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# Five new species of *Begonia* (Begoniaceae) from Taiwan

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**Abstract.** Five new species of *Begonia*, namely *B. bouffordii*, *B. pinglinensis* and *B. wutaiana* (sect. *Platycentrum*) and *B. chuyunshanensis* and *B. tengchiana* (sect. *Diploclinium*), all endemic to Taiwan, are described and illustrated. A total of 17 species of *Begonia* are now recognized in Taiwan. A key to the species of *Begonia* in Taiwan is provided.

**Key words:** *Begonia bouffordii*; *Begonia chuyunshanensis*; *Begonia pinglinensis*; *Begonia tengchiana*; *Begonia wutaiana*; Begoniaceae; New species; Taiwan; Plant taxonomy.

## Introduction

The genus *Begonia* L. comprises about 1,400 species (Smith et al., 1986). More than 600 species in 19 sections occur in Asia. The majority of the species are assignable to three sections, namely sect. *Petermannia*, sect. *Platycentrum* and sect. *Diploclinium* (Doorenbos et al., 1998; Shui et al., 2002). *Begonia* sect. *Petermannia* contains nearly 200 species concentrated in the Malesian region. Sect. *Platycentrum* contains ca. 110 species ranging from India and central China to SE Asia. Sect. *Diploclinium* contains ca. 160 species in Asia to as far north as 45°N latitude. In China, there are ca. 150 species of *Begonia*, of which about 45 species belong to Sect. *Diploclinium*; 64 species belong to Sect. *Platycentrum*; and only three species belong to sect. *Petermannia* (Shui et al., 2002; Shui and Chen, 2004). In Taiwan, about a dozen species of *Begonia* have previously been recognized (Chen, 1993; Peng and Sue, 2000; Shui et al., 2002). Except for two named hybrids resulting from natural hybridization between members of different sections, the remaining Taiwanese species are classified under three sections: sect. *Diploclinium* (4 species), sect. *Platycentrum* (5 species) and sect. *Sphenanthera* (1 species) (Peng and Chen, 1991; Peng and Sue, 2000; Peng and Chiang, 2000; Shui et al., 2002). Here we report the discovery of five new species of *Begonia*, two in sect. *Diploclinium* and three in sect. *Platycentrum* from Taiwan.

## Description

**1. Begonia bouffordii** C.-I Peng, sp. nov. (sect. *Platycentrum*)—TYPE: TAIWAN. Nantou Hsien: Tsaotun Town, Chiuchiufeng (mountain peaks), along dry, shaded rocky slope, 24°00’21’’ N, 120°46’33’’ E, elev. ca. 360 m, 8 Jul 1995, type specimen pressed from cultivated plant on 5 Feb 2005, *Ching-I Peng 16305-A* (holotype, HAST). 九九峰秋海棠 Figures 1, 2

*Herba perennis succulenta rhizomatibus repentibus, ad 25 cm alta. Folia obliqua, late ovata ad ovata, 9-16(-18) cm longa et 5-6(-10) cm lata, glabra. Flores masculi: tepalis 4 vel 6 raro; stamina 68-84, antherae anguste obovatae, 0.9-1.5 mm longae, 0.5-0.8 mm crassae. Flores foeminei tepalis 5, subaequalis; ovariis bilocularis, inaequallibus 3-alatis; placentae axiales; styli 2. Fructus maturus capsularis, trigonus aliis 3 inaequalibus praeditus, ala abaxiali 18-25 mm longa, alis lateralibus 3-5 mm longis.*

Herbs, perennial, succulent, rhizomatous, to 25 cm tall. Erect stem usually absent (except peduncle), when present rather short, to 8 (-15) cm long. Rhizomes creeping, to 1.2 cm thick. Stipules glabrous, caducous, narrowly ovate to ovate, to 7 mm long, 3.5 mm wide, apex acuminate, margins entire. *Leaves* succulent, arising from rhizomes or sometimes borne on short erect stems, nearly glabrous, abaxially reddish purple on veins, oblique, ovate, 9-16 (-18) cm long, 5-6 (-10) cm wide, base obtuse, margins entire or nearly so, apex acuminate; venation palmate, veins 7-9; petiole glabrous, to 16 cm long, 7 mm thick. Bracts in pairs, papery, glabrous, caducous, narrowly ovate to ovate, to 8 mm long, 4.5 mm wide, margin entire, apex acuminate. *Inflorescence* to 25 cm long, usually arising directly from rhizome, rarely from aerial stem, to 8 (-15) cm long, with 1 or 2 cauline leaves, peduncle erect, to 17 cm long, 7 mm across at base. Tepals pale pinkish. *Staminate flowers*: tepals 4, rarely 6, outer 2 broadly rotund to orbicular, to 15-19 mm long, 15-18 mm wide, inner 2 (4) oblanceolate to narrowly obovate, 10-17 mm long, 6-9 mm wide, stamens 68-84, yellow, clavate, anthers narrowly obovoid, 0.9-1.5 mm long, 0.5-0.8 mm across; filaments free, 1.1-1.7 mm long. *Carpellate flowers*: tepals 5, unequal to subequal, narrowly obovate to broadly obovate, largest 10-23 mm long, 11-23 mm wide, smallest 8-19 mm long, 4-16 mm wide; styles 2, each bifid, yellow, ca. 5 mm long, fused ca. 1 mm at base; ovary trigonous, locules 2, longitudinally shallowly grooved between locules, 3-winged; placentae axile, bilamellate. *Infructescence* to 18 cm long, capsules nodding, trigonous, unequally 3-winged, abaxial wing broadly elliptic to orbicular, 18-25 mm long, lateral wings

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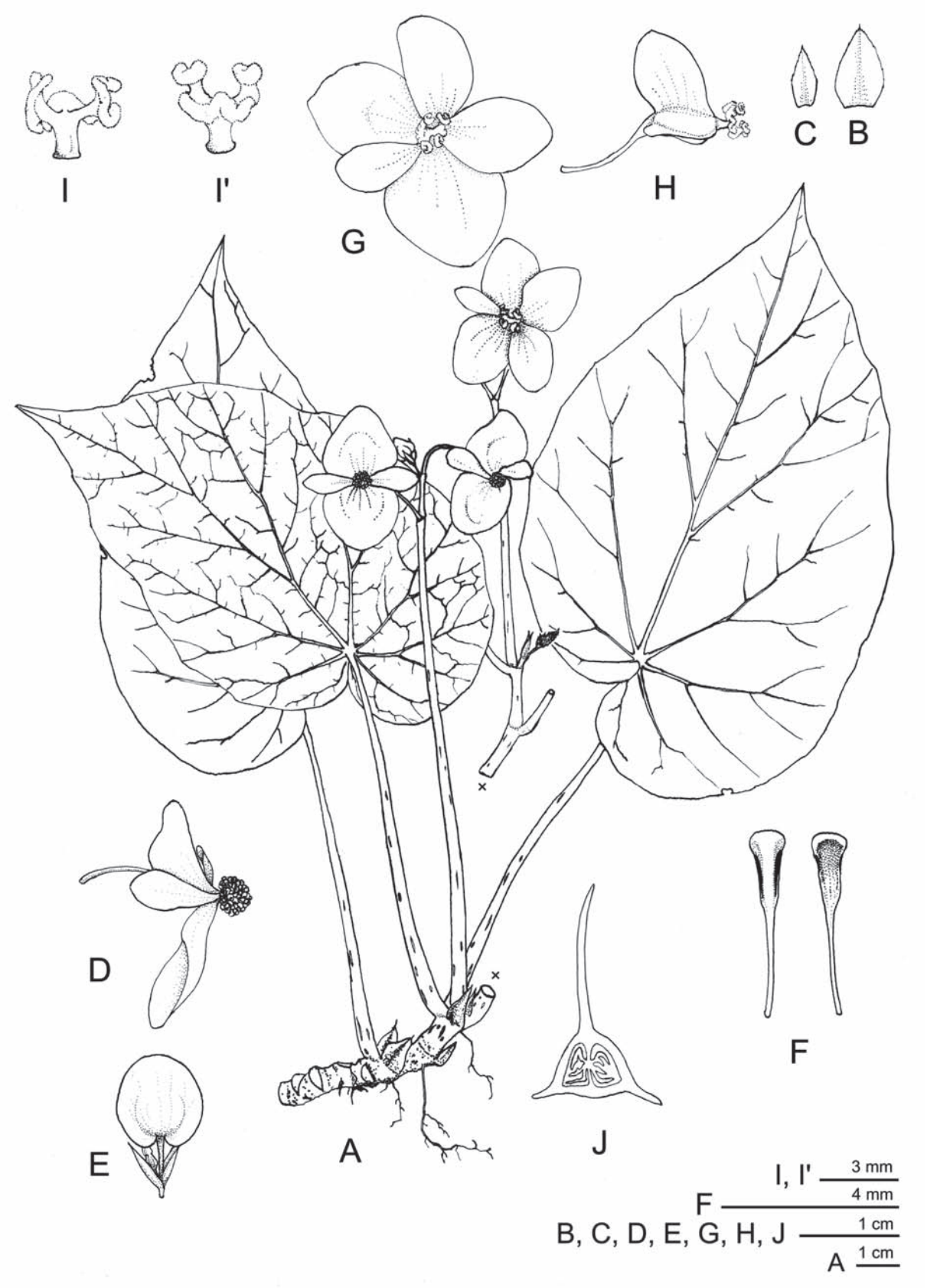


**Figure 1.** *Begonia bouffordii* C.-I Peng. A, Habit. B, Stipule. C, Bract. D, Staminate flower. E, Staminate flower bud. F, Stamen. G, Carpellate flower. H, Ovary. I, Style, ventral view; I', dorsal view. J. Cross section of ovary.

