

## BLECHNACEAE

乌毛蕨科 wu mao jue ke

Wang Faguo (王发国)<sup>1</sup>, Xing Fuwu (邢福武)<sup>1</sup>, Dong Shiyong (董仕勇)<sup>1</sup>; Masahiro Kato<sup>2</sup>

Plants mostly terrestrial, sometimes tree ferns (like small trees), rarely scandent. Rhizome mostly erect, or creeping or scandent, usually dictyostelic (*Stenochlaena* meristelic), scales brown, entire. Fronds monomorphic or dimorphic, mostly long stipitate; stipe with 2 to several vascular bundles, scaly at base; lamina pinnate, pinnatifid, or bipinnatifid, rarely simple, thickly papery to leathery, glabrous or usually with small scales; pinnae rarely articulate to rachis (*Stenochlaena*); veins free or anastomosing with 1 or more series of areoles, without included free veinlets. Sori elongate or continuous along vascular network or commissure on either side of midrib, indusiate, rarely exindusiate, rarely acrostichoid; indusium facing toward costa or costule; annulus longitudinal, interrupted. Spores elliptic, bilateral, monolete.

About (2–)14 genera and ca. 250 species: worldwide, but with greatest diversity in the S tropics; eight genera and 14 species (one endemic) in China.

*Stenochlaena* has been separated as the sole genus of Stenochlaenaceae or Blechnaceae subfamily Stenochlaenoideae. Christenhusz et al. (Phytotaxa 19: 48–49. 2011) listed seven genera of Blechnaceae but indicated that the actual number of genera was very uncertain and could be anywhere between two and nine, depending mainly on a better understanding of *Blechnum*.

Shing Kunghsia. 1990. Stenochlaenaceae. In: Ching Renchang & Shing Kunghsia, eds., *Fl. Reipubl. Popularis Sin.* 3(1): 94–97; Wu Shiew-hung. 1999. Blechnaceae. In: Wu Shiew-hung, ed., *Fl. Reipubl. Popularis Sin.* 4(2): 192–215.

- 1a. Tree ferns with erect trunklike stem, up to ca. 1 m tall.
- 2a. Stem 1–2 cm in diam.; lamina bipinnatifid; sori indusiate, discrete ..... 4. *Diploblechnum*
- 2b. Stem 10–15 cm in diam.; lamina pinnate; sori exindusiate, covering pinna surface ..... 5. *Brainea*
- 1b. Rhizome creeping to suberect; plants not like tree ferns.
- 3a. Sori acrostichoid with sporangia covering entire abaxial surface of fertile pinna; pinnae articulate at junction with rachis; rhizome scales peltate, ca. 1 mm, caducous ..... 8. *Stenochlaena*
- 3b. Sori distinct, covered by indusia when young; pinnae not articulate; rhizome scales basifixed, 4 mm or more, often persistent.
- 4a. Sori at least partially discrete, parallel to costules and sometimes also costae and rachis.
- 5a. Rhizome short and erect; stipes tufted; pinnae separate, rachis terete; sori in lines parallel to costules, discrete ..... 6. *Woodwardia*
- 5b. Rhizome creeping; stipes distant; pinnae connected by narrow wing along rachis; sori along rachis and costae almost continuous, those along costules ± discrete ..... 7. *Chieniopteris*
- 4b. Sori forming continuous coenosori along costa of lateral pinnae.
- 6a. Plants epiphytic or epilithic; fronds distant; veins anastomosing ..... 2. *Blechnidium*
- 6b. Plants terrestrial; fronds clustered; veins free.
- 7a. Fronds monomorphic; pinnae broad ..... 1. *Blechnum*
- 7b. Fronds dimorphic; fertile pinnae very narrow, almost absent ..... 3. *Struthiopteris*

### 1. BLECHNUM Linnaeus, Sp. Pl. 2: 1077. 1753.

乌毛蕨属 wu mao jue shu

Wang Faguo (王发国), Xing Fuwu (邢福武); Masahiro Kato

*Blechnopsis* C. Presl.

Plants terrestrial, moderate-sized or large. Rhizome usually erect or ascending, stout, dictyostelic, densely scaly; scales dark brown to brown, glossy, lanceolate, entire, basifixed. Fronds clustered, long stipitate; stipe robust, scaly at base, above naked; lamina pinnate, with reduced auricular lower pinnae, leathery; pinnae entire, linear, margin entire or serrulate; terminal pinna entire, similar to lateral pinnae; veins free, parallel, simple or forked. Sori linear, forming long coenosori adjacent and parallel to costa; indusium attached to commissure, facing toward costa; annulus longitudinal, interrupted, of 14–28 cells. Spores elliptic, usually smooth, with perispore.

Up to 200 species including species of *Struthiopteris*, which is usually synonymized under *Blechnum*: pantropical; one species in China.

Smith et al. (Taxon 55: 716. 2006) and Christenhusz et al. (Phytotaxa 19: 48–49. 2011) include the three following genera, *Blechnidium*, *Struthiopteris*, and *Diploblechnum*, within *Blechnum*.

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**1. *Blechnum orientale*** Linnaeus, Sp. Pl. 2: 1077. 1753.乌毛蕨 *wu mao jue**Blechnopsis orientalis* (Linnaeus) C. Presl.

