Revision of the Symplocaceae of the Old World

New Caledonia excepted

PROEFSCHRIFT

TER VERKRIJGING VAN DE GRAAD VAN DOCTOR IN DE WISKUNDE EN NATUURWETENSCHAPPEN AAN DE RIJKSUNIVERSITEIT TE LEIDEN, OP GEZAG VAN DE RECTOR MAGNIFICUS DR. A. E. COHEN, HOOGLERAAR IN DE FACULTEIT DER LETTEREN, VOLGENS BESLUIT VAN HET COLLEGE VAN DEKANEN TE VERDEDIGEN OP WOENSDAG 25 JUNI 1975 TE KLOKKE 16.15 UUR

DOOR

HANS PETER NOOTEBOOM

geboren te Waingapoe, Nederlandsch Oost Indië in 1934

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Aan de nagedachtenis van mijn Vader
Aan allen die van mij houden

CURRICULUM VITAE

Hans Peter Nooteboom werd geboren op 2 juli 1934 te Waingapoe (Soemba, voormalig Nederlandsch Oost Indië).

Na het eindexamen Gymnasium-β te Rotterdam in juni 1953 was hij van oktober 1953 t/m september 1955 in militaire dienst.

In oktober 1955 werd een aanvang gemaakt met de studie in de Biologie te Leiden. Het kandidaatsexamen volgde op 13 januari 1959. Vervolgens behaalde hij op 24 mei 1960 de akte KIV (onderwijs-bevoegdheid Plant- en Dierkunde) en op 12 december 1961 het doctoraalexamen.Voor het doctoraalexamen werden de volgende onderwerpen bewerkt: bij Prof. Dr. D. J. Kuenen (een onderzoek naar het reukvermogen bij land-Isopoden); bij Prof. Dr. C. G. G. J. van Steenis (revisies van enige Maleise Papilionaceae geslachten: Galactia, Moghania, Rhynchosia, Stylosanthes en Zornia, en een revisie van de Maleise Simaroubaceae) en bij Prof. Dr. R. Hegnauer (een onderzoek naar de bladanatomie en naar het voorkomen van enige polyphenolen bij Simaroubaceae).

Hij was leraar Biologie in een niet-volledige betrekking aan het Rembrandt Lyceum (thans scholengemeenschap) van 10 september 1958 tot 1 augustus 1974) (met een korte onderbreking in 1963), en aan het Stedelijk Gymnasium te Schiedam van 1 september 1962 tot 1 maart 1963.

Bovendien was hij practicum-assistent bij Zoölogie te Leiden van 1 september 1958 t/m 31 augustus 1959.

Voor het jaar 1962 heeft hij een beurs van de afdeling Rijksstudietoelagen van het Ministerie van Onderwijs en Wetenschappen gehad teneinde een begin te kunnen maken met de bewerking van dit proefschrift.

1 maart 1963 werd hij aangesteld als wetenschappelijk ambtenaar 1e klasse bij het Laboratorium voor Experimentele Plantensystematiek te Leiden, waar hij thans de rang heeft van wetenschappelijk hoofdmedewerker.

Door de Stichting voor Wetenschappelijk onderzoek van de Tropen (W.O.T.R.O.) werd hem een beurs ter beschikking gesteld teneinde ten behoeve van dit proefschrift een expeditie te maken in Thailand, Singapore, West Java en Sabah van 1 januari tot 22 maart 1969, en in Sabah en Sarawak van 1 maart tot 1 mei 1970.

Van zijn hand verschenen de volgende publikaties:

(met M. S. van Meeuwen en C. G. G. J. van Steenis)
Preliminary revisions of some genera of Malaysian Papilionaceae. Reinwardtia 5 (1961) 431—436, 438—443, 446—450, 453—456.

(met D. J. Kuenen)
Olfactory orientation in some land Isopods (Oniscoideae, Crustaceae). Ent. Exp. & Appl. 6 (1963) 133—142.

Generic delimitation in Simaroubaceae tribus Simaroubeae and a conspectus of the genus Quassia L. Blumea 11 (1962) 509—528.

Simaroubaceae. Flora Malesiana I, 6 (1962) 193—226.

Flavonols, Leuco-anthocyanins, Cinnamic acids, and Alkaloids in dried leaves of some Asiatic and Malesian Simaroubaceae. Blumea 14 (1966) 309—315.

The taxonomic position of Irvingioideae, Allantospermum Forman and Cyrillopsis Kuhlm. Adansonia II, 7 (1967) 161—168.

Simaroubaceae. Addenda, corrigenda et emendanda. Flora Malesiana I, 6 (1972) 968—972, fig. 15 & 16.

Ailanthus fordii Nooteboom, an endemic species of Hong Kong refound. Memoirs Hong Kong Natural History Society 9 (1974) 16, 17.

SAMENVATTING

Het huidige verspreidingsgebied van Symplocos, het enige geslacht van de familie, is Oost Azië (Mandsjoerije en Japan tot Oost Australië en enige eilanden in de West Pacific) en in de Nieuwe Wereld. Dit verspreidingsgebied wordt aangevuld met de verspreiding van fossielen uit het Eoceen, Oligoceen, Mioceen en Plioceen van Europa en uit het Plioceen van Japan. De structuur van deze fossielen (voornamelijk vruchtstenen) komt sterk overeen met die van recente soorten. Drie pliocene soorten uit Japan zijn zelfs synonym met recente soorten.

In ca 80 % van de Aziatisch-Maleise en in al de Amerikaanse soorten zijn zaad en embryo recht, in de overige soorten zijn zij één of tweemaal gebogen. Aangenomen wordt dat een recht zaad primitief is. De zaden van het ondergeslacht Symplocos zijn alle recht. Het is opmerkelijk dat alle fossiele vruchten uit Europa een recht zaad hebben bezeten, doch de drie fossiele soorten uit Japan, die synonym zijn met recente soorten, bezaten gebogen zaden. Het is de moeite van het vermelden waard dat de 20 % Aziatische soorten met een gebogen zaad, wat het aantal individuen betreft veruit in de meerderheid zijn vergeleken bij de overige soorten. Het is een kenmerk dat zich kennelijk verspreidt in enorme aantallen individuen.

Het geslacht Symplocos wordt onderverdeeld in twee ondergeslachten. Het ondergeslacht Hopea heeft een verspreiding over het grootste aantal breedtegraden; in Azië wordt het gevonden tot in de gematigde streken (45°—46° N.B.), in Amerika tot 37° N.B. Het ondergeslacht Symplocos is beperkt tot de tropische zone van beide halfronden.

Uit dit verspreidingsgebied blijkt de hoge ouderdom van het geslacht. De verspreiding van het geheel tot de tropen beperkte ondergeslacht Symplocos (en waarschijnlijk ook van Hopea) heeft hoogstwaarschijnlijk plaats gehad in een tijd waarin Noord Amerika nog aan Europa vastzat en in het zuiden van dit gebied een tropisch of warm subtropisch klimaat heerste.

Een onderzoek is gedaan op het gebied van de palynologie (285 collecties van 40 soorten van de oude wereld en 38 niet in de revisie betrokken soorten van de nieuwe wereld), gevolgd door een discussie van de toepassing van de pollenkenmerken voor het onderscheiden van de soorten. In goed af te grenzen en weinig variabele soorten komt gewoonlijk slechts één pollentype voor. In variabele, moeilijk af te grenzen soorten worden gewoonlijk meerdere pollentypes gevonden. Soms zijn deze kenmerkend voor infraspecifieke taxa.

Verder zijn van een aantal soorten de chromosomen geteld, en is een opsomming gegeven van deze en van door anderen gedane tellingen. Het basis getal blijkt 11 te zijn. Alle soorten van het ondergeslacht Hopea die geteld zijn waren diploid. Van het ondergeslacht Symplocos is slechts één soort geteld, deze was oktoploid.

Een samenvatting is gegeven van de phytochemie, de anatomie, het kiemen der zaailingen, en een overzicht van de morphologische kenmerken en hun bruikbaarheid voor de taxonomie.

Vele van deze gegevens zijn gebruikt om een inzicht te krijgen in de verwantschap van de Symplocaceae binnen de Angiospermen. De conclusie is dat de Symplocaceae niet tot de Ebenales behoren, zij tonen meer verwantschap met de Cornaceae en mogelijk ook met de Theaceae.

In het taxonomische deel worden 111 soorten onderscheiden, 21 daarvan zijn nieuw. Het is niet mogelijk gebleken een verdere onderverdeling te geven van de ondergeslachten. Binnen het ondergeslacht Hopea vormen de soorten een vrij massief blok. Hun verwantschappen zijn hoogstwaarschijnlijk netvormig. Eén soort is met vele andere soorten nauw verwant zonder dat een hiërarchie is te onderscheiden.

Verscheidene soorten zijn uitermate variabel. Dit heeft geleid tot een sterke reductie in namen (Het totaal aantal soortsnamen onder de genusnaam Symplocos dat geevalueerd is bedraagt ca 600). De structuur van de variabiliteit wordt zo goed mogelijk tot uitdrukking gebracht door het onderscheiden van ondersoorten en variëteiten.

Verschillende tabellen zijn gemaakt voor het determineren van de soorten. Naast een algemene tabel worden voor het ondergeslacht Hopea ook tabellen gegeven voor een groot aantal verspreidingsgebieden. Aangezien de tabellen zijn gemaakt met behulp van een computer kon er meer dan gewoonlijk rekening gehouden worden met de variabiliteit. Toch zal het niet mogelijk zijn alle collecties te determineren. Daarvoor is de variabiliteit te groot. Als oorzaak van deze variabiliteit kan gedacht worden aan hybridisatie. Aanwijzingen hiervoor worden gevonden in het pollen.

Getracht is een volledig overzicht van de synonymie van elke soort te geven en een uitvoerige beschrijving. Voor de infraspecifieke taxa worden determineertabellen gegeven.

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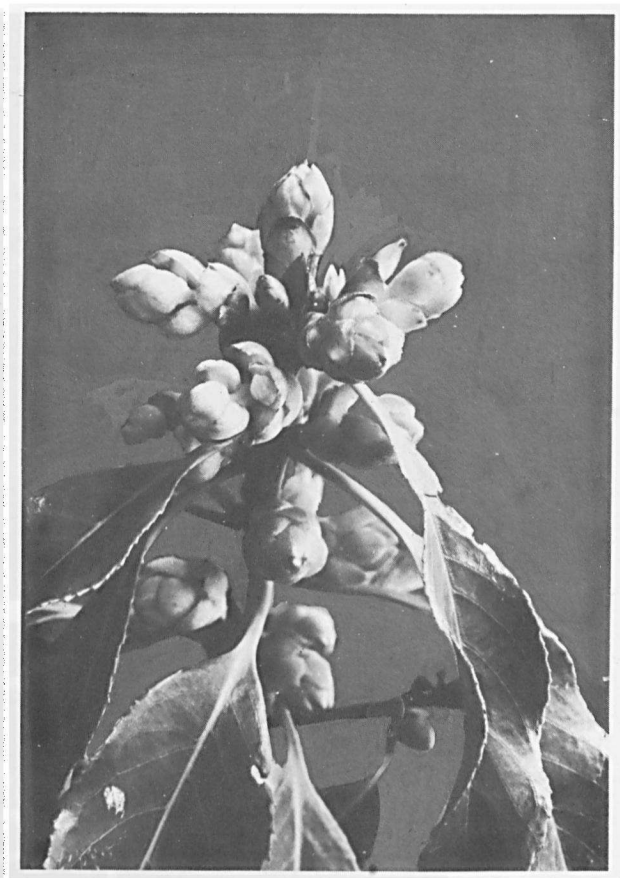
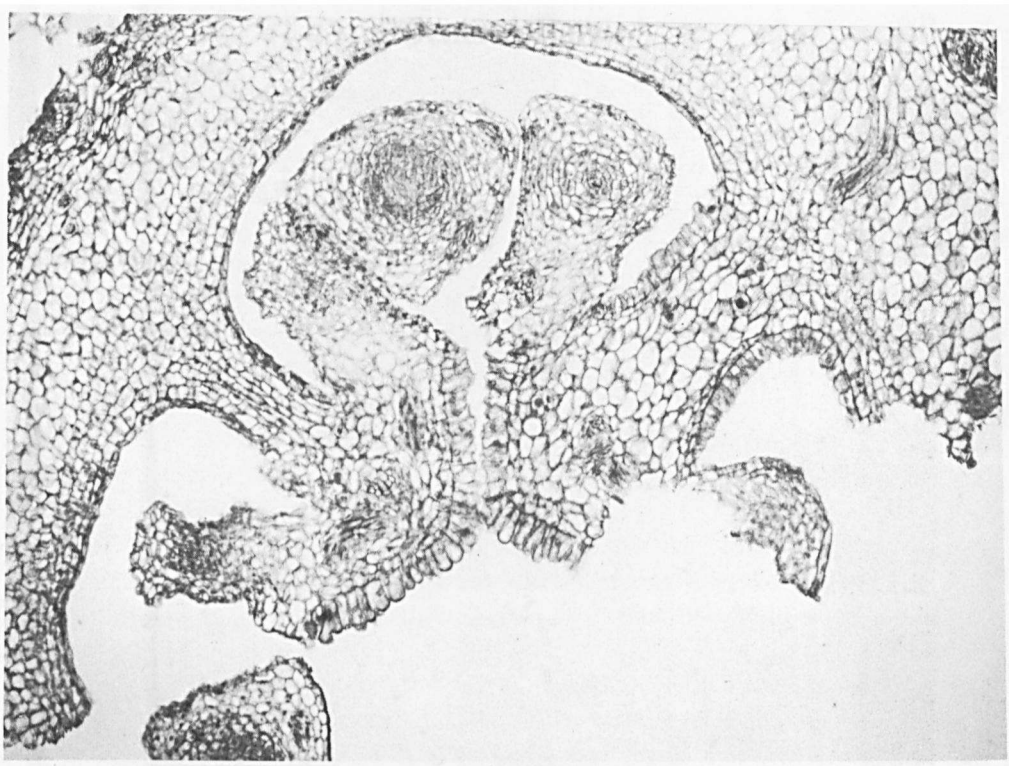


Photograph 1 (left). The tree *Symplocos costata* (Bl.) Choisy at Tjibodas, West Java. — *Photograph 2* (right). A twig in bud of *S. costata* (1 & 2 *Nooteboom 885*).

Photograph 3 (above). *Symplocos racemosa* Roxb., in flower. — *Photograph 4* (below). *Symplocos hookeri* Clarke, in fruit (3 *Nooteboom 743A*, 4 *Nooteboom 721*).



Photograph 5. Cross-section of the apical part of a very young ovary of *Symplocos paniculata* (Thunb.) Miq., somewhat obliquely made, showing the free protruding placentas with ovules.

General Part

INTRODUCTION

The last monograph of the genus *Symplocos* which is distributed widely in the eastern Old World (not in Europe and Africa) and in the New World was by Brand (1901).

He distinguished in all 281 species, *viz.* in the Old World 172 species (among which 53 new) and in the New World 109 (among which 54 new).

His list of collecting numbers amounts to *c.* 700, from which it appears that very many species were based on only a single specimen.

His descriptions were very brief and his keys were partly based on characters not known for several species, the characters being often useless taxonomically. These characteristics have from the outset very much hampered the usefulness of his work which is now completely obsolete.

Since its publication Brand has continued describing odd new species and also other botanists working on local or regional floras have added novelties, so that the identification of specimens has become almost impossible.

In 1959 Prof. Dr. C. G. G. J. van Steenis suggested to make a revision of the genus for the Flora Malesiana. He was personally interested in the genus, having started a revision himself in 1932 when at Bogor, which effort was for several reasons untimely frustrated.

From the onset it was clear that revising the Malesian species would entail a digging in the taxonomy of SE. Asian species. During the work it became even clear that the task could not well be executed without taking the whole of Asia into account and for the same reason also the West Pacific islands and Australia. The main reason for this was that there are several very variable but wide-spread species occupying ranges including these areas outside Malesia. Only New Caledonia I have left untouched, as it is clear that all species are endemic taxa.

This compulsory extension of the task has unfortunately caused a great delay in the study, to which was added the fact that during most of the time I could only spend part of it to this study.

An other delay was caused by the fact that I felt it necessary to study and collect *Symplocos* in the field, amongst others for collecting pickled material for chromosome counts, which were hardly made before. These expeditions took place in Thailand, Malaya, Sabah, and West Java from January 1 to March 22, 1969, and in Sarawak and Sabah from March 1 to May 1, 1970. Working out these collections occupied me from December 1970 to June 1971 for six months.

Last not least, the number of collections, from many herbaria, amounted to far over 8.000; this enormous amount of exclusively Old World material stands in sharp contrast to the meagre 700 odd numbers Brand used for his monograph of the entire genus.

Though the study of this vast material was time-consuming, it was a blessing to have it at disposal as it enabled me to study variability within species, a requisite for a sound

delimitation of species. This has led to a heavy reduction in the number of species. From the Old World the almost 500 described species could be reduced to 90, whereas 21 new species are proposed. The last were revealed by the extensive exploration which has taken place in Malesia during the last five decades.

I realize that my attempt is certainly not a final conclusion on Old World *Symplocos*. A number of names could not be accounted for by lack of tracing type specimens and several species are still only known from the type specimen, which always is an unsatisfactory situation.

The overall key as well as the local keys were made with aid of a computer, for which was used the 'Key generating program' of Mr. R. J. Pankhurst at Cambridge, England, which proved very useful. After constructing the overall key, the changing of one card was sufficient for constructing a local key, saving much time.

I have tested all descriptions with the overall key and in addition also with a fair number of material, which made some adjustments necessary.

POSITION IN THE ANGIOSPERM SYSTEM

Taxonomic history

Most authors, beginning with De Jussieu, place *Symplocos* in the same alliance, near the *Ebenaceae*.

De Jussieu (1789) considered *Symplocos* to belong to his *Guaiacanae* pars II near *Diospyros* (*Ebenaceae*), *Pouteria* (*Sapotaceae*), *Styrax* (*Styracaceae*), and *Alstonia*, a synonym of *Symplocos*. All these taxa belong to the concept of *Ebenales* of later authors and still of Takhtajan (1959).

Endlicher (1839: 744) and A. de Candolle (1844: 246–259) considered *Symplocaceae* a tribe of *Styracaceae*, a disposition frequently found in works of British systematists. De Candolle regarded his *Styracaceae* in the wide sense closely allied to *Ebenaceae*, and observed also possible relations with *Humiriaceae* and with *Meliaceae*, *Alangiaceae*, and *Olacineae*. These suggestions were probably due to the connate stamens, at least at the base, in most of these groups.

For the same reason Miers (1853), who placed *Symplocaceae* near *Sapotaceae* and *Ebenaceae*, suggested a relation with the *Erythroxylaceae*.

Phylogenetic relationships are expressed by few authors. R. von Wettstein (1911: 709) suggested a possible derivation of *Ebenales* from *Malvales* and/or *Celastrales*. Pulle (1950: 236, 249) derived *Ebenales* from *Ranales*.

Several authors are of the opinion that *Symplocos* does not belong in the alliance of *Ebenaceae*.

Hallier (1923: 78–93), who paid considerable attention to *Symplocos*, argues that *Symplocaceae*, *Sapotaceae*, and *Ebenaceae* principally differ from each other in the construction of the ovule. Of the *Ebenaceae* he states that they belong to the '*Guttalen*', derived from the *Linaceae*. *Styracaceae* would be narrowly allied to *Cornaceae* and *Olacaceae*, thus making it desirable to unite these three families, in his order of '*Santalalen*'. Of *Symplocaceae*, he claims them not be allied to *Ebenaceae*, although both belong to the alliance of *Linaceae*. The relationship between *Symplocos* and *Styracaceae*, according to Hallier, cannot be upheld because of many differences in anatomical as well as morphological characters. Hallier states that *Symplocos* is most closely allied to *Linaceae*, merely being a 'Sippe' of that family.

In passing: Takhtajan (1959; *Celastranae* 1973) also derived *Ebenales* from the same alliance to which the '*Guttalen*' (*i.e. Dilleniales-Theales*; he mentions especially *Theaceae*) belong, but he places *Aquifoliaceae* and *Celastraceae* in his *Disciflorae* (1959; *Celastranae* 1973) and *Linaceae* in *Geraniales* (*Pinnatae* 1959; *Rutanae* 1973).

Hutchinson (1959: 170) derived the *Styracales* (comprising *Styracaceae*, *Lissocarpaceae*, and *Symplocaceae*) from the *Rosales* (via the *Cunoniales*), placing them next to *Araliales* (incl. *Cornaceae*). The *Ebenales* are considered by him to be a sympetalous climax group, derived from the *Myrsinales* and related to the *Rhamnales* and the *Celastrales*. According to him the *Araliales* (including also *Cornaceae*) are also derived

from the *Rosales*. This view is partly shared by Huber (1963). Huber indicated a relationship of *Symplocaceae* and *Styracaceae* with the *Cornaceae*, incorporating them in one order, the *Cornales* which he derives from *Cistiflorae*, especially *Theaceae*.

Airy Shaw at last (1966: 1093) denied affinities between *Symplocaceae* and *Styracaceae*. He considered *Styracaceae* related with *Philadelphaceae* (also placed in the *Cornales* by Huber) and *Symplocaceae* with *Theaceae*.

Discussion

From this brief survey it appears that up till the present opinions vary about affinities *c.q.* derivation of the family *Symplocaceae*. In most recent systems they are included in *Ebenales*, but there are several reasons to exclude them from this order.

1. **Pollen morphology** — Erdtman (1952: 155, 397, 423, 424) stated that pollen grains ± similar to those in *Ebenaceae* are found in *Sapotaceae* and *Styracaceae*, but that the grains of *Symplocaceae* are different.
2. **Leaf anatomy** — The stomata are generally of the Ranunculaceous type in *Ebenaceae*, *Sapotaceae*, and *Styracaceae*, but of the Rubiaceous type in *Symplocaceae* (Metcalfe & Chalk, 1950: 872, 881, 887, 891).
3. **Wood anatomy** — In *Ebenaceae* and *Sapotaceae* the vessels possess exclusively simple perforations. In *Styracaceae* and *Symplocaceae* the perforations are scalariform, thus the wood of the latter families is more primitive (Metcalfe & Chalk, 1950). The wood of *Styracaceae* is considered to be more advanced than that of *Symplocaceae* because the vessels are exclusively solitary in *Symplocaceae* and solitary as well as in multiples in *Styracaceae*.
4. **Gynaecium** — According to M. Chirtoiü (1918: 353) the placentation is axillary in *Ebenaceae*, *Sapotaceae*, and *Styracaceae*, but parietal in *Symplocaceae*. The ovules are anatropous apotropous in *Ebenaceae*, *Sapotaceae*, and *Styracaceae*, anatropous epitropous in *Symplocaceae* (Davis, 1966).
5. **Leaf margin** — Entire in *Ebenaceae* and almost always in *Sapotaceae*. In *Styracaceae* entire or dentate to serrate, in *Symplocaceae* principally dentate or serrate.

Within *Ebenales Symplocos* was formerly frequently included in *Styracaceae*, but besides the differences with this family pointed out above, Kirchheimer (1949) noted that in *Symplocos* fruits each locule possesses an apical pore which is absent in fruits of *Styracaceae*; he added that this difference goes back in time to at least to Eocene.

These arguments lead to the view that the position of *Symplocaceae* within *Ebenales* is very unlikely. This holds whether *Styracaceae* are incorporated in the *Ebenales* or not.

The family appears to be more related with *Cornaceae* and *Theaceae*. With both families *Symplocaceae* share the primitive wood anatomy. Similarities with the wood of *Cornus* and some other *Cornaceae* are very striking indeed.

