

A Revision on *Pilea*, *Lecanthus*, and *Procris* (Urticaceae) of Taiwan

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ABSTRACT: *Pilea*, *Lecanthus*, and *Procris* of Urticaceae of Taiwan are revised. Thirteen species and one variety of *Pilea*, one species of *Lecanthus*, and one species of *Procris* in Taiwan are recognized. *Pilea elliptifolia* Shih & Yang, *P. peploides* var. *major* Wedd., and *P. pumila* (L.) A. Gray are first reported. *Pilea japonica* (Maxim.) Hand.-Mazz. is confirmed. *Lecanthus peduncularis* (Royle) Wedd., previously *L. sasakii* Hayata, is an universal species. Detailed descriptions of the genera and the species treated here are given. Line-drawings of the species are given except *Pilea microphylla* (L.) Liebm. *Pilea wattersii* Hance is excluded from the genus.

KEY WORDS: *Pilea*, *Lecanthus*, *Procris*, Taiwan, Urticaceae

INTRODUCTION

A revisionary work of Urticaceae in Taiwan is necessary at present. The previous revision was made by Huang in 1971. Some taxonomic changes relevant to Taiwanese species of the family have been published (Chew 1969a & b; Wang 1980a & b; Chen 1982). In addition, the 24-years old treatment seems incompatible to the large number of current collections in the herbaria of this island.

The revision of three related genera, *Pilea*, *Lecanthus*, and *Procris*, are reported here. The study is based on literature review, field observation, and specimen examination in herbaria. For each taxon, a detailed description is provided. Line drawings of most species are included.

MATERIALS AND METHODS

The materials of this study are specimens which were collected by the first author and those deposited in the herbaria of Taiwan. Some type specimens were borrowed from the herbarium of the University of Tokyo. Through literature review, field observation and collection, and specimen examination, delimitation and descriptions of species were made. Specimens examined in this paper are deposited in the Herbarium of the Department of

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RESULTS AND DISCUSSION

Based on structural morphology, fifteen species and a variety of the three genera are recognized in Taiwan. The results and discussion are made as following:

Pilea Lindley nom. cons. 冷水麻屬

Annual or perennial, monoecious or dioecious herbs or undershrubs. Leaves opposite equally or very unequally paired, entire, serrate to dentate; stipules intrapetiolar. Inflorescences axillary, in lax, dense or capitate glomerules and cymose-paniculately branched, pedunculate; bracts small, free. Flowers unisexual. Male flowers with (2-)3-4(-5) incompletely connate sepals, the sepals valvate or imbricate; stamens of the same number as sepals, the pistillodes rudimentary. Female flowers with (2-)3-4(-5) sepals, the sepals usually unequal, valvate or imbricate, usually cymbiform, gibbous or hoodlike of larger ones, free or connate at base; staminodes small, scale-like, of the same number as sepals; ovary glabrous; stigma deciduous, penicillate. Achenes lateral compressed, ovoid to spheroid.

About 600 species (Chen 1982) in warm and tropical regions. Thirteen species and one variety found in Taiwan, growing along ravines, in moist forest floors or along roadsides and sometimes on rocks from low to high altitudes.

Key to the species

1. Plants mostly less than 15 cm high; mature laminae usually less than 1.5 cm long.
 2. Leaves widely to depressedly rhombic-obovate, very obtuse to truncate at apex 9. *P. peploides*
 2. Leaves obovate-elliptic to obovate-oblong, acute to obtuse at apex ... 8. *P. microphylla*
1. Plants more than 20 cm long or high; mature laminae more than 2 cm long.
 3. Stipules narrowly oblong to oblong, free, caducous or persistent.
 4. Stipules up to 1 cm long, 5 mm wide.
 5. Leaves elliptic, with hairs visible without magnification 3. *P. elliptifolia*
 5. Leaves ovate-lanceolate or oblong, glabrous or sparsely with very minute hairs.
 6. Leaves ovate-lanceolate, membranaceous to chartaceous 1. *P. angulata*
 6. Leaves oblong, thick herbaceous to subcoriaceous 4. *P. funkikensis*
 4. Stipules less than 6 mm long, 3 mm wide.
 7. Female flowers with 5 sepals 5. *P. japonica*
 7. Female flowers with 3-4 sepals 11. *P. pumila*
 3. Stipules broadly triangular to cordiform, connate at base, persistent.
 8. Leaves entire or nearly entire to serrulate.
 9. Leaves entire, with quite thick cuticle, the apex usually long caudate 10. *P. plataniflora*

- 9. Leaves nearly entire to serrulate, without cuticle, the apex acute to caudate.
- 10. Leaves usually distinctly unequal-paired, 3-nerved 13. *P. somai*
- 10. Leaves usually slightly unequal-paired, triplinerved 12. *P. rotundimucula*
- 8. Leaves serrate or coarsely serrate to dentate.
 - 11. Leaves coarsely serrate to dentate 6. *P. matsudai*
 - 11. Leaves serrate.
 - 12. Stems hairy at nascent parts, usually brownish-red, less than 4 mm thick 2. *P. aquarum brevicornuta*
 - 12. Stems glabrous, usually greenish, up to 5 mm thick 7. *P. melastomoides*

1. ***Pilea angulata*** (Blume) Blume, Mus. Bot. Lugd.-Bat. 2 (4): 55. 1856.

長柄冷水麻 Fig. 1

Urtica angulata Blume, Bijdr. Fl. Ned. Ind. 494. 1826.

Pilea angulata (Blume) Blume ssp. *petiolaris* (Sieb. & Zucc.) C. J. Chen in Bull. Bot. Res., Harbin. 2(3): 82. 1982.

Urtica petiolaris Sieb. & Zucc. in Abh. Akad. Wiss. Munch. 4(3): 215. 1846.

Pilea petiolaris (Sieb. & Zucc.) Blume, Mus. Bot. Lugd.-Bat. 2(4): 52, f. 18. 1856; T. S. Liu & W. D. Huang in Fl. Taiwan 2: 214. 1976; S. S. Ying, Color. Fl. Taiwan 3: 437, f. 858. 1988.

Pilea stipulosa auct. non (Miq.) Miq.: T. S. Liu & W. D. Huang in Fl. Taiwan 2: 216. 1976, excl. syn. *P. bracteosa*

Pilea miyakei Yamamoto, Suppl. Ic. Pl. Form. 1: 9. 1925. syn. nov.

Pilea nokozenensis Yamamoto, Suppl. Ic. Pl. Form. 1: 10, f. 4. 1925 & 5: 17, descr. emend. 1932.

Pilea nokozenensis Yamamoto var. *minor* Yamamoto & Suzuki ex Yamamoto in J. Soc. Trop. Agr. 3: 241. 1931. syn. nov.

Monoecious subshrubs; stems subterete, glabrous, deep-green, erect or ascending, up to 1 m high, 1 cm thick. Leaves opposite, equally or slightly unequally paired, long-petiolate, stipulate; lamina membranous to chartaceous, glabrous, sometimes slightly minute-puberulent on lower side at base, deep-green, ovate-elliptic, ovate to lanceolate, 5-20 cm long, 2-8.5 cm wide, acuminate to long-acuminate at apex, serrate to dentate-serrate or obscurely double-serrate at margins, obtuse to shallowly cordate at base, with three nerves up to subapex, with dense, linear, ca. 0.25-0.5 mm long cystoliths on both surfaces; petioles semi-terete, canaliculate on upper side, 1-9.5 cm long; stipules 2, intrapetiolar, free, greenish to green, caducous, large, narrowly oblong, 1.0-2.2 cm long, 3-7 mm wide, obtuse at apex, 2-veined. Inflorescences usually in paniculate or interrupted-spicate glomerules of male ones, in dense- or loose-cymose glomerules of female ones, with long-peduncles of male ones, sessile or subsessile of female ones; peduncles up to 5.5 cm long of male ones, up to 3.0 cm long of female ones; mixed inflorescences present. Male flowers glabrous, subquadrate or ellipsoidal from top view, widely obovoid or ovoid from lateral view, ca. 1.8 mm long, 1.6 mm wide, with (3-)4 sepals, the sepals connate about half way, valvate, cymbiform, ca. 1.8 mm long, 0.9 mm wide, coriaceous; stamens (3-) 4. Female flowers with

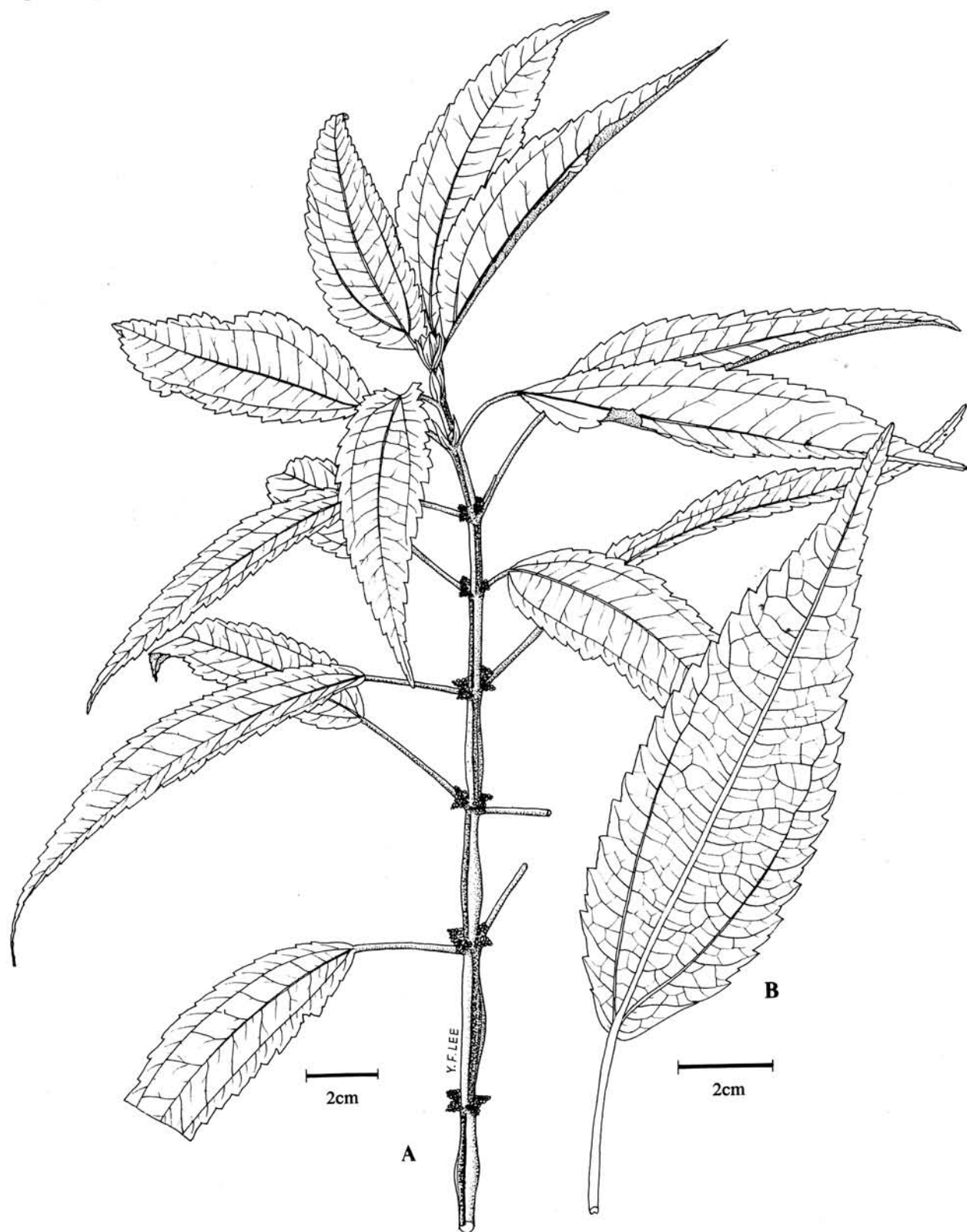


Fig. 1. *Pilea angulata* (Blume) Blume, from Shih 3101. A. A branch with flower buds. B. Leaf (abaxial view).

3 (-4) sepals, the sepals connate at base, unequal, cymbiform, the largest one ca. 1 mm long, 0.3 mm wide, the smaller ones ca. 0.7 mm long, 0.3 mm wide; stigma penicillate, ca. 0.3 mm long; ovary ellipsoidal, ca. 0.7 mm long, 0.5 mm wide. Achenes glabrous, brown when matured, asymmetrical, lateral-compressed, ellipsoidal, ca. 1.9 mm long, 1.4 mm wide.

Distributed in Japan, mainland China, Taiwan, along ravines, in shady and moist forest floors at medium altitude throughout the Central Ridge. Blooming and fruiting from July to October.

Specimens examined:

TAIPEI: Paraka Highway, *Shih* 3101; Peichatienshan, *Shih* 3132, 3140. **ILAN:** Fushan, *Shih* 2818, 2831; Nanshan-tsun, *Shih* 2879; Taipingshan, *Suzuki* 1113, 5999 (TAI, *Syntypus* of *P. nokozenensis* var. *minor*!). **TAOYUAN:** Rarashan, *Shih* 3230. **HSINCHU:** Gaogan, *Shimada* s. n. in 1917 (TAIF). **TAICHUNG:** Hohuanchi, *Shih* 3000. **NANTOU:** Meifong, *Shih* 2941; Mt. Niitaka to Zenzan, *Suzuki* 13125 (TAI). **CHIAYI:** Alishan, *Suzuki* 19362 (TAI). **KAHSHIUNG:** Meishan, *Shih* 2816. **TAITUNG:** Leikunghuo, *Miyake* s. n. in 1899 (TI, *Typus*! of *Pilea miyakei* Yamamoto). **HUALIEN:** Kiraikei, *Matuda* s. n. in 1919 (TAIF); Kuanyuan, *Shih* 3036; Sakatang-logging-trail, *Shih* 3050, 3081; Tzuen, *Shih* 3038.

2. ***Pilea aquarum* Dunn subsp. *brevicornuta* (Hayata) C. J. Chen in Bull. Bot. Res., Harbin. 2 (3): 59. 1982.** 短角冷水麻 Fig. 2

Pilea brevicornuta Hayata, Ic. Pl. Form. 6: 43, f.5. 1916; S. Hatusima, Fl. Ryukyus. 233. 1971; T. S. Liu & W. D. Huang in Fl. Taiwan 2: 207, pl. 268. 1976; S. S. Ying, Color. Fl. Taiwan 3: 435, f.857, excl. photo 543. 1988.

Pilea brevicornuta Hayata f. *laxiflora* Yamamoto, Suppl. Ic. Pl. Form 1: 4. 1925.

Pilea brevicornuta Hayata f. *magnifolia* Yamamoto, Suppl. Ic. Pl. Form. 1: 5. 1925.

Pilea minor Yamamoto, Suppl. Ic. Pl. Form. 1: 8, f.3. 1925.

Pilea mongolica auct. non Wedd.: S. S. Ying, Color. Fl. Taiwan 3: 434, quoad photo 541, excl. f.856. 1988.

Pilea swinglei auct. non Merr.: S. S. Ying, Color. Fl. Taiwan 3: 426, f.854. 1988.

