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The Celastraceae of Taiwan

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This revision is an attempt to summarize our knowledge on the Celastraceous plants of the island of Taiwan. To each genus and species of the family found in Taiwan, a full description is given. There are altogether seven genera and eighteen species; besides, one new variety and one new combination are made, and several new synonyms given here. All specimens cited in this paper are deposited in the Herbarium of the Department of Botany, National Taiwan University, with the exception of a few which are preserved in the Taiwan Forest Research Institute (FRI). Most of the cited specimens are collected in Taiwan, but some from Kwangtung, Hainan, Liukiu, and Japan, are also included.

This work was done under the direction of Dr. Hui-Lin Li, to whom the writer is deeply grateful for his kind help and valuable advise.

CELASTRACEAE

Trees or shrubs of climbing habit; leaves alternate or opposite, simple, membranaceous or chartaceous; stipules small, caducous; flowers perfect or regular, small, usually greenish, in axillary cymes or rarely solitary; sepals 4–5, small, free or united at the base, inferior and generally persistent; petals 4–5, generally free and inserted below a well marked disc, the disc with various forms; stamens 4–5, alternate with the petals, free and situated upon or on the edge of, or beneath, the disc; ovary 2–5-celled, situated upon the disc or surrounded by, or less sunk within it, each cell with 1–2 or rarely more ovules; style short, the stigma capitate, often lobed; fruit a dehiscent capsule, rarely a berry or a samara; seed albuminous, usually arillate; embryo with large green cotyledons.

About 38 genera with 400 species scattered over the tropical and temperate regions of the whole world; about 170 species were recorded in China, of which a great number are natives of the southern and central provinces.

Key to the Genera

A. Fruit a dehiscent capsule.
  B. Leaves alternate; ovary 3–4-celled.
    C. Flowers terminal, in panicles, cymose, or axillary cymose, or solitary; disc lamellar, not confluent with the ovary; stamens situated on the edge of the disc.....1. *Celastrus*
    CC. Flowers axillary, cymose; disc thick, confluent with the ovary; stamens inserted beneath the disc. .....2. *Gymnoporia*
  BB. Leaves oposite; ovary 2–5-celled.
    C. Ovary 2–5-celled, ovules 1 or 2 in each cell, in 1 row.
      D. Ovary 2-celled; fruit a 1-celled capsule.....3. *Microtropis*
      DD. Ovary 4–5-celled; fruit a 3–5-celled capsule. .....4. *Euonymus*
    CC. Ovary 4-celled, ovules 6, rarely 4–5 in each cell, in 2 rows. .....5. *Genitia*
AA. Fruit indehiscent.
  B. Fruit a broadly 3-winged samara, 1-celled, 1-seeded. .....6. *Tripterygium*
  BB. Fruit a berry, not succulent, 4-lobed; seeds in each fruit 4..... .....7. *Perrottetia*

1. Celastrus

Celastrus Linn., Gen. Pl. ed. 1: 59. 1737.
Catha G. Don., Gen. Syst. 2: 11. 1832.
Guevinia Hort. Par. ex Denne. in Rev. Hortic. Sér. II. 4:425. 1845-1846.
Orixa Thunb., Nov. Gen. 56. 1783, Fl. Jap. 3. 1784.
Semarilla Rafin., Sylsa Tellur. 146. 1838.

Deciduous, rarely evergreen shrubs, usually scandent; leaves alternate, petioled, entire or serrate, the stipules small; flowers solitary or in cymes or panicles, axillary or terminal, perfect, sometimes unisexual; calyx 5-parted; petals 5, subdisc inserted; stamens 5; disc cupular, concave, entire or crenate; superior, 3–4-celled; style short, the stigma 3–4-lobed, 2-ovuled; fruit a capsule, usually yellow, dehiscent into 3–4 valves, median-septicidal, each valve containing 1 or 2 seeds enclosed in a fleshy crimson aril; albumen copious.

A genus of about 40 species distributed in tropical Asia, China, Japan, Australia and North America. About 31 species are found in China.

Key to the Species

A. Flowers solitary, or rarely 2 or fascicled.
  B. Leaves subcoriaceous, elliptical or oblong-elliptical. 3.5–8 cm. long, 2–4 cm. wide.....1. *C. punctatus*
  BB. Leaves smaller than the above species, 3–4 cm. long, 1.5–2.5 cm. wide .....1a. *C. punctatus var. microphylla*
AA. Flowers or fruits in cymes or long panicles, terminal or axillary.
  B. Leaves oblong-rotund or nearly orbicular; cymes shorter than the leaf, 2–3 cm. long.....2. *C. Kusanoi*
  BB. Leaves elliptic-oblong or obovate; cymes longer than the leaf, 5–15 cm. long.
    C. Leaf-apex obtuse or emarginate; margins remotely crenulate..... ..... 3. *C. euphlebiphyllus*
    CC. Leaf-apex cuspidate-acute; margins remotely serrate.
      D. Leaves coriaceous, glossy, 6–11 cm. long, 2–6 cm. wide..... .....4. *C. Hindesii*
      DD. Leaves chartaceous 4.8–5.8 cm. long, 2.7 cm. wide..... .....5. *C. longeracemosus*

1. **Celastrus punctatus** Thumb., Fl. Jap. 97. 1784; Miq., Prol. Fl. Jap. 17. 1867; Fr. & Sav., Enum. Pl. Jap. 80. 1785; Kanehira & Hat. in Trans. Nat. Hist. Soc. Formos. 29: 166. 1939.

Celastrus elevativenus Hay., Icon. Pl. Formos. 6:15. 1916; Sasaki, List Pl. Formos. 272. 1928; Sasaki, Cat. Gov. Herb. Formos. 319. 1930; Mak. & Nem., Fl. Jap. 678. 1931; Suzuki in Masamune, Short Fl. Formos. 126. 1936.

Celastrus gracillimus Hay., Icon. Pl. Formos. 5:24. 1915; Sasaki, Pl. Formos. 272. 1928; Sasaki, Cat. Gov. Herb. Formos. 319. 1930; Mak. & Nem., Fl. Jap. 678. 1931; Suzuki in Masamune, Short Fl. Formos. 126. 1936.

Celastrus leiocarpus Hay., Icon. Pl. Formos. 5:22. 1915; Sasaki, List. Pl. Formos. 272. 1928, Cat. Gov. Herb. Formos. 319. 1930; Mak. & Nem., Fl. Jap. 679. 1931; Kanehira, Formos. Trees ed. 2. 385. *t. 343.* 1936; Suzuki in Masamune, Short Fl. Formos. 126. 1936.

Shrubs, scandent, punctate, the branches terete, the branchlets striate, glabrous; both lenticelled and punctate; leaves glabrous, petiolate, subcoriaceous, elliptical or oblong-elliptical, rarely obovate, 3.5–8 cm. long, 2–4 cm. wide, the apex acute

or obtuse, the base acute, the margins remotely serrate, the veins 4–5 on each side; petioles 1 cm. long; cymes axillary; flowers not seen; capsule globose, glabrous, solitary, fasiculate or rarely 2 on a very short, nearly sessile peduncle, 8 mm. long, 7 mm. broad, pallid-yellow when dried; trivalved, triloculed, triseeded; pedicels 5–7 m. long, filifom, super medium articulate; seeds yellow, arillate, wrinkled.

Taiwan: No precise locality, *U. Faurie 8015*; Niitakagun Hosya Kasunokizinzya, *S. Suzuki 265*; Kwarenko, *T. Nakamura 3618, 4909*.

Kwangtung: Lokcheong, *Y. Li 2134*.

Japan: Satuma Kyusyu, *T. Suzuki s. n.* Aug. 13, 1930.

Distribution: Taiwan, Kwangtung and Japan.

Drs. Kanehira and Hatusima suspect that *C. leiocarpus* Hay. might be the same as *C. punctatus* Thunb., but they are not decided, and accordingly they put a question mark after it. After examining all the specimens of this genus preserved in our herbarium, I have found that *C. leiocarpus* Hay. agrees with the original description of *C. punctatus* Thunb. They agree with each other especially in the capsules which are solitary or rarely 2 on a very short, nearly sessile peduncle. The two are evidently conspecific. According to this character and the leaf-shape, *C. punctatus* Thunb. can easily be separated from *C. articulatus* Thunb. The latter has peduncles which are bifid or trifid, to 5 mm. long, and leaves which are rounded or sub-rounded.

1a. **Celastrus punctus** Thunb. var. **microphyllus** Li et Hou *var. nov.*

Celastrus articulatus Thunb. var. *punctatus* Mak. in Bot. Mag. Tokyo 21:138. 1907; Rehd. & Wils. in Sargent, Pl. Wils. 2:356. 1915; Sasaki, Cat. Gov. Herb. Formos. 319. 1930; Mak. & Nem., Fl. Jap. 678. 1931; Yamamoto in Journ. Trop. Agr. 5:183; Suzuki in Masamune, Short Fl. Formos. 126; Kanehira, Formos. Trees ed. 2. 386. 1936; Chen, Illus. Man. Chin. Trees & Shrubs 669. 1937; *non C. punctatus* Thunb.

A typo differt foliis brevioribus, circiter 3–4 cm. longis, 1.5–2.5 cm. latis.

Taiwan: Taito, *Y. Yamamoto 802* Aug. 21, 1929. (*Type*).

Liukiu: Isl. Kiter-Tane, *K. Mori s. n.* Aug. 13, 1934.

Japan: Osaki, *E. Matuda 2641*.

Distribution: East Taiwan, Fokien, Japan, & Korea.

Celastrus articulatus Thunb. var. *punctatus* Mak. belongs more appropriately to this species. In the capsule, which is solitary on the peduncle, and in the leaf-shape, it is evidently more closely related to *C. punctatus* than *C. articulatus*. Thus *C. articulatus* var. *punctatus* Makino, based on *C. punctatus* Thunb.,

actually does not pertain to *C. articulatus* and is only a variety of *C. punctatus*.

