

## EUPHORBIACEAE\*

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 Baillon, H. E. 1858. Étude Générale du Groupe des Euphorbiacées. Victor Masson, Paris.  
 Müller Argoviensis, J. 1866. Euphorbiaceae. DC., Prodr. **15**(2): 189–1286.  
 Hayata, B. 1904. Revisio Euphorbiacearum et Buxacearum Japonicarum. J. Coll. Sci. Imp. Univ. Tokyo **20**(3): 1–92.  
 Pax, F. A. and K. Hoffmann. 1931. Euphorbiaceae. In: Engler, A., Pfl.-fam. ed. 2, **19c**: 11–233.  
 Hurusawa, I. 1954. Eine nochmalige Durchsicht des herkömmlichen Systems der Euphorbiaceen im weiteren Sinne. J. Fac. Sci. Univ. Tokyo sect. 3, Bot. **6**: 209–342.  
 Webster, G. L. 1994. Synopsis of the genera and suprageneric taxa of Euphorbiaceae. Ann. Missouri Bot. Gard. **81**: 33–144.

- A. Ovules 2 in each locule (Subfam. I. Phyllanthoideae)  
 B. Inflorescences racemose; ovary 3-loculed but 1 locule developed; fruits drupes (Tribe 1. Antidesmeae) ..... 1. *Antidesma*  
 B. Flowers axillary, fasciculate (in panicle in *Bischofia*); ovary 2–10-loculed  
 C. Fruits drupes, berries or indehiscent mericarps; sepals or calyx lobes of male flower imbricate or valvate in flower bud  
 D. Leaves trifoliolate (Tribe 2. Bischofieae) ..... 2. *Bischofia*  
 D. Leaves simple  
 E. Blade of leaves entire or minutely serrate, nearly symmetric at base (Tribe 3. Briedelieae) ..... 3. *Briedelia*  
 E. Blade of leaves distinctly serrate, oblique at base (Tribe 4. Drypeteae) ..... 4. *Drypetes*  
 C. Fruits dehiscent, 3–8 mericarps; sepals of male flower imbricate in flower bud (Tribe 5. Phyllantheae)  
 D. Flowers with disk; seeds without aril  
 E. Monoecious plants ..... 5. *Phyllanthus*  
 E. Dioecious plants  
 F. Flowers 4-merous; male flowers with annular disk, without ovary ..... 6. *Margaritaria*  
 F. Flowers 5-merous; male flowers with divided disk and reduced ovary ..... 7. *Flueggea*  
 D. Flowers without disk (disk completely adnate to calyx, if present)  
 E. Styles emarginate; anthers not apiculate ..... 8. *Breynia*  
 E. Styles entire; anthers apiculate ..... 9. *Glochidion*  
 A. Ovule 1 in each locule  
 B. Latex absent; dioecious or rarely monoecious, if monoecious, inflorescence unisexual (except a part of *Acalypha*) (Subfam. II. Acalyphoideae)  
 C. Petals present at least in staminate flowers (Tribe 6. Chrozophoreae) ..... 10. *Melanolepis*  
 C. Petals absent  
 D. Disk present in staminate flowers (Tribe 7. Bernardieae) ..... 11. *Discocleidion*  
 D. Disk absent in staminate flowers (Tribe 8. Acalypheae, except *Alchornea*)  
 E. Herbs  
 F. Bisexual on monoecious herbs with short ascending hairs; leaves alternate, herbaceous, hairy ..... 12. *Acalypha*  
 F. Dioecious herbs; leaves opposite, membranaceous, glabrous; inflorescences a few-flowered racemes, glabrous ..... 13. *Mercurialis*  
 E. Shrubs or trees  
 F. Anthers basifixed ..... 14. *Claoxylon*  
 F. Anthers dorsifixed  
 G. Leaves peltate; capsules 2-loculed ..... 15. *Macaranga*  
 G. Leaves not peltate; capsules usually 3-loculed  
 H. Capsules with soft spines; stamens many; hairs of young leaves stellate ..... 16. *Mallotus*  
 H. Capsules without soft spines; stamens 6–8; hairs of young leaves simple (Tribe 9. Alchorneae) ..... 17. *Alchornea*  
 B. Latex milky or colored, rarely absent; monoecious or rarely dioecious (in *Excoecaria*)  
 C. Petals present at least in staminate flowers (Subfam. III. Crotonoideae)  
 D. Inflorescences racemose; stamens many, free; filaments bent in flower bud; plants with dense scale-like hairs (Tribe 10. Crotonae) ..... 18. *Croton*  
 D. Inflorescences paniculate; stamens (8–)10(–20), usually 2(–4)-whorled; filaments erect in flower bud; plants without scale-like hairs (Tribe 11. Aleuritideae) ..... 19. *Aleurites*

\* H. Ohba. *Acalypha*, *Flueggea*, *Margaritaria*, *Mercurialis*, *Phyllanthus*, *Chamaesyce* and *Euphorbia* by T. Kurosawa.

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### C. Flowers apetalous (Subfam. IV. Euphorbioideae)

D. Trees or shrubs; inflorescences spicate; staminate flowers with 3 or 5 sepals, without petals; petiole with or without 2 glands in apical part (Tribe 12. Hippomaneae)

E. Inflorescences terminal; without milky sap ..... 20. *Sapium*

E. Inflorescences usually axillary; with milky sap ..... 21. *Excoecaria*

D. Herbs; inflorescences pseudanthial (Tribe 13. Euphorbiinae)

E. Leaves opposite, base oblique; stipules membranaceous or scale-like ..... 22. *Chamaesyce*

E. Leaves alternate, base not oblique; stipules absent or gland-like ..... 23. *Euphorbia*

## Subfam. I. Phyllanthoideae\*

### Tribe 1. Antidesmeae

#### 1. *Antidesma* L.

A. Leaves widely oblanceolate to narrowly oblanceolate, long acuminate at apex ..... 1. *A. japonicum*

A. Leaves ovate to widely elliptic to obovate, short acuminate at apex ..... 2. *A. pentandrum*

1. *Antidesma japonicum* Sieb. et Zucc. in Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. **4**(3): 212 (1846).

*Antidesma japonicum* Sieb. et Zucc. f. *angustissimum* Hurus. in Nakai, Iconogr. Pl. As. Orient. **4**(2): 346 (1941).

*Antidesma japonicum* Sieb. et Zucc. var. *liukiense* Hurus. in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. **6**: 326 (1954).

*Antidesma japonicum* Sieb. et Zucc. var. *uncinulatum* Hurus. in Nakai, Iconogr. Pl. As. Orient. **4**(2): 345, t. 64 (1941), in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. **6**: 326 (1954).

Japanese name: Yama-hihatsu.

Evergreen dioecious shrub, much branched. Branches slender and with many lenticels, pubescent when young. Leaves alternate, petiolate; petiole 4–6 mm long; blade widely oblanceolate to narrowly oblanceolate, 6–10 cm long, 2–4 cm wide, apex long acuminate, base cuneate, entire, glabrous on both surfaces (or sometimes pubescent on veins of lower surface), lower surface slightly grayish brown, midvein convex on lower surface. Stipules linear, caducous. Flowers June. Male inflorescences racemose, axillary or terminal, 1.5–3 cm long; rachis with short hairs. Bracts narrowly triangular, ca. 1 mm long, apex acuminate. Male flowers faced sideways. Pedicel pubescent, 1–2 mm long. Calyx deeply 4- (rarely 3- or 5-) lobed; lobes ca. 0.5 mm long, ascending or patent. Stamens 4, inserted on tetrangular disk; filament 1.2–1.5 mm long, almost erect at flowering; anther 0.5 mm long, yellow before dehiscence. Ovary reduced. Female inflorescences 3–6 cm long, racemose; flowers somewhat loosely arranged. Pedicel 1–2 mm long. Calyx ca. 0.5 mm long, 3- to 5-lobed; lobes 3- or 4-lobed at apex. Style short, reflexed. Drupes bently ellipsoid, 3–6 mm long, red when young and black in mature, with calyx at base and stigma at apex.

Japan: Honshu (Wakayama Pref.), Shikoku, Kyushu

and Ryukyu. In open forests or at edges of forests.

Distr.: Japan and Taiwan.

Icones: Hayata in J. Coll. Sci. Imp. Univ. Tokyo **20**(3): t. 2 I (1904); Terasaki, rev. ed.: f. 1559; Satake et al., Woody Pl. **1**: photo. 273 1–3; Makino, rev. ed.: f. 1439.

2. *Antidesma pentandrum* (Blanco) Merr.

var. *barbatum* (C. Presl) Merr. in Philipp. J. Sci. sect. C, Bot. **9**: 463 (1914).

*Antidesma kuroiwai* Makino in Bot. Mag. Tokyo **20**: 6 (1906).

*Antidesma pseudopentandrum* Hurus. in Nakai, Iconogr. Pl. As. Orient. **4**(2): 351, t. 65 (1941).

*Antidesma pentandrum* (Blanco) Merr. f. *kuroiwai* (Makino) Hurus. in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. **6**: 326 (1954).

*Antidesma pentandrum* (Blanco) Merr. var. *pseudopentandrum* (Hurus.) Hurus. in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. **6**: 326 (1954).

Japanese name: Kōtō-yamahihatsu, Kaigan-seishiboku.

Evergreen dioecious shrubs or small trees, much branched. Branches with brown or white short hairs. Leaves alternate, petiolate; petiole 5–10 mm long, pubescent; blade ovate to widely elliptic to obovate, 6–8 cm long, 2–4 cm wide, apex short acuminate, base widely cuneate or rounded, entire, glabrous on both surfaces, lower surface with sparse white short hairs on veins. Stipules linear caducous. Flowers March to June. Inflorescences panicle (male) or racemose (female), axillary or terminal, 3–5(–7.5) cm long; rachis with dense short hairs. Bracts narrowly triangular, 2–3 mm long, apex acuminate. Flowers ca. 1 mm in across. Male flowers pedicellate; pedicel 1–1.5 mm long, pubescent. Calyx 4-lobed; lobes widely ovate, ca. 0.5 mm long, membranaceous, patent or reflexed. Stamens 4, inserted on conical disk; filament ca. 2 mm long, erect at flowering. Ovary reduced. Female flowers pedicellate; pedicel ca. 1 mm long. Calyx lobes 3–5, ca. 0.5 mm long, apex almost erect at flowering. Ovary narrowly ovoidal, ca. 1 mm long; style short, 3 or 4-sected at apex, reflexed.

\* The classification at the subfamilial and tribal levels follows Webster (1994).

Drupes globose, ca. 5 mm in across, with calyx at apex and stigma at apex, red when young, black in mature.

Japan: Ryukyu (Yoron, Okinawa-jima, Miyakojima,

Ishigakijima, Iriomote-jima and Yonagunijima).

Distr.: Japan, Taiwan and the Philippines.

Icones: Satake et al., Woody Pl. 1: photo. 273 4 & 5.

## Tribe 2. Bischofieae

### 2. Bischofia Blume

1. **Bischofia javanica** Blume, Bijdr. Fl. Ned. Ind.: 1168 (1826).

Japanese name: Akagi.

Subevergreen dioecious, glabrous trees, to 25 m high. Leaves alternate, trifoliolate, petiolate, stipulate. Leaflets ovate to ovate-elliptic, 8–15 cm long, apex acuminate, base acute, crenate-serrate. Inflorescences on the axil of upper leaves, paniculate or racemose, many-flowered, shorter than subtending leaf. Male inflorescences wide, much branched. Female inflorescences sparsely branched. Flowers February to March, small, greenish, with 5 sepals, without petals and disk. Stamens 5. Ovary of male flower

short. Female flowers with caducous sepals, often with staminodes. Ovary 3- or 4-loculed; style slender. Ovules 2 in each locule. Drupes succulent, ovoid-globose or bently globose, 1–1.5 cm long, with stigma at apex, brown in mature, with 3 or 4 seeds.

