

- Forests; ca. 1600 m. Yunnan.

**2. *Lastreopsis subcedens*** Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 160. 1938.

海南节毛蕨 hai nan jie mao jue

Plants 40–75 cm tall. Rhizomes creeping, 1–1.5 cm in diam., covered with lanceolate scales. Stipe approximate, dark stramineous to brown, 18–38 cm, densely scaly at base; stipe and other parts densely clothed in soft hairs; hairs consisting of 5–8 cells, ca. 0.7 mm. Lamina 3-pinnate and 4-pinnatifid at base, pentagonal, 25–35 × 25–40 cm; pinnae 8–10 pairs, only basal pinnae shortly stalked, all pinnae usually opposite to subopposite, basal primary pinnules anadromous or subopposite at basal pinnae and catadromous at upper pinnae; basal pinna largest, 15–25 × 10–18 cm, obliquely deltoid; stalk 0.7–1.5 cm, with 8–12 pairs of primary pinnules and basal basisopic pinnules longest; veins prominent on adaxial surface, not reaching margin of pinna lobes, with spheroid yellow glands on abaxial surface. Sori terminal on veins and near margin of pinna lobes, exindusiate.

- Forests; 700–1000 m. Hainan.

**3. *Lastreopsis tenera*** (R. Brown) Tindale, Vict. Naturalist 73: 181. 1957.

台湾节毛蕨 tai wan jie mao jue

*Nephrodium tenerum* R. Brown, Prodr. 149. 1810; *Aspidium gardnerianum* Mettenius; *Ctenitis simozawae* (Tagawa) Ching; *C. tenera* (R. Brown) Copeland; *Dryopteris simozawae* Tagawa; *D. tenera* (R. Brown) C. Christensen; *Lastreopsis simozawae* (Tagawa) Tagawa.

Plants 25–100 cm tall. Rhizomes creeping, ca. 0.5 cm in diam., covered with lanceolate scales. Stipes approximate, dark stramineous, 10–30 cm, sparsely scaly at base, stipe and other parts densely clothed in soft hairs; hairs consisting of 3–6 cells, ca. 0.5 mm. Lamina 2- or 3-pinnate and at most 4-pinnatifid at base, ovate, 15–20 × 20–25 cm; pinnae ca. 10 pairs, usually only basal pinnae shortly stalked, all pinnae usually opposite to subopposite, primary pinnules anadromous at basal pinnae and catadromous at upper pinnae with rare exceptions; basal pinnae largest, 7–10 × 10–18 cm, obliquely deltoid; stalk 0.3–0.4 cm, with 8–10 pairs of primary pinnules and basal basisopic pinnule longest; veins prominent on adaxial surface, not reaching or nearly reaching margins of pinna lobes, with abundant spheroid or shortly clavate orange glands on abaxial surfaces. Sori terminal or subterminal on veins and usually near margins of pinna lobes; indusia small or large, glabrous but with abundant spheroid glands at margin.

Forests; 100–900 m. Taiwan [India, Indonesia, Malaysia, Philippines, Sri Lanka; Australia].

## 6. POLYSTICHUM Roth, Tent. Fl. Germ. 3: 31, 69. 1799, nom. cons.

耳蕨属 er jue shu

Zhang Libing (张丽兵); David S. Barrington

*Acropelta* Nakai; *Cyrtomidictyum* Ching; *Hemesteum* H. Léveillé (1915), not Newman (1851); *Plecosorus* Fée.

Plants perennial, terrestrial, evergreen or summer-green. Rhizome short, erect or ascending, together with basal stipe often covered with scales; scales linear to ovate, rarely with hairs. Fronds caespitose, monomorphic or rarely nearly dimorphic; stipe stramineous to purplish brown, canaliculate adaxially, scaly; distal stipe scales sparser, similar to but smaller than basal stipe scales. Lamina linear-lanceolate, lanceolate, ovate-lanceolate, lorate, or oblong, pinnate, bipinnatifid, or bipinnate, rarely finely divided and tripinnatifid or tetrapinnatifid; frond texture thinly papery, papery, or leathery, with lanceolate, subulate, linear, or ovate microscapes abaxially and sometimes also adaxially, acroscopic base often auriculate, rarely auricles indistinct; rachis sulcate adaxially, with or without proliferous bulbils, rarely proliferous bulbils borne terminally on a prolonged flagelliform rachis; venation pinnate, free or rarely anastomosing to form 1 or 2 rows of areoles. Sori orbicular, terminal on veins of pinnae, sometimes abaxial or nearly terminal on veins, indusiate or rarely exindusiate; indusia orbicular, peltate, membranous, entire, erose, or irregularly toothed.

About 500 species: common in the temperate regions and subtropical lowlands and montane to alpine areas in the N Hemisphere, mostly in S and SW China, Himalaya, Japan, and Vietnam; a rich diversity of *Polystichum* also found in Central and South America; ca. 15 species in North America north of Mexico, 16 in Africa, eight in Madagascar and the Mascarenes, three in Macronesia, four in Europe, 12 in Australasia, and a few in New Guinea and the Pacific islands; 208 species (139 endemic) in two subgenera in China.

Chinese species can be classified into two subgenera and 23 sections.

The following taxa are excluded from the present treatment, pending further research: *Aspidium aculeatum* (Linnaeus) Swarz var. *veitchii* Christ (Bull. Herb. Boissier, sér. 2, 3: 513. 1903), described from W Hubei, *A. aculeatum* var. *yunnanense* Christ (Bull. Herb. Boissier 6: 964. 1898), described from Yunnan, and *A. braunii* Spenner var. *clarkei* Christ (Bull. Herb. Boissier 7: 15. 1899 [“*Clarkii*”]), described from Yunnan.

### Key to sections

- 1a. Plants evergreen, rarely summer-green; lamina 1-pinnate; if lamina bipinnatifid to tetrapinnatifid then pinnae finely dissected (*P. sect. Sphaenopolystichum*) or rachis scales dark brown, ovate, and appressed (*P. excelsius*, *P. tonkinense*); venation free or rarely anastomosing to form 1 or 2 rows of areoles (*P. balansae*, *P. fraxinellum*, *P. hookerianum*, *P. lepidocaulon*, *P. ×rupestris*, *P. trapezoideum*, *P. uniseriale*) (*P. subg. Haplopolystichum*).

- 2a. Rachis with proliferous bulbils.
- 3a. Microscales broad-type; rachis prolonged at apex; sori exindusiate ..... 15. *P.* sect. *Cyrtomiopsis*
- 3b. Microscales narrow-type; rachis prolonged or not prolonged at apex; sori indusiate.
- 4a. Indusia entire; rachis prolonged at apex ..... 16. *P.* sect. *Mastigopteris*
- 4b. Indusia erose; rachis prolonged (*P. erosum*) or not prolonged at apex ..... 17. *P.* sect. *Basigemmifera*
- 2b. Rachis without proliferous bulbils.
- 5a. Lamina with extraordinarily prolonged and 1-pinnate basal pinnae ..... 18. *P.* sect. *Crucifilix*
- 5b. Lamina without extraordinarily prolonged basal pinnae.
- 6a. Lamina bipinnatifid to tetrapinnatifid, rarely 1-pinnate; pinnae finely dissected ..... 19. *P.* sect. *Sphaenopolystichum*
- 6b. Lamina 1-pinnate; pinnae not finely dissected.
- 7a. Lamina leathery; if lamina papery then pinnae long spinulose on margin (*P. formosanum*); pinnae falcate-lanceolate, length more than  $3 \times$  width, middle pinnae 0.9–2 cm wide; if middle pinnae 0.6–0.9 cm wide then pinnae obliquely oblong, up to 3.2 cm (*P. minimum*) or pinnae long spinulose on margin (*P. formosanum*); venation free or anastomosing to form 1 or 2 rows of areoles.
- 8a. Sori in 1 row on each side of midrib; pinnae symmetrical or nearly symmetrical at base; if pinnae asymmetrical at base then pinnae obliquely oblong, up to  $3.2 \times 0.9$ –2 cm (*P. minimum*); venation free; if venation anastomosing to form 1 or 2 rows of areoles along midrib then pinnae up to 10 pairs (*P. fraxinellum*) ..... 20. *P.* sect. *Cyrtogonellum*
- 8b. Sori in 2 or more rows on each side of midrib; if sori in 1 row on each side of midrib then sori close to pinna margin (*P. falcatilobum*, *P. formosanum*); pinnae asymmetrical at base; venation anastomosing to form 1 or 2 rows of areoles; if venation free then sori in 1 row on each side of midrib ..... 21. *P.* sect. *Adenolepia*
- 7b. Lamina papery or thinly papery; pinnae oblong or lanceolate, length normally  $1$ – $2 \times$  width, middle pinnae much narrower than 1 cm except those of *P. acutidens*; venation free.
- 9a. Rachis scales ovate to lanceolate ..... 22. *P.* sect. *Platylepia*
- 9b. Rachis scales linear, subulate or narrowly lanceolate ..... 23. *P.* sect. *Haplopolystichum*
- 1b. Plants evergreen or summer-green; lamina bipinnate or bipinnatifid; if lamina 1-pinnate then microscales broad-type (*P.* sect. *Hecatoptera*, *P.* sect. *Stenopolystichum*; excl. *P.* sect. *Mastigopteris*) but rachis not prolonged at apex (excl. *P.* sect. *Cyrtomiopsis*) and rachis scales not ovate-lanceolate (excl. *P. loratum*); or if 1-pinnate then sori abaxial on veinlets (*P. chingiae*, *P. nepalense*); or if 1-pinnate then pinnae stiff and with open hard spinules on margin (*P. delavayi*, *P. lonchitis*); or if 1-pinnate then pinnae with long fine microscales and rachis without bulbils (*P. fimbriatum*, *P. muscicola*, *P. subfimbriatum*, *P. zayuense*, some species of *P.* sect. *Sorolepidium*), or pinnae ovate-deltoid and with broadly lanceolate microscales (*P. duthiei*, *P. glaciale*); venation free (*P.* subg. *Polystichum*).
- 10a. Lamina stiff, leathery or nearly leathery, often shiny adaxially; pinnae dentate and with hard spinules at apex and often also on margin.
- 11a. Lamina 1-pinnate; sori abaxial on veinlets ..... 1. *P.* sect. *Polystichum*
- 11b. Lamina bipinnate, rarely 1-pinnate (*P. delavayi*) or tripinnatifid; sori terminal on veinlets ..... 2. *P.* sect. *Xiphopolystichum*
- 10b. Lamina not stiff, papery; if lamina leathery then pinnae without hard spinules on margin (*P. fimbriatum*, *P. subfimbriatum*), dull or shiny adaxially; pinnae without hard spinules at apex or margin.
- 12a. Lamina 1-pinnate; rachis without proliferous bulbils; pinnae densely regularly long spinulose on margin ..... 3. *P.* sect. *Hecatoptera*
- 12b. Lamina 1-pinnate or bipinnate; rachis with or without proliferous bulbils; if lamina 1-pinnate then pinnae shortly spinulose or entire on margin.
- 13a. Lamina 1-pinnate; rachis with proliferous bulbils ..... 4. *P.* sect. *Stenopolystichum*
- 13b. Lamina bipinnate or 1-pinnate; rachis without or with proliferous bulbils; if lamina 1-pinnate then rachis without proliferous bulbils.
- 14a. Sori abaxial on veinlets; lamina green.
- 15a. Fronds up to 1 m or longer; lamina bipinnate ..... 8. *P.* sect. *Neopolystichum*
- 15b. Fronds shorter than 50 cm; lamina 1-pinnate or bipinnatifid; if lamina bipinnatifid then pinnae and pinnules cartilaginous at margin.
- 16a. Lamina 1-pinnate or bipinnatifid; pinnae and/or pinnules cartilaginous at margin; sori in 1 row on each side of midrib ..... 5. *P.* sect. *Achroloma*
- 16b. Lamina 1-pinnate; pinnae not cartilaginous at margin; sori in 2 or 3 rows on each side of midrib.
- 17a. Auricles well developed and deltoid, sharply pointed at apex ..... 6. *P.* sect. *Chingiarum*

- 17b. Auricles less developed and rounded ..... 7. *P.* sect. *Crinigera*
- 14b. Sori terminal on veinlets; if sori abaxial on veinlets then lamina dark green (*P. biaristatum*, *P. mucronifolium*, *P. parvifoliolatum*).
- 18a. Lamina 1-pinnate; fronds leathery.
- 19a. Pinnae oblong; auricles sharply pointed at apex ..... 9. *P.* sect. *Fimbriata*
- 19b. Pinnae ovate; auricles obtuse at apex ..... 10. *P.* sect. *Subfimbriata*
- 18b. Lamina bipinnate or bipinnatifid; fronds papery or thinly leathery; if lamina 1-pinnate then lamina papery.
- 20a. Fronds shorter than 40(–60) cm, thinly papery; lamina 1-pinnate or shallowly to deeply pinnatifid ..... 11. *P.* sect. *Micropolystichum*
- 20b. Fronds often longer than (40–)60 cm and up to 1 m or longer, papery; lamina bipinnate.
- 21a. Plants summer-green; lamina 1-pinnate to bipinnatisect; microscales fibrillose or lanceolate, longer than 0.8 mm ..... 12. *P.* sect. *Sorolepidium*
- 21b. Plants evergreen or summer-green; lamina bipinnate; microscales linear, shorter than 0.5(–0.6) mm; if microscales fibrillose and up to 1 mm then pinnules exauriculate.
- 22a. Plants evergreen; lamina dark green, shiny adaxially, up to 100 cm or longer; rachis with or without proliferous bulbils; pinnules lanceolate ..... 13. *P.* sect. *Macropolystichum*
- 22b. Plants evergreen or summer-green; lamina green, normally shorter than 80 cm, dull adaxially; rachis without proliferous bulbils; pinnules ovate-lanceolate ..... 14. *P.* sect. *Hypopeltis*

### 1. *Polystichum* subg. *Polystichum*

耳蕨亚属 *er jue ya shu*

Plants summer-green or evergreen. Lamina bipinnate or bipinnatifid; if lamina 1-pinnate then microscales broad-type but rachis not prolonged at apex; or if 1-pinnate then sori abaxial on veinlets; or if 1-pinnate then pinnae stiff and with open hard spinules on margin; or if 1-pinnate then pinnae with long fine microscales and rachis without bulbils, or pinnae ovate-deltoid and with broadly lanceolate microscales; venation free.

About 230 species: worldwide; 120 species (69 endemic) in 14 sections in China.

#### 1. *Polystichum* sect. *Polystichum*

耳蕨组 *er jue zu*

Lamina papery or leathery, 1-pinnate to bipinnate. Pinna or pinnule spinulose or not spinulose on margin. Sori indusiate or exindusiate.

About 30 species: circumboreal regions (one species) and New World tropics; one species in China.

**1. *Polystichum lonchitis*** (Linnaeus) Roth, Tent. Fl. Germ. 3(1): 71. 1800.

矛状耳蕨 *mao zhuang er jue*

*Polypodium lonchitis* Linnaeus, Sp. Pl. 2: 1088. 1753;  
*Aspidium lonchitis* (Linnaeus) Swartz.

Plants evergreen. 16–30 cm Rhizome erect, densely covered with lanceolate brown scales. Stipe stramineous, sometimes brown at base, 2–4 cm, 2–3 mm in diam. at base, densely scaly; scales lanceolate and ovate, toothed. Lamina 1-pinnate, linear-lanceolate or narrowly oblanceolate, 26–60 × 3.5–8 cm, gradually contracted toward base, apex acuminate; rachis lower

part scaly abaxially, without proliferous bulbils. Pinnae 30–34 pairs, alternate, subsessile, attached at right angles to rachis or slightly ascendant, lanceolate-falcate, lower pairs gradually contracted to deltoid-ovate, middle pairs 2–2.5 cm × 8–10 mm, bases oblique, acroscopic margins truncate, auricles deltoid, basicopic margins cuneate, with spinulose teeth, apices acuminate; abaxially with lanceolate microscales; frond texture leathery; venation pinnate, midrib slightly raised abaxially, concave adaxially; lateral veins forked, indistinct. Sori in 1 row on each side of midrib; indusia irregularly erose.

*Picea* forests; 1600–2000 m. Xinjiang [Afghanistan, NW India, Japan, Kashmir; C Asia, Europe, North America].

#### 2. *Polystichum* sect. *Xiphopolystichum* Daigobo, Sci. Rep. Tokyo Kyoiku Daigaku, B, 15: 67. 1972.

刺叶耳蕨组 *ci ye er jue zu*

*Polystichum* sect. *Duropolystichum* Fraser-Jenkins.

Plants small to medium-sized, evergreen. Lamina lanceolate to narrowly ovate, stiff, leathery or thinly leathery, rarely papery, 1-pinnate to bipinnate, rarely tripinnatifid. Stipe scales brown or reddish brown, ovate and lanceolate. Rachis scales brown, reddish brown, blackish brown, or black, subulate to lanceolate, ciliate. Pinnae and pinnules asymmetrical at base, with hard spinules, with linear and ciliate microscales abaxially, shiny adaxially.

About 34 species: E Asia (33 species) and Hawaii (one species); 31 species (20 endemic) in China.

*Polystichum* sect. *Xiphopolystichum* as defined here is a combination of *P.* sect. *Xiphopolystichum* sensu Kung et al. (FRPS 5(2): 26. 2001) and *P.* sect. *Duropolystichum* Fraser-Jenkins. The latter section was called *P.* sect. *Scleropolystichum* Daigobo (FRPS 5(2): 36. 2001), but that name is a homotypic synonym of *P.* sect. *Hypopeltis* with *P. aculeatum* as its type.

*Polystichum* sect. *Xiphopolystichum* is apparently monophyletic according to molecular and morphological phylogenetic analyses.

- 1a. Rachis scales black or dark brown, linear or subulate.
  - 2a. Lamina 1-pinnate; pinnae not dissected or only shallowly dissected and with 1 or 2 free lobes at base.
    - 3a. Pinnae narrowly ovate or ovate, those of middle of lamina shorter than 2 cm ..... 2. *P. otophorum*
    - 3b. Pinnae linear-lanceolate, those of middle of lamina longer than 3 cm.
      - 4a. Lamina green; pinnae shallowly toothed, basiscopic bases obliquely truncate; indusia bicolorous (blackish at center and light brown on margin) ..... 3. *P. xiphophyllum*
      - 4b. Lamina yellowish green; pinnae entire, basiscopic bases rounded; indusia concolorous (brown) ..... 4. *P. revolutum*
  - 2b. Lamina bipinnate, bipinnatifid, or rarely tripinnate.
    - 5a. Pinnae pinnatifid, with 0–2 free lobes at base.
      - 6a. Lamina narrowly ovate or broadly lanceolate; pinnae 16–25 pairs ..... 5. *P. langchungense*
      - 6b. Lamina narrowly lanceolate; pinnae 25–32 pairs ..... 6. *P. diffundens*
    - 5b. Pinnae with many free lobes at base.
      - 7a. Lamina tripinnate; pinnules deeply dissected ..... 7. *P. incisopinnulum*
      - 7b. Lamina bipinnate; pinnules often not dissected.
        - 8a. Pinnules obviously auriculate; pinnules denticulate and spinulose on margin.
          - 9a. Lamina leathery; rachis scales narrowly lanceolate ..... 14. *P. mayebarae*
          - 9b. Lamina thinly leathery; rachis scales linear, broadened and ciliate at base.
            - 10a. Pinnules lanceolate or narrowly elliptic, distant from each other ..... 12. *P. herbaceum*
            - 10b. Pinnules oblong, ovate, or deltoid, approximate ..... 13. *P. tsus-simense*
        - 8b. Except for basalmost acroscopic pinnule, pinnules exauriculate; pinnules often entire.
          - 11a. Pinnules obliquely oblong or ovate, those of lower part of lamina 8–18 mm.
            - 12a. Lamina shorter than 30 cm; rachis scales brown ..... 8. *P. pseudosetosum*
            - 12b. Lamina up to 37 cm; rachis scales dark brown ..... 9. *P. exauriforme*
          - 11b. Pinnules obliquely broadly ovate or broadly obovate, those of lower part of lamina 4–8 mm.
            - 13a. Lamina shorter than 20 cm; pinnae shortly acute ..... 10. *P. sinotsus-simense*
            - 13b. Lamina up to 50 cm; pinnae caudate or long acuminate ..... 11. *P. pseudoxiphophyllum*
  - 1b. Rachis scales brown or reddish brown, of various shapes.
    - 14a. Lamina 1-pinnate, linear-lanceolate, 1.8–2.5 cm wide, ratio of length to width larger than 5; pinnae not dissected or shallowly dissected, rarely deeply dissected; lobes fewer than 4 pairs.
      - 15a. Pinnae rhombic-ovate, not dissected (sometimes with 1 lobe at base) ..... 15. *P. delavayi*
      - 15b. Primary pinnae pinnatifid, at least basiscopic bases with 1 lobe.
        - 16a. Lamina linear-lanceolate; pinnae of lower part of lamina with 1 or 2 lobes.
          - 17a. Pinnae acute to acuminate into a spine ..... 16. *P. stimulans*
          - 17b. Pinnae obtuse or nearly rounded and with a spine at apex.
            - 18a. Lamina leathery, subglabrous adaxially ..... 17. *P. rhomboideum*
            - 18b. Lamina thinly leathery, with fibrillose microscales adaxially ..... 18. *P. adungense*
      - 16b. Lamina lanceolate or deltoid-lanceolate; primary pinnae pinnatifid or pinnate.
        - 19a. Lobes or pinnules entire or with forward-pointing small teeth.
          - 20a. Widest part of lamina located at base or below middle; rachis scales filiform ..... 19. *P. cyclolobum*
          - 20b. Widest part of lamina located at middle; rachis scales not filiform ..... 20. *P. mehrae*
        - 19b. At least lobes or pinnules of lower part of pinnae with open spinulose teeth.
          - 21a. Pinnae spreading, approximate, basal acroscopic pinnules broadly ovate or rhombic-ovate ..... 21. *P. acanthophyllum*
          - 21b. Pinnae ascending, distant from each other, basal acroscopic pinnules ovate or narrowly ovate ..... 22. *P. meiguense*
    - 14b. Lamina bipinnatifid to bipinnate, elliptic or broadly lanceolate, broader than (5–)6 cm, ratio of length to width smaller than 4; pinnae with 4–15 pairs of lobes or pinnules.
      - 22a. Primary pinnae not dissected to pinna rachis ..... 23. *P. rigens*
      - 22b. Primary pinnae pinnate.
        - 23a. Pinnules of lower part of pinnae with obvious deltoid auricles.
          - 24a. Basalmost acroscopic pinnules unusually large, pinnatifid; lateral veins concave abaxially ..... 24. *P. baoxingense*
          - 24b. Basalmost acroscopic pinnules often not dissected or partially dissected at most; lateral veins not concave or slightly raised abaxially.
            - 25a. Lamina longer than 40 cm; stipe and rachis scales brown or reddish brown ..... 25. *P. squarrosus*
            - 25b. Lamina shorter than 30 cm; stipe and rachis scales brown, reddish brown, or dark brown ..... 26. *P. orientalitibeticum*

- 23b. Pinnules without auricles.
  - 26a. Pinnules of middle pinnae rhombic or broadly lanceolate.
    - 27a. Rachis scales ovate-lanceolate, not twisted ..... 27. *P. latilepis*
    - 27b. Rachis scales subulate to narrowly lanceolate, twisted.
      - 28a. Pinnules broadly lanceolate, with long sharp teeth ..... 28. *P. neolobatum*
      - 28b. Pinnules rhombic, with short sharp teeth ..... 29. *P. yigongense*
  - 26b. Pinnules of middle pinnae broadly ovate, obliquely oblong, or rhombic-ovate.
    - 29a. Pinnules entire or with few small teeth ..... 30. *P. integrilimum*
    - 29b. Pinnules obviously sharply spinulose.
      - 30a. Lamina 25–60 cm; pinnules obliquely broadly ovate, most pinnules without open, long, sharp teeth ..... 31. *P. garhwalicum*
      - 30b. Lamina 20–40 cm; pinnules rhombic, all pinnules with open, long, sharp teeth ..... 32. *P. rhombiforme*

**2. Polystichum otophorum** (Franchet) Beddome, Handb. Suppl. Ferns Brit. Ind. 42. 1892.

高山耳蕨 gao shan er jue

*Aspidium otophorum* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 116. 1887.

Plants evergreen. Rhizome erect, densely scaly; scales light brown, narrowly ovate. Fronds 15–30 cm; stipe stramineous, 3–9 cm, ca. 2 mm in diam. at base, lower part densely covered with narrowly ovate and lanceolate brown scales, gradually sparser toward lamina apex, scale base ciliate. Lamina 1-pinnate, lanceolate or linear-lanceolate, 15–26 × 2.5–3.2 cm, base rounded-truncate, apex long acuminate; rachis without proliferous bulbils, scaly abaxially; scales brown, linear, ± curved, bases dilated and ciliate. Pinnae 28–36 pairs, alternate, attached at right angles to rachis, several lower pairs sometimes ascendant, shortly stalked, narrowly ovate or ovate, middle pairs 1.2–1.6 cm × 5–8 mm, acroscopic bases with 1 free pinnule, sometimes basispic bases also with 1 smaller pinnule, apex acute and spinulose. Pinnules obovate or rhombic, abaxially with few filiform yellowish brown microscales; frond texture thinly leathery; venation pinnate, lateral veins forked or twice dichotomously branched, slightly raised on both surfaces. Sori in 1 row on each side of midrib, close to pinna margin; indusia present, entire.

- Broad-leaved evergreen forests; 1100–2600 m. W Sichuan.

**3. Polystichum xiphophyllum** (Baker) Diels in Engler & Prantl, Nat. Pflanzenfam. 1(4): 189. 1899.

剑叶耳蕨 jian ye er jue

*Aspidium xiphophyllum* Baker, J. Bot. 26: 227. 1888; *A. monotis* Christ; *Polystichum glandiipinum* Tagawa [“*gladiipinum*”]; *P. monotis* (Christ) C. Christensen; *P. praelongum* Christ.

Plants evergreen. Rhizome erect, densely scaly; scales brown or blackish brown, narrowly ovate. Fronds 25–60 cm; stipe stramineous, 12–36 cm, 2–3 mm in diam. at base, densely covered with lanceolate blackish brown scales, lower part mixed with narrowly ovate scales, scale base ciliate. Lamina 1-pinnate, broadly lanceolate, 18–40 × 6–15 cm, base nearly truncate, apex acuminate; rachis without proliferous bulbils, densely scaly abaxially; scales often blackish brown, linear, with dilated base, margins ciliate. Pinnae 16–20 pairs, alternate, attached at

right angles to rachis, stalk ca. 1 mm, linear-lanceolate, sometimes slightly ascendant and falcate, middle pairs 3–10 cm × 7–16 mm, oblique at base, with acute teeth or subentire, sometimes lower part of pinnae pinnatilobate, apex acuminate; acroscopic bases deltoid-auriculate or with 1 free narrowly ovate pinnule, sometimes basispic bases also with 1 free smaller pinnule; abaxially sparsely scaly; microscales yellowish brown, ciliate with dilated bases; frond texture thinly leathery; venation pinnate on pinnae, lateral veins twice dichotomously branched, slightly distinct abaxially, indistinct adaxially. Sori in 1 row on each side of midrib; indusia subentire.

- Limestone soils in broad-leaved evergreen forests; 600–2200 m. S Gansu, Guizhou, W Hubei, W Hunan, Sichuan, C and SE Taiwan (Nantou, small area in the border region of Taidong and Pingdong), Yunnan (Suijiang).

**4. Polystichum revolutum** P. S. Wang, Pterid. Fl. Guizhou, 549. 2001.

外卷耳蕨 wai juan er jue

Plants evergreen. Rhizome erect, densely scaly; scales blackish brown at middle and brown on margin, narrowly ovate-lanceolate, subentire, acuminate; smaller scales brown, lanceolate. Fronds up to 79 cm; stipe stramineous, up to 36 cm, 3–4 mm in diam. at base, densely scaly; larger scales blackish brown to black, oblong-lanceolate, margins ciliate, apices caudate; smaller scales black, lanceolate or linear. Lamina 1-pinnate, light brown when dry, deltoid-lanceolate, 30–43 × 10–16 cm at middle, base truncate and not contracted, apex acuminate; rachis without proliferous bulbils, densely scaly abaxially; scales black, linear. Pinnae 14–17 pairs, alternate, ascendant and attached at a 70° angle with rachis, shortly stalked, falcate-lanceolate, basal pairs 8–12 cm × 1.3–2 mm, shallowly cordate and with 1 or 2 free pinnules, with rounded shallow teeth not spinulose apically, acuminate; acroscopic bases auriculate and with 1(or 2) free ovate pinnules, sometimes basispic bases also with 1 smaller free pinnule; margins revolute; abaxially sparsely scaly, adaxially glabrous and slightly shiny; microscales brown, filiform; frond texture leathery; venation pinnate on pinnae, lateral veins twice dichotomously branched, slightly distinct abaxially, indistinct adaxially. Sori in 2 or 3 rows on each side of midrib, all pinnae fertile; indusia present, entire, concolorous at middle and on margins, light brown, evanescent. Spores ca. 54.4 × 39.1 μm.

- On rocks by streams in forests; ca. 1000 m. N Guizhou (Jinsha), Sichuan (Emei Shan).

**5. *Polystichum langchungense*** Ching ex H. S. Kung, Chin. J. Appl. Environm. Biol. 3(2): 134. 1997.

浪穹耳蕨 lang qiong er jue

Plants evergreen. Rhizome erect, densely covered with brown or blackish brown scales. Fronds 30–50 cm; stipe stramineous, 14–28 cm, 3–4 mm in diam. at base, densely scaly; scales dark brown, narrowly lanceolate, lower part mixed with lanceolate and ovate scales, scale margins ciliate. Lamina bipinnatifidate, narrowly ovate or broadly lanceolate, 30–45 × 10–16 cm at middle, base rounded-cuneate or truncate, apex acuminate; rachis stramineous, without proliferous bulbils, abaxially scaly; scales dark brown, linear with dilated base, margins ciliate. Pinnae 16–25 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, middle pairs 6.5–10 × 1.5–2 cm, bases oblique, acroscopic margins truncate, basicopic margins broadly cuneate, pinnatifidate nearly to costa except acroscopic bases with 1 or 2 pairs of free pinnules, apices long acuminate or nearly caudate. Lobes 10–14 pairs, alternate, ascendant, oblong or ovate, lower pairs 8–13 × 4–5 mm, acroscopic bases almost exauriculate, margins with small acute teeth or subentire, apex acute and mucronate; sparsely scaly; scales yellowish brown, filiform with dilated base; frond texture leathery or thinly leathery; venation pinnate on lobes, lateral veins forked, slightly visible abaxially, indistinct adaxially. Sori in 1 row on each side of midrib; indusia present, irregularly obtusely toothed.

• Forests; 400–2200 m. Guizhou, Sichuan (margins of Sichuan Basin), C and W Yunnan.

*“Polystichum fengjieense”* (Ching in S. F. Wu in W. T. Wang, Keys Vasc. Pl. Wuling Mts. 58. 1995) belongs here but is a nomen nudum and was not therefore validly published (*Melbourne Code*, Art. 38.1(a)).

**6. *Polystichum diffundens*** H. S. Kung & Li Bing Zhang, Acta Bot. Yunnan. 17: 27. 1995.

铺散耳蕨 pu san er jue

Plants evergreen. Rhizome erect, densely covered with lanceolate dark brown scales. Fronds spreading, ca. 40 cm; stipe stramineous, 11–15 cm, ca. 2 mm in diam. at base, scaly, shallowly canaliculate adaxially; scales dark brown, lanceolate and linear, lower part mixed with larger narrowly ovate dark brown scales. Lamina bipinnatifid, narrowly lanceolate, 25–31 × 5–6 cm at middle, not or slightly contracted at base, acuminate; rachis stramineous, without proliferous bulbils, densely scaly abaxially; scales blackish brown, linear with dilated base, margins ciliate. Pinnae 25–32 pairs, alternate, attached at right angles to rachis, shortly stalked, lanceolate, middle pairs ca. 3 × 1 cm, bases oblique, acroscopic margins truncate, basicopic side cuneate, pinnatifidate except acroscopic bases with 1 or 2 free pinnules, apices acuminate. Lobes 9–12 pairs, alternate, ascendant, obliquely oblong, 2–5 × ca. 2 mm, serrulate, acute; abaxially sparsely scaly, adaxially glabrous; scales yellowish brown, filiform with dilated base; frond texture papery; venation pinnate on lobes, slightly concave on both surfaces. Sori in 1 row on each side of pinnule midrib; indusia present, repand-serrate.

• Forests, by streams; ca. 2100 m. W Sichuan (Jiulong).

**7. *Polystichum incisopinnulum*** H. S. Kung & Li Bing Zhang, Acta Bot. Yunnan. 17: 25. 1995.

深裂耳蕨 shen lie er jue

Plants evergreen. Rhizome erect. Fronds 50–80 cm; stipe stramineous, 24–46 cm, ca. 4 mm in diam. at base, with linear dark brown scales and larger scales; larger scales dark brown, lanceolate and narrowly ovate, margins ciliate. Lamina tripinnatifid, deltoid-ovate or narrowly oblong, 40–42 × 12–26 cm at base, base rounded-cuneate or nearly truncate, apex long acuminate; rachis stramineous, without proliferous bulbils, densely scaly abaxially; scales dark brown, linear with dilated base, margins ciliate. Pinnae 17–20 pairs, alternate or nearly opposite, ascendant, shortly stalked, lanceolate, lower pairs 10–16 × 3.5–6.5 cm, bases oblique, acroscopic margins truncate, basicopic margins broadly cuneate, pinnate, apex slightly ascendant and caudate. Pinnules 14–16 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, 1.5–3 cm × 6–8 mm, basal part obliquely cuneate, apex acute, or acuminate and mucronate; acroscopic bases auriculate, pinnatifid, basal acroscopic pinnule largest, lanceolate, 3–4.5 cm × 4–8 mm; abaxially with few microscales, adaxially glabrous; microscales yellowish brown, filiform with dilated base; lobes oblong, entire or with few inconspicuous small teeth, mucronate; frond texture thinly leathery; venation pinnate on lobes, slightly raised abaxially, slightly concave adaxially. Sori in 1 row on each side of midrib of lobe or midrib of pinnule; indusia present, subentire.

• Broad-leaved evergreen forests; ca. 900 m. W Sichuan (Shimian).

**8. *Polystichum pseudosetosum*** Ching & Z. Y. Liu, Bull. Bot. Res., Harbin 4(4): 19. 1984.

假线鳞耳蕨 jia xian lin er jue

Plants evergreen. Rhizome erect, densely covered with lanceolate dark brown scales. Fronds ca. 40 cm; stipe stramineous, ca. 14 cm, ca. 3 mm in diam. at base, densely scaly; scales dark brown, linear and linear-lanceolate, lower part of stipe mixed with larger scales, larger scales brown, lanceolate. Lamina bipinnate, broadly lanceolate, 28–30 × 6.5–8 cm, slightly contracted and becoming rounded-cuneate toward bases, acuminate; rachis stramineous, densely scaly abaxially, without proliferous bulbils; scales brown, linear with dilated base, margins ciliate. Pinnae 28 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, middle pairs 4–5 × 1–1.2 cm, bases oblique, acroscopic margins truncate, basicopic side broadly cuneate, pinnate, apex acuminate. Pinnules 5–8 pairs, alternate, ascendant, lower pairs shortly stalked, obliquely oblong or ovate, 0.8–1.2 cm × 4–5 mm, obliquely cuneate, acroscopic bases exauriculate, entire, acute; basal acroscopic pinnule largest, deltoid-ovate, acroscopic margins almost entire; both surfaces glabrous; frond texture thinly leathery; venation pinnate on pinnules, indistinct on both surfaces or concave adaxially. Sori in 1 row on each side of pinnule midrib; indusia present, entire.

• Broad-leaved forests; ca. 1600 m. Chongqing (Nanchuan).

**9. *Polystichum exauriforme*** H. S. Kung & Li Bing Zhang, Acta Bot. Yunnan. 17: 27. 1995.

缺耳耳蕨 que er er jue

Plants evergreen. Rhizome erect. Fronds ca. 60 cm; stipe stramineous, 26–28 cm, ca. 4 mm in diam. at base, scaly; scales dark brown, linear and lanceolate, lower part of stipe mixed with larger scales; larger scales dark brown, ovate-lanceolate. Lamina bipinnate, oblong-lanceolate, 33–37 × 12–14 cm, slightly contracted toward base, apex acuminate; rachis stramineous, densely scaly abaxially, without proliferous bulbils; scales dark brown, linear with dilated bases, margins ciliate. Pinnae 20–24 pairs, alternate, attached at nearly right angles to rachis, shortly stalked, lanceolate, middle pairs 6.5–7 × 1.8–2.2 cm, bases oblique, acroscopic margins truncate, basiscopic margins broadly cuneate, pinnate, apices acuminate. Pinnules 6–9 pairs, alternate, ascendant, lower pairs shortly stalked, obliquely oblong, 1.2–1.8 cm × 5–8 mm, thinly leathery, obliquely cuneate, acroscopic bases exauriculate, margins entire, apices acute; basal acroscopic pinnules largest, obliquely ovate, acroscopic margins slightly toothed; both surfaces glabrous; venation pinnate on pinnule, abaxially concave, adaxially indistinct. Sori in 1 row on each side of pinnule midrib; indusia present, toothed.

- Forests on basic soils; ca. 2600 m. Sichuan (Jiulong).

**10. *Polystichum sinotsus-simense*** Ching & Z. Y. Liu, Bull. Bot. Res., Harbin 4(4): 18. 1984.

中华对马耳蕨 zhong hua dui ma er jue

Plants evergreen. Rhizome erect, densely scaly; scales dark brown or brown, narrowly ovate. Fronds 18–30 cm; stipe stramineous, 6–16 cm, ca. 2 mm in diam. at base, lower part scaly, gradually glabrous upward; scales dark brown, linear-lanceolate, margins ciliate. Lamina lanceolate to broadly lanceolate, 12–20 × 4–7 cm, base truncate and bipinnate, apex acuminate; rachis stramineous, sparsely scaly abaxially, without proliferous bulbils; scales dark brown, linear with dilated bases, margins ciliate. Pinnae 16–24 pairs, alternate, attached at right angles to rachis or slightly ascendant, sometimes basal pair angled basiscopically, shortly stalked, lanceolate, middle pairs 2–5 cm × 6–10 mm, bases oblique, acroscopic margins truncate, basiscopic margins broadly cuneate, pinnate, apices shortly acuminate. Pinnules 4–9 pairs, alternate, slightly ascendant, obliquely broadly ovate or broadly obovate, lower pairs 4–6 × 2–4 mm, bases obliquely broadly cuneate, acroscopic bases without conspicuous auricles, margins entire or with few inconspicuous small teeth, apices obtuse and mucronate; abaxially with few microscales; microscales yellowish brown, hairlike; frond texture thinly leathery; venation pinnate on pinnules, lateral veins free, simple or forked, slightly concave abaxially, indistinct adaxially. Sori in 1 row on one side or each side of pinnule midrib, 1–6 per pinnule; indusia present, repand.

- Forests; 1100–1800 m. Chongqing (Chengkou, Nanchuan), C Guizhou (Anshun), W Hunan (Shimen).

**11. *Polystichum pseudoxiphophyllum*** Ching ex H. S. Kung, Chin. J. Appl. Environm. Biol. 3(2): 135. 1997.

洪雅耳蕨 hong ya er jue

*Polystichum xiphophyllum* (Baker) Diels f. *bipinnata* Ching.

Plants evergreen. Rhizome erect, densely scaly; scales brown or dark brown, narrowly ovate. Fronds 30–60 cm; stipe stramineous, 18–40 cm, 3–4 mm in diam. at base, densely scaly; scales dark brown or blackish brown, linear-lanceolate, margins ciliate, sometimes upper part of stipe glabrous, lower part of stipe with lanceolate scales. Lamina bipinnate, broadly lanceolate to narrowly ovate, 25–50 × 10–14 cm, rounded-cuneate, acuminate; rachis without proliferous bulbils, densely scaly abaxially; scales blackish brown or brown, linear with dilated base, margins ciliate. Pinnae 18–20 pairs, alternate, attached at right angles to rachis or slightly ascendant, shortly stalked, linear-lanceolate, middle pairs 6–10 × 1.2–2 cm, bases obliquely cuneate, acroscopic margins shallowly cordate, basiscopic margins semi-orbicular, pinnate, apices long acuminate. Pinnules 6–12 pairs, alternate, slightly ascendant, lower pairs shortly stalked, obliquely broadly ovate or broadly obovate, lower pairs 6–8 × 4–5 mm, bases obliquely broadly cuneate, acroscopic bases without or only with inconspicuous auricles, margins entire or with few inconspicuous small teeth, apices obtuse, or acute and mucronate; basal acroscopic pinnule largest, often ovate, sometimes acroscopic side pinnatifidate; abaxially with few microscales, microscales yellowish brown, hairlike; frond texture thinly leathery; venation pinnate on pinnules, lateral veins often forked, indistinct on both surfaces or only slightly concave abaxially. Sori in 1 row on each side of pinnule midrib, 2–8 per pinnule; indusia present, repand.

- Under bushes; 1300–1900 m. Chongqing (Chengkou), Guangdong (Ruyuan), Guizhou, Hunan (Shimen), Jiangxi (Huanggang), Sichuan (Hongya, Xingwen), Yunnan (Maguan).

*Polystichum pseudoxiphophyllum* is tentatively recognized here pending further study. It is similar to *P. xiphophyllum*. One of us (Barrington) thinks it is more similar to *P. pseudosetosum* and *P. tsus-simense*.

**12. *Polystichum herbaceum*** Ching & Z. Y. Liu, Bull. Bot. Res., Harbin 4(4): 20. 1984.

草叶耳蕨 cao ye er jue

Plants evergreen. Rhizome erect, densely covered with narrowly ovate dark brown scales. Fronds 30–50 cm; stipe stramineous, 13–30 cm, 3–4 mm in diam. at base, lower part densely scaly; scales dark brown, lanceolate and linear, upper part of stipe with linear scales, sometimes glabrous, scale margins ciliate. Lamina bipinnate, ovate or narrowly ovate, 22–36 × 8–14 cm, rounded-cuneate, acuminate; rachis without proliferous bulbils, densely scaly abaxially; scales blackish brown or dark brown, linear with dilated bases, margins ciliate. Pinnae 20–26 pairs, alternate, slightly ascendant, approximate, stalked, linear-lanceolate, middle pairs 6–10 × 1.5–2.5 cm, bases oblique, acroscopic margins truncate, basiscopic margins broadly cuneate, pinnate, apices long acuminate or caudate. Pinnules 8–12 pairs, alternate, slightly ascendant, approximate, shortly stalked, broadly lanceolate or narrowly obliquely oblong, somewhat falcate, lower pairs 10–16 × 4–5 mm, bases obliquely cuneate, auricles sometimes deltoid, margins inconspicuously serrulate, apices acuminate and spinulose; basal

acroscopic pinnule largest, ovate or lanceolate, 1.2–2.5 cm × 5–6 mm, often pinnatifid; abaxially with few microscales; microscales yellowish brown, hairlike; frond texture papery or thinly leathery; venation pinnate on pinnules; lateral veins often forked, indistinct on both surfaces, sometimes slightly raised abaxially. Sori in 1 row on each side of pinnule midrib, 2–10 per pinnule; indusia present, entire.

• Forests; 1100–1700 m. Chongqing, Guizhou (Fanjing Shan), W Hunan.

**13. *Polystichum tsus-simense*** (Hooker) J. Smith, Hist. Fil. 219. 1875.

对马耳蕨 *dui ma er jue*

*Aspidium tsus-simense* Hooker, Sp. Fil. 4: 16. 1862; *A. aculeatum* (Linnaeus) Swartz var. *pallescens* Franchet; *Polystichum falcilobum* Ching; *P. tsus-simense* var. *pallescens* Franchet; *P. tsus-simense* var. *parvipinnulum* W. M. Chu.

Plants evergreen. Rhizome erect, densely scaly; scales dark brown, narrowly lanceolate. Fronds 30–60 cm; stipe stramineous, 16–30 cm, 2–4 mm in diam. at base, lower part densely scaly; scales blackish brown, lanceolate and linear, upper scales gradually linear, margins ciliate. Lamina broadly lanceolate or narrowly ovate, 20–42 × 6–14 cm, rounded-cuneate or truncate, bipinnate at lower part, long acuminate or caudate; rachis without proliferous bulbils, densely scaly abaxially; scales blackish brown or brown, linear with dilated base, margins ciliate. Pinnae 20–26 pairs, alternate, attached at right angles to rachis or slightly ascendant, shortly stalked, linear-lanceolate, middle pairs 4–9 × 1–1.5 cm, bases oblique, acroscopic margins truncate, basiscopic margins broadly cuneate, pinnate, apices acuminate to caudate. Pinnules 7–13 pairs, alternate, strongly ascendant, approximate, shortly stalked, obliquely rounded, obliquely ovate or deltoid-ovate, lower pairs 5–10 × 4–6 mm, apex acute or obtuse, mucronate; basal acroscopic pinnule largest, ovate or deltoid-ovate, 7–15 × 4–6 mm, sometimes pinnatifid; abaxially with few microscales; microscales yellowish brown, filiform with dilated bases; frond texture thinly leathery; venation pinnate on pinnules, lateral veins often forked, abaxially slightly concave or raised, adaxially indistinct. Sori in 1 row on each side of pinnule midrib, 3–9 per pinnule; indusia present, entire.

Broad-leaved evergreen forests, shrubs; 200–3400 m. Anhui, Fujian, S Gansu, Guangxi, Guizhou, Henan (Xixia), Hubei, W Hunan, Jiangxi, Jilin (Mopan Shan), S Shaanxi, Shandong, Sichuan, Taiwan, E and S Xizang, Yunnan, Zhejiang [N and NW India, Korea, Japan, Vietnam].

Roux (Bull. Nat. Hist. Mus. London, Bot. 30(2): 33–130. 2000) treated *Polystichum tsus-simense* as a synonym of *P. luctuosum* (Kunze) T. Moore from Africa.

**14. *Polystichum mayebarae*** Tagawa, Acta Phytotax. Geobot. 3: 91. 1934 [*“mayebarai”*].

前原耳蕨 *qian yuan er jue*

*Polystichum tsus-simense* (Hooker) J. Smith var. *mayebarae* (Tagawa) Sa. Kurata.

Plants evergreen. Rhizome erect, densely scaly; scales dark brown, narrowly lanceolate. Fronds 45–60 cm; stipe stramineous, 22–30 cm, 4–5 mm in diam. at base, lower part densely scaly; scales dark brown, narrowly ovate, upper part of stipe densely scaly; scales brown, lanceolate and narrowly lanceolate, margins ciliate. Lamina narrowly ovate or broadly lanceolate, 28–48 × 8–14 cm, rounded-cuneate, bipinnate at lower part, acuminate; rachis without proliferous bulbils, densely scaly abaxially; scales linear with dilated base, margins ciliate, lower part of rachis with lanceolate scales; scales light brown to blackish brown. Pinnae 20–26 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, often falcate, middle pairs 6–10 × 1.5–2.5 cm, bases oblique, acroscopic margins nearly cuneate, basiscopic margins rounded-cuneate, pinnate, apices acuminate. Pinnules 10–14 pairs, alternate, slightly ascendant, lower pairs shortly stalked, obliquely ovate or narrowly ovate, 8–15 × 5–8 mm, basal part obliquely broadly cuneate, acroscopic bases often with small deltoid auricles, margins with small acute teeth, apices acute and mucronate; basal acroscopic pinnule largest, often ovate, sometimes pinnatifid; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, slightly concave abaxially, indistinct adaxially. Sori in 1 row on each side of pinnule midrib, 6–12 per pinnule; indusia present, entire.

Forests; 800–2100 m. Gansu (Kangxian), Guizhou (Hezhang), Henan, Hubei (Junxian), Sichuan, Yunnan, Zhejiang [Japan].

*Polystichum mayebarae* is sometimes treated as a variety of *P. tsus-simense*.

**15. *Polystichum delavayi*** (Christ) Ching ex Li Bing Zhang & H. S. Kung, Acta Phytotax. Sin. 36: 468. 1998.

洱源耳蕨 *er yuan er jue*

*Polystichum ilicifolium* (D. Don) T. Moore var. *delavayi* Christ, Bull. Soc. Bot. France 52(Mém. 1): 31. 1905; *P. stimulans* (Kunze ex Mettenius) Beddome var. *delavayi* (Christ) H. S. Kung.

Plants evergreen. Rhizome erect, densely covered with lanceolate brown scales. Fronds 20–30 cm; stipe stramineous, 6–10 cm, ca. 2 mm in diam. at base, densely scaly; scales light brown, lanceolate and ovate. Lamina linear-lanceolate, 15–18 × 1.8–2.5 cm, not contracted at base, 1-pinnate but basal pinnae sometimes pinnatifid, acuminate or long acuminate; rachis without proliferous bulbils, densely scaly abaxially; scales light brown, lanceolate and linear, margins ciliate. Pinnae 24–35 pairs, alternate, slightly ascendant, rhombic-ovate, 8–12 × 5–8 mm, bases obliquely broadly cuneate, auricles deltoid, margins with small teeth, basal acroscopic margins of lower pinnae 1-lobed, apices acute and mucronate; abaxially scaly; microscales filiform; frond texture leathery; venation pinnate on pinnae, slightly raised abaxially, slightly concave abaxially. Sori in 1 row on each side of midrib; indusia present, concave at center, toothed.

• Broad-leaved forests, limestone cliffs; 2200–2300 m. NW Yunnan (Eryuan, Zhongdian).

Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 28. 1997) treated *Polystichum delavayi* as a synonym of *P. cyclolobum*.



**16. *Polystichum stimulans*** (Kunze ex Mettenius) Beddome, Ferns Brit. India, t. 31. 1865.

猫儿刺耳蕨 mao er ci er jue

*Aspidium stimulans* Kunze ex Mettenius, Abh. Senckenberg. Naturf. Ges. 2: 327. 1858; *A. ilicifolium* D. Don; *Dryopteris ilicifolium* (D. Don) Kuntze; *Polystichum ilicifolium* (D. Don) T. Moore (1858), not Fée (1850).

Plants evergreen. Rhizome erect, densely covered with lanceolate brown scales. Fronds 12–20 cm; stipe stramineous, 3–12 cm, 2–3 mm in diam. at base, scaly; scales brown or dark brown, lanceolate and filiform, denser at base of stipe. Lamina linear-lanceolate, 7–15 × 1.8–2.5 cm, not or slightly contracted at base, 1-pinnate but lower pinnae often pinnatifid, acuminate or long acuminate; rachis without proliferous bulbils, abaxially scaly; scales narrow, margins ciliate. Pinnae 10–16 pairs, alternate, attached at right angles to rachis, obliquely ovate nearly to deltoid, 8–14 × 6–8 mm, bases broadly obliquely cuneate, obliquely rounded-cuneate, or nearly cuneate, auricles deltoid, margins with small teeth, basal acroscopic margins of lower pinnae with 1 free pinnule or 1 or 2 pairs of lobes, apices acute, or acuminate and mucronate; lobes ovate, apex acute and mucronate; abaxially scaly; microscales filiform; frond texture hard leathery; venation pinnate on pinnae, indistinct on both surfaces. Sori in 1 row on each side of midrib; indusia present, toothed.

On rocks; 1700–3000 m. Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal].

*Polystichum stimulans* was previously published by C. Presl (Tent. Pterid. 83. 1836) but as a nomen nudum and not therefore validly published (*Melbourne Code*, Art. 38.1(a)).

**17. *Polystichum rhomboideum*** Ching, Fl. Tsinling. 2: 157, 223. 1974.

菱羽耳蕨 ling yu er jue

*Polystichum pseudorhomboideum* H. S. Kung & Li Bing Zhang, nom. illeg. superfl.

Plants evergreen. Rhizome erect, densely covered with lanceolate brown scales. Fronds 10–18 cm; stipe stramineous, 4–8 cm, 1–2 mm in diam. at base, scaly; scales light brown, ovate and filiform. Lamina lanceolate or linear-lanceolate, 6–12 × 2–3 cm, not or slightly contracted at base, 1-pinnate, sometimes with 1 lobe on acroscopic bases of basal pinnae only, acuminate; rachis without proliferous bulbils, abaxially scaly; scales narrow, margins ciliate. Pinnae 8–16 pairs, alternate, attached at right angles to rachis, ovate or nearly deltoid, 1–1.8 × 0.8–1.4 cm, bases broadly cuneate or obliquely broadly cuneate, acroscopic bases auriculate, shortly stalked, margins spinulose-toothed, often with 1 or 2 lobes on acroscopic base, sometimes with free pinnules, apices nearly rounded and mucronate; lobes obovate or rhombic, obtuse and mucronate at apex; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnae, slightly raised on both surfaces. Sori in 1 row on each side of midrib; indusia present, toothed.

• On rocks; 1800–2000 m. S Gansu (Zhouqu), W Sichuan (Leibo).

*Polystichum pseudorhomboideum* is a nomen novum replacing *P. rhomboideum* Ching, but it was nomenclaturally superfluous when published because the supposed earlier homonym, “*Polystichum rhomboideum* Schott” (Gen. Fil. ad t. 9. 1834), is a nomen nudum and was not therefore validly published (*Melbourne Code*, Art. 38.1(a)).

*Polystichum rhomboideum* does not occur in Yunnan.

Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 28. 1997) treated *Polystichum rhomboideum* as a synonym of *P. cyclobum*.

**18. *Polystichum adungense*** Ching & Fraser-Jenkins ex H. S. Kung & Li Bing Zhang, Acta Phytotax. Sin. 32: 370. 1994.

阿当耳蕨 a dang er jue

Plants evergreen. Rhizome erect, densely covered with lanceolate brown scales. Fronds 12–14 cm; stipe stramineous, 4–5 cm, 1–2 mm in diam. at base, scaly; scales brown, filiform and lanceolate. Lamina 1-pinnate, linear-lanceolate, 10–14 × 2–3 cm, slightly contracted at base, acuminate; rachis without proliferous bulbils, scaly on both surfaces; scales filiform, strongly ciliate at base. Pinnae 10–12 pairs, alternate, attached at right angles to rachis, 1–2 cm apart from one another, ovate or rhombic-ovate, 1–1.6 × 0.8–1 cm, papery, bases obliquely cuneate or nearly truncate, acroscopic bases with semi-orbicular auricles, sometimes with 1 or 2 free pinnules, margins biserrate, tips of teeth spinulose, apices obtuse; both surfaces densely scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnae, slightly raised abaxially, slightly concave adaxially. Sori in 1 row on each side of midrib; indusia present, margins irregular.

Broad-leaved evergreen forests; ca. 1600 m. Yunnan (Gongshan) [NE India (Assam), N Myanmar].

**19. *Polystichum cyclobum*** C. Christensen, Cat. Pl. Yun-Nan, 111. 1916.

圆片耳蕨 yuan pian er jue

Plants evergreen. Rhizome erect, densely covered with lanceolate brown scales. Fronds 12–25 cm; stipe stramineous, 2–12 cm, 1–4 mm in diam. at base, densely scaly; scales light brown, ovate and narrowly lanceolate. Lamina lanceolate, 8–25 × 1.8–5 cm, usually not contracted at base, bipinnatifid or rarely bipinnate and with 1 or 2 free pinnules, acuminate; rachis stramineous, without proliferous bulbils; scales light brown, linear-lanceolate or filiform, denser abaxially, linear-lanceolate scales with ciliate margins, filiform scales ciliate at base. Pinnae 15–26 pairs, alternate, slightly ascendant, ovate to narrowly ovate, 0.8–2.5 × 0.6–2 cm, obliquely truncate or nearly rounded, shortly stalked, pinnatifid or pinnate, acute or obtuse and mucronate. Lobes or pinnules 1–4 pairs, alternate, attached at right angles to rachis, obovate, rhombic-ovate, or oblong, basal acroscopic lobes or pinnules largest, margins entire or sometimes serrulate, apices obtuse and mucronate; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on lobes or pinnules, slightly raised abaxially, indistinct adaxially. Sori in 1 row on each side of midrib; indusia present, slightly incised.

On rocks, basic soils; 2100–3000 m. Guizhou, W Sichuan, SE Xizang (Zayü), Yunnan [Bhutan, India (Sikkim), Nepal].

*Polystichum acanthophyllum* (Franchet) Christ p.p. in S. K. Wu & X. Cheng (in W. T. Wang, Vasc. Pl. Hengduan Mts. 1: 144. 1993) is a misidentification of *P. cyclolobum*.

**20. *Polystichum mehrae*** Fraser-Jenkins & Khullar, Indian Fern J. 2(1, 2): 10. 1985.

印西耳蕨 yin xi er jue

*Polystichum acanthophyllum* (Franchet) Christ var. *indicum* Christ; *P. mehrae* f. *latifundus* H. S. Kung & Li Bing Zhang.

Plants evergreen. Rhizome erect, densely covered with lanceolate brown scales. Fronds 12–30 cm; stipe stramineous, 2–14 cm, 1–4 mm in diam. at base, scaly; scales brown, ovate and narrowly lanceolate. Lamina bipinnatifid or bipinnate, narrowly lanceolate, 10–26 × 2.5–5 cm, slightly contracted at base, acuminate; rachis without proliferous bulbils, abaxially scaly; scales brown, larger scales lanceolate, margins ciliate; smaller scales filiform, strongly ciliate at base. Pinnae 14–25 pairs, alternate, attached at right angles to rachis or slightly ascendant, ovate to narrowly ovate, 1.2–3 × 0.8–1.5 cm, obliquely cuneate to broadly cuneate, shortly stalked, pinnatifid or pinnate, acuminate. Lobes or pinnules 1–4 pairs, alternate, attached at right angles to rachis, broadly ovate or ovate, basal acroscopic lobes often free and largest, margins entire or sometimes serrulate, apices acuminate and spinulose; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on lobes or pinnules, slightly raised abaxially, indistinct adaxially. Sori in 1 row on each side of midrib; indusia present, slightly incised.

Forests, limestone rocks, basic soils; 2300–2500 m. W Sichuan (Daocheng, Kangding, Tianquan), E Xizang, Yunnan [Bhutan, N India, Kashmir, Nepal, Pakistan].

**21. *Polystichum acanthophyllum*** (Franchet) Christ, Bull. Soc. Bot. France 52(Mém. 1): 30. 1905.

刺叶耳蕨 ci ye er jue

*Aspidium acanthophyllum* Franchet, Bull. Soc. Bot. France 32: 28. 1885; *Polystichum aculeatum* (Linnaeus) Roth ex Mertens var. *acanthophyllum* (Franchet) Beddome; *P. horridipinum* Hayata; *P. spinulescens* Tagawa.

Plants evergreen. Rhizome erect, densely scaly; scales blackish or dark brown, lanceolate. Fronds 8–28 cm; stipe stramineous, 2–12 cm, 3–5 mm in diam. at base, scaly; scales brown or dark brown, narrowly ovate and lanceolate. Lamina bipinnate, lanceolate, 6–26 × 1.5–5 cm, slightly contracted at base, acuminate; rachis without proliferous bulbils, abaxially scaly; scales brown or dark brown; larger scales lanceolate, margins ciliate; smaller scales filiform, strongly ciliate at base. Pinnae 12–28 pairs, alternate, attached at right angles to rachis or slightly ascendant, deltoid-ovate, 0.6–2.5 cm, bases obliquely broadly cuneate to truncate, sessile, pinnate, apices acute and spinulose. Pinnules 1–3 pairs, alternate, attached at nearly right angles to rachis, broadly ovate, rhombic-ovate, or obovate, bases cuneate, margins with few open spinulose teeth, apices

acute and spinulose; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, slightly concave abaxially, indistinct adaxially. Sori in 1 row on each side of midrib; indusia present, slightly toothed.

Alpine coniferous forests, mixed broad-leaved coniferous forests; (2000–)2800–4100 m. W Sichuan, Taiwan, SE Xizang, NW and W Yunnan [N India, Nepal].

**22. *Polystichum meiguense*** Ching & H. S. Kung, Acta Bot. Boreal.-Occid. Sin. 9: 269. 1989.

美姑耳蕨 mei gu er jue

Plants evergreen. Rhizome unknown. Fronds ca. 30 cm; stipe stramineous, 12–20 cm, ca. 3 mm in diam. at base, sparsely scaly; scales light brown, ovate and lanceolate. Lamina lanceolate, 28–30 × 3.5–5 cm, slightly contracted at base, acuminate; rachis without proliferous bulbils, sparsely scaly; scales brown; larger scales lanceolate, margins ciliate; smaller scales filiform, strongly ciliate at base. Pinnae 20–22 pairs, alternate, ascendant, sparsely arranged, broadly lanceolate, 2–3.5 × 1–1.2 cm, bases obliquely broadly cuneate, sessile, pinnate, apices acuminate and spinulose. Pinnules 2 or 3 pairs, alternate, ascendant, ovate or narrowly ovate, bases cuneate, margins with few open spinulose teeth, apices acuminate and spinulose; abaxially sparsely scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on lobes, indistinct on both surfaces. Sori sparse, 1 or 2 per pinnule, on one side or both sides of midrib; indusia present, erose.

• Forests. SW Sichuan (Meigu).

**23. *Polystichum rigens*** Tagawa, Acta Phytotax. Geobot. 6(2): 91. 1937.

阔鳞耳蕨 kuo lin er jue

*Polystichum platyklamys* Ching.

Plants evergreen. Rhizome erect, stout, densely scaly; scales brown or dark brown, lanceolate. Fronds 40–60 cm; stipe stramineous, 14–30 cm, 3–5 mm in diam. at base, densely scaly; scales brown to dark brown, ovate and lanceolate. Lamina bipinnatifid, ovate to narrowly oblong, 26–50 × 11–16 cm, rounded-cuneate or nearly truncate, acuminate; rachis without proliferous bulbils, abaxially densely scaly; scales light brown or brown, ovate and lanceolate, margins ciliate, not twisted. Pinnae 14–23 pairs, alternate, slightly ascendant or attached at right angles to rachis, linear-lanceolate, sometimes falcate, middle pairs 6–11 × 1.5–2.5 cm, obliquely cordate or rounded-cuneate, shortly stalked, bipinnatifid with 1 or 2 pairs of basal free pinnules, acuminate. Pinnules and lobes 10–15 pairs, alternate, ascendant, narrowly ovate or deltoid-ovate, basal acroscopic lobes largest, 1–2 cm × 5–6 mm, bases rounded, margins with spinulose forward-pointing teeth, apices acuminate and spinulose; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules and lobes, slightly concave abaxially, flat or slightly concave adaxially. Sori in 1 row on each side of midrib; indusia present, subentire.

Forests; ca. 1200 m. Chongqing (Chengkou, Wushan), Gansu

(Kangxian, Tianshui), Hubei (Shennongjia, Zhuxi), Shaanxi (Baoji, S Wutai Shan) [Japan].

**24. *Polystichum baoxingense*** Ching & H. S. Kung, Acta Bot. Boreal.-Occid. Sin. 9: 271. 1989.

宝兴耳蕨 bao xing er jue

Plants evergreen. Rhizome erect, stout, densely scaly; scales brown, broadly lanceolate. Fronds 30–60 cm; stipe stramineous, 16–26 cm, 4–6 mm in diam. at base, densely scaly; scales brown, ovate and broadly lanceolate. Lamina bipinnate, narrowly ovate to narrowly oblong, 28–50 × 9–12 cm, rounded-cuneate, acuminate; rachis without proliferous bulbils, densely scaly on both surfaces; scales brown, lanceolate and linear, margins ciliate. Pinnae 23–24 pairs, alternate, slightly ascendant, approximate, narrowly lanceolate, sometimes falcate, middle pairs 5.5–8 × 1.5–2.5 cm, obliquely broadly cuneate or nearly truncate, shortly stalked, pinnate, acuminate. Pinnules 10–12 pairs, alternate, slightly ascendant, approximate, obliquely ovate or narrowly ovate, bases obliquely broadly cuneate, apices acute and spinulose; auricles deltoid; basal acroscopic pinnules largest, 1.2–2 cm × 6–8 mm, pinnatilobate, margins serrulate; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, slightly concave abaxially, indistinct adaxially. Sori in 1 row on each side of midrib, 3–7 per pinnule; indusia present, entire.

• Forests; 1200–2300 m. Guizhou, W Hubei (Hefeng), S Shaanxi (Pingli), Sichuan.

**25. *Polystichum squarrosus*** (D. Don) Fée, Mém. Foug. 5: 278. 1852.

密鳞耳蕨 mi lin er jue

*Aspidium squarrosus* D. Don, Prodr. Fl. Nepal. 4. 1825; *A. brachypterum* Kunze; *Polystichum apicisternale* Ching & S. K. Wu; *P. brachypterum* (Kunze) Ching; *P. integripinnulum* Ching.

Plants evergreen. Rhizome erect, densely covered with broadly lanceolate brown scales. Fronds 50–80 cm; stipe amber, 18–42 cm, up to 1 cm in diam. at base, densely scaly; scales brown or reddish brown, ovate and linear, basal stipe scales dark brown at middle. Lamina bipinnate, narrowly ovate or narrowly oblong, 45–62 × 9–16 cm, rounded-cuneate, sometimes slightly contracted at base, acuminate; rachis without proliferous bulbils, densely scaly; scales reddish brown or brown, lanceolate with ciliate margins or linear, apex twisted. Pinnae 30–40 pairs, alternate, slightly ascendant, linear-lanceolate or broadly lanceolate, middle pairs 5–10 × 1.5–2 cm, obliquely cuneate to broadly cuneate, with stalk 1–2 mm, pinnate, acuminate. Pinnules 8–18 pairs, alternate, slightly ascendant, approximate, obliquely ovate, broadly ovate, or nearly rhombic, auricles deltoid, bases obliquely broadly cuneate, margins entire or with few spinulose teeth, apices acute or acuminate and spinulose; basal acroscopic pinnules largest, 1.2–1.6 cm × 5–6 mm, not divided or acroscopic margins pinnatilobate; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, not concave or

slightly raised abaxially, slightly concave adaxially. Sori in 1 row on each side of midrib; indusia present, entire.

Forests; 1900–2400 m. S Xizang [Bhutan, N India, Kashmir, Nepal, Pakistan].

**26. *Polystichum orientalitibeticum*** Ching, Fl. Xizang. 1: 240. 1983.

藏东耳蕨 zang dong er jue

Plants evergreen. Rhizome erect, densely covered with broadly lanceolate dark brown scales. Fronds ca. 30 cm; stipe amber, 10–12 cm, ca. 2 mm in diam. at base, densely covered with linear reddish scales and narrowly ovate blackish purple scales. Lamina bipinnate, narrowly ovate, 22–30 × 7–8 cm, slightly rounded-cuneate, acuminate; rachis without proliferous bulbils, densely scaly on both surfaces; scales reddish brown, filiform and lanceolate, abaxially mixed with narrowly ovate blackish purple scales. Pinnae 18–22 pairs, alternate, attached at right angles to rachis, linear-lanceolate, middle pairs 3.5–4.5 × 1–1.2 cm, slightly oblique to rounded-cuneate, sessile, pinnate, acuminate. Pinnules 7–10 pairs, lower pairs opposite, upper pairs alternate, slightly ascendant, approximate, obliquely ovate or rhombic, auricles deltoid, bases obliquely cuneate, margins with spinulose teeth, apices acuminate and spinulose; basal acroscopic pinnules largest, ca. 7 × 3 mm; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, indistinct abaxially, slightly raised adaxially. Sori in 1 row on each side of midrib; indusia present, subentire.

• Broad-leaved forests; ca. 2000 m. E Xizang (Bomi).