2. **Celastrus Kusanoi** Hay. in Coll. Sci. Imp. Univ. Tokyo 30 (1):61. 1911, Icon. Pl. Form. 1:137. 1911, l. c. 5:20. *t. 8.* 1915; Reid. & Wils. in Sargent, Pl. Wils. 2:356. 1915; Sasaki, List Fl. Formos. 272. 1928, Cat. Gov. Herb. Formos. 319. 1930; Mak. & Nem. Fl. Jap. 679. 1931; Suzuki in Masamune, Short. Fl. Formos. 126. 1936; Kanehira, Formos. Trees ed. 2. 384. *t. 342.* 1936; Merr. & Chun in Sunyatsenia 5:111. 1940; *Celastrus articulatus* Thunb. var. Henry, List Pl. Formos. 27. 1895.

Shrubs, Scandent, the branches fuscent, wrinkled lengthwise, lenticellate, the branchlets divaricate; leaves alternate, petiolate, oblong-rotund or nearly orbicular, chartaceous, 7–10 cm. long, 5.5–11 cm. wide, rounded at the apex, shortly cuspidate, (tails 8 mm. long, obtuse) broadly truncate or roundly cordate at the base, the margins remotely and obscurely serrate, entire near the base, the petioles 2.5 cm. long, sulcate above; flowers cymose, the cymes paniculate, axillary or terminal, the rachis of panicles yellowish pubescent, articulated at the base; calyx without pubescent, broad-campanulate, 2.5 mm. long, 4 mm. wide, 5-lobed, the lobes triangular-quadrangular; petals cuneate-obovate, 4 mm. long, 1.5 mm. wide, the apex truncate or rotunded, the base cuneate, the margins denticulate, glabrous, without pubescent within below; stamens inserted at the base of the calyx-lobes, the filaments much complanate, 3.5 mm. long, pubescent below; anthers subcordate, glabrous, apiculate or not apiculate, extrorse or rarely introrse; disc thin; ovary minute, conical, 3-celled, 0.25 mm. long, the style 0.3 mm. long, short-columniform, glabrous, the apex truncate, stigamatate; fruits cymose, the cymes axillary, the peduncles 2 cm. long, shortly ternate or bearing up to 7 fruits on a peduncle; capsules globose, with persistent calyx, style 3-valvately dehiscent, the valves coriaceous, flavescent, orbicular, shortly acute at the apex, wrinkled outside, with 2 seeds in each cell; seeds covered by reddish arils, obliquely cylindrical, slightly recurved, 4.5 mm. broad, the testa fuscous, rugose, minutely papillose, coriaceous.

Taiwan: Takow Apes Hill, *Henry 1893* (Reprint); Kosyun *Nakahara, s. n.* Dec. 23, 1206; Kuaru, *E. Matuda, 1216, K. Yamada 1215, Y. Kudo & S. Suzuki 16048, T. Suzuki 6195, Y. Kudo & S. Suzuki 15882;* Mareppa, Taityu, *E. Matuda s. n.* July 20, 1919.

Distribution: Endemic.

Dr. Merrill and Prof. Chun (in Sunyatsenia 5: 111. 1940.) say that the Kwangtung records of *C. articulatus* Thunb. actually appertain to *C. Kusanoi* Hay. and that the Thunberg's species does not extend as far as south as Kwangtung. They also say that they can detect no constant differences by which the Chinese form may be distinguished from the Formosan one. However, I have

examined three Kwangtung specimens labeled as *C. articulatus* Thung., from the Herbarium of Botanical Institute of Sun Yatsen University; none of them is *C. Kusanoi* Hay., which can be easily separated from the latter especially by the leaf-texture and fruiting cymes. One of them (Lokchong, *Tsiang Ying 1346*), determined by Merrill as *C. articulatus* Thunb. is described by Masamune as a new species *C. lokchongensis* Masamune, in Trans. Nat. Soc. Form. 25 (136–139): 15. 1935. Another, (Kowloon Tai-tam-tok, Hongkong, Y. *K. Wang 3060*) also determined by Merrill as *C. articulatus* Thunb. is actually of that species, except that the veinlets not distinct or visible on both surfaces, as is usually the case in *C. articulatus*. The third specimen (Lokcheong, *Y. Li 2134*) is allied to *C. punctatus* Thunb. except that the leaves are larger; but this may be due to geographical variations.

3. **Celastrus euphlebiphyllus** (Hay.) Kanehira, Formos. Trees ed. 2. 383. *t. 340.* 1936; Nakai in Journ. Jap. Bot. 17:619. 1941.

Euonymus euphlebiphyllus Hay., Icon. Pl. Formos. 5:15. 1915; Sasaki, List Pl. Formos. 273. 1928, Cat. Gov. Herb. Formos. 320. 1930; Mak. & Nem., Fl. Jap. 678. 1931; Suzuki in Masamune, Short Fl. Formos. 127. 1936.

An evergreen climber; leaves thickly coriaceous, alternate, obovate, or obovate-oblong, 5–6.5 cm. long, 2.5–4 cm. wide, the apex obtuse or emarginate, the base cuneate or broadly acute, the petiole 8 mm. long; the margins remotely crenulate, the mid-rib distinctly elavated on both surfaces, reticulate, glabrous on both surfaces, the primary veins 6–7 on each side, divaricate-ascending; cymes terminal or axillary, 5–10 cm. long, the peduncle 1–2 cm. long, pale-greyish, glabrous, 2–3 branched; bracts minute; basal calyx short tubular, the lobes 5-0.7 mm. long, 1.3 mm. broad, glabrous, more or less rounded; petals oblong, slightly 4-angular, 2 mm. long, 1 mm. wide, the apex truncate, the base truncate, the margins entire or very minutely denticulate; disc hypogynous, lamellate annular, 5-lobed, the lobes broad, more or less rounded., 7 mm. wide, 0.3 mm. long; stamens 5, inserted at the margin of the disc, the filaments short, 0.25 mm. long, the anthers turning red, oblong, 0.3 mm long, the base slightly lobed; ovary glabrous, depressed-globose, 1 mm. wide, 0.7 mm. long, smooth; style column-shaped, 0.5 mm. long; the stigma 3-lobed, the lobes short, smooth, 2-lobed.

Taiwan: Kinpori, Taipei, *Hudii 15435* (FRI); Rokkiri, Bansyoryo, *Kawakami 15436* (FRI); Kosyun, *Kawakame 15437* (FRI); Kuraru, Kosyun, *Takeo Ito 15438, 15439* (FRI).

Distribution: Endmic to Taiwan.

This species differs from the other species by its leaf-characters, in the

rounded or emarginate apices, the remotely crenate margins, and the numerous veins, elongately reticulate and distinctly elevated on both surfaces.

4. **Celastrus Hindsii** Benth. in Journ. Bot. Kew Gard. Misc. 3:334. 1851; Maxim. in Mél. Biol. 9:199. 1881; Forb. & Hemsl. in Journ. Linn. Soc. Bot. 23:123. 1886; Lows. in Bot. Jahrb. 30:446. 1902; Dunn & Tutcher in Kew Bull. Misc. Inform. Add. Ser. 10:61. 1912; Rehder & Wils. in Sargent, Pl. Wils. 2:357. 1915; Hay., Icon. Pl. Formos. 9:15. 1920; Pitard in Lecomte, Fl. Indo-chin. 1:892. 1912; Sasaki, List Pl. Formos 272. 1928, Cat. Gov. Herb. Formos. 319. 1930; Mak. & Nem., Fl. Jap. 679. 1931; Kanehira, Formos. Trees ed. 2. 384. *t. 341.* 1936; Suzuki in Masamune, Short Fl. Formos. 126. 1936; Wang in Chin. Journ. Bot. 1:63. 1936.

Catha monosperma Benth. in Lond. Journ Bot. 1:483.

Celastrus monospermus Benth., Fl. Hongk. 63. 1861. (non Roxb.)

Celastrus oblongifolius Hay., Icon. Pl. Formos. 3:58. 1913; Sasaki, List Pl. Formos. 272. 1928; Mak. & Nem., Fl. Jap. 679. 1931; Susuki in Masamune, Short Fl. Formos. 126. 1936.

Climbing shrub, the young branches greyish green, afterwars brownish grey, terete, glabrous, the branches rarely lenticelled; leaves coriaceous, glossy, 6–11 cm. long, 2–6 cm. broad, obovate-oblong or elliptic, the apex cuspidate-acute or abruptly acute, the base rounded-obtuse or rounded, the margins obscurely serrate, the primary lateral veins 6–9 on each side, slightly elevated above, distinctly elevated beneath, the petiole 5–10 mm. long; inflorescences clustered, terminal or axillary, 5–10 mm. long; sepals 5, 1.5 mm. long, subrounded, denticulate; petals 5, colorless, 2 mm. long, 1 mm. wide, obovate, the apex obtuse; male flowers with 5 stamens, 2 mm. long, the filaments slightly flattened, inserted at the base of the disc, the anthers 1 mm. long, oval; disc cupule-like, rounded, entire; perfect flowers with 5 stamens, 1.5 mm. long, the anthers oval, slender, the disc equally 5-lobed, but the lobes often less rounded; ovary 1 mm. long, ovoid, not united to the disc, the style longer than the disc, the stigma trilobed; locules 3, each 2-ovuled; fruits paniculate, the panicles axillary or terminal, linnear, about 2 times longer than the leaf, the peduncle 2–8 mm. long, the pedicel 3–9 mm. long, with persistent sepals and style, ovoid or subglobose, marked with 3 furrows and opening with 3 clefts, loculicida, the valves light brown, nearly glabrous; seed 1, (rarely 2), more or less quadrangular, 5–8 mm. long, 5 mm. wide, enclosed in an organe-colored arillus; albumen very abundant.

Taiwan: Aderu, Heito, *S. Suzuki 11162*; Takao, *T. Suzuki 20966*.