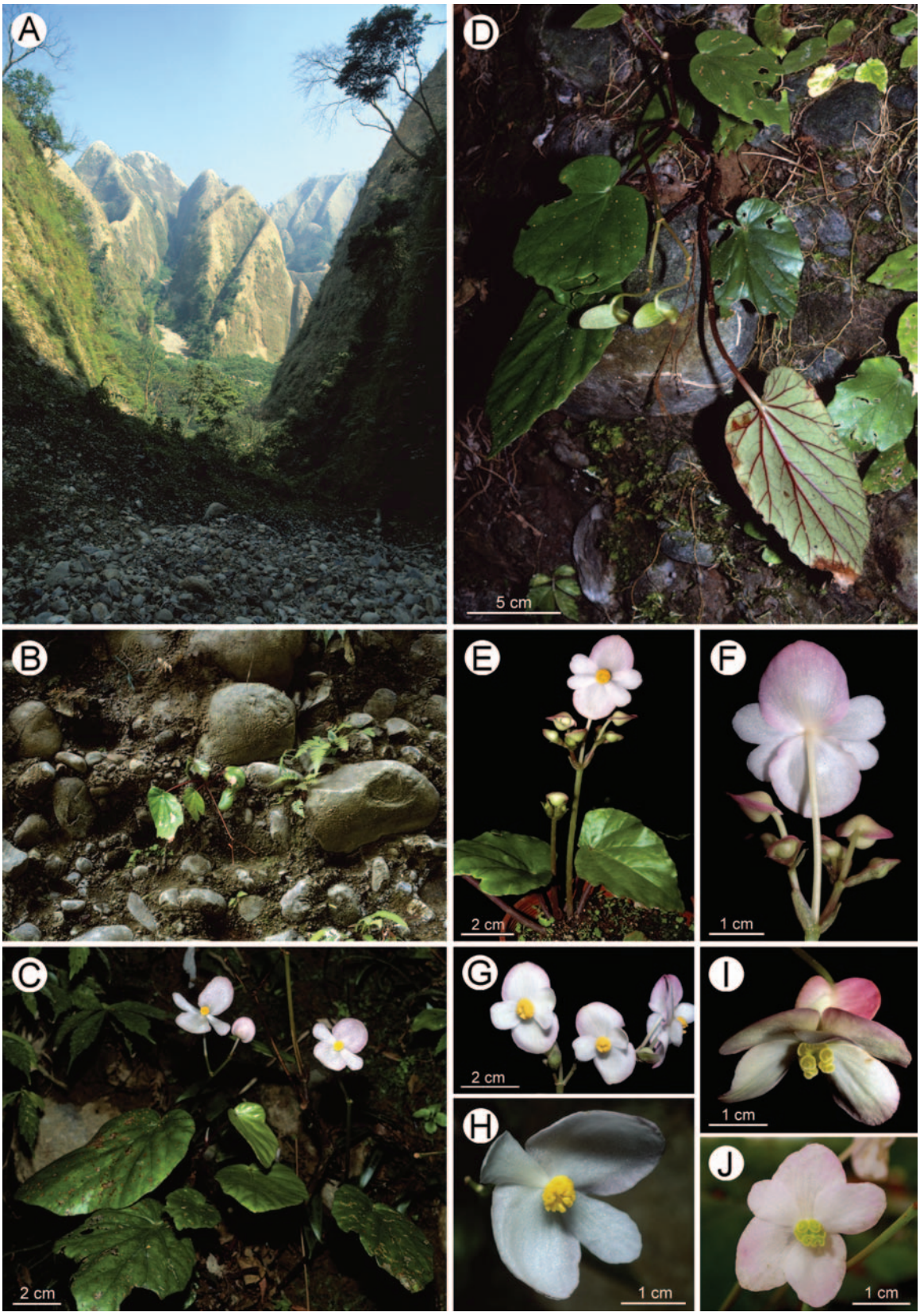


**Figure 2.** *Begonia bouffordii* C.-I Peng. A, Habitat: heavily eroded gravel slope in steep ravines (Chiuchiufeng, Nantou Hsien). B, Habitat, close-up view. C, Plant with staminate flowers. D, Plant with developing fruits. E, Plant showing inflorescence arising directly from rhizome. F, Abaxial view of staminate flower. G-H, Staminate flower, showing variation in tepal number. I, J, Carpellate flowers.

much narrower, 3-5 mm long. Seeds numerous, chalazal end rotund, lip of seed nipple-shaped, micropylar end constricted. *Chromosome number*, $n = 19$ (Figure 3); $2n = 38$ (Oginuma and Peng, 2002).

*Additional specimens examined*. **TAIWAN.** Nantou Hsien: Tsaotun Town, Chiuchiufeng (mountain peaks), Koukushan, on rocky slope, 24°00'22'' N, 120°46'35'' E, elev. 350-470 m, 12 Nov 1994, *Ching-I Peng 15991* (HAST); same loc., 12 Nov 1994, *Ching-I Peng 15999* (HAST).

*Distribution.* Rare, known only from Chiuchiufeng, central Taiwan, on dry, semi shaded to shaded, heavily eroded gravel slopes in steep ravines, at 350-470 m elevation (Figure 4).

*Notes*. *Begonia bouffordii* somewhat resembles *B. chitoensis* T. S. Liu & M. J. Lai, but it is distinct in having subcoriaceous and ovate (vs. herbaceous and broadly ovate) leaves and usually lacking an aerial stem [when present, 8 (-15) cm (vs. 40-95 cm) tall]. The two species occupy different ecological niches: *B. bouffordii* is a rare, localized species, found only at Chiuchiufeng on gravel slopes in steep ravines between 350 and 470 m elevation; whereas *B. chitoensis*, a widespread species in central Taiwan, is frequently found in shaded forests and on semi shaded forest margins between 360 and 2,200 m (Figure 4). A comparison of the two species and two other similar taxa is presented in Table 1. The specific epithet is named in honor of Dr. David E. Boufford, Harvard University Herbaria, for his contribution to the botanical inventory and floristic studies of eastern Asia.

**2. Begonia chuyunshanensis** C.-I Peng & Y. K. Chen, sp. nov. (sect. *Diploclinium*)—TYPE: TAIWAN. Kaohsiung Hsien: Taoyuan Hsiang, Laonung Forest Recreation Area, Chuyunshan, in broadleaf forest, 23°03'22'' N, 120°44'36'' E, elev. ca. 1,450 m, 22 May 1997, *Ching-I Peng 16855* (holotype, HAST; isotype, TNM)

出雲山秋海棠 Figures 5, 6

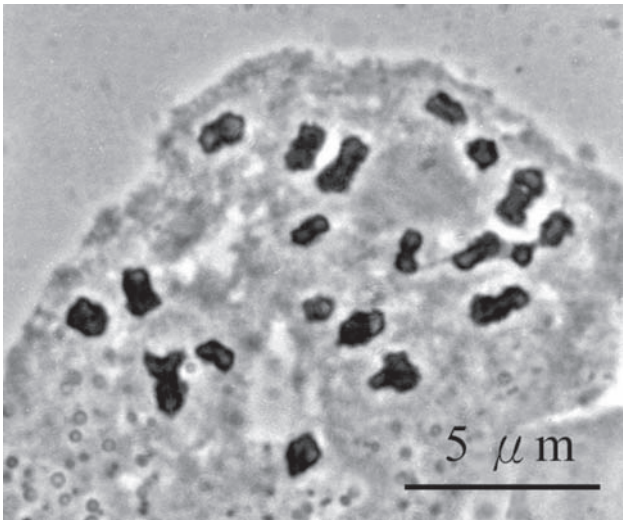


**Figure 3.** Meiotic chromosome spread of *Begonia bouffordii*. Diakinesis, $n = 19$, from *Peng 15991* (HAST).

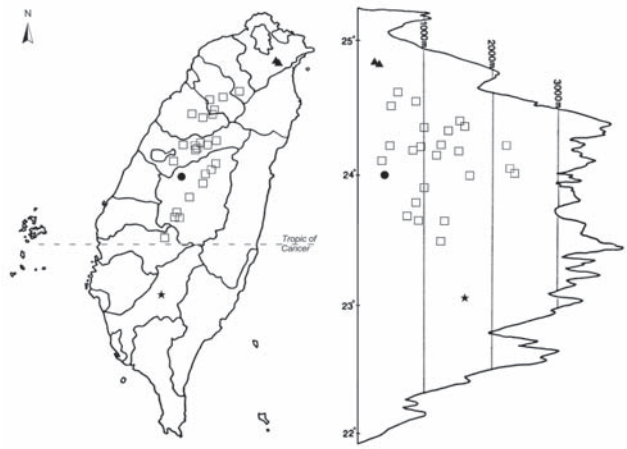


**Figure 4.** Distribution of *B. bouffordii* (●), *B. pinglinensis* (▲), *B. tengchiana* (★) and *B. chitoensis* (□) in Taiwan.

**Table 1.** Comparison of *Begonia chitoensis*, *B. bouffordii*, *B. pinglinensis* and *B. tengchiana*.

| Characters | *Begonia chitoensis* | *Begonia bouffordii* | *Begonia pinglinensis* | *Begonia tengchiana* |
|---|---|---|---|---|
| Aerial stem | 40-95 cm long | Lacking, when present 8 (-15) cm long | 35-50 cm long | 38-80 cm long |
| Leaf | | | | |
| Texture | Herbaceous | Subcoriaceous | Herbaceous | Herbaceous |
| Shape | Broadly ovate to suborbicular | Ovate | Narrowly ovate to ovate | Broadly ovate to suborbicular |
| Indumentum | Glabrous to subglabrous | Glabrous | Pilose to pilose-sericeous | Glabrous to subglabrous |
| Bracts | Entire | Entire | Entire | Serrate |
| Bracteoles on carpellate flowers | Lacking | Lacking | Lacking | Present |
| Styles | 2 | 2 | 2 | 3 |
| Ovary | 2-locular | 2-locular | 2-locular | 3-locular |
| Abaxial wing of capsule | Rotund to obricular, 19-32 mm long | Rotund to obricular, 18-25 mm long | Triangular to ligulate, 13-28 mm long | Shallowly triangular, to 5 mm long |
| Chromosome number ($2n$) | 38 | 38 | 38 | 82 |


**Figure 5.** *Begonia chuyunshanensis* C.-I Peng & Y. K. Chen. A, Habit. B, Bract. C, Stipule. D, Stamen. E, Carpellate flower. F, Staminate flower. G, G', Stigma, dorsal and ventral views. H, Capsule. I, Cross section of ovary. J, Seed.