**27. *Polystichum latilepis*** Ching & H. S. Kung, Acta Bot. Boreal.-Occid. Sin. 9: 273. 1989.

宽鳞耳蕨 kuan lin er jue

Plants evergreen. Rhizome erect, densely covered with lanceolate dark brown scales. Fronds 40–60 cm; stipe stramineous or amber, 18–28 cm, 4–6 mm in diam. at base, densely covered with ovate and lanceolate scales; scales brown to dark brown, not twisted. Lamina bipinnate, narrowly ovate to broadly lanceolate, 30–45 × 8–12 cm, rounded-cuneate, slightly contracted at base, acuminate; rachis without proliferous bulbils, abaxially densely scaly; scales light brown to dark brown, ovate and narrowly lanceolate, flat, not twisted. Pinnae 24–26 pairs, alternate, attached at right angles to rachis or slightly ascendant, linear-lanceolate, sometimes falcate, middle pairs 5–8.5 × 1.4–1.6 cm, obliquely broadly cuneate to rounded-cuneate, shortly stalked, pinnate, acuminate. Pinnules 6–12 pairs, alternate, ascendant, approximate, obliquely ovate or broadly lanceolate, bases obliquely cuneate, margins entire or with few small acute forward-pointing teeth, apices acuminate and spinulose; basal acroscopic pinnules largest, 1.2–1.8 cm × 3–6 mm; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, indistinct abaxially, flat or slightly concave adaxially. Sori in 1 row on each side of midrib; indusia present, entire.

• Forests; 900–1600 m. Anhui (Shucheng), Chongqing (Wushan), Hubei, Jiangxi, Zhejiang (Tianmu Shan).

**28. *Polystichum neolobatum*** Nakai, Bot. Mag. (Tokyo) 39: 118. 1925.

革叶耳蕨 ge ye er jue

*Aspidium lobatum* (Hudson) Swartz var. *chinense* Christ; *Polystichum assurgens* Ching & S. K. Wu; *P. lobatum* (Hudson) C. Presl var. *chinense* Christ; *P. neolobatum* Nakai var. *brevipinnum* Tagawa; *P. squarrosum* (D. Don) Fée var. *chinense* (Christ) C. Christensen.

Plants evergreen. Rhizome erect, densely covered with lanceolate brown scales. Fronds 30–60 cm; stipe stramineous, 12–30 cm, 4–6 mm in diam. at base, densely covered with scales; scales brown to dark brown, ovate and lanceolate, apex twisted. Lamina bipinnate, narrowly ovate to broadly lanceolate, 32–55 × 6–11 cm, base rounded-cuneate or nearly truncate, slightly contracted, apex acuminate; rachis without proliferous bulbils, abaxially densely scaly; scales lanceolate and narrowly lanceolate, brown to blackish brown, strongly twisted. Pinnae 26–32 pairs, alternate, slightly ascendant, approximate, lanceolate, sometimes falcate, middle pairs 3.5–10 × 1.2–2 cm, obliquely broadly cuneate or shallowly cordate, shortly stalked, pinnate, acuminate. Pinnules 5–10 pairs, alternate, slightly ascendant, approximate, obliquely ovate or broadly lanceolate, bases obliquely cuneate, margins entire or with few small acute forward-pointing teeth, apices acuminate and spinulose; basal acroscopic pinnules largest, 1–2 cm × 4–6 mm; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, concave abaxially, flat or slightly concave adaxially. Sori in 1 row on each side of midrib; indusia present, entire.

Broad-leaved forests; 1300–3100 m. Anhui, Chongqing, Gansu, Guizhou, Henan, Hubei, Hunan, Jiangxi, ?Ningxia, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Japan, Nepal].

**29. *Polystichum yigongense*** Ching & S. K. Wu, Fl. Xizang. 1: 210. 1983.

易贡耳蕨 yi gong er jue

Plants evergreen. Rhizome erect, densely covered with broadly lanceolate brown or reddish brown scales; scales up to 1.5 × ca. 0.7 cm. Fronds up to 50 cm; stipe stramineous, ca. 15 cm, 4–6 mm in diam. at base, densely covered with broadly lanceolate scales; scales brown or reddish brown, apex twisted. Lamina bipinnate, lanceolate, ca. 37 × 9 cm, base rounded, slightly contracted, apex acuminate; rachis without proliferous bulbils, abaxially densely scaly; scales brown, lanceolate and linear-lanceolate, often strongly twisted. Pinnae ca. 25 pairs, alternate, spreading, approximate, lanceolate, middle pairs ca. 4.5 × 1.5 cm, obliquely broadly cuneate, shortly stalked, pinnate, acute. Pinnules 8–10 pairs, alternate, ascendant, approximate, rhombic, bases obliquely cuneate, margins entire or with few small forward-pointing acute teeth, apices acuminate and spinulose; basal acroscopic pinnules largest; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, concave abaxially, flat or slightly concave adaxially. Sori in 1 row on each side of midrib; indusia present, entire.

• Stone crevices; ca. 2400 m. Xizang (Yigong).

*Polystichum yigongense*, which was not recognized in FRPS (5(2): 49. 2001), is distinguished by its rhombic pinnules with short, sharp teeth as opposed to the nearly elliptic pinnules with long, sharp teeth in *P. neolobatum*. The two species have remarkably different spore sculptures.

*Polystichum yigongense* was treated as a synonym of *P. makinoi* (Indian Fern. J. 2: 9. 1985) and *P. neolobatum* (Himalayan Ferns (Guide to *Polystichum*), 27. 1997) by Fraser-Jenkins.

**30. *Polystichum integrilimum*** Ching & H. S. Kung, Acta Bot. Boreal.-Occid. Sin. 9: 275. 1989.

贡山耳蕨 gong shan er jue

Plants evergreen. Rhizome erect, densely covered with ovate brown scales. Fronds 20–25 cm; stipe stramineous, 3–10 cm, 2–3 mm in diam. at base, scaly; scales brown, narrowly ovate and lanceolate. Lamina bipinnate, narrowly ovate to narrowly oblong, 15–20 × 4.5–6 cm, base rounded-cuneate, slightly contracted, apex acuminate; rachis without proliferous bulbils, abaxially sparsely scaly; scales light brown, lanceolate, slightly twisted. Pinnae 18–20 pairs, alternate, attached at right angles to rachis, broadly lanceolate to narrowly deltoid, middle pairs 2.2–3 × 1–1.4 cm, obliquely broadly cuneate or nearly truncate, pinnate, acute. Pinnules 4 or 5 pairs, alternate, slightly ascendant, broadly ovate or rhombic-ovate, bases obliquely cuneate, margins entire or with few small teeth, apices acute and spinulose; basal acroscopic pinnules largest, 7–12 × 4–6 mm; abaxially sparsely scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, slightly concave abaxially, adaxially indistinct. Sori in 1 row on each side of midrib, 1–3 pairs per pinnule; indusia entire.

• Slopes, roadsides, rock crevices; 1500–2500 m. NW Yunnan (Gongshan).

**31. *Polystichum garhwalicum*** N. C. Nair & Nag, J. Jap. Bot. 51: 138. 1976.

喜马拉雅耳蕨 xi ma la ya er jue

Plants evergreen. Rhizome erect, stout, densely covered with ovate dark brown scales. Fronds 30–70 cm; stipe amber, 10–30 cm, 4–6 mm in diam. at base, densely covered with scales; scales brown to dark brown, ovate and lanceolate, apex twisted. Lamina bipinnate, narrowly ovate to broadly lanceolate, 25–60 × 6–14 cm, rounded-cuneate to truncate, acuminate; rachis without proliferous bulbils, abaxially densely scaly; scales brown to blackish brown, lanceolate and narrowly lanceolate, strongly twisted. Pinnae 22–32 pairs, alternate, attached at nearly right angles to rachis, middle pairs 3–9 × 1.2–2.4 cm, oblique and nearly truncate, with stalk up to 1 mm, pinnate, acuminate. Pinnules 5–10 pairs, alternate, slightly ascendant, approximate, obliquely ovate, rhombic ovate, or obliquely oblong, bases broadly cuneate, margins with small acute teeth, pinnules of lower pinnae with open spinulose teeth, apices acute to spinulose; basal acroscopic pinnules largest, 0.8–2.2 cm × 4–9 mm; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, flat or slightly concave on both surfaces. Sori in 1 row on each side of midrib; indusia present, entire.

Broad-leaved forests, alpine coniferous forests; 1500–3400 m. W Sichuan, Xizang, Yunnan [India, Nepal].

*Polystichum garhwalicum* was treated as a synonym of *P. squarrosum* (Himalayan Ferns (Guide to *Polystichum*), 27. 1997) by Fraser-Jenkins. *Polystichum garhwalicum* is similar to *P. neolobatum* but can be distinguished morphologically; the two also have different distributions, with *P. garhwalicum* occurring only in the West.

*Polystichum garhwalicum* is referred to as *P. brachypterum* (Kunze) Ching in FRPS (5(2): 50. 2001). The latter, with its type material from S India, is a synonym of *P. squarrosum*.

**32. *Polystichum rhombiforme*** Ching & S. K. Wu, Fl. Xizang. 1: 209. 1983.

斜方刺叶耳蕨 xie fang ci ye er jue

Plants evergreen. Rhizome erect, densely covered with lanceolate dark brown scales. Fronds 25–50 cm; stipe stramineous, 10–20 cm, 3–5 mm in diam. at base, densely covered with ovate and broadly lanceolate scales. Lamina bipinnate, broadly lanceolate, 20–40 × 5–9 cm, broadly cuneate or trun-

cate, acuminate; rachis without proliferous bulbils, both surfaces densely scaly; scales brown, lanceolate and linear, margins ciliate. Pinnae 24–30 pairs, alternate, slightly ascendant, approximate, oblong-lanceolate, middle pairs 2.5–5 × 1–2 cm, obliquely broadly cuneate, shortly stalked, pinnate, acute or acuminate. Pinnules 5–7 pairs, alternate, slightly ascendant, approximate, obliquely oblong or rhombic, bases cuneate, distal margins with open long spinulose teeth, apices acute and prolonged into spinules; basal acroscopic pinnules largest, 7–10 × 3–6 mm; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, midrib concave adaxially; lateral veins slightly concave abaxially, indistinct adaxially. Sori in 1 row on each side of midrib; indusia present, entire.

• Alpine mixed broad-leaved coniferous forests, alpine *Quercus* forests; 2200–3300 m. W Sichuan, Xizang, NW and W Yunnan.

### 3. *Polystichum* sect. *Hecatoptera* (L. L. Xiang) Li Bing Zhang, *stat. nov.*

芒刺耳蕨组 mang ci er jue zu

Basionym: *Polystichum* ser. *Hecatoptera* L. L. Xiang, Acta Phytotax. Sin. 32: 266. 1994.

Plants medium-sized, evergreen. Stipe scales brown, lanceolate. Lamina papery, 1-pinnate. Rachis without proliferous bulbils. Pinnae asymmetrical at base, densely regularly long spinulose on margin. Microscales broad-type.

• One species: W China.

**33. *Polystichum hecatopterum*** Diels, Bot. Jahrb. Syst. 29: 193. 1900.

芒刺耳蕨 mang ci er jue

*Aspidium auriculatum* (Linnaeus) Swartz var. *stenophyllum* Baker; *Hemesteum hecatopterum* (Diels) H. Léveillé; *Polystichum auriculatum* (Linnaeus) C. Presl var. *stenophyllum* (Baker) Matthew; *P. pseudomaximowiczii* Hayata.

Plants evergreen. Rhizome ascending to erect, short, 1–1.5 cm in diam. including stipe bases, apically densely scaly; scales brown, broadly lanceolate or lanceolate, up to 6 mm, membranous, entire. Fronds 25–60 cm; stipe stramineous to amber, 4–15 cm, covered with scales; scales brown, varying in size, membranous; large scales broadly lanceolate to narrowly lanceolate, entire; smaller scales lanceolate to ovate-lanceolate, sparsely toothed or ciliate. Lamina 1-pinnate, green or light brownish green, adaxially darker, narrowly elliptic-lanceolate, 17–43 × 2–4 cm at middle, gradually contracted below middle, apex pinnatifid and long acuminate. Pinnae 35–66 pairs, very shortly stalked; upper pinnae sessile, hardly remote or approximate, alternate or nearly opposite; pinnae above middle of lamina attached at right angles to rachis or slightly ascendant, lower pairs slightly reflexed, basal pairs strongly angled basiscopically, falcate or oblong-falcate, middle pinnae 1–2 cm

× 3–8 mm, bases asymmetrical, apices obtuse or acute and long spinulose; acroscopic base wider and with deltoid auricles, proximal margins of auricles truncate or slightly pointing to rachis, parallel or nearly parallel to rachis, sometimes overlapping rachis, distal part of acroscopic margins of pinnae nearly truncate, basal basicopic margins narrowly cuneate, margins entire; distal basicopic margins truncate and curved apically, all margins except basicopic base with regular spinulose teeth, proximal margins of auricles shallowly toothed; abaxially sparsely covered with microscales, adaxially glabrous, microscales light brown, lanceolate, sparsely toothed; frond texture papery; venation visible abaxially, indistinct adaxially, pinnate, terminating in teeth; lateral veins on acroscopic side pinnate from base upward, dichotomous or simple, lateral veins on basicopic side simple or dichotomous. Sori small, terminal on shorter lateral veinlets, in 1 row on each side of midrib of pinna, medial, up to 14 above midrib, less than 8 below midrib, basicopic base sterile; indusia present, light brown, repand or shallowly erose, evanescent. Spores elliptic in polar view, semicircular in equatorial view; perispore sculpturing plicate with reticulate ornamentation.

• Montane broad-leaved and coniferous forests, bamboo forests, rock crevices, close to mountain streams; 1000–2300(–2800) m. Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, S Xizang, Yunnan, Zhejiang.

### 4. *Polystichum* sect. *Stenopolystichum* Daigobo, Sci. Rep. Tokyo Kyoiku Daigaku, B, 15: 63. 1972.

狭叶芽胞耳蕨组 xia ye ya bao er jue zu

Plants small to medium-sized, evergreen. Stipe scales brown, lanceolate. Lamina papery or thickly papery, 1-pinnate. Rachis with proliferous bulbils. Pinnae asymmetrical at base, with forward-pointing spinules on margin. Microscales broad-type.

About two species: Sino-Himalayan and Sino-Japanese regions; two species in China.

- 1a. Lamina thickly papery, pinnatifid at apex ..... 34. *P. stenophyllum*  
 1b. Lamina papery, with an apical pinna at apex ..... 35. *P. atkinsonii*

**34. *Polystichum stenophyllum*** (Franchet) Christ, Bull. Soc. Bot. France 52(Mém. 1): 27. 1905.

狭叶芽胞耳蕨 xia ye ya bao er jue

*Aspidium caespitosum* Wallich ex Mettenius var. *stenophyllum* Franchet, Pl. David. 2: 155. 1888; *Polystichum conaense* Ching & S. K. Wu; *P. deversum* Christ; *P. niitakayamense* Hayata; *P. pseudostenophyllum* Tagawa; *P. stenophyllum* var. *abbreviatum* Tagawa; *P. stenophyllum* var. *conaense* (Ching & S. K. Wu) W. M. Chu & Z. R. He.

Plants evergreen. Rhizome erect, short, densely covered with thin scales; scales brown, lanceolate, margins ciliate. Fronds 15–60 cm; stipe stramineous or light purplish red, 1–12 cm, 1–2 mm in diam. at base, often densely covered with thin scales; scales large or small; large scales ovate, up to 8 × 5 mm, entire, shortly acuminate; small scales ovate-lanceolate, up to 4 × ca. 1 mm, margins fimbriate, apex long acuminate. Lamina pinnate, linear-lanceolate, 8–50 × 1–5 cm at middle, below middle gradually contracted toward base; rachis stramineous or light purplish red, densely scaly on both surfaces; scales similar to small scales on stipe; rachis with 1 proliferous bulbil near tip. Pinnae 20–60 pairs, alternate, approximate or slightly imbricate, falcate-oblong, middle pinnae larger, 0.5–2.5 cm × 3–10 mm, margins serrulate, apices acute and shortly spinulose; acroscopic bases auriculate, auricles deltoid with spinulose tip, adaxial lateral side truncate, parallel to rachis, basiscopic base cuneate, margins shortly spinulose-serrulate or eroded, pinnae gradually contracted toward base below middle part, ± reflexed toward lamina base; adaxially subglabrous, abaxially densely covered with brownish microscales; microscales peltate, ovate-lanceolate, sparsely toothed; frond texture thickly papery; venation pinnate, distinct or nearly indistinct abaxially, concave adaxially; lateral veins ascendant, nearly reaching pinna margin; acroscopic veinlets pinnate, forked or free from base to upper part; basiscopic veinlets often forked, sometimes basiscopic forked veinlets at middle forked again. Sori terminal on veinlets of pinnae, in 1 row on each side of midrib, medial or submedial between midrib and pinna margin; indusia present, brown or dark brown, subentire, often persistent.

Montane broad-leaved forests, mixed broad-leaved and coniferous forests, bamboo forests; 1700–3500 m. S Gansu, SW Henan, W Hubei, W Sichuan, Taiwan, Xizang, NE and NW Yunnan [Bhutan, India, Japan, N Myanmar, C Nepal].

Sometimes the pinna margins of *Polystichum stenophyllum* can

be roughly serrate or pinnatilobate and the inner side of basal acroscopic auricles can be pinnatilobate to pinnatifid toward base (*P. stenophyllum* var. *conaense*). Some authors treat *P. pseudostenophyllum* separately (e.g., Knapp, Ferns Fern Allies Taiwan, 203, 474. 2011).

*Polystichum stenophyllum* has been placed in *P.* sect. *Polystichum* by Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 7. 1997).

**35. *Polystichum atkinsonii*** Beddome, Suppl. Ferns S. Ind. 14. 1876.

小狭叶芽胞耳蕨 xiao xia ye ya bao er jue

*Polystichum franchetii* Christ; *P. gracilipes* C. Christensen; *P. gracilipes* var. *gemmiferum* Tagawa; *P. morii* Hayata.

Plants evergreen. Rhizome erect, short, densely covered with lanceolate microscales; scales reddish brown, membranous, with few long teeth. Fronds 5–22 cm; stipe often light purple, slender, 0.5–10 cm, less than 0.5 mm in diam., with few small scales similar to those at rhizome apex. Lamina light green when dry, adaxially darker, light purple on both surfaces when young, often linear elliptic-lanceolate, widest at middle, sometimes nearly linear-lanceolate, base nearly as wide as middle, 3–10 × 0.5–2 cm at middle, 1-pinnate, apex with an apical pinna; rachis often light purple, with few small scales on both surfaces similar to those on stipe, often with 1 small proliferous bulbil near rachis tip. Pinnae 12–20 pairs, alternate or nearly opposite, ovate-oblong or oblong, shortly stalked, middle pinnae 2–10 × 1.5–10 mm, apices often obtuse, rarely acute, acroscopic base auriculate, adaxial lateral side truncate, parallel or nearly parallel to rachis, sometimes overlapping rachis, basiscopic base cuneate, margins often shallowly pinnatilobate, sometimes pinnatifid, or serrate and slightly biserrate, teeth acute or with mucronate tips; adaxially glabrous, abaxially with brown microscales; microscales broadly ovate-lanceolate, toothed; frond texture papery; venation pinnate, indistinct, lateral veins mostly forked or unbranched, often unbranched on auricles. Sori terminal on veinlets of pinnae, medial on each side of midrib, 1–5 on acroscopic side, 1 or 2 or sterile on basiscopic side; indusia brown, large, thickly membranous, subentire, approximate or margins overlapping, persistent.

Rock crevices on mountains, often in alpine regions; 1500–4000 m. Chongqing, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Japan, Nepal].

*Polystichum atkinsonii* has been placed in *P.* sect. *Polystichum* by Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 7. 1997).

##### 5. *Polystichum* sect. *Achroloma* Tagawa, Acta Phytotax. Geobot. 9: 122. 1940.

白边耳蕨组 bai bian er jue zu

Plants medium-sized, evergreen. Lamina thickly papery, 1-pinnate or bipinnatifid. Rachis without proliferous bulbils. Pinnae and/or pinnules without open hard spinules at apex or on margin, with cartilaginous margins. Sori in 1 row on each side of midrib, abaxial on veinlets.

About two species: Asia; two species in China.

- 1a. Lamina 1-pinnate ..... 36. *P. nepalense*  
 1b. Lamina bipinnatifid ..... 37. *P. manmeiense*

**36. *Polystichum nepalense*** (Sprengel) C. Christensen, Index Filic. 84. 1905.

尼泊尔耳蕨 ni bo er er jue

*Aspidium nepalense* Sprengel, Syst. Veg. 4: 97. 1827; *Polystichum atroviridissimum* Hayata.

Plants evergreen. Rhizome erect, densely covered with linear-lanceolate brown scales. Fronds 30–90 cm; stipe stramineous, 16–46 cm, 2–4 mm in diam. at base, sparsely covered with linear and ovate brown scales. Lamina 1-pinnate, lanceolate or broadly lanceolate, 30–52 × 4.5–12 cm, slightly contracted at base, acuminate; rachis without proliferous bulbils, both surfaces sparsely covered with ovate scales. Pinnae 22–30 pairs, alternate, slightly ascendant, shortly stalked, falcate-lanceolate, middle pairs 2.5–7 × 0.8–1.8 cm, bases oblique, apices acuminate; acroscopic margins truncate, auricles deltoid, basicopic margins cuneate, margins cartilaginous and with small acute teeth or biserrate; abaxially with numerous brown micro-scales; microscales nearly rounded at base, caudate at apex; frond texture leathery; venation pinnate, midribs flat abaxially, concave adaxially, lateral veins dichotomous, visible on both surfaces. Sori in 1 row on each side of midrib; indusia entire.

Forests; 1500–3000 m. Sichuan, Taiwan, Xizang, C and W Yunnan [Bhutan, India, N Myanmar, Nepal, Philippines, Vietnam].

The distribution record for Vietnam is new.

*Polystichum nepalense* has been placed in *P.* sect. *Polystichum* by Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 7. 1997).

**37. *Polystichum manmeiense*** (Christ) Nakaike, Misc. Publ. Nat. Sci. Mus. Tokyo, 141. 1982.

镰叶耳蕨 lian ye er jue

*Aspidium manmeiense* Christ, Bull. Herb. Boissier 6: 965. 1898; *A. marginatum* Wallich ex Mettenius (1858), not Schkuhr (1809); *Polystichum falcitipinum* Hayata; *P. nepalense* (Sprengel) C. Christensen f. *subbipinnatum* (C. Christensen) Ching; *P. nepalense* var. *subbipinnatum* C. Christensen.

Plants evergreen. Rhizome erect, densely covered with linear-lanceolate dark brown scales. Fronds 16–45 cm; stipe stramineous, 18–26 cm, 2–4 mm in diam. at base, lower part densely covered with linear-lanceolate dark brown scales and larger ovate dark brown scales, upper part sparsely covered with lanceolate scales. Lamina bipinnatifid, oblong-lanceolate, 22–35 × 6–8 cm, truncate, acuminate; rachis without proliferous bulbils, sparsely covered with lanceolate scales. Pinnae 20–24 pairs, alternate, attached at right angles to rachis or slightly ascendant, extremely shortly stalked, falcate-lanceolate, middle pairs 3–5 × 1–1.5 cm, bases oblique, acroscopic margins truncate, basicopic margins cuneate, pinnatifid or pinnatifid, apices acute or acuminate. Lobes 4–6 pairs, alternate, ascendant, oblong or obovate, margins with several cartilaginous small teeth, apices rounded-obtuse or acute, mucronate; basal acroscopic lobes largest, often deeply lobed to pinna rachis, oblong or ovate, 8–12 × 5–6 mm; abaxially with ovate light brown microscales; frond texture leathery; venation pinnate on lobes, midribs indistinct abaxially, concave adaxially, lateral veins dichotomous, indistinct on both surfaces. Sori in 1 row on each side of midrib of lobe or pinna midrib; indusia entire.

Forests; 1600–2900 m. Guizhou (Leigong Shan), Taiwan, Xizang, Yunnan [Bhutan, N India, Nepal].

## 6. *Polystichum* sect. *Chingiarum* Li Bing Zhang, sect. nov.

秦氏耳蕨组 qin shi er jue zu

*Sectio nova* *Polysticho* sect. *Achrolomati affinis*, sed ab eo pinnis non cartilagineis atque soris 2- vel 3-seriatis utroque costae latere differt.

Type: *Polystichum chingiae* Ching.

Plants medium-sized, evergreen. Lamina thickly papery, 1-pinnate. Rachis without proliferous bulbils. Pinnae without open hard spinules at apex or on margin, without cartilaginous margins; auricles well developed. Sori in 2 or 3 rows on each side of midrib, abaxial on veinlets.

About one species: S China and N Vietnam.

**38. *Polystichum chingiae*** Ching, Icon. Filic. Sin. 4: t. 182. 1937 [*“chingae”*].

滇耳蕨 dian er jue

Plants evergreen. Rhizome erect, densely covered with lanceolate brown scales. Fronds ca. 50 cm; stipe yellowish brown, 20–32 cm, 2–3 mm in diam. at base, lower part densely scaly; scales blackish brown at middle, lanceolate, with brown small teeth, mixed with larger broadly ovate brown scales. Lamina 1-pinnate, narrowly ovate or oblong-lanceolate, 28–36 × 10–16 cm, truncate or rounded-cuneate, acuminate; rachis without proliferous bulbils, both surfaces with filiform and lanceolate brown scales. Pinnae 10–16 pairs, alternate, attached at

right angles to rachis, extremely shortly stalked, falcate-lanceolate, lower pairs 5.5–10 × 1–2.5 cm, bases oblique, acroscopic margins truncate, basicopic margins cuneate, apices acuminate or long acuminate; auricles deltoid, margins with small forward-pointing acute teeth; abaxially with lanceolate yellowish brown microscales; frond texture leathery; venation pinnate, midribs slightly raised abaxially, concave adaxially, lateral veins multiple times dichotomously branched, indistinct on both surfaces. Sori abaxial on veinlets, in 2 or 3 rows on each side of midrib; indusia margins irregular.

Under bushes on acidic soils; 1400–2700 m. S Yunnan [Vietnam].

*Polystichum chingiae* is similar to *P. balansae*, but its veins are free.

7. *Polystichum* sect. *Crinigera* Li Bing Zhang, **sect. nov.**

毛发耳蕨组 mao fa er jue zu

*Sectio nova* *Polysticho* sect. *Chingiarum affinis*, sed ab eo *pinnarum auriculis rotundatis minus evolutis differt*.Type: *Polystichum crinigerum* (C. Christensen) Ching.

Plants medium-sized, evergreen. Lamina thickly papery, 1-pinnate. Rachis without proliferous bulbils. Pinnae without open hard spinules at apex or margin, without cartilaginous margins; auricles less developed and rounded. Sori in 2 or 3 rows on each side of midrib, abaxial on veinlets.

• About one species: China.

**39. *Polystichum crinigerum*** (C. Christensen) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 495. 1938.

毛发耳蕨 mao fa er jue

*Dryopteris crinigera* C. Christensen, Index Filic., Suppl. 1: 31. 1913; *Polypodium crinitum* Baker (1906), not Poiret (1804).

Plants evergreen. Rhizome erect, short. Fronds ca. 70 cm; stipe stramineous, 26–36 cm, ca. 4 mm in diam. at base, densely covered with lanceolate and linear tortuous yellowish brown scales, scale margins fimbriate. Lamina 1-pinnate, narrowly ovate, 42–48 × 12–24 cm, base nearly truncate, apex cuspidate; rachis without proliferous bulbils, densely covered

with linear yellowish brown scales. Pinnae 12–16 pairs, alternate, attached at nearly right angles to rachis, extremely shortly stalked, linear-lanceolate, middle pairs 9–12 × 1.5–2.5 cm, bases rounded-cuneate or shallowly cordate, acroscopic margins slightly curved or with semicircular auricles, margins sparsely and inconspicuously serrulate, apices acuminate; abaxially with filiform yellowish brown scales, more densely so along midribs, adaxially glabrous; frond texture leathery; venation pinnate, midribs slightly raised abaxially, concave adaxially; lateral veins multiple times dichotomously branched, distinct abaxially. Sori in 2 or 3 rows on each side of midrib; indusia unknown.

• Forests; 2200–2700 m. S Yunnan (Jingdong, Luoping, Mengzi).

8. *Polystichum* sect. *Neopolystichum* Ching ex Li Bing Zhang & H. S. Kung, Acta Phytotax. Sin. 37: 81. 1999.

新生耳蕨组 xin sheng er jue zu

Plants large, evergreen. Lamina bipinnate, leathery or thickly papery. Microscales lanceolate (broad-type). Sori abaxial or nearly terminal on veinlets, indusiate or exindusiate; if sori indusiate then indusia small and falling off early.

About four species: subtropical lowland broad-leaved evergreen forests in SW China and one species extending to Guangxi and Taiwan, and Japan; four species (three endemic) in China.

*Polystichum* sect. *Neopolystichum* is tentatively recognized here pending more evidence. The relationship between *P.* sect. *Macropolystichum* and *P.* sect. *Neopolystichum* is unclear.

1a. Stipe without blackish brown scales.

2a. Rachis scales fimbriate on margin; sori exindusiate ..... 40. *P. grandifrons*

2b. Rachis scales subentire; sori indusiate but indusia often small ..... 41. *P. altum*

1b. Stipe with blackish brown scales in addition to brown scales.

3a. Rachis with blackish brown scales in addition to brown scales ..... 42. *P. longispinosum*

3b. Rachis without blackish brown scales ..... 43. *P. robustum*

**40. *Polystichum grandifrons*** C. Christensen, Index Filic., Suppl. 3: 163. 1934.

大叶耳蕨 da ye er jue

*Polystichum grande* Ching, Bull. Fan Mem. Inst. Biol. 2: 189. 1931, not Fée (1857); *P. kiusiuense* Tagawa.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear grayish brown scales. Fronds up to 1 m; stipe stramineous, 26–40 cm, 5–7 mm in diam. at base, densely covered with linear or lanceolate, grayish brown scales and larger scales; large scales grayish brown, ovate-lanceolate and broadly lanceolate, up to 12 × 4 mm, subentire or with few small teeth, caudate or long acuminate. Lamina bipinnate, oblong, 33–73 × 20–31 cm at middle, slightly contracted toward base, basal part fertile, apex acute, fertile; rachis without pro-

liferous bulbils, covered with linear or lanceolate grayish brown scales and larger scales; large scales dense, ovate-lanceolate to broadly lanceolate, up to 7 × 2.5 mm, margins fimbriate, apices long acuminate. Pinnae 9–15 pairs, opposite or nearly opposite, ascendant, shortly stalked, oblong-lanceolate, gradually contracted toward base, apex caudate, middle pinnae 11–17 × 2.5–3.2 cm, 1-pinnate; costa densely covered with linear grayish brown scales. Pinnules 15–17 pairs, alternate, shortly stalked, falcate-oblong, bases cuneate, acroscopic margins subentire, with deltoid auricles, apices acute; abaxially with dense lanceolate microscales, adaxially with few microscales; frond texture thinly leathery; venation pinnate on pinnules, lateral veins 6–9 pairs, dichotomous, distinct. Sori 8–11 pairs per pinnule, grayish brown, large, in 1 row on each side of midrib or more on acroscopic side, terminal on veinlets, exindusiate.  $2n = 164$ .



Broad-leaved forests; 500–2300 m. Guangxi (Yaoshan), Guizhou (Duyun), Taiwan (Yilan), S Yunnan [Japan (Kyushu)].

*Polystichum squarrosom* in Y. C. Wu et al. (Bull. Dept. Biol. Sun Yatsen Univ. 3: 86, t. 34. 1932) is a misidentification of *P. grandifrons*.

Its distribution in India as reported by Fraser-Jenkins (Aspects Pl. Sci. 13: 263. 1991) and Chandra et al. (Taiwania 53: 170–209. 2008) is doubtful.

*Polystichum grandifrons* has acute lamina apex and rachis scales with fimbriate margins and is exindusiate.

**41. *Polystichum altum*** Ching ex Li Bing Zhang & H. S. Kung, Acta Phytotax. Sin. 36: 465. 1998.

高大耳蕨 gao da er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear grayish brown scales. Fronds up to 1 m; stipe stramineous, 22–44 cm, 5–7 mm in diam. at base, densely covered with linear and lanceolate grayish brown scales and larger scales; large scales dense, grayish brown, ovate-lanceolate and broadly lanceolate, up to 14 × 4 mm, subentire or with few small teeth, long acuminate. Lamina bipinnate, oblong-lanceolate, 38–66 × 20–36 cm at middle, not or slightly contracted toward base, acute; rachis without proliferous bulbils, covered with linear and lanceolate grayish brown scales and larger scales; large scales dense, ovate-lanceolate and narrowly lanceolate, up to 10 × 2.2 mm, subentire or with few small teeth, caudate. Pinnae 14–18 pairs, opposite or nearly opposite, ascendant, shortly stalked, lanceolate, not contracted toward base, bases asymmetrical or ± asymmetrical, apices caudate, middle pinnae 12–20 × 2.5–3.4 cm, 1-pinnate; costa scaly; scales ovate-lanceolate, lanceolate, and linear. Pinnules 15–21 pairs, alternate, shortly stalked, narrowly falcate-oblong, 1.4–2.3 × 0.6–0.8 cm, bases cuneate, apices acute, acroscopic margins shallowly toothed, teeth shortly aristate at tip, pinnules with deltoid auricles, basispic margins entire, shortly aristate, basal pair largest, incised; abaxially densely covered with lanceolate microscales, adaxially glabrous; frond texture thinly leathery; venation pinnate on pinnules, lateral veins 6–9 pairs, dichotomous, distinct. Sori (4–)8–10 pairs per pinnule, in 1 row on each side of midrib or more on acroscopic margin, nearly terminal on veinlets, large, grayish brown; indusia not well developed, indistinct.

• Forests; 1100–1800 m. Sichuan, Yunnan (Suijiang).

**42. *Polystichum longispinosum*** Ching ex Li Bing Zhang & H. S. Kung, Acta Phytotax. Sin. 36: 467. 1998.

长刺耳蕨 chang ci er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 60–120 cm; stipe stramineous, 16–57 cm, 5–7 mm in diam. at base, sparsely covered with linear grayish brown scales and appressed scales; appressed scales blackish brown, lanceolate, subentire. Lamina bipinnate, deltoid-lanceolate, 54–92 × 19–40 cm, not contracted toward base, basal part sterile, apex acute, fertile; rachis without proliferous bulbils, covered with linear and lanceolate scales and larger scales; large scales sparse, bicolorous, middle part

castaneous brown, ovate, up to 7 × 4 mm, subentire, caudate. Pinnae 18–26 pairs, alternate, ascendant, shortly stalked, lanceolate, not contracted toward base, bases asymmetrical, apices caudate, basal pinnae 11–17 × 1.8–3.5 cm near base, 1-pinnate; costa scaly; scales linear or lanceolate and brown, or ovate and castaneous brown. Pinnules 18–23 pairs, alternate, shortly stalked, narrowly deltoid-ovate, 1.6–2.6 × 0.6–0.8 cm, bases cuneate, auricles deltoid, margins lobed, long spinulose, apices acute with acute tips; basal acroscopic pinnules largest, pinnatipartite; abaxially with lanceolate microscales, adaxially subglabrous; frond texture papery; venation pinnate on pinnules, lateral veins 6–9 pairs, dichotomous, distinct. Sori 6–8 pairs per pinnule, in 1 row on each side of midrib or more on acroscopic side, terminal on veinlets, brown; exindusiate, or indusia not well developed, caducous.

• Broad-leaved forests, mixed forests, shrubs; 1700–2400 m. Guizhou (Pu'an), Sichuan, Yunnan (Daguan, Zhenxiang).

*Polystichum longispinosum* is similar to *P. altum* in shape and size, but it differs in its stipe scales broadly lanceolate, blackish brown, and appressed, rachis scales ovate and dimorphic, and pinnule margins long spinulose.

**43. *Polystichum robustum*** Ching ex Li Bing Zhang & H. S. Kung, Acta Phytotax. Sin. 36: 468. 1998.

粗壮耳蕨 cu zhuang er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear reddish brown scales. Fronds 1–1.5 m; stipe stramineous, 60–75 cm, 7–10 mm in diam. at base, densely covered with linear and lanceolate brown scales and larger scales; large scales grayish brown and bicolorous, broadly ovate and broadly ovate-lanceolate; bicolorous scales dense, middle part dark brown to blackish brown, shiny, up to 18 × 10 mm, shortly serrulate, caudate. Lamina bipinnate, oblong, 66–96 × 24–47 cm at middle, slightly contracted toward base, apex abruptly narrowed, fertile; rachis without proliferous bulbils, densely covered with linear dark brown scales, and sparsely covered with lanceolate grayish brown scales, latter up to 10 × 3 mm, serrulate, acuminate. Pinnae 10–17 pairs, alternate, ascendant, shortly stalked, lanceolate, apices caudate, basispic margins slightly contracted toward base, bases asymmetrical, middle pinnae 14–20 × 4.6–5.7 cm, 1-pinnate; costa scaly; scales grayish brown or blackish brown, linear or lanceolate. Pinnules 15–19 pairs, alternate, shortly stalked, deltoid-ovate, 2.1–4 × 0.8–1.6 cm, bases cuneate, acroscopic bases with semi-orbicular auricles, apices acute and mucronate, margins with obtuse teeth, tips of teeth not aristate; basal acroscopic pinnules largest, pinnatipartite; abaxially with lanceolate microscales, adaxially subglabrous; frond texture leathery; venation pinnate on pinnules, lateral veins 8–10 pairs, dichotomous, distinct. Sori numerous per pinnule, in several rows on each side of midrib, terminal on veinlets, sometimes nearly terminal, brown, large; indusia small.

• Evergreen forests; ca. 900 m. NE Yunnan (Suijiang).

*Polystichum robustum* is the largest in the genus in Asia. It has stipe scales bicolorous, pinnule margins with obtuse teeth, and sori in several rows on each side of the midrib.

**9. Polystichum sect. Fimbriata** Li Bing Zhang, **sect. nov.**

流苏耳蕨组 liu su er jue zu

*Sectio nova* Polysticho *sect.* Haplopolysticho *similis*, sed ab eo lamina atroviridi coriacea differt.Type: *Polystichum fimbriatum* Christ.

Plants evergreen. Lamina 1-pinnate, dark green, leathery. Rachis without bulbils. Pinnae oblong; auricles sharp at apex. Microscales filiform.

About one species: S China and N Vietnam.

The type of the section, *Polystichum fimbriatum*, was placed in *P. sect. Scleropolystichum* Daigobo in FRPS (5(2): 37. 2001) based on its leathery lamina. However, *P. fimbriatum* does not belong to any existing sections of the genus and should be placed in a section of its own.**44. Polystichum fimbriatum** Christ, Bull. Acad. Int. Géogr. Bot. 16: 237. 1906.

流苏耳蕨 liu su er jue

Plants evergreen. Rhizome stout, densely covered with narrowly ovate brown scales. Fronds 40–50 cm; stipe stramineous, 15–18 cm, 3–4 mm in diam. at base, densely scaly; scales reddish brown, ovate and lanceolate, margins toothed. Lamina 1-pinnate, linear-lanceolate, 34–42 × 5–5.5 cm, base nearly truncate, apex acuminate; rachis without proliferous bulbils, abaxially densely scaly in lower part; scales reddish brown, ovate, gradually becoming lanceolate and linear upward, toothed. Pinnae 30–34 pairs, attached at right angles to rachis, shortly stalked, ± approximate, oblong, middle pinnae 2.4–2.8 × 1–1.2 cm, bases obliquely broadly cuneate, acroscopic

bases auriculate, margins spinulose-toothed, apices rounded, or slightly contracted to obtuse and mucronate; abaxially with dense microscales; microscales reddish brown, filiform; frond texture hard leathery; venation pinnate, lateral veins twice-forked, slightly concave abaxially, indistinct adaxially. Sori terminal or nearly terminal on shorter veinlets, in 1 row on each side of midrib of pinna, close to pinna margin, lower part of lamina and proximal part of lower fertile pinnae often sterile; indusia present, entire.

Limestone crevices in forests; 700–1100 m. NW Guangxi, S Guizhou (Huishui, Libo, Pingtang) [N Vietnam].

The distribution record for Vietnam is new.

“*Polystichum fimbriatum* C. Presl” (Epimel. Bot. 58. 1851), based on “*Aspidium fimbriatum* Wallich” (Numer. List, no. 339. 1829, nom. nud.), was not validly published (*Melbourne Code*, Art. 38.1(a)).**10. Polystichum sect. Subfimbriata** Li Bing Zhang, **sect. nov.**

拟流苏耳蕨组 ni liu su er jue zu

*Sectio* Polysticho *sect.* Fimbriatis *similis*, sed ab eo pinnis ovatis atque auriculis apice obtusis differt.Type: *Polystichum subfimbriatum* W. M. Chu & Z. R. He.

Plants evergreen. Lamina 1-pinnate, dark green, leathery. Rachis without bulbils. Pinnae ovate; auricles obtuse at apex. Microscales filiform.

● About one species: China.

The type of the section, *Polystichum subfimbriatum*, has been placed in *P. sect. Scleropolystichum* Daigobo in FRPS (5(2): 37. 2001) based on its leathery lamina. However, *P. subfimbriatum* does not belong to any existing sections of the genus and should be placed in a section of its own. The relationship between *P. fimbriatum* and *P. subfimbriatum* might not be close.**45. Polystichum subfimbriatum** W. M. Chu & Z. R. He, Acta Phytotax. Sin. 36: 382. 1998.

拟流苏耳蕨 ni liu su er jue

Plants evergreen. Rhizome erect, densely covered with broadly lanceolate brown scales. Fronds ca. 25 cm; stipe stramineous, 4–10 cm, ca. 2 mm in diam. at base, indistinctly canaliculate adaxially, densely scaly; scales brown, lanceolate and linear, toothed. Lamina 1-pinnate, lanceolate or linear-oblancoate, 13–20 × 1.5–3 cm, contracted at base, acuminate; rachis without proliferous bulbils, adaxially scaly, scales brown, linear or narrowly lanceolate, twisted, abaxially densely scaly, scales brown, narrowly lanceolate, twisted. Pinnae 22–30 pairs, alternate, lower pairs slightly angled basiscopically, other pairs

attached at right angles to rachis, shortly stalked, approximate, ovate, middle pinnae 8–15 × 6–8 mm, bases obliquely broadly cuneate, sometimes acroscopic bases with semi-orbicular auricles, margins slightly revolute with spinulose teeth, sometimes lower part shallowly lobed, apices rounded with acute tips; abaxially scaly; microscales yellowish brown, filiform, twisted; frond texture thin leathery, venation pinnate, lateral veins forked, indistinct on both surfaces. Sori in 1 row on each side of midrib; indusia present, margins irregular.

● Under bushes; ca. 2000 m. NE Yunnan (Yiliang, Zhenxiong).

*Polystichum subfimbriatum* is similar to *P. fimbriatum*, but it is smaller, its rachis scales are narrowly lanceolate and twisted, and its pinna auricles are semi-orbicular.

**11. Polystichum** sect. **Micropolystichum** Tagawa, Acta Phytotax. Geobot. 9: 122. 1940.

小形耳蕨组 xiao xing er jue zu

*Polystichum* ser. *Exgemmifera* W. M. Chu & Z. R. He.

Plants small-sized. Lamina lanceolate, 1-pinnate. Pinnae deeply or shallowly pinnatifid. Pinnae ovate or oblong, indistinctly toothed, mucronate. Sori abaxial or terminal on veinlets. Indusia large, membranous, erose.

About six species: montane to alpine regions in Asia; six species (five endemic) in China.

- 1a. Pinnae with clavate microscales on both surfaces ..... 46. *P. zayuense*  
 1b. Pinnae without clavate microscales.  
 2a. Pinnae often pinnatifid to lobed 1/2 distance to midrib.  
 3a. Stipe obviously shorter than lamina; lamina thickly papery; pinnae 25–45 pairs, approximate; mature sori distant from midrib ..... 50. *P. setillosum*  
 3b. Stipe nearly as long as lamina; lamina papery; pinnae 10–16 pairs, distant from each other; mature sori next to midrib ..... 51. *P. costularisorum*  
 2b. Pinnae often pinnatifid to pinnatisect.  
 4a. Lamina acuminate; pinnae acute at apex ..... 47. *P. jiucaipingense*  
 4b. Lamina acuminate or long caudate; pinnae acuminate at apex.  
 5a. Lamina long caudate at apex; pinnae with linear brown microscales ..... 48. *P. thomsonii*  
 5b. Lamina shortly acuminate or acute at apex; pinnae subglabrous on both surfaces ..... 49. *P. longidens*

**46. Polystichum zayuense** W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 228. 2001.

察隅耳蕨 cha yu er jue

Plants summer-green. Rhizome erect, short, together with remnant stipe base up to 1 cm in diam., rhizome apex and stipe base densely scaly; scales brown, lanceolate, up to 5 mm, membranous, with few long teeth. Fronds ca. 25 cm; stipe grass-green, 6–7 cm, less than 1 mm in diam., distal stipe scales sparse, brown, narrowly lanceolate or linear, 1–2 mm, sparsely toothed. Lamina 1-pinnate, grass-green on both surfaces, adaxially darker, oblong-linear-lanceolate, up to 18 × 2–2.5 cm, apex pinnatifid and acuminate; rachis without proliferous bulbils, abaxially sparsely scaly, adaxially broadly and deeply sulcate; scales brown, clavate. Pinnae more than 25 pairs, obliquely oblong, 0.5–1.5 cm × 3–7 mm, pinnatifid to pinnatifid, acute or obtuse, basal acroscopic margins pinnatifid nearly to midrib and forming a pinnatifid obovate auriculate lobe, other lobes rectangular and bilobed apically, or shortly falcate and entire on margin, primary and secondary lobes acute; abaxially sparsely covered with clavate brown microscales; frond texture thinly papery; venation pinnate on pinnae, visible abaxially, indistinct adaxially, with only 1 veinlet per primary lobe or secondary lobe. Sori terminal or abaxial on veinlets, often only 1 per lobe, sometimes 2 on basal auriculate lobes; indusia present, large, as wide as lobes, thinly membranous, dark brown when mature, centers slightly concave, coarsely lobed. Spores semicircular in equatorial view.

- Rock crevices in *Picea* forests; ca. 3500 m. SE Xizang (Zayü).

*Polystichum zayuense* is similar to *P. thomsonii*, but its lamina apex is shortly acuminate (vs. often linear long caudate in *P. thomsonii*), its ultimate segments are acute at apex (vs. mucronate), its venation is indistinct adaxially (vs. distinct and concave), and its stipe scales are all lanceolate (vs. lanceolate and ovate).

**47. Polystichum jiucaipingense** P. S. Wang & Q. Luo, Bull. Bot. Res., Harbin 29: 134. 2009.

韭菜坪耳蕨 jiu cai ping er jue

Plants summer-green. Rhizome erect, short, together with basal stipe densely scaly; scales light brown, ovate or lanceolate, membranous, with short teeth, acuminate. Fronds 19–24 cm; stipe brown, 3–6 cm, 0.5–1.2 mm in diam., distal stipe scales sparser toward rachis apex, lanceolate or linear. Lamina bipinnatifid, abaxially yellowish green when dry, adaxially darker, narrowly lanceolate, 14–20 × 2.4–3.3 cm, lower 5–7 pairs of pinnae gradually contracted toward base, long acuminate; rachis brownish stramineous, without proliferous bulbils, sparsely scaly abaxially, scales similar to distal stipe scales. Pinnae 22–28 pairs, attached at nearly right angles to rachis, alternate, shortly stalked, ovate or deltoid-ovate, middle pinnae 1.3–1.7 cm × 7–12 mm, bases slightly asymmetrical, both acroscopic and basispic bases auriculate, pinnatifid, apices obtuse and shortly spinulose. Lobes 4–7 pairs, alternate, ascendant, approximate, obovate or oblong, basal acroscopic auriculate lobes largest, acroscopic margins often ± toothed, apex often obtuse but mucronate; both surfaces sparsely scaly; microscales light brown, linear or narrowly lanceolate; frond texture thinly papery; venation pinnate on lobes, visible on both surfaces, veinlets simple or forked. Sori 1–3 per lobe, abaxial on veinlets or terminal on shorter veinlets, medial, all pinnae fertile; indusia present, membranous, subentire.

- Limestone crevices; 2800–2900 m. NW Guizhou (Hezhang).

**48. Polystichum thomsonii** (J. D. Hooker) Beddome, Ferns Brit. India 1: t. 126. 1866.

尾叶耳蕨 wei ye er jue

*Aspidium thomsonii* J. D. Hooker, Cent. Ferns, t. 25. 1860; *Dryopteris thomsonii* (J. D. Hooker) Kuntze; *P. silaense* Ching.

Plants summer-green. Rhizome erect, short, densely scaly at apex; scales brown, broadly ovate and acute, or narrowly ovate or ovate-lanceolate and shortly acuminate, up to 7 × 4 mm, margins shortly fimbriate or only with short teeth. Fronds

8–50 cm; stipe stramineous, 2–20 cm, 0.5–1.5 mm in diam., large scales on basal stipe similar to rhizome scales; small scales brown, lanceolate or narrowly lanceolate, membranous, margins long fimbriate, distal stipe scales sparser toward rachis apex. Lamina 1-pinnate, abaxially light yellowish green when dry, adaxially darker, lanceolate, 5–33 × 1–5 cm, base often slightly contracted, apex long acuminate or caudate; rachis stramineous, without proliferous bulbils, sparsely scaly abaxially; scales similar to distal stipe scales. Pinnae 10–25 pairs, attached at nearly right angles to rachis, alternate, shortly stalked, stalks with decurrent narrow wings on both sides, obliquely ovate, 0.5–2.5 cm × 2–12 mm, bases asymmetrical, acroscopic base auriculate, basiscopic margins oblique, pinnatifid to pinnatisect, apices acute. Lobes 2–7 pairs, basal acroscopic auriculate lobes largest, ovate, pinnatilobate to pinnatifid, basal basiscopic lobes and sometimes also second lobes of acroscopic base pinnatilobate, all lobes angled upward, apices acute, slightly recurved; both surfaces sparsely scaly; micro-scales brown, long acicular; frond texture papery; venation pinnate, distinct abaxially, slightly visible adaxially, veinlets simple or unequally forked on primary and secondary lobes, clavate apically. Sori abaxial on veinlets or terminal on shorter veinlets, close to midrib, basalmost pinnae often sterile; indusia present, large, membranous, with shallow rounded teeth or erose, centers slightly concave, brown when mature. Spores semicircular in equatorial view; perispore sculpturing plicate.

Cliffs and rock crevices in montane broad-leaved forests, mixed broad-leaved coniferous forests, *Abies* forests; 2000–3900 m. S Gansu, Guizhou (Fanjing Shan, Hezhang), W Sichuan, Taiwan, E Xizang, Yunnan [Afghanistan, Bhutan, NE and NW India, Kashmir, N Myanmar, Nepal, Pakistan].

**49. *Polystichum longidens*** Ching & S. K. Wu, Fl. Xizang. 1: 217. 1983.

长齿耳蕨 *chang chi er jue*

Plants summer-green. Rhizome erect, short, together with basal stipe densely scaly; scales light brown, ovate or ovate-lanceolate, subentire, acuminate. Fronds 20–35 cm; stipe stramineous, 5–12 cm, ca. 2 mm in diam., distal stipe scales sparser toward rachis apex, linear-lanceolate. Lamina bipinnatifid, light green when dry, elliptic-lanceolate, 20–35 × ca. 5 cm at middle, below middle gradually contracted toward base, acute or shortly acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly abaxially; scales similar to distal stipe scales, light brown, linear-lanceolate. Pinnae 25–35 pairs, attached at nearly right angles to rachis or angled slightly acroscopically, alternate, approximate or slightly approximate, shortly stalked, deltoid-lanceolate, middle pinnae 1.5–2 cm × 6–8 mm at base, bases asymmetrical, acroscopic base auriculate, basiscopic margins truncate, pinnatifid to pinnatisect, apices acute. Lobes 6–8 pairs, angled upward; basal acroscopic auriculate lobes largest, elliptic, pinnatilobate; all remaining acroscopic lobes elliptic, pinnatilobate, forked or entire, apices acute and shortly spinulose; basiscopic lobes entire, apex acuminate and shortly spinulose; both surfaces glabrous; micro-scales absent, but if present then micro-scales brown, long acicular; frond texture thinly leathery; venation pinnate, slightly

visible abaxially, indistinct adaxially, veinlets simple or forked. Sori terminal on shorter veinlets, 1 per lobe, but basal basiscopic 2 lobes sterile, 2 or 3 on auricles, close to midrib of pinnae, whole lamina fertile; indusia present, large, membranous, with shallow rounded teeth or erose, centers slightly concave, brown when mature.

- On rocks on slopes; ca. 4000 m. Xizang (Lhasa).

*Polystichum longidens* is similar to *P. thomsonii*, but its lamina apex is shortly acuminate and its pinnae are longer, more deeply lobed, and glabrous on both surfaces.

**50. *Polystichum setillosum*** Ching, Bull. Fan Mem. Inst. Biol. 2: 188. 1931.

刚毛耳蕨 *gang mao er jue*

Plants evergreen. Rhizome short, ascending, together with remnant stipe base up to 3 cm in diam. Fronds 30–60 cm; stipe base castaneous, stramineous upward, 3–15 cm, 1–1.5 mm in diam. at base, densely scaly; scales varying in size, light brown, membranous; largest scales ovate or broadly ovate, subentire, shortly acuminate; smaller scales ovate-lanceolate to lanceolate, with few fimbriate teeth, long acuminate. Lamina dark green adaxially when dry, light green abaxially, narrowly elliptic-lanceolate, 20–45 × 2.5–5 cm at middle, gradually contracted toward base, base ca. 1/2 as wide as middle, 1-pinnate, apex acuminate; rachis stramineous, without proliferous bulbils, densely scaly on both surfaces; scales similar to stipe scales, brown, lanceolate. Pinnae 25–45 pairs, overlapping or approximate, sometimes slightly imbricate, sessile, bases asymmetrical, apices acute and with short spinule slightly curved upward; acroscopic base obviously wider and auriculate, acroscopic margins recurved and forming an obtuse angle with rachis, basiscopic margins often forming ± right angles with rachis, margins of pinnae pinnatilobate to pinnatifid, or only incised and with shallow obtuse teeth; middle pinnae largest, attached at right angles to rachis, obliquely ovate or ovate-lanceolate, 1.5–3 × 0.5–1.5 cm, lower pinnae gradually contracted toward base and slightly reflexed; basal pinnae nearly deltoid, shorter than 1/2 width of middle largest pinnae; auricles deltoid, sparsely toothed, acute and shortly spinulose; lobes of pinnatifid pinnae up to 5 pairs, basal acroscopic auriculate lobes obliquely ovate, other lobes nearly oblong, margins mostly sparsely toothed, apices acute and shortly spinulose; micro-scales on abaxial surface light brown or grayish brown, lanceolate or subulate-lanceolate, membranous, entire; micro-scales on adaxial surface sparser, along midrib, brown, linear, margins entire; frond texture thinly leathery; venation bipinnate on pinnae, slightly visible abaxially, distinct adaxially, veinlets simple or forked. Sori abaxial on veinlets, close to pinna midrib, often in 1 row on each side of midrib, sometimes in 2 rows on each side of midrib of basal part of pinna, often in 1–3 rows on auricles and auriculate lobes; indusia present, brown when mature, membranous, centers concave, erose or shallowly lacerate.

- Forests, shrubs at forest margins; 2400–2900 m. W Sichuan (Kangding, Luding, Shimian).

The phylogenetic position of *Polystichum setillosum* is unclear. It is tentatively placed here.

**51. *Polystichum costularisorum*** Ching ex W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 224. 2001.

轴果耳蕨 *zhou guo er jue*

Plants evergreen. Rhizome ascending, short. Fronds ca. 20 cm; stipe stramineous, slender, ca. 9 cm, less than 1 mm in diam. at base, whole stipe scaly; scales yellowish brown, lanceolate, thin; basal stipe scales sparse, broadly ovate, with few long teeth or subentire. Lamina 1-pinnate, narrowly elliptic-lanceolate, ca. 13 × 2.5 cm, apex pinnatifid-acuminate; rachis stramineous, without proliferous bulbils, sparsely covered with remnant scales similar to stipe scales. Pinnae ca. 10 pairs, oblong-ovate, sessile, bases asymmetrical, margins pinnatifid to

pinnatilobate, apices acute; acroscopic base auriculate, basicopic margins oblique, at right angles to rachis or slightly angled basicopically; middle pinnae largest, up to 1.5 cm × 7 mm; basal pinnae contracted and rhombic, ca. 5 mm long and wide, lobes and teeth acute at apex; frond texture papery; venation slightly visible, pinnate on pinnae, veinlets often simple, rarely forked. Sori abaxial on lower part or base of veinlets, 2–8 per pinna, often close to midrib when mature; indusia present, light brown with dark brown centers, erose.

- Wet rocks; ca. 2500 m. W Sichuan (Luding).

*Polystichum costularisorum* is similar to *P. thomsonii*, but its stipe is nearly as long as its rachis and its lamina has only 10–16 pairs of pinnae, which are pinnatilobate to pinnatifid.

**12. *Polystichum* sect. *Sorolepidium*** (Christ) Tagawa, Acta Phytotax. Geobot. 9: 122. 1940.

高山耳蕨组 *gao shan er jue zu*

*Sorolepidium* Christ, Bot. Gaz. 51: 350. 1911; *Polystichum* sect. *Lasiopolystichum* Daigobo; *P. ser. Moupinensia* H. S. Kung & Li Bing Zhang.

Plants small, summer-green. Upper part of rhizome often with persistent stipe bases. Lamina 1-pinnate, lanceolate or elliptic-lanceolate. Pinnae deeply or shallowly pinnatifid. Pinnae ovate, deltoid, or oblong, indistinctly toothed, mucronate. Microscales linear or lanceolate. Sori abaxial or terminal on veinlets. Indusia large, membranous, erose.

About 16 species: alpine regions in Asia; 13 species (seven endemic) in China.

The currently defined *Polystichum* sect. *Sorolepidium* is comparable to *P. ser. Moupinensia* H. S. Kung & Li Bing Zhang, only a part of *P. sect. Lasiopolystichum* sensu H. S. Kung & Li Bing Zhang in FRPS (5(2): 60. 2001). Molecular data (Liu et al., Chin. Sci. Bull. 52: 631–638. 2007) show that *Sorolepidium* is nested within *Polystichum*.

- 1a. Basalmost pinnae pinnatilobate or pinnatifid but not pinnatipartite.
  - 2a. Stipe and rachis with light brown scales and scales with blackish brown centers ..... 55. *P. paramoupinense*
  - 2b. Stipe and rachis scales light brown.
    - 3a. Rachis often subglabrous; pinnae glabrous adaxially ..... 52. *P. lachenense*
    - 3b. Rachis with dense scales; pinnae with lanceolate microscales adaxially.
      - 4a. Indusia exindusiate ..... 53. *P. glaciale*
      - 4b. Indusia indusiate ..... 54. *P. duthiei*
- 1b. Basalmost pinnae pinnatipartite and with 1–7 nearly free lobes dissected nearly to midrib.
  - 5a. Only pinnae of lower part of lamina with 1 or 2 pairs of free lobes dissected to midrib.
    - 6a. Stipe and rachis with light brown scales and scales with blackish brown centers; pinnae below middle of lamina ovate or oblong ..... 56. *P. castaneum*
    - 6b. Stipe and rachis scales concolorous; pinnae below middle of lamina deltoid-ovate or ovate.
      - 7a. Stipe stramineous, sometimes brown at base; pinnae acute or acuminate at apex ..... 57. *P. moupinense*
      - 7b. Stipe brown; pinnae obtuse or rounded at apex ..... 58. *P. habaense*
  - 5b. Pinnae with more than 3 pairs of free lobes dissected to midrib.
    - 8a. Stipe brown, with brown scales and scales with blackish brown centers ..... 59. *P. melanostipes*
    - 8b. Stipe stramineous.
      - 9a. Stipe and rachis with light brown scales and scales with blackish brown centers.
        - 10a. Pinnae oblong or ovate, obtuse or rounded at apex ..... 63. *P. salwinense*
        - 10b. Pinnae narrowly deltoid or narrowly ovate, acute at apex ..... 64. *P. nigrum*
      - 9b. Stipe and rachis scales concolorous.
        - 11a. Stipe and rachis scales yellowish brown to fulvous ..... 60. *P. integrilobum*
        - 11b. Stipe and rachis scales brown.
          - 12a. Lamina 11–30 cm; indusia flat ..... 61. *P. shensiense*
          - 12b. Lamina 8–12 cm; indusia arc-shaped ..... 62. *P. taizhongense*

**52. *Polystichum lachenense*** (Hooker) Beddome, Ferns Brit. India, t. 32. 1865.

拉钦耳蕨 *la qin er jue*

*Aspidium lachenense* Hooker, Sp. Fil. 4: 8. 1862; *Poly-*

*stichum sinkiangense* Ching ex Chang Y. Yang; *P. xinjiangense* Ching ex Chang Y. Yang.

Plants summer-green. Rhizome erect, densely covered with broadly lanceolate brown scales. Fronds 6–14 cm; stipe

stramineous, 2–6 cm, slender, ca. 0.5 mm in diam. at base, lower part persistent, covered with brown, linear and narrowly lanceolate scales. Lamina 1-pinnate, linear, 5–14 cm × 8–16 mm, contracted at base, acuminate; rachis without proliferous bulbils, both surfaces glabrous, or only with few scales; scales light brown, narrowly lanceolate. Pinnae 12–15 pairs, alternate, attached at right angles to rachis or slightly ascendant, sparsely arranged, sessile or shortly stalked, ovate, middle pairs 5–8 × 3–4 mm, bases broadly cuneate or rounded-cuneate, sometimes acroscopic bases slightly auriculate, margins with small acute teeth or pinnatilobate, apices rounded or rarely acute; both surfaces glabrous or with few microscales; microscales light brown, narrowly lanceolate; frond texture papery; venation pinnate on pinnules, lateral veins dichotomous, indistinct on both surfaces. Sori often on upper pinnae only, in 1 row on each side of midrib; indusia present, toothed.

Alpine meadows, rock crevices or foot of rocks; 3200–4500 m. Gansu, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [Bhutan, N and NW India, Japan, Kashmir, Nepal].

A hybrid, *Polystichum* × *gemmilachenense* Miyamoto & T. Nakamura (J. Jap. Bot. 58: 149. 1983), possibly between *P. lachenense* and *P. stenophyllum*, was described from Taizhong, Taiwan.

**53. *Polystichum glaciale*** Christ, Bull. Soc. Bot. France 52(Mém. 1): 28. 1905.

玉龙耳蕨 yu long er jue

*Sorolepidium glaciale* (Christ) Christ; *S. ovale* Y. T. Hsieh.

Plants summer-green. Rhizome erect; scales dense, pale brown, ovate or broadly lanceolate, up to 5 mm, denticulate, acuminate. Fronds 4–9, 6–20 cm; stipe stramineous, 1–6(–8) cm, 1–2 mm in diam. at middle; basal stipe scales dense, reddish brown, ovate, broadly lanceolate, lanceolate, and linear, membranous, toothed, acuminate; distal stipe scales similar but smaller. Lamina 1-pinnate, yellowish green when dry, linear-lanceolate, 9–15 cm, 1.5–2.5 cm at middle, slightly contracted toward base, acute; rachis stramineous, without proliferous bulbils, densely scaly; scales similar to distal stipe scales, broadly lanceolate and linear, toothed, acuminate or caudate. Pinnae 14–28 pairs, alternate, attached at nearly right angles with rachis, sessile, deltoid-oblong, middle pairs 0.5–1.1 cm × 3–6 mm, bases nearly rounded and slightly asymmetrical, apices obtuse; acroscopic base auriculate, auricles semicircular, proximal margins of auricles slightly overlapping rachis, acroscopic margins subentire, basal basicopic margins truncate, forming a 90°–130° angle with rachis, entire, distal basicopic margins curved upward, entire; both surfaces densely scaly; microscales light brown, lanceolate, up to 2 mm; frond texture thinly leathery; venation pinnate on pinnae, lateral veins simple or forked, indistinct on both surfaces. Sori in 1 row on each side of midrib, 3–5 on each side of midrib, terminal on shorter veinlets, medial, whole lamina fertile, exindusiate. Spores elliptic in equatorial view; perispore sculpturing reticulate with echinate folds.

Frigid alpine mountains, calcareous rock crevices up to snow line or nearby glaciers; 3000–4700 m. Gansu, Qinghai, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, NE India].

**54. *Polystichum duthiei*** (C. Hope) C. Christensen, Index Filic. 72. 1905.

杜氏耳蕨 du shi er jue

*Aspidium duthiei* C. Hope, J. Bombay Nat. Hist. Soc. 12: 532. 1899; *Sorolepidium duthiei* (C. Hope) Ching; *Polystichum duthiei* var. *subbipinnatum* Tagawa; *P. tschuense* Ching.

Plants summer-green. Rhizome erect, densely covered with broadly lanceolate brown scales, with persistent stipe bases. Fronds 5–12 cm; stipe stramineous, 1–3 cm, ca. 1 mm in diam. at base, lower part persistent, densely covered with narrowly ovate and lanceolate scales; scales light brown, serrulate. Lamina 1-pinnate, linear, 6–13 × 1–1.2 cm, slightly contracted at base, acuminate; rachis without proliferous bulbils, adaxially scaly, scales light brown, linear-lanceolate and hairlike, abaxially densely covered with same scales. Pinnae 16–25 pairs, alternate, attached at right angles to rachis, approximate, sessile, ovate or deltoid-ovate, middle pairs 6–7 × 4–5 mm, bases broadly cuneate or nearly rounded, auriculate acroscopically and basicopically, margins with obtuse teeth or pinnatilobate, apices obtuse; abaxially with narrowly lanceolate light brown microscales, adaxially with hairlike white microscales; frond texture papery; venation pinnate on pinnules, indistinct on both surfaces. Sori on upper pinnae from middle of lamina upward, in 1 row on each side of midrib; indusia present, toothed.

Alpine meadows and rocks; 2800–4800 m. Gansu, Xizang, Yunnan [N and NW India, Nepal].

*Polystichum duthiei* is not distributed in Taiwan.

**55. *Polystichum paramoupinense*** Ching, Fl. Xizang. 1: 226. 1983.

拟穆坪耳蕨 ni mu ping er jue

Plants summer-green. Rhizome erect, densely covered with broadly lanceolate brown scales with blackish brown centers. Fronds ca. 12 cm; stipe stramineous, sometimes lower part brown, 2–3 cm, ca. 1 mm in diam. at base, lower part persistent, densely covered with narrowly ovate and lanceolate scales; scales light brown, sometimes brown at middle, serrulate. Lamina 1-pinnate, linear, 9–14 × 1.4–1.6 cm, slightly contracted at base, acuminate; rachis without proliferous bulbils; adaxial scales light brown, linear-lanceolate and hairlike; abaxial scales dense, dimorphic; smaller scales light brown, linear; larger scales brown at middle and light brown on margin, lanceolate. Pinnae 20–28 pairs, alternate, attached at right angles to rachis, approximate, sessile, ovate or deltoid-ovate, middle pairs 6–7 × 4–5 mm, bases broadly cuneate or nearly rounded, auriculate acroscopically and basicopically, margins with obtuse teeth or pinnatilobate, apices obtuse; adaxial microscales white, hairlike; abaxial microscales light brown, narrowly lanceolate and hairlike; frond texture papery; venation pinnate on pinnules, lateral veins dichotomous, indistinct on both surfaces. Sori on upper pinnae from middle of lamina upward, in 1 row on each side of midrib; indusia present.

• Alpine meadows; ca. 4100 m. W Sichuan (Daocheng), Xizang (Bomi).

