WOODSIACEAE

Zhang Gangmin (张钢民)¹; Masahiro Kato², Alexandr Shmakov³

Plants epilithic, sometimes xerophytic (growing in dry habitats), small or medium-sized. Rhizomes short, erect, decumbent, or ascending, simple dictyostelic, covered with scales. Fronds clustered, monomorphic, deciduous or sometimes evergreen; stipe mostly shorter than lamina, ± scaly and hairy, articulate or not articulate; lamina 1-pinnate to bipinnatifid, elliptic-lanceolate to narrowly lanceolate, herbaceous or papery, frequently covered with articulate multicellular hairs, sometimes with glandular hairs or capitate glands. Veins free, pinnate, usually ending in enlarged hydathodes. Sori orbicular, consisting of 3–18 sporangia, borne at middle or apex of veinlets; indusia inferior, saucer-shaped to cup-shaped, margin long ciliate, or indusia absent, degenerated into curly, multicellular hairs (Woodsia), or sphaeropteroid (bladderlike) with openings at tip (Protowoodsia), sometimes also covered with false indusia, i.e., reflexed leaf margins (Cheilanthopsis). Spores ellipsoid or somewhat spherical, monolete, wall surface folded, cristate, tuberculate, or echinate.

About four genera (including the Caucasian Hymenostyli C. A. Meyer) and ca. 43 species: widely distributed in the temperate and frigid zones, rarely in Central and South America, Africa (Angola, South Africa), and Madagascar; three genera and 24 species (nine endemic) in China.

The current classification of the genera requires evaluation by molecular phylogenetic evidence.


1a. Stipe obviously articulate; indusia saucer- to cup-shaped, margin long ciliate ................................................................. 3. Woodsia
1b. Stipe continuous; indusia spherical or degenerated into curly, multicellular hairs.

2a. Indusia platelike with unequal lobes or dissected with filiform lobes ................................................................. 3. Woodsia
2b. Indusia spherical, tearing when mature.

3a. Lamina glabrous or with few glandular trichomes, margin flat, not reflexed; pinnae not articulate to rachis .............................................................................................................................................................. 1. Protowoodsia
3b. Lamina pubescent, margin reflexed to form false indusia (usually fallen later); pinnae articulate to rachis ........................................................................................................................................................................ 2. Cheilanthopsis


Plants epilithic, small. Rhizomes erect, short, apex densely scaly; scales brown, lustrous, ovate-lanceolate or lanceolate, entire. Fronds clustered or subclustered, usually diverging; stipe short, not articulate, brittle, usually lower parts persistent; lamina 1-pinnate-pinnatifid, lanceolate, much longer than stipe, herbaceous, sparsely glandular hairy, with few scales in lower part; lamina 1-pinnate-pinnatifid, lanceolate, 12–18 × 1.5–4 cm, herbaceous, sparsely glandular hairy, base attenuate, apex acuminate; pinnae (12–)16–20 pairs, oblique, subsessile; middle pinnae largest, ovate-lanceolate, 1–1.5 × up to 1 cm, pinnatifid, apex obtuse; lower pinnae shorter than above, widely separate; basal pair of pinnae ovate or flabellate; ultimate segments oblong, undulate or dentate. Veins free, pinnate, not reaching laminar margin. Sori consisting of 6–8 sporangia, medial or submarginal; indusia prominent, spherical, thinly membranous, n = 66.

On rocks in forests; 200–4000 m. Anhui, Guizhou, Hebei, Heilongjiang, Henan, Jiangxi, Jilin, Liaoning, Shandong, Sichuan, Zhejiang [Japan, Korea, Russia].

1 Beijing Forestry University, 35 Qinghwaodonglu, Haidian, Beijing 100083, People’s Republic of China.
2 Department of Botany, National Museum of Nature and Science, Amakubo 4-1-1, Tsukuba 305-0005, Japan.
3 University of Barnaul, Altai State University, Dimitrov’s Street 66, 656099 Barnaul, Russia.

滇蕨属 dian jue shu

Plants epilithic, medium-sized or small. Rhizomes ascending or decumbent, apex covered with brown, membranous, lanceolate scales. Fronds clustered; stipe short, brittle, usually broken, base or lower portion scaly, upper portion pubescent; lamina 1-pinnate-pinnatifid, lanceolate, gradually tapering to both ends, herbaceous, covered with multicellular glandular hairs; pinnae lanceolate, sessile, articulate to rachis; ultimate segments hemielliptic. Veins free, pinnate, not reaching laminar margin. Sori small, consisting of 4–10 sporangia, submarginal, at vein endings, orbicular; indusia inferior, subspherical, sometimes not fully developed, thinly membranous; false indusia formed by pale, thin, reflexed laminar margins. Spores ellipsoid, monolette, wall surface folded, granular. x = 37, 41.