Rhizome dark brown, erect, short, densely scaly; scales dark brown at center, brown near margin, narrowly linear, ca. 1 cm, entire. Stipe 10–60 cm, 3–10 mm in diam., base dark brown and covered with scales as rhizome; lamina imparipinnate, monomorphic, ovate-lanceolate, 55–100 × 20–60 cm, subleathery; pinnae numerous, close, alternate; lower ones contracted to small rounded auricles, 0.3–1 cm; upper ones oblique, distant, linear or linear-lanceolate, 10–30 × 0.8–1.8 cm, base sessile, rounded or subtruncate, or adnate, decurrent to rachis on basisopic side, gradually narrowed to acuminate apex, terminal pinna similar to middle pinnae; veins free, parallel, simple or forked near costa, close.  $2n = 66$ .

Exposed shrubby or low hillsides; 200–1000 m. Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Japan; tropical Asia, Australia, Pacific islands].

Reviewer Christenhusz notes that, in an unpublished molecular phylogeny, *Blechnum orientale* is more closely related to the New World genus *Salpichlaena* J. Smith and to *Stenochlaena* than *Blechnum* s.s., typified by *B. occidentale* Linnaeus, or *Struthiopteris* s.s., represented by *B. spicant* (Linnaeus) Roth.

Plants with cristate apices to the lateral pinnae have been called "*Blechnum orientale* var. *cristatum*" (冠羽乌毛蕨 *guan yu wu mao jue*), but that name appears not to have been validly published. It has been attributed to J. Smith, but it is not mentioned in the publication cited in FRPS, i.e., Seemann, Bot. Voy. Herald 10: 427. 1857 (incorrectly cited as "Bot. Beechey Voy. 1"), which refers only to *B. orientale*.

**2. BLECHNIDIUM** T. Moore, Brit. Ferns 2: 210. 1860.乌木蕨属 *wu mu jue shu*

Wang Faguo (王发国), Xing Fuwu (邢福武); Masahiro Kato

Plants epiphytic, small to moderate-sized. Rhizome creeping, dark brown, dictyostelic, densely scaly; scales rufous, lanceolate or ovate-lanceolate. Fronds distant, long stipitate; stipe grooved adaxially, sparsely scaly at base; lamina pectinately pinnatisect, lanceolate in outline, subleathery, both surfaces glabrous; pinnae adnate, oblong, margin entire, apex subacute or obtuse; lower few pairs of pinnae shorter; veins anastomosing with 1–3 rows of areoles. Sori linear, forming coenosori adjacent and parallel to costa; indusium attached to commissure, facing toward costa. Spores elliptic, with perispore.

One species: China, India, Myanmar.

*Blechnidium* is most closely related to *Struthiopteris* and isolated from the rest. It is included within *Blechnum* by Christenhusz et al. (Phytotaxa 19: 34. 2011).

**1. *Blechnidium melanopus*** (Hooker) T. Moore, Brit. Ferns 2: 210. 1860.乌木蕨 *wu mu jue*

*Blechnum melanopus* Hooker, Sp. Fil. 3: 64. 1859; *Blechnidium plagiogyriifrons* (Hayata) Hayata; *Blechnum plagiogyriifrons* Hayata.

Rhizome dark brown, long creeping, ca. 3 mm in diam., densely scaly; scales rufous, lanceolate to ovate-lanceolate, ca. 5 mm, membranous, subentire, acuminate or fibriform. Fronds distant, long stipitate; stipe dark brown, 12–25 cm, ca. 1 mm

in diam., grooved adaxially, sparsely scaly at base; lamina brownish green when dry, lanceolate, 15–25 × 3–7 cm, subleathery, both surfaces glabrous, gradually narrowed to base, pectinate, acuminate; pinnae 15–25 pairs, adnate; middle ones oblong, usually subfalcate, 1.5–5 × 0.5–1 cm, entire, subacute or obtuse; lower pinnae shortened, 0.4–1.3 cm; veins inconspicuous, anastomosing with 1–3 rows of hexagonal areoles. Sori linear, adjacent and parallel to costa; indusium attached to commissure, linear, facing toward costa. Spores elliptic, with perispore.

Epiphytic on tree trunks or epilithic in forests; 800–2800 m. Guizhou (Guiding), Taiwan, Yunnan [India, Myanmar].

**3. STRUTHIOPTERIS** Scopoli, Meth. Pl. 25. 1754.荚囊蕨属 *jia nang jue shu*

Wang Faguo (王发国), Xing Fuwu (邢福武); Masahiro Kato

Plants epilithic. Rhizome erect or ascending, short, dictyostelic, scaly; scales brown, linear or lanceolate, entire. Fronds tufted, ± dimorphic, often shortly stipitate; lamina pectinately pinnatisect, oblanceolate in outline, narrowed downward, leathery; pinnae spreading, oblong-subtriangular, base decurrent to rachis wing, margin entire; lower pinnae much shorter; veins inconspicuous, free, furcate, basal ones always trifurcate, not reaching lamina margin. Sori linear, forming coenosori adjacent and parallel to costa; indusium facing toward costa, thinly papery, covering young sporangia, opening when mature; spores elliptic, perispore corrugated.  $2n = 62, 68$ .

