

## 2. UTRICULARIA Linnaeus, Sp. Pl. 1: 18. 1753.

狸藻属 li zao shu

*Calpidisca* Barnhart; *Diurospermum* Edgeworth; *Lentibularia* Séguier; *Megozipa* Rafinesque; *Meloneura* Rafinesque; *Nelipus* Rafinesque; *Vesiculina* Rafinesque; *Xananthes* Rafinesque.

Herbs, perennial or annual, terrestrial, epiphytic, or aquatic, without true roots. Stems modified into rhizoids and stolons, rarely developed. Traps on rhizoids, stolons, and/or leaves, small, bladderlike. Leaves alternate or in a basal rosette, simple to many × divided, veins 1–3, unbranched, dichotomously branched, or pinnately branched. Inflorescences racemose or flowers solitary, pedunculate, usually simple, seldom branched, erect to twining, bracteate; bracts and bracteoles often present, scalelike, sometimes basisolute (with base extending below point of insertion). Calyx parted from base into 2 equal or unequal lobes, lobes sometimes apically 2-parted. Corolla lower lip larger than upper lip; lower lip entire or 2- or 3(–6)-lobed, spurred, palate variously raised; upper lip entire or 2- or 3-lobed. Anther thecae confluent or distinct. Capsule adaxially loculicidal, both abaxially and adaxially loculicidal, or circumscissile, rarely indehiscent. Seeds few, many, or rarely 1 per capsule, variously appendaged.

About 220 species: cosmopolitan but mostly in tropical regions, a few in N temperate regions; 25 species (four endemic) in China.

This account is based largely on the work of P. Taylor (Kew Bull., Addit. Ser. 14: [i]–xi, 1–724. 1989), which should be consulted for a complete synonymy.

- 1a. Leaves divided into narrowly linear to capillary segments, ultimate segments (except *U. limosa*) bearing apical and often lateral solitary or fasciculate setulae; bracteoles absent; capsule globose or ellipsoid, not dorsiventrally compressed; seeds globose, lenticular, or prismatic.
  - 2a. Scales not present on peduncle; persistent style often equaling or exceeding capsule ..... 25. *U. aurea*
  - 2b. Scales present on peduncle; persistent style much less than 1/2 as long as capsule.
    - 3a. Scales and bracts basisolute; corolla lilac, violet, or white.
      - 4a. Lower corolla lip 2-lobed to ca. 1/2 its length; seeds globose, not winged; rhizoids present and capillary ..... 18. *U. limosa*
      - 4b. Lower corolla lip rounded to retuse; seeds lenticular, with a broad dentate wing; rhizoids apparently absent ..... 19. *U. punctata*
    - 3b. Scales and bracts basifixed; corolla yellow.
      - 5a. Turions (overwintering buds) absent; corolla with a few short stipitate glands; capsule laterally 2-valvate; seeds lenticular, with a broadly irregular wing ..... 20. *U. gibba*
      - 5b. Turions usually present; corolla without external stipitate glands; capsule circumscissile; seeds prismatic, (4 or)5- or 6-angled (unknown for *U. intermedia*).
        - 6a. Stolons all with green, many × divided leaves with traps, leaf segment capillary or slightly flattened.
          - 7a. Margins of lower corolla lip deflexed; palate hairy; bracts ovate ..... 21. *U. vulgaris*
          - 7b. Margins of lower corolla lip spreading; palate glabrous; bracts orbicular ..... 22. *U. australis*
        - 6b. Stolons dimorphic, bearing either green leaves with narrowly linear segments with few or no traps or bearing colorless much reduced leaves with traps.
          - 8a. Palate of lower corolla lip with a prominent rounded basal swelling; spur subulate, slightly shorter than lower corolla lip; rhizoids present and filiform ..... 23. *U. intermedia*
          - 8b. Palate of lower corolla lip without a prominent rounded swelling but much elongate with a raised marginal rim; spur saccate to obtusely broadly conic, ca. 1/2 as long as lower corolla lip; rhizoids absent ..... 24. *U. minor*
  - 1b. Leaves simple, orbicular to linear, glabrous, margin entire or rarely divided into broader lobes; bracteoles present; capsule globose, ovoid, or ellipsoid, often dorsiventrally compressed; seeds ovoid, obovoid, or ellipsoid, rarely globose.
    - 9a. Bracts and bracteoles basisolute, attached just above to below middle.
      - 10a. Leaves linear to narrowly obovate, vein 1; scales numerous; calyx lobes ± equal in size, upper lobe shorter than upper corolla lip.
        - 11a. Corolla violet, pink, or white, marked with yellow at throat, palate without hooked processes ..... 3. *U. caerulea*
        - 11b. Corolla pale bluish purple, palate with hooked processes ..... 4. *U. warburgii*
      - 10b. Leaves reniform, orbicular, or obovate, veins dichotomously branched; scales absent (seldom few in *U. striatula*); calyx lobes very unequal in size, upper lobe much longer than upper corolla lip.
        - 12a. Plant with a basal tuber.
          - 13a. Spur of corolla ± as long as or shorter than lower corolla lip; leaf blade 1–3 cm ..... 12. *U. brachiata*
          - 13b. Spur of corolla much longer than lower corolla lip; leaf blade 0.4–0.8 cm ..... 13. *U. forrestii*

- 12b. Plant without a basal tuber.
- 14a. Trap mouth with a dorsal deeply 2-cleft appendage; corolla spur subulate,  $\pm$  as long as lower corolla lip, apex acute ..... 17. *U. striatula*
- 14b. Trap mouth with a dorsal flabellate appendage; corolla spur cylindrical, much shorter than lower corolla lip, apex obtuse.
- 15a. Middle lobe of lower corolla lip rounded; spur ca.  $2 \times$  as long as upper calyx lobe ..... 16. *U. salwinensis*
- 15b. Middle lobe of lower corolla lip emarginate; spur as long as or slightly longer than upper calyx lobe.
- 16a. Lower corolla lip 5-lobed; seed papillae short, obtuse, tufts of sometimes long bristles at both ends; leaf blade membranous ..... 14. *U. kumaonensis*
- 16b. Lower corolla lip 3-lobed; seed papillae relatively long, acute, a tuft of short bristles at distal end only; leaf blade fleshy ..... 15. *U. multicaulis*
- 9b. Bracts and bracteoles basifixed.
- 17a. Bracteoles similar to or slightly narrower than bracts.
- 18a. Scales present.
- 19a. Inflorescences and calyx glabrous; plants annual ..... 1. *U. minutissima*
- 19b. Inflorescences and calyx  $\pm$  densely covered with multicellular hairs; plants perennial ..... 2. *U. hirta*
- 18b. Scales absent.
- 20a. Leaves entire; bracts and bracteoles shortly connate to base; corolla yellowish, spur apex obtuse ..... 10. *U. peranomala*
- 20b. Larger leaves pinnately divided or lobed, smaller leaves entire; bracts and bracteoles not connate; corolla white, with a yellow dot at throat, spur apex 2-lobed ..... 11. *U. mangshanensis*
- 17b. Bracteoles much less than 1/4 as wide as bracts.
- 21a. Corolla yellow.
- 22a. Peduncle erect; pedicel strongly recurved in fruit; upper calyx lobe shorter than upper corolla lip, apex obtuse ..... 5. *U. bifida*
- 22b. Peduncle twining to erect; pedicel erect in fruit; upper calyx lobe longer than upper corolla lip, apex shortly acuminate ..... 8. *U. scandens*
- 21b. Corolla violet, mauve, lilac, or white.
- 23a. Peduncle twining; pedicel strongly deflexed in fruit ..... 9. *U. foveolata*
- 23b. Peduncle erect; pedicel erect to spreading in fruit.
- 24a. Fruiting pedicel as long as or shorter than fruiting calyx; calyx lobes suborbicular in fruit; seeds globose, with isodiametric reticulations; leaf blade 2.5–4.5 cm  $\times$  1.5–6 mm ..... 6. *U. uliginosa*
- 24b. Fruiting pedicel much longer than fruiting calyx; calyx lobes ovate in fruit; seeds ovoid to ellipsoid, with elongate reticulations; leaf blade 0.4–2 cm  $\times$  0.8–3 mm ..... 7. *U. graminifolia*

**1. *Utricularia minutissima* Vahl, Enum. Pl. 1: 204. 1804.**

斜果挖耳草 xie guo wa er cao

*Utricularia brevilabris* Lace; *U. brevilabris* var. *parviflora* Pellegrin; *U. evardii* Pellegrin; *U. lilliput* Pellegrin; *U. nigri-caulis* Ridley; *U. nipponica* Makino; *U. siamensis* Ostenfeld.

