

SELAGINELLACEAE

卷柏科 juan bai ke

Zhang Xianchun (张宪春)¹; Hans P. Nootboom², Masahiro Kato³

Plants herbaceous, terrestrial, epilithic, or occasionally epiphytic, evergreen or sometimes seasonally green, perennial (rarely annual). Rhizome erect, prostrate, creeping, ascending, or scandent, branched. Rootlike rhizophores borne on dorsal (upper) or ventral (lower) side in axils of branches, confined to lower part of rhizome or throughout, simple or branched. Roots formed at tip of rhizophore, branched. Leaves simple, 1-veined (exceptionally forked), each bearing a ligule in axil on adaxial surface, monomorphic or dimorphic, spirally arranged or in most species arranged in 4 ranks, 2 ranks on dorsal or upper side of stem and branch (called median or dorsal leaves), other 2 ranks on lateral or lower side (called lateral or ventral leaves). Strobili at apex of main stem or branch or lateral to branchlet, compact or lax, tetragonal, complanate or rarely cylindrical; sporophylls arranged in 4 ranks, monomorphic or dimorphic; in dorsiventral strobili with dimorphic sporophylls, dorsal (upper) sporophylls of most species larger than ventral (lower) ones (=resupinate), dorsal sporophylls normally green and firm in texture, while ventral ones paler and somewhat membranous, or dorsal sporophylls smaller than ventral sporophylls (=non-resupinate); in some dorsiventral strobili, dorsal sporophylls bearing outgrowths on lower surface, like a flap, termed “sporophyll-ptyeryx,” partially covering sporangium proximal to it. Sporophylls various, ranging from ovate to ovate-lanceolate, margin denticulate, ciliolate, or entire, apex acute and entire, with ligules distal to sporangia. Sporangia single per sporophyll, heterosporangiate (megaspore and microsporangium). Spores heterosporous, megaspores ca. 10 × as large as microspores, megaspores 4, rarely 1 per sporangium, microspores more than 100; spores trilete, tetrahedral-globose, or nearly spheroidal, and often bearing equatorial flange. $x = 8, 9, 10$.

One genus and ca. 700 species: almost cosmopolitan, with its highest diversity in the tropics; 72 species (23 endemic, one introduced) in China.

Zhang Xianchun. 2004. Selaginellaceae. In: Zhang Xianchun, ed., *Fl. Reipubl. Popularis Sin.* 6(3): 86–219.

1. SELAGINELLA P. Beauvois, Prodr. Aethéogam. 101. 1805, nom. cons.

卷柏属 juan bai shu

Lycopodioides Boehmer, nom. rej.; *Selaginoides* Séguier; *Stachygynandrum* P. Beauvois ex Mirbel, nom. rej.

Morphological characters and geographic distribution are the same as those of the family.

Five subgenera are recognized. In a molecular phylogeny (Korall et al., *Int. J. Pl. Sci.* 160: 585–594. 1999), the isophyllous *Selaginella* subg. *Selaginella* (absent from China) and *S.* subg. *Tetragonostachys* Jermy are monophyletic, but the anisophyllous *S.* subg. *Stachygynandrum* Warburg and *S.* subg. *Heterostachys* Warburg are nonmonophyletic.

Six uncertain taxa, not included in the following key, are listed at the end of the account.

- 1a. Sterile leaves monomorphic, spirally arranged, linear or linear-lanceolate, with long white apical seta.
2a. Leaves thickly leathery, obtuse at apex 1. *S. sibirica*
2b. Leaves thinly leathery, acuminate at apex.
3a. Apical seta ca. 1/3 as long as leaves 2. *S. vardei*
3b. Apical seta ca. 1/5 as long as leaves 3. *S. indica*
- 1b. Sterile leaves dimorphic, arranged in 4 ranks, 2 dorsal and 2 ventral leaves, rarely nearly monomorphic, without long white apical seta.
4a. Stems and branches cylindrical, often reddish; sterile leaves nearly monomorphic, adpressed to stems and branches.
5a. Leaves not white-margined 4. *S. sanguinolenta*
5b. Leaves distinctly white-margined 5. *S. albocincta*
4b. Branches often compressed; leaves dimorphic, dorsal leaves ascending, ventral leaves spreading.
6a. Strobili lax, not distinct from sterile stems; sporophylls monomorphic or dimorphic, almost conform with sterile leaves at same rank (non-resupinate) (see also 42b).
7a. Strobili cylindrical; sporophylls monomorphic, smaller than ventral leaves 6. *S. helvetica*
7b. Strobili rather loosely dorsiventrally compressed; sporophylls dimorphic, nearly conform with sterile leaves at same rank.
8a. Leaves denticulate at margin 7. *S. nipponica*
8b. Leaves shortly ciliolate at margin 8. *S. pseudonipponica*

¹ State Key Laboratory of Systematic and Evolutionary Botany, Institute of Botany, Chinese Academy of Sciences, 20 Nanxincun, Xiangshan, Beijing 100093, People's Republic of China.

² Naturalis Biodiversity Center, Section NHN, Leiden University, P.O. Box 9514, 2300 RA Leiden, Netherlands.

³ Department of Botany, National Museum of Nature and Science, Amakubo 4-1-1, Tsukuba 305-0005, Japan.

- 6b. Strobili compact, distinct from sterile stems; sporophylls in 4 ranks, monomorphic or dimorphic (dorsal sporophylls larger than ventral ones, rarely smaller).
- 9a. Strobili tetragonal; sporophylls nearly monomorphic.
- 10a. Stems forming rosettes, curling inward when dry.
- 11a. Dorsal and ventral leaves denticulate at margin 9. *S. tamariscina*
- 11b. Dorsal leaves reflexed at margin; acroscopic margin of ventral leaves brown, membranous, lacerate 10. *S. pulvinata*
- 10b. Stems not forming rosettes, not curling inward when dry.
- 12a. Main stems creeping or prostrate in basal portion to scandent; rhizophores borne throughout stems.
- 13a. Main stems scandent, up to 1–2 m or longer.
- 14a. Axillary and ventral leaves with large basal auricles; dorsal leaves slightly white-margined; sporophylls ovate, acute or cuspidate; base of rhizophores without spines 11. *S. willdenowii*
- 14b. Axillary and ventral leaves with small basal auricles; dorsal leaves white-margined; sporophylls ovate-lanceolate, acuminate; base of rhizophores with a few spines 12. *S. helferi*
- 13b. Main stems creeping, decumbent, or scandent, usually less than 1 m.
- 15a. Plants xerophytic, curling when dry; leaves ciliolate at margin.
- 16a. Dorsal leaves slightly smaller than and overlapping ventral leaves; leaves slightly lacerate and densely long ciliolate at margin 13. *S. nummularifolia*
- 16b. Dorsal leaves much smaller than and not largely overlapping ventral leaves.
- 17a. Stems and branches scarlet; ventral leaves reflexed; margin of leaves sparsely toothed and long ciliolate at acroscopic base, entire elsewhere 14. *S. rossii*
- 17b. Stems and branches stramineous; ventral leaves not reflexed; margin of leaves shortly ciliolate throughout 15. *S. sinensis*
- 15b. Plants not xerophytic, not curling when dry; leaves entire or denticulate at margin.
- 18a. Leaves entire.
- 19a. Dorsal leaves auriculate at basisopic base 16. *S. limbata*
- 19b. Dorsal leaves not auriculate.
- 20a. Sporophylls not carinate on abaxial surface 17. *S. uncinata*
- 20b. Sporophylls carinate on abaxial surface 18. *S. hainanensis*
- 18b. Leaves denticulate or ciliolate at margin.
- 21a. Stems not articulate; rhizophores borne on ventral side in axils of branches.
- 22a. Leaves not white-margined, leaves on main stems and lateral branches ciliolate at margin, those on ultimate branches often subentire 19. *S. siamensis*
- 22b. Leaves white-margined, denticulate or shortly ciliolate 20. *S. davidii*
- 21b. Stems slightly articulate beneath branching; rhizophores borne on dorsal side in axils of branches.
- 23a. Stems with a single vascular bundle 21. *S. remotifolia*
- 23b. Stems with 3 vascular bundles 22. *S. kraussiana*
- 12b. Main stems erect, suberect, or ascending with short prostrate basal portion; rhizophores usually borne on basal to middle portions of main stem.
- 24a. Rhizophores borne on basal and middle portions of main stem or sometimes also on upper portion; leaves on main stem dimorphic.
- 25a. Plants erect; lateral branches regularly pinnately branched, twice forked, or simple; leaves entire or minutely denticulate at apex.
- 26a. Main stems 3–5 mm in diam., apical part black when dry; stomata invisible on dorsal leaves 23. *S. picta*
- 26b. Main stems 2–3 mm in diam., apical part not black when dry; stomata on adaxial surface of dorsal leaves visible.
- 27a. Lateral branchlets simple or forked, or basal branchlets often forked; dorsal leaves overlapping distally 24. *S. delicatula*
- 27b. Lateral branchlets simple, sometimes with irregular longer branches; dorsal leaves parallel, not overlapping distally 25. *S. wallichii*
- 25b. Plants erect, suberect, or ascending with prostrate rhizome; lateral branches many times pinnately branched; leaves denticulate.
- 28a. Leaves subleathery, shiny when dry; dorsal leaves aristate, arista ca. 1/2 as long as leaves or longer 26. *S. commutata*
- 28b. Leaves herbaceous, not shiny when dry; dorsal leaves acuminate to aristate, arista very short.
- 29a. Ventral leaves 4.5–7 mm 27. *S. rolandi-principis*
- 29b. Ventral leaves less than 4.5 mm.

- 30a. Ventral leaves ovate-triangular or ovate-lanceolate; dorsal leaves aristate; surface of dorsal and ventral leaves scabrous 28. *S. scabrifolia*
- 30b. Ventral leaves ovate-oblong or oblong-falcate; dorsal leaves acuminate or very shortly aristate; surface of leaves glabrous or that of ventral leaves scabrous.
- 31a. Dorsal and ventral leaves glabrous 29. *S. doederleinii*
- 31b. Ventral leaves scabrous 30. *S. trachyphylla*
- 24b. Rhizophores restricted to basal or lower portion of main stem or to prostrate rhizome; leaves on main stem monomorphic.
- 32a. Stems and branches pubescent.
- 33a. Main stems isotomously branched 31. *S. pubescens*
- 33b. Main stems pinnately branched.
- 34a. Plants 45–100 cm high or more; axillary leaves biauriculate at base, ventral leaves auriculate at acroscopic base.
- 35a. Leaf portion of main stems and branches pubescent on both sides; main stems zigzag; leaves white-margined 32. *S. trichoclada*
- 35b. Leaf portion of main stems glabrous, ventral side of branches pubescent; main stems not zigzag; leaves not white-margined 33. *S. pseudopaleifera*
- 34b. Plants 10–45 cm high; axillary leaves not auriculate at base.
- 36a. Leaves thick, shrunken when dry; leaves on main stems peltate 34. *S. braunii*
- 36b. Leaves thin, not shrunken; leaves on main stems basifixed 35. *S. biformis*
- 32b. Stems and branches glabrous.
- 37a. Plants usually more than 50 cm high, main stems robust, up to 4–5 mm in diam.; branches including leaves 5–10 mm wide 36. *S. superba*
- 37b. Plants usually less than 50 cm high, main stems 1–2 mm in diam., not so robust; branches including leaves less than 5 mm wide.
- 38a. Leaves on main stems approximate.
- 39a. Main stems reddish 37. *S. stauntoniana*
- 39b. Main stems stramineous 38. *S. involvens*
- 38b. Leaves on main stems distant.
- 40a. Leaves on main stems peltate at base, not white-margined, ciliolate, very shrunken when dry 39. *S. mairei*
- 40b. Leaves on main stems basifixed, white-margined, denticulate, not shrunken when dry 40. *S. moellendorffii*
- 9b. Strobili dorsiventrally complanate; dorsal and ventral sporophylls dimorphic.
- 41a. Strobili non-resupinate, i.e., dorsal sporophylls smaller than ventral ones.
- 42a. Strobili rather lax, often forked (see also 6a).
- 43a. Fertile branches short, pinnately branched; leaves up to 3.2×1.8 mm, margin denticulate, shortly ciliolate at base 41. *S. pallidissima*
- 43b. Fertile branches erect or ascending, forked; leaves up to 2.3×1.2 mm, shortly ciliolate at margin, ciliolate at base 42. *S. laxistrobila*
- 42b. Strobili shortly compact, solitary (or sometimes forked in *S. prostrata*).
- 44a. Leaves denticulate at margin 43. *S. tama-montana*
- 44b. Leaves long ciliolate at margin.
- 45a. Strobili less than 4 mm; sporophylls plane 44. *S. prostrata*
- 45b. Strobili usually over 8 mm, up to 25 mm; larger ventral sporophylls navicular 45. *S. longistrobilina*
- 41b. Strobili resupinate, i.e., dorsal sporophylls larger than ventral ones.
- 46a. Main stems erect or suberect; rhizophores restricted to basal or lower portion of main stems.
- 47a. Plants more than 30 cm high.
- 48a. Plants erect, 40–75 cm high; rhizophores restricted to basal portion of main stems 46. *S. decipiens*
- 48b. Plants suberect, 30–40 cm high; rhizophores present in lower part of main stems 47. *S. bodinieri*
- 47b. Plants usually less than 30 cm high.
- 49a. Sporophylls strongly dimorphic, ventral sporophylls up to 1/2 as long as dorsal ones.
- 50a. Plants up to 30 cm high; main stems robust; dorsal leaves obovate-aristate 48. *S. pennata*
- 50b. Plants 5–15(–25) cm high; main stems thin.
- 51a. Ventral leaves up to 3 mm; sporophylls minutely denticulate 49. *S. leptophylla*
- 51b. Ventral leaves up to 3 mm; sporophylls sparsely ciliate 50. *S. minutifolia*
- 49b. Sporophylls not strongly dimorphic, ventral sporophylls ca. 2/3 as long as dorsal ones.
- 52a. Main stems tuberous at base 51. *S. chrysocaulos*
- 52b. Main stems not tuberous at base.
- 53a. Axillary leaves ovate-deltoid 52. *S. effusa*

- 53b. Axillary leaves ovate-lanceolate.
- 54a. Plants erect, main stems simple, branched in upper portion; leaves on stems and branches rather distant; rhizophores restricted to basal portion of main stems; base of ventral leaves shortly ciliolate 53. *S. labordei*
- 54b. Plants ascending to erect, main stems branched in lower and upper portions; leaves on main stems rather approximate; rhizophores on lower portion of main stems; base of ventral leaves long ciliolate 54. *S. repanda*
- 46b. Main stems prostrate or at least lower part prostrate, branches creeping or erect; rhizophores at intermittent intervals.
- 55a. Stems long creeping, fertile branches not erect, plants up to 30 cm or more; rhizophores on main stems and branches at intermittent intervals.
- 56a. Dorsal leaves obovate, long ciliolate in upper portion 55. *S. bisulcata*
- 56b. Dorsal leaves not as above.
- 57a. Ultimate branches including leaves 10–15 mm wide 56. *S. megaphylla*
- 57b. Ultimate branches including leaves less than 8 mm wide.
- 58a. Dorsal leaves long aristate; sporophyll-ptyx of dorsal sporophylls not reaching apex (incomplete).
- 59a. Basiscopic margin of ventral leaves entire 57. *S. ornata*
- 59b. Basiscopic margin of ventral leaves ciliolate 58. *S. amblyphylla*
- 58b. Dorsal leaves acuminate or shortly aristate; sporophyll-ptyx of dorsal sporophylls reaching apex or almost so (complete).
- 60a. Leaves glabrous 59. *S. monospora*
- 60b. Leaves scabrous 60. *S. trichophylla*
- 55b. Main stems and branches prostrate or fertile branches suberect, plants usually less than 20 cm, or main stems erect, normally less than 25 cm high; rhizophores on prostrate stems or restricted to basal portion of erect main stems.
- 61a. Prostrate stems very short, thin; plants small; fertile stems prominent.
- 62a. Sporangia only on ventral side of strobilus; sporophylls denticulate 61. *S. devolii*
- 62b. Sporangia on both sides of strobilus; sporophylls long ciliolate 62. *S. ciliaris*
- 61b. Plants not as above.
- 63a. Acroscopic base of ventral leaves not long ciliolate; leaves denticulate or shortly ciliolate at margin.
- 64a. Dorsal leaves rounded or obtuse at apex; leaves denticulate at margin 63. *S. kouytcheensis*
- 64b. Dorsal leaves acuminate or aristate; leaves denticulate or shortly ciliolate at margin.
- 65a. Fertile branches short, complanate with sterile main stems and branches, creeping or ascending.
- 66a. Leaves shortly ciliolate at margin 64. *S. boninensis*
- 66b. Leaves minutely denticulate at margin 65. *S. heterostachys*
- 65b. Fertile branches long, erect.
- 67a. Dorsal leaves cordate at base, margin shortly ciliolate 53. *S. labordei*
- 67b. Dorsal leaves not cordate at base, margin minutely denticulate 65. *S. heterostachys*
- 63b. Acroscopic base of ventral leaves long ciliolate.
- 68a. Fertile branches erect; ventral leaves involute in dry conditions.
- 69a. Basiscopic base of ventral leaves with few long cilia 66. *S. kurzii*
- 69b. Basiscopic base of ventral leaves shortly ciliolate, elsewhere subentire.
- 70a. Sporophylls obviously dimorphic 67. *S. xipholepis*
- 70b. Sporophylls slightly dimorphic 68. *S. vaginata*
- 68b. Fertile branches creeping; ventral leaves not involute in dry conditions.
- 71a. Ventral leaves oblong-falcate; dorsal leaves ovate-lanceolate 69. *S. drepanophylla*
- 71b. Ventral leaves not oblong-falcate; dorsal leaves ovate or suborbicular.
- 72a. Leaves not white-margined, sparsely ciliolate 70. *S. chaetoloma*
- 72b. Leaves distinctly white-margined.
- 73a. Ventral leaves denticulate at margin, bearing several long hairs at basal portion 71. *S. lutchuensis*
- 73b. Ventral leaves long ciliolate at margin 72. *S. albociliata*

1. *Selaginella sibirica* (Milde) Hieronymus, Hedwigia 39: 290. 1900.

Selaginella rupestris (Linnaeus) Spring f. *sibirica* Milde, Filic. Europ. 262. 1867; *Bryodesma sibiricum* (Milde) Soják; *S. rupestris* f. *manchuriensis* Milde; *S. schmidtii* Hieronymus.

西伯利亚卷柏 xi bo li ya juan bai

Plants epilithic, xerophytic, summer-green, creeping, 10–

25 cm, growing indefinitely, without stolons. Rhizophores at intervals throughout length of creeping stem and branches, borne on dorsal side in axils of branches, densely hairy. Main stems anisotomously branched throughout, glabrous; leafy branches glabrous, radially symmetrical. Leaves spirally arranged on all sides of stem and branches, monomorphic throughout, linear, 1.9–2.2 mm (seta excluded), 0.3–0.4 mm wide, with long apical seta 1/5–1/3 as long as leaves, margin long ciliolate, apex attenuate or obtuse. Strobili solitary on erect branchlets, tetragonal, 5–10(–25) × 1.5–2 mm; sporophylls monomorphic, ovate-triangular or ovate-lanceolate.

Dry cliffs. Heilongjiang, Nei Mongol [Korea, Russia; North America].

2. *Selaginella vardei* H. Lévillé, Cat. Pl. Yun-nan, 172. 1917.

细瘦卷柏 xi shou juan bai

Bryodesma vardei (H. Lévillé) Soják; *Selaginella vardei* var. *gracilis* Ching.

Plants epilithic, xerophytic, summer-green, creeping, 10–30 cm, growing indefinitely. Rhizophores at intervals throughout length of creeping stem and branches, borne on dorsal side in axils of branches. Main stems anisotomously branched throughout, glabrous; leafy branches glabrous, radially symmetrical. Leaves spirally arranged on all sides of stem and branches, monomorphic throughout, linear-lanceolate, 1.8–2 mm (seta excluded), 0.3–0.4 mm wide, with long apical seta ca. 1/3 as long as leaves, margin shortly ciliolate, apex acuminate. Strobili solitary on erect branchlets, tetragonal, 5–15(–20) × 1–1.5 mm; sporophylls monomorphic, ovate-triangular or ovate-lanceolate.

• On dry rocks; (900–)1500–3700 m. S Gansu, Sichuan, Xizang, Yunnan.

3. *Selaginella indica* (Milde) R. M. Tryon, Ann. Missouri Bot. Gard. 42: 52. 1955.

印度卷柏 yin du juan bai

Selaginella rupestris (Linnaeus) Spring f. *indica* Milde, Filic. Europ. 262. 1867; *Bryodesma indica* (Milde) Soják.

Plants epilithic, xerophytic, summer-green, creeping, 5–15 cm, growing indefinitely, without stolons. Rhizophores at intervals throughout length of creeping stem and branches, borne on dorsal side in axils of branches, densely hairy. Main stems anisotomously branched throughout, glabrous; leafy branches glabrous, dorsiventrally flattened. Leaves spirally arranged on all sides of stem and branches, monomorphic throughout, linear-lanceolate, 1.8–2.3 mm excluding seta, 0.3–0.5 mm wide, with long apical seta ca. 1/5 as long as leaves, margin shortly ciliolate, apex acuminate. Strobili solitary on erect branchlets, tetragonal, 5–25 × 1.5–2 mm; sporophylls monomorphic, ovate-triangular or ovate-lanceolate.

On rocks in open places; 2000–3700 m. Sichuan, Xizang, Yunnan [India].

4. *Selaginella sanguinolenta* (Linnaeus) Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 135. 1843.

红枝卷柏 hong zhi juan bai

Lycopodium sanguinolentum Linnaeus, Sp. Pl. 2: 1104. 1753; *Lycopodioides sanguinolenta* (Linnaeus) Kuntze; *L. sanguinolenta* f. *kantzensis* (H. S. Kung) H. S. Kung; *Lycopodium boreale* Kaulfuss; *Selaginella aitchisonii* Hieronymus; *S. borealis* (Kaulfuss) Spring; *S. borealis* f. *ajanensis* Milde; *S. borealis* f. *amurensis* Milde; *S. borealis* f. *camtschatica* Milde; *S. borealis* f. *indica* Milde; *S. jacquemontii* Spring; *S. kansuensis* Ching & Y. P. Hsu; *S. kashmiriana* R. D. Dixit; *S. sanguinolenta* f. *aitchisonii* (Hieronymus) Alston; *S. sanguinolenta* var. *brachyclada* Kitagawa; *S. sanguinolenta* var. *compressa* Trautvetter & Meyer; *S. sanguinolenta* f. *kantzensis* H. S. Kung; *Stachygynandrum sanguinolentum* (Linnaeus) P. Beauvois.