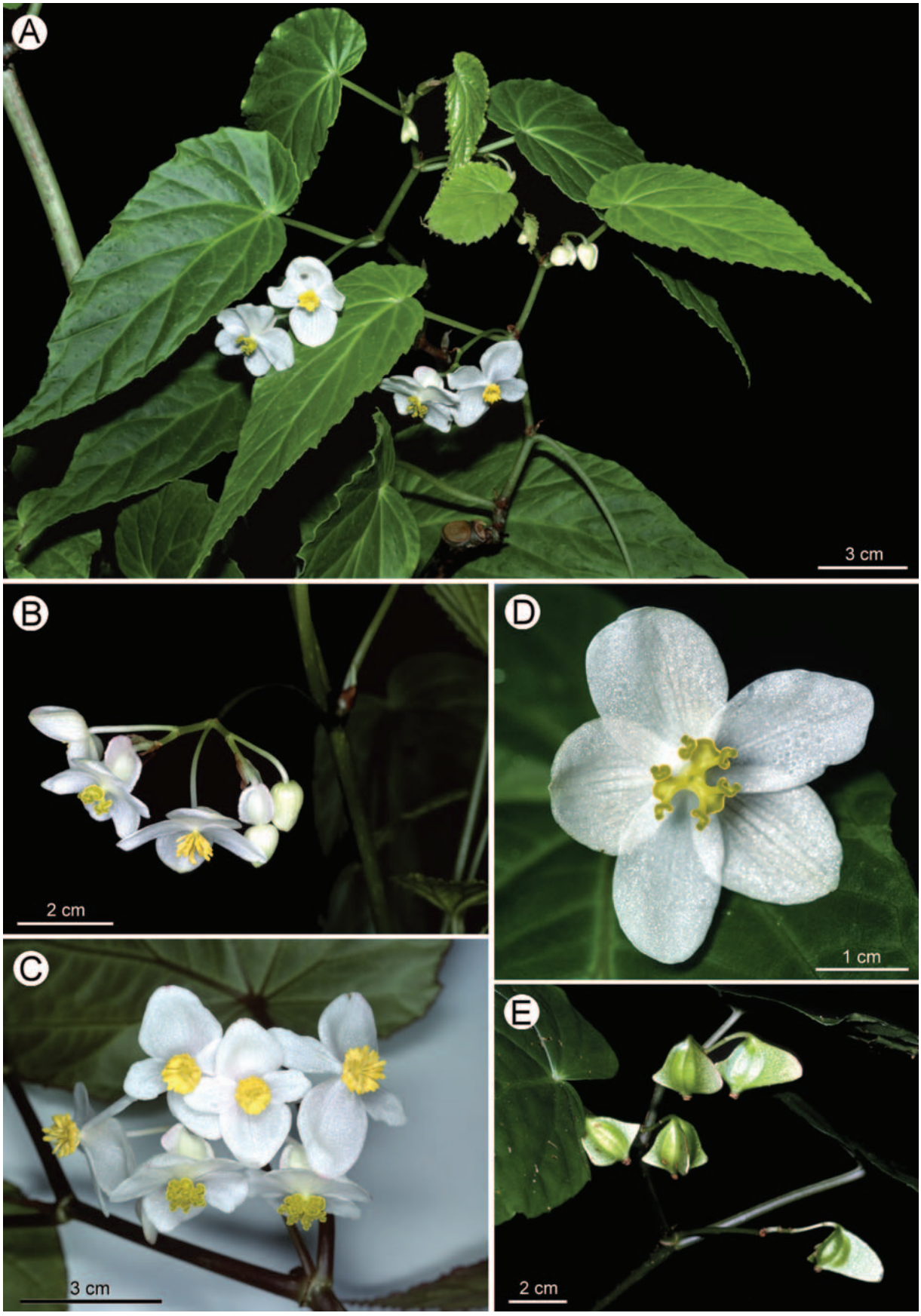


**Figure 6.** *Begonia chuyunshanensis* C.-I Peng & Y. K. Chen. A, Habit. B, Pendulous inflorescence. C, Inflorescence. D, Carpellate flower. E, Infructescence.

*Herba perennis. Caulis erecti, 40-85 cm altis. Folia obliqua, lanceolata ad ovata, 9-18 cm longa et 4-7 cm lata. Flores masculi: tepalis 4; stamina 98-137, antherae anguste oblongae ad oblanceolatae, 2.9-3.2 mm longae, 0.9-1.1 mm crassae. Flores foeminei: tepalis 5(6), subaequalis; ovariis trilocularis, inaequalibus 3-alatis; placentae axiales; styli 3. Fructus maturus capsularis, trigonus aliis 3 inaequalibus praeditus, ala abaxiali triangulati, 18-24 mm longa, alis lateralibus 4-7 mm longis.*

Herbs, erect, perennial, succulent. Rhizomes poorly developed, sometimes entirely lacking, creeping. Stems often zigzag, glabrous, 40-85 cm tall, to 18 mm across. Stipules glabrous, caducous, lanceolate to ovate, to 21 mm long, 16 mm wide, margins entire, apex acuminate. *Leaves* sparingly scaberulous on both surfaces, oblique, ovate to narrowly ovate, 12-27 cm long, 5-14 cm wide, base cordate, margins irregularly serrulate or denticulate, often slight undulate, apex acuminate to cuspidate; venation palmate-pinnate, veins 7-9; petiole glabrous, 6-30 cm long, to 8 mm across. Bracts in pairs, thickly papery, glabrous, caducous, narrowly ovate to ovate, to 23 mm long, 14 mm wide, apex acuminate, margins entire. *Inflorescence* 5-16 cm long, arising laterally from stem; peduncle erect to ascending, glabrous, to 13 cm long, 4 mm thick, flowers pendulous. Tepals white or very faintly pinkish. *Staminate flowers*: tepals 4, decussate, outer 2 broadly obovate to orbicular, 9-24 mm long, 7-21 mm wide, inner 2 oblanceolate to narrowly obovate, 7-18 mm long, 4-8 mm wide; stamens 98-137, yellow, clavate, anthers narrowly oblong to oblanceolate, 2.9-3.2 mm long, 0.9-1.1 mm across, filaments 0.5-2.1 mm long. *Carpellate flowers*: tepals 5 (or 6), unequal to subequal, narrowly obovate to broadly obovate, largest 9-21 mm long, 8-18 mm wide, smallest 8-19 mm long, 4-9 mm wide; styles 3, yellow, 4.9-5.3 mm long, fused ca. 1 mm at base, each bifid; ovary nodding or somewhat pendent, ellipsoid, locules 3, longitudinally shallowly grooved between locules, 3-winged; placentae axile, bilamellate. *Infructescence* to 19 cm long, fruit-bearing stipes 12-25 mm long; capsules nodding, trigonous, unequally 3-winged, abaxial wing triangular, 18-24 mm long, 17-21 mm wide, lateral wings much narrower, 4-7 mm long, 17-21 mm wide. Seeds numerous, broadly ellipsoid, 0.32-0.34 mm long, 0.22-0.24 mm thick, chalazal end rotund, lip of seed nipple-shaped, micropylar end constricted. *Chromosome number*, 2*n* = 52 (Oginuma and Peng, 2002).

*Additional specimens examined.* **TAIWAN.** Kaohsiung Hsien: Maolin Hsiang, Shanping Station, Liukuei Branch, Taiwan Forestry Research Institute, between luncheon room and the 2nd watershed area, elev. ca. 700 m, mixed broadleaf forest and *Cunninghamia* plantation, slope base along trail, moist places, *Ching-I Peng 14730* (HAST); Maolin Hsiang, ca. 100 m off Shanping Station (Liukuei Branch of Taiwan Forestry Institute), slope base along road to Liukuei, elev. ca. 650 m, associated with *Begonia palmata* and *B. taiwaniana* locally, *Ching-I Peng 14751* (HAST); Maolin Hsiang, Shanping, elev. ca. 750 m, *Yung-Kuan Chen 102* (HAST); Maolin Hsiang, Shanping, elev. ca. 800 m, *Yung-Kuan Chen 521* (HAST); Taoyuan Hsiang, Tengchih, elev. 1,570 m, *Ching-I Peng 14795-a* (HAST); Pingtung Hsien: Laiyi Hsiang, at ca. 5.7 km on Laiyi Forest Road, 22°31’17’’ N, 120°41’12’’ E, elev. ca. 530 m, disturbed broadleaf forest, at base of rocky/soil slope, semi shaded, moist, locally frequent, *Ya-Yi Huang 530* (HAST); Santimen Hsiang, at ca. 10.6 km on Shahsi Forest Road, 22°49’03’’ N, 120°38’45’’ E, 730 m, mixed broadleaf forest and *Miscanthus* grassland, at base of moist rocky/soil slope, semi shaded, locally frequent, *Ya-Yi Huang 541* (HAST); Santimen Hsiang, Tienehu, by a waterfall, 120°42’00’’ E, 22°48’00’’ N, elev. ca. 850 m, at stream bank, heavily shaded, wet, occasional, *Ya-Yi Huang 29* (HAST); Taitung Hsien: Peinan Hsiang, along Lichia Forest Road, at road mileage sign 14.2 km, evergreen broadleaf forest, elev. ca. 1,200 m, *Yui-Ching Kao 159* (HAST).

*Distribution.* Known from Kaohsiung Hsien, Pingtung Hsien and Taitung Hsien in southern Taiwan, between 530-1,570 m elevation (Figure 7).

*Notes*. *Begonia chuyunshanensis* is similar to *B. lukuana* Y. C. Liu & C. H. Ou, differs by having the leaves green on both surfaces (vs. deeply purple-red beneath) and anthers 2.9-3.2 mm (vs. 1.9-2.2 mm) long (Table 2). Geographically, the two species are also separable. *Begonia chuyunshanensis* occurs south of the Tropic of Cancer in southern Taiwan, whereas *B. lukuana* grows north of the range of *B. chuyunshanensis*. The specific epithet is derived from the type location Chuyunshan (‘Above-the-cloud Mountain,’ literally).