Annuals, terrestrial. Rhizoids capillary, simple. Stolons capillary, sparsely branched. Traps on rhizoids, stolons, and leaves, stalked, ovoid, ca. 0.2 mm, mouth lateral; appendage 1, dorsal, subulate, with 1 or 2 ventral pairs of trichome rows. Leaves few, from peduncle base and stolons, glabrous; leaf blade narrowly obovate to linear, 0.3–2 cm  $\times$  0.4–0.8 mm, membranous, vein 1, base attenuate onto petiole, margin entire, apex slightly obtuse. Inflorescences erect, 3–12 cm, 1–10-flowered, glabrous; peduncle terete, 0.2–0.4 mm thick; scales few, similar to bracts; bracts basifixed, narrowly ovate, 0.5–1 mm, apex acute. Pedicel erect,  $\pm$  as long as bracts, filiform; bracteoles similar to bracts but sometimes narrower or less acute. Calyx lobes convex, 1.5–2 mm, subequal, glabrous; lower lobe apex emarginate; upper lobe ovate, apex obtuse. Corolla violet

or white, 3–7 mm; lower lip suborbicular, base with a rounded 4-lobed swelling, margin distinctly 3-lobed; spur subulate, much longer than lower corolla lip, apex acute; upper lip oblong to obovate, apex emarginate to rounded. Filaments ca. 0.8 mm, slightly curved; anther thecae distinct. Ovary ovoid; style short; stigma lower lip transversely elliptic, upper lip deltoid. Capsule obliquely ellipsoid, 1.5–2 mm, dehiscing by a single longitudinal ventral slit. Seeds globose to broadly ellipsoid, 2–3 mm; seed coat with prominent reticulations. Fl. Sep–Nov, fr. Nov–Dec.  $2n = 16$ .

Sandy soil in open areas, grassy places, wet rocks; near sea level. Fujian, S Guangdong, Guangxi, S Jiangsu, Jiangxi [Cambodia, India, Indonesia, S Japan, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; N Australia].

**2. *Utricularia hirta* Klein ex Link, Jahrb. Gewächsk. 1(3): 55. 1820.**

毛挖耳草 mao wa er cao

*Utricularia hirta* var. *elongata* Pellegrin; *U. tayloriana* J. Joseph & Mani.

Probably perennials, terrestrial. Rhizoids capillary; stolons capillary, sparsely branched. Traps on rhizoids, stolons, and leaves, ovoid, ca. 0.2 mm, long stalked, with 1 or 2 ventral pairs of rows of gland-tipped hairs, mouth lateral; appendage 1, dorsal, subulate. Leaves few from stolons, 0.8–1.5 cm × 0.3–0.5 mm, glabrous; leaf blade narrowly obovate, membranous, 1-veined, base attenuate onto long petiole, margin entire, apex rounded. Inflorescences erect, 5–15 cm, 1–6-flowered, ± densely covered with multicellular hairs; peduncle terete, 0.2–0.5 mm thick; scales few, similar to bracts; bracts basifixed, narrowly ovate-deltoid, 0.5–1 mm. Pedicel erect, filiform, longer than bracts; bracteoles subulate, as long as or longer than bracts. Calyx lobes subequal, 1.5–2 mm, with dense hairs; lower lobe slightly larger, apex truncate to emarginate; upper lobe ovate, apex obtuse. Corolla violet or white, 4–8 mm; lower lip subcircular, base with a rounded 4-lobed swelling, apex 3-lobed; upper lip oblong from a deltoid base, apex ± emarginate; palate inside shortly pubescent; spur subulate, much longer than lower lip, apex subacute. Filaments 0.5–0.6 mm, curved; anther thecae subdistinct. Ovary ovoid; style short; stigma lower lip subcircular, upper lip much smaller and deltoid. Capsule obliquely ovoid, 1.5–2 mm, dehiscent by a single longitudinal ventral slit. Seeds ovoid, ca. 0.2 mm; testa with prominent reticulations. Fl. Sep–Nov, fr. Nov–Dec.

Wet open grassy places, wet rocks; near sea level. S Guangxi (Nanning) [Bangladesh, Cambodia, India, Laos, Malaysia, Sri Lanka, Thailand, Vietnam].

### 3. *Utricularia caerulea* Linnaeus, Sp. Pl. 1: 18. 1753.

短梗挖耳草 duan geng wa er cao

*Calpidisca tatenakae* Nakai; *Utricularia albiflora* Griffith (1854), not R. Brown (1810); *U. albina* Ridley; *U. caerulea* var. *filicaulis* (Wallich ex A. Candolle) Haines; *U. capillaris* D. Don; *U. cavaleriei* Stapf; *U. filicaulis* Wallich ex A. Candolle; *U. filicaulis* var. *papillosa* Pellegrin; *U. kerrii* Craib; *U. nivea* Vahl; *U. obtusiloba* Benjamin; *U. ophirensis* Ridley; *U. racemosa* Wallich ex Walpers; *U. racemosa* var. *filicaulis* (Wallich ex A. Candolle) C. B. Clarke; *U. rosea* Edgeworth; *U. roseo-purpurea* Stapf ex Gamble; *U. sampathii* Subramanyam & Yoganarasimhan; *U. sootepensis* Craib; *U. squamosa* Benjamin.

Annuals, terrestrial. Rhizoids and stolons capillary, branched. Traps on stolons and leaves, stalked, ovoid, 0.2–1 mm, with stipitate glands on appendage and mouth margin, mouth lateral; appendage 1, dorsal, subulate, beaklike. Leaves numerous, from peduncle base and stolon nodes, glabrous; leaf blade linear to linear-obovate, 0.3–2 cm × 0.5–2 mm, membranous, veins 3, base attenuate onto petiole, margin entire, apex rounded. Inflorescences erect, 5–44 cm, 1–15-flowered, glabrous; peduncle terete, 0.3–1.2 mm thick; scales 1–12, similar to bracts; bracts basisolate, oblanceolate, 1.5–3 mm, base cuneate, apex acute. Pedicel erect at anthesis but spreading to deflexed in fruit, 0.2–1 mm, minutely papillose; bracteoles basisolate, ovate-lanceolate, 1–2 mm. Calyx lobes minutely papillose, glabrous; lower lobe suborbicular, smaller than upper lobe, apex retuse; upper lobe ovate-oblong, 2–3 mm, apex rounded. Corolla violet, pink, or white, marked with yellow at throat, 4–10 mm; lower lip broadly ovate, with a basal 4-ridged swelling,

apex rounded to emarginate; spur narrowly conic, usually longer than lower corolla lip, apex subacute; upper lip oblong to ovate-oblong, apex retuse. Filaments 1–2 mm, straight; anther thecae ± distinct. Ovary globose; style short; stigma lower lip semicircular, upper lip deltoid. Capsule globose to ellipsoid, 1.5–2 mm, dehiscent by a short longitudinal ventral slit. Seeds obovoid to oblong-ellipsoid, 0.2–0.3 mm; seed coat with prominent elongate reticulations and conic to clavate papillae. Fl. Jun–Jan, fr. Jul–Feb.  $2n = 36, 40$ .

Wet rocks, beside streams, wet grassland, swamps, damp places; near sea level to 2000 m. S Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Shandong, Taiwan, Yunnan [Bangladesh, Cambodia, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Madagascar, Pacific islands (Guam, Palau)].

Reports of *Utricularia caerulea* from Anhui, Jiangsu, Jiangxi, Sichuan, and Zhejiang (Z. Yu Li, FRPS 69: 594. 1990; S. R. Chen, Higher Pl. China 10: 440. 2004) are in fact *U. warburgii*.

### 4. *Utricularia warburgii* K. I. Goebel, Ann. Jard. Bot. Buitenzorg 9: 64. 1890.

钩突耳草 gou tu er cao

Annuals, terrestrial. Rhizoids capillary, simple. Stolons capillary, branched. Traps on stolons and leaves, stalked, ovoid, 0.5–1 mm, with numerous stipitate glands on appendage and mouth margin, mouth lateral; appendage 1, dorsal, narrowly oblong-obovate, beaklike, apex obtuse. Leaves numerous, from peduncle base and stolon nodes, glabrous; leaf blade narrowly obovate-cuneate, 1–1.5 cm × 1.2–1.5 mm, membranous, vein 1, base attenuate onto petiole, margin entire, apex rounded. Inflorescences erect, 5–17 cm, (1 or) 2–6-flowered, glabrous; peduncle terete, 0.3–0.4 mm thick; scales few, similar to bracts; bracts basisolate, ovate, ca. 1.3 mm, base truncate, margin denticulate, apex obtuse. Pedicel erect at anthesis and in fruit, 0.7–1 mm, minutely papillose; bracteoles basisolate, oblong, slightly shorter than bracts, base rounded to obliquely truncate, apex acute. Calyx lobes slightly convex, 2–3 mm, subequal, minutely papillose, glabrous; lower lobe oblong, apex emarginate; upper lobe broadly ovate, apex rounded. Corolla pale bluish purple, 6–8 mm; lower lip transversely elliptic, base with a conspicuous swelling, apex rounded; spur subulate, somewhat longer than lower corolla lip; palate with 2 curved hornlike processes; upper lip obovate-cuneate, apex emarginate. Filaments ca. 1 mm, straight; anther thecae ± distinct. Ovary ovoid; style short; stigma lower lip semicircular, upper lip deltoid. Capsule globose to ellipsoid, 1.8–2.2 mm, dehiscent by a short longitudinal ventral slit. Seeds obovoid, 0.2–0.3 mm; seed coat with prominent elongate reticulations and clavate papillae. Fl. May–Sep, fr. Jul–Oct.

• Wet grasslands, wet rocks; 800–2000 m. Anhui, Chongqing, Fujian, S Jiangsu, Jiangxi, Zhejiang.

