

6. **PILEA** Lindley, Collect. Bot. t. 4. 1821, nom. cons.

冷水花属 *leng shui hua shu*

Chen Jiarui (陈家瑞 *Chen Chia-jui*); Alex K. Monro

Adenia Torrey (1843), not Forsskål (1775).

Herbs or subshrubs, rarely shrubs, without stinging hairs. Stems often succulent. Leaves usually opposite, equal or unequal in pairs, rarely alternate; petiolate, stipules deciduous or persistent, 2 at each node, axillary or rarely interpetiolar [or intrapetiolar], usually membranous, sometimes herbaceous, or papery [or fleshy]; leaf blade 3-veined or rarely pinnately veined, base symmetric or asymmetric, margin serrate, crenate, dentate, or entire; cystoliths usually linear. Inflorescences solitary or in pairs, axillary, glomerules usually forming loose, dichotomous cymes or cymose panicles, sometimes spikes or in dense, globose capitula of unisexual or polygamous flowers (plants monoecious or dioecious); bracts small. Male flowers: perianth lobes (2-)4 or 5, valvate or imbricate, often corniculate near apex; stamens (2-)4 or 5; filaments inflexed in bud; rudimentary ovary small to inconspicuous. Female flowers: perianth lobes (2 or)3(-5), subequal or strongly unequal, in fruit enlarged, when 3-lobed, the abaxial one usually gibbous or boat-shaped, much longer and often with a corniculate appendix near apex; staminodes opposite to segments, scale-like, usually oblong, minute or inconspicuous, in fruit enlarged. Ovary straight, often with oblique apex; stigma sessile, shortly penicillate; ovule orthotropous. Achene usually ovoid, usually compressed or slightly compressed, often oblique, without crested appendix at apex, partly enclosed by persistent perianth. Seeds with scarcely any endosperm; cotyledons broad. $x = 8, 12, 13, 15, 18$.

About 400 species: worldwide in tropical, subtropical, and rarely temperate regions; 80 species (31 endemic, one introduced) in China.

- 1a. Inflorescences spicate, very slender; flowers arranged on only 1 side of the axis 2. *P.* sect. *Smithiella*
- 1b. Inflorescences cymose or nearly capitate; flowers arranged around the axis.
 - 2a. Leaves pinnately veined 5. *P.* sect. *Pilea*
 - 2b. Leaves strongly 3-veined.
 - 3a. Female perianth lobes 5; male perianth lobes 5, imbricate 1. *P.* sect. *Achudemia*
 - 3b. Female perianth lobes 2-4; male perianth lobes (2-)4(or 5), valvate.
 - 4a. Female perianth lobes 4, subequal; male perianth lobes 4(or 5); subshrubs or sometimes perennial herbs 3. *P.* sect. *Tetrameris*
 - 4b. Female perianth lobes 2 or 3, often unequal; male perianth lobes (2-)4; herbs or rarely subshrubs.
 - 5a. Female perianth lobes 2 6. *P.* sect. *Dimeris*
 - 5b. Female perianth lobes 3.
 - 6a. Male inflorescences cymose, paniculate, moniliform spicate, or capitate, without a receptacle and involucre 4. *P.* sect. *Urticella*
 - 6b. Male inflorescences capitate, with a receptacle and involucre 7. *P.* sect. *Lecanthoides*

1. **Pilea** sect. **Achudemia** (Blume) C. J. Chen, Bull. Bot. Res., Harbin 2(3): 1. 1982.

五萼组 *wu e zu*

Achudemia Blume, Mus. Bot. 2: 57. 1856.

Herbs. Leaves 3-veined. Inflorescences unisexual, sometimes bisexual, arranged around the axis; female inflorescences cymose or nearly capitate. Male perianth lobes 5, imbricate. Female perianth lobes 5, subequal to each other and often to achene.

About three species: E Asia; three species in China.

- 1a. Leaf blade ± papery, margin inconspicuously serrate or crenate distally, rarely entire, often purplish abaxially; female inflorescences capitate; achene rhombic-ovoid, ca. 2 mm 3. *P. boniana*
- 1b. Leaf blade membranous, margin coarsely dentate, light green abaxially; female inflorescences cymose; achene ovoid, 1-1.4 mm.
 - 2a. Leaf blade oblong-ovate, (5-)9-16 cm, lateral veins 6-8 each side; male inflorescences cymose-racemose, longer than leaves; female inflorescences laxly cymose; achene sunken on both surfaces, verrucose by margin 1. *P. hilliana*
 - 2b. Leaf blade rhombic-ovate or ovate, rarely lanceolate, 1-6(-10) cm, lateral veins 2-3(-5) each side; male inflorescences often capitate, 1-1.5 cm; female inflorescences compactly cymose; achene slightly compressed, verrucose 2. *P. japonica*

1. **Pilea hilliana** Handel-Mazzetti, Symb. Sin. 7: 129. 1929.

翠茎冷水花 *cui jing leng shui hua*

Herbs, monoecious or dioecious. Stems 25-100 cm tall, succulent, but woody at base, swollen above nodes, glabrous. Stipules deciduous, brown, oblong, 7-10 mm, membranous;

petiole 1.5–7 cm; leaf blade abaxially pale green, dark brown when dry, oblong-ovate, often asymmetric, unequal in size, (5–)9–16 × (2.5–)4–8 cm, 3-veined, lateral veins 6–8 each side, abaxial surface glabrous, adaxial surface sparsely pilose, base broadly cuneate or rounded, margin coarsely dentate, apex shortly acuminate or shortly caudate. Inflorescence a cyme, often 3-branched, the central branch often shorter than the laterals, 7–15 cm overall, peduncle 5–10 cm, 1 side of axis densely pubescent; male inflorescence cymose-racemose, longer than leaves; female inflorescence a lax cyme. Male flowers pedicellate, in bud ca. 1.2 mm in diam.; perianth lobes puberulent; stamens 5; rudimentary ovary minute, conic. Female perianth lobes oblong or boat-shaped; staminodes oblong. Achene ovoid, ca. 1 mm, sunken on both central surfaces, slightly oblique, verrucose on elevated surfaces by the margin, enclosed by perianth lobes subequal to achene. Fl. Jun–Aug, fr. Sep–Dec.

Moist forests, near streams; 1100–2600 m. Guangxi, Guizhou, Sichuan, SE Xizang, Yunnan [N Vietnam].

2. *Pilea japonica* (Maximovicz) Handel-Mazzetti, Symb. Sin. 7: 141. 1929.

山冷水花 shan leng shui hua

Achudemia japonica Maximowicz, Mélanges Biol. Bull. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 9: 627. 1876; *A. insignis* Migo; *Nanocnide closii* Léveillé & Vaniot.

Herbs monoecious. Stems 5–30(–60) cm tall, succulent, swollen above nodes, glabrous. Leaves opposite or subwhorled; stipules almost persistent, light green, oblong, 3–5 mm, membranous; petiole 0.5–2(–5) cm; leaf blade abaxially pale green, rhombic-ovate or ovate, rarely triangular-ovate or lanceolate, slightly asymmetric, unequal in size, 1–6(–10) × 0.8–3(–5) cm, 3-veined, lateral veins 2–3(–5) each side, both surfaces sparsely puberulent, base cuneate, rarely rounded or subtruncate, margin crenate-serrate or dentate, apex often acute, rarely obtuse or shortly acuminate. Inflorescences sometimes of

mixed sexes; male inflorescence often a capitulum, 1–1.5 cm; pedunculate, female inflorescence long pedunculate, 1–3(–5) cm, subglabrous. Male flowers pedicellate, in bud ca. 1 mm in diam.; stamens 5; rudimentary ovary minute, narrowly conic. Female perianth lobes oblong-lanceolate; staminodes scale-like, oblong-lanceolate. Achene ovoid, 1–1.4 mm, slightly compressed, verrucose, enclosed by perianth lobes subequal to achene. Fl. Jul–Sep, fr. Aug–Nov.

Wet rocks in moist forests and near streams; 500–1900 m. Anhui, Fujian, S Gansu, N Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangxi, Jilin, Liaoning, S Shaanxi, Shanxi, Sichuan, Taiwan, E Yunnan, Zhejiang [Japan, Korea, Russia (E Siberia)].

The plants are used medicinally to relieve internal fever and as a diuretic.

3. *Pilea boniana* Gagnepain, Bull. Soc. Bot. France 75: 71. 1928.

五萼冷水花 wu e leng shui hua

Pilea baviensis Gagnepain; *P. morseana* Handel-Mazzetti; *P. pentasepala* Handel-Mazzetti.

Herbs perennial, creeping rhizomatous, dioecious or monoecious, stems glabrous. 15–100 cm tall, succulent, but woody at base, stipules almost persistent, interpetiolar, deltoid, ca. 1 mm, herbaceous; petiole 0.6–5(–7) cm; leaf blade abaxially often purplish, often elliptic, sometimes elliptic-lanceolate, oblong-elliptic, or oblong-ovate, symmetric, often unequal or subequal in size, (1–)3–16 × (0.8–)1.5–7.5 cm, 3-veined, lateral veins 6–10 each side, glabrous adaxially, base broadly cuneate or rounded, margin crenate-serrulate or indistinctly undulate-crenate distally, rarely entire, apex cuspidate, acuminate, or acute. Inflorescence a cyme, racemelike or paniculate, spreading, 6–16 cm overall, peduncle 4–10 cm; female inflorescences capitulate. Male flowers pedicellate, in bud obovoid, truncate at top, 1.5–2 mm in diam.; stamens 5; rudimentary ovary minute, conic or linear. Female perianth lobes oblong or boat-shaped; staminodes oblong. Achene rhombic-ovoid, ca. 2 mm, compressed, slightly elevated by margin, verrucose, enclosed by perianth lobes subequal to achene. Fl. Jul–Mar, fr. Sep–Jul.

Rock crevices in limestone mountain forests; 300–2200 m. W Guangxi, SW Guizhou, SE Yunnan [N Vietnam].

2. *Pilea* sect. *Smithiella* Dunn ex C. J. Chen, Bull. Bot. Res., Harbin 2(3): 43. 1982.

长穗冷水花组 chang sui leng shui hua zu

Smithiella Dunn, Bull. Misc. Inform. Kew 1920: 211. 1920, not H. Peragallo & M. Peragallo (1901); *Aboriella* Bennet; *Dunniella* Rauschert.

Herbs. Leaves 3-veined. Inflorescences unisexual, male ones not seen, female ones long spicate; flowers borne on 1 side of axis. Female perianth lobes 5, subequal.

One species: China, NE India.

Wu Zhengyi (editor's note) believes this section should be treated as a separate genus, in which case the correct name would be *Aboriella*.

4. *Pilea myriantha* (Dunn) C. J. Chen, Bull. Bot. Res., Harbin 2(3): 44. 1982.

长穗冷水花 chang sui leng shui hua

Smithiella myriantha Dunn, Bull. Misc. Inform. Kew

1920: 211. 1920; *Aboriella myriantha* (Dunn) Bennet; *Dunniella myriantha* (Dunn) Rauschert.

Herbs perennial, creeping rhizomatous, dioecious. 40–50 cm tall, stems woody at base, sparsely appressed pubescent distally. Stipules deciduous, brownish when dry, oblong, ca. 12 mm, papery; petiole 1.5–4 cm, sparsely appressed pubescent; leaf blade black-brown when dry, often broadly elliptic, often

symmetric, unequal or subequal in size, 7–14 × 5–10 cm, thinly papery, 3-veined, lateral veins 5–6 each side, abaxial surface glabrous, adaxial surface sparsely pilose, cystoliths linear, distinct on both surfaces, base broadly cuneate or obtuse, margin shallowly dentate or erose-dentate, apex shortly acuminate. Male inflorescence not seen. Female spike 14–20 cm, peduncle 8–12 cm. Female flowers pedicellate, dense; perianth lobes narrowly ovate, ca. 7 mm, subapically corniculate, hirsute at apex; staminodes 5, semiorbicular. Achene broadly ovoid, ca. 1.5 mm, compressed, inconspicuously verrucose, enclosed by perianth lobes shorter than achene. Fr. Sep.

Shaded and wet places; ca. 300 m. SE Xizang [NE India].

3. *Pilea* sect. **Tetrameris** C. J. Chen, Bull. Bot. Res., Harbin 2(3): 44. 1982.

四萼组 si e zu

Subshrubs or perennial herbs. Leaves 3-veined. Male perianth lobes 4(or 5), valvate; female perianth lobes 4, subequal, shorter than achene.

About 13 species: SE Asia; 11 species (four endemic) in China.

- 1a. Small subshrubs, less than 25 cm tall; stipules often over 20 mm, longitudinally 8–10-ribbed; inflorescences solitary, over 5 cm.
 - 2a. Leaf blade oblong-ovate, apex acuminate or shortly caudate; achene oblong-ovoid, spinulose-verrucose 5. *P. basicordata*
 - 2b. Leaf blade ovate to suborbicular, apex obtuse, shortly acuminate, or cuspidate; achene broadly ovoid or subglobose, purplish spots or verrucose.
 - 3a. Stems terete; leaf blade suborbicular; achene ca. 1.2 mm 6. *P. amplistipulata*
 - 3b. Stems roundly 6-angled; leaf blade oblong or broadly ovate; achene ca. 2.8 mm 7. *P. hexagona*
- 1b. Herbs or subshrubs, often more than 30 cm tall; stipules less than 13 mm, longitudinally 2-ribbed; inflorescences in pairs, less than 4 cm.
 - 4a. Male flowers in clusters or forming pedunculate capitula.
 - 5a. Plants erect, less than 40 cm tall; leaf blade obovate, adaxial surface with 2, white grooves; male flowers forming pedunculate capitula, peduncle 1.5–4 cm 15. *P. cadierei*
 - 5b. Plants erect, ascending, or climbing, usually over 50 cm tall; leaf blade lanceolate, uniformly colored, without adaxial white grooves; male flowers in axillary clusters.
 - 6a. Leaf blade oblong- or linear-lanceolate, 6–10 × 1.5–2.8 cm; petiole 0.5–1.5 cm 13. *P. rubriflora*
 - 6b. Leaf blade elliptic- or ovate-lanceolate, (3–)10–22 × (1.3–)4–6.5 cm; petiole (0.5–)2–7 cm 14. *P. funkikensis*
 - 4b. Male flowers in dichotomous cymes, racemes, or panicles.
 - 7a. Leaf blade margin entire or erose, rarely inconspicuously serrate distally; achene with a purplish ring on both surfaces 12. *P. longicaulis*
 - 7b. Leaf blade margin serrate or crenate-serrate; achene without colored ring on both surfaces.
 - 8a. Male flowers in dichotomously branched cymes; leaf blade often lanceolate.
 - 9a. Leaf blade narrowly lanceolate, 7–15 × 2–4.5 cm; achene ovoid, spinulose-verrucose 8. *P. spinulosa*
 - 9b. Leaf blade ovate to lanceolate, 2.5–10 × 1.2–3.5 cm; achene oblong-ovoid, tuberculate 9. *P. dolichocarpa*
 - 8b. Male flowers in racemose cymes, few branched; leaf blade ovate or oblong.
 - 10a. Leaf blade oblong, apex acute; male glomerules scattered; achene ca. 2 mm, smooth, densely purplish spotted 10. *P. tsiangiana*
 - 10b. Leaf blade ovate or ovate-lanceolate; male glomerules compact; achene ca. 1.2 mm, spinulose-verrucose 11. *P. pseudonotata*

5. *Pilea basicordata* W. T. Wang ex C. J. Chen, Bull. Bot. Res., Harbin 2(3): 44. 1982.

基心叶冷水花 ji xin ye leng shui hua

Shrubs or subshrubs glabrous, monoecious. Stems gray-green, 6–13 cm tall, ca. 6 mm in diam., lenticels elliptic, densely covered with bacilliform cystoliths; internodes compacted; leaf scars semiorbicular, conspicuous. Leaves crowded at apex; stipules almost persistent, brownish, oblong, 20–22 ×

8–10 mm, membranous, longitudinally 8–10-ribbed; petiole 3–8 cm, densely covered cystoliths; leaf blade gray-green, oblong-ovate, symmetric, subequal in size, 8–12 × 5–8 cm, succulent, but thick papery when dry, 3-veined, lateral veins 10 each side, anastomosing by margin, cystoliths conspicuous on both surfaces, base cordate or deeply cordate, margin undulate-erose or subentire from middle, apex acuminate or shortly caudate. Inflorescences solitary, a lax cymose-panicle, 8–13 cm overall, peduncle 6–8 cm; bracts triangular-ovate, ca. 0.8 mm.

Male flowers pedicellate, in bud pear-shaped, ca. 2 mm in diam.; perianth lobes 4, cymbiform, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary minute, conic. Female flowers pedicellate; perianth lobes very unequal, ovate-oblong, slightly keeled; staminodes scale-like, elliptic-oblong, ca. 1.2 mm. Achene orange, oblong-ovoid, ca. 1.5 mm, slightly compressed, spinulose-verrucose. Fl. Mar–Apr, fr. Apr–May.

• Wet shady rocks in mixed forests on limestone mountains; ca. 900 m. Guangxi (Liucheng).

6. *Pilea amplistipulata* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 46. 1982.

大托叶冷水花 da tuo ye leng shui hua

Subshrubs small, glabrous, dioecious. Stems terete, 10–15 cm; internodes 1–2 cm. Leaves crowded at stem apex; stipules deciduous, green, oblong, 25 × 16 mm, papery, longitudinally ribbed; petiole 6–8 cm; leaf blade abaxially gray-green, adaxially dark green, obovate-orbicular or suborbicular, symmetric, subequal in size, 9–13 cm, succulent, but thick papery when dry, 3-veined, lateral veins 10 each side, inconspicuous, with scattered cystoliths along veins, base cordate, margin entire or inconspicuously undulate-erose distally, apex obtuse or mucronate. Inflorescences solitary, 7–10 cm overall, peduncle 4–6 cm; female ones laxly cymose-paniculate. Female flowers pedunculate; 2 large perianth lobes cymbiform, ca. 0.6 mm, 2 smaller lobes oblong, 0.3–4 mm; staminodes scale-like, oblong. Achene purplish, ovoid, ca. 1.2 mm, slightly compressed, verrucose. Fl. Apr–May, fr. Jun–Aug.

• Wet shaded rocks, near streams in limestone mountains; ca. 600 m. S Yunnan (Jinping).

7. *Pilea hexagona* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 46. 1982.

六棱茎冷水花 liu leng jing leng shui hua

Subshrubs small, stipules, petioles, both surfaces of leaf base, and perianth lobes of flowers densely covered with cystoliths. dioecious; Stems roundly 6-angled, ca. 20 cm tall, ca. 6 mm in diam., sparsely pubescent on grooves; internodes 1.5–4 cm. Leaves crowded at stem apex; stipules soon deciduous, green, oblong, 25–30 mm, papery, longitudinally 9-ribbed; petiole unequal in length, 4–11 cm; leaf blade abaxially pale green, adaxially dark green, elliptic, ovate or oblong, symmetric, subequal in size, 10–18 cm, succulent, but thick papery when dry, 3-veined, lateral veins 8–12 each side, elevated abaxially, base rounded or cordate, margin crenate-serrate or subundulate from middle, apex short acuminate or cuspidate. Inflorescences solitary; borne on tops of branches, male cymes dichotomously branched 2–3 times; ca. 5 cm, glomerules capitate, 6–10 mm in diam.; female inflorescence a lax corymbose cyme, 7–10 cm (including gracile peduncle 6–8 cm). Male flowers pedicellate, in bud ca. 2 mm; perianth lobes 4, cymbiform, connate about 1/2 of length; stamens 4; rudimentary ovary minute. Female flowers sessile, ca. 1 mm; perianth lobes light blue, dorsal-ventral lobes cymbiform, longer than lateral, lateral 2 lobes oblong, subapically corniculate; staminodes dark brown, sub-

succulent. Achene purplish spotted. ovoid, ca. 2.8 mm, compressed. Fl. Apr–May, fr. Jun–Sep.

Wet rocky places in limestone mountains; ca. 200 m. SE Yunnan (Hekou) [N Vietnam].

8. *Pilea spinulosa* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 48. 1982.

刺果冷水花 ci guo leng shui hua

Herbs or subshrubs perennial, glabrous, dioecious. Stems light green when dry, 30–100 cm; stems, stipules, and petioles densely covered with cystoliths. Stipules deciduous, green, oblong, ca. 10 mm, papery, longitudinally 2-ribbed; petiole unequal in length, 1–4 cm; leaf blade abaxially pale green, adaxially green, narrowly lanceolate, subequal in size, 7–15 × 2–4.5 cm, thinly papery, 3-veined, lateral veins 10 each side, prominent abaxially, base rounded or subcordate, margin crenate from base, apex acuminate or long acuminate. Inflorescences in pairs; male cymes dichotomously branched 2–3 times, 1–1.5 cm; proximal bracts oblong, ca. 2 mm, distal bracts ovate, ca. 1 mm; female cymes dichotomously branched 3 or 4 times, ca. 1.5 cm. Male flowers sessile, in bud ca. 1.2 mm; perianth lobes 4, ovate-oblong, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary cylindrical, ca. 0.3 mm. Female flowers shortly pedicellate; perianth lobes triangular-ovate; staminodes oblong. Achene ovoid, ca. 1 mm, compressed, oblique, sparsely spinulose-verrucose. Fl. Mar–Apr, fr. May–Jun.

Shaded wet places in forests; 500–900 m. Guangdong, Guangxi, Hainan [N Vietnam].

9. *Pilea dolichocarpa* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 49. 1982.

光疣冷水花 guang liu leng shui hua

Herbs perennial or subshrubs, glabrous, dioecious. Stems black when dry, much branched, terete, to 100 cm tall, woody at base; stems and stipules densely covered with cystoliths. Stipules deciduous, green, oblong, 6–7 mm, papery, longitudinally 2-ribbed; petiole unequal in length, 0.7–2.7 cm; leaf blade abaxially pale green, adaxially dark green, ovate to lanceolate, slightly oblique, subequal in size, 2.5–10 × 1.2–3.5 cm, papery, 3-veined, lateral veins 10 each side, transverse secondary veins anastomosing by margin, both surfaces lustrous, base rounded or subcordate, margin crenate-serrate from base, apex acuminate or shortly caudate-acuminate. Inflorescences in pairs, male inflorescence a cyme, dichotomously branched 4–6 times, ca. 1–2 cm; female ones dichotomously branched 3 times, ca. 1 cm; bracts ovate, ca. 0.6 mm. Male flowers shortly pedicellate, in bud obovoid, ca. 1.4 mm; perianth lobes 4, reddish, oblong-ovate, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary conic, ca. 0.3 mm. Female flowers shortly pedicellate; perianth lobes triangular-ovate; staminodes oblong. Achene oblong-ovoid, ca. 1.2 mm, slightly compressed, sparsely tuberculate, persistent perianth lobes 3 times shorter than achene. Fl. Jan–Apr, fr. Apr–May.