Shaw (1966: 1122) especially stressed affinity with the *Theaceae*, saying that *Symplocaceae* are: 'Closely related to *Theaceae*, and scarcely differing except in the racemose

inflorescence and inferior ovary (the latter occurs also in the Theaceous genera *Anneslea* and *Symplococarpon*)'.

This statement needs correction as the inflorescence of *Symplocos* is essentially cymose; it needs also addition because Shaw erroneously assumes that *Symplocaceae* have ovules on an axile placenta. This is not so, and in more-celled fruited species there is even an axile canal in the fruit of *Symplocos*. However, *Theaceae* have a truly axile placentation with an often persistent axile columella in fruit. This is, I believe, a serious objection against such a close affinity as Shaw assumes.

Besides the similarity of wood anatomy it appears that several other characters are shared by *Symplocaceae* and both *Cornaceae* and *Theaceae*, which in my opinion reflects systematic affinity. See Table 1.

DISTRIBUTION, RECENT AND FOSSIL

From fossil fruits as well as from some flower impressions it is certain that *Symplocos* already occurred in the Lower Eocene of Central and West Europe (fig. 1). In some instances the fruit stones of as much as four species are found together in browncoal layers. This makes it probable that *Symplocos* was already as diversified in the old Tertiary as it is now. Of hardly any other genus of Dicotyledons it is known that so many fossil species are found together in one layer. Not only a large number of species existed in the old Tertiary, but the species must have been represented by numerous individuals. Kirchheimer (1949) calculated the total mass of carpolithic coal in the 'Vogelberge' to be 3500 m^3. In 125 cc of this coal he found 99 *Symplocos* endocarps and 19 fruits or seeds of other plants. The total number of *Symplocos* endocarps was estimated to be more as 2.5 milliards, mainly belonging to *S. minutula* (v. Sternb.) Kirchheimer, but also to *S. lignitarum* (Quensted) Kirchheimer. According to Kirchheimer this enormous mass of fruits must have originated from the vicinity of the coal layers, because the layers give no evidence of the presence of rivers that could have transported the endocarps. As Kirchheimer estimated the time during which the coal layer was precipitated to be about 100 years, the surrounding plants would have furnished at least 25 million endocarps a year. Thousands of trees must have occupied the area; it may have been a true '*Symplocos* forest' mixed with only few species of other genera.

Together with *Symplocos* fruits the fruits of the following genera were also found: *Mastixia*, *Brasenia*, *Magnolia*, and *Vitis*.

The fossil endocarps of *Symplocos* are so similar to endocarps of recent species, that it is almost certain that from the Early Tertiary up to recent time evolution did not result in major changes. It is not unlikely that some of the fossil species could be referred – may it be as infraspecific taxa – to a recent species. This is at all events true for some of the Japanese fossils. Most probably they belong to the recent species *S. paniculata* (Thunb.) Miq., *S. lancifolia* S. & Z., and *S. sumuntia* Buch. Ham. (*S. myrtacea* S. & Z.).

Both subgenera of *Symplocos*, subg. *Symplocos* and subg. *Hopea* nowadays occur in the tropics of the Indo-Australian area and of the New World (fig. 1).

TABLE 1 — Survey of some relevant characters in the Symplocaceae, Cornaceae, and Theaceae. Cornaceae are taken here in the strict sense, excluding Nyssaceae and Alangiaceae; cf. Airy Shaw (1966: 285).

	SYMPLOCACEAE	CORNACEAE	THEACEAE
bud scales	frequent	frequent	frequent
leaves	mostly serrate or crenate	often serrate	often serrate or crenate
perianth	cyclically arranged (imbricate)	cyclically arranged (valvate)	often spirally arranged (imbricate)
sepals	tube, adnate to ovary, lobes imbricate	tube, adnate to ovary, lobes valvate?	free (rarely connate), imbricate
petals	connate, at least at base	free	free, or very shortly basally connate
stamens	at least basally connate, monadelphous to pentadelphous, the groups alternipetalous, adnate to corolla, numerous	as many as petals and alternating with them	distinct or basally connate, monadelphous or pentadelphous, opposipetalous, numerous; often basally adnate to petals
ovary	(semi-)inferior, 2—5 carpels and locules	inferior, 2—4 carpels and locules	superior (rarely inferior), 3—5 carpels and locules
placenta	intruding, parietal in origin	axile	axile
ovules	2—4 in each locule anatropous, epitropous unitegmic, tenuinucellar	1 in each locule anatropous, epitropous unitegmic, crassinucellar	2—more in each locule anatropous, epitropous bitegmic, tenuinucellar
endosperm	copious	copious	absent or scant
embryo sac	polygonum type	polygonum type	allium type
disk	present	present	absent
fruit	drupe	drupe (or berry)	loculicidal or septicidal capsule or berry

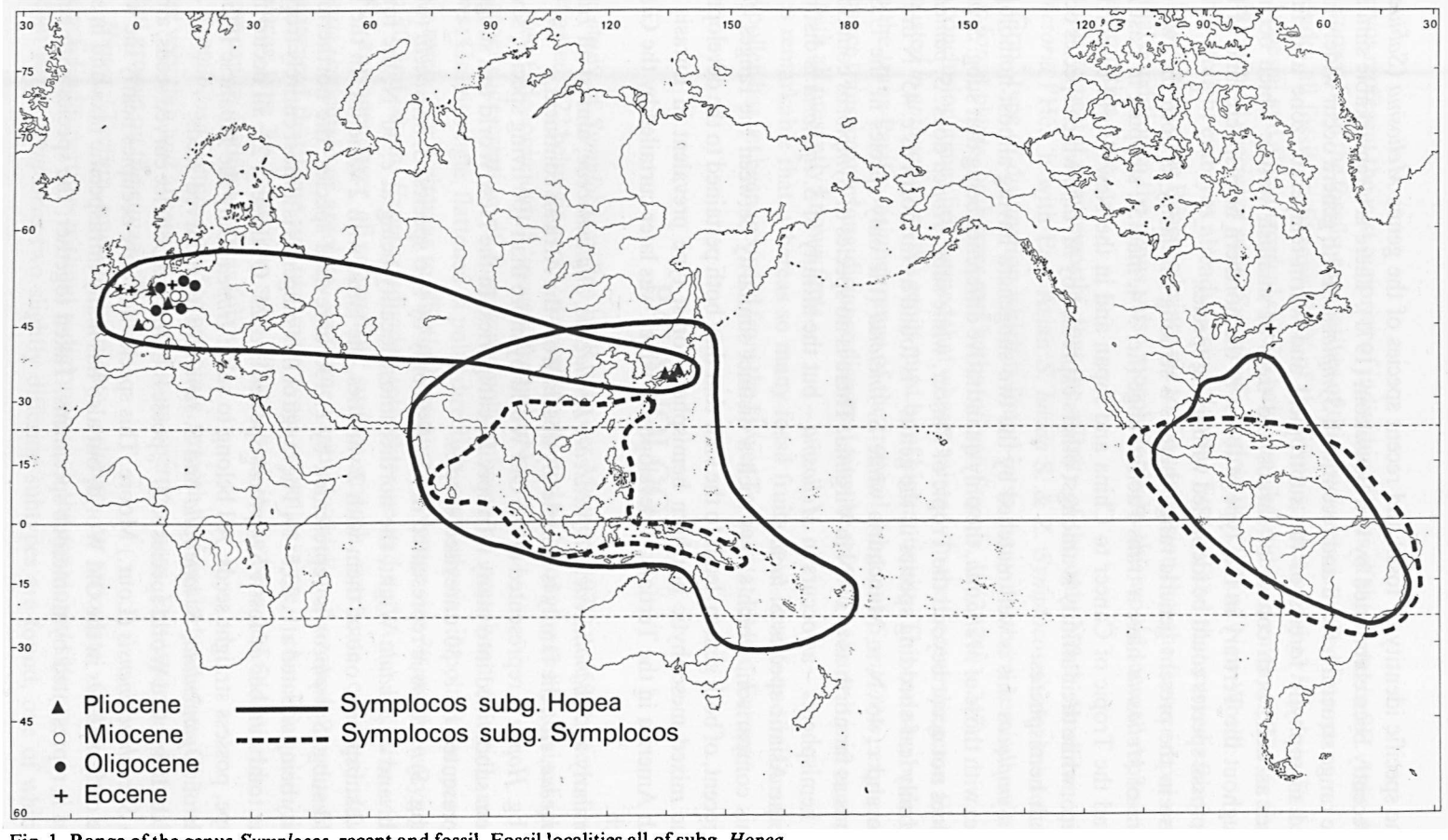


Fig. 1. Range of the genus *Symplocos*, recent and fossil. Fossil localities all of subg. *Hopea*.

The specific identity of fossil and recent species of the genus *Meliosma* (*Sabiaceae*) has recently been elaborated by van Beusekom (1971). There is a remarkable similarity in the range structure, fossil and recent with *Symplocos*. Both genera occur widely in the mixed mesophytic forests of the subtropical and warm-temperate zone and in the tropics as well; both consist of shrubs and trees of smallish stature which occurred throughout the Tertiary in this type of forest in the northern hemisphere, and of both some fossil species could be identified with living species.

Also in the present generic range there is a striking similarity as both the two subgenera of *Meliosma* have a trans-Pacific range (*l.c.* 374, map 5), stepping in East Asia beyond the Tropic of Cancer to China and Japan and in the New World to northern Mexico, while their affinity is amongst others expressed by *M. alba* which species occurs in both hemispheres.

In *Symplocos* this is well matched by the two subgenera having almost homologous ranges with those of *Meliosma*, the only quantitative difference being that subg. *Symplocos* does not occur beyond the Tropic of Cancer, while subg. *Hopea* does: *S. paniculata* – the only leaf-shedding species in the genus – is found as far north as *c.* 45° N in Hokkaido and *c.* 46° N in Manchuria while *S. tinctoria* (the only species in the U.S.A.) extends as far north as *c.* 37° N in Virginia. There is no species of *Symplocos* common to both hemispheres – as occurs in *Meliosma* – but the affinity of *S. tinctoria* is distinctly with the Asiatic species *S. lucida.*

This comparison, which shows such a distinct similarity between the ranges, fossil and recent, of both genera, leads to the view that they both pertained to the development of the mixed mesophytic northern hemisphere forest type prevalent in Eurasia and North America in the Tertiary, a development which was later curtailed by the Glacial Epoch.

Similarly as *Magnoliaceae*, *Styracaceae*, *Betulaceae*, *Juglandaceae*, almost all *Hamamelidaceae*, *etc.*, the family is completely absent from the African continent.

Subg. *Hopea* is represented in the Old World by more than 100 living species, several of them subdivided into many infraspecific categories. In the New World this subgenus is represented by *c.* 30 unrevised species.

Subg. *Symplocos* is represented in SE. Asia only by two species, *S. henschelii* (Mor.) Benth. and *S. pendula* Wight, the northernmost locality being at *c.* 30° N, the former with 2 subspecies, one of them with 2 varieties, the latter with 2 varieties. In the New World subg. *Symplocos* is represented by *c.* 130 unrevised species, the northernmost locality being situated at *c.* 23.5° N. The range of this subgenus is almost entirely tropical.

The total number of fossil *Symplocos* species is *c.* 25. Of these *c.* 22, all occurring in Europe, possess straight seeds. All belong to subg. *Hopea*. Only the Japanese Pliocene fossils of *S. paniculata*, *S. lancifolia* and *S. sumuntia* have curved seeds.

Of the living Old World species *c.* 20 % possess U-formed or twice curved seeds, among them *S. cochinchinensis* (Lour.) Moore. This species not only occupies nearly the whole range of *Symplocos* in the Old World, but also has many infraspecific taxa and in some places is represented by numerous specimens. Taken together, the species with curved

embryos represent the vast majority of individual plants of the genus in SE. Asia. As far as is known from the fossils, no relatives of this species ever reached Europe.

Besides all fossils in Europe, 80% of the living species of subg. *Hopea* in East Asia and Malesia, and all neotropical species have straight seeds and embryos. This is also the condition in all species of subg. *Symplocos*, both in the Old and New World.

That straight embryos already occurred in the Eocene, and that curved embryos are not found before the Pliocene brings me to the conclusion that the former represent the original condition in the genus. Also morphologically this would seem to represent the more primitive state.

In this respect it is noteworthy that the affinity of the only North American species *S. tinctoria* l'Hér. is with East Asian *S. lucida* S. & Z. *Symplocos* shows the so-called 'Asa Gray' type of disjunction which is found in so many northern hemisphere mesophytic forest plants, both trees and herbs (*cf.* van Steenis, 1962: 240—247).

In conclusion it may be assumed that whereas already in the Eocene the genus *Symplocos* existed *in optima forma*, the genus must be of high antiquity. This can also be deduced from the trans-Pacific disjunct range of the tropical subgenus *Symplocos*; explanation by chance transoceanic long-distance dispersal must be refused because it is in contradiction with all presently known facts.

It is remarkable that, whereas so many fossil fruits have been found in Europe, no fossil pollen has yet been recorded from the Lower Tertiary, at least in Europe.

PALYNOLOGY

In the study of *Symplocos* pollen by R. van der Meijden (1971) *c.* 250 collections were investigated, 222 belonging to 32 revised species and 63 belonging to 8 unrevised species from New Caledonia and 38 'species' from the New World.

A general description of *Symplocos* pollen, based on acetolysed material, runs as follows: Grains single, flattened in polar direction, semi-angular in polar view, provided with 3, rarely 2 or 4 circular to elliptical apertures. Average size 30 μm but varying between 20 and 70 μm. Exine subdivided into ektexine and endexine. Ektexine with or without an inner layer of columellae, surface smooth, verrucate, echinate, clavate, perforate, reticulate or areolate. Endexine variously thickened around apertures.

It appeared that there are two main types of pollen, type 1 coinciding with subg. *Symplocos*, type 2 belonging to subg. *Hopea*, both in the New and Old Worlds.

These can be distinguished as follows:

Subg. *Symplocos*: Tectum pitted to perforate, smooth to irregularly areolate. Columellae layer very thin and absent or reduced from apertural area. Endoaperture with a deep radial groove on the equatorial sides.

Subg. *Hopea*: Tectum smooth, verrucate, echinate or reticulate. Columellae layer distinct. Endoapertures without radial groove on the equatorial side.

Within subg. *Symplocos* two slightly differing subtypes are found, one of which is

confined to the New World species (subtype 1.1) and the other to the species of the Old World (subtype 1.2).

As appears from Table 2 the situation in subg. *Hopea* is more complicated, 9 subtypes being distinguished. But here there are no subtypes which are exclusively American. The pollen of 'subg. *Epigenia*' – a group of American species distinguished by Brand – belongs to the *glauca* subtype 2.3. Of 'subg. *Microsymplocos*' of Brand, also consisting of American species, only two species were studied: the pollen of *S. lanata* strongly resembles that of the Asiatic *S. polyandra* (subtype 2.9) and of *S. tenuifolia* that of the Asiatic *S. anomala* (subtype 2.8), both of subg. *Hopea*.

Comparing palynological results with the complicated subdivision of the genus by Brand it appears that there is no agreement, except for subg. *Symplocos* and the rest of the genus, supporting a subdivision into two subgenera.

At the specific level, the overall impression which resulted from the palynological

TABLE 2 — Survey of examined pollen types. Numbers of examined collections added in brackets

Pollen subtypes	Number of revised species with one subtype	Number of revised species with two or more subtypes	Number of not revised species
1.1	-	-	27 (33)
1.2	2 (13)	-	-
2.1	4 (14)	5 (6)	-
2.2	5 (10)	3 (6)	-
2.3	3 (27)	5 (13)	8 (14)
2.4	1 (2)	1 (8)	8 (10)
2.5	3 (7)	4 (90)	-
2.6	-	1 (9)	-
2.7	1 (6)	-	-
2.8	4 (7)	-	-
?2.8	-	-	2 (4)
2.9	1 (4)	-	-
?2.9	-	-	1 (2)
Totals	24 (90)	8 (132)	46 (63)

study is that within subg. *Hopea* a peculiar pattern of variation is found, possibly reflecting reticulate relationships between the species concerned. This confirms the difficulties experienced by the taxonomist in analyzing the affinities within this subgenus.

Infraspecific variability in the *Hopea* type (type 2) is found in the following species (between brackets the number of collections examined):

S. colombonensis: subtypes 2.1 (3) and 2.3 (1).

S. cochinchinensis ssp. *cochinchinensis* var. *imbricata*: subtype 2.3 (2) — var. *cochinchinensis*: subtype 2.5 (14) — var. *sessifolia*: subtype 2.5 (4) — ssp. *laurina*: one collection belonging possibly to subtype 2.3, all others to subtype 2.5 (20) — ssp. *leptophylla*: subtypes 2.4 (8) and 2.6 (9) — ssp. *thwaitesii*: subtypes 2.2 (1) and 2.5 (2). See for more detail information in the Special part under *S. cochinchinensis*.

S. crassipes: subtypes 2.1 (1) and 2.3 (1).

S. glomerata ssp. *glomerata* var. *glomerata*: subtype 2.5 (18), one collection doubtfully belonging to 2.5, one doubtfully belonging to 2.3 — var. *adenopus*: subtypes 2.3 (1) and 2.5 (1) — ssp. *congesta* var. *congesta*: subtype 2.5 (7) — var. *poilanei*: subtype 2.3 (4). See for more detail information the Special part under *S. glomerata*.

S. johniana: subtypes 2.1 (1) and 2.3 (1).

S. macrophylla ssp. *sulcata*: subtype 2.5 (4) — ssp. *cordifolia*: subtype 2.2 (1) – ssp. *macrophylla*: subtype 2.2 (1).

S. odoratissima: subtypes 2.1 (1) and 2.3 (2).

S. ophirensis ssp. *ophirensis*: subtype 2.2 (3) — ssp. *perakensis*: subtypes 2.1 (1) and 2.5 (3).

It thus appears that of the examined 32 revised species 8 possess more than one subtype of pollen, six have two subtypes, *S. ophirensis* having three and *S. cochinchinensis* having five subtypes.

However, it also appears that a fairly large number of infraspecific taxa possess only a single subtype, except for *S. cochinchinensis* ssp. *leptophylla* and ssp. *thwaitesii*, *S. ophirensis* ssp. *perakensis*, *S. odoratissima*, *S. glomerata* var. *adenopus*, *S. colombonensis*, *S. crassipes*, and *S. johniana*.

Among these *S. cochinchinensis*, *S. glomerata*, *S. ophirensis*, *S. crassipes*, and *S. macrophylla* are also systematically variable species, but *S. colombonensis*, *S. johniana* and also *S. odoratissima* are clear cut macro-morphologically.

Noteworthy is that two subtypes of pollen, both confined to one species, *viz.* 2.7 (*S. paniculata*) and 2.9 (*S. polyandra*), which are well defined pollen-morphologically, are also taxonomically sharply defined.

Furthermore, it is observed that in *S. glomerata* the varieties are largely corresponding with one subtype of pollen, but these do not correspond with those of the subspecies.

Concluding, it may be observed that the subtypes in subg. *Hopea* are rather irregularly distributed among the taxa, and a number of subtypes are found in species which are taxonomically apparently not related.

It should further be observed that, accepting species with a straight seed and embryo

as being more primitive than species with a curved embryo, there is no correspondence between these two features in subg. *Hopea*.

It is curious that the occurrence of echinate pollen (subtypes 2.4 and 2.6) is restricted to East Malesia (Philippines, Moluccas, and New Guinea), the New Hebrides, and Fiji, and is shared by all 8 species examined from New Caledonia. The taxa in East Malesia showing it, viz. *S. whitfordii* and *S. cochinchinensis* ssp. *leptophylla*, and the New Caledonian species are however apparently not closer allied to each other than the four subspecies within *S. cochinchinensis* mutually. In other words, the occurrence of echinate pollen is to a certain extent significant, especially in a geographical sense, but does not express taxonomic relationships between taxa showing this feature.

The occurrence of infraspecific variability means also that, at least in *Symplocos*, fossil pollen must be interpreted with great care: if the different pollen samples of *S. glomerata* were only known in fossil state, one would certainly refer them to different species.

It is almost certain that, both from the New World and Old World Tertiary, pollen has been described which belongs to *Symplocos* subg. *Hopea*, but has not been recognised as such.

In several taxa a certain amount of the pollen is sterile, and this is ascribed by me to hybridisation. For further remarks on this point I refer to taxon 27.8 in the Special part, sub *S. cochinchinensis* ssp. *laurina* var. *laurina*.

Pollen morphological affinity with other families

Some effort has been made to trace the pollen-morphological relations of *Symplocaceae* with other families. The following material has been investigated of genera in literature sometimes suggested to have similar pollen: *Diospyros* (*Ebenaceae*); *Humiria*, *Vantanea*, *Sarcoglottis* (*Humiriaceae*); *Carapa*, *Turraea* (*Meliaceae*); *Pouteria* (*Sapotaceae*), and a small number of specimens of *Mastixia trichotoma* Bl., *M. bracteata* Clarke, and of *Alangium javanicum* Koord. (*Cornaceae*), the latter in co-operation with Dr. Tj. Reitsma, Utrecht.

Of all the taxa examined, only those of *Mastixia*, less so those of *Alangium*, showed, with respect to the apertures, resemblance with some *Symplocos* species. This suggestion is, however, very tentative because of the limited number of families compared.

The tricolporate pollen grains of *Theaceae* show no affinity to those of *Symplocaceae*.

Appendix

Evaluation of the names of *Symplocos* species, used by Van der Meijden (1971).

Because many of the names were based on preliminary determinations, it is worthwhile, now that the revision on the genus *Symplocos* is finished, to give a survey of all the names, used by Van der Meijden, and of the specimens that were at that time not correctly named.