### 5. *Utricularia bifida* Linnaeus, Sp. Pl. 1: 18. 1753.

挖耳草 wa er cao

*Philydrum cavaleriei* H. Lévillé; *Utricularia alata* Benjamin; *U. biflora* Hayata (1911), not Lamarck (1791); *U. hu-*

*milis* Vahl; *U. recurva* Loureiro; *U. wallichiana* Benjamin.

Annuals, terrestrial. Rhizoids and stolons capillary, branched. Traps on stolons and leaves, shortly stalked, globose, 0.5–1 mm, mouth basal; appendages 2, dorsal, subulate, curved. Leaves arising from stolon nodes, few to numerous, petiolate; leaf blade narrowly linear to linear-oblong, 0.7–2(–3) cm × 1–4 mm, membranous, glabrous, vein 1, base attenuate, margin entire, apex rounded to subacute. Inflorescences erect, 2–40 cm, 1–16-flowered, glabrous; peduncle terete, 0.3–1.2 mm thick; scales few, similar to bracts; bracts basifixed, ovate, 1–2 mm, apex obtuse to acute. Pedicel spreading at anthesis but decurved in fruit, 2–5 mm, capillary, broadly winged; bracteoles subulate, much shorter than bracts, apex acute. Calyx lobes 3–4 mm at anthesis but 5–6 mm in fruit, glabrous; lower lobe ovate, slightly smaller than upper lobes, apex rounded to emarginate; upper lobe broadly ovate, apex obtuse. Corolla yellow, 6–10 mm; lower lip suborbicular, base with a prominent rounded swelling, apex rounded; spur subulate, ± as long as lower corolla lip, widely divergent, curved, apex acute; palate margin ciliate; upper lip oblong to oblong-obovate, apex rounded. Filaments ca. 1 mm, straight; anther thecae distinct. Ovary ovoid, dorsiventrally compressed; style evident; stigma lower lip semicircular, upper lip obtuse. Capsule broadly ellipsoid, 2.5–3 mm, dorsiventrally compressed, dehiscing by longitudinal dorsal and ventral slits. Seeds obliquely obovoid, 0.4–0.6 mm; seed coat with prominent elongate reticulations. Fl. Jun–Dec, fr. Jul–Jan.

Wet soil and rocks, rice fields; near sea level to 1400 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Taiwan, Yunnan, Zhejiang [Bangladesh, Cambodia, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; N Australia, Pacific islands (Guam, Palau)].

**6. *Utricularia uliginosa* Vahl, Enum. Pl. 1: 203. 1804.**

齿萼挖耳草 chi e wa er cao

*Utricularia affinis* Wight; *U. brachypoda* Wight; *U. caerulea* Linnaeus var. *affinis* (Wight) Thwaites; *U. decipiens* Dalzell; *U. elachista* K. I. Goebel; *U. griffithii* Wight; *U. lilacina* Griffith; *U. macrophylla* Masamune & Syozi; *U. nayarii* Janarthanam & A. N. Henry; *U. reticulata* Smith var. *uliginosa* (Vahl) C. B. Clarke; *U. yakusimensis* Masumune.

Annuals, terrestrial. Rhizoids and stolons capillary, branched. Traps on rhizoids, stolons, and leaves, stalked, globose, 1–1.5 mm, glandular, mouth basal; appendages 2, dorsal, subulate, stipitate. Leaves few to numerous, at stolon nodes, glabrous; leaf blade linear to narrowly obovate, 2.5–4.5 cm × 1.5–6 mm, membranous, veins 3, base attenuate onto petiole, margin entire, apex rounded to acute. Inflorescences erect, 3–12 cm, 1–10-flowered, glabrous; peduncle slightly angular, 0.2–0.5 mm thick; scales few, similar to bracts; bracts basifixed, narrowly ovate, 0.8–1 mm, apex acute. Pedicel suberect, 1–1.5 mm at anthesis but to 5 mm in fruit, filiform, narrowly winged; bracteoles narrowly linear to subulate, slightly shorter than bract, apex acute. Calyx lobes broadly ovate to suborbicular, 2.5–5 mm, margin minutely denticulate; lower lobe slightly

smaller than upper lobe, apex emarginate; upper lobe apex obtuse to subacute. Corolla lilac, violet, or white, 3–7 mm; lower lip suborbicular, base much swollen, apex rounded to emarginate; spur subulate, ± as long as lower corolla lip, widely divergent, apex acute; palate with a ciliate marginal rim; upper lip oblong, scarcely longer than upper calyx lobe, apex rounded to emarginate. Filaments ca. 1 mm, straight; anther thecae distinct. Ovary ovoid, dorsiventrally compressed; style short but evident; stigma lower lip semicircular, upper lip obsolete. Capsule ovoid, 2–4 mm, dorsiventrally compressed, dehiscing by dorsal and ventral longitudinal slits. Seeds subglobose, 0.3–0.4 mm in diam.; seed coat with prominent isodiametric reticulations. Fl. Jun–Oct, fr. Jul–Nov.

Swamps, streamsides, rice fields; near sea level to 400 m. S Guangdong, Hainan, Taiwan [India, Indonesia, S Japan, Korea, Malaysia, Myanmar, Papua New Guinea, Sri Lanka, Thailand, Vietnam; Australia, Pacific islands (Guam, New Caledonia, Palau)].

The report of *Utricularia uliginosa* from Yunnan (C. Y. Wu, Index Fl. Yunnan. 2: 1636. 1984; H. Li, Fl. Yunnan. 4: 740. 1986) is in fact *U. graminifolia*.

**7. *Utricularia graminifolia* Vahl, Enum. Pl. 1: 195. 1804.**

禾叶挖耳草 he ye wa er cao

*Utricularia caerulea* Linnaeus var. *graminifolia* (Vahl) P. K. Bhattacharyya; *U. conferta* Wight; *U. equiseticaulis* Blatter & McCann; *U. parviflora* Buchanan-Hamilton ex Smith; *U. pedicellata* Wight; *U. purpurascens* Graham; *U. subrecta* Lace; *U. uliginoides* Wight.

Perennials or perhaps sometimes annuals, terrestrial. Rhizoids and stolons capillary, branched. Traps on rhizoids, stolons, and leaves, stalked, globose, 0.5–1.3 mm, mouth basal; appendages 2, dorsal, simple, subulate. Leaves numerous, from stolon nodes, glabrous; leaf blade linear to narrowly obovate, 0.4–2 cm × 0.8–3 mm, membranous, veins 3, base attenuate onto petiole, margin entire, apex rounded to subacute. Inflorescences erect, 2.5–30 cm, 1–6-flowered, glabrous; peduncle terete, 0.4–1 mm thick; scales few to many, similar to bracts; bracts basifixed, ovate, 2–2.5 mm, apex acuminate. Pedicel ascending, 3–13 mm, filiform, narrowly winged; bracteoles basifixed, subulate, slightly shorter than bracts. Calyx lobes ovate, 3.5–6 mm; lower lobe slightly smaller than upper lobe, apex shortly 2-dentate; upper lobe apex acute to acuminate. Corolla mauve to violet, 0.7–1.3 cm; lower lip suborbicular, base with a conspicuous swelling, apex rounded; spur subulate, ± as long as lower corolla lip and widely diverging from it, straight or slightly curved; palate with a raised ciliate margin; upper lip oblong, apex rounded. Filaments ca. 1.5 mm, straight; anther thecae distinct. Ovary ovoid; style evident; stigma lower and upper lips semicircular. Capsule ellipsoid, 2–3 mm, slightly dorsiventrally compressed, dehiscing by a longitudinal ventral slit. Seed ovoid to ellipsoid, 0.3–0.4 mm; seed coat with prominent elongate reticulations. Fl. May–Dec, fr. Jun–Jan.

Marshes, swamps, streamsides, wet soil among rocks; 100–2100 m. S Fujian, Guangdong, Yunnan [India, Myanmar, Sri Lanka, Thailand].

**8. *Utricularia scandens* Benjamin, Linnaea 20: 309. 1847.**

缠绕挖耳草 chan rao wa er cao

Annuals, terrestrial. Rhizoids and stolons capillary, branched. Traps on rhizoids, stolons, and leaves, stalked, globose, 0.5–1 mm, mouth basal; appendages 2, dorsal, simple, subulate, glandular. Leaves few to many, glabrous; leaf blade narrowly linear, 5–10 × 0.4–1 mm, membranous, vein 1, base attenuate onto petiole, margin entire, apex rounded to subacute. Inflorescences erect or twining, 1.5–35 cm, (1–)3–8-flowered, glabrous; peduncle terete but somewhat angular, 0.2–0.6 mm thick; scales few to numerous, similar to bracts; bracts basifixed, broadly ovate-deltoid, 0.5–1.5 mm, apex acute to acuminate. Pedicel suberect, 2.5–3 mm, filiform, winged; bracteoles basifixed, narrowly linear to subulate, as long as or slightly shorter than bracts, apex acute. Calyx lobes ovate to elliptic, 2–3 mm at anthesis, to 5 mm in fruit; lower lobe subequal to or slightly smaller than upper lobe, apex shortly 2-cleft; upper lobe apex acute to acuminate. Corolla yellow, 5–11 mm; lower lip suborbicular, base distinctly swollen, apex rounded to obscurely crenate; spur subulate, longer than lower corolla lip, widely divergent, curved or straight, apex acute; palate papillose; upper lip oblong, apex rounded to emarginate. Filaments ca. 1 mm, straight; anther thecae distinct. Ovary ovoid, dorsiventrally compressed; style short; stigma lower and upper lips semicircular. Capsule ovoid, 2–2.5 mm, dorsiventrally compressed, dehiscing by a longitudinal ventral slit. Seeds obliquely obovoid, 0.2–0.3 mm; seed coat with prominent elongate reticulations. Fl. Jun–Sep, fr. Jul–Oct.