Shaded wet places in forests in limestone mountains; 1100–1300 m. W Guangxi, SE Yunnan (Xichou) [Vietnam].

10. *Pilea tsiangiana* Metcalfe, Lingnan Sci. J. 15: 633. 1936.

海南冷水花 hai nan leng shui hua

Subshrubs glabrous, monoecious or dioecious. Stems light green when dry, 30-100 cm; stems, stipules, petioles, and both surfaces of leaf blade densely covered with cystoliths. Stipules deciduous, green, oblong, 6-8 mm, papery, longitudinally 2-ribbed; petiole subequal in length, 1-3.5 cm; leaf blade abaxially pale green, adaxially green, elliptic or oblong, subequal in size, 7-14 x 3.5-7.5 cm, thinly papery, 3-veined, lateral veins 8-10 each side, transverse, prominent abaxially, external secondary veins anastomosing by margin, base broadly cuneate, rounded, or subcordate, margin crenate-serrate from base, apex acute or acuminate. Inflorescences unisexual or sometimes of mixed sexes, in pairs; male inflorescence a racemelike cyme, few branched, 2-4.5 cm, glomerules scattered; female inflorescence a dichotomous cyme, ca. 1.5 cm. Male flowers reddish brown, pedicellate, in bud ca. 1.5 mm; perianth lobes 4, ovate, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary cylindrical, ca. 0.3 mm. Female flowers subsessile; perianth lobes triangular-ovate, persistent perianth 1/4 as long as achene; staminodes oblong. Achene densely purplish spotted, ovoid, ca. 2 mm, compressed, smooth. Fl. Aug-Oct, fr. Nov-Jan.

Shaded wet places in forests, near streams; 200-300 m. Guangxi, Hainan [N Vietnam].

11. *Pilea pseudonotata* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 50. 1982.

假冷水花 jia leng shui hua

Subshrubs glabrous, monoecious. Stems light green when dry, to 200 cm, ca. 1.5 cm in diam.; stems, petioles, and both surfaces of leaf blade densely covered with cystoliths. Stipules deciduous, green, oblong-lanceolate, 10-12 mm, papery, longitudinally 2-ribbed; petiole subequal in length, 2-11 cm; leaf blade abaxially pale green, adaxially dark green, ovate or ovate-lanceolate, subequal in size, 5-17 x 2.5-8 cm, thinly papery, 3-veined, lateral veins 12-18 each side, transverse, prominent abaxially, external secondary veins anastomosing by margin, base rounded or subcordate, margin serrate or crenate-serrate, apex acuminate. Inflorescences unisexual or sometimes mixed sexes, in pairs, a racemelike cyme, few branched, 1-2.5 cm; male glomerules compact. Male flower greenish, pedicellate, in bud pear-shaped, ca. 2 mm; perianth lobes 4, obovate, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary conic. Female flowers pedicellate; perianth lobes lanceolate, ca. 1 mm, persistent perianth 1/3 as long as achene; staminodes minute. Achene greenish brown, ovoid, ca. 1.2 mm, slightly compressed, oblique, densely spiculose-verrucose. Fl. Mar-Apr, fr. May-Jun.

Shaded wet places in forests, near streams; 700-2500 m. S Guizhou, E Xizang, S Yunnan [N Vietnam].

This species is superficially similar to *Pilea notata* in appearance, but *P. notata* has only 3 female perianth lobes, longer male cymes, and outer secondary veins that do not anastomose near the margin.

12. *Pilea longicaulis* Handel-Mazzetti, Symb. Sin. 7: 127. 1929.

长茎冷水花 chang jing leng shui hua

Subshrubs or perennial herbs glabrous, dioecious. Stems light green when dry, terete, 50-80 cm; stems, stipules, petioles, and leaves densely covered with cystoliths. Stipules deciduous, green, oblong, 7-9 mm, papery, longitudinally 2-ribbed; petiole subequal in length, 1-3 cm; leaf blade pale green, elliptic-lanceolate, elliptic, rarely ovate, subequal in size, 6-15 x 3-6 cm, ± succulent, but thinly papery when dry, 3-veined, lateral veins 10 each side, transverse, inconspicuous on both surfaces, external secondary veins indistinctly anastomosing by margin, both surfaces lustrous, base obtuse, broadly cuneate, rounded, or subcordate, margin entire or erose, rarely serrate distally, apex acuminate or shortly caudate-acuminate. Inflorescences in pairs; male inflorescence a dichotomously branched cymose panicle or cymose raceme, or compacted into capitulum, 1-2(-5) cm. Male flowers purplish or yellow, pedicellate, in bud obovoid, ca. 1.5 mm; perianth lobes 4, elliptic, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary conic. Female flowers subsessile; perianth lobes elliptic, persistent perianth 1/3 as long as achene; staminodes oblong. Achene ellipsoid-ovoid, ca. 1.5 mm, compressed, with a purplish ring on both surfaces. Fl. Jan-Feb, fr. Mar-May.

Shaded wet places in forests often in limestone mountains; 400-1500 m. W Guangxi, Guizhou, Sichuan [Laos, N Vietnam].

- 1a. Herbs perennial; male flowers compacted into capitula, yellowish 12c. var. *flaviflora*
- 1b. Subshrubs; male flowers in cymose racemes or cymose panicles, purplish.
 - 2a. Inflorescences 1-2 cm; leaf blade elliptic-lanceolate or elliptic, base broadly cuneate or obtuse, margin entire or crenate distally 12a. var. *longicaulis*
 - 2b. Inflorescences 1.5-5 cm; leaf blade broadly elliptic or ovate, base rounded or subcordate, margin erose distally 12b. var. *erosa*

12a. *Pilea longicaulis* var. *longicaulis*

长茎冷水花(原变种) chang jing leng shui hua (yuan bian zhong)

Subshrubs. Stems to 80 cm tall. Leaf blade elliptic-lanceolate or elliptic, base broadly cuneate or obtuse, margin entire or crenate distally. Inflorescences 1-2 cm. Male flowers dark purplish. Fl. Jan-Feb, fr. Mar-May.

Shaded wet places in forests often in limestone mountains; ca. 700 m. W Guangxi (Longzhou) [N Vietnam].

The plants are used medicinally as a diuretic and to treat traumatic injuries.

12b. *Pilea longicaulis* var. *erosa* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 52. 1982.

侵蚀冷水花 nie shi leng shui hua

Subshrubs to 60 cm tall. Leaf blade broadly elliptic or ovate, base rounded or subcordate, margin erose distally. Inflorescences 1.5-5 cm. Male flowers dark purplish. Fl. Oct-Nov, fr. Nov-Dec.

• Shaded wet places in forests in limestone mountains; 400-1100 m. W Guangxi (Debao).

12c. *Pilea longicaulis* var. *flaviflora* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 52. 1982.

黄花冷水花 huang hua leng shui hua

Herbs perennial, to 80 cm tall. Leaf blade elliptic-lanceolate, base rounded, margin crenate-serrate distally. Male inflorescence a capitulum. Male flowers yellowish. Fl. Jul–Sep.

Shaded wet places in forests; 400–1500 m. Guizhou, Sichuan [Laos].

This taxon appears to be quite different from the typical variety; further taxonomic study of this group is needed.

13. *Pilea rubriflora* C. H. Wright, J. Linn. Soc., Bot. 26: 478. 1898.

红花冷水花 hong hua leng shui hua

Herbs or subshrubs perennial, glabrous, dioecious. Stems blue-green when dry, terete, 40–80 cm, ca. 8 mm in diam., waxy; stems, stipules, petioles, and leaves densely covered with cystoliths. Stipules deciduous, green, oblong, ca. 7 mm, papery, longitudinally 2-ribbed; petiole subequal in length, 0.5–1.5 cm; leaf blade pale green and lustrous on both surfaces, oblong- or linear-lanceolate, 6–10 × 1.5–2.8 cm, papery, 3-veined, lateral veins 12–15 each side, transverse, conspicuous abaxially, external secondary veins anastomosing by margin, base rounded or subcordate, margin serrulate, apex acuminate. Male inflorescence a compact, cymose cluster; female inflorescence unknown. Male flowers light yellowish, then reddish, pedicel 2–3 mm, in bud obovoid, ca. 1.6 mm; perianth lobes 4, elliptic, connate about 1/2 of length, 2 lobes subapically corniculate; stamens 4; rudimentary ovary minute. Fl. Apr.

• Shaded wet places in forests, near streams; 800–1500 m. W Hubei, E Sichuan.

14. *Pilea funkikensis* Hayata, Icon. Pl. Formosan. 6: 45. 1916.

奋起湖冷水花 fen qi hu leng shui hua

Subshrubs glabrous, monoecious or dioecious. Stems green when dry, erect, ascending, or climbing, terete, to 200 cm tall, woody at base, usually with galls on mid portion of internodes; stems, stipules, petioles, and leaves densely covered with cystoliths. Stipules caducous, green, oblong, 13–23 mm, papery, longitudinally 2-ribbed; petiole unequal in length,

(0.5–)2–7 cm; leaf blade elliptic- or ovate-lanceolate, unequal in size, (3–)10–22 × (1.3–)4–6.5 cm, papery, 3-veined, lateral veins 8–10 each side, transverse, external secondary veins indistinctly anastomosing by margin, cystoliths conspicuous, base slightly oblique, broadly cuneate or rounded, margin serrulate or obscurely serrulate, apex acute to caudate-acuminate. Inflorescences in pairs, of mixed sexes; male inflorescence a cymose panicle or few branched, interrupted spike; peduncle to 4.5 cm; female inflorescence a cyme. Male flowers pedicellate, in bud obovoid, ca. 1.5 mm; perianth lobes (3 or)4, cymbiform, connate about 1/2 of length, subapically corniculate, persistent perianth lobes 0.5–0.7 mm, 1/2 as long as achene; stamens (3 or)4; rudimentary ovary conic. Female flowers sessile; perianth lobes dimorphic; staminodes oblong. Achene asymmetrically ovoid, ca. 1.3 mm, compressed. Fl. May–Jul, fr. Aug–Oct.

• Shaded wet places in forests, ravines; 400–1400 m. Taiwan.

15. *Pilea cadierei* Gagnepain & Guillemin, Bull. Mus. Natl. Hist. Nat., sér. 2, 10: 629. 1939.

花叶冷水花 hua ye leng shui hua

Herbs perennial or subshrubs, rhizomatous, glabrous, dioecious. Stems erect, 15–40 cm tall, somewhat succulent, woody at base; stems, stipules, petioles, and leaves densely covered with cystoliths. Stipules caducous, green, brownish when dry, oblong, 10–13 mm, papery, longitudinally 2-ribbed; petiole subequal in length, 0.7–1.5 cm; leaf blade obovate, subequal in size, 2.5–6 × 1.5–3 cm, papery, 3-veined, lateral veins 3 each side, external secondary veins anastomosing by margin, adaxial surface with 2 interrupted white grooves, base broadly cuneate or subrounded, margin obscurely dentate or erose, apex mucronate. Inflorescences in pairs; male inflorescence a capitulum, peduncle 1.5–4 cm; glomerules 6–10 mm in diam.; bracts broadly ovate, ca. 3 mm. Male flowers: pedicel 2–3 mm, in bud pear-shaped, ca. 2.5 mm; perianth lobes 4, cymbiform, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary conic. Female flowers sessile; persistent perianth lobes 0.5–0.7 mm, 1/2 as long as achene; staminodes oblong. Achene ovoid, ca. 1.5 mm, compressed. Fl. Sep–Nov, fr. Nov–Dec.

Shaded wet places in forests; 500–1500 m. Guizhou, Yunnan [Vietnam].

This species is commonly cultivated as an ornamental.

4. *Pilea* sect. *Urticella* Miquel in Martius, Fl. Bras. 4(1): 198. 1853.

三萼组 san e zu

Herbs, rarely shrubs. Leaves 3-veined from base of blade, rarely main lateral veins arising above base. Inflorescences unisexual. Male perianth lobes (2–)4, valvate; female perianth lobes 3, usually unequal.

About 370 species: worldwide in tropical, subtropical, and rarely temperate regions; 58 species (25 endemic) in China.

- 1a. Leaves of each pair very unequal, the larger over 5 times as long as the smaller.
 - 2a. Minor leaves of each pair strongly reduced, less than ca. 1 cm, sometimes absent, margin serrulate; male flowers borne around axis of inflorescence 73. *P. pellionioides*
 - 2b. Minor leaves of each pair conspicuous, more than ca. 1 cm, margin entire or subentire; male flowers borne along side of inflorescence.
 - 3a. Leaf blade at least on upper stem base distinctly peltate, lateral veins U-shaped at base; achene verrucose 71. *P. insolens*
 - 3b. Leaf blade basifixed, lateral veins spreading; achene smooth 72. *P. anisophylla*

- 1b. Leaves of each pair subequal or unequal but less than 5 times in size.
- 4a. Plants with at least some multicellular hairs.
- 5a. Inflorescences usually unbranched, moniliform, sometimes few branched; leaf blade elliptic or ovate-elliptic, with incurved deeply serrate acumen 70. *P. medogensis*
- 5b. Inflorescences cymose or branched; leaf blade ovate or lanceolate with entire or shallowly serrulate acumen.
- 6a. Inflorescences dichotomously cymose or cymose-paniculate, 1–2 cm; stipules triangular, ca. 1 mm.
- 7a. Male flowers in bud pear-shaped, ca. 1.2 mm, with a beak at apex; leaf blade ovate, cystoliths fusiform, conspicuous only along veins abaxially 66. *P. rostellata*
- 7b. Male flowers in bud globose, ca. 0.7 mm, corniculate below apex; leaf blade narrowly ovate or lanceolate, cystoliths short fusiform or subpunctate, dense on both surfaces 67. *P. salwinensis*
- 6b. Inflorescences paniculate, 8–16 cm; stipules oblong or lanceolate, ca. 5 mm.
- 8a. Leaves unequally paired, broadly ovate or suborbicular, 3–12 × 2–9 cm; petiole 0.6–4.5 cm; achene ca. 0.6 mm 68. *P. umbrosa*
- 8b. Leaves strongly unequally paired, ovate to oblong-ovate, 6–9 × 3.5–4.5 cm; petiole 0–1.5 cm, small leaf sessile; achene ca. 1 mm 69. *P. multicellularis*
- 4b. Plants with unicellular hairs or glabrous.
- 9a. Male flowers 2-merous; inflorescences cincinnus.
- 10a. Stipules soon deciduous, ovate-oblong, 2–3 mm; female perianth lobes 3, subequal or abaxial lobe the shortest; achene with colored dots 64. *P. pumila*
- 10b. Stipules persistent, orbicular or subcordate, 2.5–4 mm; female perianth lobes 3, strongly unequal, abaxial lobe the longest, ca. 10 times as long as the lateral 2 lobes; achene without colored dots 65. *P. pauciflora*
- 9b. Male flowers 4-merous; inflorescences not cincinnus.
- 11a. Leaf blade, all or some, peltate.
- 12a. Leaves submembranous or thinly papery.
- 13a. Stems to 100 cm tall; leaf blade peltate, base often truncate; male inflorescences 3–11 cm 53. *P. paniculigera*
- 13b. Stems ca. 25 cm tall; leaf blade unequally paired, only major one peltate; male inflorescences 1.5–3.5 cm 54. *P. racemiformis*
- 12b. Leaves succulent, papery or thickly papery when dried.
- 14a. Stems 10–40 cm tall, internodes compact; leaf blade suborbicular, apex subrounded; stipule ca. 7 mm; male inflorescences 10–28 cm 55. *P. peperomioides*
- 14b. Stems 5–27 cm, internodes 1–4 cm; leaf blade broadly ovate or suborbicular, apex acute or short acuminate; stipule ca. 1 mm; male inflorescences 3–4 cm 56. *P. peltata*
- 11b. Leaf blade basifixed.
- 15a. Male inflorescences capitate or subcapitate, glomerules sometimes arranged on racemose branches.
- 16a. Plants with tubers.
- 17a. Tubers globose, whitish gray, 3–20 mm in diam.; leaves on middle and upper nodes, ovate or rhombic-ovate, apex obtuse or acute 62. *P. racemosa*
- 17b. Tubers at base of stem or sometimes at rhizome nodes conic, brownish, 5–10 mm in diam.; leaves crowded at stem apex, often 4–6 in whorl, ovate to lanceolate, apex acuminate (acute in upper leaves of var. *incisoserrata*) 63. *P. approximata*
- 16b. Plants without tubers.
- 18a. Leaf blade succulent, broadly ovate, rhombic, or orbicular.
- 19a. Herbs erect; leaf blade 8–20 × 6–18 mm, base often broadly cuneate or rounded; petiole 5–20 mm; male perianth lobes not corniculate at apex 60. *P. cavaleriei*
- 19b. Herbs prostrate; leaf blade 4–8 × 4–8.5 mm, base truncate; petiole 0.2–0.6 mm; male perianth lobes corniculate below apex 61. *P. sinocrassifolia*
- 18b. Leaf blade not succulent, ovate or linear.
- 20a. Herbs 5–10 cm tall, simple; leaf blade elliptic-lanceolate or oblong-linear, membranous, margin entire or shallowly 1-lobed in middle part 59. *P. linearifolia*
- 20b. Herbs 10–35 cm tall, much branched; leaf blade ovate or lanceolate, rarely linear, ± papery, margin serrate.
- 21a. Leaf blade narrowly lanceolate, 2–5 × 0.4–1 cm, margin serrulate; female perianth lobes 3, abaxial lobe short corniculate below apex 57. *P. bambusifolia*
- 21b. Leaf blade ovate, 0.7–2.5 × 0.6–1 cm, margin obtusely 2–4-serrate; female perianth lobes 3, abaxial lobe strongly recurved corniculate below apex 58. *P. unciformis*
- 15b. Male inflorescences dichotomously cymose, cymose-paniculate, or moniliform spicate, but not capitate.
- 22a. Male inflorescences moniliform spicate of remote glomerules; stipules triangular, persistent.
- 23a. Plants 50–150 cm tall; leaf blade 5–13 × 3–7 cm, margin coarsely serrate; achene ca. 1.8 mm 51. *P. monilifera*

- 23b. Plants 3–20(–40) cm tall; leaf blade 1–6 × 0.5–3 cm, margin entire or sparsely crenate; achene 0.4–0.6 mm.
- 24a. Leaf blade cordate, 0.6–1.5 × 0.5–1.4 cm, margin 4–6-crenate each side; male inflorescences 0.5–1.2 cm; achene with a colored dotted circle 52. *P. microcardia*
- 24b. Leaf blade 1.5–6 cm, margin entire; male inflorescences ca. 2 cm or more; achene verrucose.
- 25a. Leaf blade broadly elliptic or rhombic-orbicular; male inflorescences 2–5 cm; female ones capitate; achene inconspicuously verrucose 49. *P. media*
- 25b. Leaf blade rhombic-elliptic or rhombic-lanceolate; male inflorescences ca. 2 cm; female ones racemose; achene spinulose-verrucose 50. *P. elegantissima*
- 22b. Male inflorescences dichotomously cymose; stipules different forms, persistent or deciduous.
- 26a. Female perianth lobes usually equal in size (unequal in *P. hookeriana*), connate 1/2 of length or to apex, often obtuse at apex.
- 27a. Stipules soon deciduous, oblong, 7–20 mm.
- 28a. Stipules interpetiolar; male inflorescence unbranched, capitate or moniliform; female perianth lobes unequal 44. *P. hookeriana*
- 28b. Stipules intrapetiolar; male inflorescence cymose, branched; female perianth lobes equal.
- 29a. Leaf blade membranous or herbaceous, margin coarsely serrate, cystoliths fusiform, 0.3–0.4 mm; achene 1.2–1.6 mm 45. *P. angulata*
- 29b. Leaf blade papery, margin serrulate, cystoliths linear, 0.5–0.6 mm; achene ca. 0.8 mm 46. *P. notata*
- 27b. Stipules persistent, triangular, 1–2(–4) mm.
- 30a. Leaf blade acuminate or short caudate, margin 18–24-crenate 16. *P. verrucosa*
- 30b. Leaf blade caudate or long caudate, margin less than 15-dentate 47. *P. sinofasciata*
- 26b. Female perianth lobes unequal in size, free or connate at base, often acute at apex.
- 31a. Female inflorescences dichotomously cymose, sometimes compacted into clusters; male inflorescences dichotomously cymose, or cymose-paniculate; achene subglobose; basal veins on leaf blade prominent adaxially.
- 32a. Stipules cordate or oblong-ovate, 3–8 mm; male inflorescences solitary, cymose-paniculate.
- 33a. Male inflorescences often shorter or sometimes slightly longer than petioles; stipules oblong-ovate.
- 34a. Leaf blade membranous, oblong or elliptic, 9–15 × 5–8 cm 23. *P. elliptilimba*
- 34b. Leaf blade papery, elliptic-lanceolate, 3–7 × 1.2–2.3 cm 24. *P. chartacea*
- 33b. Male inflorescences often longer than petioles; stipules cordate.
- 35a. Leaf blade elliptic, ovate, ovate- or elliptic-lanceolate 20. *P. aquarum*
- 35b. Leaf blade obovate-oblong.
- 36a. Stems with several sinuately membranous wings, glabrous; female cymes 1–1.5 cm 22. *P. subcoriacea*
- 36b. Stems without wings, densely pubescent; female cymes 2–5 cm 21. *P. cordistipulata*
- 32b. Stipules triangular, 1–2(–4) mm; male inflorescences in pairs (solitary in *P. matsudae*), dichotomously cymose.
- 37a. Leaf blade ± leathery; male cymes often longer than leaves 25. *P. lomatogramma*
- 37b. Leaf blade often membranous; male cymes or cymose panicles shorter than leaves.
- 38a. Male inflorescences shorter than petioles; leaf blade broadly elliptic or ovate, margin coarsely serrate.
- 39a. Plants densely pubescent; male cymes in compact clusters 19. *P. villicaulis*
- 39b. Plants subglabrous; male cymes in panicles 48. *P. matsudae*
- 38b. Male inflorescences often longer than petioles; leaf blade elliptic to lanceolate, margin serrate, crenate-serrate, or serrulate.
- 40a. Leaf blade unequally paired, usually elliptic, base narrowly cuneate, margin serrulate or rarely subentire; achene ca. 1.8 mm 18. *P. somae*
- 40b. Leaf blade subequally paired, elliptic to lanceolate, base cuneate or subrounded, margin serrate or crenate-serrate; achene 0.7–0.8 mm.
- 41a. Leaf blade sparsely pilose adaxially, often 3-veined, rarely triplinerved; male perianth lobes acute without corniculate appendix at apex; plants dioecious 16. *P. verrucosa*
- 41b. Leaf blade glabrous, triplinerved; male perianth lobes corniculate at apex; herbs monoecious 17. *P. rotundinucula*
- 31b. Female and male inflorescences all cymose-paniculate; achene ovoid or oblong; basal veins on leaf blade even or sunken adaxially.
- 42a. Stipules oblong or oblong-lanceolate, 4–12 mm.

