

CAPRIFOLIACEAE (J. H. Kern, Bogor, and C. G. G. J. van Steenis, Leyden)

Small trees, shrubs or twining woody plants, rarely herbs; branches terete. Glands present in various parts. Indumentum consisting of simple hairs, or in *Viburnum* sometimes lepidote; glandular hairs mostly present. Stems often pithy. *Leaves* decussate, simple or deeply divided (*Sambucus*), sometimes provided with pitted or cup-shaped glands exuding resin. Stipules absent or very small. *Flowers* ♂, actinomorphic or zygomorphic, mostly cymosely arranged, 4–5-merous; outer flowers in an inflorescence sometimes differing from the normal ones, rarely (*Sambucus p.p.*) some fls aborted into extra-floral nectaries. *Calyx* adnate to the ovary, (4–)5-fid or -toothed, mostly constricted below the limb; sepals often enlarged in fruit. *Corolla* epigynous, gamopetalous, sometimes 2-lipped, lobes mostly imbricate in bud. Stamens inserted on the corolla tube, alternating with the lobes, extrorse or introrse. Anthers free, 2-celled, dorsifixed, versatile, cells parallel, opening lengthwise, mostly introrse; filaments sometimes reflexed or curved in bud. Ovary inferior, 1–(2–)3–5(–8)-celled, in fruit cells sometimes partly abortive. Style terminal, often slender with one knoblike stigma, or 3 short partly connate styles. Ovules 1(–∞), pendulous or axile. *Fruit* a drupe or berry, rarely a capsule. Seeds often only one per fruit, often with bony testa. Endosperm copious, sometimes ruminant; embryo straight, often small and linear, axial, cotyledons oval or oblong.

Distr. Ca 10–14 genera, mainly distributed on the N. hemisphere, in the tropics mostly confined to the mountains, on the S. hemisphere only *Viburnum* and *Sambucus*, an endemic genus in New Zealand, two monotypic endemic genera in New Caledonia, in Australia only *Sambucus* in the eastern part.

Ecol. *Caprifoliaceae* do not play an important role in Malaysian vegetation as to numbers: both *Lonicera* and some *spp.* of *Sambucus* may predominate locally in mountain thickets and clearings. Most members of the family are insect-pollinated; *Lonicera* has a nocturnal fragrance; the exact function of the peculiar metamorphosed flowers in *Sambucus javanica* is not known.

Uses. Many *spp.* of all three genera treated here are used as ornamentals. The honey-suckles (*Lonicera*) have mostly fragrant flowers.

Notes. The family seems to be most related to the *Valerianaceae* to which the foliage of *Sambucus* and the occurrence of valerianic acid in *Viburnum* add in importance, but there is no unanimity on the delimitation of the family.

BAILLON (Hist. Pl. 7, 1880, 352 seq.), MCATEE (Bull. Torrey Bot. Club 48, 1921, 149), and FRITSCH (Bot. Centr. Bl. 1892, ii, p. 169) are of opinion that *Caprifoliaceae* ought to be merged into *Rubiaceae*. The occurrence of interpetiolar stipules or appendages accepted to represent stipules obscure a clear distinction. I fail to understand why KURZ can eliminate *Scyphiphora* from the *Rubiaceae* and refer it to *Caprifoliaceae* (J. As. Soc. Beng. 45, ii, 1876, 133; For. Fl. 2, 1877, 4) 'by the structure of the ovary and position of the ovules which are tell-tale marks of its caprifoliaceous descent', as the gynoeceum is very variable in *Rubiaceae*. Moreover, *Scyphiphora* possesses stipules bearing colleters (see below).

With *Carlemannia* and *Sylvianthus* (the latter absent from Malaysia) the case is different; HOOKER f. and PITARD included them in *Rubiaceae*. SOLEREDER in his valuable study on the anatomy of the rubiaceoous complex showed (Bull. Herb. Boiss. 1, 1893, 171, 173, 174) that they belong to *Caprifoliaceae*, by absence of stipules and presence of capitate-glandular hairs typical of *Caprifoliaceae*. He is followed by HALLIER f. and BREMEKAMP.

However, a general merging of *Caprifoliaceae* into *Rubiaceae* seems to us undesirable, as by that procedure the various caprifoliaceous genera would be assigned to various rubiaceoous tribes, and come to remote positions not reflecting their affinity.

Another question is whether, contrarily, genera hitherto accepted as rubiaceoous ought to be removed to *Caprifoliaceae*. SOLEREDER (*l.c.*), followed by KRAUSE (Ber. D.B.G. 28, 1909, 446–452) and GLÜCK (Blatt- u. Blütenmorph. Stud. 1919, 135) have focussed attention to the regular and typical occurrence of resin-glandular bodies, or trichomes, on the adaxial basis of Rubiaceoous stipules, called colleters. Colleters are known in a limited number of other families and genera such as *Cunoniaceae*, *Rhizophoraceae*, *Caesalpinjiaceae*, and, as was found recently, are also typical for *Nothofagus*. Dr BAKHUIZEN VAN DEN BRINK Jr, who is now revising *Rubiaceae* for this Flora, has found them in all genera hitherto studied except a few, viz. *Detella*, *Hedyotis*, *Borreria*, *Spermacoce*, *Richardsonia*, *Anotis*, *Allaeophania*, and *Diodia*, of which genera some appear to be aberrant in *Rubiaceae* on account of their ovules, by which character they come now wide apart in rubiaceoous taxonomy, whereas in other points they appear

closely allied (*cf.* also BOERLAGE, *Handl.* 2, 1891, 9, 10 & 19). The research on the problem whether these are really rubiaceous is one of time-consuming nature and of too great importance to be solved prematurely. Pending continued research the present revision is published in the old circumscription of *Caprifoliaceae*. It seems desirable to make additional karyological investigations on genera eventually to be joined to *Caprifoliaceae* as in the old circumscription the basic chromosome numbers seem to be rather constantly 8 and 9 (*cf.* SAX & KRIBS, *J. Arn. Arb.* 11, 1930, 147–152). An account of pollen structure seems also desirable.

The genus *Gaertnera* is distinct from *Rubiaceae* by a superior ovary and absence of colleters, and will be treated, in this Flora, as loganiaceous, though SOLEREDER (*Ber. D.B.G. Gen.-Vers. Heft* 1890, p. 70; *Bull. Herb. Boiss.* 1, 1893, 169) assigns it to *Rubiaceae*. In both families it keeps an isolated position.

The family appears to us a coherent and natural one: minor though by no means neglectable characters common to all are: glandular hairs and glands in other parts, enlarging sepals, a distinct constriction between ovary and sepals, and dorsifixed anthers, a character hitherto not specially stressed in literature (in *Sambucus* the cells are free but fixed in the middle!).

Leaves of juvenile forms of some species are occasionally distinctly lobed, *e.g.* in *Symphoricarpus* and *Lonicera*.

In collecting *Caprifoliaceae* it is urgent to collect both full-grown flowers and ripe fruits.

The first author is responsible for the revision of *Viburnum*, the second author for the rest.

KEY TO THE GENERA

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|---|-----------------------|
| 1. Leaves pinnate | 3. <i>Sambucus</i> |
| 1. Leaves simple. | |
| 2. Erect herbs. Corolla 4-merous. Stamens 2. Capsule dehiscent | 4. <i>Carlemannia</i> |
| 2. Shrubs, small trees, or lianas. Corolla 5-merous. Stamens 5. Drupe or berry. | |
| 3. Ovary-cells with more than 1 ovule. Corolla 2-lipped, at least 12 mm long. Style simple, long, with a capitate stigma. Berry | 1. <i>Lonicera</i> |
| 3. Ovary-cells with one ovule. Flowers actinomorphic, at most 10 mm long. Style 3-fid, short. Drupe. | 2. <i>Viburnum</i> |

1. LONICERA

LINNÉ, *Sp. Pl.* (1753) 173; *Gen. Pl.* (1754) no 210; DC. *Prod.* 4 (1830) 330; REHDER, *Rep. Mo. Bot. Gard.* 14 (1903) 27–232, pl. 1–20; STEEN, *J. Arn. Arb.* 27 (1946) 443.—*Caprifolium* ZINN, *Cat. Pl. Gött.* (1757) 10.

Shrubs or (in *Malaysia* exclusively) woody climbers twining to the right, or, in the absence of sufficient support, locally scrambling shrubs; bark at last lengthwise splitting, twigs mostly contorted. Leaves hairy or glabrous, entire (in the Malaysian *spp.*), free (or in *extra-Malaysian subg. Periclymenum*) connate. Stipules absent, but leaf-bases connected by a raised line on the node. *Flowers* 5-merous, mostly sessile, in 2-flowered, axillary, peduncled or rarely almost sessile cymes, not rarely specially developed towards the end of the branches and forming a leafy terminal panicle. Cymes occasionally 3-flowered. Each pair of flowers subtended by 2 bracts and 4 bracteoles, the latter sometimes covering the ovary. Calyx-tube ovoid or subglobose, teeth mostly small. Corolla elongated, mostly 2-lipped, upper lip representing 4 lobes, and mostly 4-lobed at its apex, lobes imbricate in bud. Stamens 5, anthers introrse, mostly exerted; filaments inserted near the apex of the tube. Ovary 2–3-celled, style filiform, elongated, usually exerted, and exceeding the stamens, stigma capitate. Ovules axile, 3–8 per cell, pendulous. *Berries* mostly few-seeded, free or (in *extra-Malaysian spp.*) connate in pairs. Seeds generally ovoid with fleshy albumen and a terete embryo.

Distr. *Ca* 150 *spp.* described from the N. hemisphere, centering in the Himalayas to Central and E. Asia, not in Ceylon, crossing the equator only in *Malaysia*.

The Malaysian *spp.* belong to § *Nintooa* DC. comprising \pm 30 *spp.* centering in SE.–E. Asia, with 1 *sp.* in the Mediterranean.

Ecol. In *Malaysia* only found in the W. part, confined to the zones above 1000 m alt.

Uses. Two *spp.* are used widely as ornamentals.

Wood anat. CHALK & SCHATTAWAY, *Proc. Roy. Soc. B* 113 (1933) 82.

Notes. In the absence of sufficient support specimens may turn to scrambling, but they are in the forest true lianas.

For measurements of flowers, full-grown open flowers should be used. All Malaysian *spp.* including the cultivated ones belong to § *Nintooa*.

In my eye REHDER has distinguished too many *spp.* in this section. His subsections *Longiflorae* and *Breviflorae* I think are rather artificial.

KEY TO THE SPECIES

1. Bracts below each pair of flowers foliaceous 1. *L. japonica*
1. Bracts subulate to lanceolate, not leafy.
 2. Ovary hairy all over 2. *L. confusa*
 2. At most the extreme apex of the ovary hairy.
 3. Flowers in the dried state at most $\pm 2\frac{1}{2}$ cm long.
 4. Flowers slender, 2-4 on slender axillary peduncles. Flowering parts hairy and besides with capitate glandular hairs. In anthesis both lips recurved. Internodes slender, twigs soon shiny-brown.
 7. *L. javanica*
 4. Flowers thickish, crowded towards the twig-ends, peduncles short, congested towards the twig-ends, flowers not exceeding the leaves. Capitate glandular hairs absent or negligible. In anthesis only the lower lip recurved. Internodes stiffish, twigs not shiny-brown 6. *L. acuminata*
 3. Opened flowers in the dried state at least 3 cm long.
 5. Plant entirely glabrous (except few negligible hairs on stamens and style and some ciliae on bracts and calyx). Nerves few, not prominent, reticulations indistinct 3. *L. sumatrana*
 5. Plants hairy, nerves and reticulations distinct.
 6. Inflorescences many-flowered, mostly congested into a globose or oval leafy panicle. Floral parts with subsessile, capitate, glandular hairs. Leaves glaucous-tomentose underneath, nerves and reticulations impressed above 5. *L. pulcherrima*
 6. Peduncles axillary, 2-flowered. Capitate glandular hairs absent. Nerves and reticulations hirsute underneath, not distinctly impressed above 4. *L. malayana*

1. *Lonicera japonica* THUNB. Fl. Jap. (1784) 89; MIQ. Ann. Mus. L.B. 2 (1866) 269; REHDER, Ann. Mo. Bot. Gard. 14 (1903) 159; BOR & RAIZADA, J. Bombay N. H. Soc. 44 (1943) 76, f. 3; STEEN. J. Arn. Arb. 27 (1946) 444, *in clavis*; BACKER, Bekn. Fl. Java, em. ed. 8 (1949) fam. 175, p. 6.—*Lonicera chinensis* WATSON, Dendr. Brit. 2 (1825) t. 117; HASSK. Flora 28 (1845) 242; FILET, Pl. Bot. Tuin Weltevreden (1855) 60; MIQ. Fl. Ind. Bat. 2 (1856) 127; KURZ, Nat. Tijds. N.I. 27 (1861) 198.—*L. repens* ZIPP. ex HASSK. Cat. Hort. Bog. (1844) 116. *in syn.*; MIQ. Fl. Ind. Bat. 2 (1856) 128; STEEN. *l.c.* 451; Blumea 6 (1948) 243.

Twining. Twigs short-pubescent, glabrescent, sparsely glandular-hairy, shiny-brown, ultimate internodes short-tomentose. *Leaves* ovate-oblong to ovate-lanceolate, base rounded to truncate, apex acute, acutish or subacuminate, midrib and edges pilose, darkgreen and shiny above; 3-8½ by 1½-4 cm, petiole ¾-1 cm. *Flowers* fragrant, 3-5 cm. Peduncle ¼-1½ cm, tomentose. Bracts petioled, leafy, oblong-ovate, or oblong-obovate, 10-18 by 4-8 mm. Bracteoles roundish, ¾ mm, hairy, glandular, ciliate. Calyx-lobes linear from a triangular base, haired, $\pm 1\frac{1}{2}$ mm, ciliate. Corolla 4-5 cm, creamy, or pale rosa-tinged towards the base, fading orange-yellow, lobes as long as the tube, hairs mixed with capitate glandular hairs, tube $\pm 2\frac{1}{2}$ cm, lobes ½ of the limb of upper lip. Style glabrous, \pm as long as the corolla. Stamens glabrous. *Berry* globular, 6-7 mm diam., black.

