. multilineatus* (Wallich ex Hooker) Tardieu & C. Christensen; *Dryopteris moulmeinensis* (Beddome) C. Christensen; *Goniopteris lineata* (Colebrook ex Hooker) Beddome; *G. multilineata* (Wallich ex Hooker) Beddome; *Nephrodium moulmeinense* Beddome; *N. multilineatum* (Wallich ex Hooker) Beddome; *Phegopteris lineata* (Colebrook ex Hooker) Mettenius; *P. multilineata* (Wallich ex Hooker) Luerssen; *Polypodium lineatum* Colebrook ex Hooker; *P. multilineatum* Wallich ex Hooker; *Thelypteris multilineata* (Wallich ex Hooker) C. V. Morton; *T. nudata* (Roxburgh) C. V. Morton.

Plants to 2.5 m tall. Rhizomes strong, creeping, woody, dark brown, with sparse broadly lanceolate scales. Fronds remote; stipes 50–80(–140) cm, bases with brown scales, distally glabrous, dark brown, distally brownish; laminae broadly ovate-oblong, 60–90 × 26–40(–60) cm, 1-imparipinnate; lateral pinnae 8–14(–16) pairs, obliquely spreading, alternate, subsessile, pinnae on low and middle parts broadly linear-lanceolate, 26–30(–35) × 3–4(–5) cm, bases somewhat rounded or cuneate, margins regularly shortly and sharply serrate, apices long acuminate; distal pinnae slightly shortened; terminal pinna of similar shape as middle ones, slightly shorter, bases with both sides not symmetrical, stalk ca. 1 cm. Veins evident, veinlets raised on both sides, spreading or obliquely spreading and parallel to each other, veinlets obliquely spreading distally, raised abaxially and forming triangular areoles between veinlets, distally forming juxtaposed rhomboid areoles. Laminae herbaceous when dry, green or grayish green, abaxial surface with sparse short setae along veins, also along both sides of rachises and costae, abaxial surface foveolate on intercostal areas. Sori

orbicular, attached on middle of veinlets, arranged in 2 rows between costules; indusia small, shortly hairy adaxially. Sporangia glabrous.

Shaded sparse forests on slopes; 100–1600 m. Guizhou, Xizang, Yunnan [Bhutan, N India, Indonesia, Myanmar, Nepal, Philippines, Vietnam].

"*Polypodium lineatum* Colebrook ex Wallich" (Numer. List, no. 300. 1829, nom. nud.) and "*Goniopteris lineata* C. Presl" (Tent. Pterid. 183. 1836, nom. nud.) belong here. The taxon was validated by Hooker in 1864 as *P. lineatum*. Beddome named the taxon *Nephrodium moulmeinense* because of the blocking name *N. lineatum* (Blume) Beddome.

13. Pronephrium setosum Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 352. 1999.

刚毛新月蕨 gang mao xin yue jue

Plants 50–100 cm or taller. Rhizomes creeping, ca. 1 cm in diam., with dense lanceolate brown scales. Fronds remote; stipes 30–100 cm, woody, dark stramineous, bases with dark brown lanceolate scales, throughout with acicular setae; laminae elliptic, 50–80 × 30–60 cm, 1-imparipinnate; lateral pinnae 8–11 pairs, subobliquely spreading, alternate, proximal pair slightly reduced; middle ones narrowly ovate, 15–40 × 3–3.5 cm, bases rounded-cuneate, shortly stalked, margins regularly serrate, apices acuminate; terminal pinna of similar shape and size as lateral ones, long stalked. Veins evident, costae grooved adaxially, raised abaxially, veinlets raised on both sides, proximal pair of veinlets forming a triangular areole, distally every pair with excurrent veinlets joining into multipaired subrectangular areoles. Laminae papery when dry, yellowish brown, adaxially with dense appressed setae along costal grooves, occasionally with 1 or 2 setae along veinlets, elsewhere glabrous, abaxial surface with dense long acicular hairs along veins and intercostal areas. Sori orbicular, attached on middle of veinlets, with dense short hairs on indusia, also shortly hairy on sporangia.

● Dense forests; 500–1300 m. Yunnan.