*Polystichum paramoupinense* is similar to *P. duthiei* but differs in its bicolorous stipe and rachis scales.

**56. *Polystichum castaneum*** (C. B. Clarke) B. K. Nayar & S. Kaur, Companion Beddome's Handb. Ferns Brit. India, 50. 1974.

栗鳞耳蕨 li lin er jue

*Aspidium prescottianum* Wallich ex Mettenius var. *castaneum* C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 510. 1880; *Polystichum prescottianum* (Wallich ex Mettenius) T. Moore var. *castaneum* (C. B. Clarke) Beddome.

Plants summer-green. Rhizome erect, densely covered with lanceolate dark brown scales. Fronds 24–30 cm; stipe stramineous, 6–9 cm, ca. 3 mm in diam. at base, lower part persistent, with lanceolate and linear light brown scales, mixed with ovate and lanceolate blackish brown scales. Lamina bipinnatifid, linear-lanceolate or linear-oblancoate, 20–30 × 2–3 cm, slightly contracted at base, acuminate; rachis without proliferous bulbils, both surfaces with linear light brown scales, abaxially mixed with lanceolate blackish brown scales. Pinnae 24–38 pairs, alternate, attached at right angles to rachis, approximate, slightly distant from basal pairs, sessile, ovate or oblong, basal pairs deltoid-ovate, middle pairs ca. 1.6 cm × 7–8 mm, bases obliquely and broadly cuneate, auriculate acroscopically, pinnatifid to middle of pinnae or slightly more to pinna rachis, apices obtuse or nearly rounded. Lobes 4–6 pairs, nearly opposite, slightly ascendant, nearly approximate, broadly obovate to oblong, apices nearly rounded or acute; both surfaces with linear light brown microscales; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori on upper pinnae from middle of lamina upward, in 1 row on each side of pinna rachis; indusia present, subentire.

Alpine meadows, shrubs; 3200–4600 m. W Sichuan, Xizang, NW Yunnan [N India, N Myanmar].

**57. *Polystichum moupinense*** (Franchet) Beddome, Handb. Suppl. Ferns Brit. Ind. 42. 1892.

穆坪耳蕨 mu ping er jue

*Aspidium moupinense* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 115. 1887; *Polystichum macrochlaenum* Ching & S. K. Wu; *P. prescottianum* (Wallich ex Mettenius) T. Moore var. *moupinense* (Franchet) C. Christensen; *P. woodsiioides* Christ.

Plants summer-green. Rhizome erect, densely covered with broadly lanceolate brown scales. Fronds 12–20 cm; stipe stramineous, sometimes lower part brown, 4–9 cm, 1–2 mm in diam. at base, lower part persistent, covered with narrowly ovate and lanceolate brown scales. Lamina bipinnatifid, linear-lanceolate, 12–22 × 1.2–2.2 cm, base slightly contracted, apex attenuate; rachis without proliferous bulbils, scaly on both surfaces; scales light brown, lanceolate and linear. Pinnae 20–30 pairs, alternate, attached at nearly right angles to rachis, approximate, sessile, ovate or deltoid-ovate, upper pinnae narrower, middle pairs 6–10 × 4–6 mm, bases rounded-cuneate or nearly truncate, auriculate acroscopically and basiscopically, sometimes acroscopic auricles slightly longer, pinnatifid to middle of pinnae, immediate apex area obtuse. Lobes 3–5 pairs, but only 1 or 2 pairs lobed to rachis, alternate, slightly ascendant, approximate, broadly ovate to obovate, entire or serrulate, acu-

minate; abaxially with narrowly lanceolate light brown microscales, adaxially glabrous; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori on upper pinnae from middle of lamina upward, 1 or 2 on each side of midrib of lobe, or in 1 row on each side of pinna rachis; indusia present, toothed.

Alpine meadows, alpine coniferous forests; 2500–4500 m. S Gansu, Hubei (Shennongjia), Shaanxi (Taibai Shan), W Sichuan, Xizang, NW Yunnan [Bhutan, NW India, Nepal].

**58. *Polystichum habaense*** Ching & H. S. Kung, Bull. Bot. Res., Harbin 9(3): 4. 1989.

哈巴耳蕨 ha ba er jue

Plants summer-green. Rhizome erect, with broadly lanceolate dark brown scales. Fronds 22–28 cm; stipe brown, 10–14 cm, ca. 3 mm in diam. at base, lower part persistent; lower stipe scales brown, dark brown at middle, ovate. Lamina bipinnatifid, linear-lanceolate or linear-oblancoate, 20–26 × 2.5–3 cm, slightly contracted at base, acuminate; rachis without proliferous bulbils, lower part purplish brown, sparsely covered with lanceolate and linear scales, abaxially sparsely scaly; scales light brown, lanceolate and linear, mixed with brown scales. Pinnae 24–30 pairs, alternate, overlapping or approximate, sessile, ovate or deltoid-ovate, upper pinnae narrower, middle pairs 1.2–1.5 cm × 7–9 mm, bases rounded-cuneate or nearly truncate, auriculate acroscopically and basiscopically, sometimes acroscopic auricles longer, pinnatifid, apices acute, obtuse, or rounded. Lobes 3–6 pairs, alternate, slightly ascendant, approximate, oblong to obovate, with several small teeth, acute or obtuse; abaxially with narrowly lanceolate and linear light brown microscales, adaxially glabrous; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori on upper pinnae, on each side of midrib, or in 1 row on each side of pinna rachis; indusia present, toothed.

• Margins of alpine coniferous forests, *Rhododendron* shrubs; 3700–4100 m. NW Yunnan (Zhongdian).

**59. *Polystichum melanostipes*** Ching & H. S. Kung, Bull. Bot. Res., Harbin 9(3): 10. 1989.

乌柄耳蕨 wu bing er jue

Plants summer-green. Rhizome erect, covered with lanceolate dark brown scales. Fronds ca. 25 cm; stipe brown, 6–8 cm, ca. 2 mm in diam. at base, covered with ovate and lanceolate bicolorous scales with blackish brown centers, and mixed with lanceolate brown scales. Lamina bipinnatifid, linear-lanceolate, 19–23 × 1.6–2.8 cm, gradually contracted at base, acuminate; rachis without proliferous bulbils, both surfaces covered with scales; scales light brown, lanceolate and linear, abaxially mixed with lanceolate dark brown scales. Pinnae 28–33 pairs, alternate, attached at right angles to rachis, approximate by a distance as wide as pinna width, sessile, narrowly deltoid-ovate, middle pairs 8–13 × 5–6 mm, bases rounded-cuneate or nearly truncate, auriculate acroscopically and basiscopically, pinnatifid to or nearly to costa pinna rachis, apices acuminate. Lobes 4–6 pairs, nearly opposite, slightly ascendant, approximate, obovate to elliptic, acroscopic margins with small teeth, apices acuminate; abaxially with few micro-

scales, adaxially glabrous or with hairlike light brown microscales; microscales light brown, narrowly lanceolate; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori often on upper pinnae, in 1 row on each side of pinna rachis, sometimes 2 or 3 on basiscopic lobes; indusia present, subentire.

- Alpine meadows; 3200–4000 m. NW Yunnan (Dêqên, Weixi).

**60. *Polystichum integrilobum*** (Ching ex Y. T. Hsieh) W. M. Chu ex H. S. Kung & Li Bing Zhang, *Acta Phytotax. Sin.* 36: 244. 1998.

钝裂耳蕨 *dun lie er jue*

*Sorolepidium integrilobum* Ching ex Y. T. Hsieh, *Bull. Bot. Res.*, Harbin 9(3): 48. 1989.

Plants summer-green. Rhizome erect, densely covered with lanceolate yellowish brown scales. Fronds 12–20 cm; stipe stramineous, 4–7 cm, ca. 2 mm in diam. at base, densely covered with narrowly ovate and linear yellowish brown scales. Lamina bipinnatifid, lanceolate, 12–20 × 2–4 cm, gradually narrower toward base, acuminate; rachis without proliferous bulbils, densely covered with scales on both surfaces; scales stramineous, lanceolate and linear. Pinnae 18–22 pairs, alternate, attached at right angles to rachis, sessile, deltoid-lanceolate, middle pairs 1–2 cm × 5–8 mm, bases obliquely broadly cuneate, auriculate acropically, pinnatifid, apices obtuse. Lobes 2–5 pairs, nearly opposite, slightly ascendant, approximate, oblong, entire; abaxially with many lanceolate yellowish brown microscales, adaxially subglabrous; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori in 1 row on each side of midrib; indusia present, serrulate.

- Shrubs, rock crevices; 2900–3900 m. NW Yunnan (Lijiang).

**61. *Polystichum shensiense*** Christ, *Bull. Acad. Int. Géogr. Bot.* 16: 113. 1906.

陕西耳蕨 *shan xi er jue*

*Dryopteris lichiangensis* (C. H. Wright) C. Christensen; *Nephrodium lichiangense* C. H. Wright; *Polystichum lichiangense* (C. H. Wright) Ching ex H. S. Kung; *P. obtusipinnum* Ching & H. S. Kung; *P. prescottianum* (Wallich ex Mettenius) T. Moore var. *shensiense* (Christ) C. Christensen.

Plants summer-green. Rhizome erect, densely covered with lanceolate brown or light brown scales. Fronds 12–24 cm; stipe stramineous, 3–10 cm, ca. 1 mm in diam. at base, lower part persistent, with few ovate and lanceolate light brown scales. Lamina bipinnatifid, linear-oblong or oblong, 11–30 × 1.2–2.4 cm, slightly contracted at base, acuminate; rachis without proliferous bulbils, both surfaces with few scales; scales light brown, lanceolate and linear. Pinnae 24–32 pairs, alternate, ascendant, slightly more distant from one another toward lamina base, sessile, narrowly ovate or narrowly deltoid-ovate, middle pairs 6–15 × 4–6 mm, bases broadly cuneate or rounded-cuneate, auriculate acropically and basiscopically, pinnatifid to or near to pinna rachis, apices acute or obtuse. Lobes 4–6 pairs, alternate, slightly ascendant, obovate to ovate, apices acuminate and often with several acute teeth;

both surfaces glabrous or with few lanceolate light brown microscales; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori on upper pinnae from middle of lamina upward, in 1 row on each side of costa or 1 or 2 on each side of midrib of lobe; indusia present, subentire.

Alpine meadows, alpine coniferous forests; 2600–4000 m. Chongqing (Wushan), S Gansu, Shaanxi, W Sichuan, S Xizang, NW and W Yunnan [Bhutan, N and NW India, Kashmir, Nepal, Pakistan].

**62. *Polystichum taizhongense*** H. S. Kung, *Acta Phytotax. Sin.* 35: 461. 1997.

台中耳蕨 *tai zhong er jue*

Plants summer-green. Rhizome unknown. Fronds 10–15 cm; stipe stramineous with brown base, 3–5 cm, 1–2 mm in diam. at base, densely covered with narrowly lanceolate and linear yellowish brown scales, mixed with narrowly ovate brown scales at stipe base. Lamina bipinnatifid, linear-lanceolate, 8–12 × 1.6–2.5 cm, slightly contracted at base, acuminate; rachis without proliferous bulbils, with linear yellowish brown scales on both surfaces. Pinnae 19–24 pairs, alternate, slightly angled basiscopically, shortly stalked, ovate or narrowly ovate, middle pairs 6–14 × 4–6 mm, broadly cuneate or rounded-cuneate, pinnatifid, broadly cuneate or rounded-cuneate. Lobes 2–4 pairs, nearly opposite, slightly ascendant, oblong, ca. 2 × 1 mm, upper part with small acute teeth; abaxially covered with many lanceolate microscales, adaxially sparsely covered with filiform microscales; frond texture papery; venation pinnate on lobes, slightly raised on both surfaces. Sori in 1 row on each side of pinna rachis, terminal on veinlets; indusia present, gibbous with concave centers, irregularly repand.

- Bushes, alpine meadows, rock crevices; 3200–3800 m. Taiwan (Taizhong).

**63. *Polystichum salwinense*** Ching & H. S. Kung, *Bull. Bot. Res.*, Harbin 9(3): 7. 1989.

怒江耳蕨 *nu jiang er jue*

Plants summer-green. Rhizome erect, covered with broadly lanceolate brown scales. Fronds 20–35 cm; stipe amber, 8–14 cm, ca. 3 mm in diam. at base, lower part persistent, densely covered with lanceolate and linear light brown scales, and mixed with ovate and lanceolate scales with blackish brown centers. Lamina bipinnatifid, linear-lanceolate, 28–30 × 3–3.5 cm, contracted at base, acuminate; rachis without proliferous bulbils, densely covered with scales on both surfaces; scales light brown, narrowly lanceolate and linear, abaxially mixed with lanceolate purplish brown scales. Pinnae 26–30 pairs, alternate, strongly ascendant, slightly approximate, but approximate on lower lamina, sessile, oblong or ovate, middle pairs 1.8–2 × 1–1.2 cm, broadly cuneate, pinnatifid to pinna rachis, rounded or acute. Lobes 3–5 pairs, nearly opposite, slightly ascendant, approximate, oblong, with several long acute teeth, apices acute or nearly rounded; both surfaces scaly; microscales denser abaxially, light brown, narrowly lanceolate; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori on upper pinnae, in 1 row on each side of pinna rachis, or 1 or 2 on each side of midrib of basiscopic lobes; indusia present, subentire.



• *Abies* forests, meadows; 3500–4000 m. NW Yunnan (Dali, Dêqên, Gongshan).

**64. *Polystichum nigrum*** Ching & H. S. Kung, Bull. Bot. Res., Harbin 9(3): 8. 1989.

黛鳞耳蕨 dai lin er jue

Plants summer-green. Rhizome erect, covered with broadly lanceolate dark brown scales. Fronds ca. 30 cm; stipe stramineous, 7–10 cm, 3–4 mm in diam. at base, lower part persistent, covered with lanceolate and linear light brown scales, and mixed with ovate purplish brown scales. Lamina bipinnatifid, oblanceolate, 26–30 × 3–3.8 cm, base gradually contracted, apex attenuate; rachis without proliferous bulbils, both surfaces covered with scales; scales light brown, lanceolate and linear, abaxially mixed with lanceolate purplish brown or dark brown

scales. Pinnae 26–34 pairs, alternate, attached at right angles to rachis, slightly approximate, sessile, narrowly deltoid-ovate to ovate, middle pairs 1.6–2 cm × 6–8 mm, bases broadly cuneate or nearly truncate, auriculate acroscopically and basiscopically, pinnatifid to or nearly to pinna rachis, apices acuminate. Lobes 4–7 pairs, nearly opposite, slightly ascendant, approximate, elliptic or oblong, distal margins with small teeth, acuminate; abaxially with lanceolate and narrowly lanceolate light brown microscales, adaxially glabrous or with few hairlike light brown microscales; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori on upper pinnae, 1–4 per lobe, sometimes in 1 row on each side of pinna rachis; indusia present, toothed.

• Alpine meadows, *Rhododendron* shrubs, *Abies* forests; 3000–3800 m. W Sichuan, NW Yunnan.

**13. *Polystichum* sect. *Macropolystichum*** Daigobo, Sci. Rep. Tokyo Kyoiku Daigaku, B, 15: 61. 1972.

深绿耳蕨组 shen lü er jue zu

*Polystichum* sect. *Prionolepia* Daigobo.

Plants medium-sized to large, evergreen. Lamina often bipinnate, occasionally 1-pinnate to bipinnatifid, broadly lanceolate, ovate-lanceolate, or narrowly deltoid, thinly leathery or leathery, often with 1 or 2 proliferous bulbils toward rachis tip, occasionally with 1 proliferous bulbil toward apex tip of pinna rachis, some species without bulbils on rachis. Scales dimorphic to trimorphic, stipe often covered with dimorphic scales, base densely covered with large scales; large scales ovate, narrowly ovate or ovate-lanceolate, mixed with lanceolate to linear-lanceolate small scales, upper stipe and rachis covered with small scales, with few large scales; scales brown, thickly membranous, middle part often thickened and bright blackish brown; microscales light brown, small, subulate, basal part fimbriate, thinly membranous, often sparse on pinnae and pinnules abaxially. Sori often small, indusia small, easily falling off when mature.

About 17 species: tropical Asia and subtropical mountains, individual species widely distributed, north up to S Japan (Yakushima Island), some species west up to NW India, S Himalayan slopes; 14 species (six endemic) in China.

1a. Rachis without proliferous bulbils.

2a. Microscales lanceolate; sori abaxial on veinlets.

3a. Stipe scales up to 3 cm; pinnae 16–27 pairs ..... 73. *P. mucronifolium*

3b. Stipe scales shorter than 2 cm; pinnae 8–17 pairs ..... 74. *P. biaristatum*

2b. Microscales filiform; sori terminal on veinlets.

4a. Lamina acuminate and sterile at apex ..... 75. *P. oreodoxa*

4b. Lamina cuspidate at apex.

5a. Rachis with linear scales; lamina fertile at apex; pinnules oblong and falcate-oblong ..... 78. *P. longipinnulum*

5b. Rachis with lanceolate scales at least at base of pinna rachis.

6a. Lamina sterile at apex; pinnules deltoid-ovate or oblong ..... 76. *P. semifertile*

6b. Lamina fertile at apex; pinnules narrowly deltoid-ovate ..... 77. *P. fugongense*

1b. Rachis with proliferous bulbils.

7a. Lamina 1-pinnate to bipinnatifid.

8a. Lamina broadly lanceolate, nearly dimorphic, fertile lamina smaller; stipe scales with irregular

teeth, teeth often forked or irregularly pinnately branching ..... 65. *P. prionolepis*

8b. Lamina narrowly oblong-lanceolate, obviously monomorphic; stipe scales with regular simple teeth ..... 66. *P. lentum*

7b. Lamina bipinnate.

9a. Lamina 1-pinnatifid to pinnatisect.

10a. Stipe scales brown; pinnules with microscales linear adaxially; rachis with 2 bulbils ..... 67. *P. bigemmatum*

10b. Stipe scales mostly castaneous, at least castaneous at center; pinnules glabrous adaxially; rachis with 1(or 2) bulbils.

11a. Pinnules and lobes of lower pinnae broadly rhombic-ovate or obovate, cuspidate

aristate-spinulose ..... 68. *P. chunii*

11b. Pinnules and lobes of lower pinnae ovate or oblong, obtuse-acuminate to long

acuminate ..... 69. *P. attenuatum*

9b. Lamina fully bipinnate.

- 12a. Lamina nearly dimorphic, pinnae and pinnules of fertile fronds narrower and smaller; sori coenosori when mature, fully covering abaxial surface of pinnules ..... 70. *P. pycnopterum*  
 12b. Lamina monomorphic; sori not coenosori when mature.  
 13a. Pinnules shortly aristate-spinulose at apex and on distal margins ..... 71. *P. disjunctum*  
 13b. Pinnules not aristate-spinulose, shallowly toothed, incised to repand on margin ..... 72. *P. scariosum*

**65. *Polystichum prionolepis*** Hayata, Icon. Pl. Formosan. 4: 197. 1914.

锯鳞耳蕨 ju lin er jue

*Polystichum lentum* (D. Don) T. Moore var. *gelida* Rosenstock; *P. rectipinnum* Hayata.

Plants evergreen. Rhizome ascending, short. Fronds 40–60 cm, nearly dimorphic, fertile fronds smaller; stipe amber, 13–23 cm, 1–1.5 mm in diam. at base, whole plant with large and small scales; all scale margins densely serrulate, teeth brown to dark brown, irregular, often forked or irregularly pinnately branched; large scales brown, ovate or ovate-lanceolate, up to 1 cm × 4 mm, thickly membranous, or middle part thickened and blackish castaneous, with broad brown margins; small scales brown to dark brown, lanceolate, apices long caudate or linear-subulate. Lamina 1-pinnate to bipinnatifid, broadly lanceolate, base slightly or not contracted, apex attenuate; sterile lamina up to 30 × 12 cm; fertile lamina up to 16 × 6 cm; rachis stramineous, abaxially densely scaly; scales brown or blackish castaneous, lanceolate or narrowly lanceolate, basiscopic margins with few long teeth; sometimes with 1 proliferous bulbil near rachis tip, bulbil densely covered with brown scales. Pinnae 8–20 pairs, green or yellowish green when dry, darker abaxially, acuminate; middle pinnae attached at right angles to rachis or slightly reflexed toward base, lanceolate, apices acuminate or acute; acroscopic base auriculate, basiscopic base cuneate, pinnatifid to pinnatilobate on both sides, margins of upper pairs of pinnae with only coarse and shallow teeth, sometimes acroscopic bases of basal 1–3 pairs of pinnae nearly pinnatisect, pinnae of sterile fronds larger, up to 6 × 1.5 cm; pinnae of fertile fronds up to 3 × 1 cm; lobes obliquely deltoid, with 1–5 acute teeth, auricles often slightly curved toward rachis; pinna midribs and abaxial surface of veins covered with numerous microscales; microscales light brown, subulate or narrowly lanceolate, membranous; frond texture thinly leathery; venation pinnate on lobes, midribs conspicuous adaxially, concave; lateral veins slightly visible abaxially, indistinct adaxially; veinlets free, veinlets on auricles dichotomous. Sori small, abaxial on veinlets, close to midrib, 1–5 on each group of lateral veins, up to 9 per auricle; indusia light brown when mature, shallowly lobed, caducous. Spores semi-orbicular in equatorial view; perispore sculpturing with finely reticulate ornamentation.

• On shaded rocks in montane cloud forests and *Cunninghamia lanceolata* forests; 2000–2400 m. Taiwan, SC Yunnan.

*Polystichum prionolepis* has special, densely serrulate scales with teeth often forked or irregularly branched pinnately. The specific epithet “prionolepis” (toothed scales) refers to this characteristic.

**66. *Polystichum lentum*** (D. Don) T. Moore, Index Fil. 86, 95. 1858.

柔软耳蕨 rou ruan er jue

*Aspidium lentum* D. Don, Prodr. Fl. Nepal. 4. 1825; *A. auriculatum* (Linnaeus) Swartz var. *lentum* (D. Don) C. B. Clarke; *A. auriculatum* var. *subbipinnatum* Hooker; *Polystichum auriculatum* (Linnaeus) C. Presl var. *lentum* (D. Don) Beddome; *P. auriculatum* var. *subbipinnatum* (Hooker) Beddome; *P. longipes* Ching & S. K. Wu (1983), not Maxon (1909); *P. medogense* Ching & S. K. Wu.

Plants evergreen. Rhizome erect, short, densely covered with large scales; scales narrowly ovate or ovate-lanceolate, middle part thickened, castaneous, with broad brown margins, densely serrulate. Fronds 40–100 cm; stipe stramineous, light brown, or light purple, 10–30 cm, 1.5–3 mm in diam., base densely covered with large scales similar to rhizome scales, mixed with brown small scales; small scales lanceolate to linear-lanceolate, toothed; upper stipe with few small scales similar to basal small scales. Lamina deeply or shallowly bipinnatifid or bipinnatifid, light green abaxially, darker adaxially when dry, sometimes white along midribs, narrowly lanceolate, 30–70 × 5–10 cm at middle, base slightly contracted, apex attenuate; rachis and pinna bases sparsely covered with small scales; small scales brown, lanceolate or linear-lanceolate, with 1 proliferous bulbil near rachis tip, bulbil densely covered with brown scales. Pinnae 25–40 pairs, alternate or nearly opposite, lower pairs reflexed toward base, middle pinnae attached at right angles to rachis, upper pairs attached at right angles to rachis or slightly ascendant, lanceolate or falcate, middle pinnae 3–5 × 1.3–1.5 cm above base, both surfaces glabrous, bases shortly stalked and asymmetrical, apices acute with mucronate tips; basiscopic side cuneate, acroscopic base auriculate, auricles parallel to rachis, pinnatilobate to pinnatifid on both acroscopic and basiscopic margins, bases nearly pinnatifid to midribs; lobes of middle pinnae 5–10 pairs, ascendant, nearly elliptic, with few slender, acute teeth, mucronate; lobes of acroscopic bases obviously largest, nearly free, oblong, toothed or incised or subentire; frond texture thinly leathery; veins indistinct on both surfaces, pinnate on lobes, veinlets mostly free, often forked on auricles. Sori 1–4 per lobe, up to 6 per auricle; indusia brown when mature, small, caducous.

On rocks in montane broad-leaved evergreen forests; 800–1600 m. Xizang (Médog) [Bhutan, NE India, Nepal].

**67. *Polystichum bigemmatum*** Ching ex L. L. Xiang, *Chenia* 3–4: 133. 1997.

双胞胎耳蕨 shuang bao er jue

Plants evergreen. Rhizome ascending, ca. 4 cm in diam. Fronds ca. 60 cm; stipe brownish stramineous, ca. 2 mm in diam., densely scaly; scales brown, membranous, dimorphic; large scales ovate, up to 1 cm × 5 mm, entire, acute; small scales lanceolate or broadly lanceolate, up to 7 × 1.5 mm, slightly toothed. Lamina narrowly elliptic-lanceolate, ca. 50 × 5 cm at middle, lower part bipinnate, apex pinnatifid and acumi-

nate; rachis amber, densely covered with small scales; small scales reddish brown, lanceolate or subulate, entire, rachis often with 2 proliferous bulbils near tip, bulbils densely covered with reddish brown scales. Pinnae ca. 50 pairs, basal pairs attached nearly at right angles with rachis, all other pinnae angled slightly acroscopically; pinnae shortly falcate, up to  $3 \times 1.5$  cm, apices acute; acroscopic bases obviously auriculate, basicopic bases cuneate, lower part of lower pinnae pinnate, with 2 pairs of free pinnules; pinnules ovate or obovate-rhombic, upper part pinnatifid to pinnatifid; upper pinnae with 1 free pinnule or only pinnatifid at proximal base; margins of pinnules and lobes often reflexed toward base, apices with 1 spinulose tip, sometimes also with 1 or 2 lateral spinulose tips near apex, pinnules and lobes of basal acroscopic pinnae obviously largest; pinnules yellowish green when dry, scaly on both surfaces; microscales brown, linear, entire; frond texture thinly leathery; veins indistinct abaxially, visible adaxially, pinnate on pinnules and lobes; veinlets free, partial veinlets on basal pair of pinnae dichotomous to trichotomous. Sori small, abaxial on veinlets of pinnules, close to pinnule or lobe midrib, up to 5–7 per pinnule, 1–4 per lobe; indusia dark brown when mature, easily contracted and falling off.

• On rocks in dense *Tsuga* forests, uncommon; ca. 2600 m. SW Sichuan (Mianning).

**68. *Polystichum chunii*** Ching, *Sinensia* 1: 2. 1929.

陈氏耳蕨 *chen shi er jue*

Plants evergreen. Rhizome ascending, upper part and stipe densely scaly; large scales light brown or castaneous, ovate or narrowly ovate, 6–10 × 3–5 mm, thick in texture, margins membranous, apex caudate; or scales brown or light brown, membranous, middle part partially thickened, varying in size, castaneous, serrulate, teeth short, fimbriate, easily falling off; small scales brown, linear-lanceolate or lanceolate, membranous, margins also with fimbriate teeth. Fronds 40–50 cm; stipe stramineous to amber, 6–18 cm, ca. 1 mm in diam. at base, stipe scales gradually smaller upward, and easily falling off. Lamina bipinnate, yellowish green or light yellow when dry, adaxially darker, lanceolate, 20–30 × 4–7 cm, slightly contracted at base, long acuminate; rachis stramineous, densely scaly; scales lanceolate and linear-lanceolate, similar to small scales on stipe; rachis with 1 proliferous bulbil near tip, bulbil densely covered with brown scales. Pinnate pinnae less than 10 pairs, mostly attached at right angles to rachis, sometimes ascendant, basal pair (sometimes several basal pairs) angled basicopically with rachis, oblong, 1.5–4 cm × 5–10 mm, bases asymmetrical, apices acute; acroscopic pinnules obviously larger, auriculate, basicopic pinnules smallest, acroscopic lateral pinnae gradually contracted upward, oblong-lanceolate to oblong, pinnatifid or not pinnatifid. Pinnules rhombic-ovate, 1–4 pairs, bases sessile, ± decurrent to pinna rachis, margins sparsely toothed, teeth with aculeate tip, apices acute and spinulose; acroscopic auriculate pinnules sometimes shallowly lobed; lobes acute and spinulose at apex, broadly rhombic-ovate or obovate, apices and margins similar to those of pinnules; adaxially glabrous, sparsely covered with microscales; microscales light brown, linear or subulate; frond texture papery; veins visible abaxially, indistinct adaxially, pinnate on pinnules and lobes; veinlets free,

simple or forked, some basicopic forked veinlets on auricles and lobes of basal acroscopic pinnae further forked. Sori small, medial, abaxial on veinlets, 1–5 per pinnule or lobe, up to 8 per auricle or lobe of basal acroscopic pinnae; indusia present, small, entire.

• On rocks in broad-leaved evergreen forests in valleys; 800–1400 m. Guangxi, Guizhou, SW Hunan.

**69. *Polystichum attenuatum*** Tagawa & K. Iwatsuki, *Acta Phytotax. Geobot.* 23: 113. 1968.

长羽芽胞耳蕨 *chang yu ya bao er jue*

*Polystichum attenuatum* Tagawa & Z. Iwatsuki var. *subattenuatum* (Ching & W. M. Chu) W. M. Chu & Z. R. He; *P. mannii* Hope ex Fraser-Jenkins; *P. subattenuatum* Ching & W. M. Chu.

Plants evergreen. Rhizome ascending, short, densely scaly; scales dimorphic; large scales castaneous, ovate or oblong, up to 1 cm × 7 mm, thick in texture, margins brown and membranous, entire, acuminate; small scales brown or middle part castaneous, lanceolate or linear-lanceolate, or middle part narrowly thickened, serrulate, teeth dark brown. Fronds up to 1 m; stipe stramineous, up to 35 cm, ca. 3 mm in diam. at base, abaxially densely scaly; scales brown, dimorphic, similar to scales on rhizome apex, gradually sparser toward lamina apex, and thickened castaneous part on large scales gradually reduced upward, sometimes large scales membranous without thickened castaneous part at middle. Lamina bipinnate, green or yellowish green when dry, adaxially darker, narrowly deltoid or slightly broadly oblong-lanceolate, base not or slightly contracted, apex long acuminate; rachis stramineous, densely scaly on both surfaces; small scales brown to dark brown, subulate-linear, easily falling off, mixed with few large scales; large scales brown, broadly lanceolate, margins fimbriate, membranous; rachis with 1 proliferous bulbil near tip, bulbil densely covered with brown scales. Lateral pinnae more than 30 pairs, attached at right angles to rachis, pinnate pinnae up to 15 pairs, upper pairs gradually contracted, pinnatifid to pinnatifid or only toothed, obliquely ovate-lanceolate to obliquely ovate; larger pinnae up to 10 × 3 cm, lanceolate or slightly falcate-lanceolate, acuminate to long acuminate; middle pinnae shortly stalked, other pinnae sessile; costa with narrow green wings on each lateral side, adaxially green, stramineous or greenish stramineous, both surfaces scaly, scales similar to rachis scales. Pinnules fewer than 10 pairs, obliquely ovate, apices acuminate, obtuse, or mucronate, all acroscopic bases with distinct deltoid auricles, basicopic side curved, margins shallowly pinnatifid or toothed, lobes and teeth acute apically, basal acroscopic pairs obviously larger, oblong, acroscopic margins shallowly pinnatifid to pinnatifid, curved, basicopic only toothed or pinnatifid, often recurved, acroscopic side often overlapping rachis, basal basicopic pinnules often smaller, basal basicopic pinnules smallest; abaxially with few microscales; microscales light brown, subulate, thinly membranous; frond texture thickly papery; venation of pinnules and apical pinnae bipinnate, rarely 1-pinnate, visible abaxially, indistinct adaxially; veinlets free, simple or forked. Sori small, terminal on shorter veinlets, closer to midribs of pinnules, in 1 row on each side of midrib of upper

part of pinnules, often 2 or 3 pairs on pinnule auricles and lower lobes of basal acroscopic pinnules; indusia present, entire, centers concave, brown when mature, margins sometimes shallowly lobed.

Broad-leaved evergreen forests in valleys; 1400–2200 m. Guangxi, Guizhou, Yunnan [NE India, Myanmar, Thailand, Vietnam].

One of the important differences between *Polystichum attenuatum* and *P. lentum* is that the large scales of the former are entire while those of the latter are denticulate.

*Polystichum subattenuatum* should be conspecific with *P. attenuatum*. It has continuous distribution from Thailand to S China.

**70. *Polystichum pycnopterum*** (Christ) Ching ex W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 17. 2001.

密果耳蕨 mi guo er jue

*Aspidium aculeatum* (Linnaeus) Swartz var. *pycnopterum* Christ, Bull. Herb. Boissier 7: 14. 1899.

Plants evergreen. Rhizome erect, densely scaly; scales castaneous, lanceolate or broadly lanceolate, up to 2 cm × 5 mm, thick in texture, margins membranous, entire, brown. Fronds subdimorphic, fertile fronds slightly smaller, 65–90 cm; stipe stramineous or greenish stramineous, up to 40 cm, ca. 4 mm in diam. at base, base densely covered with large, medium-sized, and small scales; large scales castaneous, ovate or narrowly ovate, up to 2 × 1 cm, thick or partly thick in texture, membranous part brown, entire, only apical part slightly serrulate, acute; medium scales brown, lanceolate or linear-lanceolate, up to 2 cm × less than 1 mm, membranous, serrulate; small scales light brown, subulate, bases broadly rounded, long fimbriate, nearly appressed; distal stipe scales similar, but castaneous scales sparser and smaller, often lanceolate. Lamina bipinnate, green or yellowish green when dry, broadly lanceolate, up to 30–55 × 15–25 cm, base not or slightly contracted, apex abruptly contracted, acuminate; rachis stramineous, often with 1 proliferous bulbil near rachis tip, bulbil densely covered with brown scales; rachis densely covered with small scales abaxially as well as similar brownish membranous subulate scales on stipe; small scales castaneous or brown, lanceolate, margins fimbriate or only sparsely serrulate. Lateral pinnate pinnae 15–20 pairs, lanceolate or falcate-lanceolate, often slightly ascendant, sometimes basal pairs slightly reflexed toward base; pinnae of sterile fronds larger, up to 18 × 3 cm; pinnae of fertile fronds up to 10 × 2 cm, shortly stalked, acroscopic margins parallel with rachis, basiscopic margins often angled at less than 90° with pinna rachis, acuminate or long acuminate, often curved upward; apical pairs of pinnae obliquely ovate, not pinnatifid or with pinnatifid base, apex acute. Pinnules up to 20 pairs, attached at nearly right angles to rachis, ovate-lanceolate or obliquely ovate, apex acute; acroscopic bases auriculate, auricles acute, basiscopic margins broadly oblique or curved, margins acutely toothed, sometimes shallowly pinnatilobate; basal acroscopic pinnules often larger, pinnatifid to pinnatifid, auricle lobes nearly rhombic; frond texture thinly leathery; veins of pinnules bipinnate, distinct abaxially, slightly visible adaxially, adaxial midrib obviously concave; veinlets angled strongly acroscopically, free. Sori medial, abaxial on veinlets, coenosori and fully covering abaxial surface of fertile pinnules

when mature; indusia membranous, entire, brown when mature, centers slightly concave, often persistent. Spores semi-orbicular in equatorial view; perispore sculpturing plicate to lamellate.

• Broad-leaved evergreen forests; 1500–2600 m. SE Yunnan.

**71. *Polystichum disjunctum*** Ching ex W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 226. 2001.

疏羽耳蕨 shu yu er jue

Plants evergreen. Rhizome erect, densely scaly; scales dark brown, narrowly lanceolate, up to 1.5 cm, only apical margins serrulate, subentire below apex. Fronds up to 1.5 m; stipe up to > 50 cm, up to 4 mm in diam. at base, basal stipe densely scaly; scales dimorphic (large and small), upper part only with few small scales; large scales dark brown or middle part castaneous and margins brown, broadly lanceolate to lanceolate, curved, up to 2 cm × 4 mm, or middle part thickened, with broad margins, margins membranous, upper margins serrulate, subentire below apex; small scales light brown at base, castaneous upward, narrowly lanceolate, or subulate-lanceolate to subulate-linear, bases broadly rounded. Lamina bipinnate, green or light green when dry, adaxially darker, ovate-lanceolate or narrowly deltoid, up to 60 × 30 cm, base slightly or not contracted, apex abruptly slightly contracted, attenuate; rachis and costa stramineous, abaxially covered with numerous small scales; small scales brown to castaneous, subulate-lanceolate to subulate-linear, persistent; rachis with 1 or 2 proliferous bulbils near tip, bulbils densely covered with lanceolate and brown small scales. Pinnae up to 20 pairs, slightly ascendant, or sometimes basal pairs attached at right angles to rachis, alternate or nearly opposite, approximate, apical pairs obliquely ovate-lanceolate to obliquely ovate, pinnatifid to pinnatifid, apex acute; other pairs lanceolate or oblong-falcate-lanceolate, up to 18 × 4 cm, bases slightly or not contracted, pinnate, apices pinnatifid-acuminate. Pinnules up to 15 pairs, connected or approximate, alternate or opposite, slightly ascendant, obliquely ovate, up to 2 × 1 cm at middle, apices slightly curved acroscopically, acute, spinulose; acroscopic bases truncate, slightly auriculate, parallel with rachis, basiscopic side curved, margins sparsely incised, often spinulose on upper part; abaxially densely scaly; micro-scales brown to dark brown, linear; frond texture papery; venation bipinnate, abaxially visible, slightly raised, adaxially slightly visible, midrib obviously concave, veinlets ascendant, nearly reaching pinnule margins. Sori terminal on shorter veinlets, medial or close to pinnule margins; indusia present, entire, centers concave and shallowly funnellform when mature, light brown. Spores semi-orbicular in equatorial view; perispore sculpturing thin, shallowly reticulate.

Montane broad-leaved evergreen forests; 1100–2100 m. W Guangxi, Yunnan [N Vietnam].

*Polystichum disjunctum* mostly resembles *P. biaristatum* but has 1 or 2 proliferous bulbils near the rachis tip.

**72. *Polystichum scariosum*** (Roxburgh) C. V. Morton, Contr. U.S. Natl. Herb. 38: 359. 1974.

灰绿耳蕨 hui lü er jue

*Polypodium scariosum* Roxburgh, Calcutta J. Nat. Hist. 4: 494. 1844; *Polystichum aculeatum* (Linnaeus) Roth ex Mertens

var. *variiforme* Hayata; *P. eximium* (Mettenius ex Kuhn) C. Christensen var. *minus* Tagawa; *P. fibrillosum* Ching; *P. gemmiferum* Tagawa; *P. indochinense* Tardieu & C. Christensen; *P. tialooshanense* Ching; *P. variiforme* (Hayata) Tagawa.

Plants evergreen. Rhizome ascending, short, thick, up to 4 cm in diam., upper part densely covered with dimorphic scales; large scales brown or partly castaneous, margins brown, ovate-oblong or ovate-lanceolate, up to 1.5 cm × 5 mm, thickly membranous, subentire, partly to mostly thickened, margins membranous, of different widths; small scales brown, lanceolate or narrowly lanceolate, membranous, sparsely toothed. Fertile fronds 0.7–2 m; stipe stramineous, 20–80 cm, 3–7 mm in diam. at base, scales gradually sparser and smaller upward, upper stipe with small scales only. Lamina bipinnate to 5/6 of lamina, grayish green, adaxially darker, various in shape, narrowly deltoid on fully developed plants, up to 1.2 m × 70 cm, not contracted at base, acuminate; lamina on small fertile plants broadly oblong-lanceolate, ca. 40 × 12 cm, base obviously contracted, bipinnate only below middle part, sometimes lamina 1-pinnate and only basal pinnae shallowly pinnatifid to pinnatifid, acuminate; rachis stramineous, scaly on both surfaces; scales small, rachis with 1 or 2 proliferous bulbils toward tip, bulbils densely covered with brown scales. Pinnate pinnae lanceolate or oblong-lanceolate, up to 16 pairs on large lamina, up to 35 × 8 cm, stalks of pinnae up to 1 cm, long acuminate, lateral pinnules up to 16 pairs on small lamina, largest pinnae ca. 8 × 3 cm, stalks of pinnae only ca. 1 mm, shortly acuminate, lateral pinnules 2 or 3 pairs only; 1-pinnate lamina long and narrow, 45–50 × ca. 12 cm; lateral pinnae up to 20 pairs, falcate-lanceolate, upward curved, up to 8 × 1.8 cm, acroscopic base obtuse-auriculate, basiscopic side obliquely dimidiate, apex acuminate; basal pinnae pinnatifid, upper pinnae shallowly pinnatifid to only incised; costa green adaxially, stramineous abaxially, scales densely clustered at base, rarely with proliferous bulbils on upper rachis. Pinnules dimidiate, large pinnules falcate-lanceolate or falcate-rhombic, apices acuminate or long acuminate, upward curved, shallowly pinnatifid, with lobes acute or obtuse, or sparsely toothed, teeth angled upward, obtuse, and coarse; pinnules up to 7 × 1.5 cm, auricles deltoid, acute, basiscopic bases cuneate or curved, pinnules of small lamina ovate-rhombic, margins only shallowly incised or undulate, apex acute; auricles short, obtuse, or indistinct, basiscopic margins curved, basiscopic proximal half entire, basal basiscopic pinnules of all pinnae often smaller, basal acroscopic pinnules sometimes larger and sometimes smaller; microscales light brown, thinly membranous, subulate; frond texture thinly leathery; venation bipinnate on both pinnules and upper pinnae, indistinct on both sides, veins free, rarely forked. Sori terminal or abaxial on veins of pinnae, submedial, often in 1 row on each side of midrib, up to 5(–7) pairs, but often 2 rows on each side of midrib on larger pinnules of large lamina, 2–4 pairs on auricles; indusia brown when mature, small, shallowly lobed, easily falling off. Spores reniform in equatorial view; perispore sculpturing plicate or reticulate with spinules.

Streamsides in broad-leaved evergreen forests; 200–1900 m. Guangxi, Guizhou, Hainan, Hong Kong, S Hunan, Jiangxi, S Sichuan, Taiwan, Yunnan, Zhejiang [S India, S Japan (Yakushima), Sri Lanka, Thailand, Vietnam].

In FRPS (5(2): 19. 2001), this species is referred to as *Polystichum eximium* (Mettenius ex Kuhn) C. Christensen.

Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 24. 1997) argued that *Polystichum scariosum* has long been misidentified as *P. eximium* (Mettenius ex Kuhn) C. Christensen (= *P. anomalum* (Hooker & Arnott) J. Smith), a S Indian and Sri Lankan endemic. However, more studies are needed. Notably, there are several ploidy levels involved.

**73. *Polystichum mucronifolium*** (Blume) C. Presl, Epimel. Bot. 55. 1851.

南亚耳蕨 nan ya er jue

*Aspidium mucronifolium* Blume, Enum. Pl. Javae 2: 164. 1828; *A. aculeatum* (Linnaeus) Swartz var. *mucronifolium* (Blume) C. B. Clarke; *A. tacticopterum* Kunze; *Polystichum aculeatum* (Linnaeus) Roth ex Mertens var. *formosanum* Kodama; *P. aculeatum* var. *mucronifolium* (Blume) Beddome; *P. heteropaleaceum* N. C. Nair & K. Nag; *P. kodamae* Tagawa; *P. tacticopterum* (Kunze) T. Moore.

Plants evergreen. Rhizome erect or ascending, short, densely scaly; scales brown, filiform. Fronds 40–60 cm; stipe stramineous, 11–26 cm, 4–6 mm in diam. at base, densely covered with linear and lanceolate brown scales and larger scales; large scales dense, bicolorous, middle part blackish brown, margins brown, shiny, broadly ovate and broadly ovate-lanceolate, up to 30 × 10 mm, subentire, long acuminate. Lamina bipinnate, deltoid-ovate, 21–47 × 11–22 cm near basal part, not contracted toward base, acute or slightly acuminate; rachis without proliferous bulbils, densely covered with linear, lanceolate brown scales and larger scales; large scales dense, shiny, broadly ovate and broadly lanceolate, up to 10 × 6 mm, subentire, caudate. Pinnae 16–27 pairs, alternate, ascendant, shortly stalked, lanceolate, not contracted toward base or only basiscopic side slightly contracted, bases asymmetrical, apices acuminate; middle pinnae 1–1.9 cm apart, basal pairs 8–16 × 1.8–2.8 cm, 1-pinnate; costa scaly; scales brown, linear or lanceolate. Pinnules 13–25 pairs, alternate, shortly stalked, oblong, 0.7–1.1 cm × 3–4.6 mm, bases cuneate, acroscopic margins obtuse-toothed, apices acute and mucronate; bases with rounded auricles, basiscopic margins shallowly toothed, tips of teeth shortly spinulose, basal acroscopic pinnules largest, pinnatilobate; abaxially with few lanceolate microscales, adaxially subglabrous; frond texture thinly leathery; venation pinnate on pinnules, lateral veins 6–8 pairs, dichotomous, distinct. Sori (2 or) 3–5 pairs per pinnule, in 1 row on each side of midrib, terminal on veinlets, dark brown; indusia brown, membranous, irregularly toothed.

Forests, streamsides on brown soils; 1600–2400 m. Taiwan, Yunnan [Bhutan, NE and S India, N Myanmar, E Nepal, Sri Lanka, Thailand, Vietnam].

In FRPS (5(2): 55. 2001), this species was referred to as *Polystichum tacticopterum*. Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 37. 1997) placed it in *P.* sect. *Metapolystichum* Tagawa.

*Polystichum mucronifolium* can easily be distinguished from all other species by having rather large broadly ovate and bicolorous stipe scales with blackish brown middle part, ovate and brown rachis scales, and pinnules with acroscopic margins bluntly toothed.

**74. *Polystichum biaristatum*** (Blume) T. Moore, Index Fil. 86. 1858.

二尖耳蕨 er jian er jue

*Aspidium biaristatum* Blume, Enum. Pl. Javae 2: 164. 1828; *A. aculeatum* (Linnaeus) Swartz var. *biaristatum* (Blume) C. B. Clarke; *Polystichum aculeatum* (Linnaeus) Roth ex Mertens var. *biaristatum* (Blume) Beddome; *P. aculeatum* var. *durissimum* Rosenstock; *P. subapiciflorum* Hayata.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds up to 1 m; stipe stramineous, 50–58 cm, ca. 6 mm in diam. at base, with linear and lanceolate brown scales and larger scales; large scales denser on lower stipe, bicolorous, middle part blackish brown, margins brown, shiny, ovate-lanceolate, up to 21 × 10 mm, subentire, caudate. Lamina bipinnate, deltoid-oblong, 57–61 × 27–29 cm at middle, slightly contracted toward base, acute; rachis and costa without proliferous bulbils, densely covered with linear dark brown scales and subulate scales, subulate scale margins fimbriate. Pinnae 8–12 pairs, alternate, ascendant, shortly stalked, lanceolate, 12–14 × 2.5–2.8 cm, 1-pinnate, apices caudate-acuminate and fertile, not contracted toward base. Pinnules 14–18 pairs, alternate, shortly stalked, oblong, 1.5–2(–3) × 0.6–0.8 cm, cuneate, acute; auricles deltoid, shallowly obtusely toothed, basal acroscopic pinnules largest; abaxially with few lanceolate microscales, adaxially subglabrous; frond texture thinly leathery; venation pinnate on pinnules, lateral veins 5–8 pairs, dichotomous, distinct. Sori dark brown, 6–8 pairs per pinnule, in 1 row on each side of midrib, terminal on veinlets, abaxial pinnule surface with sori obviously concave; indusia brown, membranous, entire.

Wet places in forests; 1100–2200 m. Taiwan [Indonesia, Myanmar, Philippines, Singapore, Sri Lanka, Thailand, Vietnam].

*Polystichum biaristatum* has been reported as being much more widely distributed due to misidentification.

This species has laminae acute, rachis scales linear and subulate and brown, pinnae approximate, pinnules 1.5–2(–3) cm and toothed, and microscales lanceolate.

**75. *Polystichum oreodoxa*** Ching ex H. S. Kung & Li Bing Zhang, Acta Phytotax. Sin. 33: 309. 1995.

假半育耳蕨 jia ban yu er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 60–120 cm; stipe brown, 24–56 cm, 3–7 mm in diam. at base, densely covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle, shiny, ovate or ovate-lanceolate, up to 30 × 10 mm, subentire, caudate. Lamina bipinnate, oblong-ovate, 43–67 cm, lower part 11–42 cm wide, slightly contracted toward base, base fertile, apex acuminate, often sterile; rachis without proliferous bulbils, abaxially sparsely or densely scaly; scales brown (rarely blackish), lanceolate or linear, subentire or sparsely toothed, acuminate. Pinnae often 13–25 pairs, alternate, attached at right angles to rachis, shortly stalked, lanceolate, bases not contracted, asymmetrical, apices attenuate; lower pinnae 7–25 × 1.8–3.8 cm, 1-pinnate; costa abaxially covered with linear light brown to

brown scales, scales of costa lanceolate. Pinnules 10–20 pairs, alternate, shortly stalked, oblong or falcate-oblong, 1–2.3 × 0.5–1 cm, cuneate, with rounded auricles acroscopically, entire to lobed, shortly aristate, acute; basal acroscopic pinnules largest, pinnatipartite; abaxially sparsely covered with shortly filiform microscales, adaxially glabrous; frond texture thinly leathery to papery; venation pinnate, lateral veins 5–10 pairs, dichotomous, distinct. Sori large, 6–8 pairs per pinnule, in 1 row on each side of midrib, close to midrib, terminal on veinlets; indusia present, spinulose-lacerate.

• Forests; 2000–2400 m. W Yunnan.

*Polystichum oreodoxa* is especially similar to *P. semifertile*, but its lamina apex is not cuspidate.

**76. *Polystichum semifertile*** (C. B. Clarke) Ching, Lingnan Sci. J. 15(3): 398. 1936.

半育耳蕨 ban yu er jue

*Aspidium aculeatum* (Linnaeus) Swartz var. *semifertile* C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 509. 1880; *Polystichum aculeatum* (Linnaeus) Roth ex Mertens var. *semifertile* (C. B. Clarke) Beddome; *P. nyalamense* Ching; *P. yunnanense* Christ var. *submuticum* C. Christensen.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 60–100 cm; stipe brown, 26–60 cm, 4–7 mm in diam. at base, densely covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle, shiny, ovate or ovate-lanceolate, up to 30 × 10 mm, subentire, caudate. Lamina bipinnate, oblong-ovate, 45–68 × 13–40 cm near base, lower part slightly contracted, fertile, apex abruptly narrowed, sterile; rachis without proliferous bulbils, abaxially sparsely or densely scaly; scales brown, lanceolate or linear, rachis scales of some individuals blackish, subentire or sparsely toothed, acuminate. Pinnae 14–25 pairs, alternate, attached at right angles to rachis, shortly stalked, lanceolate, lower part not contracted, bases asymmetrical, apices caudate or acuminate; pinnae near lamina base 8–26 × 2–3.8 cm, 1-pinnate; costa abaxially covered with linear light brown to brown scales; scales of basal costa lanceolate. Pinnules 10–20 pairs, alternate, shortly stalked, deltoid or oblong, 1–2.3 × 0.5–1 cm, bases cuneate, with rounded auricles acroscopically, margins entire to lobed, spinulose, apices acute; basal acroscopic pinnules largest, pinnatipartite; abaxially sparsely covered with shortly filiform microscales; frond texture thinly leathery to papery; venation pinnate, lateral veins 5–10 pairs, dichotomous, relatively distinct. Sori large, 6–8 pairs per pinnule, in 1 row on each side of midrib, close to midrib, terminal on veinlets; indusia present, spinulose-lacerate.  $2n = 82$ .

Broad-leaved forests, mixed forests, mossy forests on montane slopes, valleys; 1000–3000 m. Sichuan (Shimian, Yanbian), Xizang (Médog, Nyalam) [India, Myanmar, Nepal, Thailand, Vietnam].

**77. *Polystichum fugongense*** Ching & W. M. Chu ex H. S. Kung & Li Bing Zhang, Acta Bot. Yunnan., Suppl. 5: 49. 1992.

福贡耳蕨 fu gong er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds up to 100 cm;

stipe brown, 35–45 cm, 5–7 mm in diam. at base, densely covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle, shiny, ovate or ovate-lanceolate, up to 30 × 10 mm, subentire, caudate. Lamina bipinnate, oblong-ovate, 60–70 × 24–40 cm near base, lower part slightly contracted, fertile, apex acute, fertile; rachis without proliferous bulbils, abaxially sparsely or densely scaly; scales brown or blackish brown, rarely black, lanceolate or linear, margins sparsely ciliate, apex acuminate. Pinnae 18–24 pairs, alternate, attached at right angles to rachis, shortly stalked, lanceolate; pinnae of basal lamina 16–20 × 2.6–3.2 cm, not contracted toward base, bases asymmetrical, 1-pinnate, apices caudate; costa abaxially scaly; scales light brown to dark brown, linear or lanceolate, scales of basal costa lanceolate. Pinnules 21–30 pairs, alternate, shortly stalked, narrowly deltoid-ovate, 1–2 cm × 4–7 mm, bases cuneate, with deltoid auricles acroscopically, margins with acute teeth or lobed, spinulose, apices acute; basal acroscopic pinnules largest, pinnatifid to midrib; abaxially sparsely covered with shortly filiform micro-scales, adaxially glabrous; frond texture thickly papery; venation pinnate, lateral veins 5–10 pairs, dichotomous, relatively distinct. Sori 6–8 pairs per pinnule, in 1 row on each side of midrib, close to midrib, terminal on veinlets; indusia present, aristate-lacerate.  $2n = 82^*$ .

- Forests; 1300–2300 m. Yunnan.

*Polystichum fugongense* is similar to *P. semifertile*, but its lamina apex is fertile and its pinnules are narrowly deltoid-ovate.

**78. *Polystichum longipinnulum*** N. C. Nair, Amer. Fern J. 64: 15. 1974.

长羽耳蕨 chang yu er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 60–100 cm; stipe yellowish brown, 33–58 cm, ca. 5 mm in diam. at base, sparsely covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle, shiny, ovate-lanceolate, up to 18 × 7 mm, subentire, caudate. Lamina bipinnate, deltoid-ovate, 40–77 cm, lower part 20–45 cm wide, base slightly contracted, 1 or 2 pairs of basal pinnae sterile, apex acute, fertile; rachis without proliferous bulbils, abaxially sparsely covered with linear dark brown scales. Pinnae often 11–14(–17) pairs, alternate, ascendant, shortly stalked, lanceolate, bases slightly contracted and asymmetrical, apices caudate, sterile; lower pinnae 16–22 × 3–4 cm, 1-pinnate; costa abaxially with scales similar to rachis scales. Pinnules 20–24(–30) pairs, alternate, shortly stalked, falcate-oblong, 1.3–2.6 cm × 5–9 mm, bases cuneate, with deltoid auricles acroscopically, apices acute and mucronate, margins shallowly toothed, tips of teeth spinulose, middle acroscopic pinnules largest; abaxially sparsely covered with shortly filiform microscales, adaxially subglabrous; frond texture thinly leathery to papery; venation pinnate, lateral veins 6–9 pairs, dichotomous, distinct. Sori 8–10 pairs per pinnule, in 1 row on each side of midrib, slightly close to midrib, terminal on veinlets; indusia present, entire.

Forests; 1100–1700 m. Yunnan (Jingdong, Yingjiang) [India, Myanmar, C Nepal, Thailand, Vietnam].

*Polystichum longipinnulum* is similar to *P. semifertile*, but its lamina apex is fertile, its rachis lacks lanceolate scales, and its pinnules are narrower and longer.

**14. *Polystichum* sect. *Hypopeltis*** (Michaux) T. Moore, Index Fil. 84. 1857.

后生耳蕨组 hou sheng er jue zu

*Hypopeltis* Michaux, Fl. Bor.-Amer. 2: 266. 1803; *Polystichum* sect. *Aculeata* Christ; *P. sect. Metapolystichum* Tagawa; *P. sect. Scleropolystichum* Daigobo.

Plants medium-sized to large, evergreen or summer-green, rarely small. Lamina papery or thinly papery, rarely thickly papery, bipinnate, not finely dissected. Rachis without proliferous bulbils. Pinnules stalked or sessile. Microscales narrow-type.

About 70 species: worldwide; 42 species (25 endemic) in China.

It is a dilemma in which section to place *Polystichum aculeatum*, the type of *P. sect. Hypopeltis*. *Polystichum aculeatum* evidently originated as a hybrid between *P. lonchitis* and *P. setiferum* (Forsskål) Moore ex Woynar. The chloroplast data place it in *P. sect. Metapolystichum*, but its hard spinules on the frond margins and its frond texture resemble those of *P. lonchitis*, which, as the type of *Polystichum*, belongs to *P. sect. Polystichum*. FRPS (5(2): 52. 2001) placed *P. aculeatum* in *P. sect. Scleropolystichum* (= *P. sect. Xiphopolystichum*) based on its hard spinules on the frond margins and its hard frond texture. Here, we place it in *P. sect. Metapolystichum* based on its overall morphology and its maternal origin. Therefore, the correct name for this section becomes *P. sect. Hypopeltis*, which is earlier (1857) than *P. sect. Metapolystichum* (1940).

The currently defined *Polystichum* sect. *Hypopeltis* is possibly not monophyletic. The delimitation between *P. sect. Hypopeltis* and *P. sect. Sorolepidium* is not clear because there are polyploids in both sections that are intersectional hybrids. Some alpine species may need to be moved to *P. sect. Sorolepidium*.

The Chinese species of *Polystichum* sect. *Hypopeltis* can be divided into six series based on morphology.

- 1a. Plants evergreen; pinnae leathery, stiff, with hard spinules on margin (1. *P. ser. Hypopeltis*) ..... 79. *P. aculeatum*
- 1b. Plants evergreen or summer-green; pinnae thinly papery, papery or thickly papery, not stiff, with soft spinules or without spinules on margin.
  - 2a. Microscales shorter than 0.6 mm (short-type).
    - 3a. Veins clavate and unusually swollen at ends (hydathodes) (3. *P. ser. Exauricula*) ..... 98. *P. punctiferum*
    - 3b. Veins linear and not unusually swollen at ends.
      - 4a. Stipe with only linear and linear-lanceolate scales (5. *P. ser. Linearia*).

- 5a. Lower pinnae contracted toward lamina base; pinnules ca. 0.5 cm, nearly leathery ..... 106. *P. tangmaiense*
- 5b. Lower pinnae not or slightly contracted toward lamina base; pinnules longer than 0.6 cm, papery.
- 6a. Lamina often 20(10–35) cm wide; pinnules with obvious aristate spinules on margin; rachis scales dark brown, linear and straight; apex of lamina often sterile; indusia lacerate ..... 107. *P. discretum*
- 6b. Lamina often 10(<20) cm wide; pinnules with or without obvious aristate spinules on margin; rachis scales brown, linear and tortuous.
- 7a. Lamina oblong-lanceolate, ratio of length to width ca. 4; rachis scales sparse; pinnae strongly curved upward, caudate; lower basal pinnules of lower pinnae not contracted; sori in 1 or 1.5 rows per pinnule; indusia entire or almost entire ..... 108. *P. oligocarpum*
- 7b. Lamina deltoid or broadly lanceolate, ratio of length to width ca. 2.3(–3.5); rachis scales dense; pinnae not or slightly curved upward, acute or acuminate; lower basal pinnules of lower pinnae contracted; sori in 2 rows per pinnule; indusia lacerate ..... 109. *P. weimingii*
- 4b. Stipe with ovate, ovate-lanceolate, or broadly lanceolate scales (6. *P. ser. Makinoiana*).
- 8a. Rachis scales bicolorous: brown and blackish brown.
- 9a. Except rachis base, rachis without ovate-lanceolate scales; pinnules falcate-deltoid.
- 10a. Pinnules with open spinules; indusia shallowly toothed ..... 110. *P. makinoi*
- 10b. Pinnules with forward-pointing spinules; indusia entire ..... 111. *P. otomasui*
- 9b. Rachis with ovate-lanceolate scales.
- 11a. Lamina deltoid-lanceolate; pinnule falcate-deltoid; microscales lanceolate (broad-type) ..... 112. *P. parvifoliolatum*
- 11b. Lamina oblong-lanceolate or elliptic; pinnule oblong or deltoid-ovate; microscales linear (narrow-type).
- 12a. Lamina oblong-lanceolate, ratio of length to width ca. 3:1; pinnae acuminate or acute, basalmost 1 or 2 pairs often sterile; pinnules oblong, acroscopic margins nearly not toothed but with long or short spinules; microscales dense abaxially ..... 113. *P. piceopaleaceum*
- 12b. Lamina elliptic, ratio of length to width ca. 2.5:1; pinnae often caudate, basalmost 1 or 2 pairs often fertile; pinnules deltoid-ovate, acroscopic margins shallowly toothed or dissected halfway to midrib and with long spinules; microscales sparse abaxially ..... 114. *P. yunnanense*
- 8b. Rachis scales concolorous.
- 13a. Sori marginal.
- 14a. Lamina deltoid-lanceolate; rachis scales linear and subulate; pinnules falcate-deltoid, acuminate at apex, auricles deltoid; indusia erose ..... 115. *P. acutipinnulum*
- 14b. Lamina deltoid-ovate; rachis scales lanceolate and linear; pinnules oblong or oblong-ovate, obtuse at apex, auricles rounded.
- 15a. Whole lamina fertile; acroscopic margins of pinnules without or rarely with few short spinules; indusia entire ..... 116. *P. pseudomakinoi*
- 15b. Only upper part of lamina fertile; acroscopic margins of pinnules with few short spinules; indusia irregularly lacerate ..... 117. *P. shimurae*
- 13b. Sori medial or close to midrib.
- 16a. Nearly whole rachis with ovate-lanceolate scales; pinnules long spinulose on margin.
- 17a. Microscales long filiform, obviously present on adaxial surface of pinnules; acroscopic margins of pinnules shallowly toothed or incised, basal acroscopic pinnules prolonged and pinnatifid; indusia entire ..... 118. *P. huae*
- 17b. Microscales shortly filiform, few or absent on adaxial surface of pinnules; acroscopic margins of subentire, basal acroscopic pinnules prolonged but not pinnatifid; indusia erose ..... 119. *P. longiaristatum*
- 16b. Rachis without or only lower part with ovate-lanceolate scales; pinnules shortly spinulose on margin.
- 18a. Plants up to 80 cm tall; rachis scales not regularly reflexed ..... 110. *P. makinoi*
- 18b. Plants up to 100 cm tall; rachis scales regularly reflexed ..... 120. *P. subulatum*
- 2b. Microscales longer than 1 mm (long-type).
- 19a. Plants summer-green, lamina thinly papery, yellowish green, narrowly lanceolate or narrowly elliptic-lanceolate, rarely broadly deltoid-lanceolate (*P. bakerianum*, *P. rufopaleaceum*, *P. sinense*); stipe stramineous or brown when dry; pinnules or free lobes fewer than 6(–10) pairs (up to 15 pairs in *P. bakerianum*, *P. rufopaleaceum*, and *P. sinense*), sessile (2. *P. ser. Sinensia*).
- 20a. Pinnae or lobes obviously aristate-spinulose.
- 21a. Stipe brown or dark brown.
- 22a. Stipe brown; lamina oblanceolate ..... 83. *P. bomiense*
- 22b. Stipe dark brown; lamina lanceolate or elliptic ..... 84. *P. tibeticum*
- 21b. Stipe stramineous.
- 23a. Stipe and rachis scales bicolorous: brown with blackish brown centers ..... 80. *P. pseudocastaneum*



- 23b. Stipe and rachis with brown scales only.
- 24a. Middle pinnae 1.5–2 cm, not falcate ..... 81. *P. prescottianum*
- 24b. Middle pinnae 3–3.5 cm, slightly falcate ..... 82. *P. yadongense*
- 20b. Pinnae or lobes only crenate to serrulate.
- 25a. Stipe scales bicolorous: brown and blackish brown.
- 26a. Stipe brown at lower part; pinnae obtuse or acute at apex ..... 91. *P. saxicola*
- 26b. Stipe stramineous.
- 27a. Lamina bipinnate; large bicolorous scales ovate ..... 92. *P. kangdingense*
- 27b. Lamina bipinnatipartite; large bicolorous scales lanceolate.
- 28a. Pinnae 26–32 pairs; lobes narrowly ovate or lanceolate ..... 93. *P. frigidicola*
- 28b. Pinnae 12–24 pairs; lobes obliquely oblong or rhombic-ovate ..... 94. *P. submite*
- 25b. Stipe scales concolorous: brown or dark brown.
- 29a. Stipe brown at least at lower part.
- 30a. Pinnae deltoid-lanceolate, ratio of length to width ca. 2; lobes fewer than 4 pairs ..... 85. *P. qamdoense*
- 30b. Pinnae lanceolate, ratio of length to width 3 or larger; lobes 8–12 pairs ..... 86. *P. gongboense*
- 29b. Stipe stramineous, sometimes brownish at base.
- 31a. Lamina wider than 18 cm at middle; middle pinnae with 12 or more pairs of pinnules;  
stipe scales reddish brown or brown.
- 32a. Stipe base with broadly lanceolate scales; pinnules with open teeth; sori indusiate ..... 87. *P. bakerianum*
- 32b. Stipe base with ovate scales; pinnules with forward-pointing teeth; sori exindusiate ..... 88. *P. rufopaleaceum*
- 31b. Lamina narrower than 14 cm at middle; middle pinnae with fewer than 10 pairs of  
pinnules or lobes; stipe scales yellowish brown or light brown.
- 33a. Stipe with ovate scales; lamina papery; rachis with broadly lanceolate or narrowly ovate scales ..... 89. *P. sinense*
- 33b. Stipe scales lanceolate; lamina thinly papery; rachis with linear or filiform scales ..... 90. *P. mollissimum*
- 19b. Plants evergreen or rarely summer-green (*P. braunii*); lamina green, broadly lanceolate, broadly  
deltoid-lanceolate, or broadly elliptic-lanceolate; stipe greenish when dry; pinnules 10–30 pairs, stalked.
- 34a. Rachis scales broadly ovate to ovate-lanceolate; pinnules of upper pinnae exauriculate (3. *P. ser.*  
*Exauricula*).
- 35a. Large rachis scales relatively sparse, blackish brown to dark brown; stipe scales relatively sparse;  
lamina sterile at apex; sori indusiate ..... 97. *P. pianmaense*
- 35b. Large rachis scales dense, light brown to brown; stipe scales dense; lamina fertile at apex;  
sori exindusiate.
- 36a. Stipe scales brown ..... 95. *P. longipaleatum*
- 36b. Stipe scales bicolorous: brown with blackish brown centers ..... 96. *P. nudisorum*
- 34b. Rachis scales various forms; pinnules of upper pinnae obviously auriculate (4. *P. ser. Brauniana*).
- 37a. Stipe (at least stipe base) with blackish brown scales; rachis scales light brown.
- 38a. Sori medial or close to midrib ..... 99. *P. braunii*
- 38b. Sori marginal ..... 100. *P. ningshenense*
- 37b. Stipe without blackish brown scales; rachis scales grayish brown.
- 39a. Rachis scales obviously reflexed ..... 101. *P. retrosopaleaceum*
- 39b. Rachis scales not reflexed.
- 40a. Rachis scales narrowly lanceolate or linear; sori medial or nearly marginal ..... 102. *P. polyblepharum*
- 40b. Rachis (at least lower part of rachis) with ovate and ovate-lanceolate scales; sori medial,  
marginal, submarginal, or close to midrib.
- 41a. Lamina normally shorter than 45 cm; scales of upper part of rachis narrowly lanceolate;  
pinnules normally shorter than 1 cm ..... 103. *P. parvipinnulum*
- 41b. Lamina normally longer than 50 cm; upper part of rachis also with ovate and  
ovate-lanceolate scales; pinnules up to 1.5 cm.
- 42a. Lamina oblong-lanceolate, ratio of length to width ca. 4; rachis scales caudate; pinnules  
narrowly deltoid, with numerous microscales adaxially ..... 104. *P. sozanense*
- 42b. Lamina elliptic-lanceolate, ratio of length to width ca. 2.4; rachis scales acuminate;  
pinnules oblong, with few microscales adaxially ..... 105. *P. ovatopaleaceum*

### 1. *Polystichum* ser. *Hypopeltis*

后生耳蕨系 hou sheng er jue xi

Plants medium-sized, evergreen. Lamina leathery, stiff, with hard spinules on margin.