- 43a. Stipules brownish, 4–8 mm; leaf margin serrate; achene smooth.
- 44a. Upper stems and petioles glabrous or puberulent; leaf blade ovate or ovate-lanceolate, asymmetric; inflorescences longer than petioles 26. *P. martini*
- 44b. Stems and petioles densely spreading villous; leaf blade oblong-elliptic; inflorescences shorter than petioles 27. *P. menghaiensis*
- 43b. Stipules greenish, 5–12 mm; leaf margin sharply serrulate or crenate; achene with a colored ring or smooth.
- 45a. Achene with a colored ring; leaf margin shallowly but sharply serrulate, sometimes ciliate 30. *P. bracteosa*
- 45b. Achene smooth; leaf margin crenate.
- 46a. Plants 30–80 cm tall; leaf blade 7–16 × 4–8 cm, oblique; stipules 8–12 mm 28. *P. cordifolia*
- 46b. Plants 10–25 cm tall; leaf blade 1–3 × 0.6–2.5 cm, not oblique; stipules 4–5 mm 29. *P. oxyodon*
- 42b. Stipules triangular, 1–2(–3) mm (to 5 mm in *P. longipedunculata*).
- 47a. Male inflorescences shorter than leaves.
- 48a. Male inflorescences slightly longer than petioles; cystoliths linear.
- 49a. Leaf blade subequally paired, base broadly cuneate to emarginate, margin serrulate, terminal veins interruptedly thickened; achene oblique, verrucose, often with a colored ring by margin 31. *P. scripta*
- 49b. Leaf blade unequally paired, base auriculate or cordate, margin crenate, terminal veins not thickened; achene not oblique, smooth or finely reticulate 32. *P. auricularis*
- 48b. Male inflorescences shorter than petioles; cystoliths subpunctate or very short botuliform.
- 50a. Herbs weak or subshrubs, often climbing, glabrous; leaf apex acuminate, margin entire or shallowly serrate 33. *P. glaberrima*
- 50b. Herbs robust, covered with dense brownish squamae; leaf apex caudate-acuminate; margin crenulate 34. *P. squamosa*
- 47b. Male inflorescences longer than leaves.
- 51a. Leaf margin entire or inconspicuously 1–3-serrulate near apex.
- 52a. Achene strongly elevated as eyeball; leaf blade often falcate-lanceolate 41. *P. longipedunculata*
- 52b. Achene verrucose; leaf blade often ovate.
- 53a. Leaf blade narrowly ovate to elliptic-lanceolate, 5–13 × 2–5 cm, 2-serrulate apically, lateral veins transverse, regularly reticulate 42. *P. subedentata*
- 53b. Leaf blade ovate, lanceolate, or obovate-oblong, 1–15 × 0.6–5 cm, entire, lateral veins irregularly reticulate 43. *P. plataniflora*
- 51b. Leaf margin serrate.
- 54a. Male inflorescences rather longer than leaves; achene with a colored circle or strongly elevated as eyeball.
- 55a. Herbs to 2 m tall; leaf blade elliptic or elliptic-lanceolate, symmetric, 10–25 × 5–16 cm; male inflorescences 15–35 cm 39. *P. melastomoides*
- 55b. Herbs 15–35(–80) cm tall; leaf blade broadly ovate or elliptic, somewhat asymmetric, 5–12(–18) × 2.5–5(–8) cm; male inflorescences 8–14 cm 40. *P. howelliana*
- 54b. Male inflorescences not or slightly longer than leaves; achene smooth or dotted but without colored circle.
- 56a. Leaf base rounded to subcordate; male perianth lobes beaked at apex; achene oblique at apex.
- 57a. Herbs 20–30 cm tall; leaf blade 2–6.5 × 1.5–2.5 cm; achene ca. 1 mm, smooth 35. *P. wightii*
- 57b. Herbs 30–120 cm tall; leaf blade 4–14 × 2–7 cm; achene ca. 1.5 mm, smooth, often purplish dotted 36. *P. symmeria*
- 56b. Leaf base cordate; male perianth lobes acute; achene not oblique.
- 58a. Leaf blade lanceolate, margin sinuate-crenate; female inflorescences 5–11 cm; achene ca. 2 mm, enclosed by equal perianth lobes 37. *P. macrocarpa*
- 58b. Leaf blade usually falcate-lanceolate, margin sharply serrate; female inflorescences 1.5–4 cm; achene ca. 1 mm, enclosed by unequal perianth lobes 38. *P. semisessilis*

16. *Pilea verrucosa* Handel-Mazzetti, Symb. Sin. 7: 134. 1929.

疣果冷水花 liu guo leng shui hua

Herbs perennial, rhizomatous, subglabrous, monoecious or dioecious. Stems brownish when dry, 20–100 cm tall, succulent, with galls on mid portion of internodes. Stipules persistent,

broadly triangular, ca. 1 mm, membranous, veinless; petiole subequal in length, 1–7 cm; leaf blade abaxially purplish or pale green, adaxially dark green, elliptic or elliptic-lanceolate, subequal in size, 3–18 × 1.8–7 cm, membranous to thinly papery, 3-veined or triplinerved, lateral veins many, transverse, reticulate, prominent abaxially, abaxial surface glabrous, adaxial sur-

face sparsely pilose, base rounded or cuneate, margin serrate or crenate-serrate, apex acuminate or caudate-acuminate. Inflorescences in pairs, male a dichotomously branched paniculate cyme, 2–5 cm overall, peduncle 1–2.5 cm; female cymes sometimes compacted into clusters, 0.7–2 cm. subsessile or shortly pedunculate. Male flowers pedicellate, in bud ca. 2 mm; perianth lobes 4, ovate; stamens 4; rudimentary ovary small, conic. Female flowers subsessile, in bud ca. 1.2 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene ovoid, 0.7–0.8 mm, slightly compressed, oblique, verrucose. Fl. Apr–May(–Sep), fr. May–Jul(–Jan).

Shaded wet places in forests, near streams; 400–1600 m. Chongqing, Fujian, Guangxi, Guizhou, Hainan, Hubei, Hunan, Sichuan, Yunnan [N Vietnam].

- 1a. Leaf blade 3-veined, base rounded or broadly cuneate 16a. var. *verrucosa*
- 1b. Leaf blade triplinerved, base narrowly cuneate or obtuse.
 - 2a. Leaf blade black when dry; petiole 1–2 cm; achene spinulose-verrucose 16b. var. *fujianensis*
 - 2b. Leaf blade dark green or brown when dry; petiole 1.5–7 cm; achene verrucose 16c. var. *subtriplinervia*

16a. *Pilea verrucosa* var. *verrucosa*

疣果冷水花(原变种) liu guo leng shui hua (yuan bian zhong)

Pilea gracillis Handel-Mazzetti; *P. nanchuanensis* C. J. Chen; *P. purpurella* C. J. Chen; *P. symmeria* Weddell var. *subcoriacea* Handel-Mazzetti.

Petiole 1–7 cm; leaf blade elliptic or oblong lanceolate, 3–18 × 1.8–5 cm, papery, 3-veined, base rounded or broadly cuneate; Achene ca. 0.7 mm, verrucose. Fl. Apr–May, fr. May–Jul.

Shaded wet places in forests, near streams; 400–1600 m. Chongqing, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan [N Vietnam].

The plants are used medicinally to stimulate the spleen and relieve edema.

16b. *Pilea verrucosa* var. *fujianensis* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 55. 1982.

闽北冷水花 min bei leng shui hua

Petiole 1–2 cm; leaf blade black when dry, lanceolate, 10–14 × 2.3–4.2 cm, membranous, triplinerved, base narrowly cuneate; Achene ca. 0.5 mm, spinulose-verrucose. Fl. May, fr. Jun–Jul.

- Wet places by streams; 800–1000 m. Fujian (Jianning, Taining).

16c. *Pilea verrucosa* var. *subtriplinervia* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 56. 1982.

离基脉冷水花 li ji mai leng shui hua

Petiole 1.5–7 cm; leaf blade dark green or brownish when dry, narrowly elliptic or elliptic-lanceolate, 8–17 × 3–7 cm,

submembranous, triplinerved, base cuneate or obtuse; Achene ca. 0.8 mm, verrucose. Fl. Sep, fr. Oct–Jan.

- Shaded wet places in forests; 400–600 m. Hainan (Dongfang).

17. *Pilea rotundinucula* Hayata, Icon. Pl. Formosan. 6: 49. 1916.

圆果冷水花 yuan guo leng shui hua

Pilea distachys Yamamoto; *P. funkikensis* Hayata var. *rotundinucula* (Hayata) S. S. Ying.

Herbs perennial, rhizomatous, glabrous, monoecious or dioecious. Stems erect or ascending, 20–60 cm tall, succulent, with galls on mid portion of internodes. Stipules persistent, broadly triangular, ca. 1 mm, membranous, veinless; petiole subequal in length, 0.5–4 cm; leaf blade brownish when dry, elliptic- or oblong-lanceolate, subequal in size, 5.5–22 × 1.1–75 cm, membranous to herbaceous, triplinerved or 3-veined, lateral veins many, apical ones conspicuous, transverse, reticulate, prominent abaxially, base cuneate, margin serrulate, sometimes entire, apex acuminate. Inflorescences in pairs, male a dichotomously branched cyme, 2.5–9 cm overall, peduncle 1–3.2 cm; female cymes sometimes compacted into clusters, 0.6–3.5 cm. subsessile or shortly pedunculate. Male flowers pedicellate, in bud obovoid, ca. 2 mm; perianth lobes 4, ovate, connate about 1/2 of length; stamens 4; rudimentary ovary small, conic. Female flowers subsessile, in bud ca. 1.2 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene subglobose, 0.7–0.8 mm, slightly compressed, oblique, verrucose. Fl. Apr–Jun, fr. Jul–Sep.

- Shaded wet places in forests, near streams, sunny roadsides and rocks in moist places; 300–1500 m. Taiwan.

18. *Pilea somae* Hayata, Icon. Pl. Formosan. 6: 50. 1916.

细叶冷水花 xi ye leng shui hua

Pilea funkikensis Hayata var. *somae* (Hayata) S. S. Ying.

Herbs perennial, sometimes woody at base, glabrous, dioecious. Stems ascending, 50–60 cm tall. Stipules persistent, broadly triangular, ca. 1.5 mm, membranous, veinless; petiole subequal or unequal in length, 0.5–7.5 cm; leaf blade elliptic to oblong-lanceolate, subequal or unequal in size, 2.5–15 × 1–5 cm, membranous to herbaceous, 3-veined, lateral veins inconspicuous, reticulate, prominent abaxially, base cuneate, margin serrulate to tip, apex acuminate. Inflorescences in pairs, male a dichotomously branched paniculate cyme, 2.4–6.5 cm overall, peduncle 2.5–4.5 cm; female cymes 0.5–4 cm, shortly pedunculate. Male flowers pedicellate, in bud obovoid, ca. 2 mm; perianth lobes 4, ovate, connate about 1/2 of length; stamens 4; rudimentary ovary small, conic. Female flowers subsessile, in bud ca. 1.4 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene subglobose, 0.7–0.8 mm, slightly compressed, oblique, indistinctly verrucose. Fl. Mar–Jun, fr. Jul–Sep.

- Shaded wet places in forests, near streams, sunny roadsides and rocks in moist places; 100–900 m. S Taiwan.

19. *Pilea villicaulis* Handel-Mazzetti, Symb. Sin. 7: 125. 1929.

毛茎冷水花 mao jing leng shui hua

Pilea villicaulis var. *subglabra* C. J. Chen.

Herbs perennial, rhizomatous, dioecious. Stems few branched, 20–50 cm tall, succulent, with galls on mid portion of internodes; stems and petioles densely spreading-villous or sometimes glabrous. Stipules persistent, broadly triangular, 2–3 mm, membranous, veinless; petiole unequal or subequal in length, 1–7 cm; leaf blade oblong-elliptic, rarely broadly ovate, unequal or subequal in size, 5–15 × 2.5–8 cm, membranous, 3-veined, lateral veins many, prominent abaxially, both surfaces sparsely pilose, base broadly cuneate, rounded or cordate, margin coarsely serrate or dentate, apex entire, acute or caudate. Inflorescences in pairs of dichotomous cymes compacted into clusters, 0.5–1.5 cm, often pubescent on the axis. Male flowers light green or pink, pedicellate, in bud ca. 1.5 mm; perianth lobes 4, 2 cymbiform, subapically corniculate, 2 oblong; stamens 4; rudimentary ovary small, conic. Female flowers subsessile, in bud ca. 0.7 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene ovoid, ca. 1 mm, slightly compressed, oblique, strongly verrucose. Fl. Aug. fr. Oct.

• Shaded wet places by streams or in near streams; 500–2500 m. S Yunnan.

20. *Pilea aquarum* Dunn, J. Linn. Soc., Bot. 38: 366. 1908.

湿生冷水花 shi sheng leng shui hua

Herbs perennial, stoloniferous, sometimes puberulent, dioecious or sometimes monoecious. Stems often reddish, simple or few branched, 10–70 cm tall, succulent, with galls on mid portion of internodes. pubescent or glabrous, Stipules persistent, subcordate, 3–5 mm, membranous, acute at apex, veinless; petioles subequal or unequal in length, 0.5–3.5 cm, pubescent or glabrous; leaf blade abaxially pale green, adaxially dark green, lustrous, broadly elliptic or ovate-elliptic, sometimes lanceolate, subequal or unequal in size, 1.5–14 × 1–7 cm, membranous, 3-veined, prominent adaxially, lateral veins several, subtransverse, inconspicuous, both surfaces pubescent or glabrous, base broadly cuneate or obtuse, sometimes oblique, margin obtusely crenate, crenate-serrate, or coarsely dentate, apex acute, obtuse, or acuminate. Inflorescences solitary; male inflorescence a cymose panicle, 2–7 cm overall, peduncle 1.5–3.5 cm; female cymes dichotomously branched, compacted into clusters, pedunculate or subsessile. Male flowers pedicellate, in bud ca. 2 mm; perianth lobes 4, elliptic, subapically corniculate; stamens 4; rudimentary ovary small. Female flowers subsessile; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene greenish brown, obliquely ovoid, ca. 0.7 mm, slightly compressed, verrucose. Fl. (Nov–)Feb–May, fr. (Mar–)May–Jun.

Wet places along ditches or streams; 200–2600 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, SE Sichuan, Taiwan, SE Yunnan [Japan, Vietnam].

- 1a. Herbs to 70 tall; leaf blade obliquely ovate, 5–14 × 2.5–7 cm, margin coarsely dentate; male inflorescences shorter than or little longer than petioles 20c. subsp. *acutidentata*
- 1b. Herbs 10–50 cm tall; leaf blade elliptic or lanceolate, 1.5–6 × 1–4 cm, margin crenate; male inflorescences longer than leaves.
 - 2a. Leaf blade elliptic or ovate-elliptic, apex acute; female cymes in sessile or shortly pedunculate clusters, less than 1 cm 20a. subsp. *aquarum*
 - 2b. Leaf blade ovate-lanceolate or elliptic-lanceolate, apex acuminate; female cymes pedunculate, 0.5–3 cm 20b. subsp. *brevicornuta*

20a. *Pilea aquarum* subsp. *aquarum*

湿生冷水花(原亚种) shi sheng leng shui hua (yuan ya zhong)

Pilea velutinipes Handel-Mazzetti, p.p.

Herbs, often puberulent, 10–30 cm tall, Leaf blade broadly elliptic or ovate-elliptic, 1.5–6 × 1–4 cm, margin crenate, apex acute. Male inflorescence a cymose panicle, 1.5–3.5 cm; female cymes in clusters, less than ca. 1 cm. Achene verrucose. Fl. Mar–May, fr. Apr–Jun.

• Shaded wet places along ditches, near streams; 300–1500 m. Fujian, N Guangdong, Hunan, Jiangxi, SE Sichuan.

Other syntype material of *Pilea velutinipes* belongs to species 24, *P. chartacea*.

20b. *Pilea aquarum* subsp. *brevicornuta* (Hayata) C. J. Chen, Bull. Bot. Res., Harbin 2(3): 59. 1982.

短角湿生冷水花 duan jiao shi sheng leng shui hua

Pilea brevicornuta Hayata, Icon. Pl. Formosan. 6: 43. 1916; *P. brevicornuta* f. *laxiflora* Yamamoto; *P. brevicornuta* f. *magnifolia* Yamamoto; *P. cuneatifolia* Yamamoto; *P. minor* Yamamoto.

Herbs, puberulent, then glabrescent, 10–50 cm tall, Leaf blade ovate to elliptic-lanceolate, 1.5–17 × 1–6.5 cm, margin crenate-serrate, apex acuminate. Male inflorescence a cymose panicle, to 5 cm; female cyme 0.5–1.5(–3) cm. Achene spiculate-verrucose. Fl. Jan–Apr, fr. May–Jul.

Wet places by ditches, near streams; 200–2600 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Taiwan, SE Yunnan [Japan, Vietnam].

Some material named as *Pilea symmeria* belongs here.

20c. *Pilea aquarum* subsp. *acutidentata* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 60. 1982.

锐齿湿生冷水花 rui chi shi sheng leng shui hua

Herbs 30–70 cm tall. Leaf blade obliquely ovate, 5–14 × 2.5–7 cm, margin coarsely dentate. Male inflorescence a cy-

mose panicle, 2–6 cm; female cyme ca. 2 cm. Achene verrucose. Fl. Nov–Feb, fr. Mar.

• Semishaded wet places by ditches or streams; 200–600 m. W Guangdong, E Guangxi.

21. *Pilea cordistipulata* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 60. 1982.

心托冷水花 xin tuo leng shui hua

Herbs perennial, stoloniferous, dioecious or monoecious. Stems often reddish, simple or few branched, 5–20 cm tall, succulent, with galls on mid portion of internodes. densely pubescent. Stipules persistent, subcordate, 5–8 mm, membranous, obtuse at apex, veinless; petioles, unequal in length, 0.5–3 cm, pubescent; leaf blade abaxially purplish then brownish green when dry, adaxially dark green, but brownish when dry, obovate-oblong or ovate-oblong, subequal or unequal in size, 1.2–7 × 1–3.8 cm, membranous, 3-veined, rarely basal lateral veins not extending beyond middle of leaf blade, prominent on both surfaces, lateral veins several, subtransverse, inconspicuous, abaxial surface pubescent along veins, adaxial surface sparsely pilose, base rounded or obtuse, margin dentate, apex acute, shortly acuminate. Male inflorescence a cymose panicle, 3–6 cm overall, peduncle 2–3 cm; female cymes dichotomously branched many times, 2–5 cm. pedunculate. Male flowers pedicellate, in bud 2–2.5 mm; perianth lobes 4, ovate-elliptic, subapically inconspicuously corniculate; stamens 4; rudimentary ovary small, cylindrical. Female flowers subsessile; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene greenish brown, obliquely ovoid, ca. 0.8 mm, slightly compressed, verrucose. Fl. Nov–Apr, fr. May–Jun.

• Shaded wet places along ditches, streams, near streams; 1100–1300 m. NW Guangdong, Guangxi, Guizhou, SE Yunnan.

22. *Pilea subcoriacea* (Handel-Mazzetti) C. J. Chen, Bull. Bot. Res., Harbin 2(3): 62. 1982.

翅茎冷水花 chi jing leng shui hua

Pilea symmeria Weddell var. *subcoriacea* Handel-Mazzetti, Symb. Sin. 7: 134. 1929; *P. pterocaulis* (Chien) C. J. Chen; *P. symmeria* var. *pterocaulis* Chien.

Herbs perennial, stoloniferous, subglabrous, dioecious. Stems often purplish, simple, with several longitudinal wavy wings, 20–70 cm tall, succulent. Stipules persistent, cordate, 4–7 mm, membranous; petioles subequal in length, 0.5–3.5 cm; leaf blade abaxially pale purplish or pale green, adaxially dark green, obovate-oblong or elliptic, subequal in size, 3–10 × 1.5–5.5 cm, papery, 3-veined, prominent adaxially, lateral veins 10–13 each side, slightly prominent adaxially, base rounded or obtuse, margin crenate-serrate, apex acuminate. Inflorescences solitary; male inflorescence a cymose panicle, often longer than leaves; female cymes dichotomously branched many times, 1–1.5 cm. shortly pedunculate. Male flowers pedicellate, in bud ca. 2 mm; perianth lobes 4, ovate-elliptic; stamens 4; rudimentary ovary small, conic. Female flowers subsessile; perianth lobes connate at base, slightly unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene greenish brown, broadly ovoid, ca. 0.8 mm, slightly compressed, verrucose. Fl. Apr, fr. May–Jun.

• Shaded wet places along ditches, streams, near streams; 800–1800 m. Guangxi, Guizhou, Hunan, Sichuan, N Yunnan.

23. *Pilea elliptimba* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 62. 1982.