Kwangtung: Lofoushan, *Taiang Ying* 1637; *Lek Chong, C. L. Tso 20406*.
Distribution: Taiwan, Kwangtung, Hainan and Yunan.

This species may be readily distinguished from other species of the genus by its characteristic coriaceous and shining leaves, and its 3-valved and 1-seeded capsule.

5. **Celastrus longe-racemosus** Hay., Icon. Pl. Formos. 5:23. *t. 3.* 1915; Sasaki, List Pl. Formos. 272. 1928; Cat. Gov. Herb. Formos. 319. 1930; Mak. & Nem, Fl. Jap. 679. 1931; Suzuki in Masamune, Short Fl. Formos. 126. 1936; Kanehira, Formos. Trees ed. 2. 385. *t. 344.* 1936.

Shrubs, climbing, the branchlet glabrous; leaves charataceous, oblong or elliptic-oblong 4.8–5.8 cm. long, 2.7 cm. wide, the apex cuspidate-acute or abruptly acute, the base obtuse or cuneate, the margins remotely serrate, serrations ascending; petiole 3 mm. long, glabrous; flowers whitish or pale-green, long-paniculate, in axillary racemes, up to 15 cm. long, glabrous, the peduncle 8 mm. long, the pedicels 5 mm. long; calyx widely campanulatus, green, 1.5 mm. long, 4 mm. in diameter, 5-lobed, the lobes widely rounded, 1 mm. long, 2 mm. wide, denticulate-ciliolate, concave inside, convex outside, glabrous; petals 5, pale-greenish, linear-oblong, 2.5 mm. long, 1.5 mm. wide, the apex obtuse, the base subequal, 1 mm. wide, the margins irregularly erose-denticulate; disc membranaceous, cupuliform, the margin erect, the lobes erect, 0.5 mm. high, glabrous; stamens 5, arising from the margin of the disc, the filaments 1 mm. long, glabrous, the apex rounded, narrowed, the anthers oblong-cordate, 0.7 mm. long, broad, glabrous, the base cordate, the apex outuse or slightly emarginate; ovary almost superior, glabrous, 0.25 mm. long, 0.7 mm. broad, subconical, the style short, 0.7 mm. long, columniform, the apex truncate, 3-loculed, 2-ovuled.

Taiwan: Zyuziro, Arisan, *Hayata 15418* (FRI); Mt. Arisan, *Hayata & Takeo Ito 15417* (FRI); Toroen, Arisan, *Hayata 15416* (FRI).
Distribution: Endemic to the central part of Taiwan.

This species is distinguished in having long panicles of axillary racemes.

2. Gymnosporia

Gymnosporia Benth. et Hook. f., Gen. Pl. 1:365. 1862.

Encentrus Presl, Bot. Bomerk. 33. 1844.

Polyacanthus Presl, l. c. 1844.

Shrubs, spiny or unarmed; leaves alternate or opposite, obovate, coriaceous, entire or serrate, exstipuate; cymie axillary, solitary or fasciculate, pedunculate; calyx 5-lobed; petals 5, patent; stamens 5, subdisc-inserted; disc explanate;

ovary-base broad, confluent with the disc, 3–4-celled, the style short, the stigma 2–4-seeded; seeds arillate, albumen abundant.

A genus of about 80 species which are natives of the hotter parts of the whole world. About 6 species are found in China.

Key to the Species

A. Branches spiny; capsule 4-loculed, 2-valved .....1. *G. diverifolia*
AA. Branches unarmed; capsule 3-loculed, 3-valved .....2. *G. trilocularia*

1. **Gymnosporia diversifolia** Maxim. in Mél. Biol. 11:264. 1881; Loes. in Bot. Jahrb. 30:472. 1902; Mats. & Hay. in Journ. Coll. Sc. Imp. Univ. Tokyo 22:84. 1906; Merr., Enum. Philip. Fl. Pl. 2:483. 1923; Sasaki, List Pl. Formos. 274. 1928, Cat. Gov. Herb, Formos. 321. 1930; Mak. & Nem., Fl. Jap. ed. 2. 685. 1931; Suzuki in Masamune, Short Fl. Formos. 127. 1936; Kanehira, Formos. Trees ed. 2. 393. *t.* 550. 1936; Wang, in Chin. Journ. Bot. 1:67. 1936.

Cythna diversifolia A. Gray ex Maxim. in Mél. Biol. 11. 204. 1881.

Celastrus diversifolius Hemsl. in Journ. Linn. Soc. Bot. 23:123. 1886; Henry, List Pl. Form. 27. 1896; Ito & Matsum. in Journ. Coll. Sc. Imp. Univ. Tokyo. 12:374. 1899; Dunn. & Tutbher in Kew Bull. Add. Ser. 10: 61. 1912.

"*Celastrus Wallichianus*" *sensu* Hance in Journ. Bot. 226. 1873, *non* Wight et Arn.

"*Gymnosporia Wallichiana*" *Sensu* Mexim. in Mél. Biol. 11. 203. 1881; Mats. in Tokyo Bot. Mag. 15 (168 :55. 1901, *non* Lawson.

A spinescent shrub, the spines naked, axillary, or the short lateral flowering branches terminating in spines, or the two kinds of spines present on one plant; leaves coriaceous, 2.5–3 cm. long, 1–2 cm. wide, obovate, glabrous, the apex rotund or emarginate, short-petiolate or nearly sessile; cyme axillary, dichotomous, the peduncle 4–6 mm. long, the pedicel 2–4 mm. long; calyx 5-parted, the segments 0.8 mm. long, 1 mm. wide, thick, ovate, acute, the margins denticulate; petals 5, elliptic, obtuse, 2 mm. long, 1 mm. wide; stamens 5, alternate with the petals, sub-disc inserted, the anthers oval, the filaments subulate; ovary partly immersed in the disc, 4-celled, each cell 2-ovuled; the style short, the stigma subcapitate-sublobulate; bracts wide ovate, abruptly acute, the margins glandular-fimbriate; capsules subglobose, 4-loculed, 2-valved, with mostly 2–3 rarely 1 mature seeds in a capsule; seeds arillate.

Taiwan: Koshun, *Y. Furukawa s. n.* March 13, 1910; Paiwan, *E. Matuda* 1213; Subon, *E. Matuda* 1214; Senkyakuscki, Sintiku, *S. Sasaki s. n*; South Cape, *Y. Kudo & S. Suzuki 1574*8, *1580*2; Kuraru, *Y. Kudo & S. Suzuki 1588*5; Shintiku, *Y. Kudo & S. Suzuki 143*; Garanbi, *Y. Kudo & Mari 1611*6; Taito, *Y. Yamamoto 801, 2111*; Garanbi *T. Suzuki 5954*; Taito, *S. Suzuki 1058*2; Shintiku, *T. Hosokawa s. n.* Dec. 27, 1941; Taichu, *T. Suzuki 2143*2; Koshun, Takao, *K. Mori 380*.

Riukiu: Okinawa, *Kawagoe s. n.* Oct. 18, 1916.

Hainan: Hainan, *G. Masamune & T. Fukuyama 313; 246; F. C. How 7382*7.

Distributed: Taiwan, Liukiu and Hainan.

2. **Gymnosporia trilocularia** Hay., Icon. Pl. Formos. 3:49. 1913; Sasaki, List Pl. Formos. 274. 1928, Cat. Gov. Herb. Formos. 321. 1930; Mak. & Nem, Fl. Jap. ed. 2. 685. 1231; Suzuki in Masamune, Short Fl. Formos. 127. 1936; Kanehira, Formos. Trees ed. 2. 393. *t. 351.* 1936.

A small snrub; leaves obovate or obovate-cuneate, 3.5–5 cm. long, 1.7–3.3 cm. broad, coriaceous, the apex rounded, the base cuneate, the margins remotely crenate, the veins slightly elevated above, distinctly elevated beneath, reticulate, the petioles 4 mm. long; flowers in dichotomous cymes, the peduncle 1–1.5 cm. long, the pedicel 1 cm. long; calyx 5-lobed; each lobe ovate, 1.5 mm. long, 1 mm. wide; petals 5, oblong, the apex obtuse, entire, glabrous, 3.5 mm. long, 1.5 mm. wide; stamens 5, alternate with the petals, inserted under the disc, the filaments 1.5 mm. long, the anthers oblong, the apex and the base lobed; disc annual, crenate, thick; ovary partly immersed in the disc, 3-celled, each 2-ovuled, the style short, 1 mm. long; capsule triloculed, dehiscing into 3 valves, the valves broad, rounded, 5 mm. long, the apex mucronate; seeds oblong, 3 mm. long, 2 mm. broad, the testa bright black-red-colored, the base arillate.

Taiwan: Isl. Koto-syo, *Kawakami & Mori 1550*9 (FRI), *Kawakami & Sasaki 1550*8 (FRI), *T. Hosokawa* 8149, 9895.

Distribution: Endemic to the Island Koto-syo.

This plant differs from the other species of the genus by the unarmed branches, larger leaves, longer peduncles and 3-celled capsules.

3. Microtropis

Microtropis Wallich, List 152, no. 4337–40. 1830, *nom. nud.*; Meisn., Pl. Vasc. Gen. Tabl. Diagn. 68. 1837; Benth. & Hook. f., Gen. Pl. 1:361. 1862.

Paracelastrus Miq., Fl. Ind. Bat. 1 (2):590. 1859; F. N. Williams, Bull. Herb. Boiss. II. 5:224. 1905.

Otherodendron Makino in Bot. Mag. Tokyo 23:60; *t.* 1909.

Chingithamnus Hand.-Maz. in Sinensia 2:128. 1932.

