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THE BORAGINACEAE OF TAIWAN

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In the present paper, 20 species are treated under 10 genera. Descriptions of the family and of each of the genera together with analytical keys to genera and species respectively are given. A description is also given to each species.

Among the genera studied, *Cynoglossum* is particularly difficult. There are three species in Taiwan, distributed from the lowlands to the mountains. They differ from each other only in external appearance and vegetative characters. Intermediate forms, apparently due to ecological conditions, are sometimes met with. The present treatment of this genus is only tentative and is not at all satisfactory. Further study, especially observation in the field, is needed.

An interesting case is *Bothriospermum tenellum* Fish. et Mey. var. *majusculum* Hay.. This was treated by S. Suzuki as *Bothriospermum majusculum* (Hay.) Suzuki, who considered that on ecological grounds, the latter differs entirely from *Bothriospermum tenellum*. On examining the specimens which were cited by Suzuki, I have found that the nutlets are goblet-like. This plant is thus not a *Bothriospermum*, but is actually *Thyrocarpus Samsonii* Hance.

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BORAGINACEAE

Herbs, shrubs or trees, glabrous or often scabrid or hispid; leaves alternate or very rarely opposite, simple, mostly entire; stipules absent; inflorescence often in terminal scorpioid cymes, sometimes spike-like or corymbose; flowers actinomorphic or rarely oblique, mostly perfect; calyx-lobes imbricate or rarely valvate, subentire, or 5- rarely 4- to 8-lobed or toothed, usually persistent; corolla tubular with contorted or imbricate lobes; stamens the same number as the corolla-lobes and alternate with them, inserted on the corolla-tube, the anthers 2-celled, opening lengthwise; disc present or obsolete; ovary superior, 2-celled or 4-celled by spurious septa, entire or deeply 4-lobed, the style terminal or from the middle of the lobes (gynobasic), the stigma 2-4-lobed, distinct, or 1 truncate, the ovules paired, erect or spreading from the central axis; fruit a small drupe or of 4 nutlets;

seeds with or without endosperm, and with straight or curved embryos.

A family with about 85 genera, and more than 1250 species, distributed in most parts of the world; 10 genera and 20 species are found in Taiwan.

Key to the genera

A. Shrubs, trees or scandent; fruits fleshy.

B. Leaves entire or subentire or repand-crenate.

C. Leaves entire; stigma distinct or slightly 2-lobed.

D. Inflorescence cymous; stigma distinctly 2-lobed.

.....1. *Ehretia* (in part)

DD. Inflorescence spicate, paniced, or scorpioid; stigma slight/v 2-lobed

.....2. *Tournefortia*

CC. Leaves subentire or repand-crenate; stigma 4-lobed

.....3. *Cordia*

BB. Leaves serrate.....1. *Ehretia* (in part)

AA. Herbs; fruits dry.

B. Leaves dentate.....4. *Coldenia*

BB. Leaves entire.

C. Scales absent in the throat of the corolla-tube.

D. Inflorescence scorpioid; calyx not enlarged in fruit; style very short, under 1.5mm. long.....5. *Heliotropium*

DD. Inflorescence not scorpioid; calyx much enlarged in fruit, about 2 cm. long, 1 cm. wide; style long, 1 cm. long

.....6. *Trichodesma*

CC. Scales present in the throat of the corolla-tube.

D. Nutlets goblet-like.....7. *Thyrocarpus*

DD. Nutlets not hollowed above.

E. Nutlets inserted by their tip, compressed, glochidiate, with pointed hooking, ovate or subglobose

.....8. *Cynoglossum*

EE. Nutlets inserted by their inner center, short glochidiate, not hooking.....9. *Bothridiospermum*

EEE. Nutlets inserted by their base, not compressed, smooth, obpyramidal.....10. *Trigonotis*

1. *Ehretia* Linn., Syst. ed. 10. 936. 1759; Benth. et Hook. f., Gen. Pl. 2:840. 1876.

Shrubs or trees, scabrous or glabrous; leaves alternate, entire or dentate,

petiolate; inflorescences of cymes or panicles, axillary or terminal, rarely peduncled, axillary, 1-flowered; flowers small, white; calyx sub-5-partite; corolla campanulate or subrotate, the tube short or cylindric, the lobes 5, imbricated in the bud, patent or reflexed; stamens 5, inserted on the corolla-tube, alternate with the corolla-lobes, the anthers ovate or oblong, exserted, rarely included; ovary globose, 2-celled, the cells 2-ovulate; style terminal, cylindric, bifid or bipartite, the stigmas small, capitate; drupe small, subglobose, 4-(or by suppression 3-1-) seeded; pyrene one 4-celled, or two 2-celled, or four 1-celled; 3-1 pyrenes or cells not rarely suppressed; seeds straight, the testa thin, the albumen scanty.

Species about 50, all tropical, mostly in the Old World; 5 in the Taiwan.

Key to the species

- A. Leaves serrate.
 - B. Corolla-lobes over $\frac{3}{4}$ the length of the corolla; fruit small, about 3 mm. in diameter; leaves glabrous or the veins hirtellous on the under surface1. *E. thyrsiflora*
 - BB. Corolla-lobes less than $\frac{1}{2}$ the length of the corolla; fruit 10 mm. in diameter; leaves densely tomentose on the under surface2. *E. Dicksonii*
 - AA. Leaves entire or with few dentations near the apex.
 - B. Leaves with few dentations near the apex, small, 1-2.5 cm. rarely 3.5 cm. long; cymes axillary or terminal, 1-3-flowered....3. *E. microphylla*
 - BB. Leaves entire, larger than the above, over 5 cm. long; cymes terminal, densely flowered.
 - C. Plant glabrous; calyx-lobes ovate, much shorter than the fruit4. *E. longiflora*
 - CC. Plant hairy; calyx-lobes linear, longer than the fruit5. *E. resinosa*
1. ***Ehretia thyrsiflora*** (Sieb. & Zucc.) Nakai, Trees Shrub. Jap. 1:327. *t.* 179. 1922, Fl. Sylv. Kor. 14:20. *t.* 4. 1923, in Journ. Arnold Arbor. 5:38. 1924.
- Cordia thyrsiflora* Sieb. & Zucc. in abh. Akad. Muench. 4:150. *pl.* 3. (Fl. Jap. Fam. Nat. 2:26) 1846.
- "*Ehretia acuminata*" sensu Hemsli. in Journ. Linn. Soc. Bot. 26:144. 1890; Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:253. (Enum. Pl. Formos.) 1906; Gagnepain & Courchet in Lecomte, Fl. Gén. Indo-

chin. 4:209. 1914; Wilson in Sargent, Pl. Wilson. 3:363. 1916; Kanehira, Formos. Trees ed. 1. 381. 1918 non R. Brown

Ehretia taiwaniana Nakai in Journ. Arnold Arbor. 5:38. 1924, Trees Shrub. Jap. ed. 2. 445. 1927; Kanehira, Formos. Trees ed. 2. 639. t. 596. 1936; Mori in Masamune, Short Fl. Formos. 178. 1936; *syn. nov.*

Trees of moderate size; leaves oblong or elliptic, the apex acute or mucronate, the base rounded or subcordate, 6-14.5 cm. long, 2-6 cm. wide, subcoriaceous, glabrous or scattered scabrous-strigose above, the veins hirtellous beneath, the margins serrulate, sometimes subentire or subduplicate serrate, the midrib slightly impressed and the veins distinct above, the midrib and veins elevated beneath, the primary veins 5-9 on each side of the midrib, the petiole 1.5-2 cm. long, furrowed; inflorescence thyrsoid, the base naked or leaved, 3-20 cm. long, the branchlets pilose, becoming glabrescent; flowers dense, sessile or short pedicelled, fragrant; calyx 5-lobed, the lobes orbicular or ovate-orbicular, 1 mm. long and wide, glabrous, the margins ciliolate; corolla white, the tube very short. 1.5 mm. long, the lobes oblong, obtuse, 3 mm. long, reflexed; stamens exserted, the filaments linear, 9.5 mm. long, the base affixed to the corolla tube, the anthers ovate-oblong, apiculate, versatile, 1 mm. long, the connectives not protruded; ovary oval, 1.2 mm. long, 1 mm. wide, the style linear, 2.5 mm. long, the apex bifid, divergent, the stigma truncate, 2-celled, each 2-ovuled; fruit a drupe, small, spherical, 2 mm. in diameter, orange in color, the pyrenes 2, each 2-celled, the cells 1-seeded.

China Proper: Yunnan, Wang 73726, 75477, 75826, 75379; Kwangtung: Chun 5318, 5320.

Taiwan: Kosyun, Suzuki 6068; Ako, Kawakami, 1677; Tainan, Mori 396, 397; Taipei, Fukuyama 1428; Sintiku, Suzuki 20437; Senjozan, Masamune 1383.

Liukiu. Okinawa Kaneshiro 600.

Hongkong: Lantau Isl., Tso 20121, Tsiang 1787.

Distribution: India, Indo-China, China proper, Japan, Liukiu, Taiwan and Philippine at low altitudes, in subtropical and tropical regions.

The type of *E. acuminata* Brown was from Australia. Hemsley is the first one who recorded the plant as also found in China, being distributed in Shanghai, Chekiang, Hupeh, Kwangtung, Hainan, Liukiu and Taiwan. Although E. H. Wilson stated that "the Chinese specimens (of *Ehretia acuminata*) agree with Bentham's full description of Brown's species", he was skeptical as to the two being conspecific for their ranges are very different.