14. Pronephrium yunguiensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 352. 1999.

云贵新月蕨 yun gui xin yue jue

Plants 70–150 cm tall. Rhizomes creeping, thick, ca. 1 cm in diam., with narrowly lanceolate scales. Fronds remote; stipes 40–100 cm, woody and glabrous; laminae ovate-lanceolate, 55–80 × 40–60 cm, 1-imparipinnate; lateral pinnae 8–16 pairs, proximal pair slightly reduced; middle pinnae narrowly ovate, 30–50 × 3.5–4.5 cm, bases rounded-cuneate, shortly stalked, margins regularly serrate, apices long caudate; terminal pinna larger than proximal ones, of similar shape, long stalked. Veins evident, raised abaxially, costae grooved adaxially. Laminae dark brown-green when dry, papery, adaxially with dense appressed setae along costal grooves, abaxial surface with very sparse short hairs along costae and veinlets, elsewhere glabrous, usually not foveolate on intercostal areas. Sori orbicular, attached on middle of veinlets; indusia and sporangia hairy.

● Sparse forests on slopes; 200–800 m. Guizhou, Yunnan.

15. Pronephrium gracilis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 308, 352. 1999 [*"gracillis,"* p. 352].

小叶新月蕨 xiao ye xin yue jue

Plants 25–40 cm tall. Rhizomes short and decumbent, with sparse narrowly lanceolate brown scales. Fronds remote; stipes 20–30 cm, bases sparsely scaly, distally shortly setaceous, stramineous; laminae elliptic, 12–18 × 11–14 cm, 1-imparipinnate; lateral pinnae 2 or 3 pairs, alternate, slightly bent distally, subsessile, proximal pair not reduced, ovate-lanceolate, 7–8 × 2–2.5 cm, not symmetrical, bases cuneate, margins slightly undulate, apices acuminate or acute; terminal pinna very large, symmetrical, bases cuneate, long stalked, apices acuminate. Veins evident, raised abaxially, costae grooved adaxially, proximal pair of veinlets forming a triangular areole, distally every pair joining with an excurrent veinlet into square or rectangular or subrhomboid areoles. Laminae dark brown-green when dry, papery, adaxially with dense appressed setae along costal grooves, veinlets and tissue between veins with sparse short hairs; abaxially veins with short hairs, mesophyll with long acicular hairs and foveolate. Sori orbicular, attached near ends of veinlets and often confluent, hairy on indusia and also on sporangia.

● Yunnan.

16. Pronephrium gymnopteridifrons (Hayata) Holttum, Blumea 20: 112. 1972.

新月蕨 xin yue jue

Dryopteris gymnopteridifrons Hayata, Icon. Pl. Formosan. 8: 148. 1919; *Abacopteris gymnopteridifrons* (Hayata) Ching; *Cyclosorus gymnopteridifrons* (Hayata) C. M. Kuo; *C. pustulosus* Copeland; *D. glandulosa* C. Christensen; *Polypodium urophyllum* Wallich ex Hooker & Baker var. *uniseriale* Hooker; *Thelypteris gymnopteridifrons* (Hayata) C. M. Kuo; *T. pustulosa* (Copeland) C. F. Reed.

Plants 80–120 cm tall. Rhizomes long creeping, with dense brown lanceolate scales. Fronds remote; stipes 28–80 cm, bases scaly, distally with dense short hairs, stramineous; laminae broadly ovate or ovate-oblong, 40–80 × 15–30 cm, 1-imparipinnate; lateral pinnae 3–8 pairs, rarely more, sessile, oblique distally, proximal pair shorter, subopposite, distal ones alternate; middle pinnae oblong-lanceolate, 15–30 × 3.5–5.5 cm, rounded-cuneate at bases, entire or serrate along margins, shortly caudate at apices; pinnae distally slightly smaller, terminal pinna of similar shape as middle ones, slightly larger, not symmetrical at bases and long stalked. Veins visible adaxially, obviously raised abaxially, costae grooved adaxially, veinlets parallel to each other, veinlets oblique distally, proximal pair joining into a triangular areole, distally every pair joining with excurrent veinlet forming subsquare or rectangular areoles. Laminae greenish when dry, papery, adaxially with appressed short hairs along costal grooves, elsewhere glabrous, abaxially with sparse short hairs along veins, occasionally with 1 or 2 hairs and slightly foveolate on intercostal areas. Sori orbicular, attached on middle of veinlets and arranged in 2 rows between costules and not confluent; indusia small, shortly hairy, sporangia also hairy.