Three species: Bhutan, China, India, Myanmar, Nepal; three species (one endemic) in China.

1a. Articulate hairs dense on both surfaces of lamina; indusia not large, false indusia conspicuous, orbicular-hemiovate, nearly reaching midvein ................................................................. 1. C. indusiosa

1b. Articulate hairs sparse on both surfaces of lamina; indusia large, globose, false indusia small, reniform or cordate, far from midvein.

2a. Stipe densely scaly at base, upward with dense articulate hairs, rachis also articulate hairy ....................... 2. C. elongata

2b. Stipe sparsely scaly, rachis with dense glandular hairs ................................................................. 3. C. kangdingensis


滇蕨 dian jue

Woodsia indusiosa Christ in Lecomte, Notul. Syst. (Paris) 1: 44. 1909; Cheilanthes straminea Brause; Cheilanthopsis straminea (Brause) Hieronymus ex Copeland.

Plants 25–50 cm. Rhizomes ascending, apex densely covered with scales; scales brown, broadly lanceolate, up to 1 cm, entire. Fronds clustered; stipe stramineous, 3–11 cm, 1–2 mm in diam., brittle, densely covered with scales, articulate hairs sparse when young, deciduous, middle and upper parts glabrous; lamina 1-pinnate-pinnatifid, lanceolate, 25–40 × 5–6.5 cm, herbaceous, densely covered with articulate hairs and glands on both surfaces, base attenuate, apex acuminate; rachis pale stramineous, with articulate hairs and sparse brown, narrowly lanceolate scales; pinnae 25–30 pairs, spreading or slightly oblique, sessile; lower pinnae reduced to lobes, lobes triangular, ligulate or auriculate, remote; middle pinnae largest, lanceolate, 2–3.5 cm × 3–10 mm, base truncate, margin pinnatifid, apex obtuse; lobes 7–12 pairs, opposite, spreading, hemielliptic; basal lobes largest, 3–5 mm, undulate. Veins free, obscure. Sori consisting of 4–8 sporangia, located at vein endings, submarginal; indusia not conspicuous, thinly membranous; false indusia orbicular-hemiovate, large, membranous, nearly reaching midvein, fimbriate. 2n = 74.

On rocks in broad-leaved forests; 2100–3200 m. NW Yunnan [Bhutan, India, Myanmar, Nepal].


长叶滇蕨 chang ye dian jue

Woodsia elongata Hooker, Sp. Fil. 1: 62. 1844; Phymatium elongatum (Hooker) Trevisan.

Plants 25–28 cm. Rhizomes prostrate, apex densely covered with scales; scales brown, broadly lanceolate, 4–6 mm, membranous, entire. Fronds clustered; stipe stramineous, 3–6 cm, 1–2 mm in diam., brittle, base densely covered with scales, upward and rachises densely covered with articulate hairs, and with few brown lanceolate scales; lamina 1-pinnate-pinnatifid, lanceolate, 18–22 × 2.5–4 cm, thinly herbaceous, both surfaces with sparse articulate hairs and glands, base attenuate, apex acuminate; pinnae 17–21 pairs, remote, spreading; lower pinnae shortened to deltoid-ovate to auricular lobes; middle pinnae largest, broadly lanceolate, 1.2–2 cm × 6–10 mm, base truncate, margin pinnatifid, apex obtuse; lobes 5 or 6 pairs, opposite, spreading, hemielliptic; basal lobes slightly larger, 3–5 × 1.5–3 mm, margin undulate. Sori consisting of 4–6 sporangia, terminal at vein tips, submarginal; indusia globose, thinly membranous; false indusia broadly reniform or cordate, small, membranous, remote from each other and from midvein. 2n = 82.

On rocks crevices in forests; 3200–3400 m. Xizang, NW Yunnan [Bhutan, India, Myanmar, Nepal].


康定岩蕨 kang ding yan jue


Plants 16–23 cm. Rhizome erect, apex scaly; scales brown, ovate-lanceolate, 4–6 mm, margin entire. Fronds clustered; stipe stramineous, 2–4 cm, glabrous, sparsely scaly; scales brown, lanceolate or narrowly ovate, entire; lamina 2-pinnatifid, narrowly lanceolate, 12–20 × 1.8–3 cm, base attenuate, apex acuminate; rachis with dense short glandular hairs; pinnae 14–19 pairs, subopposite, triangular-ovate, 8–18 × 4–8 mm, obtuse, base subequal, margin pinnatifid; pinna lobes 4–7 pairs, herbaceous, obtusely dentate. Veins inconspicuous. Sori orbicular; indusia globose, membranous, apex erose.