Japan: Ryukyu (Okinawa Islands and Senkaku Islands). Usually cultivated. Naturalized in Ogasawara Islands.

Distr.: Japan, China, tropical Asia, Australia and Polynesia.

Icones: Terasaki, rev. ed.: f. 1571; Satake et al., Woody Pl. 1: photo. 273 1 & 2; Makino, rev. ed.: f. 1440.

## Tribe 3. Briedelieae

### 3. Briedelia Willd.

1. **Briedelia insulana** Hance in J. Bot. 15: 337 (1877). *Briedelia balansae* Tutcher in J. Linn. Soc., Bot. 37: 66 (1905).

*Briedelia ovata* auct. non Decne.: Makino & Nemoto, Fl. Jap. ed. 2: 646 (1931); E. Walker, Import. Tr. Ryukyu: 160, f. 89 (1954); Masam., Enum. Trach. Ryukyu 5: 154 (1955).

*Briedelia glauca* Blume f. *balansae* (Tutcher) Hatus. in Mem. Fac. Agric. Kagoshima Univ. 5(3): 36 (1966).

Japanese name: Maruyama-kankonoki.

Evergreen small trees, to 5–7 m tall, often with sparse spiny projections on trunk. Leaves alternate, petiolate; petiole 3–5 mm long; blade thin coriaceous, oblong-lanceolate, 6–10 cm long, 2.5–4 cm wide, apex acuminate, base acute, entire, glabrous on both surfaces, somewhat whitish on lower surface. Flowers monoecious. Male inflorescences and female inflorescences fasciculate in

axil. Male flowers sessile, 5–6 mm in across. Calyx lobes triangular-ovate, apex acute, pubescent on both surfaces. Petals ovate, smaller than calyx lobe, ca. 1.5 mm long. Disk distinct, annular, surrounding stamens. Stamens 5, lower parts of filaments connate, surrounding reduced ovary, upper parts ascending or patent. Female flowers with very short pedicel, calyx lobes, petals and disk similar to those of male flowers. Ovary ovate, ca. 1.5 mm long, styles 2, bilobed at apex. Drupes consist from 1 or 2 mericarps, ovoidal or narrowly ovoidal, ca. 1 cm long, black or blackish purple in mature, with 1 seed.

Japan: Ryukyu (Miyakojima, Ishigakijima, Iriomote-jima, Yonagunijima and Haterumajima). In small tree forests at top of mountains or along streams.

Distr.: Japan, Taiwan, S. China, Indochina and Malaysia.

Icones: Satake et al., Woody Pl. 1: photo. 274 3 & 4.

## Tribe 4. Drypeteae

### 4. Drypetes Vahl

A. Leaves ovate-elliptic to oblong, apex acute, shallowly sparsely serrate ..... 1. *D. matsumurae*  
A. Leaves elliptic, apex rounded or rarely obtuse, entire ..... 2. *D. integerrima*

1. **Drypetes matsumurae** (Koidz.) Kaneh., Formos. Trees rev. ed.: 337 (1936).

*Putranjiva matsumurae* Koidz. in Bot. Mag. Tokyo

33: 116 (1919).

*Liodendron matsumurae* (Koidz.) H. Keng in J. Wash. Acad. Sci. 41: 202 (1951).

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*Drypetes liukuensis* Hurus. in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. **6**: 337 (1954).

*Putranjiva roxburghii* auct. non Wall.: Matsum. in Bot. Mag. Tokyo **12**: 61 (1898).

*Drypetes karapinensis* auct. non (Hayata) Pax et K. Hoffm.: Hatus., Fl. Ryukyus: 375 (1971).

Japanese name: Tsuge-modoki.

Evergreen, dioecious small trees, to 10–15 m tall. Leaves alternate, petiolate; petiole 5–10 mm long; blade coriaceous, ovate-elliptic to ovate-oblong, 6–9 cm long, 2–4 cm wide, apex acuminate to acute, base acute to obtuse, slightly oblique, sparsely shallowly serrate, glabrous on both surfaces, with ca. 8 pairs of lateral veins. Male inflorescences axillary, sessile, spike-like, ca. 1 cm long, densely flowered. Male flowers with 4 or 5 sepals; sepals ovate. Stamens 3. Female flowers solitary or a few-fasciculated on axil, pedicellate. Sepals 3 or 4, ovate, ca. 1.5 mm long. Ovary narrowly ovoid to ovoid-oblong, ca. 3 mm long, with silky hairs. Style short, reflexed. Pedicel ca. 1 cm long in fruit. Drupes narrowly ovoid to ovoid-ellipsoid, 1–2 cm long, apex obtuse, base obtuse, with style at apex, white in mature, with brownish white hairs.

Japan: Yakushima and Ryukyu (Tokara Islands, Okinawa-jima, Iheyajima, Miyakojima, Iriomote-jima, Yonagunijima). In forests near seashore. Endemic.

Icones: Hayata in J. Coll. Sci. Imp. Univ. Tokyo **20**(3): t. 2 H (1904); Satake et al., Woody Pl. **1**: photo. 275 3; Makino, rev. ed.: f. 1443.

2. *Drypetes integerrima* (Koidz.) Hosok. [in Bot. & Zool. **6**: 720 (1938), nom. nud.] ex Hurus. in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. **6**: 337 (1954)

*Putranjiva integerrima* Koidz. in Bot. Mag. Tokyo **33**: 117 (1919).

*Liodendron integerrima* (Koidz.) H. Keng in J. Wash. Acad. Sci. **41**: 202 (1951).

Japanese name: Ha-tsubaki.

Evergreen, dioecious small trees, to 3–5 m tall. Bark grayish brown. Branches with brown hairs when young. Leaves alternate, petiolate; petiole 0.8–1.2 cm long, pubescent; blade coriaceous, elliptic to ovate-elliptic, 4–7 cm long, 1.5–2.5 cm wide, apex rounded to obtuse, base cuneate to rounded, oblique, entire, glabrous on both surfaces except on midvein of lower surface, with 8–10 pairs of lateral veins. Flowers June to July. Flowers axillary at apical part. Sepals 4, widely ovate (male) or widely linear (female). Stamens 8 (male). Ovary ovoid to ovoid-oblong, 3–4 mm long, with strigose hairs. Style 3-lobed. Pedicel short in fruit. Drupes ovoid to ellipsoid, ca. 2 cm long, apex rounded, base rounded, yellow in mature, with yellowish brown hairs.

Japan: Ogasawara Islands (Chichijima group and Hahajima group). Endemic.

Icones: Toyoda, Fl. Bonin: t. & photo. 19 (1981); Satake et al., Woody Pl. **1**: photo. 275 4; Makino, rev. ed.: f. 1142.

## Tribe 5. Phyllanthae

### 5. Phyllanthus L.

Webster, G. L. 1956–1958. A monographic study of the West Indian species of *Phyllanthus*. J. Arnold Arbor. **37**: 91–122, 217–268, 340–359, **38**: 51–80, 170–198, 295–373, **39**: 49–100, 111–212.

Murata, G. 1958. Taxonomical notes. 5. Acta Phytotax. Geobot. **17**: 172–175.

Rossignol, L., M. Rossignol and R. Haicour. 1987. A systematic revision of *Phyllanthus* subsection Urinaria (Euphorbiaceae). Amer. J. Bot. **74**: 1853–1862.

Chen, S. H. and M. J. Wu. 1997. A revision of the herbaceous *Phyllanthus* L. (Euphorbiaceae) in Taiwan. Taiwaniana **42**: 239–261.

A. Branching phyllanthoid (i. e. branchlets subtended by cataphylls on main axes)

B. Shrubs, subshrubs, or herb; fruits baccate or capsular, pedicels 4–14 mm long; seeds smooth or tuberculate, not rugose

C. Shrubs or herbs; calyx lobes entire; fruits baccate or capsular (Subgen. I. Kirganelia)

D. Shrubs, 1.3–4 m high. Fruits baccate

E. Stipules 2–3.5 mm long; ovary 3-carpeled; styles entire, 1–1.5 mm long; pedicels of bacca 7–14 mm long

..... 1. *P. flexuosus*

E. Stipules 1.3–2 mm long; ovary 5 to 10-carpeled; styles bifid, ca. 0.3 mm long; pedicels of bacca 4–5 mm long

..... 2. *P. reticulatus*

D. Herbs, lower than 1 m high. Fruits capsular ..... 3. *P. tenellus*

C. Subshrubs, lower than 1 m high; calyx lobes irregularly toothed; fruits capsular (Subgen. II. Eriococcus)

..... 4. *P. liukuensis*

B. Herb; fruits capsular, pedicels 0–4 mm long; seeds rugose (Subgen. III. Phyllanthus)

C. Capsules tuberculate; seeds transversely rugose ..... 5. *P. hookeri*

C. Capsules smooth; seeds longitudinally rugose

D. Calyx lobes 5, acute at apex ..... 6. *P. amarus*

D. Calyx lobes 6, obtuse or rounded at apex ..... 7. *P. debilis*

A. Branching not phyllanthoid (i. e. branchlets subtended by normal leaves on main axes) (Subgen. IV. Isocladus)

- B. Stamens 2; calyx lobes of male flowers 4 or 5; pedicels of capsule 1–3.5 mm ..... 8. *P. ussuriensis*  
 B. Stamens 3; calyx lobes of male flowers 6; pedicels of capsule 4.5–6 mm ..... 9. *P. virgatus*

Subgen. I. **Kirganelia** (A. Juss.) G. L. Webster in J. Arnold Arbor. **37**: 344 (1956).

1. **Phyllanthus flexuosus** (Sieb. et Zucc.) Müll. Arg. in DC., Prodr. **15**(2): 324 (1866).

*Cicca flexuosa* Sieb. et Zucc. in Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. **4**(2): 143 (1845).

*Hemicicca japonica* Baill., Étude Euphorb.: 646 (1858).

*Phyllanthus japonicus* (Baill.) Müll. Arg. in Linnaea **32**: 52 (1863).

*Glochidion flexuosum* (Sieb. et Zucc.) Müll. Arg. ex Miq., Ann. Mus. Bot. Lugd.-Bat. **3**: 128 (1867).

*Hemicicca flexuosa* (Sieb. et Zucc.) Hurus. in Bot. Mag. Tokyo **60**: 71 (1947).

Japanese name: Koban-no-ki.

Monoecious shrubs, 1.3–4 m high. Branching phyllanthoid (i. e. deciduous branchlets subtended by cataphylls on main axes). Deciduous branchlets 8–21 cm long, glabrous. Leaves deciduous, alternate, 8–19 per branchlets, glabrous; blades elliptic or ovate, 2.6–6 cm long, 1.4–3.1 cm wide, apex obtuse or acute, base obtuse or cuneate, entire, upper surface green, lower surface whitish, midrib raised beneath; petioles 1.5–3 mm long; stipules persistent or deciduous, free, narrowly oblong, lanceolate, ovate or circular, 2–3.5 mm long, 0.4–2 mm wide, lacerate or entire, yellowish brown. Cymules axillary. Flowers April to July. Male flowers 0–6 per cymule; calyx lobes 4, equal, circular or oblate, 1–2 mm long, 1–1.8 mm wide, entire, dark reddish; stamens 2 (rarely 3); filaments free, 0.7–1 mm long; anthers dehiscent vertically; pedicels 2.5–5 mm long. Female flowers 0–1 per cymule; calyx lobes deciduous, 4–5, unequal, elliptic or ovate, 1–2.5 mm long, 0.8–1.5 mm wide, entire, pale green; ovary 3-carpeled, ovoid, ca. 1.2 mm long, ca. 0.8 mm across; styles entire, free, 1–1.5 mm long, reflexed; pedicels 3–4 mm long, gradually thickened distally. Fruits baccate, sphaeroidal, 5–6 mm across, black; pedicels 7–14 mm long, gradually thickened distally.

Japan: Honshu (westward from Gifu Pref.), Shikoku and Kyushu. Forest and forest margin on hills and mountains. Endemic?

