SYMPLOCACEAE (H. P. Nooteboom, Leyden)[1]

The family consists of one genus only, *Symplocos*, which occurred already in the Eocene over the entire northern hemisphere in the mixed mesophytic forest and in all probability also in the Indo-Australian tropics.

As proved by abundant fossil endocarps, the Eocene species had already a fruit structure very similar to that of now living species and the genus existed at that early time obviously already in *optima forma*, a reason to assume that it must be of high antiquity. This is also corroborated by the fact that the tropical subgenus *Symplocos* has a very disjunct trans-Pacific range; explanation by chance transoceanic long-distance dispersal must be refuted because it is in contradiction with all presently known facts.

Although *Symplocos* has shown a fairly abundant speciation, considering its present size and 25 fossil species described, it has surprisingly not led to other generic development and remained in splendid isolation.

Its systematic affinities induced mostly to classify it with *Ebenales*. In my monograph of the Old World species (1975) I have brought all evidence together and have concluded that this position is unlikely: pollen structure differs from that in other families of *Ebenales*, so do the stomata, the placentation and the structure of the ovules. This leads to the view that *Symplocos* is more allied to *Cornaceae* and *Theaceae*, sharing also with both families a primitive wood anatomy. Still the affinity is not that close, as for example *Theaceae* have a truly axile placentation. The chromosome number fits better with *Cornaceae sens. lat.*

SYMPLOCOS

JACQ. En. Fl. Carib. (1760) 5, 24; Select. Stirp. Am. Hist. (1763) 166, t. 175, f. 68; LINNÉ, Gen. Pl. ed. 6 (1764) 272; MIERS, J. Linn. Soc. Bot. 17 (1879) 285; BRAND, Pfl. R. Heft 6 (1901) 13, 9 fig.; NOOT. Leid. Bot. Ser. 1 (1975) 33, 7 fig., 21 pl., with full synonymy. — **Fig. 1–20.**

For synonyms see under the subgenera.

Shrubs to (rarely) large, (in Mal.) evergreen trees; bark in various *spp.* bitter; growth continuous or interrupted (in flushes), in the latter case the buds protected by often leathery bud-scales; glabrous or hairy (by simple hairs). *Leaves* simple, alternate or spirally arranged, rarely pseudoverticillate, estipulate, penninerved, petioled, rarely almost sessile; when dry often discolouring (often in yellow tinges)in *subg. Hopea. Flowers* in spikes, racemes, or panicles, mostly from the upper leaf-axils, sometimes condensed to clusters, sometimes terminal or from the axils of fallen leaves, rarely solitary; supported by a bract and 2 bracteoles, rarely several bracts and bracteoles by abortion of flowers; flowers actinomorphic, bisexual, rarely by reduction unisexual and plant polygamous, not rarely fragrant, distinctly so in *subg. Symplocos. Calyx* with a very short tube above the inferior ovary, the limb 3–5-lobed, imbricate, persistent, sometimes split into two parts and seemingly 2-lobed. *Corolla* sympetalous, but divided nearly to the base in *subg. Hopea*; lobes (3–)5(–10 in the New World), quincuncially imbricate, whitish, bluish or purplish. *Stamens* 4 to mostly ∞, connate in a long monadel-

(1) With co-operation of the General Editor.

phous tube, at its base adnate to the corolla and very unequal, but in *subg. Hopea* only connate at the very base, monadelphous or pentadelphous and then the bundles alternipetalous; anthers globose, 2-celled, lengthwise dehiscent, introrse. *Ovary* inferior (to ± semi-inferior), 2–5-celled, with a complete septation; style 1, stigma punctiform or peltate. *Ovules* 2–4 in each cell, pendulous, anatropous-epitropous or amphitropous, unitegmic, tenuicellular. *Drupe* monopyrenous, crowned by the persistent calyx lobes, of various shape: cylindrical to globose, ampulliform or spindle-shaped; mesocarp usually thin, sometimes thick and then often quite hard; stone smooth or mostly sculptured in various degree or lengthwise ridged. *Seeds* straight or curved, 1 in each developed cell, with copious endosperm; embryo straight or curved, with very short linear cotyledons.

Distribution. About 250 *spp.*, in the eastern parts of the Old World, from Ceylon and Bombay in the Deccan to Fiji in West Polynesia and from Manchuria at 46° N as far as New South Wales and Lord Howe I. at 32° S; in the New World from the State of Washington in the U.S.A. to S. Brasil; throughout *Malesia*. Fig. 1.

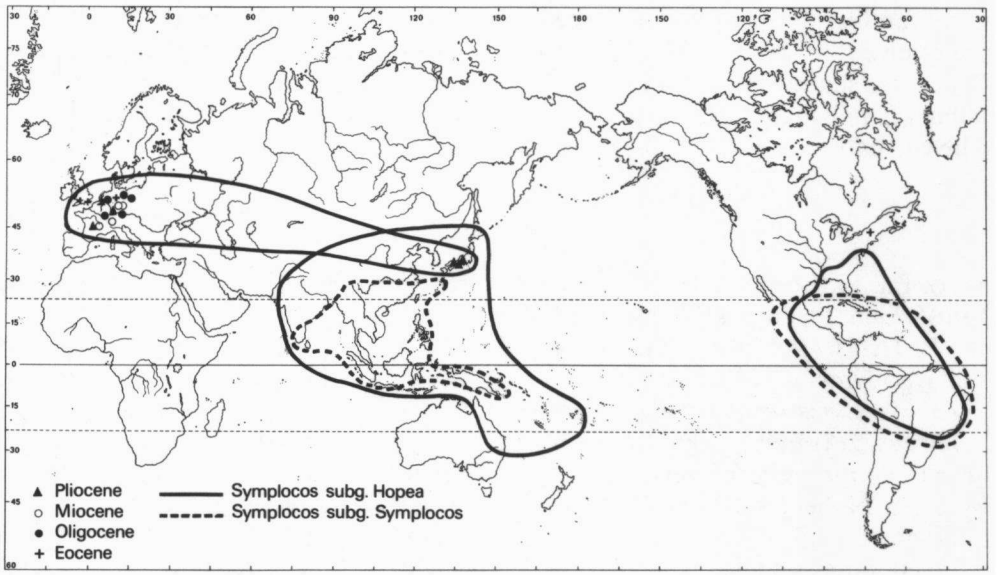

Fig. 1. Range of the genus *Symplocos*, recent and fossil. The fossil localities in Europe, Japan, and E. North America are all belonging to species of *subg. Hopea*.

There is no species common to the Old and New World, but the E. Asian *S. lucida* is closest allied to the N. American *S. tinctoria*.

Taxonomy. BRAND (1901) has made an intricate subdivision of the genus, partly based on former generic names. I believe we cannot go further than a subdivision into two subgenera, in which macromorphology is supported by chemotaxonomy and palynology, *viz subg. Symplocos* and *subg. Hopea*.

Subdivisions could be based on one important single character: straight *versus* curved embryo, spiral *versus* distichous phyllotaxis, continuous *versus* flushwise growth from scaly buds, but it appears that such subdivisions do not coincide. This leads to the view that there is a block of species with reticulate affinities. This view also emerges from the palynological results.

Both subgenera occur in the New and the Old World; *subg. Symplocos*, which is almost strictly tropical, possesses only 2 *spp.* in Indo-Malesia, but probably many more in America.

In this revision 58 *spp.* are distinguished in Malesia; there are more new species, but I have refrained from describing them as the material is incomplete; I have enumerated them in my revision *l.c.* 296.

Fossils. Before the Glacial Epoch *Symplocos* occurred also in Europe in the mixed mesophytic subtropical to warm-temperate forest, onwards of the Eocene, obviously as a common constituent of the Tertiary mixed mesophytic forest, as shown from fossil stones. *Cf.* KIRCHHEIMER, Palaeontographica 90B (1949) 1–52, t. 1–2. These stones are very similar to endocarps of recent species; obviously no major changes did occur in the genus during this era. The three fossil Pliocene species in Japan are almost certainly the same as those that are living there today. One fossil species is known from the Eocene in the eastern U.S.A. Fig. 1.

Ecology. All species are evergreen, except a single deciduous one, *S. paniculata* (THUNB.) MIQ. from Kashmir to Manchuria and Japan.

They grow under tropical to temperate conditions in mixed evergreen rain-forest, not under arid conditions.

Their stature is mostly small and they make part of the undergrowth and lower storeys, in exceptional cases attaining a maximum height of *c.* 30 m and 60 cm ⌀.

In Malesia they are found from sea-level up to the alpine zone at *c.* 4000 m (Mt Kinabalu; New Guinea), where they are represented by mostly microphyllous (fig. 12) dwarf shrubs in the dense elfin and mossy forest on slopes, summits and ridges where they may be common; but they are almost nowhere recorded as a dominant.

A few species, *e.g. S. polyandra*, are restricted to the lowland, but most species have a fair altitudinal range, and are most commonly collected in the hill and mountain forest. A few are restricted to high altitude, *e.g. S. buxifolia, S. deflexa, S. johniana, S. zizyphoides*, and several varieties of *S. cochinchinensis.*

A fair number seem to be rare and have been seldom collected, others are common and widely distributed in the archipelago, notably *S. cochinchinensis, S. celastrifolia, S. fasciculata, S. laeteviridis, S. ophirensis*, and *S. odoratissima.*

Especially these species, several of which are variable, grow on a variety of soils, including young-volcanic; they are scarce on limestone and generally prefer more acid, humous soils, *e.g. S. celastrifolia* is common in coastal forests, especially in the transition between mangroves and freshwater swamps, but it occurs also on kerangas, along river banks, and even in peat swamp forest.

S. cochinchinensis var. sessifolia is very resistant against poisonous crater gases and acid soil conditions and can act as a pioneer in crater fields in Java, sometimes dwarfing down to very small size, although still producing flower and fruit; in the surrounding closed elfin forest it is a common small tree, growing together with *Vaccinium, Myrica, Myrsine, Leptospermum, etc.*

Density of species. In fig. 2 the density of species has been indicated for each province and island (group). The richest areas are those of continental SE. Asia and West Malesia, while the number of species tapers out towards East Malesia and the SW. Pacific. The greatest number of endemic species is found in West Malesia, notably (as usually) in Borneo and the Philippines. However, in East Malesia New Guinea has a fair number of endemic species. The high number of endemics in New Caledonia is a bit exaggerating the situation as all are certainly derivatives of *S. cochinchinensis.* The same holds for the endemics of New Guinea (with the exception of *S. cylindracea*) and for Australia (with the exception of *S. cyanocarpa* C. T. WHITE).

Flower biology. In all *Symplocos spp.* the flowers of an inflorescence open almost simultaneously and on one tree almost all inflorescences are open at the same time, so that the whole crown is for a short time gay with the blossoms (fig. 3). Of *S. cochinchinensis var. sessifolia* flowers are deliciously scented, as hawthorn, but field records mention other species as scentless or faintly scented. This varies obviously with the species.

Pollination. DOCTERS VAN LEEUWEN (Verh. Kon. Ak. Wet. A'dam sect. 2, 31, 1933, 218) reported of *S. cochinchinensis var. sessifolia*, on the summit of Mt Pangrango, West Java, at *c.* 3000 m, that flowers expand in the morning but open only halfway, the corolla remaining bent over the sexual organs; at 8 h. anthers are open and often touch the stigma on which the sticky

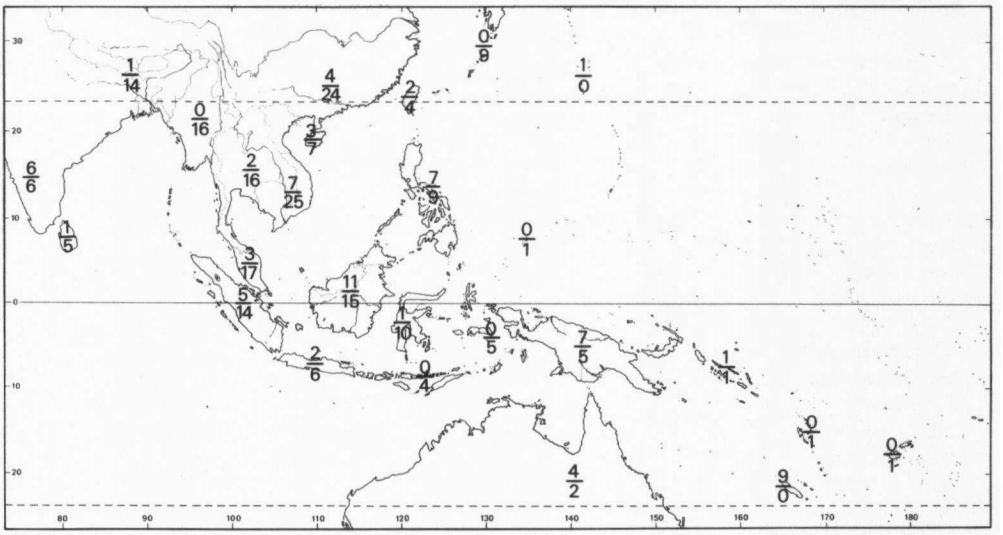

Fig. 2. Density of species in Old World *Symplocos*; above the hyphen the endemic species for each island (group) or country, below the hyphen the non-endemic species.

Fig. 3. *Symplocos laeteviridis* STAPF *var. laeteviridis* in full flower, showing also alternate phyllotaxis.— Sabah (NOOTEBOOM 1017). Photogr. NOOTEBOOM, Febr. 1969.

pollen readily falls; on the 2nd flowering day the corolla is widely open, anthers are empty, and the stigma is always pollinated. This means self-pollination. DOCTERS VAN LEEUWEN found, however, also the flowers frequented by various insects, among them bees and bumble-bees. They are not so much attracted by the little nectar, but are in search of pollen.

Some species may have locally a strict flowering time; *e.g. S. cochinchinensis var. sessifolia* flowers, according to DOCTERS VAN LEEUWEN (*l.c.*, fig. 52), from October to January, in the rainy season, on the summit of Mt Pangrango, West Java.

Hybridization. Though there are in a few instances indications (by high sterile pollen %) that hybridization may occur, no clear cases are recorded. It is, however, clear that cross-fertilization must occur in the polygamous species in East Malesia.

Galls. DOCTERS VAN LEEUWEN (Zoocecidia, 1926, 460) found in *S. cochinchinensis var. sessifolia* small leaf galls, caused by psyllids by which the two halves of the leaf curve upwards till margins touch and a narrow cavity is formed. He recorded similar galls also from other forms of this species. In *S. fasciculata* he found a stem gall caused by a gall-midge and in *S. brandisii* a flower gall caused by a gall-midge.

Dispersal. RIDLEY (Disp. 1930) assumed that bats may be fond of the hard-fleshed drupes (*l.c.* 347). He mentioned that in North America tyrant birds (*Sayornis phoebe*) eat amongst others fruit of *S. tinctoria* (*l.c.* 483) and that in South America a curassow, a sort of turkey, would feed on the fruit of *S. cernua.* DOCTERS VAN LEEUWEN (Verh. Kon. Ak. Wet. A'dam sect. 2, 31, 1933, 220) believed *Symplocos* to be dispersed by birds but did not find endocarps in the stomach of fruit-eating birds. VAN STEENIS found fruit of *S. henschelii* abundant on the ground below trees at Tjibodas, although this species has a fairly thick, hard-fleshed exocarp, in contrast to most species in which the exocarp is thin. Also in fossils sometimes immense quantities of stones are found together, about which KIRCHHEIMER reported (Palaeontographica 90B, 1949, 1–52): in a total mass of *c.* 3500 m^3 he estimated the number of endocarps at some $2^1/_2$ billions. He assumed that these were deposited within one century in a site of forest dominated by *Symplocos.* However, he added that the layers in which the endocarps were deposited gave no evidence of rivers which could have transported and accumulated the seeds and he concluded that they have dropped to the soil in situ. For these reasons abundant dispersal by birds or bats is in *Symplocos* not very likely.

Dispersal by water takes place in species in which some fruit cells are barren and remain empty, *e.g. S. celastrifolia.*

Morphology. The phyllotaxis is variable but constant for the species; it is either spiral or alternate (distichous) in which latter case the twigs are often zigzag (fig. 3).

In most species leaves are more or less equally dispersed along the twigs, but in other species there is a tendency that the leaves are becoming crowded towards the end of the year's growth, *e.g.* in *S. macrocarpa*, as noted by TRIMEN (Handb. Fl. Ceyl. 3, 1895, 103). In Malesian *spp.* this occurs also in *S. herzogii* and *S. gigantifolia* where the large leaves occur crowded at the end of the year's growth.

There is a single species in which all the leaves are in real pseudo-whorls, *viz S. verticillifolia* from the Philippine Is. (fig. 20).

The leader-shoots in *Symplocos, e.g. S. fasciculata*, have spiral phyllotaxis; such shoots may, however, also carry flowers.

Rejuvenation is in certain species by continuous growth of the twig apex, as is *e.g.* characteristic in *S. fasciculata.* In other species, however, there are clear buds with conspicuous bud-scales, indicating that the growth mode is flushwise and discontinuous, as *e.g.* in *S. costata* and *S. lucida* (fig. 15). This might be a good character of subdividing *subg. Hopea.* It can, however, only be used if one has accurate knowledge of the rejuvenation process of each species. This is sometimes difficult to ascertain from herbarium material as the bud-scales do not always leave traces of distinct scars, field data hardly ever mention the character, and material is seldom collected in the stage of flush. If the growth mode were well examined in all species I believe it would represent a good key character.

Flushwise, discontinuous growth, with scaly buds could be assumed to be an adaptation to seasonally cold climates. It is a life form intermediate halfway evergreen and deciduous. It is rare in the Malesian tropics where it is known *e.g.* from *Acer*, some genera of *Lauraceae, Fagaceae,*

which also in the tropics are found in the cool, tropical-montane climate, which is however hardly seasonal. It still could be viewed as an indication of former immigration of taxa of higher latitude. Once acquired this growth mode must then have been conserved, as it occurs also in *S. barringtoniifolia* which is restricted to the tropical lowland.

The inflorescence is either a panicle or a raceme or spike. Morphologically it is cymose, the flower always being sustained by two bracteoles which may at times carry abortive buds in their axil (fig. 11b). In some cases the inflorescence is condensed to a fascicle or cluster of flowers (fig. 20a) or even be reduced to a single flower (fig. 19a). In a few species flowers occur on old wood, as *e.g.* in *S. polyandra*, *S. wikstroemifolia* (*p.p.*), *S. rubiginosa*, and *S. tricoccata*.

The flowers are bisexual but functionally unisexual flowers are found in several taxa, especially in New Guinea. Such taxa are either dioecious or polygamous. In male flowers the style is small and without a stigma, in female flowers the number of stamens is reduced (even to less than 10) and anthers are sterile. In *subg. Symplocos* the stamens are monadelphous with a long tube (fig. 6a, d); in *subg. Hopea* they are only connate at the base for at most 2 mm (fig. 11c), and intergrading from strictly monadelphous to strictly pentadelphous, the phalanges being alternipetalous.

In my revision it has been explained that, in contrast with former opinion, the ovary is initially 1-celled, with the ovules attached close to the centre on the induplicate part of the carpels, each of the 2–5 compartments having usually 4 ovules; in fruit these appear as cells. In each developed cell there is usually one seed. The latter and the embryo it contains may be curved or straight. See fig. 4b, c, g, h, j, k.

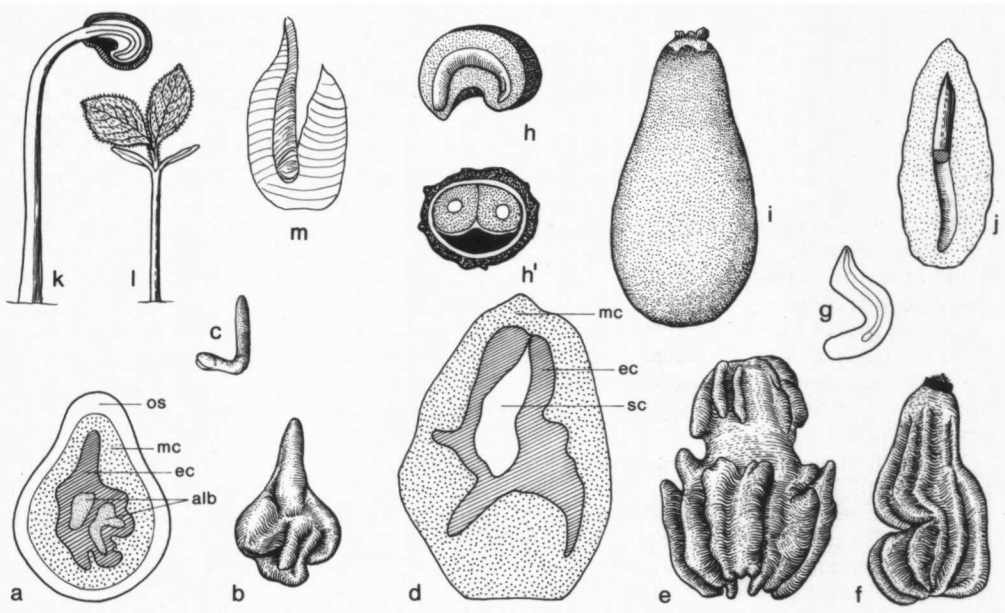

Fig. 4. *Symplocos ophirensis* CLARKE *ssp. perakensis* (K. & G.) NOOT. *var. perakensis*. a. LS of fruit, out of centre, b. seed, c. curved embryo, with 2 short apical cotyledons, all × 4. — *S. ophirensis* CLARKE *ssp. cumingiana* (BRAND) NOOT. *var. cumingiana*. d. LS of fruit, seed cavity empty, e. stone, × 4. — *S. macrophylla* WALL. *ex* DC. *ssp. cordifolia* (THW.) NOOT. *var. apicalis* (THW.) NOOT. f. Ribbed stone, with fold, g. seed, the curved embryo enveloped by the albumen, × 2. — *S. paniculata* (THUNB.) MIQ. h. LS of seed showing curved embryo, h'. *ditto* in CS, showing how such seed may appear deceptively as 2 seeds, × 1½. — *S. glauca* (THUNB.) KOIDZ. i. Fruit, j. seed in LS showing straight embryo, × 3. — *S. paniculata* (THUNB.) MIQ. k. Germinating seedling with LS of endocarp and seed, showing mode of exist of embryo, × 1⅓, l. seedling, × ⅔. — *S. celastrifolia* GRIFF. *ex* CLARKE. m. U-shaped seed, × 6 (*a–c* BURKILL 1013, *d–e* NOOTEBOOM 2229, *f–g* ASHTON 2480, *k–l* after LUBBOCK). — *alb* albumen, *ec* stony endocarp, *mc* mesocarp, *os* outer surface of fruit, *sc* seed cavity.

The fruit is a drupe, with a fleshy, corky or woody mesocarp and a very hard stone (endocarp). The endocarp may be smooth (fig. 10c, 19d) or show outside ridges or irregularities (fig. 4e, f, 9c, 10e, 14d); the same holds for the inside of the endocarp. In the centre of the copious endosperm the embryo is embedded. It is slender and may be straight or curved. In the tropical *subg. Symplocos* it is always straight. In *subg. Hopea* it is straight in all American *spp.* and in 80% of the living species in the Old World and also in all fossil species in Europe. From this it is concluded that a straight embryo seems to be the primitive state in the genus. Only the three Pliocene fossil species of Japan, which can be matched with living species, have curved seeds and consequently curved embryos.

Curved seeds occur in degree, they may be hook-shaped or U-shaped or even be twice curved (S-shaped in *S. brachybotrys*). See fig. 4. This may give some difficulty in studying sections of the stones to count the number of seeds in a fruit (*e.g.* fig. 4h-h').

Although of the living species only 20% have curved seeds the vast majority of the individual living plants have curved seeds; so it seems that this probably recent trend in the evolution of the genus was successful although the reason for its origin and advantage of its function remains obscure.

Seedlings. Few observations are made. LUBBOCK (Contr. Knowl. Seedlings, 1892, 206–208, fig. 509) noted for *S. paniculata* (*sect. Hopea*): the endocarp does not burst during germination; the radicle emerges by a small hole at the apical narrow end; the hypocotyle elongates, becoming curved, finally straightening, carrying up the endocarp containing the embryo. As the cotyledons elongate, they push out at the small hole in the endocarp (so to say throw the latter off), and finally get free and spread out to the light; they enlarge but remain narrow. The first two leaves are opposite, hairy on both sides and serrulate which may persist in leaves of saplings (fig. 4l).

Spot-characters. In the herbarium a *Symplocos* of *subg. Hopea* can mostly easily be spotted by spiral, exstipulate, eglandular, serrate or crenate leaves discolouring pale greenish or yellowish or greenish-brown, a feature connected with a high Al-content of the tissues. At a very young stage, the just expanding leaves have proportionally conspicuous gland-like teeth on the margin. A significant character is that in the herbarium the midrib is always sulcate above, with the exception of 4 *spp.* in which it is prominent: *S. anomala*, *S. lancifolia*, *S. lucida*, and *S. wikstroemifolia*.

The cup-like 3 bracts (of which 2 bracteoles) below the flower (fig. 11b) is also characteristic as is the inferior ovary and fruit.

Innovations and newly expanded leaves are in many species a beautiful violet, afterwards changing into violet-brown while the drupes are often blue to black-violet, features found in many aluminium-accumulating plants (*Eurya*, *Helicia*, *etc.*).

Anatomy. For general surveys also covering the older literature, see SOLEREDER, Syst. Anat. Dicot. Stuttgart (1899) 587–589 (under *Styracaceae*) and *ibid.* (1908) 208–210; METCALFE & CHALK, Anat. Dicot. Oxford (1950) 890–893. Selected references: JANSSONIUS, Mikr. 4 (1925) 471–498 (wood anatomy); DEN BERGER, Determinatietabel Malesië, Veenman, Wageningen (1949) (wood identification); JANSSONIUS, Blumea 6 (1950) 422–423 & 424 (wood anatomical affinities); DESCH, Mal. For. Rec. 15 (1954) 591–593 (wood); ZAHUR, Mem. Cornell Univ. Agric. Exp. Stn. 358 (1959) 35 (bark anatomy); HUBER, Mitt. Bot. Staatssamml. München 5 (1963) 1–48; BAAS, Blumea 21 (1973) 201–216 (ecological wood anatomy); NOOTEBOOM, Leid. Bot. Ser. 1 (1975) 20–22 (leaf and wood anatomy).

The wood is characterized by the following primitive set of characters: Vessels solitary and with many-barred scalariform perforations. Fibre-tracheids with conspicuously bordered pits on both radial and tangential walls. Parenchyma diffuse or diffuse-in-aggregates. Rays heterogeneous, usually of two distinct sizes. The bark is also of a primitive type with compound sieve plates. Mechanical bark tissue is poorly developed and composed of groups of sclereids (ZAHUR, *l.c.*). The leaf anatomy exhibits few constant characters such as paracytic stomata, clustered crystals and dorsiventral mesophyll. Presence or absence of a hypodermis, of idioblastic leaf sclereids, of a complex vasculation pattern in the midrib, and of an indumentum varies. The diagnostic and systematic value of these characters remains to be assessed.

The anatomical evidence is inconclusive with respect to a positive indication of the closest affinities of *Symplocaceae*. The traditional treatment of the family as a member of the *Ebenales*

close to *Styracaceae* must, however, be refuted. The anatomy is more compatible with suggestions of a Cornalean or a Thealean alliance as advocated by NOOTEBOOM *l.c.*

Palynology. The palynology of the Old World *spp.* was examined by R. VAN DER MEIJDEN (Pollen et Spores 12, 1970, 513–551, 1971, suppl. in my Monograph, 1975, 9–15). The essential results are the following: the two main pollen types coincide with the distinction of the two subgenera. In *subg. Symplocos* there are two minor types, one belonging to the Old World *spp.*, the other to those of America.

In *subg. Hopea* there are 9 subtypes, but none is apparently peculiar to American *spp.* The distribution of these subtypes is rather complicated and leads to the view of reticulate relationship, which agrees with the impression gained from macromorphology. Another feature is that within the variable species several subtypes are represented, and furthermore that a number of subtypes are found in species which are taxonomically not closely related. There is no agreement between the shape of the embryo, straight or curved, and pollen subtypes. Echinate pollen is found in the Philippine *S. whitfordii* and in the East Malesian and Pacific varieties of *S. cochinchinensis ssp. leptophylla*; also the 9 endemic *spp.* of *Symplocos* in New Caledonia which are all related to this subspecies have echinate pollen.

In several taxa a certain amount of pollen is sterile and I have ascribed this to hybridization.

Phytochemistry. Many species of *Symplocos*, especially from *subg. Hopea*, contain aluminium compounds, a feature which manifestates itself in the yellow colour of dried leaves. Especially when the plants are dried after having been conserved in alcohol vapour according to the Schweinfurth method, the yellow colour becomes very intense. The yellow colour is the result of a reaction of aluminium compounds with flavonols in the drying leaf. The amounts recorded in literature vary between 0.05 and 4.2% of dry weight of the leaves; barks may contain similar amounts of aluminium (CHENERY, Kew Bull. 1948, 173–183; Analyst, 1948, 501; NOOTEBOOM, Leid. Bot. Ser. 1, 1975, 19). RADLKOFER (Ber. Deut. Bot. Ges. 22, 1904, 216–224) already mentioned that the ash of *Symplocos* leaves contains *c.* 50% aluminium oxide. He also described the so-called "Tonerdekörper" in the leaves of *Symplocos*. These are masses of colourless material filling often large parts of the cells, predominantly in the palissade parenchyma. According to RADLKOFER these masses consist mainly of aluminium compounds. KRATZMANN (Sitz. Ber. Ak. Wiss. Wien, 1913, 311–336) found that these aluminium bodies also contain much other material, for instance silicates, and that the aluminium is also accumulated in other parts of the leaf. NEGER (Flora N.F. 16, 1923, 326–330) observed that the development of plants of *Symplocos lucida* (THUNB.) S. & Z. depends on the amount of aluminium compound in the solution they are cultivated on. Plants grew best on a solution containing 1 promille aluminium. Besides aluminium many other compounds are found (HEGNAUER, Chemotaxonomy der Pflanzen 6, 1973). The more important are: 1) Phenolic compounds (see also BATE SMITH, J. Linn. Soc. Bot. 58, 1952, 95–173). Gallic and ellagic acid seem to be rather common. Leucoanthocyanins occur in varying amount. BATE SMITH *l.c.* also found quercetin, and caffeic acid. In the bark of *S. lucida* (THUNB.) S. & Z. the lignan glycoside symplocosin has been found, and traces of methylsalicilate were demonstrated in the bark of several species. True tannins were not yet found in *Symplocos*. 2) Alkaloids. Only for two species structurally known alkaloids were described. More research is needed. 3) Saponins. In several species saponin-like compounds were found, as well in the bark as in the leaves. — R. HEGNAUER.

Chromosomes. In my monograph I have given an account of chromosome numbers, which are unfortunately too few. However, the majority is n = 11, with some deviations; rarely 2n = 24, and one count of the North American *S. tinctoria* of 1n = 14, all in *subg. Hopea*. The one count known of *subg. Symplocos* in Malesia yielded 2n = *c.* 90 (2n = 88 would fit an octoploid). It would be too rash to conclude that polyploidy would be normal in that subgenus.

On the other hand it may tentatively be concluded that species in *subg. Hopea* are diploid, with x = 11. This does not fit the numbers found in other *Ebenales* families, nor in *Theaceae*, but it does agree with *Cornaceae sens. lat.*

Uses. As timber *Symplocos* has no great value, according to HEYNE (Nutt. Pl. 1927, 1262). Leaves and bark of *Symplocos* contain a fair amount of alum, both in Asian and American *spp.* (*cf.* Ber. Deut. Bot. Ges. 22, 1904, 126). This was commonly used, mostly from decoctions of the bark, in dyeing processes (red and brown), *e.g.* in the batik industry in Java. RUMPHIUS already

mentioned this use from the Moluccas. Several species were used for this purpose, *e.g. S. cochinchinensis, S. fasciculata, S. odoratissima* (HEYNE, *l.c.*). The same compound is probably also the constituent active in medicinal uses against so-called sprue ('thrush') as '*obat seriawan*'.

Notes. Identification of material of *Symplocos* is for several reasons far from easy. Because of simultaneous flowering flowers and fruits are practically never found together and both stages are properly needed. Only few species possess well definable vegetative characters. Moreover, a few widespread species have proved to be rather variable, to a fair degree by racial differentiation. These are the reasons that besides a general key in which all characters are used, I have found it useful to add a number of partial keys for islands or island groups in a double series, either for fruiting or for flowering material.

In fig. 5 a scheme is given elucidating the way in which for this genus descriptive terminology is used in the keys and descriptions.

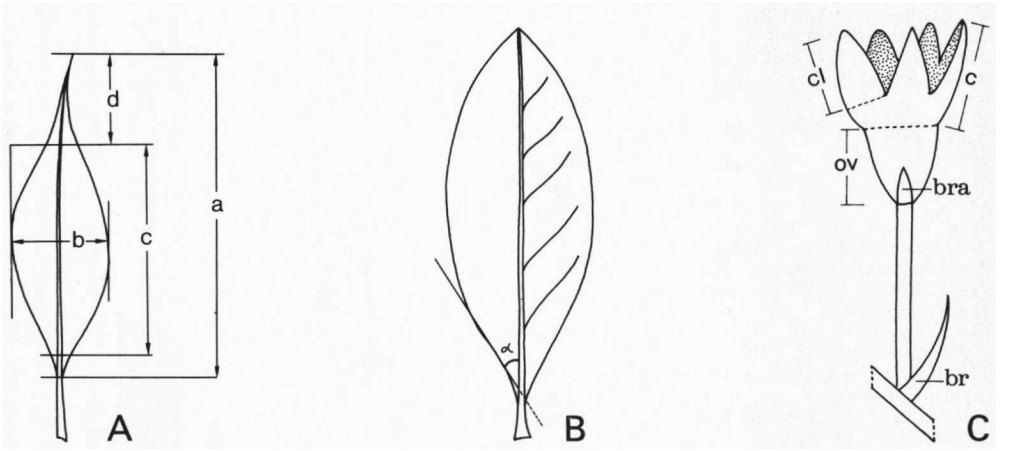

Fig. 5. Schemes elucidating descriptive terminology used in the text. — A: *a* length of leaf, *b* width of leaf, *c* divided by *b* is leaf index, *d* length of acumen. — B: way of expressing base angle α. — C: deflorated flower; *br* bract, *bra* bracteole, *c* length of calyx, *cl* length of calyx lobes, *ov* height of ovary.

KEY TO THE SUBGENERA

1. Petals connate at least halfway up. Leaves usually not becoming yellow when drying, not discolouring, spirally arranged, entire. Flowers very fragrant. Seeds and embryo straight. *Spp.* 1–2 **1. *subg.* Symplocos**

1. Petals connate only at the very base. Leaves usually becoming more or less yellow or greenish yellow when dried. Leaves spirally arranged or distichous, exceptionally in pseudowhorls. Flowers not or mostly only faintly fragrant. Seeds and embryo straight or curved. *Spp.* 3–58 . . . . **2. *subg.* Hopea**

1. Subgenus Symplocos

Cf. NOOT. Leid. Bot. Ser. 1 (1975) 36. — *Cordyloblaste* MOR. Bot. Zeit. 6 (1848) 606; RIDL. Fl. Mal. Pen. 2 (1923) 307; ALSTON, Handb. Fl. Ceyl. 6 (Suppl.) (1931) 186. — *Symplocos sect. Cordyloblaste* B. & H. Gen. Pl. 2 (1876) 669; BRAND, Pfl. R. Heft 6 (1901) 88; STEEN. Bull. Bot. Gard. Btzg III, 17 (1948) 429. — *Symplocos subg. Cordyloblaste* GAMBLE, J. As. Soc. Beng. 74, ii (1906) 248. — **Fig. 6.**

Leaves usually not becoming yellow when dry. Corolla tubular, erect, often to above the middle adherent to the staminal tube and then suddenly expanded;

margins of the petals free, thus sometimes obscuring the coalescence. Stamens monadelphous; free part of filaments ribbon-shaped, in several whorls, in the outer whorl often very short, always suddenly attenuate below the anther. Fruits 2–5-celled, usually none of the cells aborted. Seeds straight, cylindrical.

Distr. Tropics of Indo-Malesia and South America, largely within 30° N and S, more than 100 *spp.* described from the New World, in *Malesia* 2 *spp.* Fig. 1.

Ecol. Rain-forest, from the lowland up to *c.* 3300 m (Mt Kinabalu).

KEY TO THE SPECIES

1. Calyx *c.* 6(–10) mm long. Corolla $2^1/_2$–5 cm long. Fruits 3–5 cm long . . . . . **1. S. henschelii**
1. Calyx 3–5 mm long. Corolla $^1/_2$–$1^3/_4$ cm long. Fruits 1–$1^1/_2$ cm long . . . . . **2. S. pendula**

1. Symplocos henschelii (MOR.) BTH. *ex* CLARKE, Fl. Br. Ind. 3 (1882) 588, *quoad nomen et basionym, excl. stirp.*; BRAND, Pfl. R. Heft 6 (1901) 89; Bull. Herb. Boiss. II, 6 (1906) 750; KOORD. Atlas 2 (1914) t. 390; STEEN. Bull. Bot. Gard. Btzg III, 17 (1948) 440, f. 2 a–l; Nova Guinea n.s. 10 (1959) 210; BACK. & BAKH. *f.* Fl. Java 2 (1965) 204; STEEN. Mt. Fl. Java (1972) pl. 52–3; NOOT. Leid. Bot. Ser. 1 (1975) 37, pl. 1g. — *Cordyloblaste henscheli* MOR. Bot. Zeit. 6 (1848) 606. — *Eugeniodes henscheli* O. K. Rev. Gen. Pl. 2 (1891) 975. — *S. nageli* K. & V. Bijdr. 7 (1900) 159. — *S. scortechinii* KING & GAMBLE, J. As. Soc. Beng. 74, ii (1906) 250. — *Cordyloblaste scortechinii* RIDL. Fl. Mal. Pen. 2 (1923) 309. — *S. dolichantha* MERR. Sar. Mus. J. 3 (1928) 545. — *S. stenosepala* STEEN. Bull. Bot. Gard. Btzg III, 17 (1948) 444, f. 2 m–n. — Fig. 6a–c.

For further synonyms see under the variety.

Shrub, or mostly a tree, to 30 m; innovations glabrous to grey or rusty velvety. *Leaves* glabrous, sometimes the midrib above and underside hairy, 7–17(–22) by 3–$7^1/_2$ cm; petiole $^1/_2$–$1^1/_2$(–2) cm. *Racemes* up to 10 cm, incl. bracts and flowers grey or rusty tomentose, short-peduncled, 1–12-flowered. Bracts narrow-triangular; pedicels 0–6 mm, with 2(–3) tiny bracteoles. *Calyx lobes* rounded to triangular, mostly erect, 1–$4^1/_2$ by 2–3 mm, persistent. *Corolla* sericeous (in Mal.), club-shaped in bud, $2^1/_2$–5 cm, connate for $^3/_5$–$^3/_4$, tube 3–4 mm ∅, lobes spathulate. *Staminal tube* $^1/_2$ cm shorter than corolla, adnate to the corolla tube except towards apex, free part $^1/_2$–$1^1/_2$ cm; anthers 20–110, filaments unequal. *Ovary* 3–4-celled; ovules 2–4 per cell, usually only 1 developing. *Fruit* obovoid to spindle-shaped, 3–5 by 2–3 cm; mesocarp thick, hard-fleshy to ± woody.

Distr. Continental SE. Asia (Burma, Thailand, Indo-China) and *West Malesia* (Sumatra, Malay Peninsula, W. Java, Borneo), a distinct subspecies in Thailand.

Note. Additional material has shown that *S. stenosepala* STEEN. cannot be upheld and, moreover, that *S. maingayi* CLARKE deserves only varietal rank.

KEY TO THE VARIETIES

1. Leaves and twig ends usually glabrous. Free part of staminal tube 7–15 mm. **a. *var.* henschelii**
1. Twig ends and leaves underneath hairy. Free part of staminal tube 5–7 mm **b. *var.* maingayi**

a. *var.* henschelii. — Fig. 6a–b.

Shrub or tree, up to 25 m, 45 cm ∅. Twigs glabrous, the youngest ones sometimes more or less grey or rufescent appressedly pubescent to velvety or tomentose. Leaves glabrous, or the midrib beneath sparsely short fine-hairy, rarely with same indument as *var. maingayi*. Free part of staminal tube 7–15 mm; anthers (40–)55–75(–110), in the upper 5–10 mm, ascendent and nearly sessile above to descendent on a slender filament below, the lowest ones hanging from a 2–5 mm long filament. Fruit with ± fleshy mesocarp.

Distr. As the species.

Ecol. Below 1100 m in mixed dipterocarp forest, also once in swamp forest, and on podsol (Kalabit), at higher altitude in oak-chestnut mountain forest, also on ridges and in mossy forest, 600–2000 m (in continental SE. Asia at 130–800 m). *Fl.* Jan.–Dec., *fr.* Febr.–Sept.

Vern. Sumatra: *kayu djaram-djaram bosi*, Batak; Borneo: *tĕ baradang*, Sarawak, Kalabit, *yum*, Kenyah lang., *lamau-lamau*, Brunei.

b. *var.* maingayi (CLARKE) NOOT. Leid. Bot. Ser. 1 (1975) 39. — *S. maingayi* BTH. *ex* CLARKE, Fl. Br. Ind. 3 (1882) 588; BRAND, Pfl. R. Heft 6 (1901) 90; K. & G. J. As. Soc. Beng. 72, ii (1906) 249; STEEN. Bull. Bot. Gard. Btzg III, 17 (1948) 445. — *Eugeniodes maingayi* O. K. Rev. Gen. Pl. 2 (1891) 975. — *Cordyloblaste maingayi* RIDL. Fl. Mal. Pen. 2 (1923) 309. — Fig. 6c.

Tree up to 21 m, 40 cm ∅. Twigs densely rusty tomentose or velvety, glabrescent. Leaves sparsely fine-hairy beneath, especially on midrib and nerves, to greyish tomentose or velvety. Free part of staminal tube 5–7 mm; anthers 20–60, in the upper 5 mm, on a very short ($^1/_4$–$^1/_2$ mm) thin free part of the filaments. Fruit with ± woody mesocarp.

Distr. *Malesia:* Malay Peninsula and Borneo (Sarawak, Brunei).

Ecol. Evergreen primary and depleted lowland forest, 15–150 m; in Borneo often on low sandy ridges, raised beaches, and large sandy podsols (kerangas). *Fl.* April–May, *fr.* Jan.

2. Symplocos pendula WIGHT, Ic. 4 (1848) 10, t. 1237; Ill. Ind. Bot. 2 (1850) t. 151-b, 7–12; CLARKE, Fl. Br. Ind. 3 (1882) 587; BRAND, Pfl. R. Heft 6 (1901) 88; STEEN. Bull. Bot. Gard. Btzg III, 17 (1948) 437; NOOT. Leid. Bot. Ser. 1 (1975) 40, pl. 1h. — *S. scortechinii* (*non* K. & G.) RIDL. J. Linn. Soc. Bot. 38 (1908) 315. — *S. pulcherrima*

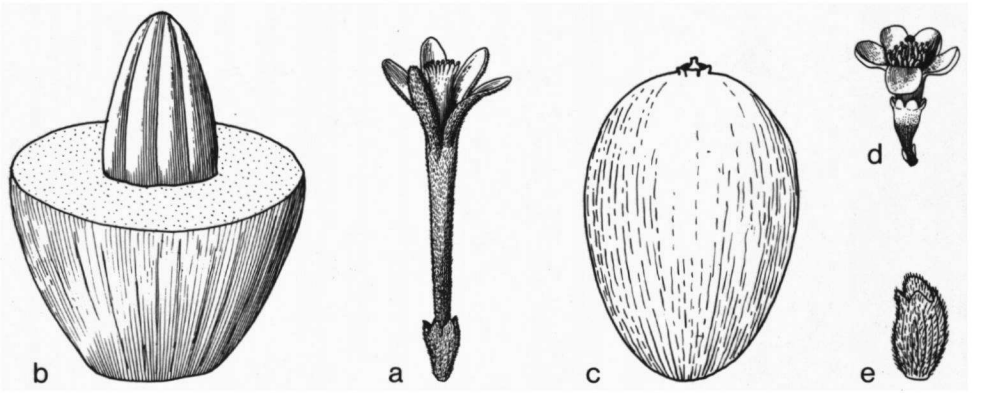

Fig. 6. *Symplocos henschelii* (MOR.) BTH. *ex* CLARKE *var. henschelii*. a. Flower, b. fruit, exocarp halved. — *S. henschelii var. maingayi* (CLARKE) NOOT. c. Fruit. — *S. pendula* WIGHT *var. pendula*. d. Flower. — *S. pendula var. hirtistylis* (CLARKE) NOOT. e. Fruit. All nat. size (*a* WILSON 2547, *b* after STEEN. 1972, pl. 52–3b, *c* KOSTERMANS 9328, *d* father ANGLADE *s.n.*, *e* MEIJER 3618).

RIDL. J. Fed. Mal. St. Mus. 6 (1915) 160. — *Cordyloblaste pulcherrima* RIDL. Fl. Mal. Pen. 2 (1923) 308. — **Fig. 6d–e.**

For further synonyms see under the variety.

***var.* pendula. — Fig. 6d.**

Small shrub $^1/_2$–3 m or tree up to 27 m and 50 cm ∅. Twigs glabrous to rusty tomentose. *Leaves* glabrous or nearly so, elliptic to obovate or orbicular, entire to crenate, apex rounded to acuminate, (1–)$2^1/_2$–$12^1/_2$ by (1–)$1^1/_2$–6 cm; nerves 4–8(–11) pairs; petiole (1-)5–15 mm. *Racemes* very short, sometimes flowers solitary. Bracts to 1 mm. Bracteoles 2–4, narrow-triangular. Pedicels 0–5 mm, longer in solitary flowers. *Calyx lobes* very short and rounded, ciliate. *Corolla* tubular-trumpet-shaped, (5–)10–17 mm, fleshy, silver-white to creamy, fragrant, the petals connate halfway up, spathulate, rounded at apex, glabrous to tomentose. *Staminal tube* adnate to corolla except for upper 3–5 mm, hairy to glabrous inside; anthers 30–50 (–80). *Ovary* semi-inferior, glabrous, the apex semi-globose, *c.* $1^1/_2$ mm high, densely grey-hairy; style *c.* 1 cm, more or less hairy at the base to glabrous at the apex. *Fruits* spindle-shaped, 10–15 by 3–6 cm, green pinkish red, the enlarged calyx lobes surrounding the hairy, conical, persistent style-base.

Distr. Continental SE. Asia (Ceylon, Deccan, Hainan), in *Malesia:* Malay Peninsula.

Ecol. Mountain forests and open heath and scrub, often on ridges, 600–1750 m. *Fl.* Febr.–March, *fr.* Sept.

***var.* hirtistylis** (CLARKE) NOOT. Leid. Bot. Ser. 1 (1975) 42, f. 2a, with full synonymy. — *S. henschelii* (*non* BTH.) CLARKE, Fl. Br. Ind. 3 (1882) 588, *pro stirp., incl. var. hirtistylis* CLARKE. — *S. confusa* BRAND, Pfl. R. Heft 6 (1901) 88; Bull. Herb. Boiss. II, 6 (1906) 750; K. & G. J. As. Soc. Beng. 74, ii (1906) 248; BRAND, Philip. J. Sc. 3 (1908) Bot. 3; MERR. En. Philip. 3 (1923) 297; STEEN. J. Arn. Arb. 28 (1947) 423; Bull. Bot. Gard. Btzg III, 17 (1948) 432. — *S. albifrons* BRAND, Pfl. R. Heft 6 (1901) 88; Bull. Herb. Boiss. II, 6 (1906) 750; Nova Guinea 14 (1924) 189. — *S. capitellata* BRAND, Pfl. R. Heft 6 (1901) 88; Bull. Herb. Boiss. II, 6 (1906) 750; Nova Guinea 14 (1924) 188. — *S. foxworthyi* BRAND, Philip. J. Sc. 3 (1908) Bot. 3; MERR. En. Philip. 3 (1923) 299. — *Styrax obovatus* RIDL. J. Str. Br. R. As. Soc. *n.* 61 (1912) 8. — *S. obovata* RIDL. J. Fed. Mal. St. Mus. 6 (1915) 51. — *S. crenulata* RIDL. *l.c.* — *S. novoguineensis* GIBBS, Arfak (1917) 176. — *Cordyloblaste obovata* RIDL. Fl. Mal. Pen. 2 (1923) 308. — *Cordyloblaste crenulata* RIDL. *l.c.* 309. — *S. atrata* BRAND, Nova Guinea 14 (1924) 188. — *S. topica* BRAND, *l.c.* 189. — **Fig. 6e.**

Ovary hairy.

Distr. Continental SE. Asia (N. Burma, Indo-China, China, Japan, Formosa), throughout *Malesia*, except Java and Lesser Sunda Is.

Ecol. Primary and secondary montane and subalpine forest, mossy forest, often common on ridges, or in open fern thickets (Tamrau), on sand or clay, 1500–3300 m, but in kerangas forest in Sarawak at 800 m. *Fl.* March–Aug. (Sept.–Febr.), *fr.* Febr.–April, July–Sept.