● On rocks and in rock crevices in forests; 3400–3800 m. Sichuan.
Plants small, usually epilithic. Rhizomes short, erect or ascending, rarely decumbent, scaly; scales lanceolate or linear-lanceolate, membranous. Fronds clustered; stipe shorter than lamina, articulate at various levels, i.e., from top to near base, or continuous in some species; lamina 1-pinnate or 1-pinnate-pinnatifid, lanceolate, herbaceous or subpapery, usually with articulate hairs or scales, rarely glabrous, base gradually tapering. Veins free, pinnate, not reaching laminar margin. Sori small, consisting of 3–18 sporangia, orbicular, on veinlets or at veinlet tips; indusia inferior, various, usually saucer- to cup-shaped, dissected into ciliate platelike segments or reduced into curly, multicellular hairs, sometimes exindusiate. Spores ellipsoid, monolete, perispore folded with granular, rarely glabrous, base gradually tapering. Veins free, pinnate, not reaching laminar margin. Sori small, consisting of 3–18 sporangia, orbicular, on veinlets or at veinlet tips; indusia inferior, various, usually saucer- to cup-shaped, dissected into ciliate platelike segments or reduced into curly, multicellular hairs, sometimes exindusiate. Spores ellipsoid, monolete, perispore folded with granular, rarely glabrous, base gradually tapering. Veins free, pinnate, not reaching laminar margin. Sori small, consisting of 3–18 sporangia, orbicular, on veinlets or at veinlet tips; indusia inferior, various, usually saucer- to cup-shaped, dissected into ciliate platelike segments or reduced into curly, multicellular hairs, sometimes exindusiate. Spores ellipsoid, monolete, perispore folded with granular, rarely glabrous, base gradually tapering. Veins free, pinnate, not reaching laminar margin. Sori small, consisting of 3–18 sporangia, orbicular, on veinlets or at veinlet tips; indusia inferior, various, usually saucer- to cup-shaped, dissected into ciliate platelike segments or reduced into curly, multicellular hairs, sometimes exindusiate. Spores ellipsoid, monolete, perispore folded with granular, rarely glabrous, base gradually tapering. Veins free, pinnate, not reaching laminar margin.
17a. Pinnae entire or undulate ................................................................. 6. W. polystichoides
17b. Pinnae pinnatifoliate on both sides .................................................. 7. W. pilosa
16b. Upper pinnae adnate, triangular-lanceolate or elliptic; midvein without scales or with few scales only abaxially.
18a. Only basal pinnae free, upper pinnae adnate, base symmetrical; rachis densely covered with long hairs, but without scales ........................................ 8. W. macrochaena
18b. Lower pinnae free, upper pinnae adnate, base asymmetrical; rachis covered with hairs and scales.
19a. Pinnae sparsely hairy, herbaceous .................................................... 9. W. oblonga
19b. Pinnae densely hairy on both surfaces, subpapery ............................... 10. W. intermedia


光岩蕨  guang yan jue


Plants 5–10 cm tall. Rhizomes compact, ascending, scaly as stipe base; scales concolorous, brown, lanceolate or ovate-lanceolate, 2–3 mm, membranous, margin entire. Fronds clustered; stipe brown-stramineous, slender, 1–2 cm, brittle, articulate below middle, glabrous or rarely with few brown, linear scales on apical portion; lamina 1-pinnate-pinnatifid, linear-lanceolate, 3–6 cm × 7–11 mm, thinly herbaceous, both surfaces glabrous or with occasional hairs, base attenuate, apex acuminate; rachis glabrous; pinnae 4–9 pairs, well separated, sessile, spreading; lower pinnae shorter than above, basal one flabellate; medial pinnae largest, deltoid-ovate, 3–5 × 2–5 mm, base truncate, margin pinnatifid, with 1–3 pairs of pinnules, apex obtuse; pinnules elliptic or tongue-shaped, proximal pairs largest, ca. 3 mm, undulate or apically crenulate. Veins pinnate, visible. Sori consisting of a few sporangia, located at veinlet tips or on veinlets, usually 1–3 per segment; indusia saucer-shaped, thinly membranous, margin with flexuose brown articulate long hairs.