Distr. From Yunnan to Formosa & Japan, in *Malaysia*: cultivated as an ornamental up to ± 1000 m.

Ecol. Fruit is rarely set in *Malaysia*, fl. Jan.-Dec. Uses. BURKILL (Dict. 1935, 1363) says that at Singapore Chinese import flowers from China; they are said to possess antifebrile, corrective and

astrigent properties. The vegetative parts contain a saponin.

Notes. An early introduction, possibly via the Botanic Gardens at Bogor, as far as known never run wild. Many varieties have been distinguished (REHDER, *l.c.*).

2. *Lonicera confusa* DC. Prod. 4 (1830) 333; REHDER, Ann. Mo. Bot. Gard. 14 (1903) 156; MERR. EN. BORN. (1921) 582; BOR & RAIZADA, J. Bomb. N.H. Soc. 44 (1943) 75, f. 2; STEEN. J. Arn. Arb. 27 (1946) 444 *in clavis*; BACKER, Bekn. Fl. Java, em. ed. 8 (1949) fam. 175, p. 6.—*L. japonica* (non THUNB.) ANDR. Bot. Rep. 9 (1809) t. 583.—*L. multiflora* CHAMP. in HOOK. J. Bot. Kew Misc. 4 (1852) 167.

Whole plant short-tomentose, with the exception of the upperside of the leaves which is sparsely pubescent. Twigs \pm eglandular. *Leaves* ovate-oblong to oblong, base rounded, truncate, or subcordate, apex acute or acutish, margin tending to recurve, texture tending to be bullate by impressed nerves and reticulations, 3-6 by 1½-3 cm. Petiole ½-1¼ cm. *Inflorescences* lateral, condensed, ± 7 -flowered or at the end of twig multiflorous, provided with reduced leaves, exceeding the leaves, on 1-2 cm long stalks; cymes \pm sessile or some mm peduncled. Bracts linear, as long as or longer than the ovary, rarely subspathulate. Bracteoles suborbicular, 1 mm, hairy. Calyx-lobes narrow-triangular, hirsute, shorter than the ovary. Corolla 4-5 cm, pubescent, lobes \pm as long as the slender tube, provided with capitate glandular hairs; apex of the upper lip split for ½ of its length, lobes ovate. Style glabrous. Stamens only slightly hairy towards the base.

Distr. China, Hainan, in *Malaysia* rarely cultivated as an ornamental.

Note. Closely allied to *L. japonica*, in one specimen I found subspathulate bracts tending to become foliaceous.

3. *Lonicera sumatrana* MIQ. Fl. Ind. Bat. Suppl. (1860) 213, 537; REHDER, Rep. Mo. Bot. Gard. 14 (1903) 149; STEEN, J. Arn. Arb. 27 (1946) 445.—*L. leiantha* KURZ, J. As. Soc. Beng. 43, II (1874) 188; For. Fl. Burma 2 (1877) 3; REHDER, l.c. 163; CRAIB, Fl. Siam. En. 2 (1932) 5.—*Caprifolium sumatranum* O.K. Rev. Gen. 1 (1891) 274.—*C. leianthum* O.K. l.c.—*L. jasminifolia* MERR. Pap. Michigan Ac. Sc. 19 (1934) 199.

Slender, ± entirely glabrous. Internodes 4–7 cm. Leaves subtriplinerved at the base, without distinct reticulations, thickish, narrowed towards the base, elliptic to oblong-elliptic, acuminate, 4–9 by 2–3 cm, nerves 4–5 on either side, not prominent; petiole 1/3–1 cm long. Peduncles axillary and terminal, 1–1 1/2 cm long, 2-flowered; at the twig-ends sometimes 4 ± together. Flowers slender, glabrous except some small negligible ciliae on the edge of the calyx and bracts, white or rosa-like beige. Bracts half as long as the ovary, lanceolate-acuminate, 1 1/2–2 mm. Bracteoles suborbicular-ovate, 1 mm, blunt. Calyx-tube (ovary) constricted at the apex, free part shorter than the ovary, split halfway down, lobes ovate, subacute, 1 mm. Corolla slender, 5 1/2–6 1/2 cm long; tube 3 1/2–4 cm, upper lip split into 4 lobes ± 1/5–1/6 of its length. Style subglabrous with reflexed, sparse, white hairs, 6–7 cm long. Stamens subglabrous, distinctly exsert.

Distr. S. Siam (Puket), Ava (Burma), Yunnan, in *Malaysia*: Sumatra (rare).

Ecol. Thickets and forest borders in the mountain regions, 1000–1250 m, fl. Apr.–June.

Vern. *Kaju kaleh simienjak* (Alahanpandjang).

Notes. REHDER places this well-defined *sp.* incorrectly in *subsect. Breviflorae* because of the fact that MIQUEL described the flowers after specimens in the immature bud state. Although I have not seen the type specimen of *L. leiantha* KURZ the description is wholly fit for Sumatran plants, at which MERRILL has already hinted.

4. *Lonicera malayana* HENDERSON, J. Fed. Mal. Stat. Mus. 11 (1924) 187; RIDL, Fl. Mal. Pen. 5 (1925) 313; STEEN, Blumea 6 (1948) 243; HENDERSON, Mal. Nat. J. 6, 1 (1950) 189, f. 170.

Scrambling shrub, branches hirsute by long spreading, and short hairs, intermixed with very few ± sessile glandular-capitate hairs. Leaves oblong-elliptic, not bullate, but nerves and reticulations impressed above, base rounded, apex short-acuminate, 6–11 by 2 3/4–5 cm, glabrous above except the base of the midrib, spreading-hirsute underneath on nerves and reticulations, and with short-stalked, sparse capitate-glandular hairs, edge ± flat, fimbriate by ± 2 mm long hairs; nerves 5–6 pairs; petiole 5–7 mm, yellow-hairy. Peduncles axillary, 1 1/2–3 1/2 cm, yellow-hairy, 2-flowered. Bracts linear-lanceolate, ± 3 mm, hairy, as long as the ovary, twice as long as the ovate-acuminate, 1 1/2–2 mm similar bracteoles. Flowers hairy, white fading to pale yellow, 5–6 cm long. Calyx-tube urceolate,

drying bluish, glabrous, teeth linear, hirsute, 1 1/2–2 mm long. Corolla-tube 3 1/2–4 1/2 cm long, very thin (1–1 1/2 mm diam.), straight, hirsute by reflexed rather appressed, setaceous yellow hairs, eglandular, yellow-strigose inside, upper lip strongly in-rolled-recurved, ± 15 by 3 1/2–4 mm, lobes ovate blunt, ± 2 mm, lower lip spreading, ca 6 by 1 mm. Filaments glabrous, ± 2 1/2 cm exserted, anthers 3 mm, linear. Style glabrous, long-exserted, 7 1/2–8 cm, stigmatic knob distinct.

Distr. ?Hainan, in *Malaysia*: Malay Peninsula (Pahang), twice collected.

Ecol. Scrambling over bushes by Bertam River, ca 1000 m, fl. April–June.

Notes. My former referring this *sp.* provisionally to *L. pulcherrima* has been entirely wrong; it is perfectly distinct from all other Malaysian *spp.* The affinity of this *sp.* seems to be with the E. Asiatic *L. affinis* HOOK. & ARN., *L. similis* HEMSL., and *L. macrantha* SPR. From *L. siamensis* GAMBLE differing by long-exserted stamens and style, from *L. similis* and *macrantha* by thinner, eglandular corolla. F. C. HOW & N. K. CHUN 70187 from Hainan seems an exact match.

5. *Lonicera pulcherrima* RIDL, J. Mal. Br. R. As. Soc. 1 (1923) 64; MERR. Contr. Arn. Arb. 8 (1934) 165; STEEN, J. Arn. Arb. 27 (1946) 449, *excl. syn.*; Blumea 6 (1948) 244.

Climbing or scrambling, branches short-tomentose. Leaves ovate, blunt or acute, base shortly narrowed, glabrous above, short glaucous-tomentose beneath, nerves and reticulations impressed above, 3–7 1/2 by 1 1/2–5 1/2 cm. Petiole tomentose, 1/2–1 1/2 cm. Flowers in terminal-congested, many-flowered leafy panicles exceeding the leaves, stalks and flowering parts with subsessile, red, capitate-glandular hairs interspersed in the tomentum. Bracts narrow-lanceolate, 2 mm, tomentose. Bracteoles ± orbicular, ± 1 mm, shorter than the ovary, tomentose. Calyx-tube ellipsoid, glabrous except near the apex, lobes lanceolate, as long as the tube, 1 1/2–2 mm. Corolla pale yellow turning orange with age, tube 2–2 1/2 cm, slender, subangular, tomentose, lips ± 1 1/4–1 3/4 cm, upper lip incised to 1/4–1/5. Stamens far exsert, filaments sparsely hairy towards the base, anthers 3 mm. Style far exsert, glabrous or occasionally with a few negligible, spreading hairs.

Distr. ?China, in *Malaysia*: Sumatra (Atjeh, Tapanuli, Eastcoast).

Ecol. Streamborders, forest borders, open rocky places, 850–1400 m, fl. Sept.–Febr.

Notes. Seems to occur in continental Asia and should be compared with *L. leschenaultii* WALL. from India. *L. reticulata* (non RAFIN.) CHAMP. from Kiangsi (LAU 4649) seems to be an exact match.

6. *Lonicera acuminata* WALL. in ROXB. Fl. Ind. 2 (1824) 176; DC. Prod. 4 (1830) 334; MIQ. Ann. Mus. L.B. 2 (1866) 270; CLARKE in HOOK. f. Fl. Br. Ind. 3 (1880) 10; REHDER, Ann. Rep. Mo. Bot. Gard. 14 (1903) 150; STEEN, J. Arn. Arb. 27 (1946) 445; Blumea 6 (1948) 244.—*Caprifolium loureiri* BL. Bijdr. 13 (1826) 653.—*L. loureiri* DC. Prod.

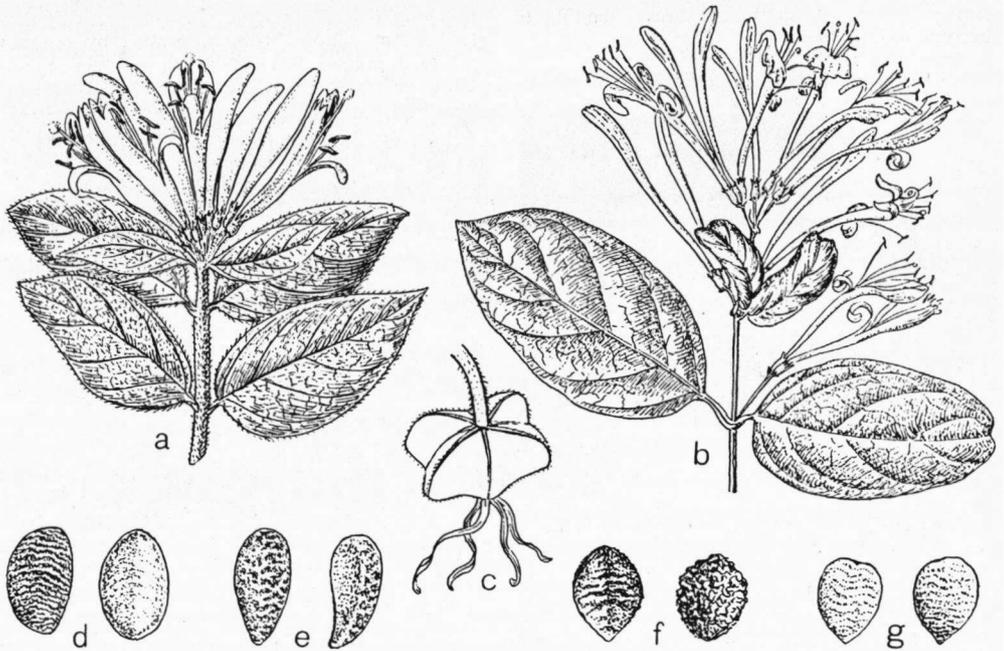


Fig. 1. a. *Lonicera acuminata* WALL. $\times \frac{3}{4}$, b. *Lonicera javanica* DC. $\times \frac{3}{4}$, c. *Carlemannia tetragona* HOOK. f., fruit $\times 4$, d-g. seeds of *Sambucus*: d. *S. canadensis* L., e. *S. adnata* WALL., f. *S. javanica* BL., g. *S. coerulea* RAFIN., all $\times 5$.

4 (1830) 334; HASSK. Flora 28 (1845) 241, incl. var. *oblonga*; HOOK. Ic. Pl. 9 (1852) t. 806, incl. var. *major*; HOOK. f. & TH. J. Linn. Soc. Bot. 2 (1858) 172; REHDER, Ann. Rep. Mo. Bot. Gard. 14 (1903) 149; KOORD. Exk. Fl. Java 3 (1912) 287; BACKER, Bekn. Fl. Java em. ed. 8 (1949) fam. 175, p. 2.—*L. flavescens* JUNGH. Java ed. 2, neerl. 2 (1854) 407, nomen.—*L. oxylepis* MIQ. Fl. Ind. Bat. 2 (1856) 125, incl. var. *oblonga* (HASSK.).—*L. leschenaultii* (non WALL.) MIQ. l.c. 126.—*L. henryi* HEMSL. J. Linn. Soc. 23 (1888) 359; REHDER, l.c. 148.—*Caprifolium henryi* O.K. Rev. Gen. 1 (1891) 274.—*C. acuminatum* incl. var. *normale*, *loureiroi*, *oxylepis* O.K. Rev. Gen. 1 (1891) 273.—*L. giraldi* REHDER, l.c. 150.—*L. rehderi* MERR. Govt Lab. Publ. (Philip.) 29 (1905) 49; Philip. J.Sc. 5 (1910) Bot. 391; En. Philip. 3 (1923) 578.—*L. philippinensis* MERR. Philip. J.Sc. 1 (1906) Suppl. 240.—*L. transarisanensis* HAYATA, Ic. Pl. Form. 6 (1916) 25.—*L. vestita* W.W.SM. Not. R. Bot. Gard. Edinb. 10 (1917) 49.—*L. mindanaensis* MERR. Philip. J.Sc. 20 (1922) 471.—*L. 'javanica* DC.', DOCT. v. LEEUWEN, Verh. Kon. Ak. Wet. A'dam 31 (1933) 235-237, f. 61-62, pro forma ♀.—Fig. 1a, 2.