椭圆叶冷水花 tuo yuan ye leng shui hua

Herbs perennial, stoloniferous, subglabrous, dioecious. Stems often reddish, simple, several longitudinally angled, 20–70 cm tall, succulent. Stipules almost persistent, brownish, oblong-ovate, 4–5 mm, membranous; petioles subequal in length, 1.5–3.5 cm; leaf blade abaxially pale green, adaxially dark green, obovate-oblong or elliptic-oblong, subequal in size, 9–15 × 5–8 cm, membranous, 3-veined, rarely basal lateral veins not extending beyond middle of leaf blade, prominent adaxially, lateral veins many, transverse, slightly prominent adaxially, abaxial surface sparsely reddish squamulose, adaxial surface sparsely setulose, cystoliths linear, conspicuous abaxially, base cuneate, rarely subrounded, margin crenate or crenate-serrate, apex shortly caudate. Female cymes dichotomously branched many times, 1–1.5 cm, shortly pedunculate. Female flowers sessile; perianth lobes unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene brownish, broadly ovoid, ca. 0.8 mm, slightly compressed, oblique, spinulose-verrucose. Fl. Mar–Apr, fr. May–Jun.

• Shaded wet places along ditches, streams, near streams; 800–1800 m. N Guangxi, S Guizhou.

24. *Pilea chartacea* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 63. 1982.

纸质冷水花 zhi zhi leng shui hua

Pilea velutinipes Handel-Mazzetti, p.p.

Herbs perennial, stoloniferous, glabrous, dioecious or sometimes monoecious. Stems often reddish, stramineous when dry, simple or few branched, angled, 30–40 cm tall, succulent, with galls on mid portion of internodes. Stipules persistent, brownish, narrowly ovate, 3–4 mm, membranous, acute at apex; petioles subequal in length, 0.7–1.5 cm; leaf blade abaxially pale green, adaxially dark green, rugulose, elliptic-lanceolate, subequal in size, 3–7 × 1.2–2.3 cm, papery, prominently 3-veined on both surfaces, lateral veins several, irregular, inconspicuous, adaxial surface reddish squamulose, with linear cystoliths along margin, base broadly cuneate or obtuse, margin shallowly serrate, apex acuminate. Male inflorescence a cyme, 1–1.5 cm; pedunculate, female cymes often compacted into clusters, ca. 0.7 cm, subsessile or shortly pedunculate. Male flowers pedicellate, in bud ca. 2.5 mm; perianth lobes 4, oblong, subapically corniculate; stamens 4; rudimentary ovary small, conic. Female flowers subsessile; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene greenish brown, obliquely ovoid, ca. 1 mm, slightly compressed, verrucose. Fl. and fr. Mar.

• Shaded wet places along streams; below 200 m. Guangdong [?Vietnam].

Other syntype material of *Pilea velutinipes* belongs to species 20, *P. aquarum* (subsp. *aquarum*).

25. *Pilea lomatomgramma* Handel-Mazzetti, Symb. Sin. 7: 135. 1929.

隆脉冷水花 long mai leng shui hua

Herbs perennial, stoloniferous, glabrous, dioecious or monoecious. Stems often reddish, brownish when dry, simple or few branched, angled at base, 10–25 cm tall, somewhat succulent. Stipules persistent, greenish, broadly ovate, 1–2 mm, herbaceous, obtuse at apex; petioles subequal in length, 0.5–2.5 cm; leaf blade abaxially pale green or purplish, adaxially dark green or gray-green, elliptic or ovate, subequal in size, 1–4 × 0.7–2.5 cm, subleathery, 3-veined, very prominent adaxially, lateral veins several, irregular, inconspicuous, base broadly rounded or cuneate, margin crenate-serrate, apex acute or obtuse. Inflorescences solitary; male inflorescence a few branched cyme, longer than leaves, peduncle 2–5 cm; female cymes often compacted into clusters, 0.5–1 cm, subsessile or shortly pedunculate. Male flowers pedicellate, in bud ca. 1.5 mm; perianth lobes 4, ovate-oblong, subapically corniculate; stamens 4; rudimentary ovary small, conic. Female flowers subsessile; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, squamiform, oblong. Achene obliquely ovoid, ca. 0.8 mm, slightly compressed, inconspicuously verrucose. Fl. Apr–Sep, fr. Jun–Oct.

• Shaded wet places on rocks or along streams, near streams in forests; 1000–2000 m. NW Fujian, SW Hubei, Sichuan, NE Yunnan.

26. *Pilea martini* (H. Léveillé) Handel-Mazzetti, Symb. Sin. 7: 131. 1929.

大叶冷水花 da ye leng shui hua

Boehmeria martini H. Léveillé, Repert. Spec. Nov. Regni Veg. 11: 551. 1913.

Herbs perennial, stoloniferous, often dioecious. Stems simple or branched, 30–100 cm tall, succulent, with galls on mid portion of internodes, glabrous or puberulent on upper part. Stipules semipersistent, oblong-lanceolate, 4–8 mm, membranous, veinless; petioles unequal in length, 1–8 cm, puberulent or glabrous; leaf blade abaxially pale green, adaxially green, obliquely ovate, narrowly ovate, or lanceolate, unequal in size, 7–20 × 3.5–12 cm, membranous, 3-veined, lateral veins many, subtransverse, abaxial surface glabrous or puberulent when young, adaxial surface sparsely setulose, base rounded or subcordate, rarely obtuse, margin coarsely serrate-dentate, apex long acuminate, acumen serrulate. Inflorescences solitary; male inflorescence a cymose panicle, 4–10 cm overall, peduncle 2–6 cm; female cymose panicles or cymose racemes, 1–4 cm, shortly pedunculate. Male flowers reddish, sessile or pedicellate, in bud ca. 1.2 mm; perianth lobes 4, oblong-ovate, 2 lobes subapically corniculate; stamens 4; rudimentary ovary small, conic. Female flowers subsessile, in bud ca. 0.6 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene brownish green, narrowly ovoid, ca. 1 mm, compressed, oblique, smooth. Fl. May–Sep, fr. Aug–Oct.

Shaded wet places along ditches, streams, near streams; 1100–3500 m. S Gangsu, N Guangxi, Guizhou, Hubei, Hunan, Jiangxi, S

Shaanxi, E Sichuan, S Xizang, Yunnan [Bhutan, Nepal, Sikkim].

This species occurs widely in W China and is very common in shady and wet places of the forest understory. It resembles *Pilea sessilis*, *P. symmeria*, and *P. umbrosa*.

27. *Pilea menghaiensis* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 67. 1982.

勐海冷水花 meng hai leng shui hua

Herbs perennial, stoloniferous, dioecious. Stems simple or branched, to ca. 100 cm tall, succulent, with galls on mid portion of internodes, densely spreading villous on upper part. Stipules almost persistent, brownish, ovate-lanceolate, 7–10 mm, membranous, 2-ribbed; petiole unequal in length, 1–3 cm, densely spreading villous; leaf blade abaxially pale green, adaxially dark green, oblong-elliptic, slightly unequal in size, 4–6.5 × 2–3 cm, membranous, 3-veined, lateral veins many, abaxial surface densely villous, adaxial surface sparsely setulose, base broadly cuneate or subrounded, margin crenate-serrulate, apex acuminate, acumen serrulate. Male inflorescences solitary, a paniculate cyme, ca. 3 cm. Female inflorescence not seen. Male flowers orange, pedicellate, in bud ca. 1.2 mm; perianth lobes 4, ovate; stamens 4; rudimentary ovary small, conic. Fl. Jul.

• Shaded wet places, near streams; ca. 1800 m. S Yunnan (Menghai).

This species is distinct, but more complete material is needed to clarify its relationships.

28. *Pilea cordifolia* J. D. Hooker, Fl. Brit. India 5: 558. 1888.

弯叶冷水花 wan ye leng shui hua

Herbs perennial, stoloniferous, monoecious. Stems simple or branched, 30–80 cm tall, succulent, with galls on mid portion of internodes, glabrous. Stipules persistent, ovate-oblong, 8–12 mm, herbaceous, veinless; petioles unequal in length, 1–5 cm, sparsely puberulent; leaf blade abaxially pale green, obliquely ovate or elliptic, unequal in size, 7–12(–16) × 4–6(–8) cm, membranous, 3-veined, lateral veins many, both surfaces sparsely puberulent along veins, base cordate or rounded, margin coarsely crenate-serrate, apex acuminate, acumen serrulate. Inflorescences solitary, male distal, a paniculate cyme, 10–25 cm overall, peduncle 5–15 cm; female inflorescence proximal, shorter. Male flowers reddish, pedicellate, in bud ca. 1 mm; perianth lobes 4; stamens 4; rudimentary ovary small. Female flowers subsessile, in bud ca. 0.6 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene brownish, obliquely ovoid, ca. 0.8 mm, compressed, smooth. Fl. Jun–Aug, fr. Aug–Sep.

Shaded wet places along ditches, streams, near streams; 700–1500 m. S Xizang, W Yunnan [NE India, Nepal, Sikkim].

29. *Pilea oxyodon* Weddell, Monogr. Urtic. 221. 1856.

雅致冷水花 ya zhi leng shui hua

Pilea bracteosa var. *oxyodon* (Weddell) H. Hara.

Herbs perennial, stoloniferous, monoecious or dioecious.

Stems branched, 10–25 cm tall, succulent distally, with galls on mid portion of internodes, puberulent adaxially, Stipules persistent, light green, oblong-ovate, 4–5 mm, membranous, veinless; petioles unequal in length, 0.5–2 cm, sparsely puberulent; leaf blade abaxially pale green, broadly ovate, unequal in size, 1–3 × 0.6–2.5 cm, herbaceous, 3-veined, lateral veins many, both surfaces sparsely puberulent along veins, base rounded or subcordate, margin sharply serrulate, apex acute. Inflorescences solitary; male distal, a cymose panicle, 2–7 cm; female inflorescence proximal, shorter. Male flowers reddish, pedicellate, in bud obovoid, ca. 1.5 mm; perianth lobes 4, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary small. Female flowers subsessile, in bud ca. 0.5 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene brownish, obliquely ovoid, ca. 0.8 mm, compressed, smooth. Fl. Jun–Sep, fr. Sep–Oct.

Wet places of the mixed forests; ca. 2900 m. S Xizang [N India, Nepal, Sikkim].

30. *Pilea bracteosa* Weddell, Monogr. Urtic. 245. 1856.

多苞冷水花 duo bao leng shui hua

Pilea bracteosa var. *striolata* Handel-Mazzetti; *P. obliqua* J. D. Hooker.

Herbs perennial, stoloniferous, subglabrous, dioecious. Stems blue when dry, 15–30 cm tall, succulent on upper part, with galls on mid portion of internodes. Stipules persistent, light green, oblong, 5–8 mm, membranous, veinless; petioles unequal in length, 1–7 cm, sparsely puberulent; leaf blade abaxially paler green, broadly ovate or oblong, sometimes oblique, unequal in size, 3–9 × 2–4 cm, membranous, 3-veined, lateral veins many, subtransverse, cystoliths prominent adaxially, base rounded or subcordate, sometimes auriculate at base, margin crenate-serrate, apex acuminate or caudate-acuminate. Inflorescences solitary, in upper stems, a cymose panicle, 4–10(–18) cm; bracts triangular, over 2 mm. Male flowers pedicellate or sessile, in bud rhombic-ovoid, ca. 1 mm; perianth lobes 4, connate 1/2 of length, 2 lobes subapically corniculate; stamens 4; rudimentary ovary small. Female flowers subsessile, in bud ca. 0.5 mm; perianth lobes connate at base, unequal, abaxial one cymbiform, longer, subapically corniculate; staminodes 3, small, scale-like, oblong. Achene broadly ovoid, ca. 0.8 mm, compressed, oblique, with an raised brownish ring. Fl. Jul–Aug, fr. Aug–Oct.

Moist places in broad-leaved forests; 1800–2800 m. S Xizang, NW Yunnan [Bhutan, N India, Nepal, Sikkim].

31. *Pilea scripta* (Buchanan-Hamilton ex D. Don) Weddell, Ann. Sci. Nat., Bot., sér. 4, 1: 187. 1854.

细齿冷水花 xi chi leng shui hua

Urtica scripta Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 59. 1825.

Perennial stout herbs, stoloniferous, glabrous, dioecious or monoecious. Stems branched, 1–1.5 m tall, woody at base, succulent distally, with galls on mid portion of internodes. Stipules persistent, light green, triangular, 2–3 mm, herbaceous,

veinless; petiole subequal in length, 1–3(–6) cm; leaf blade abaxially pale green, elliptic- or oblong-lanceolate, sometimes narrowly elliptic, subequal in size, 6–15 × 2.5–5 cm, membranous, 3-veined, lateral veins many, conspicuous, subtransverse, terminal veins often interruptedly thickened at tip or middle, cystoliths minute, adaxial, base broadly cuneate or rounded, rarely subcordate, margin serrulate or shallowly serrate, apex caudate-acuminate. Inflorescences solitary, in upper stem, a cymose panicle, often longer than petioles. Male flowers pedicellate or sessile, in bud ovoid, ca. 1 mm; perianth lobes 4, connate 1/2 of length, conspicuously ribbed; stamens 4; rudimentary ovary small. Female flowers subsessile, in bud ca. 0.5 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, small, scale-like, oblong. Achene sometimes purplish spotted, broadly ovoid, ca. 1 mm, compressed, oblique, verrucose. Fl. Jun–Aug, fr. Sep–Oct.

Shaded moist places in broad-leaved forests; 2000–3000 m. S Xizang, W Yunnan [Bhutan, N India, Kashmir, Myanmar, Nepal, Sikkim].

32. *Pilea auricularis* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 70. 1982.

耳基冷水花 er ji leng shui hua

Herbs perennial, stoloniferous, glabrous, dioecious or monoecious. Stems gray green when dry, simple or branched, to 100 cm tall, succulent, with galls on mid portion of internodes. glabrous or puberulent distally, densely covered with cystoliths, Stipules persistent, interpetiolar, triangular, connate at base, ca. 1 mm, membranous; petiole unequal in length, longer one 2.5–12 cm, shorter one 0–4 cm; leaf blade abaxially pale green, adaxially dark green, obliquely oblong-ovate or ovate-lanceolate, unequal in size, 5–15 × 2.5–8.5 cm, submembranous, 3-veined, lateral veins many, transverse, base auriculate, sometimes subcordate, margin coarsely, shallowly crenate-serrate, apex acuminate, acumen serrulate. Inflorescences solitary; male inflorescence a cymose panicle, longer than petioles; female cymose panicles 3–5 cm. Male flowers sessile, in bud ca. 1.2 mm; perianth lobes 4, obovate or obovate-oblong; stamens 4; rudimentary ovary small, subulate. Female flowers subsessile, in bud ca. 0.6 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, inconspicuous, scale-like, oblong. Achene dark brownish, ovoid, ca. 1.2 mm, compressed, reticulate. Fl. Sep–Oct, fr. Oct–Jan.

● Shaded wet places along streams, near streams; 2400–2800 m. SE Xizang, NW Yunnan.

This species is similar to *Pilea martini*, but that species has oblong stipules, a rounded leaf base, and an oblique, smooth achene.

33. *Pilea glaberrima* (Blume) Blume, Mus. Bot. 2: 54. 1856.

点乳冷水花 dian ru leng shui hua

Urtica glaberrima Blume, Bijdr. Fl. Ned. Ind. 493. 1826; *Pilea goglado* Blume; *P. smilacifolia* Weddell.

Herbs perennial, weak, or subshrubs, stoloniferous, gla-

brous, dioecious, rarely monoecious. Stems gray green, erect, ascending, or scandent, often branched, longitudinally several angled when dry, to 1.5 m tall, woody at base, densely covered with cystoliths. Stipules persistent, triangular, connate at base, ca. 2 mm, papery; petiole unequal in length, 1.5–5 cm; leaf blade adaxially pale green, ovate, elliptic, oblong- or elliptic-lanceolate, asymmetric, unequal in size, 6–15 × 2.5–7 cm, herbaceous, 3-veined, lateral veins many, transverse, reticulate, cystoliths adaxial, minute, often punctate or mixed with shortly fusiform ones, sometimes inconspicuous, base rounded, obtuse or cuneate, margin shallowly serrate or shallowly crenate sometimes subentire from middle part, apex acuminate. Inflorescences solitary, male a paniculate cyme, usually shorter than subtending petiole; female ones much shorter. Male flowers sessile, in bud ca. 1 mm; perianth lobes 4; stamens 4; rudimentary ovary small, subulate. Female flowers subsessile, in bud ca. 0.6 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, inconspicuous, scale-like, oblong. Achene brownish red, ovoid, ca. 1 mm, compressed, inconspicuously verrucose. Fl. May–Sep, fr. Oct–Nov.

Warm wide-leaved forests, shaded wet places by streams, near streams; 500–1300 m. Guangdong, Guangxi, Guizhou, Yunnan [Bhutan, Indonesia, NE India, Myamar, Nepal, Sikkim].

34. *Pilea squamosa* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 72. 1982.

鳞片冷水花 *lin pian leng shui hua*

Pilea squamosa var. *sparsa* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 73. 1982.

Herbs perennial, robust, stoloniferous, dioecious, rarely monoecious. Stems gray green, often branched, with several longitudinal angles when dry, to 1.2 m tall, woody at base, succulent distally, covered with dense brownish squamae. Stipules persistent, triangular, ca. 1 mm, membranous; petiole unequal in length, 0.5–5 cm, densely squamose; leaf blade black-brown when dry, oblong-lanceolate, ovate- or obovate-lanceolate, rarely elliptic-oblong, unequal in size, major ones 8.5–17 × 3–7 cm, minor ones 3–7 × 1.5–3 cm, papery, 3-veined, elevated on both surfaces, lateral veins many, subtransverse, distinctly reticulate, outer secondary veins anastomosing by margin, brown and densely squamose along veins, adaxial surface sparsely squamose, cystoliths conspicuous on both surfaces, base obliquely rounded, rarely broadly cuneate, margin finely crenate, apex caudate-acuminate, acumen serrulate. Inflorescences solitary; male inflorescence a paniculate cyme, 1–2 cm, densely squamose and sometimes puberulent on peduncle. Female inflorescence not seen. Male flowers shortly pedicellate, in bud ca. 1 mm; perianth lobes 4, apex obtuse, densely squamose abaxially; stamens 4; rudimentary ovary small. Fl. Oct–Apr.

Warm wide-leaved forests, or sunny dry slopes; 1900–2500 m. Xizang, Yunnan [Bhutan, NE India, Nepal, Sikkim].

Further collecting has shown that var. *sparsa* should not be recognized.

35. *Pilea wightii* Weddell, Ann. Sci. Nat., Bot., sér. 4, 1: 186. 1854.

生根冷水花 *sheng gen leng shui hua*

Herbs perennial, stoloniferous, glabrous, monoecious or dioecious. Stems much branched, 20–30 cm tall, succulent distally, with galls on mid portion of internodes. Stipules persistent, triangular, 1–2 mm, membranous; petiole unequal in length, 0.5–3 cm; leaf blade abaxially pale green, adaxially green, ovate or lanceolate, unequal in size, 2–6.5 × 1.5–2.5 cm, membranous, 3-veined, lateral veins many, with cystoliths, base rounded or emarginate, margin serrate, apex acuminate. Inflorescences solitary; male inflorescence a cymose panicle, often longer than subtending leaf, pedunculate; female cymes much shorter than male ones. Male flowers pedicellate, in bud obovoid, ca. 1.5 mm; perianth lobes 4, connate 1/2 of length, subapically conspicuously corniculate or beaked; stamens 4; rudimentary ovary small. Female flowers subsessile, in bud ca. 0.5 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene brownish, obliquely ovoid, ca. 1 mm, compressed, smooth. Fl. Jun–Jul, fr. Aug–Sep.

Roadsides, wet places in broad-leaved forests; 300–1200 m. Guangdong, Guangxi [S India, Sri Lanka].

36. *Pilea symmeria* Weddell, Monogr. Urtic. 246. 1856.

喙萼冷水花 *hui e leng shui hua*

Herbs perennial, stoloniferous, monoecious or dioecious. Stems branched or simple, 30–120 cm tall, succulent distally, swollen between nodes. Stipules persistent, interpetiolar, triangular, connate into an auricle at base, 1–2 mm, herbaceous; petiole unequal in length, 1–5 cm; leaf blade abaxially pale green, ovate, ovate-lanceolate, or oblong lanceolate, sometimes asymmetric, unequal in size, 4–14 × 2–7 cm, membranous, 3-veined, lateral veins many, transverse, abaxial surface puberulent at base, adaxial surface sparsely pilose, cystoliths small or inconspicuous, adaxial, base rounded or subcordate, margin serrate or crenate-serrate, apex caudate-acuminate. Inflorescences solitary, male a paniculate cyme, often as long as leaves, pedunculate; female ones shorter; bracts triangular-ovate, 1–2 mm. Male flowers pedicellate, in bud obovoid, 1.5–2 mm; perianth lobes 4, connate at base, subapically conspicuously corniculate or beaked; stamens 4; rudimentary ovary small, conic. Female flowers subsessile, in bud ca. 1 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, scale-like, oblong. Achene brownish, often purplish spotted, obliquely ovoid, 1.2–1.5 mm, compressed, smooth. Fl. Jun–Jul, fr. Aug–Sep.

Shaded wet places in forests; 2100–3300 m. S Xizang [Bhutan, N India, Nepal, Sikkim].

37. *Pilea macrocarpa* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 74. 1982.

大果冷水花 *da guo leng shui hua*

Herbs perennial, stoloniferous, glabrous, dioecious. Stems 20–40 cm tall, succulent distally, woody at base, swollen between nodes. Stipules membranous, triangular, ca. 1 mm, persistent; petiole unequal in length, 1–4 cm; leaf blade abaxially pale green, adaxially dark green, lanceolate or oblong-lanceo-

late, sometimes asymmetric, unequal in size, 6–14 × 2.5–4 cm, membranous, 3-veined, lateral veins many, transverse, cystoliths fusiform often arranged along secondary veins, conspicuous abaxially, base rounded or subcordate, margin shallowly undulate-crenate, with a ciliate tip of teeth from hollow, apex caudate-acuminate. Male inflorescence not seen. Female inflorescence solitary, a paniculate cyme, 5–11 cm, pedunculate. Female flowers subsessile, in bud ca. 1 mm; perianth lobes connate at base, subequal, abaxial lobe large, subapically ± corniculate; staminodes 3, scale-like, oblong. Achene brownish, broadly ovoid, ca. 2 mm, compressed, not oblique, often minutely purplish spotted, enclosed by equal perianth lobes. Fr. Sep.

- Shaded wet places of *Pinus* forests; 1500–1600 m. SE Xizang.

38. *Pilea semisessilis* Handel-Mazzetti, Symb. Sin. 7: 137. 1929.