Bogs, marshes, meadows, swamps, ponds, wet rocks, along streams among grass; 700–2900 m. SW Guizhou, NW and S Yunnan [Bangladesh, Bhutan, India, Indonesia (Papua Barat), Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Sri Lanka, Thailand, Vietnam; Africa, N Australia, Madagascar].

- 1a. Inflorescences twining to erect; calyx lobes subequal, ovate at anthesis and in fruit ..... 8a. subsp. *scandens*
- 1b. Inflorescences erect; calyx lobes unequal, upper lobe broadly ovate at anthesis, becoming rhombic-elliptic in fruit, lower lobe ovate-elliptic at anthesis, becoming ovate-oblong in fruit ..... 8b. subsp. *firmula*

**8a. *Utricularia scandens* subsp. *scandens***

缠绕挖耳草(原亚种) chan rao wa er cao (yuan ya zhong)

*Utricularia bifida* Linnaeus var. *wallichiana* Thwaites; *U. macrolepis* Wight; *U. wallichiana* Wight (1850) not Benjamin (1845); *U. wallichii* Wight.

Inflorescences twining to erect. Calyx lobes subequal, ovate at anthesis and in fruit. Fl. Aug–Sep, fr. Sep–Oct.  $2n = 12, 14$ .

Bogs, meadows, ponds; 700–800 m. SW Guizhou, S Yunnan [Bangladesh, India, Indonesia (Papua Barat), Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Sri Lanka, Thailand, Vietnam; Africa, N Australia, Madagascar].

**8b. *Utricularia scandens* subsp. *firmula* (Oliver) Z. Yu Li, Bull. Bot. Res., Harbin 8(2): 29. 1988.**

尖萼挖耳草 jian e wa er cao

*Utricularia wallichiana* var. *firmula* Oliver, J. Proc. Linn. Soc., Bot. 3: 182. 1859; *U. recta* P. Taylor; *U. scandens* var. *firmula* (Oliver) Subramanyam & Banerjee.

Inflorescences erect. Calyx lobes unequal; lower lobe ovate-elliptic at anthesis, becoming ovate-oblong in fruit; upper lobe broadly ovate at anthesis, becoming rhombic-elliptic in fruit. Fl. Jun–Aug, fr. Jul–Sep.

Bogs, marshes, swamps, wet rocks, along streams among grass; 1300–2900 m. NW Yunnan [Bhutan, N and NE India, N Myanmar?, Nepal].

P. Taylor (Kew Bull., Addit. Ser. 14: 382–384. 1989) treated *Utricularia scandens* subsp. *firmula* as a distinct species, *U. recta*.

**9. *Utricularia foveolata* Edgeworth, Proc. Linn. Soc. London 1: 351. 1847.**

海南挖耳草 hai nan wa er cao

*Utricularia baouleanensis* A. Chevalier; *U. scandens* Oliver (1859), not Benjamin (1847); *U. tenerrima* Merrill.

Annuals, terrestrial. Rhizoids and stolons capillary, branched. Traps on stolons and leaves, shortly stalked to sessile, globose, 0.8–1.2 mm, mouth basal; appendages 2, dorsal, filiform-subulate, sparsely branched, stipitate, glandular. Leaves few, from stolon nodes, petiolate, glabrous; leaf blade linear, 1–3 cm × 0.4–1 mm, membranous, vein 1, base attenuate onto petiole, margin entire, apex acute to rounded. Inflorescences twining, 15–20 cm, 2–5-flowered, glabrous; peduncle terete, 0.2–0.5 mm thick; scales few, similar to bracts; bracts basifixed, ovate to ovate-oblong, ca. 1.2 mm, apex obtuse to shortly acuminate. Pedicel erect to spreading at anthesis but sharply deflexed in fruit, 2–4 mm, filiform, dorsiventrally flattened and narrowly winged; bracteoles linear-subulate, ca. 1/2 as long as bracts, apex acute. Calyx lobes ovate, 2–4 mm; lower lobe slightly longer and narrower than upper lobe, apex obtuse to subacute. Corolla pale mauve, 3–4 mm; lower lip suborbicular, galeate, basal swelling obscurely 2-lobed, apex entire or obscurely 3-crenate; spur narrowly conic, slightly longer than lower corolla lip, apex obtuse; palate with a scarcely raised minutely ciliate rim; upper lip oblong, slightly longer than calyx, apex truncate. Filaments ca. 1 mm, straight; anther thecae ± distinct. Ovary ovoid; style short but evident; stigma lower lip semicircular, upper lip truncate. Capsule broadly ovoid, ca. 4 mm, slightly dorsiventrally compressed, dehiscing by a single longitudinal ventral slit. Seeds obliquely ovoid to ellipsoid, ca. 0.3 mm; seed coat with prominent elongate reticulations. Fl. Oct–Nov, fr. Nov–Dec.  $2n = 20$ .

Wet grasslands, rice fields; near sea level. Hainan [Bangladesh, India, Indonesia, Philippines, Thailand; tropical Africa, NE Australia, Madagascar].

**10. *Utricularia peranomala* P. Taylor, Kew Bull. 41: 12. 1986.**

合苞挖耳草 he bao wa er cao

Annuals, lithophytic. Stolons and rhizoids capillary, simple. Traps on stolons or leaf blades near margin, shortly stalked, ovoid, ca. 1 mm, mouth lateral; appendages 2, dorsal, subulate, simple, with sessile glands. Leaves few, from peduncle base, glabrous; leaf blade narrowly obovate to linear, 8–10 × 1–1.5

mm, membranous, veins pinnate, base attenuate onto petiole, margin entire, apex rounded. Inflorescences erect, 1.5–2.5 cm, 1- or 2-flowered, glabrous; peduncle terete, ca. 0.3 mm thick; scales absent; bracts basifixed, broadly ovate, ca. 0.5 mm, base shortly connate, apex rounded. Pedicel erect at anthesis but apically decurved in fruit, 2–7 mm, filiform, slightly dorsiventrally compressed; bracteoles basifixed, oblong,  $\pm$  as long as bracts, apex rounded. Calyx lower lobe ovate to oblong, smaller than upper lobe, apex rounded; upper lobe broadly ovate, 1.5–2 mm, apex obtuse. Corolla yellowish, 4–6 mm; lower lip broadly flabellate to transversely elliptic, base with a 4-lobed swelling, apex rounded to retuse; spur subulate, slightly longer than corolla lower lip, almost straight, apex obtuse; palate with a slightly raised ring, fringed with short hairs; upper lip oblong, slightly longer than upper calyx lobe, apex truncate. Filaments ca. 0.6 mm, slightly curved; anther thecae distinct. Ovary globose; style short but evident; stigma lower lip circular, upper lip oblong. Capsule globose, ca. 2.5 mm, dehiscent by a single longitudinal ventral slit. Seeds narrowly ellipsoid-fusiform, ca. 1 mm, curved or straight; seed coat with prominent very elongate reticulations. Fl. Jul–Aug, fr. Aug.

- Wet rocks among moss. NE Guangxi (Ziyuan).

*Utricularia peranomala* is known only from the type collection (T. S. Tsoong 83427), which does not record the elevation.

**11. *Utricularia mangshanensis*** G. W. Hu, Ann. Bot. Fenn. 44: 389. 2007.

莽山挖耳草 mang shan wa er cao

Annuals, bryophilous lithophytes. Rhizoids short, simple; stolons capillary, simple or branched near terminal. Leaves numerous, from peduncle base and stolon nodes, 0.8–2.2 cm  $\times$  1–2.5 mm, glabrous, petiolate or sessile; leaf blade linear to obovate, membranous, pinnately veined, base attenuate, margin entire or on larger leaves irregularly and pinnately parted or lobed, apex rounded. Traps on stolons or near leaf blade margins, ovoid, 0.6–0.9 mm, stalked, mouth lateral; appendages 2, dorsal, subulate, simple. Inflorescences erect, 3–6 cm, 1- or 2- (or 3)-flowered, glabrous; peduncle terete, 0.4–0.7 mm thick; scales absent; bracts basifixed, broadly ovate, ca. 0.8 mm, apex rounded. Pedicel filiform, 0.6–1.3 cm, ascending at anthesis; bracteoles basifixed, oblong, slightly narrower than bracts, apex rounded. Calyx lobes unequal; lower lobe ovate to elliptic-oblong, apex usually emarginate; upper lobe broadly ovate or cordate, 1.5–2 mm, apex acute. Corolla white with a yellow dot at throat; lower lip broadly flabellate or axelike, slightly undulate, apex rounded; spur subulate, 3.5–5 mm, slightly curved upward, apex unequally 2-lobed; upper lip ovate-oblong, equal to or slightly longer than upper calyx lobe, apex truncate; palate with dense short hairs. Filaments ca. 0.6 mm, curved; anther thecae distinct. Ovary globose; style short but distinct; stigma lower lip circular, upper lip ovate-oblong and much smaller. Capsule and seeds unknown. Fl. Apr–May.