Monoecious perennial herbs, with stolons; stems subterete, erect, ascending or prostrate, glabrous, shallowly canaliculate at opposite sides, puberulent at nascent parts, glabrescent toward base, brownish-green, up to 90 cm high, 1.5-6 mm thick. Leaves opposite, equally to unequally paired, long-petiolate, stipulate; lamina membranaceous to chartaceous, somewhat puberulent or with conical trichomes to nearly glabrous on adaxial sides and along nerves on abaxial sides, dark green to green above, pale-green beneath, rhombic-ovate, ovate to ovate-lanceolate, or narrowly elliptic to elliptic, 1.5-17 cm long, 1-6.5 cm wide, obtuse to acuminate at apex, with an obscurely serrulate acumene, serrate to crenate-serrate at margins, broadly cuneate to obtuse at base, three-nerved, with somewhat dense, linear or vermicular, ca. 0.25 mm long cystoliths on both surfaces; petioles canaliculate on upper side, 0.6-6.0 cm long, puberulent or with conical trichomes; stipules 2, intrapetiole, connate at base, persistent, glabrous, brownish, cordiform, up to 5 mm long, 6.4 mm wide, with dense cystoliths. Male inflorescences axillary, in cymose-paniculate glomerules, 2.5-8.5 cm long; peduncles semi-terete, up to 5.1 cm long. Female inflorescences axillary, short-pedunculate, in short-cymose glomerules, up to 2.3 cm long when fruiting; peduncles

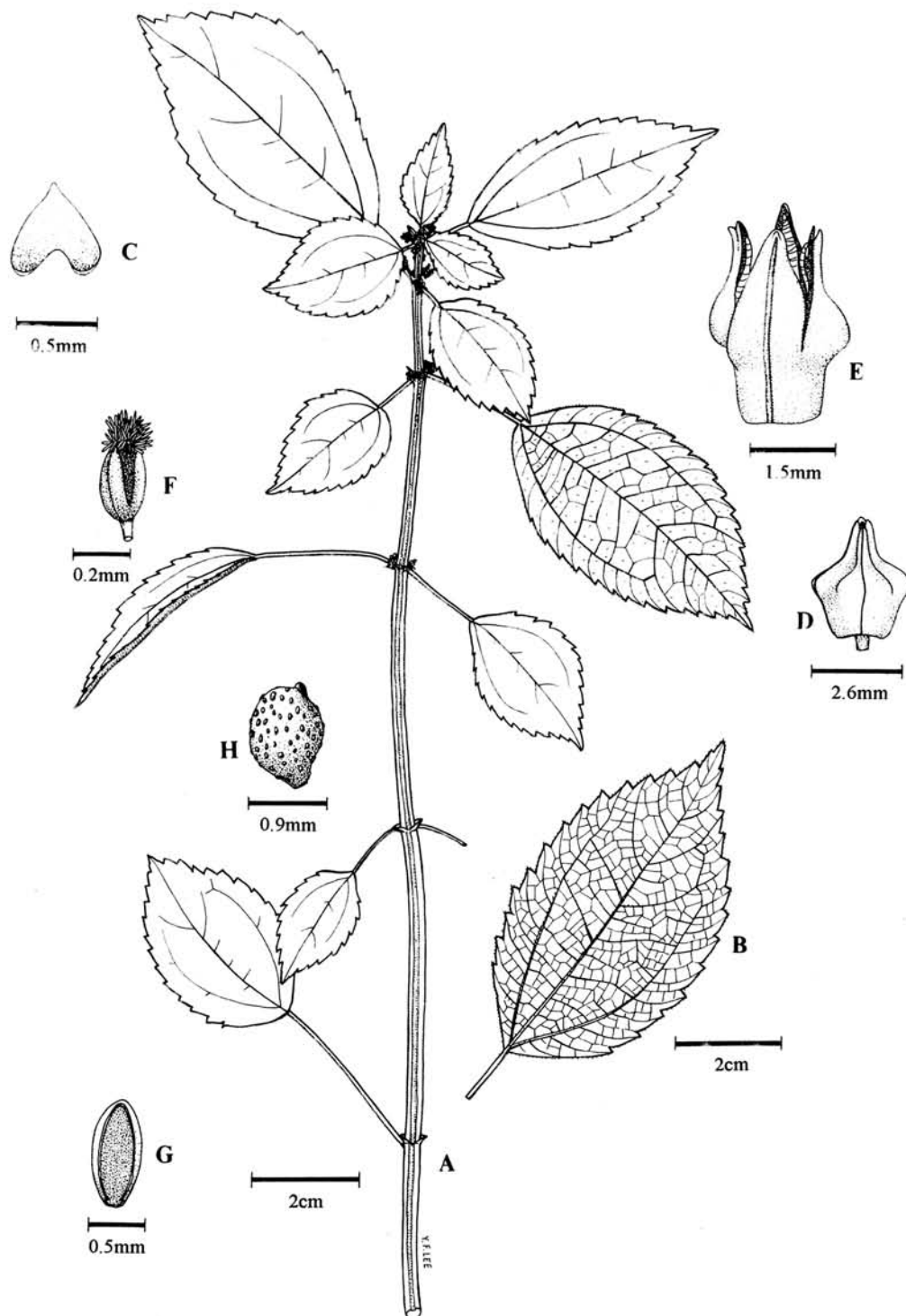


Fig. 2. *Pilea aquarum* Dunn subsp. *brevicornuta* (Hayata) C. J. Chen, from Shih 2580. A. A branch. B. Leaf (abaxial view). C. Stipule. D.. Male flower bud. E. Male flower. F. Female flower. G. Female sepal (adaxial view). H. Achene.

up to 1 cm long. Male flowers glabrous, usually brown-red or deep-red at upper parts, lateral-compressed, obovoid, ca. 3.5 mm long, 2.9 mm wide; sepals 4, subequal, connate halfway, cymbiform, ca. 3.7 mm long, 1.6 mm wide, corniculate at subapex; stamens 4; pistillodes rudimentary. Female flowers oblong-ovoid, ca. 0.3 mm long, with 3 sepals; sepals unequal, the largest one thick-cymbiform, ca. 0.9 mm long, 0.5 mm wide when fruiting, the smallest one cymbiform, ca. 0.3 mm long, 0.2 mm wide when fruiting; staminodes 3, enlarged when fruiting; ovary glabrous, oblong-ovoid, ca. 0.3 mm long, 0.16 mm wide; stigma penicillate. Achenes tuberculate, lateral-compressed, obliquely ellipsoidal, ca. 0.9 mm long, 0.067 mm wide.

Distributed in Mainland China. Taiwan found throughout this island at low to medium altitudes between 400-2600 m, along small ravines and in moist forest edges or floors. Blooming and fruiting from December to June, or to July while at higher altitude.

Specimens examined:

TAIPEI: Yang-Chin Highway, *Shih 3412*. **ILAN:** Nanshantsun, *Shih 2869*; Su-Hua Highway, *Shih 2840*. **TAOYUAN:** Rarashan, *Chen s. n.* in 1994. **HSINCHU:** Wuchihshan, *Ito s.n.* in 1914(TAIF). **MIAOLI:** Nanchuang, *Shimada s. n.* in 1923(TAI). **TAICHUNG:** Pilushan Logging Trail, *Shih 3022*. **NANTOU:** Chitou, *Ou & Kao 8909* (TAI); Meifong, *Shih 2942*; Tsueifong, *Shih 2932*. **CHIAYI:** Alishan-Erwanping, *Huang 5026*(TAI); Funkiko to Toloma, *Hayata s.n.* in 1914 (TAIF); **TAITUNG:** Chihpen Logging Trail, *Shih 2649, 2650*; Chihpenchushan, *Shih 2668*; Hsiangyang, *Shih 2625*; Liyuan, *Shih 2629*; Lichia Logging Trail, *Shih 2653, 3363*; Lotachienshan, *Shih 2580*. **HUALIEN:** Tienhsiang, *Shimizu & Kao 10613*.

Note: This species is widely distributed in Taiwan, except Hengchun Peninsula.

3. *Pilea elliptifolia* Shih & Yang, *sp. nov.*

橢圓葉冷水麻 Fig. 3

Species nova affinis Pileae angulatae (Blume) Blume, *sed differt a lamina elliptica pilosa nec ovata-lanceolata glabra et femina inflorescentia globosa nec cymosa-paniculata*. Type: Taiwan, **ILAN**, Szuyuan-yako, *Shih 3234* (Holotypus: NSYSU, Isotypus: TAI, TAIF, HAST).

Monoecious perennial herbs; stems subterete, erect or ascending, glabrous, shallowly canaliculate at opposite sides, glabrous, green, up to 1 m high, ca. 5 mm thick. Leaves subequally opposite, long-petiolate, large-stipulate; lamina membranaceous to chartaceous, elliptic, 6-14 cm long, 4-8 cm wide, acuminate to caudate at apex, with 2-7-serrulate at either side of acumine, dentate or sometimes obscurely double-serrate and ciliolate at margins, cuneate to rounded at base, three-nerved, with conical trichomes on adaxial sides and along nerves on abaxial side, dark green above, pale-green beneath, with dense, linear, up to 0.5 mm long cystoliths on both surfaces; petioles canaliculate on upper side, up to 8 cm long, slightly with conical trichomes; stipules 2, intrapetiolar, free, caducous, glabrous, white-greenish, ovate-oblong to oblong, up to 1.8 cm long, 8 mm wide, with two main nerves, without middle nerve, with dense cystoliths. Male inflorescences axillary, in cymose-paniculate glomerules, ca. 2 cm long; bracts free, broad-triangular, ca. 1 mm long, 0.6 mm wide, minute-ciliolate along margins; peduncles semi-terete, ca. 7 mm long. Female

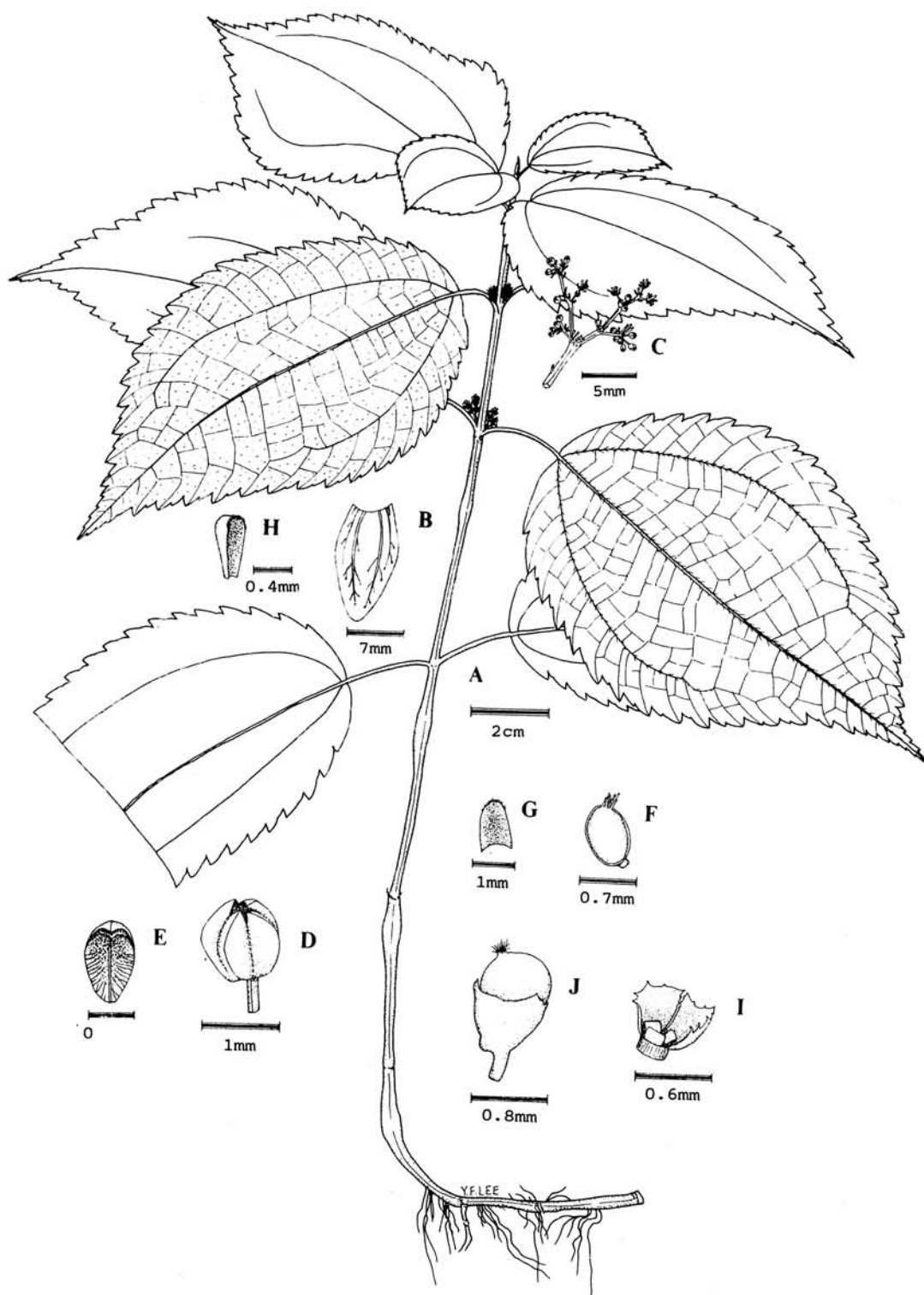


Fig. 3. *Pilea elliptifolia* Shih & Yang, from Shih 3234. A. Flowering branch. B. Stipule (abaxial view). C. Male inflorescence. D. Male flower (bud). E. Male sepal (adaxial view). F. Female flower (with sepals removed). G. Bract of an inflorescence. H. Female sepal of a mixed inflorescence. I. Female sepals with 3 staminodes (one sepal removed). J. Achene (in developing) with sepals.

inflorescences axillary, subsessile, in compacted-cymose glomerules, up to 8 mm long when fruiting; peduncles ca. 3 mm long. Sometimes, a few inflorescences with male and female flowers. Male flowers very widely obovoid, ca. 1.2 mm long, 1.1 mm wide, glabrous outside, villous along margins of sepals; sepals 4, connate at base, cymbiform, ca. 1 mm long, 0.8 mm wide, slightly corniculate at subapex; stamens 4; pistillodes rudimentary. Female flowers with 3 sepals, or with 3-4 sepals and staminodes of a mixed inflorescences; sepals free, subequal, cymbiform, ca. 0.6 mm long, 0.5 mm wide, truncate at apex, with several glandular-hairs along margins and apex, semi-transparent; staminodes 3-4, enlarged when fruiting; ovary glabrous, oblique ellipsoid, ca. 0.2 mm long; stigma penicillate. Achenes laterally compressed, oblique-ellipsoid, ca. 0.9 mm long, 0.8 mm wide.

Endemic. Found only at a very small ravine, associated with *Pilea matsudai*, at altitude ca. 1800 m. Blooming and fruiting from July to November.

Additional specimens examined: ILAN: Szuyuan-yako, *Shih* 2881.

Note: This new species is easily distinguished from all known species in Taiwan by its elliptic deep-green leaves and large stipules.