Dense forests by streams in valleys, sparse forests on slopes;

100–500 m. Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Philippines].

W. C. Shieh & J. L. Tsai (Fl. Taiwan, ed. 2, 1: 394. 1994) included *Pronephrium gymnopteridifrons* within *P. asperum* (C. Presl) Holttum (Blumea 20(1): 112. 1972; *Goniopteris aspera* C. Presl, Tent. Pterid. 183. 1836, based on *Polypodium asperum* C. Presl, Reliq. Haenk. 1: 24. 1825, not Linnaeus (1753); *Abacopteris aspera* (C. Presl) Ching; *Dryopteris presliana* Ching; *Thelypteris aspera* (C. Presl) K. Iwatsuki).

17. Pronephrium macrophyllum Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 352. 1999.

硕羽新月蕨 shuo yu xin yue jue

Plants ca. 1.5 m tall. Rhizomes not seen. Stipes 70–90 cm, stramineous, with appressed setae; laminae oblong, ca. 90 × 40–50 cm, 1-imparipinnate; lateral pinnae 8–11 pairs, alternate, obliquely spreading, sessile, proximal pair slightly reduced; middle pinnae oblong-lanceolate, 25–35 × ca. 6 cm, broadly cuneate at bases, obviously crenate along margins, acuminate at apices; distal pinnae becoming smaller; terminal pinna of similar shape and size as middle ones, bases not symmetrical and long stalked. Veins visible adaxially, obviously raised abaxially, costae grooved adaxially, veinlets slightly raised, obliquely spreading and parallel, proximal pair of veinlets joining into triangular areoles, distally every pair joining with excurrent veinlet into subrectangular areoles. Laminae herbaceous when dry, green, greenish, or yellow-green, adaxially glabrous except for appressed setae along grooves of costae, elsewhere, abaxial surface with dense acicular long hairs along veins and also slightly foveolate on intercostal areas. Sori orbicular, attached on middle of veinlets; indusia and sporangia hairy.

● Forests by streams; 500–800 m. NW Guangxi, S Yunnan.

18. Pronephrium hekouensis Ching ex Y. X. Lin, Fl. Reipubl. Popularis Sin. 4(1): 353. 1999.

河口新月蕨 he kou xin yue jue

Plants 40–110 cm tall. Rhizomes long creeping, blackish, woody, with brown lanceolate scales. Fronds remote; stipes 25–60 cm, scaly at bases, distally with acicular hairs, stramineous; laminae broadly ovate or ovate-oblong, 20–50 × 15–30 cm, 1-imparipinnate; lateral pinnae 3–6 pairs, alternate, obliquely spreading, shortly stalked, proximal pair shortened; middle pinnae ovate-lanceolate or narrowly lanceolate, 15–25 × 3–6.5 cm, cuneate at bases, undulate at margins, acuminate at apices; distal pinnae becoming smaller; terminal pinna slight larger than middle ones, not symmetrical at bases, long stalked. Veins not evident adaxially, obviously raised abaxially, costae grooved adaxially, veinlets obliquely spreading and parallel to each other, proximal pair of veinlets forming a triangular areole, next pair joining with excurrent veinlet into subsquare or rectangular areoles. Laminae papery or herbaceous when dry, green, greenish, or grayish green, adaxially with dense appressed setae along grooves of costae, sparsely hairy along veins and veinlets, abaxial surface with acicular hairs and multicellular articulate hairs along veins and intercostal areas, ± foveolate on intercostal areas. Sori orbicular, attached on middle of veinlets and usually confluent when mature; indusia and sporangia densely hairy.

● On slopes or in forests by streams; 100–500 m. Hainan, Yunnan.

18. DICTYOCLINE T. Moore, Gard. Chron. 1855: 854. 1855.

圣蕨属 sheng jue shu

Lin Youxing (林尤兴); Kunio Iwatsuki

Plants medium-sized, terrestrial. Rhizomes short and erect or ascending, including stipe bases with sparse scales; scales lanceolate, dark brown, thick, margins setaceous. Fronds clustered; stipes grayish stramineous, grooved adaxially, throughout with hairs; laminae elliptic or triangular, cordate at bases, 1-pinnate or pinnatifid, or simple, acuminate at apices; laminae if pinnate then with 1–6 pairs of lateral pinnae, pinnae broadly lanceolate, bases rounded, symmetrical, margins entire, free or adnate to rachises, obliquely spreading, apices acuminate; costae raised on both sides, veinlets evident, oblique distally and reaching margins, reticulate, thick and evident, areoles in 3 or 4 rows, slightly tetragonal or pentagonal, without included veinlet or simple or forked included veinlets. Laminae papery, dark brown when dry, rough, with dense hooked thick hairs on both surfaces. Sori scattered on included veinlets, exindusiate; sporangia bearing erect acicular hairs near annuli; spores elliptic, echinate. $x = 36$.