Icones: Kitamura & Murata, Woody Pl. **1**: t. 66 415 and f. 210; Terasaki, rev. ed.: f. 1569; Inami, Ill. Pl. Hiroshima **4**: t. 49; Satake et al., Woody Pl. **1**: photo. 276 1–4; Makino, rev. ed.: f. 1449.

Note: *Phyllanthus flexuosus* has also been reported from China. But Chinese plants differ from Japanese one in some taxonomically significant characters, such as numbers of stamens, numbers of calyx lobes and styles shape according to the descriptions in the textbooks of Chinese flora.

2. **Phyllanthus reticulatus** Poir. in Lam., Encycl. **5**: 298 (1804).

*Phyllanthus multiflorus* Willd., Sp. Pl. **4**(1): 581 (1805).

*Kirganelia reticulata* (Poir.) Baill., Étude Euphorb.:

613 (1858).

*Kirganelia sinensis* Baill., Étude Euphorb.: 614 (1858).

*Kirganelia multiflora* (Willd.) Baill., Étude Euphorb.: 614 (1858).

*Cicca microcarpa* Benth., Fl. Hongk.: 312 (1861).

*Phyllanthus sinensis* (Baill.) Müll. Arg. in Linnaea **32**: 51 (1863).

*Phyllanthus microcarpus* (Benth.) Müll. Arg. in Linnaea **32**: 51 (1863).

*Cicca reticulata* (Poir.) Kurz, Forest Fl. Burma **2**: 354 (1877).

Japanese name: Shima-koban-no-ki, Taiwan-koban-no-ki.

Monoecious shrubs, 2–4 m high. Branching phyllanthoid. Deciduous branchlets 5–15 cm long, glabrous. Leaves deciduous, alternate, 13–19 per branchlets, glabrous; blades elliptic, 2.2–3.3 cm long, 1.1–1.4 cm wide, apex acute, base cuneate, entire, upper surface green, lower surface whitish, midrib raised on both surfaces; petioles ca. 2 mm long; stipules persistent, free, lanceolate, 1.3–2 mm long, ca. 0.3 mm wide, entire, brown. Cymules axillary. Flowers July to August. Male flowers 1–3 per cymule; calyx lobes 5 or 6, unequal, elliptic, 1.3–1.5 mm long, ca. 0.8 mm wide, entire; stamens 5; pedicels 4–4.5 mm long. Female flowers 0–1 per cymule, pedicellate; calyx lobes persistent, 5, unequal, elliptic to oblate, 1–1.5 mm long, 0.7–1.8 mm wide, entire; ovary 5 to 10-carpeled, ovoid, ca. 1 mm long, ca. 1.3 mm across; styles bifid, ca. 0.3 mm long. Fruits baccate, sphaeroidal, ca. 4 mm across, 2–3 mm long, black; pedicels 4–5 mm long, gradually thickened distally.

Japan: Ryukyu (Sakishima Islands). Cultivated only?

Distr.: Widespread in tropical regions of the Old World (W. Africa to India, Ceylon, China, Taiwan, Indonesia, the Philippines and Queensland). Introduced into the West Indies.

Icones: Terasaki, rev. ed.: f. 1570; Satake et al., Woody Pl. **1**: photo. 276 5; Makino, rev. ed.: f. 1448.

3. **Phyllanthus tenellus** Roxb., Fl. Ind. ed. 1832, **3**: 668 (1832); G. L. Webster in J. Arnold Arbor. **38**: 52 (1957).

Japan: Naturalized in Honshu (southern Kanto Dist.) and Ryukyu.

Distr.: A native of Mascarene Islands.

Note: *Phyllanthus tenellus* has spread rapidly in Japan in the last 10 years. It is usually misidentified as *Phyllanthus amarus*, although they are easily distinguishable by the number of stamens and the pedicel length of capsule.

Subgen. II. **Eriococcus** (Hassk.) Croizat et F. P. Metcalf in J. Arnold Arbor. **23**: 32 (1942).

4. **Phyllanthus liukiensis** Matsum. ex Hayata in J. Coll. Sci. Imp. Univ. Tokyo **20**(3): 11 (1904).

*Phyllanthus leptocladus* auct. non Benth.: Hatus., Fl. Ryukyus: 370 (1971).

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Japanese name: Hana-ko-mikan-boku.

Monoecious subshrubs, 20–40 cm high. Branching phyllanthoid (i. e. deciduous branchlets subtended by cataphylls on main axes). Deciduous branchlets 3–10 cm long, glabrous. Leaves deciduous, alternate, 20–42 per branchlets, glabrous; blades elliptic or oblong, 7–11 mm long, 3–6 mm wide, apex obtuse or rounded, base rounded or truncate, entire, upper surface green, lower surface whitish, midrib slightly raised beneath; petioles 0.3–0.5 mm long; stipules persistent, free, lanceolate or ovate, 0.6–1 mm long, 0.3–0.7 mm wide, apex acuminate, entire, brown. Cymules axillary. Flowers May to October. Male flowers 0–3 per cymule; calyx lobes 4 or 5, unequal, ovate or widely ovate, 0.6–1 mm long, 0.6–1 mm wide, irregularly toothed, reddish; stamens 2; filaments connate into a short column; pedicels 3–5 mm long. Female flowers 0–1 per cymule; calyx lobes persistent, 6, unequal, ovate or widely ovate, 1.3–2 mm long, 0.6–1.2 mm wide, apex irregularly toothed, reddish brown; ovary 3-carpeled, ovoid; styles bifid at base, ca. 0.5 mm long. Fruits capsular, sphaeroidal, ca. 3 mm across, ca. 2.4 mm long; columella persistent after dehiscence, ca. 1.2 mm long; pedicels 5–8 mm long, gradually thickened distally. Seeds trigonous, ca. 2 mm long, ca. 1.3 mm radially and tangentially, smooth, yellowish brown.

Japan: Ryukyu (Okinawa-jima). Among calcareous rocks at or near seashore. Endemic.

Icones: Satake et al., Woody Pl. **1**: photo. 277 1 & 2.

Note: *Phyllanthus liukiensis* has been treated as a synonym of a Chinese species, *P. leptoclados*, although the latter has longer peduncles (ca. 1 cm in male flower, 1.5 cm in female flower) and minutely verrucose seeds.

### Subgen. III. *Phyllanthus*

5. *Phyllanthus hookeri* Müll. Arg. in Linnaea **32**: 19 (1863); Rossignol et al. in Amer. J. Bot. **74**: 1862 (1987).

*Phyllanthus lepidocarpus* Sieb. et Zucc. in Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. **4**(2): 143 (1845).

*Phyllanthus urinaria* auct. non L.: Hayata in J. Coll. Sci. Imp. Univ. Tokyo **20**(3): 8 (1904); G. L. Webster in J. Arnold Arbor. **38**: 194 (1957).

Japanese name: Ko-mikan-sō.

Annual monoecious herbs. Branching phyllanthoid (i. e. deciduous branchlets subtended by cataphylls on main axes). Stem branched at upper part, glabrous or hispidulous, 8.5–63 cm long. Leaves alternate; blades elliptic, 0.7–1.8 cm long, 0.3–0.7 cm wide, obtuse at apex, obtuse at base, entire, glabrous, green above, whitish beneath. Flowers August to October in Honshu, throughout the year in Ryukyu. Cymules axillary. Male flowers 0–3 per cymule; calyx lobes 6, oblong-obovate, ca. 0.3 mm long, obtuse at apex; stamens 3; filaments connate into a column; anthers dehiscing horizontally. Female flowers 0–1 per cymule, sessile; calyx lobes 6, narrowly elliptic, 0.3–0.6 mm long, 0.2–0.3 mm wide, obtuse or rounded at apex, glabrous, entire; ovary 3-carpeled, glabrous, verrucose; styles bifid. Capsules sessile, depressed-globose, ca. 2.0 mm across, verrucose; columella persistent after dehiscence. Seeds

sharply trigonous, with transverse ridges.

Japan: Honshu, Izu Islands, Ogasawara Islands, Shikoku, Kyushu & Ryukyu.

Distr.: S. & SE. Asia.

Icones: Kitamura & Murata, Herb. Pl. **2**: t. 18 148 and f. 43 3; Terasaki, rev. ed.: f. 1566; Satake et al., Herb. Pl. **2**: photo. 215 3; Makino, rev. ed.: f. 1444 & 1447, as *P. niruri* subsp. *amarus*.

6. *Phyllanthus amarus* Schum. et Thonn. in Kongel. Danske Vidensk. Selsk. Naturvidensk. Math. Afh. **4**: 195 (1829).

*Phyllanthus niruri* L. var. *amarus* Leandri, Fl. Madagascar **111**: 73 (1958).

*Phyllanthus niruri* auct. non L.: Hayata in J. Coll. Sci. Imp. Univ. Tokyo **20**(3): 7 (1904).

Japanese name: Kidachi-mikan-sō, Kidachi-ko-mikan-sō.

Japan: Naturalized in Ryukyu (Senkaku Islands, Sakishima Islands and Daitojima Islands).

Distr.: A native of tropical America.

Note: *Phyllanthus amarus* often has been reported from C. Honshu to Kyushu, but no specimens have been seen. *Phyllanthus amarus* often has been confused with *P. urinaria* or *P. ussuriensis* because of resemblance in general appearance, but is easily distinguishable from them by its smooth capsule, 5 calyx lobes and longitudinally rugose seeds without minute tubercles.

7. *Phyllanthus debilis* Klein ex Willd., Sp. Pl. **4**(1): 582–583 (1805); G. L. Webster in J. Arnold Arbor. **38**: 307 (1957).

*Phyllanthus niruri* L. var. *javanicus* Müll. Arg. in Linnaea **32**: 43 (1863).

*Phyllanthus niruri* L. var. *debilis* Müll. Arg. in Linnaea **32**: 43 (1863).

*Phyllanthus boninsimae* Nakai in Bot. Mag. Tokyo **26**: 96 (1912).

Japanese name: Ogasawara-ko-mikan-sō, Ogasawara-mikan-sō.

Japan: Naturalized in Ogasawara Islands and Ryukyu.

Distr.: A native of Ceylon and S. India.

Icones: Terasaki, rev. ed.: f. 1568; Makino, rev. ed.: f. 1446.

Subgen. IV. *Isocladus* G. L. Webster in J. Arnold Arbor. **37**: 345 (1956).

8. *Phyllanthus ussuriensis* Rupr. et Maxim. in Bull. Cl. Phys.-Math. Acad. Imp. Sci. St.-Pétersbourg **15**: 222 (1856).

*Phyllanthus simplex* Retz. var. *chinensis* Müll. Arg. in Linnaea **32**: 33 (1863).

*Phyllanthus simplex* Retz. var. *ussuriensis* (Rupr.) Müll. Arg. in Linnaea **32**: 33 (1863).

*Phyllanthus matsumurae* Hayata in J. Coll. Sci. Imp. Univ. Tokyo **20**(3): 11 (1904).

*Phyllanthus virgatus* G. Forst. var. *chinensis* (Müll. Arg.) G. L. Webster in E. Walker, J. Jap. Bot. **46**: 68 (1971).

Japanese name: Hime-mikan-sō.