About ten species: mainly distributed in temperate areas of the N Hemisphere and Australia; two species (one endemic) in China.

*Struthiopteris* is included within *Blechnum* by Christenhusz et al. (Phytotaxa 19: 39. 2011).

- 1a. Sterile lamina 2–5 cm wide; stipe 3–24 cm ..... 1. *S. eburnea*  
 1b. Sterile lamina 5–8 cm wide; stipe almost absent ..... 2. *S. hancockii*

**1. *Struthiopteris eburnea*** (Christ) Ching, Sunyatsenia 5: 243. 1940.

荚囊蕨 *jia nang jue*

Rhizome erect and short, or ascending and long, densely scaly; scales brown, lanceolate, 5–6 mm, thickly membranous, margin entire or with few teeth, apex fibriform. Fronds tufted, dimorphic; stipe stramineous, almost absent or 3–24 cm, 1–2 mm in diam., base scaly, glabrous upward; lamina pectinate-pinnatisect, dark green or brown when dry, linear-oblongate, 15–45 cm, 2–5(–8) cm above middle, thickly leathery, glabrous; pinnae 20–40 pairs, spreading, lower ones gradually shortened, basal pair small auriculate; upper pinnae oblong, 1.5–3 × ca. 0.5 cm, base adnate to rachis, margin entire, slightly narrowed to apex, slightly reflexed, spreading, close or distant; veins inconspicuous, pinnate, furcate, not reaching lamina margin; rachis stramineous, glabrous, shallowly grooved adaxially. Fertile lamina as long as but narrower than sterile lamina. Sori linear, from near costa to near laminar margin, single on either side of costa.  $2n = 66^*$ .

• On rocks or limestone; 500–2200 m. Anhui, Fujian, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Taiwan.

- 1a. Lamina to 5 cm wide; pinnae acute ..... 1a. var. *eburnea*  
 1b. Lamina to 3 cm wide; pinnae obtuse  
 or rounded ..... 1b. var. *obtusata*

**1a. *Struthiopteris eburnea* var. *eburnea***

荚囊蕨(原变种) *jia nang jue* (yuan bian zhong)

*Blechnum eburneum* Christ, Bull. Acad. Int. Géogr. Bot. 11: 233. 1902; *Lomaria eburnea* (Christ) Ching; *Spicantopsis eburnea* (Christ) Tagawa.

Lamina to 5 cm wide; pinnae acute.

• On rocks or limestone; 500–1800 m. Anhui, Fujian, Guangxi, Guizhou, Hubei, Hunan, Sichuan.

**1b. *Struthiopteris eburnea* var. *obtusata*** (Tagawa) Tagawa, Acta Phytotax. Geobot. 14: 192. 1952.

天长罗蔓蕨 *tian chang luo man jue*

*Spicantopsis eburnea* var. *obtusata* Tagawa, Acta Phytotax. Geobot. 9: 88. 1940.

Lamina to 3 cm wide; pinnae obtuse or rounded.

• On limestone of central mountain ranges; (?800–)1200–2200 m. Taiwan.

**2. *Struthiopteris hancockii*** (Hance) Tagawa, Acta Phytotax. Geobot. 14: 192. 1952.

宽叶荚囊蕨 *kuan ye jia nang jue*

*Blechnum hancockii* Hance, J. Bot. 21: 267. 1883; *Lomaria apodophylla* Baker; *L. hancockii* (Hance) Baker; *Spicantopsis hancockii* (Hance) Masamune; *S. niponica* (Kunze) Nakai var. *hancockii* (Hance) Nakai.

Rhizome erect, short, densely scaly; scales dark brown, linear, ca. 1.5 cm, membranous, entire, apex subulate. Fronds tufted, subdimorphic with fertile lamina narrower than sterile lamina, subsessile or shortly stipitate; lamina pectinate-pinnatisect, brown when dry, elliptic or oblanceolate, broadest at or above middle, 30–40 × 5–8 cm, thickly leathery, glabrous, base gradually narrowed with small auricles, apex acuminate or acute; pinnae 20–40 pairs, spreading, close or distant, linear-oblong, slightly falcate, largest 2.5–4 × ca. 0.5 cm, in fertile fronds 1.5–3 × ca. 0.3 cm, base adnate to rachis, margin entire, apex acute, slightly reflexed when dry; veins inconspicuous, pinnate, furcate, ending in submarginal fusiform hydathodes; rachis brown or stramineous, shallowly grooved adaxially, sparsely scaly; scales brown, lanceolate. Sori linear, single on either side of costa, occupying most of pinna lamina.

Forests. Taiwan [Japan].