**3. Begonia pinglinensis** C.-I Peng, sp. nov. (sect. *Platycentrum*)—TYPE: TAIWAN. Taipei Hsien: Pinglin Hsiang, Peishihhsi (a river), Tsuku Landslide Area #2 at Chinkualiao, 24°55’27’’ N, 120°40’30’’ E, elev. ca. 320 m, disturbed broadleaf forest with tea plantation on mountain slope, NE-facing rocky slope with dripping water, associated with *Miscanthus*, *Alocasia macrorrhiza*, *Goodyera*, *Curculigo capitulata*, *Villebrunea pedunculata*, *Woodwardia prolifera*, *Maesa japonica*, *Morus australis*, and *Mallotus*

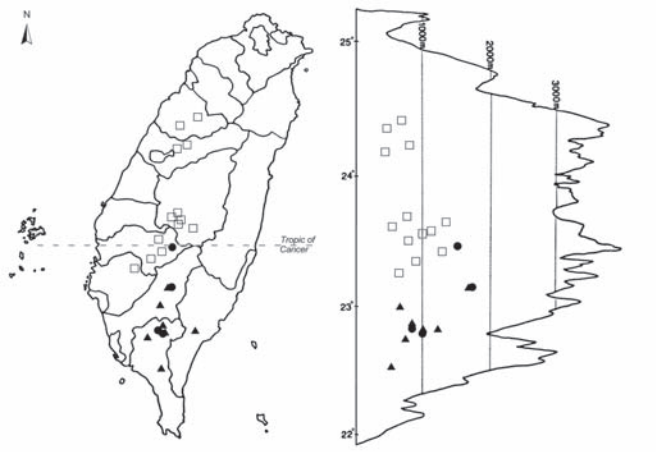


**Figure 7.** Distribution of *B. chuyunshanensis* (▲), *B. wutaiana* (●) and *B. lukuana* (□) in Taiwan.

**Table 2.** Comparison of *Begonia lukuana, B. chuyunshanensis*, *B. wutaiana* and *B. tengchiana*.

| Characters | *Begonia lukuana* | *Begonia chuyunshanensis* | *Begonia wutaiana* | *Begonia tengchiana* |
|---|---|---|---|---|
| Rhizomes | Absent or poorly developed | Absent or poorly developed | Absent or poorly developed | Creeping and elongated |
| Leaf | | | | |
| Color | Dark green above, sanguineous beneath | Green on both surfaces | Green on both surfaces | Green on both surfaces |
| Shape | Lanceolate to narrowly ovate | Lanceolate to ovate | Lanceolate to narrowly ovate | Broadly ovate to suborbicular |
| Bracts | Entire | Entire | Entire | Serrate |
| Bracteoles on carpellate flowers | Lacking | Lacking | Lacking | Present |
| Anther length (mm) | 1.9-2.2 | 2.9-3.2 | 2.4-2.9 | 1.9-2.4 |
| Styles | 3 | 3 | 2 | 3 |
| Ovary | 3-locular | 3-locular | 2-locular | 3-locular |
| Chromosome number (2*n*) | 52 | 52 | 52 | 82 |

*paniculatus, Ching-I Peng 17765* (holotype, HAST; isotypes, CAS, E, GH, HAST, K, KUN, MO, PE, TAI, TAIF, TNM, US). 坪林秋海棠 Figures 8, 9

*Herba perennis rhizomatibus repentibus, 35-50 cm altis. Folia obliqua, late ovata ad ovata, 7-16 (-25) cm longae et 5-9 (-14) cm lata, pubescentae. Flores masculi: tepalis 4; stamina 46-81, antherae anguste obovatae, 0.8-1.4 mm longae, 0.5-0.7 mm crassae. Flos foeminei: tepalis5, subaequalis; ovariis bilocularis, inaequallibus 3-alatis; placentae axiales; styli 2. Fructus maturus capsularis, trigonus aliis 3 inaequalibus praeditus, ala abaxiali 13-28 mm longa, alis lateralibus 3-4 mm longis.*

Herbs, perennial, rhizomatous. Rhizomes creeping, to 1cm thick. Stems 35-50 cm long. Stipules glabrous, caducous, narrowly ovate to ovate, to 9.7 mm long, 3.6 mm wide, margins entire, apex acuminate. *Leaves* basal and cauline, pilose to pilose-sericeous on both surfaces, oblique, narrowly ovate to ovate, 7-16 (-25) cm long, 5-9 (-14) cm wide, base obtuse, margins irregularly serrulate to denticulate, apex acuminate to cuspidate; venation palmate, veins 7-10; petiole often reddish, hispid or villosulous, to 16 (-20) cm long, 4.5 mm across. Bracts in pairs, papery, glabrous, caducous, narrowly ovate, to 7.5 mm long, 3.5 mm wide, margins entire, apex acuminate. *Inflorescence* to 25 cm long, peduncle erect to ascending, hispid, to 15 cm long, 6 mm across. Tepals white or pinkish, glabrous. *Staminate flowers*: tepals 4, decussate, outer 2 broadly ovate to ovate, 7-20 mm long, 6-17 mm wide, inner 2 oblanceolate to narrowly obovate, 8-17 mm long, 4-9 mm wide; stamens 46-81, yellow, clavate, anthers narrowly oblong to oblanceolate, 0.8-1.4 mm long, 0.5-0.7 mm across, filaments free, 0.7-1.6 mm long. *Carpellate flowers*: tepal 5, unequal to subequal, narrowly obovate to broadly obovate, largest 10-19 mm long, 9-17 mm wide, smallest 6-19 mm long, 5-14 mm wide; styles 2, yellow, 4-5 (-5.7) mm long, fused at base ca. 1 mm, each bifid; ovary ellipsoid, locules 2, longitudinally grooved, 3-winged, hispidulous; placenta axile, bilamellate. *Infructescence* to 25 cm long, fruit-bearing stipes 1.2-5.5 cm long; capsules nodding, trigonous, unequally 3-winged, abaxial wing triangular to ligulate, 13-28 mm long, 9-19 mm wide, lateral wings 3-4 mm long, 9-18 mm wide. Seeds numerous, chalazal end rotund, lip of seed nipple-shaped, micropylar end constricted. *Chromosome number*, $n = 19$ (Figure 10), $2n = 38$ (Oginuma and Peng, 2002).

*Additional specimens examined.* **TAIWAN.** Taipei Hsien: Pinglin Hsiang, from Taiyuchueh via Pinglinshanchuang to Tsukutsun, broadleaf forest, occasional on forest floor or moist, heavily shaded, N-facing slope, often on rocks with shallow soil and abundant leaf litter, 24°57’17’’ N, 121°41’12’’ E, elev. ca. 300 m, 24 Nov 2000, *Ching-I Peng 18189* (HAST); Chinhsi village, Chinkualiao, broadleaf forest by Chinkualiaohsi (a stream), shady slope, elev. ca. 250 m, *Ching-I Peng 14705* (HAST); same loc., on slope along trail, in shade, elev. ca. 250 m, *Ching-I Peng 13853* (HAST); same loc., en route from the police station to Taiwan *Keteleeria* Nature Preserve, mixed broadleaf forest and tea plantation, *Ching-I Peng 15189* (HAST); Shihtsao, Kupoliaohsi (a stream), SE of Provincial Hwy 9 at road mileage ca. 44.2 km, ca. 100 m S of Shihtsao Police Station, then hiking down for ca. 3 km, 24°53’43” N, 121°42’47’’ E, *Ficus-Machilus* forest, S of the river, on slope along trail, semi shaded, abundant, *Ching-I Peng 17814*, *17815*, *17816*, *17817*, *17818*, *17819*, *17820*, &*17821* (HAST); same loc., N of the river, elev. ca. 270 m, on heavily shaded rocky slope, *Ching-I Peng 17822* (HAST); Taiyuku, ca. 2 km S of Pinglin, crossing Talin Bridge to the left of Pei-I Road, at mountain foot of Taotiaoling, elev. ca. 300 m, *Ching I-Peng 13849* (HAST); same loc., en route from Chinkualiaohsi (a stream) to Taiwan *Keteleeria* Nature Preserve, elev. 210-300 m, beside railway, adjacent to a stream, *Chi-Cheng Liao 512* (HAST); same loc., on for-

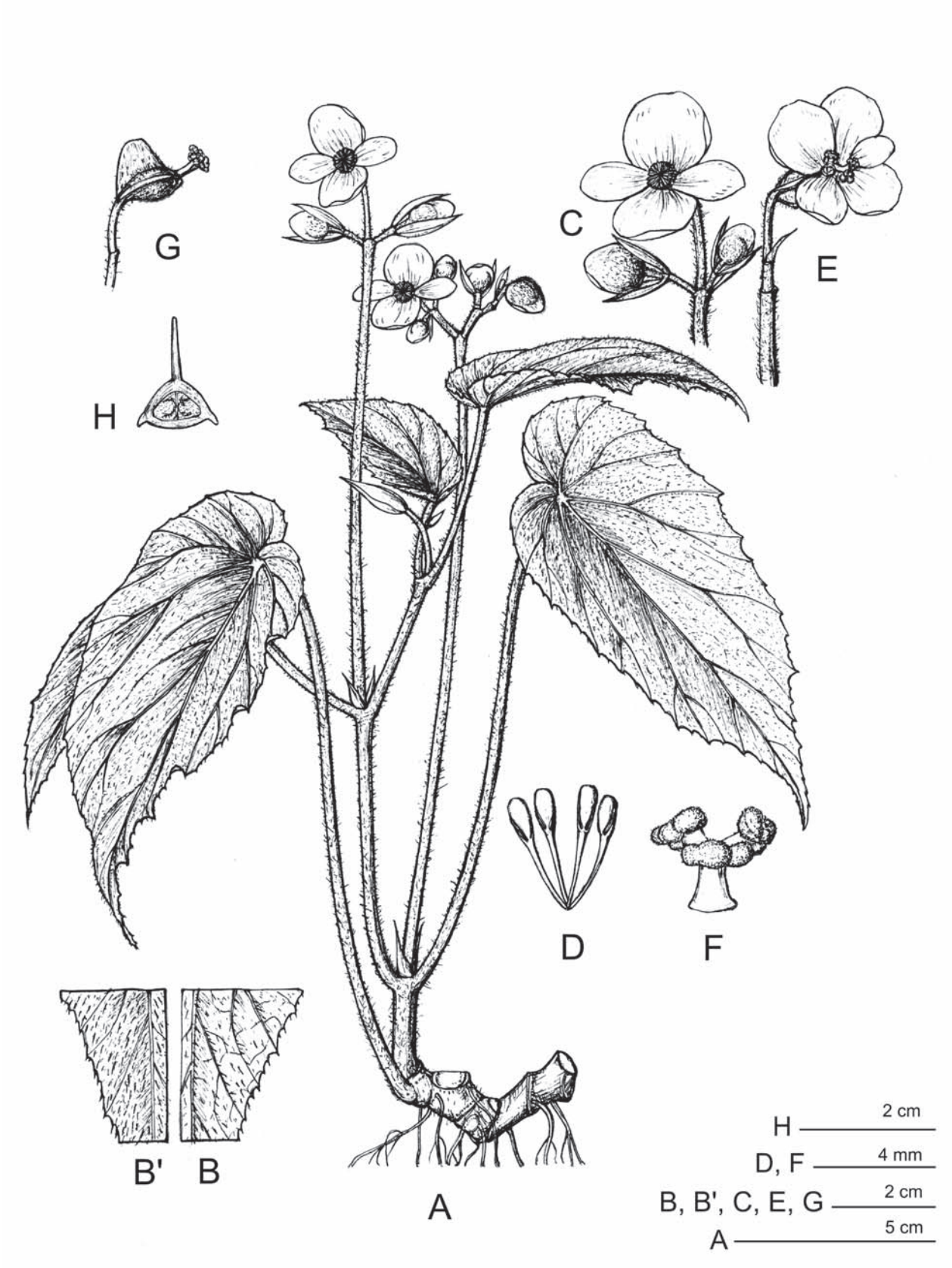


**Figure 8.** *Begonia pinglinensis* C.-I Peng. A, Habit. B, B', Portion of leaf, showing upper and lower surfaces. C, Staminate flower. D, Androecium, in part. E, Carpellate flower. F, Style. G, Ovary. H, Cross section of an ovary.