Names used by Van der Meijden	*Correct names of species or specimens*
S. adenophylla Wall. *ex* G. Don	Unchanged
S. ahernii Brand	*S. cochinchinensis* (Lour.) Moore ssp. *cochinchinensis* var. *philippinensis* (Brand) Noot.
S. alata Brand *ex* Diels	*S. anomala* Brand
S. alternifolia Noot. mss.	*S. laeteviridis* Stapf var. *alternifolia* Noot.
S. aneityensis Brand	*S. cochinchinensis* (Lour.) Moore ssp. *leptophylla* (Brand) Noot. var. *aneityensis* (Brand) Noot.
S. anomala Brand	Unchanged
S. arborea Brongn. et Gris	Not revised
S. arfakensis Gibbs	*S. cochinchinensis* (Lour.) Moore ssp. *leptophylla* (Brand) Noot. var. *maculata* (Brand) Noot.
S. attenuata Wall. *ex* DC.	*S. cochinchinensis* (Lour.) Moore ssp. *laurina* (Retz.) Noot. var. *laurina*
S. bauerlenii Baker	Unchanged
S. botryantha Franch.	*S. sumuntia* Buch. Ham. *ex* D. Don
S. brandiana Schlechter	Not revised
S. brandisii Koord. et Val.	Unchanged
S. buruensis Hallier *f.* mss.	*S. cochinchinensis* (Lour.) Moore ssp. *leptophylla* (Brand) Noot. var. *schumanniana* (Brand) Noot.
S. cagayanensis Brand	*S. vidalii* Rolfe
S. caudata Wall. *ex* G. Don	*S. sumuntia* Buch. Ham. *ex* D. Don
S. celastrifolia Griff. *ex* Clarke	Unchanged
S. celastrinea Mart. *ex* Miq.	Not revised
S. cerasifolia Wall. *ex* DC.	Unchanged
S. cochinchinensis Moore	*S. cochinchinensis* (Lour.) Moore ssp. *cochinchinensis* var. *cochinchinensis*
S. colombonensis Noot.	Unchanged
S. cordifolia Thwaites	*S. macrophylla* Wall. *ex* DC. ssp. *cordifolia* (Thwaites) Noot. var. *cordifolia*
S. costata Choisy *ex* Zoll.	Unchanged
S. curtisii Oliv.	*S. crassipes* Clarke var. *curtisii* (Oliv.) Noot.
S. decora Hance	*S. sumuntia* Buch. Ham. *ex* D. Don
S. deflexa Stapf	Unchanged
S. defoliata Brand	Not revised
S. depauperata Merr.	*S. lancifolia* S. & Z.
S. doormannensis Brand	*S. cochinchinensis* (Lour.) Moore ssp. *leptophylla* (Brand) Noot. var. *doormannensis* (Brand) Noot.
S. fasciculata Zoll.	Unchanged
S. filipes Merr.	*S. filipes* Noot.
S. fissicalyx Noot. mss.	*S. laeteviridis* Stapf var. *pauciflora* Noot.
S. flavida Miq. *ex* Clarke	*S. cochinchinensis* (Lour.) Moore ssp. *laurina* (Retz.) Noot. var. *laurina*
S. foliosa Wight	Unchanged
S. fragrans Elmer	*S. ophirensis* Clarke ssp. *perakensis* (K. & G.) Noot. var. *perakensis*
S. gambliana Brand	Unchanged
S. gardneriana Wight	*S. macrophylla* Wall. *ex* DC. ssp. *macrophylla* var. *macrophylla*

S. glauca (Thunb.) Koidz.	Unchanged
S. glomerata King *ex* Clarke	Unchanged
S. gracilis Brongn. et Gris	Not revised
S. grandiflora Wall.	*S. macrophylla* Wall. *ex* DC. ssp. *grandiflora* (Wall.) Noot. The cited unnumbered collection of Thorel could not be traced, but does not belong to this species
S. groffii Merr.	Unchanged
S. henschelii (Moritzi) Clarke	Unchanged
S. imbricata Brand	*S. cochinchinensis* (Lour.) Moore ssp. *cochinchinensis* var. *imbricata* (Brand) Noot.
S. intermedia Brand	*S. racemosa* Roxb. var. *racemosa*
S. johniana Stapf	Unchanged
S. junghuhnii Koord.	Unchanged
S. kiauensis Noot. mss.	*S. laeteviridis* Stapf var. *velutinosa* Noot.
S. kinabaluensis Heine	*S. laeteviridis* Stapf var. *kinabaluensis* (Heine) Noot.
S. lanata Krug & Urb.	Not revised
S. lanceolata (Mart.) DC.	Not revised
S. laurina (Retz.) Wall. *ex* G. Don	*S. cochinchinensis* (Lour.) Moore ssp. *laurina* (Retz.) Moore var. *laurina*. Of the cited collection numbers the following have now been named: Brass 5939 = *S. cochinchinensis* ssp. *thwaitesii* var. *stawellii*; Brass 22851, 30201 = ssp. *leptophylla* var. *schumanniana*; Brass 30680 = ssp. *leptophylla* var. *pedicellata*; Hoogland & Schodde 6820, 6918 = ssp. *leptophylla* var. *schumanniana*; Kostermans 18787 = ssp. *cochinchinensis* var. *philippinensis*; Pullen 330 = ssp. *leptophylla* var. *schumanniana*
S. lenormandiana Brongn. et Gris	Not revised
S. leptophylla (Brand) Turrill	*S. cochinchinensis* (Lour.) Moore ssp. *leptophylla* (Brand) Noot. var. *leptophylla*
S. lucida (Thunb.) S. & Z.	Unchanged; the cited collection Lörzing 278 assumed to belong to subtype 2.6 was re-examined, and cannot have been used for preparation of mollen slides. Obviously some mistake has been made
S. lucida Vieill.	Not revised
S. maingayi Clarke	*S. henschelii* (Mor.) Benth. *ex* Clarke ssp. *henschelii* var. *maingayi* (Benth. *ex* Clarke) Noot.
S. mjöbergii Merr.	*S. laeteviridis* Stapf var. *mjöbergii* (Merr.) Noot.
S. molobros Brand	*S. cochinchinensis* (Lour.) Moore ssp. *leptophylla* (Brand) Noot. var. *molobros* (Brand) Noot.
S. montana (Vieill.) Brongn. et Gris	Not revised
S. montis-fontium Guill.	Not revised
S. obtusa Wall. *ex* G. Don	Unchanged
S. odoratissima Choisy *ex* Zoll.	Unchanged
S. ophirensis Clarke	*S. ophirensis* Clarke ssp. *ophirensis*
S. paniculata (Thunb.) Miq.	Unchanged

S. pendula Wight	Unchanged
S. perakensis K. & G.	*S. ophirensis* Clarke ssp. *perakensis* (K. & G.) Noot. var. *perakensis*
S. polyandra Brand	Unchanged
S. ramosissima Wall. *ex* G. Don	Unchanged
S. revoluta (Mart.) Casar.	Not revised
S. rhamnifolia DC.	Not revised
S. rubiginosa Wall.	Unchanged
S. salicifolia Griseb.	Not revised
S. '*schefflerae*' Merr. (*sphalma*, = *S. schaefferae*)	*S. cochinchinensis* (Lour.) Moore ssp. *laurina* (Retz.) Noot. var. *laurina*
S. schumanniana Brand	*S. cochinchinensis* (Lour.) Moore ssp. *leptophylla* (Brand) Noot. var. *schumanniana* (Brand) Noot.
S. sessilifolia Gürke	*S. cochinchinensis* (Lour.) Moore ssp. *cochinchinensis* var. *sessifolia* (Bl.) Noot.
S. spectabilis Brand	Unchanged
S. spruceana (Miers) Gürke	Not revised
S. stawellii F. v. M.	*S. cochinchinensis* (Lour.) Moore ssp. *thwaitesii* (F. v. M.) Noot. var. *stawellii* (F. v. M.) Noot.
S. stenosepala Steen.	*S. henschelii* (Mor.) Clarke var. *henschelii*
S. subsessilis Choisy *ex* Miq.	*S. cochinchinensis* (Lour.) Moore ssp. *cochinchinensis* var. *sessifolia* (Bl.) Noot.
S. sulcata Kurz	*S. macrophylla* Wall. *ex* DC. ssp. *sulcata* (Kurz) Noot. var. *sulcata*
S. sundaica Noot. mss.	*S. laeteviridis* Stapf var. *laeteviridis*
S. syringoides	*S. cochinchinensis* (Lour.) Moore ssp. *cochinchinensis* var. *philippinensis* (Brand) Noot.
S. tenuifolia Brand	Not revised
S. tetrandra Mart. *ex* Miq.	Not revised
S. thwaitesii F. v. M.	*S. cochinchinensis* (Lour.) Moore ssp. *thwaitesii* (F. v. M.) Noot. var. *thwaitesii*
S. tinctoria (L. *f.*) l'Hér.	Not revised
S. trichomarginalis Noot. [mss.]	Unchanged
S. trifurceps Brand	*S. cochinchinensis* (Lour.) Moore ssp. *leptophylla* (Brand) Noot. var. *leptophylla*
S. turrilliana A. C. Smith	*S. cochinchinensis* (Lour.) Moore ssp. *leptophylla* (Brand) Noot. var. *leptophylla*
S. varifoliata Noot. mss.	*S. laeteviridis* Stapf var. *basirotunda* Noot.
S. verrucosa Brand	Not revised
S. whitfordii Brand	Unchanged
S. xanthophylla Jungh. & De Vr.	*S. cochinchinensis* (Lour.) Moore ssp. *laurina* (Retz.) Noot. var *laurina*
nov. spec. San 33414 (Borneo)	*S. tricoccata* Noot.

CHROMOSOME NUMBERS

Hitherto the diploid numbers 22 (Mehra *et al.*, 1969), 24 (Borgmann, 1964; Nevling, 1969) and 28 (Hardin, 1966) were recorded. During my collecting trips to SE. Asia I fixed flower buds in Carnoy's fluid. These buds were sent to Leyden and stored there at —28 °C until chromosome counts could be made. For counting chromosomes, buds were boiled for approximately 4 minutes in acetocarmine. After dissection of stained buds squashes were prepared with suitable stamens or sometimes other flower parts. Only few meioses were seen and most of them not appropriate for chromosome counts. Relatively many mitoses were seen, however. In many of the mitotic figures the chromosomes appeared as dense clusters. Generally a large number of squashes had to be prepared in order to find metaphase plates which allowed exact counting of chromosomes.

In Table 3 I have assembled all data, old and new, on chromosome numbers in the genus Symplocos.

In the first place it should be mentioned that mostly I counted 11 gametophytic or 22 sporophytic chromosomes. In some collections, however, besides 22 also 23 and 24 mitotic chromosomes were found and in two cases the gametophytic number was found to be 12. In my opinion the basic chromosome number of Asiatic species of *Symplocos* is 11, the somatic number in subg. *Hopea* being 22 (diploid, see fig. 2b). I believe the counts of Borgmann, Nevling and Hardin were either erroneous or due to the presence of B-chromosomes, already recorded by Mehra & Gill (1968: 575).

In subg. *Symplocos* only one count could be made; the total number of chromosomes could not exactly be settled, but is *c.* 90. These chromosomes always appear in a rather dense cluster (fig. 2a). I assume the exact somatic number for this specimen to be 88 (octoploid).

From the scant data on chromosome numbers it is clear that more counts are highly desirable, especially of species belonging to subg. *Symplocos*, as one can by no means conclude from one count made in this subgenus that all species are polyploids.

On the other hand it seems rather certain that in subg. *Hopea* most species are diploid. Karyotypes of all species of subg. *Hopea* investigated by me are very similar. This would be consistent with the assumption that hybridisation can occur. The latter is indicated by the frequent occurrence of intermediate or transitional specimens in the herbarium. Also there are certain hermaphroditic taxa which always show a high proportion of sterile pollen; this could only be explained by accepting hybridogenous origin. According to Mehra & Bawa (1969) base numbers 11, 12 and 13 are frequent in tropical hardwood taxa; x = 11 seems to be characteristic of *Alangiaceae*, *Nyssaceae*, *Davidiaceae*, most subgenera of *Cornus*, and others. On the other hand x seems to be 8 or 12 in *Styracaceae*, 15 in *Ebenaceae*, 12 in *Sapotaceae*, and 15, 20 and 21 in *Theaceae*.

Symplocaceae, therefore, seem to share the basic chromosome number 11 with *Cornus*, *Alangiaceae*, and *Nyssaceae* and deviate in this respect from *Ebenaceae*, *Styracaceae*, *Sapotaceae*, and *Theaceae*.

TABLE 3 — Chromosome numbers of species of Symplocos; voucher specimens in brackets.

Species and collector's numbers	gam. (1 n)	spor. (2 n)	Authors
S. cochinchinensis (Lour.) Moore ssp. cochinchinensis var. sessifolia (Bl.) Noot. (Nooteboom 906)	—	22	
ssp. laurina (Retz.) Noot. var. laurina (Nooteboom 896, 908)	11 + 1B	22, 22+1-2B	
ssp. leptophylla (Brand) Noot. var. leptophylla (Borgmann 171)	—	24	Borgmann 1964
var. pedicellata Noot. (Borgmann 191)	—	24	Borgmann 1964
S. costata (Bl.) Choisy ex Zoll. (Nooteboom 885)	—	22	
S. fasciculata Zoll. (Nooteboom 895, 2073)	11	22	
S. glomerata King ex Clarke (Mehra c.s. 351)	11	—	Mehra & Bawa 1969
S. laeteviridis Stapf var. basirotunda Noot. (Nooteboom 1666, 1864)	—	22	
var. kinabaluensis (Heine) Noot. (Nooteboom 1499)	—	22	
var. laeteviridis (Nooteboom 1599)	—	22	
S. lucida S. & Z. (S. phyllocalyx Clarke) (Mehra c.s. 304)	11	—	Mehra & Bawa 1969
S. micrantha Krug & Urban (Evans 128)	12	—	Nevling 1969
S. paniculata (Thunb.) Miq. (S. crataegoides Buch.Ham. ex D.Don) (Mehra c.s. 1187, 1226, 1343)	11, 11 + 1B	22, 22 + 1B	Mehra & Gill 1968
(Nooteboom, Cult. Gimborn Arb.)	11	22, 22 + 1B	
S. pendula Wight var. confusa (Brand) Noot.* (Nooteboom 2058)	—	c. 90	
S. racemosa Roxb. (Nooteboom 743A)	11 (+ 1B)	22, 22+1-2B	
S. tinctoria l'Hér. ('tentatively')	14	—	Hardin 1966
S. zizyphoides Stapf (Nooteboom 1490, 1491)	—	22	

* var. hirtistylis (Clarke) Noot.

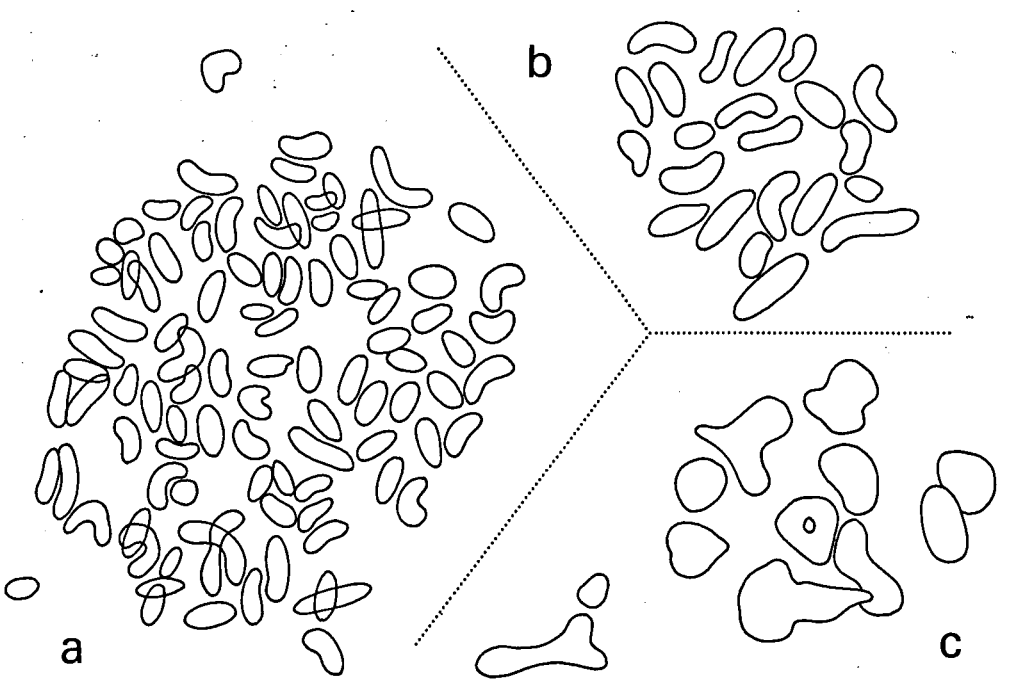


Fig. 2. Metaphase plates of a. *Symplocos pendula* Wight var. *hirtistylis* (Brand) Noot. (c. 90 chromosomes), b. *S. paniculata* (Thunb.) Miq. (22 ditto), c. meiosis of *S. fasciculata* Zoll. (11 ditto with β-chromosome) (a *Nooteboom 2058*, b *ex* Gimborn Arboretum, c *Nooteboom 895*).

PHYTOCHEMISTRY

The following survey is largely derived from Hegnauer (1973: 478, 757, 794).

1. **Phenolic compounds** — Gallic and ellagic acid seem to be rather common; they were detected in *S. hookeri* Clarke, *S. paniculata* (Thunb.) Miq., *S. celastrifolia* Griff., *S. pendula* Wight, *S. cochinchinensis* (Lour.) Moore, *S. racemosa* Roxb., *S. disepala* Guillaumin, *S. glomerata* King *ex* Clarke, and *S. flavescens* Brand. In *S. costata* (Bl.) Choisy only gallic acid was found. Leucoanthocyanidins occur in varying amount. Leucodelphinidin has been found in *S. pendula* Wight, leucocyanidin in *S. hookeri* Clarke, *S. megalocarpa* Fletcher, *S. pendula* Wight, *S. polyandra* (Blanco) Brand, and *S. costata* (Bl.) Choisy. Probably the leucoanthocyanidin containing species also contain leucopelargonidin (paperchromatographic research in our laboratory by Beyersbergen).

In hydrolysed leaf-extracts of *S. paniculata* (Thunb.) Miq. leucodelphinidin, leucocyanidin, quercetin and caffeic acid have been observed by Bate Smith (1952: 152). In the bark of *S. lucida* S. & Z. the lignan glycoside symplocosin has been found, and traces of methylsalicylate were demonstrated in the bark of several species. True tannins were not yet found in *Symplocos*.

2. **Alkaloids** — Only little research has been done. Structurally known alkaloids were described for two species; more research, however, is needed with samples that are botanically identified beyond any doubt.

3. **Saponins** — Saponin-like compounds are found in *S. crassipes* Clarke var. *curtisii* (Oliver) Noot., *S. fasciculata* Zoll., *S. rubiginosa* Wall. *ex* DC., and *S. anamallayana* Beddome (= *S. uniflora* Beddome). *S. racemosa* Roxb. and *S. beddomei* Clarke possess saponin-free bark; *S. cochinchinensis* (Lour.) Moore ssp. *laurina* (Retz.) Noot. (= *S. spicata* Roxb.) possesses a much saponin containing bark. The sapogenins of the bark of *S. cochinchinensis* ssp. *thwaitesii* (F. v. M.) Noot. var. *stawellii* (F. v. M.) Noot. (= *S. stawellii* F. v. M.) are believed to be triterpenes. Also the leaves of *S. cochinchinensis* ssp. *laurina* (Retz.) Noot. contain saponins.

4. **Minerals** — The leaves of *Symplocos* often contain much aluminium. Amounts of aluminium between 0.05 and 4.2% of dry weight of the leaves are recorded in literature. This coincides with 1.14 to 27.2% of aluminium in the ash. Barks may contain similar amounts of aluminium. Chenery (1948: 175) found 23 of the 29 species investigated by him to be aluminium accumulators (0.1% or more of aluminium in dry leaves). All non-accumulating species belonged to *Cordyloblaste* (= subg. *Symplocos*). Dr. H. W. L. Ruygrok, of our laboratory, examined leaves of 22 collections, representing 16 species. In addition to the methods described by Chenery (1948: 173) for leaf fragments he determined aluminium in the ash of leaves by a complexometric method. Contents varied between 0.15 and 0.4% for 4 species of subg. *Symplocos* and between 0.5 and 3.4% for 12 species of subg. *Hopea*. Ranges observed within one species were 0.8—2% for three samples of *S. paniculata* and 0.5—1.4% for three samples of *S. celastrifolia*. The lesser tendency of subg. *Symplocos* to accumulate aluminium has been confirmed. This coincides with the observation that leaves of subg. *Symplocos* never turn yellow in drying. Distinctly yellow leaves in herbarium specimens are an indication for strong aluminium accumulation (Chenery, 1948: 173). Such leaves are often met in subg. *Hopea*. The yellow colour is the result of the reaction of aluminium compounds with flavonols in the drying leaf; when collected specimens are preserved with ethanol vapour and later dried they also turn yellow, often with a very intensive colour.

Besides, several others have investigated the occurrence of aluminium in *Symplocos*. Radlkofer (1904: 216—224) already mentioned that the ash of the leaves contain *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 pallisade parenchyma. According to Radlkofer these masses consist mainly of aluminium compounds. He even stated that most of the aluminium of the leaves is accumulated in these masses. Kratzmann (1913: 331) found that the 'Tonerdekörper' of Radlkofer also contain much other material, for instance silicates and that the aluminium is also accumulated in other parts of the leaf. Neger (1923: 326—330) cultivated plants of *S. lucida* S. & Z. (= *S. japonica* DC.) in solutions containing different amounts of aluminium salts. He observed that the development of the plants depended on the amount of aluminium compound. Plants grew best on a solution of 1

promille aluminium, an amount that is already toxic for other xerophyllous plants. Not only were the plants well thriving, but they also contained the highest amount of aluminium in the leaves and the highest quantity of the aluminium bodies of Radlkofer. He therefore concluded that Radlkofer was correct in stating that the 'Tonerdekörper' mainly consisted of aluminium salts.

5. **Constituents of the seed** — The seeds often contain starch as well as fatty oil and probably aleuron (personal observation). Seeds of *S. paniculata* (Thunb.) Miq. are reported to be starch free and to contain 21.2% of proteins and 51.7% of fatty oil. Palmitinic, oleic and linolic acids were found to be the main fatty acids of the hitherto investigated samples of *Symplocos* seeds.

Discussion

Much remains to be done before chemical characters become really profitable in a discussion of the affinities of *Symplocaceae*. The most interesting constituents known to occur regularly in the taxon are ellagic acid, gallic acid and leucoanthocyanins. In this respect *Symplocos* resembles *Cornus*, but also *Sapotaceae*, *Theaceae*, and many other taxa. One striking feature of *Symplocos* is the strong tendency to accumulate large amounts of aluminium in leaves. Chenery (1948) and Webb (1954) discussed taxonomic implications of aluminium accumulation. Chenery mentioned affinities of *Symplocos* with *Theaceae* through the genus *Symplococarpon* Airy Shaw on the one hand and with *Polygalaceae* through *Barnhartia* Gleason and *Diclidanthera* Mart. on the other hand.

ANATOMY

Wood anatomy

A concise summary of the main features of the wood anatomy, largely following Metcalfe & Chalk (1950), runs as follows:

The wood of *Symplocos* is relatively primitive. Vessels are small, often angular, almost exclusively solitary, often with spiral thickening. Perforation plates are scalariform, usually with more than 20 fine bars, occasionally slightly reticulate. Intervascular pitting if present is scalariform to opposite. Mean member length 0.9—1.5 mm. Parenchyma is apotracheal, as scattered cells or in short uniseriate bands, and very scanty paratracheal. Wood rays heterogeneous, typically up to 3—5 cells wide, but occasionally not more than up to 2 cells wide, in *S. cochinchinensis* ssp. *laurina* (Retz.) Noot. up to 9—12 cells. Besides, numerous uniseriate rays are found. Fibres with bordered pits on both tangential and radial walls.

A similar wood anatomy is found in quite a few other families (see *e.a.* Janssonius, 1920), amongst others in *Theaceae*, *Cornaceae*, *Nyssaceae*, *Saxifragaceae*, but also in

clearly unrelated families, as for example *Clethraceae*, *Cyrillaceae*, and *Hamamelidaceae*. Huber (1963) calls it the *Cornus* type.

A note should be made about the spiral thickenings of the vessels. This has not been checked for all species, but according to the contention of P. Baas (1973: 214) the situation is probably the same as in *Ilex*, *viz.* that the thickenings are best developed in or even restricted to extra-tropical species.

Leaf anatomy

The leaves of *Symplocos* are bifacial. The cuticle is smooth or striated or ridged. High ridges sometimes occur on the lower side of the leaf. The thickness of the leaves is very variable for the genus as a whole, but relatively constant for the species. The size of the epidermal cells varies considerably from species to species; their radial walls are straight or undulate. A hypodermal layer is present in several species, but it is sometimes not continuous. In one and the same species the number of layers of palissade parenchyma can vary from 1 to 3, but mostly this character is rather constant. The spongy parenchyma is very compact to very loose; this character is according to the few samples studied constant for a species. In some species the spongy parenchyma contains sclereids. The midrib encloses one large vascular bundle, usually enveloped by a sclerenchymatic sheath which can be continuous or not. Above the vascular bundle usually several layers of parenchymatic or collenchymatic tissue can be found. Beneath the vascular bundle mostly a thick sclerenchymatic cap is present. In all but three species the midrib is grooved in dried material.