Wet shaded rock crevices in forests; 1700–2200 m. Hebei, Heilongjiang, Jilin, Nei Mongol, Shanxi, Shansi [N India, Japan, Korea, Nepal, Russia].

Woodsia hancockii is similar to W. glabella in the slender and glabrescent fronds but differs from it in the more slender lamina, trapeziform pinnae, and much larger indusia fringed with long hairs.


陝西岩蕨  shan xi yan jue

Plants 10–15 cm tall. Rhizomes short, erect, scaly; scales light brown, lanceolate, ca. 3 mm, membranous, margin entire. Fronds clustered; stipe stramineous, 3–5 cm, articulate at lower part, scaly at base, upward sparsely scaly; scales narrowly lanceolate; lamina 1-pinnate-pinnatifid to 2-pinnate, lanceolate, 7–10 × 1.5–2.9 cm, thinly herbaceous, abaxially with few brown articulate hairs, adaxially glabrous, base attenuate, apex acuminate; rachis, costae, and leaf margin also with few similar hairs; pinnae 8–10 pairs, ca. 1 cm apart, shortly stalked, slightly oblique; lower pinnae shorter than above; middle pinnae largest, ovate-rhombic, 1–1.5 cm × 7–10 mm, base broadly cuneate, margin pinnatifid or pinnate, with 2 or 3 pairs of pinnules, apex acute; pinnules obovate, basal pair largest, ca. 7 mm, serrate or crenate. Veins pinnate, distinct. Sori suborbicular, usually terminal at ends of veinlets, 2–4 per segment; indusia saucer-shaped, with long-villous margin.

● On rocks in forests; 2000–2900 m. Nei Mongol, Shanxi, Sichuan.


西疆岩蕨  xi jiang yan jue


Plants 8–12 cm tall. Rhizomes compact, ascending, with cluster of persistent stipe bases of ± equal length; scales concolorous, brown, lanceolate, ca. 5 mm, membranous, fimbriate. Fronds clustered; stipe reddish brown, lustrous, 1–2 cm, ca. 1 mm in diam., articulate below middle, sparsely scaly, and scales later fallen; lamina 1-pinnate-pinnatifid, lanceolate, 5.5–9 × 1–
1.7 cm, herbaceous or thinly herbaceous, both surfaces glabrous, base attenuate, apex acuminate; rachis with sparse long hairs and linear-lanceolate scales; pinnae 9–11 pairs, separate, oblique; lower pinnae shorter than above, ovate, 2–3 mm; middle pinnae largest, ovate or deltoid-ovate, 5–9 × 4–7 mm, pinnatifid, with 3 or 4 pairs of lobes; apex acute; pinna lobes hemi-elliptic, 2–3 mm, margin usually involute when dried. Veins pinnate, ending in hydathodes close to laminar margin, obvious adaxially. Sori orbicular; indusia saucer-shaped, membranous, margin long-ciliate. 2n = 156.

Rock crevices; ca. 4000 m. Xizang [Russia; Europe, North America].

H. C. Levinge’s collection is the only record of *Woodsia alpina* from NW Himalaya. It is closely comparable to *W. subcordata*, or other allied species, and cited by some authors in the flora of N and NE China and the vicinity.


耳羽岩蕨


Plants 12–17 cm tall. Rhizomes erect or ascending, scaly; scales concolorous, brown, broadly lanceolate, ca. 4 mm, membranous, margin entire. Fronds clustered; stipe castaneous, lustrous, 3–7 cm, ca. 1 mm in diam., with long hairs and linear-lanceolate scales, articulate below middle; lamina 1-pinnate-pinnatifid, lanceolate, 8–11 × 1.3–2 cm, herbaceous, covered with articulate hairs, especially abaxially, base gradually attenuate, apex acuminate; rachis and costae with brown, linear scales and long articulate hairs; pinnae 10–20 pairs, sessile, well separated, oblique; middle pinnae largest, ovate-lanceolate, 8–11 × 4–8 mm, pinnatifid, with 3–5 pairs of lobes; apex acute; pinna lobes elliptic, basal pair largest, 2–4 mm, entire or irregularly undulate. Veins pinnate, veinlets not reaching laminar margin. Sori orbicular and attached at ends of veinlets, submarginal; indusia saucer-shaped, membranous, margin long ciliate. 2n = 78(82).

Cliffs, rocky slopes; 200–2200 m. Hebei, Heilongjiang, Jilin, Nei Mongol, Xinjiang [Kazakhstan, Mongolia, Russia; Europe, North America].