Woody climber or scrambling shrub. Twigs patently hirsute. Internodes rather short. Leaves ovate-oblong to lanceolate, variable in shape, base rounded, truncate or subcordate, apex acute to acuminate, texture often bullate by impressed nerves and reticulations, both sides green, hairiness in various degrees but midrib above always hairy,

3-8 by 1½-4 cm; petiole patent-yellow hairy, ¼-1 cm. Cymes mostly contracted towards the twig-ends, infl. not exceeding the leaves. Peduncle densely patent-hirsute, sometimes with few sessile glands. Bracts 5-8 mm rarely shorter, narrow triangular, as long as or longer than the ovary. Bracteoles 2 mm, acute oblong, shorter than the ovary. Calyx green, lobes ciliate, with a few stiff hairs on the back. Corolla 2-2½ cm long, sulphureous, not fragrant, rather thick and club-shaped in bud, in anthesis upper lip erect, lower lip reflexed; tube glabrous or with few reflexed strigose hairs, sometimes with few sessile glands. Style ± as long as the corolla, mostly hairy. Stamens mostly hairy. Berry black.

Distr. India to S. China and Formosa, in Malaysia: Sumatra, Java, Bali, Philippines (Luzon).

Ecol. Forest borders, thickets, ericoid crooked forest, mossy forest, 1800-3300 m, fl. Jan.-Dec. Vern. *Ki seroh*, S.

Notes. Both *L. acuminata* and *L. javanica* show the remarkable 'mass-elevation effect' (cf. J. Arn. Arb. 27 (1946) 447; Fl. Mal. 4 (1949) xlix, f. 37). Cf. fig. 3. In Java the species exclude each other altitudinally, and represent vicarious species (fig. 3). On the summit of Mt Pangrango, W. Java, DOCTERS VAN LEEUWEN studied the variability (l.c.). He noted the occurrence of ♀ fls the anthers of which do not contain pollen. He also mentioned the insect pollination by *Bombus*. Part of his observations belong to *L. javanica*. Aberrative forms

I found in the herbarium are with 3-verticillate leaves, and others with occasionally flowers in triads. A duplotype in fruit at Kew leaves no doubt about the identity of *L. mindanaensis* MERR.



Fig. 2. *Lonicera acuminata* WALL. on summit of Mt Pangrango, W. Java (DOCTERS VAN LEEUWEN).

7. *Lonicera javanica* (BL.) DC. Prod. 4 (1830) 333; MIQ. Fl. Ind. Bat. 2 (1856) 125; REHDER, Ann. Rep. Mo. Bot. Gard. 14 (1903) 157; KOORD. Exk. Fl. Java 3 (1912) 287; DOCT. v. LEEUWEN, Proc. Kon. Ak. Wet. A'dam 31 (1933) 237, f. 60 *pro forma* ♂; STEEN, J. Arn. Arb. 27 (1946) 450; BACKER, Bekn. Fl. Jav. em. ed. 8 (1949) fam. 172 p. 2.—*Caprifolium javanicum* BL. Bijdr. 13 (1826) 653.—Fig. 1b.

Slender, twining. Ultimate twigs short-hairy, mixed with capitate-glandular hairs, internodes soon glabrate, shiny-brown, rather long. *Leaves* ovate to obovate, or ovate-oblong, base truncate, rounded or cordate, apex acute to acuminate, upperside glabrous or the base of the midrib hairy, beneath glaucous, short-pubescent, 4–11 by 2–6½ cm; petiole ½–1 cm, pubescent. *Inflorescences* short-grey-hairy, mixed with distinctly stalked capitate-glandular hairs, terminal and in the upper axils so as to form a rather lax, leafy panicle, exceeding the leaves; lower branches up to 6 cm, with reduced leaves, upper internodes not abbreviated. *Flowers* creamy, fragrant, later fading into yellowish. Bracts linear-lanceolate, as long as or longer than the calyx. Bracteoles ovate, shorter than the ovary. Calyx purplish, lobes lanceolate, 1½–2 mm, the lobes mostly rather densely grey-hairy, sometimes only ciliate. Bud club-shaped, thickened end ± ½–¼ of the mature bud, often acute. Corolla 18–30 mm (fresh 3–3½ cm) long, the tube slender, 1 mm or thinner, 1–2 cm, lobes narrow, 8–14 mm long, ± 1–2⅓ mm broad, during anthesis both lips recurved, lobes as long as the tube or shorter; hairs on the corolla recurved, except the capitate glandular

ones. Anthers thin, 2–4 by ⅓–½ mm. Stamens protruding, glabrous. Style often longer than the corolla, glabrous, exserted. *Berry* dark purple, ripe prob. black.

Distr. *Malaysia*: Java, Lesser Sunda Islands (Bali), Philippines (Mindanao).

Ecol. Forests and forest borders, 1000–2000 m; cf. the note under *L. acuminata*.

Vern. *Ki seroh*, S. *gauod-bukid* (Buk.).

Notes. Apparently closely allied to *L. glabrata* DC. and *L. affinis* HOOK. & ARN. from continental Asia, and in some respects to *L. macrantha*. The density of pubescence is very variable, ranging from hairy forms to almost glabrous ones; leaf-shape and size also vary, even on one twig from ovate to obovate. Pubescence of calyx-teeth varies from ciliate to tomentose. Occasionally 3-lobed leaves occur on young shoots. Sometimes 4-flowered cymes are observed.

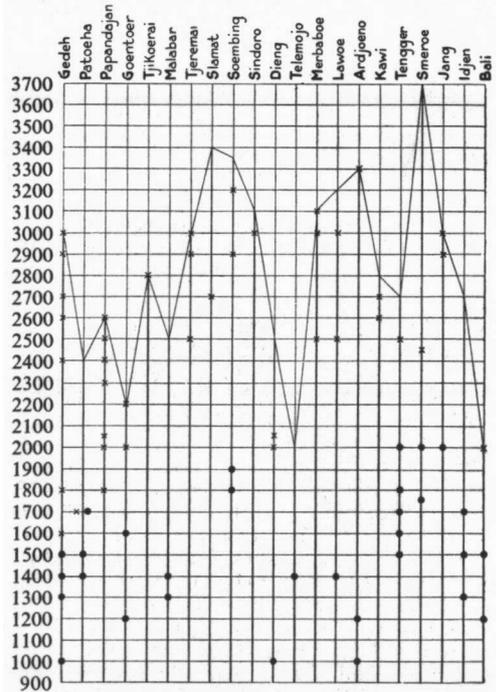


Fig. 3. Altitudinal localities (in metres) of *Lonicera acuminata* WALL. (x) and *L. javanica* (.) in Java and Bali. Mountains arranged from W towards E. Thickened vertical lines indicate the altitude of the summits.

2. VIBURNUM

LINNÉ, Sp.Pl. (1753) 267; BL. Bijdr. 13 (1826) 655; MIQ. Fl. Ind. Bat. 2 (1856) 119; BOERL. Handl. 2² (1891) 3; K. & V. Bijdr. 5 (1900) 36; KING & GAMBLE, J. As. Soc. Bengal 72² (1903) 112; KOORDERS, Exk. Fl. Java 3 (1912) 285; MERR. En.

Philip. 3 (1923) 577; RIDL. Fl. Mal. Pen. 2 (1923) 1; BACKER, Bekn. Fl. Java, em. ed. 8 (1949) fam. 175, p. 2; KERN, Reinw. 1 (1951) 107.

Shrubs or small trees. *Leaves* petiolate, simple, entire or serrate-dentate or trifid, pinnate- or palmate-nerved, (in the Malaysian species) exstipulate. Inflorescence terminal, compound, corymbiform or paniculate, primary rays usually whorled, flowers cymosely arranged. Bracts and bracteoles usually small, caducous. *Flowers* actinomorphic, the marginal ones sometimes (not in Malaysia) radiant, neutral. Calyx 5-lobed or 5-partite. Corolla white, creamy or pink, rotate, campanulate, hypocrateriform or tubular; lobes 5, imbricate in bud. Stamens 5; filaments narrow. Ovary 1-celled. Ovule anatropous, pendulous from the apex, solitary. Style short, conical; stigmas 3, often connate. *Fruit* a drupe, crowned by the persistent calyx and style, 1-seeded. Endocarp horny or stony, in cross-section often undulate or with inflexed edges. Albumen often ruminant.

Distr. Large genus; several hundred, often polymorphous species in Europe, Asia, and America, 16 spp. in Malaysia.

Uses. None of the Malaysian species are known to be of importance economically.

Wood anat. MOLL & JANSSONIUS, Mikr. Holzes 4 (1920) 5. *V. coriaceum*: M. & Js. p. 19, *V. sambucinum*: p. 20, *V. lutescens*: p. 11.

Notes. For a satisfactory identification both flowers and ripe fruits are required, a condition rarely found in the herbarium. From 3 spp. flowers are unfortunately hitherto unknown.

The stellate hairs mentioned to occur in some spp. are apparently not properly stellate but fasciculate hairs (cf. McATEE, Bull. Torrey Bot. Cl. 48, 1921, 149 seq.).

KEY TO THE SPECIES
(for flowering specimens)

As the flowers of *V. amplificatum*, *V. cornutidens* and *V. clemensae* are unknown, these species have been omitted.

- 1. Leaves triple-nerved. Tube of corolla hairy within 15. *V. propinquum*
- 1. Leaves penninerved. Tube of corolla glabrous within.
- 2. Corolla squamulose without. All young parts densely covered with minute rusty-coloured peltate scales. Leaves entire, the underside at first densely covered with minute scales, later on densely punctulate 6. *V. punctatum*
- 2. Corolla quite glabrous or pubescent without, sometimes gland-dotted, but not squamulose. Young parts without peltate scales.
- 3. Corolla pubescent without, rotate, tube very short, about 1/2 mm long, lobes 1 mm. Filaments 1 1/2-2 mm long. Young branchlets ferruginous-pubescent 16. *V. luzonicum*
- 4. Adult leaves pubescent var. *luzonicum*
- 4. Adult leaves nearly glabrous except for the midrib.
- 5. Leaves nearly entire var. *apoense*
- 5. Leaves strongly dentate.
- 6. Apex of leaves acute to shortly acuminate. var. *floribundum*
- 6. Apex of leaves slenderly acuminate. var. *sinuatum*
- 3. Corolla glabrous or gland-dotted without, tube at least 1 mm long.
- 7. Filaments adnate to the throat of the corolla. Corolla shortly salvershaped-campanulate, limb horizontally spreading, finally reflexed; tube 2-3 mm long, lobes 2 mm 13. *V. odoratissimum*
- 7. Filaments adnate to the base or the tube of the corolla. Shape of the corolla different.
- 8. Ovary pubescent. Corolla glabrous, tube 1-1 1/2 mm long, lobes 1-2 mm. Filaments 5-7(-9) mm. Leaves large, 10-25 by 5-10 cm, coriaceous, entire 7. *V. sambucinum*
- 9. Ovary and axes of inflorescence densely pubescent.
- 10. Underside of leaves glabrous except for a few hairs on the nerves var. *sambucinum*
- 10. Underside of leaves villous var. *tomentosum*
- 9. Ovary and axes of inflorescence subglabrous var. *subglabrum*
- 8. Ovary not pubescent.
- 11. Corolla distinctly tubular, tube at least 3 times as long as lobes, the latter about 1 mm, erect.
- 12. Leaves quite entire, underside with distinct glandular pit at the base on both sides of midrib, apex obtuse or shortly and bluntly acuminate. Filaments inserted at base of corolla, 7-8 mm long 2. *V. beccarii*
- 12. Leaves usually distinctly dentate, sometimes nearly entire, underside bearded in nerve-axils, but without glandular pits, apex mostly gradually long-acuminate. Filaments usually about 4 mm long 1. *V. coriaceum*