Annual monoecious herbs. Branching not phyllanthoid (i. e. branchlets subtended by normal leaves on main axes). Stem usually branched at lower part, glabrous, 5–57 cm long, winged. Leaves alternate, many; blades elliptic or narrowly elliptic, 0.8–2.6 cm long, 0.3–0.7 cm wide, apex obtuse or acute, base obtuse or rounded, entire, glabrous, upper surface green, lower surface whitish, midrib raised on both surfaces; petioles 0.3–0.6 mm long; stipules triangular to deltate, 1–1.5 mm long, 0.6–1 mm wide, apex acuminate or cuspidate, base cordate, brown. Cymules axillary. Flowers July to October. Male flowers 1–3 per cymule; calyx lobes 4 or 5, elliptic, ca. 0.3 mm long, apex rounded, obscurely toothed, glabrous; stamens 2; filaments connate into a column; pedicels 0.4–1.8 mm long; anthers dehiscing horizontally. Female flowers 1 per cymule, pedicellate; calyx lobes 6, unequal, lanceolate, elliptic or ovate, 0.3–0.5 mm long, apex rounded, glabrous, entire, reflexed in fruit; ovary 3-carpeled, glabrous, obscurely verrucose; styles free, 0.2–0.4 mm long, deeply bifid. Capsules depressed-globose, ca. 2.5 mm across, ca. 1.5 mm long, obscurely verrucose or nearly smooth, pale yellowish green; pedicels 1–3.5 mm long, angled; columella persistent after dehiscence, ca. 0.9 mm long. Seeds sharply trigonous, 1–1.4 mm long, 0.8–1.2 mm radially and tangentially, minutely transversely striate or nearly smooth, with dark minute tubercles scattered irregularly but somewhat longitudinally, brown or dark brown.

Japan: Honshu, Shikoku and Kyushu. Crop field and roadsides.

Distr.: Mongolia, Ussuri, China, Taiwan, Korea and Japan.

Icones: Kitamura & Murata, Herb. Pl. 2: t. 18 147 and f. 43 2; Terasaki, rev. ed.: f. 1567; Satake et al., Herb. Pl. 2: photo. 214 5; Makino, rev. ed.: f. 1445.

9. *Phyllanthus virgatus* G. Forst., Fl. Ins. Austr. Prodr.: 65 (1786).

*Phyllanthus simplex* Retz., Observ. Bot. 5: 29 (1788).

*Phyllanthus virgatus* G. Forst. var. *chinensis* auct. non (Müll. Arg.) G. L. Webster: Hatus., Fl. Ryukyus ed. 2: 884 (1975).

Japanese name: Shima-hime-mikan-sō, Shima-komikan-sō.

Annual monoecious herbs. Branching not phyllanthoid. Stem usually branched at lower and middle part, glabrous, winged, 25–50 cm long, somewhat ligneous at lower part. Leaves alternate, many; blades elliptic or narrowly elliptic, 1.8–2.3 cm long, 0.4–0.7 mm wide, apex obtuse or acute, base obtuse or rounded, entire, glabrous, upper surface green, lower surface whitish, midrib raised; petioles 0.3–0.7 mm long; stipules deltate, ca. 1 mm long, ca. 0.8 mm wide, apex acuminate or cuspidate, base cordate, brown. Cymules axillary. Flowers July to August. Male flowers 1–3 per cymule; calyx lobes 6, circular, 0.6 mm long, apex rounded, entire, glabrous; stamens 3; pedicels 0.3–0.5 mm long; anthers dehiscing horizontally. Female flowers 1–2 per cymule; calyx lobes 6, persistent, unequal, elliptic, apex rounded, 0.3–0.6 mm long, glabrous, entire, reflexed in fruit; ovary 3-carpeled, glabrous, obscurely verrucose; styles free, ca. 0.3 mm long, deeply bifid; pedicels 1.5–2 mm long, angled. Capsules depressed-globose, ca. 3 mm across, ca. 1.4 mm long, obscurely verrucose; columella persistent after dehiscence, ca. 1 mm long, pale yellowish green; pedicels 4.5–6 mm. Seeds sharply trigonous, ca. 1.6 mm long, ca. 1.2 mm radially and tangentially, reticulate, with dark minute tubercles scattered irregularly, brown or dark brown.

Japan: Ryukyu (Sakishima Islands and Daitojima Islands). Cultivated fields.

Distr.: Tropical and subtropical region of Asia and Pacific Islands.

## 6. *Margaritaria* L. f.

Webster, G. L. 1979. A revision of *Margaritaria* (Euphorbiaceae). J. Arnold Arbor. 60: 403–444.

1. *Margaritaria indica* (Dalzell) Airy Shaw in Kew Bull. 20: 387 (1966).

*Prosoros indicus* Dalzell in Hooker, J. Bot. 4: 345 (1852).

*Phyllanthus indicus* (Dalzell) Müll. Arg. in Linnaea 32: 52 (1863).

Japanese name: Akahada-koban-no-ki.

Dioecious trees, 10–15 m high. Leaves deciduous, alternate, glabrous; blades elliptic, 6–13 cm long, 3.3–6 cm wide, apex obtuse or acute, base cuneate, decurrent to petiole, entire, midrib prominently raised beneath; petioles ca. 7–10 mm long; stipules deciduous, free, lanceolate, 3.8–5 mm long, 1–1.2 mm wide, apex acuminate, entire. Cymules axillary. Male flowers few per cymule; pedicels

4–6 mm long; calyx lobes 4, ca. 1 mm long; stamens 4; filaments free, ca. 1 mm long. Female flowers 1–3 per cymule; pedicels 1.2–1.4 cm long; calyx lobes persistent, 4, elliptic or semicircular, 1–1.5 mm long, 0.8–1.5 mm wide, undulate, glabrous; ovary 3- or 4-carpeled, ovoid, ca. 1 mm long, ca. 1.5 mm across, glabrous; styles 3, basally connate, ca. 2 mm long, deeply bifid, curved. Fruits baccate, sphaeroidal, ca. 8 mm across.

Japan: Ryukyu (Tokunoshima, Okinawa-jima and Iriomote-jima).

Distr.: Tropical regions of Asia (India and Ceylon to Thailand, Japan, Taiwan, the Philippines and Indonesia) and Australia.

7. *Flueggea* Willd.

Webster, G. L. 1984. A revision of *Flueggea* (Euphorbiaceae). *Allertonia* 3: 259–312.

A. Leaves elliptic or ovate, apex obtuse or acute; filaments 1.5–2 mm long, longer than calyx; pedicels of capsules (3–)6–15 mm; inhabiting in thickets or grassy places in lowlands, hills or mountains ..... 1. *F. suffruticosa*

A. Leaves elliptic or obovate, apex obtuse, rounded or retuse; filaments 1–1.5 mm long, almost same as or slightly longer than calyx; pedicels of capsules 2.5–8 mm; inhabiting on seashore or low limestone hills ..... 2. *F. trigonoclada*

1. ***Flueggea suffruticosa*** (Pall.) Baill., Étude Euphorb.: 502 (1858).

*Pharnaceum suffruticosa* Pall., Reise Russ. Reich. 3: 716 (1776).

*Xylophylla ramiflora* Aiton, Hort. Kew. 1: 376 (1789), nom. superfl.

*Geblera suffruticosa* Fisch. et C. A. Mey., Index Sem. Hort. Petrop. 1: 28 (1835).

*Phyllanthus fluggeoides* Müll. Arg. in *Linnaea* 32: 16 (1863).

*Securinega ramiflora* (Aiton) Müll. Arg. in DC., Prodr. 15(2): 449 (1866), nom. superfl.

*Securinega fluggeoides* (Müll. Arg.) Müll. Arg. in DC., Prodr. 15(2): 450 (1866).

*Securinega japonica* Miq., Ann. Mus. Bot. Lugd.-Bat. 3: 126 (1867).

*Flueggea japonica* (Miq.) Pax in Pfl.-fam. III, 5: 18 (1890).

*Acidoton fluggeoides* (Müll. Arg.) Kuntze, Revis. Gen. Pl. 2: 592 (1891).

*Acidoton ramiflorus* (Aiton) Kuntze, Revis. Gen. Pl. 2: 592 (1891), nom. superfl.

*Securinega suffruticosa* (Pall.) Rehder in J. Arnold Arbor. 13: 338 (1932).

*Securinega suffruticosa* (Pall.) Rehder f. *japonica* (Miq.) Hurus. in Bot. Mag. Tokyo 60: 71 (1947).

*Securinega suffruticosa* (Pall.) Rehder var. *japonica* (Miq.) Hurus. in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. 6: 329 (1954).

*Flueggea fluggeoides* (Müll. Arg.) G. L. Webster in Brittonia 18: 373 (1967).

Japanese name: Hitotsuba-hagi.

Dioecious shrubs, 1–3 m high. Branches subterete, more or less angled when young, glabrous, yellow-brownish. Leaves deciduous, alternate, glabrous; blades chartaceous, elliptic or ovate, 3.4–9.3 cm long, 1.8–4.5 cm wide, apex obtuse or acute, base cuneate, decurrent to petiole, entire, sometimes minutely undulate, upper surface green, lower surface paler; midrib pale, lower surface with a prominently raised midrib; petioles channeled adaxially, 3–6 mm long; stipules persistent, ovate to lanceolate, 0.5–1 mm long, lacerate. Cymose clusters axillary. Flowers June to September. Staminate flowers many per cymule; sepals 5, elliptic, 1–1.2 mm long, 0.6–0.7 mm wide, entire or obscurely denticulate distally, yellowish green; stamens 5, free; filaments becoming 1.5–2 mm long; anthers ca. 0.4 mm long; pistillode ca. 0.6 mm long; pedicels 2–7 mm long. Pistillate flowers 1–7 per cymule, pedicellate; sepals 5,

persistent or tardily deciduous in fruit, elliptic to ovate, 1–1.4 mm long, 0.7–1.2 mm wide, subentire; ovary of 3 (rarely 4) carpels; styles somewhat thickened, erect to spreading, basally connate, 1–1.5 mm long, bifid, branches 0.3–0.5 mm. Fruits capsular, obovate, 3-lobed, reticulate, 4.5–5 mm across, 2.5–3 mm long, brown or dark brown, dehiscent when mature; pedicels (0.3–)0.6–1.5 cm long, somewhat dilated distally; pericarp ca. 0.4 mm thick; columella persistent after dehiscent, ca. 1.5 mm. Seeds trigonous, obscurely verruculose or nearly smooth, 2–2.5 mm long, 1.5–1.9 mm radially, 1.5–2.5 mm tangentially, brown; hilum elliptic to deltoid, ca. 0.5 mm long.

Japan: Honshu (westward from Kanto Dist.), Shikoku and Kyushu. Thickets or grassy places in lowlands, hills or mountains.

Distr.: Ussuri, Korea, N. & C. China and Japan.

Icones: Kitamura & Murata, Woody Pl. 1: t. 68 422 and f. 217; Terasaki, rev. ed.: f. 1565; Inami, Ill. Pl. Hiroshima 4: t. 50; Satake et al., Woody Pl. 1: photo. 277 4 & 5; Makino, rev. ed.: f. 1454.

2. ***Flueggea trigonoclada*** (Ohwi) T. Kuros., comb. nov.

*Securinega suffruticosa* (Pall.) Rehder var. *amamiensis* Hurus. in Bot. Mag. Tokyo 60: 71 (1947).

*Phyllanthus trigonocladus* Ohwi in Bull. Nat. Sci. Mus. Tokyo n. s. 1: 7 (1954).

*Flueggea suffruticosa* auct. non (Pall.) Baill.: E. Walker, Fl. Okinawa: 626 (1976); G. L. Webster in *Allertonia* 3: 279 (1984), p. p.

Japanese name: Amami-hitotsuba-hagi, Atsuba-koban-no-ki.

