

THE APOCYNACEAE OF TAIWAN(1)--A TAXONOMIC REVISION(1)

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ABSTRACT

Ten genera and 18 species of Taiwan apocynaceous plants and two Japanese *Trachelospermum* species are described. Two new records are added, and the up to date information for this family is given.

INTRODUCTION

Ou and Liu (1973) described nine genera and 15 species of Apocynaceae in Taiwan. Li (1978) described ten genera and 12 species. In this revision, Ten genera and 18 species are enumerated. I also accepted the binomial *Anodendron benthamiana* Hemsley on the basis of palynological evidence (Huang, 1986).

Two new records, i.e., *Holarrhena antidysenterica* and *Alyxia sinensis* are added. It is not certain whether *Holarrhena antidysenterica* is a cultivated or native plant, for there is a record for the cultivation of species (Kudo, 1934).

Palynological evidences (Huang, 1986) closely correlated with morphological differences among species or genera of this family except infrageneric taxa of *Trachelospermum*. Species of *Trachelospermum* are so variable with the regional differences. I included two Japanese species for explaining the integrating characteristics of this genus in this treatment. This genus can be divided into two specific complexes, i.e. *T. jasminoides* (with anther-tips included) complex and *T. asiatica* (with anther-tips exerted) complex. Otherwise, they have overlapping characters among species and show geographical or altitudinal differentiation. I accepted four specie in Taiwan with reservation. The chemotaxonomical approach and future field work may be able to solve the taxonomic problems of this genus.

The voucher specimens for illustration are denoted by the asterich sign (*) after collector's number. Herbarium acronyms follow that of Holmgren and Stafleu (1974).

TAXONOMIC TREATMENT

Woody vines, shrubs or small trees, with milky juice. Leaves opposite, verticillate, rarely alternate, entire, estipulate. Flowers bisexual, regular, in terminal or axillary cymes. Calyx 5-lobed, the lobes imbricate, persistent. Corolla rotate to salverform, the lobes 5(-4), convolute in the bud, rarely valvate. Stamens 5(-4), adnate to the corolla tube, the filaments usually short; anthers usually sagittate and acute, conniving, the connectives sometimes adhering to the stigma, the cells sometimes produced into a spur below. Ovary of 2-carpels, superior, the carpels distinct at base, united at basal part of style, many-ovuled, with an annular cup-shaped or lobed disc at base; style 1, simple or divided. Fruit usually of 2, distinct follicles, sometimes berry-like or drupe-like. Seeds various, usually compressed or with a tuft of hairs(coma); endosperm scanty, sometimes wanting.

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About 250 genera and over 2,000 species, chiefly tropical and subtropical; ten genera and 18 species in Taiwan.

KEY TO THE GENERA

1. Woody vines
 2. Fruit a drupe: seeds glabrous
 3. Leaves obovate, elliptic or elliptic-lanceolate; drupe ovoid to ellipsoidal, less than 2 cm long, 1.5 cm broad, septate(1) *Alyxia*
 3. Leaves linear-lanceolate; drupe ellipsoidal, 5 cm long, 2.5 cm broad, not septate(6) *Melodinus*
 2. Fruit of two follicles; seeds comose
 4. Corolla-lobes cylindrical; flowers usually more than 1 cm long; leaves oblong, oblong-lanceolate or broadly oblanceolate; seed beaked
 5. Anthers included; corolla tube silky hairy inside; follicles oblong- or ovoid-lanceolate(2) *Anodendron*
 5. Anthers exerted; corolla tube glabrous; follicles linear-lanceolate(7) *Parsonia*
 4. Corolla-lobes not cylindrical; flowers less than 1 cm long; leaves elliptic or obovate; seed not beaked
 6. Corolla urceolate, the tube less than 4 mm long.....(4) *Ecdysanthera*
 6. Corolla salverform, the tube more than 5 mm long.....(10) *Trachelospermum*
1. Shrubs or small trees
 7. Fruit a drupe
 8. Leaves alternate or fasciculate; drupe more than 5 cm long, and 3 cm in diameter(3) *Cerbera*
 8. Leaves verticillate or opposite; drupe less than 1.5 cm long, and 1 cm in diameter(8) *Rauvolfia*
 7. Fruit of two follicles
 9. Leaves alternate or subopposite; follicles linear; seed comose.....(5) *Holarrhena*
 9. Leaves opposite; follicles oblong-elliptic; seed glabrous.....(9) *Tabernaemontana*

1. ALYXIA R. Br. 念珠藤屬

Twining shrubs. Leaves 3-4-nately verticillate, or opposite to ternately verticillate. Flowers in axillary or subterminal cymes; calyx short, 5-lobed; corolla salverform, 5-lobed, the tube cylindrical, naked in the throat, the lobes overlapping to the left; stamens 5, adnate to the corolla tube at or above the middle, the cells rounded at base; disc wanting; ovary of 2 distinct carpels, united by the style, the style filiform, the stigma pointed or short 2-fids, pubescent; ovules 2-6, in 2 series in each carpel. Fruit of 1-4 drupes or berries, 1-4-seeded, constricted between the seeds, 1.2-1.5 cm long, 0.7-0.8 cm broad. Seeds ovoid or oblong, without wing or coma.

About 30 species. Tropical Asia, Malaysia to Australia and the Pacific Island. Three species in Taiwan.

KEY TO THE SPECIES

1. Leaves usually 4 in a whorl, obovate, more than 5 cm long; drupe ellipsoidal, more than 1 cm long(1) *A. insularis*
1. Leaves opposite or 3 in a whorl, elliptic-lanceolate, less than 3 cm long
 2. Leaves emarginate apex; drupes ellipsoidal, more than 0.8 cm long.....(2) *A. sinensis*

2. Leaves acute apex; drupes ovoidal, less than 0.8cm long(3) *A. taiwanensis*

- (1) *Alyxia insularis* Kanehira & Sasaki in Trans. Nat. Soc. Form. 24: 402. f.4. 1934; Kanehira, Form. Trees rev. ed. 626. f.583. 1936; Li, Woody Fl. Taiwan 782. f.313. 1963, Fl. Taiwan 4: 203, Pl. 966, 1978; Ou & Liu in Journ. For. 3:31. Pl.1. 1973. Type: TAITUNG, Lutao, *Kawakami & Sasaki s.n.* July, 1912 (TAIF). 蘭嶼念珠藤 FIG. 1.

A glabrous twining shrub. Leaves 3—4-nately verticillate, thick coriaceous, obovate, 5.5—10 cm long, 2.5—3.5 cm broad, the apex obtuse, the base cuneate, the margins revolute, the midrib impressed above, elevated beneath, the lateral veins numerous, slender and inconspicuous; petioles 1—1.5 cm long. Flowers in axillary cyme; calyx lobes triangular, glabrous, 3—4 mm long; corolla tube 7—10mm long, the lobe ovate, 5 mm wide; pistil below anther; stigma ovoidal or bilobed, pubescent. Fruit ellipsoidal, 1-2 cm long, 0.6—1.5 cm wide, 1- or 2-seeded.

Endemic. On the small islands Lanyu and Lutao only.

TAITUNG: Lanyu: *Sasaki s.n.* June 1926, *s.n.* 1934(*), *s.n.* 1912, *s.n.* Sept. 1933, *U. Mori s.n.* April 1907, *Kao 8710*, *C.S. Kuoh 4952*, *Huang 4992*, *5133*, *5155*, *9369*, *9370*(*), *9371*(*), *9401*, *9442*, *9447*(*), *9497*; Lutao: *Sasaki s.n.* Feb. 1905.

- (2) *Alyxia sinensis* Champ. ex Benth. in Hovh. Kew Journ. 4:334. 1852.
A. formosana Kanehira & Sasaki sp. nov. in Schudla. 中國念珠藤 Fig. 2.

A glabrous twining shrub. Leaves opposite, thick coriaceous, elliptic or oblong-elliptic, 1.7—2.7 cm long, 0.7—1.4 cm broad, the apex emarginate, the base cuneate, the margins revolute, the midrib impressed above, elevated beneath, the lateral veins numerous, slender and inconspicuous; petioles 2—4 mm long. Fruit ellipsoidal, green, greyish-blue after mature, 8 mm long, 6 mm wide, 2-seeded.

China. Taiwan, precise habitat unknown.

TAITUNG: Thornshan-so village (Shimoyama-shia) *S. Sasaki (Mori.) s.n.* Dec. 19, 1908(*).

Mainland China KWANGTUNG: Chiow-lung, Ta-mao-shan, alt. 300-700 m. *Togashi & Murata 8024*(TI); Shing-mun, *Togashi s.n.* March 9, 1962(TI).

HONGKONG: Victoria peak, *Yamazaki 2477* (TI).

Leaf size variable.

- (3) *Alyxia taiwanensis* Lu & Yang in Bull. Academia Sinica 19: 195, f.1, 1978.
Holotype: Taichung, Chinshan, *LU 5936* (TAIF!) 臺灣念珠藤 Fig.3.

A scandent shrub, with pubescent twigs. Leaves opposite or ternately verticillate; petioles 1—2.5 mm long; blades coriaceous, elliptic-lanceolate, 2—2.5 cm long, 1—1.5 cm broad, the apex acuminate, the base acute, the margins entire, the midrib impressed above, the lateral veins indistinct. Flowers in terminal cyme; calyx-lobes ovate-triangular, 2—3 mm long, pubescent; corolla tube 4—5 mm long, pubescent, the lobes obliquely ovate, 2 mm long; stamens 5, adnate to corolla tube about half long of filament; anthers free from stigma, just below the orifice, the cells obtuse base;

stigma conical with obtuse apex, below the anther; disc cupular-lobed at the base of ovary. Drupe ovoidal, 6 mm long, 4 mm thick, the exocarp reticulate inside, 1-4-seeded. Seeds ovoidal, fenestrate, hairy.

Endemic, growing on open forest edges or mountain top of very limited area of Chingshan at altitudes of 1200-1300 m high. This species is similar to *A. luzoniensis* Merr. except smaller leaves with acuminate or acute apex and ovoidal drupe. It is also closely related with *Alyxia stellata* Roxb. of Java & Siam.

TAICHUNG: Chinshan: *Huang 9617*(*), *9618*(*), *9619*(*), *9685*, *S.Y. Lu 4066*(TAIF), *5936*(Holotype, TAIF), *5936*(Isotype, TAIF), *6189*(TAIF).

2. ANODENDRON A. DC. 錦蘭屬

Climbing shrubs. Leaves opposite, the veins inconspicuous. Flowers in axillary and terminal paniculate cymes; calyx 5-lobed, the lobes ovate; corolla salverform, 5-lobed, the tube hairy inside, the lobes narrow, overlapping to the right, twisted to the left; stamens adnate to the base of corolla-tube; anthers sagittate, conniving and adherent to the stigma, the cells short spurred below; disc cupular; ovary of 2 distinct carpels, included in the disc and adnate to it at the base, many-ovuled; style very short, the stigma thick, conical. Follicles divergent or linear-oblong; seeds beaked, comose.

About 8 species in tropical Asia. Two species in Taiwan.

KEY TO THE SPECIES

1. Leaves lanceolate, acute at both ends, the veins prominent on upper surface; corolla tube 3-5 mm long; follicle ovate-lanceolate(1) *A. affine*
1. Leaves elliptic-lanceolate, obtuse at base, the veins obscure on upper surface; corolla tube 1.5-2.5 cm long; follicle oblong-lanceolate(2) *A. benthamiana*
Insufficiently known species(3) *A. salicifolium*

- (1) *Anodendron affine* (Hook. & Arn.) Druce in Rep. Bot. Exch. Club Brit. Isles 4: 605, 1917; Nakai, Trees Shrubs Ind. Jap. ed. 2. 416. *f. 200*. 1927; Kanehira, Form. Trees rev. ed. 627. *f. 584*. 1936; Liu, Ill. Nat. Intr. Lign. Pl. Taiwan 2: 1079. *f. 900 & 901*. 1962; Li, Woody Fl. Taiwan 782. *f. 314*. 1963; Ou & Liu in Journ. For. 2:33. *f. 2-3*. 1973. 小錦蘭 Fig. 4

Holarrhena affine Hook. & Arn., Bot. Beechey Voy. 198. 1841.