4. *Pilea funkikensis* Hayata, Ic. Pl. Form. 6: 45. 1916; T. S. Liu & W. D. Huang in Fl. Taiwan 2: 209. 1976; C. J. Chen in Bull. Bot. Res., Harbin. 2(3): 53. 1982; S. S. Ying, Color. Fl. Taiwan 3: 431, *excl. photo* 540. 1988. 奮起湖冷水麻 Fig. 4

Monoecious undershrubs; stems woody at lower parts, glabrous throughout, green at upper parts, straw-coloured at lower parts, terete, erect, ascending or scandent, up to 1.5 m high, 1.2 cm thick, usually with galls at middle parts of internodes. Leaves opposite, subequally to quite unequally paired, long-petiolate, stipulate; lamina thick herbaceous to nearly coriaceous, glabrous, green to deep-green on upside, pale-green beneath, ovate-lanceolate, narrowly elliptic or oblong to lanceolate or oblanceolate, (3-)6-22 cm long, (1.3-)2.5-6.5 cm wide, acute to short-caudate at apex, serrulate to obscurely serrulate at margins, acute to rounded at base, three-nerved, with very dense, linear, 0.4-0.7(-1.0) mm long cystoliths on both surfaces; petioles semi-terete, canaliculate on upper side, 0.5-7.0 cm long; stipules intrapetiolar, free, glabrous, greenish to brownish-green, caducous, narrowly subquadrate, 1.3-2.3 cm long, 2-5 mm wide, rounded at apex, truncate at base, 2-veined. Inflorescences usually in cymose-paniculate or few-branched, interrupted-spicate glomerules of male ones, in cymose glomerules of female ones, with long-peduncles of male ones, sessile or subsessile of female ones; peduncles up to 4.5 cm long of male's, up to 3.3 cm long of female's when fruiting; mixed inflorescences present. Male flowers with (3-)4 sepals, obovoid, ca. 1.8 mm long, 1.4 mm wide, the sepals villous along inner margins and near base of inside, connate about half way, valvate, cymbiform, ca. 2.3 mm long, 0.9 mm wide, corniculate; stamens (3-)4, yellow; pistillodes rudimentary, 0.3 mm long. Female flowers with 3(-4) sepals, the sepals connate at base, somewhat unequal, dimorphic, cymbiform, ca. 1.1 mm long, 0.42 mm wide of largest one, the smaller ones fimbriate along margins and apex, obovate-cymbiform, up to 0.9 mm long, 0.65 mm wide; stigma penicillate; ovary

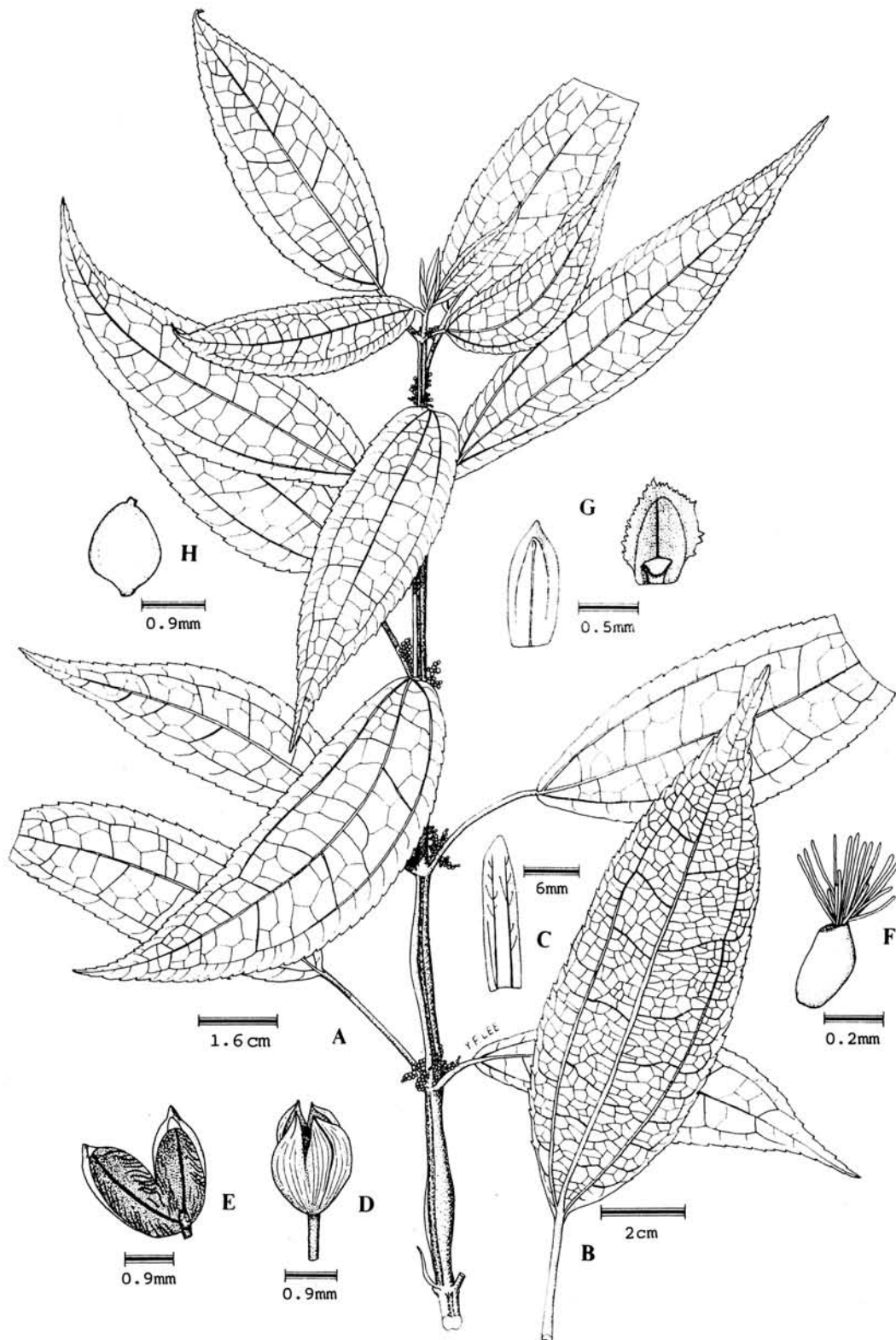


Fig. 4. *Pilea funkikensis* Hayata, from Chen *et al.* 007043. A. A branch with developing inflorescences at axils. B. Leaf (abaxial view). C. Stipule (abaxial view). D. Male flower. E. Two male sepals (adaxial view). F. Female flower (with sepals removed). G. Female sepals in fruiting stage, left: abaxial view, Right: adaxial view (with a staminodes at base). H. Achene.

nearly completely enclosed by sepals, lateral-compressed, oblong, ca. 0.3 mm long, 0.17 mm wide. Achenes brown when matured, lateral-compressed, asymmetrical ovoid to widely ovoid, ca. 1.3 mm long, 1 mm wide.

Endemic. Found in the central, southern and eastern parts of this island, along ravines, in shady and moisture forest floors at low to medium altitudes. Blooming and fruiting from May to October.

Specimens examined:

ILAN: Taipingshan, Suzuki 1158(TAI). **NANTOU:** Chitou, Hayata s. n. in 1916(TAIF). **CHIAYI:** Alishan, Hayata & Ito s. n. in 1914(TAIF, *Syntypus!*); Alishan-Nimandaira, Soma s. n. in 1915(TAIF, *Syntypus!*); Funchifu, Shih et al. 004916. **KAOWSIUNG:** Meishan, Shih 3335; Weichinch Bridge, Shih 2811; Shihshan Logging Trail, Shih 3373. **PINGTUNG:** Ali, Shih 2666; Lilongshan, Shih et al. 001414. **TAITUNG:** Chihpen Logging Trail, Shih 3273; Chinshuiying, Shimizu 3874(TAI); Tahanshan, Shih et al. 004301; Tajen, Shih 3284; Dutwoshan, Shih 2737; Lichai Logging Trail, Shih 2785. **HUALIEN:** Kiraikei-Tungnenkao, Sasaki s. n. in 1929(TAI); Tungli-Panpen, Suzuki 1655. in 1929(TAI).

Note: This species was sometimes confounded with *Pilea rotundinucula* Hayata. However, this species can be distinguished by the characters: midrib impressed on upper surface of leaves, leaf margins sharp serrate, cystoliths large on leaves, and stipules caducous and two-veined. In contrast, *P. rotundinucula* has midrib raised on upper surface of leaves, leaf margins inconspicuously serrate, cystoliths minute, and stipules persistent and unveined.

5. ***Pilea japonica*** (Maxim.) Hand.-Mazz., Symb. Sin. 7: 141. 1929; C. J. Chen in Bull. Bot. Res., Harbin. 2 (3): 41. 1982. 日本冷水麻 Fig. 5

Achudemia japonica Maxim. in Mel. Biol. 9: 627. 1876.

Monoecious perennial or annual herbs; stems terete, prostrate or ascending, glabrous, brown-greenish, up to 30 cm long, 3 mm thick. Leaves opposite, subequally or unequally paired, petiolate, stipulate; lamina membranaceous, with conical trichomes on adaxil sides and along nerves on abaxial side, green above, pale-green beneath, ovate to rhombic-ovate, 1.0-4.0 cm long, 0.8-2.2 cm wide, acuminate at apex, with an entire and ciliolate acumine, serrate at margins, oblique-cuneate or cuneate at base, three-nerved, with dense, linear, up to 0.7 mm long cystoliths on both surfaces; petioles canaliculate on upper side, 0.4-2.8 cm long, glabrous; stipules 2, intrapetiolar, free, persistent, glabrous, semi-transparent with a few purplish-red spots, oblong, up to 5 mm long, 2 mm wide, without middle nerve, with several, ca. 0.15 mm long cystoliths. Inflorescences axillary, in cymose-paniculate glomerules, up to 2.7 cm long; bracts free, broad-triangular, minute; peduncles terete, up to 2.0 cm long. Male flowers obovoid, ca. 1.0 mm long and wide, nearly glabrous, greenish; sepals 5, membranaceous, entire, connate at base, obovate-cymbiform, ca. 1.5 mm long, 0.6 mm wide, corniculate at subapex, sometimes with 1-2 hairs near tip of the hornlike appendage; pedicels up to 0.6 mm long; stamens 5; pistillode compressed-rhombic-ovoid, ca. 0.4 mm long, 0.25 mm wide. Female flowers with 5 sepals; sepals connate at base, subequal,

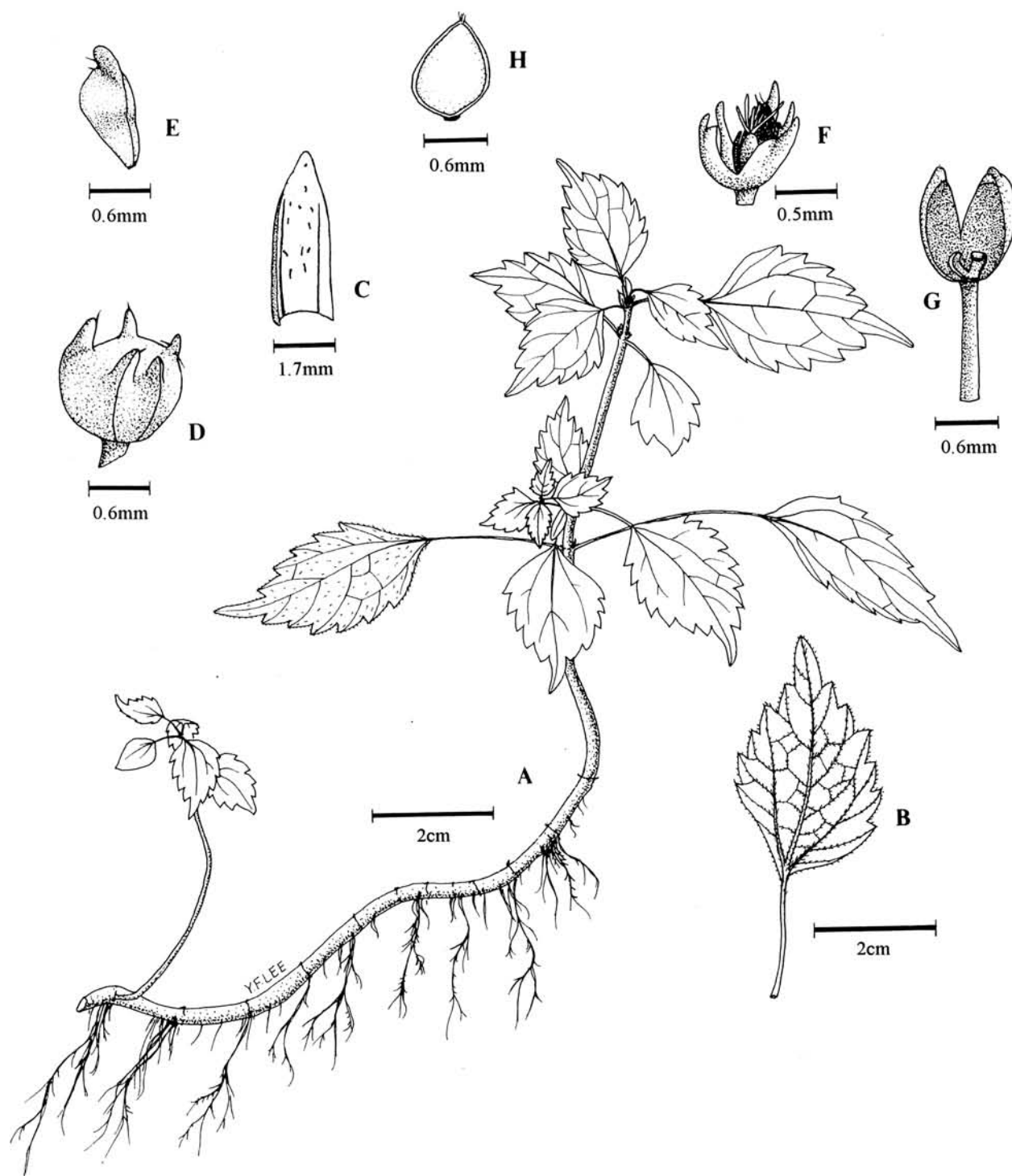


Fig. 5. *Pilea japonica* (Maxim.) Hand.-Mazz., from Shih 3414. A. Habit. B. Leaf (abaxial view). C. stipule. D. Male flower bud. E. Male sepal (abaxial view). F. Female flower . G. Female sepals & staminodes. H. Achene.

cymbiform, ca. 1 mm long, 0.7 mm wide, acute at apex, entire at margins, semi-transparent; staminodes 5, enlarged when fruiting; ovary glabrous, oblique ellipsoid, ca. 0.3 mm long; stigma penicillate; pedicels ca. 1.2 mm long in fruiting. Achenes laterally compressed, slightly obliquely ovoid, ca. 1 mm long, 0.85 mm wide.

Distributed in Japan, Russia, Korea, Mainland China. Taiwan, found at low to medium altitudes, up to 1000 m in the eastern and southern parts of the island, in ravines or along moist roadsides of shade places. Blooming and fruiting from April to July.

Specimens examined:

KAOHSIUNG: Chishangun, *Suzuki 20819*(TAI). **TAITUNG:** Hsiayeh, *Shih 2741, 3414*; South Cross Highway, *Shih 2661*.

Note: This species was first recorded for Taiwan by Chen in 1982. However, it has never been recognized in Taiwan before.

6. ***Pilea matsudai*** Yamamoto, *Suppl. Ic. Pl. Form.* **1**: 7, f.2. 1925; T. S. Liu & W. D. Huang in *Fl. Taiwan* **2**: 210. 1976; C. J. Chen in *Bull. Bot. Res.*, Harbin. **2**(3): 86. 1982.

細尾冷水麻 Fig. 6

Pilea mongolica auct. non Wedd.: S. S. Ying, *Color. Fl. Taiwan* **3**: 434, *quoad* f.856, *excl. photo 541*. 1988.