Dioecious shrubs, 0.3–3 m high. Branches subterete, more or less angled when young, glabrous, yellow-brownish. Leaves alternate, glabrous; blades chartaceous, elliptic or obovate, 2.1–8.2 cm long, 1.1–3.6 cm wide, apex obtuse, rounded, or retuse, base obtuse or cuneate, decurrent to petiole, entire, upper surface green or yellowish green, lower surface whitish; midrib pale, prominently raised beneath; petioles channeled adaxially, 1–6 mm long; stipules persistent, deltate or lanceolate, 0.8–1.5 mm long, lacerate. Cymose clusters axillary. Flowers May to September. Staminate flowers many per cymule; sepals 5, elliptic, 0.8–1.3 mm long, 0.6–1 mm wide, entire or obscurely denticulate distally; stamens 5, free; filaments becoming 1–1.5 mm long; anthers ca. 0.6 mm long; pistillode ca. 0.7 mm high; pedicels 2.5–5 mm long. Pistillate flowers 1–4 per cymule, pedicellate;



sepals 5, persistent or tardily deciduous in fruit, elliptic to ovate, 1–1.5 mm long, 0.8–1.2 mm wide, subentire; ovary of 3 (rarely 4) carpels; styles somewhat dilated, erect to spreading, free, 1–1.2 mm long, bifid, branches ca. 0.6 mm. Fruits capsular, oblate, lobes obscure, reticulate, 4–4.5 mm across, 2.2–2.4 mm long, whitish brown or brown, dehiscent when mature; pedicels 2.5–8 mm long; pericarp 0.2–0.3 mm thick; columella persistent

after dehiscence, ca. 1.8 mm. Seeds trigonous, obscurely verruculose or nearly smooth, 2–2.2 mm long, 1–1.6 mm tangentially, 1.2–1.5 mm radially; hilum elliptic to deltoid, ca. 0.5 mm long.

Japan: Kyushu (Osumi Islands) and Ryukyu. Seashore or low limestone hills.

Distr.: Japan and Taiwan.

Icones: Satake et al., Woody Pl. 1: photo. 277 3.

## 8. *Breynia* J. R. Forst. et G. Forst.

1. *Breynia vitis-idaea* (Burm. f.) C. F. C. Fisch. in Kew Bull. 1932: 65 (1932).

*Rhamnus vitis-idaea* Burm. f., Fl. Indica: 61 (1768).

*Breynia officinalis* Hemsl. in J. Linn. Soc., Bot. 26: 428 (1894).

*Phyllanthus rhamnoides* Willd., Sp. Pl. 4(1): 580 (1805).

*Breynia rhamnoides* (Willd.) Müll. Arg. in DC., Prodr. 15(2): 440 (1866).

*Breynia accrescens* Hayata in J. Coll. Sci. Imp. Univ. Tokyo 20(3): 22 (1904), p. p.

*Breynia stipitata* Müll. Arg. var. *formosana* Hayata in J. Coll. Sci. Imp. Univ. Tokyo 20(3): 23, t. 2 A & B (1904).

*Breynia formosana* (Hayata) Hayata, Gen. Index Fl. Formos.: 65 (1916).

*Breynia officinalis* Hemsl. var. *accrescens* (Hayata) M. J. Deng et J. C. Wang in Fl. Taiwan ed. 2, 3: 430 (1993).

Japanese name: Ōshima-kankonoki, Ōshima-koban-no-ki, Taiwan-hime-koban-no-ki.

Evergreen, monoecious shrubs, to 1.5–5 m tall, much

branched; branches slender, indistinctly angular. Leaves alternate, petiolate; petiole 2–4 mm long; blade membranaceous, widely ovate-elliptic, 2–4 cm long, 1.5–3 cm wide, apex rounded to obtuse, base widely cuneate, entire, upper surface green, glabrous, lower surface grayish white. Stipules triangular-ovate to narrowly lanceolate, apex acute to acuminate, caducous. Flowers greenish. Male inflorescences usually with 3 fasciculated flowers, axillary. Male flowers small, ca. 1 mm in across; pedicels ca. 2 mm long. Female flowers solitary, axillary, larger than male ones. Calyx cup-shaped, apex 6-lobed. Pistil cup-shaped, concave at apex. Ovary 3-loculed; 2 ovules in each locule. Berries ovoidal-globose, ca. 5 mm long, nearly sessile, with enlarged calyx, red or pale red in mature.

Japan: Ryukyu. In limestone areas or coral reef areas.

Distr.: Japan, Taiwan and China.

Icones: Terasaki, rev. ed.: f. 1563; Satake et al., Woody Pl. 1: photo. 275 1 & 2; Makino, rev. ed.: f. 1441; Huang et al., Fl. Taiwan ed. 2, 3: t. 222 (1993).

## 9. *Glochidion* J. R. Forst. et G. Forst.

- A. Lower surface of leaves white, blade oblong ..... 1. *G. acuminatum*  
 A. Lower surface of leaves not white  
 B. Blade of leaves obovate or obovate-oblong, 3–8 cm long, 1.2–3 cm wide  
 C. Leaves and flowers glabrous  
 D. Leaves evergreen, thick, acuminate to acute at apex, green on lower surface; branches without spines ..... 2. *G. rubrum*  
 D. Leaves deciduous or subdeciduous, somewhat thin, obtuse to acute or truncate at apex, more or less glaucous on lower surface; short branches often spine-like ..... 3. *G. obovatum*  
 C. Lower surface of leaves and flowers with soft hairs ..... 4. *G. puberum*  
 B. Blade of leaves ovate-oblong, oblong or lanceolate-oblong, 5–18 cm long, 2–6 cm wide  
 C. Blade of leaves ovate-oblong, 7–18 cm long, 4–6 cm wide ..... 5. *G. zeylanicum*  
 C. Blade of leaves oblong or lanceolate-oblong, 5–9 cm long, 2–3.5 cm wide ..... 6. *G. lanceolatum*

1. *Glochidion acuminatum* Müll. Arg. in Linnaea 32: 68 (1863).

*Glochidion bicolor* Hayata in J. Coll. Sci. Imp. Univ. Tokyo 20(3): 18, t. 2 E (1904), excl. basionym.

*Glochidion hypoleucum* Hayata, Icon. Pl. Formos. 9: 95 (1920), non Boerl. (1900).

*Glochidion hayatae* Croizat et H. Hara in J. Jap. Bot. 16: 316 (1940).

Japanese name: Urajiro-kankonoki, Kobano-kankonoki.

Evergreen, monoecious small trees, 4–6 m high, much branched; branches grayish brown, with scabrid hairs. Leaves alternate, petiolate; petiole 2–3 mm long, with

scabrid hairs; blade oblong to oblong-lanceolate, 4–8 cm long, 2–3 cm wide, apex acuminate to acute, base oblique obtuse to acute, entire, lateral veins 6–10 pairs, upper surface green, glabrous except on mid vein, lower surface with minute hairs, whitish or grayish white. Flowers March to May, fasciculate on axil. Male flowers with 1–2(–3) mm long pedicel. Sepals 6, 2-whorled, ovate-elliptic, ca. 2 mm long, patent, glabrous. Stamens 3 or rarely 4. Female flowers with 1–2(–4) mm long. Sepals similar to those of male flower but erect, with short strigose hairs. Ovary pubescent, 3-loculed; styles connate, column-shaped, longer than sepal, 3-divided at apex.

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Ovules 2 in each locule. Capsules 3-loculed, compressed globose, ca. 4 mm long, 5–7 mm broad, deeply 3-divided; pedicel ca. 5 mm long, brown in mature. Seeds 2 in each locule.

Japan: Ryukyu (Amami-oshima, Tokunoshima, Okinawa-jima, Ishigakijima, Iriomote-jima). In forests.

Distr.: Japan, Taiwan, S. China to Malaysia and India.

Icones: Hayata in J. Coll. Sci. Imp. Univ. Tokyo **20**(3): t. 2 E (1904); Terasaki, rev. ed.: f. 1560; Satake et al., Woody Pl. **1**: photo. 278 4 & 5; Makino, rev. ed.: f. 1452.

2. **Glochidion rubrum** Blume, Bijdr. Fl. Ned. Ind.: 586 (1826).

Japanese name: Hirami-kankonoki.

Evergreen small trees, 3–5 m high; much branched; branches glabrous or with minute hairs. Leaves alternate, petiolate; petiole ca. 5 mm long; blade coriaceous, obovate to obovate-oblong, 5–8 cm long, 2–3 cm wide, apex acuminate to acute, base acute to cuneate, entire, lateral veins 5 or 6 pairs, glabrous on both surfaces. Flowers fasciculate on axil. Male flowers with ca. 5 mm long pedicel. Sepals 6, 2-whorled, ovate-elliptic, ca. 1 mm long. Stamens 3 or rarely 4. Female flowers with ca. 3 mm long pedicel. Sepals ovate-oblong, ca. 1 mm long, erect, apex acute. Ovary glabrous, 5- or 6-loculed; styles connate, column-shaped, 1.5–2 mm long, lobulated at apex. Ovules 2 in each locule. Capsules compressed globose, ca. 3.5 mm long, 6–10 mm broad, 5- or 6-loculed, glabrous; mericarps 5 or 6, 2-divided. Seeds 2 in each mericarp.

Japan: Ryukyu (Okinawa-jima, Miyakojima, Ishigakijima, Iriomote-jima). In open forests or secondary forests of lowlands or hillsides.

Distr.: Japan, Taiwan to Malaysia.

Icones: Li et al., Fl. Taiwan **3**: 474, t. 692 (1977); Satake et al., Woody Pl. **1**: photo. 279 3; Makino, rev. ed.: f. 1451; Huang et al., Fl. Taiwan ed. 2, **3**: 477, t. 251 (1993).

3. **Glochidion obovatum** Sieb. et Zucc. in Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. **4**(2): 143 (1845).

*Phyllanthus obovatus* (Sieb. et Zucc.) Müll. Arg. in DC., Prodr. **15**(2): 307 (1866).

Japanese name: Kanko-no-ki.

Deciduous or subdeciduous, dioecious or often monoecious shrubs, 1–6 m high, much branched; branches glabrous or with minute hairs. Short branches in apical parts often spine-like. Leaves alternate, sessile or petiolate; petiole less than 3 mm long; blade somewhat thin, obovate to cuneate in basal part, narrowly obovate in apical part, apex obtuse to rounded or truncate, base cuneate, 2.5–5.5 cm long, 1.5–2.5 cm wide, entire, lateral veins 5 or 6 pairs, glabrous on both surfaces, lower surface more or less glaucous. Flowers July to October, white, fasciculate on axil. Male flowers with ca. 1 cm long pedicel. Sepals 6, 2-whorled, ovate-elliptic, ca. 1.5 mm long, patent, glabrous. Stamens 3 or rarely 4. Female flowers with ca. 1 mm long pedicel. Sepals similar to those of male flowers but erect, with hairs on margins. Ovary 6- or 7-loculed; styles connate, club-shaped, longer

than sepals, lobulated at apex. Ovules 2 in each locule. Capsules compressed globose, brown in mature, glabrous. Mericarps 4 or 5, 2-divided. Seeds 2 in each mericarp, red, ovoidal, ca. 3 mm long.

Japan: Honshu (westward from Kinki Dist.), Shikoku, Kyushu and Ryukyu. In grasslands or open forests of hillside near seashore. Endemic.

Icones: Hayata in J. Coll. Sci. Imp. Univ. Tokyo **20**(3): t. 2 F (1904); Shirasawa, Iconogr. Ess. Forest. Japon **2**: t. 36 14–25 (1908); Terasaki, rev. ed.: f. 1561; Satake et al., Woody Pl. **1**: photo. 279 3; Makino, rev. ed.: f. 1453.

4. **Glochidion puberum** (L.) Hutch. in Sarg., Pl. Wilson. **2**(3): 518 (1916).

*Agyneja pubera* L., Mant. Pl. altera: 296 (1771).

*Agyneja impubes* L., Mant. Pl. altera: 296 (1771).

*Nymphanthus chinensis* Lour., Fl. Cochinch. **2**: 544 (1790).

*Bradleia sinica* Gaertn., Fruct. Sem. Pl. **2**: 127, t. 109, f. 1 (1790).

*Glochidion sinicum* (Gaertn.) Hook. et Arn., Bot. Beechey Voy.: 210 (1836).

*Phyllanthus puberum* (L.) Müll. Arg. in Flora **48**: 387 (1865).

*Glochidion bodinieri* H. Lév. in Fedde, Repert. **12**: 183 (1913).

*Glochidion eriocarpum* Champ. in Hayata, Icon. Pl. Formos. **9**: 95 (1920).

*Glochidion hayatae* Croizat et H. Hara var. *tsushimense* Hurus. in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. **6**: 332 (1954).