Evergreen trees or shrubs; the branchlets glabrous; leaves opposite, petiolate, exstipulate, entire, coriaceous; flowers in cymes, or fasicled, pedunculate, axillary, occasionally unisexual by abortion; sepals 4–5, persistent; petals 4–5, confluent with the disc, rounded; staments 4–5 inserted on the back under the edge of the disc or on the edge, the filaments short; disc conspicuous, cupule-form; ovary free, ovoid, 2-celled, the style short, the stigma 4-lobed; ovules 2 in each cell of the normal ovary; capsule oblong, coriaceous, 1-celled, 2-valved, 1-seeded; seed oblong.

A genus of over 60 species which distribute in India, Ceylon, Malayan peninsula, Java, Burma, Indo-China, China, Japan, Philippines, Cental America and Mexico. About 15 species are found in China.

Key to the Species

A. Leaves lanceolate or elliptical oblong; 5–8.5 cm. long, 1.5–3 cm. wide, the apex acuminate.....1. *M. fokienensis*

AA. Leaves oval, obovate often scarcely rhombic; 6–10 cm. long, 2–5 cm. wide, the apex rounded or obtuse.....2. *M. japonica*

1. **Microtropis fokienensis** Dun. in Journ. Soc. Bot. 38:357. 1908, l. c. 39:469. 1911; Dunn & Tutchr in Kew Bull. Add. Ser. 10:61. 1912; Rehder in Journ. Arnold Arb. 11:165. 1930, l. c. 18:216. 1637; Merr. & Freem. in Proc. Amer. Acad. Art. Sc. 73:292. 1940; Nakai, in Journ. Jap. Bot. 17 (6):376. 1941.

Myrsine Chaffomjoni Lév., Fl. Kouy-Tcheou 287. 1914; Rehd. in Journ. Arnold Arb. 18:216. 1937.

Cassine Illicifolia Hay., Icon. Pl. Formos. 3:60. 1913.

Cassine Matsudi Hay, Icon. Pl. Formos. 9:18. *t. 11.* 1920.

Microtropia Matsudai Koidz. in Bot. Mag. Tokyo 40:335. 1926; Sasaki, List Pl. Formos. 274. 1928, Cat. Gov. Herb. Formos. 322. 1930; Mak. & Nem., Fl. Jap. ed. 2. 685. 1931; Suzuki in Masamune, Short Fl. Formos. 128. 1936; Kanehira, Formos. Trees ed. 2. 395. *t. 353.* 1936.

Microtropis illicifolia Koidz. in Bot. Mag. Tokyo 4:335. 1926; Sasaki, List Pl. Formos. 274. 1928, Cat. Gov. Herb. Formos. 322. 1930; Mak. & Nem., Fl. Jap. ed. 2. 685. 1931; Kanehira, Formos. Trees ed. 2. 394. *t. 352.* 1936; Suzuki in Masamune, Short Fl. Formos. 128. 1936.

Microtropis illicfolia Koiz. var. *yunnanensis* Hu in Bull. Fan. Mem. Inst. Biol. 7:214. 1936.

Shrub 3 m. high, entirely glabrous, the branchlets angular; leaves opposite,

chartaceous or membraneceous-coriaceous, lanceolate or elliptical oblong, the apex acuminate, the base cuneate, entire, 5–8.5 cm. long, 1.5–3 cm. wide, shining above, the mid-rib slightly elevated on both surfaces; petiole 5 mm. long; flowers in short cymes or solitary, the cymes axillary, to 1.5 cm. long, few-flowered or densely fasiculate, the peduncles 5 mm. long, the pedicels 1.5–3 mm. long, the apex 2 bracted, 1 mm. long; sepals 4 or 5, subequal, widely rounded, 1.5 mm. long, 2.5 mm. wide, the margins fimbriate-ciliolate, glabrous; petals 4 or 5, oblong, apex obtuse, glabrous, 3.5 mm. long, 1.5 mm. wide, alternate with sepals; stamens 4 or 5, attached to the margin of the disc, the filaments short, glabrous; ovary 2-celled, each cell 1-ovuled in the rudimentary ovary, 2-ovuled in normal flowers, the style short-columnar, the stigma digitiform, slightly 4-lobed; capsule obovoid or elliptic, 1–5 cm. long, 5 mm. wide, the pericarp coriaceous, 1-seeded; seeds 12 cm. long; testa reddish.

Taiwan: Mt. Arisan, *T. Kawakami 1109* (Photo.), *R. Kanehira & S. Sasaki s. n.* Feb. 6, 1918, *S. Sasaki s. n.* Feb. 6, 1918; Mt. Bui, *Matuda s. n.* Jan. 4, 1919; Mt. Taihei, *S. Suzuki* Aug. 7, 1928, 3921; Mt. Arisan, *T. Suzuki* 18139; Rahan, *T. Suzuki* 17078; Bako Kuru, Taipei Distric, *T. Suzuki 18350*; Mt. Arisan, *Y. Yamamoto & T. Nakamura 4100*.

Distribution: Taiwan, Yunnan, Kwangtung, Kwangsi Szechuan and Chekiang.

In Kanehira's Formosa Trees ed. 2. 395. *t. 353*, the figure of *Microtropis Matsudai* is based on the specimen collected by E. Matsuda from Mt. Bui. It is a branch of the male plant, most of the flowers are invaded by insects forming insect galls. The fruit-like bodies in the figure are simply these galls. (See Nakai in Journ. of Jap. Bot. 17:375. 1942). The figure of *Microtropis illicifolia* (Hay.) Koidz. in Kanehira's Formosa Trees ed. 2. 394. *t. 352* is apprently based on the origin figure of *Cassine Matsudai* Hay. (Icon. Pl. Formos. 9:17. *t. 11.* 1920).

According to specimens preserved here, the flowers of *Microtropis illicifolia* are 4-merous and occasionally 5-merocous in normal flowers, while in the *Microtropis Matsudai* the flowers are 5-mercus and occasionally 4-merous. Aside from this there are no constant distinguishable characters between them. Thus following the two names are combined into one species.

2. **Microtropis japonica** (Fr. & Sav.) Hall. f., Meded. Rijks Herb. 33. 1911, reprint. 33. 1923; Masam., Prel. Rep. Veg. Yak. 92. 1929, in Mem. Fac. Sci. Agr. Taihoku Univ. 41:280. 1934; Merr. & Freem. in Pro. Acad. Art. Sci. 73 (10):294. 1940; Nakai in Journ. Jap. Bot. Tokyo 17 (6): 376. 1941.

Elaeodendron japonicum Fr. & Sav., Enum. Pl. Jap. 2:315. 1879; Maxim. in Bull. Acad. Sci. St. Pétersb. 27:459. 1881; Ito & Matsum.

in Jour. Coll. Sci. Univ. Tokyo 12:375. 1899; Matsum. & Hay., Op. cit. 22. 84. 1906.

Cassine japonica O. Kuntze, Rev. Gen. Pl. 1:114. 1891.; Loesener in Engl. & Prantl, Nat. Pflanzenfam. 3 (5):215. 1896; Matsum. in Bot. Mag. Tokyo 12:62. 1898; Ito & Matsum. in Jour. Coll. Sci. Univ. Tokyo 12:375. 1899.

Otherodendron japonicum Makino in Bot. Mag. Tokyo 23:62. *t. 1–25.* 1909, Icon. Pl. Jap. 1:*t. 12–14.* 1911; Matsum, Ind Pl. Jap. 2:323. 1912; Mak. & Tanaka, Man. Fl. Jap. 330. 1927; Mak. & Nem., Fl. Jap. ed. 2. 686. 1931; Terasaki, Nippon Shokob. Zuhu *t. 36.* 1933; Naito & Kaj., Wild Pl. Kag. Pref. 389. 1934.

Cassine kotoensis Hay., Icon. Pl. Formos. 3:61. 1913.

Otherdendron liukiuense Nakai in Bot. Mag. Tokyo 36:67. 1922.

Microtropis liukiuensis Koidz. in Bot. Mag. Tokyo 40:334. 1926; Nakai in Journ. Jap. Bot. Tokyo 17 (6): 376. 1941.

Microtropis kotoensis Koidz. Bot. Mag. Tokyo 40:334. 1926; Sasaki, Pl. Formos. 274. 1928; Mak. & Nem., Fl. Jap. 2. 686. 1931; Kanehira, Formos. Trees ed. 2, 395. 1936; Suzuki in Masamune, Short Fl. Formos. 128. 1936; Nakai in Journ. Jap. Bot. 17 (6):377. 1941.

Small tree or shrub, the branches terete; leaves opposite, coriaceous, shining, ovate elliptic, or obovate, rhombic, the apex obtuse, rounded, or subemarginate-obtuse, the base acute-cuneately attenuated, the nargins entire; 6–10 cm. long, 2–5 cm. wide, the mid-rib slender, the primary veins about 4–7 on each side, elevated on both surfaces when dried; stipules very minute, caducous; cymes small, axillary, dichotomous branched, 2–10 mm. long, the pedicels very short nearly sessile; flowers calyx 5- rarely 4- or 6-parted, persistent; petals 5 rarely 4 or 6, alternate with the calyx-segments, deciduous, rounded-obtuse; stamens 5 rarely 4 or 6, alternate with the petals, inserted on the back under the edge of the disc, those of the female rudimentary; ovary ovoid, free but the vary base hardly adhering to the base of the disc, 2-celled; style short, stout; stigma 4-lobed; ovules 2 in each cell, the ovary of the male flower rudimatary, 2-celled, each cell with indistinctly 2-lobed ovules, the stigmas 2-lobed; fruits a capsule, ellipsoid, oblong, or oval, erect, septicidally dehiscent into 2 valves, 1.5–2.5 cm. long, 9–13 mm. across, 1-loculed; seed often 1, sometimes 2, exarillate, ellipsoid or oblong; albumen copious.

Taiwan: Isl. Kotosyo, *K. Miyake 1110* (Photo. of type of *Cassine kotoensis* Hay.); *T. Fukuyama s. n* Nov. 1934.

Liukiu: Kunrgami, *T. Suzuki 16397*; Syuri, Okinana, *S. Aoki* Aug. s. n. 1930. Nishi-omote, *G. Masamune & T. Nakamura 3338*.