Nakai first treated the Chinese materials of "*E. acuminata*" *sensu* Hemsley (non Brown) as a synonym of *E. thyriflora* Nakai. He recorded the plant as distributed in Kyushu, Japan, and China: Shantung, Honan, Hupeh, Kiangsu, Hunan and Yunnan. Later at the Arnold Arboretum, he examined all

the materials of *Ehretia acuminata* and allied species, as well as those from Australia. He concluded that "the most important character distinguishing *acuminata* from allied species is the shapes of the anthers. In "*E. acuminata* they are roundish and the connective is not produced while in the other species they are oblong and the connective exceeds the anther-tips". He treated a part of the material of "*E. acuminata*" *sensu* Hemsley, in addition to *E. thyrsoflora*, as *Ehretia taiwaniana* Nakai, and gave an analytical key to distinguish it from allied species. According to the record given by him, *E. taiwaniana* is distributed in the southern part of Taiwan, Liukiu, Kwangtung, Yunnan, Kwangsi and Hupeh.

After examining the descriptions of *E. acuminata* of Brown, Clark and Gagnepain & Curchet and all the available specimens of Taiwan, Kwangtung and Yunnan, I agree with the opinion of E. H. Wilson, that Asiatic plants differ from Australian ones. However, I think that specimens from India, Indo-china, China proper, Korea, Japan, Liukiu and Taiwan all belong to a single species. It is a species of low altitudes in tropical and subtropical regions of eastern Asia. Materials from Yunnan and Kwangtung are similar to Taiwan specimens in general appearance as well as in floral and fruiting characters. From both morphological characters and geographical distribution, the eastern Asiatic plants prove to be of one species. Nakai's analytical key to *E. thyrsoflora* and *E. taiwaniana* fails to disclose any distinct differentiating characters between the two and instead it shows that the two are actually conspecific.

2. ***Ehretia Dicksonii*** Hance in Ann. Sci. Nat. Sér. 4(18):224. 1862.

var. **typica** Nakai in Journ. Arnold Arb. 5:40. 1924; Kanehira, Formos. Trees. ed. 2. 635. t. 592. 1936; Mori in Masamune, Short Fl. Formos. 178. 1936.

"*Ehretia macrophylla*" *sensu* Matsum. in Bot. Mag. Tokyo 12:83. 1898; Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:254. (Enum. Pl. Formos.) 1906; *non* Wall.

A small deciduous tree; branchlets scattered pilose; leaves broadly ovate, elliptic, or obovate, 10-15 cm. long, 7.5-10 cm. wide, the apex acute or obtuse; the base rounded or cordate, the margins serrate, scattered strigose on the upper surface, densely pubescent on the under surface, the midrib and veins slightly elevated on the upper and elevated on the under surfaces, the primary veins of 5-7 pairs, the petiole furrowed above, 1-1.5 cm. long; cymes terminal, many-flowered, the ultimate pedicel 1-3 mm. long; calyx 5-lobed, cleft to the base, the lobes oblong, 5 mm. long, 1.5 mm. wide, the apex acute-obtuse, densely

hirtellous on both surfaces; corolla white, the tube 6 mm. long, 5-lobed, the lobes oblong or suborbiculate, 4.5 mm. long, 2.5-4 mm. wide, hirtellous on the outer surface; stamens 5, excluded, the filaments filiform, the free parts 3 mm. long, the anthers oblong, 1.5 mm. long, versatile; pistil 8.5 mm. long, scattered hirtellous, the stigma bifid, the apex truncate; fruit globose, 10 mm. in diameter, orange-colored, 2-seeded.

Taiwan: Kosyun, *Kawakami* 5820; Garanbi, *Kudo & Mori* 16121; Takao, *Moritani* s. n., May 30, 1937; Taito, *Yamamoto & Mori* 304; Taipei, *Suzuki* 4320, 7608; Sintiku, *Kudo & Suzuki* 146.

Liukiu: Miyako-jima, *Masamune & Mori* 2519.

Distribution: Liukiu.

This plant is easily distinguished by the characteristic leaves which are large, broad, ovate or elliptic, with serrate margins, and bearing scattered short stiff strigose hairs on the upper surface and dense pubescence on the under surface. It also has the largest globose berry among this family in Taiwan.

3. *Ehretia microphylla* Lam., *Tabl. Encycl.* 1:425. 1791-97; Merr., *Enum. Philip. Fl. Pl.* 3:374. 1923; Kanehira, *Formos. Trees* ed. 2. 637. t. 594. 1936; Mori in *Masamune, Short Fl. Formos.* 178. 1936; Tanaka & Odashima in *Journ. Soc. Trop. Agr.* 10:380. 1938.

Ehretia buxifolia Roxb., *Pl. Coromandel* 1:42. t. 57. 1795; DC., *prodr.* 9:509. 1845; Clark in *Hook. f., Fl. Brit. Ind.* 4:144. 1883; Matsum. in *Bot. Mag. Tokyo* 12:84. 1898; Matsum. & Hay., in *Journ. Coll. Sci. Imp. Univ. Tokyo* 22:255. (*Enum. Pl. Formos.*) 1906.

A small evergreen shrub, 2 m. high; branchlets hairy; leaves fascicled, obovate or ovate, 1-2.5 cm. rarely to 3.5 cm. long, 0.5-1 cm. rarely to 1.5 cm. wide, the blade rough with short stiff hairs from white cystolith cells on the upper surface, pale and setose on the under surface, the apex obtuse, the margins entire or with a few obtuse dentations at the apex, the base attenuate, subsessile, the midrib impressed above, elevated below, the veins indistinct above, plain but distinct below, the primary veins of 2 or 3 pairs; flowers short-pedicelled, axillary, or terminal, solitary or in cymes of 2-3-flowers, pedunculate, 0.5-12 mm. long, hairy; calyx 5-lobed, linear, 3.5 mm. long, hairy; corolla-tube campanulate, white, 6 mm. long, 5-lobed, the lobes 4 mm. long, orbiculate, the apex obtuse; stamens 5, slightly exserted, the filaments linear, the free parts 1.5 mm. long, the anthers oblong, 2 mm. long; ovary subglobose, 1 mm. in diameter, 2-celled, the style 4 mm. long, deeply 2-lobed, the lobes 3 mm. long, the stigma truncate; fruit globose, 4 mm. in diameter, yellowish or scarlet when ripe; 1-seeded.

Taiwan: Takao, *Hosokawa* 1789, 1791, 1792; Tainan, *Mori* 314.

Distribution: India, Malaya, Indo-china, Philippine, Hainan, China Proper to Liukiu.

This distinct plant is distinguished from other species of the genus by the remarkably small leaves which are entire or with few obtuse teeth at the apex, and bearing short stiff hairs from white cystolith cells on the upper surface.

4. *Ehretia longifolia* Champ. ex Benth. in Hook. Kew. Journ. Bot. 5:58. 1853; Benth., Fl. Hongk. 234. 1861; Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:255. (Enum. Pl. Formos.); 1906. Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26:145. 1890; Gaguepain & Courchet in Lecomte, Fl. Gén. Indo-Chin. 4:210. 1912; Kanehira, Formos. Trees ed. 2. 637. t. 593. 1936; Mori in Masamune, Short Fl. Formos. 178. 1936.

"*Ehretia laevis*" sensu Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:254. (Enum. Pl. Formos.) 1906. non Roxb.

Ehretia glaucescens Hay., Icon. Pl. Formos. 3:255. 1913.

A glabrous tree; leaves elliptical or obovate-oblong, the apex abruptly acuminate or short-caudate, the base attenuate, 5-11 cm. long, 2.5-4 cm. wide, in living state greenish and shining above, glaucous below; charataceous-membranaceous, in dry specimens opaque, entire, the primary veins of 4-5 pairs, the midrib and veins on both blades slightly elevated, the petioles 5-10 mm. long, furrowed, shorter than the leaves, the peduncle 1.5-3 cm. long, the ultimate pedicel 1.3 mm. long, articulate; calyx cup-shaped, 5-lobed, the lobes ovate, 1-2 mm. long, the margins entire or subciliate; corolla funnel-shaped, the tube 7 mm. long, 5-lobed, the lobes obovate or oblong, the apex obtuse, 3 mm. long; stamens 5, long-exserted, the filaments linear, the free parts 5 mm.-1 cm. long, affixed to the corolla-tubes, the corolla-tubes, the anthers subglobose, versatile, 1 mm. long; ovary ovoid, 1 mm. long, glabrous, 2-celled, the style filiform, 7-8.5 mm. long, the apex 2-lobed, the lobes 1-2 mm. long, the stigma truncate; fruits glabrous, 6 mm. in diameter, 2-pyrened; seeds 2 or 3.

Taiwan: Mt. Hsiran. Kosyun, Yamada, 1560; Kosyun, Kudo & Suzuki 16074; Taichu, Yamamoto & Mori s. n., Nov. 2-3, 1932; Taipei, Suzui 18203, 18178; Sintiku, Suzuki 20197.

Distribution: Hainan, Indo-China, and Hongkong.

This is a glabrous plant which is characterized by a short calyx and a long corolla-tube and by the long-exserted stamens and pistil. The corolla-tube is about 7 times the length of the calyx.

5 *Ehretia resinosa* Hance in Journ. Bot. 299. 1880; Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26:146. 1890; Matsum. in Bot. Mag. Tokyo 12:84. 1898; Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:254. (Enum.