13. Tube of corolla 3–4 mm long. Filaments about 4 mm long, adnate $\frac{1}{2}$ –1 mm above base of corolla *var. coriaceum*
13. Tube of corolla about 6 mm long. Filaments up to 6 mm long, adnate 2–3 mm above base of corolla *var. longiflorum*
11. Corolla not distinctly tubular, tube less than 3 times as long as lobes, the latter usually more than 1 mm long.
14. Inflorescence shortly pyramidal, paniculate. Corolla rotate-campanulate, tube about 1 mm long. Filaments 2–3 mm long.
15. Leaves thinly coriaceous. Corolla 2–2 $\frac{1}{2}$ mm long. Filaments inserted at base of the corolla. (Between 500 and 1500 m altitude, sometimes up to 2300 m) 10. *V. lutescens*
15. Leaves manifestly coriaceous. Corolla 3 mm long. Filaments adnate to the corolla $\frac{1}{2}$ –1 mm above the base. Without fruits hardly distinguishable from *V. lutescens*. (Altitude at least 2300 m) 11. *V. junghuhnii*
14. Inflorescence corymbiform. Tube of the corolla usually exceeding 1 mm. Filaments at least 6 mm long.
16. Filaments 6(–7) mm long, in bud with inflexed top.
17. Corolla shortly tubular-turbinate, globular in bud, tube about 2 mm, lobes 1 $\frac{1}{2}$ –2 mm. Leaves gradually long-acuminate 4. *V. platyphyllum*
17. Corolla broad-tubular, obovoid in bud, tube about 2 $\frac{1}{2}$ mm, lobes about 1 $\frac{1}{2}$ mm. Leaves obtuse or shortly and bluntly acuminate 3. *V. glaberrimum*
16. Filaments (8–)9–10 mm long, serpentine in bud.
18. Leaves dull, hispidulous on the midrib and the primary side-nerve at the underside, without glandular pits. Corolla rotate-cupular, tube 1(–1 $\frac{1}{2}$) mm, lobes 2–2 $\frac{1}{2}$ mm. 8. *V. hispidulum*
18. Leaves shining, glabrous, with distinct glandular pits at the base. Corolla turbinate, tube 2 $\frac{1}{2}$ –3 mm, lobes 1 $\frac{1}{2}$ –2 mm 9. *V. vernicosum*

KEY TO THE SPECIES
(for fruiting specimens)

1. Leaves triple-nerved. Fruits nearly globose, 4–5 mm long, 4 mm wide 15. *V. propinquum*
1. Leaves penninerved. Fruits usually compressed, if not, more than 5 mm long.
2. Endocarp with strongly incurved edges, ventral side deeply intruding, embracing an internal split or cavity.
3. Fruit oblong, 16 by 7 mm. Internal cavity of the fruit bilobate in cross-section. Leaves entire, glabrous, elliptic-oblong to slightly obovate, up to 26 by 12–13 cm 12. *V. amplificatum*
3. Fruit smaller.
4. Leaves minutely papillose-rugulose, entire. Ventral side of endocarp forming a narrow split, central cavity at most $\frac{1}{2}$ mm in diameter 14. *V. clemensae*
4. Leaves smooth, usually dentate or serrate. Central cavity of fruit about 2 mm wide.
5. Fruit ovoid, 6–7 by 4–5 mm. Internal cavity of fruit nearly circular in cross-section. Leaves dentate to nearly entire 13. *V. odoratissimum*
5. Fruit obovoid, 7–9 by 5–7 mm. Internal cavity of the fruit broad, bilobate in cross-section. Leaves closely crenate-dentate 11. *V. junghuhnii*
2. Endocarp undulate in cross-section, *i.e.* with shallow grooves on both sides, without internal split or cavity.
6. Leaves quite entire.
7. All young parts densely covered with minute peltate scales. Underside of the leaves at first densely covered with minute scales, later on densely punctulate. Fruit elliptic to somewhat obovoid, 9–11 by 6–7 mm 6. *V. punctatum*
7. Young parts without peltate scales.
8. Ripe fruit small, 5–6(–6 $\frac{1}{2}$) mm long.
9. Leaves usually ovate-lanceolate, gradually long-acuminate. Fruit ovoid to broad-ellipsoid, 6(–6 $\frac{1}{2}$) by 5–6 mm. 1. *V. coriaceum*
9. Leaves broader, ovate to obovate, obtuse or shortly and bluntly acuminate. Fruit about 5 by 5 mm, ovate to nearly orbicular 3. *V. glaberrimum*
8. Ripe fruits larger (without flowers hardly determinable!).
10. Nerve-axils and leaf-base without glandular pits or spotty glands. Midrib and primary nerves somewhat hispidulous beneath. Young branchlets and axes of infructescence glabrous or sparingly hispidulous. Young fruits glabrous 8. *V. hispidulum*
10. Nerve-axils and/or leaf-base at underside glandular pitted or with (sometimes indistinct) spotty glands. Midrib and primary nerves not hispidulous.
11. Young branchlets densely pubescent. Axes of the inflorescence pubescent, glabrescent. Young fruits thinly pubescent, soon glabrescent. Underside of leaves at the base with a (sometimes indistinct) spotty gland on both sides of midrib 7. *V. sambucinum*
12. Axes of the infructescence densely pubescent, later on glabrescent.

- 13. Underside of leaves glabrous except for a few hairs on the nerves *var. sambucinum*
- 13. Underside of the leaves villous *var. tomentosum*
- 12. Axes of the infructescence nearly glabrous *var. subglabrum*
- 11. Young branchlets and axes of infructescence glabrous to somewhat (not densely) pubescent. Young fruits glabrous.
- 14. Leaves large, up to 22 by 10 cm, ovate to oblong-ovate, apex gradually narrowed into an elongated and slender acumen 4. *V. platyphyllum*
- 14. Leaves smaller, obtuse or shortly and bluntly acuminate.
- 15. Young axes of the inflorescence pubescent, glabrescent. Young parts not vernicose. Primary nerves at the underside of the leaves little prominent 2. *V. beccarii*
- 15. Infructescence quite glabrous. Young parts vernicose. Primary side-nerves at the underside of the leaves prominent 9. *V. vernicosum*
- 6. Leaves dentate or serrate (sometimes superficially).
- 16. At least the midrib of the leaves pubescent. Leaves chartaceous, rarely subcoriaceous. Fruit ovate, much compressed, 5-7 by 5-6 mm, ripening red (always?) 16. *V. luzonicum*
- 17. Adult leaves pubescent *var. luzonicum*
- 17. Adult leaves nearly glabrous except for the midrib.
- 18. Leaves nearly entire *var. apoense*
- 18. Leaves strongly dentate.
- 19. Apex of the leaves acute to shortly acuminate *var. floribundum*
- 19. Apex of the leaves slenderly acuminate *var. sinuatum*
- 15. Leaves glabrous (sometimes bearded in the nerve-axils), more or less coriaceous. Fruit ripening purplish or bluish black.
- 20. Leaves thickly coriaceous, beneath with shallowly sunken glands in the nerve-axils, margins conspicuously corniculate-dentate. Fruit broadly ovate, 8 by 6-7 mm 5. *V. cornutidens*
- 20. Not combining these characters.
- 21. Infructescence shortly paniculate. Fruit oblong-elliptic, 7-10 by 4-5 mm or still larger. 10. *V. lutescens*
- 21. Infructescence corymbiform. Fruit more ovate or ovoid, smaller.
- 22. Leaves usually ovate-lanceolate, gradually long-acuminate, distinctly dentate. Fruit 6(-6½) by 5-6 mm 1. *V. coriaceum*
- 22. Leaves broader, ovate to obovate, obtuse or shortly and bluntly acuminate, nearly entire. Fruit 5 by 5 mm 3. *V. glaberrimum*

1. *Viburnum coriaceum* BL. Bijdr. 13 (1826) 656; DC. Prod. 4 (1830) 329; HASSK. Flora 3 (1845) 242; MIQ. Fl. Ind. Bat. 2 (1856) 120, Suppl. (1860) 213; OERSTED, Vid. Meddel. Kjöb. 1860 (1861) 300, t. 6 f. 5-6; CLARKE in HOOK. f. Fl. Br. Ind. 3 (1880) 5; K. & V. Bijdr. 5 (1900) 38; KOORD. Exk. Fl. 3 (1912) 285; KOORD. Fl. Tjib. 3² (1918) 37; DANGUY in Fl. Gén. I.C. 3 (1922) 8; KERN, Reinw. 1 (1951) 115. — *V. forbesii* var. FAWC. in FORBES, Wand. (1885) 507. — *V. cylindricum* HAM. ex D. DON *sensu* REHDER in SARGENT, Trees & Shrubs 12 (1908) 112; BACKER, Bekn. Fl. Java em. ed. 8 (1949) fam. 175, p. 3.—Fig. 4a-f.

Shrub or small tree up to 15 m. Young parts thinly stellate-pubescent. Leaves coriaceous, somewhat shining, glabrous above, often bearded in the nerve-axils on the underside, ovate to lanceolate, 10-24 by 4-8 cm, apex mostly gradually long-acuminate, base rounded or somewhat acute, margins superficially remotely dentate to rather densely serrate-dentate, sometimes almost entire; primary nerves 5-7 on each side, indistinctly anastomosing; petiole 2½-4 cm. Inflorescence umbellate, corymbiform, up to 10 cm across; axes thinly stellate-pubescent; peduncle short, up to 2½ cm; primary rays 5-7. Bracts and bracteoles small, ovate. Flowers somewhat scented. Calyx-limb obscurely toothed, 1½-2 mm diam., teeth triangular, acute. Corolla tubular, ellipsoid-obovoid in bud, creamy white to white, sometimes pink without, usually dotted with brown; tube 3-4 mm, lobes erect, rounded trian-

gular, 1 mm. Stamens exserted; filaments with inflexed top in bud, white, adnate to the corollatube ½-1 mm above the base, about 4 mm long; anthers oblong, purplish, 1-1½ mm. Ovary cylindrical, glabrous or lepidote, 1½-2 mm long. *Drupe* ovoid to broad-ellipsoid or nearly spheric, slightly compressed, bluish black, 6-6½ by 5-6 mm; endocarp undulate in cross-section, dorsally 2-grooved, ventrally 3-grooved, lateral grooves often obsolete.

Distr. SE. Asia, in *Malaysia*: Sumatra, Java, Lesser Sunda Islands (Bali, Lombok, Flores, Timor).

Ecol. In open primary and secondary forests, especially in forest borders, sometimes in brushwood or in grassy plains, from 1000 (especially 1500) m upward, often common and one of the pioneers in natural reafforestation. *Fl. fr.* Jan.-Dec.

Vern. Often noticed names: *kiapu*, *kikukuran*, *S*, *te mentilan*, *meniran*, *J*.

Notes. Extremely variable in all its parts, mainly in leaf shape.

var. longiflorum KERN, *l.c.* Tube of corolla 6-7 mm long, lobes 1 mm. Filaments about 6 mm long, adnate to the corolla 2-3 mm above the base.

Distr. *Malaysia*: Sumatra (Eastcoast).

2. *Viburnum beccarii* GAMBLE, J. As. Soc. Bengal 72² (1903) 114; HALLIER *f. Med.* Rijksherb. 14 (1912) 37; RIDL. J. Fed. Mal. St. Mus. 8 (1917) 44; Fl. Mal. Pen. 2 (1923) 2; KERN, Reinw. 1 (1951)



Fig. 4. *Viburnum coriaceum* BL. a. Flowering twig, b. flower, c. ovary, d. aestivation of stamen, e. fruit, f. cross-section through fruit,—*V. sambucinum* BL., g. flower, h. aestivation of stamen,—*V. odoratissimum* KER, i. flower, j. cross-section through fruit,—*V. lutescens* BL., k. cross-section through fruit.

120, f. 2.—*Viburnum* sp. MERR. Contr. Arn. Arb. 8 (1934) 164.

Sprawling or climbing shrub or small tree up to 8 m. *Leaves* coriaceous, upper side glabrous, under side minutely gland-dotted and with a distinct glandular pit at the base on both sides of the midrib, often smaller glands in the nerve-axils; elliptic, obovate or ovate, 8–15 by 5–8 cm, apex obtuse or shortly and bluntly acuminate, rarely somewhat emarginate, base cuneate to nearly rounded, margins entire; midrib prominent beneath, primary nerves much less prominent, 4–8 on each side, arcuately anastomosing; petioles 1½–3½ cm. *Inflorescence* corymbiform, umbellately branched, 6–12 cm across (in fruit up to 15 cm), young axes rather densely brown stellate-pubescent, glabrescent; peduncle rather stout, up to 12 cm; primary rays 5–8. Bracts and bracteoles small, linear-lanceolate, rusty stellate-pubescent. Calyx-limb cupular, obscurely lobed, minutely gland-ciliolate, otherwise glabrous. Corolla tubular, obovoid-ellipsoid in bud, white; tube 3–4 mm, lobes erect, rounded to rather acute, minutely gland-ciliolate, 1 mm. Stamens long-exserted, with inflexed top in bud, inserted at base of corolla, 7–8 mm; anthers oblong, purplish, about 2 mm. Ovary cylindrical, glabrous, 2 mm long. *Drupe* ovate, compressed, (young) bluish green, 9–10 by 6–7 mm. Endocarp undulate in cross-section, dorsally 2-grooved, ventrally 1-grooved.

Distr. *Malaysia*: Malay Peninsula (Perak, Pahang) and Sumatra (Atjeh, Eastcoast, Westcoast).

Ecol. In forests and thickets, 1100–1900 m.

3. *Viburnum glaberrimum* MERR. Philip. J.Sc. 4 (1909) Bot. 329; En. Philip. 3 (1923) 577; KERN, Reinw. 1 (1951) 122.

Small tree, nearly glabrous. *Leaves* coriaceous, shining, glabrous except for the bearded (or glandular pitted) nerve-axils on the underside, ovate or elliptic, (6–)8–15 by (3–)6–8 cm, apex broadly and obtusely acuminate to nearly rounded, base rounded or slightly decurrent-cuneate, margins entire or remotely undulate-dentate; nervation rather prominent beneath; primary nerves 6–8 on each side, anastomosing; petiole 2–4 cm. *Inflorescence* umbellate, corymbiform, 5–10 cm across, axes thinly stellate-pubescent, glabrescent; peduncle stout, 2–4 cm long; primary rays 5–7. Bracteoles very small, caducous before anthesis. Calyx-limb obscurely lobed. Corolla broad-tubular, obovoid in bud, glabrous, tube about 2½ mm, lobes erect, rounded, about 1½ mm. Stamens exserted; filaments adnate to base of corolla, in the flower-bud inflexed at the top, about 6 mm; anthers oblong, 1½–2 mm. Ovary cylindrical, glabrous, 1 mm long. *Drupe* ovate to nearly orbicular, compressed, 5 by 5 mm. Endocarp obscurely undulate in cross-section, with 2 shallow dorsal grooves and 1 shallow ventral groove.