Monoecious perennial herbs; stems subterete, erect or ascending, glabrous, shallowly canaliculate at opposite sides, glabrous, greenish, usually with purple-red spots, up to 1 m high, 7 mm thick. Leaves opposite, slightly unequal-paired, long-petiolate, stipulate; lamina membranaceous, hirsutulous on upper surface, very minutely hirsutulous on veins at lower surface, glabrescent, green, without or with pale-whitish cloudy-spots inter three main veins on upper surface, narrowly elliptic to elliptic, 5-18.5 cm long, 2.5-7.5 cm wide, acuminate to caudate at apex, with an entire acumine, coarsely sharp-serrate or -dentate at margins, cuneate at base, three-nerved, with dense, up to 0.3 mm long, linear cystoliths on both surfaces; petioles semi-terete, canaliculate on upper side, 1.0-10.0 cm long, glabrous; stipules 2, intrapetiolar, connate at base, persistent, glabrous, greenish, with many brown-red maculae, broadly deltoid or triangular, up to 5 mm long, 5 mm wide, obscurely nerved, without middle nerve, with minutely dense cystoliths. Male inflorescences axillary, in cymose-paniculate glomerules, 2.7-3.7 cm long; bracts free, fimbriate at margins, triangular, ca. 0.6 mm long, 0.5 mm wide; peduncles semi-terete, 4-8 mm long. Female inflorescences axillary, in compacted cymose-paniculate glomerules, up to 2.3 cm long when fruiting; peduncles 2.5-7 mm long. Male flowers subsessile, transversely widely oblong from lateral view, ca. 1.4 mm long, 1.5-1.8 mm wide, glabrous outside; sepals 4, valvate, connate at base, dimorphic, hoodlike, ca. 1.4 mm long, 0.7 mm wide, or upside-down L-form of inner ones, ca. 1.4 mm long, 0.55 mm wide, fimbriate at upper margins and apex, slightly corniculate at subapex; stamens 4; pistillodes rudimentary. Female flowers with 3 sepals; sepals connate at base, subequal, cymbiform, ca. 1.2 mm long, 0.7 mm wide when fruiting,

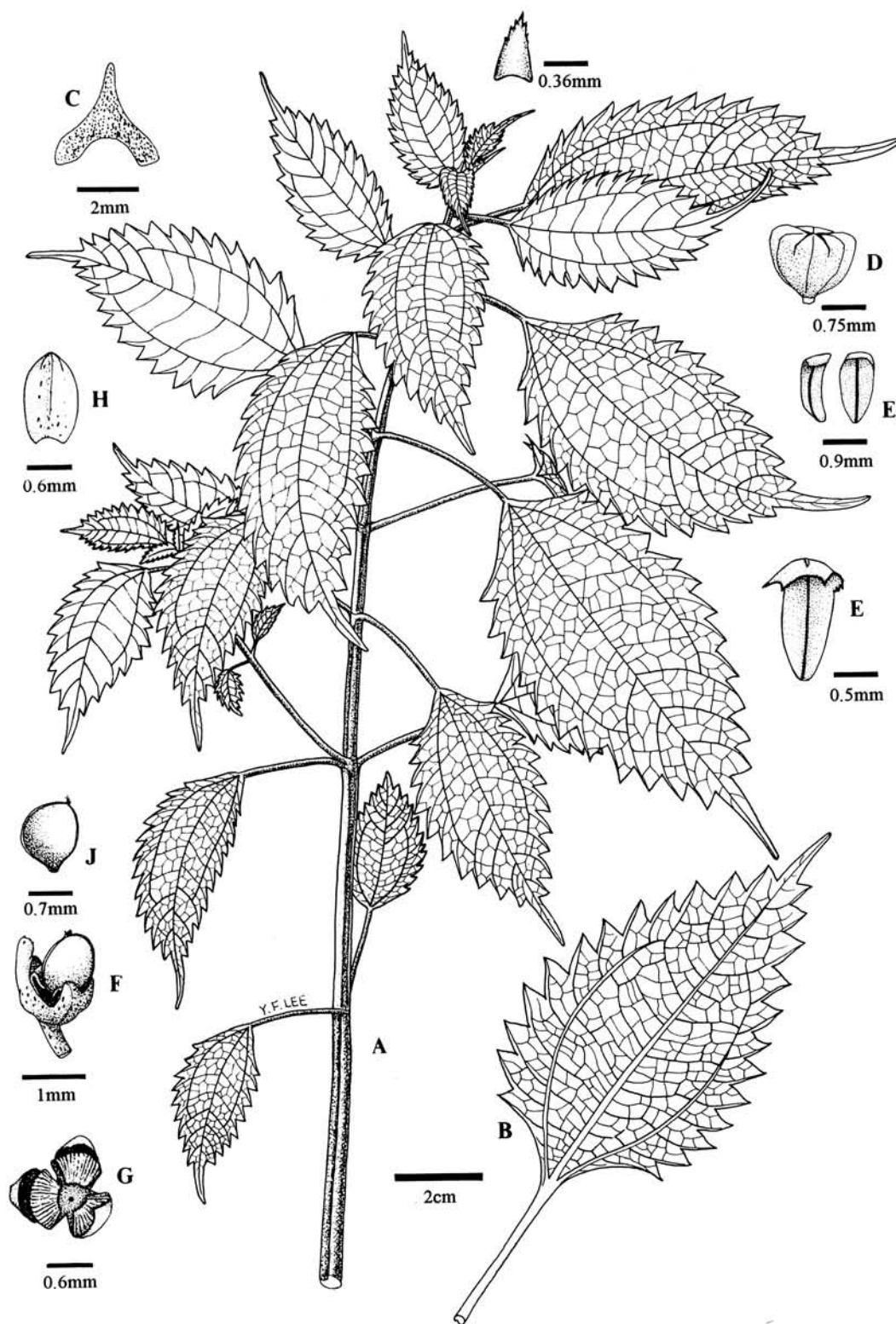


Fig. 6. *Pilea matsudai* Yamamoto, from Shih 2880. A. A branch. B. Leaf (abaxial view). C. Stipule. D. Male flower bud. E. Male sepals. F. Achene in developing. G. Sepals & staminodes. H. Female sepal (abaxial view). I. Bract. J. Achene.

obtuse at apex; staminodes 3, enlarged when fruiting; stigma penicillate. Achenes laterally compressed, oblique-ellipsoid, ca. 1.1 mm long, 0.9 mm wide.

Endemic. Found at or near small ravines at medium altitudes, from 1200-2100 m. Blooming and fruiting from July to November.

Specimens examined:

ILAN: Chaihsiang Bridge, *Shih* 2878; Szuyuan-yako, *Shih* 2880, 3232; Taipingshan, *Suzuki s. n.* in 1928(TAI). **NANTOU:** Chitou, *Chang* 18283(PPI), *Wang* 1231(HAST); Tongpu, *Shih* 2988. **KAOHSIUNG:** Chishangun, *Suzuki* 20919(TAI); Tashulinshan, *Shimizu* 3611(TAI). **PINGTUNG:** Alikang-fanti, *Matuda s. n.* in 1919(TAIF, *Syntypus!*); Tawushan, *Huang et al.* 13623(TAI).

Note: This species is quite different from other known species of Taiwan for its stems with purple-red spots, leaf margins coarsely serrate, and acumen of leaf apex long-slender.

7. ***Pilea melastomoides*** (Poir.) Wedd. in Ann. Sci. Nat. Ser. 4, 1: 186. 1854; C. J. Chen in Bull. Bot. Res., Harbin. 2(3): 76. 1982; S. S. Ying, Color. Fl. Taiwan 3: 434, *excl. photo* 542, *quoad descr.* 1988, *p. p.* 大冷水麻 Fig. 7

Urtica melastomoides Poir. in Lam. Encycl. Bot. Suppl. 4: 223. 1816.

Pilea trinervia Wight, Ic. Pl. Ind. Or. 6: 9, *tab.* 1973. 1853; Hand.-Mazz., Symb. Sin. 7: 131. 1929; W. Y. Chun & C. C. Chang, Fl. Hainanica 2: 404, *f.* 491. 1965; T. S. Liu & W. D. Huang in Fl. Taiwan 2: 216, *pl.* 271. 1976.

Pilea anisophylla auct. non Wedd.: C. H. Wright in J. Linn. Soc. Bot. 26: 475, *quoad* plant. Taiwan, 1899.

Pilea ovatinucula Hayata, Ic. Pl. Form. 6: 48. 1916.

Monoecious perennial subshrubs; stems woody at base, glabrous throughout, greenish at younger parts, straw-coloured at older or woody parts, erect or ascending, up to 1.5 m high, 1.5 cm thick, usually with galls at lower parts of internodes. Leaves opposite, subequally to unequally paired, long-petiolate, stipulate; lamina membranous to chartaceous, glabrous, greenish to green on upside, pale-greenish beneath, ovate, narrowly elliptic, widely elliptic to lanceolate, 4-22 cm long, 2-8.5 cm wide, acuminate to long-acuminate at apex, serrate to serrulate at margins, obtuse to rounded at base, three-nerved, the cystoliths sparse, linear, ca. 0.16 mm long on adaxial surface, dense, vermicular or linear, ca. 0.25 mm long on abaxial surface; petioles semi-terete, canaliculate on upper side, 1-10 cm long; stipules intrapetiolar, connate at base, glabrous, white-greenish, persistent, broadly triangular, 1.1 mm long, 1.4 mm wide, acute at apex, unveined. Inflorescences usually in paniculate-glomerules, with long-peduncles; male inflorescences up to 22 cm long, the peduncles up to 13 cm long; female inflorescences up to 16.5 cm long when third, unequal, cymbiform, the largest one ca. 1.5 mm long, 0.6 mm wide when fruiting, the smaller ones ca. 0.7 mm long, 0.6 mm wide; staminodes 3; stigma penicillate, ca. 0.23 mm long; ovary ovoid, ca. 0.3 mm long, 0.17 mm wide. Achenes slightly tuberculate, brown when matured, lateral-compressed, asymmetrical ovoid to widely ovoid, ca. 1 mm long, 0.8 mm wide.

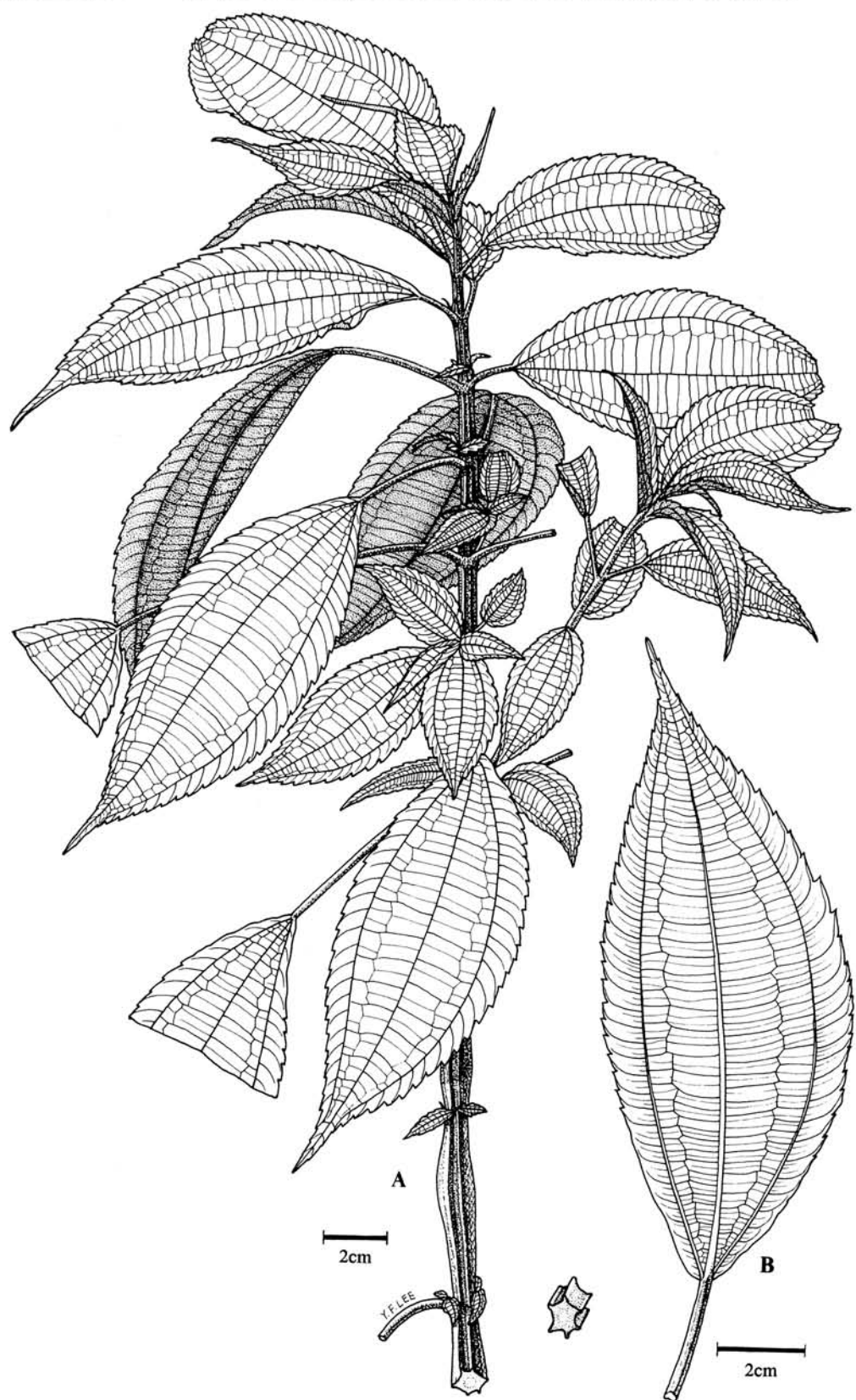


Fig. 7. *Pilea melastomoides* (Poir.) Wedd. , from Shih 2957. A. A branch & cross section of stem. B. Leaf (abaxial view).

fruiting, the peduncles up to 8 cm long when fruiting. Male flowers glabrous, white-greenish, slightly lateral-compressed, obovoid or obdeltoid, ca. 1.2 mm long and wide, with 4 sepals, the sepals equal, connate about half way, valvate, cymbiform, ca. 1.2 mm long, 0.64 mm wide, somewhat short-corniculate. Female flowers with 3 sepals, the sepals connate one-

Distributed in India, Ceylon, Java, Vietnam, and mainland China. Taiwan, along ravines, in shady and moisture forest floors at medium altitude throughout the island. Fertile plants do not find in March and June.

Specimens examined:

TAIPEI: Wulai, *Kawakami & Sasaki* s. n. in 1913(TAIF). **ILAN:** Fushan, *Shih* 2830; Nanshan-tsun, *Shih* 2871; Shenmi Lake, *Shih* 2863. **TAOYUAN:** Rarashan, *Chen* s. n. in 1994, *Shih* 3229. **TAICHUNG:** Dergi Dam, *Shih* 2989. **NANTOU:** Kwankao to Tongpu, *Huang, Hsieh & Lin* 8623; Meifong, *Shih* 2940. **CHIAYI:** Alishan Highway, *Shih* 2957. **KAHSHIUNG:** Weichinch Bridge, *Shih* 2618; Laolung Logging Trail, *Shih* 2638. **PINGTUNG:** Ali, *Chen* s. n. in 1993, *Shih* 2722. **TAITUNG:** Chihpen Logging Trail, *Shih* 2641, 3276; Lichai Logging Trail, *Shih* 2780, 3355; Lotachiehshan, *Shih* 2581; Tajen, *Shih* 3286. **HUALIEN:** Reshui Logging Trail, *Yang & Chen* s. n. in 1993; Sakatang Logging Trail, *Shih* 3080.

Note: This species is characterized by its long and large inflorescences, melastomoid leaf venation, and mostly 6-striated stems.

8. ***Pilea microphylla* (L.) Liebm.** in Vidensk. Selsk. Skr. 5(2): 302. 1851; T. S. Liu & W. D. Huang in Fl. Taiwan 2: 212. 1976; C. J. Chen in Bull. Bot. Res., Harbin. 2(3): 114. 1982; S. S. Ying, Color. Fl. Taiwan 3: 424, f. 852, photo 537. 1988. 小葉冷水麻

Parietaria microphylla L., Syst. ed. 10. 1308. 1759.