Plants terrestrial or epilithic, xerophytic, seasonally green, creeping, (5–)10–30 cm or more. Rhizophores at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched throughout, reddish or brown, 0.36–0.74 mm in diam. in lower part, stem terete, not sulcate, glabrous; branches many, some basal lateral branches developing into rather long branch systems; primary leafy branches 5–8 pairs, 3 or 4 times pinnately branched, branchlets sparse, adjacent primary branches on main stem 2–4 cm apart, ultimate branches 0.7–1.9 mm wide including leaves. Axillary leaves on main stems larger than those on branches, narrowly oblong, base peltate, obtuse; axillary leaves on branches symmetrical, narrowly elliptic or narrowly oblong, 0.8–2.1 × 0.4–0.8 mm, margin lacerate-ciliolate. Dorsal leaves ± symmetrical, those on main stems slightly larger than those on branches; dorsal leaves on branches imbricate, rhomboid-ovate, 0.8–1.5 × 0.4–0.8 mm, carinate to strongly carinate, base oblique, peltate, margin subentire or lacerate-ciliolate, apex apiculate, parallel to axis. Ventral leaves asymmetrical, those on main stem larger than those on branches; ventral leaves on branches approximate, slightly ascending, oblong-obovate or obovate, 1–2 × 0.4–0.8 mm, basicopic base decurrent, lacerate-ciliolate, acroscopic margin subentire, membranous, apex shortly aristate or apiculate. Strobili compact, tetragonal, terminal, solitary, 6–30(–80) × 1–1.5 mm; sporophylls similar to sterile leaves, monomorphic, broadly ovate, sharply carinate, not white-margined, margin slightly lacerate, apex acute; megasporophylls and microsporophylls at intervals, or megasporophylls on lower side; microsporangia suborbicular, rather thin, cells uniform; microspores yellowish orange or orange-red, megaspores pale yellow (sometimes 5 or 6 per sporangium, all 5 or 6 spores equal-sized, or 1 larger, or 4 larger).

On rocks (limestone); 1400–3500 m. S Gansu, Guizhou, Hebei, Heilongjiang, Hunan, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Himalaya, Kashmir, Mongolia, Nepal, Russia (Siberia)].

Selaginella sanguinolenta is a very variable species; the leaves are sometimes subentire or entire in very dry conditions, and the leafy stem, as well as the branches with leaves, can then appear tetragonal.

5. *Selaginella albocincta* Ching, Acta Bot. Yunnan. 3: 251. 1981.

白边卷柏 bai bian juan bai

Lycopodioides albocincta (Ching) H. S. Kung; *Selaginella albidocincta* Ching.

Plants terrestrial or epilithic, xerophytic, seasonally green, erect or long creeping; fertile stems erect, 15–30 cm or more. Rhizophores restricted to base of erect stems or at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched throughout or from near base or from lower part upward, pinnately branched, stramineous or brown, 0.5–1 mm in diam. at lower part, stem terete, not sulcate, glabrous, basal lateral branches sometimes developed into rather long branch systems; primary leafy branches 5–8 pairs, 2 or 3 times forked, branchlets sparse, adjacent primary branches on main stem 3–5 cm apart, main stem including leaves 0.5–1 mm wide at middle, ultimate branches 0.5–1.6 mm wide including leaves. Leaves alternate, inconspicuously dimorphic, leathery, shiny, white-margined, veins forked. Axillary leaves on branches symmetrical, oblong, 0.6–1.8 × 0.2–0.5 mm, base exauriculate, margin ciliolate. Dorsal leaves ± symmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches elliptic, 0.8–1.4 × 0.4–0.7 mm, contiguous or imbricate, strongly embracing stem and covering ventral leaves, apex mucronate. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches slightly ascending, elliptic, 0.8–1.5 × 0.2–0.6 mm, apex mucronate; basiscopic base rounded, margin entire (or minutely denticulate), involute; acroscopic margin minutely ciliolate or denticulate. Strobili solitary, terminal, compact, tetragonal, 4–8 × 1.2–1.8 mm; sporophylls unlike sterile leaves, monomorphic, broadly white-margined, broadly ovate, margin ciliolate, apex acute; strobili with only 1 megasporophyll at base of lower side, elsewhere with microsporophylls; microsporangia orbicular, rather thin, cells uniform; microspores orange-red, megaspores brown.

• Rocky slopes in dry warm valleys, under shrubs; 1700–3300 m. Sichuan, Xizang, Yunnan.

Selaginella albocincta is endemic to China, and its habit is very close to the Indian *S. adunca* A. Braun ex Hieronymus. They both exhibit forked veins, which might be an adaptation to their dry habitats.

6. *Selaginella helvetica* (Linnaeus) Link, Fil. Spec. 159. 1841.

小卷柏 xiao juan bai

Lycopodium helveticum Linnaeus, Sp. Pl. 2: 1104. 1753; *Bernhardia helvetica* (Linnaeus) Gray; *Diplostachyum helveticum* (Linnaeus) P. Beauvois; *Heterophyllum helveticum* (Linnaeus) Hieronymus; *Lycopodioides helvetica* (Linnaeus) Kuntze; *L. jiulongensis* H. S. Kung, Li Bing Zhang & X. S. Guo; *L. mariesii* (Baker) Kuntze; *Lycopodium radicans* Schrank; *Selaginella mariesii* Baker; *Stachygynandrum helveticum* (Linnaeus) P. Beauvois ex J. Saint-Hilaire.

Plants terrestrial or epilithic, seasonally green, shortly creeping; fertile stems erect, 5–15 cm. Rhizophores at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched throughout, stramineous, 0.2–0.4 mm in diam. in lower part, stem angulate, sulcate; primary leafy branches 2–5 pairs, simple,

forked, or once pinnately branched, branchlets sparse, adjacent primary branches on main stem 2–3 cm apart, leafy branches and main stems glabrous, dorsiventrally flattened, leafy portion of main stem including leaves 3–3.8 mm wide at middle, ultimate branches 2–3.6 mm wide including leaves. Axillary leaves on branches ± symmetrical, ovate-lanceolate or elliptic, 1.4–1.6 × 0.4–0.8 mm, base exauriculate, margin ciliolate. Dorsal leaves ± symmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches contiguous or imbricate, ovate or ovate-lanceolate, 1.2–1.6 × 0.5–0.8 mm, base obtuse, margin ciliolate, apex long acuminate or aristate, often reflexed. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches spreading or slightly deflexed, oblong-ovate or broadly ovate, 1.6–2 × 0.8–1.2 mm, apex acute or aristate, often bent upward; basiscopic margin ciliolate; acroscopic base enlarged, broader, overlapping stem and branches, margin ciliolate. Fertile branches erect, 3–6 cm including strobili. Strobili solitary or forked, terminal, lax, or lax in lower portion and compact in upper part, cylindrical, 12–35 × 2–4 mm; sporophylls unlike sterile leaves or similar, uniform, not white-margined, margin ciliolate, apex long acuminate; megasporophylls in basal portion on lower side of strobilus or megasporophylls and microsporophylls at intervals; microsporangia elliptic or suborbicular, relatively thick, with relatively large cells at central part; microspores orange-red, megaspores orange or yellowish orange.

On wet moss-covered cliffs, in rock crevices, usually on damp shaded banks in mixed forests, among moss; (200–)2600–3200(–3800) m. S Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Sichuan, Xizang, Yunnan [N India, Japan, Korea, Mongolia, Nepal, Russia; Europe].

7. *Selaginella nipponica* Franchet & Savatier, Enum. Pl. Jap. 2: 199, 615. 1879.

伏地卷柏 fu di juan bai

Lycopodioides nipponica (Franchet & Savatier) Kuntze; *L. savatieri* (Baker) Kuntze; *Selaginella hachijoense* Nakai; *S. savatieri* Baker; *S. shensiensis* Christ; *Urostachys ihwangensis* Nessel.

Plants terrestrial, seasonally green, creeping; fertile stems erect, 5–12 cm, without stolons, without elongate tuber at base of stem. Rhizophores restricted to sterile prostrate stems and branches at intervals throughout length of main stem, borne on ventral side in axils of branches. Main stems branched from near base upward, stramineous, 0.2–0.4 mm in diam. in lower part, angulate, sulcate; primary leafy branches 3 or 4 pairs, simple or forked or once pinnately branched, branchlets sparse, adjacent primary branches on main stem 1–2 cm apart, leafy branches and stems glabrous, dorsiventrally flattened, leafy portion of main stem including leaves 4.5–5.4 mm wide at middle, ultimate branches 2.8–4.2 mm wide including leaves. Axillary leaves on branches of sterile stems symmetrical or asymmetrical, ovate-lanceolate or elliptic, 1.5–1.8 × 0.8–1 mm, base exauriculate, margin denticulate. Dorsal leaves ± symmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches contiguous or imbricate

in apical portion, oblong-ovate, ovate, ovate-lanceolate, or elliptic, 1.6–2 × 0.6–0.9 mm, not carinate, base obtuse, margin not obviously denticulate, apex acuminate or acute. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches often deflexed, broadly ovate or ovate-triangular, 1.8–2.2 × 1–1.6 mm, apex acute; acroscopic base enlarged, broader, overlapping stem and branches, minutely denticulate. Fertile branches erect, 2.5–12 cm including strobilus. Strobili solitary or once or twice forked (or 3 times forked), terminal, lax, usually dorsiventrally complanate, 18–50 × 2–4.6 mm; sporophylls ± similar to sterile leaves in form and arrangement, dimorphic or slightly dimorphic, usually non-resupinate, not keeled, not white-margined, margin denticulate, apex acuminate; megasporophylls in basal portion on lower side of strobilus; microsporangia elliptic, relatively thick, with relatively large cells in central part; microspores orange-red, megaspores yellowish orange.

Grasslands, on rocks; 100–1300 m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan].

8. *Selaginella pseudonipponica* Tagawa, Acta Phytotax. Geobot. 25: 177. 1973.

拟伏地卷柏 ni fu di juan bai

Selaginella helvetica (Linnaeus) Link subsp. *pseudonipponica* (Tagawa) H. M. Chang, W. L. Chiou & J. C. Wang.

Plants epilithic, seasonally green, creeping; fertile stems erect, 5–15 cm. Rhizophores at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched throughout, stramineous, ca. 0.2 mm in diam. in lower part, angulate, sulcate, glabrous; primary leafy branches of creeping sterile stems 3–5 pairs, sparsely once pinnately branched, branchlets sparse, adjacent primary branches on main stem 1–1.7 cm apart, leafy branches and stems dorsiventrally flattened, leafy portion of main stem including leaves 3–4 mm wide at middle, ultimate branches 3.2–3.4 mm wide including leaves. Axillary leaves on branches usually symmetrical or asymmetrical, 1.2–1.6 × 0.4–0.8 mm, base exauriculate, margin ciliolate. Dorsal leaves ± symmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches oblong-ovate or elliptic, 1.2–1.6 × 0.5–0.8 mm, base obtuse, margin ciliolate, apex acuminate, sometimes reflexed. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches spreading or deflexed, broadly ovate or ovate-triangular, 1.7–2.2 × 0.8–1.3 mm, apex acute; acroscopic base enlarged, broader, overlapping stem and branches, margin irregularly shortly ciliolate. Fertile branches erect, 2–4.7 cm including strobili. Strobili solitary or forked, terminal, lax in lower portion, compact in upper portion, dorsiventrally complanate, 8–22 × 2.4–4.6 mm; sporophylls similar to sterile leaves in form and arrangement, slightly dimorphic, obscurely non-resupinate, not keeled, not white-margined, margin ciliolate, apex acuminate or slightly aristate; megasporophylls in basal portion on lower side of strobilus or megasporophylls and microsporangia at intervals; microsporangia elliptic, relatively

thick, with relatively large cells at central part; microspores orange-red, megaspores sulfur-colored, irregularly reticulate.

• On limestone rocks in dry open sunny places; below 100–2300 m. Taiwan.

9. *Selaginella tamariscina* (P. Beauvois) Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 136. 1843.

卷柏 juan bai

Stachygynandrum tamariscinum P. Beauvois, Mag. Encycl. 9(5): 483. 1804 [“*tamaris sinum*”]; *Lycopodioides tamariscina* (P. Beauvois) H. S. Kung; *L. tamariscina* var. *ulanchotensis* (Ching & W. Wang) J. X. Li; *Lycopodium apiculatum* Desvaux ex Poiret; *L. circinale* Thunberg (1784), not Linnaeus ex Murray (1774); *L. tamariscinum* (P. Beauvois) Desvaux ex Poiret; *Selaginella apiculata* (Desvaux ex Poiret) Hieronymus (1920), not Alderwerelt (1918); *S. christii* H. Léveillé (1911), not Hieronymus (1902); *S. involvens* (Swartz) Spring f. *minor* Milde; *S. involvens* var. *veitchii* (McNab) Baker; *S. japonica* Veitch (1877), not Miquel (1867); *S. leveillei* Kümmerle; *S. tamariscina* var. *ulanchotensis* Ching & W. Wang; *S. veitchii* McNab.

Plants terrestrial or epilithic, xerophytic, “resurrectional”; stems forming rosette, evergreen or seasonally green, stems and roots entangled forming treelike trunk, 5–15(–45) cm. Rhizophores restricted to base of stem, 0.5–3 cm, rather thick; roots much forked, forming thick massive rootstock, sometimes up to 20 cm or more. Main stems branched at and above middle, pinnately or anisotomously branched, stramineous or brown, stem terete, not sulcate, branches few; primary leafy branches 2–5 pairs, 2 or 3 times pinnately branched, branchlets sparse and regular, leafy branches dorsiventrally flattened, ultimate branches 1.4–3.3 mm wide including leaves. Axillary leaves on branches symmetrical, ovate, ovate-triangular, or elliptic, 0.8–2.6 × 0.4–1.3 mm, base exauriculate, margin denticulate, dark-colored. Dorsal leaves imbricate, asymmetrical, elliptic, 1.5–2.5 × 0.3–0.9 mm, not carinate, base obtuse, not peltate, margin denticulate (shortly ciliolate at base), apex aristate, spreading or parallel to axis. Ventral leaves slightly ascending, overlapping, asymmetrical, ovate to triangular or oblong-ovate, 1.5–2.5 × 0.5–1.2 mm, apex aristate; basiscopic margin subentire, serrate or ciliolate (at base), revolute; acroscopic base enlarged, broader, overlapping stem and branches, margin lacerate or denticulate. Strobili solitary, terminal, compact, tetragonal, 12–15 × 1.2–2.6 mm; sporophylls uniform, white-margined and hyaline, ovate-triangular, margin denticulate, membranous, apex acuminate or aristate; megasporophylls ± randomly distributed on both sides of strobilus; microsporangia transversely elliptic, relatively thick; microspores yellowish orange, megaspores pale yellow.

Common on limestone rocks; (100–)500–1500(–2100) m. Anhui, Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangsu, Jiangxi, Jilin, Nei Mongol, Shandong, Sichuan, Taiwan, Zhejiang [India, Japan, Korea, Philippines, Russia (Siberia), N Thailand].

10. *Selaginella pulvinata* (Hooker & Greville) Maximowicz, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 9: 335. 1859.

垫状卷柏 dian zhuang juan bai

Lycopodium pulvinatum Hooker & Greville, Hooker's J. Bot. Kew Gard. Misc. 2: 381. 1831; *Lycopodioides pulvinata* (Hooker & Greville) H. S. Kung; *Selaginella tamariscina* (P. Beauvois) Spring var. *pulvinata* (Hooker & Greville) Alston.

Plants terrestrial or epilithic, xerophytic, "resurrectional"; stems forming rosette, seasonally green, stems and roots entangled forming treelike trunk, plants 2–10 cm, without creeping rhizomes. Rhizophores restricted to base of stem, 2–4 cm, rather thick or slender, much forked at end and forming thick massive rootstock. Main stems branched near and above base, pinnately branched, stramineous or brown, main stem ca. 1 mm in diam. at lower part; primary leafy branches 4–7 pairs, 2 or 3 times pinnately branched, branchlets dense, adjacent primary branches on main stem ca. 1 cm apart, leafy portion of main stem including leaves 2.2–2.4 mm wide at middle, ultimate branches 1.2–1.6 mm wide including leaves. Axillary leaves on main stems larger than those on branches; axillary leaves on branches symmetrical, ovate to triangular, ca. 2.5 × 1 mm, base exauriculate, margin lacerate-ciliolate. Dorsal leaves on branches imbricate, obliquely ovate or triangular, 2.8–3.1 × 0.9–1.2 mm, not carinate, base truncate (with a tuft of hairs), margin lacerate, outer margin revolute, apex aristate. Ventral leaves slightly ascending, asymmetrical, oblong, 2.9–3.2 × 1.4–1.5 mm, apex aristate, entire; basicopic base not auriculate, margin lacerate, lower margin involute; acroscopic base enlarged, broader, overlapping stem and branches, margin lacerate. Strobili solitary, terminal, compact, tetragonal, 10–20 × 1.5–2 mm; sporophylls uniform, not white-margined, margin lacerate-ciliolate; megasporophylls in basal portion of strobili on lower side, in middle on lower side, or in upper portion on lower side; microspores pale yellow, megaspores white-yellow or dark brown.

Common in rock crevices on exposed rocky (limestone) ridges; (100–)1000–3000(–4300) m. Chongqing, S Gansu, Guangxi, Guizhou, Hebei, Henan, Liaoning, Shaanxi, Shanxi, Sichuan, Xizang [N India, Korea, Mongolia, Nepal, Russia (Siberia), Thailand, Vietnam].

11. *Selaginella willdenowii* (Desvaux ex Poiret) Baker, Gard. Chron. 1867: 950. 1867 [*"Willdenowii"*].

藤卷柏 teng juan bai

Lycopodium willdenowii Desvaux ex Poiret in Lamarck, Encycl., Suppl. 3: 552. 1814 [*"Willdenowii"*]; *Lycopodioides willdenowii* (Desvaux ex Poiret) Kuntze.

Plants terrestrial, evergreen, scandent, 100–200 cm or more. Rhizophores restricted to lower part of main stem or up to upper part, with some spinelike protuberances at base (as well as at axes of stems). Main stems branched from near base upward, stramineous or reddish, 2.4–3.5 mm in diam. in lower part, angulate, sulcate, glabrous; primary leafy branches 5–15 pairs, 3 times pinnately branched, ultimate branches simple or forked, branchlets sparse and regular, adjacent primary branches on main stem 6–13 cm apart, ultimate branches 3–7 mm wide including leaves. Axillary leaves on main stems obviously larger than those on branches, oblong, biauriculate (auricles larger than those of *Selaginella helferi*); axillary leaves on branches symmetrical, oblong or oblong-elliptic, 1.5–2.4 ×

1–1.6 mm, base biauriculate, margin entire. Dorsal leaves asymmetrical, those on main stems obviously larger than those on branches; dorsal leaves on branches approximate to imbricate, overlapping at leaf apex, falcate, 0.9–1.4 × 0.4–0.6 mm, not carinate, base obliquely subcordate, margin entire, apex obtusely cuspidate. Ventral leaves asymmetrical, those on main stem obviously larger than those on branches; ventral leaves on branches slightly ascending or spreading, distant or approximate, oblong-falcate, 2.8–4 × 1–1.5 mm, margin entire, apex obtuse; acroscopic base with rounded auricle, not overlapping stem and branches. Strobili solitary, terminal, compact, tetragonal, 5–35 × 1.8–3.8 mm; sporophylls unlike sterile leaves, uniform, white-margined, suborbicular, margin entire, apex acute or cuspidate; megasporophylls in middle on lower side of strobilus; microsporangia orbicular, rather thin, cells regular; microspores pale yellow, megaspores whitish.

Forests, under shrubs; below 100–1000 m. Guangxi, Guizhou, Yunnan [Cambodia, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

Selaginella willdenowii is cultivated and escaped in scattered localities of the American tropics (Proctor, Ferns Jamaica, 35. 1985).

12. *Selaginella helferi* Warburg, Monsunia 1: 121. 1900.

攀缘卷柏 pan yuan juan bai

Plants terrestrial, evergreen, scandent, 50–200 cm or more. Rhizophores restricted to lower part of stem or branched from lower to middle, with some spinelike protuberances at base. Main stems branched from lower part, pinnately branched, stramineous, 2.6–3.8 mm in diam. in lower part, subquadrangular or angulate, sulcate, glabrous or pubescent at axes; primary leafy branches 5–15 pairs, 3 times pinnately branched, branchlets regular, adjacent primary branches on main stem 5–16 cm apart, ultimate branches 5–8 mm wide including leaves. Axillary leaves on main stems obviously larger than those on branches, orbicular or reniform, ca. 3 × 2.8 mm, biauriculate at base (auricles smaller than those of *Selaginella willdenowii*); axillary leaves on branches ± symmetrical, ovate-lanceolate or oblong, 1.4–2.5 × 0.8–1.2 mm, base biauriculate, margin entire. Dorsal leaves asymmetrical, those on main stems obviously larger than those on branches; dorsal leaves on branches approximate, overlapping at leaf apex, falcate, 1.2–2.5 × 0.3–1 mm, not carinate, base oblique, not peltate, margin entire, apex cuspidate. Ventral leaves asymmetrical, those on main stem obviously larger than those on branches; ventral leaves on branches contiguous, spreading, oblong-falcate, 2.3–4.2 × 0.9–1.8 mm, apex acute or apiculate; basicopic margin entire; acroscopic base with rounded auricle, not overlapping stem and branches, margin entire. Strobili solitary, terminal, compact, tetragonal, 5–14 × 1.6–3.4 mm; sporophylls uniform, white-margined, ovate-lanceolate, carinate, margin entire, apex acuminate; megasporophylls and microsporophylls at intervals or megasporophylls in middle on lower side of strobilus; microsporangia orbicular, rather thin, cells regular; microspores pale yellow, megaspores pale yellow.

In clearings of evergreen forests; 100–1200(–1800) m. Guangxi, Guizhou, Yunnan [India (Assam), Laos, Myanmar, Thailand, Vietnam].

13. *Selaginella nummularifolia* Ching, Fl. Xizang. 1: 21. 1983.

钱叶卷柏 qian ye juan bai

Plants terrestrial or epilithic, evergreen or seasonally green, long creeping, 7–30 cm. Rhizophores at intervals throughout length of creeping stem and branches, producing axillary branches from dorsal side of stem axis. Main stems branched throughout, reddish or brown, 0.5–0.8 mm in diam. in lower part, stem terete, branches many, some primary lateral branches developing into long branch systems, 3 or 4 times pinnately branched, branchlets sparse, adjacent primary branches on main stem 2–2.8 cm apart, ultimate branches 1.7–2.2 mm wide including leaves. Axillary leaves on main stems larger than those on branches, oblong, base peltate, truncate; axillary leaves on branches symmetrical, oblong, 1–1.6 × 0.5–0.6 mm, base peltate, margin slightly lacerate-ciliolate. Dorsal leaves asymmetrical, those on main stems slightly larger than those on branches; dorsal leaves on branches imbricate, broadly ovate or suborbicular, 1.1–1.9 × 0.8–1.5 mm, not carinate, base obtuse, peltate, margin slightly lacerate-ciliolate or subentire, apex obtuse, parallel to axis. Ventral leaves asymmetrical, brown or reddish, slightly smaller than dorsal leaves, covered by dorsal leaves above, almost overlapping; ventral leaves on branches contiguous, slightly ascending, oblong-ovate, 1–1.5 × 0.6–0.8 mm, margin slightly lacerate-ciliolate, apex obtuse. Strobili solitary, terminal, compact, tetragonal, ca. 14 × 1–1.2 mm; sporophylls uniform, not white-margined, broadly ovate, sharply carinate, margin slightly lacerate-ciliolate, apex acute; ventral sporophylls brown or reddish, carinate, only one megasporophyll in upper portion on lower side of strobilus; microsporangia suborbicular, relatively thick; microspores yellowish orange, megaspores yellowish orange.