Distr. *Malaysia*: Philippines (Luzon, Mindanao).

Ecol. In primary forests; altitude according to MERRILL (1909 l.c.) 300–450 m, according to MERRILL (1923) l.c., 1000–1400 m.

Note. Closely allied to *V. coriaceum*, which is unknown from the Philippines. The differences are presumably sufficient to justify specific separation. The corolla of *V. coriaceum* is more distinctly tubular, the corolla-bud more ellipsoid. The stamens of *V. glaberrimum* are inserted at the base of the corolla, those of *V. coriaceum* somewhat adnate to the tube; the filaments are 6 mm long, those of *V. coriaceum* reach this length only in some large-flowered specimens.

4. *Viburnum platyphyllum* MERR. Philip. J.Sc. 10 (1915) Bot. 284; KERN, Reinw. 1 (1951) 123, f. 3.—*V. pachyphyllum* MERR. *sphalm.* En. Philip. 3 (1923) 577.

Tall tree, nearly glabrous. *Leaves* firmly chartaceous to subcoriaceous, somewhat shining, pale olivaceous when dry, glabrous, ovate to oblong-ovate, 9–22 by 4–10 cm, apex gradually narrowed to the usually elongated and rather slender acumen, base obtuse to somewhat acute, margins entire to obscurely undulate; primary nerves 6–7 on each side, somewhat prominent beneath, indistinctly anastomosing, axils on the lower surface (often also axils of coarser secondary nerves) glandular-pitted; petioles 4–5 cm, of the smaller leaves 1–2 cm. *Inflorescence* large, umbellate, corymbiform, up to 18 cm across, axes thinly stellate-pubescent, glabrescent; peduncle 4–6 cm long; primary rays about 7. Flowers numerous, fragrant. Calyx-limb with short but distinct triangular teeth. Corolla globular in bud, when open shortly tubular to somewhat turbinate, gradually slightly widened towards the top, white, glabrous, tube 2–2½ cm, lobes erect, rounded, 1½–2 mm. Stamens exserted; filaments inserted at base of corolla, in the flower-bud with inflexed top, sometimes moreover with a distinct fold in the lower part, 6–7 mm; anthers oblong, 2 mm. Ovary cylindrical, glabrous, 1 mm long. *Drupe* oblong-ovate, compressed, 8–9 by 6 mm. Endocarp slightly undulate in cross-section, with 2 dorsal grooves and 1 ventral groove.

Distr. *Malaysia*: Philippines (Leyte).

Ecol. In forests, at about 500 m.

Note. Very closely allied to *V. glaberrimum*, from which it is possibly not specifically different. The main differences are the much larger leaves with slender acumen (also smaller-leaved forms occur), the more distinct calyx-teeth, the shape of the corolla (widened to the top, in *V. glaberrimum* broad-tubular) and the larger fruits.

5. *Viburnum cornutidens* MERR. Philip. J.Sc. 26 (1925) 491; En. Philip. 4 (1926) 251; KERN, Reinw. 1 (1951) 125.

Small, glabrous tree, about 5 m high. *Leaves* thickly coriaceous, shining, olivaceous or brownish olivaceous, obovate to elliptic, 10–14 by 7–10 cm, apex rounded to shortly and obtusely acuminate, base acute, margins conspicuously crenulate-dentate, teeth straight, obtuse, 1–2 mm long, chiefly terminating the primary nerves, these about 9 on each side, nearly straight, once (sometimes twice) forked, beneath with glandular pits in the axils; petioles 2–3½ cm long. *Infructescence* umbellate,

corymbiform, about 15 cm across; peduncle stout, about 5 cm long; primary rays 5-7. *Drupe* broadly ovate, compressed, 8 by 6-7 mm. Endocarp slightly undulate in cross-section, dorsally 2-grooved, ventrally 1-grooved.

Distr. *Malaysia*: Philippines (Luzon, only known from Mt Baudan).

Ecol. On forested slopes at \pm 1800 m.

Vern. *Manano* (Igorot).

Note. Flowers unknown. Like *V. platyphyllum* an ally of *V. glaberrimum*. The species is (sufficiently?) characterized by the thickly coriaceous, broad, dentate leaves and the broadly ovate fruits.

6. *Viburnum punctatum* HAM. ex D. DON, Prod. Fl. Nepal. (1825) 142; DC. Prod. 4 (1830) 324; CLARKE in Hook. f. Fl. Br. Ind. 3 (1880) 5; DANGUY in Fl. Gén. I.C. 3 (1922) 12; KERN, Reinw. 1 (1951) 127.—*V. acuminatum* WALL. ex DC. Prod. 4 (1830) 325; W. & A. Prod. 1 (1834) 388; WIGHT, Icones 3 (1845) 13, t. 1021.

Shrub or small tree up to 18 m. Young parts densely covered with minute, rusty-coloured, peltate scales, leaving numerous punctiform scars when they fall off. *Leaves* coriaceous, upper surface glabrous, underside densely covered with minute scales, neither bearded nor glandular-pitted in the nerve-axils, elliptic-lanceolate to lanceolate, 5-13 by 2-4½ cm, apex bluntly acuminate, base attenuate, margins entire; primary nerves 5-7 on each side, rather prominent beneath, anastomosing; petioles 1-1½ cm. Inflorescence umbellate, corymbiform, 5-10 cm across (infructescence up to 15 cm), axes densely squamulate; peduncle very short, 1-3 cm; primary rays 3-5. Bracts and bracteoles minute, ovate-lanceolate, fimbriate. *Flowers* fragrant, about 5 mm wide. Calyx-teeth ovate-triangular, obtuse, light-margined, squamulate, about ¾ mm long. Corolla white, glabrous within, squamulate without, globular in bud, nearly rotate (only slightly campanulate) when open, tube 1 mm, lobes broad-ovate, rounded, somewhat overlapping, 2 mm. Stamens somewhat exserted; filaments in bud with inflexed top, inserted near base of corolla, 3-4 mm; anthers elliptic, 1 mm. Ovary cylindrical, lepidote, 1½-2 mm long. *Drupe* elliptic or slightly obovate, much compressed, young squamulose, ripening black, 9-11(-12) mm by 6-7 mm. Endocarp undulate in cross-section, with 2 dorsal and 3 ventral grooves.

Distr. SE. Asia, from Nepal, Kumaon and the Deccan to Siam and Indochina, in *Malaysia*: N. Sumatra (Atjeh), twice collected.

Ecol. Secondary growths, 800-1000 m.

7. *Viburnum sambucinum* BL. Bijdr. 13 (1826) 656; DC. Prod. 4 (1830) 325; Miq. Fl. Ind. Bat. 2 (1856) 120; HASSK. Bonpl. 7 (1859) 170; OERSTED, Vid. Meddel. Kjöb. 1860 (1861) 299, t. 7, f. 11-13; CLARKE in Hook. f. Fl. Br. Ind. 3 (1880) 5, 671; K. & V. Bijdr. 5 (1900) 40; GAMBLE, J. As. Soc. Bengal 72² (1903) 113; KOORD. Exk. Fl. 3 (1912) 285; KOORD. Fl. Tjib. 3² (1918) 38; MERR. J. Str. Br. Roy. As. Soc. 86 (1921) 582; DANGUY in Fl. Gén. I.C. 3 (1922) 11; RIDL. Fl. Mal. Pen. 2 (1923) 1; CORNER, Way-

side Trees (1940) 183; BACKER, Bekn. Fl. Java, em. ed. 8 (1949) fam. 175, p. 4; KERN, Reinw. 1 (1951) 129.—*V. integerrimum* WALL. Cat. 457; Hook. f. & Th. J. Linn. Soc. 2 (1858) 176.—*V. forbesii* FAWC. in FORBES, Wand. (1885) 506, excl. var.—Fig. 4 g-h, 5.

Shrub or small tree, up to 10-(15) m. Young branchlets densely stellate-pubescent. *Leaves* more or less coriaceous, glabrous except for a few hairs on the nerves and the bearded nerve-axils at the underside (see var. 2), here with an often indistinct spotty gland at the base on both sides of midrib, elliptic-oblong to oblong-lanceolate, 10-25 by 5-10 cm, apex abruptly short-acuminate, base cuneate, margins entire; nervation rather prominent beneath; primary nerves 5-7 on each side, anastomosing; petioles up to 4 cm long. *Inflorescence* densely many-flowered, umbellate, corymbiform, up to 15-18 cm across, axes densely stellate-pubescent; peduncle stout, 4-6 cm long; primary rays 6-8. Bracts and bracteoles small, linear-lanceolate, stellately pubescent. *Flowers* small, 3-4 mm diam., very fragrant. Calyx-limb with ovate-triangular, acute, ciliate lobes, ¾-1 mm long. Corolla rotate or campanulate, globular in bud, white or creamy, tube 1(-1½) mm, lobes spreading, ovate, rounded, (1-)-1½(-2) mm, usually tube somewhat shorter than lobes, not rarely the reverse. Stamens long-exserted; filaments almost filiform, serpentine in bud, inserted at base of corolla, (4-)-5-7(-9) mm; anthers elliptic to oblong, ¾-1 mm. Ovary cylindrical, usually densely hairy, 1-1½ mm long. *Drupe* ovate, much compressed, young thinly hairy, glabrescent, ripening bluish black, (7-)-9(-10) by (5-)-6(-7) mm. Endocarp undulate in cross-section, dorsally 2-grooved, ventrally 3-grooved, lateral ventral grooves often obsolete.

Distr. Cambodia, in *Malaysia*: chiefly in the western part, often frequent, Malay Peninsula, Sumatra, Borneo, Java (rare in the central and eastern part), Lesser Sunda Islands, Celebes and the Moluccas, but here presumably very rare (Ceram).

Ecol. Open primary and secondary forests, in brushwood, particularly at forest-edges in the lower mountain zone (up to 1800 m), occasionally in swampy places in the lowlands. *Fl. fr.* Jan.-Dec.

Vern. *Ki kukuran*, *ki bewog*, *S*, *bleber*, *J*, and many other local names.

var. *subglabrum* KERN, Reinw. 1 (1951) 130.—*V. longistamineum* RIDL. J. Fed. Mal. St. Mus. 6 (1915) 151; Fl. Mal. Pen. 2 (1923) 2; SYMINGTON, J. Mal. Br. R. As. Soc. 14³ (1936) 353. Inflorescence small, 5-7 cm across. Axes of inflorescence and ovary subglabrous.

Distr. *Malaysia*: Malay Peninsula, 1100-1800 m.

var. *tomentosum* HALLIER f. Med. Rijksherb. 14 (1912) 36; KERN, Reinw. 1 (1951) 130, f. 4.—*V. sumatranum* MIQ. Fl. Ind. Bat. Suppl. (1860) 537.—*V. villosum* RIDL. J. Str. Br. Roy. As. Soc. no 61 (1912) 10; Fl. Mal. Pen. 2 (1923) 2.—*V. inopinatum* CRAIB,



Fig. 5. *Viburnum sambucinum* BL. G. Pantjar, West Java (DE VOOGD).

Kew Bull. (1911) 385; DANGUY in Fl. Gén. I.C. 3 (1922) 10.

Underside of the full-grown leaves softly villous by simple, forked and stellate hairs.

Distr. Siam, in *Malaysia*: Malay Peninsula (Selangor), Sumatra (especially in the northern half), the typical form probably restricted to higher altitudes, 800–1200 m.

8. *Viburnum hispidulum* KERN, Reinw. 1 (1951) 136, f. 5.

Tree up to 24 m. *Leaves* coriaceous, dull, glabrous above or somewhat hispidulous on midrib and primary nerves, hispidulous beneath, especially on midrib and primary side-nerves, punctulate, neither glandular-pitted nor bearded in nerve-axils, elliptic to elliptic-oblong or obovate, 12–17 by 8–9 cm, apex abruptly shortly and bluntly acuminate (acumen up to 5 mm), base cuneate to broadly cuneate, margins entire; nervation prominent beneath; primary nerves 5–7 on each side, anastomosing; petioles 2–6 cm. *Inflorescence* umbellate, corymbiform, 10–15 cm across; peduncle short, up to 5 cm; primary rays 6–7; bracteoles firm, ovate to lanceolate, gland-dotted, ciliate, 4–6 mm long. *Calyx*-limb cupular, glabrous, obscurely lobed, 1 mm long. *Corolla* (creamy) white, globular in bud, rotate-cupular when open, tube 1(–1½) mm,

lobes ovate to oblong, 2–2½ mm. Stamens much exerted; filaments thick, serpentine in bud, inserted at base of corolla, 9–10 mm; anthers oblong, 2 mm. *Ovary* cylindric, lepidote, 1½ mm long and thick. *Drupe* oblong-elliptic to slightly obovate, compressed, 9–10(–11) by 6–7 mm. *Endocarp* undulate in cross-section, dorsally 2-grooved, ventrally 3-grooved.

Distr. *Malaysia*: Br. N. Borneo (Mt Kinabalu), ± 2000 m.

Note. Differs from *V. vernicosum* mainly by its dull hispidulous leaves, the absence of glandular pits at the leaf-base and the rotate-cupular corolla.

9. *Viburnum vernicosum* GIBBS, J. Linn. Soc. 42, Bot. (1914) 86; MERR. En. Born. (1921) 582; KERN, Reinw. 1 (1951) 139, f. 6.