Annual, monoecious herbs, ascending; stems juicy, very unequally many branched in pairs, as in an alternately branched figure, subterete, canaliculate at opposite sides, glabrous, green, less than 10 cm high, ca. 1 mm thick. Leaves unequally opposite, short-petiolate, stipulate; lamina succulent, with cuticle, narrowly obovate to obovate-oblong, up to 6 mm long, 2.5 mm wide, acute to obtuse at apex, entire at margins, cuneate at base, obscurely pinnate-nerved, glabrous, green above, pale-greenish beneath, with ca. 0.25 mm linear cystoliths on adaxial surface; petioles semi-terete, canaliculate on upper side, ca. 2.5 mm long; stipule unseen. Male inflorescences axillary, subsessile, in cymose glomerules, ca. 3 mm long; bracts free, less than 0.2 mm long. Female inflorescences axillary, nearly sessile, in aggregated glomerules, less than 2.5 mm long when fruiting. Male flower buds oblong from top view, ca. 0.6 x 0.3 mm in size, boatlike from lateral view. Male flowers with (3-)4 sepals, glabrous, greenish or greenish and tinged with purplish-red spots at summit, the sepals connate about half way, valvate, dimorphic, hoodlike and corniculate or cymbiform. Female flowers with 3 sepals; sepals connate at base, very unequal, the largest one hoodlike, ca. 0.2 mm long, 0.15 mm wide, the smaller ones cymbiform; staminodes 3, enlarged when fruiting; ovary glabrous, oblong, ca. 0.2 mm long, 0.1 mm wide; stigma penicillate. Achenes warted on surface, ellipsoid, ca. 0.4 mm long, 0.3 mm wide, straw-coloured when mature.

Native plants of S. America, naturalized in tropical Africa and Asia. Taiwan, found at sunny and moist roadsides, ditches, and open slopes at low to medium altitudes throughout the island. Blooming and fruiting through the year.

Specimens examined:

TAICHUNG: Chingshui, *Hsu s. n.* in 1988(PPI). **KAOHSIUNG:** Chaishien, *Shih 2567*. **PINGTUNG:** Machaitsun, *Shih 2632*. **TAITUNG:** Lanyu, *Shih 2776*.

9. ***Pilea peploides*** (Gaudich.) Hook. & Arn., Bot. Beech Voy. 96 1832, T. S. Liu & W. D. Huang in Fl. Taiwan 2: 212, *excl. pl. 270* 1976, *p.p.*; C. J. Chen in Bull. Bot. Res. Harbin. 2(3): 115. 1982; S. S. Ying, Color. Fl. Taiwan 3: 426, *f. 853* (right half), *excl. photo 536*. 1988. 矮冷水麻

9a. *Pilea peploides* (Gaudich.) Hook. & Arn. var. ***peploides***

Annual, monoecious herbs, erect or ascending; stems subterete, canaliculate at opposite sides, glabrous, greenish, less than 15 cm high, 1.5 mm thick. Leaves opposite, equally or subequally paired, long petiolate, stipulate; lamina juicy membranous, with cuticle, widely rhombic-obovate to widely depressed-rhombic-obovate, up to 8 mm long, 9 mm wide, very obtuse to truncate and entire or wavy at apex, entire at margins, broadly cuneate at base, trinerved, glabrous, greenish above, pale-greenish beneath, with dense linear cystoliths on adaxial surface and very sparse or absent from abaxial surface; petioles semi-terete, canaliculate on upper side, 2-11 mm long; stipule unseen. Male inflorescences in simple glomerules with 2-4 flowers, almost always branched from base of female peduncles; bracts free, minute, narrowly triangular, ca. 1 mm long. Female inflorescences in solitary-dichotomous, congested glomerules, less than 5 mm long when fruiting. Male flowers glabrous, greenish, shallowly obovoid-obdeltoid, ca. 0.6 mm long, 0.7 mm wide, with (3-)4 sepals, the sepals connate about half way, valvate, cymbiform, ca. 0.6 mm long, 0.3 mm wide, short-corniculate. Female flowers green, with 2 sepals, the sepals connate at base, very unequal, the larger one cymbiform, ca. 1.2 mm long, 0.5 mm wide when fruiting, the smaller one truncate-cymbiform, ca. 0.2 mm long and wide when fruiting; staminodes 2, minute; stigma penicillate. Achenes asymmetrically lateral-depressed ellipsoid, ca. 0.4 mm long, 0.3 mm wide, brown when mature.

Distributed in Siberia of Russia, Japan, Korea, mainland China, and Java. Taiwan, found at sunny and moist roadsides, ditches, and open slopes at medium altitude above 1000 m throughout the Central Ridge. Blooming and fruiting whole year.

Specimens examined:

HSINCHU: Taikogun, *Suzuki 20635*(TAI). **CHIAYI:** Alishan-Erwanping, *Jeng 2224*. **HUALIEN:** Kuanyuan, *Peng 14050*(HAST), *Shih 3035*; Tzuen, *Shih 3254*; Hualuchi, *Shih 3255*.

- 9b. ***Pilea peploides*** (Gaudich.) Hook. & Arn. var. **major** Wedd. in DC Prodr. **16(1)**: 109, 1869; C. J. Chen in Bull. Bot. Res., Harbin. **2(3)**: 115. 1982. 齒葉矮冷水麻 Fig. 8

Pilea peploides auct. non (Gaudich.) Hook. & Arn.: T. S. Liu & W. D. Huang in Fl. Taiwan **2**: 212, pl. 270. 1976, p.p.; S. S. Ying, Color. Fl. Taiwan **3**: 426, f. 853 (left half), photo 536. 1988, p.p.

Different from typical phase in having many branches, denticulate or serrate apex and subapex of leaves, and usually tuberculate achenes.

Distributed in Japan, mainland China, India, Burma, Thailand, Vietnam, Java, and the Hawaii Archipelagos. Taiwan, found at sunny and moist roadsides, ditches, and open slopes at altitude below 1000 m throughout the island and Lanyu. Blooming and fruiting through the year.

Specimens examined:

TAIPEI: Tamshui, Shimada s. n. in 1909(TAIF); Wanli, Lin s. n. in 1990(PPI); Wulaishan, Shih 3397; Yangmingshan, Wang 3230(TAI). **ILAN**: Touchang, Suzuki 3732(TAI); Wuji, Lou s. n. in 1987(PPI). **TAOYUAN**: Lungtang, Shimada s. n. in 1924(TAIF). **NANTOU**: Wushe, Kawakami & Mori s. n. in 1910(TAIF). **YUNLIN**: Peitau, Kawakami & Shimada s. n. in 1909(TAIF). **TAITUNG**: Lotachiehshan, Shih 2579; Lanyu, Chang 19137 (PPI), Huang 2644 (TAI).

10. ***Pilea plataniflora*** C. H. Wright in J. Linn. Soc. Bot. **26**: 477. 1899; Hand.-Mazz., Symb. Sin. **7**: 138. 1929; C. J. Chen in Bull. Bot. Res., Harbin. **2(3)**: 80. 1982; S. S. Ying, Color. Fl. Taiwan **3**: 428, f. 855, photo 538. 1988 & in Mem. Coll. Agric. Natl. Taiwan Univ. **28 (2)**: 38. 1988. 西南冷水麻 Fig. 9

Pilea kankaoensis Hayata, Ic. Pl. Form. **6**: 46, pl. 9. 1916; T. S. Liu & W. D. Huang in Fl. Taiwan **2**: 210, pl. 269. 1976.

Pilea minute-pilosa Hayata, Ic. Pl. Form. **6**: 47. 1916.

Pilea taitoensis Hayata, Ic. Pl. Form. **6**: 51. 1916; T. S. Liu & W. D. Huang in Fl. Taiwan **2**: 216. 1976.

Pilea plataniflora C. H. Wright var. *taitoensis* (Hayata) Ying, Color. Fl. Taiwan **3**: 430, photo. 539. 1988.

Monoecious perennial herbs; stems terete at older parts, subterete and canaliculate at opposite sides of nascent parts, glabrous throughout, dark-green at younger parts, straw-coloured at older parts, with stolons, erect or ascending, 15-60 cm high, ca. 5 mm thick. Leaves opposite, mostly unequally paired, long-petiolate, stipulate; lamina thinly succulent, with quite thick cuticle on lower surfaces, glabrous, dark-green on upside, pale-greenish beneath, usually ovate to lanceolate, sometimes elliptic or oblong, rarely obovate, (2-)3-15 (-16.5) cm long, 1.2-5.4 cm wide, mostly caudate to long-caudate at apex, sometimes acute or cuspidate, entire at margins, obtuse to shallowly cordate at base, three-nerved, with somewhat dense to sparse, linear or vermicular, 0.2-0.4 mm long cystoliths on adaxial surfaces, mostly not found any cystolith on abaxial surfaces even in exsiccated specimens;

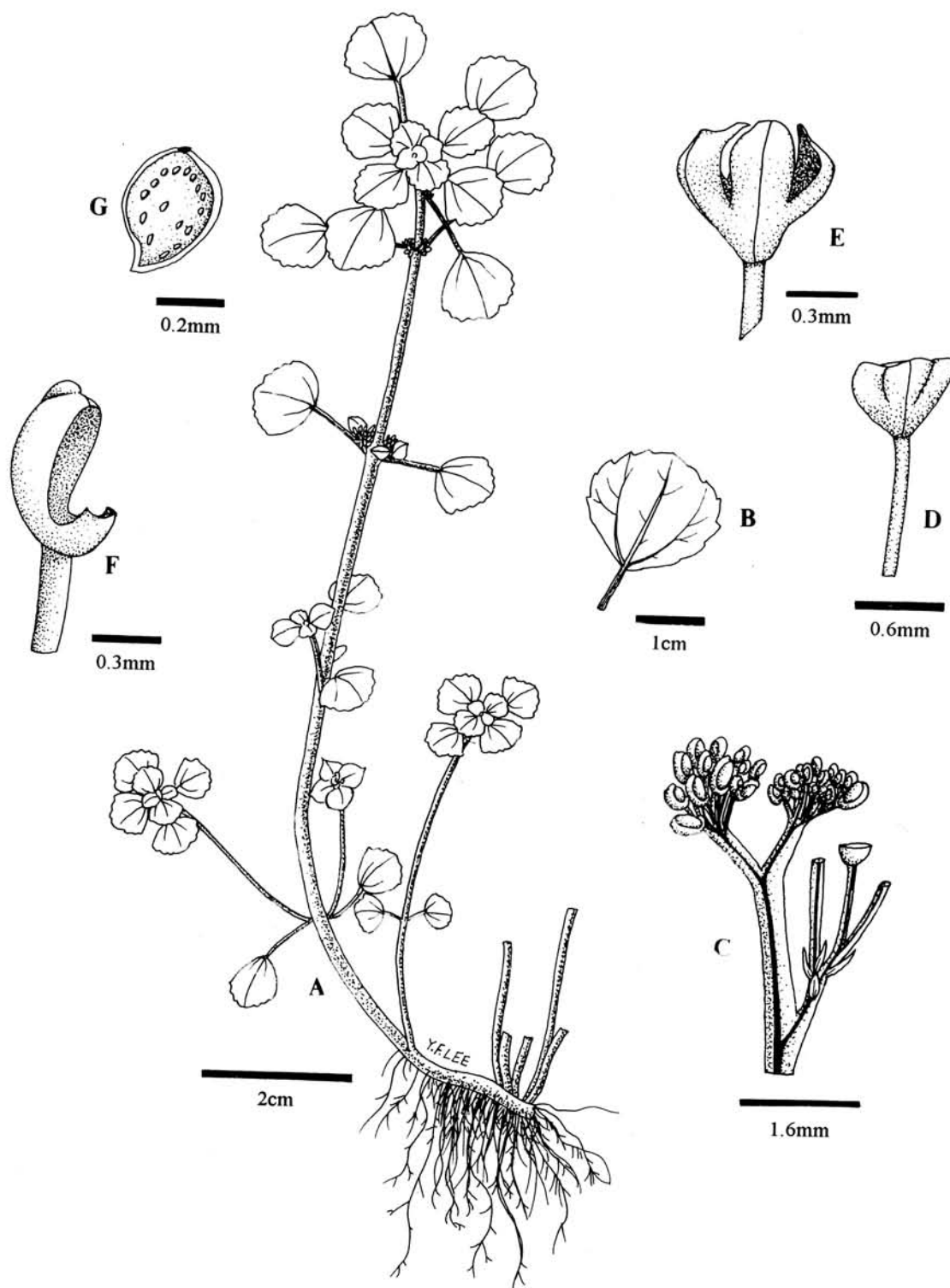


Fig. 8. *Pilea peploides* (Gaudich.) Hook. & Arn. var. *major* Wedd., from Shih 3397. A. Habit. B. Leaf (abaxial view). C. Inflorescence of both sexes. D. Male flower bud. E. Male flower in blooming. F. Female sepal. G. Achene.

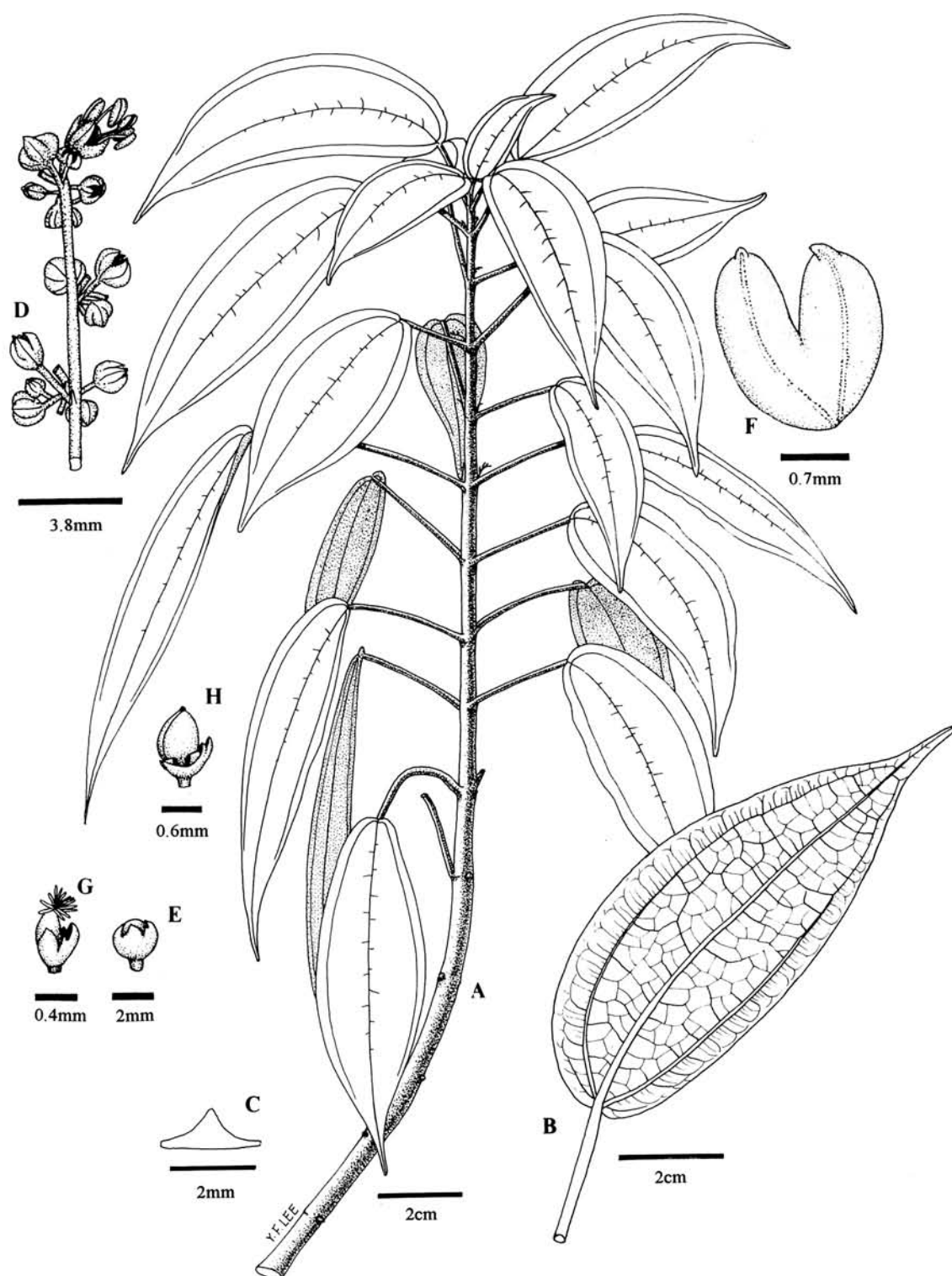


Fig. 9. *Pilea plataniflora* C. H. Wright, from Shih 3317. A. A branch. B. Leaf (abaxial view). C. Stipule. D. A branch of a male inflorescence. E. Male flower bud. F. Male spals (abaxial view). G. Female flower. H. Achene in developing.

petioles semi-terete, canaliculate on upper side, 0.3-7.5 cm long; stipules intrapetiolar, connate at base, glabrous, brownish, persistent, broadly triangular, ca. 1 mm long, 3 mm wide, acute at apex, unveined. Inflorescences usually in paniculate glomerules, with long-peduncles; male inflorescences 10-20 cm long, the peduncles 5-11 cm long; female inflorescences 4-13.5 cm long, the peduncles 2-6.5 cm long; mixed inflorescences present. Male flowers glabrous, yellowish-green, slightly lateral-compressed, obovoid, ca. 1.8 mm long, 1.6 mm wide, with 4 sepals, the sepals connate about halfway, valvate, oblong- to obovate-cymbiform, up to 2.2 mm long, 1.1 mm wide, corniculate. Female flowers glabrous, greenish, oblong, ca. 0.9 mm long, 0.4 mm wide, with 3(-4) sepals, the sepals connate at base, unequal, cymbiform, up to 0.6 mm long, 0.3 mm wide; staminodes 3(-4); stigma penicillate, ca. 1.6 mm long. Achenes slightly warted in specimens, glabrous, brown, lateral-compressed, ovoid to ovoid-ellipsoidal, 0.65-0.85 mm long, 0.5-0.7 mm wide.