Four species: Bhutan, China, N India, Japan, Myanmar, Nepal, Thailand, Vietnam; four species (two endemic) in China.

1a. Laminae pinnate, with 1–6 pairs of free lateral pinnae, without included veinlet in areoles.
  2a. Laminae ternate at top, free lateral pinnae 1–3(or 4) pairs, 3–4 cm wide, entire ..... 1. *D. griffithii*
  2b. Laminae pinnatifid at top, free lateral pinnae 4–6 pairs, ca. 2 cm wide, usually undulate ..... 2. *D. mingchegensis*
1b. Laminae pinnatifid or not lobed, ± with simple or forked included veinlets in areoles.
  3a. Laminae with long acicular hairs abaxially, transverse veins between lateral veins indistinct, few included veinlets in rectangular areoles on both sides of rachises and costae, rarely joining into small square areoles ..... 3. *D. wilfordii*
  3b. Laminae puberulent abaxially only, or very few acicular hairy, transverse veins between lateral veins distinct, more included veinlets in larger areoles on both sides of rachises or costae, these included veinlets joining again into smaller square areoles ..... 4. *D. sagittifolia*

1. Dictyocline griffithii T. Moore, Index Fil. 59. 1857.

圣蕨 sheng jue

Aspidium griffithii (T. Moore) Diels (1899), not (Baker) Beddome (1876); *Cyclosorus griffithii* (T. Moore) C. M. Kuo; *Gymnogramma griffithii* (T. Moore) Hance; *Hemionitis griffi-*

thii (T. Moore) J. D. Hooker & Thomson; *H. griffithii* var. *pinnata* Hooker; *Stegnogramma griffithii* (T. Moore) K. Iwatsuki; *Thelypteris griffithii* (T. Moore) C. F. Reed.

Plants 40–70 cm tall. Rhizomes short and ascending, including stipe bases with sparse scales and dense acicular long setae; scales lanceolate, reddish brown, thick, cetaceous along margins. Laminae narrowly elliptic, 20–35 × 12–19 cm, not narrowed to bases, imparipinnate, caudate at apices; lateral pinnae 2 or 3 pairs (sometimes 1 pair only), free, almost sessile, proximal pair not shortened and of similar shape and size as above ones, narrowly lanceolate, bent distally, 10–15 × 3–3.5 cm, bases rounded-cuneate or rounded, symmetrical, margins entire, apices acuminate; terminal pinna ternate, bases cuneate or rounded-cuneate, stalk ca. 2 cm, one pair of lateral segment of similar shape as proximal pinnae, middle segment larger, entire, acuminate at apices. Costae straight, raised on both sides, with dense thick setae, veinlets evident, oblique distally and reaching margins, veinlets reticulate between veinlets; areoles in 2 or 3 rows, subtetragonal or oblique-square, rarely pentagonal, without included vein. Laminae papery when dry, dark brown, throughout with hairs, abaxial surface with acicular thick hairs along veins, adaxially sparsely setaceous. Sori scattered along reticulate veins; sporangia shortly stalked, each with 3 or 4 erect setae near annuli; spores elliptic, echinate.

Dense forests, shaded wet streamsides; 600–1400 m. Fujian, Guangxi, Guizhou, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [N India, Japan, Myanmar, Vietnam].

2. Dictyocline mingchegensis Ching, Acta Phytotax. Sin. 8: 334. 1963.

闽浙圣蕨 min zhe sheng jue

Dictyocline griffithii T. Moore var. *tenuissima* Ching.