Anodendron laeve Maxim. ex Fr. & Sav., Enum. Pl. Jap. 1:315. 1875.

Anodendron suishaense Hayata, Icon Form. 6: 29. *Pl. 7*. 1916; Kanehira, Form. Trees rev. ed. 638. 1936.

A glabrous, climbing shrub. Leaves subcoriaceous, oblong-lanceolate, 3-12 cm long, 1-3 cm broad, the apex acute to acuminate, the base acuminate to acute, the lateral veins of 4-7 pairs; petioles 0.5-1.5 cm long. Flowers pale yellow, in terminal or axillary glabrous panicles, 2.5-9 cm long, the peduncles 2-4 cm long; calyx glabrous, elliptic, acute apex, 1.5 mm long; corolla-tube 3-5 mm long, the lobes oblong-ovate, pubescent inside, 3-4 mm long, 1-1.5 mm broad; stamens at lowest portion of corolla-tube, the anthers sagittate, 0.3 mm long, adhering to stigma; pistil below the anthers,

the style and stigma conical, the ovary lanceolate on disc. Follicles long ovoid, 8-10 cm long, 1.6-2.7cm broad, acute, woody. Seed comose.

Southern China to the Ryukyus and Japan. Taiwan, in forest, at low and medium altitudes throughout the island.

KEELUNG: *Y. Simada s.n.* March 1980 (TAIF). TAIPEI: Mu-cha, *Y.F. Chen 1955*(*); Ins. Kizan, *Masamune & Suzuki s. n.* July 3, 1932; Wutzushan, *Huang 10473*(*), *Kou 9347*; Daibulong, *Sasaki s. n.* March 1924; Sizangan, *N. Mori s.n.* June 25, 1933, *Y. Simada s. n.* Oct., 1914(TAIF); Sozan, *Sasaki s. n.* Oct. 10, 1924; Hokuto, *Murakami 169, 170, Y. Simada s.n.* Oct., 1914(TAIF); Mie-tai-shan, *Y. Simada s.n.* Oct., 1914(TAIF), *Sasaki s.n.* March, 1918 (TAIF); Shin-tien, *Hsu 3256*; Tachitin, *S.F. Huang s.n.* May, 1984, *Huang 10470*(*) Neihu, *Kuo 3048*; Agyoku, *T. Suzuki s.n.* Dec. 7, 1935; Yam-king Road, *S.Y. Lu 15755* (TAIF). TAoyUAN: Kabo-shan, *T. Suzuki 12959, Y. Simada s.n.* March, 1910 (TAIF). HSINCHU: Wutzushan, *T. Kawakami s.n.* March, 1907(TAIF). NANTOU: Sun Moon Lake, *Kudo & Sasaki 15292 s.n.* Sept. 18, 1929; Pu-li, *T. Kawakami s.n.* March, 1915(TAIF), *Y. Kawakami s.n.* March, 1915 (TAIF); Suisya Lake, *Sasaki s.n.* Sept. 12, 1929; Rengechi, *Kawakami s.n.* April, 1944. PINGTUNG: Ken-tin, *Kao 9427*; Kosun, *T. Suzuki 6064*; Son-ka, *Chung & Kao 3486*; South Cape, *S. Tanaka s.n.* May, 1911(TAIF); Kuskus, *Kudo & Suzuki s.n.* Jan. 1, 1928. TAITUNG: *U. Mori s.n.* April, 1907(TAIF).

- (2) *Anodendron benthamiana* Hemsl. in Journ. Linn. Soc. Bot. 26:98. 1889(Ind. Fl. Sin.); Matsum. & Hayata in Journ. Coll. Sci. Univ. Tokyo 22: 251. 1906(Enum. Pl. Form.); Kanehira, Form. Trees rev. ed. 627. f. 585. 1936; Liu, Ill. Nat. Intr. Lign. Pl. Taiwan 2: 1081. f. 902. 1962; Ou & Liu in Journ. For 2: 34. f. 4-5. 1973. (Holotype: *U. Faurie 366*. April 1914, TI!) 大錦剛 Fig. 5.

Formosia benthamiana (Hemsl.) Pichon in Bull. Nat. Hist. (Paris) N.S. 20:300. 1948; Li, Woody Fl. Taiwan 788. 1963, Fl. Taiwan 3:210, Pl. 970. 1978.

A climbing shrub. Leaves thick coriaceous, oblong-ovate, 5-14 cm long, 1-5 cm broad, the apex obtuse or acute at both ends, the lateral veins of 5-7 pairs; petioles 5-15 mm long. Flowers in terminal cymes, 5-15 cm long; pedicels 5 mm long; calyx elliptic, acute apex, 3-4 mm long; corolla tube 1.5-2.5 cm long, scaly hairs within. The lobes oblong, 1.5-2.5 cm long; anthers conniving and adhering to the stigma, the cells spurred at base; disc cupular; style short; stigma enlarged. Follicles oblong-lanceolate, 12 cm long, 1.5cm wide.

Endemic. Widely distributed in the sunny forest edges at low altitudes of less than 400 m high. This species differs from *A. affine* by its larger flower, shorter petioles and larger leaves with obtuse apex at both ends.

ILAN: Zuifang, *T. Kawakami s.n.* March, 1907(TAIF). LOTUNG: *U. Mori s.n.* June, 1906(TAIF). KEELUNG: *Kou & Kao s.n.* Aug., 1906(TAIF). TAIPEI: Moutz, *T.Y. Chiang 317*; Tamsui, *A. Henry 185*; Szu-chiao-ting to Yuh-mei-shan, *Liu, Chen & Kao s.n.* Mar. 29, 1956; Hsiao-Kou-Tou, *Huang 10491*(*); Susangchikou, *Kuo 10854*; Pingdunli, *Kuo 9729*; Yin-ho-tung, *Hsu & Tu. 4317*; Oobi, *Masamune s.n.* April 23 & 24, 1938; Neishungshi, *C.T. Wang s.n.* Apr. 3, 1977; Chienkou, *Hsu 5250*; Shih-ting, *C.L. Huang s.n.* Apr. 23, 1983, *S.H. Liu 529, Y.F. Chen 2078*(*),

T. Nakamura s.n. Apr. 14, 1940; Houshanyue, *Kuo 9681*; Wu-lai, *S. Koanish* s.n. Apr. 1901(TAIF), *Sasaki* s.n. Apr., 1918 (TAIF); Shen-ken, *U. Mori* s.n. Feb. 1908; Hsientien, *Y.P. Yang* s. n. April 1, 1977(TAIF). NANTOU: Chingshuikou, *Kawakami* & *Sasaki* s.n. July, 1911(TAIF). PINGTUNG: Kuskus, *U. Mori* s.n. April, 1907(TAIF); Nanjenshan, *Huang 9577*.

Insufficiently known species

- (3) *A. salicifolium* Tsiang & Li in Acta Phytotax. Sinica 11: 379. 1973 柳葉珊瑚 (Tsiang, 1977)

3. CERBERA L. 海欖果屬

Small trees. Leaves alternate to fascicled at top of branchlets, the veins slender, spreading, parallel. Flowers large, white, in terminal cymes; calyx 5-lobed; corolla funnel-shaped, the tube long, the throat with pubescent scales, the lobes broad, overlapping to the left; stamens included, the anthers lanceolate, apiculate, the cells rounded at base; disc wanting; ovary of 2 distinct carpels, united by the style; style filiform, the stigma conical. Fruit of 1 or rarely 2, globose to ellipsoid carpels, 1(-2) seeded, the pericarp thick, fibrous and woody; seeds broad, compressed, without wing or coma; endosperm absent.

About nine coastal species, Madagascar, tropical Asia to Australia and the Pacific Islands. One species in Taiwan.

- (1) *Cerbera manghas* L., Pl. 208. 1753; Kanehira, Form. Trees rev. ed. 628. f. 586. 1936; Liu, III. Nat. Intr. Lign. Pl. Taiwan 2: 1082. f. 903. 1962; Li, Woody Fl. Taiwan 784. f. 315. 1963. 海欖果 Fig. 6.

Cerbera odollam Gaertn., Fruct. 2: 193. Pl. 124. 1791; Matsum. in Bot. Mag. Tokyo 12: 15. 1898; Matsum. & Hayata in Journ. Coll. Sci. Univ. Tokyo 22: 249. 1906 (Enum. Pl. Form.).

A small tree, the branchlets rigid. Leaves coriaceous, black when dry, crowded toward the ends of branchlets, lanceolate or oblanceolate to linear-obovate, 10-25 cm long, 2.5-7 cm broad, acute to abruptly acuminate, cuneate at base, the veins slender, of 12-17 pairs; petioles about 1-6 cm long. Flowers white, usually pinkish outside in flower bud, in large cymes, the peduncles about 5-15 cm long, the bracts deciduous; calyx-lobes oblong-elliptic, 1.2-1.5 cm long, acute; corolla-tube green, hairy inside, 1.5-3 cm long, 4 mm broad, the mouth quinque-angular, pink, the limb white, 2-5 cm across, the lobes imbricate in flower bud, obovate, acute, 2-2.3 cm long, 1-1.5 cm broad; corona yellow, on the top of corolla-tube, hairy; stamens 5, subsessile, attached to below corona, the anther caudate at apex; pistil just below anther, the stigma dilated head, the floral parts deciduous except ovary; pedicels 2-2.5 cm long. Fruit ellipsoid, exocarp fleshy, mesocarp fibrous, endocarp stony, 5 cm long, 3-3.5 cm broad, Seed one, with thin membranous coat.

Tropical Asia, a common plant. Taiwan, growing along seashore.

ILAN: Aoti, *Huang 10467*(*), *Y.F. Chen 2992*, *Lee & Kao s.n. 1995*, *Chuang & Hsu 2414*. KEELUNG: *Sasaki* s.n. March, 1917(TAIF). TAIPEI: between Paisawan and Santz, *Hsu 4951*; Wanli High school, *Hsu 12218*; Botanical Garden, *C.L. Lin*

s.n. June 26, 1939; Paisawan to chinshan Power Plant, *Kuo 8920*. PINGTUNG: South Cape, *Kudo & Suzuki s.n.* Dec. 30, 1928; Kengtin, *Huang 4762, 9156* Chialaushui, *Huang 9602*. TAITUNG: Lanyu, *Biyarow s.n.* Aug. 9, 1932, *Huang & Kao 3337*, *Huang et al. 9306*, *Sasaki s.n.* June 1926, *Imoruru 4080*.

4. ECDYSANTHERA Hook. & Arn. 酸藤屬

Climbing shrubs. Leaves opposite, the nerves distant. Flowers small, in terminal trichotomous paniculate cymes; calyx small, 5-lobed; corolla suburceolate, the tube short, the lobed 5, short, overlapping to the right; stamens inserted at the base of the corolla, the anthers connivent over and adhering to the stigma, the cells spurred at the base; disc annular; ovary of 2-distinct carpels, united by the style; style short, the stigma conical. Follicles terete, linear; seeds oblong or linear, compressed, comose; endosperm scanty.

About 15 species in India, Indo-China, southern China, Malaysia and Indonesia. Two species in Taiwan.