- Among moss on wet cliffs; 700–800 m. Hunan (Yizhang).

**12. *Utricularia brachiata*** Oliver, J. Proc. Linn. Soc., Bot. 3: 187. 1859.

肾叶挖耳草 shen ye wa er cao

Perennials, lithophytic. Tuber 1, at peduncle base, globose to ellipsoid, 1–2 mm. Rhizoids and stolons capillary, simple. Traps on rhizoids and stolons, stalked, ovoid, ca. 1 mm, mouth lateral; appendage 1, dorsal, transversely elliptic to flabellate, fringed with multicellular stipitate glands. Leaves few, from tuber, glabrous; leaf blade reniform, 1–3 cm  $\times$  2.5–6 mm, membranous, veins dichotomously branched, base cordate and attenuate onto long petiole, margin entire, apex rounded to emarginate. Inflorescences erect, 3–8 cm, 1- or 2-flowered, glabrous; peduncle terete, 0.2–0.4 mm thick; scales absent; bracts basisolate, oblong, ca. 1.5 mm, base truncate to emarginate, margin erosely denticulate, apex rounded. Pedicel spreading, 2–8 mm, filiform, dorsiventrally compressed; bracteoles basisolate, similar to bracts. Calyx lobes 3–4 mm, glabrous; lower lobe oblong, much smaller than upper lobe, apex emarginate; upper lobe orbicular, apex emarginate. Corolla white, with a yellow spot at base of lower lip and violet streaks on upper lip; lower lip suborbicular, distinctly 5-lobed; spur narrowly cylindrical, 2 or more  $\times$  as long as upper calyx lobe, apex obtuse; palate with a slightly raised rim, fringed with moniliform hairs; upper lip much shorter than upper calyx lobe, apex 2-lobed. Filaments ca. 0.5 mm, curved; anther thecae  $\pm$  distinct. Ovary globose; style very short; stigma lower lip circular, upper lip obsolete. Capsule globose with a ventral keel, ca. 2.5 mm, dehiscent by a longitudinal ventral slit. Seeds ovoid, ca. 0.5 mm, with a tuft of hairs of variable length at each end usually  $\pm$  as long as body of seed and a few shorter hairs on distal surface. Fl. Jul–Sep, fr. Aug–Oct.

Forests among bryophytes on rocks; 2600–4200 m. W Sichuan, SE Xizang, N Yunnan [Bhutan, N India, N Myanmar, Nepal].

**13. *Utricularia forrestii*** P. Taylor, Kew Bull. 41: 13. 1986.

长距挖耳草 chang ju wa er cao

Perennials, lithophytic. Tuber 1, at peduncle base, globose, 1–2 mm. Rhizoids and stolons capillary, simple. Traps on rhizoids and stolons, stalked, ovoid, ca. 1 mm, mouth lateral; appendage 1, dorsal, broadly flabellate, fringed with multicellular stipitate glands. Leaves few, from a short vertical stem between tuber and peduncle base, glabrous; leaf blade broadly obovate, orbicular, or reniform, 4–8  $\times$  1–3 mm, membranous, veins dichotomously branched, base broadly cuneate to subcordate, margin entire, apex rounded. Inflorescences erect, 2–4 cm, 1- or 2-flowered, glabrous; peduncle terete, 0.2–0.3 mm thick; scales absent; bracts basisolate, narrowly ovate, ca. 1 mm, base truncate, apex subacute. Pedicel spreading, 2–8 mm, filiform, dorsiventrally compressed; bracteoles basisolate, similar to bracts. Calyx lobes glabrous; lower lobe oblong to obovate, much smaller than upper lobe, apex emarginate; upper lobe orbicular to broadly transversely elliptic, 2–3 mm, apex emarginate. Corolla mauve to violet, 1.2–1.5 cm; lower lip suborbicular, apex 3-lobed  $\pm$  to middle, lobes retuse to shortly 2-cleft; spur filiform, 0.9–1.5 cm, much longer than corolla lower lip, curved; palate with a slightly raised rim fringed with hairs; upper lip suborbicular, shorter than upper calyx lobe, apex shortly 2-lobed. Filaments ca. 0.5 mm, curved; anther thecae  $\pm$  distinct. Ovary ovoid; style very short; stigma lower lip suborbicular, upper lip obsolete. Capsule globose, ca. 2 mm, with a ventral keel, dehiscent by a single longitudinal ventral slit. Seeds nar-

rowly elliptic, ca. 0.5 mm, with a hollow obscurely apically dentate multicellular appendage at each end. Fl. Jul–Aug, fr. Aug–Sep.

Among moss on rocks; 2100–3000 m. W Yunnan [N Myanmar].

**14. *Utricularia kumaonensis*** Oliver, J. Proc. Linn. Soc., Bot. 3: 189. 1859.

毛籽挖耳草 mao zi wa er cao

*Diurospermum album* Edgeworth (1847), not *Utricularia alba* Hoffmannsegg ex Link (1820).

Annuals, epiphytic, lithophytic, or terrestrial. Rhizoids and stolons capillary, simple. Traps on rhizoids and stolons, stalked, ovoid, ca. 1 mm, mouth lateral; appendage 1, dorsal, flabellate, fringed with multicellular stipitate glands. Leaves few, rosulate at peduncle base, petiolate, glabrous; leaf blade broadly obovate, orbicular, or reniform, 2–6 × 1.5–3 mm, membranous, veins dichotomously branched, base broadly cuneate, margin entire, apex rounded. Inflorescences erect, 2–7 cm, 1–3-flowered, glabrous; peduncle terete, 0.2–0.3 mm thick; scales absent; bracts basisolute, ovate-oblong, ca. 0.5 mm, base truncate, apex obtuse. Pedicel erect at anthesis but decurved in fruit, terete, 2–6 mm, filiform; bracteoles basisolute, similar to bracts. Calyx lower lobe oblong, much smaller than upper lobe, apex truncate and emarginate to erose; upper lobe obovate, ca. 2 mm, base rounded, apex deeply 2-parted. Corolla white, with a basal yellow spot and mauve lobes on lower lip, 3–5(–7) mm; lower lip suborbicular, 5-lobed, middle lobe much larger than lateral lobes; spur broadly cylindrical, ± as long as upper calyx lobe, slightly curved, apex obtuse; palate with a slightly raised rim, fringed with short hairs; upper lip subquadrate, ca. 1/2 as long as upper calyx lobe, apex truncate to obscurely 2-lobed. Filaments ca. 0.5 mm, curved; anther thecae distinct. Ovary globose; style very short; stigma lower lip circular, upper lip nearly obsolete. Capsule obliquely ovoid, 2–2.5 mm, dehiscing by a single longitudinal ventral slit. Seeds few per capsule, ellipsoid, ca. 0.5 mm, with a tuft of hairs at each end, hairs usually longer than body of seed. Fl. Jul–Aug, fr. Aug–Sep.

Among moss on rocks, cliffs, fallen trees; 2600–2700 m. NW Yunnan [Bhutan, N India, N Myanmar, Nepal].

**15. *Utricularia multicaulis*** Oliver, J. Proc. Linn. Soc., Bot. 3: 188. 1859.

多序挖耳草 duo xu wa er cao

Annuals, terrestrial or lithophytic. Rhizoids and stolons capillary, simple. Traps on rhizoids and stolons, shortly stalked, ovoid, ca. 1 mm, mouth lateral; appendage 1, dorsal, flabellate, fringed with multicellular stipitate glands. Leaves few, rosulate at peduncle base, long petiolate, glabrous; leaf blade obovate, 2–8 × 1–1.5 mm, rather fleshy, veins dichotomously branched, base attenuate, margin entire, apex rounded. Inflorescences erect, 1–5 cm, 1–3-flowered, glabrous; peduncle terete, 0.3–0.4 mm thick; scales absent; bracts basisolute, oblong, 0.6–1.2 mm, base truncate, apex obtuse to acute. Pedicel spreading at anthesis but decurved and distally thickened in fruit, terete, 1–5 mm, filiform; bracteoles basisolute, similar to bracts. Calyx lower lobe oblong, much smaller than upper lobe, apex entire,

emarginate, or erose; upper lobe orbicular to broadly transversely elliptic, 1–1.5 mm, apex deeply emarginate. Corolla white or pale mauve, with a yellow spot at base of lower lip, 2–5 mm; lower lip 3-lobed, middle lobe much longer than lateral lobes, apex rounded to emarginate; spur cylindrical, slightly longer than upper calyx lobe, straight or almost so, apex obtuse; palate with a slightly raised rim fringed with short hairs; upper lip subquadrate, much shorter than upper calyx lobe, apex shortly 2-lobed. Filaments ca. 0.5 mm, slightly curved; anther thecae distinct. Ovary globose; style very short; stigma lower lip circular, upper lip obsolete. Capsule globose to obliquely ovoid, 1.5–2 mm, dehiscing by a single longitudinal ventral slit. Seeds ovoid, 0.7–0.9 mm, distal end with a tuft of short hairs ca. 1/2 as long as body of seed; seed coat with regular longitudinal rows of acute papillae. Fl. Jul–Sep, fr. Aug–Oct.