At higher altitude often a dwarf shrub with small leaves, but sometimes also a dwarf shrub with large leaves in high forest.

2. Subgenus Hopea

CLARKE, Fl. Br. Ind. 3 (1882) 572; BRAND, Pfl. R. Heft 6 (1901) 25; NOOT. Leid. Bot. Ser. 1 (1975) 43, with full synonymy. — *Hopea* LINNÉ, Mant. (1767) 105, *nom.*

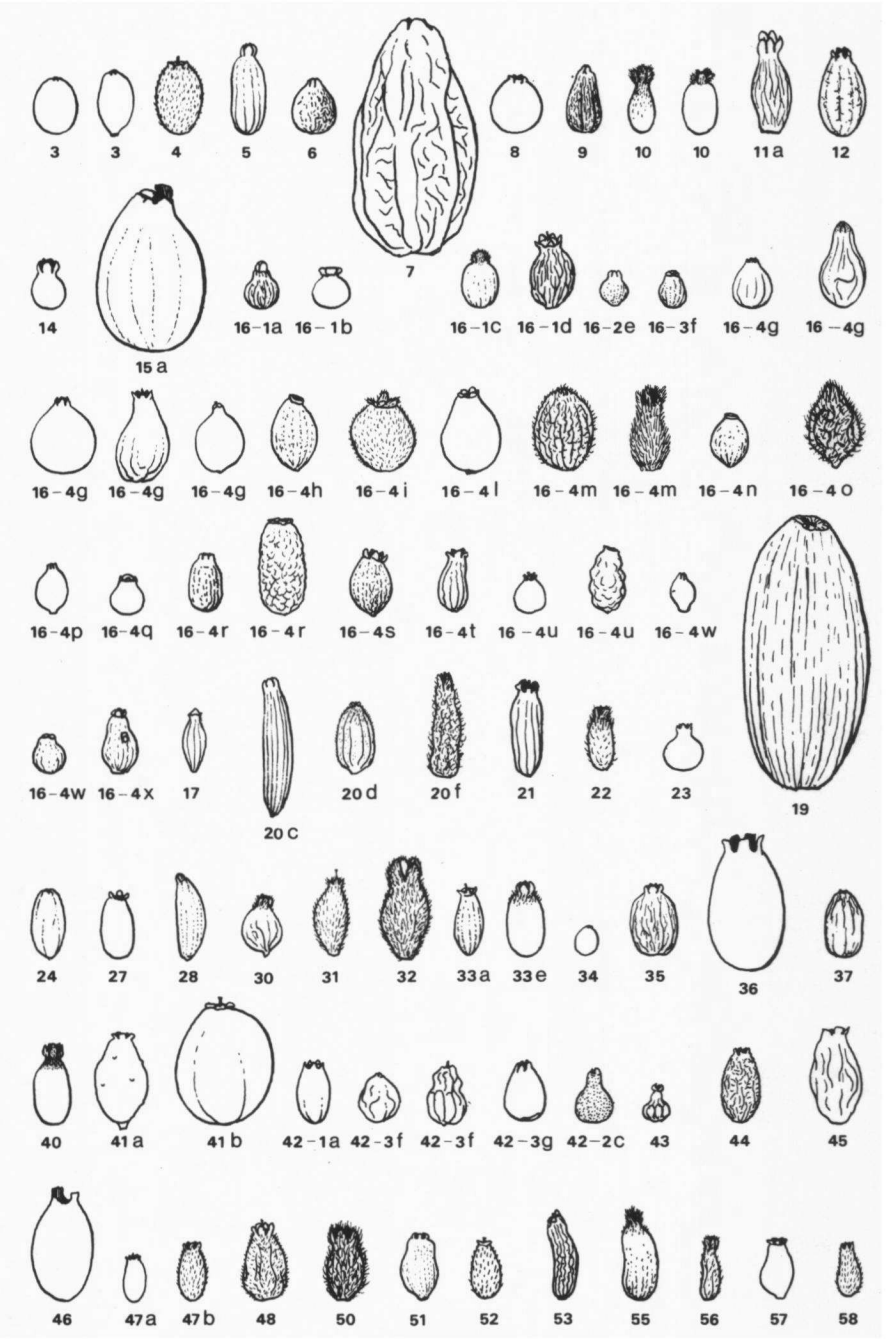

Fig. 7. Fruits in outline, in the dried state. Of each fruit the voucher specimen is cited by the number of the taxon. If for showing variability more fruits of the same taxon are drawn, read from left to right corresponding with the voucher numbers. All drawings natural size. — 3 CHEW WEE LEK 938 — 3 CF 104879 — 4 SAN 56690 — 5 DE WILDE 13773 — 6 A. ERNST 736 — 7 KING's Coll. 6179 — 8 MEIJER 7581 — 9

rejic. — *Dicalix* LOUR. Fl. Coch. 1 (1790) 663; BL. Bijdr. (1826) 1116 ('*Dicalyx*'). — *Sariava* REINW. Syll. Ratisb. 2 (1825) 12. — *Carlea* PR. Epim. Bot. (1851) 216. — *Baranda* LLanos, Mem. Ac. Cienz. Madrid 3, 2 (1857) 502. — *Eugeniodes* O. K. Rev. Gen. Pl. 2 (1891) 409, 975, *nom. illeg.* — **Fig. 7–20.**

Leaves usually becoming more or less yellow when drying. Petals glabrous, or hairy in only few species, connate only at the very base, mostly expanded. Stamens monadelphous to pentadelphous, only connate at the very base (for at most 2 mm); filaments cylindrical, slender to rather stiff, often gradually attenuate towards the anther. Fruits 2–3(–5?)-celled, often 1-celled by abortion. Seeds either straight or curved, and then with curved embryo.

Distr. About 150 *spp.*, as for the genus. Fig. 1.

Note. As explained in the note under the genus, a general overall key is given to all species, as much as possible based on vegetative characters and on flowering material.

To facilitate identification additional local keys are given for the main Malesian islands or island groups, one each for flowering and for fruiting material.

In addition in fig. 7 fruits are drawn of all species as far as available in the *dried state*. They have been numbered according to the number of the taxa. The following terminology has been adopted for fruit-shapes:

globose 34, 41b
ellipsoid 4, 19, 33e, 46
ovoid 48
obovoid 1a, 1b: fig. 6c
ampulliform 23, 42c, 43
spindle-shaped 38: fig. 19d.
cylindrical 20c, 21

It should be observed that the shape of the stone may differ from the shape of the fruit and that for instance ovoid fruits may possess an ampulliform stone.

There is no strict relation between the shape of the seed and the shape of the fruit or stone, but ampulliform fruits have always a curved seed and curved embryo and spindle-shaped and cylindrical fruits have always a straight seed and embryo.

Besides the overall-shape of the drupe, the shape of the stone can be important: sometimes it bears lower or higher ridges, which ornamentation provides good characters.

KEY TO THE SPECIES

1. Leaves (pseudo-)verticillate.
 2. Upper side of leaves glabrous. Twigs hirsute . . . . . **55. S. verticillifolia**
 2. Upper side of leaves hairy. Twigs tomentose . . . . . **30. S. herzogii**
1. Leaves not verticillate.
 3. Midrib prominent on the upper surface.
  4. Twigs glabrous.
   5. Leaves crowded towards the end of the twigs, minutely appressedly hairy beneath **37. S. wikstroemifolia**
   5. Leaves evenly distributed, glabrous . . . . . **35. S. lucida**
  4. Twigs hairy.

HALLIER *f.* 2197 — 10 CLEMENS 32525 — 10 CLEMENS 32478 — 11a bb 23324 — 12 SAN 46543 — 14 KOSTERMANS 9158 — 15a KOSTERMANS & ANTA 527 — 16–1a FORBES 861 — 16–1b MEIJER 1690 — 16–1c CLEMENS 17224 — 16–1d BS 4476 — 16–2e LARSEN *c.s.* 887 — 16–3f NGF 33643 — 16–4g ANU 2027 — 16–4g A. C. SMITH 1054 — 16–4g BW 4970 — 16–4g GILLESPIE 3918 — 16–4g NGF 28481 — 16–4h VINK 17308 — 16–4i BRASS 28343 — 16–4l BRASS 29919 — 16–4m LEDERMANN 8946 — 16–4m T. G. HARTLEY 13135 — 16–4n PULLEN 479 — 16–4o NGF 49168 — 16–4p PULLEN 7783 — 16–4q KOSTERMANS & WIRAWAN 878 — 16–4r NICOLAS 19 — 16–4r VAN BALGOOY 862 — 16–4s KALKMAN 5128 — 16–4t VINK 16079 — 16–4u KOSTERMANS 2375 — 16–4u FORBES P. P. 652 — 16–4w BRASS 28191 — 16–4w CLEMENS 1661 — 16–4x NGF 23728 — 17 CLEMENS 33706 — 19 KOORDERS 15596 — 20c VAN BEUSEKOM *c.s.* 837— 20d ENDERT 2580 — 20f CF 97832 — 21 bb 22503 — 22 JACOBS 5766 — 23 SAN A2240 — 24 MERRILL 6148 — 27 BS 45592 — 28 KEP/FRI 8236 — 30 T. G. HARTLEY 12509 — 31 NOOTEBOOM & ABAN 1500 — 32 HILDEBRAND 55 — 33a SAN 65017 — 33e SAN 44386 — 34 PNH 18483 — 35 BÜRGER *s.n.* — 36 Cel. II–374 — 37 F. C. How 73506 — 40 BS 26447 — 41a Ja 7723 — 41b SAN 57045 — 42–1a BURN MURDOCH 340 — 42–3f DING HOU 274 — 42–3f NOOTEBOOM 2229 — 42–3g BS 83753 — 42–2c CF 98890 — 43 KAJEWSKI 1208 — 44 S 17287 — 45 CARR 12782 — 46 RIDLEY 16102 — 47a ROBINSON & KLOSS 199 — 47b MEIJER 7665 — 48 ISMAEL 9 — 50 BECCARI P. S. 106 — 51 KOELZ 29538 — 52 CLEMENS 32559 —53 S 26305 — 55 PNH 14397 — 56 BS 45675 or 45775 — 57 JACOBS 7484 — 58 NOOTEBOOM 1491.

6. Leaves crowded towards the end of the twigs, minutely appressedly hairy beneath **37. S. wikstroemifolia**
6. Leaves evenly distributed, glabrous or sparsely fine hairy beneath.
7. Underside of leaves glabrous. Corolla 4–6 mm . . . . . **4. S. anomala**
7. Underside of leaves hairy. Corolla $2^1/_2$–4 mm . . . . . **34. S. lancifolia**
3. Midrib sulcate above.
8. Corolla (densely) hairy . . . . . **41. S. odoratissima**
8. Corolla glabrous.
9. Twigs hairy.
10. Underside of leaves glabrous. (When petiole and leaf margin beset with closely spaced vesicular glands: 3. *S. adenophylla*).
11. Leaves distichous . . . . . **33. S. laeteviridis**
11. Leaves spirally arranged.
12. Calyx and ovary glabrous.
13. Petiole 0–5 mm . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
13. Petiole more than 5 mm.
14. Leaves shorter than 5 cm . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
14. Leaves longer than 5 cm.
15. Disk hairy . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
15. Disk glabrous.
16. Twigs (appressedly) pubescent, puberulous or pilose. Seeds not straight. **16. S. cochinchinensis**
16. Twigs tomentose or tomentellous.
17. Petiole 12–17 mm. Acumen 2–7 mm long. Nerves 8–12 pairs. Fruits more than 10 mm long . . . . . **5. S. atjehensis**
17. Petiole 5–12 mm. Acumen longer than 7 mm. Nerves 10–16 pairs. Fruits to *c.* 10 mm long. **28. S. glomerata**
12. Calyx and/or ovary hairy.
18. Leaves crowded towards the end of the twigs, the latter tapering off towards the apex. **44. S. polyandra**
18. Leaves evenly distributed, twigs not obviously tapering off.
19. Ovary glabrous.
20. Inflorescence only 1-flowered . . . . . **38. S. multibracteata**
20. Inflorescence more-flowered.
21. Disk hairy . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
21. Disk glabrous.
22. Seed and embryo uncinately curved towards the base **16–4. S. cochinchinensis *ssp.* leptophylla**
22. Seed and embryo twice curved . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
19. Ovary hairy.
23. Calyx glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
23. Calyx hairy.
24. Bracts caducous.
25. Inflorescence an often branched raceme to 4 cm. Calyx 1–2 mm long **47. S. robinsonii**
25. Inflorescence a 1–3-flowered short spike. Calyx *c.* 3 mm . . . . **10. S. brachybotrys**
24. Bracts persistent.
26. Petiole 0–5 mm . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
26. Petiole more than 5 mm.
27. Seeds straight . . . . . **24. S. filipes**
27. Seeds not straight. . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
10. Underside of leaves hairy.
28. Leaves distichous.
29. Nerves up to 6 pairs.
30. Angle of leaf base more than 90° . . . . . **31. S. johniana**
30. Angle of leaf base less than 90°.
31. Disk glabrous . . . . . **52. S. trichomarginalis**
31. Disk hairy . . . . . **33. S. laeteviridis**
29. Nerves (5–)6 pairs or more.
32. Leaves longer than 5 cm (mean length).
33. Flowers *c.* 3 in an up to 3 cm long lax raceme. Fruits 10–14 mm long. Stamens *c.* 90 or more. **17. S. colombonensis**
33. Inflorescence usually different. Fruits to *c.* 12 mm long. Stamens *c.* 70 or less.
34. Inflorescence a fascicle. Bracts to *c.* 1 mm long, persistent, bracteoles persistent. Ovary *c.* 1 mm high, calyx *c.* 1 mm long, lobes not becoming longer by tearing. Corolla *c.* 2–$4^1/_2$ mm. Style base hairy. Fruits ampulliform . . . . . **23. S. fasciculata**
34. Inflorescence not a fascicle. Bracts longer than 1 mm, caducous, bracteoles caducous. Ovary more than 1 mm high, calyx longer than 1 mm, lobes becoming longer by tearing. Corolla more than 4 mm long. Style base glabrous. Fruits ovoid to ellipsoid **33. S. laeteviridis**

32. Leaves shorter than 5 cm.
35. Inflorescence only 1-flowered.
36. Reticulation not prominent. Ovary *c.* 1 mm high, calyx longer than 2 mm, lobes *c.* 3 mm. Bracts several. Corolla *c.* 4 mm. Fruits 8–9 mm long . . . . **52. S. trichomarginalis**
36. Reticulation present beneath. Ovary 1–1½ mm high, calyx *c.* 2 mm long, lobes 1–1½ mm long. Bract 1. Corolla 4–6 mm long. Fruits 10–12 mm long . . . . **58. S. zizyphoides**
35. Inflorescence more-flowered.
37. Bracts and bracteoles caducous . . . . . **33. S. laeteviridis**
37. Bracts and bracteoles persistent.
38. Disk hairy. Fruits *c.* 10 by 5 mm . . . . . **22. S. deflexa**
38. Disk glabrous. Fruits 10–12 by 5–6 mm. . . . . **58. S. zizyphoides**
28. Leaves spirally arranged.
39. Upper side of leaves hairy.
40. Angle of leaf base more than 90°. . . . . **13. S. calycodactylos**
40. Angle of leaf base less than 90°.
41. Leaf margin (and petiole) beset with closely spaced glands . . . . . **3. S. adenophylla**
41. Leaf margin (and petiole) often glandular but glands not closely spaced.
42. Ovary hairy. Fr. cylindrical, 13–18 by 3–5 mm. Embryo straight . . . . **20. S. crassipes**
42. Ovary glabrous. Fr. ampulliform, 6 by 4 mm. Embryo twice curved **43. S. paucistaminea**
39. Upper side of leaves glabrous.
43. Calyx and ovary glabrous.
44. Leaves crowded towards the end of the twigs, minutely appressedly hairy beneath **37. S. wikstroemifolia**
44. Leaves evenly distributed, glabrous or longer hairs beneath.
45. Seeds straight.
46. Leaf index 2–3. Fruits less than 20 mm long . . . . . **5. S. atjehensis**
46. Leaf index more than 3. Fruits longer than 20 mm.
47. Nerves less than 10 pairs . . . . . **15. S. cerasifolia**
47. Nerves more than 10 pairs . . . . . **15b. S. cerasifolia *var.* grandifolia**
45. Seeds not straight . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
43. Calyx and/or ovary hairy.
48. Leaves crowded towards the end of the twigs . . . . . **37. S. wikstroemifolia**
48. Leaves evenly distributed.
49. Ovary glabrous.
50. Disk hairy.
51. Inflorescence only 1-flowered. Seeds straight. . . . . **38. S. multibracteata**
51. Inflorescence more-flowered. Seeds not straight.
52. Petiole 0–5 mm . . . . . **34. S. lancifolia**
52. Petiole more than 5 mm . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
50. Disk glabrous.
53. Ovary to *c.* 1 mm high . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
53. Ovary more than 1 mm high.
54. Twigs (appressedly) pubescent, puberulous or pilose. **16–4. S. cochinchinensis *ssp.* leptophylla**
54. Twigs not appressedly pubescent or puberulous.
55. Leaf index 2–3. Bracts persistent, shorter than 3 mm, bracteoles persistent. Calyx lobes not becoming longer by tearing. Corolla shorter than *c.* 4 mm. Stamens less than 30. Fruits to *c.* 10 mm long. Mesocarp fleshy (shrivelled when dry). Seeds not straight. **16–4. S. cochinchinensis *ssp.* leptophylla**
55. Leaf index more than 3. Bracts caducous, longer than 3 mm, bracteoles caducous. Calyx lobes becoming longer by tearing. Corolla *c.* 5 mm long. Stamens more than 30. Fruits more than 20 mm long. Mesocarp woody or corky. Seeds straight **15. S. cerasifolia**
49. Ovary hairy.
56. Calyx glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
56. Calyx hairy.
57. Bracts caducous.
58. Leaves longer than 15 cm.
59. Fruits more than 10 mm long, 2–5-celled. Mesocarp woody or corky. Stone with high lengthwise not interrupted ridges. Seeds straight . **15b. S. cerasifolia *var.* grandifolia**
59. Fruits to *c.* 10 mm long, 1-celled. Mesocarp thin, friable in dry state. Stone with a transverse constriction at one side. Seeds not straight . . . . . **48. S. rubiginosa**
58. Leaves shorter than *c.* 15 cm.
60. Calyx lobes longer than 1½ mm. Style base hairy.
61. Leaves shorter than 5 cm . . . . . **10. S. brachybotrys**
61. Leaves longer than 5 cm.
62. Inflorescence a raceme . . . . . **50. S. sumatrana**
62. Inflorescence a 1–3-flowered short spike or a spike to 4 cm.

63. Petiole 3–4 mm. Ovary *c.* 1 mm high, calyx *c.* 3 mm, lobes longer than $2^1/_2$ mm. Ovary (appressedly) pubescent. Disk inconspicuous. Fruits *c.* 5 mm broad, 1-celled. Seeds not straight . . . . . **10. S. brachybotrys**
63. Petiole 5–7 mm. Ovary *c.* $1^1/_2$ mm high, calyx 2 mm long, lobes $1^1/_2$–$2^1/_2$ mm long. Ovary sericeous. Disk clearly present. Fruits more than 5 mm broad, 3-celled. Seeds straight . . . . . **50. S. sumatrana**

60. Calyx lobes $^1/_2$–$1^1/_2$ mm long. Style base glabrous.
64. Nerves more than 10 pairs . . . . . **47. S. robinsonii**
64. Nerves less that 10 pairs.
65. Ovary *c.* 1 mm high, lobes triangular. . **42–1b. S. ophirensis *var.* densireticulata**
65. Ovary 1–2 mm high, lobes not triangular. . . . . **47. S. robinsonii**

57. Bracts persistent.
66. Inflorescence only 1-flowered.
67. Angle of leaf base more than 90° . . . . . **31. S. johniana**
67. Angle of leaf base less than 90°.
68. Leaf index 4–7. Ovary *c.* $1^1/_4$ mm high. Stamens less than 30. Disk hairy, inconspicuous. Stone ?smooth . . . . . **49. S. salicioides**
68. Leaf index 1.3–4. Ovary to *c.* 1 mm high. Stamens more than 30. Disk glabrous, clearly present. Stone with ridges or grooves . . . . . **20. S. crassipes**

66. Inflorescence more-flowered.
69. Seeds straight.
70. Bracts to *c.* 1 mm long.
71. Ovary to *c.* 1 mm high.
72. Reticulation fine. Calyx longer than 1 mm. Inflorescence a much reduced often clustered spike. Fruits not ampulliform, 13–18 mm long . . . **20. S. crassipes**
72. Reticulation coarse. Calyx *c.* 1 mm long. Inflorescence a fascicle. Fruits ampulliform, 5–7 mm long . . . . . **23. S. fasciculata**
71. Ovary more than 1 mm high.
73. Leaf index more than 3. Calyx lobes longer than $^1/_2$ mm . . . **3. S. adenophylla**
73. Leaf index 2–3. Calyx lobes to *c.* $^1/_2$ mm long . . . . . **24. S. filipes**
70. Bracts longer than 1 mm.
74. Angle of leaf base more than 90° . . . . . **20. S. crassipes**
74. Angle of leaf base less than 90°.
75. Underside of leaves especially hairy on the margin . . . . . **20. S. crassipes**
75. Underside of leaves not especially hairy on the margin.
76. Calyx lobes longer than $1^1/_2$ mm. Disk hairy. Stamens more than 30. Style base hairy. Fruits more than 10 mm long . . . . . **20. S. crassipes**
76. Calyx lobes 1–$1^1/_2$ mm long. Disk glabrous. Stamens less than 30. Style base glabrous. Fruits *c.* 10 mm long . . . . . **56. S. vidalii**

69. Seeds not straight.
77. Disk glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
77. Disk hairy.
78. Seed and embryo U-shaped . . . . . **34. S. lancifolia**
78. Seed and embryo uncinately curved towards the base.
16–4. S. cochinchinensis *ssp.* leptophylla

9. Twigs glabrous.
79. Underside of leaves hairy.
80. Leaves crowded towards the end of the twigs, minutely appressedly hairy beneath
37. S. wikstroemifolia
80. Leaves evenly distributed.
81. Calyx and ovary glabrous.
82. Disk hairy . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
82. Disk glabrous.
83. Seed and embryo uncinately curved towards the base.
16–4. S. cochinchinensis *ssp.* leptophylla
83. Seed and embryo not uncinately curved towards the base . . . . . **5. S. atjehensis**
81. Calyx and/or ovary hairy.
84. Leaves distichous . . . . . **33. S. laeteviridis**
84. Leaves spirally arranged.
85. Leaves shorter than 5 cm . . . . . **10. S. brachybotrys**
85. Leaves longer than 5 cm.
86. Calyx glabrous.
87. Calyx lobes becoming longer by tearing. Seeds straight . . . . . **20. S. crassipes**
87. Calyx lobes not becoming longer by tearing. Seeds not straight.
16–4. S. cochinchinensis *ssp.* leptophylla
86. Calyx hairy.
88. Petiole 3–4 mm . . . . . **10. S. brachybotrys**
88. Petiole more than 5 mm.
89. Ovary glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**

89. Ovary hairy.
90. Bracts and bracteoles caducous . . . . . **48. S. rubiginosa**
90. Bracts and bracteoles persistent.
91. Bracts to *c.* 1 mm long. Seeds straight . . . . . **24. S. filipes**
91. Bracts longer than 1 mm. Seeds not straight.
16–4. S. cochinchinensis *ssp.* leptophylla
79. Underside of leaves glabrous.
92. Leaves distichous . . . . . **33. S. laeteviridis**
92. Leaves spirally arranged.
93. Calyx and/or ovary hairy.
94. Ovary glabrous.
95. Bracts caducous.
96. Leaves shorter than 5 cm . . . . . **12. S. buxifolia**
96. Leaves 9–15 cm . . . . . **21. S. cylindracea**
96. Leaves longer than 15 cm . . . . . **7. S. barringtoniifolia**
95. Bracts persistent.
97. Inflorescence only 1-flowered . . . . . **12. S. buxifolia**
97. Inflorescence more-flowered.
98. Disk hairy . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
98. Disk glabrous.
99. Calyx lobes to *c.* $^1/_2$ mm long . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
99. Calyx lobes longer than $^1/_2$ mm.
100. Ovary to *c.* 1 mm high . . . . . **16. S. cochinchinensis**
100. Ovary more than 1 mm high.
101. Seeds straight . . . . . **42. S. ophirensis**
101. Seeds not straight.
102. Seed and embryo uncinately curved towards the base.
16–4. S. cochinchinensis *ssp.* leptophylla
102. Seed and embryo different . . . . . **42. S. ophirensis**
94. Ovary hairy.
103. Leaves shorter than 5 cm. Petiole 3–4 mm . . . . . **10. S. brachybotrys**
103. Leaves longer than 5 cm.
104. Calyx glabrous.
105. Disk glabrous.
106. Calyx lobes not becoming longer by tearing. Seeds not straight.
16–4. S. cochinchinensis *ssp.* leptophylla
106. Calyx lobes becoming longer by tearing. Seeds straight . . . . . **20. S. crassipes**
105. Disk hairy.
107. Seeds not straight. Bracts and bracteoles persistent.
16–4. S. cochinchinensis *ssp.* leptophylla
107. Seeds straight. Bracts and bracteoles caducous.
108. Corolla 5–6 mm . . . . . **21. S. cylindracea**
108. Corolla 8–10 mm . . . . . **32. S. junghuhnii**
104. Calyx hairy.
109. Bracts caducous.
110. Calyx longer than 1 mm. Style base hairy.
111. Petiole 3–4 mm. Inflorescence a (basally branched) spike. Ovary *c.* 1 mm high. Disk inconspicuous. Fruits *c.* 10 mm long, 1-celled. Seeds not straight **10. S. brachybotrys**
111. Petiole more than 5 mm. Inflorescence a panicle. Ovary 1–1$^1/_2$ mm high. Disk clearly present. Fruits 15 mm long, 3-celled. Seeds straight . . . . . **21. S. cylindracea**
110. Calyx to *c.* 1 mm long. Style base glabrous . . . . . **42. S. ophirensis**
109. Bracts persistent.
112. Petiole 0–5 mm . . . . . **42. S. ophirensis**
112. Petiole more than 5 mm.
113. Leaves crowded towards the end of the twigs, the latter tapering off, at least 5 mm ⌀ beneath the leaves . . . . . **44. S. polyandra**
113. These characters not combined.
114. Nerves 13–20 pairs. Intramarginal vein absent. Leaves 21–62 cm **26. S. gigantifolia**
114. Nerves 4–13 pairs. Leaves 4–23 cm.
115. Disk glabrous.
116. Bracts longer than 1 mm . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
116. Bracts to *c.* 1 mm long.
117. Calyx lobes to *c.* $^1/_2$ mm long. Stone with low ridges . . . . . **24. S. filipes**
117. Calyx lobes longer than $^1/_2$ mm. Stone with high lengthwise interrupted ridges.
42. S. ophirensis
115. Disk hairy.
118. Nerves 4–7 pairs. Fruits ampulliform with long beak, *c.* 7 by 5 mm
42. S. ophirensis
118. These characters not combined . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**

93. Calyx and ovary glabrous.
119. Inflorescence terminal . . . . . **46. S. pyriflora**
119. Inflorescence axillary.
120. Bracts caducous.
121. Nerves more than 10 pairs.
122. Inflorescence a (basally branched) spike, forming a cone in bud. Fruits more than 20 mm long . . . . . **19. S. costata**
122. Inflorescence not a spike. Fruits less than 20 mm long.
123. Bracts and bracteoles glabrous . . . . . **46. S. pyriflora**
123. Bracts and bracteoles hairy.
124. Leaf margin entire. Disk inconspicuous . . . . . **36. S. maliliensis**
124. Leaf margin not entire. Disk clearly present.
125. Bracts shorter than 3 mm. Stamens less than 100. Corolla *c.* 4 mm **11. S. brandisii**
125. Bracts longer than 3 mm. Stamens more than 100. Corolla *c.* 5 mm long. **11b. S. brandisii *var.* pseudoclethra**
121. Nerves less than 10 pairs.
126. Disk hairy.
127. Stamens 15–40. Petiole 1–3 mm . . . . . **34. S. lancifolia**
127. Stamens more than 40. Petiole more than 5 mm.
128. Ovary to *c.* 1 mm high.
129. Inflorescence a (basally branched) lax spike. Bracts to *c.* 1 mm long **25. S. gambliana**
129. Inflorescence not a spike. Bracts longer than 1 mm.
130. Inflorescence a (basally branched) raceme. Stamens 40–*c.* 60. Calyx lobes becoming longer by tearing. Style base glabrous . . . . . **14. S. celastrifolia**
130. Inflorescence a panicle of racemes. Stamens more than 100. Calyx lobes not becoming longer by tearing. Style base hairy . . . . . **39. S. nivea**
128. Ovary more than 1 mm high.
131. Petiole 3–4 mm . . . . . **9. S. borneensis**
131. Petiole more than 5 mm.
132. Terminal buds glabrous.
133. Inflorescence a (basally branched) raceme. Calyx $1^1/_2$ mm long. Style base glabrous. Fruits *c.* 10 mm long . . . . . **8. S. batakensis**
133. Inflorescence a fascicle or very short spike. Calyx *c.* 2 mm long. Style base hairy. Fruits 12–16 mm long . . . . . **53. S. tricoccata**
132. Terminal buds hairy. Inflorescence a panicle. Calyx longer than 2 mm, lobes longer than $1^1/_2$ mm. Style base hairy. Fruits more than 10 mm long . **21. S. cylindracea**
126. Disk glabrous.
134. Fruits 2–5-celled.
135. Inflorescence a fascicle or a very short spike. Ovary more than 1 mm high. **53. S. tricoccata**
135. Inflorescence a (basally branched) raceme. Ovary to *c.* 1 mm high.
136. Inflorescence axis hairy. Corolla more than 4 mm long. Calyx lobes becoming longer by tearing. Stone smooth. Seeds not straight . . . . . **14. S. celastrifolia**
136. Inflorescence axis glabrous. Corolla shorter than *c.* 4 mm. Calyx lobes not becoming longer by tearing. Stone with ridges or grooves. Seeds straight **27. S. glabriramifera**
134. Fruits 1-celled.
137. Reticulation fine. Ovary 2–3 mm high . . . . . **12. S. buxifolia**
137. Reticulation coarse. Ovary 1–2 mm high.
138. Inflorescence much branched . . . . . **16–3. S. cochinchinensis *ssp.* thwaitesii**
138. Inflorescence simple . . . . . **51. S. sumuntia**
120. Bracts persistent.
139. Leaves shorter than 5 cm.
140. Inflorescence only 1-flowered. Bracts several.
141. Bracts shorter than 3 mm. Corolla shorter than *c.* 4 mm. Ovary 1–2 mm high. Stamens less than 30. Stone smooth. Seed and embryo uncinately curved towards the base. **16–4. S. cochinchinensis *ssp.* leptophylla**
141. Bracts longer than 3 mm. Corolla more than 4 mm long. Ovary more than 2 mm high. Stamens more than 50. Stone with ridges or grooves. Seed and embryo not uncinately curved towards the base . . . . . **12. S. buxifolia**
140. Inflorescence more-flowered. Bract 1.
142. Petiole 0–5 mm.
143. Corolla 5–7 mm . . . . . **57. S. whitfordii**
143. Corolla shorter.
144. Leaf index less than 2. Acumen shorter than 5 mm. Bracts longer than 1 mm. **16. S. cochinchinensis**
144. Leaf index more than 2. Acumen longer than 5 mm . . . . . **34. S. lancifolia**
142. Petiole more than 5 mm.

145. Inflorescence a basally branched raceme. Corolla 5–7 mm long . . **57. S. whitfordii**
145. Inflorescence a (basally branched) spike. Corolla shorter than *c.* 4 mm. **16–4. S. cochinchinensis *ssp.* leptophylla**
139. Leaves longer than 5 cm.
146. Petiole 0–5 mm . . . . . **34. S. lancifolia**
146. Petiole more than 5 mm.
147. Inflorescence not a spike.
148. Inflorescence not a fascicle.
149. Reticulation fine. Ovary *c.* 1 mm high . . . . . **18. S. composiracemosa**
149. Reticulation coarse. Ovary more than 1 mm high **16–3. S. cochinchinensis *ssp.* thwaitesii**
148. Inflorescence a fascicle.
150. Disk glabrous.
151. Petiole 12–17 mm. Ovary more than 1 mm high. Nerves 8–12 pairs. Fruits 10–12 mm long . . . . . **5. S. atjehensis**
151. Petiole 5–12 mm. Ovary *c.* 1 mm high. Nerves 10–16 pairs. Fruits 7–10 mm long. **28. S. glomerata**
150. Disk hairy.
152. Leaves obovate, longer than 10 cm. Acumen longer than 5 mm. Inflorescence axis hairy. Calyx regularly 5-lobed. Fruits ovoid or obovoid, 1-celled. Seeds 1, not straight . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
152. Leaves elliptic or circular, shorter than *c.* 10 cm. Acumen shorter than 5 mm. Inflorescence axis glabrous. Calyx 2–4-lobed or symmetrically cleft. Fruits cylindric or ellipsoid, 2–5-celled. Seeds more than 1, straight . . . . . **40. S. obovatifolia**
147. Inflorescence a (basally branched) spike.
153. Twigs (exceptionally) thick.
154. Terminal buds hairy. Disk hairy . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
154. Terminal buds glabrous. Disk glabrous.
155. Inflorescence axis hairy. Bracts 2–3 mm, hairy. Bracteoles hairy. Calyx $1^1/_2$–2 mm long. Fruits *c.* 10 mm long . . . . . **6. S. barisanica**
155. Inflorescence axis glabrous. Bracts 5–7 mm, glabrous. Bracteoles glabrous. Calyx longer than 2 mm. Fruits *c.* 13 mm long. . . . . **45. S. pulvinata**
153. Twigs not (exceptionally) thick.
156. Calyx 2–4-lobed or symmetrically cleft.
157. Petiole 15–25 mm . . . . . **54. S. trisepala**
157. Petiole 7–12 mm . . . . . **40. S. obovatifolia**
156. Calyx regularly 5-lobed.
158. Base angle to 20–30°. Leaf index $3^1/_2$–5. Nerves 11–13 pairs . . **29. S. goodeniacea**
158. Base angle more than 30°. Leaf index less than $3^1/_2$. Nerves at most 11 pairs.
159. Seed and embryo uncinately curved towards the base. **16–4. S. cochinchinensis *ssp.* leptophylla**
159. Seed and embryo twice curved . . . . . **16–2. S. cochinchinensis *ssp.* laurina**

KEYS TO FLOWERING MATERIAL ARRANGED BY ISLANDS AND ISLAND GROUPS

Sumatra

1. Midrib prominent on the upper surface.
2. Twigs hairy . . . . . **4. S. anomala**
2. Twigs glabrous . . . . . **35. S. lucida**
1. Midrib impressed in the upper surface.
3. Corolla hairy. . . . . **41. S. odoratissima**
3. Corolla glabrous.
4. Underside of leaves glabrous.
5. Twigs hairy.
6. Leaves distichous. Calyx 2–4-lobed or symmetrically cleft, calyx lobes becoming longer by tearing. **33. S. laeteviridis**
6. Leaves spirally arranged.
7. Leaves crowded towards the end of the twigs. Twigs thick, tapering towards apex. Petiole more than 20 mm. Corolla more than 7 mm long. Apex of leaves rounded or acute . **44. S. polyandra**
7. Leaves evenly distributed.
8. Calyx and ovary glabrous . . . . . **5. S. atjehensis**
8. Calyx and/or ovary hairy.
9. Leaves longer than 10 cm. Nerves more than 10 pairs. Inflorescence a (basally branched) spike. Bracts persistent. Ovary glabrous, to *c.* 1 mm high, calyx lobes longer than $1^1/_2$ mm. Disk glabrous, clearly present. Fruits ampulliform, 1-celled. **16–1. S. cochinchinensis *ssp.* cochinchinensis**

9. Leaves shorter than *c.* 10 cm. Nerves less than 10 pairs. Inflorescence a raceme. Bracts caducous. Ovary hairy, 1–2 mm high, calyx lobes $^1/_2$–$1^1/_2$ mm long. Disk hairy, inconspicuous. Fruits ellipsoid, 3-celled . . . . . **47. S. robinsonii**

5. Twigs glabrous.
10. Nerves 4–5 pairs . . . . . **42. S. ophirensis**
10. Nerves more than 5 pairs.
11. Calyx and/or ovary hairy.
12. Leaves distichous . . . . . **33. S. laeteviridis**
12. Leaves spirally arranged.
13. Leaves crowded towards the end of the tapering-off twigs . . . . . **44. S. polyandra**
13. Plant different . . . . . **42. S. ophirensis**
11. Calyx and ovary glabrous.
14. Inflorescence not a spike.
15. Inflorescence a fascicle. Stamens *c.* 50 . . . . . **5. S. atjehensis**
15. Inflorescence a raceme.
16. Stamens 40–60 . . . . . **14. S. celastrifolia**
16. Stamens *c.* 100 . . . . . **8. S. batakensis**
14. Inflorescence a (basally branched) spike.
17. Twigs thick. Terminal buds large . . . . . **6. S. barisanica**
17. Twigs not thick. Terminal buds small . . . . . **16–2. S. cochinchinensis *ssp.* laurina**

4. Underside of leaves hairy.
18. Twigs glabrous.
19. Leaves distichous. Petiole 1–4 mm. Corolla 3–5 mm . . . . . **33. S. laeteviridis**
19. Leaves spirally arranged. Petiole more than 5 mm.
20. Inflorescence a fascicle. Bracts persistent, *c.* 2 mm. Calyx glabrous. Calyx lobes not becoming longer by tearing . . . . . **5. S. atjehensis**
20. Inflorescence a spike forming a cone in bud. Bracts caducous, 3–5 mm. Calyx hairy. Calyx lobes becoming longer by tearing . . . . . **48. S. rubiginosa**
18. Twigs hairy.
21. Leaves distichous.
22. Calyx usually hairy. Inflorescence a fascicle. Bracts persistent. Ovary *c.* 1 mm long. Calyx *c.* 1 mm long. Calyx lobes not becoming longer by tearing. Style base hairy . **23. S. fasciculata**
22. Calyx often glabrous. Inflorescence a raceme or panicle of racemes. Bracts caducous. Ovary 1–$1^1/_2$ mm high. Calyx 2–3 mm. Calyx lobes becoming longer by tearing. Style base glabrous **33. S. laeteviridis**
21. Leaves spirally arranged.
23. Calyx and ovary glabrous.
24. Leaf index 2 to 3. Nerves 8–12 pairs . . . . . **5. S. atjehensis**
24. Leaf index more than 3. Nerves 6–9 pairs.
25. Nerves less than 10 pairs . . . . . **15. S. cerasifolia**
25. Nerves more than 10 pairs . . . . . **15b. S. cerasifolia *var.* grandifolia**
23. Calyx and/or ovary hairy.
26. Upper side of leaves hairy (pulverulent). Leaf margin and petiole beset with many closely spaced vesicular glands . . . . . **3. S. adenophylla**
26. Upper side of leaves glabrous. Leaf margin and petiole different.
27. Ovary glabrous.
28. Nerves less than 10 pairs. Bracts caducous. Ovary 1–$1^1/_2$ mm high. Calyx $2^1/_2$–4 mm. Calyx lobes becoming longer by tearing . . . . . **15. S. cerasifolia**
28. Nerves more than 10 pairs. Bracts persistent. Ovary to *c.* 1 mm long. Calyx 1 to 2 mm long. Calyx lobes not becoming longer by tearing. **16–1. S. cochinchinensis *ssp.* cochinchinensis**
27. Ovary hairy.
29. Leaves longer than 15 cm.
30. Nerves 10–13 pairs . . . . . **15b. S. cerasifolia *var.* grandifolia**
30. Nerves 12–17 pairs . . . . . **48. S. rubiginosa**
29. Leaves shorter than *c.* 15 cm.
31. Bracts to *c.* 1 mm long.
32. Leaf margin (and petiole) beset with closely spaced glands . . . . . **3. S. adenophylla**
32. Leaf margin (and petiole) often glandular but glands not closely spaced.
33. Nerves less than 10 pairs. Reticulation coarse. Inflorescence a fascicle. Bracts persistent. Ovary *c.* 1 mm high. Style base hairy . . . . . **23. S. fasciculata**
33. Nerves more than 10 pairs. Reticulation fine. Inflorescence a (basally branched) raceme. Bracts caducous. Ovary more than 1 mm high. Style base glabrous . **47. S. robinsonii**
31. Bracts longer than 1 mm.
34. Angle of leaf base *c.* 90° . . . . . **50. S. sumatrana**
34. Angle of leaf base less than 60° . . . . . **47. S. robinsonii**

Malay Peninsula

1. Midrib prominent on the upper surface.
 2. Twigs hairy.
  3. Leaves evenly distributed, underside glabrous . . . . . **4. S. anomala**
  3. Leaves crowded towards the end of the twigs, minutely sparsely appressedly hairy beneath. **37. S. wikstroemifolia**
 2. Twigs glabrous.
  4. Leaves crowded towards the end of the twigs . . . . . **37. S. wikstroemifolia**
  4. Leaves evenly distributed . . . . . **35. S. lucida**
1. Midrib impressed on the upper surface.
 5. Corolla hairy. . . . . **41. S. odoratissima**
 5. Corolla glabrous.
  6. Twigs hairy.
   7. Leaves distichous.
    8. Underside of leaves glabrous . . . . . **33. S. laeteviridis**
    8. Underside of leaves hairy.
     9. Bracts persistent.
      10. Inflorescence a true fascicle. Ovary *c.* 1 mm high. Calyx 1 mm long . . . **23. S. fasciculata**
      10. Inflorescence a short, often clustered spike. Ovary 1–2 mm high. Calyx $1^1/_2$–4 mm long **20. S. crassipes**
     9. Bracts caducous . . . . . **33. S. laeteviridis**
   7. Leaves spirally arranged.
    11. Upper side of leaves hairy.
     12. Angle of leaf base more than 90°. Bracts and bracteoles caducous. Hairs on twigs more than 2 mm long . . . . . **13. S. calycodactylos**
     12. Angle of leaf base less than 90°.
      13. Leaf margin (and petiole) beset with closely spaced glands. Bracts to *c.* 1 mm long. Calyx to *c.* 1 mm long, calyx lobes $^1/_2$–1 mm long. Disk glabrous. Style base not conical. Fruits to *c.* 10 mm long . . . . . **3. S. adenophylla**
      13. Leaf margin (and petiole) often glandular but glands not closely spaced. Bracts longer than 1 mm. Calyx $1^1/_2$–4 mm, calyx lobes longer than $1^1/_2$ mm. Disk hairy. Style base conical. Fruits 13–18 mm long . . . . . **20. S. crassipes**
    11. Upper side of leaves glabrous.
     14. Leaves crowded towards the end of the twigs. . . . . **37. S. wikstroemifolia**
     14. Leaves evenly distributed.
      15. Underside of leaves glabrous.
       16. Calyx glabrous. Inflorescence a fascicle. Disk pulvinate or cylindric. Fruits cylindrical. Seeds straight . . . . . **28. S. glomerata**
       16. Calyx hairy. Inflorescence a (basally branched) spike. Disk annular. Fruits ampulliform. Seeds not straight . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
      15. Underside of leaves hairy (pulverulent, nearly glabrous, in *S. adenophylla*).
       17. Calyx and ovary glabrous.
        18. Inflorescence a spike . . . . . **15. S. cerasifolia**
        18. Inflorescence a fascicle . . . . . **28. S. glomerata**
       17. Calyx and/or ovary hairy.
        19. Ovary glabrous.
         20. Nerves less than 10 pairs. Bracts and bracteoles caducous. Ovary 1–$1^1/_2$ mm high, calyx longer than 2 mm, calyx lobes 1–$1^1/_2$ mm long, becoming longer by tearing. Fruits 22–40 mm long, 3-celled . . . . . **15. S. cerasifolia**
         20. Nerves more than 10 pairs. Bracts and bracteoles persistent. Ovary to *c.* 1 mm high, calyx *c.* 2 mm long, calyx lobes longer than $1^1/_2$ mm, not becoming longer by tearing. Fruits 5–7 mm long, 1-celled . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
        19. Ovary hairy.
         21. Ovary more than 1 mm high.
          22. Leaf margin (and petiole) beset with closely spaced glands. Bracts to *c.* 1 mm long. Calyx to *c.* 1 mm long . . . . . **3. S. adenophylla**
          22. Leaf margin (and petiole) often glandular but glands not closely spaced. Bracts longer than 1 mm.
           23. Nerves 6–11 pairs. Reticulation faintly prominent. Bracts and bracteoles persistent. Calyx lobes not becoming longer by tearing. Fruits 13–18 mm long . **20. S. crassipes**
           23. Nerves 12–17 pairs. Reticulation much prominent. Bracts and bracteoles caducous. Calyx lobes becoming longer by tearing. Fruits to *c.* 10 mm long . . **48. S. rubiginosa**
         21. Ovary to *c.* 1 mm high.
          24. Leaves longer than 15 cm . . . . . **20. S. crassipes**
          24. Leaves shorter than *c.* 15 cm.
           25. (Reticulation fine.) Bracts and bracteoles caducous . . . . . **42. S. ophirensis**
           25. (Reticulation coarse.) Bracts persistent.