KEY TO THE SPECIES

1. Branches slender, the lenticels obscure; leaves thinner, obovate-oblong, the lateral veins 6, pinkish beneath; corolla and petioles pinkish; follicle not prominently lenticellate(1) *E. rosea*
1. Branches stouter, prominently lenticellate; leaves thicker, ovate-elliptic, the lateral veins 3-4, green beneath; corolla and petiole green; follicle prominently lenticellate(2) *E. utilis*

- (1) *Ecdysanthera rosea* Hook. & Arn., Bot. Beechey Voy. 189. *Pl. 42*. 1841; Benth., Fl. Hongk. 222. 1861; Kanehira, Form. Trees rev. ed. 630. 1936; Liu, Ill. Nat. Intr. Lign. Pl. Taiwan 2: 1083. *f. 904*. 1962; Li, Woody Fl. Taiwan 786. *f. 316*. 1963; Ou & Liu in Journ. Form. 2: 38. 1978. 1973; Li, Fl. Taiwan 2: 208. *Pl. 969*. 1978. 酸藤 Fig. 7.

A large climber. The branches slender, glabrous. Leaves elliptic to obovate-oblong, 3-7 cm long, 1.5-3.5 cm broad, the apex short caudate, the base attenuate, the margins entire, more or less lustrous above, glaucous beneath, the lateral veins of 6 pairs, green above, red beneath surface; petioles 7-17 mm long, reddish. Flowers small, pink, in a large open terminal panicle; calyx pubescent, 1-1.5 mm long; corolla-tube 3-4 mm long, broadly campanulate, the lobes broad, obtuse, shorter than tube; disc annular, entire; style dilate above; ovary pubescent. Follicles divaricate or horizontally linear, 10-14 cm long, 0.3-0.8 cm wide, the apex acute. Seeds pubescent.

Java, Sumatra to southern China. Taiwan, scattered in forests at low altitude throughout all island,

KEELUNG: *Sasaki s.n.* May 23, 1925; Dandan, *S. Suzuki 4478*, *Masamune 590*. TAIPEI: Hsiantienhu, *Huang 9694, 9695*(*); Nei-hu, *H. Keng s.n.* May 22, 1956, *Yang, Wang & Kao s.n.* May 22, 1956, *Kuo 11017*; Pitan, *H. Simizu s.n.* June 1, 1936; Muhchihshan, *Kuo 9747*; Shih-ting, *Liu & Shen s.n.* May 27, 1933, *Hsu 5403*, *Ito s.n.* May, 1915, *Sasaki s.n.* March, 1915; Botanical Garden, *C.L. Lin s.n.* May, 1936;

Nikakusho, *Sasaki s.n.* Nov. 26, 1933; Enshurin, *Kudo s.n.*; Yam to Tume, *Y. R. Cheum et al s.n.* May 12, 1961; Yuan-shan, *Huang 2371*; Wu-lai, *W.N.Wun s.n.* April 5, 1961, *Sasaki s.n.* May 25, 1932, *S.Suzuki s.n.* June 10, 1928, *Huang 10468*(*); Shinsan, *T.Y. Chiang 1509*; Chisanyien, *Nonaka & Mori s.n.* May 14, 1933, *Kuo 4939*; *s.loc.*, *T.Suzuki 6895*, *Shimada 723*. TAOYUAN: *U.Mori s.n.* March, 1907 (TAIF). HSINCHU: Nan-Zoun, *Y.Kawakami s.n.* June, 1906 (TAIF); Wutzushan, *S. Konishi s.n.* Oct., 1906(TAIF). TAICHUNG: Pahsienshan, *Chuang, Kou & Kao 2797*; Chia-pao-tai, *Kao 9758*; Nichigetsutan, *Kudo & Sasaki s.n.* Sept. 17, 1929. MIAO-LI: *U.Mori s.n.* July, 1906(TAIF). NANTOU: Rengechi, *K. Mori s.n.* July 7, 1936, *Yamamoto & Mori s.n.* Nov. 1932; *Hibino & Suzuki s.n.* July 21, 1926; Pu-li, *Wu, Leu & Chiu s.n.* July 29, 1970. KAOHSIUNG: Liu-Kuei, *Chuang 3191*; Chishan, *Sasaki s.n.* May, 1912(TAIF), *Y.Simada s.n.* Jun., 1918 (TAIF). PINGTUNG: Shan-ti-men, *K.S.Hsu 4565*. TAITUNG: Tipon, *Matuda 505*; Baibara, *K.Kikuchi s.n.* July 18, 1925, *Hosokawa 5175, s.loc.*, *Faurie 8202*, *T.Suzuki 6895*, *Huang 8817*(*).

This species is characterized by its reddish petioles and veins on lower surface, and delicate veins.

- (2) *Ecdysanthera utilis* Hayata & Kawakami in Bot. Mag. Tokyo 20: 51. 1906; Kanehira, Form. Trees rev. 630. *f.587*. 1936; Liu, 111. Nat. Intr. Lign. PL. Taiwan 2: 1084. *f.905*. 1962; Li, Woody Fl. Taiwan 786 1963; Ou & Liu in Journ. For. 2: 39. *f. 9-10*. 1973; Li, Fl. Taiwan 4:208. 1978. 乳藤 Fig. 8.

A large climber, the branches stouter, prominently lenticellate. Leaves ovate to elliptic, 4—9 cm long, 2—4 cm broad, the apex caudate-acuminate, the base broadly acute, the lateral veins of 3(—4) pairs, glabrous, shining above, pale green beneath; petioles 1—2.5 cm long. Flowers small, about 2 mm long in large axillary and terminal, trichotomous, broad and loose cymes, 4—15 cm long; pedicels 1—2 mm long; calyx ovate, as half long as corolla tube, the lobes ovate; corolla broadly campanulate, green; corolla tube 2 mm long, the lobes 2 mm long; stamens up to middle part of tube, the anthers sagittate, conniving and adherent to the stigma, the cells spurred below; pistil below calyx-lobes; disc cupular; ovary of 2-distinct carpels, bilobed, the style short, conical. Follicles horizontally lineate, 14—19 cm long, 6.5—7 mm wide, the apex acuminate, prominently lenticellate. Seed comose.

Southern China to the Ryukyus. Taiwan, in forest edges at low altitudes.

KEELUNG: *T.Kawakami s.n.* Dec., 1912(TAIF). TAIPEI: Ho-kan-zu-shan, *Y.F.Chen 4473*; Chienkou, *Hsu 5215*(*), *Shimizu & Kao s.n.* April 13, 1961, *Sasaki s.n.* Feb. 26, 1926; Wawuaku, *Kuo 9356*, *N. Konisi s.n.* April, 1909(TAIF). Hsientien: *Tsou & Lin s.n.* April 9, 1984, *Huang 10470*(*). TOEN: *H.Simada 1144*, *R.Syo 77*. HSINCHU: Wutzushan, *T.Kawakami s.n.* Oct., 1910 (TAIF); Taipin, *Sasaki s.n.* March 10, 1916. TAICHUNG: Nan-gun Stream, *T.Hayashi s.n.* March 20, 1926 (TAIF), *Y.Kawakami s.n.* March, 1910(TAIF); Lienhuachih, *Huang 7630*, *Hsu s.n.* Feb. 26, 1972, *Keng, Liu & Kao s.n.* July 20, 1955, *S.Y.Lu 15492* (TAIF), *T.Hayashi s.n.* Feb., 1924(TAIF); Nichigetsutan, *Kudo & Sasaki s.n.* Sept. 17, 1929; Chaei-sir, *R.Kanehira s.n.* March, 1912(TAIF). TAITUNG: Baibara, *T.Saito s.n.* May 5, 1924.

This species differs from *E. rosea* by its shape of leaf, thicker veins and leaves,

green on lower surface of veins and petioles, smaller flowers, and acuminate longer follicles.

5. *HOLARRHENA* R. Br. 止瀉木屬

Small trees. Leaves opposite to alternate. Flowers in terminal or axillary cymes; calyx linear, 5-lobed, acute; corolla salverform, 5-lobed, the tube cylindric, the lobes linear, overlapping to the left; stamens 5, adnate to the base of corolla tube, the cells rounded at base; disc wanting; ovary of 2-carpels, united at base, the stigma 2-fid. Follicles linear; seeds comose.

Few species. Tropical Africa, India, Himalayas to Ceylon and Malacca. Taiwan, possibly one native species.

- (1) *Holarrhena antidysenterica* Wallich (Cat.n. 1672: 1928, *nom. nudum*) ex A.DC. in DC., Prodr. 8: 413. 1844; Kurz, For. Fl. Brit. Burma 2:182. 1877; Hook. f., Fl. Brit. Ind. 3:3:644, 1882; Collett and Hemsl. in Journ. Linn.Soc. 28:85. 1890; Cooke, Fl. Pres. Bombay 2:133. 1904; Craib in Kew Bull. Misc. Inf. 1911:413; Brandis, Ind. Trees 459. 1921; Ridley, Fl. Malay Penins. 2: 349. 1923; Tsiang in Sunyatsenia 2(2):96. 1934. 止瀉木 Fig.9.

A small tree, up to 4.6 m high, 10 cm in diameter. Branchlets with whitish dot lenticles. Leaves subsessile, alternate or subopposite, membranous, ovate to elliptic-ovate, 4.5—17.5 cm long, 4.3—10.5 cm broad, the apex rounded or obtuse, the base rounded, the margins entire, the lateral veins 7—18 pairs, ascending at end but not connected at margin, brownish pubescent beneath; petioles 1—5 mm long. Flowers in short panicles, the peduncle 2 cm long; pedicels 1 cm long; calyx linear, 2 mm long, the corolla tube pubescent, 1 cm long, 1 mm wide, the corolla lobes 1 cm long; stamens 5, inserted to the base of corolla tube; anthers included, caudate apex, rounded base, free from stigma; stigma bilobed, at middle part of anther height. Follicles linear, pedunculate, 17—30 cm long, 0.5—1.5 cm wide, the lenticels prominently whitish tuberculate dots, the peduncle 1 cm long. Seeds linear, with long coma in 4 different dense levels.

India, Burma, Malacca, occasionally cultivated in the tropics. Taiwan, the precise locality for native plant is still unknown. Y.Kudo(1934) reported this species cultivated in the Kentin Forest station.

TAIWAN: Taipei, Sizangan, *H.Umetani s.n.* Sept. 17, 1928(*).

CHINA PROPER: Yunnan: Che-li Hsien. *Y.Tsiang 77582, 79647*. Jen-Yeh Hsien: *Tsiang 80812*.

BHUTAN: Phuntahding alt. 900 m in evergreen forest, flowers white, *Hara. Kanai, Murata, Ohashi, Tanaka & Yamazaki 2029(TI)*.

INDIA: Khesi(Oudh) Upper Gangotic Plain, Khatnanaddi *Inayat 23712*. Pankabari *G.H. Cave s.n.* Sept. 10, 1913(A); Londc, Vern. "*Kudah*" (Marathi). East of Goa boundary, *J.Fernandes 1321(A*)*.

VIETNAM: Annan: Cana, Prov. Phawrang, *M.Poilane 9259(A)*.

Growing on mountain slope at altitudes of 950 m to 1040 m high. Root and bark used in medicine. Leaves also used to warp native cigarettes for reducing smokers cough (According to the description on the herbarium label of *Fernandes 1321*).

6. MELODINUS Forst. 山橙屬

Climbing shrubs. Leaves opposite. Flowers in terminal or axillary cymes; calyx 5-lobed; corolla salverform, the throat with thick scales, the tube long, hairy inside, the lobes 5, rarely 4, overlapping to the left; stamens 5, rarely 4, adnate to the base of the corolla, the anthers included, free from the stigma, the cells rounded at the base; disc wanting; ovary 2-celled; style short, the stigma thick, 2-fid. Fruit a globose berry, the pericarp hard or coriaceous, pulpy inside; seeds many, imbedded in the pulp, without coma; endosperm fleshy.