Shrub or small glabrous tree, up to 10 m. Young parts very shining, vernicose. *Leaves* coriaceous, shining, chiefly on underside densely punctulate and gland-dotted, beneath with distinct glandular pit at the base on both sides of midrib and often smaller ones in higher nerve-axils, elliptic to slightly obovate, 12–18 by 6–11 cm, apex shortly and abruptly acuminate (acumen up to 1 cm long), base acute, margins entire; primary nerves 5–7 on each side, prominent beneath, anastomosing. *Petioles* 1–3 cm. *Inflorescence* umbellate, corymbiform, up

to 11 cm across; peduncle stout, up to 6 cm long; primary rays 5-7; bracteoles firm, oblong to lanceolate, with membranous margins, gland-dotted, 5-7 mm long. Calyx-limb obscurely lobed. Corolla creamy white, gland-dotted on outside, turbinate, obovoid in bud, tube $2\frac{1}{2}$ -3 mm, lobes erect, rounded triangular, $1\frac{1}{2}$ -2 mm. Stamens much exserted; filaments thick, serpentine in bud, inserted at base of corolla, (8-9)-10 mm; anthers oblong, 2 mm. Ovary cylindrical, lepidote, vernicose, 1- $1\frac{1}{2}$ mm long. *Drupe* ovate, compressed, purplish black, 10 by 7-8 mm. Endocarp undulate in cross-section, (often irregularly) 2-grooved on dorsal side, 3-grooved on ventral side, lateral grooves often nearly absent.

Distr. *Malaysia*: Borneo.

Ecol. Primary and secondary forests, 900-2700 m.

Note. Very polymorphous species. The above description refers to what presumably may be called the common form. Specimens with larger, elliptic fruits (12-14 by 7-8 mm), others with broad-elliptic leaves (14-16 by 9-11 cm) were also collected.

10. *Viburnum lutescens* BL. Bijdr. 13 (1826) 655; DC: Prod. 4 (1830) 325; MAXIM. Mém. Biol. 10 (1880) 651; GAMBLE, J. As. Soc. Bengal 72 (1903) 114; KOORD. Exk. Fl. 3 (1912) 286; KOORD. Fl. Tjib. 3² (1918) 38; RIDL. Fl. Mal. Pen. 2 (1923) 2; CORNER, Wayside Trees (1940) 183; BACKER, Bekn. Fl. Java em. ed. 8 (1949) fam. 175, p. 5; KERN, Reinw. 1 (1951) 142.—*V. monogynum* BL. Bijdr. 13 (1826) 655.—*V. sundaicum* MIQ. Fl. Ind. Bat. 2 (1856) 121; K.&V. Bijdr. 5 (1900) 43.—*V. colebrookianum* (non WALL.) DANGUY, Fl. Gén. I.C. 3 (1922) 9.—?*V. elegans* JUNGH. Nat. Gen. Arch. 2 (1845) 36.—Fig. 4k.

Shrub or small tree, up to 10 m, usually much lower. Youngest parts thinly stellate-pubescent. *Leaves* thinly coriaceous, upperside glabrous, underside thinly stellate-pubescent to almost glabrous, very variable in shape, broad-elliptic, ovate or oblong-elliptic, up to 18 by 10 cm, apex short-acuminate, base nearly rounded to cuneate, margins in upper $\frac{2}{3}$ coarsely crenate-serrate to finely serrate, teeth shortly mucronate, lower $\frac{1}{3}$ entire or superficially dentate; nervation rather prominent beneath; primary nerves 5-8 on each side, indistinctly anastomosing; petioles 1-2 cm. *Inflorescence* terminal or spuriously lateral, paniculate, short-pyramidal, 5-9 cm across, 5-7(-10) cm long; axes stellate-pubescent, glabrescent; primary branches 4-7, verticillate. Bracts and bracteoles minute, stellate-pubescent. *Flowers* somewhat fragrant, 4-5 mm wide. Calyx-teeth ovate-triangular, $\frac{3}{4}$ mm long. Corolla globular in bud, nearly rotate (only slightly campanulate) when open, creamy white, glabrous, tube $\frac{3}{4}$ -1 mm, lobes ovate, rounded, $1\frac{1}{4}$ - $1\frac{1}{2}$ (-2) mm. Stamens somewhat exserted, filaments inserted near base of corolla, in bud with inflexed top, white, 2-3 mm; anthers elliptic, sordidly white, 1 mm. Ovary cylindrical, glabrous, 1- $1\frac{1}{2}$ mm long. *Drupe* oblong-ellipsoid, somewhat oblique, slightly compressed, ripening

purplish-black, 7-10 by 4-5 mm (rarely 11-12 by 7-8 mm: Borneo, Malay Penins.). Endocarp undulate in cross-section, with 2 dorsal and 1 ventral groove.

Distr. SE. Asia, in *Malaysia*: Malay Peninsula (local), Borneo (few times), Sumatra, Java, Lesser Sunda Islands (Bali, Lombok).

Ecol. Primary and secondary forests, brushwood, often common but scattered, usually 500-1500 m, rarely lower (-150 m) or higher (one record of 2400 m from Mt Patuha). *Fl. fr.* Jan.-Dec.

Vern. Many native names have been recorded, e.g. *ki rantja*, *ki kukuran*, *ki bewog*, Sd, *tjèrè*, *wuru watu*, J, *kapor-kaporan*, *porkaporan*, Md, *kaju nassi* (Sum.).

Uses. Sometimes cultivated as a hedgeplant, easily propagated by cuttings. Ripe fruits are readily eaten by birds.

11. *Viburnum junghuhnii* MIQ. Fl. Ind. Bat. 2 (1856) 123; K. & V. Bijdr. 5 (1900) 47; KOORD. Exk. Fl. 3 (1912) 286; BACKER, Bekn. Fl. Java 8 em. ed. (1949) fam. 175, p. 4; KERN, Reinw. 1 (1951) 147, f. 7.—*V. lutescens* (non BL.) HALLIER f. Med. Rijks-herb. 1 (1911) 15 p.p.

Subarborescent shrub or small tree, up to 18 m. *Leaves* coriaceous, broad-elliptic, obovate-elliptic to nearly lanceolate, apex rounded or shortly acuminate, base more or less attenuate, closely crenate-dentate, teeth apiculate, glabrous, (4-8)- $12\frac{1}{2}$ by 3-6 cm; nervation very prominent beneath; primary nerves 5-7 on each side, anastomosing; petioles $1\frac{1}{2}$ - $2\frac{1}{2}$ (-4) cm. *Inflorescence* terminal or pseudolateral, paniculate, short-pyramidal, up to 5 cm long and 8 cm wide; lower ramifications 3-5 nately whorled, upper ones alternate; peduncle 3-6 cm; bracteoles small, lanceolate to ovate. *Flowers* fully 5 mm wide, fragrant. Calyx-limb 1 mm long, distinctly toothed, teeth ovate-triangular. Corolla creamy white, globular in bud, rotate-campanulate when open, glabrous, tube short, fully 1 mm, lobes up to 2 mm, ovate, rounded. Stamens hardly exserted; filaments in bud with inflexed top, inferior part adnate to corolla $\frac{1}{2}$ -1 mm, free part $1\frac{1}{2}$ -2 mm; anthers elliptic, 1 mm. Ovary cylindrical, glabrous, 2 mm long. *Drupe* obovoid, 7-9 by 5-6 mm, compressed. Endocarp in cross-section slightly undulate and with strongly incurved edges, ventral side therefore deeply intruding, embracing a broad, bilobate cavity.

Distr. *Malaysia*: Sumatra (Westcoast: Mt Korintji), Java.

Ecol. Forests, 2300-2600 m.

12. *Viburnum amplificatum* KERN, Reinw. 1 (1951) 150, f. 8.—*Viburnum sp.* MERR. Pl. Elm. Born. (1929) 297.

Shrub-like tree. *Leaves* thinly coriaceous, dull, dark olivaceous above, brown beneath, glabrous, neither glandular pitted at the base nor bearded in the nerve-axils, elliptic-oblong to slightly obovate, up to 26 by 12-14 cm, apex abruptly short-acuminate (acumen rather blunt, $\frac{1}{2}$ -1 cm), base cuneate to somewhat rounded, margins entire, sometimes distantly and obscurely undulate; nervation prom-

inent beneath; primary nerves 5-7 on each side, anastomosing; petioles 2-4 cm. *Infructescence* umbellate, corymbiform, about 13 cm diam.; peduncle stout, about 7 cm; primary rays 7-8. *Drupe* oblong, very slightly dilated upwards, much flattened, with a distinct groove on both sides, black, 16 by 7 mm. Endocarp with broad longitudinal groove on the dorsal side, the incurved edges forming a deep, broad, in cross-section bilobate furrow on the ventral side.

Distr. *Malaysia*: Br. N. Borneo (Tawao).

Note. Flowers unknown. The species is readily recognizable by its large leaves and fruits and by the cross-section of the endocarp, reminding one of *V. junghuhnii*.

13. *Viburnum odoratissimum* KER, Bot. Reg. 6 (1820) t. 456; DC. Prod. 4 (1830) 326; CLARKE in HOOK. f. Fl. Br. Ind. 3 (1880) 7; MAXIM. Mém. Biol. 10 (1880) 645, 649; REHDER in SARGENT, Trees and Shrubs 2 (1908) 107; DANGUY in Fl. Gén. I.C. 3 (1922) 5; MERR. En. Philip. 3 (1923) 577; BACKER, Bekn. Fl. Java em. ed. 8 (1949) fam. 175, p. 3; KERN, Reinw. 1 (1951) 152, f. 9.—*V. hasseltii* MIQ. Fl. Ind. Bat. 2 (1856) 123; K. & V. Bijdr. 5 (1900) 46; KOORD. Exk. Fl. 3 (1912) 286.—*V. zambalense* ELM. Leaf. Philip. Bot. 9 (1934) 3181.—Fig. 4 i-j.

Shrub or small tree, sometimes up to 20 m, glabrous, only youngest parts with few stellate hairs. *Leaves* more or less coriaceous, dull or somewhat shining, glabrous or underside with few scattered stellate hairs and somewhat bearded in the nerve-axils, elliptic-oblong to oblong-lanceolate or obovate, 8-15 by 3-7 cm, apex shortly and bluntly acuminate, rarely rounded or emarginate, base attenuate, margins in the upper half obsolete (sometimes distinctly) toothed or nearly entire, cartilaginous; nervation prominent beneath; primary nerves 5-7 on each side, indistinctly anastomosing; petioles (1/2-1)-2 cm. *Inflorescence* paniculate, more or less elongated pyramidal, up to 10 cm long and wide, many-flowered; axes slightly stellate-pubescent; peduncle 2-5 cm, primary branches verticillate, divaricate; bracteoles linear-lanceolate, ciliate, 1-3 mm long. *Flowers* fragrant, 5-6 mm wide. Calyx-limb cupular, 1 mm long, teeth broad-triangular, glabrous or sparsely ciliate. Corolla obovoid to ellipsoid-obovoid in bud, shortly funnel-shaped-campanulate when open, creamy white, glabrous or sometimes with some stellate hairs on outside, tube gradually widened upwards, 2-3 mm, limb horizontally spreading, finally reflexed, lobes broad-ovate, rounded, somewhat overlapping, 2 mm. Stamens exerted, filaments adnate to corolla-throat, in bud with inflexed top, 2-3 mm; anthers oblong, 1 1/2-1 3/4 mm. Ovary glabrous, 1 1/2-2 mm long. *Drupe* ovoid, 6-7 by 4-5 mm, purplish-black. Endocarp dorsiventrally compressed and strongly incurved, edges nearly touching, ventral side strongly concave, embracing a cavity of 1 1/2-2 mm diam. Seed strongly compressed, falcate in cross-section, 1 mm thick.

Distr. Eastern India to Indo-China, E. China & Formosa, northward to Japan, in *Malaysia*: Philippines (Luzon, Mindoro, Panay, Negros, Ley-

te, Mindanao), Celebes. The record for W. Java (Mt Pangrango, KUHLE & VAN HASSELT) is presumably a misstatement; it has not been retraced there.

Ecol. Primary forests, ravines, thickets, etc., 1000-2000 m. *Fl. fr.* Jan.-Dec.

Note. The above description has only reference to the Malaysian form. The widespread species is extremely variable both in the shape of the leaves and in the flowers.

14. *Viburnum clemensae* KERN, Reinw. 1 (1951) 157, f. 10.

Small glabrous tree. *Leaves* coriaceous, dull, in dry state olivaceous above, yellowish or brownish green beneath, minutely papillose-rugulose all over (under the lens), underside glandular-pitted both in the axils of the primary and secondary nerves, elliptic to oblong-lanceolate or slightly obovate, 9-11 1/2 by 3 1/2-5 1/2 cm, often inequilateral and somewhat falcate, apex abruptly short-acuminate to nearly caudate, rarely rounded, base cuneate, margins entire, cartilaginous; nervation prominent beneath, primary nerves 4-5 on each side, anastomosing; petioles 1-2 1/2 cm. *Infructescence* nearly sessile, small (4-8 cm long), paniculate, lowest branches ternate, middle ones opposite, upper ones alternate. Bracteoles minute, lanceolate. *Drupe* ellipsoid or oblong-ovoid, not compressed, 10 by 6-7 mm, shining, calyx-teeth persistent, triangular, 3/4 mm long. Mesocarp thin, scanty fleshy. Endocarp strongly incurved, dorsal side orbicular in cross-section, edges touching, ventral side folded to an internal longitudinal crest 2-2 1/2 mm broad, slightly widened at the upper margin, here embracing a cavity of about 1/2 mm diam. Seed compressed, reniform in cross-section, 2 mm thick.

Distr. *Malaysia*: Br. N. Borneo (Mt Kinabalu).

Note. Flowers unknown. Easily distinguishable from *V. odoratissimum* by the minutely rugulose leaves and the smaller number of primary side-nerves, but mainly by the size of the fruit and the quite different cross-section of the endocarp.

15. *Viburnum propinquum* HEMSL. J. Linn. Soc. 23 (1888) 355; REHDER in SARGENT, Trees and Shrubs 2 (1908) 33, 133, pl. 115; MERR. En. Philip. 3 (1923) 578; KERN, Reinw. 1 (1951) 160.—*V. valerianicum* ELM. Leaf. Philip. Bot. 7 (1915) 2578.