26. Inflorescence an often clustered short spike. Bracts 1–4 mm. Calyx 2½–3 mm. Stamens more than 60. Fruits not ampulliform, 13–18 mm long . . . . . **20. S. crassipes**
26. Inflorescence a fascicle. Bracts to *c.* 1 mm long. Calyx *c.* 1 mm long. Stamens 12–35. Fruits ampulliform, 5–7 mm long . . . . . **23. S. fasciculata**

6. Twigs glabrous.
27. Nerves more than 10 pairs.
28. Underside of leaves hairy.
29. Inflorescence a spike . . . . . **48. S. rubiginosa**
29. Inflorescence a fascicle . . . . . **28. S. glomerata**
28. Underside of leaves glabrous.
30. Petiole more than 20 mm. Inflorescence a spike or a cone. Fruits 3-celled **7. S. barringtoniifolia**
30. Petiole less than 20 mm.
31. Inflorescence terminal . . . . . **46. S. pyrifiora**
31. Inflorescence axillary.
32. Calyx and/or ovary hairy. Corolla 2–5 mm . . . . . **42. S. ophirensis**
32. Calyx and ovary glabrous.
33. Intramarginal vein far from margin. Inflorescence a fascicle. Bracts persistent, hairy, shorter than 3 mm. Ovary *c.* 1 mm high, calyx 1–2 mm long, calyx lobes not becoming longer by tearing. Corolla 4–5 mm. Stamens less than 50. Fruits 7–10 mm long. . **28. S. glomerata**
33. Intramarginal vein close to margin. Inflorescence a raceme or panicle of racemes. Bracts caducous, glabrous, longer than 3 mm. Ovary 1½–2 mm high, calyx 3–5 mm, calyx lobes becoming longer by tearing. Corolla 8–10 mm long. Stamens *c.* 100 or more. Fruits *c.* 15 mm long . . . . . **46. S. pyrifiora**
27. Nerves less than 10 pairs.
34. Underside of leaves hairy.
35. Leaves crowded towards the end of the twigs . . . . . **37. S. wikstroemifolia**
35. Leaves evenly distributed.
36. Bracts persistent. Disk glabrous. Fruits 13–18 mm long . . . . . **20. S. crassipes**
36. Bracts caducous. Disk hairy. Fruits 7–12 mm long . . . . . **33. S. laeteviridis**
34. Underside of leaves glabrous.
37. Calyx and/or ovary hairy.
38. Disk hairy.
39. Leaves distichous . . . . . **33. S. laeteviridis**
39. Leaves spirally arranged . . . . . **42. S. ophirensis**
38. Disk glabrous.
40. Inflorescence a short, often clustered spike. Bracts persistent. . . . . **20. S. crassipes**
40. Inflorescence a raceme. Bracts caducous . . . . . **51. S. sumuntia**
37. Calyx and ovary glabrous.
41. Inflorescence a (basally branched) spike. Bracts persistent **16–2. S. cochinchinensis** *ssp.* **laurina**
41. Inflorescence not a spike. Bracts caducous.
42. Inflorescence a panicle of racemes. Stamens more than 100 . . . . . **39. S. nivea**
42. Inflorescence a (basally branched) raceme. Stamens 25–60.
43. Calyx lobes becoming longer by tearing. . . . . **14. S. celastrifolia**
43. Calyx lobes not becoming longer by tearing . . . . . **51. S. sumuntia**

Java & The Lesser Sunda Islands

1. Corolla hairy . . . . . **41. S. odoratissima**
1. Corolla glabrous.
2. Midrib prominent on the upper surface . . . . . **35. S. lucida**
2. Midrib impressed in the upper surface.
3. Twigs hairy.
4. Leaves distichous . . . . . **23. S. fasciculata**
4. Leaves spirally arranged.
5. Underside of leaves glabrous. (If leaf margin and petiole beset with closely spaced vesicular glands: 3. *S. adenophylla*.) . . . . . **16–1. S. cochinchinensis** *ssp.* **cochinchinensis**
5. Underside of leaves hairy.
6. Upper side of leaves hairy (pulverulent) . . . . . **3. S. adenophylla**
6. Upper side of leaves glabrous.
7. Ovary glabrous, calyx longer than 1 mm. Bracts longer than 1 mm **16–1. S. cochinchinensis** *ssp.* **cochinchinensis**
7. Ovary hairy.
8. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Ovary 1–2 mm high . . . . . **3. S. adenophylla**
8. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaced. Ovary *c.* 1 mm high . . . . . **23. S. fasciculata**

3. Twigs glabrous.
 9. Calyx and/or ovary hairy.
  10. Ovary hairy. Inflorescence a raceme. Calyx glabrous . . . . . **32. S. junghuhnii**
  10. Ovary glabrous. Inflorescence a spike. Calyx hairy.
   16–1. S. cochinchinensis *ssp.* cochinchinensis
 9. Calyx and ovary glabrous.
  11. Inflorescence axis glabrous.
   12. Petiole less than 20 mm . . . . . **16–2. S. cochinchinensis *ssp.* laurina**
   12. Petiole more than 20 mm . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
  11. Inflorescence axis hairy.
   13. Nerves less than 10 pairs . . . . . **16. S. cochinchinensis**
   13. Nerves more than 10 pairs.
    14. Angle of leaf base 25–40°. Inflorescence a (basally branched) spike, forming a cone in bud.
     19. S. costata
    14. Angle of leaf base more than 60°. Inflorescence a raceme . . . . . **11. S. brandisii**

Borneo

1. Corolla hairy . . . . . **41. S. odoratissima**
1. Corolla glabrous.
 2. Midrib flat or prominent on the upper surface . . . . . **4. S. anomala**
 2. Midrib impressed in the upper surface.
  3. Underside of leaves glabrous. (If leaf margin and petiole beset with closely spaced vesicular glands: 3. *S. adenophylla*).
   4. Twigs hairy.
    5. Leaves distichous . . . . . **33. S. laeteviridis**
    5. Leaves spirally arranged.
     6. Leaves 4–6 cm. Petiole 3–4 mm . . . . . **10. S. brachybotrys**
     6. Leaves longer than 6 cm. Petiole more than 5 mm.
      7. Leaves evenly distributed. Twigs not thick, cylindrical. Leaf margin not entire. Petiole less than 20 mm. Ovary glabrous, to *c.* 1 mm high, calyx 1–2 mm long. Corolla 3–5 mm. Fruits ampulliform, 1-celled. Seed 1, not straight. Apex of leaves acuminate.
       16–1. S. cochinchinensis *ssp.* cochinchinensis
      7. Leaves crowded towards the end of the twigs. Twigs thick, tapering towards apex. Leaf margin entire. Petiole more than 20 mm. Ovary hairy, *c.* 2 mm high, calyx 2–3 mm long. Corolla 8–10 mm long. Fruits ellipsoid, 3-celled. Seeds more than 1, straight. Apex of leaves rounded or acute . . . . . **44. S. polyandra**
   4. Twigs glabrous.
    8. Calyx and/or ovary hairy.
     9. Leaves distichous. Calyx glabrous . . . . . **33. S. laeteviridis**
     9. Leaves spirally arranged.
      10. Inflorescence a 1–3-flowered spike. Bracts caducous. Stamens *c.* 100. Petiole 3–4 mm. Leaves 4–6 cm . . . . . **10. S. brachybotrys**
      10. These characters not combined.
       11. Leaves 15–50 mm long . . . . . **12. S. buxifolia**
       11. Leaves longer than 5 cm.
        12. Petiole more than 20 mm. Twigs thick. Inflorescence a spike. Calyx 3–3$^1/_2$ mm
         7. S. barringtoniifolia
        12. Petiole less than 20 mm. Inflorescence a raceme or a spike. Calyx to *c.* 1 mm long
         42. S. ophirensis
    8. Calyx and ovary glabrous.
     13. Nerves more than 10 pairs . . . . . **29. S. goodeniacea**
     13. Nerves less than 10 pairs.
      14. Bracts persistent.
       15. Leaves shorter than 5 cm . . . . . **12. S. buxifolia**
       15. Leaves longer than 5 cm . . . . . **16–2. S. cochinchinensis *ssp.* laurina**
      14. Bracts caducous.
       16. Ovary to *c.* 1 mm high. Apex of leaf mostly abruptly acuminate.
        17. Leaf margin entire. Inflorescence axis glabrous. Petiole 5–10 mm . . . **25. S. gambliana**
        17. Leaf margin not entire. Inflorescence axis hairy. Petiole 3–15 mm . **14. S. celastrifolia**
       16. Ovary more than 1 mm high. Leaf apex usually not or faintly acuminate.
        18. Leaf margin entire. Calyx $^3/_4$–1 mm long. Disk hairy. Petiole 3–4 mm . **9. S. borneensis**
        18. Leaf margin not entire. Calyx longer than 1 mm. Disk glabrous or the style base hairy.
         19. Leaves shorter than 5 cm and acumen shorter than 5 mm. Reticulation fine. Inflorescence a few-flowered raceme. Bracts longer than 3 mm. Ovary 2–3 mm high, calyx 2–5 mm long. Style base glabrous. Fruits 1-celled . . . . . **12. S. buxifolia**
         19. Leaves longer than 5 cm and acumen longer than 5 mm. Reticulation coarse. Inflorescence a fascicle or very short spike. Bracts *c.* 1$^1/_2$ mm. Ovary *c.* 2 mm high, calyx *c.* 2 mm long. Style base hairy. Fruits 3-celled. Stone smooth. Seeds more than 1 . . **53. S. tricoccata**

3. Underside of leaves hairy.
20. Leaves distichous.
21. Calyx symmetrically teared when older . . . . . **33. S. laeteviridis**
21. Calyx regular.
22. Stamens 25–35. Inflorescence a true fascicle. Petiole 2–8 mm. Leaves 5–18 cm. Ovary *c.* 1 mm high. Calyx *c.* 1 mm long . . . . . **23. S. fasciculata**
22. Stamens more than 40. Flowers solitary or in a raceme or panicle. Leaves 2–9 cm. Calyx 1–3 mm.
23. Nerves 7–11 pairs. Petiole 3–4 mm. Leaves 4–9 cm. Stamens more than 90. Calyx $1^3/_4$–3 mm **17. S. colombonensis**
23. Nerves 3–8 pairs. Stamens 40–100, but when more than 90 petiole 1–2 mm.
24. Petiole 2–4 mm. Leaves 2–$3^1/_2$ cm. Calyx *c.* 3 mm . . . . . **52. S. trichomarginalis**
24. Petiole 1–2 mm. Leaves $2^1/_2$–7 cm. Calyx 1–2 mm.
25. Calyx *c.* 2 mm long . . . . . **58. S. zizyphoides**
25. Calyx 1–$1^1/_2$ mm long.
26. Ovary 1 mm high . . . . . **31. S. johniana**
26. Ovary $1^1/_2$–2 mm high . . . . . **22. S. deflexa**
20. Leaves spirally arranged.
27. Twigs glabrous.
28. Leaves 4–6 cm . . . . . **10. S. brachybotrys**
28. Leaves longer than 6 cm.
29. Leaves 7–16 cm. Nerves 6–9 pairs . . . . . **15. S. cerasifolia**
29. Leaves 15–45 cm. Nerves 12–17 pairs . . . . . **48. S. rubiginosa**
27. Twigs hairy.
30. Upper side of leaves hairy (pulverulent). . . . . **3. S. adenophylla**
30. Upper side of leaves glabrous.
31. Calyx and ovary glabrous . . . . . **15. S. cerasifolia**
31. Calyx and/or ovary hairy.
32. Ovary glabrous.
33. Nerves less than 10 pairs. Bracts caducous. Ovary 1–$1^1/_2$ mm high, calyx longer than 2 mm. Fruits ellipsoid, 22–40 mm long, 3-celled . . . . . **15. S. cerasifolia**
33. Nerves more than 10 pairs. Bracts persistent. Ovary to *c.* 1 mm high, calyx 1–2 mm long. Fruits ampulliform, 5–7 mm long, 1-celled.
16–1. S. cochinchinensis *ssp.* cochinchinensis
32. Ovary hairy.
34. Leaves longer than 15 cm . . . . . **48. S. rubiginosa**
34. Leaves shorter than *c.* 15 cm.
35. Inflorescence only 1-flowered.
36. Angle of leaf base more than 90° . . . . . **31. S. johniana**
36. Angle of leaf base less than 90°.
37. Bracts 1. Calyx 1–2 mm long . . . . . **20. S. crassipes**
37. Bracts several. Calyx *c.* 3 mm . . . . . **10. S. brachybotrys**
35. Inflorescence more-flowered.
38. Bracts caducous. Petiole 3–4 mm. Nerves 6–9. Stamens *c.* 100 . . **10. S. brachybotrys**
38. Bracts persistent. Petiole 2–12 mm. Nerves 3–12. Stamens 12-more than 100.
39. Calyx to *c.* 1 mm long. Stamens 12–50.
40. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Ovary 1–2 mm high . . . . . **3. S. adenophylla**
40. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaced. Ovary *c.* 1 mm high . . . . . **23. S. fasciculata**
39. Calyx longer than 1 mm. Stamens 25–100. . . . . **20. S. crassipes**

Philippines

1. Leaves verticillate . . . . . **55. S. verticillifolia**
1. Leaves not verticillate.
2. Midrib prominent in the upper surface.
3. Twigs glabrous. Petiole more than 5 mm . . . . . **35. S. lucida**
3. Twigs hairy. Petiole 1–5 mm . . . . . **34. S. lancifolia**
2. Midrib impressed on the upper surface.
4. Corolla hairy (in the Philippines sometimes nearly glabrous!) . . . . . **41. S. odoratissima**
4. Corolla glabrous.
5. Twigs hairy.
6. Leaves distichous . . . . . **23. S. fasciculata**
6. Leaves spirally arranged.
7. Calyx divided into three $2^1/_2$ mm long lobes . . . . . **54. S. trisepala**
7. Calyx not so.
8. Leaves crowded towards the end of the twigs. Twigs thick, tapering towards the apex. Fruits 3-celled. Apex of leaves rounded or acute . . . . . **44. S. polyandra**

8. Leaves evenly distributed.
9. Underside of leaves glabrous. (If leaf margin and petiole beset with closely spaced vesicular glands: 3. *S. adenophylla*).
10. Ovary hairy, *c.* $1^1/_2$ mm high. Inflorescence a lax raceme. Bracts to *c.* 1 mm long. Calyx lobes *c.* $^1/_2$ mm long. Stamens *c.* 25 . . . . . **24. S. filipes**
10. Ovary glabrous (hidden between bracts!). Inflorescence a spike. **16–1. S. cochinchinensis *ssp.* cochinchinensis**
9. Underside of leaves hairy.
11. Upper side of leaves hairy (pulverulent) . . . . . **3. S. adenophylla**
11. Upper side of leaves glabrous.
12. Ovary glabrous.
13. Leaves longer than 10 cm. Petiole more than 5 mm. Nerves more than 10 pairs. Calyx lobes longer than $1^1/_2$ mm. Stamens more than 30. Disk glabrous. Style base glabrous. Fruits ampulliform . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
13. Leaves shorter than *c.* 10 cm. Petiole 1–5 mm. Nerves 4–11 pairs. Calyx lobes $^1/_2$–$1^1/_2$ mm long. Stamens 15–40. Disk hairy. Style base hairy. Fruits not ampulliform **34. S. lancifolia**
12. Ovary hairy.
14. Leaf margin (and petiole) beset with closely spaced glands . . . . **3. S. adenophylla**
14. Leaf margin (and petiole) often glandular but glands not closely spaced.
15. Style base glabrous.
16. Bracts to *c.* 1 mm long. Calyx lobes *c.* $^1/_2$ mm long, not triangular . . **24. S. filipes**
16. Bracts 2–3 mm. Calyx lobes 1–$1^1/_2$ mm, triangular . . . . . **56. S. vidalii**
15. Style base hairy.
17. Intramarginal vein present. Inflorescence a fascicle. Fruits ampulliform **23. S. fasciculata**
17. Intramarginal vein absent. Inflorescence a (basally branched) spike. Fruits ellipsoid to orbicular . . . . . **34. S. lancifolia**
5. Twigs glabrous.
18. Calyx and ovary glabrous.
19. Inflorescence a (basally branched) spike.
20. Acumen longer than 5 mm . . . . . **34. S. lancifolia**
20. Acumen shorter than 5 mm.
21. Angle of leaf base less than 60°. Bracts 2–3 mm. Calyx lobes *c.* 2 mm long. Style base hairy. **40. S. obovatifolia**
21. Angle of leaf base *c.* 90°. Bracts 3–5 mm. Calyx lobes longer than $2^1/_2$ mm. Disk glabrous. **54. S. trisepala**
19. Inflorescence not a spike.
22. Bracts and bracteoles persistent.
23. Leaves 2–$5^3/_4$ cm. Inflorescence a (basally branched) raceme. Bracts longer than 3 mm. Calyx regularly 5-lobed, calyx lobes semi-ovate. Fruits ovoid, 5–7 mm long, 1-celled. **57. S. whitfordii**
23. Leaves $7^1/_2$–11 cm. Inflorescence a fascicle. Bracts 2–3 mm long. Calyx 3-lobed, the lobes semi-elliptic. Fruits ellipsoid, 11 mm long, 3-celled . . . . . **40. S. obovatifolia**
22. Bracts and bracteoles caducous.
24. Inflorescence axis glabrous. Corolla 3–4 mm. Calyx lobes not becoming longer by tearing. **27. S. glabriramifera**
24. Inflorescence axis hairy. Corolla 4–6 mm . . . . . **14. S. celastrifolia**
18. Calyx and/or ovary hairy.
25. Inflorescence a spike. Ovary glabrous.
26. Ovary $^1/_2$–1 mm high . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
26. Ovary $2^1/_2$ mm high . . . . . **42. S. ophirensis**
25. Inflorescence a (sometimes compound) raceme. Ovary hairy.
27. Inflorescence a very lax raceme of 4–10 cm. Pedicels slender, 2–15 mm. Axis of raceme sparsely pulverulent-puberulous. Stamens *c.* 25 . . . . . **24. S. filipes**
27. These characters not combined . . . . . **42. S. ophirensis**

Celebes & The Moluccas

1. Corolla hairy . . . . . **41. S. odoratissima**
1. Corolla glabrous.
2. Midrib prominent on the upper surface . . . . . **35. S. lucida**
2. Midrib impressed in the upper surface.
3. Twigs hairy.
4. Underside of leaves glabrous. (If leaf margin and petiole beset with closely spaced vesicular glands: 3. *S. adenophylla*).
5. Leaves distichous. Bracts caducous . . . . . **33. S. laeteviridis**
5. Leaves spirally arranged.

6. Calyx and ovary glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
6. Calyx and/or ovary hairy.
7. Leaves crowded towards the end of the twigs. Twigs thick, tapering towards apex. **44. S. polyandra**
7. Leaves evenly distributed.
8. Ovary hairy . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
8. Ovary glabrous.
9. Ovary to *c.* 1 mm high . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
9. Ovary more than 1 mm high . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
4. Underside of leaves hairy.
10. Leaves distichous.
11. Inflorescence a fascicle. Bracts persistent. Ovary *c.* 1 mm high, calyx *c.* 1 mm long, calyx lobes not becoming longer by tearing. Style base hairy. Fruits ampulliform . . **23. S. fasciculata**
11. Inflorescence not a fascicle. Bracts caducous. Ovary 1–1½ mm high, calyx 2–3 mm, calyx lobes becoming longer by tearing. Style base glabrous. Fruits not ampulliform . . **33. S. laeteviridis**
10. Leaves spirally arranged.
12. Calyx and ovary glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
12. Calyx and/or ovary hairy.
13. Upper side of leaves hairy . . . . . **3. S. adenophylla**
13. Upper side of leaves glabrous.
14. Ovary glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
14. Ovary hairy.
15. Calyx glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
15. Calyx hairy.
16. Bracts to *c.* 1 mm long.
17. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Ovary 1–2 mm high. Stone not ampulliform . . . . . **3. S. adenophylla**
17. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaced. Ovary *c.* 2 mm high. Stone ampulliform . . . . . **23. S. fasciculata**
16. Bracts longer than 1 mm.
18. Bracts caducous. Ovary *c.* 1 mm high . . . . **42–1b. S. ophirensis *var.* densireticulata**
18. Bracts persistent. Ovary more than 1 mm high **16–4. S. cochinchinensis *ssp.* leptophylla**
3. Twigs glabrous.
19. Underside of leaves hairy.
20. Leaves distichous. Petiole 0–5 mm. Bracts and bracteoles caducous . . . . **33. S. laeteviridis**
20. Leaves spirally arranged . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
19. Underside of leaves glabrous.
21. Calyx and ovary glabrous.
22. Ovary to *c.* 1 mm high.
23. Inflorescence a raceme. Bracts caducous . . . . . **14. S. celastrifolia**
23. Inflorescence a (basally branched) spike. Bracts persistent **16–2. S. cochinchinensis *ssp.* laurina**
22. Ovary more than 1 mm high.
24. Twigs thick . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
24. Twigs not thick.
25. Inflorescence a raceme. Bracts caducous . . . . . **36. S. maliliensis**
25. Inflorescence a (basally branched) spike. Bracts persistent.
26. Disk hairy . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
26. Disk glabrous . . . . . **16–2. S. cochinchinensis *ssp.* laurina**
21. Calyx and/or ovary hairy.
27. Leaves distichous . . . . . **33. S. laeteviridis**
27. Leaves spirally arranged.
28. Ovary glabrous.
29. Ovary to *c.* 1 mm high . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
29. Ovary more than 1 mm. high . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
28. Ovary hairy.
30. Calyx glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
30. Calyx hairy.
31. Bracts to *c.* 1 mm long . . . . . **42. S. ophirensis**
31. Bracts longer than 1 mm. . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**

New Guinea
(incl. New Ireland & New Britain)

1. Leaves (pseudo-)verticillate . . . . . **30. S. herzogii**
1. Leaves not verticillate.
2. Inflorescence only 1-flowered.
3. Calyx and ovary glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**

3. Calyx and/or ovary hairy.
4. Ovary hairy . . . . . **49. S. salicioides**
4. Ovary glabrous . . . . . **38. S. multibracteata**
2. Inflorescence more-flowered.
5. Calyx and ovary glabrous.
6. Twigs hairy.
7. Petiole 0 to 5 mm . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
7. Petiole more than 5 mm.
8. Underside of leaves glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
8. Underside of leaves hairy.
9. Upper side of leaves hairy. Ovary *c.* $^3/_4$ mm long. . . . . **43. S. paucistaminea**
9. Upper side of leaves glabrous. Ovary more than 1 mm high.
10. Bracts caducous. Calyx lobes becoming longer by tearing . . . . . **15. S. cerasifolia**
10. Bracts persistent. Calyx lobes not becoming longer by tearing.
16–4. S. cochinchinensis *ssp.* leptophylla
6. Twigs glabrous.
11. Underside of leaves hairy . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
11. Underside of leaves glabrous.
12. Bracts caducous.
13. Bracts longer than 3 mm . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
13. Bracts shorter than *c.* 3 mm.
14. Ovary *c.* 1 mm long. Inflorescence a (basally branched) raceme . . . . **14. S. celastrifolia**
14. Ovary more than 1 mm high. Inflorescence different.
15. Disk hairy. Ovary 1–1$^1/_2$ mm. Inflorescence a panicle . . . . . **21. S. cylindracea**
15. Disk glabrous. Inflorescence an often branched spike.
16–3. S. cochinchinensis *ssp.* thwaitesii
12. Bracts persistent.
16. Inflorescence not a spike.
17. Inflorescence a fascicle . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
17. Inflorescence a panicle . . . . . **18. S. composiracemosa**
16. Inflorescence a (basally branched) spike.
18. Twigs not thick.
19. Leaves 6–12 cm. Petiole 5–25 mm. Inflorescence an (often branched) spike. Flowers bisexual, ovary 1–1$^1/_2$ mm, calyx $^1/_4$–$^3/_4$ mm . . . . . **16–3. S. cochinchinensis *ssp.* thwaitesii**
19. Plants different. Flowers usually functional unisexual.
16–4. S. cochinchinensis *ssp.* leptophylla
18. Twigs thick.
20. Terminal buds hairy, small. Acumen longer than 5 mm. Bracts hairy, shorter than 3 mm. Disk hairy. Leaves elliptic or circular . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
20. Terminal buds glabrous, large. Acumen shorter than 5 mm. Bracts glabrous, 5–7 mm. Disk glabrous. Leaves obovate . . . . . **45. S. pulvinata**
5. Calyx and/or ovary hairy.
21. Ovary glabrous.
22. Ovary hidden by bracts and bracteoles . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
22. Ovary not hidden by bracts and bracteoles.
23. Inflorescence a spike, forming a short cone in bud . . . . . **15. S. cerasifolia**
23. Inflorescence sometimes a spike, but never forming a cone in bud.
16–4. S. cochinchinensis *ssp.* leptophylla
21. Ovary hairy.
24. Twigs at least 8 mm thick. Leaves 21–62 cm . . . . . **26. S. gigantifolia**
24. Twigs thinner. Leaves at most 33 cm, but usually much smaller.
25. Calyx 2- to 4-lobed or symmetrically cleft. Calyx lobes becoming longer by tearing.
16–4. S. cochinchinensis *ssp.* leptophylla
25. Calyx regularly 5-lobed.
26. Disk glabrous . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
26. Disk hairy.
27. Bracts and bracteoles caducous . . . . . **21. S. cylindracea**
27. Bracts persistent . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**

KEYS TO FRUITING MATERIAL ARRANGED BY ISLANDS AND ISLAND GROUPS

Sumatra

1. Midrib prominent on the upper surface.
2. Twigs hairy. Terminal buds hairy, small. Seeds straight . . . . . **4. S. anomala**
2. Twigs glabrous. Terminal buds glabrous. Seeds curved . . . . . **35. S. lucida**
1. Midrib impressed on the upper surface.
3. Underside of leaves glabrous.

4. Twigs hairy.
5. Leaves distichous . . . . . **33. S. laeteviridis**
5. Leaves spirally arranged.
6. Leaves crowded towards the end of the twigs. Twigs thick, tapering towards apex. Petiole more than 20 mm. Apex of leaves rounded or acute . . . . . **44. S. polyandra**
6. Leaves evenly distributed.
7. Fruits ampulliform. Inflorescence a (basally branched) spike. Seeds not straight. **16–1. S. cochinchinensis *ssp.* cochinchinensis**
7. Fruits ellipsoid.
8. Fruits 10–12 mm long. Inflorescence a fascicle. Bracts persistent . . . . . **5. S. atjehensis**
8. Fruits 7–10 mm long. Inflorescence a (basally branched) raceme. Bracts caducous **47. S. robinsonii**
4. Twigs glabrous.
9. Nerves less than 5 pairs . . . . . **42. S. ophirensis**
9. Nerves more than 5 pairs.
10. Leaves distichous . . . . . **33. S. laeteviridis**
10. Leaves spirally arranged.
11. Inflorescence a (basally branched) spike.
12. Fruits ovoid to orbicular, 9–10 mm long. Twigs thick. Terminal buds large **6. S. barisanica**
12. Fruits ampulliform to globose, 5–7 mm long . . . . **16–2. S. cochinchinensis *ssp.* laurina**
11. Inflorescence not a spike (rarely a cone in bud).
13. Bracts persistent.
14. Petiole 12–17 mm. Fruits ellipsoid. Inflorescence a fascicle . . . . . **5. S. atjehensis**
14. Petiole 3–9 mm. Fruits ampulliform. Inflorescence a raceme or panicle . **42. S. ophirensis**
13. Bracts caducous.
15. Fruits 1-celled. Inflorescence a rusty tomentellous panicle . . . . . **41. S. odoratissima**
15. Fruits 2–3-celled. Inflorescence a raceme.
16. Leaf margin entire. Fruits *c.* 10 mm. Seeds straight . . . . . **8. S. batakensis**
16. Leaf margin not entire. Fruits 4–10 mm, the sterile cells larger than the fertile ones, towards the base filled with air . . . . . **14. S. celastrifolia**
3. Underside of leaves hairy.
17. Twigs glabrous.
18. Leaves distichous. Petiole 1–4 mm . . . . . **33. S. laeteviridis**
18. Leaves spirally arranged. Petiole more than 10 mm.
19. Inflorescence a rusty tomentellous panicle . . . . . **41. S. odoratissima**
19. Inflorescence a spike or fascicle.
20. Leaves 8–21 cm. Reticulation faintly prominent. Inflorescence a fascicle. Bracts persistent. Fruits 10–12 mm long. Seeds straight. Stone different from the following . . **5. S. atjehensis**
20. Leaves 15–45 cm. Reticulation much prominent. Inflorescence a (basally branched) spike (a cone in bud). Bracts caducous. Fruits 8–10 mm long. Seeds not straight. Stone with a transverse constriction at one side . . . . . **48. S. rubiginosa**
17. Twigs hairy.
21. Leaves distichous.
22. Fruits ampulliform. Inflorescence a fascicle. Bracts persistent. Stone ampulliform. **23. S. fasciculata**
22. Fruits not ampulliform. Inflorescence not a fascicle. Bracts caducous. Stone not ampulliform. **33. S. laeteviridis**
21. Leaves spirally arranged.
23. Upper side of leaves hairy . . . . . **3. S. adenophylla**
23. Upper side of leaves glabrous.
24. Bracts persistent.
25. Fruits 10–12 mm long and 5–6 mm broad . . . . . **5. S. atjehensis**
25. Fruits to *c.* 10 mm long.
26. Stone ellipsoid. Leaf margin (and petiole) beset with closely spaced glands. **3. S. adenophylla**
26. Stone ampulliform. Fruits 5–7 mm.
27. Nerves more than 10 pairs. Inflorescence a (basally branched) spike. **16–1. S. cochinchinensis *ssp.* cochinchinensis**
27. Nerves less than 10 pairs. Inflorescence a fascicle. . . . . **23. S. fasciculata**
24. Bracts caducous.
28. Inflorescence not a spike.
29. Inflorescence a panicle. Seeds not straight . . . . . **41. S. odoratissima**
29. Inflorescence a (basally branched) raceme.
30. Angle of leaf base *c.* 90° . . . . . **50 S. sumatrana**
30. Angle of leaf base 20–60° . . . . . **47. S. robinsonii**
28. Inflorescence a (basally branched) spike or a cone.
31. Fruits to *c.* 10 mm long; mesocarp fleshy (shrivelled when dry) or thin, coriaceous.
32. Leaves longer than 15 cm. Fruits 1-celled. Angle of leaf base 20–40°. Stone with low ridges and a depression or transverse groove near the base. Seeds not straight. . **48. S. rubiginosa**

32. Leaves 6–14 cm. Fruits 3-celled. Angle of leaf base *c.* 90°. Stone with low not interrupted ridges or grooves or brain-like grooved. Seeds straight. . . . . **50. S. sumatrana**
31. Fruits 22–40 mm long; mesocarp woody or corky.
33. Nerves 10–13 pairs. . . . . **15b. S. cerasifolia *var.* grandifolia**
33. Nerves 6–9 pairs . . . . . **15. S. cerasifolia**

Malay Peninsula

1. Midrib prominent on the upper surface.
2. Twigs hairy.
3. Leaves evenly distributed. Fruits ellipsoid . . . . . **4. S. anomala**
3. Leaves crowded towards the end of the twigs. Fruits ovoid . . . . . **37. S. wikstroemifolia**
2. Twigs glabrous.
4. Leaves crowded towards the end of the twigs. Fruits ovoid . . . . . **37. S. wikstroemifolia**
4. Leaves evenly distributed. Fruits ellipsoid . . . . . **35. S. lucida**
1. Midrib impressed on the upper surface.
5. Twigs hairy.
6. Leaves distichous.
7. Inflorescence a raceme or panicle. Fruits ovoid to ellipsoid, 7–12 mm. Bracts caducous. **33. S. laeteviridis**
7. Inflorescence a fascicle. Fruits ampulliform. Bracts persistent . . . . . **23. S. fasciculata**
6. Leaves spirally arranged.
8. Upper side of leaves hairy.
9. Angle of leaf base more than 90°. Bracts caducous. Hairs on twigs more than 2 mm long. **13. S. calycodactylos**
9. Angle of leaf base less than 90°.
10. Fruits 8–10 mm long. Leaf margin (and petiole) beset with closely spaced glands. **3. S. adenophylla**
10. Fruits more than 10 mm long. Leaf margin (and petiole) often glandular but glands not closely spaced . . . . . **20. S. crassipes**
8. Upper side of leaves glabrous.
11. Leaves crowded towards the end of the twigs. Inflorescence a spike. Fruits ovoid, 10–12 mm. **37. S. wikstroemifolia**
11. Leaves evenly distributed.
12. Underside of leaves glabrous. (If leaf margin and petiole beset with closely spaced vesicular glands: 3. *S. adenophylla*.)
13. Fruits cylindrical. Inflorescence a fascicle . . . . . **28. S. glomerata**
13. Fruits ampulliform or ovoid. Inflorescence a spike or a panicle.
14. Fruits ampulliform. Inflorescence a (basically branched) spike. Seeds not straight. **16–1. S. cochinchinensis *ssp.* cochinchinensis**
14. Fruits ± ovoid. Inflorescence a panicle. Seeds curved . . . . . **41. S. odoratissima**
12. Underside of leaves hairy (or pulverulent, nearly glabrous, in *S. adenophylla*).
15. Bracts caducous.
16. Stone smooth. Fruit 5–8 mm, ellipsoid . . . . **42–1b. S. ophirensis *var.* densireticulata**
16. Stone with ridges or grooves.
17. Fruits 3-celled with 8 high ridges, 22–40 mm . . . . . **15. S. cerasifolia**
17. Fruits 1-celled.
18. Inflorescence a panicle . . . . . **41. S. odoratissima**
18. Inflorescence a (basally branched) spike (a cone in bud). . . . . **48. S. rubiginosa**
15. Bracts persistent.
19. Fruits more than 13–18 mm long . . . . . **20. S. crassipes**
19. Fruits to *c.* 10 mm long.
20. Stone ellipsoid. Leaf margin (and petiole) beset with closely spaced glands **3. S. adenophylla**
20. Stone ampulliform.
21. Nerves more than 10 pairs. Inflorescence a (basally branched) spike. Seeds not straight. **16–1. S. cochinchinensis *ssp.* cochinchinensis**
21. Nerves 6–8 pairs. Inflorescence a fascicle . . . . . **23. S. fasciculata**
5. Twigs glabrous.
22. Underside of leaves hairy.
23. Leaves crowded towards the end of the twigs. Nerves 8–10 pairs. Stone smooth. Inflorescence a spike . . . . . **37. S. wikstroemifolia**
23. Leaves evenly distributed or nerves more than 10 pairs. Stone with ridges or grooves.
24. Leaves distichous. Inflorescence a raceme or panicle . . . . . **33. S. laeteviridis**
24. Leaves spirally arranged.
25. Nerves less than 10 pairs. Bracts persistent. Fruits 13–18 mm long. Stone with low not interrupted ridges or grooves or brain-like grooved. Seeds straight . . . . . **20. S. crassipes**
25. Nerves 12–17 pairs. Bracts caducous. Fruits 8–10 mm long. Stone with low ridges and a depression or transverse groove near the base. Seeds not straight . . . . . **48. S. rubiginosa**

22. Underside of leaves glabrous.
26. Leaves distichous . . . . . **33. S. laeteviridis**
26. Leaves spirally arranged.
27. Inflorescence terminal . . . . . **46. S. pyriflora**
27. Inflorescence axillary.
28. Bracts caducous.
29. Inflorescence a spike. Fruits 25–40 mm. . . . . **7. S. barringtoniifolia**
29. Inflorescence not a spike. Fruits shorter than 25 mm.
30. Inflorescence a panicle.
31. Petiole 7–10 mm . . . . . **39. S. nivea**
46. S. pyriflora
31. Petiole 10–50 mm . . . . . **41. S. odoratissima**
30. Inflorescence a (basally branched) raceme (rarely a cone in bud).
32. Fruits 3-celled . . . . . **14. S. celastrifolia**
32. Fruits 1-celled.
33. Nerves 5–8 pairs. Terminal buds hairy . . . . . **42. S. ophirensis**
51. S. sumuntia
33. Nerves 9–14 pairs. Terminal buds glabrous . . . . . **46. S. pyriflora**
28. Bracts persistent.
34. Fruits ovoid to cylindrical.
35. Acumen shorter than 5 mm. Apex of leaves rounded or acute . . . . . **42. S. ophirensis**
35. Acumen longer than 5 mm.
36. Nerves 10–16 pairs. Reticulation coarse. Inflorescence a fascicle. Fruits 7–10 mm long.
28. S. glomerata
36. Nerves 3–11 pairs. Reticulation fine. Inflorescence a (basally branched) spike. Fruits 13–18 mm long . . . . . **20. S. crassipes**
34. Fruits ampulliform.
37. Petiole 2–9 mm. Inflorescence a raceme or panicle . . . . . **42. S. ophirensis**
37. Petiole 10–15 mm. Inflorescence a spike . . . . . **16–2. S. cochinchinensis *ssp.* laurina**

Java & The Lesser Sunda Islands

1. Midrib prominent on the upper surface . . . . . **35. S. lucida**
1. Midrib impressed in the upper surface.
2. Twigs hairy.
3. Leaves distichous . . . . . **23. S. fasciculata**
3. Leaves spirally arranged.
4. Underside of leaves glabrous.
5. Fruits 8–25 mm . . . . . **41. S. odoratissima**
5. Fruits 5–7 mm . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
4. Underside of leaves hairy.
6. Upper side of leaves hairy (pulverulent) . . . . . **3. S. adenophylla**
6. Upper side of leaves glabrous.
7. Seeds not straight. Embryo at least U-shaped curved.
8. Fruits ampulliform. Inflorescence a (basally branched) spike. Bracts persistent. Seeds twice curved . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
8. Fruits not ampulliform. Inflorescence a panicle. Bracts caducous. Seeds U-shaped
41. S. odoratissima
7. Seeds straight. Embryo at most slightly curved.
9. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Stone not ampulliform . . . . . **3. S. adenophylla**
9. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaced. Stone ampulliform . . . . . **23. S. fasciculata**
2. Twigs glabrous.
10. Fruits ampulliform . . . . . **16. S. cochinchinensis**
10. Fruits spindle-shaped or otherwise not ampulliform.
11. Inflorescence a (basally branched) spike or a cone.
12. Angle of leaf base less than 60°. Fruits 20–40 mm long . . . . . **19. S. costata**
12. Angle of leaf base more than 60°. Fruits to *c.* 10 mm long.
16–4. S. cochinchinensis *ssp.* leptophylla
11. Inflorescence not a spike (rarely a cone in bud).
13. Terminal buds large (7–10 mm) . . . . . **32. S. junghuhnii**
13. Terminal buds small.
14. Inflorescence a panicle. Embryo curved . . . . . **41. S. odoratissima**
14. Inflorescence a (basally branched) raceme. Embryo straight . . . . . **11. S. brandisii**

Borneo

1. Midrib flat or prominent on the upper surface . . . . . **4. S. anomala**
1. Midrib impressed in the upper surface.
2. Twigs glabrous.
3. Underside of leaves hairy.
4. Leaves distichous. Seeds straight . . . . . **33. S. laeteviridis**
4. Leaves spirally arranged.
5. Leaves 4–6 cm. Nerves 6–9 pairs. Petiole 3–4 mm . . . . . **10. S. brachybotrys**
5. Leaves 7–45 cm. Nerves 5–17 pairs. Petiole 10–50 mm.
6. Leaves 15–45 cm. Nerves 12–17 pairs. Inflorescence a spike . . . . . **48. S. rubiginosa**
6. Leaves 7–40 cm. Nerves 5–16 pairs. Inflorescence a panicle . . . . . **41. S. odoratissima**
3. Underside of leaves glabrous.
7. Leaves distichous . . . . . **33. S. laeteviridis**
7. Leaves spirally arranged.
8. Bracts persistent.
9. Leaves shorter than 5 cm . . . . . **12. S. buxifolia**
9. Leaves longer than 5 cm.
10. Inflorescence not a spike . . . . . **42. S. ophirensis**
10. Inflorescence a (basally branched) spike or a cone.
11. Petiole 3–10 mm. Leaves 6–22 mm. Nerves 6–13 pairs . . . . . **42. S. ophirensis**
11. Petiole 10–25 mm.
12. Petiole 10–15 mm. Leaves $4^1/_2$–21 cm. Nerves 6–9 pairs.
16–2. S. cochinchinensis *ssp.* laurina
12. Petiole 15–25 mm. Leaves 17–30 cm. Nerves 11–13 pairs . . . . . **29. S. goodeniacea**
8. Bracts caducous.
13. Inflorescence a (basally branched) spike or a cone in bud.
14. Petiole 3–4 mm . . . . . **10. S. brachybotrys**
14. Petiole more than 5 mm. (When dubious under "15", look under 53. *S. tricoccata*.)
15. Leaves longer than 15 cm. Nerves more than 10 pairs. Twigs thick. Terminal buds hairy. Petiole more than 20 mm. Fruits 25–40 mm . . . . . **7. S. barringtoniifolia**
15. Leaves shorter than *c.* 10 cm. Nerves less than 10 pairs. Twigs not thick. Terminal buds glabrous. Petiole 5–10 mm . . . . . **25. S. gambliana**
13. Inflorescence not a spike (rarely a cone in bud).
16. Inflorescence a short spike, fascicle or panicle.
17. Fruits 1-celled. Inflorescence a panicle. Stone with ridges or grooves. Seed 1, not straight.
41. S. odoratissima
17. Fruits 3-celled. Inflorescence a fascicle. Stone smooth. Seeds more than 1, straight.
53. S. tricoccata
16. Inflorescence a (basally branched) raceme.
18. Leaves $1^1/_2$–5 cm. Nerves 6–9 pairs. Fruits ellipsoid, 10–15 mm long . . **12. S. buxifolia**
18. Leaves longer than 5 cm.
19. Apex of leaf rounded to faintly acuminate.
20. Leaves 5–8 cm. Nerves 6–9 pairs. Petiole 3–4 mm. Fruit unknown . **9. S. borneensis**
20. Leaves 6–18 cm. Nerves 6–13 pairs. Petiole 3–10 mm. Fruit ovoid to ellipsoid, 5–12 mm.
42. S. ophirensis
19. Apex of leaf rather abruptly acuminate.
21. Fruit globose, 3-celled, the sterile cells filled with air . . . . . **14. S. celastrifolia**
21. Fruit ovoid to ellipsoid, 1-celled . . . . . **42. S. ophirensis**
2. Twigs hairy.
22. Leaves distichous.
23. Underside of leaves glabrous . . . . . **33. S. laeteviridis**
23. Underside of leaves hairy.
24. Leaf base 90–130°. Flowers solitary. Petiole 1–3 mm. Leaves ovate $2^1/_2$–7 cm. Nerves 3–6 pairs. Fruit narrowly flask-shaped, *c.* 13 mm long . . . . . **31. S. johniana**
24. These characters not combined. Fruits ellipsoid to ovoid.
25. Petiole 3–4 mm. Leaves 4–12 cm. Nerves 7–11 pairs. Base of leaves 40–90°. Inflorescence more flowered. Bracts caducous.
26. Leaves 4–9 cm, acumen 9–16 mm, base 40–90° . . . . . **17. S. colombonensis**
26. Leaves 9–12 cm, acumen 7–12 mm, base *c.* 90° . . . . . **33. S. laeteviridis**
25. Petiole $^1/_2$–3 mm, if up to 4 mm, inflorescence 1-flowered. Nerves 4–9 pairs.
27. Acumen 1–3 mm. Inflorescence 1-flowered. Leaves 2–$3^1/_2$ cm. Bracts persistent.
52. S. trichomarginalis
27. These characters not combined.
28. Angle of leaf base 50–90°. Flowers solitary or in a few-flowered raceme. Bracts persistent. Petiole 1–2 mm. Leaves $2^1/_2$–$5^1/_2$ cm. Nerves 5–9 pairs. Acumen *c.* 5 mm.
58. S. zizyphoides
28. These characters not combined . . . . . **33. S. laeteviridis**
22. Leaves spirally arranged.

29. Leaves crowded towards the end of the twigs. Twigs thick, with large leaf-scars. **44. S. polyandra**
29. Leaves evenly distributed.
30. Underside of leaves glabrous. (If leaf margin and petiole beset with closely spaced vesicular glands: 3. *S. adenophylla*.)
31. Inflorescence a spike.
32. Leaves 4–6 cm. Petiole 3–4 mm . . . . . **10. S. brachybotrys**
32. Leaves 6–25 cm. Petiole more than 5 mm. Nerves more than 10 pairs. Fruits ampulliform. Stone ampulliform . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
31. Inflorescence a panicle . . . . . **41. S. odoratissima**
30. Underside of leaves hairy.
33. Upper side of leaves hairy (pulverulent) . . . . . **3. S. adenophylla**
33. Upper side of leaves glabrous.
34. Seeds not straight.
35. Petiole 3–4 mm . . . . . **10. S. brachybotrys**
35. Petiole more than 5 mm.
36. Fruits ampulliform. Bracts persistent . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
36. Fruits not ampulliform.
37. Inflorescence a panicle . . . . . **41. S. odoratissima**
37. Inflorescence a (basally branched) spike (a cone in bud). . . . . **48. S. rubiginosa**
34. Seeds straight.
38. Fruits to *c.* 10 mm long.
39. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Stone ellipsoid . . . . . **3. S. adenophylla**
39. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaced. Stone ampulliform . . . . . **23. S. fasciculata**
38. Fruits more than 10 mm long.
40. Angle of leaf base more than 60°.
41. Angle of leaf base less than 90°. Twigs and underside of leaves (appressedly) pubescent, puberulous or pilose. Fruits not ampulliform, 2–3-celled. Stone with ridges or grooves. **20. S. crassipes**
41. Angle of leaf base more than 90°. Twigs and underside of leaves not appressedly pubescent or puberulous. Fruits ampulliform, 1-celled. Stone smooth . . . . . **31. S. johniana**
40. Angle of leaf base less than 60°.
42. Petiole 1–10 mm. Fruits 13–18 mm long . . . . . **20. S. crassipes**
42. Petiole 15–25 mm. Fruits 22–40 mm long . . . . . **15. S. cerasifolia**

Philippines

1. Leaves verticillate . . . . . **55. S. verticillifolia**
1. Leaves not verticillate.
2. Midrib prominent on the upper surface.
3. Twigs glabrous. Petiole more than 5 mm . . . . . **35. S. lucida**
3. Twigs hairy. Petiole 1–5 mm . . . . . **34. S. lancifolia**
2. Midrib impressed in the upper surface.
4. Twigs hairy.
5. Underside of leaves glabrous. (If leaf margin and petiole beset with closely spaced vesicular glands: 3. *S. adenophylla*.)
6. Fruits spindle-shaped or otherwise not ampulliform.
7. Leaves evenly distributed, $4^1/_2$–$7^1/_2$ cm. Acumen 12–20 mm. Twigs not thick, cylindrical. Nerves 5–6 pairs. Petiole 7–8 mm. Fruits 1-celled. Seed 1. Apex of leaves acuminate . . **24. S. filipes**
7. Leaves crowded towards the end of the twigs, longer than 10 cm. Acumen shorter than 5 mm. Twigs thick, tapering towards apex. Nerves more than 10 pairs. Petiole more than 20 mm. Fruits 3-celled. Seeds more than 1. Apex of leaves rounded or acute . . . . . **44. S. polyandra**
6. Fruits ampulliform . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
5. Underside of leaves hairy.
8. Leaves distichous . . . . . **23. S. fasciculata**
8. Leaves spirally arranged.
9. Leaf margin and petiole beset with closely spaced glands . . . . . **3. S. adenophylla**
9. Leaf margin and petiole not so.
10. Fruits ampulliform.
11. Nerves more than 10 pairs. Inflorescence a (basally branched) spike. **16–1. S. cochinchinensis *ssp.* cochinchinensis**
11. Nerves less than 10 pairs. Inflorescence a fascicle . . . . . **23. S. fasciculata**
10. Fruits spindle-shaped or otherwise not ampulliform.
12. Petiole 1–5 mm . . . . . **34. S. lancifolia**
12. Petiole more than 5 mm.
13. Bracts and bracteoles caducous. Seeds not straight. Petiole 10–50 mm. **41. S. odoratissima**

13. Bracts and/or bracteoles persistent. Seeds straight. Petiole 7–8 mm . . . . **24. S. filipes**
Petiole 5–7 mm . . . . . **56. S. vidalii**
4. Twigs glabrous.
14. Underside of leaves hairy . . . . . **24. S. filipes**
14. Underside of leaves glabrous.
15. Inflorescence a (basally branched) spike or a cone.
16. Petiole 1–3 mm. Fruit ellipsoid to globose, 3–5 mm. Inflorescence a spike . **34. S. lancifolia**
16. Petiole longer than 3 mm.
17. Petiole 15–25 mm. Inflorescence a spike to $1^1/_2$ mm long . . . . . **54. S. trisepala**
17. Petiole shorter than 15 mm or inflorescence longer than $1^1/_2$ cm.
18. Inflorescence a raceme or panicle of racemes. Embryo curved . . . . . **42. S. ophirensis**
18. Inflorescence a spike. Embryo straight or curved.
19. Inflorescence a short spike to $1^1/_2$ cm. Embryo straight . . . . . **40. S. obovatifolia**
19. Inflorescence a spike, longer than $1^1/_2$ cm. Embryo curved.
16–1. S. cochinchinensis *ssp.* cochinchinensis
15. Inflorescence not a spike (rarely a cone in bud).
20. Fruits 2–5-celled.
21. Stone with ridges or grooves . . . . . **27. S. glabriramifera**
42. S. ophirensis
21. Stone smooth.
22. Acumen shorter than 5 mm. Inflorescence a fascicle to $1^1/_2$ cm. Bracts persistent. Fruits more than 10 mm long. Seeds straight. . . . . **40. S. obovatifolia**
22. Acumen longer than 5 mm . . . . . **14. S. celastrifolia**
20. Petiole 10–15 mm. Leaves 7–20 cm. Inflorescence a panicle. Fruit 8–25 mm, ovoid
41. S. odoratissima
20. These characters not combined.
23. Leaves 2–$5^3/_4$ cm. Fruits ovoid, 5–7 mm . . . . . **57. S. whitfordii**
23. These characters not combined.
24. Embryo straight. Leaves $4^1/_2$–$7^1/_2$ cm. Petiole 7–8 mm . . . . . **24. S. filipes**
24. Embryo curved. Leaves 5–22 cm. Petiole 1–10 mm . . . . . **42. S. ophirensis**

Celebes & The Moluccas

1. Midrib prominent on the upper surface . . . . . **35. S. lucida**
1. Midrib impressed in the upper surface.
2. Twigs hairy.
3. Leaves distichous.
4. Underside of leaves glabrous . . . . . **33. S. laeteviridis**
4. Underside of leaves hairy.
5. Fruits ampulliform. Inflorescence a fascicle. Bracts persistent . . . . . **23. S. fasciculata**
5. Fruits not ampulliform. Inflorescence not a fascicle. Bracts caducous . . . . **33. S. laeteviridis**
3. Leaves spirally arranged.
6. Leaves crowded towards the end of the twigs . . . . . **44. S. polyandra**
6. Leaves evenly distributed.
7. Underside of leaves glabrous. (If leaf margin and petiole beset with closely spaced vesicular glands: 3. *S. adenophylla*.)
8. Seed and embryo twice curved . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
8. Seed and embryo uncinately curved towards the base.
16–4. S. cochinchinensis *ssp.* leptophylla
7. Underside of leaves hairy.
9. Upper side of leaves hairy (pulverulent) . . . . . **3. S. adenophylla**
9. Upper side of leaves glabrous.
10. Bracts caducous.
11. Stone smooth. Inflorescence a (basally branched) raceme.
42–1b. S. ophirensis *var.* densireticulata
11. Stone with ridges or grooves. Inflorescence a panicle of 5–30 cm . . **41. S. odoratissima**
10. Bracts persistent.
12. Seeds not straight . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
12. Seeds straight.
13. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Stone ellipsoid . . . . . **3. S. adenophylla**
13. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaced. Stone ampulliform . . . . . **23. S. fasciculata**
2. Twigs glabrous.
14. Underside of leaves hairy.
15. Leaves distichous. Petiole 1–5 mm. Bracts caducous. Seeds straight . . . . **33. S. laeteviridis**
15. Leaves spirally arranged. . . . . **16.–4. S. cochinchinensis *ssp.* leptophylla**
14. Underside of leaves glabrous.