About 53 species in Malaysia, tropical Asia, Australia and the Pacific Islands. One species in Taiwan.

- (1) *Melodinus angustifolius* Hayata in Journ. Coll. Sci. Univ. Tokyo 30(1): 193. 1911(Mat. Fl. Form.); Li, Woody Fl. Taiwan 788. f.317. 1963, Fl. Taiwan 4:212.Pl. 971. 1978; Ou & Lin in Journ. For. 3: f.11-12. 1973. Type: Pingtung Kururu, T.Kawakami 1621(TI!). 山橙 Fig. 10

A climbing shrub. Leaves dark green above, pale green below, subcoriaceous, linear-lanceolate, 6-9 cm long, 1-2.1 cm broad, the apex attenuately obtuse, the base acute to obtuse, the margins entire, the veins prominent on both surfaces, glabrous on both surfaces; petioles 2-4 mm long. Flowers in short terminal and axillary cymes, the bracts and bracteoles broadly ovate, about 2 mm long; calyx-lobes triangular, pubescent outside, 1-2 mm long; corolla tube cylindrical, 5-8 mm long, 1 mm broad, the lobes obovate, about 6 mm long; stamens included; anthers free from stigma, the base obtuse; pistil as long as stamens, the style dilated at top, 0.5 mm long, the stigma bifid; pedicels 2-4 mm long. Fruit oblong-fusiform, 5-9 cm long, 2-2.5 cm broad, acute at both ends; peduncles 1 cm long, 4 mm broad. Seeds black, triangular, smooth.

Endemic. Southern part of Taiwan on coral rocks, in thickets and also rarely found in northern and central parts of Taiwan.

TAIPEI: Kankau, Kashin, *G.Nakahara 800*(TAIF). NANTOU: Nichi-getsu-tan, *Kudo & Sasaki s.n.* Sept. 17, 1929; Nun-guo-shan, *Kawakami & Mory s.n.* Jan., 1980(TAIF). PINGTUNG: South Cape, *Liu & Keng 2719, Sasaki s.n.* March 15, 1916, *s.n.* Dec., 1926, *G.Nakahara 1388, Sasaki s.n.* July 12, 1924; Kuskus, *Kudo & Sasaki s.n.* Dec. 31, 1928; Kururu, *E.Matuda s.n.* Aug. 8, 1915, *T.Kawakami 1621*, July 5, 1906(TI); Kentin, *Hsu 4160, C.C.Chuang 2386, Chuang & Kao 3979, Kuo 12110, Huang 10071, 10073, 10075(*), 10076(*);* Tesoenkyo et Naibun, *Kudo & Mori s.n.* April 9, 1930.

7. PARSONIA R. Br. 爬藤藤屬

Twining shrubs. Leaves opposite. Flowers small, white, in terminal or axillary dichotomous cymes; calyx 5-lobed; corolla salverform, 5-lobed, the tubes cylindrical, the throat naked, the lobes overlapping to the right; anthers exerted, conniving over and adhering to the stigma, the cells spurred below; disc of 5 lobes; ovary 2-celled; style enlarged at top, the stigma columnar, the cells many-ovuled. Fruit cylindrical; seeds comose; endosperm scanty.

About 100 species in Salilanka, India, Indochina, Malaysia, Indonesia, the Philippines, Japan and mainland China. One species in Taiwan.

- (1) *Parsonia laevigata* (Moon) Alston in Ann. Roy. Bot. Gard. Peradeniya **II**: 203. 1929; Yamazaki in Journ. Jap. Bot. **43**: 63. 1968; Ou & Liu in Journ. Form. **3**: 43. *f. 13*. 1973; Li, Fl. Taiwan **4**: 212. *Pl. 972*. 1978. 爬藤藤 Fig. 11.

Echites laevigata Moon, Cat. Pl. Ceylon. 20. 1824.

Parsonia helicandra Hook. & Arn., Bot. Beechey Voy. 197. 1896; Yamamoto in Journ. Soc. Trop. Agr. **6**: 551. 1934; Li, Woody Fl. Taiwan 790. 1963.

A twining shrub, nearly glabrous. Leaves coriaceous, pale green, obovate-oblong or oblong-elliptic, 7—15 cm long, 2.5—9.7 cm broad, the apex cuspidate, obtuse or acute, the base acute, or rounded, the veins 4—6 pairs, arched; petioles 1—3 cm long. Flowers yellow, in axillary corymbose cymes; pedicels 2—4 mm long; bracts small; sepals ovate, thick, obtuse, about as long as corolla tube, pubescent; corolla 1—2 mm across, pubescent, the tube 2—3 mm long, the lobes linear-oblong, 5—6 mm long, obtuse; stamens longer than pistil, the anther versatile; pistil bicarpellate, many ovules, the stigma conical shape, glabrous, connivent to the middle part of anther; peduncles 1.5—1.7 cm long, pubescent. Follicles 6—7 cm long, 0.8—1.5 cm broad, elongate. Seed slender, glabrous, to 1.2 cm long, the coma to 1.2 cm long.

Tropical Asia to southern China. Taiwan, climbing on rocks along coastal area.

TAIPEI: Hopintao, *K.C. Yang 1592*, *Kou 5607*, *Kawakami & Sasaki s.n.* April, 1911; Botanical Garden, *H.T. Hsieh s.n.* June 1921; Kizan Insl., *Masamune & Suzuki s.n.* July 3, 1932. PINGTUNG: Chialoshuei, *Koyama & Kao 8942*, *Kuo 9559*; Kengtin, *Huang 9145*; Oo-lan-pi, *Huang 4769*, *4850*, *Kudo & Suzuki s.n.* Dec. 30, 1928, *Kao 7108*; Nanrenshan, *C. F. Hsieh 1424*, *Huang 4867*; Kuaru, *K. Yamada s.n.* June 23, 1916, *Matuda s.n.* Aug. 16, 1915; Senpanseki et Garanbi, *T. Suzuki 5972*. TAITUNG: Botel Tobago, *C.F. Hsieh 1627*, *Hsu 9409*, *9453*, *Huang 5232*, *9202*, *9239(*)*, *9355*, *9482(*)*, *Y. Kosuge 27423*, *H. N. Yang 3079(*)*, *3138*, *Kao 8713*, *T. Sikano s.n.* July 10, 1935, *T. Hosokawa 8041 s.n.* March, 1943, *Sasaki s.n.* May, 1924, *s.n.* July, 1926, *Masamune 4127*, Green Insl., *Huang & Kao 6931*, *Kuo 3843*, *Sasaki s.n.* May 5, 1927, *Kudo & Mori 370*.

8. RAUVOLFIA L. 蘿芙木屬

Erect shrubs. Leaves usually 3—4-verticillate, rarely opposite, the veins slender. Flowers in cymes alternating with the terminal leaves, becoming lateral; calyx 5-lobed; corolla salverform, the tube cylindrical, the throat usually hairy within, the lobes 5, broad, overlapping to the left; stamens 5, included, adnate at the middle of the tube, the anthers free from the stigma, the cells rounded at the base; disc cupular or annular; ovary 2-distinct or connate carpels united by the style, the style filiform, the stigma 2-fid; ovules 2 in each cell. Fruit of 2, 1-seeded drupes; seeds ovoid; endosperm fleshy.

A genus about 135 species, in both the Old and New World, chiefly tropical. One species in Taiwan.

- (1) *Rauwolfia verticillata* (Lour.) Baillon in Bull. Soc. Linn. Pairs 1: 768. 1888; Kanehira, Form. Trees rev. ed. 631. f. 588. 1936; Liu, Ill. Nat. Intr. Lign. Pl. Taiwan 2: 1088. f. 909. 1962; Li, Woody Fl. Taiwan 790. f. 318. 1963, Fl. Taiwan 4: 215. 1978; Ou & Li in Journ. For. 3: 46. f. 14. 1973. Type: Canton, *Loureiro s.n.* BM. 蘿芙木 Fig. 12.

Dissolaena verticillata Lour., Fl. Cochinch. 138. 1790.

Ophioxylon chinense Hance in Journ. Bot. 3: 380. 1865.

Rauwolfia chinensis (Hance) Hemsl. in Journ. Linn. Soc. Bot. 26: 95. 1889 (Ind. Fl. Sin.); Matsum. & Hayata in Journ. Coll. Sci. Univ. Tokyo 22: 248, 1906 (Enum. Pl. Form.).

A small glabrous shrub. Leaves 3—4-verticillate, or opposite partly, thin-coriaceous, oblong-lanceolate, 8—18 cm long, 2—4.5 cm broad, the apex acute to acuminate, the base attenuate, the lateral veins of 5—12 pairs; petioles 1—2 cm long. Flowers in axillary trichotomous cymes, bracteate; calyx-lobes linear-ovate, acuminate, as 1/3th to 2/3th long as anther position; corolla-tube pubescent inside, up to 12 mm long, the lobes elliptic, glabrous, 4 mm long; anthers elliptic, as half long as corolla tube, nearly basifixed; stigma bilobed, lower than anther, the style of 4-short lobes. Drupe oblong-ovoid, about 12 cm long, 0.4—0.6 cm in diameter, more or less oblique; pedicels 5—12 mm long. Fruiting stalk 3—4 cm long. Seed one.

Southern China and Indo-China. Taiwan, widespread throughout.

TAIPEI: Kuang-yin shan, *Huang 1548* (*), *H. Simada 774*, *W.S. Huang et al 98*, *Tanaka & Shimada 11093*, *Keng & Kao s.n.* June 22, 1955; Sulin, *Sasaki s.n.* Sept., 1918, *s.n.* April, 1917 (TAIF), *Y. Simada s.n.* Dec., 1914 (TAIF); Sozan, *Ito s.n.* Feb., 1914; *s.loc.*, *Sasaki 4316*, *s.n.* April, 1918 (TAIF); Ta-tun-shan, *Sasaki s.n.* Sept. 1918 (TAIF), *Y. Simada s.n.* Aug., 1910 (TAIF). HSINCHU: Taiko, *M. Asikaga s.n.* Sept. 25, 1936. TAICHUNG: Yeulin, *H. Morimoto 752*; Chang-hua, *Y. Simada s.n.* July, 1907 (TAIF). NANTOU: *Sasaki s.n.* Oct., 1909 (TAIF). PINGTUNG: South Cape, *s.loc.*, *Mo & Kao s.n.* Sept. 10, 1955, *H. Morimoto 753*, *E.H. Wilson s.n.* Nov., 1918 (TAIF); Dabu, *Masamune s.n.* Dec. 25, 1930; Kentin, *C.C. Chang 2400*, *3944*, *Huang 4764*, *Hsu 4131*; Sie-chun-chi, *I.M. Liu s.n.* Feb. 18, 1953; Suanliu, *Kao 7252*, *T. Hosokawa s.n.* Aug. 24, 1932; Sekimon-Botan, *A.T. Hsieh 107*; *s.loc.*, *S. Suzuki 289*; Oluanpi, *Hukuyama 644*, *I.M. Liu 14*. TAITUNG: Lanyu, *Liu & Keng 2780*, *U. Mori s.n.* April, 1907 (TAIF); Cheng-Kung Forest Station, *Huang 10342* (*), *s.loc.*: *A. Henry 90*.