镰叶冷水花 *lian ye leng shui hua*

Herbs perennial, stoloniferous, glabrous, monoecious or dioecious. Stems blue green when dry, 20–60 cm tall, woody at base, succulent distally, swollen between nodes. Stipules persistent; triangular to oblong, 2–5 mm, membranous, petiole strongly unequal in length, 0–4 cm; leaf blade abaxially pale green, adaxially often blue-green, falcate-lanceolate rarely ovate-lanceolate, usually asymmetric, unequal in size, (2.5–)5–14 × (1–)1.5–5 cm, membranous, 3-veined, lateral veins many, transverse, abaxial surface sometimes puberulent along veins, adaxial surface sparsely pilose, cystoliths fusiform often conspicuous, base emarginate or subcordate, margin sharply serrate or shallowly serrate, acumen serrulate, apex long caudate-acuminate. Inflorescences solitary, male a paniculate cyme, 2–7 cm; pedunculate, female inflorescence 1.5–4 cm, peduncle 1–3 cm. Male flowers subsessile, in bud ca. 1 mm; perianth lobes 4, oblong-elliptic, apex acute; stamens 4; rudimentary ovary minute. Female flowers subsessile, in bud ca. 0.8 mm; perianth lobes connate at base, subequal, abaxial lobe larger, subapically corniculate; staminodes 3, scale-like, oblong. Achene brownish, broadly ovoid, ca. 1 mm, compressed, not oblique, smooth, enclosed by unequal perianth lobes. Fl. Jul–Sep, fr. Sep–Oct.

Shaded wet places of *Pinus* forests, roadsides; 1000–2800(–3400) m. N Guangxi, Hunan, W Jiangxi, Sichuan, SE Xizang, NW Yunnan [N Thailand].

39. *Pilea melastomoides* (Poiret) Weddell, Ann. Sci. Nat., Bot., sér. 4, 1: 186. 1854.

长序冷水花 *chang xu leng shui hua*

Urtica melastomoides Poiret, Encycl. Suppl. 4: 223. 1816; *Pilea cuneatifolia* Yamamoto; *P. ovinucula* Hayata; *P. trinervia* (Roxburgh) Wight; *Urtica trinervia* Roxburgh.

Herbs perennial, robust or subshrubs, stoloniferous, glabrous, monoecious or dioecious. Stems blue green when dry, to 200 cm tall, ca. 1 cm in diam., succulent distally, woody at base, swollen between nodes, upper internodes shorter. Stipules persistent, triangular, ca. 2 mm, membranous; petiole equal in length, 2–9 cm; leaf blade abaxially pale green, adaxially often

dark green or brownish, elliptic to elliptic-lanceolate, subequal in size, 10–23 × 5–16 cm, membranous, 3-veined, lateral veins many, spreading and regularly transverse, cystoliths fusiform, minute, often conspicuous abaxially, base cuneate or rarely subrounded, margin shallowly serrate or crenate, apex cuspidate or acuminate. Inflorescences solitary, male inflorescence a cymose-panicle, 15–35 cm overall, peduncle long and thick; female ones often shorter than petioles. Male flowers subsessile, in bud ca. 1 mm; perianth lobes 4, elliptic, apex acute or sometimes corniculate; stamens 4; rudimentary ovary minute. Female flowers subsessile, in bud ca. 0.8 mm; perianth lobes connate at base, subequal, abaxial lobe larger, subapically corniculate; staminodes 3, scale-like, oblong. Achene brownish, ellipsoid-ovoid, ca. 1 mm, compressed, almost not oblique, smooth or verrucose, with a slightly elevated ring by margin. Fl. Aug–Sep, fr. Oct–Nov.

Broad-leaved forests, shaded wet places by streams; 700–1800 m. SW Guangxi, Guizhou, Hainan, Taiwan, SE Xizang, S Yunnan [India, Indonesia, Sri Lanka, Myanmar, Vietnam].

40. *Pilea howelliana* Handel-Mazzetti, Symb. Sin. 7: 132. 1929.

泡果冷水花 *pao guo leng shui hua*

Herbs perennial, stoloniferous, glabrous, monoecious or dioecious. Stems gray-green when dry, 15–100 m tall, succulent, swollen between nodes. Stipules persistent, triangular, ca. 1 mm, membranous; petiole subequal in length, 1–5 cm; leaf blade abaxially purplish, adaxially often pale green, narrowly ovate, asymmetric, subequal in size, 5.5–14 × 2.5–6 cm, herbaceous, 3-veined, whitish, conspicuous, lateral veins 10 each side, external secondary veins anastomosing by margin and reaching to serrate tips, cystoliths fusiform, often abaxially, conspicuous, base subrounded, margin shallowly crenate, apex acuminate. Inflorescences sometimes androgynous, solitary, a paniculate cyme, 9–14 cm overall, peduncle 5–14 cm. Male flowers subsessile, in bud ca. 1.2 mm; perianth lobes 4, narrowly ovate, apex acute; stamens 4; rudimentary ovary minute. Female flowers subsessile, in bud ca. 0.8 mm; perianth lobes connate at base, subequal, abaxial lobe larger, subapically corniculate; staminodes 3, squamiform, oblong. Achene brownish, broadly ovoid, ca. 1 mm, slightly compressed, almost not oblique, with a strongly elevated convex lens ring by margin. Fl. Jul–Aug, fr. Sep–Nov.

- Broad-leaved forests, shaded wet places, near streams, rocks; 1500–2500 m. S and W Yunnan.

- 1a. Plants 15–35 cm tall; leaf blade margin very shallowly crenate 40a. var. *howelliana*
- 1b. Plants 60–100 cm tall; leaf blade margin denticulate or dentate 40b. var. *denticulata*

40a. *Pilea howelliana* var. *howelliana*

泡果冷水花(原变种) *pao guo leng shui hua* (*yuan bian zhong*)

Plants 15–35 cm tall. Leaf blade margin very shallowly crenate. Fl. Jul–Aug, fr. Sep–Nov.

- Shaded wet places, rocks, near streams; 1500–1700 m. W Yunnan.

40b. *Pilea howelliana* var. *denticulata* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 77. 1982.

细齿泡果冷水花 *xi chi pao guo leng shui hua*

Plants 60–80 cm tall. Leaf blade margin denticulate or dentate. Fr. Oct.

• Broad-leaved forests, shaded wet places near streams; 2000–2500 m. S Yunnan.

41. *Pilea longipedunculata* Chien & C. J. Chen, Bull. Bot. Res., Harbin 2(3): 77. 1982.

鱼眼果冷水花 *yu yan guo leng shui hua*

Herbs perennial, stoloniferous, glabrous, dioecious. Stems green-blue when dry, 30–60 cm tall, succulent, swollen between nodes, cystoliths dense. Stipules persistent, narrowly triangular, 2–4 mm, membranous; petiole unequal in length, 1–10 cm; leaf blade abaxially pale green, adaxially dark green, falcate-lanceolate or elliptic-ovate, asymmetric, unequal in size, 8–23 × 2.5–11 cm, membranous, 3-veined, lateral veins many, regularly transverse, external secondary veins anastomosing by margin, cystoliths fusiform often conspicuous adaxially, base subrounded or subcordate, margin entire or shallowly 1–3-crenate-serrate near apex, apex acuminate or long acuminate. Inflorescences solitary, cymose paniculate, 7–21 cm overall, peduncle 5–12 cm. Male flowers subsessile, in bud ca. 1 mm; perianth lobes 4, narrowly ovate, apex acute; stamens 4; rudimentary ovary minute. Female flowers subsessile; perianth lobes connate at base, subequal, abaxial lobe larger, subapically corniculate; staminodes 3, conspicuous, scale-like, oblong. Achene brownish, triangular-ovoid, ca. 1 mm, compressed, slightly oblique at apex, with a strongly elevated convex lens ring. Fl. Jul–Aug, fr. Sep–Nov.

Broad-leaved forests, shaded wet places or rocks by streams, near streams; 1400–2800 m. W Guangxi, SW Guizhou, Yunnan [Thailand, N Vietnam].

This species is easily confused with *Pilea anisophylla*, which is characterized by the very unequal leaves, the smaller leaves almost sessile, and the smooth achenes.

42. *Pilea subdentata* Chien & C. J. Chen, Bull. Bot. Res., Harbin 2(3): 79. 1982.

小齿冷水花 *xiao chi leng shui hua*

Herbs perennial, stoloniferous, glabrous, dioecious or monoecious. Stems 30–40 cm tall, succulent, swollen between nodes. Stipules subpersistent, triangular, 1–2 mm, membranous; petiole unequal in length, 1.5–6 cm; leaf blade narrowly ovate to ovate-lanceolate, asymmetric, unequal in size, 5–13 × 2–5 cm, membranous, 3-veined, lateral veins many, transverse, reticulate, external secondary veins anastomosing and slightly thickened by margin, cystoliths finely fusiform, often conspicuous on both surfaces, base obtuse-rounded, often auriculate, margin entire or shallowly 2 serrulate by apex, apex caudate-acuminate. Inflorescences solitary; male inflorescence distal, a cymose panicle, 9–13 cm overall, peduncle 6–8 cm; female cymes proximal, 3.5–8 cm overall, peduncle 2.5–5 cm. Male

flowers subsessile, in bud ca. 1 mm; perianth lobes 4; stamens 4; rudimentary ovary minute. Female flowers subsessile, ca. 0.7 mm; perianth lobes connate at base, subequal, abaxial lobe larger, subapically corniculate; staminodes 3, conspicuous, scale-like, rhombic-oblong. Achene brownish, ovoid, ca. 1 mm, compressed, slightly oblique at apex, verrucose. Fl. Oct, fr. Nov–Dec.

• Broad-leaved forests, shaded wet places by streams, near streams; 400–1000 m. Hainan.

This species is similar to *Pilea melastomoides*, but that species has stems to 2 m tall, leaf margins serrate or crenate, and achenes with a raised ring.

43. *Pilea plataniflora* C. H. Wright, J. Linn. Soc., Bot. 26: 477. 1899.

石筋草 *shi jin cao*

Pilea blinii H. Léveillé; *P. dielsiana* Handel-Mazzetti; *P. kankaoensis* Hayata; *P. langsonensis* Gagnepain; *P. minutepilosa* Hayata; *P. petelotii* Gagnepain; *P. taitoensis* Hayata.

Herbs perennial, long stoloniferous, glabrous, dioecious or monoecious. Stems green blue when dry, 10–70 cm tall, woody at base, succulent distally, swollen between nodes. Stipules gradually deciduous, triangular, 1–2 mm, membranous; petiole often unequal in length, 0.5–7 cm; leaf blade dark green or green blue, ovate, lanceolate, or obovate-oblong, asymmetric, unequal or equal in size, 1–15 × 0.6–5 cm, thinly papery or submembranous, 3(or 5)-veined, lateral veins many, irregularly reticulate, external secondary veins anastomosing by margin, sometimes inconspicuous, cystoliths finely fusiform, conspicuous adaxially, base obliquely rounded or subcordate, sometimes cuneate, margin entire or sometimes undulate, apex shortly or long caudate-acuminate. Inflorescences solitary; male inflorescence a cymose panicle or racemelike, often longer than leaves; female cymes as long as or shorter than leaves, pedunculate. Male flower subsessile, in bud ca. 1.5 mm; perianth lobes 4; stamens 4; rudimentary ovary minute. Female flowers subsessile, ca. 0.5 mm; perianth lobes connate at base, subequal, abaxial lobe larger, subapically corniculate; staminodes 3, conspicuous, scale-like, rhombic-oblong. Achene brownish, ovoid, ca. 0.6 mm, compressed, slightly oblique at apex, verrucose. Fl. (Apr–)Jun–Sep, fr. Jul–Oct.

Broad-leaved forests, semishaded wet places, karst limestone, near streams; 200–2400 m. SE Gansu, W Guangxi, Hainan, Hubei, S Shaanxi, Sichuan, Taiwan, Yunnan [Thailand, N Vietnam].

This species is widespread and exhibits great variability in plant height, leaf size and shape, and inflorescence length. It has a disjunct distribution, occurring in SW mainland China and Taiwan. Many names not included here have been treated as synonyms of this species.

44. *Pilea hookeriana* Weddell, Monogr. Urtic. 226. 1856.

须弥冷水花 *xu mi leng shui hua*

Herbs, perennial, or subshrubs, stoloniferous, glabrous, dioecious, rarely monoecious. Stems gray green, erect, ascending, or scandent, often branched, longitudinally several angled when dry, to 2.5 m tall, woody at base, densely covered with

cystoliths. Stipules deciduous, oblong, 1.5–2 mm, herbaceous; petiole unequal in length, 4–10 cm; leaf blade elliptic, ovate, or elliptic-ovate, unequal in size, 9–17 × 4.5–10 cm, membranous, 3-veined, lateral veins many, subtransverse, reticulate, cystoliths conspicuous adaxially, base rounded or broadly cuneate, margin coarsely crenate-serrate, apex caudate-acuminate, acumen serrulate. Inflorescences solitary; male inflorescence a globose capitate raceme, ca. 0.5 cm in diam., shorter than petiole; female ones cymose-paniculate, much shorter, 1–2 cm. Male flowers sessile, in bud ca. 1 mm; perianth lobes 4; stamens 4; rudimentary ovary small, subulate. Female flowers subsessile, in bud ca. 0.6 mm; perianth lobes connate at base, unequal, abaxial lobe cymbiform, longer, subapically corniculate; staminodes 3, inconspicuous, scale-like, oblong. Achene brownish, ovoid, ca. 1 mm, compressed, with 2 or 3 concentric rings of minute tubercles. Fl. Aug–Sep, fr. Oct–Nov.

Warm wide-leaved forests, shaded wet places by streams, near streams; 1200–1800 m. NW Yunnan [Bhutan, NE India, Nepal, Sikkim].

This species is here newly recorded for China.

45. *Pilea angulata* (Blume) Blume, Mus. Bot. 2: 55. 1856.

圓瓣冷水花 yuan ban leng shui hua

Herbs perennial, stoloniferous, subglabrous, monoecious or dioecious. Stems 30–100(–200) cm tall, succulent distally, with galls on mid portion of internodes. Stipules soon deciduous or subpersistent, green or brownish, oblong, 7–25 mm, herbaceous or membranous, obtuse at apex; petiole subequal in length, 2–9 cm; leaf blade abaxially pale green, adaxially dark green, ovate, ovate-elliptic, or oblong-lanceolate, subequal in size, 7–23 × 3–7 cm, herbaceous, 3-veined, lateral veins many, distal veins anastomosing, cystoliths on both surfaces, base rounded, rarely subcordate, margin coarsely serrate or coarsely dentate-serrate, apex acuminate, acumen entire or serrulate. Inflorescences in pairs, male a dense paniculate cyme, 1–2 cm; female ones of lax flowers, 2–5 cm. Male flowers greenish, pedicellate, in bud ca. 2 mm; perianth lobes 4, obovate-oblong, apex acute, subapically corniculate; stamens 4; rudimentary ovary small. Female perianth lobes greenish, connate to apex, equal, semiorbicular or broadly ovate, 1/3–1/2 as long as fruits, apex obtuse; staminodes oblong. Achene green to dark brownish, broadly ovoid, 1.2–1.6 mm, slightly compressed, oblique at apex, spinulose verrucose, enclosed by persistent lobes. Fl. Jun–Oct, fr. Sep–Dec.

Moist places in broad-leaved forests; 300–2300(–2700) m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, SW Jiangsu, Jiangxi, S Shaanxi, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [India, Indonesia, Japan, Sri Lanka, Vietnam].

- 1a. Leaf blade ovate, base cordate; stipules membranous, brownish, 7–10 mm, subpersistent; male flower reddish, perianth lobes not corniculate 45c. subsp. *laticuscula*
- 1b. Leaf blade ovate-elliptic or oblong-lanceolate; stipules herbaceous, greenish, 10–25 mm, deciduous;

male flower yellowish green, perianth lobes ± corniculate.

- 2a. Male inflorescences cymose-paniculate; male perianth lobes often with a beak by apex; leaf margin serrate with an entire acumen; female tepals often acute, connate for ca. 1/2 length 45a. subsp. *angulata*
- 2b. Male inflorescences cymose-racemose; male perianth lobes corniculate by apex; leaf margin crenate- or dentate-serrate and doubly serrate distally, with a serrulate acumen; female tepals rounded, connate for more than 1/2 length 45b. subsp. *petiolaris*

45a. *Pilea angulata* subsp. *angulata*

圓瓣冷水花(原亞種) yuan ban leng shui hua (yuan ya zhong)

Urtica angulata Blume, Bijdr. Fl. Ned. Ind. 494. 1826; *Pilea stipulosa* (Miquel) Miquel; *U. stipulosa* Miquel.

Plants dioecious. 30–200 cm tall, Stipules 10–25 mm, herbaceous; leaf blade ovate-elliptic or oblong-lanceolate, 7–23 × 3–7 cm, herbaceous, base rounded or emarginate, margin coarsely serrate or dentate-serrate, acumen entire. Male inflorescence a cymose-paniculate, 1–2 cm. Male perianth lobe subapically long-beaked. Fl. Jun–Sep, fr. Sep–Nov.

Moist places in broad-leaved forests; 800–2300 m. Guangdong, Guangxi, Guizhou, S Shaanxi, Sichuan, SE Xizang, Yunnan [India, Indonesia, Sri Lanka, Vietnam].

45b. *Pilea angulata* subsp. *petiolaris* (Siebold & Zuccarini) C. J. Chen, Bull. Bot. Res., Harbin 2(3): 82. 1982.

長柄冷水花 chang bing leng shui hua

Urtica petiolaris Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 215. 1846.

Plants monoecious. 40–150 cm tall, Stipules 20 mm, herbaceous; leaf blade often oblong-lanceolate, 10–24 × 3–7 cm, membranous, base rounded or emarginate, margin coarsely crenate-dentate, doubly serrate, acumen serrulate. Male inflorescence a cymose-paniculate, 1–5 cm. Male perianth lobes subapically corniculate. Fl. Jun–Oct, fr. Sep–Dec.

Moist places in broad-leaved forests; 700–1100(–2700) m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Taiwan, Yunnan, Zhejiang [Japan].

45c. *Pilea angulata* subsp. *laticuscula* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 83. 1982.

華中冷水花 hua zhong leng shui hua

Plants dioecious. 30–40 cm tall, Stipules almost persistent, brownish, 7–10 mm, membranous; leaf blade ovate, 3.5–10 × 3–5 cm, membranous, base cordate, rarely rounded, margin coarsely crenate-serrate, acumen serrulate. Male inflorescence a cymose-paniculate, 2–4 cm; female inflorescence ca. 2 cm, shorter than petioles. Male perianth lobes not corniculate. Fl. Jun–Jul, fr. Sep–Oct.

• Moist places in broad-leaved forests; 300–1800 m. Guizhou, Hubei, Hunan, SW Jiangsu, Jiangxi, E Sichuan, E Yunnan.

46. *Pilea notata* C. H. Wright, J. Linn. Soc., Bot. 26: 470. 1899.

冷水花 *leng shui hua*

Boehmeria vanioti Léveillé; *Pilea elliptifolia* B. L. Shih & Yuen P. Yang; *P. pseudopetiolaris* Hatusima.

Herbs perennial, stoloniferous, dioecious or monoecious. Stems 25–75 cm tall, woody at base, succulent distally, with galls on mid portion of internodes, glabrous, rarely puberulent distally, densely covered cystoliths. Stipules soon deciduous, greenish, oblong, 8–12 mm, herbaceous; petiole thin, subequal in length, 1–7 cm; leaf blade abaxially pale green, adaxially dark green and lustrous, ovate or ovate-lanceolate, subequal in size, 4–11 × 1.5–4.5 cm, membranous, 3-veined, lateral veins 8–13 each side, cystoliths fusiform, conspicuous on both surfaces, base rounded rarely broadly cuneate, margin shallowly serrate, rarely doubly serrate along apical margin. Inflorescences solitary; male inflorescence a racemelike-cyme, 2–5 cm; female a compact cyme of glomerules, shorter than males. Male flowers yellow-green, pedicellate or sessile, in bud ovoid, ca. 1 mm; perianth lobes 4, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary small. Female flowers subsessile, in bud ca. 0.5 mm; perianth lobes connate 1/2 of length, equal, apex obtuse; staminodes 3, small, scale-like, oblong. Achene oblong-ovoid, ca. 0.8 mm, compressed, oblique, spinulose-verrucose. Fl. Jun–Sep, fr. Sep–Nov.

Shaded moist places in broad-leaved forests; 300–1500 m. S Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, S Henan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Zhejiang [Japan].

47. *Pilea sinofasciata* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 85. 1982 [“*sinofasiata*”].

粗齿冷水花 *cu chi leng shui hua*

Pilea fasciata Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 81. 1888, not Weddell (1869).

Herbs perennial, stoloniferous, dioecious or monoecious. Stems almost simple, 25–100 cm tall, woody at base, succulent distally, with galls on mid portion of internodes, glabrous or sometimes puberulent distally. Stipules persistent, triangular, ca. 2 mm, membranous; petioles subequal in length, 1–5 cm; leaf blade abaxially pale green with 2 whitish striae along median vein, adaxially dark green, elliptic, ovate, or oblong-lanceolate, subequal in size, 4–17 × 2–7 cm, herbaceous, 3-veined, lateral veins many, basal ones inconspicuous, distal 3 or 4 pairs distinct and anastomosing, abaxial surface sometimes pubescent along veins, adaxial surface sparsely pilose, cystoliths worm-shaped, often conspicuously and compactly around the thickened final vein nodes abaxially, base cuneate or obtusely rounded, margin coarsely dentate, apex caudate-acuminate, acumen entire, proximal leaves often obovate, quite small. Inflorescence a paniculate cyme, shorter than petioles. Male flowers pedicellate or sessile, in bud ovoid, 1–1.5 mm; perianth lobes 4, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary small. Female flowers subsessile, in bud ca. 0.5 mm; perianth lobes connate 1/2 of length, equal, apex obtuse; staminodes 3, small, scale-like, oblong. Achene broadly

ovoid, ca. 0.7 mm, compressed, oblique, verrucose. Fl. Jun–Jul, fr. Aug–Oct.

Shaded moist places in forests; 700–2500 m. S Anhui, S Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Zhejiang [N India, N Thailand, Sikkim].

48. *Pilea matsudae* Yamamoto, Suppl. Icon. Pl. Formosan. 1: 7. 1925.