Moist rocks, open swampy meadows among bryophytes and species of Cyperaceae; 2800–3900 m. SE Xizang, NW Yunnan [Bhutan, India (Sikkim), N Myanmar, Nepal].

**16. *Utricularia salwinensis*** Handel-Mazzetti, Symb. Sin. 7: 873. 1936.

怒江挖耳草 nu jiang wa er cao

Probably perennials, terrestrial or lithophytic. Rhizoids capillary, simple. Stolons capillary, branched. Traps on rhizoids and stolons, stalked, ovoid, ca. 1 mm, mouth lateral; appendage 1, dorsal, flabellate, fringed with multicellular stipitate glands. Leaves few, from peduncle base and stolons, long petiolate, glabrous; leaf blade obovate to orbicular, 2–12 × 1–2 mm, membranous, veins dichotomously branched, base attenuate, margin entire, apex rounded. Inflorescences erect, 3–7 mm, 1-flowered, glabrous; peduncle terete, 0.2–0.4 mm thick; scales absent; bracts basisolute, oblong, ca. 1.5 mm, base truncate, margin 2-cleft or erose, apex acute to truncate. Pedicel erect, spreading, or ± recurved, 2–10 mm; bracteoles basisolute, similar to bracts. Calyx lower lobe oblong, much smaller than upper lobe, apex emarginate; upper lobe suborbicular, ca. 2 mm, apex emarginate. Corolla white or pale pink, with a yellow spot at base of lower lip; lower lip 3-lobed, middle lobe much larger than lateral lobes, apex rounded; spur narrowly cylindrical, ca. 2 × as long as upper calyx lobe, apex obtuse; palate with a slightly raised rim, fringed with moniliform hairs; upper lip subquadrate, much shorter than upper calyx lobe, apex emarginate. Filaments 0.5–0.7 mm, curved; anther thecae ± distinct. Ovary globose; style very short; stigma lower lip circular, upper lip obsolete. Capsule and seeds not seen. Fl. Jul–Aug.

● Among moss on wet cliffs and in bogs; 3200–4000 m. SE Xizang, NW Yunnan.

*Utricularia salwinensis* had been reported from the mountains of N Sumatra in Indonesia (P. Taylor, Fl. Malesiana, ser. 1, 8(2): 292. 1977). However, the Sumatran plants were later described as *U. steenisii* P. Taylor.

**17. *Utricularia striatula*** Smith in Rees, Cycl. 37: *Utricularia* no. 17. 1818.

圓叶挖耳草 yuan ye wa er cao

*Meloneura striatula* (Smith) Barnhart; *Utricularia anthro-*

*pophora* Ridley; *U. harlandii* Oliver ex Benth; *U. orbiculata* Wallich ex A. Candolle; *U. rosulata* Benjamin; *U. taikankoensis* Yamamoto.

Perennials, epiphytic or lithophytic. Rhizoids and stolons capillary, simple. Traps on rhizoids and stolons, stalked, ovoid, 0.6–0.8 mm, mouth lateral; appendage 1, dorsal, deeply 2-cleft, fringed with multicellular stipitate glands. Leaves numerous, from peduncle base and stolons, sessile to petiolate; leaf blade obovate, orbicular, or transversely elliptic, 3–10 × 2–6 mm, thinly fleshy, veins dichotomously branched, base cuneate, attenuate, or rounded, margin entire, apex rounded. Inflorescences erect, 1–15 cm, 1–10-flowered; peduncle terete, 0.2–0.4 mm thick, glabrous; scales few, similar to bracts; bracts basisolate, narrowly ovate to oblong, 1–1.5 mm, glandular, base truncate, margin irregularly crenulate to denticulate, apex subacute to rounded. Pedicel spreading at anthesis but often pendulous and withered in fruit, 2–6 mm, capillary, slightly dorsiventrally compressed; bracteoles similar to bract but slightly smaller. Calyx lower lobe oblong-elliptic, much smaller than upper lobe, apex rounded to emarginate; upper lobe suborbicular to broadly obcordate, 1.5–2.5 mm, apex rounded to emarginate. Corolla white or violet, with a yellow spot at base of lower lip, 3–10 mm or much smaller when cleistogamous; lower lip transversely elliptic to suborbicular, apex 5-lobed; spur subulate, ± as long as lower lip, straight or curved, apex acute; palate fringed with hairs; upper lip subovate, much shorter than calyx, apex shortly 2-cleft. Filaments ca. 0.6 mm, straight; anther thecae distinct. Ovary ovoid to depressed globose; style very short; stigma lower lip semicircular, upper lip obsolete. Capsule globose, ca. 2.5 mm in diam., dorsiventrally compressed, dehiscent by a single longitudinal ventral slit. Seeds obovoid, 0.2–0.4 mm, densely covered with glochidiate processes except proximal end. Fl. Jun–Oct, fr. Jul–Nov.

Damp rocks, tree trunks; 400–3600 m. S Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, S and SE Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, Indian Ocean islands (N Andaman Islands)].

**18. *Utricularia limosa*** R. Brown, Prodr. 432. 1810.

长梗狸藻 chang geng li zao

*Nelipus limosa* (R. Brown) Rafinesque; *Utricularia verticillata* Benjamin.

Perennials or annuals, subaquatic or terrestrial. Rhizoids and stolons capillary, branched. Traps on stolons and leaves, long stalked, obliquely ovoid, 0.5–1 mm, covered externally with clavate glands, mouth lateral; appendages 2, dorsal, branched, setiform. Leaves numerous, from peduncle base and stolon nodes, long petiolate, to 5 cm including petiole; leaf blade narrowly oblong in outline, pinnately divided; segments alternate, capillary, terete, glabrous. Inflorescences erect, 5–25 cm, 2–10-flowered; peduncle terete, 0.5–0.8 mm thick; scales few, similar to bracts; bracts basisolate, elliptic, 1.5–2 mm, base obliquely truncate, margin erosely denticulate, apex acute. Pedicel ascending, 2–6 mm, filiform, slightly dorsiventrally flattened, minutely papillose; bracteoles absent. Calyx lower lobe

obovate-oblong, 1.3–2 mm, apex rounded; upper lobe transversely elliptic, 1.1–1.5 mm, apex rounded. Corolla violet, with a yellow spot at base of lower lip, 4.5–6 mm; lower lip subquadrate, longer than upper lip, 2-lobed to ca. 1/2 its length, lobes ovate-oblong; spur narrowly cylindrical from a conic base, somewhat longer than corolla lower lip, apex obtuse; palate with a slightly raised, rounded marginal rim; upper lip broadly ovate, ca. 2 × as long as upper calyx lobe, apex rounded. Filaments ca. 0.6 mm, strongly curved; anther thecae confluent. Ovary globose; style short; stigma lower lip semicircular and margin papillose, upper lip obsolete. Capsule globose, 2–3 mm, dehiscent by an ovate-oblong ventral pore. Seeds globose, 0.2–0.3 mm in diam.; seed coat with prominent nearly isodiametric coarse reticulations. Fl. Aug–Sep, fr. Sep–Oct.

Swamps, rice fields, wet grasslands; near sea level. S Guangdong, S Guangxi, Hainan [Indonesia (Papua Barat), Laos, Malaysia (peninsular), Thailand, Vietnam; N Australia].

**19. *Utricularia punctata*** Wallich ex A. Candolle, Prodr. 8: 5. 1844.

盾鳞狸藻 dun lin li zao

*Utricularia fluitans* Ridley.

Perennials, freely suspended aquatic. Rhizoids apparently absent. Stolons filiform, branched. Traps on leaves, shortly stalked, broadly obliquely ovoid, 1–2 mm, mouth lateral; appendages 2, dorsal, branched, setiform, with simple shorter setae. Leaves numerous on stolons, 2–6 cm, divided from near base into 2 or 3 primary segments; segments elliptic in outline, dichotomously divided into numerous further segments; ultimate segments capillary, terete, sparsely minutely setulose. Inflorescences erect, 6–20 cm, 5–10-flowered; peduncle terete, 0.6–1 mm thick, glabrous; scales few, similar to bracts; bracts basisolate, ovate, 2–2.5 mm, glandular. Pedicel erect, 3–10 mm, filiform, slightly dorsiventrally compressed; bracteoles absent. Calyx lobes orbicular, convex, 1–1.8 mm; lower lobe slightly smaller, apex truncate to retuse; upper lobe apex rounded. Corolla lilac, violet, or white, with a yellow blotch at base of lower lip, 6–10 mm; lower lip transversely oblong-elliptic to subreniform, base with prominent 2-lobed swelling, apex rounded to retuse; spur narrowly conic, ± as long as and parallel with lower lip, slightly curved, apex truncate to emarginate; palate margin glabrous; upper lip transversely elliptic, cucullate, apex rounded. Filaments ca. 1.5 mm, curved; anther thecae confluent. Ovary broadly ovoid; style evident, glandular; stigma lower lip transversely elliptic, upper lip semicircular to deltoid. Capsule ellipsoid, ca. 3 mm, dehiscent by longitudinal dorsal and ventral slits. Seed few per capsule, lenticular, ca. 2 mm in diam., margin broadly winged, wing irregularly dentate; seed coat with small prominent reticulations. Fl. Jun–Aug, fr. Jul–Sep.