**4. *DIPLOBLECHNUM*** Hayata, Bot. Mag. (Tokyo) 41: 702. 1927.

扫把蕨属 *sao ba jue shu*

Wang Faguo (王发国), Xing Fuwu (邢福武); Masahiro Kato

Tree ferns, terrestrial. Stem black, erect, dictyostelic, covered with stubs of persistent frond bases, apex densely scaly; scales dark brown, narrowly triangular-lanceolate, entire. Fronds tufted, shortly stipitate; stipe scaly; lamina bipinnatifid, elliptic-lanceolate in outline, narrowed downward, papery, both surfaces glabrous, apex acuminate; pinnae pinnatifid, oblong-lanceolate, base decurrent to narrow rachis wing with triangular lobes between pinnae, apex acuminate; lower pinnae much shorter, basal ones triangular auricles; lobes oblong or triangular-oblong, margin entire, apex acute; veins free, pinnate, secondary veins 2- or 3-furcate, not reaching lamina margin; rachis and costae grooved adaxially. Fertile lamina as large as sterile lamina, slightly narrowed, pinnae caudate. Sori linear, costal, adjacent and parallel to costules on straight unbranched fertile veins parallel to costa; indusia facing toward costa, thin, covering young sporangia, opening when mature; spore reniform.

One species: Taiwan and SE Asian and Pacific islands.

The genus *Diploblechnum* is an ingroup of *Blechnum* (R. Cranfill, Y. Nakahira & M. Kato, unpubl. data), although the two are distinct morphologically.

**1. *Diploblechnum fraseri*** (A. Cunningham) De Vol in H. L. Li et al., Fl. Taiwan 1: 153. 1975.

扫把蕨 *sao ba jue*

*Lomaria fraseri* A. Cunningham, Companion Bot. Mag. 2: 364. 1836; *Blechnum fraseri* (A. Cunningham) Luerssen; *B. integripinnulum* Hayata; *Diploblechnum integripinnulum* (Hayata) Hayata; *L. fraseri* var. *philippinensis* Christ; *Struthiopteris fraseri* (A. Cunningham) Hayata; *S. integripinnulum* (Hayata) Hayata.

Stem black, up to ca. 0.8 m tall, 1–2 cm in diam., covered with stubs of persistent frond bases, apex densely scaly; scales dark brown, narrowly triangular-lanceolate, ca. 1 cm, entire,

subulate. Fronds tufted; stipe ca. 3 cm; lamina bipinnatifid, elliptic-lanceolate in outline, narrowed downward, up to 40 × 10–14 cm, papery, both surfaces glabrous; pinnae to 30 pairs, pinnatifid, oblong-lanceolate, 6.5–8.5 × 1.4–1.8 cm, bases decurrent with triangular lobes between, apex acuminate; lower pinnae much shorter, basal ones triangular auricles; lobes 13–15 pairs, oblong or triangular-oblong, up to 9 × 3 mm, margin entire, apex acute. Fertile lamina as large as sterile lamina, slightly narrowed, pinnae caudate. Sori linear, adjacent and parallel to costules; indusia brown.

Cloud forests, damp and somewhat exposed path sides; 1200–2000 m. SE Taiwan [Indonesia (Borneo), Malaysia, Philippines; Pacific islands (New Zealand)].

## 5. BRAINEA J. Smith, Cat. Ferns Roy. Gard. Kew, 5. 1856.

苏铁蕨属 *su tie jue shu*

Wang Faguo (王发国), Xing Fuwu (邢福武); Masahiro Kato

*Bowringia* Hooker (1853), not Champion ex Bentham (1852).

Tree ferns, terrestrial. Stem erect, very stout, dictyostelic, woody, apex scaly; scales rufous, linear, membranous, acuminate. Fronds clustered in terminal crown, slightly dimorphic; stipe with basal part scaly; lamina pinnate, elliptic-lanceolate in outline, leathery, abaxially with some small scales along costa and veins; pinnae opposite or alternate, sessile, entire, linear to narrowly oblong; basal pinnae slightly shorter; veins free, simple or 1- or 2-forked, except for costal row of subtriangular areoles; fertile pinnae somewhat shorter, margin sometimes irregularly lobed; rachis grooved adaxially. Sori borne on costal veins, abundant, covering whole abaxial surface of pinnae when mature, indusium absent.  $2n = 66$ .

One species: widely distributed in tropical Asia.

The monotypic genus *Brainea* is isolated from the rest of the family.

**1. *Brainea insignis*** (Hooker) J. Smith, Cat. Ferns Roy. Gard. Kew, 5. 1856.

苏铁蕨 *su tie jue*

*Bowringia insignis* Hooker, Hooker's J. Bot. Kew Gard. Misc. 5: 237. 1853; *Brainea formosana* Hayata; *B. insignis* var. *formosana* (Hayata) Tagawa.

Stem blackish brown, erect, stout, up to ca. 1 m tall, 10–15 cm in diam., woody, apex scaly; scales rufous, linear, up to 3 cm, membranous, acuminate. Fronds clustered in terminal crown, slightly dimorphic; stipe brownish stramineous, 10–30 cm, basal part scaly; lamina pinnate, elliptic-lanceolate, 50–100

cm, slightly narrowed downward, leathery, abaxially with some small scales along costa and veins; pinnae 30–55 pairs, opposite or alternate, sessile, linear to narrowly oblong; middle pinnae 10–15 × 0.7–1.2 cm, base asymmetrical, subauriculate, margin serrulate; basal pinnae slightly shortened; veins free, simple or 1- or 2-forked, except for costal row of areoles subtriangular; fertile pinnae somewhat shorter, margin sometimes irregularly lobed; rachis stramineous, grooved adaxially. Sori borne on costal veins, exindusiate, abundant, covering whole abaxial surface of pinnae when mature.  $2n = 66$ .