耳羽岩蕨 er yu yan jue

_Phlysematium polystichoides_ (D. C. Eaton) Trevisan; _Woodsia brandtii_ Franchet & Savatier; _W. polystichoides_ var. incisa Ching & Y. T. Hsieh; _W. polystichoides_ var. _nudiuscula_ Hooker; _W. polystichoides_ f. _veitchii_ (Hance) Kitagawa; _W. polystichoides_ var. _veitchii_ Hance.

Plants 15–30 cm tall. Rhizomes short, erect or ascending, scaly at apex; scales brown, lanceolate, 4–12 cm, 1–1.5 mm in diam., articulate at or near top, with linear or linear-lanceolate scales and long multicellular hairs; lamina 1-pinnate, linear-lanceolate or narrowly lanceolate, 10–23 × 1.5–3 cm, papery or herbaceous, abaxially with mixture of linear scales and long hairs, adaxially glabrous or with few long hairs, base attenuate, apex acuminate; rachis long hairy; pinnae 16–30 pairs, sessile, spreading or slightly oblique, entire or undulate; lower 3 or 4 pairs of pinnae reduced and reflexed downward, basal pair of pinnae triangular; middle pinnae largest, elliptic-lanceolate, slightly falcate, 8–20 × 4–7 mm, base asymmetrical, acroscopically auriculate, truncate, basiscopically cuneate, apex acute. Veins obvious, pinnate, veinlets 2-forked, ending in submarginal hydathodes. Sori orbicular, terminal at tips of acroscopic veinlets, submarginal; indusia cup-shaped, shallowly lobed, ciliate. 2n = 82.

Crevices of shaded rocks; 200–2700 m. Widely distributed in C, E (including Taiwan, but not in Fujian), N, NW, and SW (Sichuan, Yunnan) China [Japan, Korea, Russia].


嵩縣岩蕨 song xian yan jue

Plants ca. 20 cm tall. Rhizomes erect, scaly at apex; scales light brown, lanceolate, 4–5 mm, thinly membranous, firmate. Fronds clustered; stipe light stramineous, lustrous, 5–7 cm, ca. 1.2 mm in diam., articulate at top, base densely scaly, upward glabrous; lamina 1-pinnate-pinnatifid, linear-lanceolate, 11–12 × 1.6–1.8 cm, herbaceous, both surfaces densely covered with articulate hairs and occasionally abaxially with elongate scales along midvein, apex acuminate; rachis with mixture of linear scales and multicellular hairs; pinnae 15–18 pairs, free, sessile, spreading; lower pinnae opposite, slightly shortened; middle pinnae largest, ovate-lanceolate, 7–10 × 3–4 mm, alternate, shallowly pinnatifid, base asymmetrical, ± auriculate, acroscopically truncate, basiscopically cuneate, apex obtuse; ultimate segments elliptic, touching each other, entire. Veins pinnate, invisible. Sori orbicular, terminal at tips of acroscopic veinlets, submarginal; indusia cup-shaped, margin ciliate, shallowly lobed into 3 segments at maturity.

- Rock crevices. Henan (Songxian).


大囊岩蕨 da nang yan jue

_Woodsia frondosa_ Christ; _W. japonica_ Makino.

Plants 5–16(–20) cm tall. Rhizomes short, erect or ascending, scaly at apex; scales brown, lanceolate, 3–4 mm, membranous. Fronds clustered; stipe stramineous, 1–7.5 cm, ca. 1 mm in diam., articulate at top, with sparse, brown, articulate hairs; lamina 1-pinnate-pinnatifid, linear-lanceolate, 4–10 × 2–3 cm, herbaceous, densely covered with articulate hairs, especially abaxially, base slightly narrowed or not, apex acute; rachis similarly hairy; pinnae 7–10 pairs, connected to each other by wings except for basal pinnae, opposite, spreading or slightly oblique, sessile; middle pinnae slightly longer, elliptic-oblong, 7–11(–22) × 5–12 mm, base symmetrical, margin pinnatifid, lobes entire, apex obtuse. Veins obscure, pinnate, tips often enlarged to form hydathodes. Sori orbicular, terminal at tips of veinlets, submarginal; indusia cup-shaped, membranous, lacerate.