Distributed in northern India, Ceylon, Java, Hainan, Mainland China and Japan. Taiwan, along ravines, in shady and moist forest floors, sunny roadsides and rocks at low to medium altitudes throughout the island. Blooming and fruiting from June to November.

Specimens examined:

ILAN: Nanhutashan, *Sasaki s. n.* in 1922(TAIF); Taipingshan, *Huang 3960*(TAI). **MIAOLI:** Talu Logging Trail, *Wang & Yang 4848*(TAI). **TAICHUNG:** Lishan, *Shih 2882, 2889*. **NANTOU:** Meichi, *Shimada s. n.* in 1918(TAIF); Wushe, *Kanehira & Sasaki s. n.* in 1918(TAIF). *Hsu 11387*(TAI). **CHIAYI:** Funkiko, *Shih 2964, Shih et al. 004915*. **KAOHSIUNG:** Meishanko, *Shih 2805*; Shanping, *Hsieh 1391*(TAI). **PINGTUNG:** Kangkou, *Kobayashi s. n.* in 1907(TAIF, *Syntypus!* of *Pilea kankaoensis* Hayata); Paiwan, *Matuda s. n.* in 1917(TAIF); Wutoushan, *Chen s. n.* in 1993. **TAITUNG:** Chihpen Logging Trail, *Shih 3318*; Lichai Logging Trail, *Shih 3319*; Lotachiehshan, *Shih 3317*; Tawu, *Kobayashi s. n.* in 1907(TAIF, *Typus!* of *Pilea taitoensis* Hayata); Tongho Farm, *Shih 2793, 3261*. **HUALIEN:** Kuanyuan, *Shih 3037*; Sakatang Logging Trail, *Shih 3056*; Taroko No.22 comp. at 1950-2050m, *Liu, Chen & Kao 48*(TAI).

11. *Pilea pumila* (L.) A. Gray, Man. Bot. North. Un. St. ed. 1. 437. 1848.

透莖冷水麻 Fig. 10

Urtica pumila L. Sp. Pl. 984. 1753.

Monoecious perennial or annual herbs; stems juicy, subterete, erect or ascending, glabrous, greenish or dark-red, shallowly canaliculate at opposite sides, up to 60cm high, ca. 3 mm thick. Leaves opposite, subequally or unequally paired, long-petiolate, stipulate; lamina membranaceous, ovate to rhombic-ovate, 1.5-9 cm long, 1-5 cm wide, acute to caudate at apex, with an entire and ciliolate acumine, coarsely to sharply serrate at margins, cuneate at base, three-nerved, with conical trichomes on adaxil sides and along nerves on abaxial side, green to greenish above, pale-green beneath, with dense, up to 0.4 mm long, linear cystoliths on both surfaces; petioles canaliculate on upper side, up to 6 cm long, slightly with conical trichomes; stipules 2, intrapetiolar, connate into a ring, persistent, nearly glabrous, white-greenish, oblong, up to 2 mm long, 1.3 mm wide at middle portions, without nerve. Inflorescences mixed with both sexes of flowers, axillary, sessile or

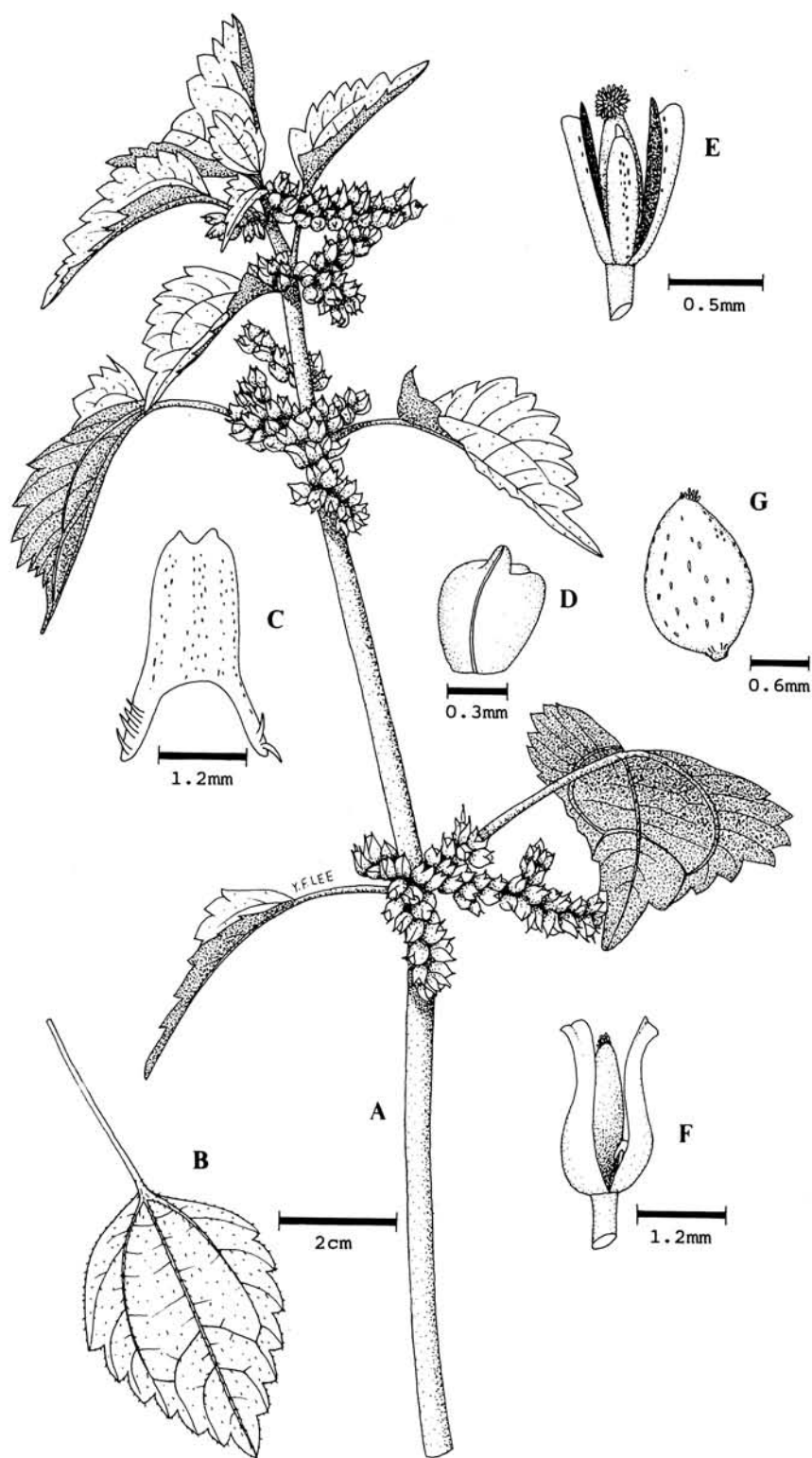


Fig. 10. *Pilea pumila* (L.) A. Gray, from Shih 3233 . A. A branch with fruiting inflorescences. B. Leaf (abaxial view). C. Stipule (abaxial view). D. A male sepal (abaxial view). E. A female flower. F. A developing achene (with sepals). G. Achene.

subsessile, in scorpioid-paniculate glomerules, 1.6-3.4 cm long; bracts free, minute. Male flowers obovoid, ca. 0.8 mm long, 0.7 mm wide, glabrous outside; sepals 2(-3-4), connate half way toward apex, obovate-cymbiform, ca. 7 mm long, 0.55 mm wide, corniculate at subapex; pedicels up to 0.6 mm long; stamens 2(-3-4); pistillodes rudimentary. Female flowers with 3(-4) sepals; sepals free, subequal, narrowly oblong-cymbiform, ca. 0.7 mm long, 0.2 mm wide when blooming, up to 2.3 mm long, truncate at apex; staminodes 3(-4), enlarged when fruiting; ovary glabrous, ovoid, ca. 0.6 mm long, 0.35 mm wide; stigma short-penicillate. Achenes laterally compressed, ovoid, ca. 1.6 mm long, 1.1 mm wide.

Distributed in temperate regions of the North America, Japan, Korea, Russia, and Mainland China. Taiwan found at medium to high altitudes, up to 2900 m in the Central Ridge, at moist forest margins near ravines or streams. Blooming and fruiting from July to November.

Specimens examined:

ILAN: Szuyuan-yako, *Shih* 3233. **TAICHUNG:** Hohuan Channel, *Shih* 3247; Piluchi Forest Station, Shih *et al.* 004989. **HUALIEN:** Loying-shan-chung, 3244; Tzuen, *Shih* 3251.

Note: This species is a new record in Taiwan. According to Chen (1982), the species is characterized by its male flowers mostly with 2 sepals and its inflorescences scorpioid-paniculate.

12. ***Pilea rotundinucula*** Hayata, Ic. Pl. Form. 6: 49. 1916; T. S. Liu & W. D. Huang in Fl. Taiwan 2: 214. 1976; C. J. Chen in Bull. Bot. Res., Harbin. 2(3): 56. 1982.

圓果冷水麻 Fig. 11

Pilea distachys Yamamoto, Suppl. Ic. Pl. Form. 1: 5. 1925; T. S. Liu & W. D. Huang in Fl. Taiwan 2: 209. 1976.

Pilea funkikensis auct. non Hayata: S. S. Ying, Color. Fl. Taiwan 3: 431, *quoad photo* 540. 1988.

Pilea funkikensis Hayata var. *rotundinucula* (Hayata) Ying, Color. Fl. Taiwan 3: 431. 1988.

Monoecious, perennial herbs or undershrubs; stems subterete and canaliculate at opposite sides of nascent parts, glabrous throughout, greenish at younger parts, green to straw-coloured at older parts, with stolons, erect or ascending, up to 2 m long, ca. 7 mm thick. Leaves opposite, equally to slightly unequally paired, petiolate, stipulate; lamina membranaceous to herbaceous, glabrous, green and mostly whitish-dotted on upside, pale-greenish beneath, narrowly elliptic-lanceolate, lanceolate or oblong-ob lanceolate, 5.5-21(-22) cm long, 1.1-7.5 cm wide, acute, acuminate to caudate at apex, with a serrulate acumine, serrulate to nearly entire at margins, cuneate at base, triplinerved, with distinctly raised nerves on both sides, with dense, linear, ca. 0.15 mm long cystoliths on both surfaces; petioles semi-terete, canaliculate on upper side, 0.2-9.5 cm long; stipules intrapetiolar, connate into a whole, glabrous, persistent, broadly triangular, ca. 1.5 mm long,

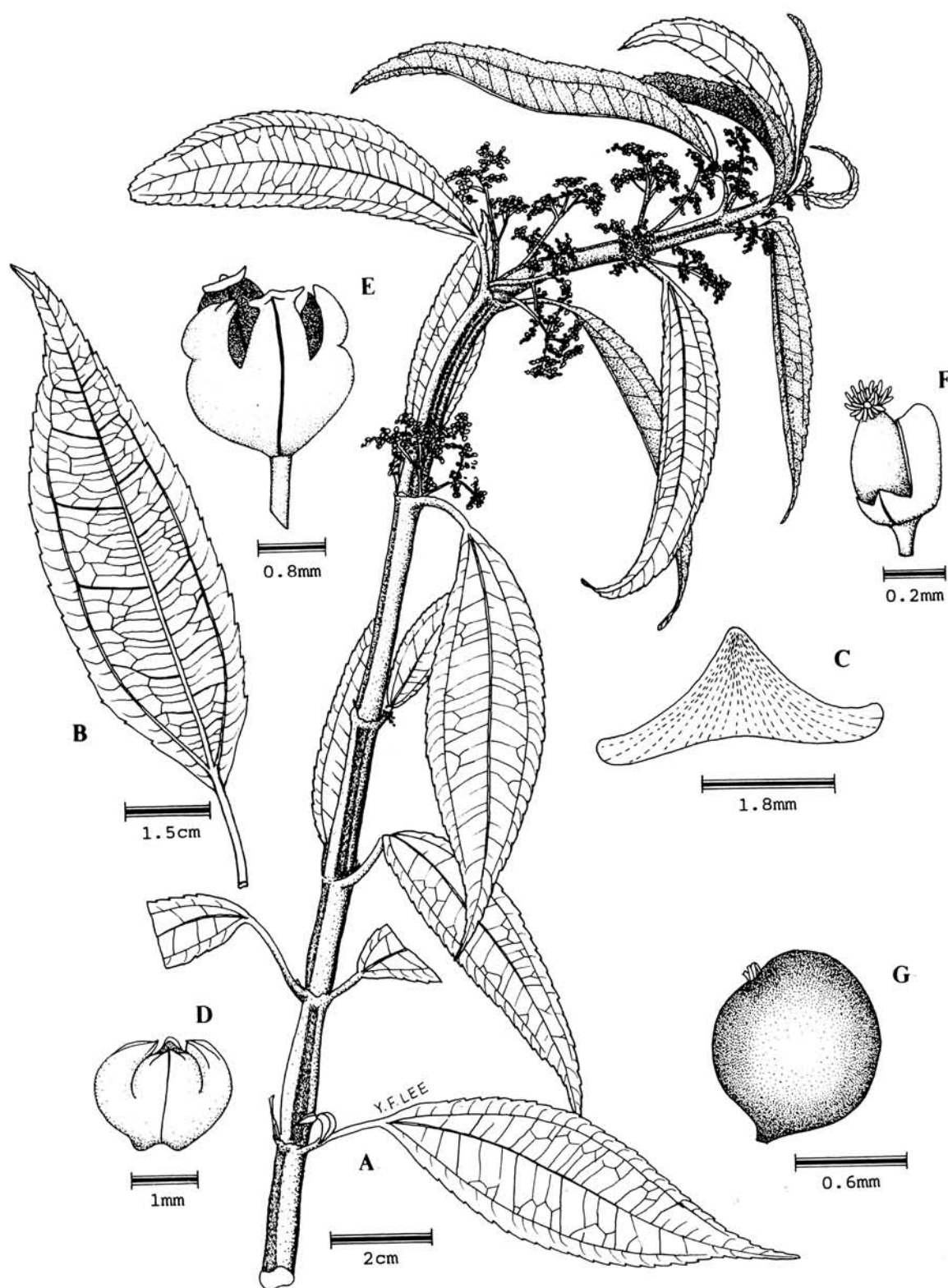


Fig. 11. *Pilea rotundinucula* Hayata, from Lin s. n. in 1995. A. A flowering branch. B. Leaf (abaxial view). C. Stipule (abaxial view). D. Male flower. E. A male flower in blooming (with stamens removed). F. Female flower. G. Achene.