Damp and exposed hillsides; 300–1700 m. Fujian, Guangdong, Guangxi, Guizhou (Anlong, Zhenning), Hainan, C Taiwan, Yunnan [tropical regions of Asia].

## 6. WOODWARDIA J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5: 411. 1793.

狗脊属 *gou ji shu*

Wang Faguo (王发国), Xing Fuwu (邢福武); Masahiro Kato

Plants terrestrial, of moderate to large size. Rhizome erect or ascending, sometimes creeping, stout, dictyostelic, densely scaly; scales brown, non-clathrate, basifixed. Fronds tufted, long stipitate; lamina deeply bipinnatifid, lower part often pinnate, elliptic in outline, papery or thinly leathery; pinnae pinnatifid, narrowly oblong in outline, gradually becoming narrowly triangular-ovate, sometimes stalked, glabrous, margin entire or serrulate; veins anastomosing to form a series of areoles along costae and costules, free to margin, simple or forked. Sori discrete, linear, elliptic, or crescent-shaped, occupying costular areoles, discrete, attached to outer areole-forming veins, superficial or sunken; indusia dark brown, facing toward costa, thickly papery; sporangia with long stalk, annulus of 17–24 thickened cells. Spores elliptic, perispore rugose.

About ten species: temperate to tropical areas in Asia, Central and North America, and Europe; five species in China.

- 1a. Rachis with large subterminal bulbils on rachis ..... 1. *W. unigemmata*  
 1b. Rachis without such bulbils.  
 2a. Base of lower pinnae asymmetrical with 1–3 basiscopic lobes lacking; sori sunken, crescent-shaped or elliptic.  
 3a. Lamina 35–45 cm; base of lower pinnae lacking 1 basiscopic lobe; lobes acute or acuminate ..... 2. *W. orientalis*  
 3b. Lamina 35–120 cm; base of lower pinnae lacking 1–3 basiscopic lobes; lobes acuminate or caudate ..... 3. *W. prolifera*  
 2b. Base of lower pinnae ± symmetrical, basal pairs of lobes shortened or slightly so; sori not sunken, linear.  
 4a. Basal pairs of lobes shortened, apex obtuse ..... 4. *W. japonica*  
 4b. Basal pairs of lobes slightly shortened, lanceolate, apex acute ..... 5. *W. magnifica*

**1. *Woodwardia unigemmata*** (Makino) Nakai, Bot. Mag. (Tokyo) 39: 103. 1925.

顶芽狗脊 ding ya gou ji

*Woodwardia radicans* (Linnaeus) Smith var. *unigemmata* Makino, J. Jap. Bot. 2(2): 7. 1918; *W. himalaica* Ching & S. K. Wu; *W. latiloba* Ching & P. S. Chiu; *W. maxima* Ching; *W. yunnanensis* Ching & P. S. Chiu.

Rhizome decumbent, dark brown, stout, up to 3 cm in diam., densely scaly; scales brown, lanceolate, 2.2–2.7 cm, membranous, entire, apex long acuminate. Stipes tufted, 30–100 cm, 5–8 mm in diam., base densely scaly; upper part of stipe and rachis with fewer brown, fibriform scales; lamina deeply bipinnatifid, elliptic or ovate-lanceolate, 30–100 × 20–60 cm, leathery; pinnae 7–15 pairs, subsessile or shortly stalked, broadly lanceolate; middle pinnae 15–35 × 4–12 cm, cut 3/4 way to costa, base rounded-truncate, unequal, apex caudate; lobes 14–20 pairs, close, oblique, oblong-lanceolate, sometimes falcate, lower pairs of lobes slightly shortened, middle lobes 1–6 × 0.8–1.2 cm, margin serrulate with sharp, long teeth; veins anastomosing with 2 or 3 rows of areoles along costae and costules, marginally free, simple or forked. Bulbils single or multiple, large, scaly, subterminal below rachis tip at base of upper pinna. Sori occupying costular areoles, oblong, sunken in rimmed depressions; indusia attached to outer vein, dark brown, thickly membranous.  $2n = 68$ .

In shrubs by roadsides, forests; 400–3000 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shanxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Japan, Kashmir, Myanmar, Nepal, Pakistan, Philippines, Vietnam].

**2. *Woodwardia orientalis*** Swartz in Schrader, J. Bot. 1800(2): 76. 1801.

东方狗脊 dong fang gou ji

*Woodwardia radicans* (Linnaeus) Smith var. *orientalis* (Swartz) Swartz.