Pl. Formos.) 1906; Kanehira, Formos. Trees ed. 2. 639. t. 595. 1936; Mori in Masamune, Short Fl. Formos. 178. 1936.

Ehretia formosana Hemsl. in Journ. Linn. Soc. Bot. 26:144. 1890; Matsum. in Bot. Mag. Tokyo 12:84. 1898; Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:254. (Enum. Pl. Formos.). 1906.

Tree or shrub; flower-bearing branches thick-pubescent; leaves chartaceous, broadly ovate, obovate or rarely nearly orbiculate, 6-16 cm. long, 4-10 cm. wide, the apex acute, the base rounded, minutely hairy above, softly pubescent below, the midrib impressed above, elevated below, the primary veins of 5-6 pairs, plain but distinct above, elevated below, the margins entire or with few teeth at the apex, petiolate, the petiole 1-2 cm. long; flowers in cymes, terminal, dense-flowered, about 6 cm. in diameter, laxly arranged, the peduncle 1-3 cm. long, the ultimate pedicel 0.25-0.5 cm. long, densely pubescent; calyx pubescent, the segments linear, hairy on the outside, glabrous on the inside, 3.5 mm. long, 0.7 mm. wide, the apex acute; corolla tubular, the tube as long as the corolla-segments, 3 mm. long, 5-lobed, the lobes ovate, the apex obtuse, glabrous; stamens 5, attached to the upper half of the corolla-tube, the filaments linear, 3 mm. long, the anthers more or less diverging, versatile, 2.3 mm. long; ovary ovoid, 1.5 mm. long, 2-celled, the style linear, 4.5 mm. long, the stigma capitate; fruit a berry, globose, with persistent calyx-lobes at the base longer than the fruit, about 7 mm. long and 5 mm. in diameter; seeds 4.

Taiwan: Takao, Yamada, s. n., 1916; Liukiusyo, Takao, Hosokawa 1772, 1785, 1786; Takao, Kudo & Suzuki 129; South Cape, Kuso & Suzuki 15825; Kosyun, Yamada, 1558; Garanbi, Masamune 1617, 1621; Usho, Kudo & Suzuki s. n., Dec. 28, 1928; Naibun, Kudo & Mori 1566; Taito, Yamamoto & Mori 116.

Distribution: Endemic.

The types of *E. resinosa* and *E. formosana* are both from the southwestern part of the island. As they cannot be distinguished from each other, Kanehira is justified in combining them.

This species is endemic to the southern part of the island along the seashore in Kosyun Peninsula and Takao. It is characterized by the long linear calyx-lobes and the fruits which are globose and enclosed by persistent calyx-lobes.

2. *Tournefortia* Linn., Sp. Pl. 140. 1753; Benth. & Hook. f., Gen. Pl. 2:843. 1876.

Trees or shrubs, often rambling or scandent; leaves alternate, entire; inflorescence terminal, rarely lateral or extraaxillary, dichotomous, scorpioid; flowers numerous, small, dense, sessile or very shortly pedicelled, ebracteate, white

or greenish-yellow; sepals 5 or 4, lanceolate or ovate; corolla-tube cylindric or short, naked in the throat, the lobes 5 or 4, small, patent; stamens 5 or 4, included in the tube, the filaments short, the anthers oblong, ovary 4-celled; style terminal, short, shortly 2-lobed; ovules 1 in each cell; fruits small, ovoid, scarcely fleshy, somewhat drupe-like, not distinctly separating into 2 or 4 pyrenes, the pyrenes two 2-celled, 2-seeded; seeds straight or curved, albuminous.

About 100 species distributed in the tropics of both hemispheres; two species are found in Taiwan.

Key to the species

- A. Leaves obovate or spatulate, nearly sessile, the apex obtuse, the base attenuate densely sericeous on both surfaces.....1. *T. argentea*
 AA. Leaves ovate or ovate-oblong, petiolate, the apex acute, the base rounded; scattered hirtellous on the upper surface and strigose-hirsute on the under surface.....2. *T. sarmentosa*

1. ***Tournefortia argentea*** Linn. f., Suppl. 133. 1781; DC., Prodr. 9:514. 1845; Clarke in Hook. f., Fl. Brit. Ind. 4:145. 1883; Maxim. in Mém. Biol. 8:540. 1873; Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26:146. 1890; Miq., Fl. Ind. Bat. 2:926. 1858; Henry in Journ. Asiat. Soc. Jap. 24. Suppl. 62. (List Pl. Formos.) 1895; Matsum. in Bot. Mag. Tokyo 12:84. 1898; Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:256. (Enum. Pl. Formos.) 1906; Gagnepain & Courchet in Lecomte, Fl. Gén. Indo-chin. 4:215. 1912; Merr., Enum. Philip. Fl. Pl. 3. 1923; Kanehira, Formos. Treeé ed. 2. 640. t. 597. 1936; Mori in Masamune, Short Fl. Formos. 179. 1936.

A tree; branchlets sericeous; leaves densely sericeous, alternate, the terminals whorled, obovate or spatulate, fleshy, 10-19 cm. long, 4-7 cm. wide, the apex obtuse, the base attenuate, nearly sessile, the veins distinct on both surfaces, the primary veins of 2-4 pairs; inflorescences terminal, scorpioid, branched, the flowers dense and sessile, 4 mm. in diameter; calyx 5-lobed, densely sericeous on the outer surface, the margins long-ciliate, ovate, 1.5 mm. long; corolla-tube 3.5 mm. long, 5-lobed, the lobes orbiculate, 1.5 mm. long; stamens 5, ovate, the apex acute, 1.5 mm. long, sessile; ovary ovoid, 0.5 mm. long, 4-celled, each 1-ovuled, the style ring-like, the stigma slightly 2-lobed; globose, 2-pyrened, each 2-celled, each cell 1-seeded.

Taiwan: Garanbi, Hibino et Suzuki 12479, Matuda 1564; South Cape, Kudo et Suzuki 15826; Hukikaku, Suzuki 4768, Masamune 778; Tamsui, Simada 60340; Liukiusyo, Hosokawa 1773, 1774.

Liukiu: Okinawa, *Kudo s. n.*, Nov. 1906.

Distribution: Tropical Asia to Madagascar, Malaya, tropical Australia and Polynesia.

The present species is a characteristic tree along the sandy seashore. It is characterized by its fleshy leaves which are densely sericeous on both surfaces.

2. ***Tournefortia sarmentosa*** Lam., Illustr. 1:416. n. 1877; DC., Prodr. 9:516. 1845; Miq., Fl. Ind. Bat. 2:927. 1858; Forbes. & Hemsl. in Journ. Linn. Soc. Bot. 26:146. 1890; Matsum in Bot. Mag. Tokyo 12:84. 1898; Henry in Journ. Asiat. Soc. Jop. 24. Suppl. 62. (List Pl. Formos.) 1895; Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:256. (Enum. Pl. Formos.); 1906 Gagnepain & Courchet in Lecomte, Fl. Gén. Indo-chin. 4:216. 1912; Merr., Enum. Philip. Fl. Pl. 3:377. 1923; Mori in Masamune, Short Fl. Formos. 179. 1936.

Climbing, the branches strigose hairy; leaves chartaceous, ovate or ovate-oblong, 8-11 cm. long, 3.5-5 cm. wide, the apex acute, the base rounded, the upper surface scattered hirtellous, the under surface strigose-hirsute, the veins impressed above, elevated below, the primary veins of 5-7 pairs, the petioles 1.5 cm. long; flowers spicate, scorpioid, dichotomously branched; calyx 5-lobed, the lobes ovate, 1.5 mm. long, acuminate, shortly hirsute; corolla salver-form, the tube 4.5 mm. long, 5-lobed, the lobes suborbiculate, 1.5 mm. long, rotate, the apex mucronate, hirsute on the outside; stamens 5, oblong, 1.2 mm. long, included, sessile; ovary ovoid, 4-celled, each 1-ovuled, 0.8 mm. long, the style cylindric, 0.5 mm. long, the stigma slightly 2-lobed, the lobes truncate; fruit subglobose, glabrous, of 4 pyrenes, each 1-seeded.

Taiwan: Tainan, *Simada s. n.* Aug. 21, 1908, Mori 317; South Cape, *Kudo & Suzuki* 15756; Garanbi & Senpanseki, *Fukuyama* 672; Garanbi, *Suzuki* 6064; Takao, *Suzuki s. n.*, May 8, 1921; Liukiusyo, *Hosokawa* 1771, 1778, 1779.

Distribution: Mauritius to Indo-china, Malaya, Taiwan, Philippine, and tropical Australia.

This is a scandent plant that has remarkable scorpioid-branched cymes. It can be easily recognized by the characteristic salver-form flowers.

3. ***Cordia*** Linn., Gen. Pl. 52. 1829; Benth. & Hook. f., Gen. Pl. 2:838. 1876.

Trees or shrubs, sometimes scandent; leaves alternate, rarely subopposite, petioled, often repant or undulate; flowers in dichotomous cymes or clusters, ebracteate, polygamous, those with perfect flowers smaller than those with male ones; calyx tubular or campanulate, the teeth very short, of the irregular, in fruit accrescent and persistent; corolla tubular, 4-8-lobed, patent or recurved,

white or yellow; stamens 4-8, the filaments often hairy at the base; the anthers shortly exserted; ovary 4-celled, glabrous; style terminal, long, bipartite, branched again, bipartite, linear or subspathulate; cells 1-ovuled; drupe ovoid or ellipsoid or mucilaginous, the putamen bony, the cells 1-4, usually 1 fertile; seeds exalbuminous.