16. Fruits 2–3-celled.
17. Leaves longer than 15 cm. Fruits more than 10 mm long. Leaf margin entire. Nerves 9–14 pairs. Stone with ridges or grooves. Seeds straight . . . . . **36. S. maliliensis**
17. Leaves shorter than *c.* 15 cm. Fruits to *c.* 10 mm long. Seed and embryo U-shaped. **14. S. celastrifolia**
16. Fruits 1-celled.
18. Leaves distichous . . . . . **33. S. laeteviridis**
18. Leaves spirally arranged.
19. Inflorescence a panicle of 5–30 cm . . . . . **41. S. odoratissima**
19. Inflorescence not a panicle or shorter than 5 cm.
20. Fruit stone with high, interrupted ridges which often protrude from the base. **42. S. ophirensis**
20. Stone different . . . . . **16. S. cochinchinensis**

New Guinea (incl. New Ireland & New Britain)

1. Leaves (pseudo-)verticillate . . . . . **30. S. herzogii**
1. Leaves not verticillate.
2. Twigs glabrous.
3. Underside of leaves hairy . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
3. Underside of leaves glabrous.
4. Nerves 13–20 pairs. Leaves 21–62 cm . . . . . **26. S. gigantifolia**
4. Nerves less than 15 pairs. Leaves usually much smaller.
5. Twigs thick.
6. Acumen shorter than 5 mm. Fruits *c.* 13 mm long. Nerves 8–12 pairs . . . **45. S. pulvinata**
6. Acumen longer than 5 mm. Fruits to *c.* 10 mm long. **16–4. S. cochinchinensis *ssp.* leptophylla**
5. Twigs not thick.
7. Bracts persistent.
8. Inflorescence a panicle to 5 cm. Petiole 13–15 mm. Nerves 5–9 pairs . **18. S. composiracemosa**
8. Plant different . . . . . **16. S. cochinchinensis**
7. Bracts caducous.
9. Fruits *c.* 15 mm long . . . . . **21. S. cylindracea**
9. Fruits to *c.* 10 mm long.
10. Fruits 3-celled (often 1 or 2 aborted) . . . . . **14. S. celastrifolia**
10. Fruits 1-celled. . . . . **16–3. S. cochinchinensis *ssp.* thwaitesii**
2. Twigs hairy.
11. Underside of leaves glabrous.
12. Inflorescence only 1-flowered.
13. Leaves shorter than 5 cm . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
13. Leaves longer than 5 cm.
14. Leaf index less than 2. Acumen shorter than 5 mm. Angle of leaf base less than 90°. Nerves less than 5 pairs. Reticulation coarse. Fruits to *c.* 10 mm long. Seeds not straight. Apex of leaves rounded or acute . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
14. Leaf index more than 2. Acumen longer than 5 mm. Angle of leaf base more than 90°. Nerves more than 5 pairs. Reticulation fine. Fruits 17–22 mm long. Seeds straight. Apex of leaves acuminate . . . . . **38. S. multibracteata**
12. Inflorescence more-flowered.
15. Petiole 0–5 mm . . . . . **16–4. S. cochinchinensis *ssp.* leptophylla**
15. Petiole more than 5 mm.
16. Seed and embryo (twice) curved . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
16. Seed and embryo uncinately curved towards the base. **16–4. S. cochinchinensis *ssp.* leptophylla**
11. Underside of leaves hairy.
17. Upper side of leaves hairy . . . . . **43. S. paucistaminea**
17. Upper side of leaves glabrous.
18. Inflorescence only 1-flowered.
19. Leaf index more than 3. Angle of leaf base less than 90°. Reticulation coarse. **49. S. salicioides**
19. Leaf index 2–3. Angle of leaf base more than 90°. Reticulation fine . . **38. S. multibracteata**
18. Inflorescence more-flowered.
20. Bracts caducous. Seeds straight . . . . . **15. S. cerasifolia**
20. Bracts persistent. Seeds not straight.
21. Seed and embryo (twice) curved . . . . . **16–1. S. cochinchinensis *ssp.* cochinchinensis**
21. Seed and embryo uncinately curved towards the base. **16–4. S. cochinchinensis *ssp.* leptophylla**

3. Symplocos adenophylla WALL. (Cat. 1831, *n.* 4427A, *nomen*) *ex* G. DON, Gen. Syst. 4 (1837) 3; DC. Prod. 8 (1844) 257; MIQ. Fl. Ind. Bat. 1, 2 (1859) 466; CLARKE, Fl. Br. Ind. 3 (1882) 575; BRAND, Pfl. R. Heft 6 (1901) 48, *incl. var. virgata* WALL. (Cat. 1831, *n.* 4427B, *nomen*) *ex* BRAND; K. & G. J. As. Soc. Beng. 74, ii (1906) 240; BRAND, Bull. Herb. Boiss. II, 6 (1906) 747, *incl. var. atrata* BRAND, *l.c.* 748; MERR. Philip. J. Sc. 2 (1907) Bot. 298; BRAND, Philip. J. Sc. 3 (1908) Bot. 7, *incl. var. merrittii* BRAND; RIDL. Fl. Mal. Pen. 2 (1923) 303, t. 101, *incl. var. montana* RIDL.; NOOT. Leid. Bot. Ser. 1 (1975) 121. — *S. bancana* MIQ. Fl. Ind. Bat. Suppl. 1 (1861) 476. — *S. iteophylla* MIQ. *l.c.*, *incl. var. rostrata* MIQ. *et var. elliptica* MIQ.; MERR. En. Born. (1921) 486. — *Eugeniodes adenophyllum* O. K. Rev. Gen. Pl. 2 (1891) 410. — *S. beccarii* BRAND, Pfl. R. Heft 6 (1901) 49. — *S. constricta* BRAND, *l.c.* 41; MERR. En. Born. (1921) 486. — *S. fulvosa* KING & GAMBLE, J. As. Soc. Beng. 74, ii (1906) 233; RIDL. Fl. Mal. Pen. 2 (1923) 300. — *S. palawanensis* BRAND, Philip. J. Sc. 3 (1908) Bot. 10; MERR. En. Philip. 3 (1923) 301. — *S. pruniflora* RIDL. J. Fed. Mal. St. Mus. 4 (1909) 46; Fl. Mal. Pen. 2 (1923) 304. — *S. brandii* ELMER, Leafl. Philip. Bot. 4 (1912) 1477. — *S. pahangensis* BRAND in Fedde, Rep. 14 (1916) 326. — Fig. 7.

Shrub or tree to 20 m, 50 cm ø. Young twigs pulverulent-puberulous or rarely tomentellous, glabrescent, often dark-brown to blackish. Innovations light redbrown. *Leaves* chartaceous to coriaceous, often dark brown when dry, pulverulent beneath or on both faces, soon glabrescent, elliptic, acuminate, with cuneate base and recurved to revolute margin with many pellucid glands, $4^1/_2$–16 by $1^1/_4$–$4^3/_4$ cm; nerves 4–12 pairs, meeting in a looped intramarginal vein; petiole 6–12 mm. *Flowers* in a spike, raceme or panicle to 6 cm; indument of axis as twigs. Bracts and bracteoles with same indument persistent in fruit, $^1/_2$–1 mm. Pedicel mostly only under older flowers, to 3 mm. *Calyx* nearly entirely divided into $^1/_2$–1 mm long lobes. *Corolla* 2–5 mm. *Stamens* (20–)25–50. Disk glabrous or rarely hairy. *Ovary* with same indument as that of twigs, 1–2 mm high; style glabrous or with some hairs towards the base, 2–4 mm. *Fruit* ellipsoid to cylindrical, sometimes with *c.* 6 ridges when dry, blue or black-purple, soon glabrescent, crowned by the incurved calyx lobes, with only one developed cell, 8–10(–11) by 3–5(–6) mm. *Seed* 1, with straight embryo.

Distr. Continental Asia (China incl. Hainan, Indo-China, Thailand), throughout *Malesia*, except Java (but found in Bawean I.), the Lesser Sunda Is. and New Guinea. A variety in Indo-China.

Ecol. Usually in montane rain-forest, in mountain heaths, on ridge-crests and ridges, and mossy forest, also in *Baeckea-Leptospermum* heath forest, often on granite, but also on ultra-basic (Trusmadi), from sea-level to 3000 m, but at low altitude largely on podsolized sand (Banka; Bako N. P.) and in heath forest on humid podsol. *Fl.* Sept. (Febr.–Oct.), *fr.* May (Jan.–Dec.).

As is the case with more species, dwarfed specimens or hardly 1 m high may already come into flower.

Uses. The timber can be used for light constructions (DESCH, Mal. For. Rec. 15^2, 1954, 593).

Vern. & Uses. *Mĕndong, mĕnugan*, Malaya, *kaju lattan, k. porugis*, Sumatra, Batak, *kayu kain*, W. Borneo, G. Klamm; the latter name alluding to the use for tanning cloth in dyeing.

The Besisi (Mal. Pen.) believe that the leaves of certain plants, *e.g. S. adenophylla*, if carried in the quiver with their darts, act as charms bringing them success in hunting (BURK. Dict. 1935).

4. Symplocos anomala BRAND, Bot. Jahrb. 29 (1900) 529; Pfl. R. Heft 6 (1901) 67; NOOT. Leid. Bot. Ser. 1 (1975) 126, pl. 1a–f, with full synonymy. — *S. concolor* BRAND, Pfl. R. Heft 6 (1901) 65; K. & G. J. As. Soc. Beng. 74, ii (1906) 242; RIDL. Fl. Mal. Pen. 2 (1923) 304. — Fig. 7.

Shrub or tree to 21 m, 40 cm ø. Young twigs tomentellous to tomentose or appressedly pubescent, glabrescent. *Leaves* glabrous, brownish or olive to yellowish green glossy above, elliptic, acuminate with cuneate-attenuate base and more or less revolute finely glandular dentate to nearly entire margin, $2^1/_2$–12 by $1^1/_4$–3 cm; midrib prominent above or flat, rarely flat and sunken; nerves 5–11 pairs, meeting in a looped intramarginal vein; petiole 2–7 mm. *Raceme* to 2 cm long, axis tomentose to appressedly pubescent. Bracts 1–2 mm, bracteoles $^1/_4$–$1^1/_2$ mm, both persistent, with same indument as axis. Pedicels 2–5 mm. *Calyx* lobes rounded, ciliolate $^1/_2$–2 mm. *Corolla* 4–6 mm. *Stamens* 50 to more than 100. Disk tomentose or shortly soft hairy. *Ovary* tomentose to (finely) appressedly pubescent, *c.* $^1/_2$–$1^1/_2$ mm high; style glabrous or hairy towards the base, 4–7 mm. *Fruit* 3-celled, ellipsoid, violet, almost black, *c.* 10 by 6 mm in Malaya, 10–13 by 6–8 mm in Borneo. *Seed* 1 in each cell, straight with straight embryo.

Distr. Continental Asia (Burma, Thailand, Indo-China, China incl. Hainan, Japan, Ryu Kyu Is., Formosa) and *Malesia:* Malaya (incl. Penang), N. Sumatra (incl. Banka), and Borneo.

Ecol. Mixed evergreen montane forest, also on ridges and along streamsides, 700–2200 m (in continental Asia to 3000 m), but also found on podsolized sands at very low altitude, 20–50 m, in Banka. *Fl.* June–Oct., *fr.* Jan.–Dec.

Vern. *Rĕnak*, Banka.

5. Symplocos atjehensis NOOT. Leid. Bot. Ser. 1 (1975) 128. — Fig. 7, 8.

Treelet to *c.* 8 m, 10 cm ø. Twigs glabrous or tomentose. *Leaves* glabrous or sparsely appressedly hairy, especially on midrib and nerves, elliptic, acuminate, with acute to rounded base and dentate margin, 8–21 by $3^1/_2$–6 cm; nerves 8–12 pairs, meeting in a looped intramarginal vein; petiole 12–17 mm. *Flowers* in fascicles with persistent redbrown tomentose to pubescent *c.* 2 mm long bracts and bracteoles. *Calyx* 2 mm, the (ciliate) lobes 1–$1^1/_2$ mm. *Corolla c.* 5 mm. *Stamens c.* 50. Disk glabrous. *Ovary* glabrous without, *c.* 1 mm high; style glabrous, 4–6 mm. *Fruit* ellipsoid, 10–12 by 5–6 mm, 3-celled, but only one cell developing; stone shallowly lengthwise ribbed. *Seed* 1, straight with straight embryo.

Distr. *Malesia:* N. Sumatra (Gajo Lands).

Ecol. Mixed evergreen mountain forest, 1700–2850 m. *Fl.* Aug.–Sept., *fr.* July.

6. Symplocos barisanica NOOT. Leid. Bot. Ser. 1 (1975) 130. — Fig. 7.

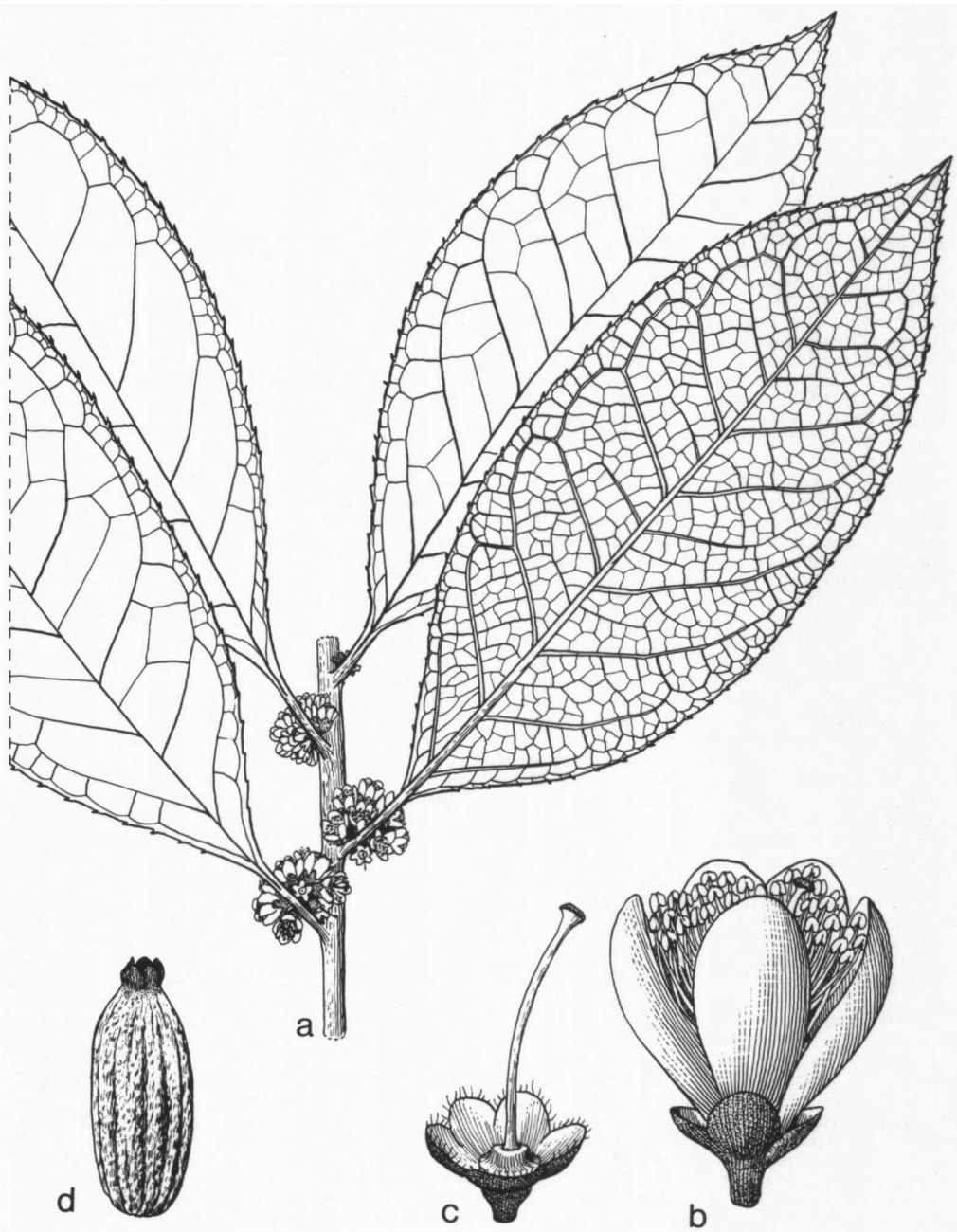

Fig. 8. *Symplocos atjehensis* NOOT. a. Habit, nat. size, b. flower, c. *ditto* after removal of petals and stamens, both × 6, d. fruit, × 3 (*a–c* VAN STEENIS 6529, *d* DE WILDE 13773).

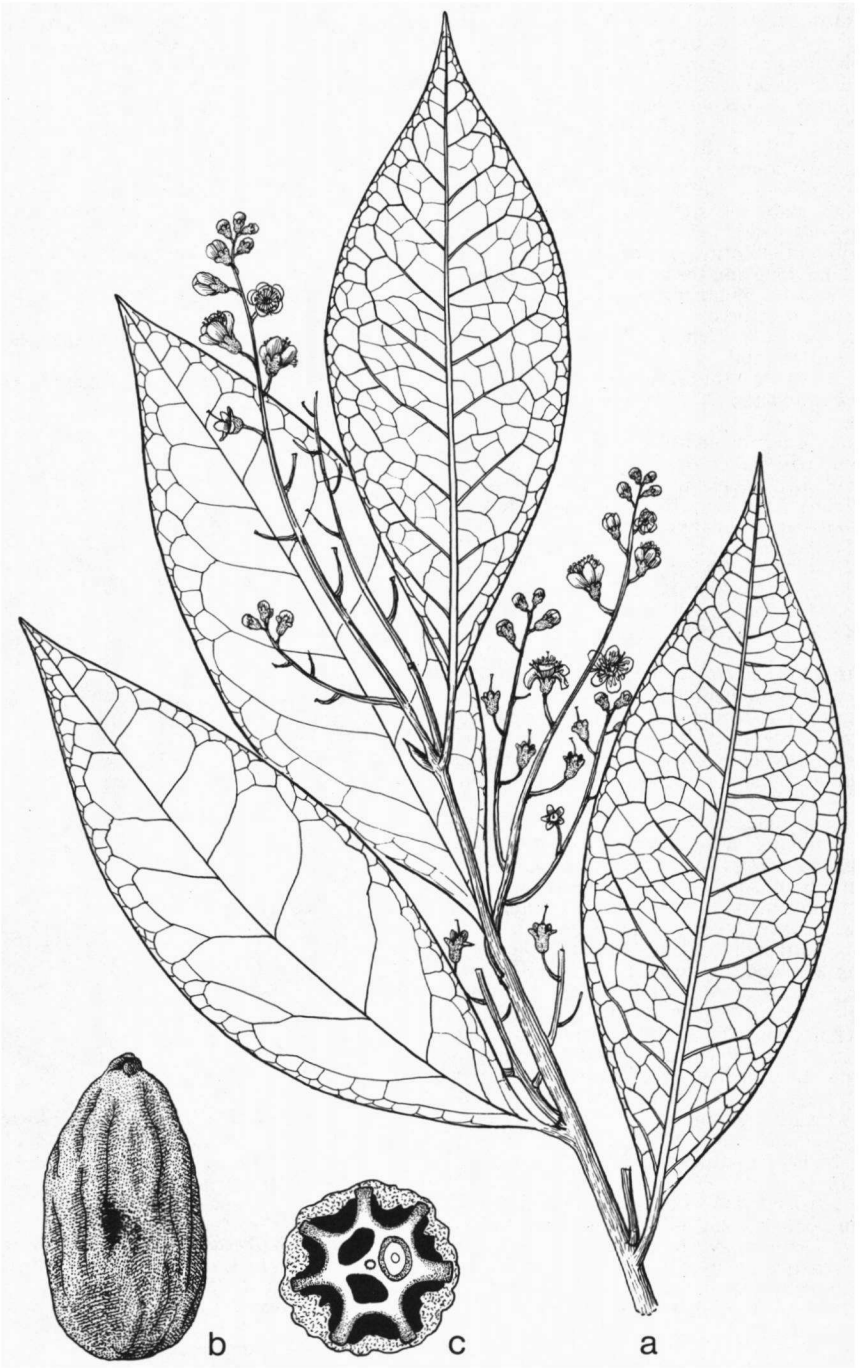

Fig. 9. *Symplocos batakensis* NOOT. a. Habit, nat. size. — *S. barringtoniifolia* BRAND. b. Fruit, c. *ditto* in CS, both × 1½ (*a* ROBINSON & KLOSS 125, *b–c* KEP/FRI 10736).

Small tree, 6–10 m, 25 cm ⌀. Twigs glabrous. *Leaves* glabrous, elliptic, with acute to nearly rounded base, denticulate margin and acuminate to rounded apex, 12–20 by 5–12 cm; nerves 8–12 pairs, whether meeting in an intramarginal vein or not; petiole 10–30 mm. *Spike* branched, to 5 cm with minutely appressedly hairy axis. Bracts and bracteoles persistent, ± ovate, with same indument, 2–3 mm long. *Calyx* divided into semi-orbicular, glabrous but ciliolate $1^1/_2$–2 mm long lobes. *Corolla* c. 6 mm. *Stamens* c. 50. Disk glabrous. *Ovary* c. 1 mm high, glabrous; style glabrous, 4–5 mm, or reduced. *Fruit* ovoid to globose, c. 10 by 9 mm with globose to ampulliform stone of c. 8 by 7 mm (the neck c. 2 mm long and the belly irregularly lengthwise grooved, c. 6 mm high). *Seed* 1, U-shaped with U-shaped embryo.

Distr. *Malesia:* Central W. Sumatra (Mts Kerintji and Merapi).

Ecol. Montane rain-forest, on Mt Kerintji in *Gleichenia* woodland, 2000–2600 m. *Fl.* June–July.

7. Symplocos barringtoniifolia BRAND, Ann. Cons. Jard. Bot. Genève 4 (1904) 283; NOOT. Leid. Bot. Ser. 1 (1975) 131, pl. 4. — *Doxomma rigidum* MIERS, Trans. Linn. Soc. II, Bot. 1 (1875) 104. — *Barringtonia rigida* CLARKE, Fl. Br. Ind. 2 (1879) 510. — *S. rigida* CLARKE, Fl. Br. Ind. 3 (1882) 581, *non* G. DON, 1837; BRAND, Pfl. R. Heft 6 (1901) 52; K. & G. J. As. Soc. Beng. 74, ii (1906) 246; RIDL. Fl. Mal. Pen. 2 (1923) 306. — *Eugeniodes rigidum* O. K. Rev. Gen. Pl. 2 (1891) 976. — **Fig. 7, 9b–c.**

Tree to 25 m, 40 cm ⌀. Twigs glabrous, often marked with prominent orbicular scars of fallen leaves; growth discontinuous, terminal buds protected by leathery scales, leaving conspicuous scars. *Leaves* glabrous, elliptic to obovate with cuneate base and acuminate apex, 15–35 by 6–11 cm; nerves 10–14(–16) pairs; petiole 2–5 cm. *Spike* resembling a cone in bud because of the large bracts, becoming $5^1/_2$(–8) cm; axis tomentose. Bracts and bracteoles tomentellous to appressedly pubescent, both soon caducous, broadly ovate, 6–10 by 6 mm and narrowly ovate, $2^1/_2$–5 mm long respectively. *Calyx* tomentellous, 3–$3^1/_2$ mm long, the 5 lobes originally c. 1 mm long but the calyx becoming 2–3-lobed by tearing. *Corolla* 4–6 mm. *Stamens* c. 60 to more than 100. Disk glabrous. *Ovary* glabrous, 1–$1^1/_2$ mm high; style c. 5 mm, with soft hairy conical base. *Fruit* ovoid or ellipsoid, royal blue, $2^1/_2$–4 by $1^1/_2$–2 cm, with chartaceous mesocarp; stone stellate in cross-section with 8 very high ridges; cells 3, often only 1 fertile. *Seed* straight with straight embryo.

Distr. Continental Asia (Indo-China), in *Malesia:* Malay Peninsula and Borneo (only once: W. Kutei).

Ecol. Lowland rain-forest, river valleys in low undulating country, on hillsides on clay, on dry hillocks in *Dryobalanops* forest, but also on sandstone or granite, mostly below 300 m, but also in Malaya more rarely in montane forest up to 1500 m. *Fl.* July–Aug., *fr.* Febr.–May (July).

VERN. *Mĕdang*, Malaya.

8. Symplocos batakensis NOOT. Leid. Bot. Ser. 1 (1975) 132.— **Fig. 7, 9a, 10a–d.**

Twigs glabrous. *Leaves* often coriaceous, glabrous, elliptic (to obovate) with acute base, entire margin and acuminate apex, 6–10 by 2–$4^1/_2$ cm; nerves 7–10 pairs, meeting in an intramarginal vein; petiole 5–8 mm. *Raceme* to 8 cm, axis glabrous or sparsely minutely pilose. Bracts and bracteoles with same indument, ovate, caducous, $1^1/_2$ and 1 mm respectively. Pedicel to 2(–5) mm. *Calyx* glabrous, $1^1/_2$ mm long, the semi-orbicular lobes 1–$1^1/_4$ mm long. *Corolla* c. 6 mm. *Stamens* c. 100. Disk shortly pilose. *Ovary* glabrous, $1^1/_2$ mm high; style glabrous, c. 5 mm, sometimes reduced. *Fruit* nearly globose, c. 10 by 8 mm, or ellipsoid-ampulliform, c. 10 by 5 mm, 3-celled, often only 1 cell fertile. *Seed* often only 1, straight with straight embryo.

Distr. *Malesia:* Central W. Sumatra (Tapanuli and Westcoast Res.).

Ecol. Montane rain-forest on low ridges, 1200–1700 m. *Fr.* Jan., Aug.

Vern. *Loala lola, sihondung*, Tapanuli.

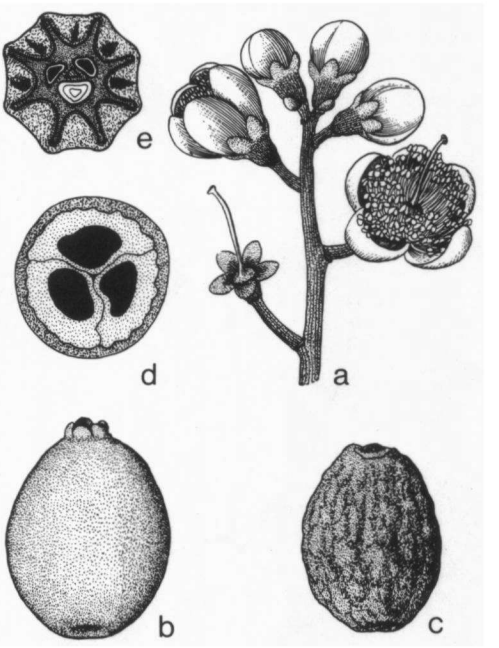

Fig. 10. *Symplocos batakensis* NOOT. a. Flowers and buds, b. fruit, c. endocarp, d. *ditto* in CS, all × 2. — *S. cerasifolia* WALL. *ex* DC. e. Fruit in CS, nat. size (*a–d* ROBINSON & KLOSS 125, *e* SAN 45168).

9. Symplocos borneensis BRAND, Pfl. R. Heft 6 (1901) 56; MERR. En. Born. (1921) 486; NOOT. Leid. Bot. Ser. 1 (1975) 134. — **Fig. 7.**

Twigs glabrous. *Leaves* narrowly elliptic, glabrous, with acute base, entire margin and rounded to faintly acuminate apex (the acumen with broad rounded tip), $4^3/_4$–8 by $1^3/_4$–$2^1/_2$ cm; nerves 6–9 pairs, faintly prominent beneath, meeting in an intramarginal vein; reticulation hardly prominent;

petiole 3–4 mm. *Raceme* lax, to 5 cm, axis minutely sparsely hairy to glabrous. Bracts and bracteoles caducous, glabrous, ciliolate, *c.* 1 and *c.* $^1/_2$ mm long respectively. Pedicel to 2 mm. *Calyx* glabrous, divided into $^3/_4$–1 mm long ciliolate lobes. *Corolla c.* 5 mm. *Stamens* 60–80. Disk shortly pilose. *Ovary* glabrous, 1–1$^1/_4$ mm high; style glabrous except the conical shortly pilose base, *c.* 5 mm long. *Fruit* unknown.

Distr. *Malesia:* Borneo (Sarawak and W. Borneo: Kenepai), 2 collections.

Ecol. Lowland rain-forest.

Note. A sterile collection from Central Celebes (Malili) possibly belongs to this species.

10. Symplocos brachybotrys MERR. J. Str. Br. R. As. Soc. *n.* 76 (1917) 110; En. Born. (1921) 486; HEINE, Pfl. Samml. Clemens (1953) 87; NOOT. Leid. Bot. Ser. 1 (1975) 134. — **Fig. 7.**

Twigs (sparsely) appressedly pubescent in innovations, soon glabrescent. *Leaves* sparsely appressedly fine hairy when young, soon glabrescent, ovate to elliptic, with acute to rounded base, denticulate margin and acute to acuminate apex, 4–6 by 2–3$^1/_4$ cm; nerves 6–9 pairs, meeting in an intramarginal vein; petiole 3–4 mm. *Spike* short, 1–3-flowered, axis at most 7 mm, appressedly pubescent, or flowers solitary, sessile from the leaf axils and then several appressedly pubescent 2–4 mm long bracts. Bracts and bracteoles caducous, in the spikes not seen. *Calyx* appressedly pubescent, divided into the *c.* 3 mm long lobes. *Corolla* 6 mm. *Stamens c.* 100. Disk glabrous, inconspicuous. *Ovary* appressedly pubescent, 1 mm high; style glabrous, *c.* 4 mm. *Fruit* ovoid to ellipsoid, intense indigo-blue, *c.* 10 by 5 mm, stone shallowly lengthwise grooved. *Seed* 1, ovoid, slightly curved with S-shaped embryo.

Distr. *Malesia:* Borneo (Sarawak and Sabah: Mt Kinabalu).

Ecol. Mixed, evergreen mountain forest, 1500–1800 m.

11. Symplocos brandisii K. & V. Bijdr. 7 (1900) 157; BRAND, Pfl. R. Heft 6 (1901) 90; KOORD. Atlas 2 (1914) t. 381; BACK. & BAKH. *f.* Fl. Java 2 (1965) 206; NOOT. Leid. Bot. Ser. 1 (1975) 135, pl. 5. — *S. koordersiana* BRAND, Bull. Herb. Boiss. II, 6 (1906) 748. — *S. pseudoclethra* HALL. *f.* Med. Rijksherb. 14 (1912) 41.

Tree to 30 m, 40 cm ⌀. Twigs glabrous. *Leaves* glabrous, mostly narrowly elliptic, with attenuate base, (coarsely) crenate margin and hardly acuminate apex, (5$^1/_2$–)7–13(–22) by 2$^1/_2$–5(–6$^1/_2$) cm; nerves (7–)10–16(–18) pairs, meeting in a looped intramarginal vein; petiole 6–15 mm. *Raceme* to 10 cm, but often shorter, axis (sparsely) pubescent. Bracts very soon caducous, appressedly pubescent, obovate or elliptic, 1–4 mm; bracteoles falling after the bracts, sometimes rather long persistent, less hairy, (broadly) ovate to narrowly elliptic, 1–2$^1/_2$ mm. Pedicels pubescent, at most 6 mm but often shorter. *Calyx* glabrous, or some appressed hairs on the base of the tube, 1$^1/_2$–2$^1/_2$ mm long, the lobes *c.* $^1/_4$ mm shorter, sometimes ciliolate. *Corolla c.* 4(–5) mm. *Stamens* 60 to more than 100. Disk 5-glandular, glabrous. *Ovary* glabrous, 1–1$^1/_2$ mm high; style glabrous or with few hairs, but the conical base soft-hairy, 4–5 mm. *Fruit* ovoid to ellipsoid, slightly narrowed towards the apex, 10–16 by 5–7 mm; stone 1-celled, smooth or faintly ribbed. *Seeds* 1 (or 2), filling the whole stone, ovoid, with straight embryo.

Distr. *Malesia:* Java and Lesser Sunda Is. (Lombok).

Ecol. From sea-level to 1800 m.

KEY TO THE VARIETIES

1. Leaves 5$^1/_2$–13 cm. Bracts obovate, 1–3 mm. Stamens *c.* 60 . . . . . **a.** ***var.*** **brandisii**
1. Leaves 11–22 cm. Bracts elliptic, 3–4 mm. Stamens more than 100 . **b.** ***var.*** **pseudoclethra**

a. ***var.*** **brandisii.** — *S. brandisii* K. & V. — *S. koordersiana* BRAND. *Cf.* NOOT. Leid. Bot. Ser. 1 (1975) 136, pl. 5a–h. — **Fig. 7.**

Leaves 5$^1/_2$–13 cm long. Nerves 7–16 pairs. Bracts obovate, 1–3 mm; bracteoles ovate to narrowly elliptic, 1–2$^1/_2$ mm. Corolla *c.* 4 mm. Stamens *c.* 60.

Distr. *Malesia:* West Java (Udjung Kulon Peninsula, Peutjang I. and Depok), East Java (Besuki: Pantjur Idjèn), and Lesser Sunda Is. (Lombok: Mt Rindjani).

Ecol. Lowland primary and secondary forest, in P. Peutjang on raised coral, in Java below 200 m, in Lombok in montane forest at '800–1800 m'. *Fl.* March–June, Nov., *fr.* July.

b. ***var.*** **pseudoclethra** (HALL. *f.*) NOOT. Leid. Bot. Ser. 1 (1975) 136, pl. 5i–j. — *S. pseudoclethra* HALL.

Leaves 11–22 cm. Nerves 11–18 pairs. Bracts elliptic, boat-shaped, 3–4 mm; bracteoles broadly ovate, *c.* 2 mm. Corolla 1$^1/_2$ mm. Stamens more than 100.

Distr. *Malesia:* Lesser Sunda Is. (Lombok: Mt Rindjani). Only known from the type.

Ecol. Montane high forest, 800–950 m. *Fl.* April.

12. Symplocos buxifolia STAPF, Trans. Linn. Soc. Bot. 4 (1894) 206; BRAND, Pfl. R. Heft 6 (1901) 64; MERR. En. Born. (1921) 487; NOOT. Leid. Bot. Ser. 1 (1975) 136, pl. 6a–d. — **Fig. 7.**

Shrub or treelet, 2–10 m; crown dense, globular, fastigiate. Twigs glabrous, dark, ± zigzag. *Leaves* glabrous, closely placed, elliptic to nearly orbicular with more or less attenuate base, finely glandular dentate or crenate margin and rounded to acute or slightly acuminate apex, 15–50 by 7–25 mm; nerves 4–6 pairs, meeting in an intramarginal vein; petiole 3–7 mm. *Inflorescence* an axillary few-flowered raceme or often a 1-flowered shoot with several miniature sparsely pubescent to glabrous bract-like leaves of 3 by 1 to 10 by 5 mm; axis glabrous or minutely appressedly hairy. Bracts and bracteoles caducous; pedicel between them to 2 mm. *Calyx* glabrous or finely appressedly hairy, 2–5 mm long, the lobes ciliate, 1–3 mm. *Corolla* 5–8 mm. *Stamens* 70 to more than 100. Disk glabrous. *Ovary* glabrous or rarely finely appressedly hairy, 2–3 mm high; style glabrous, 3–7 mm. *Fruit* ellipsoid to ovoid, 10–15 by 6–8 mm; stone with low lengthwise ridges. *Seed* 1, straight with straight embryo.

Distr. *Malesia:* N. Borneo (Sabah: Mt Kinabalu).

Ecol. Mixed, evergreen, subalpine low forest and scrub, common, 2400–4000 m. *Fl.* March–July, Oct., Dec., *fr.* Febr.–Aug.

Note. This species can hardly be distinguished from the mountain forms of *S. cochinchinensis ssp. leptophylla* in New Guinea, especially those with small orbicular leaves.

13. Symplocos calycodactylos BRAND, Pfl. R. Heft 6 (1901) 63; NOOT. Leid. Bot. Ser. 1 (1975) 137, pl. 6e.

Shrub, 3 m. Twigs densely spreadingly long-hairy, hairs to 3 mm. *Leaves* long-hairy on both surfaces, ovate to elliptic with rounded to subcordate base, dentate, long-ciliate margin and acuminate apex, 6–14 by $2^1/_2$–5 cm; nerves 7–8 pairs, meeting in an intramarginal vein; petiole 3–5 mm. *Inflorescence* a fascicle (or flowers solitary?) or raceme to 10 cm; axis long-hairy. Bracts and bracteoles soon caducous, to 7 mm long, narrowly elliptic clothed with long hairs. Pedicels from ?5 mm in fascicles to 13 mm in racemes. *Calyx* entirely divided into the narrow-elliptic to linear, 4–6 mm long pubescent lobes. *Corolla c.* 6 mm. *Stamens c.* 100. Disk pilose. *Ovary* obscured by the 3 mm long hairs, $1^1/_2$ mm high; style glabrous, *c.* 8 mm. *Fruit* ± cylindrical, densely long-hairy, crowned by the persistent calyx (only young fruits seen).

Distr. *Malesia:* Malay Peninsula (Perak and Kedah), 2 collections.

Ecol. Evergreen hill forest, 900–1000 m. *Fl.* Febr.

Note. Closely allied to the Indian-Ceylonese *S. pulchra* WIGHT with which there are hardly any vegetative differences; in flower easily distinguished by the extremely long calyx lobes.

14. Symplocos celastrifolia GRIFF. *ex* CLARKE, Fl. Br. Ind. 3 (1882) 575; BRAND, Pfl. R. Heft 6 (1901) 48; K. & G. J. As. Soc. Beng. 74, ii (1906) 239; RIDL. Fl. Mal. Pen. 2 (1923) 302; MERR. Un. Cal. Publ. Bot. 15 (1929) 248; FLETCHER, Fl. Siam. En. 2 (1938) 385; NOOT. Leid. Bot. Ser. 1 (1975) 138. — *Eugeniodes celastrifolius* O. K. Rev. Gen. Pl. 2 (1891) 975. — *S. nigricans* BRAND, Pfl. R. Heft 6 (1901) 49. — *S. candicans* BRAND, *l.c.* — *S. hutchinsonii* BRAND, Philip. J. Sc. 4 (1909) Bot. 109; MERR. En. Philip. 3 (1923) 299. — *S. peninsularis* BRAND, Philip. J. Sc. 4 (1909) Bot. 110. — **Fig. 4m, 7, 11.**

Shrub or small tree, rarely up to 30 m high and 60 cm ⌀. Twigs glabrous. *Leaves* glabrous, or rarely sparsely fine-hairy on midrib and nerves beneath, often the upper surface dark coloured to nearly black when dry and the undersurface olive brown, ± elliptic, with cuneate-attenuate base, crenate margin and mostly abruptly acuminate apex, $5^1/_2$–15 by $2^1/_4$–6 cm; nerves 6–9 pairs,

Fig. 11. *Symplocos celastrifolia* GRIFF. *ex* CLARKE. a. Habit, × $^2/_3$, b. bud, with bract and bracteoles, c. corolla and stamens, both × 3, d. anther, e. stigma, both × 9, f. LS of flower, × 5, g. CS of fruit, h. LS of fruit, both × 9 (*a* MAIN 1258, *b–h* KOSTERMANS 1144, all from Morotai I.).

usually meeting in the intramarginal reticulation; petiole 3–15 mm. *Raceme* often basally branched, axis fine-hairy to appressedly pubescent, 3–12 cm. Bracts and bracteoles soon caducous, 2–3(–4 in Morotai) and *c.* $1^1/_2$ (or $2–2^1/_2$ in Morotai) mm long respectively. Pedicels with same indument as axis, 1–5 mm. *Calyx* glabrous, $1^1/_2–2^1/_2$(–3 in Morotai) mm; lobes ciliate, when young $1–1^1/_2$ mm, becoming longer by tearing apart. *Corolla* 4–6 mm. *Stamens* 40-*c.* 60. Disk glabrous, with some hairs or pilose, especially after anthesis. *Ovary* glabrous, *c.* 1 mm high; style glabrous, 4–5 mm. *Fruit* orbicular, pink, green, yellow or dark blue (sec. coll.), 4–10(–20) by 3–8(–15) mm; stone smooth, cells 3, but usually only 1 fertile, the sterile cells larger than the fertile ones, towards the base filled with air. *Seed* and embryo U-shaped.

Distr. Peninsular Thailand and throughout *Malesia*, except in Java, the Lesser Sunda Is., the northern islands of the Philippines, the northern half of Celebes, and most of the Moluccas. The number of collections in Sumatra and East Malesia (E. of Makassar Straits) is small compared with those in Malaya and especially Borneo.

Ecol. Usually in coastal, primary and secondary lowland forests especially in the transition zone between mangrove (*Nypa*) and freshwater swamps, mostly in deep marshy, sandy soils, but in a variety of other habitats: sandy beaches, sandbanks near the sea, kerangas, *Casuarina* peat swamp, in lalang fields on white sandy soils, open heath forest behind the mangrove, in *Shorea laevifolia* forest (Nunukan), on a dry bamboo ridge at 300 m, also on red or yellow sandy loams, exceptionally as high as 750 m, and even 1900 m. *Fl.* March–May (June–Jan.), *fr.* June–Aug. (Sept.–Jan.). Flowers are noted to be fragrant. The fruits are obviously buoyant, the sterile cells being filled with air.

Vern. Sumatra: *kĕndung*, Palemb., *krunjing*, Banka; Borneo-Sarawak: *purup*, Lundu; Sabah: *kayu tanyong*, *kulimbabok*, *tandjong jawa*, *tanjongtanjong*, M, *mangkasugoi*, Mub., *songal*, Tengara, *inderatan*, Bajau, *balas*, Banggi, *enadak*, *inderopis*, *lamai-lamai*, *mata kinai*, *tukil-tukil*, Dusun; Kalimantan: *adad*, Nunukan, *bintangur pantai*, E. Kutei, *mangkinang tikus*, Kahajan, *tawi*, Sampit.

Notes. In Morotai I. a differing population is found, with tomentose axis of raceme and bracts and calyx lobes longer than in other specimens, and growing at 800–1000 m. Fig. 11.

Also in West New Guinea (Vogelkop Peninsula) deviating specimens are found with large, thicker-walled fruits at *c.* 1900 m.

15. Symplocos cerasifolia WALL. (Cat. 1831, *n.* 4434, *nomen*) *ex* DC. Prod. 8 (1844) 257; MIQ. Fl. Ind. Bat. 1, 2 (1859) 466, *excl. stirp. Zoll.*; CLARKE, Fl. Br. Ind. 3 (1882) 580; BRAND, Pfl. R. Heft 6 (1901) 52; K. & G. J. As. Soc. Beng. 74, ii (1906) 245; RIDL. Fl. Mal. Pen. 2 (1923) 306; NOOT. Leid. Bot. Ser. 1 (1975) 140, pl. 7c–f. — *Bobua cerasifolia* MIERS, J. Linn. Soc. Bot. 17 (1879) 304. — *Eugeniodes cerasifolium* O. K. Rev. Gen. Pl. 2 (1891) 975. — **Fig. 7, 10e.**

a. *var.* **cerasifolia.** — **Fig. 7, 10e.**

Tree to 25 m, 35 cm ∅. Twigs often spreadingly thin-pilose in innovations; growth discontinuous; terminal buds with many leathery scales, the latter leaving conspicuous scars. *Leaves* long spreadingly to more or less appressedly pilose beneath, especially on midrib and nerves, sometimes entirely glabrous, with cuneate base, sharply dentate margin and acuminate apex, 7–16(–22) by 2–5(–7) cm; nerves 6–9 pairs, meeting in a distinct looped intramarginal vein; petiole slender, 15–25 mm. *Spike* resembling a short cone in bud as in *S. barringtoniifolia*, becoming at most 3 cm long; axis ± appressedly long pilose to densely pubescent. Bracts broadly ovoid to orbicular, boat-shaped, appressedly (silky-)pubescent on the back, at least in the middle, *c.* 5 by 5 mm; bracteoles with same indument, narrowly elliptic, *c.* 3 mm long, both soon caducous. *Calyx* glabrous or slightly pubescent, $2^1/_2–4$ mm, the lobes initially $1–1^1/_2$ mm, becoming often as long as the calyx by tearing apart. *Corolla* *c.* 5 mm. *Stamens* 30 to more than 100. Disk glabrous. *Ovary* glabrous, $1–1^1/_2$ mm high; style glabrous, but the conical base sometimes hairy. *Fruit* ellipsoid, shiny blue, 22–40 by 8–18 mm; stone with 8 high ridges, 3-celled with a central canal, often only one cell developed. *Seed* cylindrical, with straight embryo.

Distr. Extreme south of Peninsular Thailand; in *Malesia:* Sumatra (also Banka), Malay Peninsula, Borneo, and West New Guinea (once, near Merauke), showing a most unusual disjunction in range.

Ecol. Lowland rain-forest, hillsides on granite, on granitic sand, low ridges with sandy soil, also sandy loam with lime, mostly below 200 m, rarely ascending to 1000 m. *Fl.* June, *fr.* April–Oct.

Vern. Sumatra: *sĕsĕham*, Pakanbaru, *mĕntapung*, *mĕntĕpung*, Banka.

b. *var.* **grandifolia** NOOT. Leid. Bot. Ser. 1 (1975) 141.

Leaves *c.* 30 by 8 cm. Nerves 10–14 pairs.

Distr. *Malesia:* NE. Sumatra (Asahan), 2 collections. Flowers unknown.

16. Symplocos cochinchinensis (LOUR.) S. MOORE, J. Bot. 52 (1914) 148; GUILLAUMIN, Bull. Soc. Bot. Fr. 71 (1924) 277; Fl. Gén. I.-C. 3 (1933) 998; MERR. Comm. Lour. (1935) 304; HAND.-MAZZ. Beih. Bot. Centralbl. 62 B (1943) 32; H. L. LI, J. Wash. Ac. Sc. 43 (1953) 107; NOOT. Leid. Bot. Ser. 1 (1975) 141, with full synonymy. — *Dicalix cochinchinensis* LOUR. Fl. Coch. 1 (1790) 663, *excl. syn. Arbor rediviva* RUMPH. — **Fig. 12, 13.**

For the many synonyms see under the varieties.

Small shrub to large tree. *Leaves* very variable in all characters. *Inflorescence* usually a spike, rarely a raceme, but in *ssp. leptophylla* sometimes reduced to a fascicle in the axils of the leaves or beneath them, in *ssp. thwaitesii* sometimes a panicle of racemes. *Fruits* ampulliform to globose, in *ssp. leptophylla* and *ssp. thwaitesii* from globose to ellipsoid, ovoid or ampulliform, in *ssp. cochinchinensis var. imbricata* ovoid to ellipsoid. *Seed* and embryo curved.

Distr. Continental Asia (India, Burma, Thailand, Indo-China, China, Japan, Ryu Kyu Is., Hainan, Formosa), throughout *Malesia* to Australia (Queensland, New South Wales, Lord Howe I.), the Solomons, New Hebrides, and Fiji.

Notes. The oldest name for this species is *Myrtus laurinus* RETZ. 1786. However, its epithet

can not be used because of the heterotypic synonym *S. laurina* WALL. *ex* G. DON, 1837.

This is the most widely distributed and also most variable species of the genus. The two main forms of the western part of its distribution, '*cochinchinensis*' and '*laurina*', have usually been treated as different species, the main difference being hairy versus glabrous calyx lobes; in addition the bract and bracteoles in *cochinchinensis* form a cup appressed to and concealing the ovary while the calyx lobes often enlarge in fruit forming a conical beak. In *laurina* the cup formed by the bract and bracteoles is more platter-shaped, while the calyx lobes form a small crown on top of the fruit, but they can also be closed.

These two forms can be kept rather well apart in large parts of the range, but in other parts they keep less well separate and this results in a great variability, in part intergrading, which I have ascribed to hybridization, while it is possible that from these hybrid swarms new small local taxa may have evolved through environmental conditions, *e.g.* *var. sessifolia* and *var. imbricata*.

Towards the eastern end of the range, in New Guinea, Australia, and the Pacific Islands forms occur which often have no resemblance any more to the two main western forms, but in the intermediate area they are linked with them in a continuous variation, and thus break down any definable distinction between them.

In these eastern forms, which I assume are 'derived' during the former eastward extension of the range, some new tendencies have developed, in that seed and embryo are only curved at the base and are uncinate and that there is a tendency towards unisexuality of the flowers. Several New Guinean forms are further characterized by a condensed fascicle-like inflorescence, while the disk often becomes hairy.

Within the species 5 of the 9 pollen subtypes known from *subg. Hopea* are found. The pollen type is only constant for *ssp. laurina* and for *ssp. cochinchinensis* and its varieties *philippinensis* and *sessifolia*.

Instead of giving a lengthy discussion on the variability I have found it more convenient and clear to subdivide the species in formally named subspecies and varieties, although I am aware that it will not always be possible to name odd deviating or intermediary specimens.

KEY TO THE SUBSPECIES

1. Seeds and embryo twice curved. Inflorescence a basally branched spike, rarely a raceme. Flowers bisexual. Disk always glabrous. Fruit ampulliform (ovoid to ellipsoid in *ssp. cochinchinensis var. imbricata*).
2. Calyx lobes hairy (except on Mt Diëng in Central Java), often enlarged in fruit, forming a conical beak . . . . **1. *ssp.* cochinchinensis**
2. Calyx lobes glabrous, often ciliate, not enlarged in fruit . . . . . **2. *ssp.* laurina**

1. Seeds and embryo once curved. Inflorescence a basally branched spike or raceme, or flowers solitary or in a fascicle. Flowers bisexual or functionally unisexual (or plant polygamous). Disk glabrous or hairy. Fruit ellipsoid to ovoid or ampulliform.
3. Seeds and embryo once curved. (Disk glabrous or rarely pilose.) Calyx lobes glabrous, often ciliate. Flowers bisexual . . **3. *ssp.* thwaitesii**
3. Seeds and embryo uncinately curved towards the base. (Disk glabrous to densely pilose.) Calyx lobes glabrous to densely hairy. Flowers functionally unisexual or polygamous (in male flowers the stigma is absent) **4. *ssp.* leptophylla**

1. *ssp.* cochinchinensis.
For synonyms see under the varieties.