妙峰岩蕨 miao feng yan jue

Plants 7–18 cm tall. Rhizomes ascending, scaly at top; scales light brown, lanceolate, ca. 3 mm, thinly membranous, margin ciliate. Fronds clustered; stipe brown-stramineous, lustrous, 2–5 cm, ca. 1 mm in diam., articulate at top, with sparse, curly, long hairs and linear scales; lamina 1-pinnate, lanceolate, 6–16 × 2–3.5 cm, herbaceous, both surfaces with sparse, brown, articulate hairs, base slightly attenuate, apex acute; rachis stramineous, with mixture of linear scales and articulate hairs; pinnae 8–18 pairs, sessile, spreading; lower 1 or 2 pairs of pinnae slightly shortened and reflexed downward; middle pinnae larger, elliptic, 1–1.5 cm × 5–8 mm, base asymmetrical, acroscopically truncate, close to rachis, margin ciliate, shallowly lobed into 2 or 3 segments at maturity.

- Crevices of shaded rocks; 200–1800 m. Hebei, Henan, Shan-dong.


东亚岩蕨 dong ya yan jue

**Woodsia subintermedia** Tzvelev; **W. taishanensis** F. Z. Li & C. K. Ni.

Plants 10–25 cm tall. Rhizomes short, erect or ascending, scaly; scales brown, lanceolate, ca. 3 mm, membranous, margin subentire or slightly ciliate. Fronds clustered; stipe brown-stramineous or light chestnut, 3–7.5 cm, ca. 1 mm in diam., articulate at top, with curly, long hairs and long linear scales later deciduous; lamina 1-pinnate, lanceolate, 8–18 × 2–3.8 cm, papery, both surfaces densely hairy, base slightly attenuate, apex acuminate or acute; rachis with mixture of linear scales and articulate hairs; pinnae 14–20 pairs, sessile, spreading, well separated from each other; lower pairs of pinnae shorter than above, hemielliptic or deltoid-ovate; middle pinnae largest, deltoid-lanceolate, 1–2 cm × 4–10 mm, base broadly cuneate, asymmetrical, acroscopically obviously auriculate, margin undulate or crenate, apex obtuse; upper pinnae connected to each other by wings. Veins obscure, veinlets oblique, 2- or 3-forked, ending with hydathodes and not reaching laminar margin. Sori orbicular, terminal at vein tips, submarginal; indusia cup-shaped, margin ciliate, shallowly lobed into 2 or 3 segments at maturity.

- Crevices of shaded rocks; 500–3000 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi [Japan, Korea, Mongolia, Russia].


山西岩蕨 shan xi yan jue

Plants 8–9 cm tall. Rhizomes short, erect, scaly; scales brown, ovate-lanceolate or broadly lanceolate, ca. 4 mm, membranous, margin ciliate, apex acuminate. Fronds clustered; stipe brownish or brown-stramineous, polished, (2–) 4–8 cm, ca. 1 mm in diam., with oblique or horizontal articulation at top, base scaly, upper parts with sparse articulate long hairs and linear scales, later deciduous; lamina 1-pinnate-pinnatifid, lanceolate, 8–15 × 2–3 cm, papery, both surfaces sparsely hairy and scaly, or occasionally subglabrous, hairs gray or grayish brown, long articulate; scales brown, linear, small; lamina base slightly attenuate, apex obtuse or acute; rachis stramineous or tinted castaneous-brown, as hairy and scaly as stipe; pinnae 11–16 pairs, subopposite or alternate, lower 2 or 3 pairs of pinnae gradually shortened, basal pair usually ca. 5 mm; middle pinnae largest, hemielliptic or narrowly triangular-lanceolate, 8–20 × 4–10 mm, base rounded-truncate, acroscopically auriculate, auricles ± overlapping rachis, margin pinnatifid to 1/2, apex obtuse; segments 3 or 4 pairs, hemielliptic, 2–4 mm, entire, rounded. Veins faintly visible, simply pinnate in segments, veinlets oblique, ending with hydathodes. Sori orbicular, terminal at veinlet tips, submarginal; indusia saucer-shaped, margin ciliate.

- Rock crevices in forests; 500–1800 m. Hebei, Heilongjiang, Jilin, Liaoning, Shanxi [Japan, Korea, Russia].
stipes usually fallen, middle and lower parts persistent, clustered (articulation not seen); lamina 1-pinnate, linear-lanceolate, herbaceous, pubescent, abaxial surface more densely pubescent, gradually attenuate to both ends; rachis with mixture of sparse articulate hairs and linear scales; pinnae 10 or 11 pairs, sessile, well separated, spreading; lower 1 or 2 pairs slightly shortened, ovate, ca. 4 mm; middle pinnae largest, suborbicular-ovate, 5–6 × 3–5 mm, base cuneate, margin irregularly undulate, slightly involute, apex obtuse. Veins obscure, pinnate, nearly reaching laminar margin. Sori orbicular, terminal at base truncate, margin pinnatifid, apex obtuse; ultimate segments 2–4 pairs, hemielliptic, undulate. Veins obscure, pinnate, oblique, not reaching laminar margin. Sori orbicular, terminal at vein tips, usually 2 or 3 per segment; indusia hairlike, consisting of many curly, multicellular hairs.