Lakes, swamps, rice fields; near sea level. S Fujian (Longhai), S Guangxi (Dongxing) [Indonesia, Malaysia, Myanmar, Thailand, Vietnam].

**20. *Utricularia gibba*** Linnaeus, Sp. Pl. 1: 18. 1753.

少花狸藻 shao hua li zao

*Utricularia diantha* Roxburgh ex Roemer & Schultes; *U.*

*exoleta* R. Brown; *U. gibba* subsp. *exoleta* (R. Brown) P. Taylor; *U. khasiana* J. Joseph & Mani; *U. naguriae* Makino; *U. pterosperma* Edgeworth; *Vesiculina gibba* (Linnaeus) Rafinesque.

Annuals or perennials, affixed or suspended aquatic. Rhizoids absent or present, filiform, branched. Stolons filiform, much branched, often mat-forming. Traps lateral on leaf segments, stalked, ovoid, 1–2.5 mm, mouth lateral; appendages 2, dorsal, branched, setiform, with shorter setae. Leaves numerous on stolons, 0.5–1.5 cm; primary segments (1 or) 2, unbranched or sparsely dichotomously branched into 3–8 ultimate segments; ultimate segments capillary, slightly flattened, margin entire or sparsely denticulate, apex and teeth setulose. Inflorescences erect, 2–15 cm, 1–3(–6)-flowered; peduncle terete, 0.3–0.5 mm thick, glabrous; scale 1, similar to bracts; bracts basifixed, semiobovate, ca. 1 mm, minutely glandular, apex truncate and obscurely dentate. Pedicel erect to spreading, 2–12 mm, filiform; bracteoles absent. Calyx lobes subequal, broadly ovate to orbicular, 1.5–2 mm, apex rounded. Corolla yellow, 4–8 mm; lower lip slightly smaller than upper lip, base with a prominent 2-lobed swelling, apex rounded; spur narrowly conic to cylindrical from a conic base, shorter or longer than corolla lower lip, distal part sparsely stipitate glandular, apex obtuse; palate densely pubescent; upper lip broadly ovate to suborbicular, ca. 2 × as long as upper calyx lobe, apex obscurely 3-lobed. Filaments 1–1.5 mm, curved; anther thecae confluent. Ovary globose; style evident; stigma lower lip transversely elliptic, upper lip obsolete. Capsule globose, 2–3 mm in diam., 2-valvate. Seeds lenticular, 0.8–1 mm in diam., margin broadly winged, wing shallowly and irregularly dentate; seed coat with small prominent reticulations. Fl. Apr–Nov, fr. May–Dec. *2n* = 28.

Shallow still or slowly flowing water, pools, lakes, bogs, swamps, marshes, rice fields; near sea level to 900 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Hainan, S Henan, Hubei, Hunan, Jiangsu, Taiwan, Yunnan, Zhejiang [India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, tropical America, SW Asia, Europe, Indian Ocean islands (Mauritius), Madagascar, North and South America, Pacific islands (New Caledonia, Palau)].

**21. *Utricularia vulgaris* Linnaeus, Sp. Pl. 1: 18. 1753.**

狸藻 li zao

Perennials, suspended aquatic. Rhizoids usually present, filiform, branched. Stolons filiform, branched. Traps on leaf segments, stalked, ovoid, 1.5–5 mm, mouth lateral; appendages 2, dorsal, simple or branched, setiform, with shorter simple lateral setae. Leaves numerous on stolons, 1.5–6 cm, divided from base into 2 unequal primary segments; primary segments ovate, elliptic, or ovate-oblong in outline, pinnately divided into secondary segments; secondary segments dichotomously divided into many further segments; ultimate segments capillary, slightly flattened, apically and laterally minutely setulose, without or sometimes with short marginal teeth. Inflorescences erect, 10–30 cm, 3–12-flowered, glabrous; peduncle terete, 1–2.4 mm thick; scales 1–4, similar to bracts; bracts basifixed, broadly ovate, 3–7 mm, base cordate to auriculate, apex acute to obtuse. Pedicel erect at anthesis but

decurved in fruit, terete, 0.6–1.5 cm; bracteoles absent. Calyx lobes ovate, 2.5–5 mm, glandular; lower lobe slightly shorter than upper lobe, apex obtuse to emarginate; upper lobe apex acute to subacute. Corolla yellow, 1.2–2 cm; lower lip transversely elliptic to broadly ovate, base with prominent swelling, margin strongly deflexed, apex retuse; spur narrowly conic to narrowly cylindrical from a conic base, shorter than or ± as long as corolla lower lip, straight or curved upward, apex slightly obtuse; palate distal 1/2 covered with short hairs and stipitate glands; upper lip broadly ovate, ca. 2 × as long as upper calyx lobe, apex retuse to truncate. Filaments ca. 2 mm, curved; anther thecae ± distinct. Ovary globose, densely glandular; style evident; stigma lower lip suborbicular and ciliate, upper lip truncate to broadly deltoid. Capsule globose, ca. 5 mm in diam., circumscissile. Seeds prismatic, 0.3–0.4 × 0.5–0.7 mm, 4–6-angled, narrowly winged on all angles; seed coat with small prominent slightly elongate reticulations. Fl. Jun–Aug, fr. Jul–Sep.

Lakes, pools, ditches, rivers, rice fields; near sea level to 3700 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang [Afghanistan, Kazakhstan, Mongolia, Pakistan, Russia, Uzbekistan; N Africa, SW Asia, Europe, North America].

- 1a. Spur conspicuously shorter than corolla lower lip, ± straight, with internal glands on dorsal surface only ..... 21a. subsp. *vulgaris*
- 1b. Spur ± as long as corolla lower lip, markedly curved upward, with internal glands on both dorsal and ventral surfaces ..... 21b. subsp. *macrorrhiza*

**21a. *Utricularia vulgaris* subsp. *vulgaris***

狸藻(原亚种) li zao (yuan ya zhong)

*Lentibularia vulgaris* (Linnaeus) Moench.

Spur conspicuously shorter than corolla lower lip, ± straight, with internal glands on dorsal surface only. *2n* = (36–) 40, 44.

Lakes, pools; 2900–3700 m. Xizang [Afghanistan, Kazakhstan, Pakistan, Russia, Uzbekistan; N Africa, SW Asia, Europe].

**21b. *Utricularia vulgaris* subsp. *macrorrhiza* (Le Conte) R. T. Clausen, Cornell Univ. Agric. Exp. Sta. Mem. 291: 9. 1949.**

弯距狸藻 wan ju li zao

*Utricularia macrorrhiza* Le Conte, Ann. Lyceum Nat. Hist. New York 1: 73. 1824; *Lentibularia vulgaris* var. *americana* (A. Gray) Nieuwland & Lunell; *Megozipa macrorrhiza* (Le Conte) Rafinesque; *U. vulgaris* var. *americana* A. Gray.

Spur ± as long as corolla lower lip, markedly curved upward, with internal glands on both dorsal and ventral surfaces. *2n* = 44.

Lakes, pools, ditches, rivers, rice fields; near sea level to 3500 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang [Mongolia, Russia (Altai to Kamchatka); North America].

P. Taylor (Kew Bull., Addit. Ser. 14: 594–598. 1989) treated

*Utricularia vulgaris* subsp. *macrorhiza* as a *U. macrorhiza*.

**22. *Utricularia australis*** R. Brown, Prodr. 430. 1810.

南方狸藻 nan fang li zao

*Utricularia japonica* Makino; *U. neglecta* Lehmann; *U. sacciformis* Benjamin; *U. stakujiiensis* Nakajima ex H. Hara; *U. tenuicaulis* Miki; *U. vulgaris* var. *tenuicaulis* (Miki) F. T. Kuo ex J. Y. Hsiao.

Perennials, suspended aquatic. Rhizoids usually present, filiform, bearing numerous short dichotomously divided branches. Stolons filiform, branched. Traps on leaf segments, stalked, ovoid, 0.5–2.5 mm, mouth lateral or basal; appendages 2, dorsal, simple or branched, setiform, with shorter simple lateral setae. Leaves numerous, 1.5–4 cm, divided from base into  $2 \pm$  equal primary segments; primary segment ovate, elliptic, or ovate-oblong in outline, pinnately divided into secondary segments; secondary segments dichotomously divided into further segments; ultimate segments capillary, slightly flattened, margin sparsely denticulate, apex and teeth setulose. Inflorescences erect, (5–)10–30 cm, 3–8-flowered, glabrous; peduncle terete, 1–2 mm thick; scales 1–3, similar to bracts; bracts basifixed, suborbicular, 2–5 mm, base auriculate, apex rounded and obscurely tridentate. Pedicel erect at anthesis but decurved in fruit, terete, 1–2.5 cm; bracteoles absent. Calyx lobes ovate, 3–4 mm, subequal; lower lobe apex emarginate; upper lobe apex rounded. Corolla yellow, 1.2–1.5 cm; lower lip transversely elliptic, base with a prominent swelling, apex rounded to retuse; spur broadly conic, considerably shorter than corolla lower lip, slightly curved, apex obtuse; palate glabrous; upper lip broadly ovate, apex retuse. Filaments ca. 2 mm, curved; anther thecae distinct. Ovary globose, densely covered with sessile glands; style evident; stigma lower lip semicircular and ciliate, upper lip very short or obsolete. Capsule globose, 3–4 mm in diam., circumscissile. Seeds prismatic, 0.5–0.6 × 0.5–0.7 mm, 4–6 angled, narrowly winged on all angles; seed coat with small prominent slightly elongate reticulations. Fl. Jun–Nov, fr. Jul–Dec.  $2n = 40, 44$ .