Japan: Nagasaki, *M. Yamasaki 2648*.

Distribution: Taiwan, Isl. Kotosyo, Liukiu and Japn.

A photograph of the type of *Cassine kotoensis* Hay. is available. This and an other Kotosyo specimen prove that they are the same as the plant from Japan. Those plants collected from Liukiu are also the same as the Japan Plant. There are no constant differences between these plants except vaiation in the size and texture of leaves.

4. Euonymus

Euonymus Linn., Hort. Cliff 39. 1737.

Evonymus Tourn ex Linn., Gen. Pl. ed. 1. 29. 1737.

Melenocarya Turcz. in Bull. Coc. Nat. Mosc. 1:453. 1858.

Vyenomus Presl. in Abh. Boehn. Ges. V. Folge. 3:462. 1845.

Shrubs or small trees, deciduous or evergreen, the branchlets usually 4-angled, the budes usually conspicuous; leaves opposite, rerely verticellate, petioled, entire or serrate, usually glabrous; stipules caducous; inflorescenses pedunculate, cymes axillary; flowers 4–5-merous, usualy perfect; calyx 4–5-lobed; petals 4–5, inserted under the disc, entire or dentate-fimbriate; stamens 4–5, inserted on the disc, rarely inserted on the margin of the disc, the filaments short; ovary immersed in the disc and confluent with it, 4–5-celled; fruit a 4–5-loculed, or occasionally 3-loculed capsule, angular, coriaceous or echinate, each cell with 1–2 seeds enclosed in a fleshy aril.

A genus of about 120 species which are natives of the moutain regions of Tropical Asia and Malayan Arhipelago, a few scattered over Europe and North America. Abut 96 species are found in China.

Key to the Species

A. Leaves entire.

B. Leaves always verticillate, almost ternate ……1. *E. Miyakai*

BB. Leaves opposite.

C. Fruit suppressed globose, 3-loculed; leaves white-yellowish in dried specimens ……2. *E. pallidifolia*

CC. Fruit globose, 5-loculed; leaves red-brownish …3. *E. Matsudai*

AA. Leaves serrate.

B. Fruit a prickly capsule……4. *E. echinatus*

BB. Fruit not a prickly capsule.

C. Fruit rounded, one-seeded, solitary or in terminal fascicle, with the sterile carpels persistent on one side, as the appendages of the fruit; leaves oblong-rhombic .....5. *E. acute-rhombifolia*

CC. Fruit solitary, 3–4–5-loculed capsule, solitary or in cymes, axillary; leaves not oblong-rhombic.

D. Fruit solitary, 3- or 4-loculed; leaves oblong-lanceolate.....6. *E. morrisonensis*

DD. Fruit axillary cymes; 5-loculed capsule; leaves oblong-obovate or elliptic-oblong.....7. *E. pellucidifolia*

1. **Euonymus Miyakai** Hay., Mats. &. Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:83. 1906; Hay. l. c. 30:59. 1911; Hay., Icon. Pl. Formos. 1:137. 1911; Dunn in Journ. Linn. Soc. Bot. 39:446. 1911; Sasaki, List Pl. Formos. 273. 1928, Cat. Gov. Herb. Formos. 320. 1930; Suzuki in Masamune, Short Fl. Formos. 127. 19236; Kanehira, Formos. Trees ed. 2. 388. 1936; Wang in Chin. Journ. Bot. 1:53. 1936.

Shrub, subglabrous, the branches subterete; leaves coriaceous, ternate, petioled, obovate, elliptical, or oblong, slightly acute or obtuse at the apex, attenuate at the base, 7.2–10 cm. long, 3–5.3 cm. wide, the petioles short, 7. mm. long; flowers patent, 1 cm. in diameter, loosely cymose paniculate, 4–5 cm. long, terminal or axillary, bracteate, the bracts very short, the peduncle 3 cm. long; sepals 5, incurved, broad-semi-rounded, the margins fimbriate, 2 mm. long, 4 mm. wide; petals 5, obovate, inserted under the disc, patent, the margins fimbriate and recurved, the base shortly narrowed; stamens 5, inserted above the disc, the filaments complanate, subulate, the anthers broadly didymous; disc carnose, ample, broadly explanate, entire; ovary immersed in the disc and confluent with it, 5-celled; style short, 1.5 mm. long; ovules 2 in each cell; fruits obovate-globose, angular, the apex truncate, 1 cm. long, 1 cm. broad, 1-seeded; seed elongate, 7 mm. long, 5 mm. broad, black-reddish in color.

Taiwan: Isl. Kotosyo. *K. Miyake 1126* (Photo. of Typus); Isl. Kotosyo, Mt. Yamada, *T. Sata 1475*; Isl. Kotosyo *T. Hosokawa 8051.*

Distribution: Isl. Kotosyo and Hainan.

This species can be easily recongnized by its leaves which are always entire and verticillate (ternate in almost all cases).

2. **Euonymus pallidifolia** Hay., Icon. Pl. Formos. 3:57. 1917. 1913; Sasaki, List Pl. Formos. 273. 1928; Cat. Gov. Herb. Formos. 320. 1930; Mak. & Nem, Fl. Jap. 682. 1931; Susuki in Masamune, Short Fl. Formos. 127. 1936.

Shrub, the branchlets straight, white-yellowish or pallid, terete; leaves white-yellowish when dried, oblong or boradly-elliptic, 7 cm. long, 4 cm. wide, coriaceous, the apex acute or obtuse, the base acute or rounded-obtuse, glabrous, the margins entire, reflexed, the midrib elevated above, slightly elevated below, the primary lateral veins slightly elevated above, not or little elevatory below, 5-6-nerved on both sides, the petiole short, 5 mm. long; flowers unseen; fruits pedunculate axillary, solitary, 3.5 cm. long, erect; capsule supressed globose, 1.5 cm. in diam., 7 mm. long, red-yellowish, dehiscent, in 3va lves ligneouscoriaceous, 3-loculed, the locules 1-seeded; seed quadrangular 8 mm. long, unequal, 3-4-striated, the apex arillate, crowned in red.

Taiwan: Kosyun, *Nisiguki 1127*. Jan. 11. 1911, (Photo. of the type); *15470* (FRI)
Distribution: Endemic.

This species is easily distinguished by the coriaceous, broad elliptic white yellowish and entire leaves.

3. **Euonymus Matsudai** Hay., Icon. Pl. Formos. 9:15. t. 9. 1920; Sasaki, List Pl. Formos. 273. 1928, Cat. Gov. Herb. Formos. 320. 1930; Mak. & Nem, Fl. Jap. 682. 1931; Kanehira, Formos. Trees ed. 2. 388. 1936. Suzuki inMasamune, Short Fl. Formos. 127. 1936.
Glyptopetalum Matsudai (Hay.) Nakai, Journ. Jap. Bot. 17: (11): 619. 1941.

A shrub, the branches and branchlets smooth, terete; leaves opposite, coriaceous, elliptic-oblong or ovate-oblong, 6-5-10 cm. long, 2.5-4.5 cm. wide, the apex acuminate, the base triangular-acute, the margins entire, smooth, on both surfaces, shining above, dull below, the midrib distinctly elevated above, slightly elevated below, the veins profusely branched, slightly elevated on both surfaces; petioles 7 mm. long, glabrous; cymes axillary, the peduncle 1-5 cm. long, solitary, the pedicel 0.5 cm. long, few-flowered, the bract lanceolate, surrulate; calyx glabrous, 7 mm. in diameter, 4-lobed, the lobes 1.5 mm. long, 3.5 mm. wide, broadly rounded, the margins minute crenate; petals 4, broady obovate, 5-6 mm. long, 6 mm. wide, the apex rounded, the base contracted, glabrous on both surfaces, the margins erosed or lacerate; stamens 4, the anthers sessile or short-stalked, obreniformed 3.5 mm. long, 1.25 mm. wide, smooth; disc more or less flattened, quadrangular, 3.5 mm. in diameter, entire, fused with the cupule the calyx, the margins thin, 4-lobed; ovary short, 4-angularly-pyramided, 2 mm. wide, 15. mm. long; capsule globose, 5-loculed, 1-seeded, 4 mm. broad, 4 mm. long.

Taiwan: Mt. Daibu, *E. Matuda 1218*, Nov. 1918.
Distribution: Endemic.

This species differs from all the other species of the genus in Formosa in the leaves which are entire and shinning on the upper side and very dull on the lower surface in the dried state.

Nakai tranfers this species to *Glyptopetalum*. However, I have dissected the fruits of the species and have found it 5-loculed. As the ovary of *Glyptopetalumis* is 4-celled, so I retain it in the original genus.

4. **Euonymus echinatus** Wall. in Roxb, Fl. Ind. ed. Carey 2:410. 1824. Lawson in Hook. f., Fl. Brit. Ind. 1:611. 1875; Forbes & Hemsl. in Journ. Linn. Soc. Bot. 23:119. 1886; Masamune in Trans. Nat. Hist. Soc. Formos. 24:211. 1934; Nakai in Journ. Jap. Bot. 17 (11):616. 1941.

"Euonymus echinatus" sensu Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo. 25 (19):69. 1908; Ito & Mats., Tent. Fl. Lutch. 371; *non* Wall.

Euonymus arboricolus Hay., Icon. Pl. Formos. 5:17. 1915; Sasaki, List Pl. Formos. 273. 1928, Cat. Gov. Herb. Formos. 319. 1930; Mak. & Suzuki in Nem., Fl. Jap. 680. 1931.

Euonymus kraruensis Hay., Icon. Pl. Formos. 9:12 *t. 8.* 1920; Sasaki, List Pl. Formos. 273. 1928, Cat. Gov. Herb, Formos. 320. 1930; Mak. & Nem. Fl. Jap. 681. 1931; Kanehira, Formos. Trees ed. 2. 387. 1936; Suzuki in Masamune, Short Fl. Formos. 127. 1936.