- Rock cliffs in mountain valleys; 3500–4200 m. S Gansu.


Plants perennial, deciduous, caespitose, 3–8 cm tall. Rhizomes short, erect, with a cluster of persistent stipe bases, sparsely scaly; scales light brown, linear to lanceolate, ca. 2.5 × 0.1–0.6 mm, membranous, sparsely fimbriate; adventitious roots brown when dry, to 12 cm, ca. 0.3 mm in diam. Fronds deciduous, 5–10 per rhzome, grayish green when dried; stipe brown-stramineous, not articulate, 0.5–2.2 cm, 0.4–0.6 mm in diam., adaxially canalicate and green; basal stipe scales light brown, narrowly lanceolate, 1.2–3.5 × 0.1–0.7 mm, membranous, multicellular, fimbriate, matte; distal stipe scales light brown, narrowly lanceolate, 1.2–3.5 × 0.1–0.7 mm, membranous, multicellular, fimbriate, matte; lamina 1-pinnate, narrowly elliptic, 2–6 × 0.8–2 cm, slightly contracted toward base, apex obtuse; rachis 0.2–0.5 mm in diam. at midpoint, adaxially sulcate, without proliferous bulbils; rachis scales similar to distal stipe scales; pinnnae in 3–8 pairs, herbaceous, lower pinnnae ovate, 4.8 × 3–6 mm, shortly stalked to 1 mm, base often shallowly cordate or sometimes rounded, apex obtuse or rounded; middle pinnnae longer than lower pinnnae but otherwise similar, ovate to oblong, 4–10 × 3–7 mm; terminal pinnnae nearly an equilateral triangle, 0.8–1.2 cm, apex obtuse or rounded, with 3 pairs of lobes; lobes of pinnnae 3 or 4 pairs, obtusely deltoid, nearly entire to crenate on margins; both surfaces of pinnnae densely pubescent, hairs translucent yellowish, 0.53–0.69 mm × 14–22 µm. Veins free, in 4 or 5 pairs from midrib. Sori orbicular, dorsal or subterminal on veinlets, 1–4 per pinna segment; indusia brown, shallowly cup-shaped, inferior, contracted to a jarlike shape when dry, 1–1.2 mm in diam., membranous, often 3-lobed, apices of lobes with multicellular hairs 1.2–1.36 mm × 3–15 µm. Sporangia dehiscing into 4 or 5 portions when mature, each portion ca. 0.45 mm; annuli with 18–20 thickened cells; spores light brown, oblong, with crista perispore sculpturing.

- Wet and shady limestone crevices or cliffs under broad-leaved forests; 1600–2300 m. W Guizhou (Bijie, Luipanshui, Pu’an).


Plants 10–20 cm tall. Rhizomes short, erect or ascending, scaly; scales dark brown, linear-lanceolate, ca. 3 mm, membranous, margin entire. Fronds clustered; stipe stramineous or brownish stramineous, lustrous, 5–10 cm, ca. 1 mm in diam., continuous, with fibrous small scales and articulate hairs, later partly fallen; rachis sparsely hairy when old, stipes and rachises persistent after pinnnae fallen; lamina basally 2-pinnaatifid, apically pinnatifid, lanceolate, 5–10 × 1–2 cm herbaceous, both surfaces densely covered with rusty, articulate long hairs, especially when young, base not or slightly shortened, apex acu-
minate; pinnae 6–9 pairs, sessile, lower pairs well separated, not or slightly shortened; middle pinnae ovate or suborbicular, 7–12 mm, base broadly cuneate, margin lobed, apex obtuse; ultimate segments 2–4 pairs, hemielliptic, entire or undulate. Veins obscure, pinnate, veinlets not reaching laminar margin. Sori orbicular, located on acroscopic veinlets, 1–3 per segment, medial or supramedial; indusia consisting of 8–10 long, curly hairs. 2n = 328.

Rock crevices and cliffs in forests; 2500–4500 m. Gansu, Qinghai, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, N India, Nepal].

Woodsia andersonii is distributed in SW China and Himalaya. According to Knapp (Ferns Fern Allies Taiwan, 229, 483. 2011), it has been found in two locations in Taiwan. It is densely covered with rusty, long hairs when young, while most of the hairs fall away later.