KEY TO THE VARIETIES

1. Leaves usually pubescent or tomentose beneath; nerves 10–14 pairs, much prominent beneath, strictly parallel to each other, nearly reaching the margin; petiole (2–)5–17(–35) mm. **a. *var.* cochinchinensis**
1. Leaves glabrous; nerves 4–11 pairs, usually not strictly parallel to each other, anastomosing or meeting in an intramarginal vein at some distance of the margin.
2. Leaves 3–12 by $1^1/_2$–6 cm, index $1^1/_2$–3; nerves 4–8 pairs; petiole 0–3 mm. Fruit at most 7 mm long . . . . . **b. *var.* sessifolia**
2. Leaves 6–18 by $1^1/_2$–$6^1/_2$ cm, index $1^1/_2$–$4^1/_2$; nerves 5–11 pairs; petiole 3–25 mm. Fruit at most 7 mm long . . **c. *var.* philippinensis**
2. Leaves 4–9 by $2^1/_2$–$5^1/_2$ cm, index 1–2; nerves 5–7 pairs; petiole 4–7 mm. Fruit 10–12 mm long . . . . . **d. *var.* imbricata**

a. *var.* cochinchinensis. — *Dicalix cochinchinensis* LOUR. Fl. Coch. 1 (1790) 663, *excl. syn. Arbor rediviva* RUMPH. — *Dicalyx aluminosus* BL. Bijdr. (1826) 1117, *p.p.* — *Dicalyx javanicus* BL. *l.c.* 1117. — *S. ferruginea* ROXB. (Hort. Beng. 1814, 40; WALL. Cat. 1831, *n.* 4412, *nomen*) Fl. Ind. ed. Carey 2 (1832) 542; MIQ. Fl. Ind. Bat. 1, 2 (1859) 466; CLARKE, Fl. Br. Ind. 3 (1882) 574; K. & V. Bijdr. 7 (1900) 141; BRAND, Pfl. R. Heft 6 (1901) 40; K. & G. J. As. Soc. Beng. 74, ii (1906) 238; KOORD. Atlas 2 (1914) t. 384; RIDL. Fl. Mal. Pen. 2 (1923) 302. — *S. mollis* WALL. (Cat. 1831, *n.* 4433, *nomen*) *ex* G. DON, Gen. Syst. 4 (1837) 3. — *S. spicata* ROXB. *var. platystachya* G. DON, *l.c.* 2. — *S. polystachya* WALL. (Cat. 1831, *n.* 4428, *nomen*) *ex* DC. Prod. 8 (1844) 254; MOR. Syst. Verz. (1854) 43; ZOLL. Syst. Verz. 2 (1854) 136; MIQ. Fl. Ind. Bat. 1, 2 (1859) 465. — *S. verhuellii* JUNGH. & DE VR. Pl. Ind. Or. 3 (1845) 12; MIQ. Fl. Ind. Bat. 1, 2 (1859) 467. — *S. horsfieldiana* MIQ. Sum. (1861) 475. — *S. lachnobotrys* MIQ. *l.c.*, *incl. var. glabrior* MIQ. — *S. javanica* KURZ, J. As. Soc. Beng. 40, ii (1871) 64; *ibid.* 46, ii (1877) 239, *excl. syn. S. rubiginosa*; MERR. Int. Rumph. (1917) 420; HEYNE, Nutt. Pl. (1927) 1263; BURK. Dict. (1935) 2114; BACK. & BAKH. *f.* Fl. Java 2 (1965) 205. — *Lodhra javanica* MIERS, J. Linn. Soc. Bot. 17 (1879) 302. — *Lodhra ferruginea* MIERS, *l.c.* 299. — *Lodhra polystachya* MIERS, *l.c.* 300. — *Lodhra verhuellii* MIERS, *l.c.* 302. — *S. ferruginea* ROXB. *var. polystachya* CLARKE, Fl. Br. Ind. 3 (1882) 575. — *Eugeniodes ferrugineum* O. K. Rev. Gen. Pl. 2 (1891) 975. — *Eugeniodes lachnobotryum* O. K. *l.c.* — *S. delectans* BRAND, Bot. Jahrb. 54 (1916) 219. — *S. ferruginea* ROXB. *var. delectans* KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 487. — **Fig. 7.**

Shrub or small tree, 9–22 m by 30 cm ⌀, rarely a large tree to 45 m by 80 cm ⌀. Twigs rusty tomentose or velvety, glabrescent, rarely pubescent, appressedly pilose, or glabrous. *Leaves* rusty or brownishly pubescent or tomentose beneath, especially on midrib and nerves, rarely glabrous, (ovate to) elliptic (to obovate) with cuneate, rarely rounded or (in New Guinea) cordate base, glandular dentate or crenulate margin and more or less acuminate apex, (6–)12–25 by (2½–)3–10 cm; nerves (8–)10–14(–16) pairs, very prominent beneath, parallel to each other, mostly quite straight, curved upwards towards the margin and nearly reaching it, whether forming an intramarginal vein or not; petiole (2–)5–17 mm (rarely to 35 mm in New Guinea). *Spike* usually branched, 3–15 cm, in *topodeme morobeensis* up to 3 cm, axis densely rusty tomentose or pubescent, in New Guinea sometimes sericeous. Bracts and bracteoles persistent, with same indument, the former at least 2 mm long and broad, but usually longer, exceptionally up to 10 mm long, with the 2 smaller bracteoles forming a calycle hiding the ovary. *Flowers* faintly scented to fragrant. *Calyx* appressedly pubescent (in *topodeme morobeensis* indument only towards the apex), divided into (1–)2(–3) mm long lobes. *Corolla* white (according to some collectors with a yellow spot on each lobe), from 2 (sometimes in New Guinea) to 3–5 mm long. *Stamens* 30–70 (in New Guinea from 10 at high altitudes to more than 70 at low altitudes). Disk glabrous. *Ovary* glabrous, ½–1 mm high; style glabrous, 3–5 mm. *Fruit* ampulliform or globose, 5–7 by 4–5 mm, more or less ribbed when dry, often narrowed into a cylindrical neck, crowned by the usually closed, enlarged, calyx lobes which form a conical beak on top. *Seed* 1, twice curved with similar curved embryo.

Distr. Continental SE. Asia (India, Burma, Thailand, Indo-China, China, Hainan, Formosa, Ryu Kyu Is., Japan) and throughout *Malesia* except the Lesser Sunda Is., Celebes, and the Moluccas, scarce in the Philippines.

Ecol. A variety of habitats over a considerable altitudinal range, from the lowland up to *c.* 2500 m, in New Guinea even to 3000 m, in the understorey of rain-forest, primary and secondary, in the hills often associated with *Eugenia* and *Fagaceae*, extending to a few exceptional conditions, *e.g.* in Banka and Billiton on granite sands. *Fl.* (Jan.–May) June–Sept. (Oct.–Dec.), *fr.* Oct.–July. Ripe fruit dark blue. In Malaya crown shape often called deep, domed, narrow and dense.

Vern. Sumatra: *digëra, këdung, këmbang lonah*, Djambi, *kayu njari badok*, Lampong, *kaju salondung, k. si hondung*, Padanglawas, *këkaput*, Pasemah, *loba-loba*, Batak, *madang harbo*, Tapanuli, *mënkëndung*, Banka, *sëkëndum, sëpandong*, Palembang; Java: *djirak*, S, *ki huüt*, Bantam; *kayu ara*, Kota Belud, *habo*, Sg. Baru, *kayu (h)abu*, Bandjar, Martapura; Philippines: *tabu*, Ifiago; New Guinea: *kumën*, Wigote, Wapi lang., *kutomi*, Wandammen lang., *mirik*, Sepik, Waskuk lang.

Notes. *Var. cochinchinensis* possesses rather constant characters in large parts of its area, especially in continental Asia. In Java glabrous leaves become rather common, towards East Java the number of nerves decreases, and the leaves begin to resemble those of *ssp. laurina*. Here we find the gradual transition to *var. philippinensis*. The latter variety replaces *var. cochinchinensis* in the Lesser Sunda Is., Celebes, the Moluccas, and most of the Philippine islands.

A conspicuous population from the Morobe District, New Guinea, is named *topodeme* **morobeensis** (petioles 15–35 mm, inflorescence up to 3 cm, indument of calyx only towards the apex or on the margin).

b. *var.* sessifolia (BL.) NOOT. Leid. Bot. Ser. 1 (1975) 153. — *Dicalyx sessifolius* BL. Bijdr. (1826) 1118. — *Dicalyx salaccensis* BL. *l.c.* — *S. laurina* (*non* WALL.) MOR. Syst. Verz. (1845) 42. — *S. subsessilis* CHOISY (*ex* ZOLL. Syst. Verz. 2, 1854, 136, *nomen*) *ex* MIQ. Fl. Ind. Bat. 1, 2 (1859) 467. — *S. sessi(li)folia* GÜRKE in E. & P. Nat. Pfl. Fam. 4, 1 (1890) 170; BRAND, Pfl. R. Heft 6 (1901) 35; KOORD. Atlas 2 (1914) t. 388; BACK. & BAKH. *f.* Fl. Java 2 (1965) 205. — *Eugeniodes sessilifolius* O. K. Rev. Gen. Pl. 2 (1891) 409. — *Eugeniodes salaccense* O. K. *l.c.* — *Eugeniodes diengense* O. K. *l.c.* — *S. spicata* ROXB. *f. subsessilis* K. & V. Bijdr. 7 (1900) 146. — *S. cochinchinense ssp. sessifolia* NOOT. *ex* STEEN. Mt. Fl. Java (1972) pl. 52–4. — **Fig. 7, 12, 13c–e.**

Shrub 1–5 m to small tree, 10 m, 10 cm ⌀. Twigs glabrous or nearly so. Innovations purple. Leaves glabrous, coriaceous, with cuneate-attenuate base and faintly acuminate apex, 3–12 by 1½–6 cm; nerves 4–8 pairs, meeting in a faint intramarginal vein; petiole 0–3(–5) mm. Spike often branched, up to 6 cm, often crowded towards the end of the twigs, axis densely appressedly pubescent; flowers purplish. Bracts, bracteoles and flowers as in *var. cochinchinensis*, but on Mt Diëng the calyx only ciliate, or only pubescent towards the margin. Calyx lobes on the fruit not enlarged and closed.

Distr. *Malesia:* West & Central Java (Mts Salak eastward to Sumbing).

Ecol. A constituent of the summit forest of the volcanic peaks, often associated with *Myrsine, Leptospermum, Eurya, Schima, Photinia*, and *Myrica*, on stony ridges and summits, able to invade exposed sterile rocky places in the vicinity of craters as a dwarf pioneer shrub, 1700–3050 m. *Fl.* mainly Oct.–Jan. (Febr.–March), *fr.* July–Aug.

For the ecology and flower biology see the general paragraphs under the genus. Fruit blue-black when ripe. Flush purple or blue-volet.

Uses. Flush is sometimes eaten as *lalab* (vegetable).

Vern. *Djirak, putat*, S, *djirik mëlowo, sasah*, J.

c. *var.* philippinensis (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 154. — *Dicalyx aluminosus* BL. Bijdr. (1826) 1117, *p.p.* — *S. spicata* (*non* ROXB.) F.-VILL. Nov. App. 4 (1880) 127. — *S. syringoides* BRAND, Pfl. R. Heft 6 (1901) 41; S. MOORE, J. Bot. 52 (1914) 148; MERR. Int. Rumph. (1917) 421. — *S. ferruginea* ROXB. *var. philippinensis* BRAND, Philip. J. Sc. 3 (1908) Bot. 6. — *S. ahernii* BRAND, *l.c.*; MERR. En Philip. 3 (1923) 297. — *S. ramosii* MERR. Philip. J. Sc. 12 (1917) Bot. 293; En. Philip. 3 (1923) 302. — *S. ferruginea* ROXB. *var. syringoides* HALL. *f.* Beih. Bot. Centralbl. 39 B (1923) 92. — *S. javanica* (*non* KURZ) MERR. En. Philip. 3 (1923) 299. — **Fig. 7.**

Fig. 12. *Symplocos cochinchinensis* (LOUR.) S. MOORE *ssp. cochinchinensis var. sessifolia* (BL.) NOOT. in fruit (and 1 flower), on summit of Mt Pangrango, West Java, at 3000 m (NOOTEBOOM 906). Photogr. NOOTEBOOM, Febr. 1969.

Tree to 25 m high, 50 cm ∅. Twigs glabrous or appressedly pubescent. Leaves glabrous, or the midrib sparsely appressedly fine-hairy, ± elliptic with cuneate base and acuminate apex, (4–)6–18 by $1^1/_2$–$6^1/_2$ cm, but 5–13 by $2^1/_2$–$5^1/_2$ cm in the Philippines; nerves 5–10(–15) pairs; petiole 3–15, in the Philippines 10–25 mm. Spike with tomentellous to pubescent axis. Bracts 1–2 mm, to 3 mm in the Lesser Sunda Is., with the bracteoles with same indument as the spike, further as in *ssp. laurina*. Calyx finely appressedly pubescent, divided into *c.* 1 mm long lobes. Corolla 3–6 mm. Stamens 35–70. Disk glabrous. Ovary glabrous, $^1/_2$–1 mm high; style glabrous, 2–5 mm. Fruit as in *ssp. laurina*.

Distr. *Malesia:* Central & East Java, Lesser Sunda Is. (Bali, Sumbawa, Flores), Philippines (common, throughout), Celebes, Moluccas (Tidore, Ternate, Buru, Ambon, Ceram).

Ecol. In Java in mountain rain-forest, also in tjemara forest, 700–2600 m, in the Lesser Sunda Is. 500–2400 m, in the Philippines from low altitude up to 2000 m, also recorded from primary Dipterocarp forest, in the Moluccas from low altitude to 1400 m. *Fl.* (Jan.–June) July–Dec., *fr.* Jan.–Aug. Flowers said to be scented; fruit turning through red to blue.

Vern. Java: *kayu djurang*, *tjirug*, J; Philippines: *abuabu*, *chaniusiu*, *gudik*, Ig., *banatong-babáe*, Tag., *tarañgisi*, Bag., *ngarau-ngarau*, Neg.; Moluccas: *bunga ajang*, Ambon.

Note. In East Java this variety has probably originated by hybridization between *ssp. laurina var. laurina* and *ssp. cochinchinensis var. cochinchinensis*.

d. *var.* imbricata (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 155. — *S. imbricata* BRAND, Philip. J. Sc. 4 (1909) Bot. 109; *ibid.* 7 (1912) Bot. 31; MERR. En. Philip. 3 (1923) 299. — **Fig. 7.**

Shrub or tree, 8–10 m. Twigs glabrous. Leaves glabrous, more or less coriaceous, usually broadly ovate, with cordate or slightly acuminate base, glandular dentate margin, and acuminate apex, 4–9 by $2^1/_2$–$5^1/_2$ cm; nerves 5–7 pairs. Spikes axillary or pseudoterminal. Bract and bracteoles persistent. Calyx more or less appressedly pubescent, divided into 2 mm long lobes. Corolla *c.* 6 mm. Stamens *c.* 60. Disk glabrous. Ovary glabrous, *c.* 1 mm high. Fruits black, ovoid to ellipsoid, 10–12 by *c.* 8 cm with smooth stone.

Distr. *Malesia:* Philippines (Luzon).

Ecol. In subalpine one-storey, mossy forest, 2000–2600 m. *Fl.* Dec.–April, *fr.* Aug.–Sept., Jan.–March. Innovations glossy redbrown, ripe fruit dark blue.

Note. This mountain form is probably directly derived from *var. philippinensis*, from which it differs in the shorter leaves and larger fruit.

2. *ssp.* laurina (RETZ.) NOOT. Leid. Bot. Ser. 1 (1876) 156. — *Myrtus laurinus* RETZ. Obs. Bot. 4 (1786) 26.

Note. This subspecies ranges from Ceylon eastwards to Celebes, China and Japan. Besides the type variety there is only one local stenophyllous variety in Indo-China and S. China.

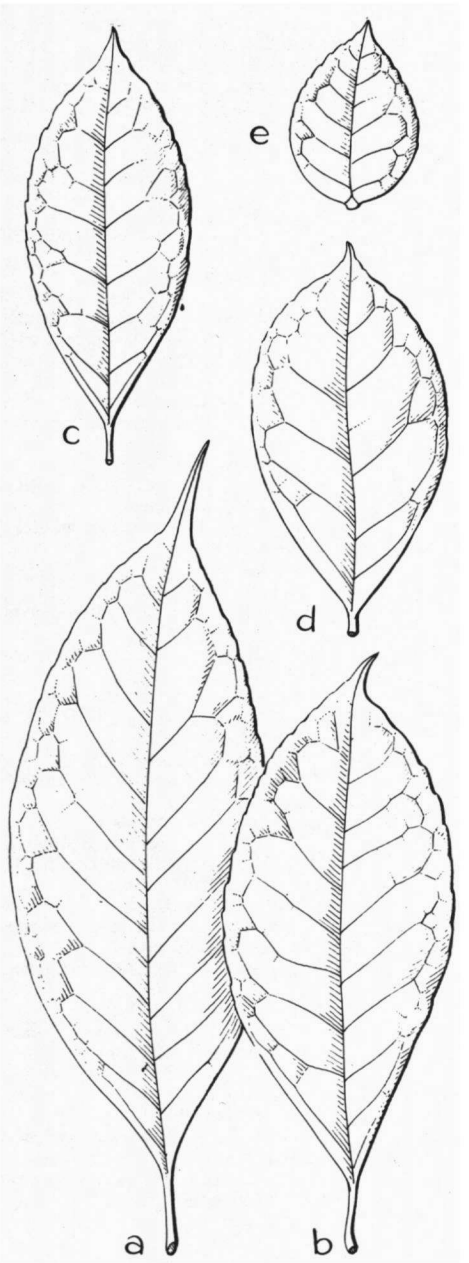

Fig. 13. Leaf size and shape in *Symplocos cochinchinensis* (LOUR.) S. MOORE at different altitudes, from a to e at 100, 1600, ?1800, 2000, and 3000 m respectively. a–b. *ssp. laurina* (RETZ.) NOOT. *var. laurina*, c–e. *ssp. cochinchinensis var. sessifolia* (BL.) NOOT., all × $^2/_3$ (*a* LÜTJEHARMS 4561, *b* BLOKHUIS 7–12–21, *c* BLUME 1965, *d* Ja 4010, *e* DOCTERS VAN LEEUWEN 8425).

e. *var.* laurina. — *Laurus serrata floris spicatis* BURM. Thes. Zeyl. (1737) 139, t. 62. — *Myrtus laurinus* RETZ. Obs. Bot. 4 (1786) 26, *non S. laurina* WALL. *ex* G. DON, 1837. — *Drupatris cochinchinensis* LOUR. Fl. Coch. 1 (1790) 314. — *Decadia aluminosa* LOUR. *l.c.* 315. — *Eugenia laurina* WILLD. Sp. Pl. 2 (1799) 967, *p.p.* — *Dicalyx spicatus* BL. Bijdr. (1826) 1118. — *Dicalyx acuminatus* BL. *l.c.* 1119. — *S. spicata* ROXB. (Hort. Beng. 1814, 40; WALL. Cat. 1831, *n.* 4417, *nomen*) Fl. Ind. ed. Carey 2 (1832) 542; CHOISY in Zoll. Syst. Verz. 2 (1854) 136; MIQ. Fl. Ind. Bat. 1, 2 (1859) 465; CLARKE, Fl. Br. Ind. 3 (1882) 573, *incl. var. malasica l.c. et var. laurina l.c. p.p.*; K. & V. Bijdr. 7 (1900) 144, *incl. f. javanica l.c. et f. acuminata et f. xanthophylla l.c.* 145, *excl. f. subsessilis*; BRAND, Pfl. R. Heft 6 (1901) 39, *incl. var. acuminata l.c.* 41; K. & G. J. As. Soc. Beng. 74, ii (1906) 236; KOORD. Atlas 2 (1914) t. 386, 387; RIDL. Fl. Mal. Pen. 2 (1923) 301; S. MOORE, J. Bot. 63 (1925) Suppl. 65; HEYNE, Nutt. Pl. (1927) 1263; BURK. Dict. (1935) 2115; BACK. & BAKH. *f.* Fl. Java 2 (1965) 205. — *S. laurina* WALL. (Cat. 1831, *n.* 4416, *nomen*) *ex* G. DON, Gen. Syst. 4 (1837) 3; REHD. & WILS. in Sargent, Pl. Wils. 2 (1916) 594; REHD. J. Arn. Arb. 15 (1934) 298; MERR. Comm. Lour. (1935) 303; CORNER, Ways. Trees (1940) 623; HAND.-MAZZ. Beih. Bot. Centralbl. 62 B (1943) 33; STEEN. Fl. Mal. I, 5 (1957) clxxxi, f. 4. — *S. polycarpa* WALL. (Cat. 1831, *n.* 4423, *nomen*) *ex* G. DON, Gen. Syst. 4 (1837) 3; MIQ. Fl. Ind. Bat. 1, 2 (1859) 465. — *S. ribes* JUNGH. & DE VR. Pl. Ind. Or. 3 (1845) 11; MIQ. Fl. Ind. Bat. 1, 2 (1859) 468. — *S. acuminata* MIQ. *l.c.* 467. — *Lodhra ribes* MIERS, J. Linn. Soc. Bot. 17 (1879) 302. — *Lodhra xanthophylla* MIERS, *l.c.* — *S. flavida* MIQ. (Pl. Hohenacker *n.* 1053) *ex* CLARKE, Fl. Br. Ind. 3 (1882) 573, *in syn.* — *Eugeniodes ribes* O. K. Rev. Gen. Pl. 2 (1891) 976. — **Fig. 7, 13a–b.**

Shrub, 3 m, to tree, 6–14 m by 30 cm ⌀. Twigs and leaves glabrous, except sometimes the very youngest parts. *Leaves* ± elliptic with cuneate base and acuminate apex, $4^1/_2$–21 by ($1^1/_2$–) $2^1/_2$–8 cm; nerves 6–9 pairs (but in forms transitional to *var. cochinchinensis* up to 13 pairs), not strictly parallel, anastomosing at some distance of the margin, often meeting in an intramarginal vein; petiole (5–)10–15(–20) mm (in transitional forms the leaves are like those of *var. cochinchinensis* except for the indument). *Spike* $1^1/_2$–14 cm, axis glabrous to more or less appressedly puberulous or pubescent. Bracts and bracteoles persistent, at most 2 mm long and broad, but usually only 1 mm, only enveloping the base of the ovary. A short pedicel exceptionally present. *Calyx* glabrous or nearly so, divided into 1–2 mm long, often ciliate lobes, not elongating in fruit, whether or not closed after anthesis. Rest of flower and fruit as in *var. cochinchinensis*.

Distr. Continental Asia (India, Ceylon, Burma, Thailand, Indo-China, China, Hainan, Formosa, Japan); in *Malesia:* Sumatra (also Enggano I.), Malay Peninsula (rare), Java (very common), Borneo (rare), Celebes (rare).

Ecol. Substage tree in rain-forest, sometimes in coastal vegetation, near waterfall, in Malaya found also in sandy, tidal *gelam* (*Melaleuca*) forest, in continental Asia, Sumatra and Celebes from low

altitude to *c.* 2000 or 3000 m, in Java only above *c.* 1000 m. *Fl.* Sept.–April, *fr.* Febr.–Sept. Flowers are said to be slightly foetid to strongly smelling, opening early in the morning. Fruit turns black via blue.

Vern. Sumatra: *kayu djari manuk*, Batak, *dadak putih*, *diera*, Enggano; Java: *djirak*, *d. sasak*, S, *djirēk*, J.

3. *ssp.* thwaitesii (F.v.M.) NOOT. Leid. Bot. Ser. 1 (1975) 159, with full synonymy. — *S. thwaitesii* F.v.M. Fragm. 3 (1862) 22.

Distr. This subspecies consists of 4 varieties which occur in Queensland, New South Wales, and Lord Howe I. One of these is also found in New Guinea.

Note. There is one sheet (LAE 54751) which is not identified to a variety; it might belong to the Queensland *var. montana* (C. T. WHITE) NOOT.

f. *var.* stawellii (F.v.M.) NOOT. Leid. Bot. Ser. 1 (1975) 161. — *S. stawellii* F.v.M. Fragm. 5 (1865) 60; BRAND, Pfl. R. Heft 6 (1901) 37, *excl. var.* — *S. spicata* ROXB. *var. australis* BTH. Fl. Austr. 4 (1869) 292. — **Fig. 7.**

Tree up to 30 m high, 80 cm ⌀. Twigs glabrous. Leaves glabrous, elliptic with broadly cuneate base and not or faintly acuminate apex, 6–16 by $2^1/_2$–10 cm; nerves 8–11 pairs; petiole 5–25 mm. Spike often branched, rarely exceeding 6 cm, the axis glabrous or appressedly puberulous. Bracts and bracteoles usually persistent, 1–$1^1/_2$ and $^1/_2$–1 mm long respectively. Calyx glabrous, divided into $^1/_4$–$^3/_4$ mm long lobes. Corolla 3–5 mm. Stamens 25–50. Disk glabrous. Ovary glabrous, 1–$1^1/_2$ mm high; style glabrous. Fruit ellipsoid-ovoid, 5–7 mm.

Distr. Australia: Queensland, New South Wales, and Lord Howe I.; in *Malesia:* New Guinea (Papua).

Ecol. Two habitats are recorded, *viz* in the lowlands with influence of a dry season, on edge of savannah forest, and on the Oriomo R. in association with *Acacia*, and in the middle mountains at *c.* 2000–2300 m, in secondary forest, tall mixed rain-forest, and in Podocarp-dominated forest on peaty soil. *Fl.* June, Sept., *fr.* June–Oct. Flowers are recorded to be fragrant. Fruit develops from green via blue to purple-black.

Vern. New Guinea: *tuliper*, Poio, Enga lang., *kun'gum*, Yogoo, Enga lang., *truom*, Oriomo R., Kiunga lang.

4. *ssp.* leptophylla (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 162. — *S. stawellii* F.v.M. *var. leptophylla* BRAND, Pfl. R. Heft 6 (1901) 37. — *S. leptophylla* TURRILL, J. Linn. Soc. Bot. 43 (1915) 30. — *S. mamberamo* BRAND, Nova Guinea 14 (1924) 186.

For further synonyms see under the varieties.

Notes. This is a rather heterogeneous subspecies ranging from the Lesser Sunda Is. and Moluccas through New Guinea (incl. Bismarcks) to Melanesia (Solomons, New Hebrides) and W. Polynesia (Fiji), the type having been described from Fiji. The varieties are rather reticulately allied and are often connected by intermediate specimens among which may be some hybrids. Some collections I could not refer to a variety, in part due to inadequate material, *e.g.* the type of *S. mamberamo*.

In most varieties the flowers are functionally unisexual or bisexual in the same variety. In the functionally female flowers the number of stamens is low, while the style is large, with peltate stigma. In the functionally male flowers the number of stamens is high and the style is small, without stigma.

KEY TO THE VARIETIES

1. Underside of leaves hairy.
2. Twigs glabrous . . . . **g. *var.* leptophylla**
2. Twigs hairy.
3. Calyx and ovary glabrous.
4. Disk hairy . . . . . **g. *var.* leptophylla**
4. Disk glabrous. Twigs sericeous or tomentose . . . . . **s. *var.* ovata**
3. Calyx and/or ovary hairy.
5. Ovary glabrous.
6. Disk glabrous. Twigs sericeous or tomentose . . . . . **s. *var.* ovata**
6. Disk hairy.
7. Twigs (appressedly) pubescent. **g. *var.* leptophylla**
7. Twigs tomentose or pilose. **v. *var.* versteegii**
5. Ovary hairy.
8. Calyx glabrous.
9. Twigs sericeous or tomentose. **s. *var.* ovata**
9. Twigs (appressedly) pubescent. **g. *var.* leptophylla**
8. Calyx hairy.
10. Disk glabrous.
11. Bracts shorter than 3 mm, fruits to *c.* 10 mm long . . . . . **s. *var.* ovata**
11. Bracts longer than 3 mm, fruits more than 10 mm long . . **t. *var.* revoluta**
10. Disk hairy.
12. Twigs (appressedly) pubescent. **g. *var.* leptophylla**
12. Twigs not appressedly pubescent or puberulous, *e.g.* tomentose.
13. Petiole more than 20. **j. *var.* tomentosa**
13. Petiole less than 20 mm.
14. Inflorescence a (basally branched) spike.
15. Bracts shorter than 3 mm **o. *var.* reginae**
15. Bracts longer than 3 mm **t. *var.* revoluta**
14. Inflorescence not a spike.
16. Nerves in 7–11 pairs. **m. *var.* molobros**
16. Nerves in 4–8 pairs. **o. *var.* reginae**

1. Underside of leaves glabrous.
17. Calyx and ovary glabrous.
18. Twigs hairy.
19. Petiole 0 to 5 mm.
20. Leaves shorter than 5 cm. **r. *var.* orbicularis**
20. Leaves longer than 5 cm. **l. *var.* longilobata**
19. Petiole more than 5 mm.
21. Leaves obovate, 10–25 cm. Petiole 10–40 mm. . . . . **i. *var.* insularis**
21. Leaves ovate or elliptic, $2^1/_2$–23 cm. Petiole 5–25 mm.

22. Leaves ovate or elliptic, $2^1/_2$–11 cm. Twigs sparsely appressedly pilose. **u. *var.* sogeriensis**
22. Leaves ± elliptic, 5–23 cm. Twigs appressedly pubescent. **g. *var.* leptophylla**
18. Twigs glabrous.
23. Inflorescence a very slender, often branched spike (or raceme) of 2–10 cm.
24. Twigs (exceptionally) thick. **p. *var.* schumanniana**
24. Twigs not (exceptionally) thick.
25. Intramarginal vein far from margin. **p. *var.* schumanniana**
25. Intramarginal vein close to margin. **w. *var.* maculata**
23. Inflorescence a fascicle or a (reduced) often branched, stout spike (or raceme).
26. Petiole 0 to 5 mm . . **r. *var.* orbicularis**
26. Petiole more than 5 mm.
27. Bracts and bracteoles caducous. New Hebrides. ***var.* aneityensis** (BRAND) NOOT.
27. Bracts persistent.
28. Reticulation fine, usually prominent on both under and upper surface. **u. *var.* sogeriensis**
28. Reticulation fine or coarse, usually only prominent on the undersurface.
29. Leaves usually less than 5(–8) cm long. **h. *var.* monticola**
29. Leaves usually more than 5 cm long.
30. Inflorescence axis glabrous. **q. *var.* floresana**
30. Inflorescence axis hairy.
31. Leaves obovate . . **i. *var.* insularis**
31. Leaves elliptic or circular. **g. *var.* leptophylla**
17. Calyx and/or ovary hairy.
32. Petiole 0 to 5 mm . . . **x. *var.* parvifolia**
32. Petiole more than 5 mm.
33. Ovary glabrous.
34. Disk glabrous. Twigs glabrous. Reticulation fine, usually prominent on both under and upper surface, calyx lobes to *c.* $^1/_2$ mm long . . . . . **u. *var.* sogeriensis**
34. Disk hairy.
35. Leaves usually less than 5(–8) cm long. **h. *var.* monticola**
35. Leaves usually more than 5 cm long.
36. Inflorescence axis glabrous. **k. *var.* doormanensis**
36. Inflorescence axis hairy. **g. *var.* leptophylla**
33. Ovary hairy.
37. Twigs hairy.
38. Calyx glabrous . . **g. *var.* leptophylla**
38. Calyx hairy.
39. Calyx symmetrically cleft. **n. *var.* pedicellata**
39. Calyx regular.
40. Leaves obovate . . . **i. *var.* insularis**
40. Leaves elliptic or circular. **g. *var.* leptophylla**
37. Twigs glabrous.
41. Calyx glabrous . . . **g. *var.* leptophylla**
41. Calyx hairy.
42. Inflorescence a very slender, often branched spike (or raceme) of 2–10 cm. **p. *var.* schumanniana**
42. Inflorescence a fascicle or a (reduced), often branched, stout spike (or raceme).
43. Calyx 2–4-lobed or symmetrically cleft, calyx lobes becoming longer by tearing . . . . . **n. *var.* pedicellata**
43. Calyx regularly 5-lobed.
44. Leaves obovate . . **i. *var.* insularis**
44. Leaves elliptic or circular. **g. *var.* leptophylla**

g. *var.* leptophylla. — *S. stawellii* F.v.M. *var. leptophylla* BRAND, Pfl. R. Heft 6 (1901) 37. — *S. leptophylla* TURRILL, J. Linn. Soc. Bot. 43 (1915) 30, *incl. f. compacta* TURRILL, *l.c.* 31. — *S. palmarum* BRAND, Bot. Jahrb. 54 (1916) 220. — *S. trifurceps* BRAND, Nova Guinea 14 (1924) 186. — *S. römeri* BRAND, *l.c.* — *S. aggregata* WHITE & FRANCIS, Proc. R. Soc. Queensl. 38 (1927) 256, t. 17. — *S. luteifolia* KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 487. — *S. turrilliana* A. C. SMITH, J. Arn. Arb. 33 (1952) 111. — Fig. 7.

Shrub 2–3 m to tree 20–28 m by 20–45 cm ⌀. Twigs glabrous or pubescent. *Leaves* glabrous or pubescent to finely appressedly pilose beneath, ± elliptic, with cuneate to cordate base, entire to dentate margin and acuminate apex, 5–23 by 2–12 cm; nerves 6–12 pairs, meeting in an intramarginal vein; petiole 5–25 mm. *Inflorescence* a fascicle or a reduced, branched spike, sometimes a spike or raceme to 5 cm, axis appressedly puberulous to pubescent or sericeous. Bracts and bracteoles persistent, with same indument, 1–10 and 1–4 mm long respectively. Pedicels 0–2 mm. *Flowers* ♂, ♀, or ☿. *Calyx* $^3/_4$–3 mm, either entirely divided into the hairy or glabrous lobes or not. *Corolla* 2–5 mm. *Stamens c.* 10 to more than 100, in ♀ flowers less than 20. Disk softly hairy. *Ovary* glabrous or pubescent to sericeous, 1–$2^1/_2$ mm high; style glabrous or with few hairs towards the base, small, without stigma in functionally ♂ flowers, with peltate stigma in ♀ and ☿ flowers. *Fruit* glabrous or sparsely pubescent, sessile in a fascicle or infructescence up to 5 cm or even more, ovoid to ellipsoid or ampulliform, often globose, 6–15 by 4–9 mm.

Distr. W. Polynesia (Fiji), Melanesia (Solomons and Santa Cruz Is.); in *Malesia:* Moluccas (Buru, Ambon, Ceram) and very common in New Guinea (incl. Jappen, Normanby, and Goodenough Is.) and the Bismarck Archipelago (New Britain, New Ireland).

Ecol. Very variable, rare in the lowland, mostly from 900–3360 m (Mt Otto), in the lauro-fagaceous forest, transition of conifer-*Castanopsis-Nothofagus* forest to grassland, mossy forest on ridge tops, in forest relicts of *Quercus-Dacrydium* forest (Arfak), once noted as a dominant on upper ridges, in association with *Podocarpus pilgeri* in New Britain, and in *Casuarina* forest there. *Fl.* Jan.–Aug., *fr.* Jan.–Dec. Flowers said to be fragrant. Fruit dark blue to purple black when mature.

Vern. New Guinea: *aibeh*, Minj, *arilth*, Nondugl, *kelekende*, Mt Ambua, *koka*, Telefomin, Nah lang., *guguma*, *konguma*, *kunguma*, Mt Hagen, Wankl lang., *lelicop*, Waria, *matala*, Mt Talawe, New Britain, *navako*, New Britain, *paiwiediedie*, Tari, Huli lang., *peiwadidi*, Mt Ne, Habono, *pungali*, Wabag, *tulifaro*, *ypap*, Enga lang., *toma*, Saidor, *utu-utu*, Cycloop Mt, Ormu lang., *wapi*, Sepik, Wagu lang.

h. *var.* **monticola** NOOT. Leid. Bot. Ser. 1 (1975) 166. — Fig. 7.

Shrub 2 m to tree to 16 m by 22 cm ø. Twigs glabrous. Leaves glabrous, ± elliptic, with cuneate base, entire or denticulate margin and acute or rounded apex, 2–8 by 1–3 cm; nerves 5–7 pairs, meeting in an intramarginal vein; petiole 4–10 mm. Spike to $1^1/_2$ cm long, axis glabrous or sparsely appressedly hairy. Bracts and bracteoles persistent, glabrous, 1–2 and 1–$1^1/_2$ mm long respectively. Flowers functionally unisexual or bisexual as in *var. leptophylla*. Calyx appressedly pubescent or puberulous to glabrous, usually divided into 1–$1^1/_2$ mm long, often purple-tinged lobes. Corolla 1–$2^1/_2$ mm. Stamens 15–35. Disk hairy. Ovary glabrous, 1–$1^1/_2$ mm high; style glabrous. Fruit ovoid to ellipsoid, 8–10 by 4–6 mm.

Distr. *Malesia:* East New Guinea.

Ecol. Substage tree in mossy forest and secondary forest with much climbing bamboo, 2700–3500 m. *Fl.* April–Sept., *fr.* July–Aug.

Vern. *Ped-ped*, Giluwe, Mendi lang.

i. *var.* **insularis** NOOT. Leid. Bot. Ser. 1 (1975) 167. — Fig. 7.

Tree up to 15 m by 25 cm ø. Twigs glabrous or appressedly pubescent. Leaves glabrous, mostly broadly ovate with attenuate base and acuminate apex, 10–25 by $5^1/_2$–15 cm; nerves 6–8 pairs; petiole 10–40 mm. Flowers not seen. Infructescence a fascicle or spike to $5^1/_2$ cm long; fruit sparsely pubescent, ovoid to globose, 8–13 mm long.

Distr. *Malesia:* East New Guinea (Louisiades: Sudest, Rossel & Misima Is.).

Ecol. Substage of rain-forest, along streambank, also on a summit where dwarfed to $1^1/_2$ m tall shrub; from the lowland to 800 m. *Fr.* July–Oct. Ripe fruits black.

j. *var.* **tomentosa** NOOT. Leid. Bot. Ser. 1 (1975) 167.

Tree to 20 m. Twigs and midrib tomentose beneath. Leaves mostly obovate, pubescent beneath, with cuneate base and rather abruptly acuminate apex, 18–23 by 10–12 cm; nerves 8–9 pairs; petiole 2–3 cm. Fascicle in the axils of the leaves or often beneath them, including the broadly boat-shaped 5 mm long bracts, the 3 mm long bracteoles and the calyx appressedly pubescent. Flowers unisexual or bisexual as in *var. leptophylla*. Calyx divided into 1–2 mm long lobes. Corolla 4–6 mm. Stamens 25 to more than 100. Disk softly pilose. Ovary pubescent, 1–2 mm high. Fruit not seen.

Distr. *Malesia:* East New Guinea (Fergusson I.).

Ecol. Montane rain-forest dominated by oaks, in the substage, 700–900 m. *Fl.* June. Flowers said to be very fragrant rose-scented.

k. *var.* **doormanensis** (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 168. — *S. doormanensis* BRAND, Nova Guinea 14 (1924) 187. — *S. dalmannensis* KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 487.

Shrub or small tree, $1^1/_2$ m. Twigs sparsely pilose to glabrous. Leaves glabrous, coriaceous, elliptic, with cuneate base, entire to glandular denticulate margin and not or faintly acuminate apex, 6–12 by $2^1/_2$–6 cm; nerves 5–10 pairs; petiole 7–10 mm. Fascicles in the axils of the leaves or on wood, including the 5 mm long broadly boat-shaped bracts and the 3–4 mm long bracteoles appressedly (long) pilose to pubescent; bracts and bracteoles persistent. Flowers unisexual or bisexual as in *var. leptophylla*. Calyx appressedly pilose to pubescent, 2–3 mm long, divided into the lobes. Corolla 4–5 mm. Stamens 30–50. Disk softly pilose. Ovary glabrous, $1^1/_2$–2 mm high; style glabrous. Fruit (immature) ellipsoid.

Distr. *Malesia:* New Guinea.

Ecol. Montane rain-forest, also in mossy forest, 1800–2700 m. *Fl.* Jan., *fr.* Oct.–Nov.

l. *var.* **longilobata** NOOT. Leid. Bot. Ser. 1 (1975) 169. — Fig. 7.

Shrub or small tree, $^1/_4$–8 m by 15 cm ø. Twigs sparsely appressedly fine-pilose, glabrescent. Leaves glabrous, elliptic (to orbicular) with rounded to more often cuneate base, crenulate margin and acute (to rounded) apex, 10–23 by 6–14 mm; nerves 2–4 pairs; petiole 2–3 mm. Flowers unisexual or bisexual, solitary or *c.* 3 in a condensed spike to 1 cm, axis pubescent. Bracts and bracteoles persistent, 3–5–6 together, narrowly triangular, 3–5 mm long. Calyx glabrous, $2^1/_2$–$4^1/_2$ mm long, the lobes (ovate to) triangular, ciliate, glandular, 2–4 mm. Corolla 3–4 mm. Stamens 14–24. Disk shortly pubescent. Ovary glabrous, 1–2 mm high, style glabrous, 2–4 mm. Fruits ovoid to ellipsoid, *c.* 10 by 6 mm, stone rather smooth.

Distr. *Malesia:* East New Guinea (Mt Wilhelm).

Ecol. Alpine shrubberies and forest edges, in subalpine tussock grassland, along creek in peaty grassland, a stiff, fastigiate, microphyllous race, in sterile exposed places often dwarfed, 3200–3400 m. *Fl.* June–July, *fr.* July. Ripe fruit blue-black.

m. *var.* **molobros** (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 169. — *S. molobros* BRAND, Bot. Jahrb. 54 (1916) 217. — Fig. 7.

Small shrub $^1/_2$–$1^1/_4$ m to slender tree, 4–6 m. Twigs densely (woolly) pilose. Leaves softly pilose beneath, (broadly) elliptic, with cuneate to rounded or even subcordate base, entire to glandular dentate margin and apex whether or not acuminate, 6–18 by $3^1/_2$–8 cm; nerves 7–11 pairs, meeting in a looped intramarginal vein; petiole 5–10 mm. Inflorescence a much reduced, branched, spike or a fascicle in the axils of the leaves or on wood, up to 2 cm long; axis rusty patently sericeous-pilose. Bracts and bracteoles persistent, rusty long pilose to appressedly sericeous, 2–4 and 1–3 mm respectively. Calyx appressedly rusty sericeous or long pubescent, divided into 1–2 mm long lobes. Corolla $2^1/_2$–5 mm. Stamens 20–60. Disk pilose. Ovary greyish sericeous, 1–2 mm high; style glabrous. Fruit ovoid to globose, 10–15 mm long, pubescent, becoming glabrous.

Distr. *Malesia:* New Guinea.

Ecol. Substage treelet in montane rain-forest, on sandy clay, on limestone or sandstone ridges, 700–2200 m. *Fl.* April–Nov., *fr.* Sept.

Vern. *Chandujant*, Wabag, Enga lang.

n. *var.* **pedicellata** NOOT. Leid. Bot. Ser. 1 (1975) 170. — Fig. 7.

Shrub 2–$4^1/_2$ m to slender tree 8–16 m. Twigs glabrous. Leaves glabrous, stiff, ± elliptic, with

cuneate to rounded base and (abruptly) acuminate apex, 5–11 by $2^1/_2$–6 cm; nerves 6–10 pairs; petiole 5–16 mm. Raceme up to 4 cm; axis sparsely appressedly puberulous as the persistent 1–2 mm long bracts and the 1–3 mm long pedicel. Calyx appressedly puberulous, *c.* 2 mm long, wholly symmetrically cleft. Corolla 3–4 mm. Stamens *c.* 40 in ♂ flowers, *c.* 10 in ♀ flowers. Disk softly pilose. Ovary appressedly puberulous, 2 mm high; style *c.* 3 mm, with conical pubescent base. Fruit ovoid to ampulliform, 10–15 by 7–9 mm. Seed strongly ruminate, embryo probably curved.

Distr. *Malesia:* East New Guinea.

Ecol. Substage of mossy forest and subalpine forest dominated by *Nothofagus-Weinmannia* or conifers (*Araucaria*, *Podocarpus*, *Papuacedrus*), sometimes abundant on ridges, also on limestone, 2100–2900 m. *Fl.* (Jan.) April–Oct., *fr.* June.

Vern. *Ypap*, Wabag, Enga lang., *keh*, *kepilam*, Enga lang.

o. *var.* **reginae** (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 171. — *S. reginae* BRAND, Bot. Jahrb. 54 (1916) 214. — Fig. 7.

Shrub 1–2 m to small tree to 10 m by 10 cm ∅. Twigs densely short and long pilose, only long-pilose, or woolly to tomentose; growth discontinuous. Leaves pubescent beneath, especially on the nerves, elliptic, with acuminate to rounded base, entire to glandular denticulate margin and acuminate apex, $1^1/_2$–11 by $^3/_4$–$6^1/_2$ cm; nerves 4–8 pairs; petiole 2–10 mm. Flowers solitary or few together in the axils of the leaves or below them, or on the apical part of an up to 3(–7) cm long spike; axis patently pilose. Bracts and bracteoles persistent, appressedly pilose, 2–4 mm and 1–2 mm respectively. Calyx appressedly pilose, divided into 1–$1^1/_2$ mm long lobes. Corolla 2–3 mm. Stamens 10–25. Disk pilose. Ovary appressedly pilose, $^3/_4$–2 mm high; style glabrous or with pilose base. Fruit ovoid, pubescent, 9–15 by 7–8 mm. Seed 1–2, curved towards the base.

Distr. *Malesia:* New Guinea.

Ecol. Oak and beech forest, also on ridges, and in river gorge, 900–2000 m. *Fl.* June–Aug., *fr.* Jan.–Oct. Fruit from cream through purple to purplish-blue when ripe.

Vern. *Dorso*, Kassam Pass, Kainantu, *mongutl*, Hagen, *harkomerinkey*, Okapa, *mamele*, Morobe, Wagau.

p. *var.* **schumanniana** (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 171. — *S. rhynchocarpa* K.SCH. *ex* BRAND in K.Sch. & Laut. Nachtr. (1905) 347; Bot. Jahrb. 54 (1916) 223. — *S. schumanniana* BRAND, *l.c.* 347 *et* 224. — *S. schlechteri* BRAND, *l.c.* 348 *et* 224. — *S. rupestris* BRAND, Bot. Jahrb. 54 (1916) 220. — *S. myrmecophila* SCHLTR *ex* BRAND, *l.c.* 224. — *S. pusilliflora* S. MOORE, Trans. Linn. Soc. II, Bot. 9 (1916) 107. — *S. cyclops* BRAND, Nova Guinea 14 (1924) 188. — *S. lamii* BRAND, *l.c.* — Fig. 7.

Shrub 2 m to tree 10–18 m by 12–37 cm ∅. Twigs sometimes very thick, glabrous, sometimes innovations appressedly pubescent, often the branches thickened in some places, hollow, lodging ants. Leaves ± elliptic, glabrous, with cuneate base, ± entire margin and acuminate apex, 9–33 by $3^1/_2$–14 cm; nerves 8–15 pairs, meeting in intramarginal vein far from the margin; petiole 5–22 mm. Inflorescence a slender spike (or rarely a raceme) to 6 cm, often branched towards the base, rarely for its whole length; axis pubescent or puberulous to glabrous. Bracts and bracteoles mostly persistent, rarely caducous, pubescent or puberulous, 1–$2^1/_2$ mm and $^1/_2$–$1^1/_2$ mm long respectively. Pedicel if present at most 1 mm. Calyx glabrous or puberulous, entirely divided into *c.* $^1/_2$ mm long lobes, or $1^1/_2$ mm long and then the lobes *c.* 1 mm. Corolla $1^1/_2$–5 mm. Stamens 10–30 in ♀ and ☿ flowers, 30–80 in ♂ and ☿ flowers. Disk pilose. Ovary glabrous or puberulous, 1–$1^1/_2$ mm high; style glabrous or with some hairs towards the base. Fruit ampulliform, 5–6 by 3–4 mm, sometimes with rather long neck; stone ampulliform, rather smooth. Seed 1, curved, U-shaped with U-shaped embryo.

Distr. *Malesia:* Moluccas (Morotai), New Guinea, New Ireland, and New Britain.

Ecol. In high lowland rain-forest, sometimes with climbing bamboo, montane rain-forest on ridges, also on sandy clay, in *Nothofagus* dominated rain-forest on peaty soil, in New Britain also on limestone, from sea-level to 2100(–2820) m. *Fl.* Jan.–Dec., *fr.* July–Nov. Flowers are said to be faintly fragrant. Fruits turn from green through red to bluish when mature.