Shrub. *Leaves* thinly coriaceous, glabrous except for the bearded axils of primary side-nerves on the underside, ovate to ovate-lanceolate, often somewhat falcate, 6-8-(11) by 2 1/2-4-(5 1/2) cm, apex acute to long-acuminate, base cuneate to broadly cuneate, margins on both sides 1/2-1(-2) cm above the base with an impressed small gland, nearly entire, only minutely and distantly serrulate, teeth reduced to mucros hardly 1/2 mm long; nervation prominent beneath, basal primary nerves nearly as prominent as the midrib (leaves therefore triple-nerved), more apical 2-3 pairs less prominent, all side-nerves anastomosing; petioles 1-2 cm. *Inflorescence* umbellate, corymbiform, (3-)-5-7 cm across, axes glabrous; peduncle short, 2(-5) cm; primary rays 5-7. Bracts and bracteoles minute, ovate, ciliate. Calyx-limb 1 mm long, obscurely lobed; lobes ovate, obtuse,

glabrous, about $\frac{1}{2}$ mm. *Corolla* whitish or yellowish green, 4 mm wide, campanulate-rotate, globular in bud; tube broad, scarcely 1 mm long, hairy within, lobes ovate to oblong, rounded, recurved in anthesis, $1\frac{1}{2}$ mm. Stamens exerted; filaments adnate near base of corolla, in bud with inflexed top, 2– $2\frac{1}{2}$ mm; anthers broadly elliptic, $\frac{3}{4}$ by $\frac{1}{2}$ mm. Ovary $\frac{3}{4}$ –1 mm long and wide, glabrous. *Drupe* globose-ovoid, bluish black, 4–5 by 4 mm. Mesocarp thin, scanty fleshy; endocarp thin, orbicular in cross-section, ventrally slightly 1-grooved. Seed ovoid; albumen deeply ruminated.

Distr. China (Hupeh) and Formosa, in *Malaysia*: Philippines (Luzon: Rizal, Benguet).

Ecol. Mossy forest, 2200–2450 m.

Notes. The triplernerved leaf with marginal glands (reminding one of those of *Vaccinium spp.*), the hairy corolla-tube, the achenoid drupe and the peculiar cross-section of the endocarp characterize this species; it stands isolated among the other Malaysian *Viburnums*. According to ELMER *l.c.* the strong odour, especially in cured specimens, is that of *Valeriana*. The same fact had already been stated by HALLIER in *V. sambucinum*, *V. coriaceum* and *V. lutescens*. VAN ITTALIE ascertained the presence of valerician acid in *V. sambucinum*. On this ground HALLIER supposed the close relationship of *Viburnum* with the *Valerianaceae* (Med. Rijksherb. 14 (1912) 36; *op. cit.* 37 (1918) 92).

16. *Viburnum luzonicum* ROLFE, J. Linn. Soc. 21 (1884) 310; VIDAL, Phan. Cuming. (1885) 117; Rev. Pl. Vasc. Philip. (1886) 147; REHDER in SARGENT, Trees & Shrubs 2 (1908) 97, pl. 146; MERR. Philip. J.Sc. 5 (1910) Bot. 391; DANGUY in Fl. Gén. I.C. 3 (1922) 13; MERR. En. Philip. 3 (1923) 577; KERN, Reinw. 1 (1951) 161.—*V. laxum* ELM. Leaf. Philip. Bot. 7 (1915) 2576.

Shrub 3–6 m high. Ultimate ramifications (often densely) ferruginous-pubescent. *Leaves* extremely variable, chartaceous to subcoriaceous, young ones pubescent by simple antrorse and stellate hairs, more or less glabrescent, 3–8(–13) by 2–5 cm, ovate to lanceolate, apex acute to long acuminate, base broadly cuneate to rounded, often inequilateral, margins almost entire to sinuate-dentate in upper part; nervation prominent beneath, often hidden by indument; primary nerves 5–7 on each side, usually terminating in teeth, lower ones anastomosing; petioles densely pubescent, $\frac{1}{2}$ –1 cm. *Inflorescence* terminal or spuriously lateral, umbellate, corymbiform to semi-globose, 3–5 cm across, axes densely ferruginous pubescent; peduncle very short, up to 2 cm; primary rays 3–6. Bracts and bracteoles small, lanceolate, pubescent and ciliate,

1–2 mm. *Flowers* slightly odorous, 3–5 mm wide. Calyx hardly 1 mm long, deeply lobed, lobes ovate-lanceolate, pubescent. *Corolla* rotate, globular in bud, creamy white or somewhat pink, strigose and stellate-pubescent without, glabrous within, tube very short ($\frac{1}{2}$ mm), lobes elliptic-oblong, rounded, $1\frac{1}{2}$ –2 mm. Stamens exerted, but shorter than corolla-lobes; filaments adnate to base of corolla, $1\frac{1}{2}$ –2 mm; anthers broadly elliptic, yellow, $\frac{1}{2}$ – $\frac{3}{4}$ mm long. Ovary cylindrical, densely pubescent, 1 mm long. *Drupe* ovate, much compressed, red (or ripening black?), (5–)6–7 by 5–6 mm. Endocarp slightly undulate in cross-section, the 2 dorsal and 3 ventral grooves often obsolete.

Distr. China & Indo-China to Formosa, in *Malaysia*: Philippines, Moluccas (Buru).

Ecol. Thickets and forests, 800–2200 m. *Fl. fr.* Jan.–Dec.

Vern. Many local names have been noticed, e.g. *atãba*, *tilba* (Ig.), *atiba* (Bon.), *bangas-bangas* (Bag.), *bagiroro* (Bik.), *putud* (Gad.).

var. apoense ELM. Leaf. Philip. Bot. 7 (1915) 2577; MERR. En. Philip. 3 (1923) 577; KERN, Reinw. 1 (1951) 162.

Leaves subcoriaceous, nearly glabrous except for midrib, ovate-lanceolate, apex long-acuminate, acumen often falcate, margins nearly entire; primary nerves often anastomosing.

Distr. *Malaysia*: Philippines (Luzon?, Mindanao).

Vern. *Angganasi*, *atadatud* (Buk.), *bangas-bangas* (Bag.).

var. floribundum (MERR.) KERN, Reinw. 1 (1951) 163.—*V. floribundum* MERR. Philip. J.Sc. 4 (1909) Bot. 328; En. Philip. 3 (1923) 577.

Leaves chartaceous, nearly glabrous except for midrib and primary nerves, ovate, apex acute to shortly acuminate, margins rather strongly dentate in upper half, primary nerves for the greater part terminating in teeth.

Distr. *Malaysia*: Philippines (Luzon).

var. sinuatum (MERR.) KERN, Reinw. 1 (1951) 163.—*V. sinuatum* MERR. Gov. Lab. Publ. 35 (1906) 65; Philip. J.Sc. 1, Suppl. (1906) 137; En. Philip. 3 (1923) 578.

Leaves oblong-ovate, apex slenderly acuminate, acumen usually falcate, margins coarsely sinuate-dentate; otherwise as *var. floribundum*.

Distr. *Malaysia*: Philippines (Luzon, Negros), Moluccas (Buru).

Vern. *Taringongog* (Neg.).

3. SAMBUCUS

LINNÉ, Sp.Pl. (1753) 269; Gen. Pl. (1754) p. 130, no 334; MILLER, Ber. D.B.G. 2 (1884) 452; FRITSCH, Oesterr. B.Z. 39 (1889) 214; DAMMER, *ibid.* 40 (1890) 261; HÖCK, Bot. Centr. Bl. 51 (1892) 233; FRITSCH, *ibid.* p. 81; in E. & P. 4, 4 (1897) 157; SCHWERIN, Mitt. Deut. Dendr. Ges. (1909) 1–56; *op. cit.* (1920) 194.

Trees, shrubs, or erect herbs. Stem and branches pithy, nodes often with stipule-

like appendages. *Leaves* imparipinnate, or incompletely bipinnate, rarely laciniate. Leaflets serrate or divided, opposite or alternate. *Flowers* actinomorphic, articulated with the pedicel, mostly white, in terminal, flat or convex corymbs; flowers sometimes dimorphic: gynodioecious, or part of them aborted into nectarial glands. Bracts mostly absent. Bracteoles 1 or absent. Calyx-tube short, limb 5-parted. *Corolla* rotate, 5-lobed, lobes valvate or imbricate(?). Stamens 5, inserted on the base of the corolla; filaments filiform, erect; anthers oblong, latrorse, cells free, attached in the middle. Ovary 3-5-celled, each cell with 1 ovule; stigmas 3 or 5, short, broad, on a cushion-like style. *Berry* 3-5-seeded. Seeds with \pm flat sides, back convex, granulate, embryo \pm as long as the seed, terete.

Distr. *Ca* 10-20 spp., throughout the globe, absent from Oceania, S. & Central Africa, and Australia (except its E. part and Tasmania), centering in the N. hemisphere.

Uses. None of the various medicinal uses ascribed to the elder in Europe, Asia, and America is known from Malaysia.

Notes. The discrimination of the specific characters as given by VON SCHWERIN is not very satisfactory, specially if only herbarium materials are available. Though the colour of the berry varies rather in several species, it is sometimes accepted for specific delimitation between others. Leaf-shape and indumentum represent variable characters. The size and shape of the seeds may furnish additional specific characters (cf. fig. 1). Among *Caprifoliaceae* it seems that *Sambucus* represents the closest relation to *Valerianaceae*.

Some specimens show well-developed stipules; these are hairy inside towards the base but do not possess collectors.

KEY TO THE SPECIES

1. Corymbs with a number of flowers aborted into top-shaped, mostly yellow nectaries. Seeds ovate.
 1. *S. javanica*
1. Corymbs without such nectaries. Seeds oblong.
 2. Upper 1-2 pairs of leaflets sessile-adnate. Leaves simply pinnate. Berry oblong . . . 3. *S. adnata*
 2. Upper leaflets not adnate. Leaves often bipinnate. Berry globular 2. *S. canadensis*

1. *Sambucus javanica* REINW. ex BL. Bijdr. 13 (1826) 657; DC. Prod. 4 (1830) 322; HASSK. Flora 28 (1845) 243; BLANCO, Fl. Filip. (1845) 151, ed. 3, 1 (1877) 271; MIQ. Fl. Ind. Bat. 2 (1856) 124; HK. f. & TH. J. Linn. Soc. Bot. 1 (1857) 180; HOOK. f. Fl. Br. Ind. 3 (1880) 2; BOERL. Handl. 2 (1891) 3; KOORD. Minah. (1898) 492; HUTCH. Kew Bull. (1909) 193; HALL. f. Med. Rijksherb. 14 (1912) 38; KOORD. Exk. Fl. 3 (1912) 285; BUYSMAN, Flora 106 (1914) 115; BOLD. Zakfl. (1916) 43; MERR. Sp. Blanc. (1918) 370; SCHWERIN, Mitt. Deut. Dendr. Ges. 18 (1909) 41, *ibid.* (1920) 222, incl. *var. borealis* SCHWER., *var. formosana* (NAKAI) SCHWER. & *var. meridionalis* SCHWER.; LÖRZING, Trop. Natuur 10 (1921) 103, f. 6; WELSEM, *op. cit.* 181-183; BACK. & SLOOT. Theonkr. (1924) 211; MOORE, J. Bot. (1924) 46; MERR. En. Philip. 3 (1923) 576; Contr. Arn. Arb. 8 (1934) 164; Comm. Lour. (1935) 375; P'EI, Bot. Bull. Ac. Sin. 1 (1947) 8; BACK. Bekn. Fl. Java em. ed. 8 (1949) fam. 175, p. 1.—*S. angustifolia* NORONHA, Verh. Bat. Gen. 5 (1790) 85, *nomen, cf. HASSK. l.c.*—*S. canadensis* (non L.) THUNB. Fl. Jap. (1784) 126; Fl. Jav. (1825) 5; HASSK. Cat. Hort. Bog. (1844) 117, an T. & B. *ibid.* (1866) 120?—*S. chinensis* LINDL. Trans. Hort. Soc. Lond. 6 (1826) 297; DC. *l.c.*; SCHEFF. Nat. Tijd. N.I. 34 (1874) 41.—*S. thunbergiana* BL. ex MIQ. Ann. Mus. L. B. 2 (1866) 265; KURZ, For. Fl. Burma 2 (1877) 3.—*S. hookeri* REHDER in SARG. Pl. Wils. 2 (1912) 308.—*S. formosana* NAKAI, Bot. Mag. Tokyo 31 (1917) 211.—*Ebulum formosanum*

NAKAI, J. Coll. Sc. Tokyo 31 (1917) 211.—Fig. 1f.

Little branched, more or less weedy, erect shrub 1-3½ m. Pith white. Twigs terete, nodes between the petioles often with recurved, rarely foliaceous, stipular appendages. *Leaflets* 2-6-jugate, higher ones often 1-3-foliolate, rachis often with foliaceous appendages at the base of the leaflets, uppermost leaflets very rarely adnate to the terminal leaflet and the rachis. Leaflets oblong to linear-lanceolate, shortly stalked to sessile, sometimes adnate to the rachis, base cuneate to cordate, symmetric to oblique, mostly opposite, rarely alternate, apex acuminate, shallowly serrate, lower teeth glandular-swollen, 7-22 by 1½-6½ cm; midrib and base of side-nerves hairy above, hairy or glabrous beneath. *Corymbs* flat-topped, 3-5-(7-) rayed, mostly hairy to subglabrous, with a foliate base, near the branching often with stalked glands. *Part of the fls* deformed into erect, stalked, yellow, orange or sometimes (?) green, top-shaped, persistent, nectaries, 3 mm diam., impressed at the top.¹ Pedicels 0-2 mm. Calyx-tube sulcate lengthwise, lobes triangular, acute, persistent, ½ mm. Corolla white or creamy, fragrant (as in *S. nigra*), (1½-2)2½-3½ mm long, lobes acute, valvate in bud, (1-2)-2½ mm. Filaments mostly \pm ½ mm, as long as the yellow anthers not exceeding the corolla-lobes, the latter spreading, rarely reflexed.