About 180 species distributed in all tropical countries; two species are found in Taiwan.

Key to the species

- A. Leaves lanceolate-ovate, 7-12 cm. long, 3.5-4 cm. wide, the margins subentire or remotely serrate, the teeth acuminate; style slightly 4-lobed; ovary incompletely 4-celled; fruit elliptic.....1. *C. Kanehirai*
 AA. Leaves broad-ovate or broad-obovate, 9-15 cm. long, 5.5-10 cm. wide, the margins subentire or repand-crenate, the teeth never acuminate; style deeply 4-lobed; ovary 4-celled; fruit globose.....2. *C. dichotoma*

1. ***Cordia Kanehirai*** Hay., Icon. Pl. Formos. 6:31. 1916; Kanehira, Formos. Trees ed. 2. 634. t. 591. 1986; Mori in Masamune, Short Fl. Formos. 178. 1936.

A small deciduous (7) tree, about 6 m. in height; branchlets ash-grey, hirsute; leaves lanceolate-ovate, 7-12 cm. long, 3.5-4 cm. wide, the apex acuminate, the base acute or obtuse, the margins subentire or remotely serrate, the teeth acuminate, scabrous on both surfaces, the midrib and veins elevated on both surfaces, the primary lateral veins of 5-6 pairs, scattered hirtellous on both surfaces, the petiole 7-20 mm. long; flowers short-cymose, dense-flowered, dense-hirtellous; calyx-tube cylindrical, 4 mm. long, 2.5 mm. wide, 10-furrowed, the exterior dense-hirtellous, slightly 5-lobed, the lobes broad-triangular, 1.5 mm. long, the apex acute; stamens 5, sessile, affixed on the throat of the corolla; pistil 3 mm. long, the ovary ovoid, incompletely 4-celled, each 1-ovuled, the style short, the stigma slightly 4-lobed; fruit ellipsoid, 13 mm. long, 7 mm. wide, 1- or 2-pyrened, the pyrene oblique-elliptic, obtuse on both ends, with large obtuse spinous-tubercles on the surface, the testa hard.

Taiwan: Kosyun, Matuda 1553.

Distribution: Endemic.

This species has a characteristic calyx-tube which bears 10 furrows on the surface, and a seed which is oblique-elliptic in form and with irregular obtuse spinous-tubercles on the surface.

2. ***Cordia dichotoma*** Forst. f., Prodr. 18. 1786; Blanco., Fl. Filip. ed. 2. 123.

1845; Merr., Enum. Philip. Fl. Pl. 3:373. 1923; Kanehira, Formos. Trees ed. 2. 633. *t.* 590. 1936; Chen Illust. Man. Chin. Trees Shrub. 1087. 1937; Tanaka & Odashima in Journ. Soc. Trop. Agr. 10:380. 1938. *Cordia obliqua* Willd. in Phytogr. 4. *t.* 4. 1794; Wight, Icon. Pl. Ind. Orien. *t.* 1738. 1850; Gagnepain & Courchet in Lecomte, Fl. Gén. Indo-chin. 4:200. 1912; Hutchinson in Kew Bull. 221: *t.* 2. 1918.

"*Cordia Myxa*" sensu Matsum. In Bot. Mag. Tokyo 12:83. 1898; Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:253. (Enum. Pl. Formos.) 1906.; Kanehira, Formos. Trees ed. 1. 379. 1917; Mori in Masamune, Short Fl. Formos. 178. 1936; *non* Linn.

A medium-sized deciduous tree; branchlets hirsute; leaves broad-ovate, oblong or obovate, 9-15 cm. long, 5.5-10 cm. wide, glabrous or obscurely scarbrous above, scarbrous often hairy on the midrib and veins beneath, the margins sinbentire or undulate repand-crenate, the teeth never acuminate, the apex shortly and bluntly acute or obtuse, the base cuneate or subrounded, the midrib and veins distinct and smooth above, elevated beneath, the petiole furrowed above, 2-3 cm. long; flowers dichotomous-cymose, terminal or axillary; calyx campanulate, slightly irregularly 2-3-lobed, densely hairy on both surfaces, 4 mm. long, 3 mm. wide; corolla yellowish-white, 7 mm. in diameter, the tube 3-5 mm. long, the throat villous, 5-lobed, the lobes oblong, reflexed, 3.5 mm. long, 2.5 mm. wide, the apex obtuse; stamens 5, attached to the corolla-throat, the filaments short, the base villose, 0.5 mm. long, the anthers oblong, 1.5 mm. long; ovary ovoid, 3 mm. long; ovary ovoid, 3 mm. long, 1.5 mm. wide, glabrous, 4-celled, the cells 1-ovuled, the style very short, the stigma deeply 4-lobed, the lobes 4 mm. long, linear, expanded at the apex, the external surface convex, smooth, the inner surface plain, rugose; fruit a drupe, globose, 72 mm. in diameter, 1-seeded, the endocarp wrinkled, the mesocarp a mucilaginous pulp, the persistent calyx broadly funnel-shaped, accrescent, about 8 mm. in diameter.

Taiwan: Taipei, Kawakami & Mori 4681, Suzuki 4320, Simada 1352; Tainan, Mori 325; Takao, Hosakawa 1780, 1781, 1782, 1783; Sizangan, Taipei, Mori s. n., May 14, 1933.

Distribution: India, Indo-china, China proper, Hainan, Taiwan to Philippine.

Merrill, in his Enumeration of Philippine Flowering Plants 3:373, treated *Cordia obliqua* Willd. and "*Cordia Myxa*" sensu Clark. *non* Linn. as synonyms of *Cordia dichotoma* Forst. Hutchinson, in Kew Bulletin 219. 1918 treating *Cordia Mazy* and allied species, distinguished the true *Cordia Myxa* L. and *Cordia obliqua* Willd. He stated that the former species has "the style arms short and broad, expanded fanwise towards the apex and with lobulate margins;

leaves always more or less orbicular, entire or obscurely repand in the upper part, always lightly covered all over the lower surface with white short setulose hairs, flabellary 5-7-nerved from the base; anthers-filaments nearly glabrous at the base". According to these characters, it can be distinctly separated from *Cordia obliqua* which has "the style arms long and slender and only sometimes slightly expanded at the apex; leaves variable but usually penni-nerved at the base, if hairy, then the hairs fairly long and mainly in the axils of the nerves and near the midrib; anthers-filaments rather densely setose-pilose towards the base".

The Taiwan plant, *i. e.*, "*Cordia Myxa*" *sensu* Matsum. *non* Linn., agrees with the characters of *C. obliqua* described above, and also with the figure given by Wight. Thus it is not the true *C. Myxa* Linn. Furthermore it does not agree with the description of "*Cordia Myxa*" *sensu* Clark, *non* Linn. of India, especially as the latter is polygamous while the Taiwan plant is hermaphroditic. In view of these facts, the action taken by Kanehira who followed Merrill in treating the Taiwan plant, "*Cordia Myxa*" *sensu* Matsum. as belonging to *C. dichotoma* Forst. f. (*C. obliqua* Willd.), seems to be a logical conclusion.

4. **Coldenia** Linn., Sp. pl. 125. 1753; Benth. & Hook. f., Gen. Pl. 2:841. 1876.

Prostrate scabrous herbs; leaves alternate, crisped; flowers small, axillary, sessile or nearly so, solitary, the upper ones sometimes in a one-sided leafy spike, white: sepals 4-5, narrow; corolla-tube short, the lobes 4-5, imbricated in the bud, patent; stamens as many as the corolla-lobes, inserted on the corolla-tube, the anthers ovate; ovary 2-celled, with 2 ovules in each cell, or sub-4-celled with solitary ovule; style terminal, bifid; fruit of 4, subconnate, 1-seeded pyrenes; testa of seed thin; albumen 0 or scanty; cotyledons flat.

About 12 species, all tropical American, except the following widely distributed one.

1. **Coldenia procumbens** Linn., Sp. Pl. 125. 1753; Clark. in Hook. f., Fl. Brit. Ind. 4:144. 1883; Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26:146. 1890; Honry in Journ. Asiat. Soc. Jap. 24. Suppl. 18. (List Fl. Formos.) 1895; Matsum. in Bot. Mag. Tokyo 12:107. 1898; Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:255. (Enum. Pl. Formos.) 1906; Gagnepain & Courchet in Lecomte, Fl. Gén. Indo-chin. 4:213. t. 215. 1912; Merr., Enum. Philip. Fl. Pl. 3:375. 1923; Mori in Masamune, Short Fl. Formos. 178. 1936.

Annual herb, usually quite flat; stem hirsute; leaves oblong or obovate-oblong, 1-2 cm. long, 0.5-1 cm. wide, the apex and margins dentate, the base

truncate-cuneate, strigose on both surfaces, the midrib and veins impressed on the upper and elevated on the under surfaces, the primary veins of 3 or 4 pairs, the petiole 2-4 mm. long, hirsute; flowers axillary, solitary, sessile, or the upper sometimes in a leafy spike, white; sepals 4, elliptic or ovate, 2.5 mm. long, 1.2 mm. wide, hirsute on both surfaces; corolla white, the tube 1.5 mm. long, 4-lobed, the lobes suborbiculate, 0.5 mm. long; stamens 4, included, the filaments short, basifixed, the anthers subglobose or ovate, 0.25 mm. long; pistil 1 mm. long, the ovary conical, 2-celled, the cells 2-ovuled, the style terminal, bifid; fruits conical, hirtellous, 4-pyrened, separated when mature.