Vern. Moluccas: *reha*, Morotai; New Guinea: *pai*, Wandammen, *tembek*, Telefomin.

q. *var.* **floresana** NOOT. Leid. Bot. Ser. 1 (1975) 172. — Fig. 7.

Small, glabrous tree, up to 7 m by 15 cm ∅. Leaves (broadly) elliptic with cuneate to rounded base and not or slightly acuminate apex, 9–16 by 5–10 cm; nerves 7–12 pairs, meeting in an intramarginal vein; petiole stout, $2^1/_2$–$4^1/_2$ cm. Spike basally branched, to 7 cm, axis glabrous. Bracts and bracteoles persistent, glabrous or appressedly pubescent, often ciliate. Calyx glabrous, divided into *c.* 1 mm long lobes. Corolla 3–4 mm. Stamens 25–35. Disk glabrous. Ovary glabrous, $^1/_2$–$^3/_4$ mm high; style glabrous. Fruit *c.* ovoid, 5–6 by 4–5 mm.

Distr. *Malesia:* Lesser Sunda Is. (Flores).

Ecol. Montane rain-forest, 1000–1500 m. *Fl.* May–July, *fr.* April. Ripe fruit blue.

r. *var.* **orbicularis** (HEMSL.) NOOT. Leid. Bot. Ser. 1 (1975) 173. — *S. orbicularis* HEMSL. Kew Bull. (1899) 105. — *S. englishii* HEMSL. *l.c.* — *S. klossii* S. MOORE, Trans. Linn. Soc. II, Bot. 9 (1916) 108. — Fig. 7.

Stiff, often compact, microphyllous treelet, with densely foliaged twigs and patent, brittle, thick (living ± fleshy) leaves; 20–50 cm to 3–10 m by 35 cm ∅. Twigs glabrous or hairy. Leaves glabrous, orbicular to elliptic, with cuneate to rounded or slightly cordate base, dentate to denticulate margin and rounded or acute apex, $^1/_2$–3(–$3^1/_2$) by $^1/_2$–2 cm; nerves 2–7 pairs; petiole 1–3 mm. Flowers solitary or in a spike to 4 cm; bracts 1–3 mm, several when flowers solitary, or 1. Bracteoles mostly persistent, glabrous or hairy, $^1/_2$–3 mm long. Calyx glabrous, entirely divided into 1–$1^3/_4$ mm long lobes or a tube of $^1/_2$–1 mm present. Corolla $2^1/_2$–4(–6) mm. Stamens from less than 10 in ♀ flowers to 25 in ♂ and ☿ flowers. Disk glabrous. Ovary glabrous, ($^1/_2$–)1–2 mm high. Fruit ellipsoid, 7–15 by 4–6 mm.

Distr. *Malesia:* New Guinea.

Ecol. Subalpine grassland shrubberies (often ericoid), sparse ridge top scrub, in moss-mounds in ridge thickets, associated with *Eurya*, *Dimorphanthera*, *Drimys*, on creviced faces and ridges of sandstone, also in subalpine moss forest, bank of a mountain torrent, still recorded as a tree of 10 m at 3300 m, 2500–3800 m, in Arfak as low as 1900 m. *Fl.* June–Aug., *fr.* June–Sept.

Vern. *Dibenkur*, Chimbu, *pombor*, Giluwe, Mendi lang.

s. *var.* ovata NOOT. Leid. Bot. Ser. 1 (1975) 173. — Fig. 7.

Shrub $^3/_4$–4 m to tree 12–21 m by 15 cm ⌀. Twigs appressedly sericeous to pubescent or tomentose, glabrescent, rarely glabrous. Leaves appressedly thin-hairy underneath, ovate to elliptic, with cuneate to cordate base and acuminate apex, 4–12 by 2–7 cm; nerves 5–10 pairs; petiole 5–20 mm. Spike basally branched, axis finely pubescent to tomentose. Bracts and bracteoles persistent, with same indument as axis or less hairy, 1–3 and 1–2 mm long respectively. Calyx glabrous but ciliate, or appressedly fine-hairy, divided into $^1/_2$–$1^1/_2$(–2) mm long lobes. Corolla 2–3(–4) mm. Stamens 8–25. Disk glabrous. Ovary glabrous or sparsely appressedly fine-hairy, 1–$1^1/_2$(–2) mm high; style glabrous. Fruit ellipsoid to ovoid, 5–10 by 3–8 mm; stone ovoid, rather smooth. Seeds 1–2, ruminate, fitting into the grooves of the stone.

Distr. *Malesia:* East New Guinea, very common.

Ecol. Substage tree in tall mossy montane forest, in association with *Phyllocladus*, in alpine shrubberies, sometimes fire-induced, on margin of bog grasslands, 1900–3700 m. *Fl.* Jan.–Dec., *fr.* July–Jan. Flowers are said to have a slightly fetid fragrance.

Vern. *Bolbeh*, Chimbu, Masul, *gongigl*, *miluad*, Chimbu, *holai*, Asaro, Kefamo, *iamuga*, Minj, Togoba, *kumbag*, Togoba, *kungum*, Poio, Enga lang., *kunguma*, Goroka, Togoba, *ontkumanip*, Wahgi, Minj, *paiwadedie*, Mt Ne, Huli lang., *paiweriedie*, Margarima R., Huli lang., *pohn*, Hagen, Togoba, *uinyambangau*, Kubor, Minj, *wanépape*, Sirunki, *winjabunggawont*, Minj, *mara*, *ypap*, Wabag, Enga lang.

t. *var.* revoluta NOOT. Leid. Bot. Ser. 1 (1975) 174. — Fig. 7.

Shrub 1–3 m to tree 10 m. Twigs appressedly pubescent to villous or tomentose. Leaves appressedly sericeous to pubescent or tomentose beneath, especially on midrib and nerves, glabrescent, ovate to elliptic, with cuneate to cordate base, strongly revolute or recurved margin and rounded to acuminate apex, (2$^1/_2$–)4–10 by (1–)2$^1/_2$–6 cm; nerves (4–)7–10 pairs; petiole (2–)10–15 mm. Spike basally branched, to 3 cm, becoming much longer in fruit, axis densely pubescent to villous or tomentose; bracts often broadly boat-shaped, 3–4 mm. Bracteoles 2 mm, both persistent, appressedly long pubescent to villous. Calyx with same indument, (nearly) entirely divided into 1–2 mm long lobes. Corolla 2–4(–5) mm. Stamens 10–60. Disk glabrous, with few hairs, or densely pilose. Ovary with same indument as calyx, 1–2 mm high. Style glabrous. Fruit ovoid to ellipsoid, 10–11 by 6–7 mm. Seed more or less curved towards the base, embryo from nearly straight to U-shaped.

Distr. *Malesia:* New Guinea.

Ecol. Mossy forest, alpine shrubberies, on ridges and in valleys, constituent of subalpine forest of *Xanthomyrtus*, *Papuacedrus*, *Quintinia*, and *Ericaceae*, sometimes on peaty soil, 2200–3600 m. *Fl.* Febr.–Aug., *fr.* July–Dec. Ripe fruit purple blue.

Vern. *Bug-bakl*, Minj.

u. *var.* sogeriensis (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 175. — *S. sogeriensis* BRAND, Pfl. R. Heft 6 (1901) 49. — *S. angiensis* KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 485. — Fig. 7.

Shrub 2–5 m to tree 22 m by 25 cm ⌀. Twigs glabrous (or appressedly pilose in innovations). Leaves glabrous, ovate or elliptic, with cuneate to rounded base, mostly crenate margin and rounded to faintly acuminate apex, 2$^1/_2$–11 by $1^1/_2$–7 cm; nerves 5–9 pairs; petiole 5–20 mm. Spike basally branched to *c.* 3 cm, axis glabrous or appressedly pilose. Bracts and bracteoles persistent, glabrous or appressedly pilose, $^1/_2$–$1^1/_2$ and $^1/_2$–1 mm long respectively. Calyx glabrous, or lobes shortly pilose towards the apex, $^1/_2$–$1^1/_4$ mm, lobes $^1/_2$ mm long. Corolla 2–3 mm. Stamens less than 10 in ♀ flowers, to 30 in ♂ flowers. Disk glabrous (or with few hairs). Ovary glabrous, $^1/_2$–$1^1/_2$ mm high; style glabrous. Fruit (ovoid to) ellipsoid, 5–9 by 3–5 mm; stone shallowly lengthwise or irregularly grooved.

Distr. *Malesia:* New Guinea.

Ecol. Montane to subalpine rain-forest and subalpine scrubberies, in stunted *Nothofagus-Myrtaceae* mossy forest, or forest dominated by *Castanopsis* or by *Podocarpus-Papuacedrus*, scattered in subalpine grasslands, on Mt Wilhelmina even at 3560 m in sheltered places still a constituent of 8–10 m high stunted forest; (1950–) 2100–3560 m. *Fl.* Sept.–April, *fr.* Jan.–Nov. Fruit turns bluish black when mature. Underside of leaves has sometimes globular, pea-sized galls.

v. *var.* versteegii (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 176. — *S. versteegii* BRAND, Nova Guinea 14 (1924) 188.

Shrub or treelet to 5 m. Twigs densely tomentose or pilose. Leaves elliptic, except the tomentose or pilose midrib and nerves glabrous, or the whole surface covered by a cobweb-like or a long-pilose indument, base cuneate, apex not or slightly acuminate to mucronate-caudate, 10–16 by 4–6$^1/_2$ cm; nerves 6–14 pairs; petiole 6–18 mm. Fascicles in the axils of the upper leaves or on wood. Bracts and bracteoles persistent, appressedly long pubescent or sericeous, 4–5 and 2–3 mm long respectively. Calyx with same indument, divided into 2–3 mm long lobes. Corolla *c.* 5 mm. Stamens *c.* 50. Disk pilose. Ovary glabrous, 1–2 mm high; style glabrous. Fruit not seen.

Distr. *Malesia:* New Guinea.

Ecol. Rain-forest, 100 and 1300 m. *Fl.* Febr., June–July.

w. *var.* maculata (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 176. — *S. maculata* BRAND in K.Sch. & Laut. Nachtr. (1905) 348; Bot. Jahrb. 54 (1916) 222. — *S. margarita* BRAND, Bot. Jahrb. 54 (1916) 215. — *S. pisifera* BRAND, *l.c.* 216, *incl. var. miophylla* BRAND. — *S. ensicuspis* BRAND, *l.c.* 219.

— *S. arfakensis* GIBBS, Arfak (1917) 175. — *S. morobeensis* SLEUM. in Fedde, Rep. 42 (1937) 265. — **Fig. 7.**

Shrub 1–2 m to small or moderate tree up to 15 m by 25 cm ⌀. Twigs glabrous. Leaves glabrous, ± elliptic with cuneate, decurrent base, mostly entire margin and acuminate apex, 2–13 by $1^1/_4$–4 cm; nerves 4–10 pairs; petiole 3–15 mm. Spike very slender, often branched, 2–10 cm, axis pubescent or puberulous to glabrous. Bracts caducous or persistent, 1–$1^1/_4$ mm long, with the *c.* $^3/_4$ mm long bracteoles pubescent or puberulous to glabrous. Calyx glabrous, divided into $^1/_4$–1 mm long ciliate lobes. Corolla 2–4 mm. Stamens from less than 10 and sterile in ♀ flowers to 25 in ♂ flowers. Disk pilose. Ovary glabrous, $^1/_2$–$1^1/_4$ mm high; style glabrous. Fruit ovoid to ampulliform, 4–6 by 3–4 mm.

Distr. *Malesia:* New Guinea (incl. Sudest, Misima & Rossel Is.); common in New Guinea.

Ecol. Both in the lowland rain-forest at 150–300 m (Louisiades) as well as in montane rain-forest at 1600–2800 m, where associated with *Nothofagus*, *Araucaria* and *Castanopsis*, on narrow crests sometimes said to be abundant, also in secondary forests. *Fl.* Aug.–Jan. (June), *fr.* Aug.–Jan. Ripe fruit blue-black.

Vern. *Comogu*, Mendi, *kunguma*, Minj, Togoba, *mokgeh*, Hagen, Togoba lang., *ouksanok*, Telefomin.

x. *var.* parvifolia NOOT. Leid. Bot. Ser. 1 (1975) 177. — **Fig. 7.**

Shrub $1^1/_2$–4 m to tree up to 10 m, often bushy and much-branched. Twigs (appressedly) pubescent or puberulous. Leaves glabrous, ± elliptic, with cuneate, attenuate base, denticulate or dentate margin and acute or acuminate apex, $1^1/_4$–4 by $^3/_4$–$1^3/_4$ cm; nerves 5–7 pairs; petiole 2–4 mm. Spike small, few-flowered, to 1 cm, axis puberulous. Bracts and bracteoles persistent, puberulous, 1–2 and $^1/_2$–1 mm long respectively. Calyx appressedly puberulous, divided into *c.* 1 mm long lobes. Corolla 2–$2^1/_2$ mm. Stamens *c.* 10 in ♀ flowers to 25 in ♂ flowers. Disk densely soft hairy. Ovary glabrous or appressedly puberulous, 1–$1^1/_2$ mm high; style glabrous or hairy towards the base. Fruit ovoid to ellipsoid, 7–10 by *c.* 4 mm.

Distr. *Malesia:* East New Guinea.

Ecol. Understorey treelet in lower montane to subalpine rain-forest dominated by *Nothofagus* and conifers (*Podocarpus* and *Papuacedrus*), often mossy, also on forest edges, 1850–3300 m. *Fl.* June–Oct., *fr.* Aug.

Uses. Flush is sometimes eaten as vegetable.

Vern. *Gili*, Ebenda, Mendi lang.

17. Symplocos colombonensis NOOT. Leid. Bot. Ser. 1 (1975) 177. — **Fig. 7, 14a–c.**

Small tree to 10 m. Twigs appressed-pubescent, dark brown. *Leaves* alternate, sparsely appressedly pilose beneath, especially on the margin, ovate, with cuneate to rounded base often revolute margin and acuminate apex, 4–9 by $1^1/_2$–$3^1/_3$ cm; nerves 7–11 pairs; petiole 3–4 mm. *Raceme c.* 3-flowered, to 3 cm long, axis finely appressedly pubescent. Bracts and bracteoles soon caducous, pubescent. Pedicel 1–5 mm. *Calyx* appressedly brown-pilose, $1^3/_4$–3 mm, lobes triangular, $1^1/_2$–$2^1/_2$ mm. *Corolla* glabrous, or thinly red-hairy on the outside in bud, *c.* 5 mm. *Stamens c.* 90 or more. Disk glabrous or with some hairs. *Ovary* appressedly brown-pilose, $1^1/_2$–2 mm high; style glabrous, 4–5 mm. *Fruit* (obliquely) ovoid to ellipsoid, 10–14 by 6 mm; stone except the apical 2–3 mm brain-like grooved. *Seed* not seen, but embryo probably straight.

Distr. *Malesia:* Borneo (Mt Kinabalu).

Ecol. Mountain forest, 2100–2800 m. *Fl.* Febr.–March, June–July, *fr.* July, Dec.

Note. Resembles *S. zizyphoides*, but a tree with less zigzag twigs, larger leaves with longer acuminate apex, and with calyx lobes longer in proportion to the tube.

18. Symplocos composiracemosa NOOT. Leid. Bot. Ser. 1 (1975) 178.

Twigs glabrous. *Leaves* glabrous, elliptic, with cuneate, acute base, entire or slightly undulate margin and acuminate apex, 8–$13^1/_2$ by $2^1/_2$–7 cm; nerves 5–9 pairs, meeting in a looped intramarginal vein; petiole 13–15 mm. *Raceme* compound, to 5 cm; axis sparsely minutely pilose. Bracts and bracteoles persistent, with same indument, 1 and $^1/_2$ mm long respectively. Pedicels at most 1 mm. *Calyx* glabrous, divided into the rounded, semi-

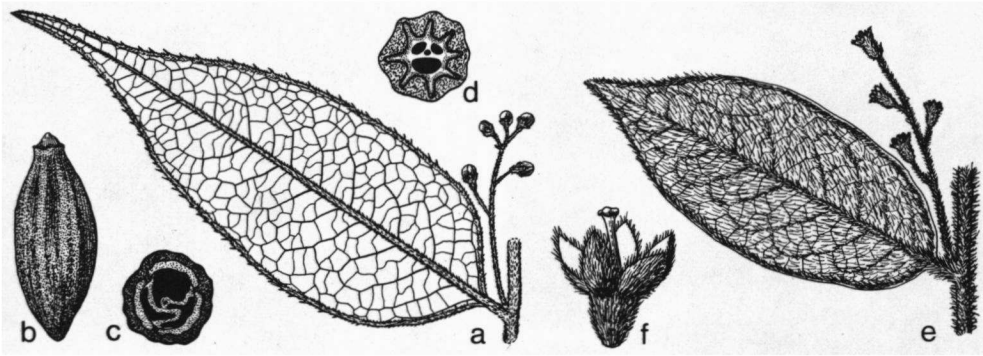

Fig. 14. *Symplocos colombonensis* NOOT. a. Habit, nat. size, b. fruit, c. CS of fruit, both × 3. — *S. costata* (BL.) CHOISY. d. CS of fruit, nat. size. — *S. deflexa* STAPF. e. Habit, nat. size, f. deflorated flower, × 4 (*a–c* CLEMENS 33706, *d* KOORDERS 10996, *e–f* NOOTEBOOM 1489).

elliptic, recurved, ½–1 mm long lobes. *Corolla* c. 2 mm. *Stamens* 15–25, rather stiff. Disk glabrous. *Ovary* glabrous, c. 1 mm high; style glabrous, 1 mm. Immature *fruit* elliptic.

Distr. *Malesia:* East New Guinea (Morobe Distr.).

Ecol. Slender substage tree, 1300–1800 m, once mentioned in understorey of *Nothofagus* dominated ridge. *Fl.* Aug., Nov.

19. Symplocos costata (BL.) CHOISY in Zoll. Syst. Verz. 2 (1854) 136; MIQ. Fl. Ind. Bat. 1, 2 (1859) 467; K. & V. Bijdr. 7 (1900) 153; BRAND, Pfl. R. Heft 6 (1901) 52; KOORD. Atlas 2 (1914) t. 380; BACK. & BAKH. *f.* Fl. Java 2 (1965) 206; NOOT. Leid. Bot. Ser. 1 (1975) 179, pl. 8a–d, phot. 1–2. — *Dicalyx costatus* BL. Bijdr. (1826) 1117. — *S. cerasifolia* (*non* WALL. *ex* DC.) CHOISY in Zoll. Syst. Verz. 2 (1854) 136; MIQ. Fl. Ind. Bat. 1, 2 (1859) 466, *pro stirp. Zoll.* — *S. caryophylloides* ZOLL. (Syst. Verz. 2, 1854, 136, *nomen*) Nat. Tijd. N. I. 14 (1857) 161; MIQ. Fl. Ind. Bat. 1, 2 (1859) 467. — *Eugeniodes costatum* O. K. Rev. Gen. Pl. 2 (1891) 975. — *S. arcuata* BRAND, Pfl. R. Heft 6 (1901) 58. — *S. sericea* BRAND, *l.c.* 58; Bull. Herb. Boiss. II, 6 (1906) 748. — **Fig. 7, 14d, 15, 16.**

Tree to 20 m, 40 cm ∅. Twigs glabrous, often with cushion-shaped conspicuous leaf-scars, terminal buds with many scales, 5–10 mm long. *Leaves* glabrous, narrowly ovate to elliptic, with cuneate, acute base, slightly dentate, nearly entire margin and acuminate apex, 6–21 by 2–7 cm; nerves (8–)10–13(–14) pairs; petiole 10–25 mm. *Spike* from the axils of the leaves or on wood, in bud resembling a cone like in *S. barringtoniifolia*, becoming at most 4 cm long, axis tomentose to pubescent. Bracts and bracteoles densely sericeous to pubescent, broadly boat-shaped, 5–8 mm long, soon caducous, and 2–3 mm long, later caducous respectively. *Calyx* glabrous, entirely divided into (narrowly) ovate to triangular, 2½–3 mm long lobes. *Corolla* 3–5 mm. *Stamens* 60 to more than 100. Disk shortly pilose. *Ovary* glabrous, c. ½ mm high; style glabrous except sometimes the very base, 3–6 mm long. *Fruit* ellipsoid to cylindrical, often slightly curved, azure blue, 20–40 by 8–20 mm; mesocarp thick, corky, stone with c. 8 high ridges, 3-celled with a central canal, often only 1 cell developed. *Seed* cylindrical; embryo straight.

Distr. *Malesia:* West & Central Java (E as far as G. Telemojo). Fig. 17.

Ecol. High mountain forest, 900–2000 m, scattered. *Fl.* Aug.–Nov., *fr.* Aug.–March.

Vern. *Ki glĕdog* (Tjibodas), *ki tĕlor*, *ki tomkil*, S.

20. Symplocos crassipes CLARKE, Fl. Br. Ind. 3 (1882) 580; BRAND, Pfl. R. Heft 6 (1901) 52; K. & G. J. As. Soc. Beng. 74, ii (1906) 245; RIDL. Fl. Mal. Pen. 2 (1923) 305; NOOT. Leid. Bot. Ser. 1 (1975) 180, pl. 9–10.

For synonyms see under the varieties.

Shrub or small tree to 18 m. Twigs glabrous, or

Fig. 15. *Symplocos costata* (BL.) CHOISY. Left a tree at Tjibodas Botanic Garden, West Java, 1450 m; right a twig in bud (NOOTEBOOM 885). Photogr. NOOTEBOOM, Febr. 1969.

Fig. 16. *Symplocos costata* (BL.) CHOISY. Close-up of flowers in anthesis (NOOTEBOOM 885). Photogr. NOOTEBOOM, Febr. 1969.

(obliquely) pubescent to appressedly or spreadingly long-hairy, sometimes with a double indument of a short tomentum and long spreading hairs. *Leaves* (narrowly) elliptic to ovate, beneath sparsely appressedly pilose, nearly glabrous, to densely appressedly to spreadingly long-hairy, rarely also hairy above, with cordate to cuneate base, recurved, entire to glandular denticulate margin and acuminate apex, 6–27 by $1^1/_4$–$8^1/_2$ cm; nerves 3–11 pairs; petiole 1–10 mm. *Spike* short, often clustered, to 1(–2) cm, from the axils of the upper leaves, rarely flowers solitary, axis subglabrous to appressedly pubescent, or with long, spreading to appressed, stiff, brown to rusty hairs 1–4 mm long. Bracts and bracteoles persistent, (broadly) ovate, triangular or semi-elliptic, rarely acuminate, hairy. *Calyx* hairy or glabrous, whether or not entirely divided into the lobes. *Corolla* $2^1/_2$–6 mm. *Stamens* *c.* 30 to *c.* 100. Disk glabrous. *Ovary* hairy, 1–2 mm high; style glabrous, but often with conical, hairy base. *Fruits* mostly 1–2 from each inflorescence, glabrous or sparsely long-hairy, bright blue in vivo, cylindrical, narrowed towards the apex, 13–18 by 3–5 mm; stone with *c.* 12 lengthwise grooves; cells 1–3. *Seed* usually 1, straight with straight embryo.

Distr. Continental Asia (Peninsular Thailand), in *Malesia:* Malay Peninsula (incl. Penang) and Borneo.

KEY TO THE VARIETIES

1. Leaves ovate, to 6 cm long and $2^3/_4$ cm wide; nerves 3–6 pairs. Flowers solitary. **e. *var.* havilandii**
1. Leaves (narrowly) ovate to elliptic, $5^1/_2$–27 by 2–$8^1/_2$ cm; nerves 3–11 pairs.
2. Leaf-base cordate, base angle 90–180°.
3. Leaves $5^1/_2$–14 cm long. Petiole 1–2 mm **b. *var.* brandiana**
3. Leaves 16–18 cm long. Petiole *c.* 5 mm. **a. *var.* crassipes**
2. Leaf-base not cordate. Base angle 25–90°.
4. Leaves sparsely appressedly pilose beneath, but the indument inconspicuous and leaves seemingly glabrous.
5. Twigs glabrous, rarely appressed-pubescent. Calyx often glabrous or nearly so, rarely appressed-pubescent. Style-base glabrous, rarely pilose . . . . . **c. *var.* curtisii**
5. Twigs appressed-long-hairy, rarely glabrous. Calyx appressed-pubescent. Style-base pilose. **d. *var.* ernae**
4. Leaves densely appressed-hairy to sparsely more or less appressed-long-hairy beneath, indument always evident.
6. Twigs densely patently brown hairy (hairs often *c.* 2 mm). Leaves sparsely (appressedly) long-hairy beneath. Nerves 6–11 pairs. **f. *var.* penangiana**
6. Twigs densely obliquely pubescent. Leaves densely appressed-pilose beneath. Nerves 4–6 pairs . . . . **g. *var.* rufomarginata**

a. *var.* crassipes.

Twigs sparsely appressedly long-hairy. Leaves sparsely appressed-pilose beneath, the hairs inconspicuous, elliptic, with cordate base and acuminate apex, 16–18 by 6–8 cm; nerves *c.* 10 pairs; petiole much swollen, 5 mm. Inflorescence and flowers as in *var. brandiana* (*sec.* CLARKE).

Distr. *Malesia:* Malay Peninsula (Johore), only known from the type.

b. *var.* brandiana (K. & G.) NOOT. Leid. Bot. Ser. 1 (1975) 182. — *S. brandiana* KING & GAMBLE, J. As. Soc. Beng. 74, ii (1906) 245.

Small tree, 3–8 m. Twigs patently dark brown pubescent to tomentose and long-hairy. Leaves (appressedly) long-hairy beneath, but midrib and nerves patently hairy, with cordate base, $5^1/_2$–14 by $1^3/_4$–5 cm; nerves 6–10 pairs; petiole 1–2 mm. Spike often on a reduced twig with many cataphylls. Bracts and bracteoles narrowly ovate, appressedly long-hairy, 3–8 mm. Calyx divided into ovate, acuminate, appressedly brown hairy, $2^1/_2$–3 mm long lobes. Stamens 60 or more. Style with hairy conical base, 4 mm. Fruit hairy.

Distr. *Malesia:* Malay Peninsula.

Ecol. Mixed forests, 100–1500 m.

c. *var.* curtisii (OLIV.) NOOT. Leid. Bot. Ser. 1 (1975) 183, pl. 9b–c. — *S. curtisii* OLIV. in Hook. Ic. Pl. 18 (1888) t. 1757. — *S. monticola* KING & GAMBLE, J. As. Soc. Beng. 74, ii (1906) 235; RIDL. Fl. Mal. Pen. 2 (1923) 301. — Fig. 7.

Treelet or shrub to 10 m, 35 cm ∅. Twigs glabrous or rarely appressed-pubescent. Leaves usually sparsely appressedly pilose, nearly glabrous beneath, with cuneate, slightly attenuate base, $8^1/_2$–18 by 3–$8^1/_2$ cm; nerves 4–9 pairs; petiole 3–7 mm. Spike contracted, often branched, axis glabrous to appressedly pubescent. Bracts and bracteoles ovate to triangular, appressedly pubescent, 1–$1^1/_2$ and *c.* 1 mm long respectively. Calyx

glabrous or nearly so, rarely appressedly pubescent, 1½–2 mm, the lobes ½–1½ mm, becoming longer by tearing apart when older. Corolla 3½–4 mm. Disk glabrous. Ovary appressedly pubescent, often narrowly funnel-shaped, 1½–2 mm high; style glabrous, the base glabrous or pilose. Fruit glabrous, deep blue.

Distr. Continental Asia (Peninsular Thailand), in *Malesia:* Malay Peninsula (Johore, Selangor).

Ecol. Hill rain-forest, 200–1400 m. *Fl.* Aug.–Jan., *fr.* Febr.–May, Oct., flowers scented.

Vern. Malaya: *kayu jenerku*, Selangor: Temuan.

d. *var.* ernae (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 184, pl. 10b. — *S. ernae* BRAND, Pfl. R. Heft 6 (1901) 58; MERR. En. Born. (1921) 486. — **Fig. 7.**

Shrub or slender tree to 18 m, 15 cm ⌀. Twigs appressedly (long-)hairy, rarely glabrous. Leaves sparsely appressedly pilose, nearly glabrous beneath, with cuneate base, 6–15(–18) by 2½–6 (–7) cm; nerves 3–6 pairs; petiole 3–5 mm. Spike basally branched, contracted, axis appressedly pubescent. Bracts and bracteoles broadly ovate, often boat-shaped, appressedly pubescent, *c.* 1 mm long. Calyx appressedly pubescent, 1¼–2 mm long, lobes 1–1½ mm, often becoming longer in older stage. Corolla 3–5 mm. Stamens *c.* 30 to *c.* 70. Disk glabrous. Ovary appressedly pubescent, 1–1½ mm high; style glabrous. Fruit glabrous.

Distr. *Malesia:* Borneo (Sarawak, Brunei, Sabah; also in W. Kutei: G. Kemul).

Ecol. Lowland mixed Dipterocarp forest, also in a swamp forest, and in hill rain-forest on sandy clay, from sea-level to 1500 m. *Fl.* Sept.–Oct., Febr.–June, *fr.* July, Nov.

e. var. havilandii (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 184, pl. 10c. — *S. havilandii* BRAND, Pfl. R. Heft 6 (1901) 41; MERR. En. Born. (1921) 486.

Treelet. Twigs pubescent. Leaves ovate, rather densely appressed-pilose, especially on midrib and nerves and along the margin, with rounded base, 2¾–6 by 1¼–2¾ cm; nerves 3–6 pairs; petiole 2–3 mm. Flowers solitary, sessile from the axils of the leaves. Bracts and bracteoles appressedly (long-) pubescent, semi-orbicular 2 mm long and ovate 1½ mm long respectively. Calyx appressedly pubescent, 2 mm, the lobes 1½ mm long. Corolla 2½ mm. Stamens *c.* 35. Disk glabrous. Ovary appressedly pubescent, *c.* 1 mm high; style with pilose base. Fruit pale blue.

Distr. *Malesia:* Borneo (Sarawak).

Ecol. Hill rain-forest, 600–900 m. *Fl. fr.* July.

f. *var.* penangiana (K. & G.) NOOT. Leid. Bot. Ser. 1 (1975) 185, pl. 9d. — *S. penangiana* KING & GAMBLE, J. As. Soc. Beng. 74, ii (1906) 245; RIDL. Fl. Mal. Pen. 2 (1923) 306. — **Fig. 7.**

Shrub or treelet to 10 m. Twigs densely patently dark brown hairy. Leaves narrowly elliptic, sparsely (appressedly) long-hairy beneath, especially on midrib and nerves, rarely also long-hairy above, with rounded to acute base, 6–27 by 2½–8 cm, margin often sharply glandular dentate, appressedly long-hairy beneath; nerves 6–11 pairs; petiole 2–10 mm. Spike contracted, branched, axis densely more or less appressedly villous, hairs 1–4 mm. Bracts and bracteoles appressedly dark brown long-hairy, narrowly elliptic to ovate, sometimes caudate, 1–7 mm. Calyx densely appressedly dark brown hairy, entirely divided into 1½–4 mm long lobes. Corolla 3–6 mm. Stamens 30 to more than 100. Disk pilose. Ovary with same indument as calyx, 1–1½ mm high; style with pilose base. Fruits hairy, pink.

Distr. *Malesia:* Malay Peninsula (incl. Penang).

Ecol. Lowland rain-forest, 150–500 m. *Fl.* May, *fr.* Nov., April.

g. *var.* rufomarginata NOOT. Leid. Bot. Ser. 1 (1975) 185, pl. 10a.

Shrub or treelet to 5 m. Twigs densely pubescent. Leaves rather densely appressedly hairy beneath, ovate to elliptic, with cuneate base and margin densely appressedly rufous-hairy beneath, 5½–11½ by 2–3½ cm; nerves 4–6 pairs; petiole 2–3 mm. Spike much contracted, axis hairy. Bracts and bracteoles (broadly) elliptic, *c.* 3 mm. Calyx densely, appressedly long sericeously pubescent, entirely divided into 2 mm long rounded lobes. Corolla *c.* 2½ mm. Stamens *c.* 25. Disk glabrous. Ovary with same indument as calyx, *c.* 1 mm high; style hairy halfway up.

Distr. *Malesia:* Borneo (Sarawak, near Kuching).

21. Symplocos cylindracea NOOT. Leid. Bot. Ser. 1 (1975) 187. — **Fig. 7.**

Tree 10–30 m, 35 cm ⌀. Twigs glabrous, or pubescent in innovation. *Leaves* glabrous, or midrib (and nerves) minutely hairy beneath, ± elliptic, acuminate with acute to rounded, attenuate base and crenate or crenulate margin, 9–15 by 3½–9½ cm; nerves 6–9 pairs, meeting in a looped intramarginal vein; petiole 7–20 mm. *Flowers* in an up to 8 cm long panicle with minute or shortly pilose axis. Bracts and bracteoles caducous, glabrous or minutely hairy, ciliate, ovate, *c.* 3 and *c.* 2 mm long respectively. Pedicel ½–3 mm, sometimes seemingly much longer when only one flower is left on a small branch. *Calyx* 2–3½ mm long, entirely divided into elliptic to nearly semi-orbicular lobes, sparsely appressedly pilose to glabrous, ciliate. *Corolla* 5–6 mm. *Stamens* more than 100. Disk 5-glandular, pilose except the glands. *Ovary* glabrous or pubescent, 1–1½ mm high; style (minutely) pilose, 2–4 mm. *Fruit* cylindrical, 15 by 5–6 mm, mesocarp fleshy, stone with low lengthwise ridges, 3-celled, 1, 2, or all 3 cells developed. *Seed* 1 in each fertile cell, straight with straight embryo.

Distr. *Malesia:* New Guinea (West and North, Morobe Distr., Central Div., and New Britain).

Ecol. Plain rain-forest, also in *Anisoptera* forest on ridge top, 60–800 m. *Fl.* Jan.–July, *fr.* Febr.–March.

22. Symplocos deflexa STAPF, Trans. Linn. Soc. 4 (1894) 205; BRAND, Pfl. R. Heft 6 (1901) 64; GIBBS, J. Linn. Soc. Bot. 42 (1914) 109; MERR. En. Born. (1921) 487; NOOT. Leid. Bot. Ser. 1 (1975) 188. — **Fig. 7, 14e–f.**

Treelet to 6 m high and 8 cm ⌀. Twigs obliquely-patently brown hairy, ± zigzag. *Leaves* alternate, glabrous above, rather densely pilose beneath, especially towards the margin, elliptic, acuminate, obtuse or acute, with rounded or sharply attenuate

base and recurved to revolute, sharply glandular dentate margin, 3–5 by $1^1/_2$–$2^1/_2$ cm; nerves 5–7 pairs, usually merging into the reticulation; petiole 1–2 mm, densely patently brown hairy. *Flowers* fragrant, in an up to 6-flowered, 1–4 cm long lax raceme which is appressedly to patently brown pilose in all parts except the corolla. Bracts and bracteoles persistent, *c.* 5 by 3 and *c.* 3 by $1^1/_2$ mm respectively. Pedicel 2–4 mm. *Calyx* divided into obtuse and semi-elliptic to acute and triangular lobes, *c.* $1^1/_2$ mm long. *Petals* 5–7, glabrous or the outer ones minutely appressedly hairy, 4–6 mm long. *Stamens* 60–90. Disk low, 5-glandular, sparsely long-pilose. *Ovary* $1^1/_2$–2 mm high; style *c.* 5 mm, gradually thickened towards its base, the lower half sparsely long-pilose. *Fruit* ovoid, often curved, including the persistent calyx *c.* 10 by 5 mm; stone *c.* 8 by 4 mm with shallow grooves and large apical pore. *Seed* straight with straight embryo.

Distr. *Malesia:* Borneo (Sabah, only found on Mt Kinabalu near Paka cave).

Ecol. Low subalpine forest and mountain scrub, 2400–3200 m. *Fl.* Oct.–Febr., *fr.* March, Aug.–Oct.

23. Symplocos fasciculata ZOLL. Syst. Verz. 2 (1854) 136; Nat. Tijd. N. I. 14 (1857) 161; MIQ. Fl. Ind. Bat. 1, 2 (1859) 467; Suppl. 1 (1861) 474, *incl. var. minor* MIQ. *l.c.* 475; CLARKE, Fl. Br. Ind. 3 (1882) 574; K. & V. Bijdr. 7 (1900) 150, *incl. var. blumeana* K. & V. *l.c.* 151; BRAND, Pfl. R. Heft 6 (1901) 34; K. & G. J. As. Soc. Beng. 74, ii (1906) 235; KOORD. Atlas 2 (1914) t. 383; RIDL. Fl. Mal. Pen. 2 (1923) 301; HEYNE, Nutt. Pl. (1927) 1262; MERR. Un. Cal. Publ. Bot. 15 (1929) 248; BURK. Dict. (1935) 2113; CORNER, Ways. Trees (1940) 622, t. 231; BACK. & BAKH. *f.* Fl. Java 2 (1965) 205; NOOT. Leid. Bot. Ser. 1 (1975) 191, f. 2c, pl. 13. — *Sariava* REINW. Syll. Ratisb. 2 (1825) 12. — *Dicalyx tinctorius* BL. Bijdr. (1826) 1116, *non S. tinctoria* L'HÉRIT. 1791. — *Eugeniodes fasciculatum* O. K. Rev. Gen. Pl. 2 (1891) 409. — *S. phanerophlebia* MERR. Philip. J. Sc. 9 (1914) Bot. 382; J. Str. Br. R. As. Soc. *n.* 76 (1917) 112; En. Philip. 3 (1923) 301. — Fig. 7.

Shrub, or less often a tree to 22 m high and 50 cm ⌀. Twigs sparsely pilose, puberulous, or appressedly pubescent, glabrescent, often zigzag. *Leaves* alternately or (on the leaders) spirally arranged, glabrous above, sparsely appressedly fine-hairy beneath, rarely patently hirsute, especially on midrib and nerves and towards the margin, (narrowly) elliptic or sometimes ovate, acuminate to caudate with acute to rounded base, 5–13(–18) by 2–$4^1/_2$ (–6) cm; nerves (4–)6–8(–11) pairs, meeting in a looped intramarginal vein; petiole 2–8 mm. *Flowers* in a fascicle of reduced, often branched, racemes to $2^1/_2$ cm long. Bracts and bracteoles persistent, minute (rarely to 3 mm), as the axis pubescent; often several bracts present, indicating the origin from a more branched inflorescence. Pedicel 1–5 mm, pubescent. *Calyx* divided into (4–)5(–6) broadly ovoid, rounded, appressedly pubescent or glabrous lobes, *c.* 1 mm long but sometimes the lobes different in size, often some of the lobes petaloid. *Corolla* glabrous or more often with minute hairs towards the outer base, rarely some hairs on the back too, 2–$4^1/_2$ mm. *Stamens* 12–35. Disk glabrous to more or less pilose, low annular. *Ovary* appressedly hairy, *c.* 1 mm high; style hairy, especially towards the thickened base, rarely glabrous, 2–$3^1/_2$ mm. *Fruit* broadly or narrowly ampulliform, often curved, the belly globose or ovoid, the neck broadly conical, dark violet-blue or cobalt-blue, 5–7 by 3–5 mm; stone brain-like grooved without or with *c.* 10 shallow grooves. *Seed* 1, much lobed, with slightly curved embryo.

Distr. Extreme South Peninsular Thailand (Pattani) and throughout *Malesia*, except the Lesser Sunda Is., the Moluccas, and New Guinea. One of the most common *Symplocos* species in Malesia. Fig. 17.

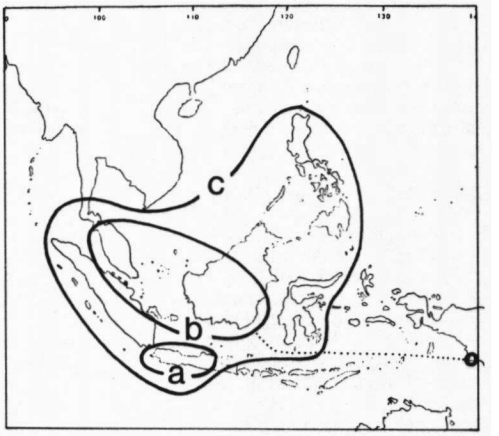

Fig. 17. Ranges of a. *Symplocos costata* (BL.) CHOISY, b. *S. cerasifolia* WALL. *ex* DC. *var. cerasifolia*, c. *S. fasciculata* ZOLL.

Ecol. In primary high and open secondary forest and thickets, common in disturbed forest, rather indifferent to soils, besides on latosols, recorded from sand (Banka), in Borneo from sandstone, black soils, seasonally swampy land and Dipterocarp forest, also riparian, in Udjong Kulon from raised coral limestone, from sea-level up to *c.* 2200 m. *Fl.* June–Sept. (Nov.–April), *fr.* Sept.–March. Several times flowers are noted to be scented, but once recorded as emitting a pervasive sour smell (Malaya, WHITMORE).

Vern. Malaya : *kĕrĕnang*, *nasi-nasi*, *mĕnasi* (obviously referring to the often unripe white fruit, resembling grains of cooked rice), M, Kepong, *sĕbiak*, Selangor; Sumatra: *kayu loba-loba*, Asahan, *djarak bulau*, Pajakumbu, *djirok*, Kerintji, *kĕkatja*, *lĕlĕbah*, Bengkalis, *pipi udan*, Karo, *lèbomĕlukut*, M. Ulu, Palembang, *hapu-hapu*, *havu-havu*, *h. h. dĕlok*, *h. h. itam*, *h. h. uding*, *kareut kareut uding*, *lihai-lihai uding*, Simalur, *gia*, Kepahiang, *kayu lebeu*, Palembang, *djarok*, Banka; Java; *djarak*, *djirĕk*, *d. leutik*, *d. prit*, *d. sasag*, *d. wulu*, J, S, *ki piit*, S; Borneo: Sarawak: *jirah*, Iban, *pĕriaboh*, Murut; Sabah: *labah*, *lĕboh*, *loboh*, Kinabatangan, Kadasan lang., *giak*, Kedayan, *idabo*, Dusun; Brunei: *pachal ambok*; Kalimantan: *njam-njam*, Bulungan, *gumiting putèh*, Balikpapan.

Notes. The fruit is of a type usually containing a curved seed with curved embryo; here it is, however, only slightly curved.

In the herbarium sterile sheets are sometimes confused with *Eurya acuminata* which has, in Malaya, often the same vernacular names; *cf.* CORNER (1940).

Normally lateral shoots are collected which have a characteristic alternate phyllotaxis, but I have also found leader-shoots which have a spiral phyllotaxis flowering in Borneo.

In habit *S. fasciculata* is very similar to *S. laeteviridis* but its flowers are truly fascicled with more than 3 bracts under each flower and these persistent, a regular 5-lobed calyx, an ampulliform fruit with a ruminate seed and curved embryo. In *S. laeteviridis* the inflorescence is a raceme or panicle with 1 bract and 2 bracteoles under each flower and these caducous, a calyx which splits into a 3-lobed and a 2-lobed part, while the fruit is ellipsoid to ovate, with a non-ruminate seed and a straight embryo.

24. Symplocos filipes NOOT. Leid. Bot. Ser. 1 (1975) 193, pl. 14a–d. — **Fig. 7.**

Twigs glabrous or sparsely pulverulent-puberulous, the terminal buds small, with pulverulent-puberulous scales which often bear large vesicular glands on the margin. *Leaves* glabrous or sparsely pulverulent-puberulous beneath, ± elliptic, long acuminate, with acute often attenuate base and entire or slightly denticulate margin which contains a row of large vesicular glands, $4^1/_2$–$7^1/_2$ by 2–3 cm; nerves 5–6 pairs, meeting in a looped intramarginal vein; petiole 7–8 mm. *Flowers* in a lax raceme of 4–10 cm, the axis sparsely pulverulent-puberulous. Bracts and bracteoles persistent, with same indument, $^1/_2$ and 1 mm long respectively. Pedicel slender, 2–15 mm. *Calyx* sparsely pulverulent-puberulous, divided into semi-ellliptic $^1/_2$ mm long lobes. *Corolla c.* 3 mm. *Stamens c.* 25. Disk annular, glabrous. *Ovary* with same indument as calyx, *c.* $1^1/_2$ mm high; style glabrous, *c.* 3 mm. *Fruit* ellipsoid, *c.* 10 by 4 mm, the small calyx incurved; stone spindle-shaped, with shallow lengthwise grooves, 1-celled. *Seed* 1, straight with straight embryo.

Distr. *Malesia:* Philippines (Mindoro: Mt Halcon), two collections.

25. Symplocos gambliana BRAND, Bull. Herb. Boiss. II, 6 (1906) 748; MERR. En. Born. (1921) 484; NOOT. Leid. Bot. Ser. 1 (1975) 195. — *S. havilandii* KING & GAMBLE, J. As. Soc. Beng. 74, ii (1906) 251, *non* BRAND, 1901.

Twigs glabrous. *Leaves* glabrous, ± elliptic, abruptly oblique acuminate with acute, attenuate base and entire, recurved margin, 6–9 by 3–$4^1/_2$ cm; nerves 6–8 pairs meeting in a looped, faintly prominent intramarginal vein; petiole 5–10 mm. *Flowers* in a lax spike or raceme to 6 cm; axis glabrous. Bracts and bracteoles ?minute, soon caducous. Pedicel less than 1 mm. *Calyx* entirely divided into semi-orbicular, ciliate, $^3/_4$–$1^1/_2$ mm long lobes. *Corolla* ciliolate, often with some minute hairs on the outside, *c.* 5 mm. *Stamens c.* 50. Disk 5-glandular, with the style base minutely pilose. *Ovary* glabrous, *c.* 1 mm high; style glabrous except the base, 4 mm. *Fruit* not known.

Distr. *Malesia:* Borneo (Sarawak), only known from the type.

26. Symplocos gigantifolia NOOT. Leid. Bot. Ser. 1 (1975) 195.

Twigs glabrous, very thick. *Leaves* glabrous, obovate, shortly acuminate, the base cuneate but truncate at its lowermost part, margin ± entire, 21–62 by 7–19 cm; nerves 13–20 pairs, merging into the venation; petiole *c.* 1 cm. *Flowers* in a fascicle or very short spike on wood. Bracts and bracteoles persistent, appressedly pubescent, semi-elliptic, rounded, 1–2 mm. *Calyx* minutely appressedly pubescent, 2 mm, the 3 semi-elliptic, rounded lobes *c.* $1^1/_2$ mm long. *Corolla* 4–5 mm. *Stamens c.* 50. Disk 5-glandular, glabrous, but style base pilose. *Ovary* with same indument as calyx, *c.* 1 mm high; style glabrous, reduced (only ♂ flowers seen). *Fruit* very young. *Seeds* not seen.

Distr. *Malesia:* East New Guinea (Central Division, Southern Highlands and Western District), 3 collections.

Ecol. In high forest, once along a riverbed, 90, 500, and 800 m. *Fl.* April–May.

Notes. BRASS (3894) noted that it is a 'striking tree with erect branching habit and flowers between the whorls.' In the three collections studied the 'whorled' position of the leaves could not be checked. Possibly the main leaves may be conspicuously crowded at the end of the year's growth (flush).

A similar situation is reported to occur in *S. herzogii*, which is the closest related species, differing in having smaller, hairy leaves, hairy twigs, and larger bracts.

27. Symplocos glabriramifera NOOT. Leid. Bot. Ser. 1 (1975) 196, pl. 15a–d. — **Fig. 7.**

Twigs glabrous. *Leaves* glabrous, elliptic to obovate, (faintly) acuminate, with acute, attenuate base and crenate or crenulate apex, 4–$6^1/_2$ by $1^1/_2$–$2^1/_2$ cm; nerves 6–8 pairs, meeting in a looped intramarginal vein; petiole 5–7 mm. *Flowers* in a short lax raceme to $1^1/_2$ cm, axis glabrous. Bracts and bracteoles caducous, glabrous, ciliolate, $1^1/_2$ and 1 mm long respectively. Pedicel 1–2 mm. *Calyx* glabrous, *c.* $1^1/_2$ mm long, the lobes 3, semi-elliptic, rounded, *c.* $1^1/_4$ mm long. *Corolla* probably 3-merous, 3–4 mm. *Stamens* 30–50. Disk glabrous, 3–5-glandular. *Ovary* glabrous, *c.* 1 mm high; style glabrous. *Fruit* ellipsoid, truncate at both ends, 8–12 by 4–6 mm; stone shallowly lengthwise grooved without, 3-celled. *Seed* 1 in each cell, straight with straight embryo.

Distr. *Malesia:* Philippines (Luzon: Benguet & Nueva Vizcaya Prov.).

Ecol. Mountain forest, 1900 m. *Fl.* Febr., May.