Rhizome decumbent, dark brown, stout, densely scaly; scales dark brown, lanceolate, 1–4 cm, entire, membranous, apex fibriform. Stipes close, 20–55 cm, 3–6 mm in diam., base densely scaly; upper part of stipe and rachis sparsely covered with brown, broadly lanceolate scales; lamina deeply bipinnatifid, brown or slightly green when dry, ovate, 35–45(–70) × 15–45 cm, leathery, glabrous, base rounded-truncate, apex acuminate; pinnae 6–8 pairs, shortly stalked, lanceolate; lower and middle pinnae 10–30 × 4–9 cm, deeply pinnatifid to 2–3(–4) mm from costa, base asymmetrical with 1 basiscopic lobe lacking, apex acuminate, basal pinnae shortened; lobes 10–18

pairs, close, oblique, oblong, 3–5.5(–7) × 0.8–1(–1.3) cm, usually broadest at base, margin cuspidately serrulate, apex acute or acuminate; veins obvious, anastomosing to form 1 row of areoles along costae and 2 or 3 rows of discrete, polygonal areoles, remainder free to margin, simple or forked. Small bulbils borne on adaxial surfaces of pinna lobes or not. Sori occupying costular areoles, crescent-shaped or elliptic, sunken in rimmed depressions; indusia dark brown, thickly papery.  $2n = 136$ .

Roadsides, mountain slopes; ca. 500 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangxi, ?Taiwan, Zhejiang [Japan, Philippines].

**3. *Woodwardia prolifera*** Hooker & Arnott, Bot. Beechey Voy. 275. 1838.

珠芽狗脊 zhu ya gou ji

*Woodwardia angustiloba* Hance; *W. exaltata* Nakai; *W. orientalis* Swartz var. *formosana* Rosenstock; *W. orientalis* var. *prolifera* (Hooker & Arnott) Ching; *W. prolifera* var. *formosana* (Rosenstock) Ching.

Rhizome decumbent, dark brown, stout, densely scaly; scales red-brown, lanceolate, 2–4 cm, membranous, entire or with a few teeth, fibriform. Stipes close, 30–110 cm, 3–15 mm in diam., base densely scaly; upper part of stipe and rachis sparsely covered with brown, broadly lanceolate scales, surface rough with scale scars; lamina deeply bipinnatifid, brown or slightly green when dry, oblong-ovate or elliptic, 35–120 × 30–40 cm, leathery, glabrous, apex acuminate; pinnae 5–9(–13) pairs, shortly stalked, lanceolate; lower and middle pinnae 10–30 × 4–9 cm, deeply pinnatifid to 1–2 mm from costa, base asymmetrical with 1–3 basiscopic lobes lacking, apex long acuminate or caudate; lobes 10–14(–24) pairs, close or separate, oblique, oblong-lanceolate, 3–7(–9) × 0.5–0.9 cm, slightly narrowed to base, margin cuspidately serrulate, occasionally lobed, apex long acuminate or caudate; veins obvious, anastomosing with 1 row of areoles along costae and 2 or 3 rows of discrete, polygonal areoles, free distally, simple or forked. Leaf-bearing bulbils small and usually abundant on adaxial surfaces of pinna lobes. Sori occupying costular areoles, crescent-shaped or elliptic, sunken in rimmed depressions; indusia dark brown, thickly papery.  $2n = 68$ .

Mountain slopes, open and wet places in sparse forests, near streams; 100–1100 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Taiwan, Zhejiang [Japan].

Herbarium and field observations of *Woodwardia prolifera* show that there is ecological variation in the frequency of bulbils on the lamina; some mature fronds are not bulbiferous.

The name “*Woodwardia radicans* (Linnaeus) Smith var. *prolifera* C. Christensen, Index Filic. 658. 1905” (Acta Phytotax. Sin. 12: 244.

1974; and FPRS 4(2): 201. 1999) appears to be a mistaken joining of the end of one line “= *W. radicans* var.” with the beginning of another, the next species in the list, “*prolifera*.”

**4. *Woodwardia japonica*** (Linnaeus f.) Smith, Mém. Acad. Roy. Sci. (Turin) 5: 411. 1793.

狗脊 *gou ji*

*Blechnum japonicum* Linnaeus f., Suppl. Pl. 445. 1782; *Woodwardia affinis* Ching & P. S. Chiu; *W. intermedia* Christ; *W. japonica* var. *contigua* Ching & P. S. Chiu; *W. omeiensis* Ching ex P. S. Chiu.

Rhizome decumbent, dark brown, stout, 3–5 cm in diam., densely scaly; scales dark brown, lanceolate or linear-lanceolate, ca. 1.5 cm, membranous, entire, apex acuminate, sometimes fibriform. Stipes close, 15–70 cm, 5–8 mm in diam., base densely scaly; upper part of stipe and rachis sparsely covered with brown, fibriform scales; lamina bipinnatifid, elliptic or lanceolate, 25–85 × 18–45 cm, leathery, apex acuminate; pinnae 7–15 pairs, subsessile or shortly stalked, broadly lanceolate; middle pinnae 12–25 × 2–4 cm, base acroscopically truncate, basiscopically rounded, margin cut 1/2 way to costa, apex acuminate; lobes 11–16 pairs, close, oblique, hemielliptic or hemiovalate, lowest pair shortened, basiscopic lobe rounded, ovate or auriculate, 5–10 mm, apex rounded; middle lobes 1.3–2.2 × 0.7–1 cm, margin serrulate, apex acute; veins anastomosing with 2 or 3 rows of areoles along costae and costules, distally free, simple or forked. Sori occupying costular areoles, discrete, linear, sunken; indusia brown.  $2n = 68$ .

Ridges, exposed slopes, shaded forests; 300–1500 m. Widely distributed south of the Chang Jiang and in Taiwan [Japan, Korea, Vietnam].