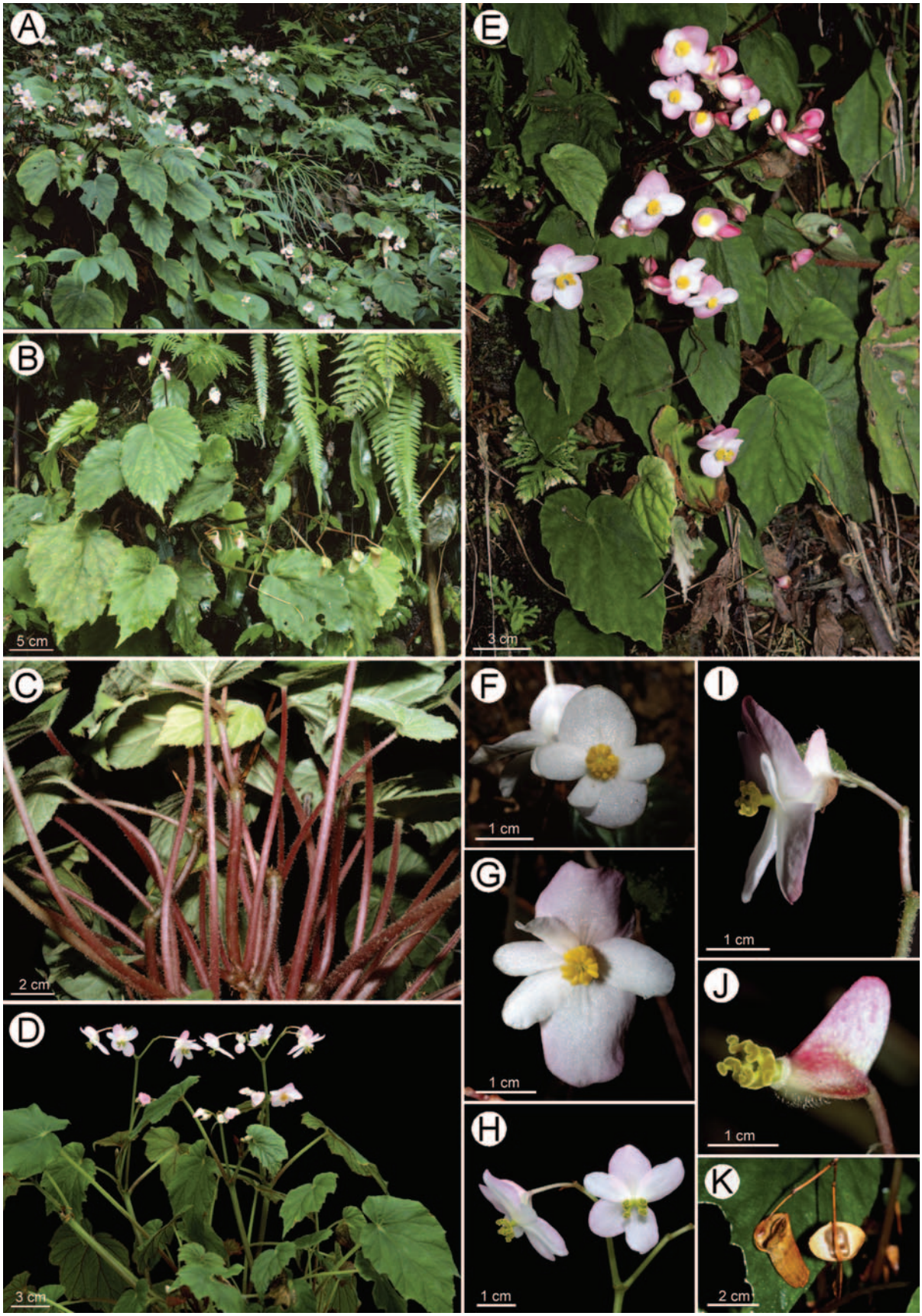


**Figure 9.** *Begonia pinglinensis* C.-I Peng. A, Habitat. B, Plant at late anthesis and in fruit. C, Habit, showing hispid petiole. D-E, Plant at peak anthesis; F, Staminate flower showing 5 tepals. G, Staminate flower showing 6 tepals. H, Carpellate flowers. I, Side view of a carpellate flower. J, Ovary. K, Dry capsules.

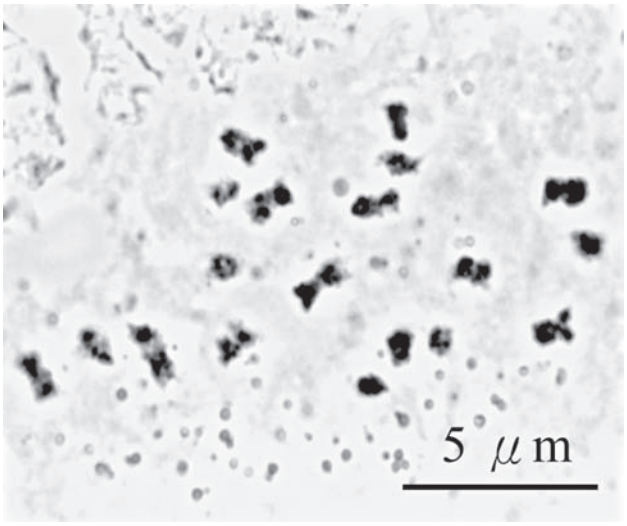


**Figure 10.** Meiotic chromosome spread of *Begonia pinglinensis*. Diakinesis, *n* = 19, from *Peng 14699* (HAST).

est floor, *Chi-Cheng Liao 511* (HAST); same loc., on semi shaded slope trail, *Chi-Cheng Liao 517, 519* (HAST); Talin village, Taiyuku, mt. foot of Taotiaoling, slope by a small creek in broadleaf forest, elev. ca. 330 m, *Peng 14699* (HAST); Talin village, secondary broadleaf forest in ravines, on soil slope, locally abundant, 24°54'56'' N, 121°41'31'' E, elev. ca. 320 m, *Ching-I Peng 17858, 17860, 17861* & *17862* (HAST); by the sign of Pinglin Taiwan *Keteleeria* Nature Reserve, near entrance, broadleaf forest, at trailside along a small stream, heavily shaded, moist, locally abundant, elev. ca. 250 m, *Ching-I Peng 18192* (HAST).

*Distribution.* Rare, known only in Pinglin Hsiang, Taipei Hsien (Figure 4); broadleaved forests and forest margins, 210-320 elevation.

*Notes.* This species is somewhat similar to *B. chitoensis* and *B. bouffordii* in habit. All three species also have the same somatic chromosome number of 2*n* = 38 (Oginuma and Peng, 2002). *Begonia pinglinensis* is notably distinct from either species in its combination of pilose (vs. glabrous or subglabrous) leaves and other characters (Table 1). *Begonia pinglinensis* is a rare species found only in the Peishihhsi river basin in northern Taiwan. It is distributed well north of *B. chitoensis* and *B. bouffordii* (Figure 4). The specific epithet is derived from the type locality "Pinglin Hsiang."

**4. Begonia tengchiana** C.-I Peng & Y. K. Chen, sp. nov. (sect. *Diploclinium*)—TYPE: TAIWAN. Kaohsiung Hsien: Fengkang Forest Road, at road marker 12 km, broadleaf forest on mountain slope, on semi shaded soil slope at road cut, a very large population (ca. 4 × 5 $m^2$) by a steep brook with running water, 23°00'17'' N, 120°42'40'' E, elev. ca. 1,630 m, 16 Sep 2000, *Ching-I Peng 18083* (holotype, HAST; isotypes, CAS, E, GH, HAST, K, KUN, MO, PE, TAI, TAIF, TNM, US). 藤枝秋海棠 Figures 11, 12

*Herba perennis rhizomatibus repentibus. Caulis 38-80 cm alti. Folia obliqua, late ovata ad ovata, 9-25 cm longae et 7-18 cm lata. Flores masculi: tepalis 4; stamina 39-68, antherae late oblanceolatae ad anguste obovatae, 1.9-2.3 mm longae, 0.9-1.2 mm crassae. Flos foeminei: tepalis 5 (or 6), subaequalis; ovariis trilocularis, fere sine alis; placentae axiales; styli 3. Fructus maturus capsularis, trigonus fere alis, ala abaxiali ad 5 mm longa, alis lateralibus ad 3 mm longis.*