One species: Europe and SW Asia.

**79. *Polystichum aculeatum*** (Linnaeus) Roth ex Mertens, Tent. Fl. Germ. 3(1): 79. 1799.

欧洲耳蕨 ou zhou er jue

*Polypodium aculeatum* Linnaeus, Sp. Pl. 2: 1090. 1753; *Aspidium aculeatum* (Linnaeus) Swartz; *A. lobatum* (Hudson) Swartz; *P. lobatum* Hudson; *Polystichum lobatum* (Hudson) C. Presl.

Plants evergreen. Rhizome erect, densely covered with broadly lanceolate brown scales. Fronds ca. 60 cm; stipe amber, ca. 12 cm, ca. 5 mm in diam. at base, densely scaly; scales brown, ovate and lanceolate. Lamina bipinnate, broadly oblanceolate, ca. 60 × 12 cm, slightly contracted toward base, acuminate;

rachis without proliferous bulbils, scaly on both surfaces, scales lanceolate and linear, margins ciliate. Pinnae ca. 38 pairs, alternate, slightly ascendant, linear-lanceolate, middle pairs 6–7 × ca. 1.5 cm, obliquely broadly cuneate or nearly rounded, shortly stalked, pinnate, acuminate. Pinnules 8–12 pairs, alternate, slightly ascendant, approximate, obliquely oblong, acroscopic bases indistinctly auriculate, obliquely cuneate, margins with small spinulose forward-pointing teeth, apices acute and spinulose; basal acroscopic pinnules largest, 1–1.5 cm × 4–6 mm; abaxially scaly; microscales filiform, strongly ciliate at base; frond texture leathery; venation pinnate on pinnules, indistinct. Sori in 1 row on each side of midrib; indusia present, entire or incised.

*Picea* forests; ca. 1900 m. Xinjiang (Yili) [W Asia, Europe].

**2. *Polystichum* ser. *Sinensia*** H. S. Kung & Li Bing Zhang, Acta Phytotax. Sin. 36: 244. 1998.

中华耳蕨系 zhong hua er jue xi

Plants small to medium-sized, summer-green. Lamina yellowish green, narrowly lanceolate, narrowly elliptic-lanceolate, rarely broadly deltoid-lanceolate, thinly papery. Stipe stramineous or brown when dry. Pinnules or free lobes fewer than 6(–10) pairs (rarely up to 15 pairs), sessile. Microscales long-type.

About 18 species: mainly in montane to alpine habitats in the Sino-Himalayan region, one species reaching Africa; 15 species (12 endemic) in China.

**80. *Polystichum pseudocastaneum*** Ching & S. K. Wu, Fl. Xizang. 1: 222. 1983.

拟栗鳞耳蕨 ni li lin er jue

*Polystichum brunneum* Ching & S. K. Wu.

Plants summer-green. Rhizome erect, covered with broadly lanceolate dark brown scales. Fronds 25–45 cm; stipe stramineous, 6–12 cm, 3–4 mm in diam. at base, lower part persistent, densely scaly; scales light brown, lanceolate and linear, sometimes gradually sparser toward lamina apex, and mixed with ovate scales, middle of scales dark brown. Lamina bipinnatifid, oblanceolate, 22–40 × 2.5–5.2 cm, gradually contracted at base, acuminate; rachis without proliferous bulbils, both surfaces covered with scales; scales light brown, linear and hairlike, abaxially mixed with lanceolate purplish brown scales. Pinnae 26–30 pairs, alternate, attached at right angles to rachis, nearly approximate, sessile, narrowly deltoid-ovate or deltoid-ovate, middle pairs 1.4–3.5 cm × 6–10 mm, bases slightly auriculate acroscopically and basiscopically, pinnatifid to or nearly to pinna rachis, apices acuminate or obtuse, aristate. Lobes 4–6 pairs, nearly opposite, slightly ascendant, nearly approximate, oblong, apices acute or obtuse and aristate, margins with small teeth, tips of teeth aristate; microscales on abaxial surface light brown, linear and filiform; microscales on adaxial surface light brown, hairlike; frond texture papery; venation pinnate on lobes, distinct abaxially, indistinct adaxially. Sori on upper pinnae, 1–4 per lobe, sometimes in 1 row on each side of pinna rachis; indusia present, subentire.

• *Abies* and *Betula* forests; 3500–3800 m. S Xizang (Gyirong, Nyalam).

**81. *Polystichum prescottianum*** (Wallich ex Mettenius) T. Moore, Index Fil. 101. 1858.

芒刺高山耳蕨 mang ci gao shan er jue

*Aspidium prescottianum* Wallich ex Mettenius, Abh. Senckenberg. Naturf. Ges. 2: 332. Aug 1858; *Polystichum erinaceum* Ching & S. K. Wu.

Plants summer-green. Rhizome erect, covered with broadly lanceolate dark brown scales. Fronds 30–40 cm; stipe 8–12 cm, ca. 3 mm in diam. at base, lower part persistent, stramineous, scaly; scales light brown, ovate, lanceolate, and linear. Lamina bipinnatifid, oblanceolate, 28–38 × 3–4 cm, gradually contracted toward base, acuminate; rachis without proliferous bulbils, adaxially covered with scales; scales light brown, lanceolate and hairlike. Pinnae 30–32 pairs, alternate, attached at right angles to rachis, hardly approximate, sessile, narrowly deltoid-ovate or deltoid-ovate, middle pairs 1.5–2 cm × 8–9 mm, bases slightly auriculate acroscopically and basiscopically, pinnatifid to or nearly to pinna rachis, apices acuminate or obtuse, aristate. Lobes 4–6 pairs, nearly opposite, slightly ascendant, hardly approximate, oblong, apices acuminate or obtuse, margins with small teeth, tips of teeth aristate; microscales on abaxial surface light brown, linear and filiform; microscales on adaxial surface sparse, brown, hairlike; frond texture papery; venation pinnate on lobes, indistinct abaxially, somewhat distinct adaxially. Sori on upper pinnae, often in 1 row on each side of pinna rachis; indusia present, subentire.

Alpine meadows, *Abies* forests; 3300–3900 m (in Xizang). Taiwan, Xizang (Cona, Nyalam) [Afghanistan, Bhutan, N India, Nepal].

*Polystichum prescottianum* is common in the Himalaya.

**82. *Polystichum yadongense*** Ching & S. K. Wu, Fl. Xizang. 1: 220. 1983.

亚东耳蕨 ya dong er jue

Plants summer-green. Rhizome unknown. Fronds ca. 50 cm; stipe stramineous, 10–17 cm, ca. 4 mm in diam. at base, scaly; scales light brown, ovate, lanceolate, and linear. Lamina bipinnatifid, oblanceolate, 38–40 × 6–7 cm, gradually contracted toward base, acuminate; rachis without proliferous bulbils, both surfaces densely covered with scales; scales light brown, lanceolate and linear. Pinnae 26–30 pairs, alternate, attached at right angles to rachis, nearly approximate, sessile, oblong-lanceolate, slightly curved upward and falcate, middle pinnae 3–3.5 × 1–1.4 cm, broadly cuneate, pinnatifid to pinna rachis, acuminate and aristate. Lobes 5–7 pairs, alternate, slightly ascendant, nearly approximate, oblong, apex acuminate, aristate, margins coarsely toothed, tips of teeth aristate; abaxially scaly, adaxially with few linear light brown scales; microscales light brown, lanceolate and filiform; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori on upper pinnae, often in 1 row on each side of pinna rachis, sometimes 2–4 on basiscopic pinnae; indusia present, subentire.

- Riverbanks; ca. 3800 m. Xizang (Yatung).

**83. *Polystichum bomiense*** Ching & S. K. Wu, Fl. Xizang. 1: 223. 1983.

波密耳蕨 *bo mi er jue*

Plants summer-green. Rhizome unknown. Fronds ca. 40 cm; stipe brown, longer than 8 cm, densely scaly; scales light brown, lanceolate and linear, mixed with few ovate brown scales. Lamina oblanceolate, 25–38 × 5–6 cm, gradually contracted toward base, bipinnatifid, acuminate; rachis without proliferous bulbils, lower part reddish brown, both surfaces covered with scales; scales light brown, lanceolate and linear, abaxially sparsely mixed with lanceolate brown scales. Pinnae 28–30 pairs, alternate, attached at right angles to rachis, nearly approximate, sessile, narrowly deltoid-ovate, sometimes slightly curved upward and falcate, middle pinnae 2.5–3 × 1.2–1.4 cm, bases broadly cuneate or truncate, auriculate acroscopically, pinnatifid to pinna rachis, apices obtuse and aristate. Lobes 5–7 pairs, alternate, slightly ascendant, approximate, oblong, apex rounded and aristate, acroscopic margins with obtuse teeth, teeth aristate at tip; microscales on abaxial surface light brown, linear and filiform; microscales on adaxial surface light brown, hairlike; frond texture papery; venation pinnate on lobes, distinct on both surfaces. Sori on upper pinnae, 1–4 per lobe; indusia present, incised.

- Forest margins; ca. 4000 m. Xizang (Bomi).

**84. *Polystichum tibeticum*** Ching, Fl. Xizang. 1: 219. 1983.

西藏耳蕨 *xi zang er jue*

Plants summer-green. Rhizome erect, covered with broadly lanceolate purple brown scales. Fronds ca. 40 cm; stipe purplish brown, 10–12 cm, ca. 3 mm in diam. at base, lower part persistent, densely scaly; scales brown, purple brown at middle, margins brown, lanceolate and linear, mixed with ovate scales. Lamina bipinnatifid, lanceolate to narrowly elliptic, 30–35 × 4.5–6 cm, gradually contracted toward base, acuminate; rachis without proliferous bulbils, purplish brown, adaxially densely scaly; scales light brown, linear; abaxially covered with linear

light brown scales and lanceolate scales, purplish brown at middle, margins brown. Pinnae 26–30 pairs, alternate, attached at right angles to rachis or slightly ascendant, approximate by distance as wide as pinna width, sessile, linear-lanceolate or narrowly deltoid-ovate, middle pairs 2.2–3.2 cm × 7–9 mm, bases broadly cuneate or rounded-cuneate, sometimes auriculate acroscopically, pinnatifid to or nearly to pinna rachis, apices acuminate. Lobes 6–9 pairs, nearly opposite, slightly ascendant, oblong or deltoid-ovate, apices acute and aristate, upper margins with small teeth, teeth aristate at tip; microscales on abaxial surface light brown, narrowly lanceolate and filiform; microscales on adaxial surface light brown, hairlike; frond texture papery; venation pinnate on lobes, indistinct abaxially, distinct adaxially. Sori on upper pinnae, 1 row on each side of pinna rachis; indusia present, subentire.

- *Abies* forests; 3600–4000 m. Xizang (Bomi, Nyingchi).

**85. *Polystichum qamdoense*** Ching & S. K. Wu, Fl. Xizang. 1: 227. 1983.

昌都耳蕨 *chang du er jue*

*Polystichum qamdoense* var. *elongatum* Ching & S. K. Wu; *P. tumbatzense* Ching.

Plants summer-green. Rhizome erect, densely covered with broadly lanceolate brown scales. Fronds 30–40 cm; stipe brown, 8–13 cm, ca. 2 mm in diam. at base, lower part persistent, scaly; scales brown, ovate and linear, gradually sparser toward lamina apex. Lamina bipinnatifid, lanceolate, 24–30 × 3–4 cm, gradually contracted to base, acuminate; rachis without proliferous bulbils, stramineous, lower part often brown, adaxially scaly; scales brown, lanceolate and linear. Pinnae 24–30 pairs, alternate, attached at right angles to rachis, sessile, deltoid-lanceolate, middle pairs 1.5–2 cm × 8–10 mm, bases oblique and nearly truncate, auriculate acroscopically, pinnatifid, apices acute. Lobes 3 or 4 (or 5) pairs, nearly opposite, slightly ascendant, approximate, oblong or obovate; abaxially with long-filiform microscales, distal margins toothed; frond texture papery; venation pinnate on lobes, flat abaxially, slightly raised adaxially. Sori in 1 row on each side of midrib of pinna; indusia present, toothed.

- Alpine coniferous forests, meadows; 3000–4200 m. Gansu, W Sichuan, E and SE Xizang, NW Yunnan.

The relationships between *Polystichum qamdoense* and *P. sinense* are unclear.

**86. *Polystichum gongboense*** Ching & S. K. Wu, Fl. Xizang. 1: 228. 1983.

工布耳蕨 *gong bu er jue*

*Polystichum rarum* Ching & S. K. Wu.

Plants summer-green. Rhizome erect, densely covered with narrowly lanceolate dark brown scales. Fronds 30–60 cm; stipe 14–24 cm, 3–4 mm in diam. at base, whole stipe or at least lower part brown, shiny, scaly; scales brown, ovate and linear, gradually sparser toward lamina apex. Lamina bipinnatifid or bipinnate, broadly oblanceolate or narrowly obovate, 30–46 × 8–12 cm, contracted at base, acuminate; rachis without pro-

liferous bulbils, stramineous, sometimes lower part brown, scaly on both surfaces; scales brown, lanceolate and linear. Pinnae 26–32 pairs, alternate, attached at right angles to rachis, sessile, lanceolate or linear-lanceolate, middle pairs 4–6 × 1–15 cm, bases oblique and nearly truncate, auriculate acroscopically, pinnatipartite or middle pinnae pinnate, apices acuminate. Lobes 8–12 pairs, nearly opposite, slightly ascendant, overlapping or nearly approximate, obliquely oblong or rhombic-ovate, 5–8 × 3–4 mm, bases obliquely cuneate and ± decurrent to pinna rachis, with acute teeth on both sides, apices acute; abaxially with long-filiform microscales, adaxially subglabrous; frond texture papery; venation pinnate on lobes, distinct on both surfaces. Sori in 1 row on each side of midrib of lobe; indusia present, incised.

• Alpine shrubs, coniferous forests, meadows; 2500–4200 m. NW Hubei (Shennongjia), W Sichuan, S and SE Xizang, NW Yunnan.

It is possible that *Polystichum gongboense* is conspecific with *P. sinense*.

**87. *Polystichum bakerianum*** (Atkinson ex C. B. Clarke) Diels in Engler & Prantl, Nat. Pflanzenfam. 1(4): 191. 1899.

薄叶耳蕨 bao ye er jue

*Aspidium prescottianum* Wallich ex Mettenius var. *bakerianum* Atkinson ex C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 510. 1880 [“*Bakeriana*”]; *A. bakerianum* (Atkinson ex C. B. Clarke) Atkinson ex Baker; *Polystichum prescottianum* (Wallich ex Mettenius) T. Moore var. *bakerianum* (Atkinson ex C. B. Clarke) Beddome.

Plants summer-green. Rhizome erect or ascending, densely covered with lanceolate reddish brown scales. Fronds 60–80 cm; stipe stramineous, 24–35 cm, 4–5 mm in diam. at base, densely scaly; scales reddish brown, lanceolate and linear, lower part of stipe mixed with lanceolate large scales. Lamina bipinnate, narrowly lanceolate or narrowly elliptic, 60–72 × 18–24 cm, slightly contracted toward base, acuminate; rachis without proliferous bulbils, stramineous, both surfaces densely scaly; scales brown, linear and filiform. Pinnae 28–40 pairs, alternate, attached at nearly right angles to rachis, shortly stalked, linear-lanceolate, middle pairs 9–12 × 1.8–2.5 cm, bases obliquely broadly cuneate or nearly truncate, auriculate acroscopically, pinnate, apices long acuminate. Pinnules 16–20 pairs, nearly opposite, slightly ascendant, obliquely oblong or ovate, 0.8–1.4 cm × 5–6 mm, bases obliquely cuneate, auriculate acroscopically, margins with acute large teeth or pinnatilobate, apices obtuse or acute; filiform microscales on abaxial surface denser than on adaxial surface; frond texture thinly papery; venation pinnate, distinct on both surfaces. Sori in 1 row on each side of pinnule midrib; indusia present, toothed.

Alpine coniferous forests, alpine *Quercus* forests, meadows; 2900–4000 m. W Sichuan, S and SE Xizang, NW Yunnan [Bhutan, N India, Kashmir, Nepal, Pakistan].

**88. *Polystichum rufopaleaceum*** Ching ex Li Bing Zhang & H. S. Kung, Acta Phytotax. Sin. 36: 246. 1998.

红鳞耳蕨 hong lin er jue

Plants summer-green. Rhizome erect or ascending,

densely covered with lanceolate reddish brown scales. Fronds 40–70 cm; stipe stramineous, 22–34 cm, 4–5 mm in diam. at base, lower part often persistent, densely scaly; scales reddish brown, lanceolate and linear, lower part of stipe with larger ovate reddish brown scales. Lamina bipinnate, narrowly ovate or narrowly elliptic, 32–60 × 18–26 cm, slightly contracted toward base, acuminate; rachis without proliferous bulbils, stramineous, both surfaces densely scaly; scales reddish brown, lanceolate and linear. Pinnae 20–25 pairs, alternate, attached at nearly right angles to rachis, shortly stalked, linear-lanceolate, slightly ascendant, middle pairs 8–15 × 2–2.5 cm, bases obliquely broadly cuneate, auriculate acroscopically, pinnate, apices long acuminate and sometimes caudate. Pinnules 14–20 pairs, nearly opposite, slightly ascendant, obliquely oblong, 1–1.8 cm × 5–8 mm, bases obliquely cuneate, auriculate acroscopically, margins with acute small teeth, apices acute; pinnules of basal acroscopic pinnae largest and often pinnatilobate; filiform microscales on abaxial surface denser than on adaxial surface; frond texture papery; venation pinnate, abaxially distinct. Sori in 1 row on each side of pinnule midrib, exindusiate.

• Broad-leaved forests, alpine coniferous forests, forest margins; 2400–3500 m. W Sichuan (Luding, Shimian), SE Xizang (Zayü), NW and W Yunnan.

*Polystichum rufopaleaceum* is similar to the Japanese species *P. microchlamys* (Christ) Matsumura, but its lower pinnae are not contracted, its scales are reddish brown, and its sori are exindusiate.

*Polystichum microchlamys* sensu S. K. Wu & X. Chen (Vasc. Pl. Hengduan Mts. 1: 139. 1993) should be treated as this species.

**89. *Polystichum sinense*** (Christ) Christ, Bull. Soc. Bot. France 52(Mém. 1): 30. 1905.

中华耳蕨 zhong hua er jue

*Aspidium prescottianum* Wallich ex Mettenius var. *sinense* Christ, Boll. Soc. Bot. Ital. 10: 289. 1901; *Polystichum alatawshanicum* Chang Y. Yang; *P. atuntzeense* Ching; *P. austrotibeticum* Ching & S. K. Wu; *P. decorum* Ching & S. K. Wu; *P. ellipticum* Ching & S. K. Wu; *P. fukuyamae* Tagawa; *P. lhasaense* Ching; *P. parasinense* Chang Y. Yang; *P. wilsonii* Christ; *P. prescottianum* (Wallich ex Mettenius) T. Moore var. *wilsonii* (Christ) C. Christensen; *P. sinense* var. *lobatum* H. S. Kung.

Plants summer-green. Rhizome erect, densely covered with lanceolate brown scales. Fronds 20–70 cm; stipe stramineous, 5–34 cm, 2–5 mm in diam. at base, densely scaly; scales brown, ovate, lanceolate, and linear. Lamina bipinnatipartite or rarely bipinnate, narrowly elliptic or lanceolate, 25–58 × 4–14 cm, slightly contracted toward base, acuminate; rachis without proliferous bulbils, stramineous, both surfaces covered with linear brown scales, abaxially mixed with broadly lanceolate to narrowly ovate scales. Pinnae 24–32 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, middle pairs 2.5–7 × 0.6–2 cm, bases oblique and nearly truncate, auriculate acroscopically, pinnatipartite to pinna rachis, apices acuminate. Lobes 7–14 pairs, nearly opposite, slightly ascendant, obliquely ovate or obliquely oblong, 4–12 × 2–5 mm, bases obliquely cuneate and decurrent to pinna rachis, slightly auriculate acroscopically, margins with acute forward-pointing teeth, apices acuminate;

both surfaces covered with filiform microscales, microscales on abaxial surface denser; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori in 1 row on each side of midrib of lobe; indusia present, incised.

Alpine coniferous forests, meadows; 2500–4000 m. S Gansu (Minxian, Xigu), Qinghai (Yushu), Shaanxi, W Sichuan, Taiwan, Xinjiang (Urumqi), S Xizang, NW Yunnan [Bhutan, NW India, Kashmir, Nepal, Pakistan; ?Africa].

*Polystichum sinense* is often referred to *P. wilsonii*, a heterotypic synonym of *P. sinense*, by various authors. *Polystichum sinense* (Christ) Christ (1905) obviously has priority over *P. wilsonii* Christ (1911).

**90. *Polystichum mollissimum*** Ching, Fl. Xizang. 1: 232. 1983.

毛叶耳蕨 mao ye er jue

*Polystichum mediocre* Ching & S. K. Wu; *P. mollissimum* var. *laciniatum* H. S. Kung & Li Bing Zhang.

Plants summer-green. Rhizome erect, densely covered with lanceolate brown scales. Fronds 8–20 cm; stipe stramineous, 2–8 cm, ca. 2 mm in diam. at base, lower part persistent, densely scaly; scales yellowish brown or brown, lanceolate and linear. Lamina bipinnatifid, lanceolate, 7–18 × 1.5–3.5 cm, slightly contracted toward base, acuminate; rachis without proliferous bulbils, stramineous, both surfaces densely covered with linear scales. Pinnae 11–24 pairs, alternate, slightly ascendant or attached at right angles to rachis, sessile, lanceolate, middle pairs 0.8–2 cm × 4–8 mm, bases obliquely broadly cuneate, auriculate acroscopically, pinnatifid nearly to pinna rachis, apices acute. Lobes 3–6 pairs, nearly opposite, slightly ascendant, obliquely oblong, 1–3 × 0.5–1.5 cm, with forward-pointing teeth, acute; both surfaces covered with filiform microscales, microscales on abaxial surface denser; frond texture thinly papery; venation pinnate on lobes, indistinct on both surfaces. Sori in 1 row on each side of costa or midrib of lobe; indusia present, obtusely toothed.

• Alpine shrubs, dark coniferous forests, alpine meadows; 2600–3700 m. E Gansu (Xinglong Shan), Hebei (Xiaowutai Shan), Nei Mongol (Daqing Shan), Qinghai (Dongdu), Shaanxi (Taibai Shan), Shanxi (Huoxian, Ningwu), W Sichuan, Xizang (Banbar, Bomi), NW Yunnan.

**91. *Polystichum saxicola*** Ching ex H. S. Kung & Li Bing Zhang, Acta Phytotax. Sin. 36: 250. 1998.

石生耳蕨 shi sheng er jue

Plants summer-green. Rhizome unknown. Fronds ca. 35 cm; stipe yellowish brown in lower part, ca. 18 cm, ca. 2 mm in diam. at base, scaly; scales ovate and linear, base of stipe covered with lanceolate scales, center of scales blackish brown, margins brown. Lamina bipinnatifid, oblanceolate, ca. 34 × 8 cm, slightly contracted toward base, acuminate; rachis without proliferous bulbils, stramineous, both surfaces covered with linear scales, abaxially mixed with lanceolate scales. Pinnae 24 pairs, alternate, attached at right angles to rachis, shortly stalked, oblong-lanceolate, middle pairs 3.5–4 × ca. 2 cm, bases oblique and nearly truncate, auriculate acroscopically, pinnatifid, apices obtuse or acute. Lobes 6 or 7 pairs, alternate, ascendant, obliquely oblong, 0.8–1 cm × 4–5 mm, bases obliquely cuneate and decurrent to costa forming narrow wings,

apices rounded; auricles inconspicuous, serrulate, abaxially covered with filiform microscales, adaxially glabrous; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori in 1 row on each side of midrib of lobe; indusia present, incised.

• Alpine meadows, rock crevices; ca. 3100 m. Sichuan (Emei Shan).

**92. *Polystichum kangdingense*** H. S. Kung & Li Bing Zhang ex Li Bing Zhang, Phytotaxa 60: 58. 2012.

康定耳蕨 kang ding er jue

Plants summer-green. Rhizome erect, densely covered with lanceolate brown scales. Fronds 35–60 cm; stipe stramineous, 14–28 cm, 3–4 mm in diam. at base, densely scaly; scales brown, lanceolate and linear, mixed with larger scales; large scales ovate, blackish brown at middle, margins brown. Lamina bipinnate, broadly lanceolate, 35–54 × 8–14 cm, slightly contracted toward base, acuminate; rachis without proliferous bulbils, stramineous, both surfaces densely covered with lanceolate and linear scales, abaxially mixed with ovate scales. Pinnae 20–30 pairs, alternate, attached at nearly right angles to rachis, shortly stalked, lanceolate or linear-lanceolate, middle pairs 4–7 cm × 1.2–2.4 mm, bases obliquely broadly cuneate, auriculate acroscopically, pinnate, apices acuminate. Pinnules 8–12 pairs, alternate, ascendant, obliquely ovate, 6–14 × 4–8 mm, bases obliquely cuneate and decurrent to pinna rachis, auricles deltoid, margins with small acute forward-pointing teeth, apices acute; abaxially more densely covered with filiform microscales, adaxially sparsely covered with filiform microscales; frond texture papery; venation pinnate on lobes, indistinct abaxially, slightly raised adaxially. Sori in 1 row on each side of pinnule midrib; indusia present, erose.

• Alpine dark coniferous forests, shrubs, bamboo forests; 2000–3800 m. W Sichuan.

“*Polystichum kangdingense* H. S. Kung & Li Bing Zhang” (Acta Phytotax. Sin. 36: 254, t. 3: f. 1–4. 1998) was not validly published because no type was indicated (*Melbourne Code*, Art. 40.1).

**93. *Polystichum frigidicola*** H. S. Kung & Li Bing Zhang, Acta Bot. Yunnan. 17: 28. 1995.

寒生耳蕨 han sheng er jue

Plants summer-green. Rhizome ascending, densely scaly; scales blackish brown at middle, margins brown, lanceolate. Fronds 40–50 cm; stipe stramineous, 16–20 cm, 3–4 mm in diam. at base, scaly; scales brown, lanceolate and linear. Lamina bipinnatifid, lanceolate, 30–32 × 5–8 cm, slightly contracted toward base, acuminate; rachis without proliferous bulbils, stramineous, both surfaces densely covered with lanceolate and linear brown scales, abaxially mixed with lanceolate dark brown scales with light brown margins. Pinnae 24–30 pairs, alternate, slightly ascendant, shortly stalked, lanceolate or linear-lanceolate, middle pairs 3.5–5 × 1.2–1.5 cm, bases obliquely broadly cuneate, auriculate acroscopically, pinnatifid, apices acuminate. Lobes 7–9 pairs, nearly opposite, ascendant, obliquely ovate or lanceolate, 8–12 × 4–5 mm, bases obliquely cuneate and decurrent to costa forming narrow wings, auricles

inconspicuous, with small acute forward-pointing teeth, acuminate; abaxially with denser microscales, adaxially sparsely covered with filiform brown microscales; frond texture papery; venation pinnate on lobes, slightly raised abaxially, distinct adaxially. Sori in 1 row on each side of midrib of lobe, or on each side of costa of upper pinnae; indusia present, erose.

• Alpine meadows, *Abies-Rhododendron* forests; 2900–4400 m. W Sichuan (Luding, Muli, Shimian).

**94. *Polystichum submite*** (Christ) Diels, Bot. Jahrb. Syst. 29(2): 192. 1900.

秦岭耳蕨 qin ling er jue

*Aspidium submite* Christ, Nuovo Giorn. Bot. Ital., n.s., 4: 93. 1897; *Polystichum paradoxum* Ching & Y. P. Hsu.

Plants summer-green. Rhizome erect, densely covered with lanceolate brown scales. Fronds 12–30 cm; stipe stramineous, 3–12 cm, 1–2 mm in diam. at base, scaly; scales brown, lanceolate and linear, mixed with larger scales; large scales lanceolate, blackish brown at middle, margins brown. Lamina bipinnatipar-

tite, lanceolate, 10–27 × 2–5 cm, slightly contracted toward base, long acuminate; rachis without proliferous bulbils, stramineous, both surfaces densely covered with lanceolate and linear brown scales, sometimes lower part mixed with lanceolate scales abaxially, dark brown at middle, margins brown. Pinnae 12–24 pairs, alternate, attached at right angles to rachis or slightly ascendant, shortly stalked, ovate or lanceolate, middle pairs 1–3 cm × 6–10 mm, bases obliquely broadly cuneate, auriculate acroscopically, pinnatipartite, apices acute, rarely acuminate. Lobes 2–10 pairs, alternate, ascendant, obliquely oblong or rhombic-ovate, 4–6 × 2–3 mm, bases obliquely cuneate and decurrent to costa forming narrow wings, auricles inconspicuous, with small acute forward-pointing teeth, acute or obtuse; abaxially covered with filiform brown microscales, adaxially glabrous; frond texture papery; venation pinnate on lobes, indistinct on both surfaces. Sori in 1 row on each side of midrib of lobe; indusia present, erose.

• Forests; 1200–2500 m. Gansu (Kangxian, Tianshui), Henan (Songxian), Shaanxi (Qinling), N and W Sichuan.

### 3. *Polystichum* ser. *Exauricula* H. S. Kung & Li Bing Zhang, Acta Phytotax. Sin. 34: 71. 1996.

缺耳耳蕨系 que er er jue xi

Plants medium-sized to large, evergreen. Lamina green, broadly lanceolate, papery or thickly papery. Stipe greenish when dry. Rachis scales linear or lanceolate to ovate-lanceolate. Pinnules 10–30 pairs, stalked, pinnules of upper pinnae exauriculate or nearly so. Microscales long-type or short-type. Vein with or without hydathodes at end.

Four species: Sino-Himalayan region; four species (two endemic) in China.

**95. *Polystichum longipaleatum*** Christ, Notul. Syst. (Paris) 1(2): 35. 1909.

长鳞耳蕨 chang lin er jue

*Aspidium aculeatum* (Linnaeus) Swartz var. *setosum* C. B. Clarke, Trans. Linn. Soc. London, Bot. 1: 510. 1880; *Polystichum aculeatum* (Linnaeus) Roth ex Mertens var. *setosum* (C. B. Clarke) Beddome; *P. aculeatum* var. *setulosum* Rosenstock; *P. setosum* (C. B. Clarke) Khullar & S. C. Gupta (1980), not (Wallich) Schott (1834), nor C. Presl (1836).

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 50–120 cm; stipe yellowish brown, 16–48 cm, 4–7 mm in diam. at base, densely covered with linear, lanceolate, brown scales and larger scales; large scales dense, shiny, ovate and ovate-lanceolate, up to 13 × 6 mm, subentire or serrulate, caudate. Lamina bipinnate, oblong-lanceolate or oblong, 32–87 × 11–25 cm near base, not or slightly contracted toward base, base sterile, apex caudate or acuminate, fertile; rachis without proliferous bulbils, abaxially densely covered with linear, lanceolate, brown scales and larger scales; large scales sparse, ovate-lanceolate and broadly lanceolate, up to 10 × 4 mm, densely serrulate, long acuminate. Pinnae 25–40 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, bases not contracted, asymmetrical, apices caudate; pinnae near lamina base 7–14 × 1.7–2 cm, 1-pinnate; rachis without proliferous bulbils, abaxially covered with linear brown scales. Pinnules 16–38 pairs, alternate, subsessile, oblong, 0.5–1 × 0.3–0.5 cm, bases cuneate, acroscopic margins entire, not

spinulose, exauriculate (except for a few large individuals), apices acute and mucronate; basispic margins shortly spinulose, basal acroscopic pinnules largest, incised; both surfaces densely covered with long-filiform microscales; frond texture papery; venation pinnate, lateral veins 5–7 pairs, dichotomous, distinct. Sori (1 or) 2–5 pairs per pinnule, in 1 row on each side of midrib, close to midrib, terminal on veinlets, small, exindusiate.

Broad-leaved forests, coniferous forests, bamboo forests, shrubs; 1100–2600 m. Guangxi (Damiao Shan, Longsheng), Guizhou, Hunan (Xinning), Sichuan, Xizang (Dinggyê, Médog), Yunnan [Bhutan, India, Nepal].

**96. *Polystichum nudisorum*** Ching, Bull. Fan Mem. Inst. Biol., Bot. 11: 71. 1941.

裸果耳蕨 luo guo er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 30–100 cm; stipe yellowish brown, 9–47 cm, 3–7 mm in diam. at base, densely covered with linear, lanceolate, brown scales and larger scales; large scales dense, brown and bicolorous, ovate and ovate-lanceolate, middle of bicolorous scales blackish brown and margins brown, shiny, up to 12 × 6 mm, subentire or serrulate, caudate. Lamina bipinnate, oblong-lanceolate or oblong, 22–85 × 6–20 cm near base, not or slightly contracted toward base, base sterile, apex caudate, fertile; rachis without proliferous bulbils, abaxially densely covered with linear and lanceolate, brown scales and larger scales; large scales sparse, brown,

ovate-lanceolate and broadly lanceolate, up to  $10 \times 4$  mm, densely serrulate, long acuminate. Pinnae 21–39 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, not contracted toward base, bases asymmetrical, apices caudate; lower pinnae  $5-10 \times 1.4-2$  cm, 1-pinnate; costa abaxially covered with linear brown scales, adaxially sulcate. Pinnules 13–38 pairs, alternate, sessile, oblong,  $0.4-1 \times 0.2-0.5$  cm, bases cuneate, acroscopic margins entire, not spinulose, bases exauriculate, basicopic margins shortly spinulose, apices acute and mucronate; basal acroscopic pinnules largest, margins incised; both surfaces densely covered with long-filiform microscales; frond texture papery; venation pinnate, lateral veins 5–7 pairs, dichotomous, distinct. Sori small, caducous, (1 or) 2–5 pairs per pinnule, in 1 row on each side of midrib, close to midrib, terminal on veinlets, exindusiate.

• Mixed broad-leaved and coniferous forests, forest margins; 1800–3000 m. Xizang (Mêdog), Yunnan.

*Polystichum nudisorum* differs from *P. longipaleatum* in its bicolorous stipe scales. It has narrower and higher distribution than *P. longipaleatum*.

This species might also occur in N India.

**97. *Polystichum pianmaense*** W. M. Chu, Acta Bot. Yunnan., Suppl. 5: 51. 1992.

片马耳蕨 pian ma er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds up to 80 cm; stipe yellowish brown, 11–32 cm, 4–6 mm in diam. at base, densely covered with linear and lanceolate and larger scales; large scales somewhat sparse, bicolorous, blackish brown to dark brown at center and brown on margin, shiny, ovate and ovate-lanceolate, up to  $14 \times 7$  mm, subentire or serrulate, caudate. Lamina bipinnate, oblong-lanceolate or oblong, up to  $27-60 \times 11-24$  cm near base, not or slightly contracted toward base, apex caudate, sterile; rachis without proliferous bulbils, abaxially densely covered with linear, lanceolate, brown scales and larger scales; large scales dense or somewhat sparse, blackish brown to dark brown, shiny, ovate-lanceolate and broadly lanceolate, up to  $9 \times 5$  mm, densely serrulate, caudate. Pinnae 23–26 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, bases not contracted, asymmetrical, apices caudate; lower pinnae  $7-10 \times 1.7-2$  cm, 1-pinnate; costa abaxially covered with linear brown scales, adaxially sulcate. Pinnules 16–25 pairs, alternate, sessile, oblong,  $0.8-1 \times 0.3-0.4$  cm, bases cuneate, acroscopic margins entire, not spinulose, exauriculate, basicopic margins shortly spinulose, apices acute and mucronate; basal acroscopic pinnules largest, incised; both surfaces

densely covered with long-filiform microscales; frond texture papery; venation pinnate, lateral veins 5–7 pairs, dichotomous, distinct. Sori small, 1–3 pairs per pinnule, in 1 row on each side of midrib, close to midrib, terminal on veinlets; indusia present, brown, small, membranous, not well developed, irregularly erose.

• Forests; 2200–2600 m. Xizang (Mêdog, Zayü), Yunnan (Gongshan, Lushui).

**98. *Polystichum punctiferum*** C. Christensen, Contr. U.S. Natl. Herb. 26: 288. 1931.

中甸耳蕨 zhong dian er jue

*Polystichum glingense* Ching & Y. X. Lin; *P. virescens* Ching & S. K. Wu.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 60–120 cm; stipe yellowish brown, 34–62 cm, 4–6 mm in diam. at base, densely scaly; scales angled upward and slightly appressed to stipe, linear, subulate, or lanceolate and mixed with larger scales; large scales dense on lower stipe, dark brown, shiny, ovate and ovate-lanceolate, up to  $20 \times 3-8.5$  mm, densely and regularly toothed and ciliate, caudate. Lamina bipinnate, deltoid-ovate,  $48-74 \times 20-35$  cm near base, slightly contracted toward base, lower part sterile, apex acute, fertile; rachis without proliferous bulbils, densely scaly; scales dark brown, linear, subulate, and lanceolate, ciliate on margin, lanceolate scales caudate at apex. Pinnae 13–18 pairs, alternate, ascendant, shortly stalked, lanceolate, bases asymmetrical, apices caudate; lower pinnae  $15-23 \times 3.5-5.5$  cm, 1-pinnate; costa scales dark brown, linear and subulate. Pinnules 12–20 pairs, alternate, shortly stalked, falcate-deltoid, bases cuneate, acroscopic bases with rounded auricles, margins with acute, shallow or deep teeth, apices acuminate; basal acroscopic pinnules (but not lowermost 3 or so) largest, pinnatifid; abaxially with dense long-filiform microscales, adaxially with sparse microscales; frond texture papery; venation pinnate, lateral veins 5–9 pairs, dichotomous, distinct, adaxially with oblong hydathode terminal on veinlets. Sori 5–20 per pinnule, in 1 row on each side of midrib, terminal on veinlets; indusia present, irregularly lacerate.

Broad-leaved forests, mixed forests; 1700–2700 m. Xizang (Mêdog: Gling), W Yunnan [Bhutan, India, Myanmar, Nepal].

*Polystichum punctiferum* was placed in *P. sect. Macropolystichum* by Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 7. 1997).

*Polystichum punctiferum* has hydathodes on adaxial surface of pinnules, which is unique in *P. sect. Hypopeltis*. Its rachis scales are linear, subulate, and lanceolate, and dark brown.

#### 4. *Polystichum* ser. *Brauniana* H. S. Kung & Li Bing Zhang, Acta Phytotax. Sin. 34: 73. 1996.

长小鳞耳蕨系 chang xiao lin er jue xi

Plants medium-sized to large, evergreen. Lamina papery, green, broadly lanceolate, gradually contracted toward base or not contracted. Stipe greenish when dry. Stipe scales ovate, ovate-lanceolate, or broadly lanceolate, concolorous or bicolorous. Rachis scales broadly ovate to ovate-lanceolate. Pinnules 10–30 pairs, stalked, pinnules of upper pinnae auriculate. Microscales long-type.

About ten species: mainly in the Sino-Japanese region, one species with circumboreal distribution; seven species (three endemic) in China.

**99. *Polystichum braunii*** (Spenner) Fée, Mém. Foug. 5: 278. 1852.

布朗耳蕨 *bu lang er jue*

*Aspidium braunii* Spenner, Fl. Friburg. 1: 9. 1825; *Polystichum shennongense* Ching, Boufford & K. H. Shing.

Plants summer-green. Rhizome erect or ascending, short, densely covered with scales; scales brown, linear. Fronds 40–70 cm; stipe brown at base, 13–21 cm, 4–5 mm in diam. at base, densely covered with scales; scales brown, linear and lanceolate or larger; large scales dense or somewhat sparse, light brown but below middle often blackish brown, shiny, ovate, ovate-lanceolate, or broadly lanceolate, up to 13 × 6 mm, subentire or slightly toothed, long acuminate or caudate. Lamina bipinnate, oblanceolate, 36–60 × 14–24 cm at middle, gradually contracted toward base, lower part sterile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially with dense light brown linear or lanceolate and larger scales; large scales ovate-lanceolate, up to 4.5 mm wide, subentire, caudate or long acuminate. Pinnae 19–25 pairs, alternate, ascendant, shortly stalked, lanceolate, bases asymmetrical, apices acuminate; middle pinnae 7–15 × 2.3–2.8 cm, 1-pinnate; costa narrowly winged, abaxially with linear light brown scales. Pinnules (2–)6–17 pairs, alternate, sessile, oblong, 0.9–1.7 × 0.5–0.9 cm, bases cuneate, decurrent, acroscopic margins entire, sometimes toothed and even shallowly pinnatifid on large plants, shortly or long aristate, apices acute with acute spine; auricles rounded, small, basispic margins aristate; basal acroscopic pinnules largest, incised or pinnatifid; both surfaces densely scaly; microscales brownish, filiform; frond texture thinly papery; venation pinnate, lateral veins 5–7 pairs, dichotomous, distinct. Sori large, (1–)3–6 pairs per pinnule, in 1 row along each side of midrib, close to midrib, terminal or sometimes abaxial on veins; indusia present, entire.  $2n = 164$ .

Forests, shaded or semi-shaded forest margins; 1000–3400 m. Anhui (Huangshan), S Gansu, Hebei (Dongling, Xinglong), Heilongjiang (Shangzhi), W Henan, NW Hubei, Jilin (Liangjiang, Xiaoxing'anling), Liaoning (Changbai Shan, Hengren, Kuandian), Shaanxi (Qinling), Shanxi (Ningwu, Yicheng), Sichuan (N and W basin), Xinjiang (Hejing), Xizang (Mainling) [Japan, Korea, Russia (Siberia); Europe, North America].

Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 35. 1997) treated *Polystichum shennongense* as a synonym of *P. makinoi*, which is incorrect.

*Polystichum braunii* is the most widely distributed species in the genus and widely distributed in temperate regions of the N Hemisphere. It occurs in most provinces of China.

**100. *Polystichum ningshenense*** Ching & Y. P. Hsu, Fl. Tsingling. 2: 223. 1974.

宁陕耳蕨 *ning shan er jue*

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 50–70 cm; stipe yellowish brown, 25–40 cm, 4–5 mm in diam. at base, sparsely covered with linear, lanceolate, light brown scales and larger scales; large scales light brown and bicolorous, ovate and ovate-lanceolate; bicolorous scales sparse, castaneous at mid-

dle, shiny, up to 13 × 5 mm, with sparse irregular teeth or subentire, caudate. Lamina bipinnate, oblong, 30–40 × 20–25 cm at middle, gradually contracted toward base, lower part sterile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially sparsely or densely covered with linear, lanceolate, light brown scales and larger scales; large scales dense, ovate-lanceolate and broadly lanceolate, up to 9 × 3.5 mm, with dense small teeth, long acuminate to caudate. Pinnae 20–28 pairs, alternate, attached at right angles to rachis, shortly stalked, lanceolate, bases asymmetrical, apices acuminate; middle pinnae 11–12 × 2.2–2.6 cm, 1-pinnate; costa narrowly winged, adaxially sulcate, abaxially covered with linear, subulate, brown scales. Pinnules 9–14 pairs, alternate, subsessile, oblong, 1–1.4 cm × 5–7 mm, bases cuneate and decurrent, acroscopic margins entire or subentire, shortly and finely spinulose, with rounded auricles, indistinct, basispic margins finely long spinulose, apices acute with acute tips; basal acroscopic pinnules largest, sometimes incised; both surfaces densely covered with long-filiform light brown microscales; frond texture thinly papery; venation pinnate, lateral veins 5–7 pairs, dichotomous, distinct. Sori (1 or)3–5 pairs per pinnule, in 1 row on each side of midrib, close to margins, terminal on veinlets; indusia present, entire.

• Forests; 1200–1600 m. Shaanxi (Ningshan, Zhen'an).

*Polystichum ningshenense* is similar to *P. braunii*; but only a few pinnae of lower lamina of the former are slightly contracted, and its sori are close to the pinnule margins.

**101. *Polystichum retrosopaleaceum*** (Kodama) Tagawa, J. Jap. Bot. 13(3): 187. 1937.

倒鳞耳蕨 *dao lin er jue*

*Polystichum aculeatum* (Linnaeus) Roth ex Mertens var. *retrosopaleaceum* Kodama, Bot. Mag. (Tokyo) 29: 330. 1915; *P. tsingkanshanense* Ching ex K. H. Shing & J. F. Cheng.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 50–80 cm; stipe yellowish brown, 24–52 cm, 4–5 mm in diam. at base, densely covered with linear, lanceolate, grayish brown scales and larger scales; large scales dense, grayish brown, ovate and ovate-lanceolate, up to 24 × 12 mm, densely serrulate, acute or acuminate to caudate. Lamina bipinnate, elliptic or elliptic-lanceolate, 36–63 cm, gradually contracted or slightly contracted toward base, lower part sterile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially densely covered with linear, lanceolate, light brown or grayish brown scales and larger scales; large scales dense, ovate-lanceolate and broadly lanceolate, up to 7.5 × 2.5 mm, with dense small teeth, acuminate to caudate, obviously pointing downward. Pinnae 20–24 pairs, alternate, ascendant, shortly stalked, lanceolate, bases asymmetrical, apices acuminate; middle pinnae 9–12 × 1.8–2.2 cm, 1-pinnate; costa shallowly winged at pinna tip, abaxially densely covered with linear light brown scales. Pinnules 18–22 pairs, alternate, shortly stalked, oblong or deltoid-ovate, 1–1.5 cm × 5–6 mm, bases cuneate and decurrent, acroscopic margins entire or repand, rarely lobed, not aristate, with rounded auricles, basispic margins spinulose, apices acute with acute tips; basal acroscopic pinnules largest, pinnatifid; long-filiform micro-



scales dense abaxially, sparse adaxially; frond texture papery or thinly papery; venation pinnate, lateral veins 5–7 pairs, dichotomous, distinct. Sori (1–)4–6 pairs per pinnule, in 1 row on each side of midrib, medial, terminal on veinlets; indusia present, subentire.  $2n = 82$ .

Forests; 600–1600 m. Anhui (Haozhai, Jiuhua Shan), Hubei (Wudang Shan), Jiangxi (Jinggangshan, Lushan), Zhejiang (W Tianmu Shan) [Japan, Korea].

The most important character of *Polystichum retrosopaleaceum* is that its rachis scales are ovate-lanceolate and broadly lanceolate and pointing downward.

**102. *Polystichum polyblepharum*** (Roemer ex Kunze) C. Presl, Epimel. Bot. 56. 1851.

棕鳞耳蕨 zong lin er jue

*Aspidium polyblepharum* Roemer ex Kunze, Bot. Zeitung (Berlin) 6: 572. 1848; *A. aculeatum* (Linnaeus) Swartz var. *japonicum* Franchet & Savatier; *Polystichum aculeatum* (Linnaeus) Roth ex Mertens var. *japonicum* (Franchet & Savatier) Diels.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear grayish brown scales. Fronds 40–80 cm; stipe yellowish brown, 14–22 cm, 4–5 mm in diam. at base, densely covered with linear, lanceolate, grayish brown scales and larger scales; large scales ovate-lanceolate and broadly lanceolate, up to  $20 \times 7$  mm, with few irregular teeth, caudate. Lamina bipinnate, broadly elliptic-lanceolate, 37–70  $\times$  15–20 cm at middle, not or slightly contracted toward base, lower part sterile or not, apex acuminate, fertile; rachis without proliferous bulbils, abaxially densely covered with linear grayish brown scales and larger scales; large scales shiny, narrowly lanceolate, up to  $12 \times 2.5$  mm, toothed, acuminate. Pinnae 20–26 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, gradually contracted toward base, bases asymmetrical, apices acuminate; middle pinnae 7–10  $\times$  1.4–2.2 cm, 1-pinnate; costa adaxially sulcate, abaxially densely covered with linear grayish brown scales. Pinnules 15–20 pairs, alternate, shortly stalked, oblong, 1–2  $\times$  0.5–0.75 cm, bases cuneate and decurrent at tip, acroscopic margins repand or subentire, with rounded auricles, basiscopic margins long spinulose, apices acute with acute tips; basal acroscopic pinnules largest, deeply incised; microscales long filiform, abaxially dense, adaxially sparse; frond texture papery; venation pinnate, lateral veins 4–6 pairs, dichotomous, distinct. Sori 3–7 pairs per pinnule, in 1 row on each side of midrib, close to margins or medial, terminal or nearly terminal on veinlets; indusia present, subentire.  $2n = 164$ .

Forests in montane valleys; 100–400 m. Jiangsu (Yixing), Zhejiang (Putuo Shan, Tiantai Shan) [Japan, Korea].

*Polystichum polyblepharum* has broadly elliptic-lanceolate laminae and grayish brown stipe scales; its large rachis scales are narrowly lanceolate, acuminate apically, and grayish brown, and its sori are medial or nearly marginal.

**103. *Polystichum parvipinnulum*** Tagawa, Acta Phytotax. Geobot. 6(3): 160. 1937.

尖叶耳蕨 jian ye er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with lanceolate grayish brown scales. Fronds 30–60 cm; stipe dark brown, 8–20 cm, 2.5–4 mm in diam. at base, densely covered with linear, lanceolate and larger scales; large scales ovate and ovate-lanceolate, up to  $14 \times 7$  mm, densely serrulate, caudate or acuminate. Lamina bipinnate, deltoid-ovate, deltoid-lanceolate, or lanceolate, 20–45(–60)  $\times$  6–17 cm near base, base not contracted, lower part sterile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially densely covered with linear, lanceolate, grayish brown scales and larger scales; large scales ovate-lanceolate and narrowly lanceolate, up to  $8 \times 3$  mm, with dense small teeth, caudate. Pinnae 14–29 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, gradually contracted toward base, bases asymmetrical, apices acuminate; lower pinnae 3.7–11  $\times$  1–1.5 cm, 1-pinnate; costa adaxially sulcate, abaxially densely covered with linear grayish brown scales. Pinnules 13–23 pairs, alternate, shortly stalked, oblong, 0.8–1.2 cm  $\times$  3–4.5 mm, bases cuneate, acroscopic margins entire or slightly repand, with acute auricles, margins with only few (2 or 3) spinules, apices acute with acute tips; basal acroscopic pinnules largest, entire or incised; abaxially densely covered with long-filiform microscales, adaxially subglabrous; frond texture papery; venation pinnate, lateral veins 4–6 pairs, dichotomous, relatively distinct. Sori 3–6 per pinnule, in 1 row on each side of midrib, or only 1 row acroscopically, close to midrib, terminal on veinlets; indusia present, subentire.

• Forests; 700–2400 m. Taiwan.

Laminae of *Polystichum parvipinnulum* are often small, deltoid or deltoid-lanceolate, and nearly papery. Its pinnules are small and with very few spinules on the margins.

A hybrid, *Polystichum*  $\times$  *pseudoparvipinnulum* Miyamoto & T. Nakamura (J. Jap. Bot. 58: 146. 1983), possibly between *P. parvipinnulum* and *P. piceopaleaceum*, was described from Taizhong, Taiwan.

**104. *Polystichum sozanense*** Ching ex H. S. Kung & Li Bing Zhang, Acta Phytotax. Sin. 33: 309. 1995.

草山耳蕨 cao shan er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear grayish brown scales. Fronds up to ca. 80 cm; stipe yellowish brown, 24–34 cm, 3–4 mm in diam. at base, densely covered with linear, lanceolate, yellowish brown scales and larger scales; large scales shiny, ovate and ovate-lanceolate, up to  $8 \times 6$  mm, with dense small teeth, caudate. Lamina bipinnate, oblong-lanceolate, up to  $63 \times 17$  cm at middle, not contracted toward base, lower part sterile, apex acute, fertile; rachis without proliferous bulbils, abaxially covered with linear, lanceolate, grayish brown scales and larger scales; large scales dense, shiny, ovate, ovate-lanceolate, and narrowly lanceolate, up to  $10 \times 4$  mm, with dense small teeth, caudate or long acuminate. Pinnae up to 32 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, gradually contracted toward basiscopic base, bases asymmetrical, apices acuminate or caudate; middle pinnae ca. 12  $\times$  1.3 cm, 1-pinnate; costa adaxially sulcate, densely covered with linear light brown

scales. Pinnules up to 23 pairs, alternate, shortly stalked, narrowly deltoid-ovate, 0.6–1 × 0.3–0.4 cm, bases cuneate, acroscopic margins slightly repand, with deltoid auricles, basicopic margins obviously spinulose, apices acute with acute tips; basal acroscopic pinnules largest, deeply incised; both surfaces densely covered with long-filiform light brown microscales; frond texture papery; venation pinnate, lateral veins 4–6 pairs, dichotomous, distinct. Sori 2–5 per pairs pinnule, in 1 row on each side of midrib, terminal on veinlets; indusia present, entire.

- Forests; 500–800 m. Taiwan.

*Polystichum sozanense* is often not accepted, but its stipe and rachis scales are much wider than *P. parvipinnulum*. It is possible that this species is extinct. More studies are needed.

**105. *Polystichum ovatopaleaceum*** (Kodama) Sa. Kurata, Sci. Rep. Yokosuka City Mus. 10: 35. 1964.

卵鳞耳蕨 luan lin er jue

*Polystichum aculeatum* (Linnaeus) Roth ex Mertens var. *ovatopaleaceum* Kodama, Bot. Mag. (Tokyo) 29: 328. 1915; *P. aculeatum* var. *coraiense* Christ; *P. ovatopaleaceum* var. *coraiense* (Christ) Sa. Kurata; *P. retrosopaleaceum* (Kodama) Tagawa var. *coraiense* (Christ) Tagawa; *P. retrosopaleaceum* (Kodama) Tagawa var. *ovatopaleaceum* (Kodama) Tagawa.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 48–67 cm; stipe yellowish brown, 19–25 cm, 3–4 mm in diam. at base, densely covered with linear, lanceolate, brown scales and larger

scales; large scales dense, brown, ovate and ovate-lanceolate, up to 11 × 9 mm, densely serrulate, caudate. Lamina bipinnate, elliptic or elliptic-lanceolate, 42–60 × 18–25 cm at middle, gradually contracted toward base, lower part sterile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially densely covered with linear, lanceolate, brown scales and larger scales; large scales dense, ovate or ovate-lanceolate, pointing laterally or randomly, up to 7 × 4.5 mm, with dense small teeth, acute or caudate. Pinnae 23–26 pairs, alternate or nearly opposite, attached at right angles to rachis, shortly stalked, lanceolate, gradually contracted toward basicopic base, bases asymmetrical, apices acuminate or slightly caudate; middle pinnae 9–12 × 1.8–2.2 cm, 1-pinnate; costa winged, adaxially sulcate, abaxially densely covered with linear, subulate, light brown scales. Pinnules 15–20 pairs, alternate, shortly stalked, oblong, 0.9–1.3 cm × 4–6 mm, bases cuneate and decurrent at tip, acroscopic margins entire or slightly repand, with rounded auricles, basicopic margins shortly spinulose, apices acute with acute tips; basal acroscopic pinnules largest, deeply incised; both surfaces densely covered with long-filiform microscales; frond texture papery; venation pinnate, lateral veins 5–7 pairs, dichotomous, distinct. Sori (1–)4–6 pairs per pinnule, in 1 row on each side of midrib, close to midrib, terminal on veinlets; indusia present, entire. 2n = 164.

- Forests; 600–1200 m. Anhui (Huangshan) [Japan, Korea].

The rachis scales of *Polystichum ovatopaleaceum* are ovate and ovate-lanceolate, similar to those of *P. retrosopaleaceum* (Kodama) Tagawa, but pointing laterally or randomly.

##### 5. *Polystichum* ser. *Linearia* H. S. Kung & Li Bing Zhang, Acta Phytotax. Sin. 34: 69. 1996.

线鳞耳蕨系 xian lin er jue xi

Plants medium-sized, evergreen. Stipe greenish when dry. Stipe scales concolorous, linear to linear-lanceolate. Lamina green, broadly lanceolate or elliptic-lanceolate, papery. Rachis scales linear and tortuous. Pinnules of upper pinnae auriculate. Microscales short-type.

- Four species: Sino-Himalayan region; four species (three endemic) in China.

**106. *Polystichum tangmaiense*** H. S. Kung & Tateishi, Acta Phytotax. Sin. 32: 268. 1994.

通麦耳蕨 tong mai er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds ca. 25 cm; stipe yellowish brown, 9–12 cm, ca. 1.8 mm in diam. at base, sparsely covered with linear brown scales. Lamina bipinnate, oblong-lanceolate, 17–24 × 6–7 cm at middle, lower part gradually contracted, base fertile, apex acuminate, sterile; rachis without proliferous bulbils, abaxially covered with linear brown scales. Pinnae 8–10 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, middle pinnae 3–4 × 0.8–1.5 cm, not contracted at base, 1-pinnate, acuminate; costa adaxially sulcate, abaxially sparsely covered with linear brown scales. Pinnules 7–9 pairs, alternate, shortly stalked, oblong, 5–8 × 2.5–4 mm, bases cuneate, with deltoid auricles acroscopically, margins shallowly toothed, apices acute; basal acroscopic pinnules largest; abaxially with shortly filiform microscales, adaxially subglabrous; frond texture papery; venation pinnate, lateral

veins 5–8 pairs, dichotomous, distinct. Sori 2–4 pairs per pinnule, in 1 row on each side of midrib, close to midrib, terminal on veinlets; indusia present, repand.

- Forests; ca. 2000 m. Xizang (Bomi).

**107. *Polystichum discretum*** (D. Don) J. Smith, J. Bot. (Hooker) 3: 413. 1841.

分离耳蕨 fen li er jue

*Aspidium discretum* D. Don, Prodr. Fl. Nepal. 4. 1825; *Polystichum aculeatum* (Linnaeus) Roth ex Mertens var. *nigropaleaceum* Christ; *P. fuscopaleaceum* Alston; *P. indicum* Khullar & S. C. Gupta; *P. kathmanduense* Nakaike; *P. lobatum* (Hudson) C. Presl var. *discretum* (D. Don) C. Christensen; *P. nigropaleaceum* (Christ) Diels; *P. setiferum* (Forsskål) Moor ex Woyнар var. *crenatum* N. C. Nair; *P. setiferum* var. *fuscopaleaceum* (Alston) Schelpe; *P. setiferum* var. *nigropaleaceum* (Christ) Sledge.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 30–90 cm;

stipe brown, 13–40 cm, ca. 4 mm in diam. at base, sparsely scaly; scales brown to dark brown, linear. Lamina bipinnate, oblong to deltoid-ovate, 24–70 × 10–35 cm at middle, often 20 cm, lower part slightly contracted, base fertile, apex acuminate or slightly acute, sterile; rachis without proliferous bulbils, abaxially scaly; scales dark brown to blackish brown, linear, twisted. Pinnae 12–26 pairs, alternate, slightly ascendant, lanceolate, lower part not contracted, asymmetrical at base, shortly stalked, middle pinnae 12–17 × 2.6–3.5 cm, 1-pinnate, caudate or acuminate; costa adaxially sulcate, abaxially scaly; scales dark brown to blackish brown, linear, twisted. Pinnules 12–35 pairs, alternate, shortly stalked, oblong, 0.9–2.2 × 0.5–0.8 cm, bases cuneate, acroscopic bases with rounded auricles, margins deeply toothed or lobed, apices acute, apices of most lobes obviously spinulose; basal acroscopic pinnules largest, pinnatifid; abaxially with few shortly filiform microscales, adaxially subglabrous; frond texture papery; venation pinnate, lateral veins 5–8 pairs, dichotomous, distinct. Sori (3–)5–8 pairs per pinnule, in 1 row on each side of midrib, terminal on veinlets; indusia present, irregularly lacerate.  $2n = 82$ .

Forests; 1700–2900 m. Xizang (Médog, Nyingchi), Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan, Thailand].

**108. *Polystichum oligocarpum*** Ching ex H. S. Kung & Li Bing Zhang, Acta Phytotax. Sin. 33: 308. 1995.

疏果耳蕨 shu guo er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 25–60 cm; stipe yellowish brown, 8–21 cm, ca. 1.5 mm in diam. at base, covered with woolly reddish brown scales. Lamina bipinnate, oblong-lanceolate, 20–47 × 5–12 cm at middle, not contracted toward base, base often sterile, apex caudate, fertile; rachis without proliferous bulbils, abaxially sparsely covered with linear and tortuous, reddish brown scales. Pinnae 20–25 pairs, alternate, slightly ascendant, lanceolate, not contracted toward base, bases asymmetrical, sessile, apices caudate; middle pinnae 5–10 × 0.7–1.2 cm near base, 1-pinnate; costa adaxially sulcate, abaxially sparsely covered with linear and tortuous, reddish brown scales. Pinnules 9–20 pairs, alternate, closely arranged, sessile, rhombic, 0.7–1.6 cm × 3–6.5 mm, bases cuneate, with obtuse teeth acroscopically, not spinulose, with rounded auricles, apices acute; basal acroscopic pinnules largest; abaxially with few shortly filiform microscales, adaxially subglabrous; frond texture thinly papery to papery; venation pinnate, lateral veins 5–8 pairs, dichotomous, distinct. Sori small, (1 or)2–4 pairs per pinnule, 1 or 1.5 rows on each side of midrib, terminal on veinlets; indusia present, entire or subentire.  $2n = 82^*$ .

• Forests; 1700–2200 m. Yunnan (Jingdong, Zhenyuan).

**6. *Polystichum* ser. *Makinoiana*** H. S. Kung & Li Bing Zhang, Acta Phytotax. Sin. 34: 194. 1996.

黑鳞耳蕨系 hei lin er jue xi

Plants medium-sized, evergreen. Lamina green, broadly lanceolate or elliptic-lanceolate, papery, not gradually contracted toward base. Stipe greenish when dry. Stipe scales bicolorous, ovate, ovate-lanceolate, or broadly lanceolate. Rachis scales linear, subulate, or lanceolate. Pinnules of upper pinnae auriculate. Microscales short-type.

About 17 species: Sino-Himalayan and Sino-Japanese regions; 11 species (five endemic) in China.

Fraser-Jenkins (Taxon. Revis. Indian Subcontinental Pteridophytes, 332. 2008) suspected that *Polystichum oligocarpum* would be *P. tangmaense*. The latter has lower pinnae contracted toward lamina base and nearly leathery pinnules of ca. 0.5 cm, which are different from the former.

**109. *Polystichum weimingii*** Li Bing Zhang & H. He, Syst. Bot. 34: 13. 2009.

维明耳蕨 wei ming er jue

Plants evergreen. Rhizome erect, short; scales brown, linear-lanceolate. Fronds 30–50(–107) cm; stipe yellowish green, 6.5–18 cm, 1.5–2(–2.5) mm in diam. at middle; basal stipe scales brown, dull, linear-lanceolate, ca. 10 × 1 mm, papery, obtusely toothed, acuminate; distal stipe scales similar but narrower and shorter, brown, dull, linear-lanceolate to linear, tortuous, papery, sparsely shortly toothed, caudate. Lamina bipinnate, shiny green adaxially when fresh, deltoid-lanceolate, 24–33(–74) × 4.6–8.2(–28) cm, not contracted toward base, acuminate at apex; rachis ca. 1.5 mm in diam., without proliferous bulbils; rachis scales brown, linear and tortuous, 0.25–0.5 mm, deltoid at base. Pinnae 15–23(–27) pairs, alternate, attached at nearly right angles to rachis, slightly (or strongly) angled upward, lanceolate, shortly stalked, pinnate, acute or acuminate; middle pinnae 2.3–6.5(–22) × 1.2–2.8(–3.2) cm, basal second and third pairs of pinnae slightly larger than others, basalmost pairs of pinnae smallest; costa ca. 0.5 mm in diam.; costa scales brown, linear and tortuous. Pinnules 5–12(–24) pairs, basal two pairs 2–4 cm apart, alternate, attached at ca. 80° angle to rachis, falcate-deltoid, 0.6–1.1(–1.6) × 0.25–0.35(–0.7) cm, shortly stalked; basal acroscopic pinnules auriculate, cuneate, shallowly undulate, mucronate; abaxially scaly, adaxially glabrous; microscales on abaxial surface linear and tortuous; frond texture papery; midrib raised abaxially, concave adaxially; lateral veins free, once dichotomously branched, ca. 4(–8) pairs from midrib per pinnule, raised and obvious abaxially, indistinct adaxially. Sori terminal on veins, (3–)5–8(–14) sori per fertile pinnule, at middle between midrib and pinnule margin; indusia dark brown at middle, brown elsewhere, ca. 0.8 mm in diam., membranous, lacerate. Spores 40(26.4–57.1) × 46.4(35.7–78.6) × 42.9(28.6–68.6) μm (polar axis × long equatorial axis × short equatorial axis, respectively); perispore sculpturing striate with perforations.

• Open canopies of large *Caryota urens* in ravines, red soil on limestone walls in low light beneath dense papery plants; 1300–2100 m. S Yunnan (Gengma, Mengzi).

It is possible that *Polystichum weimingii* also occurs in parts of Laos, Myanmar, and Vietnam bordering Yunnan.

The fronds of the tallest individual of this species at the type locality can reach 107 × 28 cm.

**110. *Polystichum makinoi*** (Tagawa) Tagawa, Acta Phytotax. Geobot. 5: 258. 1936.

黑鳞耳蕨 hei lin er jue

*Polystichum aculeatum* (Linnaeus) Roth ex Mertens var. *makinoi* Tagawa, Acta Phytotax. Geobot. 1: 88. 1932; *P. aculeatum* var. *pinfaense* Rosenstock.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 40–60 cm; stipe yellowish brown, 15–23 cm, ca. 2.5 mm in diam. at base, densely covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle and yellowish brown on margin, shiny, ovate or ovate-lanceolate, up to 13 × 6 mm, subentire, caudate. Lamina bipinnate, deltoid-ovate or deltoid-lanceolate, 28–52 cm, near basal part 9–18 cm wide, base slightly contracted, lower 1 or 2 pairs often sterile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially covered with linear and lanceolate scales; lanceolate scales light brown to brown (rarely lower rachis scales bicolorous), subentire, acuminate. Pinnae 13–20 pairs, alternate, attached at right angles to rachis, shortly stalked, lanceolate, bases not contracted, asymmetrical, apices acuminate; lower pinnae 3.5–8 × 1–2 cm, 1-pinnate; costa covered with linear light brown or brown scales. Pinnules 14–22 pairs, alternate, shortly stalked, falcate-deltoid to narrowly oblong, 0.8–1.3 cm × 4–7 mm, bases cuneate, with rounded auricles acroscopically, margins entire or subentire, apices acute, often shortly aristate; basal acroscopic pinnules largest, deeply incised or pinnatifid; adaxially subglabrous, abaxially sparsely covered with shortly filiform microscales; frond texture papery; venation pinnate, lateral veins 5–8 pairs, dichotomous, distinct. Sori 5 or 6 pairs per pinnule, in 1 row on each side of midrib, submarginal, terminal on veinlets; indusia present, shallowly toothed.  $2n = 164$ .

Wet places, on rocks in forests, bushes; 600–2500 m. Anhui, Fujian, S Gansu, Guangxi (Guilin), Guizhou, Hebei, S and W Henan, W Hubei, Hunan (Guidong, Longshan), Jiangsu (Liyang, Yixing), Jiangxi, ?Ningxia, N Shaanxi, Sichuan, SE Xizang (Zayü), NE and W Yunnan, Zhejiang [Bhutan, Japan, Nepal].