*Woodwardia japonica* is variable in the length, number, and arrangement of the pinnae and in the shape of the pinna lobes.

**5. *Woodwardia magnifica*** Ching & P. S. Chiu, Acta Phytotax. Sin. 12: 247. 1974.

滇南狗脊 *dian nan gou ji*

Rhizome decumbent, dark brown, stout, densely scaly; scales brown or dark brown, lanceolate, ca. 1.5 cm, membranous, entire, apex fibriform. Stipes close, brown-stramineous, 35–76 cm, 6–10 mm in diam., base densely scaly, sparsely scaly upward; lamina bipinnatifid, brown or brown-green when dry, oblong-ovate, 60–95 × 30–65 cm, leathery, glabrous, apex long acuminate; pinnae 13–15 pairs, alternate or lower ones opposite, oblique, subsessile or shortly stalked, basal pair slightly shortened; middle ones linear-lanceolate, 30–35 × 4–8 cm, base rounded-truncate or rounded-cuneate, margin pinnatifid, apex caudate-acuminate; lobes 20–22 pairs, alternate, lower ones slightly shortened; middle one longest, lanceolate or narrowly triangular-lanceolate, 2.6–5 × 1–1.5 cm, margin serrulate, apex acute; veins obvious, anastomosing with 1 row of areoles along rachis, costae, and costules, distally simple or forked, ending in submarginal fusiform hydathodes; rachis or costae densely covered with brown, fibriform, deciduous scales. Sori occupying costular areoles, linear, discrete; indusia dark brown.

Near forests, roadsides; 1400–1600 m. Yunnan [Vietnam].

## 7. *CHIENIOPTERIS* Ching, Acta Phytotax. Sin. 9: 37. 1964.

崇澗蕨属 *chong shu jue shu*

Wang Faguo (王发国), Xing Fuwu (邢福武); Masahiro Kato

Plants terrestrial, of small to moderate size. Rhizome long creeping, dark brown, apex covered with brown, lanceolate scales. Fronds distant, long stipitate; lamina simple, trifid, or deeply pinnatifid, thickly papery or subleathery, glabrous; pinnae (or lobes) 1–5 pairs, lanceolate, base slightly narrowed, apex acuminate, terminal pinna if present similar to but longer than lateral ones; veins anastomosing with 3 or 4 rows of areoles, marginal veins free. Sori oblong or linear, borne along costal and costular areoles; indusia facing toward costa, dark brown, linear-oblong, papery. Spores elliptic, perispore rugose, granular.

Two species: China, Japan, Vietnam; two species in China.

*Chieniopteris* is treated as a section of the genus *Woodwardia* by Cranfill and Kato (in Subhash Chandra and Mritunjai Srivastava, eds., Pteridol. New Millennium, 25–48. 2003), which was followed by Christenhusz et al. (Phytotaxa 19: 27. 2011).

- 1a. Lamina simple or imparipinnate with 1–4 pairs of lateral pinnae and longer terminal pinna ..... 1. *C. harlandii*  
1b. Lamina pinnatifid, with pinnatifid apex, lateral pinnae 5–7 pairs, ± lobed ..... 2. *C. kempii*

**1. *Chieniopteris harlandii*** (Hooker) Ching, Acta Phytotax. Sin. 9: 39. 1964.

崇澗蕨 *chong shu jue*

*Woodwardia harlandii* Hooker, Fil. Exot. t. 7. 1857; *Lorinseria harlandii* (Hooker) J. Smith.

Rhizome long creeping, dark brown, 4–6 mm in diam., densely scaly; scales brown, lanceolate, 4–6 mm, membranous, margin entire or with few hairlike teeth. Fronds distant, subdimorphic with fertile lobes narrower than sterile lobes, 30–120

cm; stipe 12–80 cm, base dark brown, scaly; lamina simple, ternate, or deeply pinnatifid, gray-green or brown when dry, thickly papery or subleathery, glabrous; pinnae (or lobes) 1–4 pairs, opposite, 4–5 cm apart, lanceolate, base adnate to rachis and decurrent, margin entire or undulate, usually reflexed when dry, apex acuminate; basal pinnae 20–29 × 2–3 cm, upper pinnae shortened, terminal pinna similar to but longer and broader than lateral ones; rachis wing often very narrow or lacking between basal pinnae; veins anastomosing with 1 row of costal areoles, 2 or 3 rows of hexagonal areoles, marginal veins free.

Sori linear, interrupted, 10–22 mm, borne along costal and costal areoles; indusia rufous when mature, papery.

Valleys, damp forests; 400–1300 m. Fujian, Guangdong, Guangxi, Guizhou (Libo), Hainan, S Hunan, Taiwan [Japan, Vietnam].

**2. *Chieniopteris kempii*** (Copeland) Ching, Acta Phytotax. Sin. 9: 39. 1964.

裂羽崇樹蕨 lie yu chong shu jue

*Woodwardia kempii* Copeland, Philipp. J. Sci., C, 3: 280. 1908; *W. harlandii* Hooker var. *takeoi* (Hayata) Masamune; *W. heteropinnata* B. S. Wang; *W. takeoi* Hayata.