Taiwan: Bansyoryo, *Kapakami* s. n., April 15, 1912.

Distribution: India, Indo-china, Southern China, Taiwan to Philippine.

This species is characterized by the quite flat habit and the small strigose and dentate leaves.

5. **Heliotropium** Linn., Sp. Pl. 130. 1753; Benth. & Hook. f., Gen. Pl. 843. 1876.

Herbs or under-shrubs, usually hairy; leaves alternate, entire or rarely dentate; inflorescences in terminal unilateral spikes or dichotomous cymes; flowers usually small, perfect, white or pale-blue; calyx usually deeply 5-cleft, rarely 5-dentate; corolla-tube cylindrical, the limb spreading, 5-lobed, the lobes short; stamens 5, the anthers included in the tube; ovary entire, completely or incompletely 4-celled, the style short, sometimes scarcely any, with a capitate or conical stigma; fruits dry, separable either into four 1-seeded nutlets or into 2, each one 2-celled, each 1-seeded, which in ripening often leave between them cavities, seeds without albumen.

About 100 species, widely distributed in warm countries, chiefly tropical or subtropical; 2 species are found in Taiwan.

Key to the species

- A. Erect; leaves spathulate-ovate, 8-7 cm. long, long-petiolate; spike up to 17 cm. long; fruit glabrous, mitre-shaped.....1. *H. indicum*
- AA. procumbent; leaves linear, 0.5-1.5 cm. long, subsessile; spike not over 2 cm. long; fruit hirsute, depressed-conical2. *H. strigosum*
- 1. **Heliotropium indicum** Linn., Sp. Pl. 130. 1753; Benth., Fl. Hongk. 253. 1861; Clarke in Hook. f., Fl. Brit. Ind. 4:152. 1883; Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26:147. 1890; Henry in Journ. Asiat. Soc. Jap. 24. Suppl. 63. (List Pl. Formos.) 1895; Matsum. in Bot. Mag. Tokyo

12:107. 1898; Gagnepain & Courchet in Lecomte, Fl. Gén. Indo-Chin. 4:220. 1912; Merr., Enum. Philip. Fl. Pl. 3:377. 1923; Mori in Masamune, Short Fl. Formos. 179. 1936.

Heliotropium indicum DC., Prodr. 9:556. 1845.

A coarse erect hairy annual, 1/3–2/3 m. high, branched, hirsute; leaves alternate or opposite, spatulate-ovate, 3–7 cm. long, 2–4.5 cm. wide, the apex acute, the base subcordate or attenuate, scattered hirsute on the upper and densely pubescent on the under surfaces, the midrib and veins impressed above and elevated below, the petiole winged, 3–7 cm. long; flowers pale-blue or white, in long terminal, solitary, generally simple, sometimes divided, unilateral spikes, often up to 17 cm. long, the tip curled; calyx 5-lobed, the lobes cleft to the base, ovate, 1.5 mm. long, long stiff-scattered-hairy on the outer surface, the apex acuminate; corolla hirsute on the outer surface, the tube 3 mm. long, the throat contracted, the limb rotate, 2 mm. in diameter, slightly 5-lobed, each uninerved; stamens 5, included, the filaments short, 1 mm. long, the anthers oblong, 0.7 mm. long; pistil glabrous, 1.5 mm. long, the ovary 2-lobed, globose, more elevated than the base of the style, the stigma discoid at the base, the terminal part prolonged into a cone and lobule; fruit mitre-shaped, glabrous, 2-pyrened, each 2-celled, each cell 1-seeded.

China proper: Yunnan, Wang 74884.

Taiwan: Tainan, Mori 39, 40; Kuskus, Kudo & Suzuki 16075; Karenko, Simada s. n., Oct. 22, 1912; Liukiusyo, Hosokawa 1776, 1777; Isl. Hoko, Horikawa s. n., Aug. 1. 1929.

Distribution: India, Indo-China, Southern China, Hongkong, through Taiwan to Philippine.

This is a common weed at the low altitudes. It is characterized by long terminal, simple or usually divided, unilateral spikes, up to 17 cm. long, and also by the remarkable mitre-shaped fruits.

2. *Heliotropium strigosum* Willd., Sp. Pl. 1:743. ; DC., Prodr. 9:546. 1845; Clarke in Hook. f., Fl. Brit. Ind. 4:151. 1883; Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26:147. 1890; Henry in Journ. Asiat. Soc. Jap. 63. (List Pl. Formos.) 1895; Matsum. in Bot. Mag. Tokyo 12:546. 1898; Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:257. (Enum. Pl. Formos.) 1906; Gagnepain & Courchet in Lecomte, Fl. Gén. Indo-chin. 4: 221. 1912; Merr., Enum. Philip. Fl. Pl. 3:378. 1923; Mori in Masamune, Short Fl. Formos. 179. 1936.

Herb, usually procumbent, 10–20 cm. high, intricately branched, the branches hispid; leaves small, linear, 0.5–1.5 cm. long, 1–2.5 mm. wide, uninerved, im-

pressed on the upper and slightly elevated on the under surfaces, hispid on both surfaces, subsessile; flowers spicate, terminal, the spikes simple or branched, the lower flowers often pedicelled, 1 mm. long, the upper flowers often sessile; bract ovate, 2.5 mm. long, hispid; calyx deeply 5-lobed, the lobes ovate-lanceolate, 2.5 mm. wide, long-hispid on the outer and short-hispid on the inner surfaces; corolla-tube 3 mm. long, the limb 9 mm. in diameter, lobed, the apex obtuse; stamens 5, sessile, the anthers ovate, 0.7 mm. long; pistil 1 mm. long, the ovary conical, the style short, linear, the stigma ovate; fruit 1 mm. long, 1.5 mm. in diameter, hirsute, depressed conical at the apex, 2-pyrened, each 2-celled, each cell 1-seeded.

Taiwan: Garanbi, *Mori* 496, *Suzuki* 4924; Tainan, *Mori* 54; Syokwa, *Mori* 495, Taiko, *Suzuki* 21434; Taito, *Kobayashi* 1907; Isl. Hoko, *Horikawa* 29.

Distribution: India, Indo-china, Malaya, China, Philippine and Australia.

The present species is a procumbent plant and has small, linear, uninerved leaves scarcely 1.5 cm. long, some of which are even shorter than 0.5 cm.

6. *Trichodesma* Br., Prodr. 496. 1810; Benth. & Hook. f., Gen. Pl. 2:845. 1876.

Annual, coarse, hispid and branched herbs; leaves opposite, the upper alternate, entire; flowers pedicelled, axillary 1-flowered, going off into terminal racemes by the gradual reduction of the floral leaves; calyx deeply 5-lobed, the lobes triangular-lanceolate, enlarged in fruit; corolla-tube campanulate-cylindric, the throat without scales, the lobes 5; stamens 5, the filaments short or sessile, the anthers elongate, lanceolate, connivent into a cone, the connectives more or less hairy on the back, the tips excurrent, at length twisted; ovary 4-celled, the style terminal, filiform, the stigma small; fruits ellipsoid, sub-4-ridged; nutlets ovoid-oblong, smooth, shining on the back, scabrous, slightly or strongly margined on the inner face, closely adnate by their whole inner face to the carpophore below the style, finally separating.

About 10 species distributed in tropical and warm-temperate Africa, Asia and Australia; one species is found in Taiwan.

1. *Trichodesma khasianum* Clarke in Hook. f., Fl. Brit. Ind. 4:154. 1885; Henry in Journ. Asiat. Soc. Jap. 24. Suppl. 63. (List Pl. Formos.) 1895; Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:258. (Enum. Pl. Formos.) 1906.

Trichodesma formosana Matsum. in Bot. Mag. Tokyo 12:108. 1898.

Herb, 2/3 m. high; stem angular, depressed hirsute or glabrescence; leaves opposite, oblanceolate, elliptic, 8-22 cm. long, 3.5-9 cm. wide, the apex acute, the

base attenuate, petiolate or winged, the petiole about 1.5 cm. long, the margins entire, the midrib and veins elevated on both surfaces, 5-7 pairs, scattered depressed hirtellous or strigose on both surfaces; flowers paniced, long-pedicelled, hirsute, 1-2 cm. long; calyx 5-lobed, the lobes ovate-lanceolate, 1-1.5 cm. long, 5-7 mm. wide, acuminate, veined, externally scattered hirtellous, internally rarely hirtellous on the midrib, the calyx accrescent in fruit, about 2 cm. long, 1 cm. wide, 3.2-4.7 cm. in diameter; corolla-tube widely cylindric, 1.3 cm. long, 1 cm. wide, externally with 10 foveolas, internally with 10 transverse tubulose, the lobes oval, 5 mm. long, long-acuminate, reflexed; stamens 5, sessile, the anthers lanceolate-subulate, 1 cm. long, contorted, tomentose; dorsally ovary depressed, glabrous, the style filiform, 1 cm. long; nutlets 4, ovate, 6 mm. long, dentate-margined dorsally and rugose ventrally.