Plants ca. 50 cm tall. Rhizomes short and ascending, with dense reddish brown setaceous lanceolate scales and grayish white acicular hairs. Fronds clustered; stipes ca. 20 cm, stramineous, with sparse acicular hairs, with 1 or 2 scales on bases; laminae narrowly oblong, 26–30 × 12–14 cm, not narrowed to bases, 1-pinnate, acuminate at apices; lateral pinnae 4–6 pairs, opposite, almost sessile, spreading, proximal pair not reduced, broadly lanceolate, 7–8 × ca. 2 cm, rounded at bases, entire or ± undulate, acuminate at apices; terminal pinna particularly large, bases decurrent, margins pinnatifid, apices acuminate; proximal segments of similar shape as lateral pinnae. Costae raised on both sides and with acicular hairs, veinlets evident, oblique distally, veinlets reticulate between veinlets, areoles in 2 rows, subtetragonal, without included veinlets. Laminae papery, grass-green when dry, abaxial surface with acicular setae along veins, adaxially glabrous or with 1 or 2 short sparse hairs along veins. Sori sparsely attached along veins.

● Shaded wet places in valleys or forests; 300–900 m. Fujian, Jiangxi, Zhejiang.

3. Dictyocline wilfordii (Hooker) J. Smith, Hist. Fil. 149. 1875.

羽裂圣蕨 yu lie sheng jue

Hemionitis wilfordii Hooker, Fil. Exot. t. 93. 1859; *Dictyocline griffithii* T. Moore var. *pinnatifida* Beddome; *D. griffithii* var. *wilfordii* (Hooker) T. Moore; *H. griffithii* (T. Moore) J. D. Hooker & Thomson var. *pinnatifida* Hooker; *Stegnogramma griffithii* (T. Moore) K. Iwatsuki var. *wilfordii* (Hooker) K. Iwatsuki; *Thelypteris griffithii* (T. Moore) C. F. Reed var. *wilfordii* (Hooker) C. M. Kuo.

Plants 30–50 cm tall. Rhizomes short and thick, ascending, with dense blackish brown lanceolate scales; scales acicular long hairy along margins. Fronds clustered; stipes 17–30 cm, dark stramineous, firm, with dense scales and short setae and acicular long hairs on proximal part; laminae triangular, ca. 20 × 17 cm, cordate at bases, pinnatifid nearly to rachises on proximal part, distally lobate, undulate and acuminate at apices; lateral segments 3 pairs, proximal pair largest, broadly lanceolate, ca. 9 × 2.5–3.5 cm, slightly bent distally, entire or undulate, acuminate at apices, connected with above pair (sometimes nearly free) by broad wing; other segments of similar shape but shortened distally, distalmost triangular; costae of segments all raised on both sides and with dense acicular hairs; lateral veins distinct, veinlets between lateral veins reticulate, areoles in 3 rows, subtetragonal or pentagonal, usually with simple or forked included veinlets. Laminae papery when dry, dark brown, abaxial surface with acicular hairs along veins, adaxially with dense appressed setae. Sori sparsely attached along reticulate veinlets.

Shaded wet places in valleys or forests; 100–1100 m. Fujian, Guangdong, Guangxi, Guizhou, Jiangxi, Sichuan, Taiwan, SE Yunnan, Zhejiang [Japan, Vietnam].

4. Dictyocline sagittifolia Ching, Acta Phytotax. Sin. 8: 335. 1963.

戟叶圣蕨 ji ye sheng jue

Stegnogramma sagittifolia (Ching) L. J. He & X. C. Zhang.

Plants 30–40 cm tall. Rhizomes short and ascending, with sparse linear-lanceolate scales; scales ciliate along margins. Fronds clustered; stipes 15–30 cm, with dense brown short setae; laminae hastate, ca. 17 × 11–13 cm, deeply cordate at bases, entire or sometimes undulate, shortly acuminate at apices; costae raised on both sides, lateral veins distinct, obliquely spreading, with 5–7 distinct transverse veins between lateral veins divided into large rectangular areoles and divided again into ca. 2 × 4 subtetragonal smaller areoles, with simple or forked included veinlets in smallest areoles. Laminae papery when dry, dark brown, adaxially with dense short pubescence along costae and appressed short hairs on intercostal areas, abaxial surface with dense short pubescence along costae and veinlets, sparsely pubescent along reticulate veinlets. Sori scattered and attached along reticulate veinlets.

● Evergreen forests, rock crevices; 400–700 m. Guangdong, Guangxi, Hunan, Jiangxi.