*Polystichum makinoi* is the most common species of *Polystichum*. Its lamina is deltoid-ovate to deltoid-lanceolate, and its rachis scales are lanceolate and brown, rarely blackish brown.

**111. *Polystichum otomasui*** Kurata, J. Geobot. 12: 67. 1963.

南碧耳蕨 nan bi er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 50–70 cm; stipe yellowish brown, 21–32 cm, up to 4.5 mm in diam. at base, densely covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle, shiny, ovate-lanceolate, up to 12 × 6 mm, subentire, caudate. Lamina bipinnate, broadly lanceolate, 32–43 cm, near basal part 12–16 cm wide, base very slightly contracted, lower 1–5 pairs of pinnae sterile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially covered with linear and lanceolate scales; lanceolate scales blackish brown, subentire, caudate. Pinnae 14–18 pairs, alternate, attached at ± right angles with rachis, shortly stalked, lanceolate, bases not contracted or lower pairs slightly

contracted on basicopic side, bases nearly symmetrical, apices acuminate; lower pinnae 8–11 × 2–2.4 cm, 1-pinnate; costa covered with linear brown scales. Pinnules 14–18 pairs, alternate, shortly stalked, falcate-deltoid to narrowly oblong, 0.9–1.3 cm × 5–7 mm, bases cuneate, with deltoid auricles acroscopically, margins subentire, often with short forward-pointing spinules, apex acute; basal acroscopic pinnules largest, deeply incised or pinnatifid; abaxially sparsely covered with shortly filiform microscales, adaxially subglabrous; frond texture papery; venation pinnate, lateral veins 5–8 pairs, dichotomous, distinct. Sori 1–13 per pinnule, in 1 row on each side of midrib or only in 1 row on acroscopic side of midrib, medial, terminal on veinlets; indusia present, shallowly toothed.  $2n = 82$ .

Wet places, slight slopes by streams, wet places along small streams in mixed *Phyllostachys heterocycla*, *Lithocarpus*, and *Tsuga* evergreen forests, secondary *Lithocarpus* forests; 1100–1800 m. Fujian (Wuyi Shan), Jiangxi (Lushan) [Japan].

*Polystichum otomasui* may have a wider distribution in China.

**112. *Polystichum parvifoliolatum*** W. M. Chu, Acta Bot. Yunnan., Suppl. 5: 49. 1992.

小羽耳蕨 xiao yu er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear dark brown scales. Fronds 50–60 cm; stipe stramineous, 18–34 cm, 2–3 mm in diam. at base, densely covered with linear, lanceolate brown scales and larger scales; large scales bicolorous, middle part blackish brown, margins brown, shiny, ovate, ovate-lanceolate, and broadly lanceolate, up to 13 × 6 mm, margins fimbriate, apices long acuminate. Lamina bipinnate, deltoid-lanceolate, 30–39 cm, 9–11 cm wide near basal part, slightly contracted toward base, lower part sterile, apex acuminate or caudate, fertile; rachis without proliferous bulbils, densely covered with linear, lanceolate brown scales and larger scales; large scales bicolorous, middle part blackish brown or dark brown, margins brown, shiny, ovate and ovate-lanceolate, up to 5 × 2.5 mm, margins regularly fimbriate, apices caudate. Pinnae 20–27 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, not contracted toward base, acuminate or caudate, basal pinnae 6–8 × 1.4–1.7 cm, 1-pinnate; costa with linear brown scales. Pinnules 16–20 pairs, alternate, shortly stalked, falcate-deltoid, 0.7–1.2 × 0.3–0.45 cm, thinly leathery, bases cuneate, auricles deltoid, apices acute, margins shallowly toothed, teeth indistinctly shortly spinulose at tip; basal acroscopic pinnules largest, pinnatifid; abaxially with few lanceolate microscales, adaxially subglabrous; venation pinnate on pinnules, lateral veins 5–7 pairs, dichotomous, distinct. Sori brown, small, (1–)3 or 4 pairs, in 1 row on each side of midrib, terminal on veinlets; indusia small.

• Montane broad-leaved evergreen forests, reddish brown soil; 1800–2600 m. Yunnan (Mile, Yiliang).

*Polystichum parvifoliolatum* was placed in *P.* sect. *Neopolystichum* in FRPS (5(2): 55. 2001) because it has broad-type microscales. Its phylogenetic relationships are unclear.

**113. *Polystichum piceopaleaceum*** Tagawa, Acta Phytotax. Geobot. 5: 255. 1936 [“*piceo-paleaceum*”].

乌鳞耳蕨 wu lin er jue

*Polystichum aculeatum* (Linnaeus) Roth var. *fargesii* Christ; *P. bicolor* Ching & S. K. Wu (1983), not A. R. Smith (1975); *P. doianum* Tagawa; *P. makinoui* (Tagawa) Tagawa var. *chuanzangense* Ching & S. K. Wu; *P. setiferum* (Forsskål) Moore ex Woynar var. *fargesii* (Christ) C. Christensen; *P. yunnanense* Christ var. *fargesii* (Christ) C. Christensen.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 48–95 cm; stipe yellowish brown, 16–32 cm, 2–3.5 mm in diam. at base, densely covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle, shiny, ovate, ovate-lanceolate, and broadly lanceolate, up to 13 × 5 mm, subentire, caudate. Lamina bipinnate, oblong-lanceolate, 32–63 cm, near basal part 10–22 cm wide, slightly or not contracted toward base, in lower part only 1 or 2 pairs sterile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially densely covered with linear, lanceolate brown scales and larger scales; large scales bicolorous, blackish brown at middle, shiny, linear and ovate-lanceolate, up to 8 × 2.5 mm, with irregular small teeth, caudate. Pinnae 17–26 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, not contracted toward base, bases asymmetrical, apices acuminate; pinnae of basal lamina 6–12 × 1.3–2.8 cm, 1-pinnate; costa abaxially covered with linear brown scales. Pinnules 9–16 pairs, alternate, shortly stalked, oblong, 0.8–1.6 cm × 4–7 mm, bases cuneate, with rounded auricles acroscopically, apices acute, margins subentire or shallowly toothed, teeth shortly spinulose at tip (or long spinulose in large individuals); basal acroscopic pinnules largest, deeply incised; adaxially with few and abaxially with many shortly filiform microscales; frond texture papery; venation pinnate, lateral veins 6–8 pairs, dichotomous, distinct. Sori 4–6 pairs per pinnule, in 1 row on each side of midrib, terminal on veinlets; indusia present, irregularly toothed.  $2n = 164$ .

Valleys, streamsides, cliffs, rock crevices; 1200–3400 m. Gansu (Kangxian, Wenxian), N Guizhou, S Shaanxi, Sichuan, Taiwan, SE Xizang, Yunnan [NE Afghanistan, Bhutan, India, Japan, Kashmir, Myanmar, Nepal, Pakistan, Sri Lanka].

The most important characters of *Polystichum piceopaleaceum* are that its lamina is oblong-lanceolate, its rachis scales are bicolorous, and its acroscopic pinnules are not toothed or only shallowly toothed.

A hybrid, *Polystichum* × *silviamontanum* Miyamoto & T. Nakamura (J. Jap. Bot. 58: 147. 1983, “*silvinmontanum*”), possibly between *P. piceopaleaceum* and *P. wilsonii* (*P. sinense*), was described from Taizhong, Taiwan.

**114. *Polystichum yunnanense*** Christ, Notul. Syst. (Paris) 1(2): 34. 1909.

云南耳蕨 yun nan er jue

*Polystichum gyirongense* Ching; *P. jizhushanense* Ching.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds up to 80 cm; stipe yellowish brown, 16–39 cm, 2–4 mm in diam. at base, densely covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle, shiny, ovate, ovate-lanceolate, and broadly lanceolate, up to 12 × 6 mm, subentire, caudate. Lamina bipinnate, oblong or elliptic-lanceolate,

30–60 cm, middle part 13–22 cm wide, base slightly or not contracted, lower part sterile, apex acuminate or slightly acute, fertile or sometimes apical tip sterile; rachis without proliferous bulbils, abaxially densely covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle, shiny, ovate-lanceolate or broadly lanceolate, up to 7 × 2.2 mm, irregularly serrulate, caudate. Pinnae 14–21 pairs, alternate, attached at right angles to rachis, shortly stalked, lanceolate, not contracted toward base, bases asymmetrical, apices acuminate or caudate; middle pinnae 5–11 × 1.4–2.6 cm, 1-pinnate; costa abaxially covered with linear brown scales. Pinnules 10–18 pairs, alternate, shortly stalked, deltoid-ovate, 1–1.7 cm × 5–7 mm, bases cuneate, with rounded auricles acroscopically, apices acute, margins coarsely toothed to shallowly lobed or deeply lobed, teeth obviously spinulose at tip; basal acroscopic pinnules largest, deeply incised to pinnatipartite; abaxially sparsely covered with shortly filiform microscales, adaxially subglabrous; frond texture papery; venation pinnate, lateral veins 5–7 pairs, dichotomous, distinct. Sori 4–6 pairs per pinnule, in 1 row on each side of midrib, slightly close to midrib, terminal on veinlets; indusia present, irregularly toothed.  $2n = 164$ .

Streamsides, rocks in forests or wet places; 1400–3100 m. W Guizhou (Hezhang), SW Sichuan, SE Xizang, Yunnan [Afghanistan, Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan].

As discussed in Zhang and He (Syst. Bot. 34: 13. 2009), although Fraser-Jenkins and Khullar's (Indian Fern J. 2: 9. 1985) lectotypification of *Polystichum yunnanense* is contrary to Rec. 9A.4 (*Melbourne Code*), it cannot be rejected, and thus Zhang and Kung's (1996) re-designation of *A. Henry 9101* (PE) as the new lectotype of this species represented in the syntypes cannot be accepted.

This species has ovate-lanceolate to broadly lanceolate and bicolorous rachis scales, and its pinnules are deltoid-ovate and coarsely toothed to shallowly lobed or deeply lobed.

**115. *Polystichum acutipinnulum*** Ching & K. H. Shing, Wuyi Sci. J. 1(1): 9. 1981.

尖头耳蕨 jian tou er jue

*Polystichum lobatopinnulum* Ching, Boufford & K. H. Shing; *P. wuyishanense* Ching & K. H. Shing.

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 50–70 cm; stipe yellowish brown, 23–38 cm, ca. 3 mm in diam. at base, densely covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle, shiny, ovate-lanceolate or broadly lanceolate, up to 16 × 2.5–6 mm, subentire, caudate. Lamina bipinnate, oblong-lanceolate or deltoid-lanceolate, 36–45 cm, lower part 13–17 cm wide, base slightly contracted, 1 or 2 pairs of lower pinnae often sterile, apex acuminate, fertile; rachis often with blackish powder and becoming blackish brown, without proliferous bulbils, abaxially covered with linear and subulate scales; scales dark brown, subentire. Pinnae 14–16 pairs, alternate, attached at right angles to rachis, shortly stalked, lanceolate; pinnae of basal lamina 5–10 × 1.7–2.2 cm, bases asymmetrical, 1-pinnate, apices acuminate, fertile; costa often with blackish powder and becoming blackish brown, abaxially covered with linear dark brown scales, adaxially sulcate. Pinnules 9–16 pairs, alternate, shortly stalked, fal-

cate-deltoid, 1.2–1.6 × 0.5–0.6 cm, bases cuneate, with conspicuous deltoid auricles, apices acuminate, margins subentire or shallowly toothed, teeth spinulose at tip, sometimes several pinnules near rachis sterile; basal acroscopic pinnules largest, nearly pinnatifid to midrib; abaxially sparsely covered with shortly filiform microscales, adaxially subglabrous; frond texture papery; venation pinnate, lateral veins 6–8 pairs, dichotomous, distinct. Sori 5–7 pairs per pinnule, in 1 row on each side of midrib, close to pinnule margins, terminal on veinlets; indusia present, erose.  $2n = 82^*$ .

• Forests; 800–3000 m. Fujian (Chong'an), Guizhou, Henan (Xinyang), W Hubei (Hefeng, Shennongjia, Xuan'en), Hunan, Sichuan, Yunnan (Daguan, Zhaotong).

Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 35, 1997) treated *Polystichum lobatopinnulum* as a synonym of *P. makinoi*, which is incorrect.

**116. *Polystichum pseudomakinoi*** Tagawa, Acta Phytotax. Geobot. 5: 257. 1936.

假黑鳞耳蕨 jia hei lin er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 50–80 cm; stipe yellowish brown, 20–30 cm, ca. 4 mm in diam. at base, densely covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle, shiny, ovate or ovate-lanceolate, up to 13 × 6 mm, subentire, caudate. Lamina bipinnate, deltoid-ovate, 32–60 × 14–23 cm near base, base slightly contracted, fertile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially covered with linear and lanceolate scales; lanceolate scales often blackish brown, entire, acuminate. Pinnae 14–21 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, not contracted toward base, bases asymmetrical, apices acuminate; lower pinnae 5–12 × 2.2–2.8 cm, 1-pinnate; costa adaxially sulcate, abaxially covered with linear brown scales. Pinnules 14–21 pairs, alternate, shortly stalked, oblong, 0.9–1.2 × 0.5–0.6 cm, bases cuneate, with inconspicuous rounded auricles, margins entire, or sparsely spinulose, apices obtuse and mucronate; basal acroscopic pinnules largest, deeply incised; both surfaces sparsely covered with shortly filiform microscales; frond texture papery to thinly papery; venation pinnate, lateral veins 5–8 pairs, dichotomous, relatively distinct. Sori 1–9 per pinnule, in 1 row on each side of midrib, or only in 1 row acroscopically, close to pinnule margins, terminal on veinlets; indusia present, entire.  $2n = 164$ .

Riversides, mountain slopes, roadsides in forests, forest margins; 200–2000 m. Anhui (Huangshan, Huoshan, Jixi), Fujian, N Guangdong, Guangxi (Damiao Shan, Lingshan), Guizhou (Kaili, Leishan, Yinjiang), Henan (Jigong Shan), Hunan, Jiangsu (Jurong, Yixing), Jiangxi, Sichuan, Zhejiang [Japan].

**117. *Polystichum shimurae*** Sa. Kurata ex Serizawa, J. Jap. Bot. 54: 139. 1979.

边果耳蕨 bian guo er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds stramineous, up to 52 cm; stipe ca. 20 cm, ca. 3 mm in diam. at base, densely covered with narrowly lanceolate and linear brown scales;

scales attached at right angles with stipe or slightly reflexed; basal scales of stipe dark brown, narrowly ovate. Lamina bipinnate, narrowly deltoid-ovate, ca. 32 × 15 cm, base slightly contracted, lower part sterile, apex acuminate; rachis without proliferous bulbils, abaxially densely scaly; scales reflexed, brown, linear. Pinnae 18 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, middle pairs ca. 8 × 2.5–3 cm, 1-pinnate, acuminate. Pinnules 10–12 pairs, alternate, slightly ascendant, oblong-ovate, 1–2 cm × 6–8 mm, bases cuneate, with rounded auricles acroscopically, margins sparsely dentate with short spinules, apices acute or obtuse and shortly aristate; basal acroscopic pinnules largest, often pinnatifid; abaxially covered with shortly filiform light brown microscales; frond texture papery; venation pinnate, lateral veins 4–6 pairs, dichotomous, indistinct on both surfaces. Sori brown, 5–10 per pinnule, in 1 row on each side of midrib, close to pinnule margins, terminal on veinlets; indusia present, irregularly erose.

Zhejiang (exact locality unknown) [Japan].

In comparison with *Polystichum pseudomakinoi*, *P. shimurae* is larger and only its upper pinnae are fertile, its pinnule margins have spinulose teeth, and its indusia margins are irregularly erose.

**118. *Polystichum huae*** H. S. Kung & Li Bing Zhang, Acta Phytotax. Sin. 33: 311. 1995.

川西耳蕨 chuan xi er jue

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 50–80 cm; stipe yellowish brown, 16–40 cm, 3–4 mm in diam. at base, densely covered with linear, lanceolate and larger scales; large scales bicolorous, dark brown at middle, shiny, ovate and ovate-lanceolate, up to 15 × 7 mm, irregularly toothed or ciliate, caudate or obtuse. Lamina bipinnate, elliptic or elliptic-lanceolate, 44–62 cm, middle part 17–21 cm wide, base slightly contracted, lower part fertile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially covered with linear, lanceolate brown scales and larger scales; large scales ovate-lanceolate and broadly lanceolate, up to 8 × 2.3 mm, margins ciliate, apices caudate. Pinnae 20–26 pairs, alternate, attached at right angles to rachis, shortly stalked, lanceolate, bases not contracted, nearly asymmetrical, apices acuminate; middle pinnae 10–14 × 2.4–2.6 cm, 1-pinnate; costa abaxially covered with linear and subulate brown scales. Pinnules 15–19 pairs, alternate, shortly stalked, deltoid-ovate, 1.2–1.8 × 0.5–0.7 cm, bases cuneate, with rounded auricles acroscopically, apices acute, margins shallowly toothed and often incised, teeth aristate at tip; basal acroscopic pinnules largest, pinnatifid to midrib; adaxially sparsely and abaxially densely covered with long-filiform microscales; frond texture papery; venation pinnate, lateral veins 5–7 pairs, dichotomous, distinct. Sori brown, 5–8 pairs per pinnule, in 1 row on each side of midrib, close to midrib, terminal on veinlets; indusia present, entire.

• Forests in valleys, wet places; 1600–2600 m. Sichuan (Baoping, Tianquan).

*Polystichum huae* was named in honor of Dr. Shiu Ying Hu, collector of the type (*S. Y. Hu 1158*), who died in 2012 at 102 years of age and is remembered for her lifelong dedication to Chinese botany.

*Polystichum huae* is similar to *P. longiaristatum*, but its indusia are entire.

**119. *Polystichum longiaristatum*** Ching, Boufford & K. H. Shing, *J. Arnold Arbor.* 64(1): 33. 1983.

长芒耳蕨 *chang mang er jue*

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 60–70 cm; stipe yellowish brown, 22–26 cm, ca. 4 mm in diam. at base, covered with linear, lanceolate and larger scales; large scales bicolorous, blackish brown at middle, shiny, ovate or ovate-lanceolate, up to 15 × 7 mm, subentire or with ciliate teeth, caudate. Lamina bipinnate, oblong or oblong-lanceolate, 48–51 cm, middle part 16–20 cm wide, slightly contracted toward base, lower part fertile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially covered with linear, lanceolate light brown scales and larger scales; large scales sparse, ovate-lanceolate and broadly lanceolate, up to 10 × 2.5 mm, with ciliate teeth, caudate. Pinnae 20–24 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, slightly contracted toward basiscopic base except for basal basiscopic pinnules, bases asymmetrical, apices acuminate or caudate; middle pinnae 9–11 × 1.8–2.1 cm, 1-pinnate; costa abaxially covered with linear and subulate light brown scales. Pinnules 12–15 pairs, alternate, shortly stalked, deltoid-ovate or oblong, 0.8–1.2 cm × 4–6 mm, bases cuneate, with rounded auricles acroscopically, margins entire or with few shallow teeth, teeth especially long aristate at tip, apices acute; basal acroscopic pinnules largest, entire or sometimes with free auricles; abaxially densely covered with shortly filiform microscales, adaxially subglabrous; frond texture thickly papery; venation pinnate, lateral veins 5–7 pairs, dichotomous, distinct. Sori 3–5 pairs per pinnule, in 1 row on each side of midrib, medial, terminal on veinlets; indusia present, irregularly toothed.

• Forests; 1000–2600 m. S Gansu, Hubei (Shennongjia), Shaanxi (Shichai).

*Polystichum longiaristatum* is similar to *P. makinoi*, but it is larger,

its rachis has ovate-lanceolate scales, and its pinnules have long-aristate margins.

**120. *Polystichum subulatum*** Ching ex Li Bing Zhang, *Acta Bot. Yunnan.* 16: 133. 1994.

钻鳞耳蕨 *zuan lin er jue*

Plants evergreen. Rhizome erect or ascending, short, densely covered with linear brown scales. Fronds 60–80 cm; stipe yellowish brown, 30–38 cm, ca. 3.5 mm in diam. at base, covered with linear, lanceolate and larger scales; large scales dense on basal stipe, bicolorous, blackish brown at middle, shiny, ovate or ovate-lanceolate, up to 12 × 2.5–5 mm, subentire, caudate. Lamina bipinnate, elliptic-lanceolate, 50–64 cm, middle part 18–22 cm wide, slightly contracted toward base, lower part fertile, apex acuminate, fertile; rachis without proliferous bulbils, abaxially scaly; scales pointing downward, dark brown, linear and subulate; subulate scale margins fimbriate. Pinnae 18–26 pairs, alternate, attached at right angles to rachis, shortly stalked, lanceolate, bases not contracted, asymmetrical, apices acuminate; middle pinnae 8–12 cm, near basal pairs 2.6–2.8 cm wide, 1-pinnate; costa abaxially with scales similar to rachis scales. Pinnules 13–17 pairs, alternate, shortly stalked, falcate-deltoid, 1.2–1.5 cm × 5–6 mm, bases cuneate, with deltoid auricles acroscopically, margins shallowly toothed, teeth long spinulose at tip, apices acute; basal acroscopic pinnules largest, pinnatipartite to midrib; abaxially sparsely covered with shortly filiform microscales, adaxially subglabrous; frond texture papery; venation pinnate, lateral veins 6–8 pairs, dichotomous, distinct. Sori 5–7 pairs per pinnule, in 1 row on each side of midrib, medial between midrib and pinnule margins, terminal on veinlets; indusia present, subentire.

• Mountain slopes, valleys, broad-leaved forests, roadsides, coniferous forests, bamboo forests; 1300–1800 m. Guizhou (Yinjiang), Sichuan.

*Polystichum subulatum* is similar to *P. makinoi*, but it is larger and its rachis scales are linear to subulate.

## 2. *Polystichum* subg. *Haplopolystichum* (Tagawa) Li Bing Zhang, *stat. nov.*

半羽耳蕨亚属 *ban yu er jue ya shu*

Basionym: *Polystichum* sect. *Haplopolystichum* Tagawa, *Acta Phytotax. Geobot.* 9: 122. 1940.

Plants evergreen. Lamina 1-pinnate; if lamina bipinnatifid to tetrapinnatifid then pinnae finely dissected or rachis scales dark brown, ovate, and appressed; venation free or rarely anastomosing to form 1 or 2 rows of areoles.

Possibly around 270 species: the highest diversity in limestone areas in S China and dozens of species in the neighboring Himalaya (six species), Japan (11 species), Korea (four species), Myanmar (six species), Philippines (two species), Russian Far East (two species), Thailand (three species), and Vietnam (ca. 40 species); 88 species (70 endemic) in nine sections in China.

*Polystichum* subg. *Haplopolystichum*, corresponding to the so-called BCPC (Lu et al., *Syst. Bot.* 32: 26–33. 2007) or CCPC clade (Li et al., *J. Plant Res.* 121:19–26. 2008), or *P.* sect. *Haplopolystichum* Tagawa s.l. (Zhang & He, *Bot. Stud. (Taipei)* 50: 101–106. 2009), is one of the two subgenera of *Polystichum*.

## 15. *Polystichum* sect. *Cyrtomiopsis* Tagawa, *Acta Phytotax. Geobot.* 9: 121. 1940.

鞭叶耳蕨组 *bian ye er jue zu*

Plants medium-sized, evergreen. Lamina papery to leathery, 1-pinnate, monomorphic or nearly dimorphic. Rachis of sterile lamina often prolonged and viviparous. Stipe and rachis scales often ciliate on margin. Sori abaxial on veinlets. Indusia small and caducous.

About four species: E Asia; four species (three endemic) in China.

- 1a. Lamina monomorphic, linear-lanceolate, 2–4 cm wide, simple to 1-pinnate; pinnae or segments oblong-ovate, acute or obtuse at apex, up to 2.5 cm.  
 2a. Lamina simple or usually pinnatifid down to rachis in lower part, with appressed segments; segments not auriculate at acroscopic side of base ..... 121. *P. basipinnatum*  
 2b. Lamina 1-pinnate in lower part, pinnae free, base nearly auriculate on acroscopic side ..... 122. *P. conjunctum*
- 1b. Lamina nearly dimorphic, broadly oblong-lanceolate, more than 5.5 cm wide, 1-pinnate; pinnae of fertile lamina lanceolate-falcate, acuminate at apex, normally over 4 cm.  
 3a. Lamina thickly papery; pinnae of fertile lamina 6–10 × 1.2–1.8 cm, entire; acroscopic basal vein of each group not reaching pinna margin, sori in 2 rows on each side of midrib or 3 rows in auricle ..... 123. *P. lepidocaulon*  
 3b. Lamina leathery; pinnae of fertile lamina 4–5 cm, or rarely longer, 0.8–1 cm wide, with acute teeth; acroscopic basal vein of each group reaching pinna margin; sori in 1 row on each side of midrib or sometimes 2 rows in auricle ..... 124. *P. putuoense*

**121. *Polystichum basipinnatum*** (Baker) Diels in Engler & Prantl, Nat. Pflanzenfam. 1(4): 189. 1899.

基羽鞭叶耳蕨 *ji yu bian ye er jue*

*Aspidium basipinnatum* Baker, J. Bot. 27: 176. 1889;  
*Cyrtomidictyum basipinnatum* (Baker) Ching.

Plants evergreen. Rhizome erect, short, together with basal stipe densely scaly; scales brown, ovate and lanceolate, membranous, margins densely ciliate, apices filiform. Fronds dimorphic, 30–40 cm; stipe brownish stramineous, 6–16 cm, 1.5–2 mm in diam. at middle; distal stipe scales sparser and smaller. Fertile lamina dark brown when dry, linear-lanceolate, 15–20 × 2.2–3.5 cm at middle, base widest and nearly truncate or shallowly cordate, pinnatifid in lower part and gradually less pinnatifid toward lamina apex, apex long acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly abaxially; scales similar to distal stipe scales, lanceolate or linear, margins toothed, apices filiform. Pinnae 10–25 or more pairs, alternate, angled slightly acroscopically; basalmost pairs oblong, attached at nearly right angles with rachis, sessile, 1.3–1.8 × ca. 1 cm, bases nearly rounded, acroscopic base not auriculate, margins entire or slightly repand, basal basicopic margins cuneate and forming a ± 80° angle with rachis, distal basicopic margins curved upward, apices obtuse; other lobes gradually smaller toward lamina apex, ascendant; abaxially densely scaly along costae and midribs, adaxially glabrous and slightly shiny; microscales light brown, ovate and linear, margins ciliate, apices filiform; frond texture thinly leathery; venation pinnate, lateral veins 2- or 3-forked, distinct on both surfaces, reaching lobe or lamina margins. Sori small, in 1 row on each side of midrib, abaxial on veinlets, medial, whole fertile lamina fertile or lower part of fertile lamina sterile, exindusiate. Sterile lamina similar to fertile lamina but less deeply pinnatifid, or simple; rachis apex often elongate and forming a long flagelliform nodding stolon with proliferous scaly bulbil.

• By streams in forests. Guangdong, Guangxi.

**122. *Polystichum conjunctum*** (Ching) Li Bing Zhang, Phytotaxa 60: 57. 2012.

卵状鞭叶耳蕨 *luan zhuang bian ye er jue*

*Cyrtomidictyum conjunctum* Ching, Acta Phytotax. Sin. 6: 263. 1957.

Plants evergreen. Rhizome erect, short, together with basal stipe densely scaly; scales brown, ovate or ovate-lanceolate, thickly membranous, margins ciliate, apices acuminate. Fronds dimorphic, 20–38 cm; stipe brownish stramineous, 10–20 cm, 1.5–2 mm in diam. at middle; distal stipe scales similar but sparser and smaller, ovate or lanceolate, margins ciliate, apices caudate. Fertile lamina 1-pinnate, yellowish green when dry, adaxially slightly shiny, lanceolate, 10–20 × 2.2–5 cm at base, apex pinnatifid-acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly abaxially; scales similar to distal stipe scales, brown, ovate or lanceolate, margins ciliate, apices filiform. Pinnae 5–7 pairs, alternate, approximate, angled slightly acroscopically, ovate-deltoid or oblong, 1.5–2.5 × 1–1.2 cm, shortly stalked, bases obliquely rounded and asymmetrical, apices acute; acroscopic base auriculate, auricles deltoid, margins entire, proximal margins of auricles slightly curved and nearly parallel with rachis, acroscopic margins of pinnae subentire or shallowly toothed; basal basicopic margins rounded and forming a ± 45° angle with rachis, distal basicopic margins curved upward; abaxially densely scaly along midribs, adaxially subglabrous; microscales light brown, ovate-lanceolate, margins densely ciliate, apices filiform; frond texture thinly leathery; venation pinnate, 3 or 4 in pinnate groups, distinct abaxially, indistinct adaxially; lateral veins forked, reaching pinna margin. Sori small, in 1 row on basicopic side of midrib, often 2 rows on acroscopic side of midrib, terminal on veinlets, whole lamina fertile, exindusiate. Sterile lamina similar to fertile lamina and with fewer pairs of pinnae; rachis apex often elongate and forming a long flagelliform nodding stolon with proliferous scaly bulbil.

• Rock crevices by streams in broad-leaved forests; ca. 300 m. Jiangxi.

**123. *Polystichum lepidocaulon*** (Hooker) J. Smith, Ferns Brit. For. 286. 1866.

鞭叶耳蕨 *bian ye er jue*

*Aspidium lepidocaulon* Hooker, Sp. Fil. 4: 12. 1862;  
*Cyrtomidictyum lepidocaulon* (Hooker) Ching; *C. lepidocaulon* var. *incisa* Ching.

Plants evergreen. Rhizome erect, short, together with basal stipe densely scaly; scales brown, ovate, ovate-lanceolate, or linear, membranous, margins densely ciliate, apices filiform. Fronds dimorphic, 28–48 cm; stipe fulvous, 10–23 cm, 2–2.5



mm in diam. at middle; distal stipe scales similar but sparser and smaller. Fertile lamina 1-pinnate, green when dry, adaxially slightly shiny, broadly lanceolate, 15–26 × 5–13 cm at base, base widest or nearly so and nearly rounded, apex pinnatifid-acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly abaxially; scales similar to distal stipe scales, light brown, ovate or ovate-lanceolate, margins densely ciliate, apices filiform. Pinnae 5–12 pairs, alternate, approximate, ascendant, falcate-lanceolate, 4–8 cm × 8–16 mm, shortly stalked, bases obliquely rounded and asymmetrical, margins entire, apices acuminate; acroscopic base auriculate, auricles deltoid, margins entire, apices acute, proximal margins of auricles slightly curved and nearly parallel with rachis; basal basisopic margins rounded and forming a ± 45° angle with rachis, distal basisopic margins strongly curved upward; abaxially densely scaly along midribs, adaxially subglabrous; microscales light brown, ovate and linear, margins ciliate, apices filiform; frond texture thickly papery or thinly leathery; venation pinnate, 4–6 in pinnate groups, indistinct on both surfaces, lateral veins forked, basal acroscopic veinlets often stopping halfway to pinna margin, other veinlets reaching pinna margin, occasionally basal veinlets of same group on same side, or of adjacent groups joining, otherwise all free. Sori small, in 2 or 3 rows on each side of midrib, abaxial or terminal on veinlets, whole fertile lamina fertile, exindusiate. Sterile lamina narrower than fertile lamina and with fewer pairs of pinnae; rachis apex often elongate and forming a long flagelliform nodding stolon with proliferous scaly bulbil.

Forests; 300–1600 m. S Anhui, Fujian, Guangxi, Hunan, S Jiangsu, Jiangxi, Taiwan, Zhejiang [C and S Japan, Korea].

**124. *Polystichum putuoense*** Li Bing Zhang, *Phytotaxa* 60: 58. 2012.

普陀鞭叶耳蕨 pu tuo bian ye er jue

*Nephrodium faberi* Baker, *Ann. Bot. (Oxford)* 5: 316. 1891, not *Polystichum faberi* Christ (1909); *Cyrtomidictyum faberi* (Baker) Ching; *Dryopteris faberi* (Baker) C. Christensen.

Plants evergreen. Rhizome erect, short, together with basal stipe densely scaly; scales brown, ovate-lanceolate or lanceolate, membranous, margins densely ciliate, apices filiform. Fronds dimorphic, up to 52 cm; stipe brownish stramineous, 10–28 cm, ca. 2 mm in diam. at middle; distal stipe scales similar but sparser and smaller. Fertile lamina 1-pinnate, green when dry, adaxially slightly shiny, broadly lanceolate, 13–24 × 5.5–10 cm at base, base widest or nearly so and nearly rounded, apex pinnatifid-acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly abaxially; scales similar to distal stipe scales, light brown, ovate-lanceolate or lanceolate, margins densely ciliate, apices filiform. Pinnae (5–)7–12 pairs, alternate, approximate, ascendant, falcate-lanceolate, 4–5 cm × 8–11 mm, shortly stalked, bases obliquely rounded and asymmetrical, margins with acute teeth, apices acuminate; acroscopic base auriculate, auricles deltoid, margins entire, apices acute, proximal margins of auricles slightly curved and nearly parallel with rachis; basal basisopic margins rounded and forming a ± 45° angle with rachis, distal basisopic margins strongly curved upward; abaxially densely scaly along midribs, adaxially subglabrous; microscales light brown, ovate and linear, margins ciliate, apices filiform; frond texture thin leathery; venation pinnate, 3 or 4 in pinnate groups, indistinct on both surfaces, lateral veins forked, reaching pinna margin. Sori small, in 1 row on each side of midrib and sometimes in 2 rows on auricles, abaxial or terminal on veinlets, whole fertile lamina fertile, exindusiate. Sterile lamina narrower than fertile lamina and with fewer pairs of pinnae; rachis apex often elongate and forming a long flagelliform nodding stolon with proliferous scaly bulbil.

• Rock crevices by streams in broad-leaved forests; ca. 500 m. Zhejiang.

*Polystichum putuoense* is very similar to *P. lepidocaulon*, but its pinna margins have acute teeth (vs. entire) and it has one row (vs. two rows) of sori on each side of the midrib. The *trnL-F* and *rbcL* sequences of the two species are slightly different, but *P. lepidocaulon* has 16-base pair insertion in the *rps4-trnS* sequence in comparison with *P. putuoense* (Liu et al., *Organisms Diversity Evol.* 10: 57–68. 2010).

**16. *Polystichum* sect. *Mastigopteris*** Tagawa, *Acta Phytotax. Geobot.* 9: 122. 1940.

鞭果耳蕨组 bian guo er jue zu

Plants small, calciphilous. Lamina 1-pinnate. Rachis prolonged and with proliferous bulbils at apex. Indusia entire.

About two species: Asia; two species (one endemic) in China.

- 1a. Pinnae oblong or deltoid-lanceolate, shorter than 2 cm; scales on stipe base lanceolate ..... 125. *P. craspedosorum*
- 1b. Pinnae lanceolate, 2–2.5 cm; scales on stipe base narrowly ovate ..... 126. *P. shandongense*

**125. *Polystichum craspedosorum*** (Maximowicz) Diels in Engler & Prantl, *Nat. Pflanzenfam.* 1(4): 189. 1899.

华北耳蕨 hua bei er jue

*Aspidium craspedosorum* Maximowicz, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 15: 231. 1871; *A. craspedosorum* var. *japonicum* Maximowicz; *A. craspedosorum* var. *mandshuricum* Maximowicz; *Polystichum leucochlamys* Christ; *Ptilopteris craspedosora* (Maximowicz) Hayata.

Plants evergreen. Rhizome erect, densely covered with

lanceolate brown scales. Fronds 10–20 cm; stipe stramineous, 2–6 cm, 1–2 mm in diam. at base, densely covered with scales; scales brown, lanceolate, basal margins with outgrowths; outgrowths hairlike, tortuous and soft; upper margins sparsely fimbriate or subtire. Lamina pinnate, linear-lanceolate or narrowly oblanceolate, 10–20 × 2–4 cm, slightly contracted at base, acuminate; rachis with dense lanceolate scales abaxially, basal margins tortuous ciliate; apex flagelliform, with proliferous bulbil capable of growing into a new plant. Pinnae 14–26 pairs, lower pairs opposite, upper pairs alternate, angled at

90° with rachis or slightly so basiscopically, shortly stalked, oblong or narrowly oblong, middle pinnae 0.8–2 cm × 5–8 mm, bases asymmetrical, apices obtuse or rounded; acroscopic base truncate, distinctly or indistinctly auriculate, basiscopic base cuneate, margins with incurved acute teeth; abaxially scaly; microscales dense or sparse, brown, linear and hairlike, basal margins with outgrowths; outgrowths hairlike, tortuous and soft; frond texture papery; venation pinnate, lateral veins free, indistinct adaxially. Sori often in 1 row close to acroscopic margins, sometimes also on basiscopic side; indusia large, entire.

Shaded and dry limestone areas; below 2300 m. Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jilin, Liaoning, Ningxia (Jingyuan), Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang (Changhua, Lin'an) [Japan, Korea, Russia (Far East)].

*Polystichum craspedosorum* var. *giraldii* Christ (in Baroni & Christ, Nuovo Giorn. Bot. Ital., n.s., 4: 93. 1897) from Shaanxi (Taibai Shan), judging from the simple description, may be the same species; however, we did not see its type.

**126. *Polystichum shandongense*** J. X. Li & Y. Wei, Acta Phytotax. Sin. 22: 164. 1984.

山东耳蕨 shan dong er jue

Plants evergreen. Rhizome erect, densely covered with

scales; scales brown, lanceolate. Fronds 30–40 cm; stipe stramineous, 10–15 cm, ca. 2 mm in diam. at base, densely covered with scales; scales brown, narrowly ovate, basal margins with outgrowths; outgrowths hairlike, tortuous and soft; upper margins sparsely fimbriate or subentire. Lamina pinnate, linear-lanceolate, 20–30 × 4–5 cm, base cuneate, apex acuminate; rachis with dense scales abaxially; scales narrowly lanceolate, basal margins tortuous ciliate; apex flagelliform, with proliferous bulbil capable of growing into a new plant. Pinnae 30–34 pairs, alternate, angled at 90° with rachis, shortly stalked, lanceolate, middle pinnae 2–2.5 cm × 5–6 mm, bases oblique, apices obtuse; acroscopic base truncate, with distinct deltoid auricles, basiscopic base cuneate, margins with incurved acute teeth; abaxially scaly; microscales dense or sparse, brown, linear or hairlike, basal margins with outgrowths; outgrowths hairlike, tortuous and soft; frond texture papery; venation pinnate, lateral veins free, slightly raised abaxially, indistinct adaxially. Sori often in 1 row close to acroscopic margins, sometimes also in 1 row on basiscopic side; indusia large, raised at center, entire.

• Rock crevices in forests; below 1100 m. Shandong (Mengshan, Qingdao, Taishan).

*Polystichum shandongense* is tentatively recognized here. It is possibly conspecific with *P. craspedosorum*.

**17. *Polystichum* sect. *Basigemmifera*** (W. M. Chu & Z. R. He) Li Bing Zhang, **stat. nov.**

小芽胞耳蕨组 xiao ya bao er jue zu

Basionym: *Polystichum* ser. *Basigemmifera* W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 223. 2001.

Plants small, summer-green or evergreen. Lamina 1-pinnate to 3-pinnate. Rachis with proliferous bulbils at either base or near apex or at both positions. Indusia erose or lacerate.

About five species: Asia; five species (four endemic) in China.

*Polystichum* sect. *Basigemmifera* has been accommodated in *P.* sect. *Micropolystichum* (FRPS 5(2): 154. 2001) as *P.* ser. *Basigemmifera*. However, the type of *P.* sect. *Micropolystichum*, *P. thomsonii*, and its relatives (e.g., *P. costularisorum*, *P. jiucaipingense*, *P. longidens*, *P. zayuense*) lack bulbils on the rachis and are members of *P.* subg. *Polystichum*, while members of *P.* sect. *Basigemmifera* have bulbils on the rachis and are members of *P.* subg. *Haplopolystichum*.

*Polystichum* sect. *Basigemmifera* and *P.* sect. *Mastigopteris* are possibly paraphyletic in relation to *P.* sect. *Platyplepia*.

1a. Rachis with bulbil at apex only.

- 2a. Lamina 1-pinnate; pinnae oblong or oblong-lanceolate, obviously serrate; basal pairs of pinnae often reflexed; rachis ± with a non-foliose elongation below terminal bulbil ..... 127. *P. erosum*
- 2b. Lamina 1-pinnate-pinnatifid; pinnae deltoid-lanceolate, pairs above middle serrate, lower pairs of pinnae profoundly pinnatifid with proximal pair of lobes nearly free; pinnae spreading or slightly ascending; rachis never elongated below rather small terminal bulbil ..... 128. *P. kungianum*

1b. Rachis with bulbil at base or at both base and apex.

- 3a. Rachis with bulbil at both base and apex ..... 131. *P. tiankengicola*
- 3b. Rachis with bulbil at base only.
- 4a. Lamina 1-pinnate with pinnae being deeply pinnatifid ..... 129. *P. capillipes*
- 4b. Lamina 2- or 3-pinnate ..... 130. *P. jiulaodongense*

**127. *Polystichum erosum*** Ching & K. H. Shing, Acta Phytotax. Sin. 10: 303. 1965.

蚀盖耳蕨 shi gai er jue

*Polystichum lacerum* Christ, Bot. Gaz. 51: 352. 1911, not C. Presl (1851).

Plants ?evergreen. Rhizome erect, densely covered with scales; scales dark brown, black in center, lanceolate. Fronds 5–15 cm; stipe stramineous, 1–5 cm, 1–2 mm in diam. at base, densely covered with scales; scales reddish brown, lanceolate, margins ciliate, cilia tortuous. Lamina pinnate, linear-lanceolate or oblanceolate, 5–16 × 1–2.6 cm, slightly contracted at base,

acuminate; rachis apex often with 1 proliferous bulbil, covered with dense or sparse scales abaxially; scales narrowly lanceolate, basal margins ciliate. Pinnae 14–25 pairs, lower pairs opposite, upper pairs alternate, angled at 90° with rachis or slightly so basiscopically, sessile, deltoid-ovate or oblong, middle pinnae 6–15 × 3–5 mm, bases asymmetrical, apices obtuse or rounded; acroscopic margins truncate, indistinctly auriculate, basicopic bases cuneate, pinna margin with incurved acute teeth; microscales on adaxial surface sparse, linear, brown; microscales on abaxial veins dense or sparse, brown, narrowly lanceolate and linear; frond texture papery; venation pinnate, lateral veins free, or forked at base, slightly raised abaxially, indistinct adaxially. Sori in 1 row on each side of midrib; indusia large, erose.

• On rocks in forests; 1400–2400 m. Chongqing, Guizhou, Henan, Hubei, Hunan (Sangzhi), Sichuan, NE Yunnan.

**128. *Polystichum kungianum*** H. He & Li Bing Zhang, Bot. Stud. (Taipei) 51: 396. 2010.

宪需耳蕨 xian xu er jue

Plants ?evergreen. Rhizome erect or slightly prostrate, 0.5–2 cm, 2–3 mm in diam., up to 1.5 cm in diam. with base of remnant old stipes; scales dull brown, linear-lanceolate, ca. 3 × 0.8 mm, subentire; roots up to 10 cm, 3–4 mm in diam. Fronds 12–16 cm; stipe stramineous, 1.5–4.5 cm, 1–2 mm in diam. at middle; scales on basal stipe brown, narrowly deltoid-lanceolate, 3–4 × 0.3–1.2 mm, thinly papery, margins at base with outgrowths; outgrowths hairlike, tortuous and soft; margins upward sparsely fimbriate or subentire, apices filiform; scales on distal stipe similar but narrower, brown, mostly linear-lanceolate, up to 3 × 0.5 mm, apices filiform. Lamina 1-pinnate-pinnatifid, yellowish green adaxially, slightly paler abaxially, lanceolate, 5.5–12.5 × 1.5–2.5 cm, slightly narrower at base, acuminate toward apex; rachis 0.5–1.2 mm in diam. at middle, apex with a small proliferous bulbil, without flagelliform prolongation. Pinnae 18–22 pairs, 0.5–1.5 × 0.3–0.6(–0.8) cm, shortly stalked, alternate, lower pairs deltoid-lanceolate, attached nearly at right angles to rachis, upper pairs shorter and rhombic-lanceolate, spreading to slightly ascending, acroscopic base auriculate, basicopic base cuneate, apices acute and terminating in a mucronate spine, several pairs of pinnae below middle of lamina deeply pinnatifid with their proximal pair of lobes nearly free, pairs above middle serrate with a mucronate tip at tooth apex and basal acroscopic auricle deltoid; lobes obliquely oblong to obovate, entire, mucronate; frond texture papery; abaxially moderately clothed with scattered microscales, adaxially with occasional articulate hairs especially along midrib; microscales brown, linear-subulate, up to 2.5 mm, usually with few tortuous hairlike outgrowths at margin of their broader base; frond texture thinly papery; venation pinnate, obvious abaxially, lateral veins free, 1–2 times forked. Sori terminal on distal branchlets of forked veinlets, 0.5–2.5 mm apart (when young), (1–)3–5(or 6) in 1 row on each side of midrib, submarginal; indusia irregularly lacerate, membranous, glossy brown later, adjacent ones often overlapping by 0.5–1.5 mm and extending over pinna margin when mature.

• Shaded wet limestone walls at edges of small NE-facing downward sloping karst caves; ca. 1800 m. Chongqing (Wuxi), Hunan (Shimen).

*Polystichum kungianum* has a similar stature and lacerate indusia to *P. erosum*, but the pinnae below middle of the lamina of the former are profoundly pinnatifid with the proximal pair of lobes nearly free from the other parts. Basal and adjacent pairs of pinnae of *P. kungianum* are attached nearly at right angles to rachis, whereas they are usually ± reflexed in *P. erosum*. Most importantly, *P. kungianum* has deltoid-lanceolate pinnae and a rather small terminal bulbil borne directly on the apex of the rachis which never elongates, while *P. erosum* has a much larger terminal bulbil on the rachis which usually elongates between the terminal bulbil and the uppermost part.

**129. *Polystichum capillipes*** (Baker) Diels in Engler & Prantl, Nat. Pflanzenfam. 1(4): 191. 1899.

基芽耳蕨 ji ya er jue

*Aspidium capillipes* Baker, J. Bot. 26: 228. 1888; *Dryopteris inaensis* Tagawa; *Polystichum inaense* (Tagawa) Tagawa; *P. michelii* Christ; *P. minusculum* Christ; *P. molliculum* Christ.

Plants summer-green, small. Rhizome erect, short, rhizome apex and basal stipe densely scaly; scales reddish brown, dimorphic; larger scales lanceolate, entire; smaller scales narrowly lanceolate, basal margins with few fimbriate long teeth. Fronds 5–30 cm; stipe light green, slender, 2–8 cm, less than 1 mm in diam. at base. Lamina narrowly elliptic-lanceolate, green when dry, darker adaxially, 4–17 × 0.7–2 cm, gradually contracted toward base, bipinnatifid or nearly bipinnate (basalmost pinnae with 1 pair of nearly free lobes), acuminate; rachis light stramineous, sparsely scaly on both surfaces; scales reddish brown, linear, margins entire or base with few filiform long teeth, often with 1 proliferous bulbil between basalmost pinnae. Pinnae 11–30 pairs, attached at nearly right angles to rachis or ascendant, alternate or nearly opposite, narrowly approximate, nearly oblong or oblong-lanceolate, shortly stalked, bases asymmetrical and cuneate, apices obtuse or acute; acroscopic margins forming a nearly right angle with rachis, basicopic margins forming an obtuse angle with rachis, bases pinnatifid nearly to midrib, margins deeply pinnatifid to pinnatifid upward; middle pinnae largest, 0.5–1.4 cm × 2–4 mm; lower pinnae contracted toward base, basalmost pairs 2–7 mm, both surfaces sparsely covered with clavate brown microscales, more so abaxially. Lobes obovate or shortly lanceolate, apices with acute or sometimes obtuse tip, 1–5 lobes below midrib of middle pinnae, 2–6 above midrib; basal acroscopic lobes largest, nearly pinnatifid to midrib, auriculate, apex with 2–4 coarse teeth or lobed to 2–4 smaller lobes; frond texture papery; venation indistinct on both surfaces, sometimes distinct adaxially, with only 1 veinlet on each lobe or coarse tooth. Sori abaxial on lower portions of veinlets, close to midrib, 1 per lobe, often 1–3 or sometimes sterile on basal acroscopic auriculate lobes; indusia present, large, brown when mature, thinly membranous, next to one another, shallowly lacerate. Spores semicircular in equatorial view; perispore sculpturing granulate with few shallow ridges.

Wet rock crevices and cliffs in subalpine forests; (1700–)2700–3900 m. Chongqing, NE and W Guizhou, W Hubei, SW and W Si-

chuan, Taiwan, SE Xizang, C, NE, and W Yunnan [Bhutan, NW India, Nepal].

**130. *Polystichum jiulaodongense*** W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 227. 2001.

九老洞耳蕨 *jiu lao dong er jue*

Plants summer-green. Rhizome erect, 3–5 mm tall, 1–2 mm in diam. Fronds 6–10 cm; stipe lower part castaneous, upper part green, slender, 1–8 cm, ca. 0.5 mm in diam., sparsely scaly; scales lanceolate or broadly lanceolate, thinly membranous, with few long teeth. Lamina bi- to tripinnatifid, lanceolate, 4–7 × 1–1.5 cm, slightly or not contracted toward base, acuminate; rachis grass-green, abaxially sparsely scaly; scales brown, narrowly lanceolate, basal margins with few long teeth, with 1 proliferous bulbil between basalmost pinnae, bulbil densely covered with brown scales. Pinnae 10–20 pairs, ovate, lower pairs slightly shortly stalked, ultimate segments slender, with only 1 veinlet, oblanceolate, 1–3 mm, 0.3–1 mm, acute; grass-green when dry, abaxially darker, abaxially sparsely scaly; microscales brown, narrowly lanceolate, entire, evanescent; frond texture thinly papery. Sori basal on ultimate segments; indusia brown, thinly membranous, irregularly peltate, coarsely lacerate, often larger than ultimate segments.

• Among moss on wet limestone cliffs, broad-leaved evergreen forests; ca. 1800 m. Sichuan (Emei Shan).

*Polystichum jiulaodongense* is a slender species, similar to a small individual of *P. caruifolium*, but it has a proliferous bulbil between the basalmost pinnae, its sori are basal on the ultimate segments, and its indusia are irregularly peltate with coarsely lacerate margins.

**131. *Polystichum tiankengicola*** Li Bing Zhang, Q. Luo & P. S. Wang, Novon 22: 186. 2012.

天坑耳蕨 *tian keng er jue*

Plants summer-green, 7–22 cm tall. Rhizome ascending, ca. 1 cm, sparsely or densely covered with scales; scales brown,

linear, ca. 0.1 mm; roots dark brown when dry, up to 12 cm, ca. 0.3 mm in diam. Fronds 5–10 per rhizome; stipe green, 3–9 cm, 0.3–0.9 mm in diam. at middle; basal stipe scales brown, dull, lanceolate, 1.2–3.5 × 0.1–0.8 mm, papery or membranous, composed of multiple cell layers, margins minutely ciliate, apices long caudate; distal stipe scales brown, dull, lanceolate, 1–2.8 × 0.1–0.3 mm, varying in size, composed of 1 or 2 cell layers, membranous, margins long ciliate, apices long caudate. Lamina 1-pinnate, lanceolate, slightly contracted toward base, 8–14 × 1.6–2.4 cm at middle, broadest part 1.8–2.7 cm wide near base, apex truncate; rachis 0.2–0.5 mm in diam. at middle, with 2 proliferous bulbils, one each at both base and apex of rachis, sometimes with only 1 bulbil at either base or apex, rarely without bulbils; scales of rachis similar to distal stipe scales but smaller, brown, dull, varying in size, papery, margins minutely ciliate, apices caudate. Pinnae 13–22 pairs, not overlapping, pointing slightly upward, basal two pairs 0.5–1.2 cm apart, alternate but nearly opposite at frond base, deltoid in lower part of lamina, oblong in upper part of lamina; middle pinnae 0.9–1.2 × 0.5–0.7 cm; largest pinnae in lower half of lamina, shortly stalked, asymmetrical at base, bipinnatifid. Lobes 2 or 3 pairs per pinna, alternate, elliptic or oblong, acute, basalmost pairs of lobes free or almost free; both surfaces scaly; microscales on both surfaces subulate without dilated base (narrow-type microscales), 0.9–2.25 mm, base ca. 0.1 mm wide, with few tortuous cilia on basal margin; frond texture papery; venation pinnate; midrib slightly raised abaxially, flat adaxially. Sori terminal on veinlets, entire abaxial lamina fertile, 2–5 sori per pinna, close to midrib, center of sorus 1.2–1.6 mm distant from pinna margin; indusia brown, 1–1.2(–1.5) mm in diam., membranous, erose.

• Wet basic soil among limestone rubble, limestone cliffs at entrances of caves at bottom of sinkholes; ca. 2500 m. NW Guizhou (Hezhang).

*Polystichum tiankengicola* can have two proliferous bulbils on each end of the rachis, distinguishing it from all other species in the genus.

### 18. *Polystichum* sect. *Crucifix* Tagawa, Acta Phytotax. Geobot. 9: 122. 1940.

戟叶耳蕨组 *ji ye er jue zu*

Plants medium-sized. Lamina papery, bipinnate at base, 1-pinnate upward. Basal pinnae extraordinarily prolonged.

About four species: Asia; three species (one endemic) in China.

- 1a. Pinnae coarsely serrate, falcate-lanceolate, acuminate ..... 132. *P. tripterum*  
 1b. Pinnae toothed, oblong or almost rectangular, acute.  
   2a. Basal pinnae 1-pinnate (at least some laminae of same plant with 1-pinnate basal pinnae); sori slightly closer to midrib; indusia much smaller than below; perispore with reticulate sculpture ..... 133. *P. hancockii*  
   2b. Basal pinnae rarely 1-pinnate; sori closer to pinna margin; indusia 0.6–0.8 mm in diam.; perispore with irregularly perforate sculpture ..... 134. *P. normale*

**132. *Polystichum tripterum*** (Kunze) C. Presl, Epimel. Bot. 55. 1851.

戟叶耳蕨 *ji ye er jue*

*Aspidium tripterum* Kunze, Bot. Zeitung (Berlin) 6: 569. 1848; *Dryopteris triptera* (Kunze) Kuntze; *Polystichum tri-*

*pterum* f. *subbipinnatum* H. Itô; *Ptilopteris triptera* (Kunze) Hayata.

Plants evergreen. Rhizome erect, short, rhizome apex and stipe base densely scaly; scales dark brown, lanceolate, margins ciliate. Fronds 30–65 cm; stipe 12–30 cm, ca. 2 mm in diam.,

distal stipe stramineous, together with rachis and costa sparsely covered with lanceolate scales. Lamina green when dry, adaxially darker, hastate-lanceolate, 30–45 × 10–16 cm at base, with 3 elliptic-lanceolate pinnae; lateral pair smaller, 5–8 × 2–5 cm, shortly stalked, oblique, pinnate, pinnules 5–12 pairs; middle pinna much larger, 30–40 × 5–8 cm, long stalked, 1-pinnate, pinnules 25–30 pairs; all pinnules alternate, attached at nearly right angles to rachis, lower pairs shortly stalked, upper pairs subsessile, middle pairs 3–4 × 0.8–1.2 cm, falcate, apices acuminate; basicopic base oblique, acroscopic margins straight, acroscopic base with deltoid auricles, margins coarsely toothed or pinnatifid, teeth and lobes spinulose at apex; sparsely scaly along veins; microscales light brown, ovate-lanceolate or lanceolate; frond texture papery; venation pinnate on lobes, veinlets simple, rarely forked. Sori terminal on veinlets; indusia present, slightly erose, caducous. Spores elliptic in polar view, semicircular in equatorial view.  $2n = 41$ .

Rock crevices, on rocks in forests; 400–2300 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Sichuan, Zhejiang [Japan, Korea, Russia (Far East)].

**133. *Polystichum hancockii*** (Hance) Diels in Engler & Prantl, Nat. Pflanzenfam. 1(4): 191. 1899.

小戟叶耳蕨 xiao ji ye er jue

*Ptilopteris hancockii* Hance, J. Bot. 22: 139. 1884; *Aspidium hancockii* (Hance) Baker; *A. reductum* Baker; *Polystichum hancockii* var. *leptopterum* (Hayata) Suzuki; *P. leptopterum* Hayata; *P. longistipes* Hayata; *P. parahancockii* Ching; *P. simplicipinnum* Hayata.

Plants evergreen. Rhizome erect, short, rhizome apex and stipe base densely scaly; scales dark brown, ovate-lanceolate, toothed at apex. Fronds 30–50 cm; stipe stramineous upward, 10–20 cm, sparsely scaly or subglabrous. Lamina hastate-lanceolate, green when dry, 20–25 × 8–12 cm at base, with 3 linear-lanceolate pinnae; lateral pairs shorter, 2–5 × 1–2 cm, shortly stalked, pinnate, shortly acuminate; pinnules 5 or 6 pairs; middle pinna much larger than lateral pinnae, 20–25 × 3–6 cm, long stalked, 1-pinnate, long acuminate, pinnules 20–25 pairs; all pinnules alternate, attached at nearly right angles to rachis, lower pairs shortly stalked, upper pairs subsessile, middle part 1.5–2 cm × 6–8 mm, obliquely rectangular, apices acute or obtuse, acroscopic base with deltoid auricles, margins coarsely toothed, teeth with small spinules at apex; both surfaces glabrous; frond texture thinly papery; venation pinnate on lobes, veinlets simple, rarely forked. Sori terminal on veinlets; indusia present, slightly erose, caducous. Spores elliptic in polar view, semicircular in equatorial view, perispore sculpturing reticulate.  $2n = 41$ .

Forests; 300–2100 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Taiwan, Zhejiang [Japan, Korea].

**134. *Polystichum normale*** Ching ex P. S. Wang & Li Bing Zhang, Novon 22: 250. 2012.

渝黔耳蕨 yu qian er jue

Plants evergreen. Rhizome ascending or erect, short, 0.5–2 cm; scales light brown to brown, ovate-lanceolate, 3–4 mm, papery; roots dark brown to brown when dry, up to 7 cm, 0.2–0.3 mm in diam., sparsely covered with hairlike scales. Fronds 4–7 per rhizome, (11–)16–33 cm; stipe green, stramineous when dry, (4–)6–17 cm, (0.4–)0.7–2.6 mm in diam. at middle; basal stipe scales dull, ovate-lanceolate, 5–7 × 1.2–1.5 mm, varying in size, thinly papery and brown at middle, membranous and light brown on margin, entire, acuminate or caudate; distal stipe scales similar but narrower and shorter toward rachis apex, light brown, dull, lanceolate or ovate-lanceolate, membranous, ciliate, caudate. Lamina 1-pinnate, lanceolate, (6–)9–27 × 1.9–3.3 cm at middle, slightly contracted toward base, acuminate; rachis 0.7–1.3 mm in diam. at middle, without proliferous bulbils; scales light brown, dull, 1.5–3 × 0.3–0.7 mm at base, varying in size, membranous, margins ciliate, apices caudate. Pinnae 14–28 pairs, approximate, angled acroscopically, basalmost pairs simple, pinnatifid or 1-pinnate, 8–35 × 3.5–12 mm, basal two pairs 0.7–1.4 cm apart, alternate, green, oblong to rectangular, middle pinnae 9–17 × 3.5–7.2 mm, shortly stalked, stalks ca. 1.2 mm; acroscopic base auriculate, basicopic base truncate and often forming a (90°–)100°–110° angle with rachis, apices acute or rounded but mucronate; acroscopic margins repand-serrate; abaxially scaly, adaxially glabrous; microscales on abaxial surface subulate without dilated base (narrow-type microscales), 0.1–0.23 mm, base 0.05–0.1 mm wide; frond texture papery; venation pinnate; midrib abaxially slightly raised, adaxially flat and invisible; lateral veins free, 4–7 pairs from midrib per pinna, each lateral vein further dichotomous, indistinct on both surfaces. Sori terminal on veins of pinnae, (1–)4–8 per fertile pinna, between midrib and pinna margin and 0.7–2.2 mm distant from pinna margin; all pinnae on fertile lamina fertile; indusia brown, 0.6–0.8 mm in diam., membranous, erose. Spores dark brown when fresh, circular in polar view, elliptic in equatorial view, ca. 50.5 × 41.3 μm (polar axis × equatorial axis); perispore sculpturing irregularly perforate with few ridges and numerous spinules.

• Thick acidic soils derived from sandstone in forests, shaded places in valleys; 600–1900 m. S Chongqing, NE and SE Guizhou, NW Hunan.

*Polystichum normale* is similar to *P. tripterum* and *P. hancockii*. *Polystichum normale* is distinguished from *P. tripterum* by its toothed, oblong or almost rectangular pinnae with acute apices and its basal pinnae that are simple, pinnatifid, or 1-pinnate. The basalmost pinnae of *P. normale* are almost as long as to twice as long as the median pinnae. In contrast, *P. tripterum* has coarsely serrate and falcate-lanceolate pinnae with acuminate apices and basal pinnae ca. six times as long as the median pinnae.

*Polystichum normale* differs from *P. hancockii* in having sori closer to the pinna margins (vs. slightly closer to the midrib) and indusia larger, 0.6–0.8 mm in diam. (vs. only 0.3–0.4 mm). In addition, the basal pinnae of *P. normale* can be simple or pinnatifid or 1-pinnate, while those of *P. hancockii* are consistently 1-pinnate (at least some laminae on any given plant of *P. hancockii* have 1-pinnate basal pinnae).

Material of *Polystichum normale* was included in *P. leveillei* in FRPS (5(2): 175. 2001). Genuine *P. leveillei* has simple basal pinnae and thin stipes and is a calciphilous member of *P.* sect. *Haplopolystichum* s.s. occurring in karst caves in S Guizhou (Luodian and Ziyun).

**19. Polystichum** sect. **Sphaenopolystichum** Ching ex W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 223. 2001.

细裂耳蕨组 xi lie er jue zu

Plants small to medium-sized, evergreen. Frond texture papery, thinly papery, or rarely thinly leathery. Stipe scales uniform, ovate to lanceolate, often appressed, rarely spreading. Lamina lanceolate, broadly lanceolate, ovate-lanceolate, or ovate, often bipinnatifid to bipinnatifid, bipinnatisect, tripinnatifid, rarely tetrapinnatifid. Ultimate lobes often narrow, linear to spatulate, entire, with 1 veinlet per lobe. Sori 1 per lobe or ultimate lobe, small, abaxial or terminal on veinlets. Indusia falling off early or sori without indusia.

About 12 species: China, India, Myanmar, and Vietnam; 12 species (nine endemic) in China.

*Polystichum* sect. *Sphaenopolystichum* is recognized here based on morphology.

- 1a. Scales on stipe and rachis open.
- 2a. Lamina tripinnate to tetrapinnatifid; stipe scales dense, up to 10 × 5 mm, reddish brown ..... 144. *P. wattii*
- 2b. Lamina bipinnatifid to bipinnatisect, or lamina base bipinnate; stipe scales sparse, shorter than 2 mm, brown.
- 3a. Lamina elliptic-lanceolate, green ..... 145. *P. martinii*
- 3b. Lamina deltoid-lanceolate, dark green ..... 146. *P. cuneatifforme*
- 1b. Scales on stipe and rachis all or mostly appressed.
- 4a. Lamina tripinnate or tetrapinnate; ultimate lobes linear.
- 5a. Lamina narrowly elliptic or broadly elliptic-lanceolate, middle or upward broadest; pinnae approximate, up to 40 pairs, yellowish green, those below middle or above middle narrowed gradually toward lamina base; rachis scales narrowly lanceolate; pinna rachis stramineous or greenish stramineous; sori indusiate ..... 135. *P. caruifolium*
- 5b. Lamina narrowly ovate, broadest below middle; pinnae often separate from each other, fewer than 25 pairs, dark green, those below middle not or only slightly narrowed toward lamina base; rachis scales broadly ovate; pinna rachis green; sori exindusiate ..... 136. *P. alcorni*
- 4b. Lamina 1-pinnate to bipinnate; ultimate lobes not linear.
- 6a. Lamina 1-pinnate; pinnae pinnatifid to pinnatifid.
- 7a. Upper side of pinnae pinnatifid to pinnatisect and often forming 1 or few free lobes ..... 141. *P. auriculatum*
- 7b. Upper side of pinnae pinnatifid only and without free lobes.
- 8a. Pinnae 30–40 pairs, only a few basalmost pinnae slightly narrowed ..... 142. *P. bifidum*
- 8b. Pinnae 15–23 pairs, those below middle of lamina gradually narrowed toward lamina base ..... 143. *P. pseudolanceolatum*
- 6b. Lamina bipinnate; pinnules toothed or pinnatifid to pinnatifid.
- 9a. Lamina elliptic-lanceolate, 5–9 cm at widest (at middle); pinnae asymmetrical at base; pinnules toothed or pinnatifid to pinnatifid, narrowly cuneate, basal acroscopic ones largest and slightly auriculate.
- 10a. Pinnules pinnatifid to pinnatifid; ultimate lobes elliptic-clavate or spatulate ..... 137. *P. christii*
- 10b. Pinnules only dentate-spinulose on margin, elliptic ..... 138. *P. bissectum*
- 9b. Lamina ovate or ovate-lanceolate, (7–)10–23 cm at widest (below middle); pinnae symmetrical or nearly symmetrical at base; pinnules pinnatifid to pinnatifid, rarely pinnatifid, broadly cuneate, basal acroscopic ones same size as others; ultimate lobes ovate-deltoid, rarely clavate-oblong.
- 11a. Pinnae often acute; lower part of pinna rachis often not winged; pinnules up to 2 cm, wider than 5 mm; sori medial or nearly medial ..... 139. *P. tonkinense*
- 11b. Pinnae often acuminate or long acuminate; lower part of pinna rachis often narrowly winged; pinnules up to 1 cm, ca. 3 mm wide; sori submarginal ..... 140. *P. excelsius*

**135. Polystichum caruifolium** (Baker) Diels, Bot. Jahrb. Syst. 29: 194. 1900 [*“caruifolium”*].

峨眉耳蕨 e mei er jue

*Aspidium caruifolium* Baker, J. Bot. 26: 228. 1888; *Polystichum faberi* Christ, nom. illeg. superfl.; *P. omeiense* C. Christensen (1906), nom. illeg. superfl., not Christ (1906).

Plants evergreen. Rhizome ascending, short, densely scaly; scales brown, ovate, small, subentire, acuminate. Fronds 20–60

cm; stipe stramineous, 5–15 cm, up to 1 mm in diam., young stipe densely scaly; scales brown, ovate, membranous, acuminate, opening acroscopically or appressed, upper part of some scales thickened and castaneous; scales on old stipe sparser, appressed. Lamina tri- to tetrapinnatifid, yellowish green when fresh, grayish green when dry, narrowly elliptic or elliptic-oblong, 15–45 × 3–10 cm at middle, shallowly cordate, shortly acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly abaxially; scales narrowly lanceolate, appressed. Pinnae 25–40 pairs, approximate, mostly alternate,

subsessile, attached at right angles to rachis or slightly ascendant, several basal pairs slightly contracted and reflexed, broadly lanceolate, apex acuminate or acute; lower pairs nearly ovate, bi- to tripinnatifid; primary lobes 5–12 pairs per pinna on pinnae above middle of lamina, oblong-ovate, bases long cuneate and with narrow wings on both sides and decurrent connecting with wings of pinna rachis; secondary lobes 1–4 pairs, twice or once dichotomously branched, apical lobules simple; ultimate lobules linear, ca. 0.5 mm wide, margins entire, apices acute and spinulose; abaxially sparsely scaly; microscales brown, narrowly lanceolate; frond texture softly papery. Sori on upper part of ultimate lobules, terminal on veinlets; indusia present, membranous, entire, wider than ultimate lobules. Spores elliptic in polar view; perispore sculpturing granulate with few ridges but without perforations.