• *Betula* or *Cupressus gigantea* relict forests, on limestone rocks; 3100–4200 m. Xizang.

14. *Selaginella rossii* (Baker) Warburg, *Monsunia* 1: 101. 1900.

鹿角卷柏 lu jiao juan bai

Selaginella mongholica Ruprecht var. *rossii* Baker, J. Bot. (Hooker) 21: 45. 1883; *Lycopodioides rossii* (Baker) Tzvelev.

Plants epilithic, xerophytic, seasonally green, creeping, 10–25 cm or more. Rhizophores at intervals throughout length of main stem, on dorsal side in axils of stem branches. Main stems branched throughout, reddish, ca. 0.2 mm in diam. in lower part, terete, not sulcate, glabrous; primary leafy branches 3–10 pairs, once or twice forked, secondary branches forked, branchlets sparse, adjacent primary branches on main stem 2–3 cm apart, leafy portion of main stem including leaves 4–4.5 mm wide at middle, ultimate branches 3–4 mm wide including leaves. Axillary leaves on main stems larger than those on branches, ovate, base not peltate, attenuate; axillary leaves on branches symmetrical, elliptic, narrowly elliptic, or oblong, 1.6–2 × 1–1.2 mm, base exauriculate, margin lacerate-ciliolate (in middle, subentire to base and to apex). Dorsal leaves asymmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches contiguous or imbricate, ovate-elliptic or rhomboid-ovate, 1.4–1.6 × 0.8–1.1 mm, cari-

nate, base attenuate, peltate, margin sparsely and shortly lacerate-ciliolate, apex acuminate or cuspidate. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches as distant as width of leaf, usually deflexed, oblong or oblong-obovate, 1.8–2.1 × 0.9–1.2 mm, apex acuminate; basicopic margin subentire, involute; acrosopic base rounded, overlapping stem and branches, margin lacerate-ciliolate (in basal half). Strobili solitary, terminal, compact, tetragonal, 5–15 × 1–1.5 mm; sporophylls uniform, not white-margined, ovate-triangular, sharply carinate, margin sparsely ciliolate, apex acute; megasporophylls in basal portion on lower side of strobilus; microsporangia reniform, relatively thick; microspores yellowish orange or pale yellow, rugose, megaspores whitish, irregularly papillate.

In rock crevices, on rocks in forests, on shaded rocks; 200–800 m. Heilongjiang, Jilin, Liaoning, Shandong [Korea, Russia (Far East)].

15. *Selaginella sinensis* (Desvaux) Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 137. 1843.

中华卷柏 zhong hua juan bai

Lycopodium sinense Desvaux, Mém. Soc. Linn. Paris 6: 189. 1827; *Lycopodioides mongholica* (Ruprecht) Kuntze; *L. sinensis* (Desvaux) Satou; *Selaginella mongholica* Ruprecht.

Plants terrestrial, xerophytic, seasonally green, creeping, 15–45 cm or more. Rhizophores at intervals throughout length of main stem, on ventral side in axils of branches. Main stems branched throughout, pinnately branched, stramineous, 0.4–0.6 mm in diam. in lower part, terete; primary leafy branches many, up to 10–20, 1–3 times forked, secondary branches once or twice forked, tertiary branches forked or simple, branchlets sparse and regular, adjacent primary branches on main stem 1.5–3 cm apart, ultimate branches 2–3 mm wide including leaves. Axillary leaves on main stems larger than those on branches, oblong-ovate or obovate; axillary leaves on branches symmetrical, narrowly obovate, 0.7–1.1 × 0.17–0.55 mm, base exauriculate, margin ciliolate. Dorsal leaves ± symmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches contiguous, ovate-elliptic, 0.6–1.2 × 0.3–0.7 mm, not carinate, base cuneate, margin long ciliolate, apex acute. Ventral leaves ± symmetrical, those on main stem not obviously larger than those on branches, overlapping or imbricate (at apex of branchlets), slightly ascending, 1–1.5 × 0.5–1 mm, apex acute or obtuse; basicopic base slightly auriculate, margin long ciliolate (at base); acrosopic base not enlarged, not overlapping stem and branches, margin long ciliolate. Fertile branches erect. Strobili solitary or in pairs, terminal, compact, tetragonal, 5–12 × 1.5–1.8 mm; sporophylls uniform, white-margined, ovate, carinate, margin ciliolate, apex acute; ventral sporophylls ovate, strobili with only 1 megasporophyll at base of lower side, elsewhere with microsporophylls (megasporophyll very large); microsporangia ellipsoid, relatively thick, cells regular; microspores orange-red, megaspores whitish.

• On rocks, soil banks; 100–1000(–2800) m. Anhui, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi.

16. *Selaginella limbata* Alston, J. Bot. 70: 62. 1932.具边卷柏 *ju bian juan bai*

Plants terrestrial, seasonally green, long creeping, branches ascending, 50–100 cm or more. Rhizophores at intervals throughout length of main stem, borne on ventral side in axils of branches. Main stems branched throughout, stramineous, 0.4–1.4 mm in diam. in lower part, subquadrangular or angulate, sulcate, branches many, some primary lateral branches developing into long branch systems; primary leafy branches 2–5 pairs, 2 or 3 times forked, branchlets sparse, adjacent primary branches on creeping main stems 4–10 cm apart, leafy branches dorsiventrally flattened, ultimate branches 2.4–5.6 mm wide including leaves. All leaves entire and white-margined. Axillary leaves on main stems obviously larger than those on branches, suborbicular, base subcordate; axillary leaves on branches symmetrical, elliptic or broadly elliptic, 1.3–2.8 × 0.8–1.8 mm. Dorsal leaves asymmetrical; dorsal leaves on branches imbricate, overlapping at leaf apex, ovate-elliptic, 0.8–1.6 × 0.3–1 mm, not carinate, base uniauriculate at basispic side, apex long acuminate. Ventral leaves asymmetrical, those on main stem larger than those on branches; ventral leaves on branches approximate or contiguous, spreading, ovate-lanceolate or oblong, 1.5–3 × 0.8–1.6 mm, apex acute; basispic base slightly dilated; acrosopic base rounded, not overlapping stem and branches. Strobili solitary, terminal, compact, tetragonal, 5–12 × 1.8–3.3 mm; sporophylls uniform, white-margined, ovate, carinate, margin entire, apex acuminate; megasporophylls and microsporophylls at intervals or only 1 megasporophyll at base on lower side of strobilus, elsewhere microsporophylls or megasporophylls in middle on lower side; microsporangia cordate or transversely elliptic, relatively thick, marginal cells differentiated, longer; microspores pale yellow, megaspores dark brown, baculate.

Under shrubs on sunny slopes, forests, common in coastal regions of E China; below 100–1000 m. Fujian, Guangdong, Hunan, Jiangxi, Zhejiang [Japan (Amami Oshima)].

Plants of *Selaginella limbata* found in shade are usually sterile.

17. *Selaginella uncinata* (Desvaux ex Poiret) Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 141. 1843.翠云草 *cui yun cao*

Lycopodium uncinatum Desvaux ex Poiret in Lamarck, Encycl., Suppl. 3: 558. 1814; *L. dilatatum* Hooker & Greville; *Lycopodioides uncinata* (Desvaux ex Poiret) Kuntze; *Selaginella eurystachya* Warburg.

Plants terrestrial, evergreen; main stem scandent from erect base, 50–100 cm or more. Rhizophores restricted to lower part of stem or at intervals throughout length of main stem, borne on ventral side in axils of branches. Main stems branched from near base upward, pinnately branched, stramineous, 1–1.5 mm in diam. in lower part, terete and angulate, sulcate, glabrous, apex of main stems flagelliform, branches many; primary leafy branches 5–8 pairs, twice pinnately branched, secondary branches once or twice forked, branchlets dense, adjacent primary branches on main stem 5–8 cm apart, ultimate

branches 3.8–6 mm wide including leaves. Leaves often iridescent, distinctly white-margined, margin entire. Axillary leaves on main stems obviously larger than those on branches, reniform, ca. 3 × 4 mm, base slightly cordate; axillary leaves on branches symmetrical, broadly elliptic or orbicular, 2.2–2.8 × 0.8–2.2 mm, base subcordate, margin entire. Dorsal leaves asymmetrical, those on main stems obviously larger than those on branches; dorsal leaves on branches approximate to imbricate, parallel to axis or overlapping at leaf apex and often reflexed, ovate, 1–2.4 × 0.6–1 mm, not carinate, base obtuse, margin entire, apex long acuminate. Ventral leaves asymmetrical, those on main stem obviously larger than those on branches; ventral leaves on branches contiguous, spreading, oblong, 2.2–3.2 × 1–1.6 mm, margin entire, apex acute or mucronate; basispic base rounded; acrosopic base not enlarged. Strobili solitary, terminal, compact, tetragonal, 5–25 × 2.5–4 mm; sporophylls uniform, white-margined, ovate-triangular, carinate, margin entire, apex acuminate; megasporophylls in basal portion on lower side of strobilus or megasporophylls in middle or upper portion on lower side; microsporangia transversely elliptic, rather thin, cells regular; microspores pale yellow, megaspores gray-white or dark brown.

• Damp ground under shrubs along rivers or on forest floor, also cultivated and sometimes escaped; below 100–1200 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang.

18. *Selaginella hainanensis* X. C. Zhang & Nootboom, Bot. J. Linn. Soc. 148: 323. 2005.琼海卷柏 *qiong hai juan bai*

Plants terrestrial, seasonally green, long creeping, 35–80 cm or more. Rhizophores at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched throughout, stramineous, 0.4–1 mm in diam. in lower part, subquadrangular, sulcate; primary leafy branches 5–10 pairs, once or twice pinnately branched, secondary branches forked or once pinnately branched, branchlets sparse, adjacent primary branches on main stem 4–9 cm apart; leafy portion of main stem including leaves 6–7 mm wide at middle, ultimate branches 3.4–6 mm wide including leaves. Leaves entire, distinctly white-margined. Axillary leaves on main stems larger than those on branches (often reflexed where rhizophore occurs), broadly ovate or suborbicular, 2.4–3.5 × 1.8–3.6 mm, base attenuate; axillary leaves on branches symmetrical, ovate, broadly elliptic, or oblong-elliptic, 1.9–2.8 × 1–2 mm, base exauriculate, margin entire. Dorsal leaves ± symmetrical, those on main stems obviously larger than those on branches, 3.2–3.8 × 1.6–2 mm, arista 0.4–0.8 mm; dorsal leaves on branches approximate or imbricate, overlapping at leaf apex or often reflexed, ovate, 2–3 × 1–1.8 mm, not carinate, base obtuse, apex long acuminate or aristate, arista 0.5–1 mm. Ventral leaves strongly asymmetrical, those on main stem obviously larger than those on branches, 3.4–4.2 × 2.2–3.2 mm; ventral leaves on branches approximate, spreading, ovate, oblong, or oblong-ovate, 2.5–3 × 1–1.6 mm, apex apiculate; basispic base with 1 or few cilia, margin entire; acrosopic base enlarged, broader, overlapping stem and branches, margin entire. Strobili solitary, terminal, compact, tetragonal, 7–25 × 4–5 mm;

sporophylls uniform, ovate-lanceolate, carinate, margin entire, apex long acuminate to aristate; megasporophylls in basal portion on lower side of strobilus or megasporophylls in middle on lower side; microsporangia transversely elliptic, relatively thick, marginal cells differentiated, smaller with thin walls; microspores pale yellow, megaspores white-yellow or whitish (or sometimes with dark central part), reticulate.

• Forests of rubber trees, forming mats on ground; below 100 m. E Hainan.

Selaginella hainanensis is endemic to the coastal region of E Hainan.

19. *Selaginella siamensis* Hieronymus, Bot. Tidsskr. 24: 113. 1901.

泰国卷柏 tai guo juan bai

Plants terrestrial, evergreen or seasonally green, long creeping or ascending from decumbent base or scandent, 20–45 cm. Rhizophores at intervals throughout length of main stem or up to middle of main stem, borne on ventral side in axils of branches. Main stems branched throughout, anisotomously branched, brown, 1–2 mm in diam. in lower part, terete, glabrous, branches few to many, some primary lateral branches developing into long branch systems, twice pinnately branched, tertiary branches forked, branchlets sparse and regular, adjacent primary branches on main stem 2–8 cm apart; leafy portion of main stem including leaves 3–3.5 mm wide at middle, ultimate branches 2–4 mm wide including leaves. Leaves papery, not iridescent, not white-margined, margin not entire or subentire; leaves on main stems approximate or sparse, larger than those on branches, slightly dimorphic, green or yellowish, oblong-ovate, appressed, not keeled, base not peltate, margin ciliolate. Axillary leaves on main stems obviously larger than those on branches, oblong-elliptic or oblong-ovate, base obtuse or subcordate; axillary leaves on branches symmetrical, ovate, 1.3–2.5 × 0.7–1.7 mm, base exauriculate, margin ciliolate. Dorsal leaves asymmetrical or ± symmetrical, those on main stems obviously larger than those on branches, base obliquely cordate or biauriculate, margin ciliolate, apex aristate (1/3–1/2 as long as leaves); dorsal leaves on branches imbricate, ovate-elliptic or ovate-orbicular, 1.2–1.8 × 0.4–0.8 mm, base obliquely subcordate, margin entire or subentire, apex aristate, parallel to axis, arista ca. 1/3 as long as leaves. Ventral leaves asymmetrical, those on main stem obviously larger than those on branches, basiscopic margin ciliolate; ventral leaves on branches contiguous, slightly ascending, ovate or oblong-ovate, 1.8–2.6 × 0.8–1.4 mm, margin ciliolate, apex acute and aristate; acroscopic base rounded, overlapping stem and branches; ventral leaves on ultimate branches with basiscopic base rounded, margin subentire, shortly ciliolate at base. Strobili solitary, terminal, compact, tetragonal, 4–10 × 1.2–2.6 mm; sporophylls uniform, not white-margined, ovate-triangular, carinate, margin minutely ciliolate, apex acuminate; megasporophylls in basal portion on lower side or megasporophylls and microsporangia at intervals, or only 1 megasporophyll at base of lower side of strobilus, elsewhere with microsporangia; microsporangia cordate, relatively thick, marginal cells differentiated, smaller with thin walls; microspores yellowish orange, megaspores brown.

Rather dry ground in open places, forests, on rocks; 800–1800 m. S Yunnan [Cambodia, Laos, Thailand, Vietnam].

20. *Selaginella davidii* Franchet, Pl. David. 1: 344. 1884.

蔓生卷柏 man sheng juan bai

Lycopodioides davidii (Franchet) H. S. Kung & Li Bing Zhang; *L. gebaueriana* (Handel-Mazzetti) H. S. Kung; *Selaginella davidii* subsp. *gebaueriana* (Handel-Mazzetti) X. C. Zhang; *S. gebaueriana* Handel-Mazzetti.

Plants terrestrial or epilithic, evergreen or seasonally green, creeping, (5–)15–45 cm or more. Rhizophores at intervals. Main stems pinnately branched, stramineous; primary leafy branches 3–9 pairs or more, once or twice pinnately branched, secondary branches once or twice forked, branchlets sparse, adjacent primary branches on main stem 1–2(–5) cm apart, leafy portion of main stem including leaves 4.5–6(–8.5) mm wide at middle, ultimate branches 3.6–4.2(–6.5) mm wide including leaves. Axillary leaves on branches symmetrical or asymmetrical, ovate-lanceolate, (1.2–)2–3(–3.8) × (0.6–)1.2–1.8 mm, margin subentire, denticulate or ciliolate in basal half. Dorsal leaves asymmetrical, obliquely ovate, 1.6–2(–2.8) × 0.5–0.8(–1.2) mm, base subcordate, margin denticulate or shortly ciliolate (at least at base), apex aristate, arista short to more than 1/2 length of dorsal leaf and often reflexed. Ventral leaves spreading or slightly deflexed, asymmetrical, oblong-ovate, (1.6–)2–3(–3.6) × 1–1.8 mm, apex acute or obtuse; basiscopic margin subentire or minutely denticulate; acroscopic base enlarged, broader, overlapping stem and branches, margin subentire or minutely denticulate. Strobili solitary, terminal, compact, tetragonal, 3–17 × 2–4.6 mm; sporophylls uniform, white-margined, ovate, sharply carinate, margin denticulate or ciliolate, apex aristate; megasporophyll only 1 at base on lower side of strobilus, elsewhere microsporangia or megasporophylls in basal portion on lower side, or megasporophylls and microsporangia at intervals; microsporangia elliptic; microspores yellowish orange, megaspores whitish.

• Under shrubs in wet shaded places on rather dry slopes, often in limestone areas; 100–2300 m. Anhui, Chongqing, Gansu, Guangxi, Hebei, Henan, Hubei, Hunan, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan.

21. *Selaginella remotifolia* Spring in Miquel, Pl. Jungh. 3: 276. 1854.

疏叶卷柏 shu ye juan bai

Lycopodioides remotifolia (Spring) H. S. Kung; *Selaginella involucrata* Warburg; *S. japonica* Miquel; *S. kelungensis* Hayata; *S. remotifolia* var. *japonica* (Miquel) Koidzumi.

Plants terrestrial, evergreen, creeping, 20–50 cm or more. Rhizophores at intervals throughout length of creeping stem and branches, on dorsal side in axils of stem branches. Main stems branched from near base upward, not obviously articulate, stramineous, 0.5–1.5 mm in diam. in lower part, oval or terete, sulcate, glabrous, with single vascular bundle, basal lateral branches occasionally developed into rather long branch systems; primary leafy branches 5–10 pairs or more, once or twice pinnately branched, secondary branches forked or once

pinnately branched, branchlets sparse, adjacent primary branches on main stem 3–5 cm apart, ultimate branches 3–4(–7) mm wide including leaves. Leaves decussate, not white-margined, margin subentire. Axillary leaves on main stems larger than those on branches, ovate or broadly ovate, base not peltate, attenuate; axillary leaves on branches symmetrical, ovate-lanceolate or elliptic, 1.4–2.4 × 0.5–1.2 mm, base exauriculate, margin slightly denticulate. Dorsal leaves asymmetrical, those on main stems slightly larger than those on branches, base uniauriculate, margin entire; dorsal leaves on branches approximate or imbricate, elliptic-lanceolate or ovate-elliptic, 1.4–2(–2.8) × 0.4–0.9(–1.2) mm, not carinate, base uniauriculate, margin subentire or minutely denticulate, apex long acuminate, parallel to axis. Ventral leaves asymmetrical, those on main stem larger than those on branches; ventral leaves on branches distant or approximate, spreading, ovate-lanceolate, 1.8–3(–3.6) × 0.8–1.4(–1.7) mm, margin subentire or denticulate, apex acute; acroscopic base rounded, not overlapping stem and branches, margin minutely denticulate or subentire. Fertile branches erect. Strobili solitary, terminal and lateral to branches, compact, tetragonal, 3.5–6 × 1–3 mm; sporophylls uniform, not white-margined, ovate-lanceolate, carinate, margin denticulate, apex acuminate; ventral sporophylls ovate-lanceolate, margin denticulate, only 1 megasporophyll at base on lower side of strobilus, elsewhere with microsporophylls; microspores pale yellow, megaspores gray-white.

Shaded slopes; (100–)600–2400(–3000) m. Chongqing, Fujian, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [NE India, Indonesia (Sumatra), Japan, Nepal, Philippines].

22. *Selaginella kraussiana* (Kunze) A. Braun, Index Sem. (Berlin), 22. 1860.

小翠云 xiao cui yun

Lycopodium kraussianum Kunze, Linnaea 18: 114. 1844; *Didiclis kraussiana* (Kunze) Rothmaler; *Lycopodioides kraussiana* (Kunze) Kuntze.

Plants terrestrial, evergreen or seasonally green, creeping, 15–45 cm or more. Rhizophores at intervals throughout length of creeping stem and branches, on dorsal side in axils of stem branches. Main stems branched throughout, not very regularly pinnately branched, slightly articulate, stramineous, 0.6–1.2 mm in diam. in lower part, subquadrangular or angulate, sulcate, glabrous, with 3 vascular bundles; primary leafy branches 10–20 pairs, 2 or 3 times pinnately branched, branchlets sparse or irregular, adjacent primary branches on main stem 2–5 cm apart, ultimate branches 3–6 mm wide including leaves. Axillary leaves on main stems not obviously larger than those on branches, oblong-elliptic, base not peltate, obtuse; axillary leaves on branches symmetrical, oblong-elliptic, 2.3–3.8 × 1–2 mm, base exauriculate (obtuse), margin denticulate. Dorsal leaves asymmetrical, those on branches approximate or not, broadly elliptic-lanceolate, 2.1–2.8 × 0.6–1 mm, not carinate or slightly carinate, base oblique, slightly uniauriculate (on outer side), not peltate, margin denticulate, apex acuminate. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches distant, spreading, ovate-elliptic, 2.4–4 × 1.2–1.8 mm, margin denticu-

late, apex acute; acroscopic base not enlarged. Fertile branches erect. Strobili solitary, terminal and lateral to branches, compact, tetragonal, 3–4 × ca. 1 mm; sporophylls uniform, not white-margined, ovate-lanceolate, margin denticulate, apex acuminate; lower side of strobilus with only 1 megasporophyll at base, elsewhere with microsporophylls; microsporangia elliptic-oblong, with relatively large cells in central part; microspores echinate, 25–36 μm, megaspores cristate-reticulate, 400–1100 μm.

Common in botanical gardens, in shade-forming mats. Guangdong, Guizhou [native to S and E Africa; cultivated and escaped in many countries].

23. *Selaginella picta* A. Braun ex Baker, J. Bot. 23: 19. 1885.

黑顶卷柏 hei ding juan bai

Lycopodioides picta (A. Braun ex Baker) Kuntze; *Selaginella hypopterygia* A. Braun ex Warburg; *S. picta* f. *viridis* Alston.