Insufficiently known species

- (2) *Rauwolfia taiwanensis* Tsiang in Kwantung Research Report of Forest Institute. 1: 12. Pl. 7. 1962. (Tsiang, 1977). 臺灣蘿芙木

9. TABERNAEMONTANA L. 馬蹄花屬

Erect trees or shrubs. Leaves opposite. Flowers white, in axillary and terminal cymes; calyx 5-lobed, usually glandular within; corolla salverform, the tube cylindrical, inflated in the middle or above, the lobes 5, overlapping to the left; stamens adnate at or above the middle of the corolla-tube; anthers elliptic, the base sagittate or obtuse; disc wanting; ovary of 2-distinct carpels united by the style, the stigma 2-

lobed; ovules many. Fruit of 2 coriaceous or fleshy follicles, the follicles ovoid or oblong, smooth or ribbed, 1- to many-seeded, pulpy. Seeds ovoid-oblong, terete or compressed, embedded in the pulp, without coma; endosperm fleshy, smooth or ruminate.

A large genus of over 150 species in all tropical regions. Two or three species in Taiwan. *T. divaricata* (L.) R.Br. ex Roem. & Schutt is one of the common cultivated garden trees in Taiwan.

KEY TO THE SPECIES

1. Leaves acuminate or caudate apex, the first lateral veins parallel to margin (1) *T. pandacaqui*
 1. Leaves rounded or obtuse apex, the first lateral veins parallel to margin (2) *T. subglobosa*
 Insufficiently known species (3) *T. macrocarpa*

(1) *Tabernaemontana pandacaqui* Poir. in Lamark, Encyc. 7: 529, 1806; Liao, Chen & Ho in Mem. Coll. Arg. NTU. 17(2): 161, 1977. 南洋馬蹄花 Fig. 13.

A shrub of about 2 m tall. Leaves opposite, subcoriaceous, brownish or pale yellow, lanceolate or ovate-lanceolate, 9–15 cm long, 3–6 cm broad, the apex acuminate or acute, the base acuminate or obtuse, the margin entire, the lateral veins of 12–13 pairs, parallel to margin and curved at ends, silky hairs on the lower surface; petioles 1–1.5 cm long. Flowers umbellate-cyme, the flowering stalks 1.5 cm long; calyx 1.5–5 mm long; corolla tube 1.3–1.8 mm long, the corolla lobes 4–6 mm long, 6 mm wide; pedicels 1–1.5 cm long. Follicles ovate to lunate, with 5-elevated veins, long caudate at apex, over 2 cm long, 1 cm in diameter, the stalk 1 mm long, the fruiting stalk 3 cm long. Seeds several, 6 mm long, 3 mm wide.

Micronesia to the Philippines. Taiwan, naturalized and scattered in forest at low altitudes of southern Taiwan.

PINGTUNG Hengchun(Kosyun): *Konishi s.n.* June, 1909; *A.T. Hsieh 34, Huang 9707, 10065(*) 10100, 10101, 10323 (*)*. Kuraru: *Kudo & Suzuki s.n.* Dec., 1938.

MICRONESIA *Kanehira 366*(T1).

The PHILIPPINES Luzon, Baton, Lamao River, Mt. Mariveles, *H.N. Whitford 370* (T1); Luzon, Union, *A.D.E. Elmer 5564*(T1).

This species is very similar to commonly cultivated species of *T. divaricata* (L.) R.Br. ex Roem & Schutt, but the former differs from the latter by its numerous primary lateral veins and tomentose calyx outside.

(2) *Tabernaemontana subglobosa* Merr. in Philip. Journ. Sci. Bot. 7:242, 1912; Hatusima in Mem. Fac. Agr. Kagoshima Univ. 5:13-70, 1966, et *l.c.* 7(2): 321, 1970; Liao, Chen & Ho in Mem. Coll. Arg. NTU, 17(2): 161, 1977; Chang in Journ. Phytogeo. & Tax. 29(1): 20, 1981. 蘭嶼馬蹄花 Fig. 14.

T. dichotoma sensu Hayata, Icon. Pl. Form. 3: 151, 1913; Kanehira, Trees rev. ed. 632. *f. 589*, 1936; Li, Woody Fl. Taiwan 792, *f. 319*, 1963 et Fl. Taiwan

4: 217, Pl. 974, 1978, *non* Roxb.

A shrub of 2 m tall. Leaves opposite, membranous, pale green, petiolate, lanceolate, 9–14 cm long, 3.5–6.5 cm wide, the apex rounded of bluntly acute, the base acute, the margins entire, the lateral veins of 10–17 pairs, parallel to margin, prominent on both surfaces, glabrous; petioles 0.8–2 cm long. Flowers whitish-yellow, umbellate-cyme, the peduncles 2–2.5 cm long; calyx glabrous, the lobes ovate, acuminate apex, 2–3 mm long; corolla tube cylindrical, 5–12 mm long, the corolla lobes glabrous, 0.5–0.7 cm long; stamens below throat; pistil nearly as long as anther position; stigma long caudate; pedicels 0.5 cm long. Follicles two boat-shaped, oil glands dotted, 2.7 cm long, 1.2–1.7 cm broad, 0.7–0.9 cm thick, with 5-veins, the peduncles 1.5–2.5 cm long. Seeds oblong, smooth, longitudinally grooved, 1.5 cm long, 1.1 cm broad.

The Philippines. Taiwan, growing among thickets at altitudes about 100 m high of the Botel Tobago.

TAITUNG: Botel Tobago: *Huang* 5118, 5213, 5444, 6318, 6418, 6425, 9174(*), 9236(*), 9282, 9403, 10356(*), *Kao* 6425, 7674, 7677, 8691, *Keng* 450, *Chuang* 2416, *Sata* s.n. June 1932, *J.T.Wu* 1617, *Chang* 5432, *Hsu* 5019, 9451, *Hsieh* 1617, *Y.C.Jeng* 1662, 1675, *LKH & C.* 113.

The PHILIPPINES near Balutubat, Camiguin Is., Cagayan, alt. 2050 m, *Suzuki & Sugawara* 317(TI); Balitag Channel, Isl. Camiguin, *T.Sugawara* 1655(TI); NE. side of Sabtung Isl. Batanes, alt. c. 100 m, *Suzuki & Sugawara* 1741(TI).

Insufficiently known species

- (3) *Tabernaemontana macrocarpa* Jack in Malay. Misc. 2(7): 80. 1822 (Tsiang, 1977) 大果狗牙花

10. TRACHELOSPERMUM Lemaire 絡石屬

Climbing shrubs. Leaves opposite. Flowers white or purplish, in lax terminal or pseudo-axillary cymes; calyx small, 5-lobed, glandular or scaly within; corolla salverform, the tube slender, constricted at the mouth, the lobes 5, oblique, overlapping to the right, sharply twisted to the left; stamens inserted nearly the middle of tube, included or slightly exerted anther-tip, with short, broad filaments, the anthers conniving over and adhering to the stigma, the cells spurred at the base; disc of oblong glands or annular; ovary of 2-distinct carpels, united by the style, exerted from the disc; style short, the stigma columnar; ovules many. Fruit of 2 elongate, slender, incurved follicles. Seeds linear, with long coma; endosperm copious.

A genus of about 30 species in Malaysia and Eastern Asia, four species in Taiwan. Since the genus shows great diversity in morphological characters in relation to the regional differentiation (Table 1), the following six closely related taxa of *Trachelospermum* are intentionally described. The genus can not obtain favourable taxonomical result without field study in the mainland China, Japan, the Ryukyus and Taiwan.

KEY TO THE SPECIES

1. Anther-tips exerted
 2. Anther-tips slightly exerted
 3. Calyx lobes (1.5—)2—3(—5) mm long; leaves elliptic to narrowly elliptic, acute apex (Japan, Korea)(1) *T. asiaticum*
 3. Calyx lobes 2—3 mm long
 4. Leaves usually elliptic, small, acute apex; corolla lobe obliquely obovate (Taiwan, mainland China).....(4) *T. gracilipes*
 4. Leaves usually obovate or broadly elliptic, large, obtuse or cuspidate apex; corolla lobe ovate (Botel Tabago)(6) *T. lanyuense*
 2. Anther-tips usually attaining the orifice of the corolla throat; leaves broadly elliptic to elliptic (Ryukyus, Bonin).....(2) *T. foetidum*
1. Anther-tips included
 5. Calyx lobes 1.5—2 mm long; corolla tube short, 4—5 mm long; stem, leaves and petioles glabrous(3) *T. formosanum*
 5. Calyx lobes 2—6 mm long; corolla tube usually over 7 mm long; stem, leaves and petioles pubescent(5) *T. jasminoides*

- (1) *Trachelospermum asiaticum* (S. & Z.) Nakai, Trees & Shrubs Indig. Jap. Prod. 1:306. f.170, 1922. 亞洲絡石

Malouetia asiaticum Sieb. & Zucc. in Abh. Akad. Munchen 4:163.1846.

Stem and petioles pubescent, sometimes glabrous. Leaves elliptic, rarely lanceolate or obovate, the apex acute to acuminate, the base acute, pubescent, (2—)2.9—5.3(—8) cm long, (1—)1.2—2.4(—3.2) cm broad; petioles (2—)3—5(—7) mm long. Calyx elliptic, rarely lanceolate, (1.5—)2—3(—5) mm long, pubescent or glabrous; corolla (5—)6—7(—10) mm long, pubescent or glabrous, expanded at top, the throat glabrous, the lobes obovate, (6—)7—9(—11) mm long, pubescent or glabrous; pedicels (4—)5—10(—15) mm long. Follicles 10 cm long, 3—4 mm thick.

Distribution in Korea and Japan.

- KOREA Quelpaert Island, common round Saishu on lava rock, *E.H. Wilson 9362* (MO).
 JAPAN Shizuoka Pref. Mt. Kanukiyama, a scandent evergreen: fls. white, *T. Nakaïke 15544* (MO); Izu Penin, Tagata-gun, alt. 400 m, *Ohashi, Nakaïke & Tateishi 7020* (MO); Izu, *Faurie 15532* (MO). Ugo, Tobishima Island, village Nakamura, roadside, alt. 40 m, *Y. Suda 941* (MO); Shojiko & Kofu, *Dorsett & Morse 527* (MO), Abors Harous, *H.E. Fox s.n.* May 11, 1912 (MO). Kuyshu Island Fukuoka, alt. 40 m, 8 miles mouth of Kokura City, *L.A. Charette 1096* (MO); Kagoshima Tarumizu-ahi onobaru alt. 450 m, *Ohha & Murata s.n.* July 3, 1974 (MO); Idzumishi, Takemoma, jonodan, alt. 250.300 m. *Ohba & Ahiyama 338* (T1). Kunizan, *Doraett & Morse 765* (MO). Takaoka, *Doraett & Morse 905* (MO). Honshu chiba, awa Tateyama, *Saito & Sato s.n.* May 24, 1973 (MO). Chiba, *Hsu 2320*; Hondo, Tochigi, Shiobase, *Faurie 4261* (MO). Yamagushi, Iika Park, alt. 14 m east slope of Shiro-yama, National Forest, West bank of Nashihi river. Yokoyama village

in Iwakuni City, *L.A.Charette 1751*(MO). Pref. Kyoto: Hozuhyo, Ukyoky, *Murata 18644*; Saitama Pref. Hannooshi, Hatai, Mt. Izugatake, alt. 400 m. *Ohasi, Tateishi, Murata*, Ahiyama & Liijima 1569(TI); Nara Pref., Yashino-gun, Totsugawa-mura, Taketo, alt. ca. 100m. *Tateishi & Murata 4334*(TI); Kyoto, Sugitani, *Kao 8468*. Miagi Pref. Ojika-gun, Isl. Enoshima, *Ohashi et al. 8352*, Izumi-shogen, *Goshima s.n.* June 1983. Rikuzen: ins Yateijima, Okashimachi, *Sugaya et al. s.n.* July 1956, Tsukinoshimachi, *Kimura & Sugaya s.n.* March 1954. Isl. Tsushima: Shimoagata, *Ohashi & Sohma 10031, 10206, 10200*. Yose, Kanagawa Pref. *Kanai 6336*.