• Wet limestone rocks by streams, limestone cliffs, karst caves; 700–1800 m. Chongqing, W Guangxi (Leye), S and SW Guizhou (Dushan, Panxian), S and W Sichuan, NE and SE Yunnan.

**136. *Polystichum alcicorne*** (Baker) Diels, Bot. Jahrb. Syst. 29(2): 194. 1900.

角状耳蕨 jiao zhuang er jue

*Polypodium alcicorne* Baker, J. Bot. 26: 229. 1888; *Aspidium alcicorne* (Baker) Christ.

Plants evergreen. Rhizome ascending, short, rhizome apex and from stipe to rachis densely scaly; scales brown, ovate or broadly ovate, often appressed, membranous, margins fimbriate. Fronds 30–60 cm; stipe stramineous, 7–30 cm, 1–2 mm in diam. Lamina tri- to tetrapinnatifid, green when fresh and dry, darker adaxially, narrowly ovate, 18–35 × 6–12 cm, base not or slightly contracted, apex shortly pinnatifid-acuminate; rachis stramineous, without proliferous bulbils, with numerous membranous scales abaxially; scales brown, appressed, broadly ovate, erose. Pinnae 18–25 pairs, ascendant, falcate-lanceolate, 2–7 × 1–3 cm, broadly cuneate, shortly stalked or sessile, shortly acuminate; costa green, with gradually narrowed wings from apex to base on both sides reaching below middle of pinnae, abaxially sparsely scaly, scales similar to rachis scales but smaller. Pinnules 6–10 pairs, slightly ascendant, oblong-ovate, 5–15 × 2–8 mm, bases cuneate and decurrent forming narrowly winged short stalk, pinnatifid or pinnate forming 2–5 pairs of oblong-ovate or obovate lobes, apices acute; basal acroscopic pinnules largest and often parallel to rachis; basal basicopic lobes largest, dichotomously lobed or shallowly lobed or pinnatifid and forming 2 pairs of secondary lobules, other lobes ± tri- or dichotomously lobed or not lobed, rarely second lobes of acroscopic base deeply lobed and forming 2 pairs of secondary lobules; sometimes basal acroscopic secondary lobules further lobed and forming 2 “lobulettes” in equal or unequal lengths; secondary lobules and apical lobules of pinnules lanceolate or oblanceolate, apex acute, with 1 veinlet per lobule not reaching lobule apex; abaxially sparsely scaly along veins; microscales brown, narrowly lanceolate; frond texture papery. Sori small, terminal on veinlets, exindusiate.

• Wet limestone crevices in montane broad-leaved evergreen forests; 600–1000 m. Chongqing (Jinfo Shan), NE Guizhou (Dejiang, Sinan, Yanhe), Sichuan (Emei Shan).

**137. *Polystichum christii*** Ching, Bull. Fan Mem. Inst. Biol. 2: 192. 1931.

拟角状耳蕨 ni jiao zhuang er jue

Plants evergreen. Rhizome ascending, short, rhizome apex and stipe densely scaly; scales light brown on margin, castaneous at middle, ovate, thickened at middle, membranous, entire, acuminate. Fronds 30–45 cm; stipe stramineous or light brownish stramineous, 6–16 cm, ca. 1 mm in diam. at base. Lamina tripinnatifid to tripinnate, green or light green when dry, concolorous on both surfaces, elliptic-lanceolate, 18–32 × 5–6 cm, gradually and slightly contracted below middle, acuminate; rachis stramineous, without proliferous bulbils, adaxially glabrous, abaxially sparsely scaly; scales appressed, brown, ovate, membranous, long acuminate. Pinnae ca. 30 pairs, approximate, attached at right angles to rachis or slightly ascendant, opposite or alternate, sessile, falcate-lanceolate or oblong-lanceolate, bases asymmetrical, apices acute or shortly acuminate; basal acroscopic pinnules largest and parallel to rachis, basicopic margins of pinnae oblique, middle pinnae 2.5–4 × 1–1.5 cm, basalmost pinnae 1–2.5 cm; costa green, abaxially sparsely scaly; scales similar to rachis scales, brown, membranous, long acuminate. Pinnules 7–10 pairs, slender, elliptic or oblong-ovate, 4–8 × 1–3 mm, bases narrowly cuneate, pinnatifid and forming acute lacinate lobes, apices acute; basal acroscopic pinnules largest and slightly auriculate, proximal margins of basal acroscopic pinnules close to rachis. Lobes elliptic-clavate or spatulate, apices acute and shortly spinulose, sometimes shallowly bilobed, each lobule also shortly spinulose at apex; adaxially glabrous, abaxially sparsely scaly; microscales evanescent, short and slender; frond texture thinly papery; venation indistinct adaxially, slightly visible abaxially, slender, 1 veinlet per lobe, reaching base of spinule. Sori small, located on upper part of veinlets, close to lobe apex, 1 per lobe; indusia present, light brown, entire, nearly as wide as lobes, evanescent.

Wet limestone crevices in montane broad-leaved evergreen forests, karst caves; 800–1900 m. Guizhou, SE Yunnan [N Vietnam].

**138. *Polystichum bissectum*** C. Christensen, Index Filic., Suppl. 1906–1912: 64. 1913.

川渝耳蕨 chuan yu er jue

*Polystichum omeiense* Christ, Bull. Acad. Int. Géogr. Bot. 16: 114. 1906, not C. Christensen (1905).

Plants evergreen. Rhizome erect, short, ca. 1.5 cm in diam. including stipe bases. Fronds few, 40–80 cm; stipe stramineous, 15–30 cm, 1–2 mm in diam. at base; distal stipe and rachis sparsely scaly; scales appressed, dark brown, broadly ovate or ovate-lanceolate, membranous, apex long caudate. Lamina bipinnate, light green on both surfaces when dry, elliptic-lanceolate, 23–45 × 5–9 cm, contracted at base, acuminate; rachis stramineous, without proliferous bulbils, abaxially sparsely scaly; scales light brown, lanceolate. Pinnae 26–31 pairs, falcate-lanceolate, up to 5 × 1 cm at middle, bases obviously asymmetrical, acroscopic margins truncate, basicopic margins narrowly cuneate, margins of pinnae pinnatifid to pinnatifid, apices acuminate. Pinnules 10–13 pairs, basal acroscopic

pinnules obviously largest, slightly auriculate, elliptic, bases cuneate, margins toothed and spinulose; other lobes ascendant, elliptic, apex curved upward, upper part lobed and forming 2–4 secondary lobes, few basal basisopic lobes often smaller, apices acute and spinulose; adaxially glabrous, abaxially densely covered with fibrillose light brown microscales; frond texture papery; venation pinnate to dichotomous or simple on primary lobes. Sori small, ca. 1 mm in diam., abaxial or terminal on veinlets, located between midrib and pinnule margins; indusia present, dark brown, thickly textured, entire, evanescent.

- Wet limestone crevices in broad-leaved evergreen forests in valleys; 700–900 m. Chongqing (Jinfo Shan), Sichuan (Emei).

The description of *Polystichum bissectum* in FRPS (5(2): 171. 2001) is incorrect.

**139. *Polystichum tonkinense*** (Christ) W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 169. 2001.

中越耳蕨 zhong yue er jue

*Aspidium aculeatum* (Linnaeus) Swartz var. *tonkinense* Christ, Bull. Sci. France Belgique 28: 268. 1898.

Plants evergreen. Rhizome ascending, short, together with remnant stipe base 2–3 cm in diam. Fronds few, 35–105 cm; stipe stramineous, 12–60 cm, 2–3 mm in diam. at base, whole stipe to rachis with numerous scales, scales appressed, dark brown, ovate, membranous, entire, acute, evanescent. Lamina bipinnate, green when dry, adaxially darker, ovate or ovate-lanceolate, 18–47 × 7–23 cm at middle, slightly or not contracted at base, broadly cuneate, acuminate; rachis stramineous, without proliferous bulbils. Pinnae 10–15 pairs, alternate or opposite, slightly ascendant, sometimes basal pairs attached at nearly right angles to rachis, slightly shortly stalked, narrowly oblong or falcate-lanceolate, 2–15 × 1–3 cm, bases broadly cuneate, symmetrical on both sides, apices often acute or shortly acuminate, rarely long acuminate; costa stramineous, lower part often without narrow green wings, with conspicuous narrow green wings upward, adaxially glabrous, abaxially sparsely scaly; scales dark brown or reddish brown, ovate or narrowly ovate, membranous, margins entire, apices caudate and long acuminate, upper part not appressed. Pinnules 3–17 pairs, oblong or oblong-ovate, alternate, approximate, slightly ascendant, 0.5–2 cm × 3–8 mm, bases cuneate and decurrent forming narrowly winged stalk, bases asymmetrical, acroscopic base wider, slightly auriculate, basisopic margins narrowly cuneate, margins pinnatilobate to pinnatipartite, apices acuminate. Lobes 2–5 pairs, ascendant, often ovate-deltoid, rarely clavate-oblong, apices acute, often with curved upward and short spinules, often not lobed, margins entire, rarely lobed and forming 2 or 3 lobules; lobules coarsely toothed; adaxially glabrous, abaxially sparsely scaly; microscales brown, lanceolate; frond texture papery; venation slightly distinct on both surfaces, pinnate, lateral veins pinnate to forked from base to apex on acroscopic lobes, simple on lobe apex, not reaching lobe margins. Sori small, ca. 1 mm in diam., terminal on veinlets, medial or nearly medial on acroscopic part of pinnules (between midrib and margins); indusia present, brown or dark brown, thickly membranous, entire, evanescent. Spores semicircular in equatorial view, perispore sculpturing plicate.

Limestone hills, rocks in broad-leaved evergreen forests; 800–1500 m. Guangxi (Napo), Guizhou (Libo), Yunnan (Jinping, Xichou) [N Vietnam].

*Polystichum tonkinense* is similar to *P. excelsius*, but its pinnae are often acute (rarely acuminate) apically, its costa does not have green wings, its pinnules are approximate, larger, often 1–2 cm, and wider than 5 mm, the spinules of its lobe apex are shorter or inconspicuous, and its sori are medial or nearly medial.

**140. *Polystichum excelsius*** Ching & Z. Y. Liu, Bull. Bot. Res., Harbin 4(4): 16. 1984 [*“excelsior”*].

杰出耳蕨 jie chu er jue

Plants evergreen. Rhizome ascending, together with remnant stipe base 1.5–2 cm in diam. Fronds few, 45–80 cm; stipe stramineous, 15–30 cm, 1–2 mm in diam. at base, all stipe to rachis with numerous scales; scales appressed, light brown to reddish brown, ovate, membranous, entire, acute, evanescent. Lamina bipinnate, green when dry, adaxially darker, ovate or ovate-lanceolate, 25–45 × 9–18 cm at middle, often slightly contracted at base, broadly rounded, acuminate; rachis stramineous, without proliferous bulbils. Pinnae 15–25 pairs, alternate to opposite, slightly ascendant, or basal pairs sometimes attached at nearly right angles to rachis, slightly shortly stalked, falcate-lanceolate, 2–11 × 1–2 cm, bases broadly cuneate, symmetrical on both sides, apices acuminate or long acuminate, rarely basal pairs acute at apex; costa stramineous or light greenish stramineous, with narrow green wings, adaxially glabrous, abaxially sparsely scaly; scales dark brown or reddish brown, ovate or narrowly ovate, thinly membranous, margins entire, apices caudate and long acuminate, upper part not appressed. Pinnules 7–20 pairs, alternate, approximate, slightly ascendant, oblong, 0.5–1 cm × 2–4 mm, bases cuneate and decurrent forming narrow wings, bases asymmetrical, acroscopic side wider, slightly auriculate, basisopic margins narrowly cuneate, margins of pinnules pinnatilobate to pinnatifid, apices acute; lobes 2–4 pairs, ascendant, ovate-deltoid, apices often acute and with short spinules curved upward, not lobed or unequally shallowly bilobed; adaxially glabrous, abaxially sparsely scaly; microscales brown, lanceolate; frond texture papery; venation slightly distinct on both surfaces, pinnate, lateral veins simple or forked, 1 veinlet per lobe, veinlets forked on unequally shallowly bilobed lobes, veinlets not reaching pinnule margins. Sori small, ca. 1 mm in diam., terminal on veinlets, close to pinnule margins; indusia present, grayish brown or gray, thickly membranous, entire, evanescent. Spores semicircular in equatorial view, perispore sculpturing plicate.

- By streams in valleys in broad-leaved evergreen forests; 400–1400 m. Chongqing (Nanchuan, Wuling), Hubei, NW and W Hunan (Fenghuang, Sangzhi, Shimen).

**141. *Polystichum auriculum*** Ching, Bull. Fan Mem. Inst. Biol., n.s., 1: 309. 1949.

滇东南耳蕨 dian dong nan er jue

Plants evergreen. Rhizome erect, short, rhizome apex and stipe base densely scaly; scales mostly spreading, brown to dark brown or castaneous, ovate-lanceolate, thickly membranous, entire, some scales appressed and thinly membranous. Fronds



25–50 cm; stipe stramineous, 5–15 cm, ca. 1 mm in diam. at base; distal stipe scales sparser, similar to basal stipe scales but smaller. Lamina 1-pinnate, green when dry, adaxially darker, lanceolate, or narrowly elliptic-lanceolate, 15–30 × 2–8 cm, often slightly contracted at base, sometimes as wide as middle pinnae or wider, acuminate; rachis stramineous to light greenish stramineous, without proliferous bulbils, abaxially sparsely scaly; scales mostly appressed, brown or upper part castaneous, ovate-lanceolate, entire. Pinnae 30–45 pairs, attached at right angles to rachis, sometimes slightly ascendant or basiscopically, approximate, alternate or nearly opposite, oblong or oblong-lanceolate, bases asymmetrical, acroscopic side wider, basiscopic margins broadly oblique, obviously narrower, acroscopic base nearly lobed to midrib, distal margins pinnatilobate to pinnatisect, apices obtuse or acute, sometimes shortly acuminate. Lobes 5–10 pairs, basal acroscopic lobes obviously largest, auriculate, oblong or obovate, bases cuneate, margins biserrate with acute and shortly spinulose apex or pinnatilobate, apices rounded-obtuse; other lobes obovate, oblanceolate or nearly linear, bases cuneate or as wide as upper portions, acroscopic margins often lobed into 2–7 coarse teeth, teeth acute and spinulose; abaxially sparsely covered with brown microscales; frond texture thinly papery; venation pinnate on lobes from base to apex, dichotomous or simple, 1 veinlet on each tooth or lobe, veinlets not reaching lobe apex or tooth apex. Sori small, terminal on veinlets, close to pinna margin; indusia present, grayish brown, slightly wider than lobes, membranous, entire, evanescent. Spores elliptic in equatorial view; perispore sculpturing plicate with spinules and granules.

• Limestone crevices in montane broad-leaved evergreen forests; 1100–1800 m. SE Yunnan (Malipo, Xichou).

**142. *Polystichum bifidum*** Ching, Icon. Filic. Sin. 5: t. 242. 1958.

钳形耳蕨 qian xing er jue

Plants evergreen. Rhizome erect, short, ca. 2 cm in diam. including stipe bases. Fronds 25–50 cm; stipe stramineous, sparsely scaly on lower part; scales dark brown to castaneous at middle, ovate-lanceolate, finely toothed, acuminate; cells often rectangular, cell walls straight; lateral portions of scales light brown; areoles composed of irregularly curved cells. Lamina 1-pinnate, green when dry, adaxially darker, oblong-lanceolate, 20–35 × 3–4 cm at middle, slightly contracted below middle of lamina, shortly acuminate; rachis stramineous, without proliferous bulbils, abaxially sparsely scaly; scales brown, narrowly lanceolate, toothed. Pinnae 30–40 pairs, approximate, attached at nearly right angles to rachis, oblong or nearly falcate, 1–2 cm × ca. 5 mm at middle, pinnatilobate to pinnatifid, acroscopic margins of pinnae with auriculate lobes and 4–7 short lobes, each lobe shallowly further lobed at apex into 2 unequal secondary lobules, auriculate lobes with 4 or 5 secondary small lobules, basiscopic margins of pinnae with 4 or 5 short lobes equal to or longer than those on acroscopic margins, basalmost basiscopic lobes not further lobed; all lobes ascendant, apices acute and often shortly spinulose; adaxially glabrous, abaxially sparsely scaly; microscales linear; frond texture papery; venation distinct abaxially, visible adaxially, veinlets on auricles pinnate, others nearly dichotomous, rarely simple, only 1 veinlet

per lobe or secondary lobule, not reaching lobe apex. Sori small, terminal on veinlets, close to pinna margin; indusia evanescent.

• Limestone crevices in montane broad-leaved evergreen forests; ca. 1500 m. SE Yunnan (Pingbian, Xichou).

**143. *Polystichum pseudolanceolatum*** Ching ex P. S. Wang, Pterid. Fl. Guizhou, 548. 2001.

假亮叶耳蕨 jia liang ye er jue

Plants evergreen. Rhizome erect, short, ca. 1 cm in diam. including stipe bases. Fronds 7–17 cm; stipe stramineous, 2–5 cm, 0.5–1 mm in diam. at base, densely scaly; scales brown, ovate to broadly lanceolate, ca. 1.5 mm, membranous, margins fimbriate, apices acuminate; distal stipe scales sparser. Lamina 1-pinnate, green or light brownish green when dry, narrowly elliptic-lanceolate, 4–14 × 1–2.3 cm at middle, gradually slightly contracted below middle of lamina, 0.8–1.4 cm wide at base, acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly; scales similar to distal stipe scales, ovate, margins with outgrowths, apices filiform. Pinnae 15–25 pairs, alternate, middle pairs attached at nearly right angle with rachis, upper pairs angled slightly acroscopically, lower pairs angled slightly basiscopically, oblong or nearly broadly lanceolate, shortly stalked, pinnatilobate or pinnatipartite, middle pairs 0.5–1.1 cm × 2–4 mm, bases asymmetrical, apices acute and ascendant; acroscopic base auriculate, auricles obovate or oblong and with 3 acute spinulose teeth, proximal margins of auricles parallel to rachis, acroscopic margins with 3 or 4 coarse acute teeth, basal basiscopic margins cuneate, entire, distal basiscopic margins curved upward, with 2 or 3 coarse acute teeth. Lobes 3 or 4 on acroscopic margins, 2 or 3 on basiscopic margins, elliptic, apices acute and spinulose; adaxially glabrous, abaxially sparsely scaly; microscales light brown, subulate; frond texture papery; venation pinnate on pinnae, lateral veins dichotomous on auricles, free on lobes, slightly distinct abaxially, indistinct adaxially. Sori in 1 row on each side of midrib, terminal on shorter veinlets, nearly medial; indusia present, light brown, entire, evanescent.

• Limestone cliffs and floors of karst caves; ca. 1500 m. C Guizhou (Anshun).

**144. *Polystichum wattii*** (Beddome) C. Christensen, Index Filic. 98. 1905.

细裂耳蕨 xi lie er jue

*Aspidium wattii* Beddome, J. Bot. 26: 234. 1888; *Lastrea wattii* (Beddome) Beddome.

Plants evergreen. Rhizome ascending to erect, short, rhizome apex and stipe base densely scaly; large scales opening, dark brown, ovate or narrowly ovate, up to 1 cm × 5 mm, shallowly erose, acuminate. Fronds 30–85 cm; stipe stramineous, 3–25 cm, 1–4 mm in diam. at base. Lamina tri- to tetrapinnatilobate, green or dark green when dry, adaxially darker, narrowly elliptic-lanceolate, 20–60 cm, 3–20 cm wide at middle, 2–7 cm wide at base, acuminate; rachis stramineous, without proliferous bulbils, sparsely covered with linear scales. Pinnae 25–40 pairs, mostly alternate, slightly ascendant, sessile, lanceolate and often slightly curved upward and falcate, middle

pairs 1.5–13 × 0.5–2 cm, acuminate to caudate and long acuminate. Pinnules 5–15 pairs on middle pinnae, obliquely ovate, alternate, slightly ascendant, shortly stalked, acute; basal acroscopic pinnules largest; secondary pinnules obliquely rectangular or obovate, bases shortly stalked or narrowly cuneate and decurrent, apices acute or slightly obtuse, without spinulose tips; basal acroscopic secondary pinnules largest, apices forked-lobed or pinnate and forming 1 or 2 pairs of free obovate lobes, margins of other secondary pinnules entire or with 2 or 3 shallow lobes; costa green, abaxially scaly; scales similar to rachis scales but smaller; frond texture thinly papery; venation indistinct, 1 per lobe, reaching tip of lobe. Sori small, abaxial on veinlets, located at middle of secondary pinnules or lobes; indusia present, brown, small, entire, ca. 1/2 width of lobes. Spores semicircular in equatorial view, elliptic in polar view; perispore sculpturing reticulate with large lumina.

Rocks and rock crevices in montane broad-leaved evergreen forests; 1400–2000 m. SE Xizang (Médog), NW and W Yunnan (Dulongjiang region, Gaoligong Shan, Nushan) [N India, N Myanmar].

*Polystichum wattii* has been placed in *P.* sect. *Micropolystichum* by Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 7. 1997). It might be a member of *P.* sect. *Hypopeltis*.

**145. *Polystichum martinii*** Christ, Bull. Acad. Int. Géogr. Bot. 11: 263. 1902 [*“Martini”*].

黔中耳蕨 qian zhong er jue

Plants evergreen. Rhizome erect, short, ca. 1 cm in diam. including stipe bases. Fronds 12–40 cm; stipe stramineous, 2–10 cm, 0.5–1 mm in diam. at base, sparsely scaly; scales brown, narrowly ovate to ovate-lanceolate, ca. 1.5 mm, membranous, margins fimbriate. Lamina 1-pinnate, yellowish green or light brown when dry, nearly concolorous on both surfaces, narrowly elliptic-lanceolate, 10–25 × 2–3 cm at middle, gradually contracted below middle of lamina, 1–1.5 cm wide at base, acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly; scales similar to stipe scales. Pinnae 15–22 pairs, alternate, attached at right angle to rachis or angled slightly acropically, sometimes lower pairs angled slightly basiscopically, sessile or very shortly stalked, pinnatipartite to pinnatisect, obliquely ovate or nearly oblong, acroscopic margins forming a nearly right angle with rachis, basiscopic margins forming an obtuse angle with rachis, proximal margins of basal acroscopic pinnules or lobes nearly parallel to rachis, apices acute or obtuse and ascendant. Lobes 3–6 pairs, lobes ascendant, obovate, bases narrowly cuneate, apices 2–5-toothed-lobed or not lobed, apices of lobes acute apically, basal acroscopic lobes obviously largest; adaxially glabrous, abaxially

sparsely scaly; microscales brown, ovate-lanceolate to lanceolate, with few long teeth, smaller microscales light brown or grayish white, vermiform; frond texture papery; venation pinnate on pinnae, lateral veins dichotomous on auricles and other lobes, slightly distinct abaxially, indistinct adaxially. Sori small, less than 1 mm in diam. when mature, abaxial and terminal on veinlets, nearly medial; indusia present, light brown, entire, evanescent.

• Limestone cliffs at cave mouths; 1100–1300 m. C Guizhou.

The type of *Polystichum martinii* was collected from Pingba (Gan-pin) instead of Anshun.

**146. *Polystichum cuneatiforme*** W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 177. 2001.

楔基耳蕨 xie ji er jue

*Polystichum cuneatum* Ching ex P. S. Wang, Guizhou Sci. 12(2): 56. 1994, not Nakaike (1978).

Plants evergreen. Rhizome erect, short, rhizome apex and stipe base scaly; scales opening, brown, ovate, thick in texture, margins fimbriate, apices caudate-acuminate. Fronds 13–28 cm; stipe 2–12 cm, ca. 1 mm in diam. at base, distal stipe scales sparse, similar to basal stipe scales but smaller, thick in texture, margins fimbriate. Lamina lanceolate or deltoid-lanceolate, 6–17 × 2.5–5 cm, base not contracted or even slightly broad, bipinnatipartite to bipinnate or base bipinnate, apex acuminate; rachis without proliferous bulbils. Pinnae 10–15 pairs, shortly stalked, slightly ascendant, oblong-ovate and falcate, lower pinnae below middle of lamina 1.5–2.5 × 7–10 mm at base, bases asymmetrical, basiscopic margins rounded-cuneate, acroscopic margins truncate, pinnatisect to pinnate, apices acute. Pinnules and lobes adjacent to one another or imbricate, obovate or elliptic, basal acroscopic pinnules largest and pinnatilobate to pinnatipartite, other pinnules or lobes mostly entire apically or with only 1 shallow obtuse tooth, rarely forked-toothed or with 3 or 4 shallow lobes at apex; adaxially glabrous, abaxially sparsely scaly; microscales appressed, brown, broadly ovate-lanceolate, membranous, margins fimbriate; frond texture papery to thinly papery; venation pinnate, slightly distinct on both surfaces, veinlets simple or dichotomous on lobes. Sori small, terminal on veinlets, often 1 per pinnule or lobe; indusia present, brown, sparsely toothed.

• Limestone crevices in karst caves; ca. 1200 m. C Guizhou (Ziyun).

*Polystichum cuneatiforme* is similar to *P. martinii*, but its basal pinnae are not contracted and its pinnules and scales are densely arranged or imbricate.

## 20. *Polystichum* sect. *Cyrtogonellum* (Ching) Li Bing Zhang, **comb. et stat. nov.**

柳叶耳蕨组 liu ye er jue zu

Basionym: *Cyrtogonellum* Ching, Bull. Fan Mem. Inst. Biol., Bot. 8: 327. 1938.

Plants medium-sized. Lamina leathery, 1-pinnate. Rachis without proliferous bulbils. Pinnae falcate-lanceolate or obliquely oblong, length more than 3 × width or only ca. 1.5 × width, symmetrical or nearly symmetrical, rarely asymmetrical at base. Venation free, rarely anastomosing to form 1 or 2 rows of areoles. Sori in 1 row on each side of midrib.

About five species and one hybrid: S China and N Vietnam; five species and one hybrid (three species and one hybrid endemic) in China.

*Polystichum* sect. *Cyrtogonellum* is defined based on morphology but is possibly not monophyletic (Zhang & He, Syst. Bot. 35: 13–19. 2010).

- 1a. Lamina imparipinnate and with apical pinna of same shape as lateral pinnae.  
 2a. Pinnae 13–24 pairs, obliquely ovate; veins free ..... 147. *P. minimum*  
 2b. Pinnae fewer than 8(–10) pairs, lanceolate; veins with few areoles along midrib ..... 148. *P. fraxinellum*  
 1b. Lamina pinnate and with pinnatifid apex.  
 3a. Pinnae fewer than 8 pairs; veins with few areoles along midrib ..... 149. *P. ×rupestris*  
 3b. Pinnae obviously more than 10 pairs; veins free.  
 4a. Pinnae narrowly lanceolate, symmetrical or nearly symmetrical at base ..... 150. *P. tenuius*  
 4b. Pinnae obliquely deltoid-falcate or falcate-lanceolate, obviously asymmetrical at base.  
 5a. Pinnae fewer than 20 pairs, falcate-lanceolate, 3.5–5 cm ..... 151. *P. simile*  
 5b. Pinnae ca. 30 pairs, obliquely deltoid-falcate, shorter than 2.5 cm ..... 152. *P. xichouense*

**147. *Polystichum minimum*** (Y. T. Hsieh) Li Bing Zhang, Phytotaxa 60: 58. 2012.

斜基柳叶耳蕨 xie ji liu ye er jue

*Cyrtogonellum minimum* Y. T. Hsieh, Bull. Bot. Res., Harbin 9(3): 17. 1989; *C. inaequale* (Christ) Ching; *Cyrtomium fraxinellum* (Christ) Christ var. *inaequale* Christ.

Plants evergreen. Rhizome erect or ascending, together with basal stipe densely scaly; scales dark brown or blackish brown, lanceolate, margins ciliate, apices acuminate. Fronds 14–54 cm; stipe stramineous, 6–26 cm, 2–2.5 mm in diam. at middle; basal stipe scales dense, blackish brown, lanceolate or subulate, membranous, margins ciliate, apices caudate, distal stipe scales sparser and smaller. Lamina imparipinnate, grayish green when dry, adaxially shiny, linear-lanceolate, 8–28 × 2.5–3.5 cm at middle, not or only basalmost pinnae slightly contracted toward base, cuspidate; rachis stramineous, without proliferous bulbils, sparsely scaly abaxially; scales similar to distal stipe scales, appressed, brown, ovate-lanceolate, margins ciliate, apices filiform. Apical pinna with same shape as lateral pinnae but smaller; lateral pinnae 7–34 pairs, alternate, lower pairs approximate, upper pairs approximate, lower pairs attached at ± right angles with rachis, upper pairs slightly ascendant, shortly stalked, obliquely ovate, middle pairs 1.5–2.5 × 0.6–0.9 cm, bases asymmetrical, acroscopic base hardly auriculate, proximal acroscopic margins of pinnae curved and slightly overlapping rachis, acroscopic margins truncate or very slightly recurved, regularly shallowly incised-toothed, basal basispic margins cuneate, forming a ± 80° angle with rachis, entire, distal basispic margins curved upward, regularly shallowly incised-toothed, apices acute or shortly acuminate, rarely obtuse; adaxially glabrous, abaxially sparsely scaly; microscales light brown, subulate; frond texture thinly leathery; venation pinnate on pinnae, lateral veins 2- or 3-forked, slightly sunken on both surfaces. Sori in 1 row on each side of midrib, terminal on shorter veinlets, medial, lower lamina often sterile; indusia present, brown, thickly membranous, entire, evanescent.  $2n = 123^*$ .

• Limestone crevices in forests, rarely in limestone caves; 500–1500 m. Chongqing (Jinfo Shan), NW Guangxi (Tian'e), Guizhou.

Although *Cyrtogonellum inaequale* (Christ) Ching (1938) is older than *C. minimum* Y. T. Hsieh (1989), the epithet “*inaequale*” is blocked by *Polystichum inaequale* Von Keyserling (1873) when the species is transferred to *Polystichum*.

**148. *Polystichum fraxinellum*** (Christ) Diels in Engler & Prantl, Nat. Pflanzenfam. 1(4): 194. 1899.

柳叶耳蕨 liu ye er jue

*Aspidium fraxinellum* Christ, Bull. Herb. Boissier 7: 15. 1899; *Cyrtogonellum fraxinellum* (Christ) Ching; *C. omeiense* Ching ex Y. T. Hsieh; *Cyrtomium fraxinellum* (Christ) Christ.

Plants evergreen. Rhizome erect or ascending, together with basal stipe densely scaly; scales slightly castaneous, broadly lanceolate, sparsely toothed, acuminate. Fronds up to 60 cm; stipe stramineous, 14–35 cm, 2–2.5 mm in diam. at middle; basal stipe scales dense, castaneous, broadly lanceolate or lanceolate, thickly membranous, sparsely toothed, acuminate; distal stipe scales smaller, brown, lanceolate, membranous, margins ciliate, apices caudate. Lamina imparipinnate, grayish green when dry, adaxially shiny, oblong, 12–27 × 7–12 cm at middle, not contracted toward base, rounded, cuspidate to acute; rachis stramineous, without proliferous bulbils, abaxially sparsely scaly; scales similar to distal stipe scales, brown, lanceolate or subulate, margins ciliate, apices filiform. Apical pinna with same shape as lateral pinnae but smaller; lateral pinnae 3–6 pairs, alternate, approximate, ascendant, shortly stalked, ovate-lanceolate, basal pairs 5–9 × 1.4–2.5 cm, bases nearly symmetrical, acroscopic base hardly auriculate, proximal acroscopic margins of pinnae slightly curved and forming a ± 20° angle to rachis or nearly parallel with rachis, acroscopic margins very slightly recurved, regularly shallowly incised-toothed, basal basispic margins cuneate, forming a ± 60° angle with rachis, entire, distal basispic margins curved upward, regularly shallowly incised-toothed, apices acuminate; adaxially glabrous, abaxially sparsely scaly; microscales light brown, subulate; frond texture thinly leathery; venation reticulate, distinct on both surfaces, with 1 row of obliquely rectangular areoles on each side of midrib and a sporadic second row of areoles between major areoles, each areole with 1 included veinlet, veinlets outside of areoles free. Sori in 1 row on each side of midrib, terminal on included veinlets, medial, apical portions of lamina and pinnae sometimes sterile; indusia present, brown, membranous, entire, evanescent.  $2n = 123$ .

Crevices of limestone rocks in forests; 500–1800 m. Guangxi, Guizhou, Hunan, Sichuan, Taiwan, Yunnan [N Vietnam].

**149. *Polystichum ×rupestris*** P. S. Wang & Li Bing Zhang, Phytotaxa 60: 58. 2012.

石生柳叶耳蕨 shi sheng liu ye er jue

*Cyrtogonellum ×rupicola* P. S. Wang & X. Y. Wang, *Perid. Fl. Guizhou*, 242. 2001.

Plants evergreen. Rhizome erect or ascending, together with basal stipe densely scaly; scales dark brown, broadly lanceolate, thickly membranous, margins fimbriate, apices acuminate. Fronds 26–55 cm; stipe stramineous, 13–30 cm, 1.5–2 mm in diam. at middle, distal stipe scales smaller, brown, lanceolate or subulate, membranous, margins ciliate, apices caudate. Lamina 1-pinnate, grayish green or light green when dry, adaxially shiny, oblong, 13–25 × 6–10 cm at middle, not contracted toward base, base rounded, apex pinnatifid-acuminate; rachis stramineous, without proliferous bulbils, abaxially sparsely scaly; scales similar to distal stipe scales, brown, lanceolate to subulate, margins ciliate, apices filiform. Pinnae 4–8 pairs, alternate, approximate, ascendant, shortly stalked, narrowly elliptic, basal pairs 6–6.5 × 2–2.4 cm at middle, bases cuneate and nearly symmetrical, acroscopic base not auriculate, proximal acroscopic margins of pinnae slightly curved and forming a 0°–40° angle with rachis, acroscopic margins very slightly curved, regularly shallowly incised, basal basispic margins cuneate, forming a 80°–120° angle with rachis, entire, distal basispic margins curved upward, regularly shallowly incised-toothed, apices acuminate; adaxially glabrous, abaxially sparsely scaly; microscales light brown, filiform; frond texture thinly leathery; most veins free, distinct on both surfaces, with few or more obliquely rectangular areoles on each side of midrib, areoles not in a complete row, each areole with or without 1 included veinlet. Sori in 1 row on each side of midrib, terminal on free veinlets above acroscopic base of lateral veins, or on included veinlets, rarely on connections between veinlets, medial, lower part of lamina sometimes sterile; indusia present, brown, membranous, entire, evanescent.

- Limestone crevices in forests; ca. 1500 m. C Guizhou (Anshun).

When this hybrid is transferred to *Polystichum*, the original epithet is blocked by *Polystichum rupicola* Ching ex W. M. Chu (*Acta Bot. Yunnan.*, Suppl. 5: 51. 1992).

**150. *Polystichum tenuius*** (Ching) Li Bing Zhang, *Phytotaxa* 60: 59. 2012.

离脉柳叶耳蕨 li mai liu ye er jue

*Cyrtogonellum tenuius* Ching, *Bull. Fan Mem. Inst. Biol., Bot.* 8: 329. 1938 [*“tenuium”*]; *C. caducum* Ching; *C. falcilobum* Ching ex Y. T. Hsieh; *C. salicifolium* Ching ex Y. T. Hsieh.

Plants evergreen. Rhizome erect or ascending, together with basal stipe densely scaly; scales dark brown, ovate-lanceolate, thickly membranous, toothed, acuminate. Fronds 30–70(–100) cm; stipe stramineous, 15–25(–46) cm, 1.5–2.5 mm in diam. at middle; distal stipe scales smaller, brown, subulate, membranous, margins ciliate, apices filiform. Lamina 1-pinnate, grayish green when dry, adaxially shiny, broadly lanceolate, 15–30(–54) × 6–10 cm at middle, base truncate, not or only basalmost pairs contracted toward base, apex pinnatifid-acuminate; rachis stramineous, without proliferous bulbils, abaxially sparsely scaly; scales similar to distal stipe scales but smaller, brown, subulate, margins ciliate, apices filiform. Pinnae 13–24 pairs, alternate, approximate, attached at right angles

to rachis or angled slightly acroscopically or basiscopically, shortly stalked, lanceolate or rarely falcate-lanceolate, basal pairs 3.5–7 × 0.8–1.8 cm, bases nearly symmetrical, acroscopic base hardly auriculate, proximal acroscopic margins of pinnae slightly curved and forming a 0°–30° angle with rachis, acroscopic margins truncate or very slightly recurved, subentire or shallowly incised-toothed, basal basispic margins cuneate, forming a ± 45° angle with rachis, entire, distal basispic margins slightly curved upward, shallowly incised-toothed, apices acuminate; adaxially glabrous, abaxially sparsely scaly; microscales light brown, filiform; frond texture thickly papery to thinly leathery; venation pinnate, distinct abaxially, indistinct adaxially; lateral veins 3- or 4-forked, not reaching pinna margin. Sori in 1 row on each side of midrib, terminal on veinlets, medial, basalmost pinnae often sterile; indusia present, brown, membranous, entire, evanescent.  $2n = 123$ .

Limestone crevices in forests; 300–1700 m. Chongqing, Guangxi, Guizhou, Hunan, Sichuan, Yunnan [N Vietnam].

The original epithet *“tenuium”* is a correctable error of *“tenuius.”*

*Cyrtogonellum caducum* and *C. tenuius* were published in the same paper and thus have the same priority. When the species is transferred to *Polystichum*, the epithet *“caducum”* is blocked by *Polystichum caducum* Diels (*Nat. Pflanzenfam.* 1(4). 194. 1899).

**151. *Polystichum simile*** (Ching ex Y. T. Hsieh) Li Bing Zhang, *Phytotaxa* 60: 59. 2012.

相似柳叶耳蕨 xiang si liu ye er jue

*Cyrtogonellum simile* Ching ex Y. T. Hsieh, *Bull. Bot. Res.*, Harbin 9(3): 16. 1989.

Plants evergreen. Rhizome erect or ascending, together with basal stipe densely scaly; scales dark brown or blackish brown, lanceolate, margins ciliate, apices acuminate. Fronds 45–55 cm; stipe stramineous, 18–28 cm, 2–2.5 mm in diam. at middle; basal stipe scales dense, blackish brown, lanceolate to subulate, membranous, margins ciliate, apices caudate; distal stipe scales sparser and smaller. Lamina imparipinnate, grayish green when dry, adaxially shiny, lanceolate, 25–30 × 6–9 cm at middle, not or only basalmost pinnae slightly contracted toward base, apex acute; rachis stramineous, without proliferous bulbils, abaxially sparsely scaly; scales similar to distal stipe scales, appressed, brown, ovate-lanceolate, margins ciliate, apices filiform. Pinnae 16–20(–22) pairs, alternate, lower pairs approximate, upper pairs approximate, lower pairs attached at ± right angles with rachis, upper pairs slightly ascendant, shortly stalked, falcate-lanceolate, middle pairs 3.5–5 × 0.8–1.5 cm, bases asymmetrical, acroscopic base hardly auriculate, proximal acroscopic margins of pinnae curved and slightly overlapping rachis, acroscopic margins straight or very slightly recurved, regularly shallowly incised-toothed, basal basispic margins cuneate, forming a ± 80° angle with rachis, entire, distal basispic margins curved upward, regularly shallowly incised-toothed, apices shortly acuminate; adaxially glabrous, abaxially sparsely scaly; microscales light brown, subulate; frond texture thinly leathery; venation pinnate on pinnae, entirely free, lateral veins 2- or 3-forked, slightly impressed on both surfaces. Sori in 1 row on each side of midrib, terminal

on shorter veinlets, medial, lower lamina often sterile; indusia present, brown, thickly membranous, entire, evanescent.

- Limestone crevices in forests; 900–1100 m. Guizhou, Yunnan.

It is possible that *Polystichum simile* is conspecific with *P. tenuius*.

**152. *Polystichum xichouense*** (S. K. Wu & Mitsuta) Li Bing Zhang, *Phytotaxa* 60: 59. 2012.

西畴柳叶耳蕨 xi chou liu ye er jue

*Cyrtogonellum xichouense* S. K. Wu & Mitsuta, *Acta Phytotax. Geobot.* 36: 25. 1985.

Plants evergreen. Rhizome erect or ascending; scales dense, fuscous brown, lanceolate, margins entire, apices filiform. Fronds 60–70 cm; stipe stramineous, 25–30 cm, ca. 3 mm in diam. at middle; basal stipe scales dense, fuscous brown, subulate-lanceolate, membranous, slightly toothed, caudate; distal stipe scales sparser and smaller. Lamina 1-pinnate, green or light green when dry, adaxially slightly shiny, lanceolate, up to 35 × 6 cm at middle, not or only basalmost pinnae slightly

contracted, apex pinnatifid-acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly; scales similar to distal stipe scales, lanceolate or linear, margins slightly toothed, apices filiform. Pinnae up to 30 pairs, alternate, angled slightly acroscopically, lower pairs attached at nearly right angles with rachis, shortly stalked, obliquely deltoid-falcate, middle pairs ca. 3 × 1 cm, bases asymmetrical, acroscopic bases auriculate, apices acute and ascendant; auricles rounded, proximal margins of auricles slightly overlapping rachis, acroscopic margins repand or obtuse-toothed, basal basisopic margins cuneate, forming a 50°–70° angle with rachis, entire, distal basisopic margins curved upward, repand or with 6–8 obtuse teeth; adaxially glabrous, abaxially sparsely scaly; microscales light brown, linear; frond texture papery; venation pinnate on pinnae, lateral veins 2- or 3-forked, distinct abaxially, indistinct adaxially. Sori in 1 row on each side of midrib, terminal on shorter veinlets, medial, whole lamina fertile; indusia present, brown, entire.

- Limestone crevices or cliffs in forests; ca. 1700 m. SE Yunnan (Xichou).

*Polystichum xichouense* is an apomict producing 32 spores per sporangium.

**21. *Polystichum* sect. *Adenolepia*** Daigobo, *Sci. Rep. Tokyo Kyoiku Daigaku*, B, 15: 61. 1972.

假贯众耳蕨组 jia guan zhong er jue zu

*Cyrtomium* subser. *Balansana* Ching & K. S. Shing ex K. S. Shing.

Plants medium-sized. Lamina leathery, rarely papery, 1-pinnate. Rachis without proliferous bulbils. Pinnae falcate-lanceolate, length more than 3 × width, asymmetrical at base. Venation free or anastomosing to form 1 or 2 rows of areoles. Sori in 2 or more rows, rarely in 1 row, on each side of midrib.

About six species: Asia; six species (three endemic) in China.

- 1a. Venation free; sori in 1 row on each side of midrib.
  - 2a. Lamina papery; pinnae long spinulose on margin; veins distinct; microscales with glandlike apices ..... 153. *P. formosanum*
  - 2b. Lamina leathery; pinnae slightly spinulose on margin; veins indistinct; microscales without glandlike apices ..... 154. *P. falcatilobum*
- 1b. Venation anastomosing to form 1 or 2 rows of areoles; sori in 2 or more rows on each side of midrib.
  - 3a. Pinnae much less asymmetrical at base, acroscopic bases nearly exauriculate ..... 155. *P. hookerianum*
  - 3b. Pinnae strongly asymmetrical at base, acroscopic bases strongly auriculate.
    - 4a. Pinnae rhombic-ovate ..... 156. *P. trapezoideum*
    - 4b. Pinnae broadly lanceolate.
      - 5a. Pinnae approximate, often with 1 row of areoles on each side of midrib; midrib strongly curved ..... 157. *P. uniseriale*
      - 5b. Pinnae distant from each other, often with 2 or 3 rows of areoles on each side of midrib; midrib substraight ..... 158. *P. balansae*

**153. *Polystichum formosanum*** Rosenstock, *Hedwigia* 56: 338. 1915.

台湾耳蕨 tai wan er jue

*Polystichum iriomotense* Tagawa; *P. obtuso-auriculatum* Hayata.

Plants evergreen. Rhizome ascending, short, up to 2 cm in diam. including stipe bases, rhizome apex and stipe base densely scaly; scales brown, lanceolate, up to 4 mm, membranous, with few fine teeth, acuminate. Fronds 30–50 cm; stipe pale greenish stramineous, 9–22 cm, ca. 1 mm in diam. at base, above base

glabrous. Lamina 1-pinnate, light green on both surfaces when dry, narrowly elliptic-lanceolate, 17–30 × 3.5–7.5 cm at middle, 2.5–4 cm wide at base, gradually or slightly contracted toward base, base broadly rounded-cuneate or nearly truncate, apex abruptly contracted and acuminate; rachis pale greenish stramineous, without proliferous bulbils; costa scaly abaxially; scales dark brown, linear, entire. Pinnae 15–20 pairs, alternate or nearly opposite, approximate by a distance wider than pinna width, attached at right angles to rachis or slightly ascendant, falcate or falcate-lanceolate, middle pairs 1.5–4 cm, 0.5–1.5 cm wide at base, bases asymmetrical, acroscopic base with deltoid or semicircular auricles, and proximal margins of auricles nearly

parallel to rachis or often overlapping rachis, basiscopic margins of pinnae narrowly cuneate, often  $\pm$  recurved, margins irregularly biserrate or toothed, teeth mostly long spinulose apically, apices shortly acuminate; abaxially sparsely covered with microscales; microscales dark brown, ciliate or not, with dilated bases, apices gland-shaped; frond texture leathery; venation distinct on both surfaces, pinnate, lateral veins pinnate, dichotomous or simple, rarely trifurcate, veinlets nearly reaching tips of teeth. Sori small, located on upper lamina, lower pinnae sterile, in 1 row on each side of midrib, medial or close to margins, terminal on shorter veinlets; indusia present, small, irregularly erose, caducous.

Cliffs by streams, mossy rocks, mountains at low elevations; 400–1400 m. Taiwan [S Japan (Ryukyu Islands)].

**154. *Polystichum falcatilobum*** Ching ex W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 227. 2001.

长镰羽耳蕨 chang lian yu er jue

Plants evergreen. Rhizome ascending, short, 1.5–2 cm in diam. including stipe bases, rhizome apex and stipe base scaly; scales brown, ovate-lanceolate, up to 5 mm, membranous, with few fine teeth. Fronds 2–6 per rhizome, 25–60 cm; stipe stramineous, 8–25 cm, 1–2 mm in diam. at base. Lamina 1-pinnate, adaxially dark green and abaxially light green when dry, lanceolate or narrowly elliptic-lanceolate, 15–40  $\times$  4–9 cm at middle, bases broadly rounded, apices pinnatifid and long acuminate; rachis stramineous, without proliferous bulbils, adaxially sparsely scaly; scales appressed, brown or dark brown, ovate, membranous, peltate, toothed, caudate with long acute tips. Pinnae 10–30 pairs, slightly ascendant, slightly curved upward and falcate-lanceolate, middle pairs 2–5 cm, 1–1.5 cm wide at base, lower pairs below middle of lamina gradually contracted or only slightly contracted, bases obviously asymmetrical, acroscopic base with deltoid or semicircular auricles, proximal margins of auricles nearly parallel to rachis or often overlapping rachis, acroscopic margins near auricles slightly biserrate, basal basiscopic margins narrowly cuneate, lower part of basiscopic margins curved, margins entire, distal basiscopic margins curved upward, toothed, teeth spinulose apically and often slightly recurved, apices acuminate; adaxially glabrous, abaxially sparsely scaly; microscales appressed, brown, lanceolate or with long caudate tips, membranous, margins toothed; frond texture leathery; venation pinnate, slightly distinct abaxially, indistinct adaxially; lateral veins pinnate above midrib from base to apex, dichotomous or simple, simple or dichotomous below midrib; veinlets not reaching pinna margin. Sori small, often limited to upper lamina, in 1 row on each side of midrib, close to margins, up to 30, lower part of pinnae below midrib sterile; indusia present, small, subentire, caducous.

• Wet sandstone crevices by streams, montane broad-leaved evergreen forests; 1000–1600 m. Chongqing (Jiangjin), N Guizhou (Chishui, Xishui), S Sichuan, NE Yunnan (Suijiang).

*Polystichum falcatilobum* is similar to *P. formosanum*, but its lamina is leathery, its veins are indistinct, its pinnae are longer and long falcate-lanceolate, and its microscales are lanceolate or ovate, caudate apically, toothed on the margins, appressed, and brown.

**155. *Polystichum hookerianum*** (C. Presl) C. Christensen, Index Filic. 67. 1905.

虎克耳蕨 hu ke er jue

*Lastrea hookeriana* C. Presl, Tent. Pterid. 77. 1836, based on *Aspidium caducum* Wallich ex Hooker & Greville (1831), not Kunth (1815); *Cyrtomium caducum* T. Moore; *C. hookerianum* (C. Presl) C. Christensen; *C. integripinnum* (Hayata) Copeland; *Phanerophlebia hookeriana* (C. Presl) Copeland; *Phanerophlebiopsis hookeriana* (C. Presl) Fraser-Jenkins; *Polystichum integripinnum* Hayata.

Plants evergreen. Rhizome erect, sparsely covered with lanceolate brown scales. Fronds 50–100 cm; stipe stramineous, 25–54 cm, 4–5 mm in diam. at base, scaly when young, gradually glabrous when mature; scales blackish brown at middle, ovate and lanceolate, gradually glabrous when mature. Lamina 1-pinnate, ovate-lanceolate, 42–78  $\times$  12–20 cm, contracted at base, acuminate; rachis sparsely covered with lanceolate brown scales. Pinnae 15–20 pairs, alternate, slightly ascendant, shortly stalked, lanceolate, middle pinnae 8–13  $\times$  1–2 cm, bases cuneate and asymmetrical but less strongly than following three species (*Polystichum balansae*, *P. trapezoideum*, and *P. uniseriale*), margins entire, sometimes slightly repand and distal margins near apex serrulate, apices acuminate and sometimes caudate; adaxially glabrous, abaxially with few lanceolate brown microscales; frond texture leathery; venation pinnate but with a marginal connecting vein, slightly raised abaxially, indistinct adaxially, veinlets anastomosing to form 1 or 2 rows of areoles. Sori 1–3 rows on each side of midrib; indusia present, entire.

Forests; 600–2500 m. Guangxi (Longsheng), Guizhou, Hunan, Sichuan, Taiwan, Xizang (Médog), Yunnan [Bhutan, N India, Nepal, N Vietnam].

*Polystichum hookerianum* is variable morphologically and may be divided into several taxa. The Japanese species should be called *P. tachiroanum* (Luerssen) Tagawa.

*Polystichum hookerianum* is a sexual species.

**156. *Polystichum trapezoideum*** (Ching & K. H. Shing ex K. H. Shing) Li Bing Zhang, Phytotaxa 60: 59. 2012.

梯羽耳蕨 ti yu er jue

*Cyrtomium trapezoideum* Ching & K. H. Shing ex K. H. Shing, Acta Phytotax. Sin., Addit. 1: 15. 1965.

Plants evergreen. Rhizome erect, densely covered with lanceolate brown scales. Fronds 35–50 cm; stipe stramineous, 20–24 cm, 2–3 mm in diam. at base; basal stipe scales dense, brown, narrowly ovate and lanceolate, with small teeth; distal stipe scales similar but smaller, gradually sparser toward stipe apex. Lamina 1-pinnate, lanceolate, 22–40  $\times$  6–9 cm, slightly contracted at base, acuminate; rachis scales sparse, brown, linear. Pinnae 14–16 pairs, alternate, slightly ascendant, shortly stalked, rhombic-ovate, middle pinnae 3.5–5  $\times$  1.5–2 cm, bases oblique, acroscopic margins truncate and with auricles, basiscopic margins cuneate, margins with forward-pointing acute teeth, apices acute; both surfaces glabrous; frond texture thinly leathery; venation pinnate, slightly raised abaxially, indistinct adaxially, veinlets anastomosing to form 1 row of areoles. Sori in 2 rows on each side of midrib; indusia present, entire.

- Dense forests. Guangdong (Ruyuan), Sichuan.

No molecular studies have sampled *Polystichum trapezoideum* yet, but based on its pinnatifid and acuminate apex of lamina, it is a member of *Polystichum*.

**157. *Polystichum uniseriale*** (Ching ex K. H. Shing) Li Bing Zhang, *Phytotaxa* 60: 59. 2012.

单行耳蕨 dan hang er jue

*Cyrtomium uniseriale* Ching ex K. H. Shing, *Acta Phytotax. Sin.*, Addit. 1: 15. 1965; *C. uniseriale* f. *marginale* Ching ex K. H. Shing.

Plants evergreen. Rhizome erect, densely covered with lanceolate brown scales. Fronds 30–50 cm; stipe stramineous, 14–30 cm, 2–3 mm in diam. at base; basal stipe scales dense, brown, narrowly ovate and lanceolate, with small teeth; distal stipe scales similar but smaller, gradually sparser toward stipe apex. Lamina 1-pinnate, lanceolate, 22–42 × 5–10 cm, slightly contracted at base, acuminate; rachis scaly; scales brown, lanceolate and linear, curled. Pinnae 20–24 pairs, alternate, slightly ascendant, shortly stalked, falcate-lanceolate, lower pinnae 3.5–7 × 1–1.5 cm, bases oblique, acroscopic margins nearly truncate and with acute auricles, basicopic margins cuneate, margins with forward-pointing small blunt teeth, apices acuminate or nearly caudate; adaxially glabrous, abaxially with lanceolate brown microscales; frond texture thinly leathery; venation pinnate, slightly raised abaxially, indistinct adaxially, veinlets anastomosing to form 1 row of areoles. Sori in 1 row on each side of midrib; indusia present, entire.  $2n = 164^*$ .

- Under shrubs, bamboo forests; 400–1100 m. Chongqing, S and W Sichuan (Pingshan, Ya'an).

*Polystichum uniseriale* is a sexual tetraploid.

**158. *Polystichum balansae*** Christ, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 28: 193. 1908.

巴郎耳蕨 ba lang er jue

*Cyrtomium balansae* (Christ) C. Christensen; *C. balansae* f. *edentatum* Ching ex K. H. Shing; *C. kwantungense* Ching; *Polystichum anomophyllum* (Zenker) Nakai var. *miyajimense* (Kodama) Nakai; *P. miyajimense* Kodama.

Plants evergreen. Rhizome erect, densely covered with lanceolate brown scales. Fronds 25–60 cm; stipe stramineous, 12–35 cm, 2–4 mm in diam. at base; basal stipe scales brown, narrowly ovate and lanceolate, with small teeth; distal stipe scales similar but smaller, gradually sparser toward lamina apex. Lamina 1-pinnate, lanceolate or broadly lanceolate, 16–42 × 6–15 cm, slightly contracted at base, acuminate; rachis scaly; scales brown, lanceolate and linear, curled. Pinnae 12–18 pairs, alternate, slightly ascendant, shortly stalked, falcate-lanceolate, lower pinnae 3.5–9 × 1.2–2 cm, bases oblique, acroscopic margins truncate and with acute auricles, basicopic margins cuneate, margins with small forward-pointing blunt (rarely acute) teeth or sometimes entire or only distal margins with few incisions, apices acuminate or nearly caudate; adaxially glabrous, abaxially with lanceolate brown microscales; frond texture thinly leathery; venation pinnate, slightly raised abaxially, indistinct adaxially, veinlets anastomosing to form 2 rows of areoles, each areole with 1 or 2 included veinlets. Sori in 2 rows on each side of midrib; indusia present, entire.

Acidic soils in evergreen forests; 100–1600 m. Anhui, Fujian, Guangdong, Guangxi, E and SE Guizhou, Hainan, Hunan, Jiangxi, Zhejiang [Japan, Vietnam].

*Polystichum balansae* is a sexual diploid.

## 22. *Polystichum* sect. *Platylepia* Li Bing Zhang, **sect. nov.**

宽轴鳞耳蕨组 kuan zhou lin er jue zu

*Sectio nova* *Polysticho* sect. *Haplopolysticho similis*, sed ab eo squamis rhachidis ovatis vel late lanceolatis differt.

Type: *Polystichum yaanense* Liang Zhang & Li Bing Zhang.

Plants medium-sized, evergreen. Lamina 1-pinnate, yellowish green, thinly papery or papery. Rachis without bulbils. Rachis scales ovate to broadly lanceolate. Pinnae oblong. Microscales linear, oblong, or narrowly ovate.

- About two species: SW China.

*Polystichum* sect. *Basigemmifera*, *P.* sect. *Mastigopteris*, and *P.* sect. *Platylepia* together have been resolved as a monophyletic group (Zhang & He, *Syst. Bot.* 36: 854–861. 2011).

- 1a. Lamina lanceolate; pinnae stiff, nearly transparent when dry with veins visible adaxially, not cartilaginous on margin; microscales of pinnae subulate; sori indusiate ..... 159. *P. yaanense*  
 1b. Lamina linear; pinnae soft, not transparent when dry with veins indistinct adaxially, slightly cartilaginous on margin; microscales of pinnae oblong to narrowly ovate; sori exindusiate ..... 160. *P. loratum*

**159. *Polystichum yaanense*** Liang Zhang & Li Bing Zhang, *Novon* 22: 244. 2012.

雅安耳蕨 ya an er jue

Plants evergreen, 8–15 cm tall. Rhizome ascending, short, 0.5–1 cm, 2–3 mm in diam.; scales light brown, ovate-lanceo-

late, 0.4–3.6 mm, papery; roots dark brown when dry, up to 10 cm, ca. 0.6 mm in diam., sparsely or densely covered with scales. Fronds 5–11 per rhizome; stipe green, 1.5–3 cm, 0.5–1.2 mm in diam. at middle; basal stipe scales brown at middle and light brown on margin, dull, ovate-lanceolate, 2.7–3.4 × 0.8–1.1 mm, varying in size, thinly papery at middle, membranous on

margin, margins subentire or ciliate, apices acuminate or caudate; distal stipe scales similar but narrower and shorter toward stipe apex, brown, dull, lanceolate or ovate-lanceolate, membranous, margins ciliate, apices caudate. Lamina 1-pinnate, shiny adaxially, lanceolate, 6–12 × 1.4–1.8 cm at middle, 1.6–2 cm wide at widest, contracted toward base, acute; rachis 0.7–1.2 mm in diam. at middle, without proliferous bulbils; rachis scales light brown, dull, narrowly ovate to lanceolate, 1.5–3.2 mm, base 0.3–1 mm wide, papery, margins slightly ciliate, apices caudate. Pinnae 10–26 pairs, approximate, angled acropically, basal two pairs 0.5–1.3 cm apart, alternate, yellowish green, oblong; largest pinnae 8.2–10.1 × 4.5–5.1 mm and located around lamina middle, shortly stalked, stalks ca. 1.5 mm, acropical base auriculate, basiscopic base truncate and often forming a 90°–120° angle with rachis, acropical margin repand-serrate and without aristate spinules, apices obtuse; abaxially scaly, adaxially glabrous; microscales on abaxial surface subulate without dilated base (narrow-type microscales), 0.3–0.9 mm, base 0.12–0.24 mm wide, ciliate on margin; frond texture leathery; venation pinnate; midrib slightly raised abaxially, flat but obviously visible adaxially; lateral veins free, 3 or 4 pairs from midrib per pinna, nearly opposite, each lateral vein further dichotomous, distinct on both surfaces. Sori terminal on veins of pinnae, (1 or) 2–5 per fertile pinna, close to and ca. 0.9 mm distant from pinna margin; all pinnae on fertile lamina fertile; indusia brown, 0.7–1.1 mm in diam., erose.

- Shallow acidic soils on wet shaded sandstone cliffs; 900–1100 m. Sichuan (Hongya, Ya'an).

*Polystichum yaanense* is unique in the whole *P.* subg. *Haplopolystichum* in having yellowish green fronds with a thin but hard texture and adaxially visible veins. *Polystichum yaanense* grows in acidic soils, which also distinguishes it from most species in the subgenus. Its ovate-lanceolate rachis scales are shared only by *P. loratum* in the subgenus.

**160. *Polystichum loratum*** Hai He & Li Bing Zhang, *Novon* 22: 166. 2012.

线叶耳蕨 xian ye er jue

Plants evergreen. Rhizome ascending, 0.5–2.2 cm, 0.4–1.6 cm in diam. together with remnant bases of old stipes, scaly; scales similar to stipe scales but much darker; roots dull brown when dry, 0.16–0.28 mm in diam., subglabrous or occasionally covered with linear and tortuous scales, longer ones once or twice branched with lateral rootlets, up to 1.8 cm. Fronds 8–18(–25) per rhizome, appressed to substrate or ascending, (5.9–)11.2–16.8 cm; stipe green, (0.5–)1.5–4.8 cm, 0.31–1.18 mm in diam. at middle, densely covered with spreading scales; scales brown, ovate to lanceolate, 2.52–4.05 × 0.85–1.25 mm, thinly papery, bases rounded and slightly peltate, margins with 0.5–0.8 mm curled hairlike outgrowths, apices caudate and

ending in a ca. 0.8 mm hairlike tip; mixed smaller scales (fewer and mostly adaxial) deltoid-lanceolate, ca. 2 × 0.5 mm, margins and apices with hairlike outgrowths, basal stipe scales mostly without marginal outgrowths and hairlike tips, thicker in texture and dark brown. Lamina 1-pinnate, linear, (4.5–)7.5–12.5 × 0.9–1.5 cm, ± narrowed toward base from below middle, apex acuminate; rachis 0.3–0.58 mm in diam. at middle, without proliferous bulbils, green (as in pinnae) when fresh, yellowish green when dry, abaxially densely covered with scales, adaxially sparsely scaly (especially at base of stalks); abaxial rachis scales ovate to broadly lanceolate, similar to those of stipe but smaller, lighter and thinner in texture; adaxial rachis scales dark brown, deltoid-subulate, up to 2 × 0.45 mm, hairlike outgrowths only at broadest base, subentire, caudate. Pinnae (16–) 25–55 pairs, alternate, 1–2 mm apart, approximate or imbricate (sometimes basal 1–6 pairs up to 3 mm apart, other pinnae imbricate), asymmetrically rectangular-oblong (or slightly falcate toward apex), 3.5–6.5 × 1.8–2.5 mm, lowest pairs usually 1/2–2/3 as long as middle pinnae, asymmetrically deltoid, or fan-shaped, shortly stalked (stalk up to ca. 1 mm, attached with rachis at an acropical angle of ca. 60°), basiscopic margins at angles of 75°–150° with rachis, base on acropical side cuneate, basiscopic side truncate (with a blunt auricle, sometimes auricle deeply incised to near midrib and forming a basal free cuneate-based lobe ca. 2 × 1.8 mm with 2 or more small teeth at apex), forming angles of 90°–120° at point where stalks attached, margins slightly cartilaginous, basiscopic side subentire, distally curved toward apex and with 1 or 2 small teeth (distal margins of some fronds curved with 2 or 3 undulations), acropical side with 3 or 4 shallow teeth between basal auricle teeth and pinna apex (sometimes this side also with 3 or more shallow or rarely deep undulations), apex rounded or acute (or acuminate) and ending in a blunt tooth, all teeth without aristate tips; adaxially glabrous (occasionally with 1–3 microscales), abaxially covered with microscales (especially along veins); microscales broad-type, light brown, oblong to narrowly ovate, 0.8–1.2 × 0.15–0.25 mm, membranous, margins irregularly erose, apices hairlike, broadest part consisting of 6–8 lines of cells; frond texture thinly leathery; venation pinnate, visible abaxially, indistinct adaxially; lateral veins free, simple or once forked. Sori terminal on lateral veins, 2–4(or 5) on acropical side, none or 1 on distal basiscopic side, 1.4–2.4 mm in diam., mostly medial (between pinna margins and midrib), proximal 1 or 2 sori closer to pinna margin, occasionally all sori close to pinna margin, centers ca. 1.5 mm apart from one another, approximate when mature; indusia absent.

- Shaded or unshaded damp limestone cliffs of small gorges, carbonate sediments at bottom of cave mouths; 1100–1300 m. N Guizhou (Zunyi).

**23. *Polystichum* sect. *Haplopolystichum*** Tagawa, *Acta Phytotax. Geobot.* 9: 122. 1940.

半羽耳蕨组 ban yu er jue zu

Plants medium-sized, evergreen. Lamina 1-pinnate, papery or rarely thickly papery. Rachis without bulbils; scales lanceolate, subulate, or linear. Pinnae oblong, lanceolate, or falcate-lanceolate. Microscales linear or subulate.

More than 200 (ca. 54 described) species: mainly in limestone areas in S China, a dozen of species in neighboring Asian regions, especially in N Vietnam; 48 species (43 endemic) in China.



*Polystichum* sect. *Haplopolystichum* in its current circumscription is possibly not monophyletic.