Plants terrestrial, evergreen, erect, suberect, or ascending from decumbent base, 35–55(–85) cm, without creeping rhizomes or stolons. Rhizophores restricted to lower part of stem. Main stems branched from near base or from lower part upward, pinnately branched, pale green or stramineous, unbranched main stem 3–5 cm tall, 2.5–5 mm in diam. in lower part; stem oval or terete, sulcate, glabrous, apex of main stem blackish (basal part of branches also blackish); primary leafy branches 4–6 pairs, once pinnately branched, secondary branches not forked or basal branch once or twice forked, tertiary branches simple; branchlets dense, regular; adjacent primary branches on main stem 3–5 cm apart, ultimate branches 4.5–5.5 mm wide including leaves. Axillary leaves on main stems obviously larger than those on branches, oblong-ovate, 5–6.5 × 2–3 mm, base subcordate; axillary leaves on branches symmetrical, ovate-lanceolate, 2–3.8 × 0.6–1.6 mm, base slightly cordate, margin entire. Dorsal leaves on branches contiguous, overlapping at leaf apex, obliquely oblong, 1.2–2.5 × 0.5–1.4 mm, not carinate, base oblique, slightly subcordate, margin entire, apex acuminate or caudate. Ventral leaves on branches slightly ascending, contiguous, falcate, 3–6 × 1–2.4 mm, apex subacute; basisopic base slightly dilated, margin entire; acroscopic base not enlarged, margin entire. Strobili solitary or in pairs, terminal, compact, tetragonal, 5–35 × 1–3 mm; sporophylls uniform, white-margined, ovate-triangular, sharply carinate, margin entire, apex acuminate; megasporophylls in basal portion on lower side of strobilus, or in middle on lower side; microsporangia transversely elliptic, relatively thick, marginal cells differentiated, longer; microspores light pale yellow, megaspores brown.

Dense forests; 400–1000(–1800) m. Guangxi, Hainan, Jiangxi, Xizang, Yunnan [Cambodia, India (Assam), Laos, Myanmar, Thailand, Vietnam].

24. *Selaginella delicatula* (Desvaux ex Poiret) Alston, J. Bot. 70: 282. 1932.

薄叶卷柏 bao ye juan bai

Lycopodium delicatulum Desvaux ex Poiret in Lamarck,

Encycl., Suppl. 3: 554. 1814; *Lycopodioides delicatula* (Desvaux ex Poiret) H. S. Kung; *Lycopodium flaccidum* Bory; *L. pouzolzanum* Gaudichaud; *Selaginella chinensis* (Loddiges) Kunze; *S. flaccida* (Bory) Spring; *S. pouzoliana* (Gaudichaud) Spring.

Plants terrestrial, evergreen, erect, suberect, or ascending from decumbent base, 35–50 cm, with stolons at base. Rhizophores restricted to lower part of stem or up to middle of main stem. Main stems branched from lower part or middle upward, pinnately branched, stramineous, 1.8–3 mm in diam. in lower part, oval, subquadrangular, or angulate in cross section, sulcate, glabrous, apex of main stem not blackish or blackish, base of some upper lateral branches also blackish; primary leafy branches 5–8 pairs, once pinnately branched or twice pinnately branched at base, secondary branches not forked or basal branch once or twice forked, branchlets dense and regular, leafy portion of main stem including leaves 5–6 mm wide at middle, ultimate branches 4–5 mm wide including leaves. Axillary leaves on main stems obviously larger than those on branches, oblong-ovate, 2.4–3.6 × 1.6–2.4 mm; axillary leaves on branches narrowly elliptic, 2.2–2.6 × 0.8–1 mm, base exauriculate, margin entire. Dorsal leaves on branches contiguous, oblique, narrowly elliptic or falcate, 1.8–2.4 × 0.8–1.2 mm, not carinate, base oblique, margin entire, apex acuminate, acute, mucronate, or cuspidate. Ventral leaves on branches contiguous to imbricate, slightly ascending, oblong-ovate or oblong, 3–4 × 1.2–1.6 mm, apex acute or apiculate, minutely dentate; basiscopic base rounded, margin entire; acroscopic base not enlarged, not overlapping stem and branches, margin entire. Strobili solitary, terminal, compact, tetragonal, 5–10(–20) × 1.4–2.8 mm; sporophylls uniform, white-margined, broadly ovate, margin entire, apex acuminate; megasporophylls in middle on lower side of strobilus; microsporangia transversely elliptic, rather thin, cells regular; microspores orange-red or pale yellow, spinose, 20–30 μm, megasporangia whitish or brown, verrucate to gemmate, 350–375 μm.

Terrestrial in forests, on shaded rocks; 100–1000 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

25. *Selaginella wallichii* (Hooker & Greville) Spring, Fl. Bras. 1(2): 124. 1840.

瓦氏卷柏 *wa shi juan bai*

Lycopodium wallichii Hooker & Greville, Hooker's J. Bot. Kew Gard. Misc. 2: 384. 1831.

Plants terrestrial, evergreen, erect, 40–70 cm, with creeping subterranean rhizome and stolons. Rhizophores restricted to lower part of stem. Main stems branched in upper part or from lower part, pinnately branched or irregularly pinnately branched, stramineous, unbranched main stem 5–20 cm tall, 2–2.6 mm in diam. in lower part, subquadrangular, sulcate, glabrous, apex of main stem not blackish; primary leafy branches 4–8 pairs, once pinnately branched, branchlets regular, adjacent primary branches on main stem 5–10 cm apart, ultimate branches 3.8–6 mm wide including leaves. Axillary leaves

on main stems obviously larger than those on branches, broadly ovate to suborbicular, 4–5 × 3–4.2 mm, base cordate; axillary scales on branches ± symmetrical, broadly ovate to oblong-elliptic, 2.4–3.8 × 1.2–1.9 mm, base exauriculate, margin entire. Dorsal leaves on ultimate branches contiguous, elliptic-lanceolate, 1–2.6 × 0.3–1.2 mm, not carinate, base oblique, margin entire, apex acuminate to shortly aristate. Ventral leaves on ultimate branches contiguous, spreading, oblong-falcate, 2.2–3.2 × 0.9–1.3 mm, margin subentire, apex acute or apiculate; basiscopic base rounded, margin entire; acroscopic base rounded, not overlapping stem and branches, margin entire. Strobili solitary, terminal, compact, tetragonal, 6–20 × 1.3–2 mm; sporophylls uniform, white-margined, ovate-lanceolate, margin entire, apex acuminate; dorsal sporophylls ovate-lanceolate, carinate, margin entire, apex acuminate; megasporophylls in middle on lower side of strobilus; microsporangia ellipsoid, relatively thick, cells regular; microspores pale yellow, megasporangia white-yellow.

Shaded places in forests; 100–1500 m. Guangdong, Guangxi, Yunnan [Malaysia, Myanmar, Singapore, Thailand].

Selaginella wallichii is superficially like *S. delicatula*. The dorsal leaves of *S. delicatula* usually overlap at the apex, while they are straight in *S. wallichii*.

26. *Selaginella commutata* Alderwerelt, Bull. Jard. Bot. Buitenzorg, sér. 2, 11: 26. 1913.

长芒卷柏 *chang mang juan bai*

Plants terrestrial, evergreen, erect, suberect, or ascending from decumbent base, (20–)30–40 cm, without creeping rhizomes or stolons. Rhizophores restricted to lower part of stem or up to middle of main stem. Main stems branched from lower part or middle upward, stramineous, unbranched main stem 5–10 cm tall, 2–3 mm in diam. in lower part, flattened or terete, sulcate, glabrous; primary leafy branches 3–5 pairs, once or twice pinnately branched, secondary branches forked or once pinnately branched, branchlets sparse, adjacent primary branches on main stem 4–8.5 cm apart; leafy portion of main stem including leaves 11–13 mm wide at middle, ultimate branches 5–9 mm wide including leaves. Axillary leaves on branches symmetrical, ovate, 3–3.4 × 1.8–2.2 mm, base exauriculate, margin densely and regularly denticulate. Dorsal leaves on branches contiguous to imbricate, broadly ovate-orbicular or rhomboid-ovate, 2.2–2.6 × 1.3–2 mm, not carinate or slightly carinate, base cordate, margin denticulate in upper portion, elsewhere entire or subentire, apex aristate, apical arista curved, 1.2–2.2(–2.6) mm. Ventral leaves on branches spreading or slightly ascending, oblong-ovate or oblong, 4–5.6 × 2–2.8 mm, apex acute or obtuse; basiscopic margin subentire, slightly denticulate at base; acroscopic base rounded, strongly overlapping stem and branches, margin denticulate. Strobili solitary or in pairs, terminal, compact, tetragonal, 5–17 × 2.2–3.8 mm; sporophylls uniform, not white-margined, ovate-triangular, sharply carinate, margin denticulate, apex acuminate; megasporophylls and microsporophylls at intervals (in lower side); microsporangia elliptic-oblong, relatively thick, marginal cells differentiated, smaller with thin walls; microspores pale yellow, megasporangia whitish, reticulate.

Forests; 100–1000 m. Guangxi [Vietnam].

In *Selaginella commutata*, the arista (awn) of the dorsal leaf on the main stem is as long as the leaf, while the arista of the dorsal leaf on lateral branches is even longer.

27. *Selaginella rolandi-principis* Alston, J. Bot. 72: 228. 1934.

海南卷柏 hai nan juan bai

Selaginella magnifica Bonaparte, Notes Pterid. 6: 192. 1923, not Warburg (1900).

Plants terrestrial, evergreen, erect, 20–45 cm, with stolons at base. Rhizophores restricted to lower part of stem or up to middle of main stem. Main stems branched from near base or from lower part upward, pinnately branched, pale green or stramineous, unbranched main stem up to 15 cm tall, 2–3 mm in diam. in lower part, oval, sulcate or not, glabrous; primary leafy branches 3–7 pairs, once or twice forked, or once or twice pinnately branched, secondary branches forked, branchlets sparse and irregular, adjacent primary branches on main stem 5–8 cm apart, leafy portion of main stem including leaves 12–16 mm wide at middle, ultimate branches 10–15 mm wide including leaves. Axillary leaves on branches symmetrical, narrowly oblong, 3–4 × 1.5–2 mm, base slightly biauriculate, margin denticulate. Dorsal leaves on branches contiguous, obliquely broadly ovate, 2.5–4 × 1.6–2.6 mm, not carinate, base obliquely subcordate, margin ciliolate, apex acuminate or cuspidate. Ventral leaves on branches spreading, oblong, 4.5–7 × 2–4.5 mm, margin not obviously denticulate, apex apiculate or obtuse; basispic base not auriculate, margin entire, denticulate (at base) or serrate (at apex), slightly involute; acroscopic base not enlarged, margin denticulate (to base), serrate (to apex). Strobili solitary or in pairs or forked (often 2 at tip of branch, sometimes 3), terminal or lateral to branches, compact, tetragonal, 5–37 × 1–1.5 mm; sporophylls uniform, not obviously white-margined, ovate-triangular, sharply carinate, margin denticulate, apex acute; megasporophylls and microsporophylls at intervals, or megasporophylls in middle on lower side of strobilus or in upper portion on lower side; microsporangia elliptic-oblong, relatively thick, marginal cells differentiated, smaller with thin walls; microspores light pale yellow, megasporos grey-white, reticulate.

Wet shaded places in mixed woods, beside streams in dense forests; (100–)300–900(–1500) m. Guangxi, Hainan, Yunnan [Vietnam].

The ventral leaves of *Selaginella rolandi-principis* are the largest of all the Chinese species.

28. *Selaginella scabrifolia* Ching & Chu H. Wang, Acta Phytotax. Sin. 8: 157. 1959.

糙叶卷柏 cao ye juan bai

Selaginella doederleinii Hieronymus subsp. *scabrifolia* (Ching & Chu H. Wang) X. C. Zhang.

Plants terrestrial, evergreen, suberect or ascending from decumbent base, rarely creeping, 30–60 cm. Rhizophores branched throughout length of stem and branches, or restricted to middle of suberect main stem. Main stems branched from near base upward, pinnately branched, 0.6–2.4 mm in diam. in

lower part, oval or subquadrangular; primary leafy branches 6–12 pairs, 3 times pinnately branched, secondary branches once or twice pinnately branched, tertiary branches forked or once pinnately branched, branchlets dense and regular, adjacent primary branches on main stem 2–5 cm apart, leafy portion of main stem including leaves 4.5–7 mm wide at middle, ultimate branches 2.5–4 mm wide including leaves. All leaves spinose on adaxial surface. Axillary leaves on branches symmetrical, ovate, 1.2–2.5 × 0.5–1.5 mm, base exauriculate, margin denticulate. Dorsal leaves on branches approximate, parallel to axis or overlapping at leaf apex, ovate, obovate, or ovate-elliptic, 0.8–1.4 × 0.3–0.8 mm, slightly carinate, base cuneate, margin denticulate, apex rather long aristate. Ventral leaves on branches contiguous or overlapping, somewhat slightly ascending, ovate-triangular or ovate-lanceolate, 1.7–4 × 0.5–1.5 mm, apex subacute or obtuse; basispic base rounded or decurrent, margin subentire, entire or denticulate at base, slightly involute; acroscopic base enlarged, broader, overlapping stem and branches, margin denticulate. Strobili solitary, terminal, compact, tetragonal, 4–26 × 2–3 mm; sporophylls uniform, not obviously white-margined, ovate-triangular, carinate, margin denticulate, apex acuminate, without sporophyll-ptyeryx; microsporangia elliptic-oblong, relatively thick; marginal cells differentiated, longer; microspores pale yellow, megasporos whitish.

• Forests, shaded places along streams; (600–)900–1800 m. Hainan.

Selaginella scabrifolia differs from *S. trachyphylla* in the length of the arista on the dorsal leaves and the presence of unicellular thorns on the ventral leaves. The above three taxa might be ecological variations.

29. *Selaginella doederleinii* Hieronymus, Hedwigia 43: 41. 1904.

深绿卷柏 shen lu juan bai

Lycopodioides doederleinii (Hieronymus) H. S. Kung.

Plants terrestrial, evergreen, suberect or ascending from decumbent base, 25–45 cm, without creeping rhizomes or stolons. Rhizophores branched from base to middle of main stem. Main stems branched from lower part upward, pinnately branched, stramineous, 1–3 mm in diam. in lower part, oval or subquadrangular, glabrous; primary leafy branches 3–6 pairs, 2 or 3 times pinnately branched, secondary branches once pinnately branched, tertiary branches forked, branchlets sparse, adjacent primary branches on main stem 3–6 cm apart, leafy portion of main stem including leaves 0.7–1 mm wide at middle, ultimate branches 4–7 mm wide including leaves. Axillary leaves on branches symmetrical, narrowly ovate to triangular, 1.8–3 × 0.9–1.4 mm, base exauriculate, margin denticulate. Dorsal leaves on branches imbricate, oblong-ovate, ovate-elliptic, or narrowly ovate, 1.1–2.7 × 0.4–1.4 mm, carinate or strongly carinate, base cuneate or obliquely subcordate, margin denticulate, apex acuminate to aristate, parallel to axis. Ventral leaves on branches contiguous or overlapping, slightly ascending, oblong-falcate, 2.3–4.4 × 1–1.8 mm, apex obtuse, subacute, or apiculate; basispic base slightly dilated, margin subentire, denticulate at base; acroscopic base enlarged, broader, overlapping stem and branches, margin denticulate. Strobili

solitary or in pairs, terminal, compact, tetragonal, 5–30 × 1–2 mm; sporophylls uniform, not obviously white-margined, ovate-triangular, carinate, margin denticulate, apex acuminate; megasporophylls and microsporophylls at intervals, or megasporophylls in basal portion on lower side of strobilus; microsporangia elliptic-oblong, relatively thick, marginal cells differentiated, longer; microspores yellowish orange, megasporophylls whitish, without equatorial flange.

Terrestrial in forests; 200–1000(–1400) m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Malaysia, Thailand, Vietnam].

30. *Selaginella trachyphylla* A. Braun ex Hieronymus in Engler & Prantl, Nat. Pflanzenfam. 1(4): 693. 1902.

粗叶卷柏 *cu ye juan bai*

Selaginella atroviridis Spring var. *trachyphylla* (A. Braun ex Hieronymus) Warburg; *S. doederleinii* Hieronymus subsp. *trachyphylla* (A. Braun ex Hieronymus) X. C. Zhang.

Plants terrestrial, evergreen, suberect or ascending from decumbent base, 25–45 cm. Rhizophores branched from base to middle of main stem. Main stems branched from lower part upward, pinnately branched, stramineous, main stem 1–3 mm in diam. in lower part, oval or subquadrangular, 2 or 3 times pinnately branched, adjacent primary branches on main stem 1.5–3.8 cm apart, ultimate branches 4–7 mm wide including leaves. Axillary leaves on branches symmetrical, narrowly ovate to triangular, base exauriculate, margin denticulate. Dorsal leaves on branches approximate or contiguous, oblong-ovate or ovate-elliptic, 1.1–2.7 × 0.4–1.4 mm, strongly carinate, base cuneate, margin denticulate, apex aristate, parallel to axis. Ventral leaves on branches contiguous or overlapping, slightly ascending, oblong-falcate, 3.4–4.3 × 1–1.9 mm, adaxially spinose, apex obtuse, subacute, or apiculate; basicopic base rounded, margin subentire, denticulate at base; acroscopic base enlarged, broader, overlapping stem and branches, margin denticulate. Strobili in pairs, terminal, compact, tetragonal, 5–30 × 1–2 mm; sporophylls uniform, not obviously white-margined, ovate-triangular, margin denticulate, apex acuminate, without sporophyll-ptyx; microsporangia elliptic-oblong, relatively thick; marginal cells differentiated, longer; microspores pale yellow, megasporophylls whitish.

• Terrestrial in forests; 100–400 m. Guangdong, Guangxi, Guizhou.

Selaginella trachyphylla differs from *S. doederleinii* only in the length of the apex of the dorsal leaves and the presence of unicellular thorns on the ventral leaves.

31. *Selaginella pubescens* (Wallich ex Greville & Hooker) Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 225. 1843.

二歧卷柏 *er qi juan bai*

Lycopodium pubescens Wallich ex Greville & Hooker, Bot. Misc. 2: 383. 1831.

Plants terrestrial or xerophytic, evergreen, erect, 35–75 cm, with creeping subterranean rhizome and stolons; leaves on rhizome and stolons scalelike, peltate, margin lacerate. Rhi-

zophores restricted to base of stem. Main stems branched in upper part, isotomously branched, stramineous, terete, not sulcate, pubescent; branches few, 3 or 4 times pinnately branched, leafy branches pubescent on ventral side, dorsiventrally flattened. Axillary leaves on main stems larger than those on branches, ovate-lanceolate; axillary leaves on branches symmetrical, ovate-lanceolate, 1–1.7 × 0.2–0.7 mm, margin entire. Dorsal leaves on branches asymmetrical, elliptic or falcate, 0.7–1.2 × 0.15–0.4 mm, base decurrent, not peltate, margin entire, involute, apex acuminate, parallel to axis. Ventral leaves slightly ascending, asymmetrical, oblong-ovate or falcate, 1.3–1.9 × 0.4–0.6 mm, margin entire or subentire, involute, apex acute. Strobili solitary, compact, tetragonal, 6–12 × ca. 1 mm; sporophylls uniform, not white-margined, without sporophyll-ptyx, margin entire.

On rather dry slopes in half-shaded places; 400–1200 m. Yunnan [India (Assam), Laos, Myanmar, Thailand, Vietnam].

32. *Selaginella trichoclada* Alston, J. Bot. 70: 63. 1932.

毛枝卷柏 *mao zhi juan bai*

Plants terrestrial, evergreen or seasonally green, erect, 45–80(–110) cm, with creeping subterranean rhizome and stolons. Rhizophores restricted to base of stem. Main stems branched at or above lower part or at or above middle, pinnately branched, obviously zigzag, stramineous, unbranched main stem (5–)10–20 cm tall, 2–4 mm in diam. at lower part, angulate, sulcate, glabrous or pubescent on leafy branched portion; primary leafy branches 5–7 pairs, 2 or 3 times pinnately branched, secondary branches once or twice pinnately branched, branchlets dense and regular, adjacent primary branches on main stem 6–12 cm apart, leafy branches pubescent on both sides, dorsiventrally flattened, leafy portion of main stem including leaves 6–8 mm wide at middle, ultimate branches 3–5 mm wide including leaves. Axillary leaves on branches symmetrical, narrowly elliptic, 2.4–4.2 × 2–3.4 mm, base biauriculate, margin entire. Dorsal leaves on branches asymmetrical, overlapping at leaf apex, falcate, 1.2–1.5 × 0.4–0.6 mm, base cuneate, margin entire, apex acute. Ventral leaves on branches approximate to contiguous, slightly ascending or spreading, asymmetrical, oblong or falcate, 2.5–4 × 0.8–1.4 mm, margin entire, apex acuminate; basicopic base not auriculate; acroscopic base with triangular auricle, not overlapping stem and branches. Strobili solitary, terminal, compact, tetragonal, 4–10 × 1.4–3.5 mm; sporophylls uniform, white-margined, broadly ovate or suborbicular, slightly carinate, margin entire, apex acute or acuminate; megasporophylls only 1 in middle on lower side of strobilus, or at base on lower side, elsewhere with microsporophylls; microsporangia suborbicular, rather thin, marginal cells differentiated, smaller with thin walls, microspores pale yellow, megasporophylls dark brown.

• Forests; 100–900 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Zhejiang.

33. *Selaginella pseudopaleifera* Handel-Mazzetti, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 61: 82. 1924.

毛枝攀援卷柏 *mao zhi pan yuan juan bai*

Plants terrestrial, evergreen, ascending from decumbent base, 50–100 cm, with creeping subterranean rhizome and stolons. Rhizophores restricted to creeping rhizomes and stolons. Main stems branched at and above lower part, pinnately branched or anisotomously branched, stramineous, unbranched main stem (5–)15–20 cm tall, main stem 2–2.7 mm in diam. at lower part, subquadrangular or angulate, sulcate, glabrous, apex of main stem not blackish or blackish; primary leafy branches 3–5 pairs, 3 times pinnately branched, secondary branches once or twice pinnately branched, leafy branches pubescent on ventral side, dorsiventrally flattened, ultimate branches 3–7 mm wide including leaves. Axillary leaves on branches symmetrical, oblong-elliptic, 1.4–2.2 × 0.5–0.9 mm, margin entire, base biauriculate, auricles narrowly triangular. Dorsal leaves on branches contiguous, parallel to axis or overlapping at leaf apex, obliquely ovate, 1–2 × 0.4–0.8 mm, not carinate, base obliquely attenuate, margin entire, apex acuminate. Ventral leaves on branches contiguous, slightly ascending, oblong-falcate or falcate, 3–3.6 × 1–1.5 mm, margin entire, apex acute or acuminate; basiscopic base slightly dilated; acroscopic base with triangular auricle, not overlapping stem and branches. Strobili solitary, terminal, compact, tetragonal, 5–10 × 1.5–3 mm; sporophylls uniform, not white-margined, ovate-lanceolate, margin entire, apex acuminate; megasporophylls in upper portion on lower side of strobilus; microsporangia orbicular, rather thin, cells regular; microspores pale yellow, megasporangia whitish.

Evergreen forests; 200–400 m. Yunnan [Vietnam].