Japanese name: Tsushima-kankonoki.

Deciduous small trees or shrubs, 1–3 m high, much branched; branches with dense hairs. Leaves alternate, petiolate; petiole less than 2 mm long; blade lanceolate-oblong to elliptic, 5–6 cm long, 2–3 cm wide, apex obtuse, usually mucronate, base acute, entire, lateral veins 4 or 5, lower surface with dense hairs. Flowers May to June, yellowish green, fasciculate on axil. Male flowers with ca. 3 mm long pedicel. Sepals 6, 2-whorled, narrowly oblanceolate, ca. 2 mm long, ascending, pubescent on abaxial side. Stamens 4. Female flowers with ca. 1 mm long pedicel. Sepals narrowly elliptic, erect, with dense hairs. Pistil longer than sepals; ovary usually 7-loculed, with dense hairs; style short, connate to column-like. Capsules compressed globose, 4–5 mm long, 10–15 mm broad, with dense hairs, usually shallowly 7-divided.

Japan: Kyushu (Tsushima). In open forests near seashore.

Distr.: Japan, Taiwan and C. China.

Icones: Kanehira, Formos. Trees rev. ed.: f. 298 (1936); Li et al., Fl. Taiwan **3**: t. 691 (1977); Huang et al., Fl. Taiwan ed. 2, **3**: t. 250 (1993).

5. **Glochidion zeylanicum** (Gaertn.) A. Juss., Euphorb. Gen.: 107 (1824).

var. **zeylanicum**

*Bradleia zeylanicum* Gaertn., Fruct. Sem. Pl. **2**: 128 (1790).

*Glochidion hongkongense* Müll. Arg. in Linnaea **32**: 60

(1863).

Japanese name: Kakiba-kankonoki.

Evergreen, monoecious small trees, to 2–10 m tall, much branched; branches thick, glabrous. Leaves alternate, petiolate; petiole 5–7 mm long; blade slightly coriaceous, ovate-oblong, 7–18 cm long, 4–6 cm wide, apex acute to obtuse, base oblique, truncate to widely cuneate, entire, with 6 or 7 pairs of lateral veins, glabrous on both surfaces. Flowers May. Inflorescences umbel, with 6–10 flowers, terminal on 6–8 mm long short shoot; short shoot connate with branch in basal half. Bracts widely ovate, ca. 0.8 mm long. Male flowers with 7–10 mm pedicel. Sepals 6, in 2-whorled, elliptic, patent, glabrous. Stamens 5 or 6. Female flowers with ca. 5 mm long pedicel. Sepals 6, widely ovate, erect. Ovary 5-loculed; styles as long as sepals, connate to column-like. Ovules 2 in each locule. Capsules compressed globose, 7–9 mm broad, black in mature, glabrous; mericarps 5, 2-divided, with 2 seeds. Seeds brown, ovoidal, ca. 3 mm long.

Japan: Kyushu (Yakushima and Tanegashima) to Ryukyu. In open forests of lowlands.

Distr.: Japan, Taiwan and China to Indochina, Malaysia and India.

Icones: Webster in Walker, Fl. Okinawa: f. 86 (1976); Terasaki, rev. ed.: f. 1562; Satake et al., Woody Pl. 1: photo. 279 1 & 2; Makino, rev. ed.: f. 1450.

var. **tomentosum** Trimen, Syst. Cat. Fl. Pl. Ceylon: 79 (1885).

*Glochidion sphaerostigmum* Hayata, Icon. Pl. Formos. 9: 96 (1920), p. p.

*Glochidion dasyphyllum* K. Koch var. *iriomotense* Hurus. in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. 6: 334 (1954).

Japanese name: Ke-kankonoki, Ōba-ke-kankonoki.

Plants with densely hairy young branches, lower surface of leaves, ovaries and capsules.

Japan: Ryukyu (Okinoerabu-jima, Okinawa-jima, Ishigakijima and Iriomote-jima).

Distr.: Japan, Taiwan and China to India.

6. **Glochidion lanceolatum** Hayata in J. Coll. Sci. Imp. Univ. Tokyo 20: 16, t. 2 C (1904).

*Glochidion kotoense* Hayata, Icon. Pl. Formos. 9: 96 (1920).

*Glochidion sphaerostigmum* Hayata, Icon. Pl. Formos. 9: 96 (1920), p. p.

*Glochidion zeylanicum* (Gaertn.) A. Juss. var. *lanceolatum* (Hayata) M. J. Deng et J. C. Wang in Fl. Taiwan ed. 2, 3: 480, t. 252 (1993).

*Glochidion zeylanicum* auct. non (Gaertn.) A. Juss.: G. L. Webster in E. Walker, Fl. Okinawa: 629 (1976), p. p.

Japanese name: Kirun-kankonoki.

Evergreen small trees, to 10 m tall. Branches glabrous. Leaves alternate, petiolate; petiole ca. 4 mm long; blade coriaceous, oblong to lanceolate-oblong, 5–9 cm long, 2–3.5 cm wide, apex acuminate, apex itself obtuse, base oblique, acute, entire, with 6 or 7 pairs of lateral veins, green and glabrous on both surfaces. Inflorescences umbel, with 6–10 flowers, terminal on short shoot; short shoot 8–10 mm long, connate in basal half. Male flowers with ca. 1 cm long pedicel. Sepals 6, in 2-whorled, elliptic, patent, glabrous. Stamens usually 4. Female flowers nearly sessile. Sepals similar to those of male flowers but erect, with sparse hairs. Ovary 5- or 6-loculed; styles connate to column-like, distinctly longer than sepals, lobulate at apex. Ovules 2 in each locule. Capsules compressed globose, glabrous, 8–10 angular.

Japan: Ryukyu (Okinoerabu-jima, Okinawa-jima and Senkaku Islands).

Distr.: Japan, Taiwan and the Philippines.

Icones: Satake et al., Woody Pl. 1: photo. 279 4; Huang et al., Fl. Taiwan ed. 2, 3: t. 252 (1993).

## Subfam. II. Acalyphoideae

### Tribe 6. Chrozophoreae

#### 10. *Melanolepis* Rchb. f. et Zoll.

1. ***Melanolepis multiglandulosa*** (Blume) Rchb. f. et Zoll. in Linnaea 28: 324 (1856).

*Croton multiglandulosus* Reinw. ex Blume, Catalogus: 105 (1823).

Japanese name: Yanbaru-akamegashiwa.

Deciduous small trees, to 4–10 m tall. Leaves petiolate; petiole 10–25 cm long; blade ovate-orbicular, 10–25 cm long, apex acuminate, base cordate, usually 3–5-lobed but rarely simple. Inflorescences racemose or paniculate, to 20 cm long. Flowers ca. 5 mm in across, yellowish green, with ca. 7 mm long pedicel. Calyx lobes narrowly ovate

to lanceolate, ca. 2.5 mm long, patent at flowering (male), erect (female). Capsules compressed globose, ca. 1 cm broad, with dense stellate hairs.

Japan: Ryukyu (Okinawa-jima, Miyakojima, Ishigakijima and Iriomote-jima). In open forests and secondary forests and on roadsides.

Distr.: Japan and Taiwan to tropical Asia and Melanesia.

Icones: Terasaki, rev. ed.: f. 1583; Satake et al., Woody Pl. 1: photo. 286 1 & 2; Huang et al., Fl. Taiwan ed. 2, 3: t. 256 and photo. 25 (1993).

Tribe 7. **Bernardieae**11. **Discocleidion** (Müll. Arg) Pax et K. Hoffm.

1. **Discocleidion ulmifolium** (Müll. Arg.) Pax et K. Hoffm. in Pfl.-reich **63**: 46 (1914).

*Cleidion ulmifolium* Müll. Arg. in Flora **47**: 481 (1864).

*Alchornea ulmifolia* (Müll. Arg.) Hurus. in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. **6**: 304 (1954).

Japanese name: Enoki-fuji.

Dioecious trees or small trees. Leaves simple, petiolate; petiole ca. 1–3 cm long; blade membranaceous, ovate-oblong, 6.5–10 cm long, apex acuminate, base rounded, coarsely minutely serrate, lateral veins 3–5 pairs and distinct, with 2 glands at base on upper surface. Bracts

ovate, apex acuminate. Male inflorescences paniculate, longer than subtending leaf, sparsely branched. Calyx 3–5-lobed; lobes ovate, apex acute. Stamens many. Female inflorescences, racemose, shorter than subtending leaf. Calyx 5-lobed; lobes ovate, apex acute. Ovary glabrous.

Japan: Ryukyu (Amami-oshima, Kumejima, Okinawa-jima, Ishigakijima and Iriomote-jima).

Distr.: Japan and Taiwan.

Icones: Hayata in J. Coll. Sci. Imp. Univ. Tokyo **20**(3): t. 4 B (1904).

Tribe 8. **Acalypheae**12. **Acalypha** L.

1. **Acalypha australis** L., Sp. Pl.: 1004 (1753).

*Acalypha pauciflora* Hornem., Hort. Bot. Hafn. **2**: 909 (1815).

*Acalypha pauciflora* Hornem. var. *glareosa* Rupr. in Maxim., Prim. Fl. Amur.: 240 (1859).

*Ricinocarpus australis* (L.) Kuntze, Revis. Gen. Pl. **2**: 617 (1891).

*Acalypha australis* L. var. *lanceolata* Hayata in J. Coll. Sci. Imp. Univ. Tokyo **20**(3): 51 (1904).

*Acalypha australis* L. var. *glareosa* (Rupr.) Nakai in Bot. Mag. Tokyo **43**: 442 (1929).

*Acalypha australis* L. var. *velutina* Honda in Bot. Mag. Tokyo **45**: 2 (1931).

*Acalypha australis* L. f. *velutina* (Honda) Ohwi in Bull. Nat. Sci. Mus. Tokyo no. 33: 78 (1953).

*Acalypha australis* L. f. *glareosa* (Rupr.) H. Hara, Enum. Sperm. Jap. **3**: 39 (1954).

Japanese name: Enoki-gusa, Birōdo-enoki-gusa, Nagaba-enoki-gusa, Amigasa-sō.

Annual monoecious herbs. Stems erect, branched at middle and lower nodes, 12–75 cm high, with short ascending hairs or hirsute. Leaves many, alternate; leaf blades ovate to lanceolate, 2.5–9.1 cm long, 1.3–4.6 cm wide, apex acuminate, base cuneate, obtuse or rounded, serrate, upper surface sparsely pilose, lower surface green, sometimes reddish, pilose especially on nerves; 3-nerved at base; petioles 0.8–5.8 cm long, with short ascending

hairs or hirsute; stipules persistent, lanceolate, ca. 1.5 mm long, with short ascending hairs. Inflorescences axillary or terminal, spiciform, bisexual or unisexual; peduncles 0.2–8 cm long, with short ascending hairs or hirsute. Flowers July to November. Male flowers many, dense at upper part of inflorescence, several per bract; bracts ovate, 0.3–0.7 mm long; calyx lobes 4, widely ovate, 0.2–0.4 mm long, apex acute, reddish; pedicels 0.3–0.7 mm long. Female flowers sessile, 1–3 per bract; bracts reniform or cordiform, 1 to several at base of inflorescence, 0.4–2.5 cm long, 0.8–1.7 cm wide, apex acute or acuminate, margin denticulate, pilose especially at margin; ovary globose, verrucose, pilose; styles fimbriate, 0.5–1.5 mm long, reddish. Capsules very broadly ovoid, verrucose, pilose, green. Seeds carunculate, ellipsoid, ca. 2 mm long, ca. 1.5 mm wide, smooth, black or dark brown.

Japan: Hokkaido, Honshu, Izu Islands, Shikoku, Kyushu and Ryukyu. Disturbed habitats such as cultivated fields, roadsides and riverbanks.

Distr.: E. Asia (Ussuri, Korea, China, Japan, Taiwan and the Philippines).