Herbs, erect, perennial, with creeping rhizomes. Rhizomes to 2.1 cm thick. Stems 38-80 cm tall, to 1.8 cm thick. Stipules caducous, ovate to broadly ovate, to 24 mm long, 19 mm wide, apex acuminate, margin entire. *Leaves* sparingly scaberulous on upper surface, lower surface glabrous, oblique, ovate to suborbicular, 9-25 cm long, 7-18 cm wide, base cordate, margin remotely irregularly serrate or denticulate, apex acuminate; venation palmate to palmate-pinnate, veins 6-9; petiole glabrous, 7-23 cm long, to 1.1 cm thick. Bracts in pairs, thickly papery, glabrous, caducous, ovate to broadly ovate, 7-18 mm long, 4-13 mm wide, margin serrate, apex acute. *Inflorescence* 10-24 cm long, in upper leaf axils; peduncle erect or ascending, to 18 cm long, 0.5 cm thick. Tepals white or sometimes pinkish, margin slightly irregularly dentate, more or less strigillose. *Staminate flowers*: tepals 4, decussate, outer 2 broadly rotund to orbicular, 11-23 mm long, 9-22 mm wide, inner 2 oblanceolate to narrowly obovate, 10-21 mm long, 5-11 mm wide. Stamens 39-68, yellow, golf-club shaped, anthers broadly oblanceolate to narrowly obovate, 1.9-2.3 mm long, 0.9-1.2 mm across, filaments 1.2-2.6 mm long. *Carpellate flowers*: bracteoles in pairs, ca. 1 cm long, narrowly lanceolate, on pedicel 5-7 mm beneath ovary; tepals 5 (or 6), unequal or subequal, narrowly obovate to very broadly obovate, largest 9-19 mm long, 6-17 mm wide, smallest 7-16 mm long, 3-9 mm wide; styles 3, yellow, 4.2-5.1 mm long, bifid; ovary ellipsoid, locules 3, longitudinally shallowly grooved between locules, shallowly 3-winged; placentae axile, bilamellate. *Infructescence* to 28 cm long, fruit-bearing stipes 12-39 mm long; capsules nodding, trigonous, shallowly 3-winged, abaxial wing shallowly triangular, to 5 mm long, 12-21 mm wide, lateral wings to 3 mm long, 10-18 mm wide. *Chromosome number*, 2*n* = 82 (Oginuma and Peng, 2002).

*Additional specimens examined.* **TAIWAN.** Kaohsiung Hsien: Taoyuan Hsiang, Paoshan Village, Tengchi Forest Recreation Area, 1,500 m, *Yung-Kuan Chen 725* (HAST); Taoyuan Hsiang, Paoshan Village, Tengchi Forest Recreation Area, broadleaf forest dominated by Lauraceae and Fagaceae, en route from the guesthouse along trail to the peak, elev. 1,560-1,800 m, *Ching-I Peng 14776* (HAST); same loc., *Ching-I Peng 14792* (HAST); same loc., elev. ca. 1,570 m, *Ching-I Peng 14794, 14795* (HAST).

*Distribution.* Rare, known only from Kaohsiung Hsien, in broadleaved forests and at forest margins at the southern end of the Central Mountain Range, elev. 1,550-1,800 m (Figure 4).

*Notes.* In *Begonia*, bracteoles on the carpellate flowers are common in the New World but occur rarely in Asia

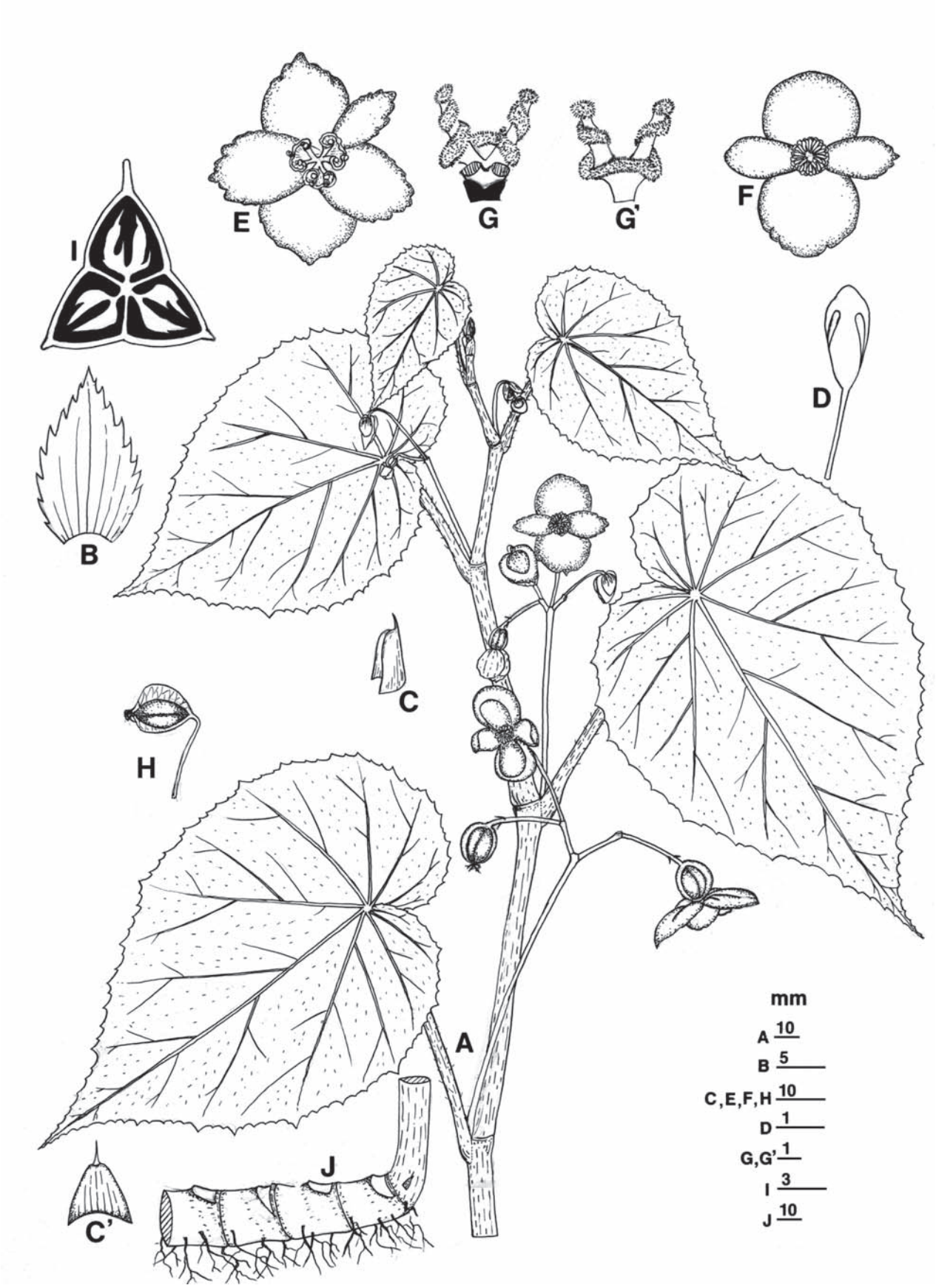


**Figure 11.** *Begonia tengchiana* C.-I Peng & Y. K. Chen. A, Habit. B, Bract. C, Stipule on stem; C', Stipule on rhizome. D, Stamen. E, Carpellate flower. F, Staminate flower. G, Stigma, ventral view; G' dorsal view. H, Capsule. I, Cross section of ovary. J, Rhizome.

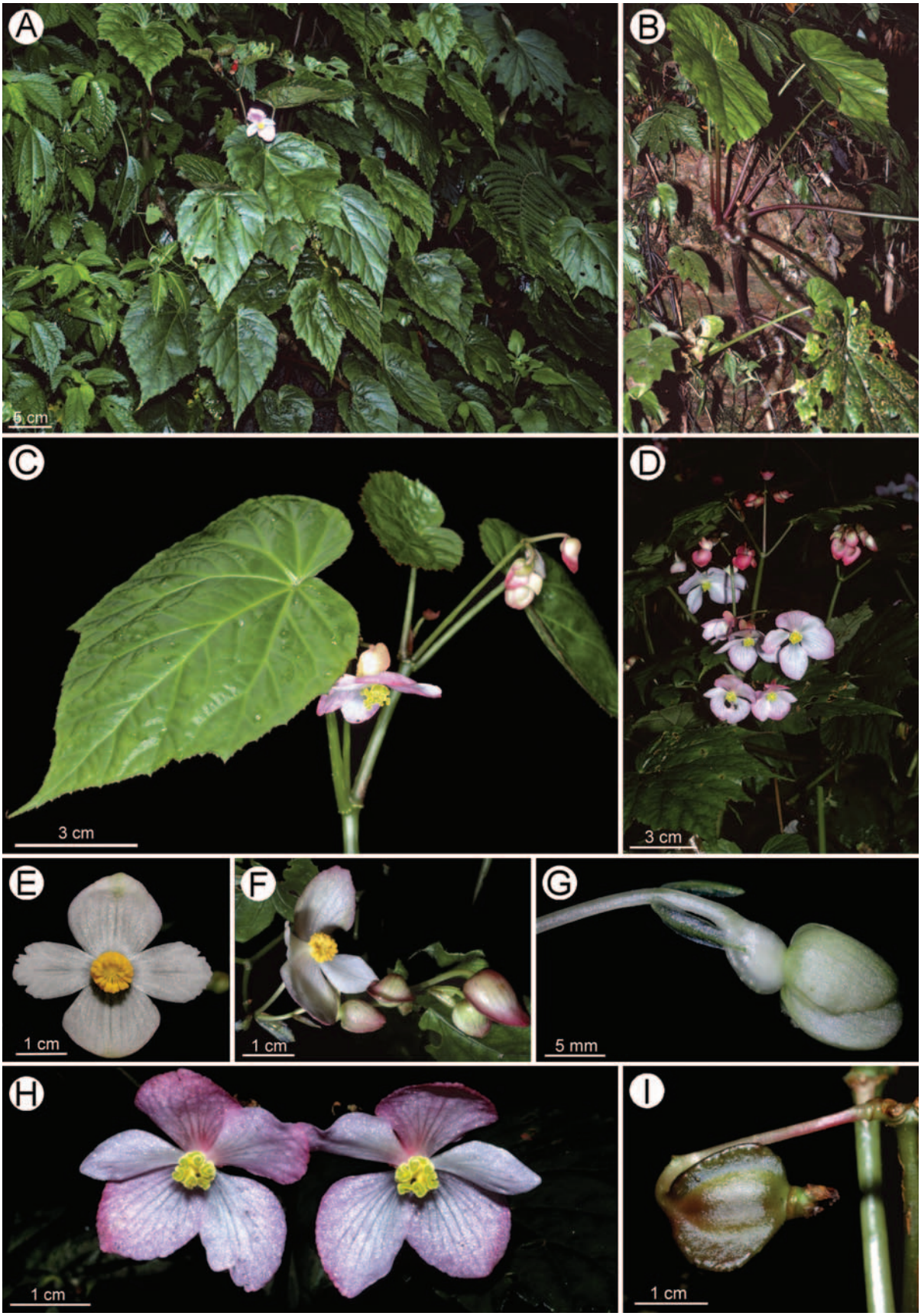


**Figure 12.** *Begonia tengchiana* C.-I Peng & Y. K. Chen. A, Habitat. B, Habit, showing rhizome with elongated internode, climbing on rocky slope. C, Plant, showing carpellate flower. D, Plant at peak anthesis. E, F, Staminate flowers. G, Carpellate flower bud, note pair of bracteoles on pedicel. H, Carpellate flowers. I, Capsule.