Rhizome long creeping, dark brown, 4–7 mm in diam., densely scaly; scales brown, lanceolate, 4–5 mm, membranous, entire, apex acuminate. Fronds distant, subdimorphic, fertile fronds larger and more deeply dissected than sterile fronds; stipe 30–70 cm, base dark brown, densely scaly, upward sparsely scaly and glabrous, brown-stramineous; lamina brown when dry, deltoid-ovate, 13–26 × 11–28 cm, subleathery, gla-

brous, base rounded-truncate, apex acuminate; sterile lamina pinnatifid, basal lobes largest, lanceolate, 6.5–10 × 1–2.5 cm, base slightly narrowed, united with broad wing, margin serrulate, apex acuminate; fertile lamina bipinnatifid; pinnae 5–7 pairs, opposite, oblique or basal pair subspreading, pinnatifid; basal pair largest, elliptic-lanceolate, 11–20 × 4.5–10 cm, base narrowed, sessile or shortly stalked, ca. 3 cm apart from above, pinnatifid to broad wing of costa, apex acuminate; middle lobes lanceolate or linear, 8–9 × 1.2–1.5 cm, margin irregularly undulate or lobed, entire, or with irregular and distant serrae, basal lobes much shortened or rounded-auriculate; veins inconspicuous but midvein prominent on both surfaces, anastomosing with 1 row of long, narrow areoles along costa, secondary veins anastomosing with 2 rows of areoles, free near margin. Sori linear, 5–17 mm, borne in costal, rachis, or midvein areoles; indusium dark brown when mature, papery.

Forests, damp forests, along ridges; 400–800 m (in Taiwan). Fujian, Guangdong, Guangxi, N Taiwan [Japan].

## 8. STENOCHLAENA J. Smith, J. Bot. 3: 401. 1841.

光叶藤蕨属 guang ye teng jue shu

Dong Shiyong (董仕勇); Masahiro Kato

Terrestrial and climbing plants. Rhizome creeping or climbing, stout, terete, meristelic, with 40 or more vascular bundles in 3 circles, scaly only at apex; scales brown to blackish, orbicular, ovate, or ovate-lanceolate, margin uneven, peltate, caducous. Fronds distant, strongly dimorphic, stipe glabrous except when very young; lamina imparipinnate, leathery or stiffly papery, both surfaces glabrous; sterile pinnae broadly lanceolate, articulate to rachis (apical pinna not articulate), shortly stalked, with single gland on base of each costa, margin sharply toothed; veins anastomosing, forming single row of areoles along each side of costa, other veins free; fertile pinnae linear, lamina very reduced, margin entire. Sporangia acrostichoid, covering whole abaxial surface of fertile pinnae. Spores ellipsoid, with prominent tubercles on distal face.  $x = 37$ .

Six species: Africa, Asia, Australia, Pacific islands; one species in China.

*Stenochlaena* is exceptional because of its distinct stele type. Ching (1978) gave it family status and placed it after the Acrostichaceae. Kramer (1990) treated it as a subfamily within the Blechnaceae based on its venation, stomata, spores, and gametophyte, which agree best with the Blechnaceae. Recent molecular data show that *Stenochlaena* forms a clade with species such as *Blechnum indicum* N. Burman and with *Salpichlaena*.

**1. *Stenochlaena palustris*** (N. L. Burman) Beddome, Suppl. Ferns S. Ind. 26. 1876 [*“palustre”*].

光叶藤蕨 guang ye teng jue shu

*Polypodium palustre* N. L. Burman, Fl. Indica, 234. 1768; *Acrostichum palustre* (N. L. Burman) C. B. Clarke; *A. scandens* Hooker (1864), not Bory ex Fée (1845); *Chrysodium palustre* (N. L. Burman) Luerksen; *Lomaria scandens* Willdenow; *Lomariopsis palustris* (N. L. Burman) Kuhn; *L. scandens* Mettenius; *Olfersia scandens* C. Presl; *Onoclea scandens* Swartz, nom. illeg. superfl.; *Pteris scandens* (Willdenow) Roxburgh; *Stenochlaena hainanensis* Ching & P. S. Chiu; *S. scandens* J. Smith.

Stems long creeping and climbing; scales at apex of rhizome dark brown to black, orbicular, ovate, or ovate-lanceolate,

ca. 1 mm in diam., caducous. Fronds distant, dimorphic. Stipe 10–80 cm, glabrous; lamina 1-pinnate, oblong in outline, 50–80 × 20–30 cm; lateral pinnae 8–16 pairs, terminal pinna similar; pinnae very shortly stalked, articulate to rachis; sterile pinnae broadly lanceolate or oblong-lanceolate, (10–)15–20 × 2–4.5 cm, varying much in size and shape, leathery or stiffly papery, surface smooth and glossy, base broadly cuneate, margin sharply and irregularly serrate, apex acuminate or sometimes caudate; fertile pinnae 10–20 × 0.1–0.5 cm, linear. Veins simple or forked, forming single row of narrow costal areoles. Sori acrostichoid, covering whole abaxial surface of fertile pinnae.  $2n = 148$ .

Secondary forests, open places; near sea level to 400 m. Guangdong, Guangxi, Hainan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Nepal, Thailand, Vietnam; Australia, Pacific islands].