Icones: Kitamura & Murata, Herb. Pl. **2**: t. 18 146; Terasaki, rev. ed.: f. 1584; Satake et al., Herb. Pl. **2**: photo. 215 4 & 5; Makino, rev. ed.: f. 1456.

Note: A tropical weed, *Acalypha indica* L., has been reported from Ryukyu (Daitojima Islands).

13. **Mercurialis** L.

1. **Mercurialis leiocarpa** Sieb. et Zucc. in Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. **4**(2): 145 (1845).

Japanese name: Yama-ai.

Monoecious or dioecious perennial herbs with creeping slender rhizome. Stems deciduous or sometimes perennial, simple, erect, 17–56 cm long, glabrous. Leaves deciduous

or sometimes perennial, 6–14, opposite; blades membranaceous, lanceolate, ovate or elliptic, 2.5–12.5 cm long, 1.5–5 cm wide, apex acuminate or cuspidate, base obtuse or rounded, with a pair of glands, margin serrate, with a gland on each tooth, upper surface pubescent, lower surface glandular spots scattered, pubescent on veins; petioles 1.3–5.5 cm long in middle leaves, shorter in upper leaves; stipules persistent, free, lanceolate or ovate, 1–3.5 mm long. Flowers January to July. Inflorescences modified thyrses, unisexual or less commonly bisexual, axillary, solitary; upper female or bisexual, lower flowers male in monoecious shoots; upper flowers female, lower flowers male in bisexual shoots; 1–12.5 cm long, pedunculate; bracts ovate, glabrous, 1.5–2 mm long. Male flowers 1 to several per bract; pedicels 0.3–0.8 mm long; calyx lobes 3, connate at base, widely elliptic, ovate or widely ovate, 1.5–2.3 mm long, 1.5–2 mm wide, entire, apex acute, glabrous; stamens

12–22; filaments 1.8–2.5 mm. Female flowers 1 per bract, short pedicellate; calyx lobes 3, base connate, widely elliptic, 1.6–2 mm long, 1.5–1.6 mm wide, entire, apex acute, glabrous; ovary 2- carpel, reniform, glabrous, styles 1–1.2 mm long. Capsules 2-valves, ca. 6 mm across, ca. 3 mm long, rugulose, dehiscent when mature; pedicels 2–11 mm long; columella persistent after dehiscent, ca. 2 mm long. Seeds subglobose, reticulate, ca. 2.5 mm across.

Japan: Honshu (Japan Sea side and westward from Shizuoka Pref.), Shikoku, Kyushu and Ryukyu. Forest and forest margin in hills and lowland.

Distr.: Korea, China, Japan, Taiwan and Indochina.

Icones: Kitamura & Murata, Herb. Pl. 2: t. 18 145 and f. 43 1; Terasaki, rev. ed.: f. 1578; Inami, Ill. Pl. Hiroshima 4: t. 51; Satake et al., Herb. Pl. 2: photo. 215 1 & 2; Makino, rev. ed.: f. 1460.

#### 14. *Claoxylon* A. Juss.

1. *Claoxylon centinarium* Koidz. in Bot. Mag. Tokyo 33: 119 (1919).

Japanese name: Sekimon-no-ki.

Evergreen, dioecious small trees, to 4–5(–8) m tall, glabrous. Bark dark brown; young branches greenish brown. Leaves alternate, more or less gathered at apical part of branches, petiolate; petiole 7–9 cm long; blades oblong to ovate-oblong to widely oblanceolate, 10–20 cm long, apex acute, base oblique, rounded, undulate, minutely serrate. Flowers March to April (to June). Inflorescences racemose, axillary; rachis with dense hairs.

Male flowers greenish white, ca. 3 mm in across. Calyx semi-globose, deeply 3-lobed; lobes oblong. Stamens many; filaments free; anther 2-loculed; locules apart. Female flowers semi-globose. Ovary distinct, 3-loculed, with dense hairs; styles short, 3-divided. Ovule 1 in each locule. Capsules triangular-globose, with black warts, yellow in mature; mericarps 3, 2-divided.

Japan: Ogasawara Islands. Rare. Endemic.

Icones: Toyoda, Fl. Bonin: t. & photo. 62 (1981); Satake et al., Woody Pl. 1: photo. 283 4 & 5; Makino, rev. ed.: f. 1489.

#### 15. *Macaranga* Thouars

1. *Macaranga tanarius* (L.) Müll. Arg. in DC., Prodr. 15(2): 997 (1866).

*Ricinus tanarius* L. in Stickman, Herb. Amboin.: 14 (1754).

*Mappa tanarius* (L.) Blume, Bijdr. Fl. Ned. Ind.: 624 (1826).

*Ricinus mappa* Roxb., Fl. Ind. ed. 1832, 3: 690 (1832).

*Mappa moluccana* Wight, Icon. Pl. Ind. Orient. 3: t. 816 (1844–45).

*Rottlera tanaria* (L.) Hassk., Cat. Hort. Bot. Bogor.: 238 (1844).

*Tanarius glaber* Kuntze, Revis. Gen. Pl. 2: 619 (1891).

Japanese name: Ōba-gi.

Evergreen, dioecious small trees, to 4–10 m tall. Branches thick, with hairs when young. Leaves simple, peltate, stipulate, petiolate; petiole 6–15 cm long; blade widely ovate, ovate, triangular-ovate to rarely ovate-oblong, 10–25 cm long, apex acuminate, base rounded, entire or serrate, lateral veins 5–7, distinct, radiate from

the attached point of petiole, lower surface with dense yellow glands and scale-like hairs. Flowers March to May, greenish yellow. Inflorescences on side of bract-like stipule. Male inflorescences racemose or paniculate, 13–30 cm long. Female inflorescences racemose, shorter than male ones. Male flowers globose to ovoidal, many on sides of bract, without petals. Calyx lobes 4, valvate. Stamens 4–6; anther 4-loculed. Female flowers with 2–4 calyx lobes. Ovary 2- or 3-loculed; styles 2-divided. Ovule 1 in each locule. Capsules compressed globose, 5–15 mm long, ca. 10 mm broad; mericarps 2 or 3, 2-divided, with 2 or 3 shallow grooves, with glands and spines. Seeds globose, ca. 5 mm in across.

Japan: Ryukyu. In secondary forests or open forests.

Distr.: Japan, Taiwan and China to Malaysia.

Icones: Hayata in J. Coll. Sci. Imp. Univ. Tokyo 20(3): t. 4 C (1904); Terasaki, rev. ed.: f. 1579; Satake et al., Woody Pl. 1: photo. 283 1–3.

16. *Mallotus* Lour.

- A. Blade of leaves obovate-orbicular to ovate-oblong, never rhombic, lower surface not white  
 B. Blade of leaves obovate-orbicular to widely ovate, sometimes ovate-lanceolate, lower surface pale green, without glands at base on upper surface or with indistinct glands; capsules with spiny projections ..... 1. *M. japonicus*  
 B. Blade of leaves ovate-oblong, narrowly ovate to lanceolate, lower surface more or less grayish white, with distinct pair of glands at base on upper surface; capsules without spiny projections ..... 2. *M. philippensis*  
 A. Blade of leaves ovate-rhombic, with a pair of glands at base on upper surface, lower surface white ..... 3. *M. paniculatus*

1. ***Mallotus japonicus*** (Thunb. ex L. f.) Müll. Arg. in *Linnaea* **34**: 189 (1865).

*Croton japonicum* Thunb. ex L. f., *Suppl.*: 422 (1782), *Thunb., Fl. Jap.*: 270, t. 28 (1784).

*Croton acuminatum* Lam., *Encycl.* **2**(1): 207 (1786).

*Ricinus japonicus* Thunb., *Ricin.*: 4 (1815).

*Rottlera japonica* (Thunb.) Spreng., *Syst. Veg.* **3**: 878 (1826).

*Mallotus japonica* Thunb. ex L. f. var. *angustata* Koidz. in *Acta Phytotax. Geobot.* **5**: 40 (1936).

Japanese name: Akame-gashiwa.

Deciduous, dioecious trees, to 15 m tall or more, to 50 cm broad or more. Bark grayish brown, longitudinally shallowly splitted. Branches gray, with dense stellate hairs and sparse elliptic lenticels. Leaves alternate, simple or usually shallowly 3-lobed when young, petiolate; petiole reddish brown, 5–20 cm long; blade obovate-orbicular to widely ovate, sometimes ovate-lanceolate, apex acuminate, base rounded to truncate, entire or undulate, with stellate hairs on both surfaces, upper surface bright green or yellowish green, without glands at base or with indistinct glands, lower surface pale green, densely punctate. Flowers July. Inflorescences paniculate, ca. 7–20 cm long; rachis with dense stellate hairs. Bracts ovate, 1–1.5 mm long. Flowers without petals and disk. Male flowers a few on axil of bract, with 4 mm long pedicel, without ovary. Calyx pale yellow, deeply 3- or 4-lobed; lobes valvate, ca. 3 mm long, reflexed. Stamens many, free; filaments ca. 3 mm long; anther oblong, yellow. Female flower solitary on axil of bract, with 3–4 mm long pedicel. Calyx 2- or 3-lobed. Ovary 3- or rarely 4-loculed, with white glands, red stellate hairs, and many spiny projections. Styles 3 or 4, free from base, slender, with dense papilla, patent or reflexed. Ovule 1 in each locule. Capsules compressed globose, ca. 8 mm in across (excluding spiny projections), with hairs, glands, or spiny projections, 3- or rarely 4-divided. Seeds compressed globose, ca. 4 mm in across, black in mature.

Japan: Honshu (westward from Miyagi and Akita Pref.), Shikoku, Kyushu and Ryukyu. Common in lowlands and mountains.

Distr.: Japan, Korea, Taiwan and China.

Icones: Thunberg, *Fl. Jap.*: t. 28 (1784); Siebold & Zuccarini, *Fl. Jap.*: t. 79 (1841); Shirasawa, *Iconogr. Ess. Forest. Japon* **1**: t. 55 and f. 1–15 (1900); Hayata in *J. Coll. Sci. Imp. Univ. Tokyo* **20**(3): t. 3 I (1904); Ichimura, *Imp. Pl. Jap.*: t. 56 (1932); Terasaki, rev. ed.: f. 1580; Satake et al., *Woody Pl.* **1**: photo. 284 1–6; Makino, rev. ed.: f. 1459.

2. ***Mallotus philippensis*** (Lam.) Müll. Arg. in *Linnaea* **34**: 196 (1865).

*Croton philippensis* Lam., *Encycl.* **2**(1): 206 (1786).

*Rottlera tinctoria* Roxb., *Pl. Coromandel* **2**: 36, t. 168 (1802).

*Croton montanus* Willd., *Sp. Pl.* **4**(1): 547 (1805).

*Rottlera aurantiaca* Hook. et Arn., *Bot. Beechey Voy.*: 270 (1838).

*Echinus philippinensis* (Lam.) Baill. in *Adansonia* **6**: 314 (1866).

*Rottlera philippinensis* (Müll. Arg.) Scheffer in *Ann. Mus. Bot. Lugd.-Bat.* **4**: 124 (1868).

Japanese name: Kusunoha-gashiwa.

Evergreen dioecious small trees, to 4–6 m tall or more. Branches with dense brown stellate hairs when young. Leaves alternate, simple, petiolate; petiole 1–4 cm long; blade ovate-oblong, narrowly ovate to lanceolate, apex acuminate, base rounded, entire or undulate, upper surface glabrous, with a pair of glands at base, lower surface more or less grayish white, with minute hairs, punctate. Flowers February to April. Inflorescences racemose or paniculate, 5–8 cm long (male), 3–7 cm long (female), axillary of leaves of apical part of branches, terminal-like. Male flowers without petals and ovary, a few in axil of bract, ca. 4 mm long. Calyx lobes 3 or 4, pale yellow, ca. 3 mm long, valvate, reflexed. Stamens 18–32, free; anther 2-loculed, oblong. Female flower solitary on axil of bract. Calyx 3- or 4-lobed. Ovary 2- or 3-loculed, with bright red stellate hairs and glands; styles 2 or 3, free in apical half, with dense papilla, patent or reflexed. Ovule 1 in each locule. Capsules compressed globose, 6–8 mm in across, 2- or 3-divided, with dense bright red stellate hairs and glands. Seeds compressed globose, glabrous, black in mature.