(Doorenbos et al., 1998). The pair of distinct bracteoles below the base of the ovary in *Begonia tengchiana* is unique in Taiwan. This species resembles *B. chitoensis* in habit, differing by the ovary with 3 locules (vs. 2 locules); bracteoles present (vs. lacking) on carpellate flowers; serrate (vs. entire) bracts; and the abaxial wing of the capsule shallowly triangular, 5-10 mm long (vs. broadly elliptic to orbicular, 19-32 mm long) (Tables 1, 2). Notably, *Begonia tengchiana* has the highest chromosome number (2*n* = 82: Oginuma and Peng, 2002) known for the genus in eastern Asia (cf. Doorenbos et al., 1998; Nakata et al., 2003; Peng et al., 1988; Peng and Chen, 1990, 1991; Peng and Sue, 2000; Peng and Chiang, 2000; Oginuma and Peng, 2002; Ye et al., 2004; Ku et al., 2004; Peng et al., 2005a, b; Tien et al., 2002). The specific epithet is derived from the type locality, Tengchi, in southern Taiwan.

**5. Begonia wutaiana** C.-I Peng & Y. K. Chen, sp. nov. (sect. *Platycentrum*)—TYPE: TAIWAN. Pingtung Hsien: Wutai Hsiang, at road marker 42 km on Prov. Hwy 24. Broadleaf forest, on rocky slope with soil cover, shaded by thickets, moist, occasional. Herb at peak fruiting stage. 22°44’35’’ N, 120°43’24’’ E, elev. ca. 1,000 m, 8 Oct 2000, *Ching-I Peng 18160* (holotype, HAST).

霧台秋海棠 Figures 13, 14

*Herba perennis. Caulis erecti, 40-70 cm altis. Folia obliqua lanceolata ad ovata, 18-24 cm longae et 12-15 cm lata. Flores masculi: tepalis 4; stamina 41-53, antherae anguste oblongae ad oblongae, 2.4-2.9 mm longae, 0.7-0.9 mm crassae. Flores foeminei: tepalis 5 (or 6), subaequalis; ovariis bilocularis, inaequallibus 3-alatis; placentae axiales; styli 2. Fructus maturus capsularis, trigonus, ala abaxiali 15-25 mm longa, alis lateralibus 2.5-4 mm longis.*

Herbs, erect, perennial, with poorly developed rhizome. Stems 40-70 cm tall, to 14 mm thick. Stipules glabrous, caducous, lanceolate to ovate, 18-24 mm long, 12-15 mm wide, margin entire, apex acuminate. *Leaves* occasionally with white spots on upper surface, oblique, lanceolate to narrowly ovate, 9-18 cm long, 4-7 cm wide, glabrous on both surfaces, base cordate, margin irregularly serrulate, apex acuminate; venation palmate-pinnate, veins 6-9; petiole glabrous, 5-14 cm long, to 6 mm thick. Bracts in pairs, thickly papery to succulent, glabrous, caducous, narrowly ovate to ovate, 9-21 mm long, 5-15 mm wide, margin entire, apex acuminate. *Inflorescence* 6-14 cm long, in upper leaf axils; peduncle ascending, to 11 cm long, 4 mm thick; flowers pendulous. Tepals white or pinkish. *Staminate flowers*: tepals 4, decussate, outer 2 rotund to orbicular, 11-18 mm long, 8-18 mm wide, inner 2 oblanceolate to narrowly obovate, 9-16 mm long, 4-9 mm wide. Stamens 41-53, yellow, clavate, anthers narrowly oblong, 2.4-2.9 mm long, 0.7-0.9 mm across, filaments 2-2.8 mm long. *Carpellate flowers*: tepals 5 (or 6), unequal, narrowly obovate to orbicular, largest 9-16 mm long, 7-15 mm wide, smallest 6-13 mm long, 4-7 mm wide; styles 2, yellow, fused ca. 1 mm at base, bifid; ovary ellipsoid, locules 2, longitudinally shallowly grooved between locules, 3-winged; placentae axile, bilamellate. *Infructescence* to 18 cm long, fruit-bearing stipes 15-28 mm long; capsules trigonous, unequally 3-winged, abaxial wing 15-25 mm long, 15-23 mm wide, lateral wings much narrower, 2.5-4 mm long, 15-22 mm wide. Seeds numerous, rotund, 0.28-0.3 mm long, 0.23-0.24 mm thick, apex round, lip of seed nipple-shaped, micropylar end constricted. *Chromosome number*, 2*n* = 52 (Oginuma and Peng, 2002).

*Additional specimens examined*. **TAIWAN.** Chiayi Hsien: Alishan Hsiang, at entrance of Tatungshan, virgin broadleaf forest, 23°09’73’’ N, 120°42’16’’ E, elev. ca. 1,500 m, on somewhat shaded floor of *Cunninghamia* plantation, *Chi-Cheng Liao 1669* (HAST). Kaohsiung Hsien: Taoyuan Hsiang, Paoshan Village, Tengchi Forest Recreation Area, en route from the guesthouse along trail to the peak, elev. 1,560-1,800 m, broadleaf forest dominated by Lauraceae and Fagaceae, *Ching-I Peng 14784* (HAST). Pingtung Hsien: Wutai Hsiang, en route from Wutai to Ali, elev. 800-1,200 m, *Yung-Kuan Chen 386* (HAST); same loc., elev. 1,000-1,100 m, *Ching-I Peng 10225* (HAST).

*Distribution*. Known from Chiayi Hsien, Kaohsiung Hsien and Pingtung Hsien; around the southern end of the Central Mountain Range in shaded forests and semi shaded forest margins at 860-1,500 m altitude (Figure 7).

*Notes*. *Begonia wutaiana* is separable from *B. chuyunshanensis* in having carpellate flowers with 2 (vs. 3) styles and 2 (vs. 3) ovarian locules, one of the major characters for sectional assignment in *Begonia* (Doorenbos et al., 1998; Shui et al., 2002) (Table 2). *Begonia wutaiana* is so similar to *B. chuyunshanensis* in habit and foliage, however, that it could hardly be identified without seeing carpellate flowers. *Begonia wutaiana* is a member of sect. *Platycentrum*, whereas *B. chuyunshanensis* is grouped within sect. *Diploclinium*. We have observed both kinds of carpellate flowers on the same individual (Taiwan. Pingtung Hsien, Wutai Hsiang, Province Road # 24, between road markers 42 & 43 km. Semi shaded broadleaved forest margin, 120°43’50” E, 22°44’17” N, elev. ca. 1,100 m, *Leong 2990*, HAST) (Figure 14: G, H), which probably represent a natural hybrid between the two species. The specific epithet is derived from the type locality, Wutai Hsiang, in Pingtung Hsien.

## Key to species of *Begonia* in Taiwan

(Natural hybrids, *B.* ×*buimontana* and *B.* ×*taipeiensis*, are excluded from this key.)

1. Stems annual, dying back to ground annually; plants tuberous or with moniliform rhizomes; carpellate flowers with 2 or 3 tepals.
   2. Plants tuberous, with elongated stolons; flowers of both sexes with 2 tepals ..... *B. ravenii*