The leaf surface is totally glabrous in some species, in other species it possesses a more or less dense indument, especially on the nerves underneath. The hairs are (nearly?) always septate; they are appressed to erect and sometimes lignified, heavily cutinised, especially in the basal part.

The stomata are of the paracytic type. In most (maybe in all) species there are two kinds: besides the normal ones a few very large so-called water stomata occur. The size of the stomata is within certain limits constant for a species.

Clustered Ca-oxalate crystals probably occur in all species and they can be found in most parts of the leaves. Tannin-like compounds, probably condensed leucoanthocyanins and catechins (so-called 'Inklusen') are common in *Symplocos*; they occur in epidermal cells, sometimes giving them a very characteristic brown colour. The leaves of many species contain a high percentage of aluminium compounds; the latter are often visible as dark bodies in the leaf tissues (fat-like bodies of Metcalfe & Chalk).

The leaf anatomy is rather constant for some species and highly variable for others, probably often due to altitudinal variation. In practice it turned out to be too time-consuming to use the leaf anatomy in discriminating between species, even when good characters would have been available, but time was lacking for an examination of the anatomy of all the species.

Sources: Cador (1900), Hegnauer (1973), Loesener (1896), Metcalfe & Chalk (1950),

Neger (1923), Wehnert (1906); a research of the leaf anatomy was done in our laboratory by J. C. den Hartog.

SEEDLINGS

Of the seedlings little is known. Lubbock (1892) gave the following description of those of *S. paniculata* (Thunb.) Miq.

The *endocarp* of the fruit is obovoid, woody, and does not burst during germination. The radicle emerges by a small hole at the narrow apical end, the hypocotyl elongates, becoming curved and finally straightens, carrying up with it the endocarp containing the seed. As the cotyledons elongate they push out at the small hole in the endocarp, and finally get free and spread out to the light.

Primary root of great length, with a few rootlets only in the young stage near the base.

Hypocotyl erect, terete, glabrous, pale green, arched at the top in germination, ultimately 2—2.7 cm long.

Cotyledons unequal in length, linear, obtuse, sessile and slightly connate at the base, glabrous with a channelled midrib above, and slightly convex on the back, the longer 8—9.5 mm long, the shorter 7—8 mm long, both 1—1.25 mm wide. The seed is reniform or curved, and contains a large quantity of fleshy endosperm. If a seed is cut open during germination the cotyledons are found to be linear, obtuse and, together with the apex of the hypocotyl, curved like the head of a shepherd's staff. Their shape then might be accounted for by the shape of the seed and the quantity of endosperm originally surrounding them.

Stem erect, terete, hairy with upwardly incurving colourless hairs; 1st internode 2—4 mm long, 2nd much shorter.

Leaves simple, alternate, exstipulate, very shortly petiolate, penninerved with ascending, incurved nerves, hairy on both surfaces. First and second leaf elliptic, acute, shallowly and distantly serrate above the middle, tapering at the base, decurrent and forming a narrow wing to the short petiole.

I could not perform personal observations: seed of *Symplocos paniculata* obtained through a garden catalogue and seed of *S. polyandra* from Borneo sent to me through the kind help of Dr. W. Meijer failed to germinate in the Leiden Hortus.

Moreover, I did not find in the field seedlings in a sufficiently young stage to confirm and amplify the observations of Lubbock.

MORPHOLOGY

1. **Habit** — Shrubs or trees. In some species varying from a small shrub to a moderately large tree, and therefore in those cases of no value for specific delimitation.

2. **Twigs** — Slender to rather thick, in some species covered with pulvinate leaf scars.

When the leaves are distichously arranged the twigs are often zig-zag. The twigs are terminated by a bud which possesses large, leathery scales in most species with discontinuous growth. In other species (with continuous growth) the buds are naked or covered by small scales.

3. **Hairs** — All the hairs are simple, 1-celled but with transverse septa, rarely bulbous-based. There is a great variability in the kind of indument which sometimes bears some importance for the discrimination of the species. It can be of a different nature in different parts of the plant. In many species the indument is variable and of no systematic value at all. Absence of hairs is sometimes important for taxonomic purpose.

4. **Leaves** — Mostly spirally or distichously arranged, rarely pseudoverticillate. The type of phyllotaxis is usually constant for a species, but in some species it depends on the position of the twigs, the 'leaders' having often spirally arranged leaves. The shape of the leaves, the leaf index, the size and the venation often yield good specific characters. But in some species all these characters vary widely, making vegetative discrimination between species very difficult.

For the size of the leaf the *length* of the leaf blade is taken from the tip to the base of the blade, that is, including the acumen and the attenuation at the base, excluding the petiole. See figure 3A.

For the *leaf-index*, however, the length of the blade is taken in the more strict sense, that is, excluding the acumen, the petiole and also the basal extremity of the cuneation of the blade. See figure 3A.

For the *base angle* is taken the angle of the *general* direction of the lower part of the leaf margin with the midrib, not including the small, tapering, last extremity to the petiole. See figure 3B.

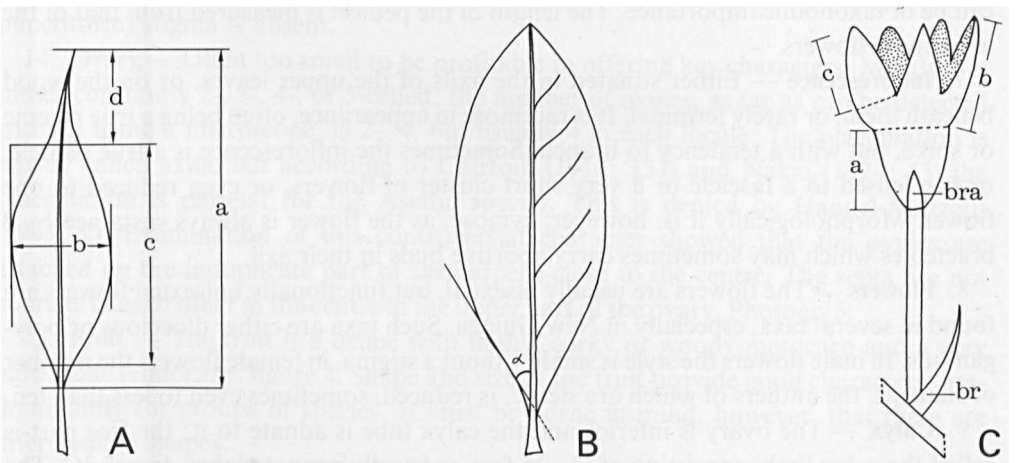


Fig. 3. Schemes elucidating descriptive terminology used in the text.
A: — *a* length of leaf — *b* width of leaf — *c* divided by *b* is leaf index — *d* length of acumen.
B: — Way of expressing base angle α.
C: — Deflorated flower; *br* bract — *bra* bracteole — *a* height of calyx tube — *b* length of calyx limb — *c* length of calyx lobes.

In the descriptions the following terms have been used (fig. 3): Leaf index 3 to 6: narrowly elliptic (ovate- or obovate-). Leaf index 1.5 to 2: elliptic (ovate- or obovate-). Leaf index 1 to 1.2: broadly elliptic (ovate- or obovate-) or orbicular.

When dried the midrib is always sulcate, except in four species, *S. anomala* Brand, *S. lancifolia* S. & Z. (not always), *S. lucida* S. & Z., and *S. microtricha* Hand.-Mazz. (in part).

The number of (lateral) nerves is always given in pairs, even when they are not exactly opposite. The reticulation of the veins is often an important character. In some species the secondary veins are transverse to the nerves. The tertiary veins (and the quaternary) can be prominent or obscure, the reticulation dense or lax (sometimes a fine reticulation is only visible with translucent light). Usually details of the venation are only distinct on the undersurface. The margin of the leaves is often provided with vesicular or tooth-like glands. When tooth-like these glands are usually lost during expansion of the leaves.

5. **Petiole** — The length is very variable in some species, but rather constant and providing a good character in others. In cross-section the petiole is usually convex beneath, grooved or flat above. In some species it bears some lengthwise decurrent edges and may even appear winged by the decurrent leafblade.

6. **Bracts, bracteoles and pedicel** – Principally 1 bract and 2 bracteoles are present below each flower, the latter directly under the flower. See figure 3C. Sometimes a pedicel occurs between bract and bracteoles. Bracts and/or bracteoles are, depending the species, persistent or caducous; rarely I could find bracteoles in none of the specimens of a species. Sometimes the presence of several bracts and bracteoles indicates the origin from a more elaborate inflorescence (*S. fasciculata* Zoll., *etc.*). Sometimes the bracts and bracteoles bear vesicular glands on the margin. The size of bracts and bracteoles can be of taxonomic importance. The length of the pedicel is measured from that of the lowermost flowers.

7. **Inflorescence** — Either situated in the axils of the upper leaves, or on the wood beneath them, or rarely terminal. It is racemose in appearance, often being a true raceme or spike, but with a tendency to branch. Sometimes the inflorescence is a true panicle, or condensed to a fascicle or a very short cluster of flowers, or even reduced to one flower. Morphologically it is, however, cymose, as the flower is always sustained by 2 bracteoles which may sometimes carry abortive buds in their axil.

8. **Flowers** — The flowers are usually 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 without a stigma, in female flowers the number of stamens, the anthers of which are sterile, is reduced, sometimes even to less than ten.

9. **Calyx** — The ovary is inferior and the calyx tube is adnate to it; the free part is called the calyx limb, consisting of (3—)5 free or basally connate lobes. figure 3C. The calyx lobes are normally ±equal, but in several species the calyx splits after anthesis, thus becoming symmetrically cleft. Of the calyx tube the height is given, of the lobes and/or the limb (rim) the overall length measured from the adnation line to the apex of the lobes. The incision between the calyx lobes sometimes becomes longer with age.

The presence or absence of indument on the calyx offers sometimes a good character as well as the shape and the length of the calyx lobes.

The term 'calyx tube' is here accepted as a purely descriptive term; no decision is made whether it is morphologically comparable with a calyx of other plants or consists of receptacular tissue.

10. **Corolla** — In subg. *Symplocos* the petals are connate into a true tube (because the overlapping margins are free this is often only well visible from the inside) (pl. 1g–h); in subg. *Hopea* the petals are only connate at their very base (pl. 2c). Rarely the petals are covered with a dense indument, at least in bud. More often they are glabrous or provided with some minute hairs towards the outer base. For most species the corolla does not offer good specific characters.

11. **Stamens** — In subg. *Symplocos* the stamens are monadelphous with a long tube. The number of the filaments and the relative length of their free part provide good characters, as well as the length of the free part of the staminal tube (pl. 1g).

In subg. *Hopea* the stamens are only connate towards the base, for at most 2 mm, and intergrading from strictly monadelphous, to strictly pentadelphous, the groups being alternipetalous (pl. 2c). It appeared that the degree of coalescence is constant only for few species. In some species the stamens are hairy.

12. **Disk** — The superior part of the ovary is covered by an often stellate and 5-glandular disk. In some species the shape of this part is variable, but in others it offers good characters. The disk can be globose, low-cylindrical, or flat and then inconspicuous. It is often covered by an indument. The last feature is very variable in some species, in others it can, however, be fairly constant.

13. **Style** — Of the same shape in the whole genus; its indument is often coincident with that of the disk. In male flowers of dioecious or polygamous species the (peltate or punctiform) stigma is absent.

14. **Ovary** — Often too small to be profitable in offering key characters. Mostly it is rather constantly 2-, 3-, 4-, or 5-celled; the number of ovules, as far as can be detected without using a microscope, is 2—4, but usually 4 in each locule. The placentation is mostly called axile, but according to Chirtoiü (1918: 353) and Nakai (1924: 43) the placentation is parietal for the Asiatic species. This is denied by Handel-Mazzetti (1943: 2). Examination of this controversial character showed that the ovules are attached on the induplicate part of the carpels, close to the centre. The septa are not connate to each other at the centre in the upper part of the ovary. Photogr. 5.

15. **Fruit** — The fruit is a drupe with fleshy, corky or woody mesocarp and a very hard stone (endocarp. figure 4. Shape and size of the fruit provide good characters, predominantly for groups of species. It must be borne in mind, however, that there are intermediate shapes.

The following terminology has been used for defining the shape of the fruit and the stone, as illustrated in the figures 6 and 7 on pages 45 and 47 in which the fruits of all taxa of which fruits were available have been drawn in outline in the *dried state* and have been numbered according to the numbering of taxa adopted in the Special part.

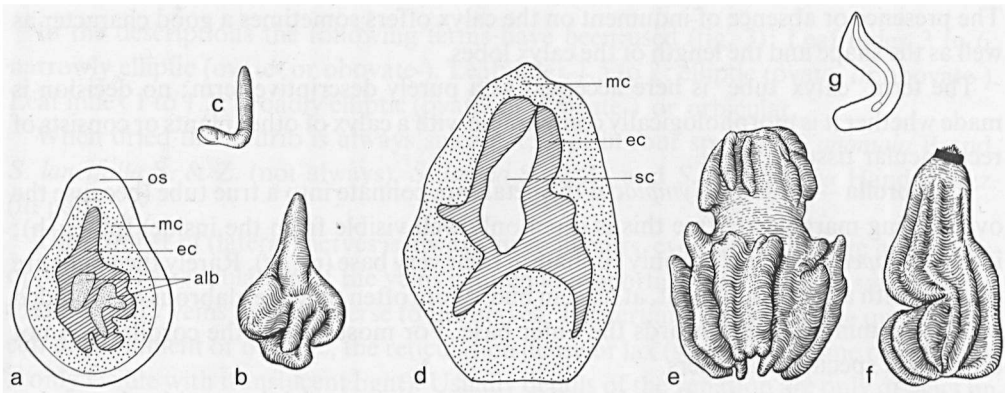


Fig. 4. *Symplocos ophirensis* Clarke ssp. *perakensis* (K. & G.) Noot.var. *perakensis*. a. LS of fruit, out of centre, b. seed, c. curved embryo, with 2 short apical cotyledons, all ×4. — *S. ophirensis* Clarke ssp. *cumingiana* (Brand) Noot. var. *cumingiana*. d. LS of fruit, seed cavity empty, e. 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 (a–c *Burkill 1013*, d–e *Nooteboom 2229*, f–g *Ashton 2480*). — *alb* albumen, *ec* stony endocarp, *mc* mesocarp, *os* outer surface of fruit, *sc* seed cavity.

This runs as follows:

globose 38, 59, 74-2, 80
ellipsoid 7, 30, 43, 58-5, 88
ovoid 63-14, 79, 93
obovoid 1-2, 1-3, 1-4
ampulliform 41, 77-8, 82, also pl. 3d
spindle-shaped 53, 69
cylindrical 32-3, 35, also photogr. 4

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.

Though the fruit provides usually good characters, it has not appeared possible to frame a satisfactory key on fruiting material; even with my knowledge I have hesitated to describe new species on such material and have indicated several assumedly new taxa under 'Dubious' and 'Incompletely known species'.

This is unfortunate but the reproduction cycle is such that usually either a tree is in flower or in fruit; all inflorescences and all flowers in each inflorescence open usually simultaneously, so that one hardly ever finds ripe fruit and flowers on the same tree.

16. **Seed and embryo** — They can be straight (pl. 15h), once curved (fig. 4c, 4g) to

U-shaped (pl. 21i) or twice curved in two planes. Almost always the shape of the embryo is similar to that of the seed. Globose and ampulliform fruits are mostly correlated with curved embryos; cylindrical fruits have always straight embryos. Ovoid and ellipsoid fruits may contain straight or curved seeds and embryos; in some species there are even intergradations between them.

PRESENTATION

In the preceding chapter I have already given some data on the use of terms for leaf shape, base angle and leaf index, measuring the calyx and calyx limb *c.q.* lobes, and the fruit shape.

As to literature references in the synonymy of species a selection has been made of the most important or relevant citations.

In the citation of specimens also selections have been made; a complete 'Identification List' will be published separately.

Vernacular names are few and as I feel unqualified to discriminate in this field of science alien to me they have usually been omitted.

Ecological notes have been made only occasionally as it is difficult to give a precise one of species which are widely distributed over tens of latitudinal degrees; instead I have preferred to give altitudes with cited numbers; it was found unnecessary to repeat under each taxon that it grows in rain forest.

ACKNOWLEDGEMENTS

For substantial precursory contributions made in the interest of this revision I have to express sincere thanks to Drs. R. van der Meijden (1970) who made a palynological study of a number of *Symplocos* specimens under the tutorship of Mr. J. Muller at the Rijksherbarium, Leiden.

Thanks are also due to my colleague Dr. H. W. L. Ruygrok, whose examination of *Symplocos* leaves contributed to the knowledge of the phytochemistry.

I have gratefully used data from an examination of the leaf anatomy made in our laboratory by Mr. J. C. den Hartog.

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I also wish to express my thanks to Miss Helene de Vos, who assisted me in tabulating the descriptions for the computer and in punching the cards, thus greatly shortening the time needed.

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These Herbaria are the following:

A	Arnold Arboretum, Cambridge, Mass., U.S.A.
BISH	Bernice P. Bishop Museum, Honolulu.
BM	British Museum (Nat. Hist.), Botany Department, London.
BO	Herbarium Bogoriense, Bogor.
BR	Jardin botanique de l'Etat, Brussels.
BRI	Botanic Museum and Herbarium, Brisbane.
C	Botanical Museum and Herbarium, Copenhagen.
CANB	Herbarium of C.S.I.R.O., Canberra.
CGE	Herbarium of the Botany School, Cambridge, England.
E	Royal Botanic Gardens, Edinburgh.
FI	Istituto Botanico, Firenze.
G	Conservatoire et Jardin botanique, Geneva.
GH	Gray Herbarium, Cambridge, Mass., U.S.A.
HK	Hong Kong Herbarium.
K	Royal Botanic Gardens, Kew.
KSEPL	Herbarium of the Palynological Division, Shell, Rijswijk, Netherlands.
KYO	Herbarium Botany Department, Faculty of Science, Kyoto.
LAE	Botany Division, Lae, Papua New Guinea.
L	Rijksherbarium, Leiden.
LE	Botanical Institute, Academy of Sciences, Leningrad.
MEL	National Herbarium of Victoria, Melbourne.

NY New York Botanical Garden, Bronx, New York.
P Laboratoire de Phanérogamie, Muséum National d'Histoire naturelle, Paris.
S Botaniska Avdelningen, Naturhistoriska Riksmuseet, Stockholm.
SAN Forestry Herbarium, Sandakan, Sabah, Malaysia.
SAR Forestry Herbarium, Kuching, Sarawak, Malaysia.
SING Botanic Gardens, Singapore.
SUVA Botany Laboratory, Suva, Fiji.
TI Herbarium Botanic Gardens, Faculty of Science, Tokyo.
U Instituut voor systematische Plantkunde, Utrecht.
UC Herbarium of the University of California, Berkeley.
US National Museum, Smithsonian Institution, Washington, D.C.
W Naturhistorisches Hofmuseum, Vienna.
WRSL Herbarium Instituti Botanici, Universitas, Wroclaw, Poland.

REFERENCES TO PREVIOUS CHAPTERS

BAAS, P. 1973. The wood anatomical range in Ilex (Aquifoliaceae) and its ecological and phylogenetical significance. Blumea 21: 193—258.

BATE SMITH, E. C. 1952. The phenolic constituents of plants and their taxonomic significance. 1. Dicotyledons. J. Linn. Soc. Bot. 58: 95—173.

BEUSEKOM, C. F. VAN. 1971. Revision of Meliosma (Sabiaceae), section Lorenzanea excepted, living and fossil, geography and phylogeny. Blumea 19: 355—529.

BORGMANN, E. 1964. Anteil der Polyploiden in der Flora des Bismarckgebirges von Ostneuguinea. Zeitschr. f. Bot. 52: 134.

BRAND, A. 1901. Symplocaceae. Das Pflanzenreich Heft 6: 100 pp., 9 fig.

CADOR, L. 1900. Blattstruktur der matélieferende Symplocos-Arten. Bot. Centralbl. 21: 248, 345, 369.

CANDOLLE, A. DE. 1844. Prodromus 8: 684 pp.

CHENERY, E. M. 1948. Aluminium in the plant world. Kew Bull.: 173—183.

CHENERY, E. M. 1948. Thioglycolic acid as an inhibitor for iron. Analyst: 501.

CHIRTOIÜ, M. 1918. Lacistemacées et Symplocacées. Bull. Soc. Bot. Genève sér. II, 10: 350—361.

DAVIS, G. L. 1966. Systematic embryology of the Angiosperms: 254.

ENDLICHER, S. L. 1839. Genera Plantarum: 744.

ERDTMAN, G. 1952. Pollen morphology and Plant taxonomy: 539 pp.

HALLIER, H. 1923. Beiträge zur Kenntnis der Linaceae. Beih. Bot. Centralbl. 39-B: 1—178.

HANDEL-MAZZETTI, H., & E. PETER-STIBAL. 1943. Eine Revision der chinesischen Arten der Gattung Symplocos Jacq. Beih. Bot. Centralbl. 62-B: 1—42.

HARDIN, J. W. 1966. An analysis of variation in Symplocos tinctoria. J. Elisha Mitchell Sc. Soc. 82: 6—12.

HEGNAUER, R. 1973. Chemotaxonomie der Pflanzen 6: 882 pp.

HUBER, H. 1963. Die Verwandtschaftsverhältnisse der Rosifloren. Mitt. Bot. Staatssammlungen München 5: 1—48.

HUTCHINSON, J. 1959. The families of flowering plants, ed. 2, 1: 510 pp.

JANSSONIUS, H. H. 1920. Mikrographie des Holzes. 4. Gamopetalae: 471—499.

JUSSIEU, A. DE. 1789. Genera Plantarum: 498 pp.

KIRCHHEIMER, F. 1949. Die Symplocaceae der erdgeschichtlichen Vergangenheit. Palaeontographica 90B: 1—52, t. 1—2.
KRATZMANN, E. 1913. Der mikrochemische Nachweis und die Verbreitung des Aluminiums im Pflanzenreich. Sitz. Ber. Akad. Wiss. Wien: 311—336.

LOESENER, TH. 1896. Beiträge zur Kenntnis der Matépflanzen. Ber. Deut. Pharm. Ges. 6: 203.
LUBBOCK, J. 1892. A contribution to our knowledge of seedlings. London: 206—208.

MEHRA, P. N., & K. S. BAWA. 1969. Chromosomal evolution in tropical hardwoods. Evolution 23: 466—481.
MEHRA, P. N., & B. S. GILL. 1968. IOPB Chromosome number reports XIX. Taxon 17: 575.
METCALFE, C. R., & L. CHALK. 1950. Anatomy of the Dicotyledons 2: 871—893.
MEIJDEN, R. VAN DER. 1971. A survey of the pollenmorphology of Indo-Pacific species of Symplocos. Pollen et Spores 12: 513—551 (1970).
MIERS, J. 1853. In: Lindley, The vegetable kingdom, ed. 3: 593.

NAKAI, T. 1924. Abstract from T. Nakai: Trees and shrubs indigenous in Japan proper, vol. 1 (1922), with additional remarks on some species. Bot. Mag. Tokyo 38: 23—48.
NEGER, F. W. 1923. Neue Methoden und Ergebnisse der Mikrochemie der Pflanzen. Flora N.F. 16: 326—330.
NEVLING JR, L. I. 1969. The ecology of an elfin forest in Puerto Rico. 5. Chromosome numbers of some flowering plants. J. Arn. Arb. 50: 99—103.

PULLE, A. A. 1950. Compendium van de terminologie, nomenclatuur en systematiek der zaadplanten, ed. 2: 370 pp.

RADLKOFER, L. 1904. Über Tonerdekörper in Pflanzenzellen. Ber. Deut. Bot. Ges. 22: 216—224.