细尾冷水花 *xi wei leng shui hua*

Herbs perennial, stoloniferous, dioecious. Stems usually with purple-red spots, erect or ascending, 25–100 cm tall, with galls on lower part of internodes, glabrous. Stipules persistent, broadly triangular, 2–3 mm, membranous; connate at base, petiole unequal in length, 1–10 cm; leaf blade elliptic or elliptic-oblong, unequal in size, 5–18.5 × 2.5–7.5 cm, membranous, 3-veined, prominent abaxially, lateral veins many, basal ones inconspicuous, distal ones distinct and anastomosing, irregularly reticulate, cystoliths worm-shaped, sparse on both surfaces, base cuneate or obtuse, margin coarsely dentate, apex caudate, acumen entire. Inflorescence a paniculate cyme, shorter than petioles. Male flowers greenish, subsessile, in bud ovoid; perianth lobes 4, ca. 0.5 mm, connate at base, dimorphic; stamens 4; rudimentary ovary small. Female perianth lobes unequal. Achene ellipsoid, compressed, oblique, enclosed by persistent perianth. Fl. Mar–May, fr. Jun–Aug.

• Shaded moist places in forests, streams, near streams; 1200–2100 m. Taiwan.

49. *Pilea media* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 89. 1982.

中间型冷水花 *zhong jian xing leng shui hua*

Herbs perennial, stoloniferous, glabrous, monoecious or dioecious. Stems blue-green when dry, erect or ascending, much branched, 20–40 cm tall, succulent, swollen between nodes. Stipules almost persistent, triangular, 1–2 mm, membranous; petiole subequal in length, 0.5–3 cm; leaf blade gray-green on both surfaces, broadly elliptic or rhombic-orbicular, subequal in size, 2–5 × 1.5–3 cm, thinly papery, 3-veined, lateral veins 5–7 each side, even and inconspicuous on both surfaces, honeycombed abaxially, cystoliths fusiform, often conspicuous adaxially, base broadly cuneate, subrounded or obtuse, often with small auricle, margin entire, apex shortly caudate-acuminate or acute. Inflorescences solitary; male glomerules in moniliform racemes, 2–5 cm, thinly pedunculate; female inflorescence capitate, shortly pedunculate, ca. 5 mm. Male flowers pedicellate, in bud obovoid, ca. 1.5 mm; perianth lobes 4, connate 1/2 of length, subapically corniculate; stamens 4(or 5); rudimentary ovary conspicuous. Female perianth lobes unequal, longest lobe with apex acute, subapically corniculate. Achene obliquely subglobose, ca. 0.4 mm, slightly compressed, indistinctly verrucose, enclosed by persistent perianth. Fl. Mar–Jun, fr. May–Jul.

• Shaded moist places, rocks; 100–900 m. NW Guangxi, SW Guizhou, SE and W Yunnan.

This species resembles *Pilea boniana* and *P. plataniflora* in habit and floral morphology, and is probably a hybrid between them.

50. *Pilea elegantissima* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 90. 1982.

石林冷水花 shi lin leng shui hua

Herbs annual, weak, glabrous, monoecious or dioecious. Stems blue-green when dry, erect, branched at base, 5–20 cm tall, succulent. Stipules almost persistent, triangular, ca. 1 mm, membranous; petiole subequal in length, 0.5–2 cm; leaf blade abaxially pale green, adaxially green, rhombic-elliptic, rhombic-lanceolate, or ovate, unequal in size, 1.5–6 × 0.7–2.8 cm, submembranous, 3-veined, lateral veins 3–5 each side, slightly elevated and finely honeycombed abaxially, depressed adaxially, cystoliths fusiform, often conspicuous adaxially, base broadly cuneate or subrounded, margin entire, apex acuminate, shortly caudate-acuminate, or acute, acumen obtuse. Inflorescences in pairs; male inflorescence a moniliform spike, 1.5–2.5 cm overall, peduncle slender, 1–1.6 cm; female inflorescence a racemelike cyme, shorter than petioles. Male flowers purplish, pedicellate, in bud obovoid, ca. 1.5 mm; perianth lobes 4, connate 1/2 of length, subapically corniculate with a small gibbose appendix at each side; stamens 4; rudimentary ovary conspicuous. Female perianth lobes unequal, longest one subapically corniculate. Achene brownish, broadly ovoid, ca. 0.4 mm, slightly compressed, oblique, spinulose-verruucose, enclosed by persistent perianth. Fl. Jul–Sep, fr. Sep–Oct.

Shaded moist places, rocks; 1500–1900 m. SW Sichuan, C and N Yunnan [N Thailand].

51. *Pilea monilifera* Handel-Mazzetti, Symb. Sin. 7: 124. 1929.

念珠冷水花 nian zhu leng shui hua

Herbs perennial, stoloniferous, monoecious or dioecious. Stems simple or branched, 50–150 cm tall, woody at base, succulent, swollen between nodes, glabrous. Stipules deciduous, narrowly triangular, ca. 1 mm, membranous; petiole unequal in length, 1–5 cm, puberulent adaxially; leaf blade abaxially pale green, adaxially dark green, elliptic, ovate-elliptic or ovate-oblong, often slightly oblique at base, unequal in size, 5–13 × 3–7 cm, submembranous, 3-veined, lateral veins many, regularly transverse, often ending in a gland, abaxial surface glabrous, adaxial surface pilose, cystoliths fusiform, often conspicuous abaxially, base rounded or subcordate, margin coarsely crenate-serrate or dentate-serrate, apex acuminate, caudate-acuminate, acumen entire. Inflorescences solitary, male a moniliform spike of 3–8 loose glomerules on simple axis, 3–10 cm, glabrous or sparsely puberulent; female inflorescence 1–3.5 cm. Male flowers pedicellate, in bud triangular-ovoid, 2–2.5 mm; perianth lobes 4, connate 1/2 of length, subapically long corniculate, sometimes puberulent; stamens 4; rudimentary ovary inconspicuous. Female perianth lobes unequal, longest lobe subapically corniculate; Achene brownish, broadly ovoid, ca. 1.8 mm, slightly compressed, smooth, but with some cystoliths, enclosed by persistent perianth. Fl. Jun–Aug, fr. Jul–Sep.

• Shaded moist places, rocks; (900–)1400–2400(–3500) m. N Guangxi, Guizhou, W Hubei, W Hunan, Jiangxi, Sichuan, Yunnan.

Collections from alpine habitats in NW Yunnan, which have puberulent male inflorescences and perianth lobes, may be ecological forms.

52. *Pilea microcardia* Handel-Mazzetti, Sinensia 2: 2. 1931.

广西冷水花 guang xi leng shui hua

Herbs annual, weak, glabrous, monoecious. Stems erect, simple or branched at base, 3–8 cm tall, succulent. Stipules soon deciduous, triangular, ca. 1 mm, membranous; petiole subequal in length, 3–10 mm; leaf blade abaxially pale green, adaxially lustrous green, cordate, subequal in size, 6–15 × 5–14 mm, subpapery, 3-veined, lateral veins 4–5 each side, depressed adaxially, slightly elevated abaxially, often terminating with a gland, finely honeycombed, cystoliths fusiform, often conspicuous adaxially, base cordate, margin 4–6 crenate each side, apex acute or rounded, proximal leaves smaller, often entire. Inflorescence a capitulum or moniliform spike, 0.5–1.2 cm. Male flowers subsessile, in bud obovoid, ca. 1.2 mm; perianth lobes 4, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary conspicuous. Female perianth lobes unequal, longest one subapically corniculate. Achene brownish, broadly ovoid, ca. 0.6 mm, compressed, oblique, with a colored ring, enclosed by persistent perianth. Fl. and fr. May.

• Shaded moist places, steep rocks; ca. 300 m. N Guangxi.

This is a very rare and local species.

53. *Pilea paniculigera* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 92. 1982.

滇东南冷水花 dian dong nan leng shui hua

Herbs perennial, glabrous, monoecious or dioecious. Stems blue-green when dry, erect, much branched, to 100 cm tall, succulent; lower internodes 2–7 cm, upper internodes 1–4 cm. Stipules almost persistent, triangular, ca. 1 mm, membranous; petiole subequal in length, 1.8–6 cm; leaf blade abaxially green, adaxially dark green, narrowly ovate, ovate-lanceolate, or oblong-lanceolate, peltate, subequal in size, 4.5–11 × 2–5 cm, submembranous, 3-veined, lateral veins 3 or 4 on each side, external secondary veins 5–7, finely honeycombed abaxially, cystoliths fusiform, often conspicuous abaxially and along margin on both surfaces, base often truncate, rarely rounded, margin coarsely dentate, apex long acuminate or caudate-acuminate. Inflorescences solitary; male inflorescence a cymose panicle, 3–11 cm overall, peduncle 1–6 cm; female inflorescence a racemelike cyme, distal, often shorter than petioles. Male flowers greenish, subsessile, in bud obovoid, ca. 1.2 mm; perianth lobes 4, connate at base, apex acute, without corniculate tip by apex; stamens 4; rudimentary ovary conic. Female perianth lobes unequal, longest one corniculate at apex. Achene brownish, obliquely ovoid, ca. 0.8 mm, compressed, enclosed by persistent perianth. Fl. Nov–Feb, fr. Mar–May.

Shaded moist places in mixed forests, on rocks; 1200–1600 m. SE Yunnan [N Vietnam].

54. *Pilea racemiformis* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 93. 1982.

总状冷水花 zong zhuang leng shui hua

Herbs perennial, glabrous, dioecious. Stems blue-green when dry, erect, much branched, to 25 cm tall, succulent, with dense cystoliths when dry; internodes 1–2 cm. Leaves crowded

on upper nodes; stipules almost persistent, triangular, ca. 1 mm, membranous; petiole strongly unequal in length, 0.5–2.5 cm; leaf blade adaxially brownish green, strongly unequal in size, large leaves often peltate, narrowly ovate, ovate- or elliptic-lanceolate, 5–7 × 1.7–2.1 cm, subpapery, cystoliths fusiform, often conspicuous adaxially, base emarginate or subrounded, margin serrate; apex long acuminate; small leaves often basifixed, ovate, 1.4–2.6 × 1–1.4 cm, base emarginate, apex acute. Male inflorescences solitary, a racemelike cyme, of several glomerules, 1.5–3.5 cm overall, peduncle 1–2 cm; female inflorescence unknown. Male flowers pink, subsessile, in bud obovoid, ca. 0.2 mm; perianth lobes 4, obovate-oblong, connate at base, subapically corniculate; stamens 4; rudimentary ovary oblong.

Shaded moist places in dense forests in limestone hills; ca. 1600 m. W Guangxi [N Vietnam].

55. *Pilea peperomioides* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 592. 1912.

镜面草 *jing mian cao*

Herbs perennial, rhizomatous, glabrous, often dioecious, sometimes monoecious. Stems greenish to dark brownish, often simple, erect, ascending, or climbing, 15–40 cm tall, 0.6–2 cm in diam., thick, woody at base, succulent distally, internodes 0.3–1 cm, rough; leaf scars conspicuous, semiorbicular, 3–4 mm in diam., Leaves spirally opposite, crowded on upper nodes; stipules persistent, light green, becoming brownish when dry, triangular-ovate, caudate-acuminate, squamose, 7–12 mm, with dense linear cystoliths; petiole unequal in length, 2–17 cm; leaf blade abaxially pale green, adaxially green, suborbicular, peltate, unequal in size, 2.5–9 × 2–8 cm, succulent, papery when dry, 3-veined, lateral veins 3 or 4 on each side, inconspicuous, external secondary veins numerous, anastomosing by margin, finely honeycombed abaxially, cystoliths fusiform, often conspicuous adaxially, base rounded or emarginate, margin entire, rarely inconspicuously undulate, apex rounded or obtuse. Inflorescences solitary, in upper nodes, male inflorescence a cymose panicle, 18–28 cm overall, peduncle thick, 5–14 cm; bracts lanceolate, ca. 0.5 mm; female inflorescence shorter. Male flower purplish, pedicellate, in bud obovoid, ca. 2.5 mm; perianth lobes 4, obovate, connate at base, subapically corniculate; stamens 4; rudimentary ovary oblong. Female perianth lobes unequal, largest lobe cymbiform, 1/2 as long as achene. Achene purplish, broadly ovoid, ca. 0.8 mm, slightly compressed, oblique, verrucose, enclosed by persistent perianth. Fl. Apr–Jul, fr. Jul–Sep.

• Shaded moist rocks in forests; 1500–3000 m. SW Sichuan, W Yunnan.

This species is very rare and possibly endangered in the wild, but is widely cultivated as an ornamental pot plant in China and other countries.

56. *Pilea peltata* Hance, Ann. Sci. Nat., Bot., sér. 5: 242. 1866.

盾叶冷水花 *dun ye leng shui hua*

Herbs perennial, rhizomatous, glabrous, dioecious or monoecious. Stems greenish, erect, often simple, 5–27 cm tall, succulent, internodes 1–4 cm. Leaves crowded on upper nodes;

stipules persistent, triangular, ca. 1 mm, membranous; petiole subequal in length, 0.6–4.5 cm; leaf blade blue-green, suborbicular or subcordate, peltate, subequal in size, 1–4.5(–7) × 1–3.5(–4) cm, succulent, papery when dry, 3-veined, lateral veins 3 or 4 on each side, inconspicuous, external secondary veins 5–7, indistinct on both surfaces, often glandular punctate at terminal veins, finely honeycombed abaxially, cystoliths fusiform, often conspicuous adaxially, base cordate, rounded or truncate, margin shallowly undulate-crenate, apex acute or obtuse. Inflorescences solitary, in upper nodes, male a moniliform spike, 3–4 cm overall, peduncle 1–1.7 cm; female ones 1–2.5 cm (including peduncle 0.5–1 cm); bracts lanceolate, ca. 0.4 mm. Male flowers light yellow-green, pedicellate or sessile, in bud obovoid, ca. 1.5 mm; perianth lobes 4, obovate, connate at base, subapically strongly corniculate; stamens 4; rudimentary ovary oblong. Female perianth lobes unequal, largest lobe cymbiform, 1/2 as long as achene. Achene obliquely ovoid, ca. 0.6 mm, slightly compressed, smooth, with an inconspicuously colored punctulate ring, enclosed by persistent perianth. Fl. Jun–Aug, fr. Aug–Nov.

• Shaded moist places in forests, thickets; 100–500 m. Guangdong, Guangxi, S Hunan.

- 1a. Leaf blade cordate or suborbicular, apex acute or obtuse, margin shallowly undulate-crenate 56a. var. *peltata*
- 1b. Leaf blade ovate, apex often acuminate, margin sharply serrate or crenate-serrate 56b. var. *ovatifolia*

56a. *Pilea peltata* var. *peltata*

盾叶冷水花(原变种) *dun ye leng shui hua* (*yuan bian zhong*)

Leaf blade cordate or suborbicular, margin shallowly undulate-crenate, apex acute or obtuse. Fl. Jun–Aug, fr. Aug–Sep.

• Shaded moist rocks in forests, thickets on limestone hills; 100–500 m. Guangdong, Guangxi, S Hunan.

56b. *Pilea peltata* var. *ovatifolia* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 95. 1982.

卵叶盾叶冷水花 *luan ye dun ye leng shui hua*

Leaf blade ovate, margin sharply serrate or crenate-serrate, apex often acuminate. Fl. Apr–Jul, fr. Aug–Nov.

• Shaded moist places in forests, thickets; 300–400 m. N Guangdong.

57. *Pilea bambusifolia* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 95. 1982.

竹叶冷水花 *zhu ye leng shui hua*

Herbs perennial, glabrous, dioecious. Rhizomes fusiform, ca. 3 mm in diam. Stems reddish, blue-green when dry, erect, much branched, 20–30 mm tall, 2–4 mm in diam., slightly succulent, with dense, longitudinally arranged cystoliths when dry; internodes 0.4–1.8 cm. Leaves crowded on upper nodes of stem and branches; stipules almost persistent, triangular, ca. 1 mm, membranous; petiole subequal in length, 5–10 cm; leaf blade abaxially pale green, adaxially dark green, oblong-lanceolate, linear-lanceolate, or linear, subequal in size, 2–5 × 0.4–1

cm, subpapery, 3-veined, lateral veins many, reticulate, both surfaces lustrous, cystoliths shortly fusiform, dense on both surfaces, base obtuse or subrounded, margin sharply serrulate from mid-base. Male inflorescence not known. Female inflorescences solitary, cymose-racemose, of several glomerules, sometimes capitate, 0.5–2 cm, peduncle 0.3–1.3 cm. Female perianth lobes unequal, largest lobe cymbiform, subapically corniculate. Achene obliquely ovoid, ca. 1 mm, slightly compressed, smooth or sparsely verrucose, enclosed by perianth. (Male flowers unknown.) Fr. Nov.

• Shaded moist steep places in mountains; ca. 1300 m. SW Guizhou.

58. *Pilea unciformis* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 96. 1982.

鹰嘴冷水花 ying zui leng shui hua

Herbs perennial, stoloniferous, glabrous, dioecious. Stems gray-green when dry, erect, much branched through main stem like corymb, 10–35 cm tall, somewhat succulent, with shortly fusiform cystoliths when dry; internodes 1–3.5 cm. Leaves crowded on upper nodes of stem and branches, sometimes 4 in whorl; stipules persistent, triangular, ca. 1 mm, membranous; petiole unequal in length, 0.5–1.2 cm; leaf blade abaxially gray-green, adaxially dark green, ovate, unequal in size, 0.7–2.5 × 0.6–1 cm, subpapery, 3-veined, sunken adaxially, prominent abaxially, lateral veins several, inconspicuous, honeycombed abaxially, cystoliths fusiform, adaxially densely, regularly and longitudinally arranged along margin on both surfaces, base subcordate or emarginate, rarely broadly cuneate, margin somewhat thickened, obtusely 2–4-serrate from mid-base. Inflorescences solitary; male inflorescence a capitulum, peduncle 5–12 mm; female ones shorter. Male flowers pedicellate, in bud ca. 0.8 mm; perianth lobes 4, obovate, subapically corniculate; stamens 4; rudimentary ovary conic. Female perianth lobes unequal, largest lobe cymbiform, subapically strongly recurved corniculate. Achene brownish, narrowly ovoid, ca. 0.8 mm, slightly compressed, smooth, enclosed by perianth lobes. Fl. Apr–May, fr. Jun–Sep.

Shaded moist places of limestone mountain; ca. 1300 m. SE Yunnan [N Vietnam].

59. *Pilea linearifolia* C. J. Chen, Acta Phytotax. Sin. 17(1): 105. 1979.

条叶冷水花 tiao ye leng shui hua

Herbs weak, glabrous, dioecious. Stems erect, simple, 5–10 cm tall, ca. 1 mm in diam., succulent. Leaves crowded on upper nodes; stipules persistent, interpetiolar, connate at base, deltoid, ca. 1 mm, membranous; petiole subequal in length, 0.1–0.2 cm; leaf blade elliptic-lanceolate or oblong-linear, subequal in size, 6–12 × 2–4 mm, membranous, 3-veined, lateral pair reaching margin at middle, secondary veins 2–3 each side, inconspicuous, cystoliths linear, conspicuous on both surfaces, base obtuse or emarginate, margin entire, rarely shallowly 1-lobed in middle, apex attenuate, with obtuse tip. Inflorescences solitary, in upper nodes; male a capitulum, peduncle 4–15 mm; glomerules of few flowers, sometimes only 1 developing, bracts ovate-lanceolate, ca. 0.7 mm; female inflorescence a cluster of a

few flowers; bracts ovate, 0.6 mm. Male flowers pedicellate, in bud ca. 2 mm; perianth lobes 4, obovate, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary minute. Female perianth lobes unequal, largest lobe cymbiform, subapically corniculate. Achene narrowly ovoid, ca. 0.6 mm, slightly compressed, enclosed by perianth lobes. Fl. Jul, fr. Aug–Sep.

Shaded moist mossy places in *Quercus* forests; ca. 3100 m. S Xizang (Gyirong) [Nepal].

60. *Pilea cavalieriei* H. Léveillé, Repert. Spec. Nov. Regni Veg. 11: 65. 1912.

石油菜 shi you cai

Herbs perennial, stoloniferous, glabrous, dioecious. Stems blue-green when dry, erect, much branched, 5–40 cm tall, 1.5–5 mm in diam., somewhat succulent, with dense cystoliths. Leaves crowded on apex of stem and branches; stipules persistent, deltoid, ca. 1 mm, membranous; petiole subequal in length, 0.5–2 cm; leaf blade abaxially gray-green, broad-ovate, rhombic-ovate, or suborbicular, subequal in size, 8–20 × 6–18 mm, succulent, papery when dry, 3-veined, lateral pair reaching margin in middle, secondary veins 2–3 each side, inconspicuous, honeycombed abaxially, cystoliths linear, conspicuous adaxially, sometimes on both surfaces, and often longitudinally arranged along margins on both surfaces, base broadly cuneate, subrounded, or subtruncate, often with small auricle, margin entire, rarely undulate or bluntly crenate, apex obtuse, acute, or subrounded. Inflorescences solitary, in upper nodes; male inflorescence a capitulum, peduncle 0.4–1.5 cm; glomerules few flowered, sometimes only 1 developing, bracts ovate-lanceolate, ca. 0.7 mm; female inflorescence a cluster of a few flowers; bracts ovate, 0.6 mm. Male flowers pedicellate, in bud ca. 1.8 mm; perianth lobes 4, obovate-oblong, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary oblong. Female perianth lobes unequal, largest lobe cymbiform, subapically corniculate. Achene ovoid, ca. 0.7 mm, compressed, smooth, enclosed by perianth lobes. Fl. May–Aug, fr. Aug–Oct.

Shaded moist places, rocks in forests; 200–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, E Sichuan, SW Zhejiang [Bhutan].

- 1a. Leaf apex obtuse, acute, or subrounded, margin entire, rarely undulate 60a. subsp. *cavalieriei*
- 1b. Leaf apex rounded, margin obtusely crenate 60b. subsp. *crenata*

60a. *Pilea cavalieriei* subsp. *cavalieriei*

石油菜(原亚种) shi you cai (yuan ya zhong)

Pilea cavalieriei subsp. *valida* C. J. Chen; *Pilea peploides* (Gaudichaud-Beaupré) W. J. Hooker & Arnott var. *cavalieriei* (H. Léveillé) H. Léveillé.