34. *Selaginella braunii* Baker, Gard. Chron. 1867: 1120. 1867.

布朗卷柏 bu lang juan bai

Lycopodioides braunii (Baker) Kuntze.

Plants terrestrial or epilithic, xerophytic, evergreen or seasonally green, erect, 10–45 cm, with creeping subterranean rhizome and stolons. Rhizophores restricted to creeping rhizomes and stolons, very short. Main stems branched from middle or upper part, pinnately branched, usually stramineous, unbranched main stem (3–)8–13(–25) cm tall, 0.5–2(–3) mm in diam., usually subquadrangular, often pubescent; primary leafy branches 4–8 pairs, 2 or 3 times pinnately branched, branchlets sparse, adjacent primary branches on main stem (3–)5–8(–11) cm apart, leafy branches pubescent on both sides, dorsiventrally flattened, ultimate branches 2.5–4.5 mm wide including leaves. Axillary leaves on branches contiguous or imbricate, narrowly elliptic or falcate, 1.6–2.8 × 0.4–1.2 mm, not carinate, base obliquely decurrent, margin subentire, slightly involute when dry, apex acuminate. Ventral leaves on branches slightly ascending, ovate-triangular or oblong-falcate, 1.6–2.2 × 1–1.8 mm, apex acute or mucronate; basiscopic base decurrent, margin subentire, involute; acroscopic base rounded, not overlapping stem and branches, margin subentire. Strobili solitary, terminal, compact, tetragonal, 5–6 × 1.4–2.3 mm; sporophylls unlike sterile leaves, uniform, not white-margined, broadly ovate or suborbicular, margin denticulate, apex acute; megasporophylls throughout lower side of strobili; microsporangia orbicular; microspores yellowish orange or pale yellow, megasporangia whitish.

In rock crevices, usually on limestone rocks; (below 100–)400–1400(–1800) m. Anhui, Chongqing, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang [Malaysia (Peninsular)].

Selaginella braunii is cultivated outside of China, sometimes escaping in widely scattered localities in various parts of the world (Proctor, Ferns Jamaica, 35. 1985).

35. *Selaginella biformis* A. Braun ex Kuhn, Forschungs. Gazelle 4(Bot. 6): 17. 1889.

二形卷柏 er xing juan bai

Selaginella flagellifera W. Bull; *S. hirticaulis* Warburg; *S. utchinensis* Koidzumi.

Plants terrestrial or epilithic, evergreen, erect or creeping, 15–45 cm, with creeping subterranean rhizome and stolons. Rhizophores restricted to creeping rhizomes and stolons. Main stems branched in upper part, pinnately branched, stramineous, stem 1–1.5 mm in diam. at lower part, angulate or subquadrangular, sulcate, unbranched main stem glabrous or pubescent in leafy branched part, apex of main creeping stems flagelliform; primary leafy branches 4–7 pairs, 2 times pinnately branched, leafy branches dorsiventrally flattened, pubescent on ventral side, leafy portion of main stem including leaves 4–5 mm wide at middle, ultimate branches 2–3 mm wide including leaves. Axillary leaves on branches slightly asymmetrical, ovate-lanceolate or elliptic, 1.8–2.4 × 0.8–1.2 mm, base exauriculate, margin ciliolate at base. Dorsal leaves on branches contiguous, ovate, 0.8–1.4 × 0.6–0.8 mm, not carinate, base obliquely cordate, margin very ciliolate, apex aristate. Ventral leaves on branches contiguous or imbricate, slightly ascending, oblong-falcate or falcate, 1.8–3.2 × 1.2–1.6 mm, apex acute; basiscopic base rounded, margin subentire except base with a few cilia; acroscopic base not enlarged, not overlapping stem and branches, margin ciliolate to denticulate. Strobili solitary, terminal, compact, tetragonal, 5–15 × 1.5–2 mm; sporophylls uniform, not white-margined, ovate, sharply carinate, margin denticulate or ciliolate, apex acuminate; megasporophylls in basal portion on lower side of strobili, or megasporophylls and microsporophylls at intervals, microsporangia elliptic; microspores yellowish orange, megasporangia pale yellow, whitish, or dark brown, without equatorial flange, undulate-rugose.

Shaded places or on rocks in forests; 100–1500 m. Guangdong, Guangxi, Guizhou, Hainan, Yunnan [India, Indonesia, Japan, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam].

Plants of *Selaginella biformis* are usually of two forms: main stems erect or creeping, creeping plants usually glabrous or less hairy. Branches are also flagelliform, forming new plants. Dahlen (Bot. J. Linn. Soc. 98: 277–302. 1888) reported that of 53 strobili of *S. biformis* with megasporangia, only five had mature or senescent megasporangia while the rest had only immature sporangia.

36. *Selaginella superba* Alston, J. Bot. 52: 70. 1932.

粗茎卷柏 cu jing juan bai

Plants terrestrial, evergreen, erect, (20–)50–70 cm, with creeping subterranean rhizome and stolons. Rhizophores restricted to base of stem or to creeping rhizomes and stolons. Main stems branched from middle upward, a few lower branches abortive, pinnately branched, stramineous, un-

branched main stem 20–30 cm tall, main stem 3–5 mm in diam. at lower part, subquadrangular, sulcate, glabrous; primary leafy branches 3–7 pairs, once or twice pinnately branched, secondary branches forked, branchlets dense, adjacent primary branches on main stem 2.5–9 cm apart, leafy main stem including leaves 10–14 mm wide at middle, ultimate branches 5–8(–10) mm wide including leaves. Axillary leaves on branches symmetrical, triangular or ovate-lanceolate, 3.2–5 × 1.1–1.8(–2.3) mm, base deeply cordate or subcordate, or slightly biauriculate, margin long ciliolate at base, margin elsewhere shortly ciliolate. Dorsal leaves contiguous or imbricate, asymmetrical, ovate-elliptic, 2.2–2.8(–3.6) × 1–2 mm, strongly carinate, base obliquely cordate, with few long cilia at base, ciliolate upward, apex aristate. Ventral leaves slightly ascending, asymmetrical, oblong-falcate, 4.7–7 × 1.7–2.6 mm, apex acute; acroscopic base rounded, overlapping stem and branches, margin long ciliolate at very base, then shortly ciliolate below middle of leaf, elsewhere entire, cilia 0.2–0.5 mm. Strobili solitary or in pairs, terminal or lateral to branches, compact, tetragonal, 10–45 × 1.8–3 mm; sporophylls unlike sterile leaves, uniform, not white-margined, sharply carinate, margin denticulate, apex acuminate; megasporophylls only 1 in lower portion on lower side, elsewhere with sporophylls, microsporophylls, or megasporophylls and microsporophylls at intervals, or megasporophylls in middle on lower side; microsporangia elliptic-oblong, relatively thick, marginal cells differentiated, smaller with thin walls; microspores light pale yellow, megasporangia whitish or gray.

Rain forests in limestone areas; 100–500 m. S Yunnan [N Vietnam].

Selaginella superba was treated as a synonym of *S. frondosa* Warburg but can be distinguished from the latter by the much larger leaves. It is the most beautiful species of the Chinese *Selaginella*. The main stem is very strong and has a bladelike upper part. It is found only in Hekou, Yunnan, on the border with Vietnam, where the type was collected. The typical form occurs mainly in lowland forests along riverbanks at 100–200 m in elevation, while another form was found only on limestone hills from 300–500 m, in monsoon semi-evergreen rain forests. The two forms differ much in branching patterns and leaf shape and margin. The two forms could be different species, but they share most of the common important characters, e.g., the stem, leaf, strobilus, and spores. Further studies are needed to better ascertain their delimitation.

37. *Selaginella stauntoniana* Spring, Mém. Acad. Roy. Sci. Belgique 24: 71. 1850.

旱生卷柏 han sheng juan bai

Lycopodioides stauntoniana (Spring) Kuntze; *Selaginella affinis* Milde (1867), not A. Braun (1865); *S. pseudoinvolvens* Hayata.

Plants epilithic or xerophytic, seasonally green, erect, 15–35 cm, with creeping subterranean rhizome and stolons; leaves on rhizome and stolons scalelike, reddish brown. Rhizophores restricted to creeping rhizome. Main stems branched in upper part or from lower part, not very regularly pinnately branched, reddish or brown, unbranched main stem 5–28 cm tall, main stem 0.8–2 mm in diam. in lower part, stem oval or terete, glabrous; primary leafy branches 3–5 pairs, 2 or 3 times pin-

nately branched, higher order branches forked, ultimate branches 1.8–3.2 mm wide including leaves. Axillary leaves slightly asymmetrical, triangular, 1–1.7 × 0.4–0.9 mm, base exauriculate, margin membranous, lacerate. Dorsal leaves imbricate, ovate-elliptic, 0.7–1.7 × 0.3–0.6 mm, not carinate, base obtuse, not peltate, margin entire or subentire, slightly revolute, apex acuminate-aristate, parallel to axis. Ventral leaves approximate to overlapping, slightly ascending, obliquely ovate or obliquely oblong, 1.4–2.2 × 0.6–1.2 mm, apex aristate; basiscopic margin entire, except base with 1 cilium; acroscopic base rounded, overlapping stem and branches, margin hyaline and membranous, denticulate. Strobili solitary, compact, tetragonal, 5–20 × 1.3–2 mm; sporophylls uniform, ovate-triangular, carinate, margin membranous, lacerate or lacerate-ciliolate, hyaline, apex long acuminate to aristate; megasporophylls and microsporophylls at intervals, or megasporophylls in middle on lower side, or megasporophylls throughout lower side; microsporangia transversely elliptic, rather thin, cells regular; microspores yellowish orange or orange-red, megasporangia yellowish orange, without equatorial flange.

In limestone rock crevices; 500–2500 m. Hebei, Henan, Jilin, Liaoning, Ningxia, Shaanxi, Shandong, Shanxi, Taiwan [Korea].

38. *Selaginella involvens* (Swartz) Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 136. 1843.

兗州卷柏 yan zhou juan bai

Lycopodium involvens Swartz, Syn. Fil. 182. 1806; *Lycopodioides involvens* (Swartz) Kuntze; *L. pennula* Kuntze; *Lycopodium caulescens* Wallich ex Hooker & Greville; *L. microstachyum* Desvaux ex Poiret; *Selaginella caulescens* (Wallich ex Hooker & Greville) Spring; *S. caulescens* var. *behulla* Hieronymus; *S. caulescens* var. *brachypoda* Baker; *S. caulescens* var. *gracilis* W. Bull.; *S. caulescens* var. *japonica* Baker; *S. caulescens* var. *subintegerrima* Spring; *S. microstachya* (Desvaux ex Poiret) Hieronymus (1913), not Warburg (1900); *S. pachystachys* Koidzumi; *S. pseudostauntoniana* Pampanini; *S. warburgii* Hieronymus.

Plants epilithic or xerophytic, evergreen or seasonally green, erect, 15–35(–65) cm, with creeping subterranean rhizome and stolons; leaves on rhizome and stolons scalelike, pale yellow. Rhizophores restricted to creeping rhizomes and stolons. Main stems branched from middle upward, pinnately branched, stramineous, unbranched main stem 5–25 cm tall, 1–1.5 mm in diam. in lower part, terete, not sulcate, glabrous; primary leafy branches 7–12 pairs, 2 or 3 times pinnately branched, secondary branches 1 or 2 times pinnately branched, tertiary branches forked or once pinnately branched, leafy main stem including leaves 4–6 mm wide at middle, ultimate branches 2–3 mm wide including leaves. Axillary leaves symmetrical, ovate to triangular, 1.1–1.6 × 0.4–1.1 mm, base exauriculate, margin denticulate. Dorsal leaves imbricate, ovate-triangular or ovate-elliptic, 0.6–1.2 × 0.2–0.5 mm, slightly carinate, base cuneate, margin denticulate, apex long acuminate to shortly aristate, parallel to axis. Ventral leaves contiguous or overlapping, slightly ascending, ovate to triangular, 1.4–2.4 × 0.4–1.4 mm, apex subacute or apiculate; basiscopic base rounded, margin entire; acroscopic base enlarged, broader,

overlapping stem and branches, margin hyaline, denticulate. Strobili solitary, terminal, compact, tetragonal, 5–15 × 1–1.4 mm; sporophylls uniform, not white-margined, ovate-triangular, sharply carinate, margin denticulate, apex acuminate, without sporophyll-ptyeryx; megasporophylls and microsporophylls at intervals, or megasporophylls in middle on lower side; microsporangia elliptic, rather thin, cells regular; microspores yellowish orange, megaspores whitish or brown, with equatorial flange.

On rocks in shade or epiphytic on tree trunks in forests; 200–3100 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

39. *Selaginella mairei* H. Lévillé, Sert. Yunnan. 299. 1916.

狭叶卷柏 xia ye juan bai

Lycopodioides mairei (H. Lévillé) H. S. Kung; *Selaginella elephantopus* Handel-Mazzetti.

Plants terrestrial or epilithic, seasonally green, erect, 10–40 cm high, with creeping subterranean rhizome; leaves on rhizome scalelike, pink, peltate, margin lacerate or fimbriate. Rhizophores restricted to creeping rhizome. Main stems branched in upper part, pinnately branched, reddish or stramineous, unbranched main stem 2–15 cm tall, 1–2.2 mm in diam. in lower part, terete, glabrous; primary leafy branches 4–8 pairs, once or twice pinnately branched, secondary branches once or twice forked, ultimate branches 2.5–4 mm wide including leaves. Axillary leaves symmetrical, oblong-elliptic, 1.2–1.6 × 0.3–0.9 mm, base exauriculate, margin ciliolate at basal half. Dorsal leaves approximate, obliquely falcate, elliptic-lanceolate, or rhombic, 0.8–1.8 × 0.2–0.6 mm, not carinate, base obliquely decurrent, ± peltate, apex long acuminate or aristate, parallel to axis; basiscopic margin ciliolate; acroscopic margin subentire. Ventral leaves distant or approximate, slightly ascending, oblong-falcate or obliquely ovate, 1.4–2 × 0.6–1.2 mm, apex apiculate; basiscopic base slightly dilated, margin subentire or entire, ciliolate at base; acroscopic base not enlarged, not overlapping stem and branches, margin ciliolate. Strobili solitary, terminal, compact, tetragonal, 5–10 × 1.4–2.8 mm; sporophylls uniform, not white-margined, broadly ovate or suborbicular, not keeled, margin ciliolate, apex mucronate; megasporophylls in middle on lower side; microsporangia reniform, rather thin, cells regular; microspores yellowish orange or pale yellow, megaspores whitish or yellowish orange, baculate.

On rocks under shrubs, open grassy slopes; (300–)1100–2600(–3000) m. Guizhou, Sichuan, Yunnan [Myanmar].

40. *Selaginella moellendorffii* Hieronymus, Hedwigia 41: 178. 1902 [“*Möllendorffii*”].

江南卷柏 jiang nan juan bai

Lycopodioides filicinum Dillenius; *L. minus* Dillenius; *L. moellendorffii* (Hieronymus) H. S. Kung; *Selaginella hayata*ana Kümmerle; *S. subcaulescens* Hayata (1918), not Baker (1884).

Plants terrestrial or epilithic, evergreen, erect, 20–55 cm, with creeping subterranean rhizome and stolons. Rhizophores

restricted to base of stem. Main stems branched from middle upward, pinnately branched, stramineous or reddish, unbranched main stem (5–)10–25 cm tall, stem 1–3 mm in diam. in lower part, terete, glabrous; primary leafy branches 5–8 pairs, 2 or 3 times pinnately branched, branchlets dense and regular, ultimate branches 2.5–4 mm wide including leaves. Axillary leaves symmetrical, ovate, 1–2.2 × 0.4–1 mm, base exauriculate, margin denticulate. Dorsal leaves imbricate, ovate-orbicular, 0.6–1.8 × 0.3–0.8 mm, not carinate or slightly carinate, base obliquely subcordate, margin denticulate, apex aristate, parallel to axis or imbricate. Ventral leaves contiguous, slightly ascending, ovate-triangular, 1–2.4 × 0.5–1.8 mm, margin denticulate, apex acute; basiscopic base slightly dilated, margin subentire or denticulate at base; acroscopic base enlarged, broader, not overlapping stem and branches, margin denticulate. Strobili solitary, terminal, compact, tetragonal, 5–15 × 1.4–2.8 mm; sporophylls uniform, white-margined, ovate-triangular, carinate, margin denticulate, apex acuminate; megasporophylls in middle on lower side; microsporangia elliptic-oblong, rather thin, cells regular; microspores yellowish orange, megaspores pale yellow, without equatorial flange.

On rocks, in rock crevices; 100–1500 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Philippines, Vietnam].

41. *Selaginella pallidissima* Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 231. 1843.

平卷柏 ping juan bai

Selaginella rubella W. M. Chu.

Plants terrestrial or epilithic, seasonally green, creeping, 15–25 cm. Rhizophores at intervals throughout length of main stem, borne on ventral side in axils of branches. Main stems branched throughout, pinnately branched, stramineous or reddish, 0.3–0.5 mm in diam. in lower part, angulate, sulcate; primary leafy branches 6–8 pairs, once or twice pinnately branched, secondary branches once or twice forked, branchlets sparse, adjacent primary branches on main stem 2.4–3 cm apart, leafy branches and stems dorsiventrally flattened, leafy portion of main stem including leaves 6–7.5 mm wide at middle, ultimate branches 4.3–6 mm wide including leaves. Axillary leaves on branches asymmetrical, ovate, 2–3 × 1–1.5 mm, base subcordate, margin minutely denticulate. Dorsal leaves ± symmetrical, those on branches contiguous or imbricate, ovate or ovate-lanceolate, 1.6–2.2 × 0.6–1.3 mm, slightly carinate, base subcordate, margin minutely denticulate or ciliolate, apex acuminate. Ventral leaves asymmetrical, those on branches spreading, ovate or ovate-triangular or ovate-lanceolate, 1.8–3.2 × 1.1–1.8 mm, apex acute; basiscopic margin denticulate; acroscopic base enlarged, broader, overlapping stem and branches, margin denticulate or ciliolate in basal portion. Strobili solitary or forked, terminal, lax, dorsiventrally complanate, 5–13 × 4–6 mm; sporophylls similar to sterile leaves in form and arrangement, strongly dimorphic, non-resupinate, not white-margined; dorsal sporophylls ovate, not keeled or slightly carinate, margin shortly ciliolate or denticulate, apex acuminate, without sporophyll-ptyeryx; ventral sporophylls ovate, oblong-ovate, or

broadly ovate, not carinate, margin denticulate; megasporophylls in basal portion on lower side of strobilus; microsporangia orbicular; microspores orange-red, megaspores sulfur-colored or yellowish orange.

Pinus yunnanensis forests or mixed forests, on ditch banks, exposed places along roadsides on mountain slopes; 2000–2700 m. Sichuan, Yunnan [N India, Nepal].

42. *Selaginella laxistrobila* K. H. Shing, Acta Phytotax. Sin. 31: 569. 1993.

松穗卷柏 song sui juan bai

Plants terrestrial, evergreen, main stem shortly decumbent, 1–4(–6) cm, producing a few upright stems over a short distance. Rhizophores restricted to lower part of stem. Main stems branched from near base upward, stramineous, 0.3–0.4 mm in diam. in lower part, angulate, sulcate, repeatedly once or twice forked, branchlets sparse, leafy branches and stems dorsiventrally flattened, ultimate branches 3.2–4.2 mm wide including leaves. Axillary leaves on branches symmetrical, elliptic, 1–1.8 × 0.3–0.7 mm, base exauriculate, margin slightly denticulate. Dorsal leaves ± symmetrical, those on branches not approximate, ovate, 1.2–1.8 × 0.6–0.8 mm, not carinate, base subcordate or obtuse, margin ciliate, apex acuminate. Ventral leaves asymmetrical, those on branches spreading, ovate-triangular, 1.8–2.3 × 0.8–1.2 mm, apex acute; acroscopic base enlarged, broader, slightly overlapping stem and branches, margin ciliate. Fertile branches erect. Strobili solitary or forked, terminal, lax, dorsiventrally complanate, 10–20 × 3–5 mm; sporophylls dimorphic, similar to sterile leaves in form and arrangement, non-resupinate; dorsal sporophylls like dorsal sterile leaves, not white-margined, ovate-lanceolate, margin shortly ciliate, apex acuminate, without sporophyll-ptyx; ventral sporophylls ovate, margin shortly ciliate; megasporophylls in basal portion on lower side of strobilus; sporangia only distributed on lower side; microsporangia orbicular; microspores orange-red, megaspores orange or yellowish orange.

Damp places in mixed forests, under *Quercus* shrubs, on rocks, soil banks, rare; 2500–3600 m. Sichuan, Yunnan [India, Nepal].

43. *Selaginella tama-montana* Serizawa, J. Jap. Bot. 53: 242. 1978.

高山卷柏 gao shan juan bai

Plants epilithic, evergreen, often becoming reddish, creeping, 5–10 cm. Rhizophores at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Stems irregularly branching, 3.5–5 mm wide including leaves, forming mats. Dorsal leaves ovate, 1–1.5 × 0.5–0.8 mm, margin denticulate, apex acuminate. Ventral leaves ± asymmetrically ovate, 1.5–2.7 × 0.8–1.7 mm, margin denticulate, apex acute. Strobili solitary, terminal, compact, dorsiventrally complanate, non-resupinate, very short; sporophylls similar to trophophylls, nearly symmetrical.

• On rock crevices; above 3000 m. Taiwan.

44. *Selaginella prostrata* (H. S. Kung) Li Bing Zhang, Novon 22: 262. 2012.

地卷柏 di juan bai

Lycopodioides prostrata H. S. Kung, Fl. Sichuan. 6: 76. 1988.

Plants epilithic, evergreen, prostrate, 5–15 cm. Rhizophores at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched throughout, stramineous, ca. 0.2 mm in diam. in lower part, terete, slightly sulcate, branches few, branchlets sparse; leafy portion of main stem including leaves 3.6–4.6 mm wide at middle, ultimate branches 3–4.4 mm wide including leaves. Axillary leaves on main stems larger than those on branches, ovate-lanceolate, base not peltate, obtuse; axillary leaves on branches ± symmetrical, ovate-lanceolate or narrowly elliptic, 1.2–1.9 × 0.4–0.8 mm, base exauriculate, margin sparsely long ciliate in basal half, cilia ca. 0.2 mm. Dorsal leaves ± symmetrical, those on main stems in leafy portion slightly larger than those on branches; dorsal leaves on branches not approximate, contiguous, or imbricate, ovate, broadly ovate, or suborbicular, 1–1.7 × 0.6–1 mm, not carinate, base obtuse, margin sparsely long ciliate, cilia 0.3–0.4 mm, apex acuminate or aristate, often reflexed. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches distant, spreading or deflexed, obliquely ovate, 1.6–2.8 × 1–1.4 mm, apex acute or acuminate; acroscopic base rounded, not overlapping stem and branches, margin sparsely ciliate, cilia 0.2–0.3 mm. Strobili solitary or forked, terminal, compact, dorsiventrally complanate, 4.5–9 × 3–4.8 mm; sporophylls strongly dimorphic, non-resupinate, not white-margined; dorsal sporophylls ovate, not keeled, margin ciliate, apex acuminate, without sporophyll-ptyx; ventral sporophylls broadly oblong-ovate; basal sporophylls larger than upper, not carinate, margin ciliate, with only 1 megasporophyll at base on lower side of strobilus, elsewhere with microsporangia, or megasporophylls in basal portion of lower side; microsporangia cordate, rather thin, with relatively large cells at central part; microspores orange-red, megaspores pale yellow or orange.