- (2) *Trachelospermum foetidum* (Mats. & Nakai) Nakai in Bot. Mag. Tokyo 36: 21, 1922. 琉球絡石

T. jasminoides subsp. *foetida* Matsum. & Nakai in Bot. Mag. Tokyo 22: 153, 1908.

T. majus Nakai in Nakai & Koidz. Trees & Shrubs Japan proper, ed. 1. 308. f. 171, 922.

Stem and petioles pubescent. Leaves elliptic 2.6-9.3 cm long, 1.8-4.2 cm broad, the apex acute to obtuse, the base acute, glabrous; petioles 4-10 mm long. Calyx elliptic, glabrous rarely pubescent, 2-3 (-4) mm long; corolla tube glabrous, rarely pubescent expanded at top, (6-)8(-10) mm long, the throat glabrous, the lobe obovate, glabrous, rarely pubescent, 5-6(-7) mm long; pedicel (3-)5-6(-9) mm long. Follicles 10-31 cm long, 3 mm thick.

Distribution in Japan, Bonin and the Ryukyu Islands.

RYUKYU ISLANDS Uncommon, shrub 2-4 m tall in river bottom, Yana fana forest, Kunigamigun, Okinawa Shima, *J.C.Elliott 1205*(MO). Tokunoshima: Shikaura, Isencho, Oashima-gun, Kagoshima, *Iwatsuki, Takasu, Mitsuta, Terao & Fukuka 024*(MO), West of Awa. prostrate on rock, fls white, *R.Moran 5092*(MO).

BONIN Chickijima Island: *Y.Sato s.n.* June 2 & 3, 1971(MO). Abundant on rocks on the ground and on bushes. Chickijima, *E.H.Wilson 8218*(MO), *Hisauchi s.n.* July 1930.

RIKUZEN Okochimachi, Yakujima: *Higaya, Ogura, Kimura, Kysgoku & Singiyanna s.n.* July 31, 1956(MO). Isigakimati, Isigaki-zima, *Masamune & Suzuki s.n.* Mar. 1935; Utibanane-zima, Yaegama-gun, *Masamune s.n.* Mar. 1935.

- (3) *Trachelospermum fozmosanum* Liu & Ou in Y.C.Liu, Lign. Pl. Taiwan 613, Ph. I, 1972; Ou & Liu in Journ. Forestry 2: 47, 1973. Holotype: Kaoshiung, Sanping. *Liu & Ou 71*, TCF! 臺灣絡石 Fig. 15

Stem and petioles glabrous. Leaves lanceolate or narrowly elliptic, 2.7-4.2 cm long, 1-1.6 cm broad, the apex caudate, acuminate to the acute, the base acute to acuminate, glabrous; calyx elliptic, pubescent, 1.5-2 mm long; corolla tube glabrous, 4-5 mm long, expanded at middle portion, the lobes obovate, 4-5 mm long, glabrous, the throat glabrous; pedicels 4-8 mm long. Follicles 8.5-22 cm long, 2-3.5 cm wide, glabrous, remotely constricted several times.

Endemic. Growing on sunny forest edges at altitude more than 600 m high, with shorter pistil and smaller floral parts.

ILAN: Nanshan to Chilichting, *Huang 7733*; Nanhutashan, *Kuo 5077*. TAOUYUAN: Lalashan, *T.Y. Chiang 1297*. TAICHUNG: Chinshan *Huang et al. 9620*. NANTOU: Chitou, *Ou 367*, s.n. Feb., 1970(*); Sanlingsea, *Tang 483*. KAOHSING: Sanping, *Liu & Ou 711* (Type, TCF*). TAITUNG: Mt. Ramaramani, *Kao 6866*.

This species differs from *T. jasminoides* var. *jasminoides* only by shorter calyxlobes, less than 2 mm long, and branches and petioles glabrous. Otherwise, they are similar. However one of our collection, *W.S. Tang 483* at Sanlingsea, Nantou county shows hairy branchlets and petioles, and shorter (1.5 mm long) calyxlobes, which possesses intermediate characteristics between them. The texture, veins and shape of leaves of *T. formosanum* is almost identical to *T. asiaticum* except the former possesses included anther-tips and glabrous leaves.

- (4) *Trachelospermum gracilipes* Hook. f., Fl. Brit. Ind. 3: 668, 1882; Schneider in Sargent, Pl. Wils. 3: 339, 1916; Tsiang in Sunyatsenia 2: 136, 1934, 3:144, 1926, p.p.; Woodson in Sunyatsenia 3:91, 1936, p.p.; Masam, List Vas. Pl. Taiwan 113, 1954; Li, Woody Fl. Taiwan 794, f. 320, 1963, Fl. Taiwan 4:219. Pl. 975, 1978; Y.C. Liu, Lign. Pl. Taiwan 615, f. 19-20, 1972; Ou & Liu in Journ. Forestry 2:49 f. 19-20, 1973. 細梗絡石 Fig. 16

Trachelospermum divaricatum Kanitz. var. *brevisepalum* Schneider in Sargent, Pl. Wils. 3:338, 1916.

Trachelospermum brevisepalum (Schneider) Masam. in Trans. Nat. Hist. Soc. Formos. 9 28:235, 1938, List Vas. Pl. Taiwan 113, 1954.

Trachelospermum asiaticum (Sieb. & Zucc.) Nakai var. *brevisepalum* (Schneider) Tsiang in Sunyatsenia 2: 134, 1934.

Trachelospermum asiaticum (Sieb. & Zucc.) Nakai var. *intermedium sensu* Masamune, Short Fl. of Formosa 174, 1936, List Vas. Pl. Taiwan 113 1954, non Nakai.

Trachelospermum foetidum sensu Kanehira, Form. Trees rev. ed. 632, 1936. p.p.; Y.S. Liu, Ill. Nat. Intr. Lign. Pl. Taiwan 2: 1091, f. 912, 1962, non Nakai.

Stem and petioles pubescent. Leaves elliptic to lanceolate, 2.7—6.4 (—9.4) cm long, 1.2—3.9 cm broad, the apex acute to obtuse, the base acute, glabrous. Calyx elliptic, (1.5—)2—3(—4) cm long, pubescent; corolla tube 5—8 mm long, expanded at top, pubescent, the lobes obovate, (4—)5—9 mm long, pubescent or glabrous; petioles, 2—5(—8) mm long, pedicels 3—4(—9) mm long. Follicles divaricate or horizontally arranged, linear, 4—11 cm long, 1.5—4 mm broad; seeds comose.

Northeastern India through China to Korea. Taiwan, growing on coastal area or sunny forest edges at altitudes less than 500 m high.

ILAN: Fure-Long, *S.Y. Lu 15996*(TAIF), Fure-Long to Aw-Dii, *S.Y. Lu 15997*(TAIF); Sou-oh, *Keng & Kao 2700*; Ao-ti, *Huang 10499*(*), *Y.F. Chen*

2200. KEELUNG: *T. Suzuki 6696*, *Sasaki s.n.* April, 1926. TAIPEI: Neihu, Mutzshan, *H. Simizu 5036*; Chutzehu, *S. Suzuki 4290* (MO); Kuanyinshan, Huang-tien near Shih-ting, *Huang 10463*(*), *Hsu 5423*, *T.Y. Chiang 1216*; Ianlau, *T.Y. Chiang 1376*; Yeliu, *Huang 10490*. PINGTUNG: Henchun, *Sasaki s.n.* May, 1924, *Kanehira s.n.* May 1924(MO); Chialuosuei, *Kuo 9551*, Banana Bay, *Huang 8361*; Nanreshan, *Kuo 9493*; Mutan, *Hsu 14316*, *14324*. HUALIEN: *Ou & Kao 9392*; Tzen, *Huang 10414*, *s.loc.*; *R. Oldham 329*(MO).

CHINA PROPER: Hupeh, *Wilson 2341*(MO), *2342*(MO); Lingnan, Lung Tau Shan, in village; in forest to left; vines 30 m long; flowers white, *Merrill 12309* (MO).

The anthers slightly exerted out from orifice for Taiwan plants, and completely exerted out from orifice for plants of mainland China. Such minor difference seen from exerted anther-tip might prove geographical differentiation. In Taiwan, the coastal plant possesses small thicker coriaceous elliptic leaves with emarginate apex; and hillside plant possesses larger subcoriaceous elliptic leaves with acute apex. These differentiation seen from leafy characters might be influenced by regional wind, light and altitudinal effects.

- (5) *Trachelospermum jasminoides* (Lindl.) Lemaire in Gard. Fl. 1: Pl. 51, 1851; Hayata, Enum. Pl. Form. 252, 1906; Schneider in Sargent, Pl. Wils. 3: 334, 1916; Tsiang in Sunyatsenia 2: 143, *f. 14*, 1934, 3: 145, 1936, p.p.; Woodson in Sunyatsenia 3: 74, 1936, p.p.; Makino in Bot. Mag. Tokyo 26: 122, 1912; Nakai, Trees and Shrubs Jap. 2nd ed. 421, 1927; Hatusima in Journ. Bot 16(1): 26, 1940; Masam., List Vas. Pl. Taiwan 113, 1954; Li, Woody Fl. Taiwan 796, 1963; Ou & Liu in Journ. Forestry 2: 50, *f. 21-22*, 1973. 絡石 Fig. 17

Rhynchospermum jasminoides Lindl. in Journ. Hort. Soc, London 1: 94, 1846; Hook. in Bot. Mag. 79, Pl. 4737. 1853.

Trachelospermum foetidum sensu Kanehira, Form. Trees rev. ed. 632, 1936 *p. p.*

Trachelospermum jasminoides (Lindl.) Lem. var. *heterophyllum* Tsiang in Sunyatsenia 2: 146, 1934.

Trachelospermum asiaticum (Sieb. & Zucc.) Nakai var. *intermedium sensu* Masamune, Short Fl. of Formosa 174, 1936, List Vas. Pl. Taiwan 113, 1954, *non* Nakai.

Trachelospermum asiaticum (Sieb. & Zucc.) Nakai var. *pubescens sensu* Ou & Liu in Journ. Forestry 2: 50, 1973, *non* Nakai.

Stem and petioles pubescent. Leaves elliptic to broadly elliptic or oblong-elliptic to narrowly oblong, (1.0-)3-5.3(-8.5) cm long, (0.3-)1.5-2(-3.4) cm broad, the apex acute, the base obtuse, glabrous or pubescent; petioles 1-7(-12) mm long. Calyx elliptic to lanceolate, (1.5-)3-4(-6) mm long, glabrous to pubescent; corolla tube 4-8(-10) mm long, glabrous or pubescent; expanded at upper half, below 2.5-5 mm long from orifice, the throat glabrous, the lobes obovate, 5-9(-13) mm long, glabrous or pubescent; pedicels (2-)3-4(-12) mm long. Follicles 13.2-39.5 cm long, 4 mm thick.

China mainland, Hainan, Hongkong, Vietnam, Korea, Japan, Taiwan, growing on sunny forest edges usually at altitudes less than 500 m high.