Taiwan: Kosyun, Kudo & Suzuki 15893, Suzuki 6062, Mamada s. n., Dec. 20, 1915; Taito, Yamamoto & Mori 141; Takeyama, Suzuki s. n., Jan. 28, 1932; Takao, Suzuki 20867.

Distribution: India.

This is a very characteristic plant, which can be easily recognized by the remarkable flowers and fruits. The flower is the largest one in this family in Taiwan. The pedicel is very long, the calyx-lobes are very large, and the the anthers are long, lanceolate-subulate, and connivent into a cone. The nutlets are ovoid, dentate-margined dorsally and rugose ventrally.

7. **Thyrocarpus** Hance in Ann. Sc. Nat. 4. Sér. 18:225. 1862; Benth & Hook. f., Gen. Pl. 2:847. 1876.

Perennial herbs, villose-hispid; leaves radical, large, petiolate, the cauline alternate, sessile or short-petiolate; inflorescence racemed or paniced, bracteate; calyx deeply 5-lobed, slightly enlarged in fruit, patent; corolla-tube short, the limb large, usually cleft to the middle, the lobes 5, broadly ovate, imbricate, obtuse, patent; stamens 5, attached to the tube, included, the filaments short, the anthers subglobose, with 5 scales; ovary 4-lobed, distinct, gynobasic, conical, the style short, the stigma small; nutlets 4, the basal gynobasic, ovoid, the base rounded, the upper part large-tuberculate, pateriform, the margin duplicate, the interior entire, the exterior dentate; seeds straight; cotyledons obovate.

About 3 species, distributed in Indo-china and China proper; one species is found in Taiwan.

1. **Thyrocarpus Sampsonii** Hance in Ann. Sci. Nat. 4. Sér. 18:225. 1862; Maxim. in Bull. Acad. Sci. St. Pétersb. 26:499. 1880; Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26:149. 1890; Diels. in Engler, Bot. Jahrb. 29:545. 1900; Gagnepain & Courchet in Lecomte, Fl. Gén. Indo-chin.

4:223. t. 27. 1912; Brand. in Engl., Pflanzentr. 78:112. 1921; Mori in Masamune, Short Fl. Formos. 179. 1936.

Botriospermum tenellum Fisch. & Mey. var. *majusculum* Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 30 (1):205. (Mater. Fl. Formos.) 1911; Mori in Masamune, Short Fl. Formos. 178. 1936; *syn. nov.*

Botriospermum majusculum (Hay.) Suzuki in Ann. Rep. Bot. Gard. Taihoku Imp. Univ. 1:169. 1931; *syn. nov.*

Annual (or biennial?), more or less branched, densely sericeous-villose; stem erect, 12-30 cm. high, simple or branched at the base; leaves variable, the basal ones rosette, spatulate, short-petiolate, (petiole 5.5-6 cm. long), 1-2 cm. wide, the apex abruptly acute, the cauline leaves alternate, ovate or blong, sessile, 1-2 cm. long, 5-7 mm. wide, the apex acute; both basal and cauline leaves long-hirsute on both surfaces, the midrib distinct, veins not conspicuous on the upper surface, the midrib and veins conspicuous or slightly elevated on the under surface; flowers bracteate terminal; sepals 5, elliptic, 2-3 mm. long, 1.5 mm. wide, long-hirsute on both surfaces, the apex acute; corolla blue, the tube 1.5 mm. long, the limb 4-6 mm. in diameter, 5-lobed, the lobes orbiculate, 2 mm. long, the apex obtuse; scales oblong or subulate, 0.5 mm. long; stamens attached to the middle of the corolla-tube, included, the filaments short, nearly sessile, the anthers subglobose, 0.5 mm. long; pistil 1 mm. long; ovary small, conical, the style gynobasic, filiform, 0.5 mm. long, the stigma truncate; fruit of 4 nutlets, disposed on an pyramidal receptacle, inserted in 4 elliptical concave respectacle; nutlets ovoid, truncate, 1.5 mm. long, composed of three parts: the base swelling, fertile, covered with papillae, continued to the upper part through a contraction, the upper part tubular, crateriform, 2 mm. in diameter, the margin duplicate, the interior entire, the exterior with about 15 teeth.

Taiwan: Sikikun, Suzuki s. n., Oct. 23, 1928; Kinyan & Piyahan, Suzuki 6379; Ryohen & Mohen, Suzuki 6063; Kinyan, Suzuki 6150; Namakoyama, Suzuki 8840, 8946; Ayo, Taroko, Suzuki 8606; Ayo & Batakan, Suzuki 10450; Takao, Matuda s. n., Jan. 2, 1917; Sikirian, Taroko, Suzuki 9605; Ako, Suzuki s. n., Dec. 25, 1930; Hakuhyo & Simppaiwan, Suzuki 6803; Taityuensyurin, Ueyama 77; Taichu, Simizu 521; Mt. Kappan, Sintiku, Suzuki 4700, 4701; Musya-santinozyo, Masamune 1458.

Distribution: Indo-China, China Proper and Taiwan.

The most important character distinguishing *Thyrocarpus* from *Botriospermum* is the shape of fruit. In *Thyrocarpus* the nutlet is goblet-like, inserted by its base, and with duplicate margins with the inner entire and outer dentate. But in *Botriospermum*, the nutlet is compressed, compact, and inserted by either its center or apex.

In 1911, Hayata described *Bothriospermum tenellum* Fisch. & Mey. var. *majusculum* Hay. and stated that "the variety differs from the type in having much larger flowers and fruit". In his description, however, the fruit is not mentioned. In 1931, Suzuki raised it to a species, *Bothriospermum majusculum* (Hay.) Suzuki. He stated that "according to my observation in the field however, *Bothriospermum tenellum* grows always in the lowland which is not so much dry, while *Bothriospermum majusculum* is always found in dry soil in the mountain side of about 1000-2000 feet above the sea". His record shows that these two species have entirely different ranges and habitats.

I have examined and dissected all specimens of *Bothriospermum majusculum* cited by Suzuki in his paper. It is found that the nutlets are all goblet-like, which can be plainly seen even by the naked eye. The plant is in reality not a *Bothriospermum* but belongs to *Thyrocarpus Sampsonii* Hance, and accordingly a reduction is made.

8. *Cynoglossum* Linn., Sp. Pl. 134. 1753; Benth. & Hook., f., Gen. Pl. 2:848. 1876.

Biennial or perennial herbs, erect, hairy; leaves alternate, the radical petioled, oblong-linear, attenuate at both ends; racemes elongate, ebracteate; flowers ultimately distant, sessile or the lower shortly pedicelled, blueish or purple; calyx deeply 5-lobed, in fruit spreading, not or slightly enlarged; corolla-tube short, with 5 obtuse or emarginate scales in the throat, the lobes 5, obtuse, imbricate in the bud; stamens 5, included beneath the scales, the anthers small, ovate, their tips hardly exerted above the mouth of the corolla-tube; ovary-lobes 4, the style short or longish from the base of the lobes, the stigma small; nutlets 4, forming a much depressed pyramid, the apices hardly produced above the hilum, the bases rounded, produced downwards, the outer faces convex or flattened, with or without a margin, glochidiate, the carpophore linear, shortly conic at the base; seed straight or slightly curved.

About 60 species, distributed in subtropical and temperate regions especially in the mountains; 3 species are found in Taiwan.

Key to the species

- A. Leaves oblong or elliptic; stem pilose, impressed.....1. *C. zeylanicum*
- AA. Leaves lanceolate or oblanceolate; stem pilose not impressed.
 - B. Leaves setulose, the hairs short, rough, the basal portion of the hairs with prominent cystolith cells on the upper surface...2. *C. lanceolatum*
 - BB. Leaves villose, the hairs long, flaccid, the portion of the hairs not as

- above.....3. *C. alpestre*
1. ***Cynoglossum zeylanicum*** (Vahl.) Thunb. ex Lehm. in Neue Schrift. Naturf. Ges. Halle 3(2):20. 1817; Brand in Engler, Pflanzenr. 73:135. 1921.
Anehusa zeylanica Vahl. in Herb. & Hornem, Enum. Hafn. 3. 1807.
"Cynoglossum micranth" sensu Maxim. in Mém. Biol. 8:555. 1872; Forbes & Hemsl. in Journ. Linn. Soc. Bot. 26:150. 1890; Matsum. in Bot. Mag. Tokyo 12:108. 1898; Matsum. & Hay. in Journ. Coll. Sci., Imp. Univ. Tokyo 22:257. (Enum. Pl. Formos.) 1906; Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 25 (19):170. (Fl. Mont. Formos.) 1911; *non* Desfontaines.
Cynoglossum formosum Naki in Bot. Mag. Tokyo 37:4. 1923; Mori in Masamune, Short Fl. Formos. 178. 1936; *syn. nov.*
Cynoglossum formosum Nakai form. *albiflorum* Masamune in Journ. Soc. Trop. Agr. 2:152. 1930, *nom. nud.*; Mori in Masamune, Short Fl. Formos. 178. 1936; *syn. nov.*

Annual or biennial; root elongate; stem erect, thick, 80-85 cm. high, simple or branched, appressed-pilose, especially on the lower part of the stem, rarely on the upper portion; radicle leaves oblong, elliptic, 15-20 cm. long, 3-4.5 cm. wide, the apex obtuse or acute, the margins entire, the upper surface covered with homogenous tomentum, the veins impressed, velutinous on the veins beneath, distinctly elevated, recurved forward, elongated, of 5 pairs, the petiole usually 3.5 cm. long; cauline leaves short petioled, the upper sessile, gradually becoming smaller, oblong or lanceolate; raceme terminal and subterminal, many-flowered, pedicelled; pedicel 2-3 mm. long, long-hairy; calyx 5-lobed, oblong-elliptic, the apex obtuse, hairy without, glabrous within, 3 mm. long, 1.5 mm. wide; corolla campanulate, 5-lobed, 3-4.5 mm. long, 1.8 mm. wide, blue; fruiting branch 10-22 cm. long, the pedicel 3-5 mm. long; stamens 5, the anthers 0.8 mm. long; scale reniform, 0.8-1 mm. wide, 0.5 mm. long, emarginate; style 1.7 mm. long, the basal portion larger, the tip truncate; nutlets 4, as a cross on a plain, 8 mm. wide, the style persistent, 4 mm. long, the basal portion 4-angular, concave, to fit the 4 nutlets, attached by the tip, densely glochidiate, homogeneous, the nutlet convex externally, the under surface plain.