Euonymus Spraguei Hay., in Journ. Coll. Sci. Imp. Univ Tokyo 30 (11): 59. 1911, Icon. Pl. Formos. 1:137. *t. 20.* 1911, l. c. 5:18. 1915; Sasaki, List Pl. Formos. 273. 1928; Mak. & Nem., Fl. Jap. 683. 1931; Suzuki in Masamune, Short Fl. Formos. 127. 1936; Kanehira, Formos. Trees ed. 2. 391. 1936; Nakai in Journ. Jap. Bot. 17 (11):618. 1941.

Euonymus tricocarpus Hay., Fl. Mont. Formos. 69. 1908, Icon. Pl. Formos. 1:138. 1911; Sasaki, List Pl. Formos. 274. 1928, Cat. Gov. Formos. Herb. 321. 1930; Mak. & Nem, Fl. Jap. 684. 1931; Suzuki in Masamune, Short Fl. Formos. 127. 1936; Kanehira, Formos. Trees ed. 2. 391. *t. 349.* 1936; Nakai in Journ. Jap. Bot. 17 (11):618. 1941.

A shrub; the branches terete, the branchlets subtetragonous, sulcate, fulvofuscent, slender, divaricate; stipules caducous; leaves ovate-oblong or elliptic-oblong, 4–7.5 cm. long, 2.4 cm. wide, chartaceo-coriaceous, the apex obtusely acute or obtusely acuminate, the base acute or rounded, the margins serrulate, serratous obtuse, pallid above, more so below, the midrib and veins slightly elevated above, the midrib elevated and the veins conspicuous so below, the petioles 3–6 mm. long, furrowed above; cymes at the end of the young branchlets,

axillary, the peduncles glabrous, flattened, 1–1.3 cm. long, simple, the apex cymose, the cymes (excluding the peduncle) 1–5 cm. long, multiflorous, the bracts subtriangular, the pedicel 8 mm. long, glabrous; calyx cupulate, more or less concave, 2 mm. in diameter, the lobes, 4 mm. long, semi-rounded, 1.3 mm. wide, glabrous, the margins brownish, erosed-ciliolate or not reflexed; petals rounded, 3 mm. long, the base shortly unguiculate, the blade rounded in diameter, the margins erosed-ciliate, glabrous; stamens 4, inserted at the base of the disc, the filaments glabrous 0.5 mm. long, flattened, the base 0.25 mm. wide, gradually narrowed upwards, the anthers triangular-cordate, 0.5 mm. long, broad, the apex triangular-acute to apiculate, the base cordate, 2-lobed, the lobe-apex rounded, glabrous; disc broad, glabrous, ovary semi-superior, the apex free, conical, 1.5 mm. wide, 0.7 mm. long, dense setose, the seta 0.2 mm. long, obtuse, the style column-shaped, 1.3 mm. long, glabrous, the ovary 4-celled, the locule 2-ovuled; capsules cymosely arranged, (the cymes axillary, the peduncles slender, 2–3 cm. long), broadly globose, 5 mm. in diameter, 2–4-lobed, 2–3–4-locular, truncate at the apex, echinate on the surface, the spines sometimes to nearly 30, sometimes 5–6, recurved, 1–2 mm. long, the styles persistent; seeds quadrangular, rubescent, 5 mm. long, smooth; testa coriaceous.

Taiwan: Mt. Niitaka, *T. Kawakami & U. Mori 1130*, (Photo. of Type of E. trichocarpus); Mt. Arisan, *B. Hayata & S. Sasaki s. n.* Jan. 26, 1912; Kararu, *T. Soma 1124*, (Photo of Type of *E. kurarnensis*); Tikutokak, *E. Matuda 1220*; Mt. Arisan, *S. Sasaki s. n.* Jan 29, 1918; Mt. Bui, *E. Matuda* 1219; Mt. Taihei, *S. Suzuki s. n.* Ang. 7, 1928; Mt. Arisan, Tozan, *Y. Yamamoto & Mori s. n.* Nov 6, 1932; Mt Arisan, *Y. Kudo & S. Suzuki* 2995; Sankan, *T. Suzuki* 7061; Kwarenko, *T. Suzuki 16180*; Takao, *H. Simizu 3930*; Taito, *Y. Yamamoto 459*; Mt Niitaka-zenzan, *Moritani s. n.* Dec. 31, 1937; Taipei District, *T. Suzuki 18280*; Mt. Nankotai, *G. Masamune 2965*; Takao, *T. Suzuki* 20838; Taityn District, *T. Suzuki 21592*.

India: Tongloo, *Prain's Collector, 539*.

Distribution: Himalayas, Central China, Taiwan, and Liukiu.

This species is distinguished from all other species of the genus by its characteristic spiny capsules.

5. **Euonymus acuto-rhombifolia** Hay., Icon. Pl. Formos. 3:56, 1913, l. c. 9:9. *t. 6.* 1920; Sasaki, List Pl. Formos. 272. 1928, Cat. Gov. Herb. Formos. 319. 1930; Mak. & Nem, Fl. Jap. 680. 1931; Suzuki in Masamune, Short Fl. Formos. 126. 1936; Kanehira, Formos. Trees ed. 2. 386. *t.* 345. 1936.

Glyptopetalum acuto-rhombifoliuu (Hay.) Nakai in Journ. Jap. Bot. 17 (11):616. 1941.

A shrub, the branches and branchlets glabrous, 4-angled, glabrous; leaves

opposite, thinnly coriaceous, oblong-rhombic, 5–8 cm. long, 2.3 cm. wide, the apex acuminate, obtuse at the very tip, the base cuneate, the margins serrate above the middle, glabrous on both surfaces, the veins abundant, elevated on both surfaces; petiole 2 mm. long, nearly sessile; flowers terminal on the young shoot, solitary or few flowered; clusters, the bracts present towards the lower part of the peduncle, the bracts lanceolate, the peduncle 1 cm. long; sepals and petals each 4, 5 mm. long, 5 mm. wide, rounded, denticulate-ciliate; stamens 4, the anthers reniform, 4–5 mm. wide, 0.7 mm. long, subsessile, attached at the apex of the dentate disc, the filaments short or ssesile; disc concave, rectangular-shaped, dark, 4-dentate, the teeth remote, broad; ovary elevated or flat, 4-celled, each 2-ovuled, the style short; capsule 4-carpeled; sterile carpels rounded, broad, flattened, compressed, 4 –4.5 mm. long, 4 mm. wide; fertile carpels 1-seeded, round. 7 mm. long, 6 mm. wide, the apex rounded, slightly compressed: sepals persistent; seeds broadly oblong, slightly compressed, 7 mm. long, 6 mm. wide, the apex arillate, oblong, 5 mm. long, fleshy, obtuse; testa membranaceous, the albumen pulpy, abundant, the embryo central, the cotyledons foliose, cordate, 4 mm. long, the radicle 1.5mm. long.

Twiwan: Ochobi, *T. Kawakami & G. Nayahara 1120* (Photo. of Type); Kuwarusu, Ako, *E. Matuda s. n.* Jan. 1, 1917; Mt. Daibu, *E. Matuda s. n. 1217*; Taito-montibus, *Y. Yamamoto 803*; Kwarenkotyo, *T. Suzuki 19444*; Taitotyo, *T. Suzuki 19695*.

Distribution: Endemic.

The species is 4-carpelled, but only one carpel is fertile, thus the mature fruit is rounded and one-seeded, with the persistent sterile carpels situated on one side appearing as appendages of the fruit, this character enables the species to be readily distinguish from others.

Nakai transfers this species to *Glyptopetalum*. Based that he gives the characters of *Glytopetalum* as: "ovary confluent with the disc, annual-formed, and the stamens situated at the nargin of the disc" I have found that the present species does not agree with his statement opinion, especially in the ovary being 4-celled and each cell 2-ovuled; while in *Glyptopetalum* the ovary is 4-celled and each 1-ovuled; according the species is retained in *Euonymus*.

6. **Euonymus morrisonensis** Kanehira & Sasaki ex Kanehira, Formos. Trees ed. 2. 389. *t. 346*. 1936.

A small glabrous tree, about 5–6 m. high, 15–25 cm. in diam., the branchlets numerous, slender; leaves coriaceous, pale yellowish when dry, oblong-lanceolate, 4–6.5 cm. long, 0.8–2 cm. wide, acminate, the base obtuse, the margins minutely serrate, the lateral nerves about 5 on each side, obsolete on both surfaces, the

petioles 2 mm. long; flowers axillary, apparently solitary, rarely in 2–3–flowered cymes, the peduncle about 8–10 mm. long, subtended by a pair of deciduous bracts at the middle; calyx 4–cleft, imbricate, petals orbicular, about 1–2 mm. in diameter; stamens subsessile; ovary 3– or 4–celled; capsule, 8 mm. long, 3– or 4–angled, with persistent sepals.

Taiwan: Niitaka, Tataka, *S. Suzuki s. n.* Oct. 29, 1933; Mt. Arisan–Niitakasita, *S. Hidetaro 788.*
Distribution: Endemic in Mt. Arisan.

This species characterized by its oblong–lanceolate leaves, very minute and apparent solitary flowers, and 3– or 4–angled dehiscent capsuled.

The two specimens cited above are from the type locality. They agree with the original description in all respects except that their fruit is 4–celled instead of 3–celled.

7. **Euonymus pellucidifolius** Hay., Icon. Pl. Formos. 3:57. *t. 10.* 1913, l. c. 5:16. 1915, l. c. 9:15. 1920; Sasaki, List Pl. Formos. 273. 1928, Cat. Gov. Herb. Formos. 321. 1930; Mak. & Nem, Fl. Jap. 682. 1931; Suzuki in Masamune, Short Fl. Formos. 127. 1936; Kanehira, Formos. Trees ed. 2. 390. *t. 347.* 1936.