- JAPAN Hondo: Harima, *S. Arimato s.n.* July 29, 1903(MO). Yokohama: *Maximowicz 1862*(MO); Rikuzen, Sendai city cultivate, *Hayashi s.n.* July 11, 1960, Fukuoka, *Konishi s.n.* May 1895.
- CHINA MAINLAND; Inghok, *H.H. Chung 3221*(MO), *2609*(MO); Foochow hillsides near University, *T. Chung 3434*(MO), Foochow Huoqie Hillside near University, *T. S. Guig 7548*(MO); Hinghwa, *F.P. Metcalf 6526*(MO); Amoy, Robit *Fortune # a.53*(MO); Kwongtung: Teugwa Mts., *C.O. Levine s.n.* Sept. 20, 1918(MO); Honam Island, *C.O. Levine s.n.* May 1, 1917(MO). Hupeh: *A. Henry 5976*, *E.H. Wilson 578*(MO), *2343*(MO), *2344*(MO). Nanking: *L.F. Tsu 635*(MO). Hongkong: New Territories Rai-mo Shan. alt. 3600 ft., Do-on District, Near field, semiwoody, *T.M. Tsui 289*(MO).
- TAIWAN; Ilan, Taipingshan, *S. Suzuki 280*. Taipei: Sizangan, *Nonaka & Mori s.n.* 1933; Hokuto, *Murakami 171*; Kizan, *Masamune & Suzuki s.n.* 1933; Suigenchi, *H. Simizu 89*; Wantan, *H. Simizu 2077*; Bunzan, *Fukuyama 1219*. Miaoli Co.: Santao, *Huang 8683*(*). Taichung: Tunhai, Univ. Compass, *Ou s.n.* Nov. 1969(*); Tatunshan, *Hsu 10762*. Nantou: Nichigetsutan, *Kudo & Sasaki s.n.* Sept. 1219.
- INDIA: Assam Dirang Dzong 5000-6000 ft., *F. Kingdon Ward 11484*(MO).
- S.AFRICA Nairobi: *P.J. Greenway 11542*(MO).
- S.LOC. fls white, liana, Asia origin, *W.G. D'Arcy 5838*(MO).

Hooker(1853) stated "branches glabrous or nearly so. Leavesall glabrous."

Woodson (1936) stated "Leaves very variable in size and outline, either surface glabrous or the lower one rarely slightly pubescent".

Tsiang(1934) stated that "the leaves are very variable..... Regarding pubescent, the leaves are normally glabrous, but as often, hairs occur on the midrib of the upper surface, and on the whole of the under-surface, more especially along the veins".

However, most Taiwan specimens, the pubescence covers on leaves, calyx, corolla tubes and lobes.

- (6) *Trachelospermum lanyuense* Chang in Jour. Phytogeography and Taxonomy 29(1): 16, f.3, 1981. Type: Taitung, Botel Tobago, *Chang 2984* PAI! 蘭嶼絡石 Fig.18.

T. majus sensu Masamune, List Vas. Pl. Taiwan 113, 1954, non Nakai.

Stem and petioles pubescent. Leaves elliptic to obovate, (1.6-)2-6(-10.7) cm long, (1.6-)2-3.9(-5.9) cm broad, the apex cuspidate to caudate, the base acute, pubescent; petioles 5-6 (-12) mm long. Calyx elliptic, 2-3 mm long, pubescent; corolla tube (5-)7-8(-10) mm long, expanded at orifice, pubescent, the lobes obovate, 5-9(-10) mm long, pubescent, the throat glabrous; pedicels (3-) 5-10 mm long. Follicles divaricate, slender, 26.7- 29 cm long.

Endemic, growing on ravines or shaded areas of lowland of Lanyu and Lutao only.

- TAITUNG: Lanyu, *Huang 5182, 9169, 9175, 9238, 9241*(*), *9268*(*), *9375, 9460, 9475, Jeng 1659*(*), *Sasaki s.n.* June 1912, *s.n.* July 1926, *Yamamoto s.n.* June 3, 1947, *Sata s.n.* July 19, 1932, *Kawakami & Sasaki s.n.* July, 1912, *Sasaki s.n.* 1912, *s.n.* May 1924, *s.n.* June 1926, *Kao 8726, Kudo & Mori 271, Kawakami & Nakahara 971, Hsu 9270*(*), *LKH & C 88*. KASHOTO: Churo, *Kudo & Mori s.n.* July 6, 1930.

There are intermediate form of *T. lanyuense* and *T. gracilipes*. It possesses obovate to broadly elliptic leaves with obtuse to emarginate leafy apex. They are *T. gracilipes* collected at Pingtung County, Banana Bay by *Huang 8361*; and *T. lanyuense*, collected at Green Island (Kashoto) by *Kudo & Mori s.n.* July 1930 and collected at Botel Tabago(Kotosyo) by *Kawakami & Nakahara s.n.* Jan. 1906. The leaf form and size of *T. foetidum*(Mats. & Nakai) Nakai collected at Bonin Island by *E.H.Wilson 8218* also similar to those specimens, mentioned above.

EXCLUDED SPECIES

Trachelospermum kuraruense Masamune in Trans. Nat. His. Soc. Form. 287. 1938.

There is no type specimen kept in our TAI-herbarium, but I agree with Tsiang's opinion (1977) that this is not a plant of *Trachelospermum*.

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Table 1. A chart showing comparative characters among *Trachospermum* species complex

characters	taxa	T. asiatica complex				intermediate taxon		T. jasminoides complex			
		asiatica Japan	gracilipes China	gracilipes Taiwan	Ianyuense Taiwan	foetidum Bonin	formosana Taiwan	jasminoides China	jasminoides pubescent China	jasminoides pubescent Taiwan	
1. Anther-tips exerted		++++	+++	++	++	(+)	-	-	-	-	
2. Petiole length(mm)		(2-3) ⁵ (-7)	2-5(-8)	2-6	5-6(-12)	4-10	3-6	2-7(-12)	3-5	1-3(-6)	
3. Stem & petiole hairs		+(-)	+	+	+	+	-	+(-)	+	+	
4. Leaf shape		lanceolate obovate elliptic	elliptic	elliptic	obovate broadly elliptic	elliptic broadly elliptic	elliptic	elliptic	elliptic	elliptic lanceolate	
5. Leaf length x broad (cm)		(2-2.9-5) 3(-8) X 1.2 -4(-3.2)	2.9-6.4 (-9.4) X 1.4-3.9	2.3-5.4 X 1-2.6	(1.6-2) ⁶ (-10.7) X (1.6-) 2.3-9(-5.9)	3.3-7.7 X 1.8-4	2.7-4.2 X 1-1.6	3.1-8.5 X 1.1-3.4	(2.2) ³ -5.3 (-5.7) X (0.7-) 1.5-2(-3)	1-6.5 X (0.3-) ⁰ 6-2(-2.5)	
6. Leaf hairs		+(-)	-	+(-)	+	-	-	+(-)	+	+	
7. Pedicel length (mm)		(4-) ⁵ -10 (-13)	3-4(-9)	4-8	(3-) ⁵ -10	(3-) ⁵ -4 (-9)	4-8	3-11	(2-) ³ -4 (-12)	(2-) ³ (-5)	
8. Calyx lobe hairs		+, -	+	+	+	+	+	+, -	+	+	
9. Calyx lobes(mm)		(1.5-) ² -3 (-5)	2-3	2-3	2-3	2-3	1.5-2	2-6	3-4	2-3	
10. Corolla lobe hairs		+, -	+, -	+	+, -	-	-	-	+	+, -	
11. Corolla tube (mm)		(5-) ⁶ -7 (-10)	5-8	7-9	(5-) ⁷ -8 (-10)	(6-) ⁸ (-10)	4-5	(4-) ⁶ -8 (-10)	(5-) ⁸ (-10)	8-6	
12. Expanded position from corolla mouth		top	top	top	top	top	1/2	1/3	1/3	1/2-3	
13. Corolla throat hairs		-	-	-	-	-	-	+	+	+	



Fig. 1. *Alyxia insularis* Kanehira & Sasaki (1,2, Sasaki s. n. Nov. 1934; 3,4, Huang 9447; 5, Huang 9370, 9371).

1. Fructing branch; 2. Seed; 3. Flowering branch; 4. Longitudinal section of flower; 5,6. Pollen grains.



Fig. 2. *Alyxia sinensis* Champ. ex Benth.
Fruiting branch, S. Sasaki s. n. Dec. 1908.

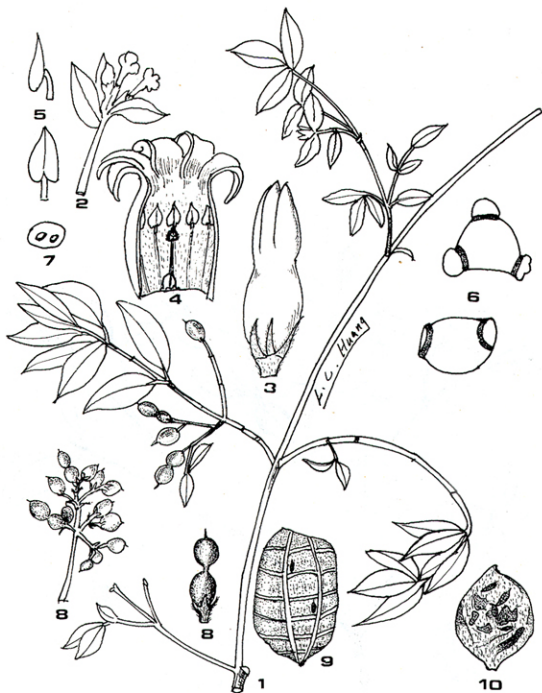


Fig. 3. *Alyxia taiwanensis* Lu & Yaug (1, 8-10, Huang 9617; 2-7a, Huang 9619; 7b, Huang 9618).

1. Fruiting branch; 2. Inflorescence; 3. Flower bud; 4. Longitudinal section of flower; 5. Stamen; 6. Pollen grains; 7. Cross section of ovary; 8. Drupe articulate; 9. Inside of exocarp; 10. Seed.

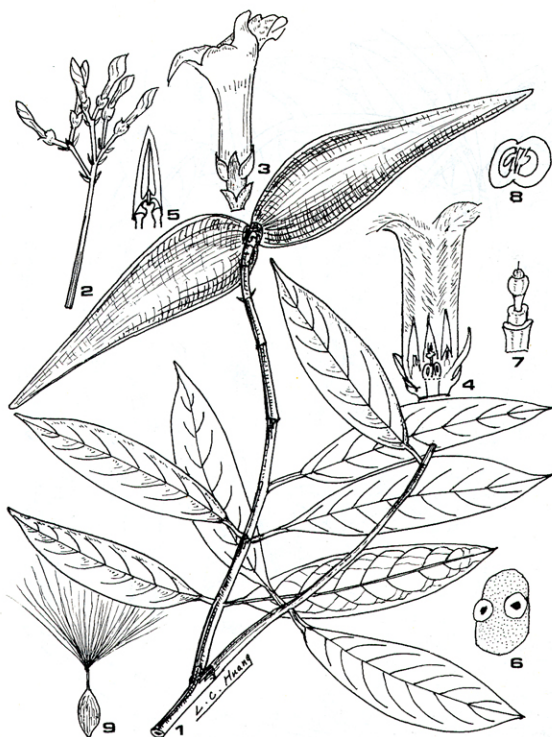


Fig. 4. *Anodendron affine* (Hook. & Arn.) Durce (1, Huang 10470; 2-5, 7-8, Chen 1955; 6, S. F. Huang s. n. May 1984; 9, Huang 10473).

1. Fruiting branch; 2. Inflorescence; 3. Flower; 4. Longitudinal section of flower; 5. Stamen; 6. Pollen grain; 7. Pistil; 8. Cross section of ovary; 9. Seed.



Fig. 5. *Anodendron benthamiana* Hemsl. (1-4, Chen 2078; 5, Kouh s. n. 1983; 6, 7, Huang 10491).