Taiwan: Mururoahu & Kyanrawa, Suzuki 7225; Sikayo, Masamune 1278; Nichigetsutan, Kudo & Sasaki 15610; Mt. Taihen, Suzuki s. n., Aug. 1, 1928; Mt. Nankotai, Masamune & Fukuyama 2982; Taito, Hosakawa 5292; Mt. Tarokotai, Suzuki 9526; Ugan & Pinananbu, Suzuki 5036.

Distribution: Himalaya, Ceylon, Philippine, Liukin, Japan, Taiwan, Yunnan, Hupeh and Shensi.

Yamamoto stated that "*C. formosanum* Nakai is difficult to distinguish from *C. zeylanicum* (Vahl.) Thumb. from China and Philippines, both having many characters in common." I have found also that Taiwan specimens are essentially similar to *C. zeylanicum* from Yunnan, both in general appearance and floral characters. Nakai's original description also agrees closely with that given by Brand. It is thus reduced to the synonymy of *C. zeylanicum*.

Cynoglossum formosanum Nakai form. *albiflorum* Masamune is based on plants with white flowers. As the color is an unstable character in most species, it is also reduced and treated as a synonym of the present species.

2. ***Cynoglossum lanceolatum*** Forsk., Fl. Aegypt. Arab. 41. 1775; Brand in Engl., Pflanzenr. 78:137. 1921; Clarke in Hook. f., Fl. Brit. Ind. 4:156. 1883; Merr., Enum. Philip. Fl. Pl. 3:379. 1923; Yamamoto in Journ. Soc. Trop. Agr. 6:553. 1934; Mori in Masamune, Short Fl. Formos. 178. 1936.

"*Cynoglossum micranthum*" sensu Matsum. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:257. (Enum. Pl. Formos.), 1906. *non* Desf.

Biennial; stem erect, 60–150 cm. high, simple or branched, more or less hirsute; radical leaves short-petiolate, lanceolate or oblong-lanceolate, 5–6 cm. long, 10–22 mm. wide, obtuse, gradually attenuate, uninerved, densely setulose on both surfaces, the bases of the hairs on the upper surface with prominent cystolith cells; cauline leaves short-petioled, the upper sessile; linear lanceolate or oblong, 4–9 cm. long, 10–25 mm. wide, acute, the veins impressed above, elevated below, the primary veins of 3–4 pairs, densely setulose on both surfaces, the base of hairs on the upper surface with a group of cytolith cells; inflorescence pubescent, terminal or subterminal, broadly panicleate, many-flowered; flowers pedicelled; sepals oblong-elliptic, 1.52 mm. long, obtuse, ciliate, more or less distinctly univerved; corolla white or pale colored, infundibular, 2–5 mm. long, the limb often lobed to the base, the lobes subequal: scale transversely linear, 0.8 mm. long, 0.25 mm. wide; stamens short, the anthers ovate, 0.8 mm. long; style thick, short; nutlets subglobose, 2–5 mm. long, 2 mm. wide, with equal or unequal glochidiates, the style 1.5 mm. long, quadrangular, truncate:

China Proper: Yunnan, Wang 74372; Fukien, Amoy, Migo s. n., July 24, 1938.

Taiwan: Mt. Bui, Matuda 1555; Kibitsu-Mizuho, Taito, Yamamoto 2352.

Liukiu: Okinawa, Suzuki 1784, 1785.

Distribution: India, South China, Liukiu to Philippine.

The first record of this species for Taiwan was given by Yamamoto. Taiwan specimens, when compared with available specimens from Fukien and Yunnan,

are very much the same. They agree with each others especially in the leaf-shape and the cystolith cells. They also agree with Brand's description.

Some authors treated *C. micranthum* Desf. as a synonym of the present species. Nakai, however, pointed out that the two are actually different as the flowers are pedicelled in *C. lanceolatum* and sessile in *C. micranthum*.

3. **Cynoglossum alpestre** Ohwi in Acta Phytotax. Geobot. 2:150. 1933; Mori in Masamune, Short Fl. Formos. 178. 1936.

Perennial herb, long-villose; stem more or less terete, 30-40 cm. tall, few-branched above, basal leaves many, petioled, oblanceolate or linear-lanceolate, the margins entire, the apex acute, the base attenuate, the petiole 7-10 cm. long, oblique, the midrib slightly elevated beneath, the primary veins of 2-3 pairs, slightly distinct on both surfaces; cauline leaves linear-lanceolate, sessile, racemes usually long-pedunculate, the peduncles up to 11 cm. long, axillary, often bifid at the base, erect, ascending, more or less densely flowered, flowers few or many, blue, 5 mm. across, pedicelled; pedicel 1.5 or 2 mm. long; sepals 5, ovate, obtuse, hairy without, glabrous within, 2.5-3 mm. long, 5 mm. long in fruit; corolla-tube 4 mm. long, 5-lobed, the lobes 2 mm. long, rounded, patent; scales reniform, the apex emarginate; anthers yellowish, ovate, 0.6 mm. long, the filaments very short; style 1.5 mm. long, the stigma truncate; nutlets 4, compressed, long-glochiate, ovoid, 3 mm. wide.

Taiwan: Mt. Nankotai, Ohwi 4076, Masamune & Mori 1627, 1628; Suzuki s. n., July 17, 1937, Fukuyama & Simada 17377, 17618; Mt. Tynosen, Suzuki & Fukuyama 16290; Mt. Tugitaka, Hosakawa 2325, 2321.

Distribution: Endemic.

This plant is related with *C. lanceolatum*, but it is an alpine plant and is limited to mountains above 2500 m. It has long and dense hairs, smaller, thicker, and more numerous leaves.

9. **Bothriospermum** Bunge, Enum. Pl. China Bor. 47. 1832; Benth. & Hook. f., Gen. Pl. 2:853. 1876.

Slender herbs, annual or biennial, strigose or hirsute; leaves alternate, ovate or lanceolate; flowers small, blue or white, axillary, pedicelled, the upper going off into a bracteate raceme; calyx 5-partite, the lobes lanceolate, narrow, not enlarged in fruit; corolla-tube short, the throat with 5 scales, the lobes 5, imbricate in bud, obtuse, rotate-spreading; stamens 5, attached to the tube, the filaments short, included, the anthers ovate, obtuse; ovary deeply 4-lobed; style short, gynobasic, the stigma capitate; nutlets 4, ellipsoid, without angles, convex and muricate or warted on the back, the scar near the middle of the inner face,

large, ovate or oblong, subconcave, smooth, with an inflexed margin; carpophore oblong.

A genus of very few species, all natives of temperate or tropical Asia; 1 species is found in Taiwan.

1. **Bothriospermum tenellum** (Hornem.) Fisch. & Mey., Ind. Sem. Hort. Petrop. 1:24. 1835; DC., Prodr. 10:116. 1846; Miq., Fl. Ind. Bat. 2:930. 1858; Benth., Fl. Hongk. 235. 1861; Maxim. in Mém. Biol. 8:560. 1873; Clarke in Hook. f., Fl. Brit. Ind. 4:107. 1885; Forbes & Hemel. in Journ. Linn. Soc. Bot. 26:152. 1890; Henry, in Journ. Asiat. Soc. Jap. 24. Suppl. 63. (List Pl. Formos.) 1895; Matsum. in Bot. Mag. Tokyo 12:108. 1898; Diels in Engl., Bot. Jahrb. 29:546. 1901; Gaynepain & Courchet in Lecomte, Fl. Gén. Indo-chin. 4:223. t. 27. 1912; Merr., Enum. Philip. Fl. Pl. 379. 1923; Mori in Masamune, Short Fl. Formos. 178. 1936.

Anchusia tenella Hornem, Hort. Hafn. 4:176. 1813.

A slender herb, usually prostrate or diffused, much-branched, annual or biennial, the branches hirsute; leaves obovate or ovate-oblong, 1–2 cm. long, 4–7 mm. wide, scattered strigose on both surfaces, the base of each hair beset with crystals, uninerved, impressed above and elevated below, the apex acute, the base attenuate, the margins entire; inferior leaves, the petiole about 0.5–1.5 cm. long, hirsute, the upper floral leaves smaller and sessile; flowers extra-axillary or axillary, solitary; calyx cleft to the base, the lobes 5, elliptic or ovate, 3 mm. long, 1 mm. wide, the apex acuminate, the margins long-ciliate; corolla white, the tube 2 mm. long, 5-lobed, the lobes orbiculate, 1 mm. long, the apex obtuse; scales quadrate, 0.3 mm. long; stamens 5, included, the filaments short, the anthers ovate, 0.3 mm. long; pistil 0.7 mm. long, the ovary depressed, 4-lobed, the style gynobasic, short, the stigma capitate, slightly 2-lobed; fruiting calyx to 4 mm. long; nutlets 4, 2 mm. in diameter, short-glochidiatae, the scar more than the half of their length.