SHAW, H. K. AIRY. 1966. A dictionary of the flowering plants and ferns, by J. C. Willis, ed. 7: 1214 pp.
STEENIS, C. G. G. J. VAN. 1962. The land-bridge theory in botany. Blumea 11: 240—247.

TAKHTAJAN, A. L. 1959. Die Evolution der Angiospermae: 344 pp., 43 fig.
TAKHTAJAN, A. L. 1973. Evolution und Ausbreitung der Blütenpflanzen: 189 pp., 19 fig.

WEBB, L. J. 1954. Aluminium accumulation in the Australian New Guinea flora. Austr. J. Bot. 2: 176—196.
WEHNERT, A. 1906. Anatomisch-systematische Untersuchungen der Gattung Symplocos. Thesis. München.
WETTSTEIN, R. VON. 1911. Handbuch der systematischen Botanik, ed. 2: 914 pp.

Taxonomical Part

Symplocaceae

Symplocaceae Desfontaines, Mém. Mus. Hist. Nat. Paris 6 (1820) 9, '*Symploceae*'; D. Don, Prod. Fl. Nepal. (1825) 144, *p.p.* '*Symplocineae*'; G. Don, Gen. Syst. 4 (1837) 1; Gürke, in E. & P. Nat. Pfl. Fam. 4, 1 (1891) 168; Brand, Pfl. R. Heft 6 (1901) 13; Hallier*f.*, Beih. Bot. Centralbl. 39-B (1921) 78. — *Guaiacanae pars II* Juss. Gen. (1789) 157, *p.p.* — *Styracineae* H.B.K. Nov. Gen. Sp. 3 (1818) 257, *p.p.* — *Styracaceae* tribus *Symploceae* DC. Prod. 8 (1844) 244, *p.p.*

SYMPLOCOS

Symplocos Jacquin, Enum. Pl. Carib. (1760) 5, 24; Select. Stirp. Amer. Hist. (1763); Linné, Gen. Pl. ed. 6 (1764) 272; l'Héritier, Trans. Linn. Soc. 1 (1791) 174; Benth. Trans. Linn. Soc. 18 (1841) 231; DC. Prod. 8 (1844) 246; Miq. Fl. Bras. 7 (1856) 23; Benth. Fl. Austr. 4 (1869) 292; B. & H. Gen. Pl. 2 (1876) 668; Miers, J. Linn. Soc. Bot. 17 (1879) 285; Clarke, Fl. Br. Ind. 3 (1882) 572; Gürke, in E. & P. Nat. Pfl. Fam. 4, 1 (1891) 168; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number; Urban, Bot. Jahrb. 15 (1892) 328; Brand, Pfl. R. Heft 6 (1901) 13; Ridl. Fl. Mal. Pen. 2 (1923) 298; Guillaumin, Fl. Gén. I.-C. 3 (1933) 991; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 1; Backer & Bakh.*f.* Fl. Java 2 (1965) 204. — Type: *Symplocos martinicensis* Jacq.

Bobu Adanson, Fam. Pl. 2 (1763) 88, 526; DC. Prod. 3 (1828) 23, '*Bobua*'; Miers, J. Linn. Soc. Bot. 17 (1879) 302. — *Eugeniodes* ['*Eugenioides*' Linné, Fl. Zeyl. (1747) 192] O. Kuntze, Rev. Gen. Pl. 2 (1891) 409, 975, *nom. illeg.* — *Symplocos* sectio *Bobua* Brand, Pfl. R. Heft 6 (1901) 25, 32; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 4. — Type: *Bobua laurina* DC.

Hopea Linné, Mant. (1767) 105 and Syst. nat. 2ed XII (1767), *nom. rejic.*, *non* Roxb. (1811). *Symplocos* sectio *Hopea* B. & H. Gen. Pl. 2 (1876) 668. – *Protohopea* Miers, J. Linn. Soc. Bot. 17 (1879) 289. — *Symplocos* subgenus *Hopea* Clarke, Fl. Br. Ind. 3 (1882) 572; Brand, Pfl. R. Heft 6 (1901) 25. — Type: *Hopea tinctoria* Linné, *l.c.*

Ciponima Aubl. Hist. Pl. Guin. Fr. (1775) 567, t. 226; Miers, J. Linn. Soc. Bot. 17 (1879) 287. — *Symplocos* sectio *Ciponima* B. & H. Gen. Pl. 2 (1876) 669. — *Symplocos* subgenus *Ciponima* Clarke, Fl. Br. Ind. 3 (1882) 587. — *Symplocos* subsectio *Ciponastrum* Brand, Pfl. R. Heft 6 (1901) 26, 78. — Type: *Ciponima guianensis* Aubl. *l.c.*

Alstonia Mutis *ex* Linné*f.* Suppl. (1781) 39, *non* R. Brown (1810) *nom. cons.*, *nec* Scop. (1777). — *Symplocos* sectio *Alstonia* G. Don, Gen. Syst. 4 (1837) 1. — *Praealstonia* Miers, J. Linn. Soc. Bot. 17 (1879) 291. — *Symplocos* subsectio *Pseudoalstonia* Brand, Pfl. R. Heft 6 (1901) 26, 73. — Type: *Alstonia theaeformis* Linné*f. op. cit.* 264.

Decadia Lour. Fl. Cochinch. 1 (1790) 315; Miers, J. Linn. Soc. Bot. 17 (1879) 295. — Type: *Decadia aluminosa* Lour. *l.c.*

Dicalix Lour. Fl. Cochinch. 1 (1790) 663; Miers, J. Linn. Soc. Bot. 17 (1879) 296. — '*Dicalyx*' Spreng. Syst. Veg. 2 (1825) 557, 568; Blume, Bijdr. (1826) 1116. — Type: *Dicalix cochinchinensis* Lour. *l.c.*

Drupatris Lour. Fl. Cochinch. 1 (1790) 314; Miers, J. Linn. Soc. Bot. 17 (1879) 295. — Type: *Drupatris cochinchinensis* Lour. *l.c.*

Barberina Vell. Fl. Flumin. (1825) 235; Icon. 5 (1835) t. 117; Miers, J. Linn. Soc. Bot. 17 (1879) 292. — *Symplocos* sectio *Barberina* DC. Prod. 8 (1844) 253; Brand, Pfl. R. Heft 6 (1901) 25, 26. — *Symplocos* subsectio *Barberina* B. & H. Gen. Pl. 2 (1876) 668. — Type: *Barberina hirsuta* Vell. *l.c.*

Epigenia Vell. Fl. Flumin. (1825) 183; Icon. 4 (1835) t. 137—138, *excl. Epigenia integerrima quae est Styrax glabratum.* — *Symplocos* subgenus *Epigenia* Brand, Pfl. R. Heft 6 (1901) 25, 26.

Mongezia Vell. Fl. Flumin. (1825) 229; Icon. 5 (1835) t. 105—106.

Sariava Reinw. Syll. Ratisb. 2 (1825) 12.

Stemmatosiphum Pohl, Pl. Bras. Ic. 2 (1831) 86, t. 157—159.

Symplocos sectio *Lodhra* G. Don, Gen. Syst. 4 (1837) 2; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 4. — *Lodhra* Guillemin, Ann. Sc. Nat. sér. II, 15 (1841) 158, *nom. illeg.*; Decaisne, Voy. Jacquemont 4 (1844) 104, *quoad basionym, excl. species*; Miers, J. Linn. Soc. Bot. 17 (1879) 298. — *Symplocos* subsectio *Lodhra* B. & H. Gen. Pl. 2 (1876) 668; Brand, Pfl. R. Heft 6 (1901) 25, 42. — Type: *Symplocos racemosa* Roxb.

Symplocos sectio *Palura* G. Don, Gen. Syst. 4 (1837) 3; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 4. — *Symplocos* subsectio *Palura* B. & H. Gen. Pl. 2 (1876) 668. — *Palura* Miers, J. Linn. Soc. Bot. 17 (1879) 297. — Lectotype: *Symplocos crataegoides* Ham. *ex* D. Don.

Cordyloblaste Moritzi, Bot. Zeit. 6 (1848) 606; Ridl. Fl. Mal. Pen. 2 (1923) 307. — *Symplocos* subgenus *Cordyloblaste* Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 248. — *Symplocos* sectio *Cordyloblaste* B. & H. Gen. Pl. 2 (1876) 669; Brand, Pfl. R. Heft 6 (1901) 26, 88; Steen. Bull. Bot. Gard. Btzg III, 17 (1948) 429. — Type: *Cordyloblaste henscheli* Moritzi *l.c.*

Carlea Presl, Epim. Bot. (1851) 216. — Type: *Carlea oblongifolia* Presl, *l.c.*

Baranda Llanos, Mem. Acad. Cienz. Madr. 3, 2 (1857) 502. — Type: *Baranda angatensis* Llanos, *l.c.*

Hypopogon Turcz. Bull. Soc. Imp. Nat. Mosc. 3, 1 (1858) 246.

Chasseloupia Vieill. Bull. Soc. Linn. Norm. 10 (1866) 101.

Suringaria Pierre, Bull. Soc. Linn. Paris 1 (1866) 635. — Type: *Suringaria cambodiana* Pierre.

Symplocos subgenus *Eusymplocos* Brand, Pfl. R. Heft 6 (1901) 26, 73. — Lectotype: *Symplocos martinicensis* Jacq.

Symplocos subgenus *Microsymplocos* Brand, Pfl. R. Heft 6 (1901) 25, 70.

Symplocos sectio *Neosymplocos* Brand, Pfl. R. Heft 6 (1901) 25, 70.

Symplocos sectio *Palaeosymplocos* Brand, Pfl. R. Heft 6 (1901) 25, 30. — Lectotype: *Symplocos japonica* DC.

Symplocos sectio *Pseudosymplocos* Brand, Pfl. R. Heft 6 (1901) 25, 30.

Symplocos sectio *Symplocastrum* Brand, Pfl. R. Heft 6 (1901) 26, 73.

Symplocos sectio *Urbaniocharis* Brand, Pfl. R. Heft 6 (1901) 25, 70.

Symplocos subgenus *Eosymplocos* Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 4. — Lectotype: *Symplocos racemosa* Roxb.

Small, evergreen (exceptionally deciduous) shrubs to (rarely) huge trees. Growth continuous or interrupted, in the latter case the buds are protected by often leathery scales. An indumentum of simple hairs can be present on all the parts of the plant, at least in young stages. *Leaves* spirally or distichously arranged, rarely pseudo-verticillate, estipulate, simple, penninerved; petiole always present, rarely very short. *Inflorescence* a spike, raceme or panicle, sometimes condensed to dense clusters, from the upper leaf axils, or beneath them from the axils of fallen leaves, rarely flowers solitary. Flowers supported by a bract (exceptionally bractless in the axil of a leaf) and 2 bracteoles, rarely several bracts and bracteoles by abortion of flowers. *Flowers*-actinomorphic, bisexual, rarely by reduction unisexual and the plant polygamous, fragrant. *Calyx* limb 3—5-lobed, imbricate, persistent, sometimes split into two parts and seemingly 2-lobed. *Corolla* gamopetalous, but divided nearly to the base in subg. *Hopea*, the lobes (3—)5(—10 in the New World), quincuncially imbricate, whitish bluish or purplish.

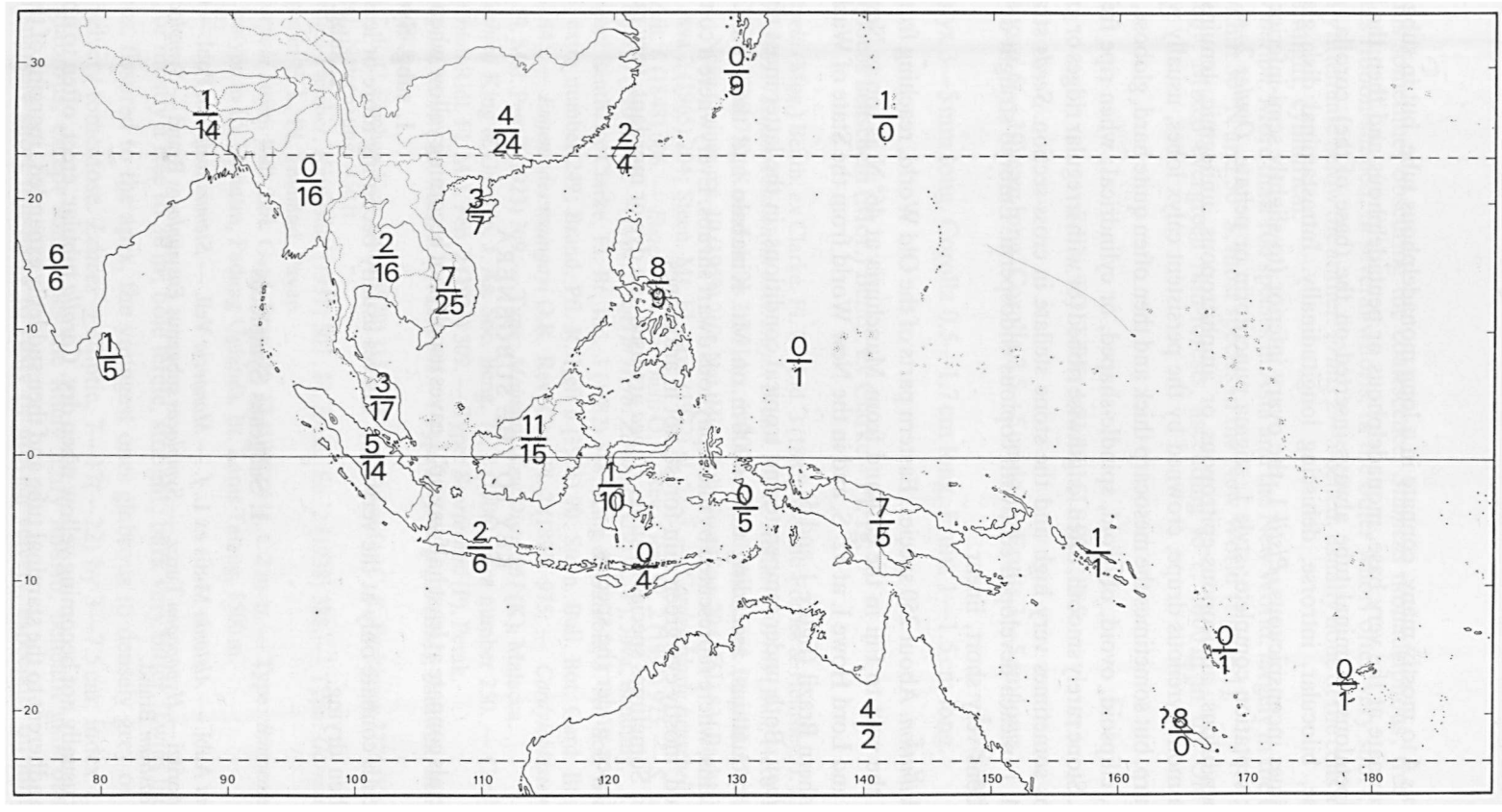


Fig. 5. Species density of *Symplocos* in the Old World, above the hyphen the number of endemic species, below it the number of non-endemic species.

Stamens 4 to mostly many, connate in a long monadelphous tube, but in subg. *Hopea* only connate at the very base, monadelphous or pentadelphous and then the bundles alternipetalous; staminal tube always inserted on the (base of the) corolla. Anthers globose, bilocular, introrse, dehiscing longitudinally. Intrastaminal disk glandular, sometimes inconspicuous. *Pistil* 1, the ovary inferior (to slightly semi-inferior), 2—5-celled; septation complete; style 1, stigma punctiform or peltate. *Ovules* 2—4 in each cell, pendulous, anatropous-epitropous or amphitropous, unitegmic, tenuinucellate. *Fruit* a monopyrenous drupe, crowned by the persistent calyx lobes, usually with thin mesocarp, but sometimes the mesocarp thick and then often quite hard, globose, ampulliform, ellipsoid, ovoid, obovoid, spindle-shaped, or cylindrical; when ripe frequently bluish. Stone rarely smooth, often lengthwise ribbed (or with irregular ridges or grooves), the ribs sometimes very high and the stone stellate in cross-section. *Seeds* straight or curved, 1 in each developed cell, with copious endosperm. Embryo straight or curved, cotyledons very short, linear.

Distribution. About 250 species. Eastern parts of the Old World, reaching from Bombay in the west to Fiji in the east and from Manchuria at 46° N as for as New South Wales and Lord Howe I. at 32° S, and in the New World from the State of Washington to Southern Brazil (figure 1 and 5).

Ecology. Both under temperate and tropical conditions, in the latter most abundant in the mountains, ascending to *c.* 4000 m on Mt. Kinabalu and the New Guinean mountains, where represented by microphyllous dwarf shrubs. Everywhere a constituent of mixed, mostly evergreen rain-forest, not in arid zones.

Uses. Sometimes species of subg. *Hopea* are used as a dye or mordant, very rarely for timber. See under the species.

KEY TO THE SUBGENERA

1a. Petals connate at least halfway up. Leaves usually not becoming yellow when drying. **1.** subg. **Symplocos**

b. Petals connate only at the very base. Leaves usually becoming more or less yellow when drying. . . . . **2.** subg. **Hopea**

1. Subgenus Symplocos

Ciponima Aubl. — *Alstonia* Mutis *ex* L. *f.* — *Mongezia* Vell. — *Stemmatosiphum* Pohl — *Cordyloblaste* Moritzi — *Hypopogon* Turcz. — *Symplocos* subgenus *Eusymplocos* Brand — *Symplocos* sectio *Symplocastrum* Brand.

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.

Distribution. More than 100 species in Asia and the New World, largely in the tropical zone within 30° N and 30° S, most species in the New World (figure 1).

Ecology. Mixed evergreen rain-forests, ascending to *c.* 1800 m in the Old World tropics.

KEY TO THE ASIATIC SPECIES

1a. Calyx *c.* 6(—10) mm long. Corolla 2.5—5 cm long. Fruits 3—5 cm long. **1. S. henschelii**

b. Calyx 3—5 mm long. Corolla 0.5—1.7 cm long. Fruits 1—1.5 cm long. **2. S. pendula**

1. Symplocos henschelii (Mor.) Benth. *ex* Clarke – Pl. 1g.

S. henschelii (Mor.) Benth. *ex* Clarke, Fl. Br. Ind. 3 (1882) 588 and Forbes & Hemsley, J. Linn. Soc. Bot. 26 (1889) 72, *quoad basionym excl. stirp.*; Brand, Pfl. R. Heft 6 (1901) 89; Bull. Herb. Boiss. II, Boiss. II, 6 (1906) 750; Koord. Atlas 2 (1914) t. 390; Steen. Bull. Bot. Gard. Btzg III, 17 (1948) 440, t. 2 a–l; Nova Guinea n.s. 10 (1959) 210; Nat. Hist. Bull. Siam Soc. 20 (1961) 83; Backer & Bakh. *f.* Fl. Java 2 (1965) 204; Steen. Mt. Fl. Java (1972) pl. 52–3. — *Cordyloblaste henschelii* Moritzi, Bot. Zeit. 6 (1848) 606. — *Eugeniodes henschelii* O.K. Rev. Gen. Pl. 2 (1891) 975. — *S. nagelii* K. & V. Bijdr. 7 (1900) 159. — Type: *Nagel in Herb. Zollinger 3195* (L, P), Java, Bandung.

S. maingayi Benth. *ex* Clarke, Fl. Br. Ind. 3 (1882) 588; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 249; Brand, Pfl. R. Heft 6 (1901) 90; 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. — Type: *Maingay, Kew Distr. 961* (K), Malacca.

S. scortechinii King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 250. — *Cordyloblaste scortechinii* Ridl. Fl. Mal. Pen. 2 (1923) 309. — Type: *Scortechini* (P), Perak.

S. dolichantha Merr. Sar. Mus. J. 3 (1928) 545. — Type: *Mjöberg 120* (BM), Sarawak, Mt. Murud, 1900—2400 m.

S. sukoi C. E. C. Fischer, Kew Bull. (1929) 315. — Type: *Sukoe* for *C. E. Parkinson 7776* (K), Burma, Mergui, Nalechaung, 450 ft.

S. magnifica Fletcher, Kew Bull. (1937) 507; Fl. Siam. En. 2 (1938) 388. — Type: *Garrett 402* (K, isotypes in E, L, P), Thailand, Payap.

S. stenosepala Steen. Bull. Bot. Gard. Btzg III, 17 (1948) 444, t. 2 m–n. — Type: *Bünnemeijer 5563* (BO, isotype in L), Sumatra, Padang Uplands, Bt. Laras Talang, 1500 m.

Shrub, or mostly a tree to 30 m; bole terete, straight; bark very bitter. Twigs light grey, glabrous, fissured to the apex, the youngest ones glabrous to densely grey or ferrugineous velvety tomentose. *Leaves* ±elliptic, 7—17(—22) by 3—7.5 cm, index 1.8—3.8; above glabrous, except sometimes the finely hairy midrib, beneath glabrous or the midrib sparsely short fine-hairy to rusty or greyish velvety, especially on midrib and

nerves; base cuneate-rounded, attenuate, base angle 30°—90°; acumen 3—20 mm, tip mostly acute; margin recurved, entire. *Midrib* mostly much prominent beneath; nerves 5—11 pairs, arching upwards and meeting in a looped intramarginal vein; reticulations rather fine to coarse. *Petiole* 5—15(—20) mm. *Inflorescence* a raceme up to 10 cm, including bracts and bracteoles light grey to rusty tomentose, shortly peduncled, 1—12-flowered, sometimes together forming a leafy panicle; bracts narrowly triangular, to 4 mm long. Pedicels 0—6 mm, with 2(—3) tiny bracteoles. *Flowers* fragrant. *Calyx* appressedly grey or rusty hairy, *c.* 6(—10) mm long; lobes quincuncially imbricate in bud, subsemi-orbicular to triangular, erect or rarely spreading, 1—4.5 by 2—3 mm. *Corolla* whitish or rusty sericeous-tomentose when dry (in ssp. *magnifica* only sparsely fine short-hairy towards the apex), club-shaped in bud, 25—50 mm long, the upper 1/4—2/5 part free; tube 3—4 mm wide, lobes spreading or recurved, spoon-shaped to spathulate. *Staminal tube c.* 5 mm shorter than corolla, adnate to its tube except towards the apex; free part 5—15 mm long; anthers 20—110, in the upper 5—10 mm, either ascendent above and there nearly sessile and the lower ones descendent, hanging from a slender 2—5 mm filament, the uppermost on $\frac{1}{2}$—$1\frac{1}{2}$ mm long teeth of the tube, or all the anthers on a very short ($\frac{1}{4}$—$\frac{1}{2}$ mm) thin free part of the filaments. *Ovary* semi-inferior, 3—4-celled; ovules 2—4 in each cell, usually but 1 (the lowermost?) developing; style slightly longer (or shorter, Van Steenis, *l.c.*) than the stamens, with a knob-shaped stigma, densely appressedly long hairy beneath to sparsely hairy or glabrous above. *Fruits* dull-green *in vivo*, drupaceous, narrowly obovoid to spindle-shaped, often oblique or curved, 30—50 by 20—30 mm; calyx lobes enveloping the conical style base, sometimes wholly closed; the superior part of the ovary not growing when the fruit ripens; mesocarp rather hard, fleshy, or even woody.

Distribution. Burma, Thailand, Indo-China, Malaya, Sumatra, West Java, and Borneo.

KEY TO THE INFRASPECIFIC TAXA

1a. Corolla sparsely fine short hairy towards the apex. . . . . **1-4.** ssp. **magnifica**
b. Corolla whitish to rusty sericeous or tomentose.
2a. Twigs usually glabrous. Free part of staminal tube 7—15 mm.
1-2. ssp. **henschelii** var. **henschelii**
b. Twigs hairy. Free part of staminal tube 5—7 mm.
1-3. ssp. **henschelii** var. **maingayi**

1-1. ssp. **henschelii** — **Pl. 1g.**

S. henschelii (Mor.) Clarke — *S. maingayi* Benth. *ex* Clarke — *S. nagelii* K. & V. — *S. scortechinii* K. & G. — *S. dolichantha* Merr. — *S. stenosepala* Steen.