1. Flowering branch; 2. Longitudinal section of flower; 3. Stamen; 4. Cross section of ovary; 5. Pollen grain; 6. Fruiting branch; 7. Seed.

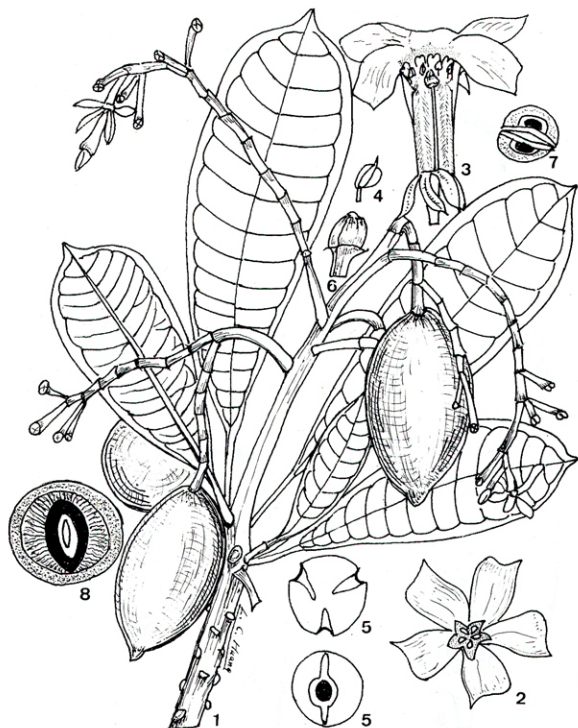


Fig. 6. *Cerbera manghas* L. (Huang 10467)

1. Flowering and fruiting branch; 2. Optical view of flower; 3. Longitudinal section of flower; 4. Stamen; 5. Pollen grain; 6. Stigma; 7. Cross section of drupe showing fleshy exocarp, fibrous mesocarp, stony endocarp, thin membranous seed coat, and embryo.



Fig. 7. *Ecdysanthera rosea* Hook. & Arn. (1,6,7, Huang 10468; 2,3,4, Huang 8817; 5, Huang 9695).

1. Fruiting branch; 2. Inflorescence; 3. Open flower; 4. Stamen; 5. Pollen grain; 6. Cross section of capsule; 7. Seed.



Fig. 8. *Ecdysanthera utilis* Hay. & Kawakami (1, 7, Huang 10469; 2,3,4,6, Hsu 5251; 5, Tsou s. n. May 1984).
 1. Fruiting branch; 2. Inflorescence; 3. Longitudinal section of flower; 4. Stamen;
 5. Pollen grain; 6. Cross section of ovary; 7. Seed.

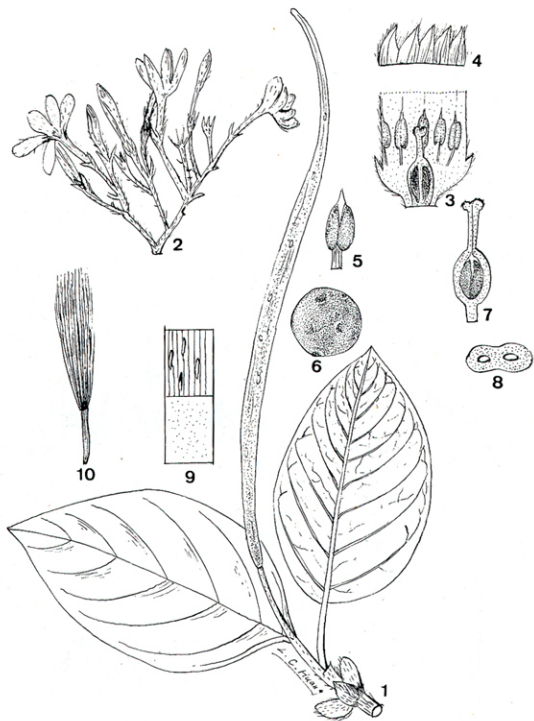


Fig. 9. *Holarrrhena antidysenterica* Wallich ex DC(1, *Umetani s. n.*, Sept. 1928; 2, *Inayat 23712*; 3,4,5,7,8, *Fernandes 1321*; 6, *Poilane 9259*; 9,10, *Wang 77682*).
 1. Fruiting branch; 2. Inflorescence; 3. Flower; 4. Calyx; 5. Stamen; 6. Pollen grain; 7. Longitudinal section of ovary; 8. Cross section of ovary; 9. Pericarp of follicle; 10. Seed comose.



Fig. 10. *Melodinus angustifolius* Hay. (1, 7, 8, *Huang 10076*; 2-6, *Huang 10075*).
 1. Fruiting branch; 2. Inflorescence; 3. Longitudinal section of flower; 4. Longitudinal section of ovary, stamen, and calyx-lobes; 5. Stamen; 6. Pollen grain; 7. Cross section of drupe; 8. Seeds.



Fig. 11. *Parsonia laevigata* (Moon) Alston (1-4, 6, 7. Huang 9482A; 5. Huang 9239; 8. H.N. Yang 3079).
 1. Fruiting and flowering branch; 2. Flower bud; 3. Open flower; 4. Stamen;
 5. Pollen grain; 6. Pistil; 7. Cross section of ovary; 8. Seed comose.



Fig. 12. *Rauvolfia verticillata* (Lour.) Baillon (1-7, Huang 1034 2; 8-10, Huang 1548).

1. Flowering branch; 2. Flower; 3. Longitudinal section of flower; 4. Stamen; 5. Pollen grains; 6. Style and stigma; 7. Cross section of ovary; 8. Fruiting branch; 9. Fruit; 10. Longitudinal section of drupe.



Fig. 13. *Tabernaemontana pandacaqui* Poir (1,3, Huang 9707; 2,4, Huang 10323; 5,6, Huang 10065).
 1. Flowering branch; 2. Longitudinal section of flower; 3. Pollen grains
 4. Cross section of ovary; 5. Follicle; 6. Seed.



Fig. 14. *Tabernaemontana subglobossa* Merr. (1-6, Huang 9174; 7, Huang 9236; 8-10, Huang 10356).

1. Flowering branch; 2. Calyx; 3. Longitudinal section of flower; 4. Stamen; 5. Pollen grains; 6. Stigma; 7. Fruiting branch; 8. Follicles; 9. Longitudinal section of follicle; 10. Seed.



Fig. 15. *Trachelospermum formosanum* Liu & Ou (1, 5, *Ou s. n.* Feb. 1970; 2, 3, *Liu & Ou 711*; 4, *Huang 9620*).
 1. Fruiting branch; 2. Inflorescence; 3. Longitudinal section of flower; 4. Pollen grain; 5. Seed.



Fig. 16. *Trachelospermum gracilipes* Hook. f. (1,6, Huang 10490; 2-5, Huang 10449).

1. Fruiting branch; 2. Inflorescence; 3. Flower; 4. Stamen; 5. Pollen grain; 6. Seed.



Fig. 17. *Trachelospermum jasminoides* (Lindl.) Lem. (1,5, *Ou s.n.* Nov. 1969; 2,3, *Huang 8683*; 4, *Huang 10241*).
 1. Fruiting branch; 2. Inflorescence; 3. Longitudinal section of flower; 4. Pollen grain; 5. Seed.

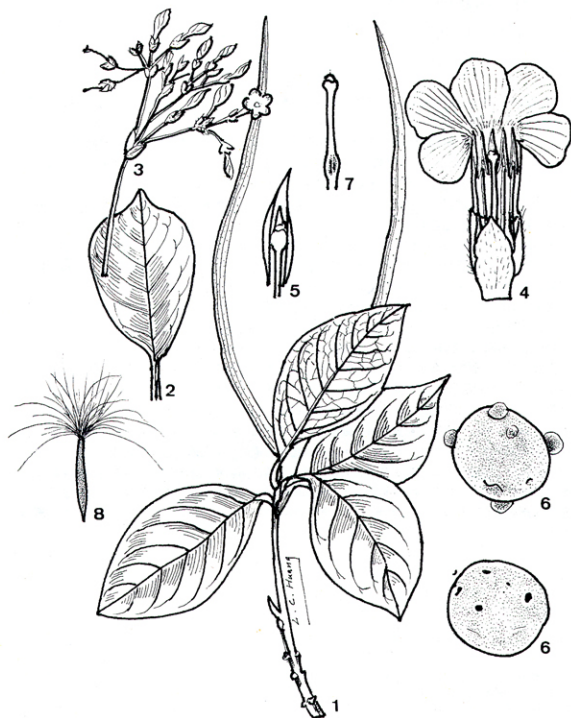


Fig. 18. *Trachelospermum lanyuense* Chang (1, Jeng 1659; 2-7, Huang 9241; 6, Huang 9268; 8, Hsu 9270).

1. Fruiting branch; 2. A leaf; 3. Inflorescence; 4. Longitudinal section of flower; 5. Stamen; 6. Pollen grains; 7. Pistil; 8. Seed.

臺灣之夾竹桃科植物(1)—訂正

黃增泉

摘 要

臺灣產夾竹桃科植物於1896年已記錄約有八屬九個自生種(Henry, 1896)。日據時期經日本學者不斷地發現,並不斷地訂正及命名(Matsumura & Hayata, 1906; Kawakami, 1910; Hayata, 1916; Sasaki, 1928; Masamune, 1936)至1954年,除絡石屬外,其他各屬各種的分類已相當穩定,並普遍被接受(Masamune, 1954)。光復後除了李惠林(1963, 1978),劉業經及歐辰雄(1971)及廖日京、陳益昇及何豐吉(1977)等學者專家外,亦少有人深究此科。由於夾竹桃科植物係屬熱帶植物,大多數分佈區域廣泛,且具有相當大的變異範圍。故分類方面的研討,需不斷地觀察各地標本,搜集文獻,始能逐漸地進步。

本省所產夾竹桃科植物計有10屬約18種,亦即除了絡石屬外,均為種數極少的小屬,分類問題較少,需要更深一層鑽研的方向是進行亞洲相關種屬的觀察,相信在命名上仍有待訂正之處。絡石屬是亞洲較大且較混亂之一屬。1934年Woodson記錄有20種,而1978年李惠林教授的記載則僅8種,其分類之困難及混亂可見一斑。目前我們就臺灣可獲得之資料,對各屬再加以觀察。特別是對絡石屬加以訂正(表一)。目前保留臺灣產四種絡石,或許絡石屬僅可區分為兩種群:亞州絡石(*T. asiaticum* (Sieb. & Zucc.) Nakai) 種群及絡石(*T. jasminoides* (Lindl.) Lem) 種群,前者代表所有花藥伸出花粉筒外,後者則花藥隱於花粉筒內。亞州絡石,花藥伸出最長,次為大陸上的細梗絡石(*T. gracilipes*)。大陸產的細梗絡石,較臺灣產的猶稍為伸長,而表示地域上之分布特徵頗為顯著(表一)。另外提出止瀉木及中國念珠藤二新記錄種,但仍懷疑止瀉木是否為本地自生種?據本人(1986)的孢粉證據,可資支持小錦蘭與大錦蘭應該合併為同屬。廖日京教授(1977)處理馬蹄花屬將蘭峽馬蹄花學名更改,可謂新見,但南洋馬蹄花或許為歸化種,而非本地產自生種。蔣英教授(1977)曾根據臺灣的標本發表臺灣羅芙木及柳葉蠶藤的兩新種及大果狗牙花一新記錄種,除柳葉蠶藤存在於臺灣較可能外,其他兩新種之有效性頗值懷疑,惟向未覆查模式標本前,不加以斷論。蔣英教授又認為屏東產之 *Trachelospermum kuraruense* Masamune 並非絡石屬植物,其見解頗為合理。