"*Euonymus Dielsianus*" *sensu* Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 30:58. 1911, *non* Loes.

Shrub, 3–4 m. high, erect; leaves glabrous, elliptic–oblong, or oblong–obovate, the apex cuspidate–acuminate, the base cuneate–attenuate, 6.5–15 cm. long, 2.5–5 cm. wide, chartaceous or coriceous, pellucid (wholly or partially transparent), shining above, pallid when dry, concolorous; the midrib distinctly elevated on both surfaces, primary lateral veins slightly distinctly elevated above, not distinct or scacely visible below, 4–6–nerved, on both sides, the margins remotely serrulate, entire on the lower part; petiole 7–10 mm., profundly furrowed above; cymes axillary, solitary or 3–4–fasciculate, the peduncle 1.5–5 cm. long, dichotomous, few–flowered, the bracts minute, deciduous, the pedicel 5–10 mm. long, articulate at the middle; flowers patent 7 mm. in diam.; sepals 4–5, persistent, semirounded, 2.5 mm. long, 2.5 mm. wide,; petals 5, unequal, widely rounded to 3 mm. long, 3.5 mm. wide, red–coloured, the margins minutely denticulate, the base contracted, 0.5–1 mm. wide; stamens 5, attached on the disc, the filaments short or sessile, the anthers reniform, 0.7 mm. wide, 0.5 mm. long, the locules divergent at the apex, the conective oblique or transverse, white when dry, stout, minutely red–punctate; disc more or less flattened, rouned, 2.5 mm. in diameter, slightly 5–lobed; ovary in the disc, subimmersed, widely conical, 5–celled, the cells 1–ovuled, erect, the style short; fruits obconical, 9 mm.

long, 8 mm. wide, truncate at center, the base triangular-cuneate, 2 mm. wide, at base smooth outside in dried specimen, pallid-yellow, 5-angular in transverse sections, winged to the angles, 1–2 mm. wide, uneven, the apex rounded, loculicidely dehiscent, 5-loculed, sometimes 4- or 2-loculed, the locule 1-seeded; seeds subovoid, 4.5 mm long, 3.5 mm. wide, the apex obtuse, the base rounded, shining black-reddish, the base arillate, testa not hard but of brittle texture; albumen abundant; embryo always solitary.

Taiwan: Suisya, Nanto, *C. Kanejira* et *S. Suzuki s. n.* March 11, 1918; Suito, Horigai, *Y. Saito s. n.* June 2, 1929; Rengeehi, *Y. Yamamoto s. n.* Oct. 11, 1929; Nichigetsulan, *Y. Kudo & S. Sasaki*, 15129; Mt. Suisyatai, *S. Sasaki s. n.* Dec. 15, 1931; Rengechi, *S. Hilana & S. Suzuki s. n.* July 17, 1936; Taipei Distric, *T. Suzuki 15952*; Sankyo, *G. Masamune* 4039.

Distribution: Endemic to the central part of Taiwan

This species is readily distinguished by the characteristic fruit which is obconical, the apex truncate, depressed at the center and 5-angular. It is closely allied to *E. Laxiforus* Champ. of Kwangtung and Hongkong, except that fruit of the latter is much large than the former.

5. Genitia

Genitia Nakai in Act. phytotax. Geob. Dedic. Vol. G. Koidz. 21. 1944.

Shrubs or trees, the branches straight; leaves opposite or verticillate, petiolate, simple-crenulate-serrulate, chartaceous; inflorescence cymose, axillary; calyx disk-like, the margins truncate, undulate, dorsally with numerous minute glands; petals 4, imbricate, deciduous, broad-carnose, both surfaces glandulose, the margins entire; disk hypogynous, continuous with the ovary, with 4 glands alternate with the petals and around the bases of the 4 stamens respectively, the filaments subulate, the anthers basifixed, articulate with the filament, with two locules, horizontal, interrupted by the thickened subspheric apex of the connective; ovary quadra-sided-conical, continuous to the stigma, 4-celled, 6 rarely 4–5-ovuled, in two distinct rows; fruit a capsule, rounded 4-angular, loculicidal; 1-seeded; seeds albuminous.

A genus of two species, one distributed in Japan, the other is found in Taiwan.

1. **Genitia carnosus** (Hemsley) Li et Hou *comb. nov.*

Euonymus carnosus Hemsley in Journ. Linn. Soc. Bot. 23:218. 1886; Henry, List Pl. Formos. 27. 1895; Mats. & Hay. in Journ. Coll. Sci., Imp. Univ. Tokyo 22:83. 1906 (Enum. Pl. Formos.); Hayata, Icon. Pl. Formos. 1:136. 1911; Mak. & Nem., Fl. Jap. ed. 2. 680. 1931; Sasaki, List Pl. Formos. 27. 1928; Suzuki in Masamune, Short Fl. Formos.

127. 1936; Nakai in Act. Phytotax. Geob. Dedic. Vol. G. Koidz. 29. 1944.

"*Euonymus Tanakae*" *sensu* Mats. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:83. 1906 (Enum Pl. Formos.); Hay., Icon. Pl. Formos. 1:137. 1911, 5:19. 1915; Sasaki, Cat. Gov. Herb. Formos. 321. 1930; Mak. & Nem., Fl. Jap. 684. 1931 (partim); Suzuki in Masamune, Short Fl. Formos. 127. 1936; *non* Maxim.

Euonymus batakensis Hay., Icon. Pl. Formos. 9:11. *t.* 7. 1920; Sasaki, List Fl. Formos. 273. 1923, Cat. Gov. Herb. Formos. 320. 1930; Mak. & Nem, Fl. Jap. 680. 1631; Suzuki in Masamune, Short. Fl. Formos. 127. 1936; Kanehira, Formos. Trees ed. 2. 391. 1936.

Genitia batakensis (Hay.) Nakai in Act. Phytotax. Geob. Dedic. Vol. G. Koidz. 23. 1944, *excl. syn.*

Shrub, the branches and branchlets straight, the branchlets terete; leaves chartaceous, obovate, oblong-obovate or elliptic, 3–8.8 cm. long, 1.8–3.8 cm. wide, the apex acute or acuminate, or sometimes obtuse, the base acute, the margins crenate-serrulate, glabrous on both surfaces, the midrib distinctly elevated on both surfaces, the veins slightly elevated or visible on both surfaces; petioles 5–10 mm. long, frequently more or less winged; cymes axillary, long-pedunculate, the peduncle 3.5–5 cm. long, branching, the pedicel 1 cm. long; calyx rounded-flat, 5 mm. in diameter, the margins denticulate, 4-lobed; petals 4, rounded-oblong, 6 mm. long, 5.5 mm. wide, the apex rounded, the base frequently more or less contracted, the margins entire or gnawed; stamens 4, inserted on the disc, the filaments short, 2 mm. long, smooth, the anthers subreniform, 1.5 mm. wide, 0.7 mm. long; disk depressed, smooth; ovary 4-angled-conical, 4-loculed, the locules each 6-ovuled, rarely 4 or 5, in 2 rows; styles short, 1.5 mm long; fruit a 4-angled capsule, supported by the disk, 12 mm. long, 10 mm. broad, 1-seeded; seeds arillate.

Taiwan: Shinzyo-Batagan, *B. Hayata 1122* (Photo of Type of *E. batakensis*); Koshoto, Churo, *Y. Kudo & K. Mori* 3358; Mt. Daiton, *Kuramasu s. n.* Aug. 25, 1933; Keelung, *T. Kawakami & S. Sasaki s. n.* April 4, 1911; Mt. Kwannon, Taipei, *T. Nakamura* 4364; Kwannon, Taipei, *T. Fukuyama & S. Miura 246.*

Distribution: Endemic.

Euonymus batakensis Hay. has been confused with *E. Tanakae* Maximovicz by several authors including Kanehira. Nakai, in Journ. Jap. Bot. 17:619. 1941. supposes that they are two distinct species. *E. batakensis* is found in eastern Taiwan while the latter is distributed in Liukui and Kuisiu. The former is

distinguished by its more slender branches, thinner and smaller leaves as well as smaller capsules.

These two species are combined by Nakai to represent a distinct genus *Genitia*. According to Nakai, this new genus differs from *Euonymus* in the truncate calyx, the broad disk with 4 large glands around the bases of stamens, and the 3–6 ovules in each cell arranged in a longitudinal series.

The two species seem to differ in both general appearance and certain floral characters from *Euonymus* that are marked enough to reckon the establishment of a distinct genus. However Nakai still retains a species *E. carnosus* Hemsley in *Enonymus*, which in the opinion of the present writer should be considered synonymous with *E. batakensis*.

Upon careful examination of the ovary and fruit, it is found that Nakai's statement about the ovules of the two species needs correction. The ovules in *E. batakensis* are usually 6 in each cell, but these are definitely arranged in two rows. In *E. Tanakae*, 6 or rarely 4–5 ovules are observed, and these are also found in two series. The large number and 2 series condition of the ovules are quite distinct in the Celastraceae. It is possible that Nakai's drawing is a side view, with the ovules pressing together and giving the appearance of being in one longitudinal series. In cross sections, the two series condition is clearly revealed.

Nakai unites *E. Miyaki* Hay. and *E. pallidifolia* Hay. with *E. carnosus* Hemsley and treats the latter two as synonyms of the former, basing mainly on their similarity in general appearance. An examination of the original descriptions as well as available specimens proves this as hardly justified. No type specimen of *E. carnosus* Hemsley is available, but the original description agrees fairly closely with *E. batakensis* Hay. This is especially evidenced by the crenulate leaves and the 4–5 ovules in each cell, which are distinct characters among the species of *Euonymus*. Hemsley also states that "the broadly-expanded fleshy calyx and disk bearing the fleshy persistent filaments give this species a peculiar appearance." This is exactly the case in *E. batakensis*. Hemsley's species is based on a specimen collected by Ford from Keelung, which is the same locality of "*E. Tanakae*" *sensu* Mats. & Hay.