• In rock crevices, on moss-covered rocks in forests; 1500–2500 m. Guizhou, Shaanxi, Sichuan, Yunnan.

45. *Selaginella longistrobilina* P. S. Wang, X. Y. Wang & Li Bing Zhang, Novon 22: 260. 2012.

长穗卷柏 chang sui juan bai

Plants epilithic, evergreen, to 15 cm. Stem prostrate, stramineous, terete, slightly sulcate, 2.5–4 mm wide including leaves, 1–4 times branched; ultimate branches 2–3 mm wide including leaves. Rhizophores borne throughout. Ventral leaves patent, ovate, 1.5–1.8 × 1–1.5 mm, base slightly cordate, margin white, ciliate, apex mucronate or cuspidate; dorsal leaves ovate, 0.8–1.3 × 0.4–0.7 mm, base rounded, margin white, ciliate, apex shortly aristate; axillary leaves ovate to lanceolate, 0.7–1.5 × 0.3–0.5 mm, base rounded, apex acuminate, often disappearing with development of rhizophores at approximate positions. Strobili compact, (3–)10–15(–25) mm, solitary or paired, strongly dimorphic, non-resupinate. Ventral sporophylls sunken adaxially, broadly lanceolate, adaxially

navicular, base rounded, margin ciliate, apex acuminate; dorsal sporophylls broadly lanceolate to narrowly ovate, adaxially flattened, base rounded, margin ciliate, apex acuminate. Macrosporangia 1–5, at basal portion of strobili, elsewhere with more than 15 microsporangia; microspores ocher, sculpturing verrucate with irregularly sized verrucae, colpi twisted, usually not forked at ends, and reaching equatorial plane of spore; macrospores 4 in each macrosporangium, light orange.

- Weathered crust of limestone rocks and among crevices under secondary mixed forests; ca. 1500 m. C Guizhou (Anshun).

46. *Selaginella decipiens* Warburg, *Monsunia* 1: 127. 1899.

拟大叶卷柏 ni da ye juan bai

Plants terrestrial or epilithic, evergreen, erect from decumbent or creeping main stems, 45–75 cm, with creeping subterranean rhizome and stolons. Rhizophores restricted to creeping rhizomes and stolons. Main stems pinnately branched from middle upward; branches not very regular, some much longer, unequally long, pale green or stramineous; unbranched main stem 15–30 cm tall, 1–2 mm in diam. in lower part, angulate, sulcate; primary leafy branches 5–8 pairs, 2 or 3 times pinnately branched, secondary branches once or twice pinnately branched, branchlets regular, adjacent primary branches on main stem 3.5–8 cm apart; leafy portion of main stem including leaves 6–9 mm wide at middle, ultimate branches 4–5 mm wide including leaves. Axillary leaves on main stems obviously larger than those on branches, broadly ovate, 2.5–4.5 × 2.4–3.6 mm, base not peltate, obtuse; axillary leaves on branches strongly asymmetrical, ovate, 3.5–4.2 × 1.9–2.8 mm, base exauriculate, margin slightly denticulate. Dorsal leaves ± symmetrical, those on main stems obviously larger than those on branches, dorsal leaves on primary branches contiguous or imbricate, oblong-lanceolate, 1.2–2 × 0.4–1 mm, slightly carinate, base truncate, margin denticulate, apex aristate. Ventral leaves asymmetrical, those on main stem obviously larger than those on branches; ventral leaves on primary branches spreading, ovate-triangular or oblong-falcate, 3–4.6 × 1.4–3 mm, apex subacute or obtuse; basiscopic margin entire; acroscopic base strongly enlarged, broader, overlapping stem and branches, margin subentire or minutely denticulate. Strobili solitary, compact, dorsiventrally complanate, 3–6.5 × 1.6–2.5 mm; sporophylls slightly dimorphic, resupinate, not white-margined; dorsal sporophylls ovate-lanceolate, margin denticulate, not keeled, apex acute, with sporophyll-ptyx incomplete and denticulate; ventral sporophylls ovate, carinate, margin denticulate; megasporophylls in basal portion on lower side of strobilus; microsporangia transversely elliptic; microspores pale yellow, megasporophylls whitish or pink.

Dense forests; 1200–1500 m. Guangxi, Yunnan [India (Assam), Vietnam].

47. *Selaginella bodinieri* Hieronymus, *Hedwigia* 43: 6. 1904.

大叶卷柏 da ye juan bai

Lycopodioides omeiensis (Ching ex H. S. Kung) H. S. Kung; *Selaginella bodinieri* var. *omeiensis* (Ching ex H. S. Kung) W. M. Chu; *S. chingii* Alston; *S. omeiensis* Ching ex H. S. Kung; *S. yunnanensis* Hieronymus; *S. yunnanensis* var. *longiflora* Hieronymus.

Plants terrestrial or epilithic, evergreen, creeping or pendulous from cliffs; upper portion erect or suberect, (15–)30–40(–50) cm, with creeping subterranean rhizome and stolons. Rhizophores restricted to lower part of stem, borne on ventral side in axils of branches. Main stems branched from lower part or from middle upward, pinnately branched, stramineous; unbranched main stem 5–10 cm tall, 1.5–2 mm in diam. in lower part, subquadrangular (carinate in leafy branch portion), sulcate, glabrous; primary leafy branches 6 or 7 pairs, twice pinnately branched, secondary branches forked or once pinnately branched, branchlets dense, adjacent primary branches on main stem 2.4–4.8 cm apart, leafy portion of main stem including leaves 7–8 mm wide at middle, ultimate branches 4–6 mm wide including leaves. Axillary leaves on branches asymmetrical, ovate or triangular, 2–3.2 × 0.9–1.6 mm, base exauriculate, margin denticulate or ciliolate (in lower half). Dorsal leaves asymmetrical, those on main stems obviously larger than those on branches; dorsal leaves on branches contiguous, obliquely ovate, 2.4–3.4 × 1.2–1.8 mm, not carinate, base obliquely cordate, not peltate, margin denticulate or ciliolate (at base), apex acuminate, aristate, or cuspidate. Ventral leaves asymmetrical, those on main stem obviously larger than those on branches; ventral leaves on branches contiguous, slightly ascending, oblong-ovate or oblong, 3.4–4.4 × 1.6–2.2 mm, margin entire, apex acute or obtuse; basiscopic base slightly auriculate, margin entire; acroscopic base enlarged, broader, not overlapping stem and branches, margin denticulate or ciliolate (in basal portion). Strobili solitary, compact, slightly dorsiventrally complanate, 4–16 × 1.4–2.4 mm; sporophylls dimorphic, slightly dimorphic, or ± uniform, resupinate, not white-margined; dorsal sporophylls broadly orbicular-ovate, slightly carinate, margin shortly ciliolate or denticulate, apex acuminate, with sporophyll-ptyx incomplete and denticulate; ventral sporophylls broadly ovate, carinate, margin denticulate or ciliolate; megasporophylls in basal portion on lower side of strobilus; microsporangia orbicular; microspores pale yellow, megasporophylls white-yellow.

- On rocks, forests, hanging from walls of limestone caves; (200–)700–1800(–2100) m. Chongqing, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan.

48. *Selaginella pennata* (D. Don) Spring, *Bull. Acad. Roy. Sci. Bruxelles* 10: 232. 1843.

拟双沟卷柏 ni shuang gou juan bai

Lycopodium pennatum D. Don, *Prodr. Fl. Nepal.* 18. 1825; *Selaginella blepharostachya* Alston ex Knox; *S. suberosa* Spring.

Plants terrestrial, seasonally green, suberect or ascending from decumbent base, 15–30 cm. Rhizophores restricted to lower part of stem. Main stems branched from lower part upward, not very regularly pinnately branched, stramineous, shiny, 0.8–2.7 mm in diam. in lower part, terete, not sulcate or sulcate in upper part, branches few; primary leafy branches 3–5 pairs, twice pinnately branched, secondary branches forked or once pinnately branched, branchlets regularly long, adjacent primary branches on main stem 3–6 cm apart, leafy portion of

main stem including leaves 5–7 mm wide at middle, ultimate branches 3.5–5.7 mm wide including leaves. Axillary leaves on branches symmetrical, ovate, 1.5–2.3 × 0.6–1.2 mm, base exauriculate, margin ciliolate in basal part, upward subentire, or with 1 or 2 cilia. Dorsal leaves approximate, asymmetrical, 1.2–2.1 × 0.4–0.8 mm, base obliquely cuneate, margin sparsely ciliolate, apex mucronate or aristate with arista curved, up to 1/2–3/4 as long as leaf, 0.5–0.8 mm. Ventral leaves asymmetrical, those on main stem larger than those on branches; ventral leaves on branches distant, slightly ascending, oblong or oblong-ovate, 1.6–3 × 0.7–1.4 mm, apex acute or apiculate; basiscopic margin entire; acroscopic base rounded, not overlapping stem and branches, margin sparsely shortly ciliolate. Strobili solitary or in pairs, terminal, compact, dorsiventrally complanate, 6–12 × 2.5–4.5 mm; sporophylls unlike sterile leaves, strongly dimorphic, very basal sporophylls on ventral side of strobilus similar to lateral sterile leaves; dorsal sporophylls oblong-lanceolate, with incomplete sporophyll-ptyerix; ventral sporophylls ovate or broadly ovate, not carinate, base dilated, margin lacerate-ciliolate; megasporophylls in basal portion on lower side; microsporangia reniform, relatively thick, marginal cells differentiated, longer; microspores pale yellow, megasporangia whitish, gray, or dark brown, baculate.

Mixed forests on rather dry mountain slopes; 400–1200 m. Yunnan [NE India, Myanmar, Nepal, Thailand].

Selaginella pennata is very close to *S. bisulcata* in the shape of the dorsal leaves and the color and ornamentation of the megasporangia.

49. *Selaginella leptophylla* Baker, J. Bot. (Hooker) 23: 157. 1885.

膜叶卷柏 mo ye juan bai

Lycopodioides leptophylla (Baker) Kuntze; *Selaginella cristata* Warburg; *S. hayatana* Satake (1934), not Kümmerle (1928); *S. leptophylla* var. *wichuriae* (Warburg) Tagawa; *S. satakeana* Koidzumi; *S. stenostachya* Hayata; *S. wichuriae* Warburg.

Plants terrestrial, evergreen or seasonally green, erect, (5–) 10–25 cm, without creeping rhizomes or stolons, sometimes very long compared with fertile branches. Rhizophores restricted to lower part of stem, borne on ventral side in axils of branches. Main stems branched from near base upward, pinnately branched, stramineous, 0.3–1.2 mm in diam. in lower part, terete, sulcate, glabrous; primary leafy branches 5–8 pairs, once or twice pinnately branched, secondary branches forked or once pinnately branched; tertiary ultimate branches simple, sparse and regular; adjacent primary branches on main stem 1.5–3.5 cm apart; ultimate branches 2.4–4 mm wide including leaves. Axillary leaves on main stems larger than those on branches, orbicular or elliptic, base not peltate, attenuate; axillary leaves on branches symmetrical, elliptic, 1.5–2.2 × 0.5–1.4 mm, base exauriculate, margin slightly denticulate. Dorsal leaves ± symmetrical, those on main stems not obviously larger than those on branches, base oblique, margin minutely denticulate, apex aristate; dorsal leaves on branches not approximate, elliptic or narrowly ovate, 0.8–1.5 × 0.2–0.4 mm, base attenuate, not peltate, margin minutely denticulate, apex long aristate (as long as rest of leaf), parallel to axis or often reflexed or

apical arista curved. Ventral leaves asymmetrical, those on main stem obviously larger than those on branches; ventral leaves on branches distant, slightly ascending, ovate-lanceolate or oblong-ovate, 1.7–2.4 × 0.7–1.1 mm, apex acute; basiscopic margin subentire or minutely denticulate; acroscopic base enlarged, broader, overlapping stem and branches, margin minutely denticulate. Strobili solitary, terminal, compact, dorsiventrally complanate, 4–18 × 1.7–3.2 mm; sporophylls unlike sterile leaves, strongly dimorphic, resupinate; dorsal sporophylls oblong-lanceolate, margin minutely denticulate, not keeled, apex subacute or obtuse, with sporophyll-ptyerix incomplete (almost up to apex along vein) and denticulate; ventral sporophylls ovate-triangular, not carinate, margin ciliolate, apex long aristate; megasporophylls in basal portion on lower side of strobilus; microsporangia suborbicular, rather thin, cells uniform; microspores orange-red, with dense spherules, megasporangia reddish brown, finely rugose.

On rocks or in shaded damp places; below 100–1300(–2100) m. Guizhou, Hong Kong, Sichuan, Taiwan, Yunnan [India, Japan (S Ryukyu Islands), Myanmar, Thailand, Vietnam].

50. *Selaginella minutifolia* Spring, Monogr. Lycopod. 2: 239. 1850.

小叶卷柏 xiao ye juan bai

Plants terrestrial, seasonally green, erect, generally less than 10 cm, stramineous, glabrous. Rhizophores restricted to base of stem. Main stem pinnately branched, stramineous, branched from lower part, 0.4–0.7 mm in diam. in basal part, leaves on lower part of main stems or below leafy portion distant, with single vascular bundle; primary leafy branches 3–5 pairs, forked, branchlets sparse, middle primary branches ca. 3 cm, ca. 2 cm wide, leafy branches glabrous, dorsiventrally flattened, ultimate branches 1.5–2.5 mm wide including leaves. Leaves decussately arranged except on unbranched main stem, dimorphic throughout, herbaceous, white-margined, entire. Dorsal leaves asymmetrical; dorsal leaves on branches elliptic, ca. 1.2 × 0.4 mm, base cuneate, margin denticulate, apex long acuminate. Ventral leaves asymmetrical; ventral leaves on branches ascending, approximate, oblong, ca. 2 × 1.5 mm, apex acute; acroscopic base rounded, decurrent, margin denticulate. Strobili solitary, terminal, compact, dorsiventrally complanate, ca. 5 × 2.5 mm; sporophylls strongly dimorphic, resupinate; dorsal sporophylls ovate, margin denticulate, apex acute, with sporophyll-ptyerix incomplete, ciliate; ventral sporophylls ovate, margin denticulate or ciliate; megasporangia usually in basal portion on lower side or megasporangia in basal portion of both sides; microspores orange-red, megasporangia yellow.

On soil banks in shaded forests; 100–1300 m. Yunnan [India (Assam), Malaysia, Myanmar, Thailand, Vietnam].

51. *Selaginella chrysocaulos* (Hooker & Greville) Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 232. 1843.

块茎卷柏 kuai jing juan bai

Lycopodium chrysocaulos Hooker & Greville, Bot. Misc. 2: 401. 1831; *Lycopodioides chrysocaulos* (Hooker & Greville) H. S. Kung; *Selaginella hypnoides* Spring; *S. philippina* Spring var. *khasiensis* Baker; *S. rosenstockii* Hieronymus.

Plants terrestrial or epilithic, evergreen or seasonally green, erect, (5–)10–15(–25) cm, with stolons at base, with elongate tuber at base of stem, covered by colorless scalelike leaves. Rhizophores restricted to base of stem or borne in lower part. Main stems branched from near base or from lower part upward, pinnately branched, stramineous, unbranched main stem 1–2(–5) cm tall, 0.5–1 mm in diam. in lower part, terete or subquadrate; primary leafy branches 6–12 pairs, forked or once or twice pinnately branched, branchlets sparse, adjacent primary branches on main stem 1–3 cm apart, leafy portion of main stem including leaves 3–5.5 mm wide at middle, ultimate branches 3–4 mm wide including leaves. Axillary leaves on branches asymmetrical, narrowly ovate or narrowly elliptic, 2–3 × 1–1.4 mm, base exauriculate, margin ciliate (at base). Dorsal leaves asymmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches not approximate, as widely separated as width of leaf, narrowly ovate, 0.6–1 × 0.3–0.5 mm, carinate or not carinate, base subcordate or obliquely cordate, margin denticulate or ciliate at base, apex acuminate or aristate. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches slightly ascending or spreading, ovate-lanceolate, 1.4–2 × 0.8–1.4 mm, apex acute; acroscopic base not enlarged, not overlapping stem and branches, margin sparsely minutely denticulate or ciliate at base. Strobili solitary, terminal, compact, dorsiventrally complanate, 3–5 × 1–1.5 mm; sporophylls unlike sterile leaves, slightly or strongly dimorphic, resupinate, not white-margined; dorsal sporophylls with sporophyll-ptyx incomplete and ciliate; ventral sporophylls ovate, margin denticulate; megasporophylls in basal portion on lower side of strobilus; microsporangia orbicular, microspores orange-red, megasporangia yellowish orange or brown.

On damp shaded banks in evergreen and deciduous forests, in grass under shrubs, forming mats; (1400–)1800–2500(–3100) m. Guizhou, Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, Malaysia (Peninsular), Myanmar, Nepal, Pakistan, Thailand, Vietnam].

Selaginella chrysocaulos is closely related to *S. labordei* but differs in the typical underground tuber and the leaves not white-margined and not very ciliate.

52. *Selaginella effusa* Alston, J. Bot. 70: 65. 1932.

疏松卷柏 shu song juan bai

Selaginella liboensis H. S. Kung & P. S. Wang.

Plants terrestrial or epilithic, evergreen or seasonally green, erect, 10–45 cm, without creeping rhizomes or stolons, without elongate tuber at base of stem. Rhizophores at intervals throughout length of creeping stem and branches and to upper part of main stem, borne on ventral side in axils of branches. Main stems branched from lower part upward, pinnately branched, stramineous, subquadrate, sulcate, glabrous; primary leafy branches 3–10 pairs, 2 or 3 times pinnately branched; secondary branches once or twice pinnately branched, regularly long; adjacent primary branches on main stem 2–4 cm apart; leafy portion of main stem including leaves 0.4–0.7 mm wide at middle, ultimate branches 3.3–6 mm wide including leaves. Axillary leaves on main stems larger than

those on branches, ovate, ovate-triangular, or ovate-elliptic, base not peltate, obtuse; axillary leaves on branches symmetrical, ovate-triangular or ovate, 2–3.5 × 1.2–2.8 mm, base exauriculate, margin ciliate. Dorsal leaves asymmetrical, those on main stems slightly larger than those on branches; dorsal leaves on branches approximate or contiguous, obliquely ovate-elliptic, 1.5–3.2 × 0.6–1 mm, carinate, base subcordate or cuneate, not peltate, margin ciliate, apex aristate, arista curved, 0.8–1.6 mm. Ventral leaves asymmetrical, those on main stem larger than those on branches; ventral leaves on branches distant or approximate, spreading, oblong or oblong-ovate, 2.2–5 × 1–2.2 mm, margin denticulate, apex subacute; basisopic base decurrent, margin ciliate at base (elsewhere subentire); acroscopic base enlarged, broader, strongly overlapping stem and branches, margin ciliate in basal half (denticulate to apex). Strobili solitary, terminal, compact, dorsiventrally complanate, 6–12 × 1.5–3 mm; sporophylls unlike sterile leaves, strongly dimorphic, resupinate, not white-margined; dorsal sporophylls oblong-lanceolate, sharply carinate, margin ciliate, apex acute or acuminate, with sporophyll-ptyx complete and sparsely shortly ciliate; ventral sporophylls ovate-triangular, carinate, margin shortly ciliate; megasporophylls in basal portion on lower side of strobilus; microsporangia orbicular, rather thin, cells uniform; microspores pale yellow, megasporangia white-yellow.

On rocks in shaded places, terrestrial along roadsides in forests; 200–1500 m. Guangdong, Guangxi, Guizhou, Xizang, Yunnan [Vietnam].

Selaginella effusa is similar to *S. heterostachys* but differs in the axillary leaves ciliate and ovate-triangular.

53. *Selaginella labordei* Hieronymus ex Christ, Bull. Acad. Int. Géogr. Bot. 11: 272. 1902.

细叶卷柏 xi ye juan bai

Lycopodioides labordei (Hieronymus ex Christ) H. S. Kung; *L. sichuanica* (H. S. Kung) H. S. Kung; *Selaginella hupehensis* Pampanini; *S. morrisonensis* Hayata; *S. sichuanica* H. S. Kung; *S. zahlbruckeriana* Handel-Mazzetti.

Plants terrestrial or epilithic, evergreen or seasonally green, erect or ascending from decumbent base, (5–)15–20(–30) cm, with creeping subterranean rhizome and stolons. Rhizophores restricted to base of stem or borne on creeping rhizomes and stolons. Main stems branched from middle or lower part upward, pinnately branched, stramineous or reddish (when alive), 0.4–1.4 mm in diam. in lower part, terete, sulcate; primary leafy branches 3–5 pairs, 2 or 3 times pinnately branched, secondary branches once or twice pinnately branched, tertiary branches forked or simple, branchlets sparse or dense, adjacent primary branches on main stem 1–5 cm apart, ultimate branches (2.2–) 3–3.5(–5.5) mm wide including leaves. Axillary leaves on main stems larger than those on branches, ovate, base not peltate, truncate; axillary leaves on branches asymmetrical, ovate-lanceolate, (1.4–)2–2.4(–2.9) × (0.5–)0.8–1(–1.3) mm, base exauriculate, margin denticulate or ciliate. Dorsal leaves ± symmetrical, those on main stems obviously larger than those on branches; dorsal leaves on branches approximate, ovate or ovate-lanceolate, 0.9–2 × 0.3–0.8 mm, carinate or not carinate,

base subcordate, not peltate, margin denticulate or ciliolate (at base), apex aristate, often reflexed or arista curved. Ventral leaves asymmetrical, those on main stem obviously larger than those on branches; ventral leaves on branches distant, slightly ascending, ovate-lanceolate, narrowly ovate, or triangular, 1.7–3.2 × 0.6–1.2 mm, apex acute; basiscopic base rounded, denticulate or ciliolate at base (denticulate to apex); acroscopic base enlarged, broader, overlapping stem and branches, margin shortly ciliolate at base, denticulate to apex. Strobili solitary, terminal, compact, dorsiventrally complanate or subcomplanate, 5–18 × 1.3–3 mm; sporophylls unlike sterile leaves, slightly or strongly dimorphic, resupinate, white-margined; dorsal sporophylls ovate-lanceolate, margin ciliolate or denticulate, apex acuminate, with sporophyll-ptyx incomplete and ciliolate or denticulate; ventral sporophylls ovate, carinate, margin denticulate or ciliolate, apex aristate or acuminate; megasporophylls and microsporophylls at intervals or megasporophylls in basal or upper portion on lower side of strobilus; microsporangia orbicular, rather thin, cells uniform; microspores orange-red or red, megaspores pale yellow or yellowish orange.