Twigs glabrous to densely grey or rusty velvety tomentose. Leaves glabrous, or the midrib sparsely short fine-hairy, to rusty or greyish velvety, 7—17 by 3—7½ cm; petiole 5—15 mm. Corolla whitish to rusty sericeous-tomentose when dry.

Distribution. Burma, Thailand, Indo-China, Sumatra, Malay Peninsula, Java and Borneo.

Note. S. stenosepala Steen. appears to be conspecific with *S. henschelii*. The differences (cited by Van Steenis, 1948) are: the longer and narrower calyx lobes, the indument of the twigs and the length of the free filaments. The first difference does not hold when more material is available. As to the other characters, they point to a narrow relationship with '*S. maingayi*'. Other intermediate collections are *bb 1980* and *Olivier 22*, both from Lebong, Sumatra, and already mentioned by Van Steenis as deviating from true *S. henschelii* because of the indument. At last I made in Borneo two collections which have the vegetative characters of '*S. maingayi*' and the flower characters of *S. henschelii* (*Nooteboom & Chai 1932*, Mt. Murud east, alt. 1700 m, and *Nooteboom & Chai 2249*, Ulu Limbang, 115°28′ E 3°49′ N, alt. 1600 m).

1-2. var. **henschelii — Pl. 1g.**

S. henschelii (Mor.) Clarke — *S. nagelii* K. & V. — *S. scortechinii* K. & G. — *S. dolichantha* Merr. — *S. sukoi* Fischer — *S. stenosepala* Steen.

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.

Distribution. As for the subspecies.

BURMA (S). Mergui: *Parkinson 7776*, alt. 130 m.

THAILAND (S). Trang: *Kerr 19182*, Kao soi Dao, alt. 700 m.

INDO-CHINA. Annam, Prov. Haut Donai, Blao: *Poilane 21849, 22198, 22205*, alt, 800 m; Nhatrang: *Poilane 5014*.

SUMATRA. Tapanuli, Toba: *Rahmat si Boeea 10527*. — Westcoast: *Bünnemeijer 5563*; *W. Meijer 3618*, Pajakumbuh, Mt. Sago, alt. 2000 m. — Bencoolen: *bb 1980*; *Olivier 22*, Lebong, alt. 800 m; *Jacobs 4447*, G. Tudjuh, 1°40′ S 101°20′ E, alt. 1400—1500 m.

MALAY PENINSULA. Perak: *Scortechini s.n.* — Pahang, Cameron Highlands: *CF 30997*. — Johore (Eastcoast): *Kep. FRI 7690*. — Kedah: *Smith & Chai 8636*, G. Jerai.

JAVA. Preanger: 13 collections, alt. 1100—1500 m.

BORNEO. Sarawak: *c.* 10 collections. — Kalimantan, Kutai, G. Kemul: *Endert 3590, 3926, 3935, 3969*, alt. 1200—1600 m. — Sabah: 14 collections.

1-3. var. **maingayi** (Benth. *ex* Clarke) Noot., *comb. nov.*

S. maingayi Benth. *ex* Clarke, Fl. Br. Ind. 3 (1882) 588.

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 ($\frac{1}{4}$—$\frac{1}{2}$ mm), thin free part of the filaments. Fruit with ± woody mesocarp.

MALAY PENINSULA. Perak: *King's coll. 6728*, Larut, alt. 100—150 m. — Johore: *Kep. FRI 150, 2297*, Labis For. Res. — Singapore: *Ridley 6753*, Bukit Manday.

BORNEO. Sarawak: *Beccari 1854*, Mattang; *S 16*, Semengoh For. Res. — Brunei: *S 41879 Anderson*; *S 7826 Ashton*, Berakas For. Res. — Sabah: *SAN 17499*, Kuala Belait, Andalau For. Res., alt. 45 m. — NE. Kalimantan: *Kostermans 9328*, Bulungan.

1-4. ssp. **magnifica** (Fletcher) Noot., *comb. nov.*

S. magnifica Fletcher, Kew Bull. (1937) 507.

Twigs glabrous or sparsely hairy. Leaves glabrous, 12—22 by $4\frac{1}{2}$—9 cm; nerves 8—11 pairs; petiole 5—20 mm. Corolla sparsely fine short hairy towards the apex.

THAILAND. Payap, Doi Inthanon: *Garrett 402*, alt. 1420 m; *Nooteboom 842*, alt. 1800 m.

2. Symplocos pendula Wight — **Pl. 1h, fig. 2a.**

S. pendula Wight, Ic. Pl. 4 (1848) 10, t. 1237; Ill. Ind. Bot. 2 (1850) t. 151-b, 7-12; Thwaites, En. Zeyl. 3 (1860) 184; Beddome, Fl. Sylv. 3 (1872) 152, t. 20, 1; For. Man. Bot. (1874) 153; Clarke, Fl. Br. Ind. 3 (1882) 587; Brand, Pfl. R. Heft 6 (1901) 88; Bull. Herb. Boiss. II, 6 (1906) 750; Gamble, Fl. Pres. Madras 5 (1923) 784; Steen. Bull. Bot. Gard. Btzg III, 17 (1948) 437. — *Palura pendula* Miers, J. Linn. Soc. Bot. 17 (1879) 297. — *Eugeniodes pendula* O.K. Rev. Gen. Pl. 2 (1891) 976. — *Cordyloblaste pendula* Alston, Fl. Ceyl. Suppl. (1931) 188. — *S. scortechinii* [*non* K. & G.] Ridl. J. Linn. Soc. Bot. 38 (1908) 315. — Syntypes: *Herb. Wight 2136* (K, isotypes in E, L), Pulney Mts., India; *Herb. Wight* (K), Ceylon.

S. pauciflora Wight [*ex* Benth. in B. & H. Gen. Pl. 2 (1876) 669, nomen] *ex* Clarke, Fl. Br. Ind. 3 (1882) 587; Trimen, Fl. Ceyl. 3 (1895) 111; Brand, Bull. Herb. Boiss. II, 6 (1906) 750; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 40. — *Eugeniodes pauciflora* O.K. Rev. Gen. Pl. 2 (1891) 976. — Lectotype: *Thwaites C. P. 504* (BM, BO, CGE, FI, K, LE, W), Ceylon.

S. sessilis Clarke, Fl. Br. Ind. 3 (1882) 587; Brand, Pfl. R. Heft 6 (1901) 88; Bull. Herb. Boiss. II, 6 (1906) 750; Gamble, Fl. Pres. Madras 5 (1923) 784. — *Eugeniodes sessilis* O.K. Rev. Gen. Pl. 2 (1891) 976. — Type: *Beddome 229* (K), India, Travancore Mts.

S. henschelii Clarke var. *hirtistylis* Clarke, Fl. Br. Ind. 3 (1882) 588. — Type: *Maingay 2586* (K), Malaya, Mt. Ophir.

S. confusa Brand, Pfl. R. Heft 6 (1901) 88; Bull. Herb. Boiss. II, 6 (1906) 750; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 248; Brand, Philip. J. Sc. 3 (1908) Bot. 3; Hayata, Fl. Mont. Form. (1908) 158; Merr. En. Philip. 3 (1923) 297; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 273; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 918; Guillaumin, Fl. Gén. I.-C. 3 (1933) 1031, t. 117, 1, 2; K. Mori, Sylvia 5 (1934) 223; Kanehira, Form. Trees (1936) 582, t. 539; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 40; Steen. J. Arn. Arb. 28 (1947) 423; Bull. Bot. Gard. Btzg III, 17 (1948) 432; Walker, Imp. Trees Ryu-Kyu Is. (1954) 261, t. 166. — *S. henschelii* (*non*

Benth.) Clarke, Fl. Br. Ind. 3 (1882) 588 and Forbes & Hemsley, J. Linn. Soc. Bot. 26 (1889) 72, *pro descr. et stirp. excl. syn.* Moritzi. — *Cordyloblaste confusa* Ridl. Fl. Mal. Pen. 2 (1923) 307; Hatusima, J. Jap. Bot. 12 (1936) 282. — *Bobua confusa* Kanehira & Sasaki, List Pl. Form. (1928) 330, *non vidi*; Sasaki, Cat. Govt. Herb. (1930) 406. — Type: *Griffith 3644* (K,S,W), Malaya, Mt. Ophir.

S. albifrons Brand, Pfl. R. Heft 6 (1901) 88; Bull. Herb. Boiss. II, 6 (1906) 750; Nova Guinea 14 (1924) 189. — Type: *Haviland c.l.n.l. 1891* (K, isotype in BO), Sarawak, Serapi, 3000 ft.

S. capitellata Brand, Pfl. R. Heft 6 (1901) 88; Bull. Herb. Boiss. II, 6 (1906) 750; Nova Guinea 14 (1924) 188. — Type: *Beccari 206* (K, isotypes in BM, BO, LE, MEL), Central W. Sumatra, above Padang, Mt. Singalang.

S. foxworthii Brand, Philip. J. Sc. 3 (1908) Bot. 3; Merr. En. Philip. 3 (1923) 299. — Type: *BS 552 Foxworthy* (*non vidi*), Philippines.

Styrax obovatus Ridl. J. Str. Br. R. As. Soc. 61 (1912) 8. — *S. obovata* Ridl. J. Fed. Mal. St. Mus. 6 (1915) 51. — *Cordyloblaste obovata* Ridl. Fl. Mal. Pen. 2 (1923) 308. — Type: *Haniff 3920* (BM, BO, K), Malaya, G. Kerbau, Perak.

S. crenulata Ridl. J. Fed. Mal. St. Mus. 6 (1915) 51. — *Cordyloblaste crenulata* Ridl. Fl. Mal. Pen. 2. (1923) 309. — Type: *Robinson* (BM), Malaya, Perak, G. Kerbau.

S. pulcherrima Ridl. J. Fed. Mal. St. Mus. 6 (1915) 160. — *Cordyloblaste pulcherrima* Ridl. Fl. Mal. Pen. 2 (1923) 308. — Type: *Wray & Robinson 5392* (BM, SING), Malaya, Perak, G. Kerbau.

S. novoguineensis Gibbs, Arfak (1917) 176. — Type: *L. S. Gibbs 5578* (L, isotypes in BM, K), New Guinea, Arfak Mts., Angi Lake, 2100 m.

S. confusa var. *lysiostemon* Hand.-Mazz. Sitzganz. Ak. Wiss. Wien 58 (1921) 92, *non vidi*; Beih. Bot. Centralbl. 62-B (1943) 40. — Type: *Poilane 7209* (P), Indo-China, Annam, Ba-na près Tourane.

S. atrata Brand, Nova Guinea 14 (1924) 188. — Syntypes: *H. J. Lam 1528, 1546* (BO, K, L), New Guinea, Div. Hollandia, Mt. Doorman.

S. topica Brand, *op. cit.* 189. — Type: *H. J. Lam 1870* (L, isotypes in BO, K), New Guinea, Div. Hollandia, Mt. Doorman, 3100 m.

S. sonoharai Koidzumi, Pl. Nov. Amami-Oshima (1928) 6; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 918. — Syntypes: *S. Sonohara 1, 2* (KYO), Ryu Kyu Is., Utchina I.

S. punctulata Masamune & Syozi, Act. Phytotax. Geobot. 12 (1950) 201. — Type: *F. C. How 73682* (TAI), China, Hainan, Potin, 3400 ft.

Shrub, or tree, up to 27 m. Twigs glabrous, sparsely appressedly fine hairy, to (rarely) rusty tomentose. *Leaves* glabrous or nearly so, (broadly) elliptic or obovate to sometimes orbicular, (1—)2½—12½ by (0.9—)1½—6 cm, index 1—3.2; base cuneate to rounded, often decurrent, base angle 30°—90°; apex rounded to acuminate, acumen 0—10(—15) mm; margin entire to (distantly) crenate or undulate. *Nerves* 4—8(—11) pairs, mostly angularly curved upwards, anastomosing or arching into intramarginal vein far from the margin; reticulations mostly rather coarse, sometimes obscure. *Petiole* (1—)5—15 mm. *Racemes* very short, with the calyxes shortly tomentose [or racemes shortly tomentose to nearly glabrous, calyx glabrous but sometimes with few hairs at the very base (var. *pendula*)], 1—7(—15)-flowered. Bracts triangular, to 1 mm long. Bracteoles 2—4, narrowly triangular, at the base of the calyx. Pedicels 0—5 mm, or longer in solitary flowers. *Calyx* 3—5 mm high, campanulate, the lobes very short and rounded, ciliate. *Corolla* tubular trumpet-shaped, (5—)10—17 mm. *Petals* 5, fleshy, connate halfway up but the margins free except the lowermost 1—3 mm, spathulate with rounded apex, brown-red when dry, but silver-white to cream *in vivo*, tomentose to glabrous outside.

Staminal tube adnate to corolla except the upper 3—5 mm, hairy to glabrous within; free parts of the filaments fleshy, 1—3½ by 1 mm, constricted at the apex into a short filiform part; anthers 30—50(—80), inserted at various heights within the staminal tube, the upper ones erect, the lower ones hanging from a short filiform filament. *Ovary* semi-inferior, 2—3-celled, each cell with 1—3? ovules, the free part subhemispheric, *c.* 1½ mm high, densely greyish hairy. *Style c.* 1 cm long, more or less hairy at the base to glabrous towards the apex; stigma terminal, knob-shaped. *Fruits* spindle-shaped, 10—15 by 3—6 mm, the enlarged calyx lobes surrounding the hairy conical persistent stylebase.

Distribution. Ceylon, S. India, Burma, Indo-China, China (incl. Hainan), Japan, Formosa, and throughout Malesia (not in Java and Lesser Sunda Is.).

2-1. var. **pendula — Pl. 1h.**

S. pendula Wight — *S. pauciflora* Wight *ex* Clarke — *S. sessilis* Clarke — *S. pulcherrima* Ridl. — *S. punctulata* Masamune & Syozi.

Calyx glabrous, ciliate.

Distribution. India, China and Malay Peninsula.

INDIA. Ceylon: *Thwaites C. P. 504, 9288*; *Wight 1698*. — S. India: *Wight*, Pulney Hills; *Beddome 4944*, Travancore.

CHINA. Hainan: *F. C. How 73682*, Po-ting, alt. 1000 m; *S. K. Lau 27370, 27273*, Lok tung.

MALAY PENINSULA. Trengganu: *Kep. FRI 12108*, G. Mandi Angin shale, alt. 1500 m; *SF 31842*, G. Padang, alt. 1200 m. — Pahang: 6 collections, alt. 600—1800 m.

2-2. var. **hirtistylis** (Clarke) Noot., *comb. nov.* — **Fig. 2a.**

S. henschelii var. *hirtistylis* Clarke, Fl. Brit. Ind. 3 (1882) 588. — *S. confusa* Brand — *S. albifrons* Brand — *S. capitellata* Brand — *S. foxworthii* Brand — *Styrax obovatus* Ridl. — *S. crenulata* Ridl. — *S. novoguineensis* Gibbs — *S. atrata* Brand — *S. topica* Brand — *S. sonoharai* Koidzumi — *S. confusa* var. *lysiostemon* Hand.-Mazz.

Calyx hairy.

Distribution. Burma, Indo-China, China, Japan, Sumatra, Malay Peninsula, Borneo, Celebes, Moluccas and New Guinea.

BURMA (N). *Forrest 25073*, 26° 10′ N, 98° 25′ E.

INDO-CHINA. Annam: *Poilane 7209*, Ba na près Tourane, alt. 1500 m.

CHINA. Yunnan: *Forrest 25758*, 27° N 98° 35′ E, alt. 3000 m; *T. T. Yü 20141*, Taron-Taru Divide, alt. 1500 m; *C. Wang 73874*, Fo Hai. — Kweichow: *Handel-Mazzetti 10986*, Li Ping, alt. 700 m. — Kwangsi: *C. Wang 39647*. — Kwangtung: 5 collections. — Kiangsi: 6 collections. — Fukien: *H. H. Chung 6614, 6709, 6727*, Ku Liang; *8111*, Ku Shan. — Chekiang: *R. C. Ching 2088*, Ping Yun,

alt. 500—900 m; *Y. L. Keng 160*, Tsing Tien; *255*, Tai Shun. — Formosa: *Wilson 10884*, Arisan.

JAPAN. Ryu Kyu Is.: Amami-Oshima: *S. Hatusima 19522*, alt. 650 m; Okinawa: *Walker c.s. 7018*, alt. 500 m.

SUMATRA. Padang Uplands: 5 collections, alt. 900—2000 m. — Frontier Palembang-Bencoolen: *van Steenis 3750 A*, G. Pesagi.

MALAY PENINSULA. Perak: *Haniff 3920*, G. Kerbau, alt. 2100 m; *H. N. Ridley 2901*, G. Hijam. — Selangor: *Kelsall 1999*, B. Etam. — Pahang: *CF 71938*, *SF 11281*, Fraser's Hill; *Wyatt-Smith 71938*. — Johore, Mt. Ophir: *Griffith 3644*, *6704*; *Maingay 954*, *2586*; *H. N. Ridley 3308*.

BORNEO. Sarawak: 10 collections, alt. 700—2300 m. — Sabah: *c.* 30 collections, all from Mt. Kinabalu, alt. 1500—3300 m.

PHILIPPINES. Luzon: 16 collections, up to 2500 m (Mt. Pulog). — Palawan: *BS 558*, *77595*, G. Gantung, alt. 1600 m. — Negros: *Elmer 9532*, Dumaguete, Cuernos Mts.; *13635*, Mt. Marapara. — Mindanao: 6 collections. — Leyte: *BS 15297*, Dagami.

CELEBES. Toradja Lands: *bb 20280*, Makale-Rantepao; *20051*, Kolaka; *33067*, Mamasa, alt. 1500—1700 m.

MOLUCCAS. Ceram: *Rutten 2232*, *2247*, *2257*, alt. 1000—1200 m.

NEW GUINEA. West New Guinea, Arfak Mts. and Nettotti Range: 7 collections. — Div. Hollandia: *Kostermans & Soegeng 699*, Baliem Valley; *H. J. Lam 1528*, *1546*, *1870*, all from Mt. Doorman, up to 3100 m. — Morobe Distr.: *M. S. Clemens 9501*, Samanzing, alt. 2100—2400 m; *NGF 29042*. — Milne Bay Distr.: *NGF 41003*, Mt. Simpson, alt. 1200 m; *R. Pullen 7837*, 10°02′S 149°40′E.

Ecology. Sometimes on high, exposed places, on ridges and slopes, often in mossy forest, but also in dry forest.

2. Subgenus Hopea (L.) Clarke

Symplocos subgenus *Hopea* (L.) Clarke — *Bobu* Adanson — *Hopea* Linné — *Drupatris* Lour. — *Decadia* Lour. — *Dicalix* Lour. — *Epigenia* Vell. — *Barberina* Vell. — *Sariava* Reinw. — *Symplocos* sectio *Palura* G. Don — *Symplocos* sectio *Lodhra* G. Don — *Carlea* Presl — *Baranda* Llanos — *Chasseloupia* Vieill. — *Suringaria* Pierre — *Symplocos* subgenus *Microsymplocos* Brand — *Symplocos* sectio *Pseudosymplocos* Brand — *Symplocos* sectio *Palaeosymplocos* Brand — *Symplocos* sectio *Urbaniocharis* Brand — *Symplocos* sectio *Neosymplocos* Brand — *Symplocos* sectio *Eosymplocos* Hand.-Mazzetti.

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 (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.

Distribution. As for the genus, c. 150 spp. (figure 1).

Ecology. As for the genus.

Note. For subg. *Hopea* a key is given based on flowering material for all the species dealt with in this revision. This overall key is followed by a key based on flowering material and one based on fruiting material for each of the following areas: Ceylon,

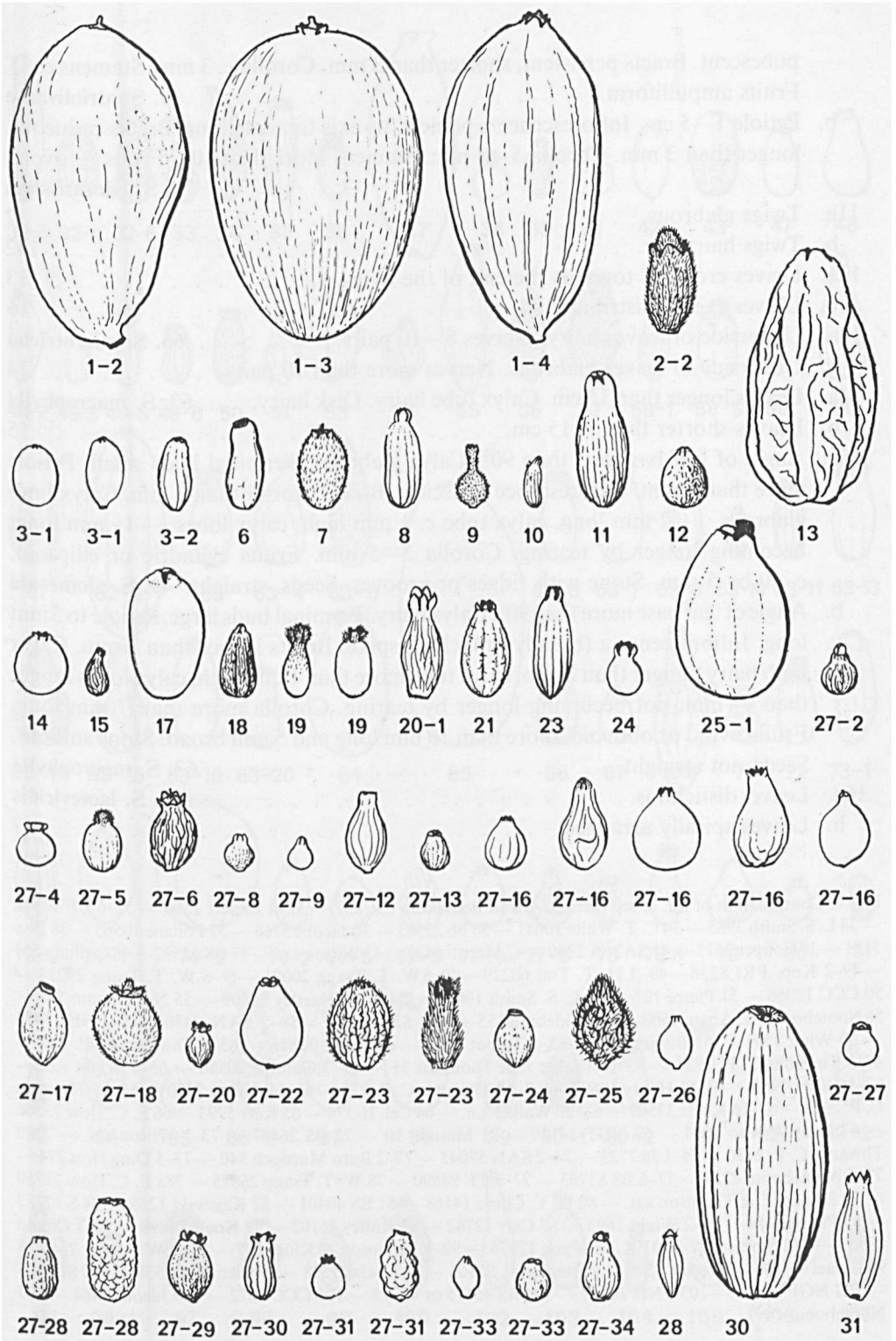
India and Burma, Thailand, Indo-China, China (incl. also Formosa), Japan (incl. also Ryu-Kyu and Bonin Is.), Sumatra, Malay Peninsula, Java and Lesser Sunda Is., Borneo, Philippines, Celebes and Moluccas, New Guinea (incl. also New Ireland and New Britain).