栗柄岩蕨　mi mao yan jue

Woodsia delavayi Christ; W. jeholensis Nakai & Kitagawa; W. lanosa Hooker var. attenuata C. Christensen.

Plants 7–25 cm tall. Rhizomes short, erect, scaly; scales brown, lustrous, linear-lanceolate, 4–5 mm, membranous, margin entire, apex subulate. Fronds clustered; stipe yellowish brown or stramineous, 2–6 cm, less than 1 mm in diam., densely covered with yellow-brown long multicellular hairs and linear scales, stipe and rachis usually curved and ± S-shaped; rachis as densely hairy and scaly as stipe; lamina basally 1-pinnate-pinnatifid, apically pinnatifid, lanceolate, 7–20 × 1.5–3 cm, herbaceous, both surfaces densely covered with brownish long articulate hairs, base gradually shortened, apex acute; pinnae 10–15 pairs, spreading, sessile, lower pairs reduced into auricles, well separated; middle pinnae largest, oblance-obovate or ovate-lanceolate, 8–15 × 5–8 mm, base broadly cuneate, margin pinnatifid, apex obtuse or rounded; ultimate segments 4 or 5 pairs, hemielliptic, basal pair largest, entire. Veins obscure, pinnate, veinlets nearly reaching laminar margin. Sori orbicular, located at vein endings or on veinlets, submarginal, dispersed throughout abaxial surface of pinnae at maturity; indusia shallowly saucer-shaped, dissected into 3–5 platelike lobes at maturity, margin with curly, unicellular hairs. 2n = 164.

Rock crevices in forests and in thickets; 1000–3000 m. Hebei, Liaoning, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan].

"Eriosoriopsis rosthorniana" (Ching & S. H. Wu, Fern Fam. Gen. China, 402. 1991) belongs here but was not validly published because a full and direct reference to the author and place of valid publication of the basionym was not provided (Melbourne Code, Art. 41.5).


栗柄岩蕨　li bing yan jue

Plants 4–10 cm tall. Rhizomes ascending or prostrate, scaly; scales dark brown, lanceolate, ca. 2 mm, membranous, margin entire or sparsely denticate. Fronds subclustered; stipe castaneous, 2–5 cm, fragile, lower part covered with scales and articulate hairs, upper part and rachis densely covered with articulate knee-jointlike long hairs, hairs later fallen; lamina imparipinnate, elliptic-lanceolate, 3–6 × 1–2.5 cm, thinly herbaceous, abaxially with articulate hairs along veins and margin, adaxially glabrous; pinnae 5 or 6 pairs, opposite, spreading, sessile, ovate or elliptic, 8–12 × 5–9 mm, margin entire or slightly undulate, apex rounded. Veins visible, pinnate, veinlets not reaching laminar margin. Sori large, orbicular, located at bifurcations of lateral veins or on acroscopic veinlets; indusia absent or composed of ciliate, platelike, small lobes, hidden. 2n = 328.

Crevices in granite rocks and schist cliffs; 2900–4600 m. Shaanxi, Sichuan, Xizang, Yunnan [India (Sikkim), Nepal].


冈本氏岩蕨　gang ben shi yan jue

Rhizomes ascending, up to 5 cm, densely covered by persistent stipe remains. Stipes clustered, rigid but fragile, together with rachis eburneous, relatively polished, sparsely scaly and pubescent, 3–5 mm, up to 1 mm in diam.; hairs pale, articulate, flexuous; scales rust-colored, lanceolate or linear-lanceolate, membranous, gradually attenuate into articulate hairs, hairs not glandular-capitate at apex, scales in lower parts of stipe larger, up to 4 mm; lamina 1-imparipinnate, lanceolate, widest at middle, 4–7 × 1–2 cm, herbaceous, slightly attenuate to base, apex obtuse; pinnae 6–9 pairs, spreading, ± remote from each other, ovate or ovate-oblong, both surfaces pubescent, base truncate or finely cordate, sessile, margin crenate-lobe to pinnatifid, apex rounded; margin beneath to costa scaly; middle pinnae largest, 5–10 mm, 3–6 mm wide at base; lobes ca. 4 pairs, entire, rounded; terminal pinna smaller, 3–5 mm long and wide. Sori medial; indusia consisting of pale, long, crested hairs. Spores subellipsoid, surface folded, tuberculate.

● Moss-covered shaded rocks in coniferous forests; 3000–3500 m. Taiwan.