2-5 mm wide, unveined, obtuse at apex, entire at margins. Inflorescences usually 2 in an axile, in cymose-paniculate glomerules, pedunculate; male inflorescences 2.5-9.0 cm long, the peduncles 1-3.2 cm long; female inflorescences 0.6-3.5 cm long when fruiting, the peduncles 2-16 mm long; mixed inflorescences present. Male flowers glabrous, greenish or tinged with red spots of plants which growing at sunny places, lateral-compressed, widely obovoid, ca. 1.45 mm long, 2.1 mm wide, rounded at apex, truncate at base, with (3-)4 sepals, the sepals connate about half way, valvate, slightly dimorphic, cymbiform, ca. 2 mm long, 1 mm wide, somewhat short-corniculate; pedicels 0-1.2 mm long. Female flowers glabrous, greenish, ovoid, ca. 0.4 mm long, 0.3 mm wide, with 3(-4) sepals, the sepals connate at base, somewhat unequal, cymbiform, ca. 0.38 mm long of largest one, ca. 0.15 mm long of smaller ones; stigma penicillate, ca. 0.15 mm long; ovary glabrous, ovoid, ca. 0.4 mm long, 0.23 mm wide; staminodes 3(-4). Achenes glabrous, brown, lateral-compressed, asymmetrical, ellipsoidal, up to 1 mm long, 0.9 mm wide, slightly warted in specimens.

Endemic. Found along ravines, in shady and moist forest floors, sunny roadsides and rocks of moist places at low to medium altitudes throughout the island except Hengchun peninsula. Blooming and fruiting almost through the year, flowers and fruits abundant in summer and fall seasons.

Specimens examined:

ILAN: Chaihsiang Bridge, Shih 2872, 2873. **HSINCHU:** Kawakami & Shimada 5662(TAIF). **TAICHUNG:** Hohuanchi, Shih 2882, 2999; Lishan, Shih 2887. **NANTOU:** Tili, Shih 2966; Tongpu, Shih 2982; Wushe, Shih 2944. **CHIAYI:** Alishan near Funkiko, Hayata s. n. in 1912(TI, *Syntypus*!); Alishan, Soma s. n. in 1914(TAIF, *Syntypus*! of *Pilea distachys* Yamamoto); Alishan Highway at ca. 760 m & 1300 m, Shih 2946, 2952; Funkiko, Shih 2965, Laichih, Shih et al. 004897; Shalun Bridge, Shih 2730. **TAINAN:** Kuantzuling, Shih 2735. **KAOHSIUNG:** Likuan, Shih 3337; Weichinchi Bridge, Shih 2619, 2810. **PINGTUNG:** Ali, Shih 2720. **TAITUNG:** Chihpentsushan, Shih 2671; Chihpen Logging Trail, Shih 2597, 2644, 3270, 3392; Lichai Logging Trail, Shih 3359. **HUALIEN:** Sakartang Logging Trail, Shih 3057; Tzuen, Shih 3250.

Note: This species is very similar to *Pilea somai* Hayata. The difference between the two species is that *P. rotundinucula* Hayata has triplinerved leaf base, almost equal size of paired leaves at each node, conspicuously raised midrib at upper surface of leaves, and completely connate stipules with obtuse and entire apex; and *P. somai* has trinerved leaf base, rather unequal size of paired leaves at each node, flattened or slightly raised midribs at upper surface of leaves, and basally connate stipules with truncate apex.

13. *Pilea somai* Hayata, Ic. Pl. Form. 6: 50. 1916; T. S. Liu & W. D. Huang in Fl. Taiwan 2: 215, *quoad descr.* 1976, *p.p.*; C. J. Chen in Bull. Bot. Res., Harbin. 2(3): 57. 1982.

細葉冷水麻 Fig. 12

Pilea funkikensis Hayata var. *somai* (Hayata) Ying, Color. Fl. Taiwan 3: 432. 1988, *excl. syn.*

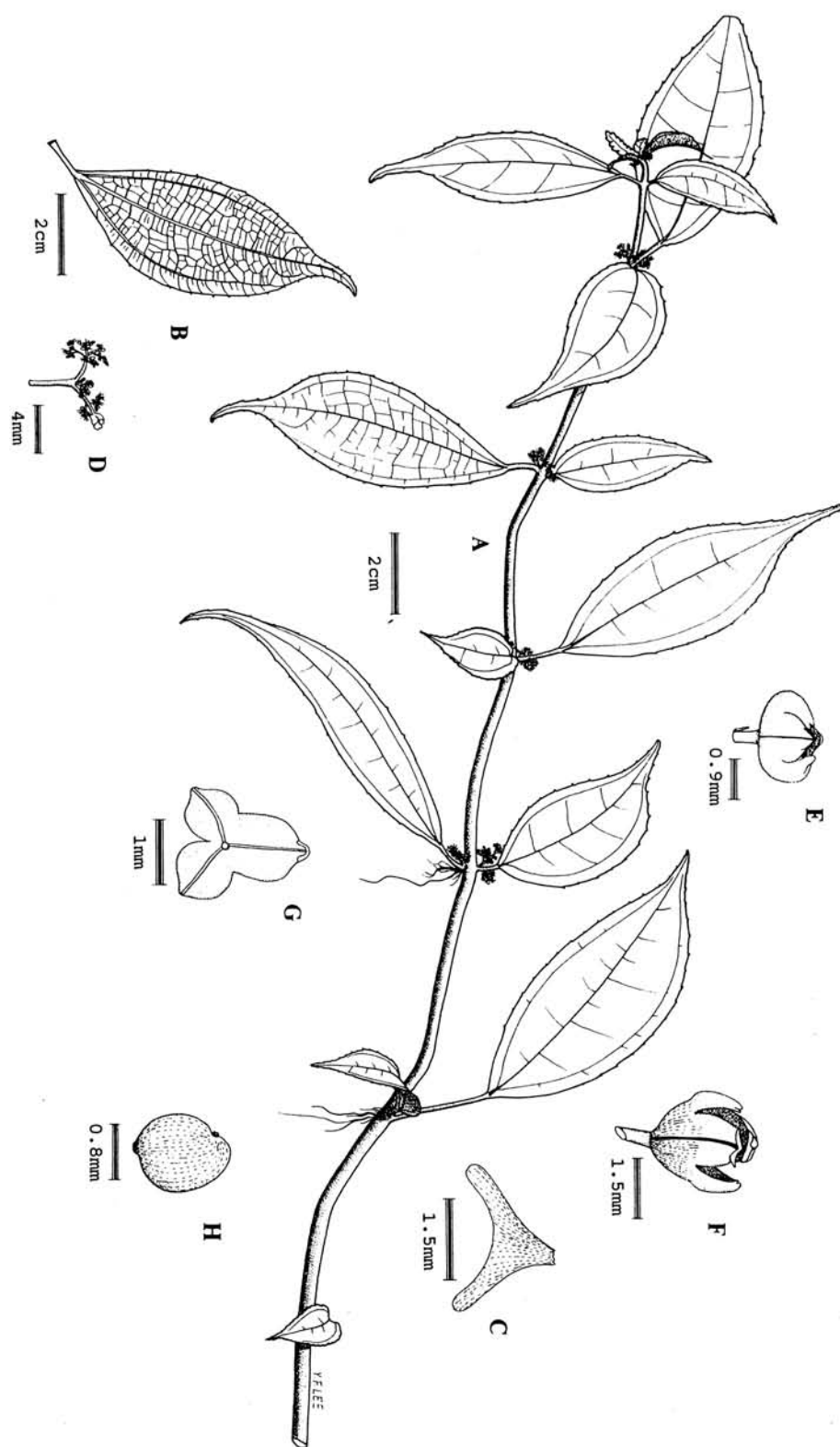


Fig. 12. *Pilea somai* Hayata, from Shih 3395. A. A branch with female inflorescences at axils. B. Leaf (abaxial view). C. Stipule (abaxial view). D. Male inflorescence. E. Male flower. F. A male flower

Pilea angulata auct. non (Blume) Blume: S. S. Ying, Color. Fl. Taiwan 3: 436, photo 544, 1988.

Monoecious perennial herbs, sometimes slightly woody at base, ascending, prostrate at lower or older parts; stems subterete and canaliculate at opposite sides of nascent parts, glabrous throughout, brownish-green at younger parts, brown-red to straw-coloured at older parts, with stolons, erect, ascending or prostrate at lower parts, up to 1.4 m high, ca. 6 mm thick. Leaves opposite, subequally to very unequally paired, sessile to long-petiolate, stipulate; lamina membranaceous to herbaceous, glabrous, green to dark-green on upside, pale-greenish beneath, ovate, obovate, elliptic, narrowly elliptic, oblanceolate to oblong-ob lanceolate, 1.2-15.2 cm long, 0.8-5.0 cm wide, cuspidate, acute, acuminate to caudate at apex, with a serrulate acumine, serrulate at margins, cuneate to broadly cuneate at base, three-nerved, with distinctly raised midribs beneath and flattened or slightly raised on upside, with dense, linear, 0.05-0.15 mm long cystoliths on both surfaces; petioles semi-terete, canaliculate on upper side, 0-7.5 cm long; stipules intrapetiolar, connate at base, glabrous, semi-transparent, persistent, broadly triangular, ca. 1.2 mm long, 2-5 mm wide, truncate and inconspicuously toothed at apex, unveined. Inflorescences usually 2 at an axile, in cymose-paniculate glomerules, sessile to short-pedunculate; male inflorescences 2.4-6.5 cm long, the peduncles 2.7-4.7 cm long; female inflorescences 0.3-3.9 cm long when fruiting, the peduncles 0-2.5 cm long. Male flowers slightly lateral-compressed, broadly obovoid, ca. 1.7 mm long, 2.8 mm wide, with 4(-5) sepals, the sepals connate about half way, valvate, cymbiform, ca. 2.3 mm long, 1.3 mm wide, somewhat short-corniculate. Female flowers with 3 sepals, the sepals connate at base, somewhat unequal, cymbiform, ca. 1.3 mm long, 1 mm wide of largest one when fruiting, the smaller ones ca. 1 mm long, 0.9 mm wide when fruiting; stigma penicillate, ca. 0.15 mm long; ovary glabrous, slightly asymmetrical, ellipsoidal, ca. 0.7 mm long, 0.45 mm wide. Achenes brown, lateral-compressed, asymmetrical, ellipsoidal, ca. 1.4 mm long, 1.2 mm wide.

Endemic. Growing along ravines, in shady and moist forest floors, sunny roadsides and wet rocks at low to medium altitudes in the eastern parts of the island and in Island Lanyu. Blooming and fruiting almost through the year, flowers and fruits abundant in summer and fall seasons.

Specimens examined:

ILAN: Jenjei, Chang 18173(PPI). **PINGTUNG:** Kuskus, Kudo & Suzuki 15932(TAI), Soma s. n. in 1912(TI, *Syntypus*!); Lienfa Farm, Shih & Chen 3313; Lilungshan, Shih *et al.* 001378; Peililungshan, Chen *et al.* 002983; Shouka, Shih 3395. **TAITUNG:** Lanyu, Shih 2752, 2756, 2770, 2774, 3316; Lichai Logging Trail, Shih 3353, 3358; Tongho Farm, Shih 2802, 3262. **HUALIEN:** Chimay, Shih 3097, 3258; Sakatang Logging Trail, Shih 3087.

*Excluded species

Pilea wattersii Hance in J. Bot. 23: 327. 1885. = *Boehmeria blinii* Levl. var. *podocarpa* W. T. Wang in Acta Bot. Yunnanica 3(3): 323. 1981.

Lecanthus Wedd. 盤花麻屬

Annual or perennial, monoecious herbs. Leaves opposite, serrate or dentate; stipules intrapetiolar. Flowers unisexual, on a discoid receptacle; receptacles axillary, solitary, with a very long peduncle; male and female flowers in the same or in separate receptacles. Male flowers with 4-5 incompletely connate sepals, the sepals imbricate; stamens of the same number as sepals, the pistillodes rudimentary. Female flowers with 3-4 sepals, the sepals unequal, valvate, connate at base; staminodes small, 3-4; ovary glabrous; stigma deciduous, penicillate. Achenes oblong or ovoid-oblong, glabrous.

One species with polymorphic habits. Distributed in Africa, Southern Asia, and the Pacific Islands.

Lecanthus peduncularis (Royle) Wedd. in DC., Prodr. 16: 164. 1869; S. S. Ying, Color.

Fl. Taiwan 3: 442, f.859, photo 548. 1988.

長梗盤花麻 Fig. 13

Lecanthus sasakii Hayata, Ic. Pl. Form. 6: 52. 1916; T. S. Liu & W. D. Huang in Fl. Taiwan 2: 196, excl. pl. 263. 1976.

Lecanthus taiwanensis Ying in Mem. Coll. Agric. Natl. Taiwan Univ. 31(1): 38. 1991, syn. nov.