For the Pacific and Australia respectively only one key is given.

KEY TO THE SPECIES

1a. Leaves verticillate 2
b. Leaves not verticillate 3
2a. Upper side of leaves glabrous . . . . . **103. S. verticillifolia**
b. Upper side of leaves hairy . . . . . **54. S. herzogii**
3a. Midrib prominent on the upper surface 4
b. Midrib impressed in the upper surface 8
4a. Twigs glabrous 5
b. Twigs hairy 6
5a. Leaves crowded towards the end of the twigs . . . . . **66. S. microtricha**
b. Leaves evenly distributed . . . . . **61. S. lucida**
6a. Leaves crowded towards the end of the twigs . . . . . **66. S. microtricha**
b. Leaves evenly distributed 7
7a. Underside of leaves glabrous . . . . . **7. S. anomala**
b. Underside of leaves hairy . . . . . **59. S. lancifolia**
8a. Corolla hairy 9
b. Corolla glabrous 11
9a. Twigs glabrous, underside of leaves glabrous . . . . . **74. S. odoratissima**
b. Twigs hairy 10
10a. Petiole 3—5 mm. Inflorescence a fasciculate spike, its axis appressedly whitish

Fig. 6. 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. — 1–2 Jacobs 5032 — 1–3 Kostermans 9328 — 1–4 Nooteboom 842 — 2–2 W. Meijer 3618 — 3–1 Chew Wee Lek 938 — 3–1 CF 104879 — 3–2 Poilane 6908 — 6 Poilane 21003 — 7 SAN 56690 — 8 de Wilde 13773 — 9 S. K. Lau 28008 — 10 C. Wang 39588 — 11 Poilane 7975 — 12 A. Ernst 736 — 13 King's coll. 6179 — 14 W. Meijer 7581 — 15 Constable 22474 — 17 Wilson 8336 — 18 Hallier f. 2197 — 19 Clemens 32525 — 19 Clemens 32478 — 20–1 bb 23324 — 21 SAN 46543 — 23 herb. d'Alleizette s.n. — 24 Kostermans 9158 — 25–1 Kostermans & Anta 527 — 27–2 Forbes 861 — 27–4 W. Meijer 1690 — 27–5 Clemens 17224 — 27–6 BS 4476 — 27–8 Larsen c.s. 887 — 27–9 S. K. Lau 28116 — 27–12 McCornish 107 — 27–12 C. T. White 10581 — 27–13 NGF 33643 — 27–16 ANU 2027 — 27–16 A. C. Smith 1054 — 27–16 BW 4970 — 27–16 Gillespie 3918 — 27–16 NGF 28481 — 27–17 Vink 17308 — 27–18 Brass 28343 — 27–20 Kajewski 295 — 27–22 Brass 29919 — 27–23 Ledermann 8946 — 27–23 T. G. Hartley 13135 — 27–24 Pullen 479 — 27–25 NGF 49168 — 27–26 Pullen 7783 — 27–27 Kostermans & Wirawan 878 — 27–28 Nicolas 19 — 27–28 van Balgooy 862 — 27–29 Kalkman 5128 — 27–30 Vink 16079 — 27–31 Kostermans 2375 — 27–31 Forbes P. P. 652 — 27–33 Brass 28191 — 27–33 Clemens 1661 — 27–34 NGF 23728 — 28 Clemens 33706 — 30 Koorders 15596 — 31 S. K. Lau 25899.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pubescent. Bracts persistent, shorter than 3 mm. Corolla *c.* 3 mm. Stamens *c.* 35. Fruits ampulliform. . . . . **9. S. atriolivacea**

b. Petiole 1—5 cm. Inflorescence a panicle, its axis tomentellous. Bracts caducous, longer than 3 mm. Corolla 5—8 mm. Stamens more than 100. Fruits ± ovoid. **74. S. odoratissima**

11a. Twigs glabrous. 12

b. Twigs hairy. 142

12a. Leaves crowded towards the end of the twigs. 13

b. Leaves evenly distributed. 16

13a. Underside of leaves hairy. Nerves 8—10 pairs. . . . . **66. S. microtricha**

b. Underside of leaves glabrous. Nerves more than 10 pairs. 14

14a. Leaves longer than 15 cm. Calyx tube hairy. Disk hairy. . . **63. S. macrophylla**

b. Leaves shorter than *c.* 15 cm. 15

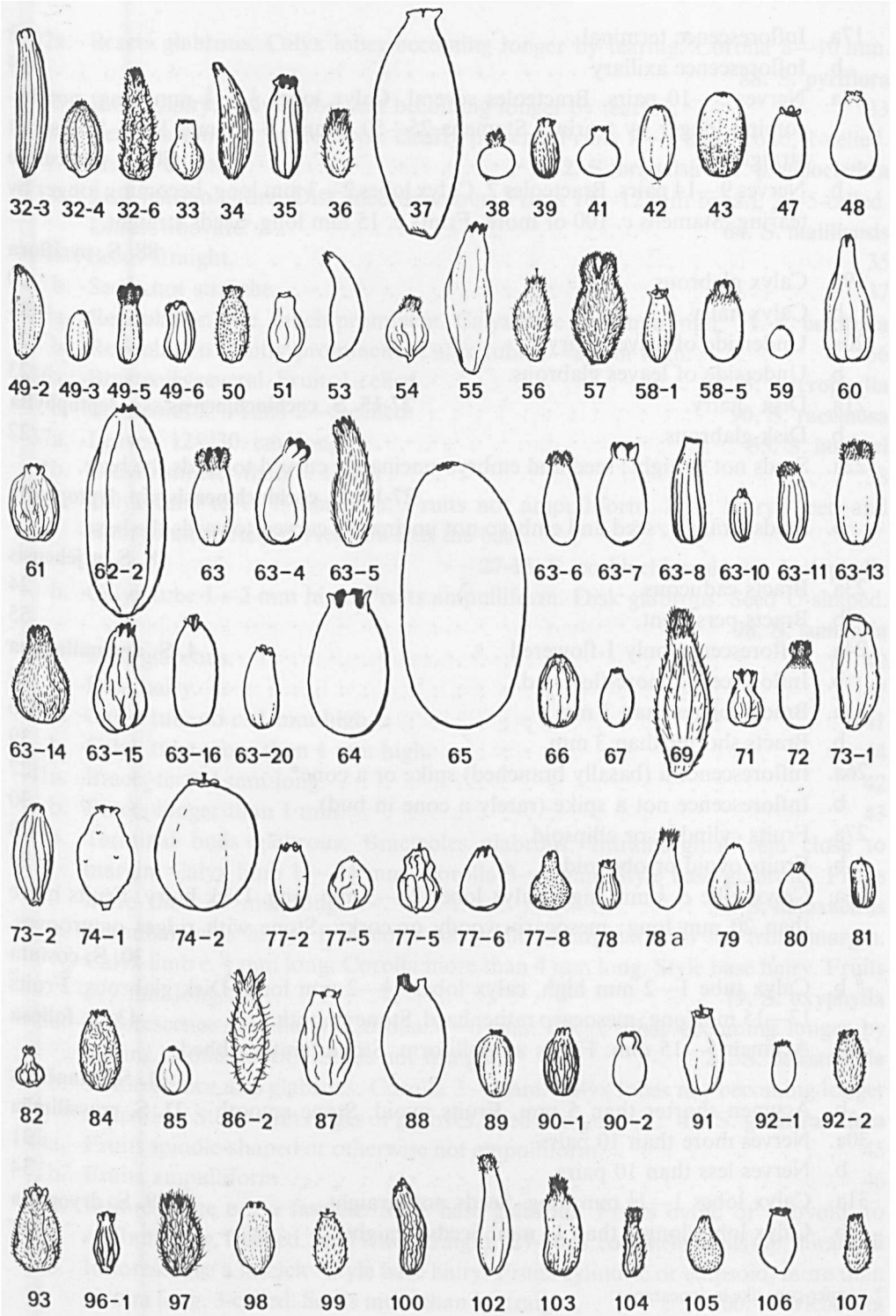
15a. Angle of leaf base less than 90°. Calyx glabrous. Terminal buds small. Petiole more than 5 mm. Inflorescence a fascicle. Bracts shorter than 3 mm. Calyx limb glabrous, 1—2 mm long, calyx tube *c.* 1 mm high, calyx lobes ½—1½ mm long, becoming longer by tearing. Corolla 3—5 mm. Fruits cylindric or ellipsoid, *c.* 10 by 5 mm. Stone with ridges or grooves. Seeds. straight. **49. S. glomerata**

b. Angle of leaf base more than 90°. Calyx hairy. Terminal buds large. Petiole to 5 mm long. Inflorescence a (basally branched) spike. Bracts longer than 3 mm. Calyx limb hairy, longer than 2 mm, calyx tube more than 1 mm high, calyx lobes longer than 1½ mm, not becoming longer by tearing. Corolla more than 7 mm long. Fruits ovoid or obovoid, more than 10 mm long and 5 mm broad. Stone smooth. Seeds not straight. . . . . **63. S. macrophylla**

16a. Leaves distichous. . . . . **58. S. laeteviridis**

b. Leaves spirally arranged. 17

Fig. 7. Continuation of fig. 6, see there 32–3 van Beusekom c.s. 837 — 32–4 Endert 2580 — 32–6 CF 97832 — 33 L. S. Smith 3965 — 34 C. T. White 10641 — 35 bb 22503 — 36 Jacobs 5766 — 37 Poilane 10563 — 38 Bon 3181 — 39 Cooper 2615 — 41 SAN A 2240 — 42 Merrill 6148 — 43 Wilson s.n. — 47 BS 45592 — 48 Oldham 531 — 49–2 Kop. FRI 8236 — 49–3 H. T. Tsai 60229 — 49–5 W. T. Tsang 20091 — 49–6 W. T. Tsang 29913 — 50 CCC 12066 — 51 Pierre 121 — 53 L. S. Smith 10839 — 54 T. G. Hartley 12509 — 55 Nooteboom 799 — 56 Nooteboom & Aban 1500 — 57 Hildebrand 55 — 58–1 SAN 65017 — 58–5 SAN 44386 — 59 PNH 18483 — 60 Winit 1597 — 61 Bürger s.n. — 62–2 Talbot 3673 — 63 Koelz 32816 — 63–4 Thwaites C. P. 174 — 63–5 Thwaites C. P. 2920 — 63–6 Hooker f. & Thomson 31 — 63–7 Gamble 20586 — 63–8 Wight s.n. — 63–10 Kerr 4984 — 63–11 Henry 10699 — 63–13 Thwaites C. P. 271 — 63–14 Alston 2480 — 63–15 Thwaites C. P. 2933 — 63–16 Koelz 33567 — 63–20 Walker s.n. — 64 Cel. II-374 — 65 Kerr 5793 — 66 F. C. How 73506 — 67 Keng & Kao 2554 — 69 NGF 14157 — 71 Matuda 10 — 72 BS 26447 — 73–1 Wilson s.n. — 73–2 Thwaites C. P. 2436 — 74–1 Ja 7723 — 74–2 SAN 57045 — 77–2 Burn Murdoch 340 — 77–5 Ding Hou 274 — 77–5 Nooteboom 2229 — 77–6 BS 83753 — 77–8 CF 98890 — 78 W. T. Tsang 26875 — 78a F. C. How 71750 — 79 Hooker f. & Thomson s.n. — 80 C. Y. Chiao 14168 — 81 BS 40401 — 82 Kajewski 1208 — 84 S 17287 — 85 Pierre 5044 — 86–2 Wight 1693 — 87 Carr 12782 — 88 Ridley 16102 — 89 Koelz 29898 — 90–1 Chand 8350 — 90–2 Stone 4637 — 91 K. M. Feng 12375 — 92–1 Robinson & Kloss 199 — 92–2 W. Meijer 7665 — 93 Ismael 9 — 96–1 Gressitt 1248 — 97 Beccari P. S. 106 — 98 Koelz 29538 — 99 Clemens 32559 — 100 S 26305 — 102 NGF 31111 — 103 PNH 14397 — 104 BS 45675 or 45775 — 105 CCC 9672 — 106 Jacobs 7484 — 107 Nooteboom 1491.


32-3 32-4 32-6 33 34 35 36 37 38 39 41 42 43 47 48
49-2 49-3 49-5 49-6 50 51 53 54 55 56 57 58-1 58-5 59 60
61 62-2 63 63-4 63-5 63-6 63-7 63-8 63-10 63-11 63-13
63-14 63-15 63-16 63-20 64 65 66 67 69 71 72 73-1
73-2 74-1 74-2 77-2 77-5 77-5 77-6 77-8 78 78 a 79 80 81
82 84 85 86-2 87 88 89 90-1 90-2 91 92-1 92-2
93 96-1 97 98 99 100 102 103 104 105 106 107

17a. Inflorescence terminal 18
b. Inflorescence axillary 19
18a. Nerves 5—10 pairs. Bracteoles several. Calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long, not becoming longer by tearing. Stamens 25—50. Fruits 3—7 mm long. Seeds not straight. . . . . **80. S. paniculata**
b. Nerves 9—14 pairs. Bracteoles 2. Calyx lobes 2—3 mm long, becoming longer by tearing. Stamens *c.* 100 or more. Fruits *c.* 15 mm long. Seeds straight. **88. S. pyriflora**
19a. Calyx glabrous. 20
b. Calyx hairy. 83
20a. Underside of leaves hairy. 21
b. Underside of leaves glabrous. 23
21a. Disk hairy. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Disk glabrous. 22
22a. Seeds not straight; seed and embryo uncinately curved towards the base. **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Seeds straight; seed and embryo not uncinately curved towards the base. **8. S. atjehensis**
23a. Bracts caducous. 24
b. Bracts persistent. 55
24a. Inflorescence only 1-flowered. . . . . **4. S. anamallayana**
b. Inflorescence more-flowered. 25
25a. Bracts longer than 3 mm. 26
b. Bracts shorter than 3 mm. 39
26a. Inflorescence a (basally branched) spike or a cone* 27
b. Inflorescence not a spike (rarely a cone in bud). 30
27a. Fruits cylindric or ellipsoid. 28
b. Fruits ovoid or obovoid. 29
28a. Calyx tube *c.* $\frac{1}{2}$ mm high, calyx lobes $2\frac{1}{2}$—3 mm long. Disk hairy. Fruits more than 20 mm long; mesocarp woody or corky. Stone with ridges or grooves. **30. S. costata**
b. Calyx tube 1—2 mm high, calyx lobes $1\frac{1}{2}$—2 mm long. Disk glabrous. Fruits 12—15 mm long; mesocarp rather hard. Stone smooth. . . . . **43. S. foliosa**
29a. Acumen 5—15 mm. Fruits ampulliform. Stone faintly ribbed. **11. S. banaënsis**
b. Acumen shorter than 5 mm. Fruits ovoid. Stone smooth . **31. S. crassilimba**
30a. Nerves more than 10 pairs. 31
b. Nerves less than 10 pairs. 34
31a. Calyx lobes 1—$1\frac{1}{2}$ mm long. Seeds not straight. . . . . **39. S. dryophila**
b. Calyx lobes longer than $1\frac{1}{2}$ mm. Seeds straight. 32

* conifer-cone like in appearance.

32a. Bracts glabrous. Calyx lobes becoming longer by tearing. Corolla 8—10 mm. **88. S. pyriflora**

b. Bracts hairy. Calyx lobes not becoming longer by tearing. 33

33a. Leaf margin not entire. Disk clearly present. Fruits 5—7 mm broad, 1-celled. Leaves elliptic. . . . . **20-2. S. brandisii** var. **pseudoclethra**

b. Leaf margin entire. Disk inconspicuous. Fruits 10—12 mm broad, 2—5-celled. Leaves obovate. . . . . **64. S. maliliensis**

34a. Seeds straight. 35

b. Seeds not straight. 37

35a. Reticulation fine, much prominent. Calyx tube 2—3 mm high. **21. S. buxifolia**

b. Reticulation faintly prominent. Calyx tube 1—2 mm high. 36

36a. Bracteoles several. Fruits 1-celled . . . . . **63. S. macrophylla**

b. Bracteoles 2. Fruits 2—5-celled. . . . . **90. S. racemosa**

37a. Leaves 12—30 cm long. . . . . **55. S. hookeri**

b. Leaves shorter than *c.* 10 cm 38

38a. Calyx tube to *c.* 1 mm high. Fruits not ampulliform. Disk hairy. Seed and embryo uncinately curved towards the base. **27-15. S. cochinchinensis** ssp. **leptophylla**

b. Calyx tube 1—2 mm high. Fruits ampulliform. Disk glabrous. Seed U-shaped. **98. S. sumuntia**

39a. Disk glabrous. 40

b. Disk hairy. 47

40a. Calyx tube to *c.* 1 mm high... 41

b. Calyx tube more than 1 mm high. 44

41a. Bracts to *c.* 1 mm long. 42

b. Bracts longer than 1 mm. 43

42a. Terminal buds glabrous. Bracteoles glabrous. Intramarginal vein close to margin. Calyx limb $1\frac{1}{4}$—$1\frac{1}{2}$ mm. Corolla 3—4 mm. Style base glabrous. Fruits more than 10 mm long. . . . . **52. S. hainanensis**

b. Terminal buds hairy. Bracteoles hairy. Intramarginal vein far from margin. Calyx limb *c.* $\frac{1}{2}$ mm long. Corolla more than 4 mm long. Style base hairy. Fruits *c.* 9 mm long.. . . . . **79. S. oxyphylla**

43a. Inflorescence axis hairy. Corolla 4—6 mm. Calyx lobes becoming longer by tearing. Stone smooth. Seeds not straight. . . . . **24. S. celastrifolia**

b. Inflorescence axis glabrous. Corolla 3—4mm. Calyx lobes not becoming longer by tearing. Stone with ridges or grooves. Seed straight. . . **47. S. glabriramifera**

44a. Fruits spindle-shaped or otherwise not ampulliform. 45

b. Fruits ampulliform.. 46

45a. Inflorescence not a fascicle. Style base glabrous. Fruits ovoid or obovoid, to *c.* 10 mm long, 1-celled. Seed 1, not straight. **27-10. S. cochinchinensis** ssp. **thwaitesii**

b. Inflorescence a fascicle. Style base hairy. Fruits cylindric or ellipsoid, more than 10 mm long, 3-celled. Seeds more than 1, straight. . . . . **100. S. tricoccata**

46a. Fruits narrowly ampulliform. . . . . **78. S. oreades**
b. Fruits ellipsoid or ovoid-ampulliform. **27-10. S. cochinchinensis** ssp. **thwaitesii**
47a. Bracts to *c.* 1 mm long. 48
b. Bracts longer than 1 mm. 49
48a. Petiole 3—4 mm. Inflorescence a lax raceme. Calyx tube 1—1¼ mm high. **18. S. borneensis**
b. Petiole 5—10 mm. Inflorescence a (basally branched) spike or raceme. Calyx tube *c.* 1 mm high. . . . . **45. S. gambliana**
49a. Style base glabrous. 50
b. Style base hairy. 52
50a. Calyx tube *c.* 1 mm high, calyx lobes becoming longer by tearing. **24. S. celastrifolia**
b. Calyx tube more than 1 mm high, calyx lobes not becoming longer by tearing. 51
51a. Intramarginal vein absent. Calyx lobes longer than 1½ mm, semi-elliptic or -ovate. Reticulation fine. Fruits more than 10 mm long, 1-celled. **63. S. macrophylla**
b. Intramarginal vein present. Calyx lobes 1—1¼ mm long, semicircular. Reticulation coarse. Fruits *c.* 10 mm long, 1—3-celled. . . . . **14. S. batakensis**
52a. Nerves 10—16 pairs. Corolla *c.* 4 mm. . . . . **20. S. brandisii**
b. Nerves less than 10 pairs. 53
53a. Terminal buds hairy. . . . . **35. S. cylindracea**
b. Terminal buds glabrous. 54
54a. Inflorescence axis villous. Stamens more than 100. Calyx tube *c.* 1 mm high. Disk clearly present . . . . . **70. S. nivea**
b. Inflorescence axis glabrous. Stamens 25—50. Calyx tube 1½—3 mm high. Disk inconspicuous . . . . . **73. S. obtusa**
55a. Leaves shorter than 5 cm. 56
b. Leaves longer than 5 cm. 62
56a. Inflorescence only 1-flowered. Bracts several. 57
b. Inflorescence more-flowered. Bract 1. 58
57a. Bracts shorter than 3 mm. Corolla shorter than *c.* 4 mm. Calyx tube 1—2 mm high. Stamens less than 30. Stone smooth. Seed and embryo uncinately curved towards the base. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Bracts longer than 3 mm. Corolla 5—8 mm. Calyx tube 2—3 mm high. Stamens more than 70. Stone with ridges or grooves. Seed and embryo straight. **21. S. buxifolia**
58a. Petiole more than 5 mm. 59
b. Petiole 0—5 mm. 60
59a. Inflorescence a basally branched raceme. Corolla 5—7 mm. Bracts longer than 3 mm. . . . . **106. S. whitfordii**
b. Inflorescence a (basally branched) spike. Corolla shorter than *c.* 4 mm. **27-15. S. cochinchinensis** ssp. **leptophylla**