Forests, on rocks; (200–)1000–3000(–4000) m. Anhui, Chongqing, Fujian, S Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Myanmar].

Selaginella labordei differs from *S. chrysocaulos* in the more-ciliolate indument of the dorsal leaves and the absence of underground tuberlike rhizomes. A small form in shaded, wet, rocky places under waterfalls at Jinfo Shan, Nanchuan, Chongqing, has dorsal leaves with aristae as long as the leaves. This form has been named as *S. sichuanica*, but it is only an ecological form.

54. *Selaginella repanda* (Desvaux ex Poiret) Spring in Gaudichaud, Voy. Bonite, Bot. 1: 329. 1844.

高雄卷柏 gao xiong juan bai

Lycopodium repandum Desvaux ex Poiret in Lamarck, Encycl., Suppl. 3: 558. 1814; *L. barbatum* Kaulfuss; *L. tetragonostachyum* Wallich ex Greville & Hooker var. *major* Greville & Hooker; *Selaginella barbata* Warburg; *S. henryi* Koidzumi; *S. suberecta* Baker; *S. tetragonostachya* Spring, p.p.

Plants terrestrial or epilithic, seasonally green, ascending from decumbent base, 8–30 cm, with creeping subterranean rhizome and stolons. Rhizophores borne from base to upper part of main stem or restricted to creeping rhizomes and stolons (sometimes also on lateral branches), on ventral side in axils of branches. Main stems branched from near base upward, pinnately branched, stramineous, unbranched main stem 8–15 cm tall, oval or terete, apex of main stem and lateral branches sometimes flagelliform; primary leafy branches 2–6 pairs, once or twice pinnately branched, secondary branches once or twice forked, branchlets dense, adjacent primary branches on main stem 1.5–3 cm apart, leafy portion of main stem including leaves 4.4–6.6 mm wide at middle, ultimate branches 3–4.5 mm wide including leaves. Axillary leaves on main stems larger than those on branches, ovate or ovate-lanceolate, base not peltate, obtuse; axillary leaves on branches ± symmetrical, ovate, 2–3 × 1–1.4 mm, base exauriculate, margin ciliolate.

Dorsal leaves asymmetrical, those on main stems in leafy portion slightly larger than those on branches; dorsal leaves on branches approximate, obliquely ovate, 0.7–1.6 × 0.4–0.9 mm, not carinate or slightly carinate, base obliquely subcordate, not peltate, margin long ciliolate (denticulate to apex), apex long acuminate to shortly aristate, parallel to axis or often reflexed. Ventral leaves asymmetrical, those on main stem larger than those on branches; ventral leaves on branches approximate, spreading, oblong-falcate, 2.5–3 × 1–1.5 mm, margin minutely denticulate, apex acute; basiscopic base rounded, margin ciliolate with a few long cilia at base, denticulate to apex; acroscopic base rounded, not overlapping stem and branches, margin ciliolate in basal half (denticulate to apex). Strobili solitary, terminal, compact, subtetragonal or subcomplanate, 3–7 × 1.5–3 mm; sporophylls unlike sterile leaves, submonomorphic or sometimes dorsal sporophylls longer, not obviously white-margined; dorsal sporophylls ovate, sharply carinate, margin ciliolate, apex acuminate; ventral sporophylls ovate, margin ciliolate; megasporophylls in basal portion on lower side of strobilus or ± randomly distributed on both sides; microsporangia orbicular, rather thin, cells uniform; microspores orange-red or red, coarsely granular, megaspores yellowish orange, baculate.

On rocks or under shrubs on soil banks; 100–1300 m. Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam].

55. *Selaginella bisulcata* Spring, Mém. Acad. Roy. Sci. Belgique 24: 259. 1850.

双沟卷柏 shuang gou juan bai

Lycopodioides bisulcata (Spring) Kuntze; *Selaginella bisulcata* var. *spinulosa* Spring.

Plants terrestrial, evergreen, creeping, 20–35 cm. Rhizophores at intervals throughout length of main stem, borne on ventral side in axils of branches. Main stems branched from near base upward, pinnately branched, stramineous, main stem 1.2–1.8 mm in diam. in lower part, subquadrangular, sulcate; primary leafy branches 5–8 pairs, 1–3 times pinnately branched, branchlets sparse or dense, adjacent primary branches on main stem 6–10 cm apart, leafy portion of main stem including leaves 9–12 mm wide at middle, ultimate branches 5–8 mm wide including leaves. Axillary leaves on branches symmetrical, elliptic, 3–4.6 × 1.1–1.6 mm, base exauriculate, margin denticulate or sparsely ciliolate. Dorsal leaves contiguous or imbricate, asymmetrical, 1–2.4 × 0.6–1.5 mm, base obliquely cuneate, margin sparsely ciliolate, apex mucronate or aristate with arista curved, up to 1/2–4/5 as long as leaf, 0.4–0.8 mm. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches distant, slightly ascending or spreading or deflexed (on main stem), oblong, 3.2–5 × 1.2–2 mm, apex apiculate; basiscopic margin entire or subentire, but denticulate at apex, not revolute, not involute; acroscopic base not enlarged, not overlapping stem and branches, margin ciliolate or denticulate in basal and apical portions, entire in middle. Strobili solitary, terminal, compact, dorsiventrally complanate, 6–10 × 3.5–5.5 mm; sporophylls unlike sterile leaves, strongly dimorphic (very basal sporophylls on ventral side similar to lateral sterile leaves),

resupinate, not obviously white-margined; dorsal sporophylls oblong-lanceolate, carinate, margin ciliolate, apex acuminate or aristate, with sporophyll-ptyx incomplete and ciliolate; ventral sporophylls ovate-lanceolate or oblong-ovate, carinate or not carinate, base dilated, margin ciliolate or lacerate-ciliolate; megasporophylls in basal portion on lower side of strobilus, or megasporophylls and microsporophylls at intervals; microsporangia orbicular, relatively thick, cells uniform; microspores pale yellow, megaspores gray or dark brown.

Terrestrial on rather dry slopes in light shade; 400–2400 m. Sichuan, Yunnan [Bhutan, N India, Indonesia (Java), Myanmar, Nepal, Thailand, Vietnam].

Selaginella bisulcata is very closely related to *S. pennata* but differs in the stems creeping, the rhizophores borne also in distal portion, and the dorsal leaves acute to mucronate at apex.

56. *Selaginella megaphylla* Baker, J. Bot. (Hooker) 23: 180. 1885.

宽叶卷柏 kuan ye juan bai

Lycopodioides megaphylla (Baker) Kuntze.

Plants terrestrial, evergreen, long creeping, 50–100 cm. Rhizophores at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched throughout, stramineous, 1.3–3 mm in diam. in lower part, stem oval or terete, branches many, once pinnately branched, secondary branches once or twice forked, branchlets sparse, adjacent primary branches on main stem 2–7 cm apart, ultimate branches 10–15 mm wide including leaves. Axillary leaves on main stems larger than those on branches, ovate-lanceolate or triangular, base not peltate, truncate; axillary leaves on branches symmetrical, ovate-lanceolate, 3–4 × 1–1.5 mm, base exauriculate, margin slightly denticulate. Dorsal leaves asymmetrical, those on branches imbricate, ovate-elliptic, 2–3.3 × 1.2–1.7 mm, slightly carinate, base obtuse, not peltate, margin denticulate, apex acute, parallel to axis. Ventral leaves asymmetrical, those on branches distant, approximate, or contiguous, spreading, oblong-falcate, 5–7 mm, apex obtuse; basiscopic margin entire; acroscopic base slightly enlarged, broader, not overlapping stem and branches, margin slightly denticulate. Strobili solitary or in pairs, terminal, compact, dorsiventrally complanate, 4–12 × 1.3–2.6 mm; sporophylls dimorphic, resupinate; dorsal sporophylls ovate-lanceolate, carinate, margin denticulate, apex acuminate, with sporophyll-ptyx incomplete and denticulate; ventral sporophylls ovate, carinate, margin denticulate; megasporophylls in basal portion on lower side of strobilus; microsporangia suborbicular, rather thin, cells uniform; microspores pale yellow, megaspores whitish or brown.

Evergreen broad-leaved forests; 800–1800 m. Xizang [Bhutan, NE India, N Myanmar].

Selaginella megaphylla is similar to *S. ornata* but differs in the leaves much longer and the lower margin of ventral leaves entire.

57. *Selaginella ornata* (Hooker & Greville) Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 232. 1843.

微齿卷柏 wei chi juan bai

Lycopodium ornatum Hooker & Greville, Bot. Misc. 3:

108. 1833; *Selaginella rabenavii* Hieronymus; *S. tonkinensis* Baker.

Plants terrestrial, evergreen, creeping, upper part ascending, 20–40 cm. Rhizophores at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched from near base upward, stramineous or reddish, main stem 0.7–1.4 mm in diam. in lower part; stem oval, flattened, or subquadrangular, sulcate or not, glabrous, with single vascular bundle, apex of main stem blackish (reddish when fresh), branches few or many; primary leafy branches 3–8 pairs, once pinnately branched, secondary branches forked or once pinnately branched, branchlets sparse, adjacent primary branches on main stem 4–7 cm apart, leafy portion of main stem including leaves 0.8–1.2 mm wide at middle, ultimate branches 5–8 mm wide including leaves. Axillary leaves on main stems not obviously larger than those on branches, ovate-lanceolate or lanceolate, base not peltate, attenuate; axillary leaves on branches symmetrical, lanceolate or ovate-lanceolate, 2–3.6 × 0.8–1.6 mm, base exauriculate, margin slightly denticulate. Dorsal leaves ± symmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches contiguous or imbricate, ovate, 2.1–3.8 × 0.5–1.8 mm, carinate, base obtuse, margin minutely denticulate, apex aristate with arista 1/4–1/3 as long as leaf, parallel to axis. Ventral leaves asymmetrical, those on main stem larger than those on branches; ventral leaves on branches distant or contiguous, spreading, oblong or oblong-falcate, 3.5–5 × 1.2–2.2 mm, apex obtuse; basiscopic base decurrent, margin entire; acroscopic base rounded, overlapping stem and branches, margin denticulate in basal half. Strobili solitary or in pairs, terminal, compact, dorsiventrally complanate, 4–14 × 1.4–3.2 mm; sporophylls strongly dimorphic, resupinate; dorsal sporophylls ovate-lanceolate, carinate, margin ciliolate, apex acuminate, with sporophyll-ptyx incomplete and denticulate; ventral sporophylls much smaller than dorsal leaves, later colorless, broadly ovate, carinate, margin denticulate; megasporophylls in basal portion on lower side of strobilus; microsporangia suborbicular, rather thin, cells uniform; microspores pale yellow, megaspores reddish brown.

Forests, limestone caves; 500–1500 m. Guangxi, Yunnan [Indonesia (Java), Malaysia (Peninsular), Thailand, Vietnam].

58. *Selaginella amblyphylla* Alston, Bull. Fan Mem. Inst. Biol., Bot. 5: 287. 1934.

钝叶卷柏 dun ye juan bai

Plants terrestrial, evergreen or seasonally green, creeping or suberect, up to 35 cm. Rhizophores restricted to lower part of stem or at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched from near base or lower part upward, pinnately branched, stramineous, 1–2 mm in diam. in lower part, terete, not sulcate; primary leafy branches 5–10 pairs, 2 or 3 times pinnately branched, branchlets dense, adjacent primary branches on main stem 1.5–3 cm apart, leafy portion of main stem including leaves 5–8 mm wide at middle, ultimate branches 4–5 mm wide including leaves. Axillary leaves on branches asymmetrical, ovate or triangular, 2–3 × 0.6–1.2 mm, base exauric-

ulate, margin denticulate. Dorsal leaves \pm symmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches contiguous, ovate-lanceolate or ovate, $1.4\text{--}2.2 \times 0.4\text{--}0.8$ mm, not carinate, base obliquely cordate, margin denticulate or ciliolate at base, apex aristate, arista ca. 1 mm. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches distant, spreading, oblong, $2.2\text{--}3.5 \times 1.6\text{--}2$ mm, apex obtuse or subacute; basiscopic margin sparsely ciliolate at base, elsewhere subentire; acroscopic base enlarged, broader, overlapping stem and branches, margin shortly ciliolate in basal portion, elsewhere entire. Strobili solitary, terminal, compact, dorsiventrally complanate, $3.5\text{--}10 \times 3.2\text{--}4.4$ mm; sporophylls strongly dimorphic, resupinate, not obviously white-margined; dorsal sporophylls ovate-lanceolate, carinate, margin ciliolate, apex acuminate, with sporophyll-ptyx incomplete and ciliolate; ventral sporophylls ovate-triangular, carinate, margin ciliolate; megasporophylls in basal portion on lower side of strobilus; microsporangia orbicular, rather thin, cells uniform; microspores orange-red, megaspores yellowish orange or whitish.

Forests; (100–)500–1800 m. Guangxi, Sichuan, Xizang, Yunnan [Myanmar, Thailand].

59. *Selaginella monospora* Spring, Mém. Acad. Roy. Sci. Belgique 24: 135. 1850.

单子卷柏 dan zi juan bai

Lycopodioides gorvalensis (Spring) Kuntze; *Lycopodium monosporum* (Spring) Hooker; *Selaginella effusa* Alston var. *medogensis* (Ching & S. K. Wu) W. M. Chu; *S. medogensis* Ching & S. K. Wu; *S. microclada* Baker; *S. plumosa* (Linnaeus) C. Presl var. *monospora* (Spring) Baker.

Plants terrestrial, evergreen, long creeping, 35–85 cm or more. Rhizophores at intervals throughout length of main stem, borne on ventral side in axils of branches. Main stems branched throughout, pinnately branched, stramineous, 1.5–2 mm in diam. in lower part, stem oval or terete, not sulcate, branches many, some primary lateral branches developed into long branch systems; primary leafy branches 8–12 pairs, once or twice pinnately branched or 2 or 3 times forked, tertiary branches forked, branchlets dense and regular, adjacent primary branches on main stem 2.5–5.5 cm apart; leafy portion of main stem including leaves (5–)8–11 mm wide at middle, ultimate branches 4–8 mm wide including leaves. Axillary leaves on main stems larger than those on branches, ovate or broadly ovate, base not peltate, obtuse; axillary leaves on branches asymmetrical, ovate, narrowly ovate, or narrowly elliptic, $2\text{--}3 \times 0.8\text{--}1.6$ mm, base exauriculate, margin denticulate. Dorsal leaves asymmetrical, those on main stems slightly larger than those on branches, margin denticulate or subentire in ultimate branches, base obtuse, apex shortly aristate; dorsal leaves on branches contiguous, ovate-lanceolate or elliptic, $1\text{--}1.6 \times 0.3\text{--}0.7$ mm, carinate or strongly carinate, base obtuse, not peltate, margin denticulate, apex acuminate or shortly aristate. Ventral leaves asymmetrical, those on main stem obviously larger than those on branches, $3.5\text{--}5.5 \times 1.4\text{--}2.3$ mm; ventral leaves on branches approximate, slightly ascending or spreading, ovate-triangular or oblong-falcate, $2.6\text{--}4.3 \times 0.9\text{--}1.4$ mm, apex sub-

acute; basiscopic base decurrent, margin subentire or entire; acroscopic base enlarged, broader, strongly overlapping stem and branches, margin denticulate. Strobili solitary, terminal, compact, dorsiventrally complanate (sometimes appearing uniform), $3\text{--}20 \times 1.9\text{--}3.2$ mm; sporophylls slightly dimorphic, resupinate, not white-margined; dorsal sporophylls lanceolate, sharply carinate, margin minutely denticulate, apex acuminate, with sporophyll-ptyx complete and denticulate; ventral sporophylls ovate-lanceolate, carinate, base dilated, margin denticulate; strobili with megasporophylls in basal portion on lower side of strobilus, or megasporophylls and microsporophylls at intervals, or only 1 megasporophyll at base on lower side, elsewhere with microsporophylls; microsporangia transversely elliptic, rather thin, upper margin cells differentiated; microspores yellowish orange or pale yellow, megaspores whitish.

On damp banks in forests; (400–)1300–1800(–2600) m. Guangdong, Guangxi, Guizhou, Hainan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand, Vietnam].

60. *Selaginella trichophylla* K. H. Shing, Acta Phytotax. Sin. 31: 569. 1993.

毛叶卷柏 mao ye juan bai

Selaginella monospora Spring subsp. *trichophylla* (K. H. Shing) X. C. Zhang.

Plants terrestrial, evergreen, creeping, 30–50 cm. Rhizophores at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems pinnately branched throughout, stramineous, terete, not sulcate; primary leafy branches 10–15 pairs, once or twice pinnately branched, secondary branches forked or once pinnately branched, tertiary branches forked, branchlets sparse, adjacent primary branches on main stem 2–4 cm apart; leafy portion of main stem including leaves 5–6 mm wide at middle, ultimate branches 2.8–3.2 mm wide including leaves. All leaves spinose on both surfaces. Axillary leaves on branches symmetrical, ovate, $1.2\text{--}2.5 \times 1\text{--}2$ mm, base exauriculate, margin ciliolate. Dorsal leaves \pm symmetrical, those on main stems slightly larger than those on branches; dorsal leaves on branches contiguous or imbricate, ovate, $1.2\text{--}1.8 \times 0.5\text{--}1$ mm, not carinate, base subcordate or obtuse, not peltate, margin ciliolate (more densely ciliolate at base), apex acuminate or shortly aristate. Ventral leaves asymmetrical, those on main stem larger than those on branches; ventral leaves on branches distant, slightly ascending or spreading, ovate-triangular, $2\text{--}3.2 \times 0.8\text{--}1.6$ mm, margin denticulate, apex acute; acroscopic base enlarged, broader, overlapping stem and branches, margin denticulate, ciliolate. Strobili solitary, terminal, compact, dorsiventrally complanate, $6.5\text{--}10 \times 1.2\text{--}2.3$ mm; sporophylls dimorphic, resupinate, not white-margined; dorsal sporophylls ovate-lanceolate, carinate, margin denticulate, apex acuminate, with sporophyll-ptyx complete and denticulate; ventral sporophylls ovate-lanceolate, carinate, margin denticulate; megasporophylls in basal portion on lower side of strobilus; microsporangia transversely elliptic, rather thin, upper margin cells differentiated; microspores pale yellow, megaspores white-yellow.

• On rocks in evergreen broad-leaved forests; 1300–1500 m. Xizang.

Selaginella trichophylla is known only from the type material. It is superficially similar to *S. effusa* and *S. scabrifolia* but differs in the leaves spinose on both surfaces.

61. *Selaginella devolii* H. M. Chang, P. F. Lu & W. L. Chiou, *Blumea* 56: 21. 2011.

棟氏卷柏 di shi juan bai

Plants prostrate, annual, very small, without erect or ascending stems. Rhizophores present along basal branches. Stems widely branching with main segments 1–3 cm, 2–2.5(–3) mm wide across microphylls, decumbent or creeping. All leaves conspicuously dimorphic, arranged in 4 ranks (2 dorsal and 2 ventral), vein single, prominent on ventral side, usually not reaching apex, margin with 1 or 2 rows of specialized, elongated cells. Axillary leaves present at branch forks, inserted at ventral side of stem, broadly ovate to elliptic, sparsely serrulate along margin. Dorsal leaves ovate or broadly elliptic, 0.5–0.8 × 0.3–0.6 mm, base rounded or truncate, margin sparsely serrulate, apex acute to rounded. Ventral leaves broadly ovate or broadly oblong, rarely ovate, 1–1.3 × 0.7–0.9 mm, base rounded or somewhat cordate, margin usually sparsely serrulate but sometimes entire at basiscopic 2/3, apex rounded or broadly acute. Strobili terminal, complanate, 3–10 × 2.5–3 mm; sporangia on ventral side only, megasporangia at basal parts and microsporangia more apically; dorsal sporophylls significantly larger than ventral ones, widely spreading, broadly falcate, 1–1.3 × 0.5–0.7 mm, sparsely serrulate along margin, apex acute to rounded, single vein bearing a keel-like wing along its basal half on ventrally facing adaxial side, margin of wing toothed; ventral sporophylls pointing forward, shovel-like, ovate or broadly lanceolate, 0.7–0.9 × 0.4–0.5 mm, rounded at base, serrulate along margin apically but toothed nearer base, apex acuminate or acute, vein prominent on ventrally facing abaxial side.

● On moist rocky slopes with some shade; 600–1200 m. C and S Taiwan.

Selaginella devolii most resembles young sporophytes of *S. leptophylla*. However, the latter has oblong ventral trophophylls and lanceolate dorsal sporophylls that easily distinguish it. *Selaginella ciliaris*, which usually grows together with this new species, is distinguished by its trophophylls and sporophylls with ciliate margins.

62. *Selaginella ciliaris* (Retzius) Spring, *Bull. Acad. Roy. Sci. Bruxelles* 10: 231. 1843.

睫毛卷柏 jie mao juan bai

Lycopodium ciliare Retzius, *Observ. Bot.* 5: 32. 1789; *Lycopodioides ciliaris* (Retzius) Kuntze; *L. exigua* (Spring) Kuntze; *Lycopodium belangeri* Bory; *Selaginella belangeri* (Bory) Spring; *S. exigua* Spring.

Plants terrestrial, evergreen or seasonally green, shortly creeping, fertile erect stem 2–5 cm, with creeping or prostrate stems. Rhizophores restricted to lower part of erect fertile branches or to middle of main stem, borne on ventral side in axils of branches. Main stems branched throughout, stramineous, 0.3–0.4 mm in diam. in lower part, terete, not sulcate or sulcate; primary leafy branches 3 or 4 pairs, simple or forked or once pinnately branched, branchlets sparse, adjacent primary

branches on main stem ca. 1 cm apart; leafy portion of main stem including leaves 3–4 mm wide at middle. Axillary leaves on branches symmetrical or slightly asymmetrical, ovate, 1.2–2 × 0.6–1 mm, base exauriculate, margin ciliolate in basal half, upward denticulate. Dorsal leaves ± symmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches contiguous, ovate, 1.2–1.6 × 0.6–1 mm, slightly carinate, base subcordate or obtuse, margin minutely denticulate, apex acuminate or aristate. Ventral leaves asymmetrical; ventral leaves on branches spreading, ovate or ovate-lanceolate, 1.6–2 × 1.6–2 mm, apex acute; basiscopic margin subentire or minutely denticulate to apex; acroscopic base enlarged, broader, overlapping stem and branches, margin ciliolate. Strobili solitary, terminal, compact, dorsiventrally complanate, 4.5–13 × 2–4.5 mm; sporophylls strongly dimorphic, resupinate, white-margined; dorsal sporophylls minutely denticulate, with sporophyll-ptyx incomplete (ending midway to apex) and ciliolate; ventral sporophylls ovate-triangular, margin ciliolate, all known sporophylls megasporophylls; megasporophylls greenish-yellowish orange.