Stems 5–30 cm tall, 1.5–2.5 mm in diam. Leaf margin entire, apex obtuse, acute, or subrounded, rarely undulate. Male inflorescences longer than petioles. Fl. May–Aug, fr. Aug–Oct.

Shaded moist places, rocks in forests; 200–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, E Sichuan, SW Zhejiang [Bhutan].

60b. *Pilea cavalieriei* subsp. *crenata* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 99. 1982.

圆齿石油菜 yuan chi shi you cai

Leaf margin obtusely crenate, apex rounded. Fr. May.

- Shaded moist steep rocks; ca. 600 m. N Guangxi, Guizhou.

61. *Pilea sinocrassifolia* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 99. 1982.

厚叶冷水花 hou ye leng shui hua

Pilea crassifolia Hance, J. Bot. 20: 294. 1882, not Blume (1855).

Herbs prostrate, glabrous, monoecious. Stems much branched, succulent, with dense cystoliths when dry. Stipules persistent, triangular, ca. 1 mm, membranous; petiole subequal in length, 0.2–0.6 mm; leaf blade adaxially green, suborbicular, subequal in size, 4–8.5 × 6–18 mm, succulent, papery when dry, 3-veined, lateral pair reaching margin in middle, secondary veins 2–4 each side, all veins inconspicuous, abaxial surface rugose, cystoliths fusiform, conspicuous, base subtruncate, margin entire and revolute, apex subrounded. Male inflorescences solitary, in upper nodes, a capitulum, peduncle 2–5 mm, glomerules of a few flowers; bracts ovate-lanceolate, ca. 0.8 mm. Female inflorescence not seen. Male flowers yellow-green, pedicellate, in bud ca. 2 mm; perianth lobes 4, obovate-oblong, connate 1/2 of length, subapically corniculate, with 2 small gibbose appendices at each side; stamens 4; rudimentary ovary oblong. Fl. Nov–Mar.

- Shaded moist places, rocks along streams; 200–1000 m. SW Fujian, N Guangdong, Guizhou, S Hunan, SE Yunnan.

62. *Pilea racemosa* (Royle) Tuyama in H. Hara, Fl. E. Himal. 61. 1966.

亚高山冷水花 ya gao shan leng shui hua

Procris racemosa Royle, Ill. Bot. Himal. Mts. t. 83, f. 1. 1836; *Pilea subalpina* Handel-Mazzetti; *P. wightii* Weddell var. *roylei* J. D. Hooker.

Herbs perennial, weak, glabrous, monoecious or dioecious. Tuber whitish gray, globose, 3–20 mm in diam. Stems often branched, 2–15(–30) cm tall, succulent. Stipules persistent, triangular, ca. 1 mm, membranous; petiole subequal in length, 0.2–1 cm; leaf blade abaxially pale green, adaxially green, ovate, elliptic, rhombic, obovate, or suborbicular, subequal in size, 0.5–2 × 0.3–1.2 cm, succulent, herbaceous, 3(–5)-veined, rarely triplinerved, lateral veins 1–3 each side, inconspicuous, cystoliths fusiform, conspicuous on both surfaces, base rounded, subcordate, or broadly cuneate, margin bluntly 1–5-serrate each side or entire, apex subacute or obtuse. Inflorescences in pairs, male a capitulum or racemelike-cyme, 1–3.5 cm; female peduncle 0.2–2 cm. Male flowers pedicellate, in bud ca. 1.5 mm; perianth lobes 4, obovate-oblong, connate 1/2 of length, subapically corniculate, stamens 4; rudimentary ovary oblong. Female perianth lobes unequal, subapically corniculate. Achene narrowly ovoid or oblong-ovoid, ca. 0.8 mm, slightly compressed, smooth, enclosed by persistent perianth lobes. Fl. May–Jun, fr. Jul–Sep.

Tsuga or *Picea* forests, semishaded moist places, often on mossy rocks, sometimes on walls by villages; 2200–5400 m. W Sichuan, S Xizang, NW Yunnan, [Bhutan, N India, Nepal, Sikkim].

This species shows great variability in stem branching, leaf shape, leaf margin, and peduncle length. Plants found at higher elevations are shorter, often unbranched, have a less serrate leaf margin, and a shorter peduncle. This species is distinct in always having a globose tuber, capitate inflorescences, and a narrow, smooth achene.

63. *Pilea approximata* C. B. Clarke, J. Linn. Soc., Bot. 15: 123. 1876.

顶叶冷水花 ding ye leng shui hua

Herbs perennial, weak, glabrous, dioecious, rarely monoecious. Tuber brownish, conic, 5–10 × 3–4 mm, sometimes underground internodes becoming a tuber. Stems often simple, thin, 3–12 × 0.1 cm, succulent. Leaves crowded at stem apex, opposite or 4–6 in whorl; stipules persistent, deltoid, ca. 1 mm, membranous, apex obtuse; petiole unequal in length, 0.1–0.7 cm; leaf blade ovate to ovate- or elliptic-lanceolate, unequal in size, 0.8–4 × 0.5–1.4 cm, submembranous, 3-veined, lateral veins several, reticulate, glabrous, adaxial surface sometimes sparsely pilose on veins, cystoliths fusiform, slightly conspicuous abaxially, base cordate or obtuse, margin sharply serrate, often with a glandular dot by tooth tip abaxially, apex acuminate, sometimes acute. Inflorescences solitary, in upper nodes, a capitulum, peduncle slender, 0.5–2 cm; of several unisexual or rarely bisexual flowers, female peduncle 0.2–2 cm. Bisexual flowers: perianth lobes 3; ovate, ca. 1.5 mm, stamens 3; ovary ellipsoid, ca. 0.8 mm. Male flowers: pedicel 1–1.5 mm; in bud ca. 1.8 mm; perianth lobes (3 or)4, ovate, connate 1/2 of length, subapically corniculate, stamens (3–)4; rudimentary ovary narrowly conic. Female perianth lobes unequal, largest lobe 1/2 as long as achene, subapically corniculate. Achene obliquely ovoid, 1–1.2 mm, slightly compressed, smooth, enclosed by persistent perianth. Fl. Jun–Jul, fr. Jul–Sep.

Abies and *Rhododendron* forests, shaded moist places, mossy rocks, wet mossy trees; 2500–3500 m. S Xizang, NW Yunnan [Bhutan, Nepal, Sikkim].

- 1a. Stipules deltoid, ca. 1 mm; leaves crowded at stem apex or in a whorl of 4–6, leaf blade ovate to lanceolate, apex acuminate or long-acuminate, margin serrate 63a. var. *approximata*
- 1b. Stipules oblong or triangular, 3–4 mm; leaves regularly opposite, subequal in length; leaf blade broadly ovate, apex acute, margin incisoserrate 63b. var. *incisoserrata*

63a. *Pilea approximata* var. *approximata*

顶叶冷水花(原变种) ding ye leng shui hua (yuan bian zhong)

Leaves crowded at stem apex or in a whorl of 4–6; stipules triangular, ca. 1 mm; leaf blades ovate to lanceolate, very unequal in length, 0.8–4 × 0.5–1.4 cm, main veins sunken, adaxial surface glabrous, margin serrate, each tooth often with an abaxial gland dot at tip, apex often acuminate. Fl. Jun–Jul, fr. Jul–Sep.

Abies and *Rhododendron* forests, shaded moist places, mossy rocks along ravines; 2900–3000 m. S Xizang, NW Yunnan [Bhutan, Nepal, Sikkim].

63b. *Pilea approximata* var. *incisoserrata* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 100. 1982.

锐裂齿冷水花 rui lie chi leng shui hua

Leaves regularly opposite, subequal in length; stipules oblong or triangular, 3–4 mm; leaf blade broadly ovate, 1–2 × 0.7–1 cm, main veins slightly raised, adaxial surface pubescent on veins, margin sharply incisoserrate, teeth acute, apex always acute. Fl. Jun–Jul, fr. Jul–Aug.

Wet mossy rocks or trees; 2500–3500 m. S Xizang [Bhutan].

64. *Pilea pumila* (Linnaeus) A. Gray, Manual, 437. 1848.

透茎冷水花 tou jing leng shui hua

Herbs annual, subglabrous, monoecious. Stems erect, simple or branched, 5–50 cm tall, succulent. Stipules soon deciduous, ovate-oblong, 2–3 mm, membranous; petiole subequal in length, 0.4–4.5 cm, sparsely puberulent adaxially; leaf blade spreading, rhombic-ovate or broadly ovate, subequal in size, 1–9 × 0.6–5 cm, membranous, 3-veined, lateral veins several, distal ones anastomosing, others inconspicuous, both surfaces sparsely pilose, cystoliths linear, base often broadly cuneate, or proximal ones obtuse, margin dentate-serrate, apex shortly acuminate, caudate, or acute; proximal leaf pair often entire. Inflorescences often androgynous, solitary, from almost every node, male a scorpioid cyme, shorter, in the lower nodes, subsessile, many flowered; female inflorescence larger, in upper nodes, in fruit enlarged, but often shorter than petioles. Male flower pedicellate or sessile, in bud obovoid, ca. 1.8 mm; perianth lobes 2(–4), cymbiform, connate at base, subapically corniculate; stamens 2(–4); rudimentary ovary inconspicuous. Female perianth lobes free, subequal or lateral ones slightly larger, all oblong-cymbiform, as long as achene in fruit. Achene often with brownish dots, triangular-ovoid, 1.2–1.8 mm, compressed, smooth. Fl. Jun–Aug, fr. Aug–Nov.

Moist places in forests, ravines, by rice fields, walls by villages; 300–2200(–2900) m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia (Siberia); North America].

Populations of this species from E Asia were described as *Pilea mongolica*. The authors have examined material of this species, including plants from Asia and North America, and found the specimens were consistently characterized by the scorpioid cyme, 2(–4)-merous male flowers, and triangular-ovoid achene. There is no reason to separate populations from E Asia as a separate species. However, three varieties are recognized here.

The plants are used medicinally as a diuretic.

- 1a. Herbs diffuse; leaf blade rhombic-orbicular or broadly ovate, apex subrounded or obtuse, margin bluntly 3–5-crenate; achene without colored dots 64c. var. *obtusifolia*
- 1b. Herbs erect or ascending; leaf blade

rhombic-ovate or ovate, apex lanceolate or acute, margin serrate; achene with brownish dots.

- 2a. Female perianth lobes linear, subequal, shorter than or subequal to achene ... 64a. var. *pumila*
- 2b. Female perianth lobes ovate or obovate-oblong, unequal, lateral 2 broader with conspicuous ribs and longer than achene, abaxial one 1/2 as long as lateral 2 64b. var. *hamaoi*

64a. *Pilea pumila* var. *pumila*

透茎冷水花(原变种) tou jing leng shui hua (yuan bian zhong)

Urtica pumila Linnaeus, Sp. Pl. 2: 984. 1753; *Pilea mongolica* Weddell; *P. viridissima* Makino.

Herbs erect. Leaf blade rhombic-ovate or ovate, margin serrate, apex lanceolate or acute. Female perianth lobes subequal, linear, shorter than or subequal to achene. Achene with brownish dots.

Shaded moist places in forests, rocks in ravines; 400–2200(–2900) m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia (Siberia); North America].

64b. *Pilea pumila* var. *hamaoi* (Makino) C. J. Chen, Bull. Bot. Res., Harbin 2(3): 103. 1982.

荫地冷水花 yin di leng shui hua

Pilea hamaoi Makino, Bot. Mag. (Tokyo) 10: 364. 1896.

Herbs erect or ascending. Leaf blade rhombic-ovate or ovate, margin serrate, apex often acute or slightly obtuse. Female perianth lobes unequal, abaxial lobe ovate- or obovate-oblong, 1/2 as long as the 2 lateral lobes which are longer than achene. Achene with brownish dots. Fl. Mar.

Shaded moist places in forests, ravines; 300–900 m. Hebei, Heilongjiang, Jilin [Japan, Korea].

64c. *Pilea pumila* var. *obtusifolia* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 104. 1982.

钝尖冷水花 dun jian leng shui hua

Herbs diffuse. Leaf blade rhombic-orbicular or broadly ovate, margin bluntly 3–5-crenate, apex subrounded or obtuse. Female perianth lobes unequal, abaxial lobe ovate-lanceolate or oblong, 1/4–1/3 as long as lateral lobes which are subequal to or 1/2 as long as achene. Achene without colored dots. Fl. Sep–Oct, fr. Oct–Nov.

• Moist places in forests, ravines, by rice fields, walls by villages; 500–1500 m. S Gansu, Guizhou, W Hubei, S Shaanxi, Sichuan.

65. *Pilea pauciflora* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 104. 1982.

少花冷水花 shao hua leng shui hua

Herbs annual, weak, subglabrous, monoecious, rarely dioecious. Stems erect, simple or branched, thin, 5–20 cm tall,

1–2.5 mm in diam., succulent. Stipules persistent, light green, suborbicular or subcordate, 2.5–4 mm, thinly membranous, apex rounded; petiole subequal in length, thin, 0.5–2.6 cm, sparsely puberulent adaxially; leaf blade broadly ovate, subequal in size, 0.8–4 × 0.6–3 cm, membranous, 3-veined, lateral veins several, inconspicuous, adaxial surface sparsely pilose, cystoliths minute, base often broadly cuneate or obtuse, margin bluntly 3–5(–7)-crenate, apex obtuse, rarely acute. proximal leaves often smaller, entire. Inflorescences often androgynous, solitary, from almost every node, a cluster or scorpioid cyme, subsessile, few flowered. Male flowers pedicellate, in bud obovoid, 0.4–0.6 mm; perianth lobes 2, hooded, connate at base, subapically corniculate; stamens 2; rudimentary ovary inconspicuous. Female perianth lobes free, very unequal, abaxial lobe longest, hooded, subapically long corniculate, in fruit as long as achene, lateral lobes triangular, quite small, 1/10 as long as abaxial lobe, membranous; staminodes minute, oblong. Achene brownish, triangular-ovoid, ca. 1.5 mm, compressed, attenuate, smooth. Fl. Jun–Aug, fr. Aug–Sep.

• Shaded moist places in forests, by marshes; 2100–2800 m. C and S Gansu, NW Sichuan.

66. *Pilea rostellata* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 106. 1982.

短喙冷水花 duan hui leng shui hua

Herbs perennial, stoloniferous, dioecious. Stems erect, simple or branched, ca. 50 cm tall, succulent, with gall-like swellings between nodes; stems, petioles, abaxial leaf blade, and peduncle of male cymes densely covered with villous multicellular hairs. Stipules persistent, triangular, ca. 1 mm, membranous; petiole subequal in length, 1.5–7 cm; leaf blade ovate or narrowly ovate, slightly asymmetric, subequal in size, 9–13 × 4–7.6 cm, membranous, 3-veined, lateral veins many, regularly reticulate, abaxial surface subglabrous, cystoliths fusiform, conspicuous along veins abaxially, base subrounded or broadly cuneate, margin shallowly crenate. Inflorescences in pairs; male cymes ca. 1 cm; bracts narrowly ovate, ca. 0.4 mm. Male flowers pedicellate, in bud obovoid, ca. 1.2 mm; perianth lobes 4, ovate, connate at base, subapically beaked, puberulent, stamens 4; rudimentary ovary conic. Fl. Apr.

• Shaded moist places in forests, near streams; ca. 1700 m. W Yunnan (Longling).

67. *Pilea salwinensis* (Handel-Mazzetti) C. J. Chen, Bull. Bot. Res., Harbin 2(3): 107. 1982.

怒江冷水花 nu jiang leng shui hua

Pilea symmeria Weddell var. *salwinensis* Handel-Mazzetti, Symb. Sin. 7: 134. 1929.

Herbs perennial, robust, or subshrubs, stoloniferous, dioecious. Stems brownish when dry, erect, much branched, to 100 cm tall, woody at base, succulent distally; stems and petioles glabrous or sparsely covered with multicellular hairs and squamae above. Stipules persistent, triangular, ca. 1 mm, membranous; petiole unequal in length, 1–6 cm; leaf blade brownish green when dry, narrowly ovate or oblong-lanceolate, unequal in size, 6–12 × 4–5 cm, herbaceous, 3-veined, lateral veins many, regularly transverse, abaxial surface pubescent along

veins, adaxial surface sparsely pilose, cystoliths fusiform on both surfaces, base rounded, margin crenulate, apex acuminate, acumen dentate. Inflorescences in pairs; male inflorescence a cymose panicle, 1–2 cm overall, peduncle thin and short, sparsely pubescent; female inflorescence shorter; bracts linear-lanceolate, ca. 0.6 mm. Male flowers pedicellate, in bud obovoid, ca. 0.7 mm; perianth lobes 4, oblong-ovate, connate at base, subapically corniculate, glabrous; stamens 4; rudimentary ovary minute, conic. Female perianth lobes dimorphic, subequal, abaxial lobe hooded, 1/2 as long as achene, lateral 2 lobes triangular-ovate, membranous. Achene ovoid, ca. 0.5 mm, oblique, smooth, enclosed by persistent perianth. Fl. Apr–May, fr. Jun.

Shaded moist places in forests, near streams; 2000–2500 m. W Yunnan [Myanmar].

68. *Pilea umbrosa* Blume, Mus. Bot. 2: 56. 1856.

荫生冷水花 yin sheng leng shui hua

Herbs perennial, stoloniferous, dioecious or monoecious. Stems erect, often branched, 20–50 cm tall, succulent distally, usually covered with multicellular hairs throughout. Stipules soon deciduous, brownish, narrowly ovate or oblong, ca. 5 mm, membranous; petiole unequal in length, 0.6–6.5 cm; leaf blade abaxially pale green, adaxially dark green, broadly ovate, broadly elliptic, or suborbicular, slightly asymmetric, unequal in size, 3–12 × 2–9 cm, submembranous, 3-veined, lateral veins many, cystoliths minute, shortly fusiform, base obtuse to subcordate, margin coarsely dentate, apex short acuminate to caudate-acuminate, acumen untoothed. Inflorescences solitary, male one a widely branched, paniculate cyme, 10–16 cm overall, peduncle 6–10 cm; female inflorescence shorter than male one, shorter than petioles. Male flowers subsessile, in bud obovoid, ca. 0.8 mm; perianth lobes 4, connate at base, corniculate below apex, sparsely setose; stamens 4; rudimentary ovary minute. Female perianth lobes unequal, abaxial lobe hooded, 1/2 as long as achene, lateral 2 lobes triangular-ovate, much shorter, membranous. Achene ovoid, ca. 0.6 mm, compressed, oblique, thinner at margins, smooth, sometimes with an inconspicuously dotted colored ring enclosed by persistent perianth. Fl. Jul–Aug, fr. Sep–Oct.

Shaded moist places in forests, near streams; 1500–2800 m. S Xizang, NW Yunnan [Bhutan, N India, Kashmir, Nepal].

- 1a. Stems, petioles, and abaxial leaf blade densely covered with multicellular hairs; male panicles to 16 cm 68a. var. *umbrosa*
- 1b. Lower stems and abaxial leaf blade subglabrous, otherwise sparsely covered with multicellular hairs; male panicles to 10 cm 68b. var. *obesa*

68a. *Pilea umbrosa* var. *umbrosa*

荫生冷水花(原变种) yin sheng leng shui hua (yuan bian zhong)

Pilea producta Blume, p.p.

Stems, petioles, and abaxial leaf blade densely covered

with multicellular hairs. Male panicles to 16 cm. Fl. Jul–Aug, fr. Sep–Oct.

Shaded moist places in forests, near streams; 1500–2800 m. S Xizang, NW Yunnan [Bhutan, N India, Kashmir, Nepal].

Other syntype material of *Pilea producta* belongs to the following species, *P. multicellularis*.

68b. *Pilea umbrosa* var. *obesa* Weddell, Monogr. Urtic. 243. 1856.

少毛冷水花 shao mao leng shui hua

Lower stems and abaxial leaf blade subglabrous; stem in upper part, petioles, and peduncles sparsely covered with multicellular hairs. Male panicles to 10 cm. Fl. Sep.

Shaded moist places in mixed forests; ca. 2600 m. SE Xizang, NW Yunnan [Nepal].

69. *Pilea multicellularis* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 108. 1982.

串珠毛冷水花 chuan zhu mao leng shui hua

Pilea producta Blume, p.p.

Herbs perennial, stoloniferous, dioecious. Stems erect, ca. 40 cm tall, succulent distally; stems, petioles, and both surfaces of leaf blade densely covered with multicellular hairs. Stipules deciduous; petiole strongly unequal in length; the longer one 1–1.5 cm; the shorter one sessile; leaf blade brownish when dry, the major one oblong-ovate, strongly unequal in shape and size; 6–8 × 3.5–4.5 cm, herbaceous, 3-veined, lateral veins many, regularly transverse, cystoliths minute, shortly fusiform, inconspicuous, base cordate, margin serrate, apex acuminate; the minor one broadly ovate to cordate, 2–4 × 1–2.8 cm, base deeply cordate, almost around stem, apex shortly acuminate or acute. Male inflorescence subspicate, few branched, 5–7 cm, flowers densely arranged along 1 side of axis; female inflorescence a cymose panicle, much branched, to 10 cm. Male flowers minute, ca. 1 mm; perianth lobes 4, apex acute; stamens 4; rudimentary ovary minute. Female abaxial perianth lobe hooded, 1/2 as long as achene, lateral 2 lobes triangular-ovate, ca. 1/3 as long as abaxial lobe, membranous. Achene ovoid, ca. 1 mm, slightly compressed, slightly oblique, smooth, sometimes inconspicuously verrucose, enclosed by persistent perianth. Fl. Jul–Aug, fr. Sep–Oct.

• Shaded moist places in forests, near streams; ca. 2900 m. NW Yunnan.

Other syntype material of *Pilea producta* belongs to the previous species, *P. umbrosa*.

70. *Pilea medogensis* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 109. 1982.