- (1) Not galls as DANGUY (F. Gén. I.C. 3, 1922, 4) supposes (*sic!*).

Stigmas 3, narrowed towards the apex. Ovary 3-celled, sulcate. Ripe berry ovoid, black, 3-seeded, 3-4 mm diam. Seeds ovate, pointed 2 mm long.

Distr. SE.-E. Asia, Japan, Formosa, in *Malaysia*: not E. of the line Philippines-Celebes-Lombok, but not yet found in the Malay Peninsula!

Ecol. Everwet primary and secondary forests, thickets, clearings, mostly in \pm shaded localities, (350-)700-2000 m, fl. fr. Jan.-Dec. The nectaries have been actually found to contain honey. The habit has been described as 'straggling', but this is certainly incorrect.

Vern. *Ki katumpang, ki tamblæg, ki tèspong, bëbëdjaran, S, mantjo, sèngitan, J, galamat, kalamat* (Ig.), *saucó* (Sp.), *sèlando* (Karo-Batak), *Javanse vlier, D, tatamaikang* (Minah.)

Notes. P'EI describes the fruits as red from China. It is quite possible that Malaysian specimens represent some varieties; e.g. I found in a specimen from Sumatra (DOCT. v. LEEUWEN 12831) the petals recurved and filaments twice as long as the anthers instead of as long as these. In hairy young infl. the flowers are mostly subsessile. Along with normal flowers I found sometimes stamens exposed in flowers with apparently aborted corollas. *S. javanica* is, apparently, the only representative of the section *Scyphidanthè* MIQ. *S. hookeri* REHD. does not appear to be different.

2. *Sambucus canadensis* LINNÉ, Sp.Pl. (1753) 269; DC. Prod. 4 (1830) 322; SCHWERIN, Mitt. Deut. Dendr. Ges. (1909) 35; *ibid.* (1920) 215; v. WELSEM, Trop. Natuur 10 (1928) 181-183, *cum ic.*; BRUGGEMAN, Ind. Tuinb. (1939) 263, f. 268; BACKER, Bekn. Fl. Java em. ed. 8 (1949) fam. 175, p. 2.—*S. bipinnata* MOENCH. Meth. Pl. (1794) t. 506, ?*non* SCHL. & CHAM. (1830).—Fig. 1d.

Shrub 1-3½ m, forming subterranean sprouts. Twigs with stipular glandular appendages on the nodes or not, 3-5-jugate, in the larger *leaves* the lowest 1-2 pairs of leaflets mostly 2-3-foliolate, rachis not rarely with small, gland-tipped, leafy appendages; leaflets opposite, ovate to lanceolate, base variable, apex acuminate, base of margin entire, above serrate, 4½-12 by 1½-4 cm; midrib hairy on both sides, underside hairy on the nerves. *Corymbs* 20-45 cm diam., convex, (4-)-5-rayed, \pm glabrous, axes purple. Pedicels 5-6 mm. Flowers feebly fragrant. Calyx-tube 1 mm high, hardly sulcate, lobes ovate, blunt, after anthesis appressed,

in fruit dark purple. Corolla creamy, 4-4½ mm, lobes blunt, often toothed, 3-3½ mm, imbricate in bud. Filaments small in bud, in anthesis 3 mm, spreading. Anthers yellow, oblong. Ovary 5-celled, stigmas 5. Berry globular, subapplanate, shiny black-purple, 4-5 mm diam., (4-)-5-seeded. Seeds \pm 2½ mm long, oblong-elliptic.

Distr. N. America, said to have been imported in Java as late as 1918 from Indochina by the Botanic Gardens, Bogor (v. WELSEM, *l.c.*), but rapidly dispersed in gardens throughout Malaysia as an excellent, often rich-flowering, ornamental.

Ecol. Cultivated, 200-1300 m, fl. Jan.-Dec. The flowers remain opened for several days, they do not produce honey in Java; easily propagated by cuttings; if cut twigs are partly defoliated, the infl. remains fresh for several days.

Vern. *Amerikaanse vlier, D, American elder, E.*

Notes. The differences between *S. canadensis* L. and *S. mexicana* PRESL ex DC. [Prod. 4 (1830) 322; STANDLEY, Tr. & Shr. Mexico (1926) 1395;—*S. bipinnata* SCHL. & CHAM. *Linnaea* 5 (1830) 171; CORNER, Wayside Trees (1940) 182, t. 40] seem slight and both *spp.* were considered conspecific by SARGENT. The main differences are apparently the oblong shape and sulcate surface of the berry in *S. mexicana*. The 2 specimens of *S. mexicana* I could examine had smaller flowers and more roundish anthers than those of *S. canadensis*.

3. *Sambucus adnata* WALL. ex DC. Prod. 4 (1830) 322; HOOK. f. Fl. Br. Ind. 3 (1882) 3; SCHWERIN, Mitt. Deut. Dendr. Ges. (1909) 41; P'EI, Bot. Bull. Ac. Sin. 1 (1947) 7.—Fig. 1e.

Distr. Himalaya to Chiná; ?E. Africa; mountains.

This species does not belong to \S *Scyphidanthè* MIQ. though SCHWERIN treated it as such; it is more related to *S. canadensis*. Entirely different from *S. javanica* by absence of nectaries, oblong-elliptic 2½-3 mm long seeds, apparently constantly 1-2 pairs of upper leaflets connate with the rachis, oblong and larger berries (type at Kew!). There is one specimen in Herb. Leiden (899.-69-80) said to come from Celebes, but the specimen consists of one leaf only and is too poor for proper identification. Its upper leaflets are adnate, but this is a feature also occurring, though very rarely, in *S. javanica*. I doubt the occurrence of *S. adnata*, which is a native of continental SE. Asia (India to China), in Malaysia.

4. CARLEMANNIA

BENTH. in HOOK. J. Bot. 5 (1853) 307; B. & H. Gen. Pl. 2 (1873) 63; HOOK. f. Fl. Br. Ind. 3 (1880) 85; BAILL. Hist. Pl. 7 (1880) 468; PITARD, Fl. Gén. I.C. 3 (1923) 167; SOLEREDER, Bull. Herb. Boiss. 1 (1893) 173-8; K. SCH. in E. & P. 4, 4 (1897) 31; SOLEREDER, Syst. Anat. Dik. Ergänzt. (1908) 173, HALLIER f. in JUST'S Bot. Jahrb. 36, 3 (1910) 221; Med. Rijksherb. no 1 (1910) 40; *ibid.* 14 (1912) 38; Arch. Néerl. Sc. Ex. Nat. IIIB, 1 (1912) 224; BREMEKAMP, Rec. Trav. Bot. Néerl. 36 (1939) 372.

Generally little-branched herbs, subglabrous or hairy, apparently erect. Inflorescence with sparse sessile or stalked, capitate-glandular hairs. *Leaves* mostly

obliquely elliptic, crenate-dentate, parenchyma apparently with glands at the underside. Petioles connected by a raised line, in which no interpetiolar stipule can be distinguished. *Flowers* white, yellowish or pink, in short-peduncled terminal sometimes also axillary corymbs. Calyx-tube globose, constricted at the apex; lobes 4-5, subequal or unequal, persistent. Corolla tubular, club-shaped in bud, circumsciss at the base, lobes 4, rather narrowly imbricate in bud, two outer two inner. *Stamens* 2, inserted in the middle of the tube, alternating with the lobes, dorsiflex, cohering in bud and enclosing the style; filaments short, terete or somewhat flattened, extending towards the corolla base but distinctly forming part of the corolla tube; anthers linear, latrorse, included in the tube, relatively large, opened already in bud, connective apiculate. Pollen granular. Disk annular-short-cylindric, consisting of two parts alternating with the ovarial cells, placed below the anthers. *Ovary* 2-celled, each cell with ∞ ovules inserted on a thick basal placenta. Style filiform, included, stigma clavate, erect, 2-fid. *Capsule* membranous, \pm globular, or more or less pyramidal, \pm inflated, and 4-lobed, each lobe with a few veins, 2-celled, loculicidally 2-valved. Seeds ∞ , minute, oval, testa smooth(?) or reticulated, albumen granular or horny, embryo minute at the top of the albumen (*ex auct.*).

Distr. Three *spp.*, Himalaya & Mishmi Hills, Tonkin, and Yunnan, in *Malaysia*: Sumatra.

Ecol. Montane forest plants.

Notes. For a discussion on the systematic position compare the notes at the head of the family. HALLIER, after having switched in a few years his opinion from *Gesneraceae* to *Saxifragaceae*, finally agreed with SOLEREDER assigning this genus to *Caprifoliaceae*.

Few figures exist of the genus; that of SCHUMANN is wrong. The flowers are 4-merous and the corolla is definitely imbricate in bud; the number of sepals may vary to 5. The relative large size of the stamens, their coherence in bud enclosing the style, the anther-cells shedding pollen in bud, point to an unusual anthesis, on which no field observations are available. The typical 'glassy' hairs, constricted apex of the calyx, and dorsiflexed anthers remind of a longitudinal section of the flower of *Dentella*, also a plant without interpetiolar stipules. The capitate-glandular hairs, typical cymose infl. and symmetric flower point towards *Lonicera*, the reduction in the androecium, unknown or extremely rare in *Rubiaceae*, to *Valerianaceae* acc. to BREMEKAMP.

1. *Carlemannia tetragona* HOOK. *f.* Fl. Br. Ind. 3 (1880) 85; DRAKE in MOROT, J. de Bot. 9 (1895) 215; PITARD, Fl. Gén. I.C. 3 (1923) 168, 159, *f.* 164-7 *incl. var. tonkinensis*.—*Carlemannia sumatrana* RIDL. J. Str. Br. R. As. Soc. 1 (1923) 66; STEEN. Bull. J.B.B. III, 13 (1934) 246; BREMEKAMP, Rec. Trav. Bot. Néerl. 36 (1939) 372.—*C. henryi* LÉV. in FEDDE, Rep. 13 (1914) 178.—Fig. 1c.

Puberulous delicate herb, 20-50 cm. Stems terete, older nodes articulated. *Leaves* membranous, ovate-oblong to lanceolate, base and apex acute to subacuminate, sparsely white-hairy on both sides, hairs relatively coarse, 4-9 by 1½-3¾ cm, primary nerves 5 pairs; petiole 2½ cm. *Corymbs* terminal, congested to dense, above 2 reduced spatulate leaves, \pm 2½ cm diam., puberulous, not or hardly exceeding the leaves, 7- to many-flowered, each pair with a reduced cyme at the base; peduncle 1-2 cm. *Fls* in pairs, only 1 narrow bract resembling the sepals; pedicels 1 mm; no bracteoles observed. Calyx tube hairy, 1 mm; lobes 4-5, linear, erect, hairy, 3-4 mm, exceeding the middle of the mature bud, in fruit 3-nerved, equal. *Corolla* hairy towards the tip by thick glassy hairs on a raised bulbous base, imbricated margins

and inside glabrous, prob. pale, 6-6½ mm, lobes slightly unequal, the larger ones ovate, rounded, \pm 1¾ by 1½ mm. Disk short-cylindric, ½ mm high, consisting of two parts, margin slightly crenate, lobes below the anthers. Filaments 1 mm, anthers 2½ mm, linear, opened in bud, their tip just reaching the throat of the corolla. Style filiform, its base fusiform-swollen above the disk, glabrous, 5 mm; stigmatic arms narrow, \pm 1 mm, fibrous, also in opened flowers often sticking to one of the anthers, not exceeding the stamens. *Capsule* 4-5 mm through, distinctly 4-lobed or 4-horny at the base, broader than high. Seeds ovate-oblong, hardly 1 mm, testa reticulate.

Distr. Mishmi Hills (NE. Himalaya), Tonkin, Yunnan in *Malaysia*: NE. Sumatra (mountains above Medan-Deli), apparently local.

Ecol. In forests, 1000-1300 m, *fl.* Dec.-July.

Notes. Allied to *C. griffithii* HOOK. *f.* which differs by oblong sepals, 1-2 mm, distinctly unequal, and not reaching the middle of the corolla, larger fls, shorter filaments and \pm globular fruit without distinctly stellate-spreading basal lobes. I have not seen the fruit lobes dehiscing as RIDLEY mentions. The size of the leaves by which the Indochinese variety was distinguished seems of little value. The

type material is in a slightly older state than the Sumatran specimens are, but I am perfectly satisfied about their identity.

Excluded

Lonicera GAERTN. = *Loranthaceae*.

Lonicera chinensis WATS., *L. confusa* DC., *L. javanica* DC., and *L. macrantha* DC. were mentioned to occur in the Philippines by F.-VILLAR, Nov. App. (1880) 104, but these records have been excluded by MERRILL, Gov. Lab. Publ. (Philip.) 29 (1905) 50; En. Philip. 3 (1923) 578.

Lonicera symphoricarpus (non L.) BLANCO, Fl. Filip. (1837) 161. = *Scurrula philippinensis* (CHAM. & SCHLECHT.) G. DON, cf. DANSER, Philip. J.Sc. 58 (1935) 121.

Viburnum zippelii MIQ. Fl. Ind. Bat. 2 (1856) 122; SCHEFFER, Ann. Jard. Bot. Btzg 1 (1876) 28; HAL-LIER f. Med. Rijksherb. 14 (1912) 36 = *V. japonicum* (THUNB.) SPR., wrongly recorded for New Guinea. Cf. KERN, Reinw. 1 (1951) 165.

Viburnum alternifolium ZOLL. & MOR. Syst. Verz. (1845-1846) 59 = *Ilex alternifolia* (ZOLL. & MOR.) LOES.