Monoecious, annual or perennial herbs; stems long-prostrate, rooting at lower parts, usually ascending or erect at upper parts, subterete, very juicy, with densely conical trichomes at nascent parts, glabrescent toward base, shallowly canaliculate at opposite sides, brownish-green, up to 70cm high, 2-7 mm thick. Leaves opposite, unequally paired, long-petiolate, stipulate; lamina membranaceous, obliquely ovate, narrowly elliptic to elliptic, (1.5-)3-13(-14) cm long, (0.5-)1-7(-8) cm wide, acute to caudate at apex, with an entire and ciliolate acumine, sharply serrate or dentate at margins, obliquely obtuse to cuneate at base, three-nerved at base and articulate with secondary nerves at upper parts, with conical trichomes on adaxil sides and along nerves on abaxial sides, green to deep-green, with dense, 0.2-0.35 mm long, linear cystoliths above and absent from beneath; petioles semi-terete, canaliculate on upper side, up to 7 cm long, with conical trichomes; stipules 2, intrapetiolar, free, persistent, glabrous, white-greenish, oblong, up to 4.6 mm long, 2.5 mm wide, without middle nerve, with dense cystoliths. Inflorescences axillary, in discoid heads, rounded-, oblong- to subquadrate-shaped from top view, up to 2.3 cm in diameter; male inflorescences somewhat villous at outsides of receptacles; peduncles somewhat villous, semi-terete, up to 22 cm long. Male flowers nearly glabrous, greenish or tinged with purplish-red spots at apex, obdeltoid, ca. 1.4 mm long and wide; sepals (4-)5, connate up to subapex, dimorphic, hoodlike, ca. 1.6 mm long, 1.2 mm wide, fimbriate at margins of subapex and apex, corniculate at apex, or cymbiform, ca 1.6 mm long, 0.8 mm wide, nearly entire, slightly corniculate at subapex; pedicels up to 0.6 mm long; stamens (4-)5, the anther yellow; pistillodes rudimentary. Female flowers with (3-)4 sepals; marginal flolwers of a discoid head mostly with an elongated, enlarged and hornlike appendage which decorates the head along margin; sepals connate at base, subequal, hoodlike, up to 1.7 mm long, 0.7 mm wide when fruiting, ciliolate at margins and apex, short-corniculate, sparsely puberulent

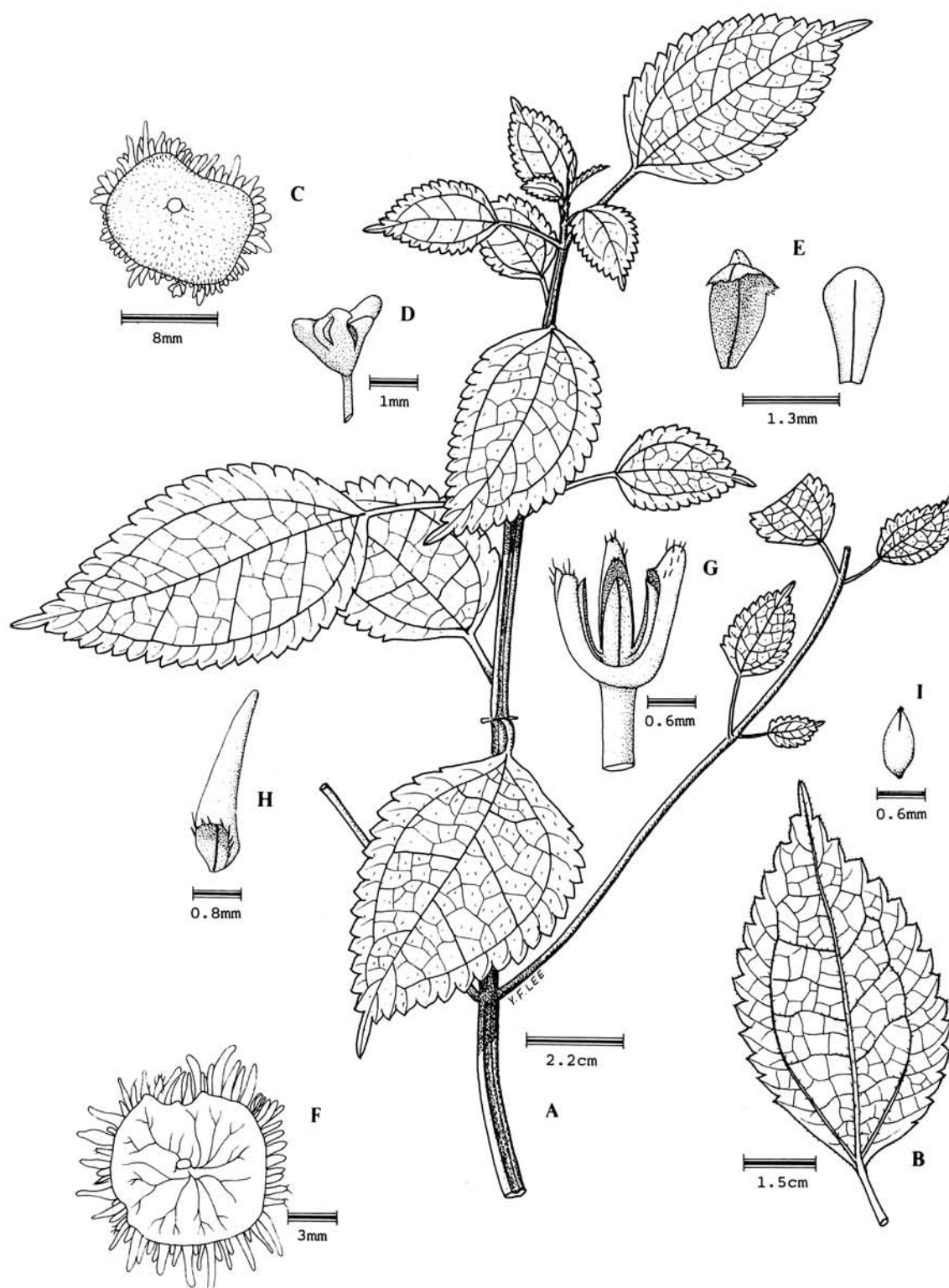


Fig. 13. *Lecanthus peduncularis* (Royle) Wedd., from Shih 3364. A. A branch. B. Leaf (abaxial view). C. Male inflorescence (ventral view). D. Male flower. E. Male sepals, left: adaxial view, right: abaxial view. F. Female inflorescence (ventral view). G. Female sepals & staminodes (with one sepal & staminode removed). H. A female sepal of a marginal flower. I. Achene.

at abaxial sides; staminodes (3-)4; ovary glabrous, oblong, ca. 0.2 mm long; stigma penicillate. Achenes laterally compressed, ovoid to lanceoloid, ca. 0.9 mm long, 0.4 mm wide.

Distributed in Africa, Southern Asia, and the Pacific Islands. Taiwan found at medium to high altitudes, up to 2700 m in the Central Ridge, at moist forest near ravines and in ravines. Blooming and fruiting from late July to next February.

Specimens examined:

ILAN: Fushan, *Shih* 2829; Shenmi Lake, *Shih* 2856; Ssuyuanyako, *Yang* 2062(TAI). **TAOYUAN:** Rarashan, *Shih* 3119, 3227. **HSINCHU:** Tapachienshan, *Matuda* 726 (TAI). **MIAOLI:** Tahsuehshan, *Wang, Huang & Yang* 4993(TAI). **TAICHUNG:** Hohouan Channel, *Shih* 3248; Lishan, *Shih* 2884; Piluchi, *Shih* 2991. **NANTOU:** Meifong, *Shih* 2939; Tongpu, *Shih* 2986; Tsefong, *Ying s. n.* in 1990(NTUF, *Typus!* of *Lecanthus taiwanensis* Ying). **CHIAYI:** Funkiko, *Liu* 187(TAI). **KAOHSIUNG:** Shihshan Logging Trail, *Shih* 3381; South Cross Highway, *Shih* 3338. **TAITUNG:** Chihpentsushan, *Shih* 2669; Lichai Logging Trail, *Shih* 3364. **HUALIEN:** Tzuen, *Shih* 3252.

Procris Comm. ex Juss. 烏來麻屬

Shrubs, undershrubs or perennial herbs, usually epiphytic; stems often succulent. Leaves alternate or rarely opposite at nascent parts of stems, mostly with very reduced, deciduous organs(i.e. nanophylls) opposite normal leaves, entire or serrulate at margins, pinnately nerved, short-petiolate, stipulate; stipules free, intrapetiolar. Inflorescences monoecious or dioecious, mixed with both sexes of flowers, the flowers capitate, on a subglobose receptacle, or the male flowers on a pedunculate glomerules; receptacles elongated when fruiting, terete, with several free bracts. Male flowers sessile of mixed inflorescences or pedicellate of male inflorescences, with (4-)5 sepals, the sepals valvate; stamens (4-)5; pistillode rudimentary. Female flowers with (4-)5 sepals, the sepals valvate; stigma penicillate; ovary straight. Achenes lateral compressed.

About 20 species in warm and tropical parts of Old World. Only one species found in Taiwan.

Procris laevigata Blume, Bijdr. 510. 1825; C. H. Wright in J. Linn. Soc. Bot. **26**: 484. 1899; T. S. Liu & W. D. Huang in Fl. Taiwan **2**: 224, *pl.* 275. 1976; S. S. Ying, Color. Fl. Taiwan **3**: 428, *f.* 860, *photo* 549. 1988. 烏來麻 Fig. 14

Procris wightiana Wall. ex Wedd. in Arch. Mus. Hist. Nat. Paris **9**: 336. 1856; W. Y. Chun & C. C. Chang, Fl. Hainanica **2**: 412, *f.* 494. 1965.

Monoecious perennial herbs or undershrubs, epiphytic on tree trunks or rocks; stems pendent, succulent, derma-like(especially in specimens), woody, subterete, many-striated, glabrous, grayish, up to 90 cm long, 5-10 mm thick. Leaves alternate, rarely opposite at

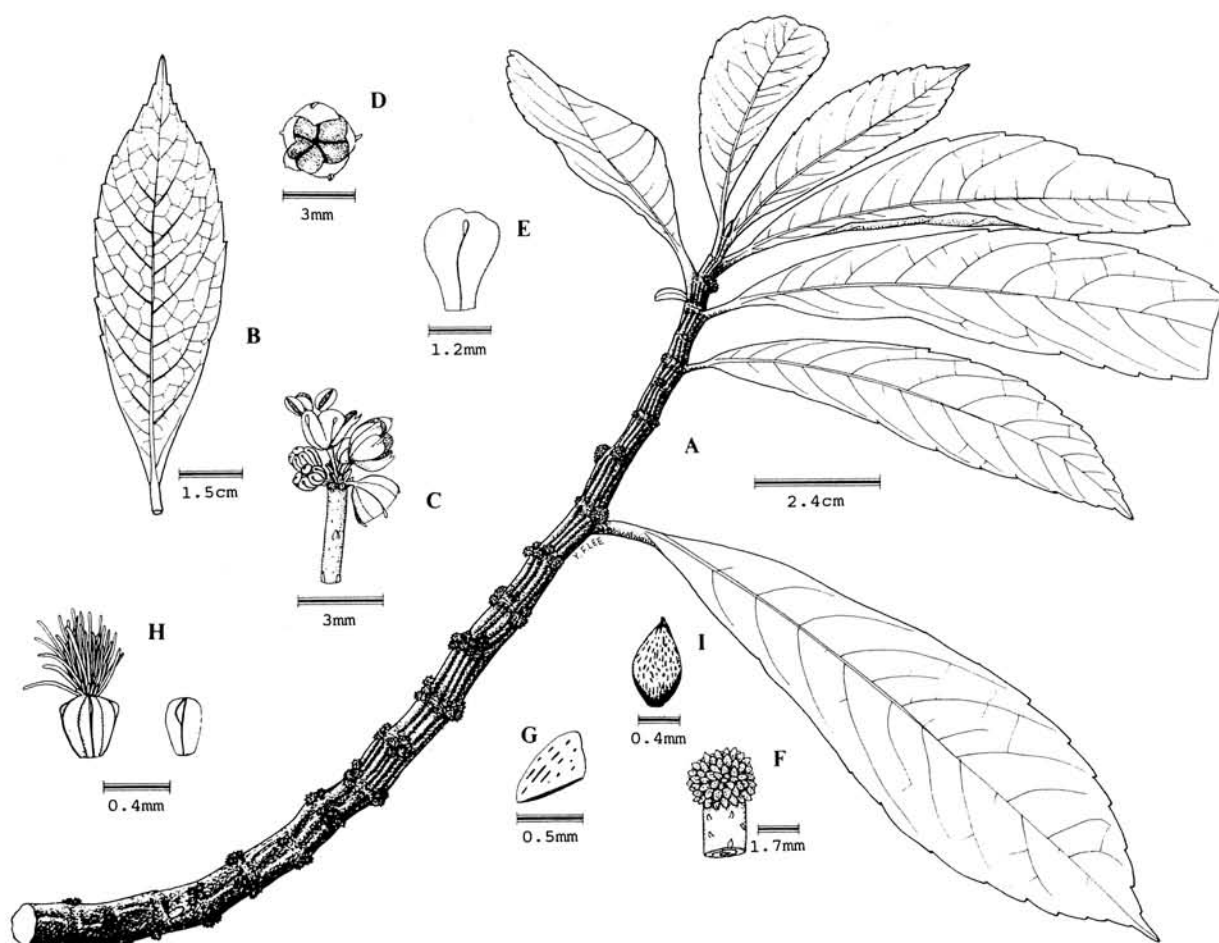


Fig. 14. *Procris laevigata* Blume, from Shih 3131. A. A flowering branch. B. Leaf (abaxial view). C. Male inflorescence. D. Male flower (top view, with stamens removed). E. Male sepal (abaxial view). F. A fruiting inflorescence. G. A female bract (abaxial view). H. A female flower & sepal (abaxial view). I. Achene.

nascent parts of stems, almost always with a nanophyll opposite the leaf at each node, short-petiolate, stipulate; nanophylls deciduous, 5-8 (-20) mm long, 2-3 (-5) mm wide; lamina membranaceous to herbaceous, narrowly oblong, oblanceolate to oblong-oblanceolate, 7-15 cm long, 1.5-3.5 cm wide, acute to long-acuminate at apex, crenate to nearly entire at margins, slightly obliquely cuneate at base, glabrous, deep-green, pinnate-nerved, prominent beneath, impressed above, the lateral nerves 7-10 pairs; petioles semi-terete, canaliculate on upper side, 4-11 mm long, glabrous; stipules 2, intrapetiolar, free, deciduous, glabrous, dark-brown when dry, triangular, 2-3 mm long. Inflorescences in capitate glomerules, axillary, up to 5.5 mm long when fruiting; bracts free, oblique, very broadly triangular, ca. 0.4 mm long, 0.5 mm wide, entire at margins; receptacles fleshy, terete, up to 4 mm long and wide; male inflorescences with slender peduncles of 4.5-6 mm long. Male flowers

sessile of mixed inflorescences or with 1-1.5 mm long pedicels of male inflorescences, very broadly obovoid, ca. 2 mm long, 2.4 mm wide, glabrous outside; sepals (4-)5, connate ca. 1/2 of length, glabrous, greenish, obovate-cymbiform, ca. 2 mm long, 1.5 mm wide, corniculate at subapex, entire at margins; stamens (4-)5; pistillodes clavate, ca. 0.5 mm long. Female flowers ca. 0.4 mm long and wide, with (4-)5 sepals; sepals free, subequal, glabrous, obovate-cymbiform, ca. 0.3 mm long, 0.2 mm wide, rounded to truncate at apex, very short-corniculate; staminode invisible; ovary glabrous, oblong, ca. 0.3 mm long, 0.2 mm wide; stigma penicillate, longer than ovary. Achenes slightly compressed, glabrous, green, ovoid, ca. 1 mm long, 0.6 mm wide.

Distributed in the Africa, tropical Asia. Taiwan found at low to medium altitudes throughout the island, on tree trunks and rocks of moist forests and ravines. Blooming and fruiting from May to next February.

Specimens examined:

TAIPEI: Peichatienshan, *Shih* 3131, 3151; Wulai, *Liu* 119(TAI); Wenshangun, *Lin & Shen* s. n.(TAI). **ILAN:** Fushan, *Shih* 2821. **HSINCHU:** Wutzushan, *Kawakami* 1314(TAIF). **CHIAYI:** Funkiko, *Huang & Huang* 15948(TAI), *Shih* 2959. **KAHSIUNG:** Meishankou, *Shih* 3329; Tengchih, *Yamamoto & Mori* 806(TAI); Shaping, *Koyama* s. n. in 1980(TAI). **PINGTUNG:** Ako-fanti, *Ito* s. n. in 1909(TAIF); Ali, *Chen* s. n. in 1993. **TAITUNG:** Sinkogun, *Suzuki* 19617(TAI); Tongho Farm, *Shih* 2798, 3265. **HUALIEN:** Luanshan, *Hsu* 3564(TAI).

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台灣蕁麻科冷水麻屬、盤花麻屬與烏來麻屬之訂正

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摘 要

經本文整理後，台灣蕁麻科冷水麻屬有13種及1變種，盤花麻屬及烏來麻屬各有1種。其中，橢圓葉冷水麻為新種，透莖冷水麻為台灣之新紀錄，日本冷水麻確認其分布於本島。矮冷水麻之原種及其變種齒葉矮冷水麻均見於台灣。以前認為特產於台灣的長梗盤花麻為一世界廣布之多形種。各屬種均附與詳細描述。除了小葉冷水麻之外，均給予手繪圖。中華冷水麻為蕁麻科苧麻屬植物，自冷水麻屬中剔除。

關鍵詞：冷水麻屬，盤花麻屬，烏來麻屬，台灣，蕁麻科。

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