E. Miyaki is known only from Koshoto and is characterized by its entire verticillate or ternate leaves and 5-celled ovary. *E. pallidifolia* is characterized by its broad-elliptic and entire leaves and 3-celled ovary. It is found only in Kosyun Peninsula, in southern Taiwan.

6. Tripterygium

Tripterygium Hook. f., Gen. Pl. 1:368. 1862.

A climbing shrub, glabrous, the branchlet angular; leaves alternate, petiolate exstipulate; cymes axillary or terminal; calyx 5-lobed; petal^s 5, staments 5; ovary situated in the disc, free, imcomplete 3-celled; style short; stigma 3-lobed; ovules 2 in each locule; fruits of 3 broad winged samara; seeds linear, exarillate.

A genus of about 3 species distributed in eastern Asia.

1. **Tripterygium Wilfordii** Hook. f., Gen. Pl. 1:368. 1862; Maxim. in Mél. Biol. 11: 206. 1881; Forbes & Hemsl. in Journ. Linn. Soc. 23:125. 1886; Henry, List Pl. Formos. 27. 1896; Lees. in Engl., Bot. Jahrb. 30:472. 1902; Matsum & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:85. 1906; Hay., Icon. Pl. Formos. 1:140. 1911; Matsuda in Bot. Mag. Tokyo 26:367. 1912; Sprag. & Takeda in Kew Bull. 222. 1912; Sasaki, Cat. Gov. Herb. Formos. 321. 1930; Mak. & Nem., Fl. Jap. ed. 2. 1931; Suzuki in Masamune, Short Fl. Formos. 128. 1936; Kanehira, Formos. Trees ed. 2. 397. *t. 355.* 1936; Chen, Illus. Man. Chin. Trees & Shrubs 672. 1937.

Tripterygium Bullockii Hance in Journ. Bot. 259. 1880.

Tripterygium Wilfordi Hook. f. var. *Bullochii* (Hance) Matuda in Bot. Mag. Tokyo 24:286. 1910.

Shrubs, climbing, the branches castanea-brown, ferrugineous tomentose, the branchlets ferrugineous-tomentose, 5-angular, minutely pustulate; leaves subcoriaceous, alternate, petiolate, exstipulate, ovate-oblong to broadly elliptic, the apex long and often caudate-acuminate, the margins crenate, 5- or 6-nerved on both sides, 7-9 cm. long, 5-6 cm. wide; petiole 7 mm. long,; flowers small, terminal or axillary, paniculate, to 7 cm. long, the peduncle 1-1.3 cm. long, the pedicel 5 mm. long, pubescent; calyx 5-lobed, each lobe tri-angular, the apex acute, pubescent; 1.5 mm. long, 1.25 mm. wide; petals 5, inserted at the base of the disc, oblong, the apex rounded, the margins serrated, 3 mm. long, 1.5 mm. wide, glabrous; stamens 5, inserted on the margin of the disc, the filaments subulate, the anthers widely oblong; disc wide cupule, the margins entire; ovary on the disc, imperfectly 3-celled, free, the stigma 6-lobed in nonmal flowers, while the style shorter in male flowers with unfertilized ovule, calvate-shaped, 3-lobed; ovules 2 in each locule, erect; fruits indehiscent, 14 mm. long, 13 mm. wide, 3-winged, the wings membraneous, the mrgins entire, the style terminal, persistant, the apex

subtruncate or broaded, emarginate, the base mostly truncate or shortly cordate, 1-loculed, 1-seeded; seeds erect, linear, 3-angular, exarillate, the seed coat sub-coriaceous; embryo small, the albumen fleshy, the cotyledons oblong.

Taiwan: Keelung, *S. Sasaki s. n.* May. 20, 1923; Mt. Goryosen, Sankyo, *G. Masamune* 4032; Taipei District, *Y. Abe s. n.* Aug. 24, 1941.

Distribution: Taiwan, Kiangsi, Chekiang and Japan.

The remarkable character of this species is the winged fruit, which is distinct from all the species of this family.

7. Perrottetia

Perrottetia H. B. & K., Nov. Gen. & Sp. 7:73. *t.* 622. 1825.

Theaphyllum Nutt. & Turcz. in Bull. Soc. Nat. Mosc. 36 (1):605.

A small deciduous tree; leaves alternate, petiolate, ovate, serrate; stipules diceduous; flowers in short cymes, axillary; monoecious; calyx 4-lobed, erect, remotely 3-angular; petals 4, 3-angular, valvate or the margins imbricate; stamens 4, inserted on the margin of the disc; filaments filiform; disc in male flowers flat, in female flowers annular; ovary ovoid, slightly confluent with the disc, 4-celled, each 1-ovuled, the style short or elongated, the apex 2-lobed, fruit a berry, but not fleshy, 4-lobed, 4-seeded.

A genus of about eleven species which distribute in Mexico, Columbia, Hawaii, Australia, Molukka, Java, and Sumatra. Only 2 species are found in China.

Perrottetia arisanensis Hay., Icon. Pl. Formos. 5:26.*t.* 4. 1915; Sasaki, List Pl. Formos. 274, 1928, Cat. Gov. Herb. Formos. 322. 1930; Mak. & Nem., Fl. Jap. 686, 1931; Suzuki in Masamune, Short Fl. Formos. 128. 1936; Kanehira, Formos. Trees ed. 2. 396. *t.* 354. 1936.

Trees or shrubs, the branchlets sub-erect; leaves alternate, highly pubescence on the lower surface, while in dry specimen pubescent on the veins or smooth, dark-brown-colored above, pallid below, elliptic-oblong, 5–16 cm. long, 2–6 cm. wide, the apex caudate-acuminate, the base obtuse or rounded, rarely acute, the margins acutely serrulate, the mid-rib more or less narrow, elevated above, slightly elevated above, more elevated below, the veinlets reticulate, the primary lateral veins on both sides of the midrib 6–12; petiole black-colored, 0.5–1 cm. long, pubescent or glabrous, profoundly furrowed above; stipules minute, caducous; flowers minute, monoecious, the panicles axillary, solitary or terminal, 2–4.5 cm. long, often broad, bracted; male flowers with pedicel 2–3 mm. long, articulate toward the middle or near the apex; calyx more or less flat, glabrous, the cupule 1.5 mm. in diameter, the sepals 4, linear, glabrous, subpatent, 1.5 mm.

long, 0.5–0.3 mm. wide, persistent; petals 1-nerved, linear, 1.5 mm. long, 0.5–0.3 mm. wide, entire, the apex acute, the base scarcely dilated; stamens 4, inserted with the petals, and alternate with them on the margin of the disc, the filaments 0.5–1 mm. long, glabrous, the anthers dorsifixed, rounded, emarginate at both ends, 0.7 mm. in diameter, versatile; disc complanate, at the entire face of the calyx cupule, slightly expanded; rudimentary ovary minute, semi-immersed in the disc; female flowers smaller than the male flowers; sepals and patals conforming in bud not or scarcely imbricate, in open flowers patent, dorsal more or less recurved, linear, 1 mm. long, the broader, 0.3 mm. wide, both blades glabrous; staminodes 4, opposite to the sepals, inserted at the margin of the disc, shorted oblong, 0.3 mm. long, 0.25 mm. wide, the apex obtuse; disc at the face of the cupule; ovary superior, globose, glabrous, 2-loculed, each locule 2-ovuled; fruits black colored in dried condition, slightly depressed globose, 4-lobed, 1.5 mm. long, 1.7 mm. wide, the apex truncate or more or less depressed, a berry, not succulent but juiceless, the apex with persistent style, coronate, the base supported by persistent sepals and petals; seeds in each fruit 4, globose, more or less complanate, 1.25 mm. long, the aril membraneous; seed-coat hard, minutely reticulate, rugose, black-colored; albumen abundant.

Taiwan: Baisi-ko, Kagi *T. Kawakami 1132* (Photo. of Type); Mt. Bui, *E. Matuda 1221*; Paiwane, *E. Matuda s. n.* June 1917; Mt. Tentana, *S. Sasaki s. n.* April 1918; Mt. Arisan, *Nakazawa s. n.* July 1919; Amawan-sya, Ako, *S. Sasaki s. n.* Narch 10, 1920; Mt. Taihei, *S. Suzuki s n* July 14, 1929; Sintiku District, *T. Suzuki 4552*; Mt. Syo-agyoku, Taipei District, *T. Suzuki 6478*; Musya-Santinozyo, *G. Masamune 2284, 2439*; Kwaren, *T. Nakamune 4503*.

Distribution: Endemic.

Doubtful and Excluded Species

No specimens of the following four species are preserved in our herbarium.

1. **Celastrus patentiflorus** Hay., Icon. Pl Formos. 9:15. *t. 10.* 1920; Suzuki in Masamune, Short Fl. Formos. 126. 1936.
2. **Euonymus chinensis** Lindl. Henry, List Pl. Formos. 27. 1895; Mats. & Hay. in Journ. Coll. Sci. Imp. Univ. Tokyo 22:83. 1906; Sasaki, List Pl. Formos. 273. 1928; Suzuki in Masamune, Short Fl. Formos. 127. 1936.
3. **Microtropis micrantha** Koidz. in Bot. Mag. Tokyo 40:335. 1926; Sasaki, List Pl. Formos. 274. 1928; Kanehira, Formos. Trees ed. 2. 396. 1936; Suzuki in Masamune, Short Fl. Formos. 128. 1936os.

Cassine micrantha Hay., Icon. Pl. Formos. 3:61. 1913. No specimen pre-

served in our herbarium. Basing on a photograph of the type, Drs. Merrill and Freeman judge that the species is closelv allied to *Microtropis submembranacea* Merr. & Freem.

4. **Euonymus Platycline** Ohwi in Act. Phytotax. Geob. 5:186. 1936. According to the original description and the locality of this species, I think it may be *Euonymus echinatus* Wall.

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