28. Symplocos glomerata KING *ex* CLARKE, Fl. Br. Ind. 3 (1882) 577; BRAND, Pfl. R. Heft 6 (1901) 69; BRANDIS, Ind. Trees (1906) 438; HAND.-MAZZ. Beih. Bot. Centralbl. 62 B (1943) 30; NOOT. Leid. Bot. Ser. 1 (1975) 199, pl. 16a–b, with full synonymy. — **Fig. 7.**

var. **glomerata.**

Small tree, 6 m. Twigs glabrous, or tomentellous and then soon glabrescent. *Leaves* elliptic, acuminate, with glandular dentate margin, 7–20 by

2–4½ cm; nerves 10–16 pairs meeting in a looped intramarginal vein; petiole 5–12 mm. *Flowers* in a fascicle from the axils of the leaves or from wood. *Calyx* glabrous, 1–2 mm, the ciliate lobes slightly shorter. *Corolla* 4–5 mm. *Stamens c.* 25 to *c.* 50. Disk cylindrical, *c.* 1 mm high. *Ovary* glabrous, *c.* 1 mm high. *Fruit* 7–10 by *c.* 3 mm.

Distr. Continental Asia (India, Burma, Indo-China, China, Hainan, Hong Kong, Formosa); in *Malesia:* Malay Peninsula (Trengganu, once found on G. Lawut Besut).

Ecol. Montane forest, 1500 m. *Fr.* April.

Note. There is a considerable synonymy involved in this widely spread continental SE. Asian species which I have subdivided into two subspecies and several varieties.

29. Symplocos goodeniacea NOOT. Leid. Bot. Ser. 1 (1975) 204.

Small tree to 7½ m. Twigs glabrous. *Leaves* narrowly elliptic, shortly acuminate with cuneate base and recurved entire or denticulate margin, 17–30 by 3½–7 cm; nerves 11–13 pairs, at least in the apical part of the leaf meeting in a looped intramarginal vein close to the margin; petiole 15–25 mm. *Flowers* in a spike to 4 cm; axis puberulous. Bracts and bracteoles persistent, glabrous but ciliate, *c.* 2 mm. *Calyx* glabrous, divided into the broadly rounded 1½–2 mm long lobes. *Corolla* 6–8 mm. *Stamens* more than 100. Disk annular, minutely pilose. *Ovary* glabrous, 1½–2 mm high; style glabrous. *Fruit* not known.

Distr. *Malesia:* Borneo (Sabah), only known from the type.

Ecol. Lowland rain-forest, 150 m.

30. Symplocos herzogii SLEUM. in Fedde, Rep. 42 (1937) 264; NOOT. Leid. Bot. Ser. 1 (1975) 207. — **Fig. 7.**

Small tree or leaning shrub, 4–6 m high. Twigs thick, densely tomentose. *Leaves* pseudoverticillate, but between the whorls the scars of fallen spirally arranged leaves visible in at least one collection, rather densely hairy beneath, especially on midrib and nerves, ± elliptic, acute to acuminate with cuneate base (the very base truncate) and sharply dentate margin, 13–20 by 5–9½ cm; nerves 10–17 pairs; petiole with same indument as twigs, very thick, 7–20 mm. *Flowers* in a fascicle or spike to 2 cm from the axils of the leaves or from wood. Bracts and bracteoles persistent, densely redbrown sericeous, *c.* 5 mm and *c.* 3 mm respectively. *Calyx* appressedly redbrown hairy, 2–2½ mm, the lobes ± ovate, acute, 1½–2 mm. *Corolla* 3–4 mm. *Stamens c.* 40 in ♂ flowers (according to SLEUMER *l.c.* absent in ♀ flowers). Disk pilose. *Ovary* glabrous, ½–1 mm high; style reduced in ♂ flowers, in ♀ flowers 3½ mm (according to SLEUMER *l.c.*). *Fruit* globose to ampulliform, *c.* 8 by 6 mm, the stone ribbed. *Seed* 1, curved with curved embryo.

Distr. *Malesia:* East New Guinea (Morobe Distr.).

Ecol. Midmountain rain-forest, 1500–1800 m. *Fl.* Dec.–April.

Notes. I have only seen ♂ flowers and fruits. According to SLEUMER ♀ flowers are few, at the base of the inflorescence.

This species is allied to *S. gigantifolia*; see the notes under that species.

31. Symplocos johniana STAPF, Trans. Linn. Soc. Bot. 4 (1894) 206; BRAND, Pfl. R. Heft 6 (1901) 65; MERR. En. Born. (1921) 487; H. HEINE, Pfl. Samml. Clemens Kinabalu (1953) 88; NOOT. Leid. Bot. Ser. 1 (1975) 208, pl. 17f–g. — **Fig. 7.**

Shrub or small tree, to 3 m. Twigs densely obliquely to patently rusty hirsute. *Leaves* spirally arranged or alternate, rather densely patently hirsute beneath, or only midrib and nerves hairy, acuminate to caudate with rounded to cordate base and usually rather coarsely sharp-dentate margin, ovate, 2½–7 by 1¼–3½ cm; nerves 3–6 pairs meeting in a looped intramarginal vein; petiole 1–2 mm. *Flowers* in 1-flowered raceme, axis ½ mm, with 1½ mm long bract and the *c.* 1 mm long bracteoles loosely appressedly rusty hirsute. Pedicel *c.* 1 mm. *Calyx* rusty hirsute, divided into the semi-elliptic rounded 1–1½ mm long lobes. *Corolla c.* 5 mm. *Stamens* 60–90. Disk stellate, densely hirsute. *Ovary* rusty hirsute, *c.* 1 mm high; style glabrous, *c.* 6 mm. *Fruit* narrowly flask-shaped, often sparsely hairy, intense indigo-blue, *c.* 13 by 4 mm, the persistent calyx not included. *Seed* 1, straight, narrowly elliptic, embryo straight.

Distr. *Malesia:* Borneo (Sabah: Mt Kinabalu; W. Kutei: G. Kemul).

Ecol. In forest, in damp shady places, often in crevices of granite rocks, 1500–3200 m. *Fl.* Febr.–Oct., *fr.* Febr.–May, Sept.–Oct.

Note. The distribution is interesting because this species, which was assumed to be a Kinabalu endemic, is also found on an old, worn-down, rather low summit in W. Kutei, in a mountain range which is probably older than Mt Kinabalu. This feature is also found in some other mountain plants, *e.g. Lobelia borneensis*, which were found on Mt Murud, in Sarawak (*cf.* STEEN. Proc. R. Soc. Lond. B 161, 1964, 16). VAN STEENIS concluded that Kinabalu plants possibly in the past had a wider distribution in Borneo when there were more higher peaks in the island, and that the few present stations on the low mountains are relict stations (*cf.* also STEEN. Mal. Nat. J. 20, 1967, 39).

32. Symplocos junghuhnii KOORD. Proc. Kon. Acad. Wet. A'dam 10 (1908) 160; NOOT. Leid. Bot. Ser. 1 (1975) 209. — **Fig. 7, 18.**

Twigs glabrous. *Leaves* glabrous, or with some appressed hairs beneath, acuminate with cuneate to cordate base and entire to denticulate margin, obovate to elliptic, 9–13 by 4½–5 cm; nerves 7–10 pairs; petiole 10–17 mm. *Flowers* in a raceme to 6 cm, axis pubescent to tomentose, glabrescent. Bracts and bracteoles soon caducous, not seen. *Calyx* glabrous, divided into ± semi-orbicular cordately based *c.* 2 mm long lobes. *Corolla* 8–10 mm. *Stamens* more than 100. Disk 5-glandular, with the broadly conical style base soft hairy. *Ovary* tomentose, 2–3 mm high; style glabrous, *c.* 7 mm. *Fruit* (only young fruits seen) ± elliptic, 15 by 8 mm. Embryo probably straight.

Distr. *Malesia:* West Java (Preanger: Tjigenteng).

Ecol. Mixed montane rain-forest, 1750 m.

Note. It is not clear why this species was omitted from BACK. & BAKH. *f.*'s Flora of Java.

33. Symplocos laeteviridis STAPF, Trans. Linn. Soc. Bot. 4 (1894) 205; BRAND, Pfl. R. Heft 6 (1901) 53;

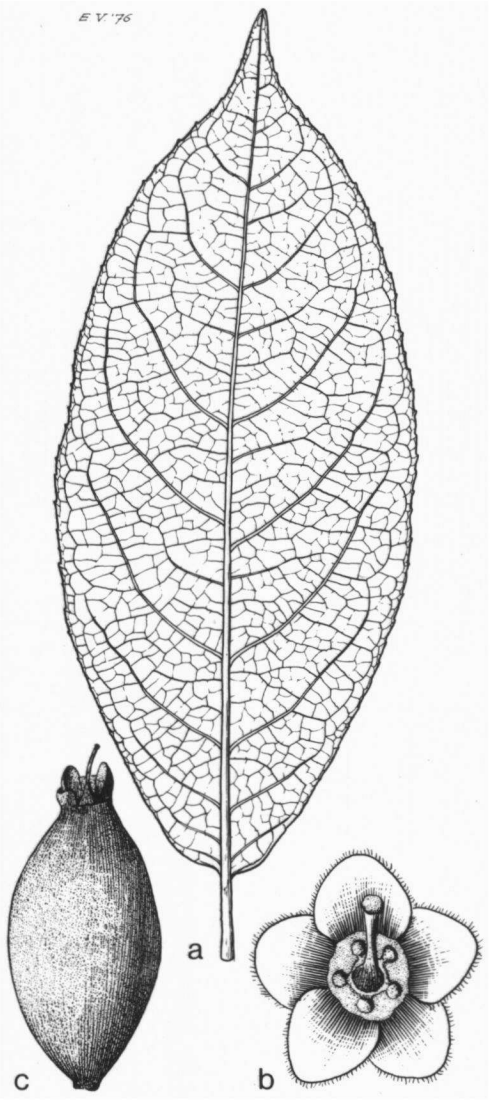

Fig. 18. *Symplocos junghuhnii* KOORD. a. Leaf underside, nat. size, b. deflorated flower from above, showing 5-glandular disk, × 4, c. fruit, × 2 (KOORDERS 26420).

MERR. En. Born. (1921) 487; AIRY SHAW, Kew Bull. (1939) 408; H. HEINE, Pfl. Samml. Clemens Kinabalu (1953) 88; NOOT. Leid. Bot. Ser. 1 (1975) 208, pl. 18–19. — **Fig. 3.**

For synonyms see under the varieties.

Shrub or tree to 10(–21) m. Twigs glabrous or clothed by a much variable indument, often faintly zigzag. *Leaves* alternate, glabrous to more or less pilose beneath, acuminate to caudate with acute to cordate base and nearly entire finely glandular dentate or sharply dentate, flat or recurved, margin, (narrowly) ovate to elliptic, $1^3/_4$–12 by 1–$4^1/_2$ cm; nerves (3–)4–11 pairs, usually meeting in a looped intramarginal vein. *Flowers* in a raceme or panicle to $4^1/_2$ cm, the axis clothed with hairs. Bracts and bracteoles hairy, soon caducous. Pedicels 0–5 mm. *Calyx* glabrous or hairy, 2–3 mm long, symmetrically cleft, the lobes 1–3 mm. *Corolla* 3–5 mm, often with minute hairs on the outside. *Stamens* 25–70. Disk 5-stellate, shortly minutely pilose. *Ovary* (appressedly) hairy, 1–$1^1/_2$ mm high; style glabrous, as long as the corolla. *Fruit* white to bluish-black, (obliquely) ovoid to ellipsoid, 7–12 by (3–)5–6 mm. *Seed* 1, cylindrical to ellipsoidal or ovoid with straight embryo.

Distr. *Malesia:* N. Sumatra, Malaya, Borneo, and Celebes.

Note. See for differences with *S. fasciculata* under that species.

KEY TO THE VARIETIES

1. Leaf base distinctly cordate.
 2. Twigs with an indument of *c.* 2 mm long hairs. Leaves 5–12 cm long . . . **e. *var.* mjöbergii**
 2. Twigs with an indument of $^1/_4$–1 mm long hairs. Leaves $1^3/_4$–$4^1/_2$ cm long. **d. *var.* kinabaluensis**
1. Leaf base cuneate to rounded.
 3. Twigs velutinous.
  4. Leaves *c.* 4 cm long . . . **f. *var.* pauciflora**
  4. Leaves 9–12 cm long. . . **g. *var.* velutinosa**
 3. Twigs glabrous, or pubescent, hairs much shorter than 2 mm.
  5. Twigs glabrous or appressed-pubescent. Nerves 6–9 pairs. . . . **a. *var.* laeteviridis**
  5. Twigs loosely appressed-pubescent. Nerves 3–6 pairs . . . . . **b. *var.* alternifolia**
 3. Twigs obliquely to patently long-pilose, hairs of the indument *c.* 2 mm long. **c. *var.* basirotunda**

a. *var.* laeteviridis. — *Cf.* NOOT. Leid. Bot. Ser. 1 (1975) 211, pl. 18e–f, 19b. — *S. forbesii* BRAND, Pfl. R. Heft 6 (1901) 63. — **Fig. 3, 7.**

Shrub or tree to 10(–21) m. Twigs glabrous or appressedly pubescent. Leaves often yellowish green above, brownish beneath *in sicco*, acuminate to caudate with cuneate to rounded base (narrowly) elliptic to ovate, 4–11 by $1^1/_2$–4 cm; nerves 6–9 pairs, usually meeting in a looped intramarginal vein; petiole 1–3(–4) mm. Flowers in a predominantly basally branched, often very short lax panicle of racemes, rarely a simple raceme, to 3 cm long; axis pubescent. Bracts and the 0–1 bracteoles very soon caducous. Pedicel with same indument as axis, 0–2(–5) mm. Fruit black-blue.

Distr. *Malesia:* N. Sumatra, Banka, Malay Peninsula (Perak, once), Borneo (throughout, many collections from Mt Kinabalu), SW. Celebes (Bonthain, Todjambu).

Ecol. In hill and montane rain-forest, in a variable set of conditions, on rich clay in mixed Dipterocarp forest near a river, on stony hillsides, on black soil on ridge top, on a basalt ridge under Dipterocarp forest (Sarawak), and even on ultrabasic; 500–2000 m. *Fl.* Jan.–Oct., *fr.* almost Jan.–Dec.

Vern. Sumatra: *alleban*, Karolands, *kayu lobaloba*, *k. sae-sae*, Asahan; Borneo: Sarawak: *luroh*, Kayan.

b. *var.* alternifolia NOOT. Leid. Bot. Ser. 1 (1975) 211, pl. 18a.

Shrub or treelet. Twigs densely loosely appressedly brown-pubescent. Leaves rather densely to sparsely appressed-pilose beneath, especially on the margin, acuminate to caudate with cuneate shortly attenuate base and ciliate, recurved, entire to finely glandular dentate margin, ± elliptic, 4–5½ by 1½–2½ cm; nerves (3–)4–6 pairs, meeting in a looped intramarginal vein but sometimes obscured by the indument; petiole *c.* 2 mm. Flowers in a (sometimes branched) raceme to 3 cm or solitary, axis red-brown pilose. Pedicel 0–½ mm (to 4 mm in solitary flowers).

Distr. *Malesia:* Borneo (Sabah: Mt Kinabalu).

Ecol. Montane rain-forest, 1000–1500 m. *Fl.* May.

c. *var.* basirotunda NOOT. Leid. Bot. Ser. 1 (1975) 212, pl. 18b.

Shrub or treelet. Twigs obliquely to patently long-pilose. Leaves glabrous to sparsely appressedly long-pilose beneath, acuminate to caudate with rounded to subcordate base and sharply glandular dentate to nearly entire margin, elliptic, 3–11 by 1¾–3½ cm; nerves 6–9 pairs, meeting in a looped intramarginal vein; petiole 1–2 mm. Flowers in a raceme or panicle to 2 cm, axis pilose. Pedicels 0–2(–3) mm. Fruit blue.

Distr. *Malesia:* Borneo (Sarawak: Kalabit Uplands).

Ecol. Montane rain-forest, on humus on sandstone, and on podsolized sand (kerangas), 1000–1700 m. *Fl.* March–April, *fr.* April, Aug.

d. *var.* kinabaluensis (HEINE) NOOT. Leid. Bot. Ser. 1 (1975) 212, pl. 19c. — *S. kinabaluensis* HEINE, Mitt. Bot. Staatssamml. München 6 (1953) 217.

Shrub or small tree to 4 m. Twigs shortly obliquely hairy. Leaves acuminate with cordate base and finely glandular-dentate margin, ovate to elliptic, 1¾–4½ by 1–2¾ cm; nerves 4–6 pairs; petiole *c.* ½ mm. Flowers in a ± 3-flowered raceme to 3 cm, axis with same indument as twigs. Bracts 3–5 mm, leaf-like, soon caducous. Pedicel ½–5 mm.

Distr. *Malesia:* Borneo (Sabah: Mt Kinabalu).

Ecol. Montane rain-forest, also secondary forest, and in landslip regrowth, on black or clay soils, 1400–2300 m. *Fl.* Febr., May–Sept., *fr.* March, Aug., Nov.–Dec.

e. *var.* mjöbergii (MERR.) NOOT. Leid. Bot. Ser. 1 (1975) 212, pl. 18g. — *S. mjöbergii* MERR. Sar. Mus. J. 3 (1928) 546. — **Fig. 7.**

Small tree. Twigs patently brown or rusty pilose. Leaves (narrowly) elliptic or ovate, acuminate, base cordate with 2–10 mm long lobes, margin finely glandular dentate, 5–12 by 2½–4½ cm; nerves strongly impressed above, in 6–9 pairs, meeting in a conspicuous looped intramarginal vein; petiole *c.* 1½ mm. Flowers in a predominantly basally branched panicle to 4 cm, the axis ± patently brown or rusty pilose. Bracts often leaflike, and then up to 10 mm. Pedicels 1–5 mm. Fruit from green to purple, finally bluish.

Distr. *Malesia:* Borneo (Sabah: Mt Kinabalu; Sarawak: Mt Murud).

Ecol. Montane rain-forest, also in secondary forest, along hillsides and streams, in *Agathis-Podocarpus*-oak forest, sometimes on blackish soil, 1200–2400 m. *Fl.* Aug.–Nov., *fr.* Dec.–June.

f. *var.* pauciflora NOOT. Leid. Bot. Ser. 1 (1975) 213, pl. 18c–d.

Shrub. Twigs velutinous. Leaves glabrous except the appressedly pilose midrib and the recurved finely dentate margin underneath, or appressedly fine-pilose beneath, acuminate with rounded base, elliptic, *c.* 4 by 2 cm; nerves *c.* 5–7 pairs, meeting in a looped intramarginal vein; petiole with same indument as twigs, *c.* 2 mm. Flowers in a 1–5-flowered raceme up to 3 cm; axis patently pubescent. Pedicel 0–½ mm, but much longer when flowers solitary. Fruit blue.

Distr. *Malesia:* Borneo (Sabah: Mt Kinabalu; Sarawak: Mt Murud).

Ecol. Montane rain-forest, often mossy, on ridges, also in scrub forest, 1700–2570 m. *Fl.* April, July, Oct., *fr.* April.

g. *var.* velutinosa NOOT. Leid. Bot. Ser. 1 (1975) 213, pl. 19a.

Treelet to *c.* 10 m. Twigs velutinous. Leaves glabrous above, more or less appressedly pilose beneath, especially on the nerves and the sharply dentate flat margin, acuminate with rounded base, (narrowly) elliptic, 9–12 by 3–4 cm; nerves 7–11 pairs, meeting in a conspicuous looped intramarginal vein; petiole 3–4 mm. Flowers in a panicle to 3 cm, axis patently pilose. Bracts and the 0–3 mm long pedicels with same indument.

Distr. *Malesia:* Borneo (Sabah: Mt Kinabalu; Sarawak: Kapit area).

Ecol. Primary and old secondary rain-forest, 1000–1500 m. *Fl.* Aug.–Oct.

34. Symplocos lancifolia S. & Z. Fam. Nat. 2 (1846) 133; CLARKE, Fl. Br. Ind. 3 (1882) 577; BRAND, Pfl. R. Heft 6 (1901) 41; NOOT. Leid. Bot. Ser. 1 (1975) 214, pl. 21a–d, with full synonymy. — *S. montana* VIDAL, Rev. Pl. Vasc. Filip. (1886) 179, *non* BRONGN. & GRIS, 1866. — *S. luzoniensis* ROLFE, J. Bot. 24 (1886) 348; BRAND, Pfl. R. Heft 6 (1901) 61; Philip. J. Sc. 3 (1908) Bot. 9; ROLFE, Kew Bull. (1912) 157; BRAND, Philip. J. Sc. 7 (1912) Bot. 35; MERR. En. Philip. 3 (1923) 300. — *S. depauperata* MERR. Publ. Gov. Lab. Philip. *n.* 29 (1905) 45; BRAND, Philip. J. Sc. 3 (1908) Bot. 10, *incl. var. sordida* BRAND; *ibid.* 7 (1912) Bot. 36, *incl. var. angustissima* BRAND; MERR. En. Philip. 3 (1923) 298. — *S. merrilliana* BRAND, Philip. J. Sc. 3 (1908) Bot. 9. — *S. betula* BRAND, *l.c.* 8; MERR. En. Philip. 3 (1923) 297; NOOT. Leid. Bot. Ser. 1 (1975) 133. — *S. inconspicua* BRAND, Philip. J. Sc. 4 (1909) Bot. 110; MERR. En. Philip. 3 (1923) 299. — *S. zamboangensis* BRAND in Fedde, Rep. 14 (1916) 325; MERR. En. Philip. 3 (1923) 303. — **Fig. 7.**

Low shrub 1–2 m or tree to 20 m. Twigs appressedly to patently hairy, soon glabrescent. *Leaves* often sparsely appressedly fine-hairy beneath, acuminate, with cuneate to nearly rounded base

and mostly finely glandular dentate or undulate margin, (narrowly) ovate, 2–10 by $1^1/_2$–$4^1/_4$ cm; midrib above prominent to slightly sulcate; nerves (4–)6–11 pairs, often meeting in a looped intramarginal vein; petiole 1–3(–5) mm. *Flowers* in a raceme to 3(–7) cm. Bracts and bracteoles persistent but falling in fruit, $^1/_2$–2 and $^1/_2$–$1^1/_2$ mm respectively. Pedicel 0–1 mm. *Calyx* usually sparsely appressedly fine short-hairy or pubescent, rarely glabrous, divided into $^1/_2$–$1^1/_2$ mm long lobes. *Corolla* $2^1/_2$–4 mm. *Stamens* 15–40. Disk 5-glandular, mostly hairy including the style base. *Ovary* with same indument as calyx or glabrous, $^1/_2$–$1^1/_2$ mm high. *Fruit* ellipsoid to globose, 3–5 by 2–5 mm, the calyx forming a blunt beak on top; stone smooth. *Seed* 1, filling the whole fruit, with U-shaped embryo.

Distr. Continental SE.-E. Asia (N. India, Indo-China, China, Hainan, Hong Kong, Ryu Kyu Is., Formosa); in *Malesia:* Philippines (Luzon, Mindoro, Panay, Negros, Mindanao).

Ecol. In a variety of habitats, also in dense mossy forest at higher altitude, 400–2500 m. *Fl.* Dec.–April, *fr.* May–Dec. Flowers noted as scentless.

35. Symplocos lucida (THUNB.) S. & Z. Fl. Jap. 1 (1835) 55, t. 24, *excl. syn. Myrtus laevis*; OHWI, Fl. Jap. (1965) 727; NOOT. Leid. Bot. Ser. 1 (1975) 217, with full synonymy. — *Laurus lucida* THUNB. Fl. Jap. (1784) 174. — *Hopea lucida* THUNB. Ic. Fl. Jap. (1800) t. 4. — *S. theaefolia* D. DON, Fl. Nepal. (1825) 145; BRAND, Pfl. R. Heft 6 (1901) 66 ('*theifolia*'); HALL. *f.* Med. Rijksherb. 14 (1912) 40; BACK. & BAKH. *f.* Fl. Java 2 (1965) 205. — *Dicalyx ciliatus* BL. Bijdr. (1826) 1119. — *S. ciliata* MIQ. Fl. Ind. Bat. 1, 2 (1859) 466; K. & V. Bijdr. 7 (1900) 155; BRAND, Pfl. R. Heft 6 (1901) 65. — *S. ridleyi* KING & GAMBLE, J. As. Soc. Beng. 74, ii (1906) 239; RIDL. Fl. Mal. Pen. 2 (1923) 302. — *S. loheri* BRAND, Philip. J. Sc. 7 (1912) Bot. 32; MERR. En. Philip. 3 (1923) 300. — *S. laeviramulosa* ELMER, Leafl. Philip. Bot. 7 (1914) 2323; MERR. En. Philip. 3 (1923) 300. — **Fig. 7.**

Shrub or tree to 20 m, 25 cm ∅. Twigs glabrous, yellowish green, angular when dry. *Leaves* coriaceous, glabrous (sometimes quite thin), acute or obtuse with cuneate base and entire or glandular dentate revolute margin, ± elliptic, 5–12 by 2–$4^1/_2$ cm; midrib more or less prominent on the upper surface, often sulcate towards the base; nerves 5–15 pairs, prominent on both upper and undersurface; petiole 5–15 mm. *Flowers* in a basally branched short dense raceme or condensed spike of $1^1/_2$–4 cm; axis puberulous or pubescent. Bracts and bracteoles persistent under the fruit, glabrous, or sometimes pubescent or puberulous on midrib and base, 1–3 mm. Pedicels 0–5 mm. *Calyx* mostly glabrous, nearly divided into 5 lobes, 1–3 mm. *Corolla* 3–5 mm. *Stamens* 10–70. Disk densely hairy. *Ovary* glabrous, $^1/_2$–2 mm high; style glabrous, or hairy, mostly towards the base. *Fruit* ellipsoid (to rarely nearly orbicular), 1–3-celled, 5–18 by 4–15 mm, the wider ones with 2 seeds. *Seeds* usually U-shaped with U-shaped embryo, in the 3-celled fruits the seeds abortive or (at most) V-shaped; the legs of the U are either separated by a septum or not.

Distr. Continental SE.–E. Asia (N. India, N. Burma, N. Thailand, Indo-China, China, Hong Kong, Hainan, Japan, Ryu Kyu Is., Formosa); throughout *Malesia*, except Borneo, the Moluccas, and New Guinea.

Ecol. High and low mountain forest, elfin forest, and mossy forest at higher altitude, also in tjemara forest, 1500–3000 m. *Fl.* (July) Oct.–Nov., *fr.* July (April–Oct.). In habit very much resembling the Theaceous *Pyrenaria serrata* BL. which grows in similar forest.

Vern. Sumatra: *kayu hotir*, Asahan; Java: *djarak lulub*, S, *djirĕk*, J.

36. Symplocos maliliensis NOOT. Leid. Bot. Ser. 1 (1975) 237. — **Fig. 7.**

Tree, 25–30 m, 30–40 cm ∅. Twigs glabrous. *Leaves* acuminate, base cuneate, often the very base rounded, margin entire, recurved, (narrowly) obovate, 15–22 by $4^1/_2$–$8^1/_2$ cm; nerves 9–14 pairs, meeting in a looped intramarginal vein; petiole 8–15 mm. *Flowers* in a raceme to 8 cm, axis pubescent. Bracts and bracteoles caducous, pubescent, ovate, 3–4 and 2–3 mm long respectively. Pedicel to 2 mm. *Calyx* glabrous, oblique, 3–4 mm, the lobes ovate, 2–3 mm. *Corolla c.* 6 mm. *Stamens c.* 100 or more. Disk shortly pilose. *Ovary* glabrous, 1–2 mm high; style with broadly conical shortly pilose base, the rest glabrous, *c.* 5 mm. *Fruit* ellipsoid, 15–20 by 10–12 mm, stone with *c.* 6 lengthwise ridges, mostly 2-celled. *Seeds* not seen.

Distr. *Malesia:* Central Celebes (Malili).

Ecol. Primary high rain-forest, at low altitude, *c.* 200 m. *Fl.* June–July, *fr.* Febr., Sept.

Vern. *Lako*, *kandoa*, Tobela lang.

37. Symplocos wikstroemifolia HAYATA, Ic. Pl. Form. 5 (1915) 119, t. 25b; MORI, Sylvia 5 (1934) 249; KANEH. Form. Trees rev. ed. (1936) 602, t. 560. — *S. microtricha* HAND.-MAZZ. Beih. Bot. Centralbl. 62 B (1943) 17; NOOT. Leid. Bot. Ser. 1 (1975) 239. — **Fig. 7.**

Shrub $1^1/_2$ m, or tree to 20 m. Twigs sometimes soon thickened, tapering towards the apex. *Leaves* often only towards the end of the twigs, minutely sparsely appressedly fine hairy beneath, acuminate, with cuneate base and nearly entire margin, (narrowly) elliptic to obovate, 6–$15^1/_2$ by $1^3/_4$–$4^1/_2$ cm; midrib above prominent or sunken, flat or slightly sulcate; nerves 8–10 pairs, joined in an intramarginal looped vein 1–3 mm from the margin; petiole 3–10 mm. *Flowers* in an often branched spike from the axils of the leaves, the lower ones from wood. Bracts and bracteoles soon caducous, appressedly pubescent, 1–$1^1/_4$ and 1 mm respectively. *Flowers* ♂ or ☿, probably all flowers on one plant alike. *Calyx* divided into *c.* 1 mm long semi-orbicular or semi-elliptic lobes, glabrous, or the outer lobes appressedly fine pubescent. *Corolla* 2–3 mm. *Stamens* 15–20 in ♂ flowers, 5, alternipetalous, in ☿ flowers (observed once). Disk pulvinate, glabrous or (minutely) shortly pilose. *Ovary* glabrous or finely appressedly short hairy, $^1/_2$ mm high in ♂, 1–$1^1/_2$ mm in ☿ flowers; style glabrous, 2 mm, with thick, knob-like stigma, but aborted in ♂ flowers. *Fruit* ovoid, or slightly constricted towards the apex, 10–12 by 6–8 mm. *Seed* 1, curved, with curved embryo.

Distr. Continental SE. Asia (Indo-China, China, Hainan, Formosa); in *Malesia:* Malay

Peninsula (Pahang: G. Paking, G. Benom, Fraser's Hill, G. Tahan).

Ecol. In hill forest, on mossy or exposed ridges, 1300–1500 m. *Fl.* Febr.–March, *fr.* Oct. In elfin forest noted to assume a fastigiate habit. Flowers often in part ramiflorous.

38. Symplocos multibracteata NOOT. Leid. Bot. Ser. 1 (1975) 241. — **Fig. 19.**

Small shrub, $^3/_4$–$1^1/_4$ m, or treelet to 4 m. Twigs densely appressedly to patently (softly) pilose to nearly glabrous. *Leaves* acuminate with rounded to cordate base and glandular denticulate to dentate margin, elliptic to ovate, 5–14 by $2^1/_2$–$5^1/_2$ cm; nerves 7–13 pairs, meeting in a looped intramarginal vein; petiole 2–10 mm. *Flowers* in a reduced spike of at most 2 cm, usually only 1 (subterminal) flower left, sometimes another flower present in bud, axis glabrous. Bracts many, appressedly pubescent, 4–8 cm. *Calyx* divided into the appressedly pubescent 3–5 mm long lobes. *Corolla* 5–8 mm. *Stamens* 80 to more than 150. Disk softly pilose. *Ovary* glabrous, 2–3 mm high; style glabrous, to $2^1/_2$ mm long. *Fruit* obliquely ovoid to ellipsoid to spindle-shaped, 17–22 by 8–10 mm. *Seed* 1, filling the whole stone, with the embryo straight or slightly curved.

Distr. *Malesia:* East New Guinea (W. & E. Highlands).

Ecol. Montane rain-forest and depleted *Castanopsis-Nothofagus* forest, 2000–2300 m. *Fl.* July, Sept., *fr.* Aug., Jan.

Vern. *Chandujant*, Wabag, Enga lang.

39. Symplocos nivea BRAND, Pfl. R. Heft 6 (1901) 36; K. & G. J. As. Soc. Beng. 74, ii (1906) 234; RIDL. Fl. Mal. Pen. 2 (1923) 300; NOOT. Leid. Bot. Ser. 1 (1975) 241.

Tree to 18 m. Twigs glabrous. *Leaves* acuminate with cuneate, attenuate base and entire to obscurely undulate-crenate margin, glabrous, (narrowly) elliptic, 7–11 by 2–$4^1/_2$ cm; nerves 5–8 pairs, meeting in an intramarginal vein 2–5 mm from the margin; petiole 7–10 mm. *Flowers* in a panicle of racemes, axis villous. Bracts and bracteoles glabrous, soon caducous, $2^1/_2$–3 and *c.* $2^1/_2$ mm long respectively. Pedicel pubescent, to 5 mm long. *Calyx* glabrous, $2^1/_2$–3 mm, the lobes 1–2 mm long, becoming longer by tearing apart. *Corolla c.* 5 mm. *Stamens* more than 100. Disk 5-glandular, with the broadly conical style base soft hairy. *Ovary* glabrous, *c.* 1 mm high; style glabrous, *c.* 5 mm. *Fruit* not known.

Distr. *Malesia:* Malay Peninsula (Penang, Johore), 2 collections.

Ecol. Hill rain-forest.

Note. Closely allied to *S. pyriflora* RIDL., differing in the number of nerves and with shorter corolla. May in future prove to be conspecific.

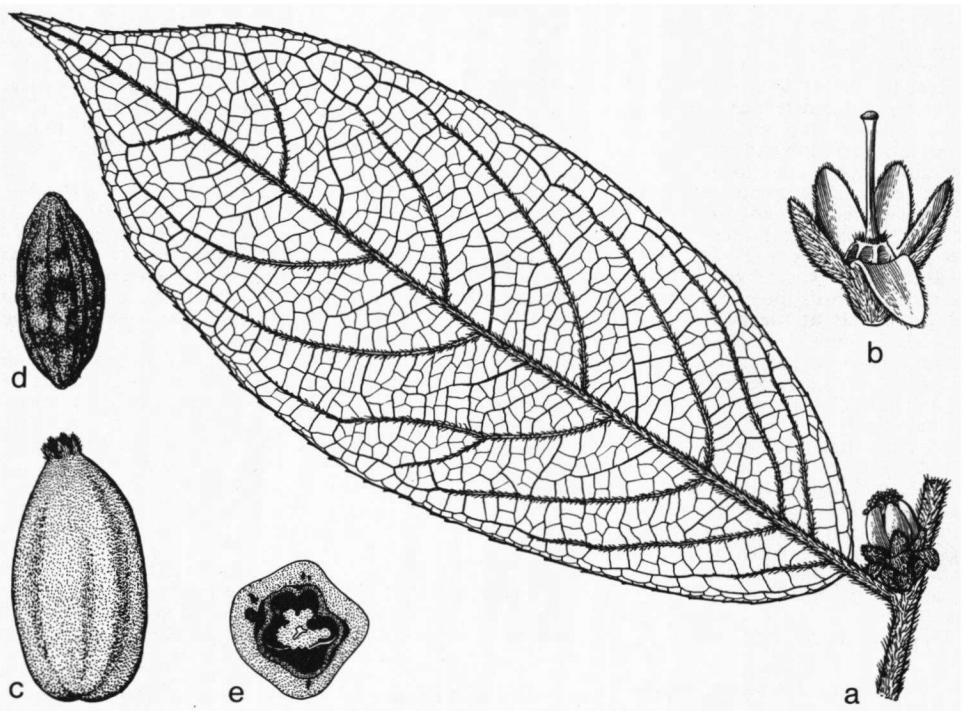

Fig. 19. *Symplocos multibracteata* NOOT. a. Leaf and flower, nat. size, b. deflorated flower, showing 5-lobed hairy disk, c. fruit, d. endocarp, e. fruit in CS, all × 2 (*a–b* HOOGLAND 5882, *c–e* HOOGLAND 5887).

40. Symplocos obovatifolia MERR. Philip. J. Sc. 12 (1917) Bot. 290; En. Philip. 3 (1923) 300; NOOT. Leid. Bot. Ser. 1 (1975) 242. — **Fig. 7.**

Twigs glabrous. *Leaves* glabrous, rounded or shortly acuminate with cuneate, attenuate base and entire or glandular denticulate apex, obovate, $7^1/_2$–11 by $3^1/_2$–6 cm; nerves 7–9 pairs, meeting in a looped intramarginal vein; petiole 7–12 mm. *Flowers* in a fascicle or short spike to $1^1/_2$ cm, axis glabrous. Bracts and bracteoles glabrous, persistent, 2–3 mm. Only fruits seen. *Calyx* 3-lobed, glabrous, elliptic, rounded, *c.* 2 mm. Disk glabrous, style base shortly pilose. *Fruit* (obliquely) ellipsoid, *c.* 11 by 5 mm, the persistent calyx not included; stone smooth, 3-celled. *Seed* 1 in each cell, straight with straight embryo.

Distr. *Malesia:* Philippines (Luzon, Mt Umingan, Nueva Ecija), 2 collections.

Ecol. Hill rain-forest. *Fr.* Aug.–Sept.

41. Symplocos odoratissima (BL.) CHOISY *ex* ZOLL. Syst. Verz. 2 (1854) 136; MIQ. Fl. Ind. Bat. 1, 2 (1859) 468; GÜRKE in E. & P. Nat. Pfl. Fam. 4, 1 (1891) 170; K. & V. Bijdr. 7 (1900) 148, *incl. var. aluminosa* K. & V. *l.c.* 150; BRAND, Pfl. R. Heft 6 (1901) 35, *incl. var. divaricata* BRAND; K. & G. J. As. Soc. Beng. 74, ii (1906) 233; KOORD. Atlas 2 (1914) t. 382; RIDL. Fl. Mal. Pen. 2 (1923) 299; S. MOORE, J. Bot. 63 (1925) Suppl. 65, *incl. var. leptocarpa* S. MOORE; HEYNE, Nutt. Pl. (1927) 1263; BURK. Dict. 2 (1935) 112; BACK. & BAKH. *f.* Fl. Java 2 (1965) 205; NOOT. Leid. Bot. Ser. 1 (1975) 245. — *Dicalyx odoratissimus* BL. Bijdr. (1826) 1116. — *Eugeniodes odoratissima* O. K. Rev. Gen. Pl. 2 (1891) 975.

For further synonyms see under the varieties.

Tree (shrub) to 30 m high and 50 cm ⌀. Twigs glabrous or tomentellous to tomentose or pubescent. *Leaves* glabrous or pubescent beneath, especially on midrib and nerves, with blunt, usually acuminate apex, acute to rarely rounded base and entire or mostly crenulate or dentate margin, (narrowly) elliptic to obovate, 7–20(–40) by (2$^1/_2$–)5–10(–20) cm; nerves 5–13(–16) pairs; petiole stout, 1–5 cm. *Flowers* mostly many in a 5–30 cm long panicle which is sometimes only branched towards the base, the axes rusty tomentellous. Bracts at the base of the 3–7 mm long pedicel, 3–5 mm, bracteoles directly under each flower, both tomentellous on both surfaces, caducous. *Calyx* tomentellous, the lobes blunt, $^1/_2$–$1^1/_2$ mm. *Corolla* usually tomentellous, at least in bud, rarely nearly glabrous, 5–8 mm. *Stamens* more than 100. Disk hairy with 5 conspicuous glands. *Ovary* with same indument as calyx, $1^1/_2$–$2^1/_2$ mm high; style pilose towards the conical base, about as long as the corolla. *Fruit* glabrous or tomentellous, (obliquely) ovoid (or rarely narrowly flask-shaped, pear-shaped or globular), more or less narrowed towards the apex, 8–25 by 5–20 mm; stone with *c.* 5(–10) ridges. *Seeds* curved, with curved embryo.

Distr. Throughout *Malesia*, except New Guinea.

KEY TO THE VARIETIES

1. Twigs mostly glabrous. Leaves 7–23 cm long. Fruit 8–15(–20) by 5–10 mm. **a. *var.* odoratissima**
1. Twigs mostly patently pilose, pubescent or tomentose. Leaves 15–27 cm long. Fruit 17–25 by 12–20 mm . . . . . **b. *var.* wenzelii**

a. *var.* odoratissima. — *Cf.* NOOT. Leid. Bot. Ser. 1 (1975) 247. — *Dicalyx odoratissimus* BL. Bijdr. (1826) 1116. — *Dicalyx aluminosus* (LOUR.) BL. *l.c.* 1117, *p.p.* — *S. ciliata* PRESL, Rel. Haenk. 2 (1831) 61; F.-VILL. Nov. App. (1880) 127. — *S. patens* PRESL, Rel. Haenk. 2 (1831) 61; F.-VILL. Nov. App. (1880) 127; BRAND, Pfl. R. Heft 6 (1901) 34, *incl. var. ciliata* BRAND, *l.c.* 35; Philip. J. Sc. 3 (1908) Bot. 4, *incl. f. ciliata* BRAND, *l.c.* 5 *et f. elmeri* BRAND, *l.c.* 4; MERR. En. Philip. 3 (1923) 301. — *S. repandula* MIQ. Fl. Ind. Bat. Suppl. 1 (1861) 474. — *S. racemosa* (*non* ROXB.) F.-VILL. Nov. App. (1880) 127. — *S. spicata* (*non* ROXB.) F.-VILL. *l.c.* 127; VIDAL, Sinopsis Atlas (1883) t. 64. — *S. villarii* VIDAL, Rev. Pl. Vasc. Filip. (1886) 178, *excl. syn. Guettarda polyandra* BLANCO, *nom. illeg.* — *S. pseudospicata* VIDAL, *l.c.* 179. — *Pygeum grandiflorum* KING, J. As. Soc. Beng. 66, ii (1897) 228; *cf.* KALKMAN, Blumea 13 (1965) 107. — *S. aluminosa* BRAND, Pfl. R. Heft 6 (1901) 35. — *S. polyandra sens.* BRAND, *l.c.* 36, *quoad descr. et syn. Vidal.* — *S. floridissima* BRAND, *l.c.* 35; Philip. J. Sc. 3 (1908) Bot. 5; *ibid.*, 7 (1912) Bot. 32; MERR. En. Philip. 3 (1923) 298. — *S. elmeri* BRAND in Perkins, Fragm. Fl. Philip. (1904) 36. — *S. pulverulenta* KING & GAMBLE, J. As. Soc. Beng. 74, ii (1906) 234; RIDL. Fl. Mal. Pen. 2 (1923) 300; BURK. Dict. 2 (1935) 112. — *S. floridissima* BRAND *var. serrata* BRAND, Philip. J. Sc. 4 (1909) Bot. 108. — *S. pulgarensis* ELMER, Leafl. Philip. Bot. 5 (1913) 1841; MERR. En. Philip. 3 (1923) 302. — *S. apoensis* ELMER, Leafl. Philip. Bot. 7 (1914) 2319; MERR. En. Philip. 3 (1923) 297. — *S. megabotrys* MERR. Philip. J. Sc. 9 (1914) Bot. 383; En. Philip. 3 (1923) 300. — *S. dagamensis* BRAND in Fedde, Rep. 14 (1916) 324; MERR. En. Philip. 3 (1923) 298. — *S. salix* BRAND in Fedde, Rep. 14 (1916) 325; MERR. En. Philip. 3 (1923) 302. — *S. acuminatissima* MERR. Philip. J. Sc. 11 (June 1916) Bot. 31; En. Philip. 3 (1923) 296. — *Pygeum viride* BAKER *f.* J. Bot. 62 (1924) Suppl. 34; *cf.* KALKMAN, Blumea 13 (1965) 107. — *S. bulusanensis* ELMER, Leafl. Philip. Bot. 10 (1939) 3792, *nom. illeg., angl.* — *S. verdifolia* ELMER, *l.c.* 3793, *nom. illeg., angl.* —**Fig. 7.**

Tree up to 30 m, 50 cm ⌀. Twigs, petioles and underside of leaves mostly glabrous, sometimes however tomentellous, tomentose, or pubescent. Leaves 7–23 by 2–12 cm, in watersprouts up to 40 cm. Fruit with thin, fleshy mesocarp, 8–15 by 5–10 mm, ovoid, or up to 20 mm, flask-shaped. The stone with low ridges.

Distr. Throughout *Malesia*, except New Guinea.

Ecol. Primary and secondary rain-forest, not rarely along river-banks, on sandy river alluvium, in Borneo also on brown sandy soils, black soils, loam and sandstone, from sea-level to 2500 m. *Fl.* Febr.–Nov., *fr.* Aug.–March. Flowers are noted to be fragrant.

Uses. Dayak people extract salt from wood ash. As in other species the bark is used for dyeing purposes and HEYNE *l.c.* even says that for the purpose of obtaining bark and leaves the species is planted by the Sundanese at Tjiamis.

The tree is mainly useful for the inner bark which is commonly sold in the medicinal market in West Java as *kayu* or *kulit sĕriawan*. Decoctions are used against sprue-like diseases; also pounded bark is applied to the gums and young leaves are sometimes eaten or applied externally on mouth and nose. *Obat sĕriawan* is even officially recognized in the Dutch pharmacopeia.

Vern. Sumatra: *sarigintung*, Karo, *tjirupago uding*, Simalur; Java: *ki njatu*, *ki sariawan*, *ki sĕriawan*, S; Borneo: *lisang*, Kinabatangan, Dusun lang., *margaram*, Sangkulirang I.; Bali: *udu*; Talaud: *labah*.

b. *var.* wenzelii (MERR.) NOOT. Leid. Bot. Ser. 1 (1975) 248. — *S. wenzelii* MERR. Philip. J. Sc. 10 (1915) Bot. 282; En. Philip. 3 (1923) 302. — *S. trichophlebia* MERR. Un. Cal. Publ. Bot. 15 (1929) 248. — **Fig. 7.**

Tree up to 26 m, 50 cm ø. Twigs usually patently pilose, pubescent or tomentose. Leaves mostly densely pubescent, 15–27 by 12–20 cm; ridges on the stone up to 4 mm.

Distr. *Malesia:* Borneo (Sarawak and Kalimantan), Philippines (Leyte, once).

Ecol. Primary and secondary rain-forest in the lowland and hills in a variety of conditions: sandy ridges and slopes, calcareous loam, dark red soil, and black soil, near streams. *Fl.* (March) June–Dec., *fr.* (Febr.–May) July. Obviously mature fruits are often noted pale green or white.

Note. Size and shape of leaves are very variable in *S. odoratissima*; *var. wenzelii* possesses the larger and most hairy leaves. The flowers are exactly matching those of *var. odoratissima* and with collections without fruit it is not always possible to decide to which variety they belong.

42. Symplocos ophirensis CLARKE, Fl. Br. Ind. 3 (1882) 579; K. & G. J. As. Soc. Beng. 74, ii (1906) 243; RIDL. Fl. Mal. Pen. 2 (1923) 305; NOOT. Leid. Bot. Ser. 1 (1975) 249, f. 4a–e. — *Eugeniodes ophirense* O. K. Rev. Gen. Pl. 2 (1891) 975. — **Fig. 4a–e.**

For further synonyms see under the infraspecific taxa.

Shrub or tree to 18 m high and 50 cm ø. Twigs glabrous, or sometimes the youngest parts appressedly pubescent. *Leaves* glabrous, except sometimes the very youngest, cuneate or rounded to acuminate, with cuneate base and entire, glandular crenulate to denticulate or serrate margin, elliptic to ovate or obovate, 5–22 by $1^1/_2$–7 cm; nerves 4–13(–16) pairs, anastomosing or meeting in an intramarginal vein; petiole 2–10(–20) mm. *Flowers* in a short raceme, a 3–5-branched panicle of racemes or a spike of 1–3(–6 in Sumatra) cm, rarely only 1–3 flowers together; axis appressedly pubescent to minutely puberulous or nearly glabrous. Bracts and bracteoles caducous or persistent, with same indument as axis, $^1/_2$–$1^1/_2$(–3) mm and slightly shorter than that respectively. *Calyx* with same indument as ovary or less hairy, $^1/_2$–1 ($2^1/_2$–3 in *ssp. cumingiana var. pachyphylla*) mm long. *Corolla* 2–5 mm. *Stamens* 20–60, but more than 75 in *var. pachyphylla*. Disk glabrous to shortly pilose, 5-glandular. *Ovary* mostly with same indument as inflorescence axis, or densely appressedly pubescent, rarely glabrous, *c.* $1^1/_2$ mm high ($2^1/_2$ mm in *var. pachyphylla*); style glabrous to pilose, 3–5(–8) mm. *Fruit* ampulliform, with long neck, to ovoid, rarely ellipsoid or cylindrical; stone with coarse surface, low lengthwise ridges, or high, interrupted ridges and then with hollow base, filled with fleshy mesocarp. *Seed* 1, embryo obscurely S-shaped, curved with an angle of *c.* 90° ± halfway its length, or twice screw-like curved.

Distr. *Malesia:* Central West Sumatra (incl. Lingga Is.), Malay Peninsula, Borneo, Celebes, and throughout the Philippines.