Lakes, pools, river backwaters, ditches, rice fields; near sea level to 2500 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Indonesia, Japan, Kashmir, Korea, Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Russia (Sakhalin), Sri Lanka; Africa, SW Asia, Australia, Europe, Pacific islands (New Zealand)].

**23. *Utricularia intermedia*** Hayne, J. Bot. (Schrader) 1800(1): 18. 1800.

异枝狸藻 yi zhi li zao

*Lentibularia intermedia* (Hayne) Nieuwland & Lunell.

Perennials, usually affixed aquatic. Rhizoids usually present, filiform, with short dichotomously divided branches. Stolons filiform, sparsely branched, some green, others without chlorophyll. Traps lateral on reduced leaves on colorless stolons, stalked, ovoid, 1.5–4 mm, mouth lateral; appendages 2, dorsal, branched, setiform, with a few lateral simple setae. Leaves numerous on green stolons, suborbicular to elliptic in

outline, 0.3–1.5(–2) × 0.4–1.8 cm, palmately divided from base into 2 or 3 primary segments; primary segments dichotomously divided from base into 2–5 further segments; ultimate segments flattened, narrowly linear, 0.2–0.7 mm wide, margin entire or sparsely denticulate, laterally and apically setulose. Inflorescences erect, 8–20 cm, 2–5-flowered, glabrous; peduncle terete, 0.4–0.8 mm thick; scales 1–3, similar to bracts; bracts basifixed, broadly ovate to ovate-deltoid, 2–4 mm, base conspicuously auriculate, apex acute. Pedicel erect, terete, 0.5–1.5 cm; bracteoles absent. Calyx lobes ovate, 3–5 mm; lower lobe slightly shorter than upper lobe, apex obtuse, shortly 2-cleft, or truncate; upper lobe apex acute. Corolla yellow, 0.9–1.5 cm; lower lip transversely elliptic, base with a prominent rounded swelling, apex rounded; spur subulate, slightly shorter than corolla lower lip, apex acute; palate glabrous; upper lip broadly ovate, apex rounded. Filaments ca. 2 mm, curved; anther thecae ± confluent. Ovary globose, glandular; style relatively long; stigma lower lip circular and ciliate, upper lip deltoid and apex acute or 2-cleft. Capsule globose, 2.5–3 mm in diam., circumscissile. Seeds not seen. Fl. Jun–Sep.  $2n = 44$ .

Bogs, lakes, ponds; 300–4000 m. Heilongjiang, Jilin, Nei Mongol, W Sichuan, S and SE Xizang [Japan, Korea, Kyrgyzstan, Mongolia, Russia; Europe, North America].

**24. *Utricularia minor*** Linnaeus, Sp. Pl. 1: 18. 1753.

细叶狸藻 xi ye li zao

*Lentibularia minor* (Linnaeus) Rafinesque; *Utricularia minor* var. *multispinosa* Miki; *U. multispinosa* (Miki) Miki; *U. nepalensis* Kitamura; *U. rogersiana* Lace; *Xanathes minor* (Linnaeus) Rafinesque.

Perennials, usually affixed aquatic. Rhizoids absent. Stolons filiform, terete, sparsely branched, some green, others without chlorophyll. Traps lateral on leaf segments, shortly stalked, ovoid, 0.8–2.5 mm, mouth lateral; appendages 2, dorsal, long, branched, setiform, with a few lateral simple setae. Leaves numerous on green stolons, semicircular to suborbicular in outline, 2–15 × 3–15 mm, palmately divided from base into 2 or 3 primary segments; primary segment dichotomously divided from base into 2–11 further segments; ultimate segments flattened, narrowly linear, 0.1–0.5 mm wide, margin entire or sparsely denticulate, apex acute, apex and teeth with or without microscopic setulae. Inflorescences erect, 5–20(–25) cm, 2–8-flowered, glabrous; peduncle terete, 0.3–1 mm thick; scales 2–4, similar to bracts; bracts basifixed, broadly ovate to ovate-deltoid, 1.5–2 mm, base conspicuously auriculate, apex acute to obtuse. Pedicel erect at anthesis but spreading and decurved in fruit, terete, 4–8 mm; bracteoles absent. Calyx lobes broadly ovate, 2–3 mm, subequal; lower lobe smaller, apex narrowly truncate; upper lobe apex subacute. Corolla lemon-yellow, 6–8 mm; lower lip broadly obovate, margin deflexed, apex rounded to retuse; spur saccate to obtusely broadly conic; palate elongate, with a raised marginal rim, distally narrowed and glandular; upper lip ovate to ovate-oblong, apex retuse. Filaments ca. 1.5 mm, curved; anther thecae ± distinct. Ovary broadly ellipsoid; style relatively long; stigma lower lip broadly ovate and ciliate, upper lip deltoid and apex acute or 2- or 3-cleft. Capsule globose, 2–3 mm in diam., circumscissile. Seeds lenticular-pris-

matic,  $0.3\text{--}0.4 \times \text{ca. } 1 \text{ mm}$ , scarcely winged on angles; seed coat with small prominent  $\pm$  isodiametric reticulations. Fl. Aug–Sep, fr. Sep–Oct.  $2n = 40, 44$ .

Bogs, ponds, marshes; 3100–3700 m. Heilongjiang, Jilin, Nei Mongol, Shanxi, Sichuan, N Xinjiang, E Xizang, Yunnan [Afghanistan, Bhutan, India, Japan, Kashmir, Kyrgyzstan, Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, Russia, Uzbekistan; SW Asia, Europe, North America].

**25. *Utricularia aurea*** Loureiro, Fl. Cochinch. 1: 26. 1790.

黄花狸藻 huang hua li zao

*Utricularia confervifolia* Jackson ex D. Don; *U. extensa* Hance; *U. fasciculata* Roxburgh; *U. flexuosa* Vahl; *U. pilosa* (Makino) Makino; *U. vulgaris* Linnaeus var. *pilosa* Makino.

Perennials or annuals, suspended aquatic. Rhizoids usually present, verticillate at base or shortly above base of peduncle, fusiform, inflated, with filiform branches. Stolons filiform to relatively thick, branched. Traps on leaf segments, stalked, obliquely ovoid, 1–4 mm, mouth lateral or basal; appendages 2 or sometimes absent, dorsal, sparsely branched, setiform. Leaves numerous on stolons, 2–8 cm, divided from base into 3 or 4(or 5) semiverticillate primary segments; primary segments ovate to oblong-lanceolate in outline, 1.5–3 cm wide, pinnately divided into secondary segments; secondary segments dichotomously divided from base into numerous further segments; ultimate segments capillary, slightly flattened, laterally and apically setulose; stipulelike auricles usually present at base of primary segments, semicircular in outline, divided dichotomously into filiform sparsely setulose segments. Inflorescences erect, 5–25 cm, 3–10-flowered, glabrous; peduncle terete, 0.5–1.5 mm thick; scales absent; bracts basifixed, broadly ovate to orbicular, 1–2 mm, apex rounded. Pedicel erect at anthesis but sharply deflexed and thickened in fruit, 0.4–2 cm, dorsiventrally compressed; bracteoles absent. Calyx lobes ovate, subequal, apex rounded to subacute; lower lobe often slightly broader than upper lobe, 2–3 mm at anthesis, becoming fleshy, 7–9 mm, and spreading to reflexed in fruit. Corolla pale yellow, 1–1.5 cm, pubescent or glabrous; lower lip transversely elliptic, base with a prominent 2-lobed swelling, apex rounded to emarginate; spur cylindrical from a narrowly conic base,  $\pm$  as long as and parallel with lower lip, straight or slightly curved, apex obtuse to subacute; palate pubescent; upper lip broadly ovate, apex rounded. Filaments 1–1.5 mm, curved; anther thecae  $\pm$  confluent. Ovary ovoid; style evident; stigma lower lip semicircular, upper lip obsolete. Capsule globose, 4–5 mm in diam., circumscissile; persistent style greatly enlarged and elongated, often equaling or exceeding capsule. Seeds prismatic, 1–2 mm wide, 5- or 6-angled, narrowly winged on all angles; seed coat with  $\pm$  isodiametric obscure reticulations. Fl. Jun–Nov, fr. Jul–Dec.  $2n = 80$ .

Pools, lakes, swamps, river backwaters, rice fields; near sea level to 2700 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Taiwan, Yunnan, Zhejiang [Cambodia, India, Indonesia, Japan, Kashmir, Korea, Laos, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