Grasslands; below 100–900 m. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [India, Indonesia (Java), Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

The presence of only megasporangiate strobili in *Selaginella ciliaris* suggests that this species may be apomictic.

63. *Selaginella kouytcheensis* H. Lévillé, *Repert. Spec. Nov. Regni Veg.* 9: 451. 1933.

贵州卷柏 gui zhou juan bai

Plants evergreen, small, weak, 1.5–6 cm high. Main stems suberect, slender, leafy portion once or twice pinnately branched. Leaves very thin. Axillary leaves oblong, 1.5–2 × 0.6–1.2 mm, margin subentire or minutely denticulate. Ventral leaves oblong, 1.5–2 × 0.6–1 mm, base rounded, margin slightly denticulate, apex obtuse. Dorsal leaves much smaller than ventral leaves, ovate or elliptic, 0.8–1 × 0.4–0.6 mm, base cuneate, margin minutely denticulate, apex obtuse. Strobili solitary, dorsiventrally compressed, 3–5 × 2–3 mm; sporophylls strongly dimorphic, resupinate; dorsal sporophylls larger, spreading, oblong-lanceolate, up to 1.5 × 0.5 mm, base rounded, margin minutely denticulate, apex acute; ventral sporophylls smaller, ovate, margin minutely denticulate, apex acuminate; megasporophylls whitish, microspores not found.

● Limestone caves; 900–1100 m. Guizhou, Yunnan.

64. *Selaginella boninensis* Baker, *J. Bot. (Hooker)* 23: 178. 1885.

小笠原卷柏 xiao li yuan juan bai

Lycopodioides boninensis (Baker) Kuntze.

Plants epilithic, evergreen, creeping, 10–30 cm, fertile stems erect. Rhizophores at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched throughout, pinnately branched, stramineous, ca. 1 mm in diam. in lower part, terete, sulcate, branches few, erect fertile stems branched from middle upward; primary leafy branches 5–8 pairs, simple or once pinnately

branched, secondary branches not forked or basal one or two forked, branchlets sparse, adjacent primary branches on main stem ca. 2 cm apart, leafy portion of main stem including leaves 6–8 mm wide at middle, ultimate branches 3.6–4.5 mm wide including leaves. Axillary leaves on branches symmetrical, ovate-lanceolate, $2.3\text{--}2.5 \times 1.2\text{--}1.4$ mm, base exauriculate, margin ciliolate. Dorsal leaves \pm symmetrical, those on main stems slightly larger than those on branches; dorsal leaves on branches not approximate, ovate or ovate-lanceolate, $1.8\text{--}2.5 \times 0.8\text{--}1$ mm, not carinate, base subcordate or cordate, not peltate, margin ciliolate, apex acuminate or aristate. Ventral leaves asymmetrical, those on main stem larger than those on branches; ventral leaves on branches contiguous or slightly overlapping, spreading, oblong or oblong-ovate, $2.2\text{--}3.2 \times 1\text{--}1.8$ mm, apex acute; acroscopic base enlarged, broader, overlapping stem and branches, margin ciliolate. Strobili solitary, terminal, compact, dorsiventrally complanate, $6\text{--}8 \times 2.6\text{--}3.3$ mm; sporophylls dimorphic, resupinate, not white-margined; dorsal sporophylls ovate-lanceolate, not keeled, margin ciliolate, apex acute, with sporophyll-ptyx incomplete and ciliolate; ventral sporophylls ovate-lanceolate, carinate, margin ciliolate; megasporophylls in basal portion on lower side of strobilus or in basal portion on both sides; microsporangia orbicular, rather thin, cells uniform; microspores red, megasporangia white-yellow.

Slopes in tropical forests, trailsides, roadsides; 100–500 m. S Taiwan [Japan (Bonin Islands)].

Selaginella boninensis is similar to *S. heterostachys* and *S. effusa* but differs in the plants always creeping.

65. *Selaginella heterostachys* Baker, J. Bot. (Hooker) 23: 177. 1885.

异穗卷柏 *yi sui juan bai*

Lycopodioides heterostachya (Baker) Kuntze; *Selaginella hezhangensis* P. S. Wang & X. Y. Wang; *S. praticola* Handel-Mazzetti; *S. recurvifolia* Warburg; *S. tarokoensis* Yamamoto.

Plants terrestrial or epilithic, evergreen, erect or creeping, 10–20 cm, fertile stems erect. Rhizophores restricted to lower part of erect fertile branches or at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stem pinnately branched, stramineous, 0.4–1.2 mm in diam. in lower part, terete, sulcate, erect fertile stems branched from lower part upward; primary leafy branches 3–5 pairs, once or twice pinnately branched, secondary branches once or twice forked, tertiary branches forked or simple, branchlets sparse and regular, adjacent primary branches on main stem 1.5–6 cm apart, leafy portion of main stem including leaves 3–6 mm wide at middle, ultimate branches 2.4–5.6 mm wide including leaves. Axillary leaves on main stems larger than those on branches, ovate, base not peltate, subcordate; axillary leaves on branches symmetrical, ovate or oblong, $1.4\text{--}2.6 \times 0.4\text{--}1.2$ mm, base exauriculate, margin denticulate. Dorsal leaves asymmetrical, those on branches not approximate, ovate or ovate-lanceolate, $1\text{--}1.6 \times 0.4\text{--}0.8$ mm, not carinate, base cuneate or obliquely attenuate, not peltate, margin minutely denticulate, apex acuminate or shortly aristate. Ventral leaves asymmetrical, those on main stem obviously larger than those

on branches; ventral leaves on branches distant or approximate, spreading or deflexed, oblong-ovate, $1.8\text{--}2.7 \times 0.7\text{--}1.8$ mm, margin denticulate, apex acute; basisopic base rounded; acroscopic base enlarged, broader, overlapping stem and branches. Strobili solitary, terminal, compact, dorsiventrally complanate, $5\text{--}25 \times 1.5\text{--}3.5$ mm; sporophylls strongly dimorphic, resupinate; dorsal sporophylls ovate-lanceolate or oblong-lanceolate, not keeled, margin ciliolate or denticulate, apex acuminate or aristate, with sporophyll-ptyx complete and ciliolate or denticulate; ventral sporophylls ovate-lanceolate, carinate (ridge also ciliolate), margin ciliolate, apex long acuminate; megasporophylls in basal portion on both sides or lower side of strobilus, \pm randomly distributed on both sides, or throughout lower side, or megasporophylls and microsporophylls at intervals; microsporangia transversely elliptic, rather thin, cells uniform; microspores yellowish orange, megasporangia yellowish orange.

• On rocks in forests, wet habitats including on moss-covered or wet rocks and walls, occasionally on tree trunks close to streams; 100–1300(–1900) m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang.

66. *Selaginella kurzii* Baker, J. Bot. (Hooker) 23: 249. 1885.

缅甸卷柏 *mian dian juan bai*

Lycopodioides kurzii (Baker) Kuntze.

Plants terrestrial or epilithic, evergreen or subterranean rhizomes evergreen and aerial part seasonally green, creeping, creeping stems 10–20 cm, fertile stems erect. Rhizophores restricted to lower part of erect fertile branches or at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched throughout, pinnately branched; erect fertile stems 5–15(–25) cm high, stramineous, terete, not sulcate; primary leafy branches 5 or 6 pairs, branches once or twice forked, branchlets sparse, adjacent primary branches on main stem 1.5–2.5 cm apart, ultimate branches 2–6 mm wide including leaves. Axillary leaves on main stems larger than those on branches, triangular, base not peltate, obtuse; axillary leaves on branches symmetrical, ovate or ovate-lanceolate, $1\text{--}2.5 \times 0.6\text{--}1.6$ mm, base exauriculate, margin rather long ciliolate at base. Dorsal leaves asymmetrical or \pm symmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches approximate or imbricate, ovate or ovate-elliptic, $1\text{--}1.2 \times 0.4\text{--}0.8$ mm, carinate, base subcordate or obtuse, not peltate, margin ciliolate, apex acuminate or aristate, arista 0.3–0.6 mm. Ventral leaves strongly asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches distant or approximate, slightly ascending, ovate-triangular, $1.6\text{--}3.8 \times 0.6\text{--}1.6$ mm, margin denticulate, apex acute or acuminate; basisopic margin entire or with 1 or 2 cilia at base; acroscopic base rounded, overlapping stem and branches, margin rather long ciliolate at base, subtire upward. Strobili solitary, terminal, compact, tetragonal, $6\text{--}8 \times 2\text{--}3$ mm; sporophylls dimorphic or strongly dimorphic, resupinate, white-margined; dorsal sporophylls ovate-lanceolate, sharply carinate, margin ciliolate, apex acute or acuminate, with sporophyll-ptyx incomplete and

ciliolate; ventral sporophylls ovate, carinate, margin ciliolate; megasporophylls and microsporophylls at intervals, or megasporophylls throughout lower side or in basal portion of lower side of strobilus; microsporangia orbicular, rather thin, marginal cells differentiated, smaller with thin walls; microspores orange-red, megaspores sulfur-colored.

Forest margins at roadsides; 200–1800 m. Yunnan [NE India, Malaysia, Myanmar, Thailand, Vietnam].

67. *Selaginella xipholepis* Baker, J. Bot. (Hooker) 23: 155. 1885.

剑叶卷柏 jian ye juan bai

Lycopodioides xipholepis (Baker) Kuntze.

Plants terrestrial or epilithic, evergreen or seasonally green; creeping stems 5–10 cm; fertile stems erect. Rhizophores restricted to lower part of erect fertile branches and at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched throughout; erect fertile stems not very regularly pinnately branched, stramineous, 5–10 cm high, 0.3–0.4 mm in diam. in lower part, terete, not sulcate; primary leafy branches 2 or 3 pairs, once or twice forked, branchlets sparse, adjacent primary branches on main stem 1.5–2 cm apart, leafy portion of main stem including leaves 4.5–6 mm wide at middle, ultimate branches 3–4.4 mm wide including leaves. Axillary leaves on branches symmetrical or asymmetrical, triangular, 1.6–2.5 × 1–1.4 mm, base exauriculate, margin ciliolate. Dorsal leaves ± symmetrical, those on main stems slightly larger than those on branches; dorsal leaves on branches approximate or imbricate, ovate, 1.5–2 × 0.5–1.2 mm, carinate, base slightly subcordate, margin long ciliolate at base, shortly ciliolate upward, apex acuminate or aristate. Ventral leaves asymmetrical, those on main stem larger than those on branches; ventral leaves on branches spreading, ovate-lanceolate, 2.3–3.2 × 1.3–1.5 mm, apex acute or acuminate; basiscopic margin not entire, denticulate in basal half, elsewhere subentire; acroscopic base enlarged, broader, strongly overlapping stem and branches, margin rather long ciliolate at base, denticulate to apex, cilia 0.4–0.6 mm. Strobili solitary or in pairs, terminal, compact, dorsiventrally complanate, 15–22 × 2.2–3 mm; sporophylls dimorphic or slightly dimorphic, resupinate, not obviously white-margined; dorsal sporophylls oblong-lanceolate, sharply carinate, margin denticulate, apex long acuminate, with sporophyll-ptyx complete and denticulate; ventral sporophylls ovate-lanceolate, sharply carinate, margin denticulate; megasporophylls in basal portion on lower side of strobilus or throughout lower side, or megasporophylls and microsporophylls at intervals; microsporangia transversely elliptic, rather thin, cells uniform; microspores yellowish orange, covered with small rounded protuberances, megaspores yellowish orange, verrucate to gemmate.

• Creeping and often forming mats on moss-covered rocks; 400–900 m. Guangdong, Guangxi, Guizhou, Jiangxi.

68. *Selaginella vaginata* Spring, Mém. Acad. Roy. Sci. Belgique 24: 87. 1850.

鞘舌卷柏 qiao she juan bai

Lycopodioides compta (Handel-Mazzetti) H. S. Kung; *L. vaginata* (Spring) Kuntze; *Selaginella bomiensis* Ching & S. K. Wu; *S. compta* Handel-Mazzetti; *S. schottmuelleri* Warburg [“*Schottmülleri*”]; *S. shensiensis* Christ, p.p.; *S. smithii* O. C. Schmidt; *S. thomsonii* Hieronymus; *S. xishuiensis* G. Q. Gou & P. S. Wang.

Plants terrestrial or epilithic, evergreen or seasonally green, creeping, 5–10 cm, fertile stems erect. Rhizophores restricted to lower part of erect fertile branches or at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems branched throughout, 0.2–0.4 mm in diam. in lower part, terete, sulcate or not, branches few; erect fertile stems pinnately branched throughout, 5–10 cm high, stramineous; primary leafy branches 2–5 pairs, once or twice forked, branchlets sparse, adjacent primary branches on main stem 1–2 cm apart, ultimate branches 3–5 mm wide including leaves. Axillary leaves on branches asymmetrical or symmetrical, ovate-triangular, 1.2–2.5 × 0.5–1.5 mm, base exauriculate, margin ciliolate in basal half, elsewhere subentire. Dorsal leaves ± symmetrical, those on branches approximate, contiguous, or imbricate, lanceolate, ovate-lanceolate, or triangular, 0.8–2.4 × 0.4–1.2 mm, slightly carinate, base subcordate, cuneate, or obtuse, not peltate, margin long ciliolate at base, shortly ciliolate upward, apex acuminate or aristate, parallel to axis or often reflexed. Ventral leaves asymmetrical, those on branches distant, spreading or deflexed, ovate-lanceolate or oblong-falcate, 1.6–3.2 × 0.8–1.5 mm, apex acute; basiscopic base rounded, margin denticulate in basal half, elsewhere subentire, or very shortly ciliolate at base; acroscopic base enlarged, broader, overlapping stem and branches, margin sparsely long ciliolate at base, cilia 0.4–0.6 mm, denticulate upward. Strobili solitary or in pairs, terminal, compact, dorsiventrally complanate, or sometimes tetragonal, 10–15(–45) × 2–3.5 mm; sporophylls dimorphic or slightly dimorphic, resupinate; dorsal sporophylls ovate-lanceolate, sharply carinate, margin ciliolate or denticulate, apex acuminate, with sporophyll-ptyx complete and ciliolate or denticulate; ventral sporophylls ovate-lanceolate, carinate, margin denticulate or ciliolate; megasporophylls in basal portion or middle on lower side of strobilus, or megasporophylls and microsporophylls at intervals; microsporangia transversely elliptic, rather thin, cells uniform; microspores orange-red, megaspores pale yellow or yellowish orange.

On limestone rocks, open and shaded places; (600–)1000–3100 m. Beijing, Chongqing, S Gansu, Guangxi, Guizhou, Henan, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan, Thailand, Vietnam].

69. *Selaginella drepanophylla* Alston, J. Bot. 70: 66. 1932.

镰叶卷柏 lian ye juan bai

Selaginella xichouensis W. M. Chu.

Plants epilithic, evergreen, prostrate, 5–15 cm. Rhizophores at intervals throughout length of main stem, borne on ventral side in axils of branches. Main stems branched throughout, stramineous, ca. 0.2 mm in diam. in lower part, subquad-

rangular, sulcate; primary leafy branches 3–5 pairs, once or twice forked, branchlets sparse, adjacent primary branches on main stem 1–1.5 cm apart; leafy portion of main stem including leaves 3.5–4.5 mm wide at middle, ultimate branches 3.5–5 mm wide including leaves. Axillary leaves on main stems obviously asymmetrical, linear-lanceolate, 1.4–1.9 × 0.5–0.8 mm, base exauriculate, margin ciliolate in basal half, elsewhere subentire. Dorsal leaves on branches approximate or contiguous, ovate-lanceolate, 0.8–1.1 × 0.2–0.7 mm, not carinate, base cuneate or obtuse, margin sparsely ciliolate, apex acuminate, often reflexed. Ventral leaves asymmetrical; ventral leaves on branches spreading or deflexed, oblong-falcate, 1.8–2.4 × 0.8–1.4 mm, apex subacute; basispic margin subentire, very shortly ciliolate at base, elsewhere denticulate or subentire; acroscopic base enlarged, broader, not overlapping or overlapping stem and branches, margin sparsely long ciliolate at base, elsewhere denticulate, cilia 0.4–0.6 mm. Strobili solitary, terminal, compact, dorsiventrally complanate, 3–7 × 2.5–3.5 mm; sporophylls dimorphic, resupinate, shortly ciliolate, white-margined; dorsal sporophylls with sporophyll-ptyx incomplete and denticulate; megasporophylls in basal portion of lower side of strobilus.

- At mouths of caves on rocky cliffs, on shaded rocks, on tree trunks; 600–800 m. Guangxi, Guizhou, Yunnan.

70. *Selaginella chaetoloma* Alston, J. Bot. 70: 67. 1932.

毛边卷柏 mao bian juan bai

Plants terrestrial or epilithic, evergreen, prostrate, up to 15 cm. Rhizophores at intervals throughout length of main stem, borne on ventral side in axils of branches. Main stems branched throughout, stramineous, ca. 0.2 mm in diam. in lower part, flattened, sulcate; primary leafy branches 3 or 4 pairs, forked or once pinnately branched, branchlets sparse, adjacent primary branches on main stem 1–3.5 cm apart; leafy portion of main stem including leaves 4–4.8 mm wide at middle, ultimate branches 3.5–4 mm wide including leaves. Axillary leaves on branches symmetrical or asymmetrical, elliptic, 1.2–1.4 × 0.6–0.8 mm, base exauriculate, margin sparsely ciliolate. Dorsal leaves ± symmetrical or asymmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches not approximate or contiguous, broadly ovate or suborbicular, 0.8–1.2 × 0.5–0.7 mm, slightly carinate, base obtuse or obliquely cordate, margin sparsely long ciliolate, apex aristate. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches spreading or deflexed, oblong-ovate or oblong, 2–2.3 × 1–1.3 mm, apex acute or apiculate; basispic base rounded, margin entire; acroscopic base enlarged, broader, overlapping stem and branches, margin long ciliolate in basal half, cilia 2–3 mm. Strobili solitary, terminal, compact, dorsiventrally complanate, 2–5 × 2–2.6 mm; sporophylls dimorphic, resupinate, not obviously white-margined; dorsal sporophylls ovate-lanceolate, carinate, margin ciliolate, apex acuminate, with sporophyll-ptyx incomplete and ciliolate; ventral sporophylls ovate, carinate, margin ciliolate; megasporophylls in basal portion on lower side of strobilus; microsporangia elliptic, relatively thick, cells uniform; microspores yellowish orange or pale yellow, verrucate, megaspores orange.

- Limestone caves, dense forests, on wet moss-covered limestone rocks; 900–1100 m. Guangxi, Guizhou.

Selaginella chaetoloma is a poorly known tiny species only known from the limestone areas of SE Guizhou and N Guangxi, and it differs from other small species by the broadly ovate dorsal leaves.

71. *Selaginella lutchuensis* Koidzumi, Acta Phytotax. Geobot. 1: 165. 1932.

琉球卷柏 liu qiu juan bai

Lycopodioides lutchuensis (Koidzumi) Satou.

Plants terrestrial or epilithic, evergreen, prostrate, 5–10 cm. Rhizophores at intervals throughout length of creeping stem and branches, borne on ventral side in axils of branches. Main stems irregularly branched throughout, stramineous, 2–3 mm wide including leaves. Dorsal leaves white-margined, ovate, margin long ciliolate, apex acute or long caudate. Ventral leaves oblong-ovate, 1–1.7 mm, margin denticulate, long ciliolate at base, apex long caudate. Strobili solitary, terminal, compact, dorsiventrally complanate, 3–15 mm; sporophylls dimorphic, resupinate; dorsal sporophylls ovate-lanceolate, less than 2 mm, apex acuminate or long caudate; ventral sporophylls broadly lanceolate, ca. 1.5 mm, margin long ciliolate.

On wet cliffs. Taiwan [Japan].

72. *Selaginella albociliata* P. S. Wang, J. Arnold Arbor. 71: 269. 1990.

白毛卷柏 bai mao juan bai

Plants epilithic, evergreen, prostrate. Rhizophores at intervals throughout length of main stem, borne on ventral side in axils of branches. Main stems branched throughout, stramineous, terete, sulcate; primary leafy branches more than 3 pairs, forked, branchlets sparse, adjacent primary branches on main stem 0.7–1.2 cm apart; leafy portion of main stem including leaves 2–3.4 mm wide at middle, ultimate branches 1.6–2.4 mm wide including leaves. Axillary leaves on branches symmetrical, ovate-lanceolate, 1–2 × 0.6–1 mm, base exauriculate, margin long ciliolate. Dorsal leaves ± symmetrical, those on main stems not obviously larger than those on branches; dorsal leaves on branches not approximate, ovate, broadly ovate, or suborbicular, 0.8–2 × 0.4–0.8 mm, not carinate, base obtuse, margin long ciliolate, apex aristate or cuspidate. Ventral leaves asymmetrical, those on main stem not obviously larger than those on branches; ventral leaves on branches spreading or slightly deflexed, ovate or elliptic, 1.6–2 × 0.8–1.2 mm, apex acute or apiculate; basispic base rounded, margin sparsely ciliolate; acroscopic base enlarged, broader, overlapping stem and branches, margin shortly ciliolate, cilia 0.3–0.5 mm. Strobili solitary or in pairs, terminal, compact, dorsiventrally complanate, 6–25 × 2–2.5 mm; sporophylls dimorphic, resupinate, white-margined; dorsal sporophylls oblong-lanceolate, carinate, margin ciliolate, apex acuminate, with sporophyll-ptyx incomplete and ciliolate; ventral sporophylls oblong-ovate, carinate, margin long ciliolate; microsporangia elliptic; microspores orange-red, megaspores gray.

- On limestone rocks, on cliffs near streams in forests; 400–800 m. Guangxi, Guizhou.

Uncertain taxa

Selaginella effusa Alston var. *dulongjiangensis* W. M. Chu (Fl. Yunnan. 20: 718. 2006), described from Gongshan, Yunnan.

Selaginella jugorum Handel-Mazzetti (Symb. Sin. 6: 8. 1929; *Lycopodioides jugorum* (Handel-Mazzetti) H. S. Kung), described from NW Yunnan.

Selaginella monospora Spring var. *ciliolata* W. M. Chu (Fl. Yunnan. 20: 719. 2006), described from Jingdong, Yunnan.

Selaginella somae Hayata (Icon. Pl. Formosan. 7: 101. 1918 [“*somai*”]), described from Taiwan.

Selaginella spinulosovena G. Q. Gou & P. S. Wang (Acta Bot. Yunnan. 27: 145. 2005), described from Ziyun, Guizhou.

Selaginella tibetica Ching & S. K. Wu (Fl. Xizang. 1: 25. 1983), described from Bomi, Xizang. = *Selaginella hengduanshanicola* W. M. Chu (Fl. Yunnan. 20: 718. 2006), described from Gongshan, Yunnan.