- 1a. Lamina with dense articulate hairs in addition to regular scales ..... 161. *P. articulatifoliosum*
- 1b. Lamina with only scales.
- 2a. Veins clavate and unusually swollen at ends.
- 3a. Fronds 7–12 cm; pinnae up to 15 pairs ..... 162. *P. liboense*
- 3b. Fronds up to 35 cm; pinnae up to 35 or more pairs.
- 4a. Pinnae undulate or shallowly toothed; all veins robust and obviously raised ..... 163. *P. crassinervium*
- 4b. Pinnae irregularly toothed and often shortly spinulose at tips of teeth; veins raised more obviously at ends.
- 5a. Pinnae acute at apex; most pinnae spreading or ascending ..... 164. *P. ichangense*
- 5b. Pinnae rounded at apex; most pinnae deflexed ..... 165. *P. wulingshanense*
- 2b. Veins linear and not swollen at ends.
- 6a. Pinnae entire or repand (without spinules) on margin.
- 7a. Ratio of length to width of pinnae larger than 2.5; sori close to pinna margins.
- 8a. Ratio of length to width of pinnae ca. 3; pinnae acuminate or acute at apex ..... 166. *P. peishanii*
- 8b. Ratio of length to width of pinnae 2.5–3; pinnae rounded at apex.
- 9a. Ratio of length to width of pinnae 2.5–2.7; whole lamina fertile; sori above midrib of middle pinnae fewer than 4 ..... 167. *P. hainanicola*
- 9b. Ratio of length to width of pinnae ca. 3; lower part of lamina sterile; sori above midrib of middle pinnae 6–11 ..... 168. *P. guangxiense*
- 7b. Ratio of length to width of pinnae smaller than 2; sori close to pinna margins or midrib or located between them.
- 10a. Fronds appressed to substrate or slightly ascending; pinnae dark green, entire, leathery ..... 169. *P. dangii*
- 10b. Fronds slightly or obviously ascending; pinnae green, repand, papery.
- 11a. Pinnae sessile; sori closer to midrib than to pinna margin ..... 170. *P. fengshanense*
- 11b. Pinnae stalked; sori closer to pinna margin than to midrib.
- 12a. Plants 1.6–4.1 cm tall; pinnae 6–8 pairs, middle pinnae 2.9–5.8 × 2.8–4.5 mm; lateral veins 2 or 3 pairs from midrib per pinna ..... 171. *P. minutissimum*
- 12b. Plants 4–10 cm tall; pinnae 6–20 pairs, middle pinnae 3.7–7 × 2.5–6 mm; lateral veins (3 or) 4–6 pairs from midrib per pinna.
- 13a. Lamina of larger plants bipinnatifid to bipinnatipartite; pinnae of larger plants with free lobes ..... 172. *P. leveillei*
- 13b. Lamina never bipinnatifid to bipinnatipartite; pinnae never with free lobes.
- 14a. Rachis scale 0.70–1.41 mm, 0.10–0.25 mm wide at base; pinnae acute at apex ..... 173. *P. oblancoletatum*
- 14b. Rachis scale 1.6–4 mm, 0.3–1 mm wide at base; pinnae rounded at apex.
- 15a. Broadest part of lamina well above midpoint; rachis scales 0.4–1 mm wide at base; basicopic base of pinnae and rachis often forming a 20°–60° angle; pinnae thickly papery, deltoid-ovate, approximate and often overlapping; acroscopic base rounded; microscales broad-type ..... 174. *P. speluncicola*
- 15b. Broadest part of lamina near midpoint; rachis scales 0.3–0.6 mm wide at base; basicopic base of pinnae and rachis often forming a 75°–120° angle; pinnae papery, oblong, normally not overlapping; acroscopic base auriculate; microscales narrow-type ..... 175. *P. cavernicola*
- 6b. Pinnae ± toothed and spinulose at least on upper part of margin.
- 16a. Pinnae deltoid, those of lower part of lamina nearly equilateral-triangular; pinnae with 8–12 coarse and spinulose teeth ..... 176. *P. subdeltodon*
- 16b. Pinnae various shapes but not deltoid, with or without teeth.
- 17a. Pinnae rounded, rounded-truncate or truncate at apex (with or without mucro).
- 18a. Pinnae aristate-spinulose on margin, truncate at apex.
- 19a. Pinnae thinly papery, acroscopic margins serrate and spinulose but not aristate-spinulose, basicopic margins entire ..... 181. *P. jinshoshanense*
- 19b. Pinnae leathery or nearly leathery, both acroscopic margins and upper portion of basicopic margins or only acroscopic margins toothed and aristate-spinulose.
- 20a. Pinnae nearly leathery, dull adaxially, green; rachis scales lanceolate or broadly lanceolate, acuminate ..... 182. *P. liui*
- 20b. Pinnae leathery, shiny adaxially, dark green; rachis scales ovate, caudate ..... 183. *P. lanceolatum*
- 18b. Pinnae shallowly toothed or subentire but not aristate-spinulose on margin, rounded or rounded-truncate at apex.
- 21a. Lamina shorter than 12 cm, thinly papery; scales long fimbriate on margin ..... 177. *P. oblongum*

- 21b. Lamina often longer than 20 cm, papery or nearly leathery; scales sparsely toothed, ciliate or entire on margin.
- 22a. Stipe scales ovate-lanceolate, dark brown, ciliate on margin; scales marginate (central cells narrow and straight while cells of margin irregularly curved) ..... 178. *P. kwangtungense*
- 22b. Stipe scales lanceolate, dark brown to castaneous, entire or sparsely toothed on margin; scales conform (middle and marginal cells similar in shape).
- 23a. Auricles deltoid, well developed; only upper pinnae of lamina fertile ..... 179. *P. dielsii*
- 23b. Auricles rounded, less well developed; most pinnae of lamina fertile ..... 180. *P. pseudodeltodon*
- 17b. Pinnae acuminate or acute (*P. daguanense*, *P. huashanicola*) at apex.
- 24a. Nearly all pinnae obviously ascending; lamina with more than 20 pairs of pinnae.
- 25a. Pinnae acuminate; auricles narrowly deltoid, entire; nearly all pinnae fertile and sori located above midrib ..... 184. *P. assurgentipinnum*
- 25b. Pinnae acute; auricles deltoid or nearly deltoid, with 1–3 teeth; only upper pinnae of lamina fertile and sori located above and mostly also below midrib ..... 185. *P. submarginale*
- 24b. Most pinnae spreading or reflexed, only upper pinnae of lamina ascending; lamina with more or fewer than 20 pairs of pinnae.
- 26a. Most pinnae ± reflexed.
- 27a. Pinnae mostly falcate-oblong and bases as broad as upper portions of pinnae, acroscopic margins and distal basispic margins with regular open teeth ..... 186. *P. houchangense*
- 27b. Pinnae oblong or ± falcate-oblong and obviously with broader bases.
- 28a. Pinnae falcate-oblong to oblong, crenate to repand ..... 187. *P. deflexum*
- 28b. Pinnae oblong, sharply serrate.
- 29a. Stipe scales marginate (central cells narrowly rectangular while cells of margin irregularly curved); acroscopic margins and distal basispic margins of pinnae with regular shortly spinulose teeth ..... 188. *P. consimile*
- 29b. Stipe scales conform; acroscopic margins and distal basispic margins of pinnae irregularly with shallow teeth, sometimes with shortly spinulose teeth ..... 189. *P. yuanum*
- 26b. Most pinnae spreading or ascending.
- 30a. Ratio of length to width of pinnae lower than 2:1.
- 31a. Pinna margins spinulose.
- 32a. Fronds smaller than 20 × 1.8 cm; pinnae ovate or ovate-oblong, smaller than 1 × 0.6 cm, symmetrical or asymmetrical at base.
- 33a. Lamina 7–13 × 1–2 cm at middle; rachis scales lanceolate; pinnae shallowly toothed, weakly symmetrical at base ..... 190. *P. muscicola*
- 33b. Lamina 2–6 × 0.85–1.25 cm at middle; rachis scales deltoid-ovate or ovate-lanceolate; pinnae serrate, strongly asymmetrical at base ..... 191. *P. perpusillum*
- 32b. Fronds larger than 25 × 2 cm; pinnae oblong or shortly falcate, middle pinnae larger than 1.5 × 0.7 cm, obviously asymmetrical at base.
- 34a. Pinnae oblong, mostly rounded or acute ..... 192. *P. rupicola*
- 34b. Pinnae falcate, falcate-oblong, oblong, or rarely nearly deltoid, usually acute ..... 193. *P. deltodon*
- 31b. Pinna margins not spinulose, or if spinulose then pinnae rhombic-ovate.
- 35a. Basispic margins of pinnae attached at 30°–90° angles to rachis.
- 36a. Pinnae dark green, thickly papery, acuminate; sori approximate when mature ..... 194. *P. puteicola*
- 36b. Pinnae green, papery, mostly acute; sori separate from each other when mature ..... 195. *P. nanchurnicum*
- 35b. Basispic margins attached at 90°–110° angles to rachis; pinnae green or yellowish green, papery.
- 37a. Pinnae ovate, rhombic-ovate, or rarely oblong, 7–15 pairs; sori between midrib and pinna margin ..... 196. *P. obliquum*
- 37b. Pinnae oblong or falcate-deltoid, 16–40 pairs; sori between midrib and pinna margin or close to pinna margin.
- 38a. Sori close to pinna margin; pinnae up to 40 pairs ..... 197. *P. mengziense*
- 38b. Sori between midrib and pinna margin or slightly closer to pinna margin; pinnae fewer than 20 pairs ..... 198. *P. paradeltodon*
- 30b. Ratio of length to width of pinnae ca. 3:1 or higher.
- 39a. Lamina linear-lanceolate or narrowly elliptic-lanceolate, often narrower than 3 cm; pinnae shorter than 1.7 cm, narrower than 5 mm.
- 40a. Lamina linear-lanceolate, slightly contracted toward lamina base; pinnae 40–100 pairs, narrowly deltoid or oblong-lanceolate, repand or bluntly toothed ..... 199. *P. subacutidens*
- 40b. Lamina linear-lanceolate or narrowly elliptic-lanceolate, contracted or not contracted toward lamina base; pinnae 20–70 pairs, falcate-lanceolate or oblong, aristate-spinulose.

- 41a. Lamina narrowly elliptic-lanceolate, up to 52 cm, strongly contracted from lamina middle toward lamina base; pinnae 30–70 pairs, mostly falcate-lanceolate, shallowly toothed; auricles well developed, deltoid; sori exindusiate ..... 200. *P. gymnocarpium*
- 41b. Lamina linear-lanceolate, up to 27 cm, slightly contracted toward lamina base; pinnae 20–40 pairs, often nearly rectangular, serrate; auricles weakly developed, rounded or deltoid; sori indusiate.
- 42a. Pinnae up to 40 pairs, ascendant; only ca. 1/3 of basiscopic margin of pinnae serrate; teeth on acroscopic margins 11–13; teeth on basiscopic margins 3; teeth on pinna margins forward-pointing or incurved; sori large, approximate or nearly so when mature ..... 201. *P. daguanense*
- 42b. Pinnae up to 30 pairs, attached at right angles to rachis or reflexed; ca. half of basiscopic margin of pinnae serrate; teeth on acroscopic margins 7–9; teeth on basiscopic margins 4; teeth on pinna margins slightly open; sori small, obviously approximate when mature ..... 202. *P. huashanicola*
- 39b. Lamina lanceolate or broadly lanceolate, 3–12 cm wide; at least some pinnae up to 2 cm, broader than 7 mm.
- 43a. Pinnae deltoid-lanceolate; basiscopic margins of pinnae substraight; pinnae with coarse teeth ..... 203. *P. pseudoacutidens*
- 43b. Pinnae falcate-lanceolate or nearly so; basiscopic margins of pinnae obviously curved; pinnae with shallow or coarse teeth.
- 44a. Basiscopic margins of pinnae repand or bluntly and shallowly toothed but not spinulose.
- 45a. Stipe scales with conform cells; auricles well developed, deltoid; veins strongly raised abaxially; sori close to pinna margins ..... 204. *P. elevatovenusum*
- 45b. Stipe scales marginate (central cells narrow and long while cells of margin irregularly curved); auricles less well developed, often rounded and with a mucro; veins only slightly raised abaxially; sori between pinna margin and midrib ..... 205. *P. excellens*
- 44b. Basiscopic margins of pinnae toothed and spinulose.
- 46a. Proximal margins of pinnae overlapping rachis; pinnae with coarse teeth; sori closer to pinna margins ..... 206. *P. nayongense*
- 46b. Proximal margins of pinnae parallel and not overlapping rachis; pinnae with shallow teeth on margin; sori medial or closer to pinna margins.
- 47a. Teeth of pinna margins ± incurved or forward-pointing; sori marginal or medial ..... 207. *P. acutidens*
- 47b. Teeth of pinna margins upward-pointing; sori medial ..... 208. *P. longissimum*

**161. *Polystichum articulatifoliosum*** H. G. Zhou & Hua Li, Guihaia 16: 205. 1996.

节毛耳蕨 jie mao er jue

Plants evergreen. Rhizome short, ascending, 3–6 mm in diam., densely scaly; scales brown, narrowly lanceolate, subentire. Fronds 6–12 cm; stipe amber or light brown, 2–6 cm, 0.5–1 mm in diam.; basal stipe scales lanceolate, texture thick, entire or sparsely toothed, upward densely covered with slender brown articulate hairs from base to rachis, distal stipe scales sparse, brown, narrowly lanceolate. Lamina 1-pinnate, light green when dry, adaxially slightly darker, oblong-lanceolate, 2.5–8.5 × 1.5–2.2 cm, base slightly or not contracted, apex obtuse and pinnatifid; rachis amber or light brown, without proliferous bulbils. Pinnae 4–11 pairs, alternate, approximate or remote, attached at right angles to rachis or slightly ascendant, shortly stalked, oblong or obliquely ovate-oblong, 5–11 × 3–7 mm, bases asymmetrical, acroscopic base obviously auriculate, auricles deltoid, apex of auricle acute or obtuse, proximal margins of auricle parallel to rachis or slightly overlapping rachis, basiscopic margins of pinnae rounded-cuneate, distal part of pinnae nearly equal in width to base, margins repand; both surfaces densely covered with long brown articulate hairs; frond texture papery; venation slightly distinct abaxially, indistinct

adaxially, pinnate; lateral veins simple or dichotomous, not reaching pinna margin. Sori small, terminal on veinlets, close to pinna margin, exindusiate.

● Limestone walls in karst caves; 500–600 m. W Guangxi (Fengshan).

*Polystichum articulatifoliosum* is the only species in the genus with articulate hairs on its stipe, rachis, and pinnae.

**162. *Polystichum liboense*** P. S. Wang & X. Y. Wang, Guizhou Sci. 21: 109. 2003.

荔波耳蕨 li bo er jue

Plants evergreen. Rhizome ascending, ca. 0.8 cm, densely covered with scales; scales bicolorous, brown and blackish brown, lanceolate. Fronds ca. 7 per rhizome, 7–12 cm; stipe stramineous, 1.5–3 cm, ca. 0.6 mm in diam. at middle; basal stipe scales brown and blackish brown, shiny, lanceolate, papery, toothed, acuminate or caudate; distal stipe scales similar but narrower and shorter, varying in size, brown, shiny, lanceolate, papery, regularly toothed, caudate. Lamina 1-pinnate, shiny adaxially, lanceolate to linear-lanceolate, 6.5–10 × 1.2–1.6 cm at middle, slightly contracted toward base, acuminate; rachis ca. 0.5 mm in diam. at middle, without proliferous bulbils; rachis scales brown, dull, ovate, varying in size, papery,

margins ciliate, apices caudate. Pinnae 12–15 pairs, approximate, spreading except reflexed in lowest pairs, basal two pairs ca. 4 mm apart, alternate, nearly rectangular, middle (largest) pinnae up to  $9 \times 4$  mm, shortly stalked, proximal margins parallel with rachis, acroscopic base auriculate, auricles obtuse, basiscopic base cuneate and often forming an  $80^\circ$ – $120^\circ$  angle with rachis, apices obtuse, acroscopic margin with 3–5 slightly forward pointing obtuse teeth; abaxially scaly, adaxially glabrous; microscales on abaxial surface subulate or linear (narrow-type microscales); frond texture papery; venation pinnate; midrib abaxially slightly raised, adaxially flat; lateral veins free, 2 or 3 pairs from midrib per pinna, alternate, each lateral vein again dichotomous or not, abaxially clavate and unusually swollen at ends (hydathodes), adaxially indistinct. Sori terminal on veins of upper pinnae, 1–3 above midrib and none or 1 below midrib, close to pinna margin; indusia brown, repand or shallowly toothed.

• Limestone rocks in dense forests; ca. 1000 m. S Guizhou (Libo).

**163. *Polystichum crassinervium*** Ching ex W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 224. 2001.

粗脉耳蕨 *cu mai er jue*

Plants evergreen. Rhizome ascending, 1.5–3 cm in diam. including stipe bases, upper part and basal stipes densely scaly; scales spreading, shiny, lanceolate or broadly lanceolate, ca.  $7 \times 1$ – $1.5$  mm, thickly membranous, entire. Fronds few, 25–65 cm; stipe pale greenish stramineous, 2.5–18 cm, 1–2 mm in diam. at base, sparsely covered with smaller scales above base; scales brown, lanceolate, membranous, margins fimbriate. Lamina 1-pinnate, narrowly elliptic-lanceolate,  $15$ – $45 \times 2.5$ – $6$  cm at middle, gradually contracted below middle, 1–2.5 cm wide at base, acuminate or shortly acuminate; rachis pale greenish stramineous, without proliferous bulbils, abaxially sparsely scaly; scales brown, ovate-lanceolate, lower part peltate and appressed, membranous, margins fimbriate, apices caudate and long acuminate. Pinnae 20–50 pairs, alternate or nearly opposite, often obviously remote, upper pairs from middle of lamina upward attached at right angles to rachis, lower pairs  $\pm$  reflexed, oblong or falcate, rarely falcate-lanceolate, middle pairs  $1.5$ – $3$  cm  $\times$   $4$ – $7$  mm, bases obviously asymmetrical, apices often obtuse-rounded, sometimes acute; acroscopic base with deltoid auricles, apex of auricles acute, proximal margins of auricles  $\pm$  parallel to rachis, basiscopic margins of pinnae narrowly cuneate, attached at right angles or nearly right angles with rachis, acroscopic margins curved, distal margins often shallowly obtusely toothed, rarely acutely toothed; abaxially sparsely covered with short light brown microscales, adaxially subglabrous; frond texture papery; venation pinnate, often prominent abaxially, distinct adaxially; lateral veins robust, thickened and clavate apically, nearly reaching pinna margin, mostly dichotomous, rarely simple, pinnate on auricles; clavate and unusually swollen at ends (hydathodes). Sori small, in 1 row on each side of midrib, more numerous on acroscopic side, medial or close to margins, terminal on shorter veinlets, sometimes only apical pinnae fertile; indusia present, brown, shallowly erose or sparsely obtusely toothed, rarely lacerate.

• Rock crevices on limestone hills; 200–400 m. N Guangdong (Ruyuan), Guangxi, S Guizhou (Libo), S Hunan (Xinning).

*Polystichum crassinervium* is similar to *P. gymnocarpium* in habit, but it does not have slender and filiform microscales on the abaxial surface of pinnae; as well, the sori are indusiate.

**164. *Polystichum ichangense*** Christ, Bull. Soc. Bot. France 52(Mém. 1): 28. 1905.

宜昌耳蕨 *yi chang er jue*

Plants evergreen. Rhizome ascending or nearly erect, short, 1.2–2.5 cm in diam. including stipe bases, apically densely scaly; scales brown to dark brown or castaneous, lanceolate, up to 8 mm, densely serrulate. Fronds 14–48 cm; stipe light stramineous, 3–10 cm, 0.5–1 mm in diam., whole stipe sparsely scaly; scales brown or dark brown or partially castaneous, ovate (acute apically) or ovate-lanceolate, often whole or lower part appressed, membranous, sparsely toothed. Lamina 1-pinnate, light green or grayish green when dry, adaxially slightly darker, narrowly elliptic-lanceolate,  $10$ – $34 \times 1.5$ – $3.5$  cm at middle, gradually contracted below middle, 1–2 cm wide at base, long acuminate to caudate; rachis light stramineous, without proliferous bulbils, both surfaces sparsely scaly; scales similar to stipe scales but smaller, brown or dark brown, appressed. Pinnae 17–35 pairs, alternate or nearly opposite, sessile or slightly shortly stalked, approximate, sometimes slightly remote, most pinnae somewhat reflexed, nearly oblong, bases obviously asymmetrical, apices acute and slightly ascendant; acroscopic base auriculate, auricles deltoid, apex of auricles acute or mucronate, proximal margins of auricles truncate or slightly curved and parallel or nearly parallel to rachis, sometimes slightly overlapping rachis, margins of auricles entire or with 1 shallow tooth on each margin, distal margins of pinnae substraight and with 1–6 shallow or deep, acute, often shortly spinulose teeth, basal basiscopic margins oblique, margins entire, often straight, distal basiscopic margins curved and with 1–4 teeth similar to those on acroscopic margins; adaxially glabrous, abaxially sparsely covered with microscales; microscales light brown, lanceolate or narrowly lanceolate; frond texture papery; venation pinnate, distinct abaxially, visible adaxially; lateral veins thickened to clavate apically, nearly reaching pinna margin, acroscopic lateral veins pinnate, dichotomous (a few simple), basiscopic lateral veins simple, rarely dichotomous; clavate and unusually swollen at ends (hydathodes). Sori small, terminal on shorter lateral veinlets, 1–8 on acroscopic side, medial or slightly closer to pinna margin, often absent on basiscopic side, sometimes 1–3 on acroscopic side; indusia present, small, dark brown, often light castaneous at middle, repand, caducous.

• Rock crevices in montane broad-leaved forests; 1000–1600 m. Chongqing (Jinfo Shan, Pengshui), N Guizhou (Daozhen, Wuchuan, Yanhe), W Hubei (Yichang), N and NW Hunan (Sangzhi, Shimen).

**165. *Polystichum wulingshanense*** S. F. Wu, Keys Vasc. Pl. Wuling Mts. 568. 1995.

武陵山耳蕨 *wu ling shan er jue*

Plants evergreen. Rhizome erect, short, including stipe base densely scaly; scales brown, ovate, thickly membranous,

margins subentire. Fronds 13–20 cm; stipe stramineous, 2–6 cm, ca. 1 mm in diam., distal stipe scales similar to basal stipe scales but smaller and sparser, appressed. Lamina 1-pinnate, grayish green when dry, narrowly lanceolate, 11–14 × 1.6–1.8 cm at middle, slightly gradually contracted below middle, apex pinnatifid and acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly abaxially; scales brown, ovate or ovate-lanceolate, membranous, sparsely toothed. Pinnae ca. 20 pairs, approximate, alternate, midribs attached at right angles to rachis or slightly ascendant, shortly stalked, reflexed, oblong, apices acute, pointing downward; acroscopic base auriculate or rounded, auricles nearly semicircular, with 1 or 2 sharp, shortly spinulose teeth, proximal margins of auricles slightly curved, overlapping or sometimes nearly parallel to rachis, basiscopic margins recurved, margins entire, basal basiscopic margins cuneate, distal basiscopic margins and whole acroscopic margins (including auricle margins) serrate or biserrate and with 8–10 (or 11) sharp teeth; adaxially glabrous, abaxially sparsely covered with lanceolate and light brown microscales; frond texture thinly papery; venation pinnate, visible abaxially, indistinct adaxially; lateral veins reaching tips of teeth, dichotomous or simple above midrib, often simple below midrib; clavate and unusually swollen at ends (hydathodes). Sori small, terminal on shorter veinlets, medial or slightly closer to pinna margin, 1–6 above midrib, 0–2 below midrib, lower part of lamina often sterile; indusia present, brown, erose, evanescent.

• Acidic soils of wet sandstone cliffs in valleys, roadsides, by streams; 400–500 m. W Hubei (Lichuan), NW Hunan (Sangzhi).

*Polystichum wulingshanense* is similar to *P. ichangense* in having hydathodes at vein ends, though slightly indistinct; it differs by its rounded pinna apex, thinner and mostly deflexed pinnae, and location in acidic soils.

**166. *Polystichum peishanii*** Li Bing Zhang & H. He, Bot. Stud. (Taipei) 50: 102. 2009.

培善耳蕨 *pei shan er jue*

Plants evergreen. Rhizome erect; scales dark brown, lanceolate. Fronds 36–75 cm; stipe yellowish green, 14–32 cm, 1.5–2 mm in diam. at middle; basal stipe scales brown, dull, broadly lanceolate, ca. 10 × 1.5–1.8 mm, papery, obtusely toothed, acuminate; distal stipe scales similar but narrower and shorter toward apex of stipe and base of rachis, dark brown, dull, varying in size, narrowly lanceolate to subulate, papery, margins shortly and sparsely ciliate, apices caudate or acute. Lamina simply pinnate, adaxially shiny, green when fresh, lanceolate, 22–43 × 4.5–6.5 cm, base slightly contracted, apex caudate; rachis ca. 1.5 mm in diam., without proliferous bulbils; rachis scales dark brown, narrowly lanceolate. Pinnae 18–38 pairs, two basal pairs 1.7–2.3 cm apart, alternate, attached at ca. 80° angle to rachis, oblong-deltoid, 2.4–3.3 × 1.1–1.3 cm, shortly stalked, acroscopic base auriculate, basiscopic base cuneate, margins entire, apices acute; abaxially scaly, adaxially glabrous; microscales present abaxially, subulate, up to 1 cm; frond texture thinly leathery; adaxial midrib concave, abaxially raised; lateral veins free, once dichotomous, ca. 11 pairs from midrib per pinna, prominent abaxially, indistinct adaxially. Sori terminal on veins of upper pinnae, 1–20 per fertile pinna, ca. 1

mm distant from pinna margin; indusia yellowish brown, ca. 1 mm in diam., membranous, repand.

• Broad-leaved evergreen forests dominated by *Cyclobalanopsis glauca* mixed with *Celtis sinensis* and *Zelkova serrata*, basic black soil derived from limestone in ravines; 700–1100 m. S Guizhou (Libo, Luodian, Pingtang).

*Polystichum peishanii* and *P. guangxiense* share ± oblong pinnae with entire margins and sori located close to the pinna margin. The two species differ in the following ways: *P. peishanii* has the lamina contracted toward the base, papery pinnae, acute apices, and larger scales on the stipe base. The lamina of *P. guangxiense* is not contracted toward the base, the pinnae are smaller (1.7–2 × 0.6–0.8 cm), nearly leathery, and with the apex obtuse; the scales at the base of the stipe are also smaller (5–6 × 1–1.5 mm).

**167. *Polystichum hainanicola*** Li Bing Zhang, Liang Zhang & X. F. Gao, Phytotaxa 85: 10. 2013.

海南耳蕨 *hai nan er jue*

Plants evergreen. Rhizome ascending, 0.8–1.8 cm, ca. 7 mm in diam., with remnant bases of old stipes, scaly; scales brown, ovate-deltoid or broadly lanceolate, 1.15–1.85 × 0.50–0.85 mm, subentire, with few short outgrowths and shortly ciliate; roots dull brown when dry, up to 17 cm, 0.22–0.43 mm in diam., subglabrous or densely covered with short linear and tortuous hairs. Fronds 4–10 per rhizome, appressed to substrate or slightly ascending, (13.5–)20.1–35.6 cm; stipe green, (3.6–)6.7–10.5 cm, 0.63–1.22 mm in diam. at middle, scaly; basal stipe scales brown, concolorous, ovate-deltoid or lanceolate, papery, 1.8–3.15 × 0.6–0.95 mm, subentire or slightly ciliate, with irregular dentate outgrowths, caudate; distal stipe scales similar to basal stipe scales but narrower, brown, 1.2–2.8 × 0.4–0.7 mm, papery, margins with short outgrowths, apices caudate. Lamina 1-pinnate, adaxially green when fresh, dull green when dry, oblanceolate, (8.7–)12.9–24.3 × 3.1–4.3 cm, slightly narrowed toward base from below middle of lamina, apex acute or rounded; rachis green (same color as pinnae) when fresh, turning yellowish green when dry, 0.59–0.84 mm in diam. at middle, apex without proliferous bulbils, abaxially scaly; rachis scales light brown, nearly transparent, lanceolate or narrowly lanceolate, 1.25–2.65 mm, base 0.25–0.58 mm wide, unequal in length, membranous, sparsely toothed, caudate. Pinnae (8–)18–22 pairs, oblong, 16.9–18.6 × 7.1–9.4 mm, basalmost pairs slightly narrowed, nearly 2/3–4/5 as long as middle ones, shortly stalked, basiscopic margins at angles of 95°–120° with rachis, alternate, apices rounded, bases broadly cuneate with basiscopic side being narrower and forming an 80° angle with acroscopic side, distal acroscopic margins shallowly undulate, undulations 3 or 4, ca. 0.2 mm tall at middle and non-mucronate, acroscopic base auriculate, auricles deltoid, 3.7–5.1 × 3.1–3.4 mm, basiscopic margins entire, curved; adaxially almost glabrous, abaxially sparsely covered with microscales; microscales narrow-type, brown, linear or subulate, 1.1–2.9 × 0.11–0.18 mm at base; frond texture papery; venation pinnate, visible abaxially, slightly obscure adaxially; lateral veins free, simple or forked. Sori terminal on lateral veins, 4–8 on acroscopic side, 1–4 on distal basiscopic side, 1.4–2.4 mm in diam., close to pinna margins (centers of sori 0.6–0.8 mm from pinna margins, 1.8–3.1 mm from midrib), centers ca. 1.2 mm apart

from one another; indusia brownish, (0.3–)0.8–1.2 mm in diam., membranous, irregularly lacerate, caducous.

- Wet limestone cliffs in rain forests; ca. 800 m. Hainan (Dongfang).

*Polystichum hainanicola* is most similar to *P. guangxiense* but differs in having a lower length to width ratio of the pinnae, completely fertile laminae, and fewer sori on each pinna.

**168. *Polystichum guangxiense*** W. M. Chu & H. G. Zhou, *Guihaia* 16: 205. 1996.

广西耳蕨 *guang xi er jue*

Plants evergreen. Rhizome ascending, brown, short, 1.5–2 cm in diam. including stipe bases, apically densely scaly; scales dark brown, lanceolate, membranous, with fine teeth. Fronds 17–42 cm; stipe stramineous or light greenish stramineous, 8–17 cm, 1–1.5 mm in diam.; basal stipe scales dense, spreading, shiny, dark brown, lanceolate or broadly lanceolate, 5–10 × 1–3 mm, membranous, finely toothed, long acuminate; distal stipe scales dense, smaller, appressed, dark brown, lanceolate to subulate, membranous, peltate, toothed. Lamina 1-pinnate, both surfaces light green or slightly grayish green when dry, linear-lanceolate, 12–27 × 2.5–3.6 cm, base nearly truncate and as wide as middle, apex abruptly contracted and pinnatifid-acuminate; rachis stramineous or light greenish stramineous, without proliferous bulbils, with numerous small scales abaxially; small scales appressed, brown, lanceolate or narrowly subulate, membranous, peltate, sparsely toothed. Pinnae 13–28 pairs, alternate, approximate, sometimes slightly imbricate, attached at right angles to rachis or slightly ascendant above middle of lamina, sessile or very shortly stalked, oblong, 1.7–2 cm × 6–8 mm, bases asymmetrical, margins entire or acroscopic margins shallowly repand, apices obtuse-rounded or slightly ascendant and obtusely rounded-truncate; acroscopic bases with broadly deltoid auricles, apex of auricles acute or obtuse, proximal margins of auricles truncate and parallel to rachis, basal basicopic margins cuneate, slightly curved or nearly truncate, distal basicopic margins curved; adaxially glabrous, abaxially with few microscales; microscales light brown, linear or filiform; frond texture thickly papery or nearly leathery; venation prominent abaxially, indistinct adaxially, pinnate, midrib obviously raised abaxially, slightly concave adaxially; lateral veins dichotomous, pinnate on auricles. Sori small, terminal on veinlets, close to pinna margin, sometimes medial; indusia present, light brown, membranous, entire or slightly repand.

- Limestone ridges, rock crevices in broad-leaved evergreen forests; 1200–1400 m. W Guangxi (Napo).

**169. *Polystichum dangii*** P. S. Wang, *Pterid. Fl. Guizhou*, 531. 2001.

成忠耳蕨 *cheng zhong er jue*

Plants evergreen. Rhizome erect, short, 2–4 cm in diam. including stipe bases, upper part densely scaly; scales black or blackish brown, shiny, broadly lanceolate, 3–5 × 0.6–0.8 mm at base, papery, with few short teeth, caudate. Fronds 8–22 cm, sometimes only 5 cm under dry conditions; stipe stramineous, 1–4 cm, 1–2.5 mm in diam., densely scaly; scales black or blackish brown, shiny, lanceolate and linear, with few short

teeth, caudate. Lamina 1-pinnate, light green when dry, adaxially darker, shiny, lanceolate or oblong, 2.5–13 × 1.6–3.7 cm at middle, base not or slightly contracted, apex obtuse; rachis light stramineous, without proliferous bulbils, sparsely scaly; scales dark brown or black, lanceolate, margins sparsely toothed. Pinnae 5–21 pairs, sessile, usually approximate or imbricate, alternate, basicopic margins forming 45°–80° angles to rachis, most pinnae ± angled basicopically, oblong or obliquely oblong, middle pairs largest, 1–1.5 cm, 5–9 mm, bases asymmetrical, acroscopic base nearly non-auriculate or slightly curved, proximal acroscopic margins of pinnae truncate, parallel to rachis, distal part of acroscopic margins truncate, basal basicopic margins cuneate, truncate or curved, distal basicopic margins curved, margins of pinnae entire, apices obtuse; adaxially glabrous, abaxially sparsely covered with dark brown, linear microscales; frond texture leathery; venation indistinct abaxially, distinct adaxially, pinnate, lateral veins dichotomous or simple. Sori large, on distal part of pinnae, lower pinnae sterile, terminal on shorter veinlets, close to pinna margin, up to 4 above midrib, 0–3 below middle midrib; indusia brown, small, repand, evanescent.

- Wet or dry limestone crevices and walls, around cave mouths; 700–800 m. N Guangxi (Huanjiang), S Guizhou (Libo).

**170. *Polystichum fengshanense*** Li Bing Zhang & H. He, *Syst. Bot.* 36: 859. 2011.

凤山耳蕨 *feng shan er jue*

Plants evergreen. Rhizome ascending, 0.5–1.3 cm, ca. 3 mm in diam. or ca. 7 mm in diam. with remnant bases of old stipes, sparsely scaly; scales brown, ovate-deltoid or lanceolate, ca. 0.2 × 0.5 mm, entire; roots dull brown when dry, up to 16 cm, 0.2–0.3 mm in diam., subglabrous or densely covered with short and linear tortuous hairs. Fronds 8–17 per rhizome, appressed to substrate or slightly ascending, (2.5–)4.3–18 cm; stipe green, (0.7–)1.5–3.5 cm, 0.25–0.45 mm in diam. at middle, densely scaly; basal stipe scales dark brown, concolorous, lanceolate or subulate, 0.7–3.5 × 0.28–0.43 mm, papery, margins with ca. 0.07 mm irregular dentate outgrowths, apices caudate; distal stipe scales similar to basal stipe scales but narrower, dark brown, up to 2.5 × 0.35 mm, papery, margins with short outgrowths, apices caudate. Lamina 1-pinnate, adaxially shiny green when fresh, dull green when dry, oblanceolate, (2.1–)3.5–18 × 0.9–2.5 cm, gradually narrowed toward base from below middle of lamina, acute or rounded; rachis green (same color as pinnae) when fresh, turning yellowish green when dry, 0.59–0.71 mm in diam. at middle, apex without proliferous bulbils, abaxially densely scaly; rachis scales dark brown or lighter, subulate, 2.1–4.6 mm, base 0.35–0.61 mm wide, differing in length, papery, sparsely toothed, caudate. Pinnae (4–)8–24 pairs, oblong, 4.9–13 × 3–7 mm, basalmost pairs nearly fan-shaped and 1/4–1/3 as long as middle ones, approximate, sessile or almost so, basicopic margins at 100°–120° angles with rachis, alternate, apices rounded or acute, not mucronate, bases broadly cuneate with basicopic side wider and forming an 80° angle with acroscopic side, distal acroscopic margins shallowly undulate or almost entire, undulations 4, ca. 0.4 mm tall at middle and non-mucronate, acroscopic base auriculate; auricles rounded or slightly deltoid, 1.1–1.4 ×

2.4–2.8 mm; basiscopic margins entire, curved; adaxially almost glabrous, abaxially dull and slightly paler, sparsely covered with microscales; microscales narrow-type, brown, linear or subulate, 0.35–1.1 × 0.07–0.18 mm at base; frond texture papery; venation pinnate, visible abaxially, slightly obscure adaxially; lateral veins free, simple or forked. Sori terminal on lateral veins, 1–4 on acroscopic side, 0–2 on distal basiscopic side, 1.4–2.4 mm in diam., close to midrib (centers of sori 0.88–1.4 mm (small individuals) to 0.9–3.1 mm (large individuals) from midrib, 0.95–2.3 mm from pinna margin), centers ca. 2.1 mm apart from one another; indusia brownish, (0.7–)1.2–1.5 mm in diam., irregularly lacerate. Sporangia orbicular, ca. 0.28 mm in diam., walls ca. 0.018 mm thick, dark brown when mature; annuli with ca. 15 thickened cells; stalks ca. 0.32 mm. Spores elliptic or slightly trapezoid in equatorial view; perispore sculpturing granulate with blunt folds.

• Wet weathered soil on cave walls, stalagmites, limestone crevices inside caves; (400–)500–700(–800) m. N Guangxi (Bama, Fengshan).

**171. *Polystichum minutissimum*** Li Bing Zhang & H. He, Bot. Stud. (Taipei) 50: 353. 2009.

微小耳蕨 wei xiao er jue

Plants evergreen. Rhizome erect, 0.3–0.5 cm, sparsely covered with scales; scales brown, lanceolate, ca. 1.4 mm; roots 1–1.5 cm, ca. 0.23 mm in diam. Fronds 6–9 per rhizome, 1.6–4.1 cm; stipe green, 3.4–8 mm, 0.23–0.45 mm in diam. at middle; basal stipe scales brown, dull, lanceolate, 1–1.5 × 0.35–0.55 mm, papery, margins slightly ciliate, apices acuminate to caudate; distal stipe scales similar but narrower and shorter toward apex of rachis, varying in size, brown, dull, narrowly lanceolate to subulate, papery, margins sparsely shortly ciliate, apices caudate. Lamina 1-pinnate, broadly lanceolate, 1.3–3.8 × 0.7–1.1 cm at middle, contracted toward base, apex obtuse; rachis 0.23–0.45 mm in diam. at middle, without proliferous bulbils; scales of rachis brown, dull, subulate to linear, 0.7–1.2 mm, varying in size, papery, margins ciliate, apices caudate. Pinnae 5–8 pairs, 2 basal pairs 2.3–4.8 mm apart, alternate, attached at ca. 70° angles to rachis, middle pinnae 2.9–5.8 × 2.8–4.5 mm, nearly rectangular, shortly stalked, acroscopic base auriculate, bases cuneate, margins bluntly toothed, apices obtuse; abaxially scaly, adaxially glabrous; microscales on abaxial surface linear, 1.1–2.9 mm; frond texture thinly papery; venation pinnate; midrib slightly raised abaxially, flat adaxially; lateral veins free, 2 or 3 pairs from midrib per pinna, slightly raised and nearly indistinct abaxially, indistinct adaxially. Sori terminal on veins of upper pinnae, 1–3(or 4) per fertile pinna, close to and ca. 0.7 mm distant from margin of pinna; indusia yellowish brown, ca. 0.7 mm in diam., erose.

• Inside karst caves; ca. 800 m. S Guizhou (Libo).

*Polystichum minutissimum* is similar in stature to *P. liboense*, which is also found in limestone areas of Libo Xian, Guizhou, but *P. liboense* is larger with lamina 6.5–10 × 1.2–1.6 cm and the middle pinnae ca. 9 × 4 mm. Most importantly, *P. liboense* has hydathodes near the margin of the pinnae, while *P. minutissimum* does not. Both species have nearly rectangular pinnae without spinules on margin.

**172. *Polystichum leveillei*** C. Christensen, Bull. Acad. Int. Géogr. Bot. 23: 143. 1913.

莱氏耳蕨 lai shi er jue

Type: China. Guizhou: Ta'tsing [Luodian Xian], alt. 630 m, Sep 1910, *J. H. Esquirol 2223* (**lectotype, designated here**, NY! [barcode 00128155]; isolectotypes, BM! [barcode 001048675], UC! [barcode 394190]; fragments of type material, PE!).

Plants evergreen. Rhizome ascending, short, ca. 8 mm in diam. including stipe bases. Fronds few, 9–35(–40) cm; stipe stramineous, 6–16 cm, slender, 0.6–0.9 mm in diam. at base; basal stipe scales sparse, dark brown, lanceolate and subulate, membranous, margins irregularly ciliate; distal stipe scales sparser. Lamina 1-pinnate, yellowish green or green, adaxially shiny, narrowly elliptic-lanceolate, 7–22 × 3–8 cm at middle, slightly contracted toward base, 1.5–3 cm wide at base, acute; rachis stramineous, without proliferous bulbils, sparsely scaly; scales similar to stipe scales but smaller. Pinnae 8–12 pairs, alternate, approximate by a distance equal to or narrower than pinna width, rarely approximate, ascendant, sometimes lower pairs angled slightly basiscopically, stalked, oblong, deltoid, deltoid-lanceolate, or ovate, middle pairs 2.6–4.5 × 1–1.6 cm, basalmost pairs 1.5–3.4 cm × 1–1.3 mm, margins irregularly lobed, incised to pinnatisect with free lobes, apices obtuse; acroscopic margins forming a 60° angle with rachis, basiscopic margins forming a 120° angle with rachis. Lobes 0–3 pairs, obovate, bases broadly cuneate, apices acute or acuminate; basal acroscopic lobes obviously largest, free or nearly free, other lobes not free, margins repand, without teeth or spinules; adaxially glabrous, abaxially sparsely scaly; microscales light brown, nearly linear; frond texture thickly papery. Sori small, ca. 1 mm in diam., terminal on veinlets, closer to lobe or pinna margin; indusia small, slightly erose.

• Limestone cliffs or floors at cave mouths; ca. 600 m. C and S Guizhou (Luodian, Ziyun).

The record for *Polystichum leveillei* in FRPS (5(2): 175. 2001) was based on material of the separate, newly described species, *P. normale*. *Polystichum normale* and *P. leveillei* are indeed similar in pinna form. However, *P. normale* often has extraordinarily prolonged basalmost pinnae, is a member of *P. sect. Crucifilix*, grows in (sandstone) acidic soils, and occurs in S Chongqing, NE and SE Guizhou (but not in S Guizhou), and NW Hunan, while *P. leveillei* does not have extraordinarily prolonged basalmost pinnae, is a member of *P. sect. Haplopolystichum*, grows in (limestone) basic soils, and occurs in S Guizhou only.

Although often cited as a homotypic synonym of *Polystichum leveillei*, *Hemesteum leveillei* Christ (in Lévillé, Fl. Kouy-Tchéou, 497. 1915; cited as "*Hemesteum leveillei* (C. Christensen) H. Lévillé" in FRPS 5(2): 175. 2001) did not include the type specimen of *P. leveillei* (*J. Esquirol 2223*), which instead was cited by H. Lévillé for *H. obliquum* (loc. cit.: 498). This suggests that H. Lévillé considered *H. leveillei* Christ and *P. leveillei* C. Christensen to be different species.

The diagnostic characters of *Polystichum leveillei* include its slender stipe, thin but hard pinnae often with 1 or more free lobes, and complete absence of teeth or spinules on lobe.

**173. *Polystichum oblanceolatum*** H. He & Li Bing Zhang, Novon 22: 160. 2012.

倒披针耳蕨 dao pi zhen er jue

Plants evergreen, (2.8–)6.5–9.5 cm tall. Rhizome erect, ca. 4.25 mm, ca. 2.7 mm in diam., up to 4.3 mm in diam. with bases of remnant old stipes, sparsely scaly; scales dark brown, lanceolate, ca.  $0.7 \times 0.12$  mm, entire; roots dull brown when dry, up to 11.5 cm, 0.2–0.35 mm in diam. Fronds 5–12 fronds tufted around rhizome, (2.7–)6.3–9.4 cm; stipe stramineous, 0.8–1.4 cm, 0.65–0.98 mm in diam. at middle, moderately scaly; scales on basal stipe dark brown with narrow lighter-colored margins when fresh, but becoming entirely brown when dry, deltoid-lanceolate,  $1.42\text{--}1.69 \times 0.51\text{--}0.68$  mm, papery, margins subentire, apices subulate; scales on distal stipe similar but thinner and narrower, brown, up to  $1.61 \times 0.37$  mm, thinly papery, margins mostly with small irregular dentate outgrowths especially below, apices subulate. Lamina 1-pinnate, adaxially shiny green when fresh, dull stramineous when dry, abaxially paler and dull, oblanceolate, (2.3–)4.5–8.5  $\times$  0.9–1.7 cm, gradually narrowed toward base from below middle, apex acute or shortly acuminate; rachis green (same color as pinnae) when fresh, turning stramineous when dry, 0.51–0.69 mm in diam. at middle, apex without proliferous bulbils, abaxially sparsely scaly; rachis scales pale brown, linear-lanceolate, 0.70–1.41 mm, base 0.10–0.25 mm wide, varying in size, thinly papery, margins entire, apices subulate. Pinnae (5–)10–16 pairs, 4.45–7.82  $\times$  2.95–4.57 mm, upper middle ones approximate or slightly imbricate, firmly papery, shortly stalked, (stalk 0.3–0.8 mm), at angles of 70°–90° with rachis, alternate, basal 1–3 pairs nearly fan-shaped, base rounded to broadly cuneate with acroscopic side slightly wider, distally repand or with 3–5 broad teeth, teeth occasionally shortly mucronate, upper pairs mostly oblong but asymmetrical, acroscopic sides much broader and slightly auriculate at base, both acroscopic and basispic bases substraight and forming a  $\pm$  right angle at base of pinna, apices acute, distal acroscopic side repand or with 3 wavelike teeth, distal basispic side mostly with 1 or 2 short broad teeth; adaxially glabrous, abaxially sparsely covered with microscales along veinlets; microscales brown, linear, 0.35–0.55  $\times$  0.01–0.07 mm at base; frond texture papery; venation pinnate, visible abaxially, slightly obscure adaxially; lateral veins free, simple or forked. Sori terminal on lateral veins, (1–)3–4(–6) in 1 row on acroscopic side, usually 1 sorus on distal basispic side, 0.70–1.25 mm in diam., 0.55–1.12 mm apart, submarginal, center of sorus 0.3–1.1 mm from pinna margin; indusia pale brown, ca. 0.8 mm in diam., membranous, irregularly lacerate. Sporangia dark brown when mature, almost orbicular, ca. 0.29 mm in diam., walls ca. 0.018 mm thick; annuli with 11–14 thickened cells; stalks ca. 0.35 mm.

• Weathered crust of limestone rocks on floors of karst caves; ca. 900 m. N Guangxi (Tian'e).

**174. *Polystichum speluncicola*** Li Bing Zhang & H. He, *Sys. Bot.* 35: 13. 2010.

岩穴耳蕨 *yan xue er jue*

Plants evergreen. Rhizome ascending, 0.4–0.7 cm; roots brown when dry, up to 4.3 cm, 1–1.3 mm in diam., densely covered with scales; scales brown, linear or subulate, 1–1.3 mm. Fronds 3–8 per rhizome, 4–8 cm; stipe green, 1–3 cm, 1.3–1.9 mm in diam. at middle; basal stipe scales fuscous, dull, lanceolate, 2–4.5  $\times$  0.5–1.2 mm, papery, margins slightly ciliate

or erose, apices acuminate or caudate; distal stipe scales fuscous, dull, lanceolate with dilated bases, papery, margins ciliate, apices caudate. Lamina 1-pinnate, shiny adaxially, oblanceolate, 4–7  $\times$  1–1.6 cm at middle, 1.3–1.7 cm wide at broadest part, contracted toward base, apex obtuse; rachis 1.2–1.6 mm in diam. at middle, without proliferous bulbils; scales of rachis fuscous, dull, lanceolate with dilated base, 1.8–4  $\times$  0.4–1 mm at base, varying in size, papery, margins ciliate, apices caudate. Pinnae 6–14 pairs, approximate to often overlapping, basal two pairs 4–9 mm apart and strongly reflexed toward lamina base, alternate, deltoid-ovate, middle pinnae 5–7  $\times$  4–6 mm, largest pinnae 5.3–7.5  $\times$  4.2–6.3 mm and near lamina apex, sessile, acroscopic base rounded, basispic base and rachis often forming 20°–60° angle, apices obtuse, bases truncate, margins repand, not mucronate; abaxially scaly, adaxially glabrous; microscales on abaxial surface subulate with dilated bases (broad-type microscales), 0.5–1.1 mm, base 0.16–0.28 mm wide, with few tortuous cilia on margin of base; frond texture thinly leathery; venation pinnate; midrib slightly raised abaxially, flat adaxially; lateral veins free, 3 or 4 pairs from midrib per pinna, nearly opposite; each lateral vein dichotomous, slightly raised and distinct abaxially, indistinct adaxially. Sori terminal on veins of upper pinnae, 2–5 per fertile pinna, close to (ca. 0.7 mm from) pinna margin; indusia brown, ca. 0.7 mm in diam., membranous, erose. Spores orbicular in polar view, elliptic in equatorial view, ca. 40.9  $\times$  53.7(48.9–59.2)  $\times$  44.4(39.8–49.1)  $\mu$ m (polar axis  $\times$  long equatorial axis  $\times$  short equatorial axis, respectively); perispore sculpturing cristate with numerous spinules shorter than 3  $\mu$ m.

• Inside karst caves; ca. 700 m. S Guizhou (Libo).

*Polystichum speluncicola* is special in *P.* sect. *Haplopolystichum* in having broad-type microscales and deltoid-ovate pinnae. It is  $\pm$  similar to *P. dielsii*, *P. liboense*, and *P. minutissimum*, but *P. speluncicola* has nearly leathery and close-set pinnae, and basal pinnae reflexed. In addition, *P. speluncicola* can be distinguished from *P. dielsii* by having lamina smaller, oblanceolate, apex obtuse, and with 6–14 pairs of pinnae, and sori fewer per pinna; from *P. liboense* by having lamina oblanceolate and pinnae without hydathodes; and from *P. minutissimum* by having stature larger and lamina with 6–14 pairs of pinnae.

**175. *Polystichum cavernicola*** Li Bing Zhang & H. He, *Bot. Stud. (Taipei)* 52: 122. 2011.

洞生耳蕨 *dong sheng er jue*

Plants evergreen. Rhizome ascending, 0.4–0.8 cm, densely covered with scales; scales brown, linear or subulate, 1–1.3 mm; roots brown when dry, up to 9 cm, 0.2–0.5 mm in diam. Fronds 3–7 per rhizome, (4–)6–10 cm; stipe green, 1–2.5(–4.5) cm, 0.2–0.9 mm in diam. at midpoint; basal stipe scales brown, dull, lanceolate, 3–4.5  $\times$  0.4–0.9 mm, papery, margins with few cilia, apices acuminate or caudate; distal stipe scales similar but narrower, varying in size, brown, dull, lanceolate with dilated bases, papery, margins regularly shortly ciliate, apices caudate. Lamina 1-pinnate, shiny adaxially, oblanceolate, 4.2–9.4  $\times$  1.1–1.4 cm at midpoint, 1.2–1.7 cm wide at broadest part, contracted toward base, acute; rachis 0.3–1 mm in diam. at midpoint, without proliferous bulbils; scales of rachis brown, dull, subulate with dilated bases, 1.6–3.6  $\times$  0.3–0.6 mm at base, varying in size, papery, margins regularly shortly ciliate, apices



caudate. Pinnae 10–20 pairs, approximate, ascendant, basal two pairs 5–8 mm apart, basal pinnae deltoid-ovate, median pairs  $3.7\text{--}6.2 \times 2.5\text{--}5$  mm, largest pairs  $4\text{--}7 \times 2.6\text{--}5.3$  mm and located slightly above middle of lamina, alternate, oblong, shortly stalked with stalks 0.2–0.5 mm, acroscopic base slightly auriculate, basiscopic base straight and often forming a  $75^\circ\text{--}120^\circ$  angle with rachis, apices obtuse, acroscopic margin repand; abaxially scaly, adaxially glabrous; microscales on abaxial surface subulate without dilated base (narrow-type microscales), (0.3–)0.5–1.8 mm, base ca. 0.1 mm wide, with few tortuous cilia on margin of base; frond texture papery; venation pinnate; midrib slightly raised abaxially, flat adaxially; lateral veins free, 4 or 5 pairs from midrib per pinna, nearly opposite; each lateral vein further dichotomous, slightly raised and distinct abaxially, indistinct adaxially. Sori terminal on veins of distal pinnae, (1–)4–8 per fertile pinna, close to pinna margin, center of sorus 1–1.6 mm from pinna margin; indusia brown, ca. 0.9 mm in diam., fimbriate. Spores circular in polar view, elliptic in equatorial view, dark brown when fresh, ca.  $39.1 \times 40.6$   $\mu\text{m}$  (polar axis  $\times$  equatorial axis): perispore sculpturing verrucate.

- Inside karst caves; ca. 800 m. S Guizhou (Libo).

*Polystichum cavernicola* and *P. speluncicola* share similar stature, but they can be easily distinguished from each other. *Polystichum cavernicola* has narrow-type microscales on the abaxial laminar surface, its pinnae are papery and have rounded acroscopic bases, and the broadest part of the lamina is located medially, whereas *P. speluncicola* has broad-type microscales on the abaxial laminar surface, its pinnae are nearly leathery and have auriculate acroscopic bases, and the broadest part of the lamina is located above the midpoint.

**176. *Polystichum subdeltodon*** Ching, Bull. Fan Mem. Inst. Biol., n.s., 1: 308. 1949.

粗齿耳蕨 cu chi er jue

*Polystichum grossidentatum* Ching.

Plants evergreen. Rhizome ascending, short, ca. 1 cm in diam. including stipe bases, apically densely scaly; scales dark brown, small, sometimes thicker at middle and slightly blackish, ovate, with hairlike fine teeth, caudate to long acuminate; scales marginate, cells of margin irregularly curved. Fronds 30–40 cm; stipe light stramineous, 8–14 cm, ca. 1 mm in diam., sparsely covered with scales similar to rhizome scales, gradually becoming glabrous upward. Lamina light brownish green when dry, linear-lanceolate,  $18\text{--}30 \times$  ca. 2.5 cm below middle, base not contracted, 1-pinnate, apex pinnatifid-acuminate; rachis light stramineous, without proliferous bulbils, both surfaces glabrous. Pinnae 30–45 pairs, alternate or nearly opposite, remote below, approximate above, lower pairs nearly attached at right angles with rachis, upper pairs slightly ascendant, sessile or lower pinnae shortly stalked, nearly right-triangular, lower pairs often slightly larger, up to  $1.5 \times$  ca. 1 cm at base, apices acute, bases asymmetrical; auricles deltoid and with up to 5 acute coarse teeth, proximal margins of auricles truncate or slightly curved, parallel to rachis, apex of auricles acute, distal margins of pinnae with up to 7 irregular deltoid coarse teeth with acute tips, basal basiscopic margins narrowly cuneate, margins entire, distal basiscopic margins slightly curved acroscopically and with 2–5 acute shallow teeth; frond texture pa-

pery; venation pinnate, distinct abaxially, slightly visible adaxially; lateral veins nearly reaching pinna margin, lateral veins on acroscopic side pinnate from base upward, dichotomous or simple, lateral veins on basiscopic side simple or dichotomous. Sori large, terminal on shorter lateral veinlets, close to pinna margin, up to 6 above midrib, 1–3 or absent below midrib; indusia small, reddish brown, caducous.

- Limestone walls; ca. 700 m. Chongqing (Youyang).

The types of *Polystichum subdeltodon* and *P. grossidentatum* are the same.

**177. *Polystichum oblongum*** Ching ex W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 228. 2001.

镇康耳蕨 zhen kang er jue

Plants evergreen. Rhizome erect, short, rhizome apex and basal stipe scaly; scales reddish brown, lanceolate, membranous, margins long fimbriate. Fronds 5–12 cm; stipe stramineous, short and slender, shorter than 2 cm, less than 1 mm in diam. Lamina dark brownish green when dry, narrowly elliptic-lanceolate, up to  $10 \times 1.5$  cm, gradually contracted below middle, 1-pinnate, apex pinnatifid and shortly obtuse, with only 3–5 (or 6) lobes; rachis stramineous, without proliferous bulbils, abaxially covered with a few lanceolate brown scales. Pinnae fewer than 20 pairs, approximate or slightly imbricate, alternate, oblong, shortly stalked, up to  $7 \times 5$  mm, apices obtuse, truncate, or rounded-truncate; acroscopic margins with few (no more than 5) repand obtuse teeth, acroscopic base auriculate, auricles with obtuse tips, proximal margins truncate, parallel to rachis, basiscopic margins narrowly cuneate, nearly vertical to rachis, often  $\pm$  curved inward, apices with 1–3 repand and obtuse teeth; both surfaces glabrous; frond texture thin papery; venation pinnate, slightly distinct abaxially, inconspicuous adaxially; lateral veins dichotomous or simple, not reaching pinna margin, 3–5 on acroscopic side, only 1 or 2 on basiscopic side. Sori small, nearly medial on each side of pinna, slightly close to pinna margin, 1–5 terminal on veinlets; indusia present, dark brown, small, thickly membranous, coarsely lobed.

- Rock crevices in dense *Quercus* forests; ca. 2000 m. SW Yunan (Zhenkang).

*Polystichum oblongum* is similar to *P. jinshoshanense*, but its scale margins are long fimbriate and its pinnae are thinly papery with a few obtuse teeth on the margin.

**178. *Polystichum kwangtungense*** Ching, Icon. Filic. Sin. 5: t. 236. 1958.

广东耳蕨 guang dong er jue

Plants evergreen. Rhizome erect, short, rhizome apex and stipe base sparsely scaly; scales dark brown, ovate-lanceolate, margins with shortly filiform teeth; scales marginate, central cells rectangular and each side substraight, marginal cells irregularly curved. Fronds 30–42 cm; stipe stramineous, 10–12 cm, ca. 1 mm in diam.; distal stipe scales sparser, similar to basal stipe scales but smaller. Lamina light brownish green when dry, nearly linear-lanceolate,  $20\text{--}30 \times$  ca. 2.5 cm at middle, base slightly contracted, 1-pinnate, apex shallowly pinnatifid-acuminate or shortly acuminate; rachis stramineous, without

proliferous bulbils. Pinnae 30–35 pairs, alternate, sessile or lower pinnae slightly shortly stalked, apical pairs attached at nearly right angles to rachis or slightly ascendant, all other pinnae ± reflexed, oblong, lower pairs ca. 1.2 cm × 6 mm at base, apices obtuse and mucronate, bases asymmetrical, acroscopic base wider, slightly acute-auriculate or with 1 small acute tip, proximal margins of auricles slightly, curved or truncate, parallel to rachis, distal pinna margin shallowly repand or shallowly toothed, teeth with short and fine acute tip, distal basicopic margins curved and with 2 or 3 shallow teeth, basal basicopic margins entire, truncate, straight or slightly concave and curved; adaxially glabrous, abaxially with few linear to lanceolate microscales; frond texture papery; venation pinnate, conspicuous on both surfaces, lateral veins close to pinna margin, pinnate above midrib from base upward, simple or dichotomous below midrib, veinlets rarely twice dichotomously branched. Sori small, terminal on shorter veinlets, relatively close to pinna margin, up to 9 above midrib, 1–3 below midrib on distal part of pinnae, sometimes missing below midrib; indusia large, entire, falling off when mature.

- Rock crevices; ca. 900 m. Guangdong (Ruyuan).

*Polystichum kwangtungense* is similar to *P. yunnanum* (NW Yunnan), but the latter has conform scales that are slightly toothed. Also, the latter often has only 3 or 4 sori, 6 at the most, above the midrib of the pinnae.

**179. *Polystichum dielsii*** Christ, Bull. Acad. Int. Géogr. Bot. 16: 238. 1906.

圆顶耳蕨 yuan ding er jue

*Polystichum craspedocarpium* Ching & W. M. Chu ex L. L. Xiang; *P. deltodon* (Baker) Diels var. *marginale* (Christ) C. Christensen; *P. hecatopterum* Diels var. *marginale* Christ.

Plants evergreen. Rhizome erect, short, 1–2 cm in diam. including stipe bases, upper part densely scaly; scales brown to dark brown or castaneous, lanceolate, up to 4 mm, thick, entire or with few short teeth. Fronds up to 50 cm, sometimes only 6 cm under dry conditions; stipe light stramineous, (0.5–)3–10(–18) cm, (0.6–)1–2 mm in diam., all covered with numerous scales similar to rhizome apex scales, but spreading and easily falling off. Lamina light green or light brownish green when dry, adaxially darker, narrowly elliptic-lanceolate, (4–)15–30(–33) cm, middle (1–)2–3.5(–4) cm wide, with pinnae below middle slightly or obviously contracted, 1-pinnate, apex pinnatifid to pinnatifid, obtuse or shortly acuminate to long acuminate; rachis light stramineous, without proliferous bulbils, sparsely scaly; scales brown to dark brown or nearly castaneous, subulate-lanceolate, sparsely toothed; often covered with small appressed scales. Pinnae (8–)30–50(–60) pairs, sessile, usually approximate or imbricate, sometimes lowest pairs remote, alternate, rarely nearly opposite, attached at right angles to rachis or most pinnae ± angled basicopically, few pairs ascendant, nearly oblong, lower pairs nearly right-triangular, middle pairs largest, 0.5–2 cm, 2.5–8 mm, apices obtuse-rounded or acute and slightly curved acroscopically, sometimes mucronate, bases asymmetrical, acroscopic base slightly auriculate, auricles deltoid with acute or shortly spinulose tip, proximal margins of auricles nearly truncate, parallel to rachis or slightly over-

lapping rachis, distal part of acroscopic margins nearly truncate, shallowly repand, sometimes apex with 1 or 2 teeth, sometimes with spinules, sometimes acroscopic base obtuse and without conspicuous auricles, basal basicopic margins narrowly cuneate, truncate, margins entire, distal basicopic margins curved, basicopic margins repand or with 3 or 4 teeth similar to those on acroscopic margins; adaxially glabrous, abaxially sparsely covered with light brown or grayish white short and narrowly lanceolate microscales; frond texture papery; venation visible or distinct abaxially, indistinct adaxially, pinnate; lateral veins nearly reaching pinna margin, above midrib pinnate from base upward, dichotomous or simple, below midrib simple or dichotomous. Sori small, terminal on shorter veinlets, close to pinna margin, up to 9 above midrib, 1–3 or sterile below middle midrib, lower part of lamina often sterile; indusia present, grayish brown, entire, evanescent. Spores semicircular in equatorial view, perispore sculpturing sparsely plicate.

Broad-leaved evergreen forests, wet limestone and rock crevices around caves, rarely in dry limestone crevices at forest margins; 500–1600 m. W Guangxi, C and S Guizhou (Guiding, Wangmo), SE Yunnan (Xichou) [N Vietnam].

The name *Polystichum pinfaense* Christ is often treated as a synonym of *P. dielsii*. However, original material of *P. pinfaense* needs to be studied before any conclusions can be reached.

*Polystichum dielsii* is probably not distributed in Sichuan or NW Guizhou.

**180. *Polystichum pseudodeltodon*** Tagawa, Acta Phytotax. Geobot. 6: 159. 1937.

拟对生耳蕨 ni dui sheng er jue

*Polystichum deltodon* (Baker) Diels var. *pseudodeltodon* (Tagawa) Tagawa.

Plants evergreen. Rhizome ascending to erect, short, 1–2 cm in diam. including stipe bases, rhizome apex and basal stipe densely scaly; scales brown to dark brown, ovate or ovate-lanceolate, up to 6 × 2 mm, thickly membranous, subventre, acuminate. Fronds 27–57 cm; stipe stramineous, 10–20 cm, 0.5–1.5 mm in diam., upper stipe base sparsely scaly; scales brown to dark brown, ovate-lanceolate or lanceolate, varying in size, membranous, margins with a few long teeth, apices caudate or long acuminate, evanescent; remnant scales often appressed. Lamina light green or light brownish green when dry, lanceolate or narrowly elliptic-lanceolate, 17–37 × 2–4 cm at middle, base slightly contracted or not, 1-pinnate, apex pinnatifid and acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly on both surfaces; scales brown to pale dark brown, ovate, membranous, with a few long teeth, caudate. Pinnae 18–38 pairs, often alternate, rarely nearly opposite, approximate, lower pairs obviously approximate, often nearly spreading, sometimes upper pairs slightly ascendant, sometimes most pinnae or those below middle of lamina slightly angled basicopically, oblong, middle pairs 11–21 × 4–8 mm at base, apices slightly curved upward, rounded and shortly spinulose, bases asymmetrical, acroscopic base auriculate, auricles deltoid or nearly deltoid, apex of auricles acute or acuminate and shortly spinulose, proximal margins of auricles truncate or

slightly curved, entire or with 1 or 2 shallow obtuse teeth, parallel to rachis or slightly overlapping rachis, distal margins of auricles often with 1 or 2 shallow incised rounded teeth or shallowly spinulose or sometimes acute coarse teeth, acroscopic margins of pinnae truncate or slightly recurved and coarsely toothed or biserrate, basal basicopic margins narrowly cuneate, straight, margins entire, distal basicopic margins curved upward, with coarse and often shortly spinulose teeth; adaxially glabrous, abaxially sparsely covered with narrowly lanceolate light brown microscales; frond texture thickly papery; venation slightly distinct abaxially, distinct adaxially, pinnate; lateral veins pinnate above midrib from base to apex, dichotomous or simple, simple or dichotomous below midrib, sterile veinlets reaching tooth base. Sori small, terminal on veinlets, close to pinna margin, often 1 row above midrib, up to 10, only 1–3 below midrib on apical part or sterile; indusia present, brown, erose, caducous.

- Grassy slopes in forests; 700–2300 m. Taiwan.

*Polystichum pseudodeltodon* is often synonymized with *P. deltodon*, but the former has rounded pinna apex, while the latter has acute pinna apex. Preliminary molecular analysis confirmed their separation into two species (Zhang et al., unpublished data).

**181. *Polystichum jinfoshanense*** Ching & Z. Y. Liu, Bull. Bot. Res., Harbin 3(4): 29. 1983.

金佛山耳蕨 jin fo shan er jue

Plants evergreen, small. Rhizome ascending or erect, short, 4–8 mm in diam. including stipe bases, rhizome apex and basal stipe scaly; scales brown, broadly lanceolate, membranous, sparsely toothed. Fronds 4–12 cm; stipe stramineous or pale greenish stramineous, 0.5–4 cm, less than 0.5 mm in diam., distal stipe scales similar to basal stipe scales in shape and color but smaller. Lamina light green when dry, adaxially darker, narrowly elliptic-lanceolate, 2.5–10 × 1–2 cm at middle, gradually slightly contracted below middle, 7–15 mm wide at base, 1-pinnate, apex obtuse or nearly acute, rarely shortly acuminate, often pinnatifid to pinnatifid. Pinnae 5–22 pairs, alternate or nearly opposite, often approximate or imbricate, sometimes slightly remote, lower pairs very shortly stalked, upper pairs sessile, attached at right angles to rachis or slightly angled basicopically, oblong, middle pinnae 4–11 × 2.5–7 mm, apices rounded-truncate or truncate, mucronate or shortly spinulose, bases asymmetrical, above midrib wider, bases without distinct auricles, margins with fewer than 10 coarse teeth; teeth irregular, acute or shortly spinulose apically, or shallowly lobed; basal basicopic margins narrowly cuneate, margins entire, straight or slightly angled inward and curved, distal basicopic margins nearly truncate and with 1–3 coarse teeth similar to those on acroscopic margins; adaxially glabrous, abaxially sparsely covered with light brown lanceolate and shortly linear microscales; frond texture papery; venation pinnate, slightly distinct on both surfaces, midrib slender, slightly zigzag, lateral veins dichotomous or simple, acroscopic base sometimes trifurcate, nearly reaching pinna margin. Sori terminal on shorter veinlets, close to pinna margin, 1–4 above midrib, 1 or 2 or sterile on upper part of pinnae below midrib; indusia present, dark brown, repand. Spores semicircular in equatorial view, orbicular or nearly orbicular in polar view; perispore sculpturing plicate.

- Shaded limestone crevices in montane broad-leaved evergreen forests; 800–2000 m. Chongqing (Jinfo Shan), Guizhou (Zhenning), Sichuan (Emei Shan, Pengzhou), NE Yunnan (Yiliang, Zhenxiang).

*Polystichum jinfoshanense* is often hard to identify. It is similar to *P. liui* but has fewer and larger pinnae, shorter laminae, and no spinules on the pinna margin except for the pinna tip.

**182. *Polystichum liui*** Ching, Bull. Bot. Res., Harbin 3(4): 28. 1983 [“*liuii*”].

正宇耳蕨 zheng yu er jue

Plants evergreen. Rhizome erect, short, 0.7–2 cm in diam. including stipe bases, rhizome apex and basal stipe scaly; scales reddish brown (sometimes partially blackish purple), ovate-lanceolate, up to 3 mm, membranous, with dense small teeth. Fronds 7–25 cm; stipe stramineous, 1–4 cm, 0.5–1 mm in diam., upper base sparsely scaly, scales similar to basal stipe scales. Lamina green when dry, narrowly elliptic-lanceolate, 4.5–18 × 0.8–2 cm at middle, below middle often gradually ± contracted toward base, 1-pinnate, apex pinnatifid to pinnatifid, often shortly acuminate; rachis stramineous, without proliferous bulbils, abaxially sparsely scaly; scales reddish brown, lanceolate or broadly lanceolate, membranous, sparsely toothed. Pinnae 16–45 pairs, approximate or imbricate, alternate or nearly opposite, attached at right angles to rachis or slightly ascendant, lower pairs shortly stalked, upper pairs sessile, nearly oblong, apices acute, slightly curved upward, acroscopic base auriculate; auricles nearly deltoid, with aristate spinules, proximal margins of auricles truncate or slightly curved, parallel to rachis or overlapping rachis, basicopic margins narrowly cuneate, truncate, margins entire, distal basicopic margins and whole acroscopic margins (including auricle margins) with up to 10 teeth, tips of teeth with aristate spinules; adaxially glabrous, abaxially sparsely covered with lanceolate and linear light brown microscales; frond texture papery; venation visible on both surfaces, pinnate, lateral veins reaching tips of teeth, dichotomous or simple above midrib, simple below midrib. Sori small, terminal on shorter veinlets, close to pinna margin, 5 at most above midrib, 1–3 or none below midrib, often merging when mature; indusia present, dark brown, erose, evanescent. Spores reniform in equatorial view; perispore sculpturing sparsely plicate.