墨脱冷水花 mo tuo leng shui hua

Herbs perennial, weak, stoloniferous, dioecious or monoecious. Stems erect, often branched underground, 5–25 cm tall, 1.5–2 mm in diam., woody at base, succulent distally; upper stems, petioles, and inflorescences with multicellular hairs. Stipules soon deciduous, brownish, oblong-lanceolate, membra-

nous; petiole slightly unequal in length, 5–30 mm; leaf blade elliptic or ovate-elliptic, slightly unequal in size, 1.5–8 × 1–4 cm, submembranous, 3-veined, lateral veins 10–13 each side, inconspicuous, abaxial surface pubescent, adaxial surface sparsely multicellular pilose, cystoliths minute, shortly fusiform or punctate, inconspicuous only at margins, base broadly cuneate or obtuse, margin sharply dentate, apex caudate-acuminate, acumen sharply denticulate. Inflorescence glomerules several, in moniliform spikes, sometimes few branched, rarely capitate, 1–4 cm overall, peduncle 0.5–2.5 cm; bracts ovate-oblong, ca. 0.6 mm. Male flowers purplish, ovoid, ca. 1 mm; perianth lobes 4, subapically inconspicuously corniculate; stamens 4; rudimentary ovary minute. Female perianth lobes unequal, abaxial lobe somewhat hooded, 1/2 as long as achene, lateral 2 lobes triangular-ovate, shorter, membranous. Achene ovoid, ca. 1 mm, slightly compressed, slightly oblique, verrucose, enclosed by persistent perianth. Fl. Jun–Jul, fr. Aug–Sep.

Shaded moist places of forest margins, near streams; 2400–3800 m. SE Xizang [N India].

This species was formerly included in *Pilea umbrosa* var. *obesa*, which was based on three collections, which were later recognized as three different taxa. One specimen, *Wallich 4589B*, from Nepal, is considered to be consistent with *P. medogensis* by its general appearance and inflorescence morphology. *Pilea medogensis* is similar to *P. umbrosa*, but is distinct in its moniliform spike, elliptic leaf blades, and leaf apex with a sharply denticulate acumen.

71. *Pilea insolens* Weddell in Candolle, Prodr. 16(1): 118. 1869.

盾基冷水花 dun ji leng shui hua

Pilea anisophylla Weddell var. *khasiana* J. D. Hooker; *P. khasiana* (J. D. Hooker) C. J. Chen.

Herbs perennial, stoloniferous, dioecious or monoecious. Stems simple, 20–50 cm tall, soft, succulent; internodes long. Stipules persistent, triangular-ovate, 1.5–2 mm, membranous; petiole strongly unequal in length, to 5 cm or absent; leaf blade abaxially pale green, adaxially green, the major blade oblong-ovate, asymmetric, strongly unequal in shape and size, sometimes reduced into alternate leaves, 5–13 × 3–6 cm, membranous, 3-veined, basal lateral veins U-shaped near origin, lateral veins many, regularly transverse, reticulate, cystoliths minute, shortly fusiform, conspicuous on both surfaces; base distinctly peltate or deeply cordate in basifixed leaves, margin entire or with a few small teeth near apex, apex caudate-acuminate; the minor blade ovate, 1.5–4 × 0.8–2 cm, base deeply cordate, almost around stem, or subtruncate, margin entire but with a few small teeth near apex, apex acute. Male inflorescence spikelike, somewhat coiled distally, few branched, 5–14 cm, flowers or glomerules loosely arranged along 1 side of axis; female inflorescence a cymose panicle, much branched, to 5 cm; bracts triangular-ovate, ca. 3 mm. Male flowers ca. 2.5 mm; pedicel thin, ca. 2 mm; perianth lobes 4, ovate, connate for ca. 1/2 length, apex caudate; stamens 4; rudimentary ovary minute, conic. Female perianth lobes unequal, abaxial lobe hooded, ca. 1/2 as long as achene, lateral 2 lobes triangular-ovate, ca. 1/2 as long as abaxial lobe, membranous. Achene brownish, ovoid, ca. 1.2 mm, slightly compressed, slightly oblique, verrucose, enclosed by persistent perianth. Fl. Jun–Aug, fr. Sep–Oct.

Shaded moist places in evergreen and broad-leaved mixed forests, near streams; 1600–2700 m. SE Xizang [Bhutan, N India, Nepal].

The type of *Pilea anisophylla* var. *khasiana*, Griffith 4515, has some leaves peltate and clearly belongs here rather than in *P. anisophylla*.

72. *Pilea anisophylla* Weddell, Monogr. Urtic. 193. 1856.

异叶冷水花 *yi ye leng shui hua*

Pilea anisophylla var. *robusta* J. D. Hooker; *P. secunda* Chien.

Herbs perennial, stoloniferous, dioecious or monoecious. Stems ascending, simple or branched, 20–150 cm tall, succulent, glabrous or sparsely multicellular pubescent adaxially. Stipules persistent, triangular-ovate, 1.5–2 mm, herbaceous; petiole strongly unequal in length, 0–2.5 cm; leaf blade abaxially pale green, adaxially green, asymmetric, strongly unequal in shape and size; the major blade falcate-lanceolate, ovate- or oblong-lanceolate, 5–16 × 1.5–5 cm, membranous, 3-veined, lateral veins many, regularly transverse, reticulate, cystoliths minute, shortly fusiform, conspicuous on both surfaces, base deeply or shallowly cordate, rarely rounded, margin entire or shallowly 1–3-serrate distally, apex caudate-acuminate; the minor blade sessile, triangular-ovate, oblong, rarely falcate lanceolate, 1.5–3(–6) × 0.4–2(–3) cm, base deeply cordate, almost around stem or hastate, rarely subrounded, margin entire or 1- or 2-serrulate near apex, apex acute or acuminate. Male inflorescences spikelike, somewhat coiled distally, few branched, flowers or glomerules loosely arranged along 1 side of axis 3–8(–19) cm, female inflorescences cymose-racemose or cymose-paniculate, branched, shorter, 2–6 cm, glabrous or pubescent. Male flowers ca. 1.2 mm; pedicel 0–1 mm, thin; perianth lobes 4, ovate, connate 1/2 of length, subapically corniculate; stamens 4; rudimentary ovary minute, conic. Female perianth

lobes unequal, abaxial lobe hooded, 1/2 as long as achene, lateral 2 lobes triangular-ovate, 1/2 as long as abaxial lobe, membranous. Achene brownish, ovoid, slightly oblique, ca. 1 mm, slightly compressed, smooth, enclosed by persistent perianth. Fl. Jun–Sep, fr. Sep–Dec.

Shaded moist places in evergreen and broad-leaved mixed forests, near streams; 900–2400 m. SE Xizang, S and W Yunnan [Bhutan, N India, Myanmar, Nepal, Sikkim].

73. *Pilea pellioides* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 112. 1982.

赤车冷水花 *chi che leng shui hua*

Herbs perennial, robust, or subshrubs, stoloniferous, dioecious. Stems much branched, to 120 cm tall; upper stems, branches, petioles, and inflorescence with multicellular pubescence. Stipules deciduous, deltoid or subcordate, 1.5–2.5 mm; petiole strongly unequal in length, 0–2 cm; leaf blade brownish when dry, the major blade oblong-oblancoate, slightly asymmetric, strongly unequal in shape and size; 8–12 × 2.3–3.5 cm; submembranous, 3-veined, lateral veins many, subtransverse, reticulate, abaxial surface sparsely setose, with dense multicellular hairs on veins, adaxial surface with multicellular hairs, cystoliths minute, only at margins, base obtuse or broadly cuneate, margin serrate or crenate, apex acuminate or caudate-acuminate, acumen serrate. the minor blade rarely reduced, sessile, obovate, 6–9 × 4–6 mm. Inflorescence a compact cymose panicle, 0.8–1.5 cm, shortly pedunculate. Male flowers shortly pedicellate, ca. 1 mm; perianth lobes 4, ovate, connate 1/2 of length, apex obtuse; stamens 4; rudimentary ovary minute, conic. Female flowers ca. 0.5 mm; perianth lobes subequal, oblong, persistent, subapically corniculate. Fl. Aug–Oct.

● Shaded moist places in forests, near streams; 1800–2800 m. NW Yunnan.

5. *Pilea* sect. *Pilea*

冷水花组 *leng shui hua zu*

Herbs. Leaves pinnately veined. Inflorescences capitate or subcapitate. male perianth lobes 4, valvate. Female perianth lobes 3, unequal.

About ten species: Central and South America, Asia; three species (one introduced) in China.

- 1a. Leaf blade obovate or spatulate, 2–7 mm, margin entire 76. *P. microphylla*
- 1b. Leaf blade elliptic-lanceolate or linear, 1.5–9 cm, margin serrate, sometimes bluntly so.
 - 2a. Stolon nodes often thickened into conic tubers; leaves crowded on upper 2 or 3 nodes, membranous, linear, 3–9 × 0.5–1 cm, lateral veins 6–10 each side 75. *P. ternifolia*
 - 2b. Stolon nodes not thickened; leaves on upper stem and branches, succulent, thick papery when dry, elliptic-lanceolate, 1.5–4 × 0.5–1 cm, lateral veins 4–6 each side 74. *P. penninervis*

74. *Pilea penninervis* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 113. 1982.

钝齿冷水花 *dun chi leng shui hua*

Herbs perennial, stoloniferous but nodes not thickened, glabrous, dioecious. Stems much branched, 15–25 cm tall, somewhat succulent; internodes 1.5–3.5 cm. Leaves on upper stem and branches; stipules almost persistent, deltoid, ca. 1 mm; petiole subequal in length, 2–5 mm; leaf blade abaxially pale

green, adaxially greenish, slightly lustrous, elliptic-lanceolate, symmetric, subequal in size, 1.5–4 × 0.5–1 cm, succulent, thick papery when dry, veins sunken adaxially, prominent abaxially, lateral veins 4–6 each side, honeycombed abaxially, cystoliths linear, sparse abaxially, dense adaxially, base obtuse, subrounded, or emarginate, margin slightly thickened, bluntly 3- or 4-serrate, apex attenuate or acute. Inflorescences in upper nodes, compactly spicate, 0.3–0.8 cm; bracts triangular-ovate, ca. 0.5 mm; female inflorescence unknown. Male flower pedicellate or

sessile, ca. 1 mm; perianth lobes obovate, connate 1/2 of length, apex acute; rudimentary ovary minute, conic. Fl. Feb–Apr.

Shaded moist places in forests in limestone mountains, near streams; ca. 700 m. W Guangxi, SE Yunnan [N Vietnam].

75. *Pilea ternifolia* Weddell, Monogr. Urtic. 202. 1856.

羽脉冷水花 yu mai leng shui hua

Herbs perennial, stoloniferous, glabrous, dioecious. Tubers brownish, conic, from thickened nodes. Stems simple, thin, 6–20 cm tall, 1–2 mm in diam., somewhat succulent; internodes long inferior, very short superior. Leaves crowded on upper 2 or 3 nodes, opposite, sometimes 4 in whorl; stipules persistent, deltoid, ca. 1 mm, membranous; petiole slender, unequal in length, 1–5 mm; leaf blade linear or oblong-lanceolate, slightly asymmetric, unequal in size, 3–9 × 0.5–1 cm, membranous, lateral veins 6–10 each side, base attenuate, obtusely rounded or emarginate, cystoliths linear, margin sharply serrate, apex long acuminate or attenuate. Inflorescences in upper nodes, compact capitula; peduncle 1–2 cm; glomerules few flowered. Male flowers pedicellate, ca. 1.5 mm; perianth lobes obovate, connate 1/2 of length, subapically corniculate; rudimentary ovary minute, conic. Female perianth lobes unequal, abaxial lobe cymbiform, longer, lateral 2 lobes triangular-ovate, much shorter. Achene ovoid, 1–1.2 mm, compressed, oblique, smooth, enclosed by persistent perianth. Fl. Jun–Jul, fr. Aug–Sep.

Shaded moist places in forests, mossy rocks, near streams; 2900–3100 m. S Xizang [Bhutan, N India, Nepal, Sikkim].

6. *Pilea* sect. *Dimeris* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 115. 1982.

二萼组 er e zu

Dubrueilia Gaudichaud-Beaupré.

Herbs ?annual. Leaves 3-veined. Male perianth lobes 4, valvate; female perianth lobes 2(or 3).

About four species: Asia, Pacific Islands; two species in China.

- 1a. Leaves suborbicular or rhombic-orbicular, base broadly cuneate or subrounded, margin weakly sinuate-crenate distally or entire, apex rounded or obtuse 77. *P. peploides*
- 1b. Leaves broadly ovate or triangular-ovate, base cordate or subtruncate, margin serrate or crenate, apex acute 78. *P. swinglei*

77. *Pilea peploides* (Gaudichaud-Beaupré) W. J. Hooker & Arnott, Bot. Beechey Voy. 96. 1832.

苔水花 tai shui hua

Dubrueilia peploides Gaudichaud-Beaupré, Voy. Uranie, Bot. 495. 1830; *Pilea peploides* var. *major* Weddell.

Herbs weak, often clumped, glabrous, monoecious. Stems reddish, simple or branched, slender, 3–20 cm tall, 1–2 mm in diam., succulent; lower internodes long, upper ones very short. Stipules soon deciduous, triangular, minute, ca. 0.5 mm, membranous; petiole slender, subequal in length, 3–20 mm; leaf blade conspicuously purplish punctate, particularly abaxially, suborbicular, rhombic-orbicular, or deltoid-ovate, subequal in size, 3.5–21 × 3–23 mm, membranous, lateral veins indistinct, cystoliths linear, often regularly transverse, conspicuous abaxially, base cuneate or broadly cuneate, rarely subrounded, margin entire or weakly sinuate-crenate distally, apex obtuse, rounded, sometimes subacute. Inflorescences sometimes andro-

76. *Pilea microphylla* (Linnaeus) Liebmann, Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd., ser. 5, 5(2): 302. 1851.

小叶冷水花 xiao ye leng shui hua

Parietaria microphylla Linnaeus, Syst. Nat., ed. 10, 2: 1308. 1759.

Herbs weak, glabrous, monoecious. Stems erect or ascending, blue-green when dry, simple or branched, 3–17 cm tall, 1–1.5 mm in diam., succulent, cystoliths dense. Stipules persistent, triangular, ca. 0.5 mm, membranous; petiole slender, unequal in length, 1–4 mm; leaf blade abaxially pale green, adaxially green, obovate or spatulate, unequal in size, 2–7 × 1.5–3 mm, succulent, papery when dry, midvein indistinct distally, lateral veins several, indistinct, abaxial surface honey-combed, cystoliths linear, adaxial, regularly transverse, base cuneate or attenuate, margin entire, somewhat recurved, apex obtuse. Inflorescences often androgynous, compactly cymose-capitate; peduncle 1.5–6 mm, sometimes sessile; glomerules few flowered. Male flowers pedicellate, ca. 0.7 mm; perianth lobes ovate, subapically corniculate; rudimentary ovary minute, conic. Female perianth lobes subequal, oblong, longer lobe subequal to achene. Achene ovoid, ca. 0.4 mm, compressed, smooth, enclosed by persistent perianth. Fl. Jun–Aug, fr. Sep–Oct.

Commonly naturalized in S China and in greenhouses in N China [native to tropical South America].

gynous, often with male and female inflorescences borne in same axil, compactly cymose-capitate, subglobose; male ones 0.3–1 cm overall, peduncle 0.15–0.7 cm; female inflorescence 0.2–0.6 cm, peduncle 1–4 mm or almost absent. Male flower pedicellate, ca. 0.8 mm; perianth lobes ovate, connate 1/2 of length, apex acute; stamens 4; rudimentary ovary minute. Female flowers light green, pedicellate; perianth lobes 2, very unequal, abaxial lobe cymbiform, as long as fruit, thickened in fruit, adaxial lobe triangular-ovate, ca. 1/5 as long as abaxial lobe, membranous; staminodes oblong, ca. 1/2 length of fruit, but abortive ones much longer. Achene light brownish, ovoid, ca. 0.5 mm, slightly compressed, oblique at apex, smooth or spinulose-verrucose. Fl. Apr–Jul, fr. Jun–Aug.

Shaded moist places in forests, mossy rocks, near streams; 100–1300 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hunan, Jiangxi, Liaoning, E Nei Mongol, Taiwan, Zhejiang [Bhutan, N India, Indonesia, Japan, Korea, Myanmar, Russia (Siberia), Sikkim, Thailand, Vietnam; Pacific Islands (Hawaii)].

This species appears to divide into two forms in China, one in the north with usually simple stems, entire leaves, and capitate inflorescences on 2–7 mm long peduncles, and the other in the south with much-branched stems, denticulate leaves, subsessile cymes, and ornamented achenes. However, in SE China, Japan, and Korea, these differences break down and it is not possible to recognize formal taxa.

The plants are used medicinally as an agent to relieve pain and to treat snake bites.

78. *Pilea swinglei* Merrill, Philipp. J. Sci., C, 13: 136. 1918.

玻璃草 bo li cao

Pilea crateriforma Metcalf; *P. henryana* C. H. Wright; *P. peploides* (Gaudichaud-Beaupré) J. D. Hooker & Arnott var. *minutissima* Hsu.

Herbs weak, glabrous, monoecious. Stems simple or branched, 7–30 cm tall, 1–3 mm in diam., succulent. Stipules soon deciduous, triangular, minute, ca. 1 mm, membranous; petiole subequal in length, 0.5–3 mm; leaf blade abaxially pale green with dense purplish dots, adaxially greenish, broadly ovate or triangular-ovate, subequal in size, 1–5.5 × 0.8–3 mm, succulent, thinly papery when dry, lateral veins 2 or 3 each side,

indistinct, sunken adaxially, prominent abaxially, abaxial surface honeycombed, cystoliths linear, often conspicuously along margin adaxially, base cordate or subtruncate, margin often serrate or crenate, sometimes proximal ones entire, apex acute, sometimes acuminate or obtuse. Inflorescence male simple or few-branched; often longer than the subtending leaf; glomerules 2–4, 2–5 mm in diam., remote; female spike shorter than leaves; bracts oblong-lanceolate, ca. 0.4 mm. Male flowers yellow-green, pedicellate or sessile, in bud ca. 1 mm; perianth lobes oblong-obovate, connate at base, subapically 2-corniculate; stamens 4; rudimentary ovary minute. Female flowers light green, pedicellate; perianth lobes 2(or 3), very unequal, abaxial lobe cymbiform, slightly shorter than achene, adaxial lobe ovate, 1/5 as long as abaxial lobe, membranous; staminodes oblong, 1/2 of length of fruit. Achene light brownish, sometimes with indistinctly dotted colored ring by margin, ovoid, ca. 0.5 mm, slightly compressed, oblique, smooth. Fl. Jun–Aug, fr. Aug–Nov.

?Mossy rocks in moist shaded places in forests; 400–1500 m. S Anhui, Fujian, Guangdong, NE Guangxi, E Guizhou, W Hubei, Hunan, Jiangxi, Zhejiang [Myanmar].

The plants are used medicinally to relieve fever.

7. *Pilea* sect. *Lecanthoides* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 118. 1982.

托序冷水花组 tuo xu leng shui hua zu

Herbs. Leaves 3-veined. Male inflorescences capitate, usually with a receptacle and involucre; female inflorescences compactly cymose-capitate. male perianth lobes 4, valvate. Female perianth lobes 3.

- Two species.

- 1a. Plants dioecious; receptacle of male inflorescence inconspicuous or absent; leaf blade unequal in size, ovate, 1.5–5 × 1–2.5 cm, without white stripe adaxially 79. *P. gansuensis*
- 1b. Plants monoecious; receptacle of male inflorescence conspicuous; leaf blade subequal in size, ovate to lanceolate, 6–9 × 2.5–3.5 cm, with 2 broad, interrupted, white stripes along midvein 80. *P. receptacularis*

79. *Pilea gansuensis* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 118. 1982.

陇南冷水花 long nan leng shui hua

Herbs weak, glabrous, dioecious. Stems much branched, to 20 cm tall, succulent. Stipules persistent, greenish, ovate-oblong, 3–5 mm, herbaceous; petiole unequal in length, 0.5–1.5 mm; leaf blade ovate, unequal in size, 1.5–5 × 1–2.5 cm, 3-veined, basal lateral veins reaching margin in middle, anastomosing with adjacent lateral veins, lateral secondary veins 3–6 each side, indistinct, abaxial surface glabrous, adaxial surface sparsely pilose, cystoliths linear, often inconspicuous, base rounded or shallowly cordate, margin denticulate or ciliate, apex acuminate or acute. Inflorescences in pairs, of 2–3 glomerules compactly clustered a globose head 3–6 mm in diam., often with an inconspicuous receptacle and involucre, peduncle 1–3.5 cm; bracts triangular-ovate, somewhat connate at base, ca. 0.5 mm. Female inflorescence not seen. Male flowers yellow-green, pedicellate, in bud ca. 1.5 mm; perianth lobes connate at base, subapically corniculate; rudimentary ovary minute. Fl. Jul–Aug.

• ?Shaded moist places in forests; 1400–1800 m. SE Gansu, NW Sichuan.

80. *Pilea receptacularis* C. J. Chen, Bull. Bot. Res., Harbin 2(3): 119. 1982.

序托冷水花 xu tuo leng shui hua

Herbs subglabrous, monoecious. Stems light green or purplish, almost simple, 25–40 cm tall, 2–3 mm in diam., succulent; internodes 2.5–8 cm. Stipules persistent, greenish, ovate-oblong, 6–9 mm, membranous, obtuse at apex; petiole subequal in length, 1–5 cm, sparsely puberulent above; leaf blade abaxially pale green, adaxially dark green with 2 broad, interrupted, white stripes along midvein, ovate to lanceolate, subequal in size, 6–9 × 2.5–3.5 cm, 3-veined, base-lateral ones reaching margin at middle, anastomosing with adjacent lateral veins, lateral secondary veins 7–10 each side, reticulate, abaxial surface glabrous, adaxial surface sparsely pilose, with minute, linear, often inconspicuous cystoliths, base rounded or broadly cuneate, rarely emarginate, margin denticulate or sparsely ciliate, apex acuminate or long acuminate, proximal leaves acute or obtuse. Male inflorescences solitary, often with female inflores-

cence in same axil, flowers crowded on bracteate, conspicuous fleshy cupulate receptacles, 0.4–0.8 cm in diam., pedunculate, rarely without receptacle; bracts triangular-ovate, ca. 1.2 mm; female inflorescence a compactly clustered cyme, peduncle 0.5–1.2 cm. Male flowers yellow-green, long pedicellate, in bud ca. 1.5 mm; perianth lobes ovate-oblong, connate 1/2 of length,

subapically corniculate, with sparse cystoliths; rudimentary ovary minute. Achene ovoid, ca. 1 mm, slightly compressed, oblique at apex, with several concentric colored circles on both sides. Fl. Jun–Aug, fr. Jul–Sep.

● Shaded moist places in forests, near streams, roadsides; 600–2000 m. W Hubei, S Shaanxi, E Sichuan.