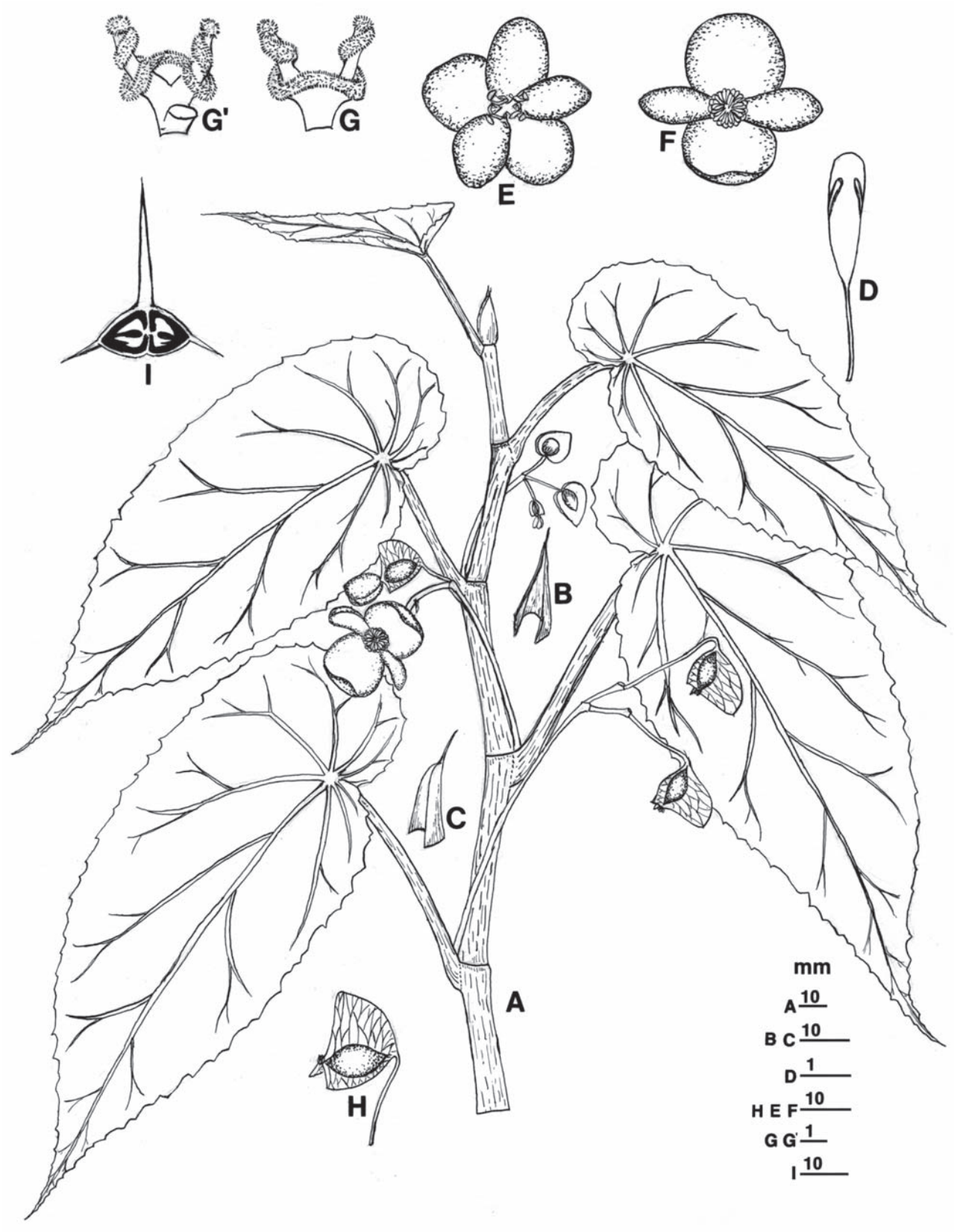


**Figure 13.** *Begonia wutaiana* C.-I Peng & Y.-K. Chen. A, Habit. B, Bract. C, Stipule; D, Stamen. E, Carpellate flower. F, Staminate flower. G, G', Stigma, dorsal and ventral views. H, Capsule. I, Cross section of ovary.

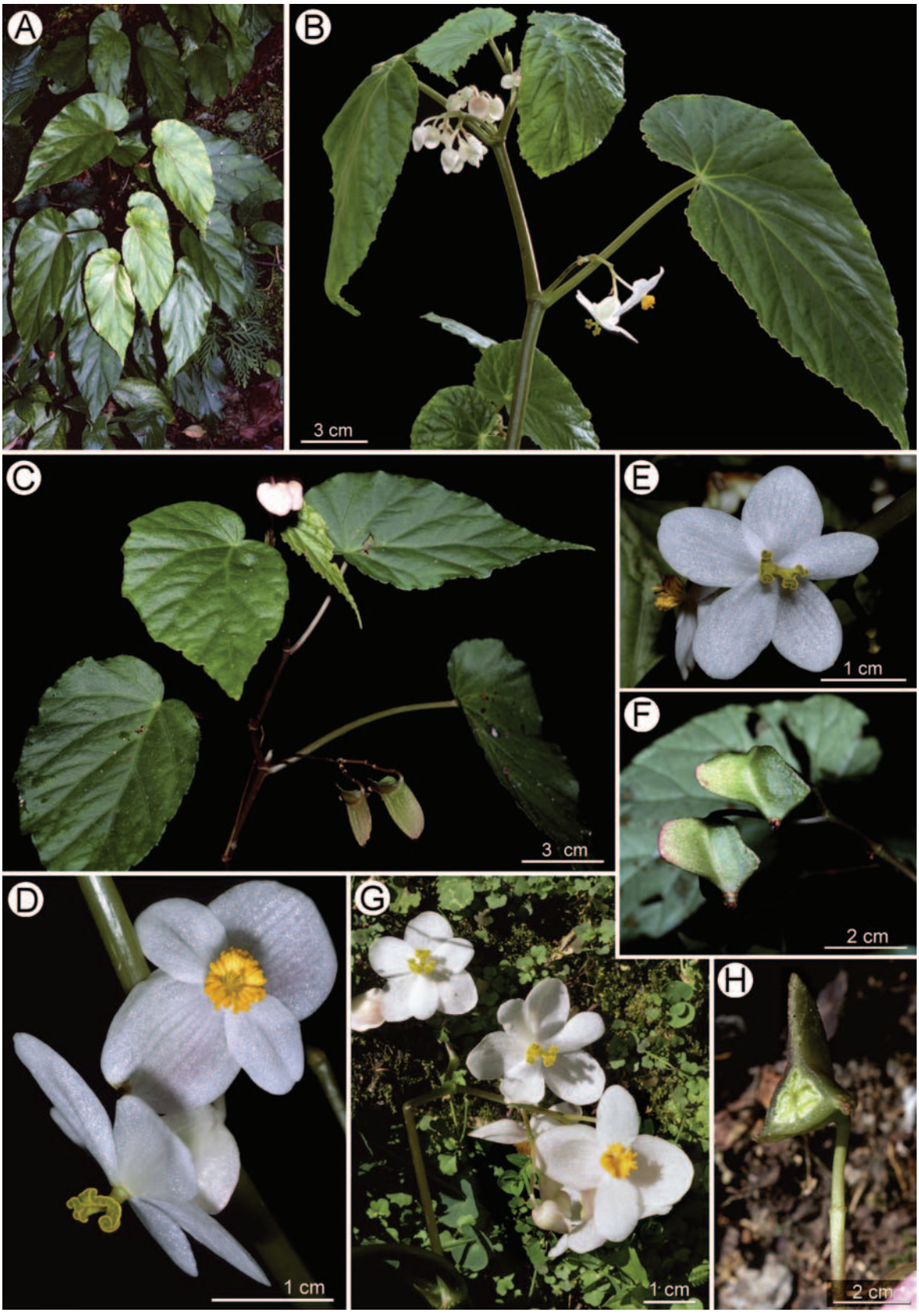


**Figure 14.** *Begonia wutaiana* C.-I Peng & Y.-K. Chen. A, Habit. B, Plant at anthesis. C, Plant with staminate flowers and fruits. D, Staminate and carpellate flowers. E, Carpellate flowers. F, Capsules. G, Inflorescence of abnormal individual (*Leong 2990*, HAST) with staminate flower (below), and two carpellate flowers (middle: 2-styled; upper: 3-styled). H, Cross section of young fruit of *Leong 2990*, showing two normal locules (below) and one reduced locule (above).

2. Plants with moniliform rhizomes, stolons absent; staminate flowers with 4 tepals; carpellate flowers with 3 tepals ..... *B. austrotaiwanensis*

1. Stems perennial, evergreen; plants rhizomatous or erect; carpellate flowers with 5-6 (-10) tepals.
3. Rhizomes rather short or poorly developed; aerial stems always present.
4. Peduncle less than 2 cm long; tepals of carpellate flowers 6; fruit berry-like, wingless ..... *B. longifolia* Bl. [syn: *B. aptera* Bl., cf. Tebbit, 2003]
4. Peduncle 7 cm long or more; tepals of carpellate flowers usually 5, rarely 6 (-10); fruits capsular, 3-winged.
5. Aerial stem well-branched, with secondary or even tertiary branches; leaves 7-14 × 2-4 cm; petiole to 4 cm long ..... *B. taiwaniana*
5. Aerial stem unbranched or with very few branches, secondary branches lacking; leaves 9-33 × 4-16 cm; petiole 5-33 cm long.
6. Anthers narrowly oblong to oblanceolate, 2.9-3.2 mm long..... *B. chuyunshanensis*
6. Anthers narrowly obovate to broadly oblanceolate, 1.9-2.9 mm long.
7. Styles 2; ovary locules 2..... *B. wutaiana*
7. Styles 3; ovary locules 3..... *B. lukuana*
3. Rhizomes creeping, elongated, well developed; aerial stems present or absent.
8. Inflorescences arising directly from rhizome.
9. Styles 2; ovary locules 2..... *B. bouffordii*
9. Styles 3; ovary locules 3..... *B. fenicis*
8. Inflorescences arising from aerial stem.
10. Outer tepals and ovary pubescent; leaves markedly pubescent.
11. Young shoots, petiole and lower leaf surface rusty lanate; leaves distinctly palmately lobed ..... *B. palmata*
11. Young shoots, petiole and lower leaf surface not lanate; leaves indistinctly lobed or lobeless.
12. Upper surface of leaves sparsely pubescent to tomentulose; staminate flower buds dropping precociously ..... *B. nantoensis*
12. Upper surface of leaves pilose to pilose-sericeous; staminate flower buds opening normally ..... *B. pinglinensis*
10. Outer tepals and ovary glabrous; leaves glabrous or nearly so.
13. Styles 3; ovary locules 3.
14. Leaves broadly ovate to suborbicular; pedicel of carpellate flowers with a pair of bracteoles; anthers 1.9-2.3 mm long; abaxial wing of capsule to 5 mm long ..... *B. tengchiana*
14. Leaves lanceolate to ovate; pedicel of carpellate flowers lacking bracteoles; anthers 2.9-3.2 mm long; abaxial wing of capsule 18-24 mm long ..... *B. chuyunshanensis*
13. Styles 2; ovary locules 2.
15. Leaves palmately lobed; abaxial wing of capsule triangular, 7-16 mm long ..... *B. formosana*
15. Leaves entire to serrulate or denticulate, but not palmately lobed; abaxial wing of capsule rotund to orbicular, 18-26 mm long.
16. Aerial stems to 8 (-15) cm long; leaves subcoriaceous ..... *B. bouffordii*
16. Aerial stems 40-95 cm long; leaves herbaceous ..... *B. chitoensis*

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# 台灣秋海棠屬五新種植物

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本文報導特產於台灣的五個秋海棠新種：九九峰秋海棠（*Begonia bouffordii*）、坪林秋海棠（*Begonia pinglinensis*）、霧台秋海棠（*Begonia wutaiana*）（以上屬於扁果組，sect. *Platycentrum*），出雲山秋海棠（*Begonia chuyunshanensis*）、藤枝秋海棠（*Begonia tengchiana*）（以上屬於秋海棠組，sect. *Diploclinium*），並提供線繪圖與彩色照片以資辨識。台灣目前已知的原生秋海棠共17種，本文另製作檢索表以利鑑別。

**關鍵詞：**九九峰秋海棠；出雲山秋海棠；坪林秋海棠；藤枝秋海棠；霧台秋海棠；秋海棠科；新種；台灣；植物分類學。