KEY TO THE INFRASPECIFIC TAXA

1. Twigs densely appressedly pubescent or tomentose . **1. *ssp.* ophirensis b. *var.* densireticulata**
1. Twigs glabrous or sparsely fine-hairy.
2. Fruit ampulliform, with long neck. Ovary $1^1/_2$ mm high. Calyx lobes *c.* $^1/_2$ mm long. Corolla 2–3 mm. Disk globose or annular, shortly pilose . . . . . **2. *ssp.* perakensis**
3. Terminal buds glabrous. Secondary veins forming a rather coarse reticulation with the slightly less prominent veins. Inflorescence a many-flowered panicle of racemes, 1–4 cm long. Style shortly pilose for its whole length. **c. *var.* perakensis**
3. Terminal buds glabrous. Secondary veins prominent, forming a fine reticulation with the faintly prominent tertiary veins. Inflorescence a 1–3-flowered raceme, up to 1 cm. Style pilose only towards its base. **d. *var.* lingaensis**
3. Terminal buds pubescent. Secondary and tertiary veins much prominent, forming a fine reticulation with the often also prominent quaternary veins. Style glabrous. **e. *var.* sumatrana**
2. Fruit ovoid, ellipsoid, or cylindrical. Ovary $1^1/_2$(–$2^1/_2$) mm high. Calyx lobes $^1/_2$–1(–$1^1/_2$) mm long. Corolla 3–5 mm. Disk 5-glandular, glabrous or sparsely hairy.
4. Fruit ovoid to cylindrical; stone with shallow lengthwise grooves. Seed ovoid, with small, nearly straight embryo. Disk sparsely hairy. Reticulation beneath very dense. **1. *ssp.* ophirensis a. *var.* ophirensis**
4. Fruit ovoid, ellipsoid, or rarely cylindrical; stone with high, interrupted ridges. Seeds ovoid to horse-shoe-shaped, embryo curved, or twice screw-like curved. Disk glabrous, rarely with some hairs. Reticulation beneath either very fine or coarse **3. *ssp.* cumingiana**
5. Inflorescence a raceme. Ovary $1^1/_2$ mm. Calyx lobes $^1/_2$–1 mm. Corolla 3–$4^1/_2$ mm. Stamens 20–60 . . . **f. *var.* cumingiana**
5. Inflorescence a spike. Ovary $2^1/_2$ mm. Calyx lobes *c.* $1^1/_2$ mm. Corolla *c.* 5 mm. Stamens more than 75 . . . . **g. *var.* pachyphylla**

1. *ssp.* ophirensis. — *Cf.* NOOT. Leid. Bot. Ser. 1 (1975) 252. — *S. ophirensis* CLARKE, Fl. Br. Ind. 3 (1882) 579.

For the description see the species.

a. *var.* ophirensis. — **Fig. 7.**

Shrub $1^1/_2$ m, or small tree to 6 m. Leaves acuminate or rounded, (narrowly) elliptic, $5^1/_2$–$9^1/_2$ (–$11^1/_2$) by $1^1/_2$–$4^1/_2$(–6) cm; nerves 5–6 pairs,

meeting in a looped intramarginal vein; petiole only with faint ridges towards the blade. Racemes up to 10 mm, from the axils of the upper leaves or from wood. Bracts caducous or persistent. Pedicels 1–3 mm. Calyx lobes $^1/_2$–1 mm. Corolla 3–5 mm. Stamens 25–60. Disk usually sparsely hairy. Ovary $1^1/_2$ mm high; style glabrous, $3^1/_2$–5 mm. Fruit ovoid to cylindrical, 6–12 by 4–5 mm. Seed ovoid, with small, nearly straight embryo.

Distr. *Malesia:* Malay Peninsula (Perak, Selangor, Johore).

Ecol. Montane forest, bush-like, on granite, 1200–1500 m. *Fl.* July–Sept., *fr.* Aug. Young leaves black purple.

b. *var.* **densireticulata** NOOT. Leid. Bot. Ser. 1 (1975) 252.

Small, bushy treelet, 2–4 m. Twigs (appressedly) pubescent to tomentose. Leaves cuneate to acuminate with cuneate to cordate base, $3^1/_2$–11 by $1^1/_2$–$4^1/_2$ cm; nerves 6–9 pairs, anastomosing or meeting in an intramarginal vein; petiole 2–9 mm. Flowers in a short raceme to *c.* 3 cm; axis pubescent. Bracts and bracteoles pubescent, soon caducous, 2 and 1 mm long respectively. Calyx pubescent, 1–$1^1/_2$ mm long, the lobes ± triangular, *c.* 1 mm. Corolla 2–$2^1/_2$ mm. Stamens delicate, *c.* 40. Disk inconspicuous, pilose. Ovary pubescent, 1 mm high; style glabrous, *c.* 2 mm. Fruit pubescent, ellipsoid, 5–8 by 4–5 mm; stone smooth. Seed not seen.

Distr. *Malesia:* Malay Peninsula (Pahang: Cameron Highlands) and S. Celebes, in both areas 2 collections each.

Ecol. Montane forest, 1400–2500 m. *Fl.* Sept.

2. *ssp.* **perakensis** (K. & G.) NOOT. Leid. Bot. Ser. 1 (1975) 254. — *S. perakensis* KING & GAMBLE, J. As. Soc. Beng. 74, ii (1906) 241; RIDL. Fl. Mal. Pen. 2 (1923) 304; BURK. Dict. (1935) 2114. — *S. caudata* (*non* WALL. *ex* G. DON) RIDL. Fl. Mal. Pen. 2 (1923) 304.

Tree to 18 m high and 50 cm ⌀. Leaves faintly acuminate to caudate with cuneate base, (narrowly) elliptic, 5–12 by 2–$4^1/_2$ cm; nerves 4–7 pairs, except in *var. sumatrana* meeting in a looped intramarginal vein; petiole 3–9 mm, not winged. Flowers in a (basally) 3–5-branched very slender panicle of racemes, a raceme, or in *var. lingaensis* only 1–3 flowers in each inflorescence. Bracts and bracteoles persistent, minute. Pedicels 1–4 mm. Calyx divided into semiorbicular *c.* $^1/_2$ mm long lobes. Corolla 2–3 mm. Stamens 30–50. Disk shortly pilose. Ovary $^1/_2$–1 mm high; style pilose to glabrous. Fruit ampulliform, *c.* 7 by 5 mm, with long beak; stone with coarse surface, the inner wall of the stone following the grooved surface of the deeply ruminate cerebrum-like seed; embryo curved with an angle of not yet 90°.

Distr. *Malesia:* Sumatra, Malay Peninsula, and the Philippines.

c. *var.* **perakensis.** — *Cf.* NOOT. Leid. Bot. Ser. 1 (1975) 255, f. 4a–c. — *S. fragrans* ELMER, Leafl. Philip. Bot. 2 (1908) 508; BRAND, Philip. J. Sc. 7 (1912) Bot. 33; MERR. En. Philip. 3 (1923) 299. — **Fig. 4a–c, 7.**

Leaves 5–11 by 2–$4^1/_2$ cm; petiole 3–6 mm. Flowers in a many-flowered panicle of racemes of 1–4 cm. Calyx and ovary appressedly pubescent; style shortly pilose for its whole length.

Distr. *Malesia:* Malay Peninsula and the Philippines (Negros, once).

Ecol. Primary lowland and montane forest, hillsides, bamboo forest, 60–1500 m. *Fl.* April–July, Sept., *fr.* Nov.

d. *var.* **lingaensis** NOOT. Leid. Bot. Ser. 1 (1975) 255.

Leaves narrowly elliptic with caudate apex, 7–12 by 2–$3^1/_2$ cm; petiole *c.* 5 mm. Flowers in a 1–3-flowered raceme to 1 cm. Calyx and ovary minutely puberulous; style pilose only towards its base. Fruit unknown.

Distr. *Malesia:* Sumatra (Lingga Arch.). Only known from the type.

e. *var.* **sumatrana** NOOT. Leid. Bot. Ser. 1 (1975) 256.

Leaves faintly acuminate, narrowly elliptic, 6–10 by 2–3 cm; nerves 4–5 pairs; petiole 4–9 mm. Flowers in a lax panicle or raceme of $1^1/_2$–6 cm. Calyx and ovary minutely appressedly pubescent; style glabrous. Fruit not known.

Distr. *Malesia:* Central West Sumatra.

Ecol. Montane forest, 900–1300 m.

3. *ssp.* **cumingiana** (BRAND) NOOT. Leid. Bot. Ser. 1 (1975) 253. — *S. cumingiana* BRAND, Pfl. R. Heft 6 (1901) 58.

Shrub or small tree to 6 m. Leaves ± elliptic, 6–22 by 3–7 cm; nerves 6–13(–16) pairs; petiole 1–10(–20) mm, narrowly winged, except to its very base. Flowers in a 3(–5) cm long often branched raceme or spike. Pedicels 0–3 mm. Calyx $^1/_2$–1 (–$1^1/_2$) mm long. Corolla 3–5 mm. Disk 5-glandular, glabrous, rarely with some hairs. Ovary $1^1/_2$(–$2^1/_2$) mm high. Fruit ovoid, ellipsoid or rarely cylindrical, 5–12 by 3–8 mm; stone with high, interrupted ridges which often protrude from the base, enclosing some fleshy mesocarp. Seed ovoid to horse-shoe-shaped, embryo curved with an angle of about 90° to twice screw-like curved.

Distr. *Malesia:* Borneo, Philippines and Celebes.

f. *var.* **cumingiana.** — *Cf.* NOOT. Leid. Bot. Ser. 1 (1975) 253, f. 4d–e, pl. 20a–e. — *S. cumingiana* BRAND, Pfl. R. Heft 6 (1901) 58; Philip. J. Sc. 3 (1908) Bot. 8; *ibid.* 7 (1912) Bot. 34; MERR. En. Philip. 3 (1923) 297; H. HEINE, Pfl. Samml. Clemens Kinabalu (1953) 87. — *S. curtiflora* ELMER, Leafl. Philip. Bot. 2 (1908) 509; MERR. En. Philip. 3 (1923) 298. — *S. angularis* ELMER, Leafl. Philip. Bot. 2 (1908) 510. — *S. purpurascens* BRAND, Philip. J. Sc. 7 (1912) Bot. 33; MERR. En. Philip. 3 (1923) 302. — *S. minutiflora* ELMER, Leafl. Philip. Bot. 7 (1914) 2320; MERR. En. Philip. 3 (1923) 300. — *S. agusanensis* ELMER, Leafl. Philip. Bot. 7 (1914) 2321. — *S. elliptifolia* MERR. Philip. J. Sc. 12 (1917) Bot. 292; En. Philip. 3 (1923) 298. — *S. brachybotrys* MERR. Philip. J. Sc. 14 (1919) 447, *non* MERR. 1917; En. Philip. 3 (1923) 297. — *S. ilocana* MERR. Philip. J. Sc. 35 (1928) 7. — **Fig. 4d–e, 7.**

Shrub $1^1/_2$ m or small tree to 12 m, once even 30 m and 50 cm ⌀. Leaves ± elliptic, 6–18 by 3–7 cm; nerves 6–13(–16) pairs, usually meeting in a looped intramarginal vein; petiole 3–10(–15)

mm. Racemes to 3(–5) cm long. Bracts and bracteoles usually very small, caducous or persistent. Pedicels 1–3 mm. Calyx $^1/_2$–1 mm, pubescent. Corolla 3–4$^1/_2$ mm. Stamens 20–60. Ovary 1$^1/_2$ mm high. Fruit 5–12 by 3–7 mm, ripe purple-blue.

Distr. *Malesia:* Borneo, Philippines, Celebes.

Ecol. Mostly in the mountain forest, on hillsides in oak-*Podocarpus* forest, largely between 1000 and 3000 m, but on Mt Kinabalu once found as high as 3700 m (sterile), and once collected in lowland Dipterocarp forest at 300 m in the Sierra Madre Mts (Luzon), a very common species in the Philippines. Flowers (once) noted to be faintly fragrant. *Fl.* May–Dec., *fr.* March–Oct.

g. *var.* pachyphylla (MERR.) NOOT. Leid. Bot. Ser. 1 (1975) 254. — *S. pachyphylla* MERR. Philip. J. Sc. 10 (1915) Bot. 283. — **Fig. 7.**

Small tree, 6 m. Leaves 10–20 by 6–8$^1/_4$ cm; nerves *c.* 10 pairs; petiole 10–20 mm. Flowers in a spike. Bracts and bracteoles appressedly pubescent, 2$^1/_2$ and 3 mm long respectively. Calyx densely appressedly pubescent, divided into *c.* 1$^1/_2$ mm long lobes. Corolla *c.* 5 mm. Stamens more than 75, up to 9 mm. Disk glabrous, 5-glandular. Ovary glabrous, 2$^1/_4$ mm high; style glabrous, *c.* 8 mm. Fruit ovoid, *c.* 10 by 6–8 mm, the stone as in *var. cumingiana*, but several ridges totally lacking in the upper half, *c.* 7 by 5–6 mm. Seed ovoid or curved, and then as the embryo with an angle of about 90° beneath the middle.

Distr. *Malesia:* Philippines (Leyte and Mindanao), 2 collections.

Ecol. Hill forest, *c.* 500 m. *Fl.* Sept.

43. Symplocos paucistaminea F.V.M. & F. M. BAILEY, 3rd Suppl. Syn. Queensl. Fl. (1890) 46; F. M. BAILEY, Queensl. Fl. 3 (1900) 967; NOOT. Leid. Bot. Ser. 1 (1975) 262. — **Fig. 7.**

Tree 18 m, 45 cm ⌀. Twigs densely spreadingly pubescent to tomentose. *Leaves* acuminate, with acute to rounded base and dentate margin, sparsely pubescent above and beneath, elliptic to obovate, 8–20 by 3–8 cm; nerves 7–12 pairs, meeting in a looped intramarginal vein; petiole 5–10 mm. *Flowers* in a basally branched spike to 5 cm long, becoming longer in fruit; axis sparsely brown hairy. Bracts and bracteoles persistent, spreadingly hairy, *c.* 2 and *c.* 1$^1/_2$ mm respectively. *Calyx* divided into glabrous *c.* 1 mm long lobes, the lobes tomentose. *Corolla c.* 2$^1/_2$ mm. *Stamens c.* 10 to 60. Disk glabrous or pilose. *Ovary* glabrous, *c.* $^3/_4$ mm high; style glabrous, *c.* 1$^1/_2$ mm. *Fruit* ampulliform, *c.* 6 by 4 mm, stone ampulliform with globose, lengthwise grooved belly and narrow cylindrical neck, 1-celled. *Seed* 1, filling the whole stone, with the embryo twice curved.

Distr. Queensland and *Malesia* (New Guinea: Milne Bay Distr.: Mt Suckling, two collections).

Ecol. Lowland rain-forest at 360 m. *Fl.* July.

44. Symplocos polyandra (BLANCO) BRAND, Pfl. R. Heft 6 (1901) 436, *quoad syn. Blanco, excl. descr. et stirp.*; MERR. Sp. Blanc. (1918) 304; En. Philip. 3 (1923) 301; STEEN. Bull. Bot. Gard. Btzg III, 12 (1932) 170, f. 5; NOOT. Leid. Bot. Ser. 1 (1975) 264. — *Guettarda polyandra* BLANCO, Fl. Filip. ed. 2 (1845) 500; ed. 3 (1879) 126. — *Carlea oblongifolia* PRESL, Epim. Bot. (1851) 216. — *Baranda angatensis* LLANOS, Mem. Acad. Cienc. Madrid 3, 2 (1857) 502. — *S. oblongifolia* ROLFE, J. Bot. 23 (1885) 214; VIDAL, Phan. Cuming. Philip. (1885) 124; Rev. Pl. Vasc. Filip. (1886) 178; BRAND, Pfl. R. Heft 6 (1901) 55; HALL. *f.* Beih. Bot. Centralbl. 39 B (1921) 94. — *S. superba* BRAND, Pfl. R. Heft 6 (1901) 55. — **Fig. 7.**

Tree up to 30 m, 50 cm ⌀, rarely a shrub. Bark dark, cracked. Twigs puberulous, glabrescent, tapering off towards the apex, thick, at least 5 mm ⌀ beneath the leaves and there usually with many pulvinate leaf-scars. *Leaves* crowded towards the end of the twigs, rounded or cuneate-obtuse at the apex, with cuneate, attenuate base and entire, revolute margin, glabrous (except in innovations and then puberulous), narrowly elliptic to obovate, 9–22 by 2$^1/_2$–7(–9) cm; nerves 11–15 pairs; petiole 2–4 cm. Many *spikes* from old wood beneath the leaves, axis densely rusty appressedly puberulous, glabrescent, 4–15 cm long. Bracts and bracteoles with same indument, persistent under the fruit, 1$^1/_2$–2 mm long. *Calyx* with same indument, becoming glabrous towards the apex, 2–3 mm, the lobes *c.* 2 mm long. *Corolla* 8–10 mm. *Stamens* 50 to more than 100. Disk glabrous, annular, and then surrounding a lower, rarely shortly pilose receptacle, or low pulvinate, only surrounding the glabrous, 7–9 mm long style. *Ovary* with same indument as calyx, c. 2 mm high. *Fruit* ellipsoid, *c.* 10 by 7 mm in vivo; stone rather smooth, with few shallow lengthwise grooves, 8–10 by 4–5 mm (*s.s.* the whole fruit as big as the stone), 3-celled. *Seed* 1 in each cell with straight embryo.

Distr. *Malesia:* Borneo and adjacent islands (Natuna, Banka, Billiton, Karimata, St. Barbe), Philippines (throughout), and SW. Celebes (Makassar: Baleh Angien, once).

Ecol. Secondary and primary forest, almost always on sandstone, granite, kerangas, sandy flats, more rarely on sandy loam, at low altitude, below *c.* 300 m, once found in montane forest (Luzon: Sierra Madre) at 1000–1100 m in low, mixed, primary rain-forest (JACOBS 7840). *Fl.* Sept.–March, *fr.* Febr.–June (July–Oct.). The flowers are faintly fragrant, especially at night.

Vern. *Bungur*, *dutat*, Banka; *sudjèng*, Natuna; Borneo: *merbryot*, Sarawak, *beluno-beluno*, *salambuno*, *temasuk jantan*, Sandakan; Philippines: *ditáman*, *rapo-rápo*, Tag., *balakbák*, *balakbákan*, *bangkunai*, *mankónai*, P.Bis., *buli-búli*, *malabúli*, *ribúli*, Pang., *dilangi-báka*, Sbl.

45. Symplocos pulvinata NOOT. Leid. Bot. Ser. 1 (1975) 269. — **Fig. 7.**

Sparsely foliaged tree, 12–18 m high. Twigs thick, at least 5 mm. *Leaves* coriaceous, glabrous, acute or faintly acuminate with cuneate base and glandular crenate or dentate margin, obovate, 12–21 by 4$^1/_2$–10$^1/_2$ cm; nerves 8–12 pairs; petiole stout, 1$^1/_2$–2$^1/_2$ cm. *Spike* glabrous, *c.* 3 cm. Bracts and bracteoles probably persistent, glabrous, 5–7 and *c.* 4 mm long respectively (older flowers often fallen including bracts and bracteoles, leaving conspicuous pulvinate light coloured scars on the dark axis). *Calyx* glabrous, *c.* 3 mm, divided in 5, 2–2$^1/_2$ mm long lobes. In some flowers corolla and stamens absent or obsolete, in other flowers

corolla 5 mm, 3(–4)-lobed and *stamens* 20–35. Disk glabrous. *Ovary* glabrous, oblique, 1–1¹/₂ mm at one, *c.* 2 mm at the other side; style glabrous, 6 mm. *Fruit* ovoid, deeply violet, *c.* 13 by 6–8 mm; stone with rather high lengthwise ridges in the basal and low ridges in the apical half, in the middle a deep transverse groove, 1-celled. *Seed* 1, uncinately curved towards the base with curved embryo.

Distr. *Malesia:* East New Guinea (Koitaki and Normanby I.), 2 collections.

Ecol. Under open canopy of tall forest, 450–825 m. *Fl.* Febr.

46. Symplocos pyriflora RIDL. J. Fed. Mal. St. Mus. 6 (1915) 159; Fl. Mal. Pen. 2 (1923) 307. — *S. bakeri* SYMINGTON, J. Mal. Br. R. As. Soc. 14 (1936) 356, t. xx. — Fig. 7.

Shrub or small to medium-sized tree. Twigs often stout, glabrous. *Leaves* glabrous, mostly faintly acuminate with cuneate or rounded base and undulate to crenate margin, elliptic, 5–15 by 2–2³/₄ cm; nerves 9–14 pairs, meeting in an intramarginal vein 2–4 mm from the margin; petiole stout, 3–10 mm. *Flowers* in a subterminal, rarely terminal, raceme or panicle of racemes; axis pubescent to glabrous. Bracts and bracteoles glabrous, soon caducous, *c.* 8 and *c.* 5 mm long respectively. Pedicel at most 3 mm. *Calyx* glabrous, 3–5 mm, sometimes becoming symmetric by tearing; lobes 2–3 mm, becoming longer by tearing apart. *Corolla* 8–10 mm. *Stamens c.* 100 or more. Disk 5-glandular, included the conical style base glabrous or soft hairy. Ovary glabrous, 1¹/₂–2 mm high; style glabrous, *c.* 5 mm. *Fruit* ellipsoid, *c.* 15 by 8 mm; stone smooth or with faint ridges, 1-celled. *Seeds* not seen, but probably with straight embryo.

Distr. *Malesia:* Malay Peninsula (Pahang: G. Tahan; Kuantan: G. Tapis), two collections.

Ecol. Montane rain-forest, 1400–1650 m. *Fl.* June.

Note. Closely allied to *S. nivea*, see there.

47. Symplocos robinsonii RIDL. J. Fed. Mal. St. Mus. 8 (1917) 60; NOOT. Leid. Bot. Ser. 1 (1975) 276.

Twigs tomentose, dark brown pubescent or (sparsely) appressedly pubescent or puberulous, glabrescent. *Leaves* sparsely long pubescent, appressedly fine dark-pilose or sparsely appressedly minutely pilose, glabrescent beneath, acute or acuminate with acute base and dentate, denticulate or crenulate margin, narrowly to broadly elliptic, 3–9¹/₂ by 1¹/₂–4 cm; nerves 7–14 pairs. *Flowers* in an often branched raceme to 1, 2 or 4 cm; axis pubescent or appressedly puberulous. Bracts and bracteoles caducous, with same indument as axis, 1–2 and ³/₄ to 1¹/₂ mm respectively. Pedicel to 2 or 3(–4) mm long. *Calyx* pubescent to puberulous, often less hairy than ovary, 1–2 mm, the lobes ¹/₂–1¹/₂ mm. *Corolla* 4–5 mm. *Stamens* 25–55. Disk with some hairs or shortly pilose, often the indument hardly visible. *Ovary* with same indument as calyx or more hairy; style glabrous, or the base shortly pilose. *Fruit* ellipsoid, 7–10 by 3–6 mm; stone inconspicuously lengthwise grooved, 3-celled. *Seeds* 1–3, straight with straight embryo.

Distr. *Malesia:* Sumatra.

KEY TO THE VARIETIES

1. Twigs tomentose . . . . . **a. *var.* robinsonii**
1. Twigs not tomentose.
2. Inflorescence to 4 cm long. Leaves 3–6 by 2–4 cm (index 1¹/₄–2¹/₄) . . . . **b. *var.* latifolia**
2. Inflorescence 1–2 cm long.
3. Twigs densely dark-brown pubescent. Leaves 4–6¹/₂ by 1¹/₂–3¹/₂ cm (index 1³/₄–2³/₄). **c. *var.* pilosa**
3. Twigs sparsely appressed-pubescent or puberulous. Leaves 5–9¹/₂ by 2–3 cm (index 2¹/₄–3¹/₂) . . . . . **d. *var.* angustifolia**

a. *var.* robinsonii. — *Cf.* NOOT. Leid. Bot. Ser. 1 (1975) 277. — Fig. 7.

Twigs tomentose. Leaves sparsely long-pubescent, especially on midrib and nerves beneath, ± elliptic, 4¹/₂–9 by 2–3³/₄ cm; nerves 7–9 pairs; petiole 7–10 mm. Raceme to 2 cm, axis rusty pubescent. Bracts and bracteoles appressedly pubescent, 1¹/₂ and 1 mm long respectively. Pedicel to 3 mm. Calyx appressedly pubescent, *c.* 1 mm, the ± ovate lobes ³/₄–1 mm long. Corolla *c.* 4 mm. Stamens 25–40. Disk with some hairs. Ovary appressedly pubescent, *c.* 1¹/₂ mm high; style with conical base, glabrous. Fruit 7 by 3 mm; stone 3-celled.

Distr. *Malesia:* Sumatra (Westcoast: G. Kerintji).

Ecol. *Gleichenia* woodland in mountain forest, 2200–2500 m. *Fl.* May, Aug.

b. *var.* latifolia NOOT. Leid. Bot. Ser. 1 (1975) 277. — Fig. 7.

Treelet 6 m. Twigs (sparsely) appressedly pubescent, glabrescent. Leaves sparsely minutely appressedly pilose beneath, especially on midrib and nerves, or glabrous, shortly acuminate, 3–6 by 2–4 cm; nerves 7–8 pairs; petiole 4–7 mm. Raceme branched, to 4 cm; axis (sparsely) appressedly puberulous. Bracts and bracteoles ovate, 1–1¹/₂ mm. Pedicel to 3(–4) mm. Calyx sparsely appressedly puberulous, 1¹/₄–2 mm long, the ± semi-orbicular lobes 1–1¹/₄ mm long. Corolla *c.* 5 mm. Stamens 35–55. Disk with the conical style base pilose. Ovary with same indument as calyx, *c.* 1¹/₄ mm high; style glabrous, *c.* 4 mm. Fruit *c.* 10 by 6 mm, blue-black. Seeds 1–3.

Distr. *Malesia:* northern half of Sumatra (Gajo Lands: G. Losir; Westcoast: G. Kerintji).

Ecol. In dense ericoid shrub-forest, 2000–3000 (–3400) m. *Fl.* May–Aug. Flowers scentless.

c. *var.* pilosa NOOT. Leid. Bot. Ser. 1 (1975) 278.

Twigs densely dark brown pubescent. Leaves appressedly fine dark pilose beneath, especially on midrib and nerves, acute to acuminate, ± elliptic, 4–6¹/₂ by 1¹/₂–3¹/₂ cm; nerves 7–10 pairs; petiole 5–7 mm. Raceme to 1 cm; axis appressedly brown pubescent. Bracts and bracteoles with same indument, 1¹/₂–2 and 1–1¹/₂ mm respectively. Pedicel to 2 mm. Calyx sparsely fine puberulous, *c.* 1¹/₂ mm, the lobes semi-elliptic to ovate, *c.* 1 mm long. Corolla 4–5 mm. Stamens 30–45. Disk minutely pilose, hairs sometimes very inconspicuous. Ovary appressedly fine puberulous, 1¹/₄–1¹/₂ mm high; style glabrous, 4–5 mm.

Distr. *Malesia:* Sumatra (Westcoast: G. Merapi and G. Singalang).

Ecol. Subalpine mountain forest, between lava boulders, 2500–2800 m. *Fl.* May–June.

d. *var.* angustifolia NOOT. Leid. Bot. Ser. 1 (1975) 278.

Twigs sparsely appressedly pubescent or puberulous. Leaves sparsely appressedly minutely pilose beneath, acuminate, 5–9 1/2 by 2–3 cm; nerves 9–14 pairs; petiole 5–12 mm. Raceme to 2 cm; axis minutely appressedly puberulous. Bracts and bracteoles with same indument, ovate, *c.* 1 and 3/4 mm respectively. Pedicel to 3 mm. Calyx less hairy than ovary, *c.* 1 mm long, the lobes ovate, 1/2–3/4 mm. Corolla *c.* 4 mm. Stamens *c.* 35. Disk minutely pilose. Style glabrous.

Distr. *Malesia:* Sumatra (Westcoast: G. Ophir = G. Talakmau).

Ecol. Subalpine mountain forest, 1900–2700 m. *Fl.* May.

48. Symplocos rubiginosa WALL. (Cat. 1831, *n.* 4432, *nomen*) *ex* DC. Prod. 8 (1844) 257; MIQ. Fl. Ind. Bat. 1, 2 (1859) 466; CLARKE, Fl. Br. Ind. 3 (1882) 580; BRAND, Pfl. R. Heft 6 (1901) 53; K. & G. J. As. Soc. Beng. 74, ii (1906) 247; RIDL. Fl. Mal. Pen. 2 (1923) 306; NOOT. Leid. Bot. Ser. 1 (1975) 279. — *Lodhra rubiginosa* MIERS, J. Linn. Soc. Bot. 17 (1879) 299. — **Fig. 7.**

Shrub, or tree to 30 m high and 50 cm ø. Twigs tomentose, pubescent, tomentellous or glabrous, rather thick (3–5 mm). *Leaves* sparsely appressedly pilose to more or less densely patently soft-villous beneath, especially on midrib and nerves, usually abruptly acuminate with cuneate base and finely to rather coarsely dentate margin, narrowly elliptic to obovate, 15–45 by 5 3/4–17 cm; nerves 12–17 pairs; petiole thickened, 10–25 mm. *Flowers* in a spike from wood beneath or between the leaves; in bud the inflorescence has the appearance of a short cone; axis pubescent to tomentellous, 1–5(–8) cm. Bracts and bracteoles caducous as soon as the flower matures, ovate, boat-shaped, densely silky-pubescent, 3–5 and 2–3 mm respectively. *Calyx* appressedly puberulous to silky pubescent, often symmetrically torn, 1 1/2–3 mm, the lobes 1/2–2 mm. *Corolla* sparsely (minutely) stiff hairy towards the outer base, 4–5 mm. *Stamens* 60–100. Disk glabrous or sparsely pilose. *Ovary* pubescent to tomentellous or with same indument as calyx, 1–2 mm high; style glabrous or pilose, sometimes with thick conical pilose base. *Fruit* blue *in vivo*, ovoid to ellipsoid, sparsely short pilose to glabrous, 8–10 by 5–8 mm; stone lengthwise grooved, at one side with a deep transverse constriction at 1/4 from the base. *Seed* 1, once or twice and then S-shaped curved due to the constriction of the stone.

Distr. *Malesia:* Sumatra, Malay Peninsula, and Borneo (rare in Kalimantan).

Ecol. Both in the lowland and in the hills, from sea-level to 1800 m, in primary and secondary mixed rain-forest, not rarely in Dipterocarp forest, along streamsides, on kerangas, in *bertam* (*Eugeissona*) ridge forest. *Fl.* Oct.–Dec. (once April), *fr.* Jan.–Dec. Fruit remain white for a long time, then turn through red to light blue when ripe.

Uses. The wood is very hard and used for house-building (BURK. Dict. 1935, 2115).

Vern. Sumatra: *lempaong kantjil*, Palemb.; Malaya: *pemasa*, Sakai lang.; Borneo: *smuak*, Sarawak, Land-Dayak.

49. Symplocos salicioides NOOT. Leid. Bot. Ser. 1 (1975) 280.

Shrub 2 m, with pubescent twigs. *Leaves* faintly acuminate to sharply acute, with cuneate to rounded base, pubescent beneath, narrowly elliptic, 3 1/2–7 by 3/4–1 1/2 cm; nerves 6–8 pairs, rather inconspicuous, meeting in an intramarginal looped vein; petiole 3–4 mm. *Spike* 1-flowered. Bracts and bracteoles pubescent, 2 and 1 mm long respectively. *Calyx* densely pubescent, divided into 1–1 1/4 mm long triangular lobes. *Corolla* 2–2 1/2 mm. *Stamens* 15–20. Disk with the conical style base softly long-hairy. *Ovary* with same indument as calyx, 1 1/4 mm high; style hairy for its lower half, *c.* 2 mm long. *Fruit* long ellipsoid, pubescent, 13 by 5 mm, only seen immature.

Distr. *Malesia:* East New Guinea (Sepik area, once).

Ecol. Lowland rain-forest, 1000 m.

50. Symplocos sumatrana BRAND, Pfl. R. Heft 6 (1901) 62; NOOT. Leid. Bot. Ser. 1 (1975) 283. — **Fig. 7.**

Treelet 3 m. Twigs densely patently red-brown long-hairy or tomentose. *Leaves* softly pilose beneath, acuminate with rounded base and denticulate margin, narrowly elliptic to ovate, 6–14 by 2–4 cm; nerves 7–15 pairs, meeting in a looped much prominent intramarginal vein; petiole 5–7 mm. *Flowers* in a spike or raceme of 2–4 cm; axis brown tomentose or spreadingly hairy. Bracts and bracteoles soon caducous, the first not seen, the latter appressedly long-hairy, *c.* 2 1/2 mm long. *Calyx* divided into 5 appressedly pilose semi-elliptic 2 mm long lobes. *Corolla c.* 5 mm. *Stamens* 45–70. Disk pulvinate, pilose. *Ovary* sericeous, *c.* 1 1/2 mm high; style with some hairs in the lower half, 2–5 mm. *Fruit* ellipsoid, hairy, *c.* 10 by 6 mm; stone lengthwise ribbed, 3-celled, 1, 2 or 3 cells fertile. *Seed* straight with straight embryo.

Distr. *Malesia:* Sumatra (Gajo Lands: Mt Kemiri; Westcoast: Mt Singalang), 2 collections.

Ecol. Ericoid, elfin and subalpine mossy forest, 2700–3000 m. *Fl.* March, June–July. Flowers fragrant.

51. Symplocos sumuntia BUCH.-HAM. *ex* D. DON, Prod. Fl. Nepal. (1825) 145; CLARKE, Fl. Br. Ind. 3 (1882) 578; NOOT. Leid. Bot. Ser. 1 (1975) 284, with full synonymy. — **Fig. 7.**

Low shrub to medium-sized tree. Twigs glabrous or nearly so, dark-coloured. *Leaves* glabrous, acuminate to caudate with attenuate base and glandular dentate margin, ± elliptic, 2–10 by 3/4–4 1/2 cm; nerves 5–8 pairs, meeting in an intramarginal vein; petiole 2–10 mm. *Raceme* few to many-flowered, 1–6 cm long; axis from nearly glabrous to pilose or pubescent. Bracts at base of pedicel, with the bracteoles soon caducous, appressedly hairy, 2–5 and 1/2–4 mm long respectively. Pedicel 1/2–13 mm. *Calyx* glabrous to (sparsely) appressedly hairy, divided into 1/3 to 1 1/2 mm long lobes. *Corolla* 4–8 mm. *Stamens* 25–40. Disk

glabrous. *Ovary* glabrous to shortly sparsely appressedly hairy, 1–2 mm high; style glabrous, 2–11 mm. *Fruit* ovoid to ampulliform, 6–10 by 3–6 mm; stone shallowly (brain-like) grooved. *Seed* curved, embryo once or twice curved.

Distr. Continental Asia (India, Burma, Thailand, Indo-China, China, Hong Kong, Hainan, Formosa, Ryu Kyu Is., Japan, and Korea); in *Malesia:* Malay Peninsula (Pahang: Cameron Highlands and G. Tahan), 3 collections.

Ecol. Montane high forest, 1200–1500 m. *Fl.* Aug.–Oct.

52. Symplocos trichomarginalis NOOT. Leid. Bot. Ser. 1 (1975) 287. — **Fig. 7.**

Shrub 1–4 m. Twigs often zigzag, appressedly brown-pilose. *Leaves* alternate, sparsely appressedly pilose beneath, the midrib and the finely glandular-dentate recurved margin beneath conspicuously densely appressedly brown-pilose, acuminate with cuneate to rounded base, elliptic, 2–3½ by 1¼–1¾ cm; nerves 5–7 pairs; petiole 2–4 mm. *Flowers* solitary, often several brown-pilose bracts indicating the derivation from a more-flowered inflorescence, the 2 uppermost bracts 3–5 by 1–3 mm, persistent. Pedicel from twig to flower up to 1 cm. *Calyx* loosely appressedly pilose, divided into the narrowly elliptic, acute, *c.* 3 mm long lobes. *Corolla c.* 4 mm. *Stamens c.* 50. Disk glabrous. *Ovary* with same indument as calyx, *c.* 1 mm high; style glabrous, *c.* 5 mm. *Fruit* sparsely pilose, ellipsoid to ovoid, green to deep indigo when ripe, 8–9 by *c.* 4 mm; stone narrowly ovoid, muricate with shallow lengthwise grooves. *Seed* 1, embryo straight (only young seeds seen).

Distr. *Malesia:* Borneo (Sabah: Mt Kinabalu).

Ecol. Open places and forest edges, 1500–2400 m. *Fl.* May, *fr.* April.

Note. In habit similar to *S. zizyphoides*, but differing in the veins being obscure and in the long-pilose calyx with narrow triangular lobes being longer than those of that species.

53. Symplocos tricoccata NOOT. Leid. Bot. Ser. 1 (1975) 288. — **Fig. 7.**

Shrub 3 m to small tree to 10 m high, 15 cm ∅. Twigs glabrous. *Leaves* glabrous, yellowish or olive-grey or water-green, sometimes glossy beneath, acuminate, with acute base and dentate to denticulate margin, ± elliptic, 7–29 by 4–9½ cm; nerves 5–10 pairs, meeting in an intramarginal vein; petiole 5–15 mm. *Flowers* in a fascicle or very short spike; axis glabrous, to 5 mm long. Bracts and bracteoles soon caducous, *c.* 1½ mm. Pedicel 0–1 mm. *Calyx* glabrous or with some hairs, *c.* 2 mm long, the lobes 1–1¾ mm. *Corolla* 5–8 mm. *Stamens* 40 to more than 100. Disk 5-glandular, the conical style base with some hairs to softly short-pilose. *Ovary* glabrous, *c.* 2 mm high; style glabrous to 7 mm. *Fruit* narrowly obliquely ellipsoid, 12–16 by 4–6 mm, ± triangular in CS, 3-celled, each cell circular in CS; stone 3-lobed in CS, endocarp thin, woody. *Seed* cylindrical, with straight embryo.

Distr. *Malesia:* Borneo (Sarawak, Sabah, and Kalimantan).

Ecol. Lowland and montane primary rainforest, near streams, on hillsides, in low undulating flat country, on rocky soil, also in Dipterocarp forest, 30–2100 m. *Fl.* Aug.–Nov., Febr., *fr.* Febr.–June, Sept. Fruits often recorded to be whitish, through purple to blue when ripe.

Uses. In Sarawak the wood is said to be used for knife handles.

Vern. Borneo: *atup*, Sarawak, Kenyah lang.

54. Symplocos trisepala MERR. Philip. J. Sc. 12 (1917) Bot. 291; En. Philip. 3 (1923) 302; NOOT. Leid. Bot. Ser. 1 (1975) 289.

Twigs glabrous, but sparsely long-pilose in innovations. *Leaves* sparsely appressedly pilose on the midrib beneath, faintly acuminate, with rounded or subcordate base and glandular denticulate margin, ± elliptic, 5–9 by 2¾–5 cm; nerves 7–9 pairs, meeting in an intramarginal vein; petiole 15–25 mm. *Spike* to 1½ cm; axis glabrous. Bracts and bracteoles persistent, glabrous, ciliate, 3–5 mm. *Calyx* glabrous, divided into three 2½–3 mm long semi-elliptic rounded lobes. *Corolla* 5–6 mm. *Stamens* 40–70. Disk glabrous, but style base hairy. *Ovary* glabrous, 1 mm high; style glabrous. *Fruits* not known.

Distr. *Malesia:* Philippines (Luzon: Mt Umingan, Nueva Ecija), only the type.

Ecol. Montane rain-forest, at least 400 m. *Fl.* Aug.–Sept.

55. Symplocos verticillifolia NOOT. Leid. Bot. Ser. 1 (1975) 290. — **Fig. 7, 20.**

Treelet 7–9 m, 20 cm ∅. Twigs hirsute, glabrescent. *Leaves* in whorls of 4 or 5, sparsely long-pilose beneath, acuminate with cuneate base and glandular denticulate margin, obovate, 6½–11 by 2¾–5 cm; nerves 6–9 pairs, meeting in an intramarginal vein; petiole 8–10 mm. *Flowers* in a reduced axillary fascicle-like spike; axis glabrous, *c.* 3 mm long. Bracts and bracteoles persistent under the flower, 8–10 and *c.* 4 mm long respectively. *Calyx* divided into unequal narrowly triangular appressedly long-hairy 2–4 mm long lobes. *Stamens* 70 to more than 100. Disk pilose. *Ovary* glabrous. *Fruit* ellipsoid to cylindrical, immature whitish, 10–12 by *c.* 5 mm; stone with shallow lengthwise grooves, cylindrical, a little swollen towards both ends, 3-celled but mostly only one cell fertile. *Seed* mostly 1, straight with straight embryo.

Distr. *Malesia:* Philippines (Samar: Mt Cansayao).

Ecol. Lowland Dipterocarp forest, 200 m. *Fr.* April.

56. Symplocos vidalii ROLFE, Kew Bull. (1912) 157; MERR. En. Philip. 3 (1923) 302; NOOT. Leid. Bot. Ser. 1 (1975) 290. — *S. luzoniensis* (*non* ROLFE) BRAND, Pfl. R. Heft 6 (1901) 61, *pro descr. et specim. Vidal 2141.* — *S. cagayanensis* BRAND, Philip. J. Sc. 7 (1912) Bot. 35; MERR. En. Philip. 3 (1923) 297. — **Fig. 7.**

Twigs villous to tomentose. *Leaves* patently soft pilose beneath, acuminate with acute to rounded base and recurved, entire to denticulate margin, ± elliptic, 2¾–8 by 1–3 cm; nerves 7–10 pairs; petiole 5–7 mm. *Flowers* in a lax raceme to 5 cm; axis villous. Bracts and bracteoles linear, villous, at least the latter persistent under the fruit, 2–3 and 1½–2½ mm long respectively. Pedicel 1–2 mm. *Calyx* (appressedly) pilose, wholly divided into the

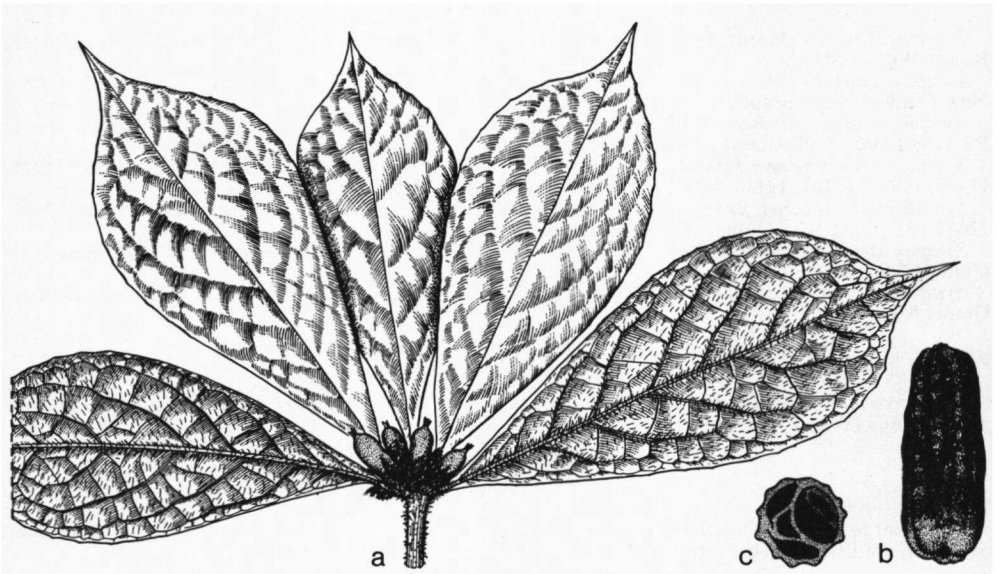

Fig. 20. *Symplocos verticillifolia* NOOT. a. Habit, in fruit, × $^2/_3$, b. endocarp, c. *ditto* in CS, both × 3 (SULIT 14397).

narrowly triangular acute 1–$1^1/_2$ mm long lobes. *Corolla* $2^1/_2$–3 mm. *Stamens* 17–30. Disk glabrous. *Ovary* with same indument as calyx, 1–$1^1/_2$ mm high. *Fruit* cylindrical, *c.* 10 by 3 mm; stone shallowly lengthwise ribbed, 1-celled. *Seed* 1, straight with straight embryo.

Distr. *Malesia:* Philippines (Luzon: Rizal and Nueva Ecija Prov.).

Ecol. Rain-forest at low and medium altitude. *Fl.* Febr., *fr.* April.

57. Symplocos whitfordii BRAND, Philip. J. Sc. 3 (1908) Bot. 8; MERR. En. Philip. 3 (1923) 302; NOOT. Leid. Bot. Ser. 1 (1975) 292. — **Fig. 7.**

Small tree, 6–10 m, 30 cm ∅, sometimes fastigiate. Twigs glabrous. *Leaves* glabrous, acuminate with acute, attenuate base and crenate margin, ± elliptic, 2–$5^3/_4$ by 1–$2^1/_2$(–3) cm; nerves 5–9 pairs; petiole 2–9 mm. *Raceme* basally branched; axis glabrous or sparsely (long-)pilose $1^1/_2$–$3^1/_2$ cm. Bracts and bracteoles persistent, glabrous or sparsely pilose on the midrib, 3–8 and $1^1/_2$–3 mm long respectively. Pedicel (0–)$^1/_2$–$2^1/_2$ mm long. *Calyx* glabrous, $1^1/_2$–$2^1/_2$ mm long, the lobes ovate, acute, $1^1/_2$–2 mm. *Corolla* 5–7 mm. *Stamens* stout, 20–30. Disk glabrous. *Ovary* glabrous, $1^1/_2$–3 mm high; style glabrous. *Fruit* ovoid, 5–7 by 3–5 mm; stone ampulliform, the belly irregularly grooved. *Seed* 1, U-shaped, embryo U-shaped.

Distr. *Malesia:* Philippines (Luzon: Mt Pulog; Negros).

Ecol. Montane rain-forest, also in mossy forest, 1600–2450 m. *Fl.* Jan.–April, *fr.* Febr., May. Flowers recorded as scentless, the white corolla outside and apically blue violet tinged.

58. Symplocos zizyphoides STAPF, Trans. Linn. Soc. Bot. 4 (1894) 205; BRAND, Pfl. R. Heft 6 (1901) 65; MERR. En. Born. (1921) 488; NOOT. Leid. Bot. Ser. 1 (1975) 293. — *S. clementis* MERR. J. Str. Br. R. As. Soc. *n.* 76 (1917) 111; En. Born. (1921) 486. — **Fig. 7.**

Small shrub, $^1/_2$ m, to treelet to 4(–10) m high. Twigs appressedly brown-pubescent, often distinctly zigzag. *Leaves* alternate, olive-yellow beneath and dark brown to green above when dry, glabrous above, nearly glabrous to appressedly fine-pilose beneath, faintly acuminate with rounded to cuneate base and sharply glandular dentate margin, ovate to elliptic, $2^1/_2$–$5^1/_2$ by 1–$2^1/_2$ cm; nerves 5–8 pairs; petiole 1–2 mm. *Flowers* solitary and pedicels to 12 mm, or flowers up to 3 or 4 together in a raceme and then with very short pedicel, except sometimes the uppermost flower; axis, pedicels, the *c.* 4 mm long bracts and the 2–3 mm long bracteoles appressedly brown-pubescent. *Calyx* less hairy than ovary, *c.* 2 mm long, the lobes 1–$1^1/_2$ mm. *Corolla* 4–6 mm. *Stamens* 40 to more than 100. Disk glabrous or with some minute hairs. *Ovary* appressedly pubescent, 1–$1^1/_2$ mm high; style glabrous or with some hairs, gradually thickened towards its base, 4–5 mm. *Fruit* purple to blackish when ripe, ellipsoid to ovoid, sometimes a little curved, 10–12 by 5–6 mm. *Seed* 1, straight with straight embryo.

Distr. *Malesia:* Borneo (Sabah: Mt Kinabalu).

Ecol. Subalpine shrub forest and open places, between granite rocks and on ridges, 2400–3700 m. *Fl.* Jan.–May, Oct., *fr.* Jan., March, July.

Dubious

Symplocos aprilis BRAND, Bot. Jahrb. 54 (1916) 221. — Type: LEDERMANN 7559 (B†), New Guinea, Kaiser Wilhelmsland.

Symplocos argenna BRAND, Bot. Jahrb. 54 (1916) 223. — Type: LEDERMANN 11173, 11376 (B†), East New Guinea, Hunsteinspitze.

Symplocos imperialis BRAND, Philip. J. Sc. 4 (1909) Bot. 109; MERR. En Philip. 2 (1923) 299. — Type: BS 4133 FÉNIX, Philippines, Babuyanes Is.

Symplocos ledermannii BRAND, Bot. Jahrb. 54 (1916) 218. — Syntypes: LEDERMANN 11901, 11925, 11977, 11980, 12107, 12118 (B†), East New Guinea, Station Schraderberg.

Symplocos leucocarpa BRAND, Bot. Jahrb. 54 (1916) 221. — Syntypes: LEDERMANN 11031, 12430, 12683 (B†), East New Guinea, Hunsteinspitze.

Symplocos lilacina BRAND, Bot. Jahrb. 54 (1916) 223. — Type: LEDERMANN 11771 (B†), East New Guinea, Schraderberg.

Symplocos oranjeensis BRAND in Fedde, Rep. 26 (1929) 172. — Type: VERSTEEG 2481, New Guinea, Oranje Mts.

Excluded

Symplocos atrocyanea ELMER (Philippines, ELMER 14679), *nom. in sched.* = *Mastixia pentandra* BL. *ssp. philippinensis* (WANG.) MATTHEW (*Cornaceae*).

Incompletely known taxa

A number of Malesian specimens which are represented by incomplete material, but possibly represent new taxa, are listed by NOOTEBOOM in Leid. Bot. Ser. 1 (1975) 296.