- Shaded wet limestone crevices in broad-leaved evergreen forests or in limestone caves; 600–1700 m. Chongqing (Fengjie, Jinfo Shan), ?Guangxi, Guizhou (Anshun, Daozhen, Jiangkou), Hunan (Fenghuang, Sangzhi, Shimen).

**183. *Polystichum lanceolatum*** (Baker) Diels, Bot. Jahrb. Syst. 29: 193. 1900.

亮叶耳蕨 liang ye er jue

*Aspidium lanceolatum* Baker, Gard. Chron. n.s., 14: 494. 1880; *Polystichum neoliui* D. S. Jiang; *P. parvulum* Christ.

Plants evergreen. Rhizome erect, short, 3–5 mm in diam. including stipe bases, rhizome apex scaly; scales dark brown, ovate, sparsely toothed, acuminate. Fronds 4–10 cm; stipe light brownish stramineous, sometimes light greenish stramineous, 3–10 mm, less than 0.5 mm in diam., sparsely scaly; scales similar to rhizome scales. Lamina shiny adaxially, linear-lan-

ceolate, 4–9 × 0.5–1.2 wide, base not or slightly contracted, 1-pinnate, apex pinnatifid and shortly acuminate or nearly obtuse; rachis light brownish stramineous, sometimes light greenish stramineous, without proliferous bulbils, abaxially sparsely scaly; scales brown, ovate, with a few long teeth, caudate and long acuminate. Pinnae 15–20 pairs, alternate or nearly opposite, attached at right angles to rachis or slightly ascendant, approximate or imbricate, shortly stalked, deltoid to oblong, apex truncate, with 1–3 short hard spinules, bases asymmetrical, acroscopic base wider, with weakly developed auricles, apex of auricles aristate-spinulose or acute, sometimes nearly obtuse, proximal margins of auricles nearly truncate, parallel to rachis, margins of auricles with 1 or 2 teeth, tips of teeth aristate-spinulose or with short hard spinules, basicopic margins narrowly cuneate, truncate, entire; both surfaces concolorous, often light brownish green when dry, sometimes slightly grayish green, adaxially glabrous, abaxially sparsely covered with light brown short microscales; frond texture leathery; venation pinnate, sparse, slightly visible on both surfaces, lateral veins simple or dichotomous, nearly reaching tips of teeth. Sori small, terminal on shorter veinlets, 1–3 above midrib, submarginal, none or rarely 1 below midrib; indusia present, dark brown, entire, evanescent.

• Limestone crevices in wet valleys; 900–1800 m. Guizhou, Henan, Hubei, Hunan, Jiangxi, Sichuan (Emei Shan).

*Polystichum nanum* Christ (Bull. Acad. Int. Géogr. Bot. 16: 238. 1906) is often treated as a synonym of *P. lanceolatum* (e.g., FRPS 5(2): 134. 2001), but it might be a different species judging from the morphology of its type material (China. Guizhou: Pin-fa (Guiding Xian), 10 Nov 1904, *P. Julien Cavalerie 1945* (lectotype, designated here, NY! [barcode 00128158]; isolecotypes, BM! [barcode 001048650], S-P! [barcode 16336]). However, a detailed type locality is not given in the protologue; thus, any field observations and a molecular analysis of *P. nanum* are not possible unless it can be refound.

**184. *Polystichum assurgentipinnum*** W. M. Chu & B. Y. Zhang, Fl. Reipubl. Popularis Sin. 5(2): 224. 2001.

上斜刀羽耳蕨 shang xie dao yu er jue

Plants evergreen. Rhizome ascending, ca. 1.5 cm in diam. including stipe bases. Fronds ca. 48 cm; stipe light stramineous, ca. 13 cm, ca. 1 mm in diam., whole stipe sparsely scaly; scales appressed, dark brown, broadly ovate or ovate-lanceolate, membranous, margins ciliate. Lamina light green when dry, adaxially darker, linear-lanceolate, base slightly contracted, 1-pinnate, apex pinnatifid and caudate to long acuminate; rachis light stramineous, without proliferous bulbils, sparsely scaly; scales pale brown, ovate, sometimes only with appressed, thinly membranous scales at base. Pinnae 30–35 pairs, alternate or nearly opposite, approximate or slightly imbricate, sessile or subsessile, strongly ascendant, oblong-falcate, apices acute, aristate-spinulose, obviously curved upward, bases obviously asymmetrical, acroscopic base raised forming an acuminate auricle, apex of auricles long aristate-spinulose, entire on both sides of auricles, acroscopic margins of pinnae straight, weakly toothed, basicopic margins of pinnae truncate, straight and entire except curved apical part with 2 or 3 short teeth, basal basicopic margins narrowly cuneate; adaxially glabrous, abaxially sparsely covered with narrowly lanceolate light brown and linear micro-

scales; frond texture papery; venation slightly visible abaxially, distinct adaxially; lateral veins not reaching pinna margin, pinnate above pinna midrib from base upward, dichotomous or simple, simple and rarely dichotomous below pinna midrib. Sori small, (1–)4–6 above pinna midrib, terminal on shorter veinlets, slightly closer to pinna margin than to midrib, none or rarely 1 on apical part below midrib; indusia evanescent.

• Valleys; ca. 1500 m. Chongqing (Qijiang).

*Polystichum assurgentipinnum* is similar to *P. submarginale*, but its auricles are narrowly deltoid and its pinnae are entire on both acroscopic and basicopic margins and are almost completely sterile below pinna midrib.

**185. *Polystichum submarginale*** (Baker) Ching ex P. S. Wang, Pterid. Fanjing Mt. 129. 1992.

近边耳蕨 jin bian er jue

*Aspidium auriculatum* (Linnaeus) Swartz var. *submarginale* Baker, J. Bot. 26: 227. 1888; *Polystichum deltodon* (Baker) Diels var. *submarginale* (Baker) C. Christensen.

Plants evergreen. Rhizome erect, short, 1.5–2 cm in diam. including stipe bases, rhizome apex and basal stipe densely scaly; scales brown to dark brown, lanceolate or broadly lanceolate, membranous, margins with short cilia or shallowly erose, and mixed with smaller scales; smaller scales brown to dark brown, ovate or ovate-lanceolate, thinly membranous, margins fimbriate. Fronds 15–55 cm; stipe light stramineous, 2–20 cm, 0.5–1.5 mm in diam., distal stipe scales similar to basal stipe scales but smaller and mostly appressed. Lamina 1-pinnate, light green or light brownish green when dry, linear-lanceolate, slightly contracted at base, caudate to long acuminate. Pinnae 15–35 pairs, alternate, shortly stalked, ± ascendant, approximate to slightly remote, falcate-oblong, middle pinnae 1–2.5 cm × 4–10 mm at base, apices slightly ascendant, acute and with or without short spinules, bases asymmetrical, auricles deltoid, apex of auricles acute or shortly spinulose, proximal margins of auricles truncate or slightly curved, entire or with 1–3 shallow teeth, parallel to rachis, distal margins of auricles with 1–3 acute or obtuse coarse teeth, distal part of acroscopic margins of pinnae truncate or slightly recurved and curved, with acute tips or short spinules, or slightly irregular teeth, basal basicopic margins narrowly cuneate, margins entire, distal basicopic margins curved upward, margins with teeth similar to those on acroscopic margins; adaxially glabrous, abaxially sparsely covered with microscales; microscales ovate and long caudate or lanceolate, light brown, margins toothed; frond texture papery; venation slightly visible abaxially, indistinct adaxially, pinnate; lateral veins reaching tips of teeth, pinnate above pinna midrib from base upward, dichotomous or simple, simple or dichotomous below pinna midrib. Sori small, terminal on shorter veinlets, close to pinna margin, 1–7 above pinna midrib, 1–4 below midrib, only on upper part of pinnae; indusia present, dark brown, entire. Spores hemispherical in equatorial view; perispore sculpturing granulate.

• Wet limestone crevices and cliffs; 1100–1400 m. Sichuan (Emei Shan, Erlang Shan).

*Polystichum submarginale* is only known from Sichuan.

**186. *Polystichum houchangense*** Ching ex P. S. Wang, Guizhou Sci. 12(2): 55. 1994.

猴场耳蕨 hou chang er jue

Plants evergreen. Rhizome erect, short, 2–4 cm in diam. including stipe bases, rhizome apex and basal stipe densely scaly; scales brown, ovate-lanceolate, up to 5 mm, membranous, weakly serrulate. Fronds 40–70 cm; stipe stramineous, 7–20 cm, 1–1.5 mm in diam., sparsely scaly from basal stipe to rachis; scales similar to basal stipe scales but gradually becoming smaller, and mixed with smaller scales; smaller scales brown, appressed, narrowly lanceolate, bases cuneate, margins with a few long teeth, apices long caudate. Lamina 1-pinnate, grayish green when dry, adaxially darker, narrowly elliptic-lanceolate, 20–45 × 2–3.8 cm at middle, slightly contracted toward base, acuminate; rachis without proliferous bulbils, stramineous. Pinnae 30–60 pairs, alternate, sessile, lowest pairs remote, otherwise contiguous to imbricate, ± reflexed except near apex, oblong-lanceolate, 1–2 cm × 3–7 mm at middle, basal part of pinnae as wide or nearly as wide as upper part, apices acute, bases obviously asymmetrical, acroscopic base wider and with ± deltoid auricles, apex of auricles acute and shortly spinulose, proximal margins of auricles truncate, parallel to rachis or slightly overlapping rachis, margins of pinnae regularly toothed, teeth open, apices obtuse or acute, shortly spinulose or sometimes only repand, basispic margins entire below middle, cuneate, angled upward above middle, toothed, teeth acute or obtuse apically; adaxially glabrous, abaxially sparsely scaly, microscales appressed or not, light brown, lanceolate, margins slightly toothed; frond texture thickly papery. Sori small, terminal on shorter veinlets, 1 row on each side of midrib of pinna, close to margins, often 4–10 above midrib, 1–3 below midrib near apex; indusia present, light brown, thick, subentire, evanescent.

• Wet cliffs inside limestone caves; ca. 1200 m. C Guizhou (Anshun, Ziyun).

*Polystichum houchangense* is similar to *P. consimile*, but it has conform stipe scales, longer laminae, and sessile pinnae up to 60 pairs.

**187. *Polystichum deflexum*** Ching ex W. M. Chu, Acta Bot. Yunnan., Suppl. 5: 47. 1992.

反折耳蕨 fan zhe er jue

Plants evergreen. Rhizome ascending or erect, short, 1–2 cm in diam. including stipe bases, rhizome apex and basal stipe densely scaly; scales acuminate ovate or ovate-lanceolate, up to 7 × ca. 2.5 mm, margins fimbriate, membranous or thickly membranous, marginate, central cells longitudinally arranged (long axes of cells in longitudinal direction), sides of marginal cells irregularly curved, basal stipe scales mixed with smaller scales; smaller scales reddish brown, membranous, broadly ovate, margins fimbriate, apices caudate, cells undulate, not rectangular. Fronds 20–55 cm; stipe light stramineous, 2–15 cm, 0.5–1.5 mm in diam., sparsely scaly from basal stipe to rachis; scales similar to basal stipe scales but smaller and often appressed. Lamina green or grayish green when dry, sometimes light brown, darker adaxially, narrowly elliptic-lanceolate, 15–40 × 2.5–5.5 cm at middle, 1–3 cm wide at base,

widest at middle, gradually contracted downward, 1-pinnate, apex pinnatifid and long acuminate; rachis without proliferous bulbils, light stramineous. Pinnae 15–45 pairs, alternate or nearly opposite, sessile, remote to contiguous below, sometimes upper pinnae imbricate, pinnae reflexed, except apical pinnae sometimes attached at right angles with rachis or slightly angled acroscopically, oblong-falcate to oblong, apices acute, bases obviously asymmetrical, acroscopic base with deltoid auricles, apex of auricles acute, crenate, proximal margins of auricles truncate, parallel to rachis, or raised outward and curved, sometimes slightly overlapping rachis, distal part of acroscopic margins of pinnae truncate or slightly curved inward and crenate, or sometimes with regular or irregular obtuse or acute teeth, teeth sometimes with short acute tips, basal basispic margins narrowly cuneate, truncate or slightly recurved, margins entire, distal basispic margins slightly angled acroscopically and curved; adaxially glabrous, abaxially sparsely scaly, microscales light brown to brown, narrowly lanceolate; frond texture papery. Sori small, terminal on shorter veinlets, close to pinna margin; indusia present, light brown or nearly gray, entire or slightly shallowly repand, evanescent.

• On rocks in broad-leaved evergreen forests; 1000–2600 m. NW and SW Yunnan.

**188. *Polystichum consimile*** Ching, Icon. Filic. Sin. 5: t. 237. 1958.

涪陵耳蕨 fu ling er jue

Plants evergreen. Rhizome erect, short, rhizome apex and basal stipe sparsely scaly; scales ascending and appressed, dark brown, ovate, bases peltate, margins with short cilia, marginate, apices shortly acuminate; cells mostly narrowly rectangular with straight sides, sides of marginal cells irregularly curved. Fronds 30–40 cm; stipe grayish stramineous, 10–12 cm, distal stipe subglabrous. Lamina 1-pinnate, dark brown when dry, narrowly elliptic, 20–28 × ca. 3 cm at middle, slightly contracted toward base, acuminate; rachis stramineous, without proliferous bulbils, glabrous abaxially. Pinnae 30–35 pairs, shortly stalked, alternate, basal pairs remote, remaining pairs contiguous or slightly imbricate, broadly oblong and slightly curved, apices acute or obtuse, bases asymmetrical, acroscopic base weakly auriculate, whole margin except for proximal half of basispic side with sparse irregular spinulose teeth, proximal margins of auricles truncate or slightly curved outward, basal basispic margins cuneate, margins entire, often slightly recurved, distal part of basispic margins angled acroscopically and curved, with 2–4 spinulose teeth; both surfaces glabrous; frond texture papery; venation indistinct, pinnate; lateral veins nearly reaching pinna margin, pinnate above pinna midrib from base upward, dichotomous or simple, simple or dichotomous below pinna midrib. Sori small, terminal on shorter veinlets, close to pinna margin, 2–8 above pinna midrib, 1–3 below pinna midrib on apical part; indusia present, entire.

• Limestone cliffs inside karst caves; ca. 200 m. Chongqing (Fuling).

*Polystichum consimile* has shortly acuminate lamina apices. The illustration in the protologue is incorrect in having apical free pinnae homomorphic with lateral pinnae.

Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 13. 1997) reduced this species to a synonym of *Polystichum shensiense*, a member of *P.* sect. *Sorolepidium*.

This species might be extinct.

**189. *Polystichum yuanum*** Ching, Icon. Filic. Sin. 5: t. 235. 1958.

倒叶耳蕨 *dao ye er jue*

Plants evergreen. Rhizome erect, or slightly ascending, short, together with stipe base 1–2.5 cm in diam., rhizome apex and stipe densely scaly; scales dark brown, up to 4 mm, membranous, margins with irregular ciliate teeth, apices rounded-acuminate. Fronds 12–38 cm; stipe stramineous or pale greenish stramineous, 1–15 cm, ca. 1 mm in diam., distal stipe scales mostly caducous. Lamina 1-pinnate, light brown or light brownish green, adaxially darker, narrowly elliptic-lanceolate, 8–30 × 1.8–3.5 cm at middle, 1.3–2 cm wide at base, slightly contracted below middle, long acuminate; rachis stramineous or light green stramineous, without proliferous bulbils, sparsely scaly abaxially, especially on pinna bases; scales dark brown, ovate or lanceolate, with sparse irregular long teeth. Pinnae 20–30 pairs, often alternate, sometimes nearly opposite, often remote, rarely contiguous or hardly imbricate, very shortly stalked, mostly ± reflexed, rarely attached at right angles or nearly so with rachis above middle, oblong, middle pinnae 8–15 × 5–7 mm, basal pinnae 5–10 × 4–6 mm, apices acute, bases asymmetrical, acroscopic side much wider, acroscopic margins nearly truncate, base widest and with 1 acute weakly spinulose auricle, margins of auricles with sparse, unequally sized, shallow teeth, tips of teeth obtuse, basal basiscopic margins narrowly cuneate, truncate or slightly recurved, margins entire, distal part of basiscopic margins nearly obliquely truncate and with 2–4 shallowly spinulose teeth; adaxially glabrous, abaxially sparsely covered with microscales, microscales light brown, ovate-lanceolate or lanceolate or hairlike; frond texture papery; venation pinnate, distinct abaxially, slightly distinct adaxially; lateral veins not reaching pinna margin, pinnate above pinna midrib from base upward, dichotomous or simple, simple or dichotomous below pinna midrib. Sori small, terminal on shorter veinlets of upper pinnae from middle of lamina upward, close to pinna margin; indusia present, dark brown, entire, caducous.

• Rock crevices in limestone valleys in broad-leaved forests and mixed broad-leaved coniferous forests; 2200–2900 m. NW Yunnan (Zhongdian).

**190. *Polystichum muscicola*** Ching ex W. M. Chu & Z. R. He, *sp. nov.*

伴藓耳蕨 *ban xian er jue*

Type: China. Sichuan: Luding County, Feiyueling, alt. 2800 m, 16 Nov 1934, *H. Smith 13456* (holotype, PE!).

Validating Latin diagnosis: that of “*Polystichum muscicola* Ching ex W. M. Chu et Z. R. He” (Ching ex W. M. Chu & Z. R. He in Kung et al., Fl. Reipubl. Popularis Sin. 5(2): 140–141, 228; t. 45: 1–2. 2001).

Plants evergreen. Rhizome erect, short, together with per-

sistent stipe base ca. 1.5 cm in diam. Fronds 10–20 cm; stipe stramineous, 2–6 cm, thinner than 1 mm in diam., whole stipe sparsely scaly; scales brownish yellow, broadly lanceolate or broadly ovate-lanceolate, thinly membranous, with a few long teeth. Lamina 1-pinnate, yellowish green when dry, narrowly elliptic-lanceolate or only linear-lanceolate, 7–13 × 1–2 cm, base slightly contracted or gradually contracted below middle, apex long acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly; scales similar to basal stipe scales. Pinnae 10–23 pairs, attached at nearly right angles to rachis, ovate or ovate-oblong, apices acute, sessile, margins pinnatilobate or only sparsely toothed, teeth shortly spinulose, bases asymmetrical, acroscopic base ± auriculate, auricles of lower pinnae with 2 or 3 acute teeth, acroscopic margins mostly attached at acute angles to rachis and ascendant, basiscopic margins obliquely truncate, attached at nearly right angles to rachis and angled basiscopically, middle pinnae 5–9 × ca. 4 mm, basal pinnae often obviously contracted and ca. 3 mm long and wide; margins of lower lobes often with 2 or 3 acute teeth; frond texture thinly papery. Sori abaxial on veinlets, medial or closer to pinna margin, mostly 2–4 per pinna; indusia small, evanescent.

• Wet moss-covered rocks in forests; 2000–2800 m. W Hubei (Badong), W Sichuan (Emei Shan, Luding).

“*Polystichum muscicola* Ching ex W. M. Chu & Z. R. He” was not validly published because the herbarium in which the type is conserved was not specified (*Melbourne Code*, Art. 40.7).

*Polystichum muscicola* is similar to *P. atkinsonii* in habit and lamina texture, but its rachis lacks proliferous bulbils and its lower pinnae below the middle of the lamina are gradually contracted and attached at right angles to the rachis or slightly angled basiscopically.

**191. *Polystichum perpusillum*** Li Bing Zhang & H. He, Ann. Bot. Fenn. 49: 68. 2012.

极小耳蕨 *ji xiao er jue*

Plants evergreen. Rhizome ascending, 0.3–0.5 cm, densely covered with scales; scales brown, deltoid-ovate, 0.9–1.4 mm; roots brown when dry, up to 4 cm, ca. 0.3 mm in diam. Fronds 4–7 per rhizome, 3.3–9.5 cm; stipe green, 1.2–4 cm, 0.4–0.9 mm in diam. at middle; basal stipe scales brown, dull, deltoid-ovate, 2–2.5 × 0.5–1.2 mm, papery, margins slightly long ciliate, apices acuminate or caudate; distal stipe scales similar but narrower and shorter, varying in size, brown, dull, ovate-lanceolate, papery, margins regularly shortly ciliate, apices caudate. Lamina 1-pinnate, shiny adaxially, lanceolate, slightly contracted toward base, 2.1–6.1 × 0.85–1.25 cm at middle, acute; rachis 0.4–0.7 mm in diam. at middle, without proliferous bulbils; rachis scales brown, dull, deltoid-ovate or ovate-lanceolate, 0.5–1.3 × 0.25–0.31 mm at base, varying in size, papery, margins regularly ciliate, apices caudate. Pinnae 5–12 pairs, not overlapping, ascendant except lowest pairs, basal two pairs 2.5–6 mm apart, alternate, oblong, middle (largest) pinnae 3.2–7.3 × 2–3.5 mm, shortly stalked (stalk 0.2–0.4 mm), acroscopic base auriculate, basiscopic base cuneate and often forming an 80°–120° angle with rachis, apices acute, acroscopic margin with 1–4 teeth; abaxially scaly, adaxially glabrous; microscales on abaxial surface subulate or linear (narrow-type microscales), 0.13–0.54 mm, base 0.05–0.07 mm wide; frond texture papery;

venation pinnate; midrib slightly raised abaxially, flat adaxially; lateral veins free, 2 or 3 pairs from midrib per pinna, alternate; each lateral vein again dichotomous or not, slightly raised and distinct abaxially, indistinct adaxially. Sori terminal on veins of upper pinnae, 1–3 per fertile pinna, close to pinna margin (center of sorus 0.4–0.6 mm distant from pinna margin); indusia brown, ca. 0.6 mm in diam., membranous, erose. Spores orbicular in polar view, elliptic in equatorial view, ca.  $38.1 \times 45.2 \mu\text{m}$  (polar axis  $\times$  equatorial axis); perispore sculpturing granulate with few verrucae.

- Cave entrances; ca. 600 m. S Guizhou (Libo).

In comparison with the morphologically most similar species *Polystichum minutissimum*, *P. perpusillum* has a lamina with an acute apex and up to 12 pairs of pinnae per lamina and its rachis scales are deltoid-ovate or ovate-lanceolate, while *P. minutissimum* has a lamina with a rounded apex and 5–8 pairs of pinnae per lamina and its rachis scales are subulate or linear.

**192. *Polystichum rupicola*** Ching ex W. M. Chu, Acta Bot. Yunnan., Suppl. 5: 51. 1992.

岩生耳蕨 yan sheng er jue

Plants evergreen. Rhizome erect, short, together with stipe base 1–1.5 cm in diam., rhizome apex scales and basal stipe scales dark brown, broadly lanceolate, thickly membranous, sparsely toothed. Fronds 15–32 cm; stipe stramineous, 3–8 cm, less than 1 mm in diam., sparsely scaly from stipe base to rachis; scales dark brown, lanceolate to narrowly lanceolate, mixed with few smaller scales; smaller scales appressed, dark brown, ovate, thinly membranous, with sparse short to long teeth. Lamina 1-pinnate, light brownish green or grayish green when dry, adaxially darker, linear-lanceolate, 15–25  $\times$  2–3 cm at middle, broader at middle, base slightly contracted, apex pinnatifid and long acuminate, sometimes pinnatilobate and shortly acuminate; rachis stramineous, without proliferous bulbils. Pinnae 15–20 pairs, mostly widely remote, slightly angled acroscopically or attached at nearly right angles with rachis, very shortly stalked, oblong, apex rounded-truncate, middle pinnae 1–2 cm  $\times$  4–7 mm, basal pinnae 8–11  $\times$  4–6 mm, apices acute and with short spinule angled acroscopically, bases asymmetrical, acroscopic base auriculate, auricles nearly semicircular and with 1 short acute tip at apex or 1–3 low spinulose teeth on margin, acroscopic margins nearly truncate and with 4–6 deep or shallow obtuse teeth, basal basicopic margins truncate, margins entire, distal basicopic margins abruptly curved upward, with 3 or 4 shallow teeth (sometimes repand), teeth obtuse or shortly spinulose at apex; pinnae or lobes near lamina apex strongly angled acroscopically, almost parallel to rachis, apex often hooked and pointing to rachis, basicopic margins nearly semicircular; adaxially glabrous, abaxially sparsely scaly; microscales appressed, light brown, ovate, thinly membranous; frond texture papery or thinly leathery. Sori small, terminal on shorter veinlets, close to pinna margin, 1–4(–6) above midrib, 1–3 below midrib and only on upper part; indusia present, dark brown, subentire, evanescent.

- Montane wet limestone crevices; 1500–2800 m. NW Yunnan (Gongshan, Lijiang) [?N Myanmar].

**193. *Polystichum deltodon*** (Baker) Diels in Engler & Prantl, Nat. Pflanzenfam. 1(4): 191. 1899.

对生耳蕨 duì shēng ěr jué

*Aspidium deltodon* Baker, Gard. Chron., n.s., 14: 494. 1880; *Hemesteum deltodon* (Baker) H. Léveillé; *Polypodium submarginale* Langsdorff & Fischer; *Polystichum deltodon* (Baker) Diels var. *cultripinum* W. M. Chu & Z. R. He; *P. pseudodeltodon* Ching & Z. Y. Liu (1984), not Tagawa (1937).

Plants evergreen. Rhizome ascending to erect, short, together with stipe base 1–2 cm in diam., rhizome apex and basal stipe densely scaly; scales brown to dark brown, ovate or ovate-lanceolate, up to 6  $\times$  2 mm, thickly membranous, subentire, acuminate. Fronds 13–42 cm; stipe stramineous, 3–16 cm, 0.5–1.5 mm in diam., stipe above base sparsely scaly; scales brown to dark brown, ovate-lanceolate or ovate, varying in size, membranous, with sparse long teeth, caudate and long acuminate, evanescent; remnant scales mostly appressed. Lamina light green or light brownish green when dry, lanceolate or narrowly elliptic-lanceolate, 9–30  $\times$  2–4.5 cm at middle, base not or slightly contracted, 1-pinnate, apex pinnatifid and acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly on both surfaces; scales brown to pale dark brown, ovate, membranous, with sparse long teeth, caudate. Pinnae 18–40 pairs, often alternate, rarely nearly opposite, contiguous, lower pairs remote, often attached at nearly right angles with rachis, sometimes upper pairs slightly angled acroscopically, sometimes most pinnae or those below middle of lamina slightly angled basicopically, oblong or falcate-oblong, middle pairs 8–22  $\times$  4–10 mm at base, apices slightly curved upward, acute and shortly spinulose, bases asymmetrical, acroscopic base auriculate; auricles deltoid or nearly deltoid, apex of auricles acute or acuminate and shortly spinulose, proximal margins of auricles truncate or slightly curved, entire or with 1 or 2 shallow obtuse teeth, parallel to rachis or slightly overlapping with rachis, distal margins of auricles often with 1 or 2 shallow incised rounded teeth or sometimes acute coarse teeth; acroscopic margins of pinnae truncate or slightly recurved and crenate, basal basicopic margins narrowly cuneate, straight, margins entire, distal basicopic margins curved upward, with coarse and often shortly spinulose teeth; adaxially glabrous, abaxially sparsely covered with narrowly lanceolate light brown microscales; frond texture papery; venation slightly distinct abaxially, distinct adaxially, pinnate; lateral veins pinnate above midrib from base to apex, dichotomous or simple, simple or dichotomous below midrib, sterile veinlets reaching base of teeth. Sori small, terminal on veinlets, close to pinna margin, often in 1 row above midrib, up to 10, only 1–3 below midrib on apical part or none; indusia present, brown, erose, caducous. Spores reniform in equatorial view; perispore sculpturing plicate with granules and perforations.

- Acidic or basic soils in limestone crevices or limestone walls in broad-leaved evergreen forests; 1000–2600 m. Chongqing, Guizhou, Hubei, Hunan, Sichuan, Yunnan.

*Polystichum pseudodeltodon* from Taiwan is a distinct species, not closely related to *P. deltodon*. *Polystichum tosaense* (Makino) Makino from Japan is a second distinct species that has been treated as a synonym of *P. deltodon*. The distribution of *P. deltodon* in Anhui, Taiwan,

and Zhejiang, as well as Japan, Myanmar, and the Philippines, is doubtful.

**194. *Polystichum puteicola*** Li Bing Zhang, H. He & Q. Luo, Bot. Stud. (Taipei) 51: 128. 2010.

吞天井耳蕨 tun tian jing er jue

Plants evergreen. Rhizome ascending, 0.5–1 cm; scales brown, linear, 0.2–3.6 mm; roots dark brown when dry, up to 9 cm, ca. 0.6 mm in diam., sparsely or densely covered with scales. Fronds 4–7 per rhizome, 5–14 cm; stipe green, 2–6 cm, 0.6–1.2 mm in diam. at middle; basal stipe scales ovate-lanceolate, 3.6–4.5 × 1.1–2.3 mm, papery, abaxially brown and dull, adaxially flat, dark brown and shiny, margins ciliate or erose, apices acuminate or caudate; distal stipe scales brown, ovate-lanceolate, 2.7–3.7 × 1.1–2.1 mm, varying in size, membranous, composed of 1 layer of cells, margins regularly ciliate or with outgrowths, apices caudate, matte. Lamina 1-pinnate, shiny adaxially, lanceolate, 3.5–9.5 × 1.2–2.6 cm at middle, 1.3–2.7 cm wide and broadest at base, apex acute; rachis 0.7–1.2 mm in diam. at middle, without proliferous bulbils; scales of rachis similar to distal stipe scales but smaller, varying in size, margins regularly ciliate, apices caudate, matte. Pinnae 6–14 pairs, remote, strongly reflexed toward lamina base, basal two pairs 0.7–1.5 cm apart, alternate, oblong, middle pinnae 7.5–12 × 3.5–5.5 mm, basal pinnae slightly larger, shortly stalked, acroscopic base slightly auriculate, basiscopic base cuneate, forming 30°–90° angle with rachis, apices acute, margins crenate or subentire, without spinules; abaxially scaly, adaxially glabrous; microscales on abaxial surface subulate with dilated base (broad-type microscales), 0.5–1.1 mm, base 0.13–0.26 mm wide, with few tortuous outgrowths on margin of base; frond texture thinly leathery; venation pinnate; midrib slightly raised abaxially, flat adaxially; lateral veins free, 4 or 5 pairs from midrib per pinna, each lateral vein further dichotomous, indistinct on both surfaces. Sori terminal on veins of pinnae, 5–9 (1–3 below midrib, 4–6 above midrib) per fertile pinna, located approximately at middle between midrib and pinna margin and 0.9–1.6 mm distant from pinna margin; all pinnae on fertile lamina fertile; indusia brown, 0.8–1.2 mm in diam., erose. Spores subglobose in polar view, elliptic in equatorial view, ca. 32.5(28–37) × 43.5(36–48) × 34.2(31–38) μm (polar axis × long equatorial axis × short equatorial axis, respectively); perispore sculpturing cristate with numerous spinules ca. 0.5 μm.

• Limestone walls inside karst sinkholes; ca. 1700 m. NW Guizhou (Bijie).

*Polystichum puteicola* is most similar to *P. obliquum* in stature, pinna shape, and pinna size, but *P. puteicola* has the lamina widest at the base, stipe scales blackish brown adaxially, rachis scales up to 3.6 × 0.8 mm, pinnae oblong, dark green, nearly leathery, shiny adaxially, and slightly repand-serrate or subentire, and microscales brown and up to 2 × 0.5 mm. In contrast, *P. obliquum* has a narrowly oblanceolate lamina with the basal pair of pinnae contracted, stipe scales brown adaxially, rachis scales up to 2.3 × 0.5 mm, pinnae rhombic-ovate or rarely oblong, green, papery, dull adaxially, and serrulate, and microscales brownish and 0.5–0.8 × 0.2–0.3 mm.

*Polystichum puteicola* is also similar to *P. paradeltodon* in stature and pinna size but differs in having fronds thicker and dark green and

pinnae oblong, ± reflexed, with basiscopic base attached at 30°–90° angle with rachis (vs. fronds thinner, green or yellowish green, and pinnae falcate-triangular, attached at 100°–110° angle with rachis).

**195. *Polystichum nanchurnicum*** Ching, Bull. Fan Mem. Inst. Biol., n.s., 1: 310. 1949.

南川耳蕨 nan chuan er jue

Plants evergreen. Rhizome erect, short, together with stipe base 1–2 cm in diam., upper part densely scaly; scales brown, broadly lanceolate, membranous. Fronds few, 14–19 cm; stipe light stramineous, 4–5 cm, ca. 1 mm in diam.; stipe scales rufous, broadly lanceolate, toothed, acuminate. Lamina 1-pinnate, light green when dry, adaxially darker, lanceolate, 10–14 × 2–2.7 cm, slightly contracted downward, acuminate; rachis light stramineous, without proliferous bulbils, sparsely scaly; scales brown, lanceolate or linear, sparsely toothed. Pinnae 14–18 pairs, alternate, lower pairs contiguous, upper pairs remote, shortly stalked, attached at nearly right angles with rachis but lower pairs angled basiscopically, rhomboid-oblong, basal pairs 0.7–1 cm, middle pairs 1–1.3 cm wide, apices obtuse but with a spinule and slightly curved acroscopically, bases asymmetrical, acroscopic base auriculate, auricles semicircular or almost triangular with ca. 3 small obtuse low teeth, proximal margins of auricles slightly curved and slightly overlapping with rachis, distal part of acroscopic margins toothed, teeth 4 or 5, obtuse or weakly spinulose, basal basiscopic margins cuneate, truncate, margins entire, distal basiscopic margins curved upward and with 4 obtuse weakly spinulose teeth; adaxially glabrous, abaxially sparsely covered with light brown linear microscales; frond texture papery; venation visible or distinct abaxially, indistinct adaxially, pinnate; lateral veins nearly reaching pinna margin, pinnate from base upward above midrib, dichotomous or simple, simple or dichotomous below midrib. Sori terminal on shorter veinlets, close to pinna margin, up to 7 above midrib, 2–4 below middle midrib; indusia present, grayish brown, erose, evanescent.

• Wet limestone crevices; ca. 1200 m. Chongqing (Jinfo Shan).

*Polystichum nanchurnicum* was not treated in FRPS. Its relationship with *P. deltodon* is unclear.

**196. *Polystichum obliquum*** (D. Don) T. Moore, Index Fil. 87. 1858.

斜羽耳蕨 xie yu er jue

*Aspidium obliquum* D. Don, Prodr. Fl. Nepal. 3. 1825; *A. auriculatum* Wallich ex Mettenius var. *caespitosum* Wallich ex C. B. Clarke; *A. auriculatum* var. *obliquum* (D. Don) Baker; *A. caespitosum* Wallich ex Mettenius; *Polystichum caespitosum* (Wallich ex Mettenius) Beddome (1865), not Schott (1834); *P. subobliquum* Tagawa.

Plants evergreen. Rhizome erect, short, densely scaly apically; scales reddish brown, membranous, central part of scales hardened and bright castaneous, ovate-lanceolate, ca. 3 × 1 mm, margins shortly fimbriate or with dense and short cilia, apices acuminate. Fronds 6–32 cm; stipe light stramineous, 0.5–12 cm, 0.5–1 mm in diam., sparsely scaly; scales dimorphic; larger scales similar to rhizome apex scales, reddish brown, membra-



nous; smaller scales lanceolate, sparsely toothed, reddish brown or light brown. Lamina 1-pinnate, green or grayish green when dry, adaxially darker, lanceolate,  $3.5\text{--}21 \times 1\text{--}5$  cm at middle, not or slightly contracted at base, acuminate or shortly acuminate to obtuse; rachis light stramineous, without proliferous bulbils, sparsely scaly adaxially; scales brown, lanceolate or nearly subulate. Pinnae 7–15 pairs, alternate or nearly opposite, shortly stalked, distant to contiguous, sometimes hardly imbricate, most pinnae attached at right angles with rachis or slightly angled acroscopically, basal 1 or 2 pairs angled basiscopically, sometimes  $\pm$  angled basiscopically below middle of lamina or most pinnae, rhombic-ovate or nearly oblong, apices acute or obtuse, bases obviously asymmetrical, acroscopic base often with deltoid or nearly deltoid auricles, sometimes only weakly developed, apex of auricles acute, margins of auricles entire or with 1 or 2 shallow obtuse teeth, acroscopic margins of pinnae nearly truncate or slightly raised toward rachis and curved, sparsely toothed, teeth acute, obtuse or weakly repand, rarely with acute and spinulose teeth, basal basiscopic margins cuneate, straight, margins entire, distal basiscopic margins slightly curved upward, toothed same as on acroscopic margins but with fewer teeth; adaxially glabrous, abaxially sparsely covered with lanceolate or subulate, light brown or brown microscales; frond texture thinly leathery; venation pinnate, slightly distinct abaxially, visible adaxially; lateral veins nearly reaching pinna margin, pinnate above midrib from base to apex, trifurcate, dichotomous or simple, simple or dichotomous below midrib. Sori small, medial on each side of midrib of pinna, up to 9 above midrib, less than 4 or sometimes sterile below midrib; indusia present, light brown, entire.

Montane wet limestone crevices or limestone walls; (900–)1700–2800 m. W Guangxi, W Guizhou, W Sichuan, Taiwan, C, NW, and SW Yunnan [Bhutan, N India, Kashmir, Myanmar, Nepal, ?Vietnam].

*Polystichum obliquum* has been placed in *P. sect. Polystichum* by Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 7. 1997).

**197. *Polystichum mengziense*** Li Bing Zhang, Phytotaxa 60: 58. 2012.

蒙自耳蕨 *meng zi er jue*

*Polystichum deltodon* (Baker) Diels var. *henryi* Christ, Bull. Soc. Bot. France 52(Mém. 1): 1: 27. 1905.

Plants evergreen. Rhizome ascending to erect, short, apex densely scaly; scales bicolorous, blackish brown at middle, dull brown on margins, lanceolate, up to  $5 \times 1$  mm at base, thickly membranous, subentire, acuminate. Fronds 18–25 cm; stipe stramineous, 3–8 cm, ca. 1.5 mm in diam. at middle; basal stipe scales dense, light brown, ovate-lanceolate, membranous, subentire, acuminate; distal stipe scales appressed, light brown, ovate or ovate-lanceolate, irregularly shortly denticulate, caudate. Lamina 1-pinnate, light green or light brownish green when dry, lanceolate,  $14\text{--}19 \times 1.8\text{--}2.2$  cm at middle, base slightly contracted, apex pinnatifid and acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly on both surfaces, scales similar to distal stipe scales. Pinnae 24–35 pairs, often alternate, rarely nearly opposite, approximate, midribs often attached at nearly right angles with rachis, sometimes lower pairs angled slightly basiscopically, rectangular or nearly

deltoid, middle pairs  $10\text{--}13 \times 3\text{--}4$  mm at base, apices slightly curved upward, acute and shortly spinulose, bases asymmetrical, acroscopic base slightly auriculate; auricles mucronate or nearly semicircular, apex of auricles acute and spinulose, proximal margins of auricles truncate or slightly curved, parallel to or slightly overlapping rachis, distal margins of auricles rounded, acroscopic margins of pinnae with 7–9 acute spinulose teeth, basal basiscopic margins narrowly cuneate, margins entire, distal basiscopic margins curved upward and with 1 sharp tooth; both surfaces glabrous; frond texture papery; venation pinnate, slightly distinct abaxially, indistinct adaxially, lateral veins dichotomous or simple. Sori small, terminal on veinlets, close to pinna margin, 1 row above midrib, 5–8 above midrib, often sterile below midrib, all pinnae fertile; indusia present, brown, erose, caducous.

- Rock crevices; ca. 1800 m. SE Yunnan (Mengzi).

When raising this taxon to specific rank, the original varietal epithet “*henryi*” is blocked by *Polystichum henryi* Christ (Notul. Syst. (Paris) 1(2): 36. 1909).

**198. *Polystichum paradeltodon*** L. L. Xiang, Acta Phytotax. Sin. 32: 265. 1994.

新对生耳蕨 *xin dui sheng er jue*

Plants evergreen. Rhizome erect, short. Fronds 10–30 cm; stipe stramineous, 3–10 cm, stipe base sparsely scaly; scales brown, narrowly ovate or broadly lanceolate, membranous, toothed, sparsely mixed with smaller scales; small scales broadly ovate at base, membranous, becoming glabrous upward, margins toothed, apices linear and narrowly caudate. Lamina green or grayish green when dry, lanceolate,  $7\text{--}20 \times 2\text{--}4.5$  cm at middle, base truncate, not or slightly contracted, 1-pinnate, apex pinnatifid and acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly adaxially; scales light brown, ovate-lanceolate or broadly ovate, membranous, bases peltate and appressed. Pinnae 12–20 pairs, alternate, shortly stalked or sessile, nearly oblong,  $0.8\text{--}2$  cm  $\times$   $5\text{--}8$  mm at middle, apices slightly curved upward, rounded or acute, bases asymmetrical, acroscopic base auriculate; auricles low and deltoid or nearly semicircular, apices acute or obtuse, proximal margins of auricles truncate or slightly curved, parallel to rachis or slightly overlapping with rachis, basal basiscopic margins narrowly cuneate, nearly truncate, coarsely dentate or with slightly recurved teeth; adaxially glabrous, abaxially sparsely covered with short light brown microscales; frond texture papery; venation pinnate, distinct on both surfaces; lateral veins pinnate above midrib from base to apex, dichotomous or simple, simple or dichotomous below midrib. Sori small, terminal on shorter veinlets, medial or close to pinna margin, in 1 row on each side of midrib of pinna, more numerous above midrib, sometimes absent below midrib; indusia present, light brown, repand. Spores brown, orbicular in equatorial view; perispore sculpturing reticulate.

- Wet limestone crevices in valleys; ca. 800 m. S Yunnan (Mengla).

**199. *Polystichum subacutidens*** Ching ex L. L. Xiang, Acta Phytotax. Sin. 32: 261. 1994.

多羽耳蕨 *duo yu er jue*

*Polystichum deltodon* (Baker) Diels var. *cultratum* Christ.

Plants evergreen. Rhizome erect, short, together with stipe base 1.5–3 cm in diam., rhizome apex densely scaly; scales shiny, yellowish brown, linear-lanceolate, ca. 1.5 cm × 1–1.5 mm, thickly membranous, entire. Fronds 35–60 cm; stipe light stramineous or greenish stramineous, 4–15 cm, 1–1.5 mm in diam., lower part densely scaly; scales yellowish brown to dark brown, ovate-lanceolate, up to 1 cm × ca. 3 mm, thickly membranous, finely toothed, appressed or opening in upper part; scales gradually sparser toward lamina apex, mixed with membranous and thinly membranous scales; scales appressed, ovate-lanceolate, lanceolate, narrowly lanceolate, or broadly ovate, sulcate, varying in size, margins erose to nearly fimbriate, bases of partial scales peltate. Lamina 1-pinnate, green or yellowish green when dry on both surfaces, narrowly elliptic-lanceolate, 25–50 × 1.8–3 cm at middle, often gradually contracted below middle of lamina, 1–1.5 cm wide at base, acuminate; rachis green or pale greenish stramineous, without proliferous bulbils, with denser small scales adaxially; small scales brown, filiform, evanescent. Pinnae 40–110 pairs, alternate or nearly opposite, sessile or shortly stalked, attached at right angles with rachis or upper pairs sometimes slightly angled acroscopically, basal one to several pairs or sometimes upper pairs above middle of lamina ± reflexed, oblong-deltoid or right triangular, 7–15 × 3–5 mm at middle, apices obtuse-rounded or acute, bases asymmetrical, acroscopic base auriculate; auricles deltoid with acute tips, proximal margins of auricles truncate or slightly curved outward, parallel to rachis, acroscopic margins of pinnae repand to coarsely crenate, rarely pinnatifid with acute lobes, basal basicopic margins narrowly cuneate, straight or slightly recurved, margins entire, distal basicopic margins weakly repand or with 2 or 3 coarse obtuse teeth; adaxially glabrous, abaxially sparsely covered with linear light brown microscales; frond texture papery; venation pinnate, distinct abaxially, slightly visible adaxially; all lateral veins ending short of pinna margin, pinnate above midrib from base to apex, dichotomous or simple, simple or dichotomous below midrib. Sori small, terminal on shorter veinlets, close to pinna margin; indusia present, light brown, darker at center, entire, caducous. Spores orbicular in equatorial view; perispore sculpturing plicate.

Limestone crevices in montane broad-leaved evergreen forests, limestone caves; 700–1500 m. S Guizhou (Changshun, Ziyun), NW Guangxi (Leye, Nandan), SE Yunnan [N Vietnam].

*Polystichum subacutidens* has a narrow, long lamina with up to 110 pairs of pinnae.

**200. *Polystichum gymnocarpium*** Ching ex W. M. Chu & Z. R. He, Fl. Reipubl. Popularis Sin. 5(2): 227. 2001.

闽浙耳蕨 min zhe er jue

Plants evergreen. Rhizome ascending, short, rhizome apex and stipe base densely scaly; scales brown, lanceolate, up to 1 cm × 1.5 mm, membranous, weakly shortly serrulate or entire, long acuminate. Fronds 25–65 cm; stipe stramineous, 6–14 cm, 1–2 mm in diam. at base, upper stipe base covered with lanceolate and filiform scales. Lamina 1-pinnate, narrowly elliptic-lanceolate, 15–52 × 2–3.5 cm at middle, often gradually contracted below middle of lamina, 1–2 cm wide at base, acumi-

nate; rachis stramineous, without proliferous bulbils. Pinnae 30–70 pairs, alternate or nearly opposite, remote, upper pairs from middle of lamina upward attached at right angles with rachis, lower pairs ± reflexed, falcate or falcate-lanceolate, basal pairs often forming nearly right angles with each other, up to 1.8 cm × ca. 5 mm at middle, apices shortly spinulose, bases obviously asymmetrical, acroscopic base auriculate; auricles deltoid, apices acute and spinulose, margins of auricles with sparse shallow teeth, proximal margins of auricles nearly parallel to rachis; basicopic base cuneate, margins of pinnae toothed, teeth often spinulose or sometimes obtuse at apex; abaxially sparsely scaly, microscales brown, filiform, up to 3 mm; frond texture papery; venation slightly distinct abaxially, indistinct adaxially, pinnate; lateral veins often dichotomous but pinnate on auricles, apex of veinlets thickened, nearly reaching pinna margin. Sori terminal on shorter veinlets, in 1 row on each side of midrib, medial, exindusiate.

● On rocks in forests, forest margins; 300–700 m. N Fujian (Pucheng), SW Zhejiang (Songyang, Suichang, Wuyi).

*Polystichum gymnocarpium* is similar to *P. hecatopterum*, but the pinna margins are spinulose instead of aristate, the microscales are filiform, and the sori are exindusiate.

**201. *Polystichum daguanense*** Ching ex L. L. Xiang, Acta Phytotax. Sin. 32: 263. 1994.

大关耳蕨 da guan er jue

Plants evergreen. Rhizome erect, short. Fronds 18–30 cm; stipe pale greenish stramineous, 2.5–7 cm, ca. 1 mm in diam. at base, upper stipe base to rachis sparsely scaly; scales dark brown, often appressed, ovate, membranous, with irregular fine teeth. Lamina 1-pinnate, narrowly elliptic-lanceolate, 10–27 × 1.5–2.5 cm at middle, truncate or slightly broadly cuneate, nearly shallowly cordate, acuminate; rachis pale greenish stramineous, without proliferous bulbils. Pinnae 20–40 pairs, alternate or nearly opposite, slightly angled acroscopically or attached at right angles with rachis, approximate to contiguous, sessile, nearly rectangular, middle pairs 7–15 × 2–4 mm, basal pairs 5–10 × 2–4 mm, apices acute, bases asymmetrical, acroscopic base with deltoid auricles, proximal acroscopic margins of pinnae parallel with rachis, acroscopic margins substraight, basicopic base narrowly cuneate, distal basicopic margins curved, acroscopic margins of pinnae with 11–13 regular coarse teeth, only ca. 1/3 of basicopic margins of pinnae serrate and with 3 teeth, teeth shortly spinulose and forward-pointing or slightly recurved; adaxially glabrous, abaxially sparsely scaly; microscales light brown, appressed, ovate or lanceolate, membranous; frond texture papery; venation distinct on both surfaces, pinnate, lateral veins often dichotomous above midrib, simple below midrib, veinlets nearly reaching pinna margin. Sori relatively large, contiguous or nearly so when mature, terminal on shorter veinlets, close to pinna margin, 1–5 above midrib, 1 or 2 below midrib and on apical part, auricles and lower part of basicopic margins without sori; indusia present, light brown, subentire, persistent. Spores orbicular in equatorial view; perispore sculpturing plicate with granules.

● Wet rock crevices in bushes in limestone valleys; 1500–2000 m. NE Yunnan (Daguan, Yongshan).

**202. *Polystichum huashanicola*** (W. M. Chu & Z. R. He) Li Bing Zhang, *Phytotaxa* 60: 58. 2012.

花山耳蕨 hua shan er jue

*Polystichum daguanense* Ching ex L. L. Xiang var. *huashanicola* W. M. Chu & Z. R. He, *Acta Bot. Yunnan.* 22: 257. 2000 [*“huashanicolum”*].

Plants evergreen. Rhizome erect, short. Fronds 19–33 cm; stipe pale greenish stramineous, 2.5–6.7 cm, ca. 1 mm in diam. at base, upper stipe base sparsely scaly to rachis; scales often appressed, dark brown, ovate, membranous, with irregular fine teeth. Lamina 1-pinnate, narrowly elliptic-lanceolate, 10–25 × 1.5–2.4 cm at middle, truncate or slightly broadly cuneate, sometimes slightly becoming shallowly cordate, acuminate; rachis pale greenish stramineous, without proliferous bulbils. Pinnae up to 30 pairs, alternate or nearly opposite, attached at right angles with rachis, approximate, subsessile, nearly rectangular, middle pairs 7–15 × 2.5–5 mm, basal pairs 5–11 × 2.4–5 mm, apices acute, bases asymmetrical, acroscopic base with deltoid auricles, proximal acroscopic margins of pinnae overlapping rachis, acroscopic margins substraight, basicopic base narrowly cuneate, distal basicopic margins curved, acroscopic margins of pinnae with 7–9 regular coarse teeth, ca. 1/2 of basicopic margins of pinnae serrate and with 4 teeth, teeth shortly spinulose and slightly open; adaxially glabrous, abaxially sparsely scaly; microscales light brown, appressed, ovate or lanceolate, membranous; frond texture papery; venation distinct on both surfaces, pinnate; lateral veins often dichotomous above midrib, simple below midrib, veinlets nearly reaching pinna margin. Sori small, obviously not contiguous when mature, terminal on shorter veinlets, close to pinna margin, 1–5 above midrib, 1 or 2 below midrib and on apical part, auricles and lower part of basicopic margins without sori; indusia present, light brown, subentire, persistent.

• Wet rock crevices in bushes in limestone valleys, limestone sinkholes; 1900–2100 m. NE Yunnan (Zhengxiong).

*Polystichum huashanicola* was treated as a variety of *P. daguanense* in FRPS (5(2): 147. 2001). The two taxa are different in a number of aspects (see key) and should be treated as two species. It remains unclear if they are closely related.

**203. *Polystichum pseudoacutidens*** Ching ex W. M. Chu & Z. R. He, *Acta Bot. Yunnan.* 22: 257. 2000.

文笔峰耳蕨 wen bi feng er jue

Plants evergreen. Rhizome short, ascending or erect, 1.5–2 cm. Fronds more than 10, 40–50 cm; stipe stramineous, 12–18 cm, 1.5–2 mm in diam. at base, sparsely covered with large and small scales; large scales brown, not appressed, lanceolate or broadly lanceolate, up to 5 mm, membranous, entire; small scales appressed, brown, membranous, toothed. Lamina 1-pinnate, light green when dry, adaxially darker, lanceolate, 20–32 × 3.5–4.5 cm, base nearly truncate, not or slightly contracted, apex acuminate or long acuminate; rachis stramineous, without proliferous bulbils, sparsely covered with scales abaxially; scales appressed, brown, ovate, membranous, sparsely toothed, caudate with long acute tip. Pinnae 20–30 pairs, alternate or nearly opposite, shortly stalked, attached at right angles to

rachis or slightly ascendant, nearly right triangular, up to 2.5 cm × 6 mm at middle, apices shortly acuminate, shortly spinulose, bases obviously asymmetrical, acroscopic base auriculate, auricles deltoid, apices spinulose, sparsely shallowly toothed on both margins, acroscopic margins often straight or substraight, with regular coarse teeth, teeth mostly shortly spinulose at apex, basal basicopic margins narrowly cuneate, basicopic margins substraight or slightly curved upward, distal basicopic margins sparsely toothed; adaxially glabrous, abaxially sparsely scaly; microscales light brown, lanceolate; frond texture papery; venation visible abaxially, indistinct adaxially, pinnate; lateral veins above midrib pinnate from base to apex, dichotomous or simple, simple or dichotomous below midrib, lateral veins mostly reaching teeth. Sori small, terminal on shorter veinlets, located at bases of teeth, close to pinna margin, up to 10 above midrib, fewer than 4 below midrib and located on upper part; indusia present, dark brown, membranous, subentire, caducous.

• Limestone crevices in broad-leaved forests; 2500–2800 m. NW Yunnan (Lijiang).

*Polystichum pseudoacutidens* is similar to *P. acutidens* but differs in having more (more than 10) fronds per rhizome, pinnae nearly right triangular, with basicopic margins often straight and marginal teeth often opening, and sori close to pinna margin.

**204. *Polystichum elevatovenusum*** Ching ex W. M. Chu & Z. R. He, *Fl. Reipubl. Popularis Sin.* 5(2): 226. 2001.

凸脉耳蕨 tu mai er jue

Plants evergreen. Rhizome ascending or erect, short, 2–2.5 cm including stipe bases, rhizome apex densely scaly; scales brown, lanceolate, up to 8 × 1 mm, thickly membranous, subentire. Fronds few per rhizome, 45–70 cm; stipe stramineous, 12–20 cm, 1.5–2 mm in diam., base densely scaly; scales similar to rhizome scales or wider, slightly spreading, distal stipe with similar but appressed membranous brown scales. Lamina 1-pinnate, both surfaces grayish green when dry, adaxially slightly shiny, narrowly elliptic-lanceolate, 33–50 × 3.5–6 cm at middle, slightly contracted toward base from middle, 2–4 cm wide at base, apex acuminate; rachis stramineous, without proliferous bulbils, abaxially sparsely scaly; scales similar to stipe scales but smaller, appressed, thin. Pinnae 30–45 pairs, alternate or nearly opposite, upper pairs contiguous to imbricate, often attached at right angles with rachis, lower pairs or only basal-most pairs ± reflexed, falcate or oblong, apices slightly angled acroscopically, acute, bases obviously asymmetrical, acroscopic base with deltoid auricles with acute tips, proximal margins of auricles truncate or slightly curved, parallel to rachis, basal basicopic margins narrowly cuneate, straight or substraight, margins entire, distal part of basicopic margins curved upward, both margins with shallow obtuse teeth or with incised shallow rounded teeth; adaxially glabrous, abaxially sparsely scaly; microscales light brown, lanceolate, small; frond texture thinly leathery; venation pinnate, obviously raised abaxially, distinct adaxially; lateral veins often dichotomous, rarely simple, pinnate on auricles, nearly reaching pinna margin. Sori small, in 1 row on each side of midrib, more above midrib, terminal on shorter veinlets, close to pinna margins; indusia present, brown, caducous.

• Wet limestone crevices, red soils derived from limestone, in forests or under bushes; 1200–2400 m. NW, S, and W Yunnan.

*Polystichum elevatovenusum* is similar to *P. acutidens*, but its lamina texture is thicker, i.e., thickly papery, its pinna margins have rounded, non-spinulose teeth, its veins are obviously raised abaxially, and its sori are close to the pinna margin.

**205. *Polystichum excellens*** Ching, Icon. Filic. Sin. 5: t. 234. 1958.

尖顶耳蕨 *jian ding er jue*

Plants evergreen. Rhizome erect, short, 1–2.5 cm, rhizome apex and stipe base densely scaly; scales reddish brown, ovate or ovate-lanceolate, up to  $5 \times$  ca. 2 mm, thickly membranous, with short fine teeth, acuminate. Fronds 23–55 cm; stipe stramineous, 7–20 cm, 0.8–1.2 mm in diam., distal stipe sparsely scaly; scales varying in size, reddish brown, membranous; larger scales similar to basal stipe scales; smaller scales lanceolate or broadly ovate, margins with irregular thick cilia, apices long acuminate or shortly caudate; scales marginate with cells along margins often irregularly curved. Lamina 1-pinnate, grayish green when dry, adaxially darker, linear-lanceolate or nearly linear-lanceolate, rarely nearly narrowly deltoid,  $11\text{--}30 \times 3\text{--}10$  cm at middle, slightly contracted or not at base, acuminate or long acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly abaxially; microscales reddish brown, narrowly lanceolate or broadly ovate, with sparse long teeth, long caudate. Pinnae 9–30 pairs, nearly falcate or oblong-lanceolate, middle pairs  $1.5\text{--}5 \text{ cm} \times 7\text{--}15$  mm at middle, apices acuminate and spinulose, bases asymmetrical, acroscopic base obviously wider, slightly raised and auriculate; auricles low and broadly deltoid, with 1–3 shallow teeth and only 1 or 2 teeth spinulose, sometimes only weakly acute or obtuse at apex of teeth, acroscopic margins of pinnae substraight, with sparse low obtuse teeth or nearly repand, basal basiscopic margins narrowly cuneate, truncate or slightly curved, margins entire, distal basiscopic margins curved upward, with sparse low obtuse teeth; adaxially glabrous, midrib concave, abaxially sparsely covered with lanceolate light brown microscales; frond texture papery; venation pinnate, distinct and slightly raised abaxially, indistinct adaxially; lateral veins nearly reaching pinna margin, pinnate above midrib from base to apex, dichotomous or simple, simple or dichotomous below midrib. Sori terminal on shorter veinlets, in 1 row on each side of midrib, medial, 1–15 above midrib, fewer than 8 or absent below midrib; indusia present, reddish brown, with regular fine teeth, evanescent.

Limestone crevices in montane broad-leaved evergreen forests, limestone caves; 800–1700 m. NW, SW, and W Guangxi, C Guizhou (Qingzhen, Ziyun), W Hunan (Baojing), SE Yunnan [N Vietnam].

The distribution record for Vietnam is new.

**206. *Polystichum nayongense*** P. S. Wang & X. Y. Wang, Acta Bot. Yunnan. 19: 41. 1997.

纳雍耳蕨 *na yong er jue*

Plants evergreen. Rhizome erect, short, together with stipe base ca. 2 cm in diam. Fronds sparsely caespitose, 30–60 cm; stipe stramineous, 5–17 cm, 1–2 mm in diam., basal stipe scales denser, slightly spreading, brown, broadly ovate, thickly mem-

branous, with irregular fine teeth or subentire, caudate; distal stipe scales sparser, similar to basal stipe scales but smaller, mostly appressed, brown, membranous. Lamina 1-pinnate, grayish when dry, adaxially darker, lanceolate or narrowly elliptic-lanceolate,  $20\text{--}44 \times 3\text{--}5$  cm at middle, 2–4 cm wide at base, base truncate and slightly contracted or not, apex caudate and long acuminate; rachis stramineous, without proliferous bulbils. Pinnae 25–38 pairs, alternate or nearly opposite, lower pairs remote, attached at right angles with rachis, basal pinnae rarely slightly angled basiscopically, upper pairs contiguous or slightly imbricate, slightly angled acroscopically, falcate or oblong-falcate,  $1\text{--}2.5 \text{ cm} \times 4\text{--}8$  mm at middle, apices slightly angled upward, with aristate tip, bases obviously asymmetrical, acroscopic base auriculate, auricles deltoid or nearly semicircular, apex of auricles acute and aristate, proximal margins of auricles truncate or slightly curved, parallel to rachis or slightly overlapping rachis, acroscopic margins substraight or slightly recurved, with regular, acute, curved upward, aristate teeth, basal basiscopic margins narrowly cuneate, truncate, margins entire, distal basiscopic margins curved upward from middle upward, with regular, acute, often incurved, and aristate teeth; adaxially glabrous, abaxially sparsely scaly; microscales appressed, light brown, ovate, thinly membranous; frond texture papery or thickly papery. Sori terminal on shorter veinlets, in 1 row on each side of midrib, nearly medial, often 5–9 above midrib, 1–4 below midrib and on upper part only; indusia present, light brown, entire or slightly repand, evanescent.

• Limestone sinkholes; ca. 1500 m. W Guizhou (Nayong).

**207. *Polystichum acutidens*** Christ, Bull. Acad. Int. Géogr. Bot. 11: 259. 1902.

尖齿耳蕨 *jian chi er jue*

*Polystichum deltodon* (Baker) Diels var. *acutidens* (Christ) C. Christensen; *P. subauriculatum* Tagawa.

Plants evergreen. Rhizome erect, up to 10 cm, together with remnant old stipe base up to 3 cm in diam., rhizome apex and stipe base densely scaly; scales brown or dark brown, ovate or ovate-lanceolate, up to  $8 \times 3$  mm, thickly membranous, entire. Fronds 25–100 cm; stipe stramineous, 5–40 cm, 1–2 mm in diam. at base, sparsely scaly upward, a few distal stipe scales similar to basal stipe scales; more distal stipe scales gradually narrower toward rachis apex, brown or dark brown, lanceolate or narrowly subulate, mostly appressed, membranous, with sparse long teeth. Lamina 1-pinnate, green or grayish green when dry, adaxially darker, lanceolate,  $18\text{--}65 \times 2.5\text{--}12$  cm, slightly contracted or not at base, acuminate; rachis stramineous, without proliferous bulbils, sparsely scaly abaxially; scales often appressed, brown or dark brown, lanceolate, linear, or narrowly subulate, sparsely toothed, membranous. Pinnae 25–45 pairs, sessile, alternate or opposite, lower pairs more remote and sometimes angled acroscopically, upper pairs contiguous, falcate-lanceolate,  $1\text{--}6 \text{ cm} \times 3\text{--}10$  mm at middle, apices acuminate, often spinulose, bases obviously asymmetrical, acroscopic base with deltoid auricles, proximal margins of auricles truncate or slightly curved outward, parallel to rachis, basal basiscopic margins narrowly cuneate, straight or slightly recurved, both acroscopic and basiscopic margins toothed, tips of

teeth often  $\pm$  recurved and shortly or long spinulose; adaxially glabrous, abaxially sparsely covered with narrowly lanceolate light brown or brown microscales; frond texture papery or thinly papery; venation pinnate, visible or distinct abaxially, indistinct adaxially; lateral veins pinnate above midrib from base to apex, dichotomous or simple, simple or dichotomous below midrib. Sori small, terminal on shorter veinlets, in 1 row on each side of midrib, medial or nearly medial, veinlets of lower part below midrib often without sori; indusia present, dark brown, small, subtentire, caducous. Spores reniform in equatorial view, narrowly elliptic in polar view; perispore sculpturing plicate with numerous granules.

Montane broad-leaved evergreen forests, often in wet limestone valleys; 600–2400 m. Guangxi, Guizhou, Hubei, Hunan, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [N India, Myanmar, Thailand, N Vietnam].

*Polystichum acutidens* was placed in *P. sect. Polystichum* by Fraser-Jenkins (Himalayan Ferns (Guide to *Polystichum*), 7. 1997).

**208. *Polystichum longissimum*** Ching & Z. Y. Liu, Bull. Bot. Res., Harbin 4(4): 16. 1984.

长叶耳蕨 chang ye er jue

Plants evergreen. Rhizome ascending to erect, short, together with stipe base ca. 2 cm in diam., rhizome apex scaly; scales dark brown, ovate-oblong, thickly membranous. Fronds 50–70 cm; stipe light stramineous, 15–20 cm, 1–1.5 mm in diam., abaxially sparsely scaly; scales appressed, dark brown,

acuminately ovate and broadly lanceolate, varying in size, membranous, erose. Lamina 1-pinnate, green or grayish green when dry, adaxially darker, linear or linear-lanceolate, 30–48  $\times$  3.5–6 cm at middle, base slightly contracted or not, apex pinnatifid-caudate and long acuminate; rachis light stramineous, without proliferous bulbils, sparsely scaly on both surfaces; scales brown or light castaneous, ovate or narrowly lanceolate, erose, acuminate. Pinnae 40–50 pairs, alternate or nearly opposite, attached at right angle with rachis, sessile, lower pairs obviously remote, upper pairs contiguous, nearly falcate, apices slightly angled acroscopically, acute and shortly spinulose, middle pairs 1.5–3 cm  $\times$  5–8 mm, bases obviously asymmetrical, acroscopic base with deltoid and spinulose auricles, proximal margins of auricles nearly truncate, parallel or nearly parallel to rachis, acroscopic margins substraight, with regular coarse obtuse spinulose teeth, basal basispic margins cuneate, truncate, margins entire, distal basispic margins curved upward, toothed, teeth similar to those on acroscopic margins but sparser; adaxially glabrous, abaxially sparsely covered with lanceolate light brown or grayish white microscales; frond texture thinly papery; venation pinnate, visible abaxially, indistinct adaxially; lateral veins often reaching pinna margin, pinnate above midrib from base to apex, dichotomous or simple, simple or dichotomous below midrib. Sori terminal on shorter veinlets, often in 1 row on each side of midrib, up to 8, nearly medial, absent or only 1 or 2 below midrib; indusia present, grayish white, shallowly erose, evanescent.

• Wet cliffs in montane broad-leaved evergreen forests; 700–1400 m. Chongqing (Nanchuan), Guizhou (Jinsha, Xifeng).

## 2. Subfam. ELAPHOGLOSSOIDEAE

舌蕨亚科 she jue ya ke

Xing Fuwu (邢福武), Wang Faguo (王发国), Dong Shiyong (董仕勇); Kunio Iwatsuki, John T. Mickel, Masahiro Kato, Michael G. Gilbert

Fronds weakly to strongly dimorphic. Sporangia evenly covering fertile parts of fronds abaxially.

About eight genera and 700 species: nearly cosmopolitan, but highest diversity found in the New World; four genera and 34 species (16 endemic) in China.

Subfamily Elaphoglossoideae as defined here is supported as monophyletic by both molecular and morphological evidence.

## 7. *BOLBITIS* Schott, Gen. Fil. t. 14. 1835.

实蕨属 shi jue shu

Xing Fuwu (邢福武), Wang Faguo (王发国); Kunio Iwatsuki

*Egenolfia* Schott; *Poecilopteris* C. Presl.

Plants small to medium-sized, terrestrial or creeping on rocks or riverbanks or small trees. Rhizome creeping or shortly erect, dorsiventral, covered with ovate to linear-lanceolate, brown or blackish scales. Fronds dimorphic, evergreen, simple, pinnate, or rarely bipinnate. Sterile fronds: stipe with ovate or lanceolate brown scales at base; lamina mostly  $\pm$  herbaceous, apex usually with a bulbil, margin entire or crenate to deeply lobed, with or without teeth or spines, veins either free or variously anastomosing, with or without included free veinlets. Fertile fronds similar in shape to sterile ones, usually with longer stipe and narrower lamina. Sori acrostichoid, without indusia. Spores globose or nearly so, with thick epispores.

About 80 species: pantropical, mainly in Asia and Pacific islands; 25 species including three putative hybrids (twelve endemic) in China.

1a. Veins free.