Taiwan: Isl. Kizan, Masamune & Suzuki s. n., July 3, 1932; Kwareenko, Hosokawa 5167; Ako, Matuda 1554; Sizangan, Nonaka & Mori s. n., April 2, 1923; Dangai, Taroko, Suzuki 9354; Tikusiko, Suzuki 4397; Mt. Kwannon, Suzuki 3573; Suigenchi, Taipei, Suzuki s. n., Feb. 1, 1923; Kwannon-daki, Hori, Suzuki, 6447; Tainan, Mori 494; Sinten, Taipei, Kudo, Suzuki & Mori 352; Musya-santinozyo, Masamune & Mori 1942.

Distribution: India, Indo-china, China Proper, Japan, Taiwan, to Philippine.

This is a slender herb, usually prostrate or diffused, and much branched. The leaves are small, and both leaves and branches are strigose. The flowers are characteristically solitary and are either axillary or extra-axillary.

10. **Trigonotis** Stev. in Bull. Soc. Imp. Nat. Mosc. 1:603. 1851; Benth. &

Hook. f., Gen. Pl. 2:858. 1876.

Perennial herbs, weak, glabrous or pilose; leaves alternate, ovate or lanceolate, often petiolate; racemes broad, ebracteate; flowers small, pedicelled; calyx 5-lobed, the lobes linear, enlarged in fruit; corolla-tube short, 5-lobed, imbricate, obtuse, patent, the throat-scales short; stamens 5, affixed to the tube, included, the filaments short, the anthers oblong, obtuse; ovary 4-lobed, distinct, subglobose, gynobasic, the style often short, the stigma capitate or subdilated; nutlets 4, erect, smooth, glabrous or pilose, often narrow, attached by the base on the gynobasic surface, stipitate, or affixed by a small areola; seed straight; cotyledons ovate, plane.

About 15 species distributed in Asia and Australia; 3 species are found in Taiwan.

Key to the species

- A. Radical leaves elliptic or suborbicular, the apex rounded more or less emarginate; veins often distinctly elevated above and impressed below
.....1. *T. elevato-venosa*
- AA. Radical leaves oblong or spatulate, the apex not emarginate; veins mostly absent or inconspicuous, or if present, not as above.
 - B. Inflorescence about 6-10 cm. long, flowering portion of the inflorescence 1-4 cm. long, rarely branched; leaves 1.3-2 cm. long, 0.5-1 cm. wide
.....2. *T. nankotaiwanensis*
 - BB. Inflorescence mostly over 15 cm. long, flowering portion of the inflorescence mostly over 5 cm. long, often branched; leaves 3.5-7 cm. long, 1.5-2.5 cm. wide.....3. *T. formosana*
- 1. ***Trigonotis elevato-venosa*** Hay., Icon. Pl. Formos. 6:32. 1916; Mori in Masamune, Short Fl. Formos. 179. 1936.

Low herb, perennial, with peduncle about 15 cm. long, erect, slender, not or few branched, in dry specimen ferruginous-hirsute; radicle leaves elliptic or suborbicular, 2-3.5 cm. long, 1.5-2.5 cm. wide, the apex rounded, more or less emarginate and short mucronate at the center, the base obtuse, the margins entire or crispate-undulate, green not shining above, pale below, the midrib impressed above, elevated below, the veins elevated above but impressed below, appressed, scattered hirtellous on both surfaces, the lateral veins of 4-5 pairs, anastomosing at the margins, the petiole 1.5-5 cm. long; cauline leaves smaller, short-petioled, 1-3 mm. long or nearly sessile; raceme slender, up to 14 cm. long, erect, hirsute; flowers secund, pedicelled, the pedicels 2-4 mm. long; calyx green, 5-lobed, the

segments obovate or elliptic, the apex obtuse or obtuse-acute, strigose without, minutely hirsute within, 2–3 mm. long, 1–1.5 mm. wide; corolla white, rotate, the tube glabrous, 3.5 mm. long, 5-lobed, the segments rounded, glabrous; scales 5, pulvini-formed, 0.5 mm. wide, 0.25 mm. long; stamens 5, the filaments filiform, short, 0.25 mm. long, the anthers oblong, 0.3–0.5 mm. long; ovary obconical, the apex truncate, 0.25 mm. long, glabrous, the style columniform, 1 mm. long, the stigma peltiform; ovary 4–5-lobed; nutlets obpyramidal, about 1 mm. long, smooth, black.

Taiwan: Mt. Kara, Taipei, Suzuki 6258; Saukan & Kyanrawa, Suzuki 6983; Mt. Taihen, Suzuki 3769, 1034, 4004, 4098; Rato, Taipei, Suzuki 5037; Mt. Kita-soten, Sintiku, Suzuki 4547; Taikei, Sintiku, Nakamura 18252.

Endemic.

This species is characterized by the small elliptic or suborbicular leaves, which have rounded and more or less emarginate apex, and veins often elevated above while impressed below.

2. *Trigonotis nankotaizanensis* (Sasaki) Masamune & Ohwi ex Masamune in Trans. Nat. Hist. Soc. Formos. 23:210. 1933; Mori in Masamune, Short Fl. Formos. 179. 1936.

Omphalodes formosana Masamune in Journ. Soc. Trop. Ager. 2:240. 1930; *non Trigonotis formosana* Hay.

Myosotis nankotaizanensis Sasaki in Trans. Nat. Hist. Soc. Formos. 9:155. 1931.

Herb, perennial, hirsute; caulicle arcuate, ascending about 6–10 cm. high; basal leaves long-petiolate, the petiole winged, often 4 cm. long, the blades elliptic, 1.3–2 cm. long, 0.5–1 cm. wide, the apex obtuse or sometimes mucronate, the base attenuate, hirsute on both surface, the impressed above, distinct or slightly elevated below; cauline leaves sessile, elliptic or ovate, 0.8–1.3 cm. long, 0.5–0.7 mm. wide, the apex obtuse or slightly acute, the base blunt, both surfaces densely hirsute; flowers terminal, solitary or branched, pedicelled, the pedicels 2–5 mm. long, hirsute; calyx 3 mm. long, 5-lobed, the lobes elliptic, 2 mm. long, sericeous on the outside, scattered hirsute on the inside, uninerved; corolla white, sub-rotate, about 4.5 mm. long, the tube 2.5 mm. long, the lobes suborbicular, 2 mm. long, the apex slightly emarginate; stamens 5, included, the filaments short, the anthers ovate or oblong, 0.8 mm. long, the ovary depressed-globose, 4-lobed, the lobes distinct, the style liner, 2 mm. long, the stigma truncate; nutlets 4, glabrous, 1.5 mm. in diameter, obpyramidal.

Taiwan: Mt. Tsugitaka, Masamune 1234 (*Typus*); Mt. Nankotai, Suzuki 17376, Masamune

s. n., July 15, 1931; Simada 557, 566, Fukuyama & Suzuki 15104.

Endemic.

This is a small alpine herb. It attains to about 10 cm. in height and is localized on Mt. Nankotaisan above 3000 m. It is characterized by its small densely hairy spathulate leaves.

Masamune & Ohwi's species is based on the earlier *Omphalodes formosana* Masamune and *Myosotis nankotaisanensis* Sasaki but as the specific epithet *formosana* is preoccupied in *Trigonotis*, so Sasaki's later name is adopted.

3. ***Trigonotis formosana*** Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 25 (19):

171. (Fl. Mont. Formos.) 1908; Mori in Masamune, Short Fl. Formos.

179. 1986.

Herb, perennial, hairy, up to 15 cm. high including the inflorescence, stoloniferous; radicle and inferior leaves long petioled, the petiole 3-5 cm. long; leaves oblong, rarely spathulate, 3.5-7 cm. long, 1.5-2.5 cm. wide, equally hirtellous on both surfaces, the apex truncate or retuse-mucronate, the base acuminate, the margins entire; green above, pale below, the midrib impressed above, elevated below, the primary veins mostly indistinct, rarely of 5-6 pairs; cauline leaves similar to the inferior but smaller; flowers cymose, scorpioid, branched or simple; racemes elongate, short-pedicelled, the pedicel 1-2.5 mm. long; calyx 5-lobed, the lobes obovate, 2.5 mm. long, obtuse, pilose on both surfaces, scarcely enlarged in fruit; corolla rotate, 3 mm. long, the lobes 5, imbricate, patent, broadly orbicular, the base narrow; scales transverse, thick, 0.6 mm. wide, 0.25 mm. long, stamens 5, the filaments short, the anthers oblong, obtuse; ovary depressed-globose, 0.25 mm. long, 0.5 mm. wide, 4-lobed, the lobes distinct, the style short, 0.5 mm. long, the stigma capitate; nutlets 4, obpyramidal, smooth, 1 mm. long.

Taiwan: Taito, Matuda s. n., Aug. 14, 1919, Hosokawa 5208; Kwareenko, Fukuyama 4435, Suzuki 1720.

Endemic. This species has spathulate radical leaves, and is also characterized by terminal branched inflorescences.

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