Japan: Ryukyu (southward from Tokara Islands). On roadsides or in secondary forests.

Distr.: Japan, Taiwan, S. China and widely distributed in tropical Asia and Australia.

Icones: Hayata in *J. Coll. Sci. Imp. Univ. Tokyo* **20**(3): t. 3 H (1904); Terasaki, rev. ed.: f. 1581; Satake et al., *Woody Pl.* **1**: photo. 285 1–3; Huang et al., *Fl. Taiwan ed.* **2**, **3**: 487, t. 255 (1993).

3. ***Mallotus paniculatus*** (Lam.) Müll. Arg. in *Linnaea* **34**: 189 (1865).

*Croton paniculatus* Lam., *Encycl.* **2**(1): 207 (1786).

*Mallotus formosanus* Hayata, *Mat. Fl. Formosa*: 269 (1911).

Japanese name: Urajiro-akamegashiwa.

Deciduous, monoecious small trees, to 10 m tall. Bark

smooth; branches with dense brown stellate hairs. Leaves alternate, simple, petiolate; petiole 10–15 cm long; blade ovate-rhombic, 7–16 cm long, apex acuminate, base rounded to obtuse, nearly entire, sometimes shallowly 3-lobed, with a pair of glands at base on upper surface, lower surface white with dense soft white stellate hairs. Inflorescences paniculate, terminal, 6–26 cm long (male), 5–3 cm long (female); rachis with dense yellowish brown stellate hairs. Flowers small without petals and disk. Male flowers without ovary, sessile or with short pedicel. Calyx lobes 3 or 4, ovate. Stamens many, free; anther 2-loculed. Female flower solitary on axil of bract. Calyx unequally 5-lobed. Ovary 3-loculed, with spiny hairs and

stellate hairs; styles 3, with dense papilla, patent or reflexed. Ovule 1 in each locule. Capsules compressed globose, ca. 8 mm in across (excluding spiny projections), with dense stellate hairs, yellow glands and spiny projections. Seeds ovate, glabrous, blackish brown in mature.

Japan: Ryukyu (Ishigakijima and Iriomote-jima). In open forests or secondary forests or on roadsides.

Distr.: Japan, Taiwan and S. China to Malaysia, Burma and Australia.

Icons: Terasaki, rev. ed.: f. 1582; Satake et al., Woody Pl. 1: photo. 285 4.

## Tribe 9. Alchorneae

### 17. Alchornea Sw.

1. *Alchornea liukiuensis* Hayata, Mat. Fl. Formosa: 268 (1911).

*Alchornea loochoensis* Hayata, Icon. Pl. Formos. 9: 103 (1920).

*Alchornea kelungensis* Hayata, Icon. Pl. Formos. 9: 102 (1920).

*Alchornea trewioides* Müll. Arg. var. *formosae* Müll. Arg. ex Pax et K. Hoffm. in Pfl.-reich 63: 248 (1914).

*Alchornea trewioides* Müll. Arg. var. *loochoensis* (Hayata) H. Keng in J. Wash. Acad. Sci. 41: 204 (1951).

*Alchornea liukiuensis* Hayata var. *formosae* (Pax et K. Hoffm.) Hurus. in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. 6: 303 (1954).

*Alchornea trewioides* auct. non Müll. Arg.: Hayata in J. Coll. Sci. Imp. Univ. Tokyo 20(3): 46, t. 4 A (1904).

Japanese name: Amigasa-giri.

Deciduous, dioecious shrubs, to 2–3 m tall. Leaves alternate, simple, petiolate; petiole 3–10 cm long; blade papery, cordate to widely ovate, 6–18 cm long, apex

obtuse to acuminate, base cordate to truncate, shallowly minutely serrate, glabrous on both surfaces, lower surface whitish green, with distinct 3 veins, upper surface with 2 glands at base. Inflorescences racemose or paniculate, 10–15 cm long, with many male flowers in basal part and 1 or 2 female flowers in upper part, with many globose fascicles of bracts. Flowers ca. 1.5 mm long. Male flowers with (2–)4 triangular sepals. Stamens (6–)8. Female flowers with lanceolate to ovate sepals. Ovary with dense hairs; stigma 3-divided. Dry fruits globose, ca. 1 cm in across, glabrous, with 3 grooves. Seeds compressed obovate, 6–7 mm long, with warty projections.

Japan: Ryukyu (southward from Amami-oshima). In open forests.

Distr.: Japan and Taiwan.

Note: Plants in Taiwan are sometimes separated as var. *formosae* (Müll. Arg.) Hurus. *Alchornea davidii* Franch. distributed in China is cultivated in Japan.

## Subfam. III. Crotonoideae

### Tribe 10. Crotoneae

#### 18. Croton L.

1. *Croton cascarilloides* Raeusch., Nomencl. Bot.: 380 (1797).

*Croton punctatus* Lour., Fl. Cochinch. 2: 581 (1790), non Jacq. (1786).

*Rottlera punctata* (Lour.) A. Juss. ex Spreng., Syst. Veg. 3: 877 (1826).

*Croton cumingii* Müll. Arg. in Linnaea 34: 101 (1865).

*Oxydectes cumingii* (Müll. Arg.) Kuntze, Revis. Gen. Pl. 2: 611 (1891).

*Oxydectes punctata* (Lour.) Kuntze, Revis. Gen. Pl. 2: 612 (1891).

*Croton polystachyum* auct. non Willd.: Hook. & Arn., Bot. Beechey Voy.: 270 (1838).

Japanese name: Gumi-modoki, Chankanii.

Evergreen, monoecious shrubs, to 2–3 m tall, with brownish grayish white scales. Leaves tufted at apical part of branches, petiolate; petiole 1–2 cm long; blade thin coriaceous, oblong, oblanceolate, obovate to narrowly rhombic-ovate, 6–15 cm long, 2–5.5 cm wide, apex acuminate to acute, base obtuse to acute, entire, with 6 or 7 pairs of lateral veins. Inflorescences racemose, 4–5 cm long, few-flowered. Male flowers with ovate calyx lobes

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with dense brown scales. Petals 5, obovate. Stamens 15–20, erect. Female flowers with ovate calyx lobes. Petals spatulate. Ovary globose, 3-loculed; styles many, erect, bilobed at apex. Capsules globose, ca. 1 cm long, yellowish brown in mature. Seeds elliptic, ca. 2.5 mm long.

Japan: Ryukyu. In open forests or on waysides.

Distr.: Japan, Taiwan and S. China to Malaysia.

Icones: Hayata in J. Coll. Sci. Imp. Univ. Tokyo **20**(3): t. 3 B (1904); Terasaki, rev. ed.: f. 1573; Satake et al., Woody Pl. **1**: photo. 279 5 & 6; Makino, rev. ed.: f. 1463; Huang et al., Fl. Taiwan ed. 2, **3**: 454, t. 238 (1993).

## Tribe 11. Aleuritideae

### 19. *Aleurites* J. R. Forst. et G. Forst.

- A. Flowers longer than 1.5 cm long; fruits with 3–5 seeds; leaves with glands at sinus when lobed
- B. Some leaves shallowly 3–5-lobed; fruits with 3 grooves; glands at apical part of petiole and base of blade usually with stalk
- C. Leaves usually 3-lobed and more or less glaucous on lower surface in mature plants; fruits compressed globose, ca. 2.5 cm in across; flowers 1.5–1.8 cm long ..... 1. *A. cordata*
- C. Leaves usually 3–5-lobed; green on lower surface; fruits ovoid, 3–5 cm in across, verrucose on surface; seeds usually 3; flowers ca. 3 cm long ..... 1'. *A. montana*
- B. Leaves usually entire and pale green on lower surface in mature plants, without stalked glands; fruits globose, 4–5 cm in across, apex slightly acute, smooth on surface; seeds usually 5 ..... 1'. *A. fordii*
- A. Flowers shorter than 8 mm long; fruits with 1 or 2 seeds; leaves without glands at sinus when lobed ..... 1'. *A. moluccana*

1. *Aleurites cordata* (Thunb.) R. Br. ex Steud., Nomencl. Bot. ed. 2, **1**: 49 (1840).

*Dryandra cordata* Thunb., Nov. Gen. Pl. **3**: 60 (1783), Fl. Jap.: 267, t. 27 (1784).

*Dryandra oleifera* Lam., Encycl. **2**(1): 329 (1786).

*Elaeococca verrucosa* A. Juss., Euphorb. Gen.: 38, t. 11 and f. 35 (1824); Sieb. et Zucc. in Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. **4**(2): 145 (1845).

*Elaeococca cordata* (Thunb.) Blume, Bijdr. Fl. Ned. Ind.: 618 (1826).

*Aleurites japonica* Blume ex Miq., Ann. Mus. Bot. Lugd.-Bat. **4**: 120 (1869).

*Aleurites verniciflua* Baill., Hist. Pl. **5**: 116 (1874).

*Vernicia cordata* (Thunb.) Airy Shaw in Kew Bull. **20**: 394 (1966).

Japanese name: Abura-giri.

Deciduous, monoecious, nearly glabrous trees; stem to 15 m tall, ca. 60 cm in across; barks pale grayish brown with dense elliptic lenticels in transversally arranged. Branched thick when young, pale green, with many grown lenticels, but in second year dark brown. Leaves alternate, petiolate; petiole 6–12(–20) cm, pale reddish, with 2 glands at apex; blade ovate to widely ovate, 12–20 cm long, 8–16 cm wide, apex acute, base cordate to truncate, sometimes shallowly 3-lobed, upper surface glabrous, lower surface greenish white, with white or brown hairs at branching parts of veins near base. Flowers May to June, white. Inflorescences paniculate, 16–25 cm broad (male) and 9–12 cm broad (female). Male flowers with ca. 8 mm long pedicel. Calyx tubular, 7–8 mm long, bilobed

in flower. Petals 5, obovate to fern-shaped, 15–18 mm long. Glands 5, ca. 2.5 mm long. Outer stamens 5; filaments 7–9 mm long. Inner stamens connate, with dense brown hairs at basal half. Female flowers with rectangular, 1.5–2 mm long glands. Ovary ellipsoid, ca. 4 mm long, with dense short brown hairs. Styles 3, free, 5–6 mm long, bilobed at apex. Capsules compressed globose, 2–2.5 cm long, 2.5 cm broad, 3-loculed. Seeds compressed globose, ca. 1.3 cm long.

Japan: Honshu (westward from Chubu Dist.), Shikoku and Kyushu. In mountains. Sometimes cultivated.

Distr.: Japan and Korea.

Icones: Thunberg, Fl. Jap.: t. 27 (1784); Kaempfer, Icon. Select. Pl.: t. 23 (1791); Shirasawa, Iconogr. Ess. Forest. Japon **1**: t. 56 and f. 1–19 (1900); Terasaki, rev. ed.: f. 1574; Satake et al., Woody Pl. **1**: photo. 280 1–4; Makino, rev. ed.: f. 1464.

Note: This species is cultivated for oil in western Japan, and distinguished from *A. montana* by the glands at apex of petiole and the leaves with white or brown hairs at branching parts of veins of lower surface. *Aleurites montana* (Lour.) Wilson, distributed in S. China to Indochina and cultivated in China and rarely in western Japan, differs from *A. fordii* in having ovoid verrucose fruits, that of *A. fordii* being smooth and spherical. *Aleurites fordii* Hemsl. is cultivated in China and sometimes in Japan. *Aleurites moluccana* (L.) Willd. is cultivated in Okinawa Islands (Naha, Kunigami) and different from all of them by the small flowers not over 1 cm long and the leaves without glands.