60a. Acumen shorter than 5 mm. Apex of leaves rounded or acute. Seed and embryo uncinately curved towards the base.
27-15. S. cochinchinensis ssp. **leptophylla**
b. Leaves acuminate, acumen longer than 5 mm. 61
61a. Terminal buds hairy. Inflorescence a (basally branched) spike to $2\frac{1}{2}$ cm.
16. S. betula
b. Terminal buds glabrous. Inflorescence a lax, few-flowered raceme.
67. S. modesta
62a. Nerves 14—18 pairs. . . . . **95. S. spectabilis**
b. Nerves less than 15 pairs. 63
63a. Twigs (exceptionally) thick. 64
b. Twigs not (exceptionally) thick. 66
64a. Terminal buds hairy. Disk hairy.
27-15. S. cochinchinensis ssp. **leptophylla**
b. Terminal buds glabrous. Disk glabrous. 65
65a. Inflorescence axis minutely hairy. Bracts 2—3 mm, hairy, bracteoles hairy. Calyx limb $1\frac{1}{2}$—2 mm long. Fruits *c.* 10 mm long. Stone ampulliform, with low ridges. Leaves elliptic. . . . . **12. S. barisani**
b. Inflorescence axis glabrous. Bracts 5—7 mm, glabrous, bracteoles glabrous. Calyx limb *c.* 2 mm. Fruits *c.* 13 mm long. Stone not ampulliform, with high lengthwise interrupted ridges. Leaves obovate. . . . . **87. S. pulvinata**
66a. Bracts to *c.* 1 mm long. 67
b. Bracts longer than 1 mm. 69
67a. Petiole 2—3 mm. Inflorescence a (basally branched) spike to $2\frac{1}{2}$ cm. **16. S. betula**
b. Petiole more than 5 mm. Inflorescence not a spike. 68
68a. Terminal buds hairy. Inflorescence a compound raceme or a panicle, its axis minutely hairy. Reticulation fine. Bracts hairy. Calyx lobes $\frac{1}{2}$—1 mm.
29. S. composiracemosa
b. Terminal buds glabrous. Inflorescence a (basally branched raceme, its axis glabrous. Reticulation coarse. Bracts glabrous. Calyx lobes to *c.* $\frac{1}{2}$ mm long.
85. S. pseudobarberina
69a. Calyx limb 2—4-lobed or symmetrically cleft. 70
b. Calyx limb regularly 5-lobed. 71
70a. Angle of leaf base *c.* 90° . . . . . **101. S. trisepala**
b. Angle of leaf base 25—60°. . . . . **72. S. obovatifolia**
71a. Inflorescence only 1-flowered. . . . . **17. S. boninensis**
b. Inflorescence more-flowered. 72
72a. Disk hairy. 73
b. Disk glabrous. 77
73a. Petiole 0—5 mm . . . . . **63. S. macrophylla**
b. Petiole more than 5 mm. 74
74a. Calyx tube to *c.* 1 mm high. 75

b. Calyx tube more than 1 mm high. 76
75a. Bracts 1. Corolla shorter than *c.* 4 mm. Calyx limb to *c.* 1 mm long. Stamens less than 30. Seeds not straight. Apex of leaves acuminate.
27-15. S. cochinchinensis ssp. **leptophylla**
b. Bracts several. Corolla 5—6 mm long. Calyx limb *c.* 4 mm long. Stamens more than 60. Seeds straight. Apex of leaves rounded. . . . . **17. S. boninensis**
76a. Inflorescence not a spike. Leaves obovate.
27-15. S. cochinchinensis ssp. **leptophylla**
b. Inflorescence a (basally branched) spike. 76A
76a. Base angle more than 30°. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Base angle less than 30°. . . . . **49a. S. goodeniacea**
77a. Inflorescence not a spike (rarely a cone in bud). 78
b. Inflorescence a (basally branched) spike or a cone. 82
78a. Inflorescence not a fascicle. Seeds not straight. 79
b. Inflorescence a fascicle. Seeds straight. 80
79a. Fruits narrowly ampulliform. . . . . **78. S. oreades**
b. Fruits ellipsoid or ovoid-ampulliform.
27-10. S. cochinchinensis ssp. **thwaitesii**
80a. Calyx tube to *c.* 1 mm long. . . . . **49. S. glomerata**
b. Calyx tube more than 1 mm high. 81
81a. Leaf index 2.3—3.5. Calyx lobes 1—1½ mm. Fruits tapering towards apex, more than 5 mm broad. . . . . **8. S. atjehensis**
b. Leaf index 3.5—6. Calyx lobes *c.* ½ mm. Fruits ± cylindrical, to *c.* 5 mm broad.
96. S. stellaris
82a. Seed and embryo uncinately curved towards the base.
27-15. S. cochinchinensis ssp. **leptophylla**
b. Seed and embryo not uncinately curved towards the base.
27-7. S. cochinchinensis ssp. **laurina**
83a. Underside of leaves hairy. 84
b. Underside of leaves glabrous. 94
84a. Leaves shorter than 5 cm. . . . . **19. S. brachybotrys**
b. Leaves longer than 5 cm. 85
85a. Calyx limb glabrous. 86
b. Calyx limb hairy. 88
86a. Bracts caducous. . . . . **91. S. ramosissima**
b. Bracts persistent. 87
87a. Calyx lobes becoming longer by tearing. Seeds straight. . . **32. S. crassipes**
b. Calyx lobes not becoming longer by tearing. Seeds not straight.
27-15. S. cochinchinensis ssp. **leptophylla**
88a. Petiole 0—5 mm. 89
b. Petiole more than 5 mm. 91
89a. Calyx tube 1—1½ mm high. Disk glabrous. . . . . **105. S. viridissima**

b. Calyx tube to *c.* 1 mm high. Disk hairy. 90
90a. Leaf margin entire. Calyx limb *c.* 1 mm long. . . . . **76. S. olivacea**
b. Leaf margin not entire. Calyx limb *c.* 3 mm long. . . . . **19. S. brachybotrys**
91a. Calyx tube glabrous. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Calyx tube hairy. 92
92a. Bracts and bracteoles caducous. Calyx limb symmetrically cleft. **93. S. rubiginosa**
b. Bracts and bracteoles persistent. 93
93a. Bracts *c.* ½ mm long. Seeds straight. Calyx lobes *c.* ½ mm long. . **42. S. filipes**
b. Bracts longer than 1 mm. Seeds not straight. **27-15. S. cochinchinensis** ssp. **leptophylla**
94a. Calyx tube glabrous. 95
b. Calyx tube hairy. 114
95a. Bracts caducous. 96
b. Bracts persistent. 105
96a. Petiole more than 20 mm. . . . . **13. S. barringtoniifolia**
b. Petiole less than 20 mm. 97
97a. Disk hairy. 98
b. Disk glabrous. 101
98a. Nerves 3—5 pairs. Reticulation not prominent. Bracts 3—4 mm. **81a. S. paucinervia**
b. Nerves more than 5 pairs. 99
99a. Terminal buds glabrous. Fruits cylindric or ellipsoid, 6—10 mm long, 3-celled. **89. S. pyrifolia**
b. Terminal buds hairy. Fruits ovoid or obovoid. 100
100a. Reticulation fine. Inflorescence not a spike, its axis hairy. Calyx limb longer than 2 mm. Corolla shorter than *c.* 4 mm. . . . . **63. S. macrophylla**
b. Reticulation coarse. Inflorescence a (basally branched) spike or a cone, its axis glabrous. Calyx limb 1½—2 mm long. Corolla *c.* 6 mm long. . **60. S. longifolia**
101a. Inflorescence a (basally branched) spike or a cone. 102
b. Inflorescence not a spike (rarely a cone in bud). 103
102a. Terminal buds large. Inflorescence axis hairy. Calyx limb regularly 5-lobed, 1½—2 mm long, calyx lobes not becoming longer by tearing. Corolla 5—7 mm. Fruits 12—15 mm long, 7 mm broad; mesocarp rather hard. Stone smooth. Leaves elliptic. . . . . **43. S. foliosa**
b. Terminal buds small. Inflorescence axis glabrous. Calyx limb 2—4-lobed or symmetrically cleft when older, 3—5 mm long, calyx lobes becoming longer by tearing. Corolla *c.* 4 mm. Fruits 30—35 mm long, *c.* 15 mm broad; mesocarp woody or corky. Stone with ridges or grooves. Leaves obovate. **65. S. megalocarpa**
103a. Leaves 10—20 cm. Nerves 11—15 pairs. . . . . **37. S. disepala**
b. Leaves shorter than *c.* 10 cm. 104

104a. Terminal buds glabrous. Corolla 5—8 mm. Calyx tube 2—3 mm high. Stamens more than 70. Disk inconspicuous. Fruits ellipsoid to ovoid, 10—15 mm long. Seeds straight. . . . . **21. S. buxifolia**

b. Terminal buds hairy. Corolla 4—8 mm. Calyx tube 1—2 mm high. Stamens 25—40. Disk clearly present. Fruits ampulliform, 6—10 mm long. Seeds curved. **98. S. sumuntia**

105a. Inflorescence only 1-flowered. . . . . **21. S. buxifolia**

b. Inflorescence more-flowered. 106

106a. Disk hairy. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**

b. Disk glabrous. 107

107a. Calyx lobes to *c.* $\frac{1}{2}$ mm long. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**

b. Calyx lobes longer than $\frac{1}{2}$ mm. 108

108a. Calyx tube more than 1 mm high. 109

b. Calyx tube to *c.* 1 mm high. 111

109a. Seeds straight. . . . . **77. S. ophirensis**

b. Seeds not straight. 110

110a. Seed and embryo uncinately curved towards the base. **27-15. S. cochinchinensis** ssp. **leptophylla**

b. Seed and embryo not uncinately curved towards the base. . **77. S. ophirensis**

111a. Calyx lobes longer than $1\frac{1}{2}$ mm. . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long. 112

112a. Intramarginal vein absent. . . . . **48. S. glauca**

b. Intramarginal vein present. 113

113a. Petiole less than 30 mm. Fruits ampulliform, to *c.* 10 mm long. **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Petiole more than 30 mm. Fruits ovoid to cylindrical, 12—18 mm long. **48-2. S. glauca** var. **epapillata**

114a. Calyx limb glabrous. 115

b. Calyx limb hairy. 119

115a. Bracts persistent. 116

b. Bracts caducous. 117

116a. Calyx lobes becoming longer by tearing. Seeds straight. . **32. S. crassipes**

b. Calyx lobes not becoming longer by tearing. Seeds not straight. **27-15. S. cochinchinensis** ssp. **leptophylla**

117a. Bracteoles persistent. . . . . **91. S. ramosissima**

b. Bracteoles caducous. 118

118a. Terminal buds large, glabrous. Calyx tube 2—3 mm high. Corolla 8—10 mm. Stamens more than 100. Disk hairy. Style base hairy. Fruits ± elliptic, more than 10 mm long. Seeds straight. . . . . **57. S. junghuhnii**

b. Terminal buds small, usually hairy. Calyx tube 1—2 mm high. Corolla to 8 mm. Stamens less than 50. Disk glabrous. Style base glabrous. Fruits ampulliform, to *c.* 10 mm long. Seeds not straight. . . . . **98. S. sumuntia**

119a. Bracts caducous. 120
b. Bracts persistent. 128
120a. Calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long. 121
b. Calyx lobes longer than $1\frac{1}{2}$ mm. 124
121a. Stone spindle-shaped or otherwise not ampulliform. . . . **77. S. ophirensis**
b. Stone ampulliform. 123
123a. Bracts longer than 3 mm. . . . . **98. S. sumuntia**
b. Bracts to *c.* 1 mm long. . . . . **77. S. ophirensis**
124a. Leaves shorter than 5 cm. . . . . **19. S. brachybotrys**
b. Leaves longer than 5 cm. 125
125a. Leaves 14—24 cm. Nerves 10—15 pairs. Calyx limb torn into 3 to 4 pieces. **6. S. annamensis**
b. Leaves shorter than *c.* 15 cm. 126
126a. Inflorescence a 1—3-flowered spike. Disk inconspicuous. Calyx tube *c.* 1 mm high. Fruits to *c.* 10 mm long. . . . . **19. S. brachybotrys**
b. Inflorescence not a spike (rarely a cone in bud). Disk clearly present. . . . 127
127a. Inflorescence a (basally branched) raceme. Corolla shorter than *c.* 4 mm. Bracts longer than 3 mm. Fruits ovoid or obovoid, 1-celled. . . . **63. S. macrophylla**
b. Inflorescence a panicle. Corolla 5—6 mm. Bracts *c.* 3 mm. Fruits cylindric or ellipsoid, 2—3-celled. . . . . **35. S. cylindracea**
128a. Petiole 0—5 mm. 129
b. Petiole more than 5 mm. 137
129a. Leaves shorter than 5 cm. . . . . **19. S. brachybotrys**
b. Leaves longer than 5 cm. 130
130a. Terminal buds glabrous. 131
b. Terminal buds hairy. 133
131a. Reticulation fine. Inflorescence a (basally branched) raceme. **77. S. ophirensis**
b. Reticulation coarse. Inflorescence not a raceme. 132
132a. Inflorescence not a fascicle. Bract 1, to *c.* 1 mm long. . . . **77. S. ophirensis**
b. Inflorescence a fascicle. Bracts several. . . . . **34. S. cyanocarpa**
133a. Bracts longer than 1 mm. 134
b. Bracts to *c.* 1 mm long. 135
134a. Inflorescence only 1-flowered. Calyx tube *c.* 1 mm high.. **19. S. brachybotrys**
b. Inflorescence more-flowered. Calyx tube more than 1 mm high. **105. S. viridissima**
135a. Acumen shorter than 5 mm. Calyx tube more than 1 mm high. Disk 5-glandular or 5-stellate. Apex of leaves rounded or acute. . . . . **77. S. ophirensis**
b. Acumen longer than 5 mm. 136
136a. Inflorescence a very short spike. Calyx limb *c.* 1 mm long, regularly 5-lobed, calyx tube appressedly sericeous. Style base hairy. . . . . **76. S. olivacea**
b. Inflorescence a very short raceme. Calyx limb 1—$1\frac{1}{2}$ mm long, 2—3-lobed,

calyx tube not appressedly sericeous. Style base glabrous. **51. S. guillauminii**

137a. Nerves more than 13 pairs. Intramarginal vein absent. . . **46. S. gigantifolia**

b. Nerves less than 13 pairs. 138

138a. Disk glabrous. 139

b. Disk hairy. 141

139a. Bracts longer than 1 mm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**

b. Bracts to *c.* 1 mm long. 140

140a. Calyx lobes *c.* $\frac{1}{2}$ mm long. Stone spindle-shaped. . . . . **42. S. filipes**

b. Calyx lobes longer than $\frac{1}{2}$ mm. Stone ampulliform. . . . **77. S. ophirensis**

141a. Nerves less than 5 pairs. . . . . **77. S. ophirensis**

b. Nerves more than 5 pairs. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**

142a. Leaves distichous. 143

b. Leaves spirally arranged. 155

143a. Underside of leaves glabrous. . . . . **58. S. laeteviridis**

b. Underside of leaves hairy. 144

144a. Nerves less than 5 pairs. 145

b. Nerves more than 5 pairs. 146

145a. Angle of leaf base 90—130°. . . . . **56. S. johniana**

b. Angle of leaf base less than 90°. . . . . **58. S. laeteviridis**

146a. Calyx glabrous. . . . . **44. S. fordii**

b. Calyx hairy. 147

147a. Calyx limb glabrous. . . . . **58. S. laeteviridis**

b. Calyx limb hairy. 148

148a. Leaves longer than 5 cm. 149

b. Leaves shorter than 5 cm. 151

149a. Inflorescence a lax raceme. Fruits 10—14 mm long. . . . **28. S. colombonensis**

b. Inflorescence not a raceme. Fruits to *c.* 10 mm long. 150

150a. Inflorescence a fascicle. Bracts to *c.* 1 mm long, persistent. Calyx limb regularly 5-lobed, *c.* 1 mm long, calyx tube *c.* 1 mm high, calyx lobes not becoming longer by tearing. Corolla 2—$4\frac{1}{2}$ mm. Style base hairy, conical. Fruits ampulliform. **41. S. fasciculata**

b. Inflorescence not a fascicle. Bracts longer than 1 mm, caducous. Calyx tube more than 1 mm high, calyx limb longer than 1 mm, calyx lobes becoming longer by tearing. Corolla more than 4 mm. Style base glabrous, not conical. Fruits not ampulliform. . . . . **58. S. laeteviridis**

151a. Inflorescence only 1-flowered. 152

b. Inflorescence more-flowered. 153

152a. Reticulation not prominent. Bracts several. Calyx tube *c.* 1 mm high, calyx lobes *c.* 3 mm long. Corolla *c.* 4 mm. Fruits 8—9 mm long, *c.* 5 mm broad. **99. S. trichomarginalis**

b. Reticulation present beneath. Bract 1. Calyx tube 1—$1\frac{1}{2}$ mm high, calyx limb

c. 2 mm long, calyx lobes 1—1½ mm long. Corolla 4—6 mm. Fruits 10—12 mm long, more than 5 mm broad. . . . . **107. S. zizyphoides**

153a. Bracts and bracteoles caducous, bracts shorter than 3 mm. Calyx lobes becoming longer by tearing. . . . . **58. S. laeteviridis**

b. Bracts and bracteoles persistent. 154

154a. Disk hairy. Fruits *c.* 5 mm broad, *c.* 10 mm long. . . . . **36. S. deflexa**

b. Disk glabrous. Fruits more than 5 mm broad, more than 10 mm long. **107. S. zizyphoides**

155a. Leaves crowded towards the end of the twigs. 156

b. Leaves evenly distributed. 158

156a. Nerves 8—10 pairs. . . . . **66. S. microtrichia**

b. Nerves more than 10 pairs. 157

157a. Underside of leaves hairy. Angle of leaf base more than 90°. Acumen longer than 5 mm. Reticulation fine. Petiole less than 20 mm. Bracts longer than 3 mm. Calyx tube *c.* 1 mm high. Corolla shorter than *c.* 7 mm. Disk 5-glandular or 5-stellate. Fruits more than 5 mm broad, 1-celled. Stone with low ridges and a depression or transverse groove near the base. Seed 1, not straight. **63. S. macrophylla**

b. Underside of leaves glabrous. Angle of leaf base 25—35°. Acumen shorter than 5 mm. Reticulation coarse. Petiole more than 20 mm. Bracts 1½—2 mm. Calyx tube *c.* 2 mm high. Corolla 8—10 mm. Disk annular. Fruits 4—5 mm broad, 2—5-celled. Stone with low not interrupted ridges or grooves or rather smooth. Seeds more than 1, straight. . . . . **84. S. polyandra**

158a. Inflorescence terminal. . . . . **80. S. paniculata**

b. Inflorescence axillary. 159

159a. Underside of leaves glabrous. 160

b. Underside of leaves hairy. 211

160a. Calyx glabrous. 161

b. Calyx hairy. 180

161a. Petiole 0—5 mm. 162

b. Petiole more than 5 mm. 169

162a. Bracts 1. 163

b. Bracts several. 166

163a. Acumen shorter than 5 mm. 164

b. Acumen longer than 5 mm. 165

164a. Corolla shorter than *c.* 4 mm. Stamens less than 30. Disk glabrous. **27-15. S. cochinchinensis** ssp. **leptophylla**

b. Corolla more than 4 mm long. Stamens more than 50. Disk hairy. **63. S macrophylla**

165a. Angle of leaf base *c.* 20°. Fruits ellipsoid, *c.* 6 mm long. . . . **15. S. bauerleni**

b. Angle of leaf base more than 90°. Bracts persistent. Fruits spindle-shaped, 15—20 mm long. . . . . **53. S. hayesii**

166a. Leaves longer than 5 cm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
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167a. Leaf index *c.* 2½; apex of leaves acuminate. . . . . **68. S. monantha**
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27-15. S. cochinchinensis ssp. **leptophylla**
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170a. Disk hairy. 171
b. Disk glabrous. 173
171a. Bracts persistent . . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
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172a. Reticulation fine. Bracts shorter than 3 mm, glabrous, bracteoles glabrous. Stone with ridges or grooves. . . . . **63. S. macrophylla**
b. Reticulation coarse. Bracts 3—4 mm. . . . . **90. S. racemosa**
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174a. Reticulation not prominent. Calyx lobes *c.* ½ mm long. . . . . **96. S. stellaris**
b. Reticulation present beneath. Calyx lobes longer than ½ mm. 175
175a. Twigs (appressedly) pubescent, puberulous or pilose. 176
b. Twigs tomentose or tomentellous. 178
176a. Terminal buds large. Bracteoles and bracts caducous. . . . **43. S. foliosa**
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27-15. S. cochinchinensis ssp. **leptophylla**
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178a. Bracts 3—5 mm. . . . . **23. S. cambodiana**
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182a. Petiole *c.* 4 mm. Leaves ovate. . . . . **82a. S. pedunculata**
b. Petiole more than 5 mm. 183
183a. Calyx tube to *c.* 1 mm high. Seeds straight. . . . . **63. S. macrophylla**
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27-15. S. cochinchinensis ssp. **leptophylla**
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185a. Leaves longer than 5 cm. . . . . **19. S. brachybotrys**
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186a. Leaf margin (and petiole) often glandular but glands not closely spaced. Reticulation present beneath. Intramarginal vein present. Bracts 2—4 mm long. Calyx lobes *c* 3 mm long. Corolla *c.* 6 mm. Stamens *c.* 100. Disk hairy, inconspicuous. Style base hairy. Seeds slightly curved. . . . . **19. S. brachybotrys**
b. Leaf margin (and petiole) beset with closely spaced glands. Reticulation not prominent. Intramarginal vein absent. Bracts *c.* 1 mm long. Calyx lobes *c.* 2 mm long. Corolla 3—4 mm. Stamens 25—50. Disk glabrous, clearly present. Style base glabrous. Seeds straight. . . . . **40. S. euryoides**
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188a. Inflorescence not a spike (rarely a cone in bud). 189
b. Inflorescence a (basally branched) spike or a cone. 190
189a. Acumen longer than 5 mm. Bracts longer than 3 mm. Calyx limb longer than 2 mm, calyx lobes longer than 1½ mm, semi-elliptic or -ovate. Corolla shorter than *c.* 4 mm. Disk clearly present. Fruits ovoid or obovoid, more than 10 mm long, 1-celled. . . . . **63. S. macrophylla**
b. Acumen shorter than 5 mm. Bracts 1—2 mm. Calyx limb 1—2 mm long, calyx lobes ½—1½ mm long, semicircular. Corolla 4—5 mm. Disk inconspicuous. Fruits ellipsoid, 7—*c.* 10 mm long, 2—5-celled. . . . . **92. S. robinsonii**
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b. Petiole 5—10 mm. Calyx tube *c.* 1½ mm high. Corolla *c.* 4 mm. Stamens *c.* 40. Disk clearly present. Fruits more than 25 mm long, more than 10 mm broad; mesocarp woody or corky. Stone with high lengthwise not interrupted ridges. Seeds straight. . . . . **62. S. macrocarpa**
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193a. Leaves shorter than 5 cm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
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b. Bracts shorter than 3 mm. Calyx limb to *c.* 1 mm long, calyx lobes to *c.* ½ mm long. Corolla *c.* 3 mm. Stamens *c.* 25. Disk glabrous. Fruits to *c.* 5 mm broad. **42. S. filipes**

196a. Bracts caducous. 197
b. Bracts persistent. 201
197a. Leaves shorter than 5 cm. Stamens 5—15. . . . . **75. S. oligandra**
b. Leaves longer than 5 cm. 198
198a. Stone smooth. 199
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199a. Leaves 10—20 cm. Inflorescence a cone in bud becoming a raceme. Calyx limb 2-lobed, symmetrically cleft, longer than 2 mm. Stamens more than 100. Fruits 30—40 mm long; mesocarp woody or corky. . . . . **37. S. disepala**
b. Leaves shorter than *c.* 15 cm. Inflorescence a cone in bud becoming a spike. Calyx limb regularly 5-lobed, 1½—2 mm long. Stamens 60—90. Fruits 12—15 mm long; mesocarp rather hard. . . . . **43. S. foliosa**
200a. Reticulation coarse. Calyx lobes ½—1¼ mm long. Bracts shorter than 3 mm. Disk glabrous, inconspicuous. Fruits ampulliform, 5—6 mm long. Seeds slightly curved. . . . . **78. S. oreades**
b. Reticulation fine. Calyx lobes longer than 1½ mm. Bracts longer than 3 mm. Disk hairy, clearly present. Fruits not ampulliform, more than 10 mm long. Seeds straight. . . . . **63. S. macrophylla**
201a. Inflorescence only 1-flowered. 202
b. Inflorescence more-flowered. 203
202a. Bracts 4—8 mm. Disk hairy. Calyx tube 2—3 mm high. Fruits 8—10 mm broad. **69. S. multibracteata**
b. Bracts 1—3 mm. Disk glabrous. Calyx tube *c.* 1 mm high. Fruits *c.* 3 mm broad. **102. S. unicarpa**
203a. Disk hairy. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
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204a. Calyx lobes to *c.* ½ mm long. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Calyx lobes longer than ½ mm. 205
205a. Seeds straight. 206
b. Seeds not straight. 209
206a. Inflorescence a dense, fasciculate, short spike. Calyx lobes 1—1½ mm long. 207
b. Inflorescence a fascicle. Calyx lobes longer than 1½ mm. 208
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b. Intramarginal vein present. Reticulation fine. **48-2. S. glauca** var. **epapillata**
208a. Leaves 16—33 cm. Nerves 10—17 pairs. Bracts 3—5 mm. Calyx tube 1—1½ mm high. . . . . **23. S. cambodiana**
b. Leaves shorter than *c.* 15 cm. Nerves less than 10 pairs. Bracts shorter than 3 mm. Calyx tube to *c.* 1 mm high. . . . . **49. S. glomerata**
209a. Calyx tube to *c.* 1 mm long. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Calyx tube more than 1 mm high. 210
210a. Seed and embryo not uncinately curved towards the base.. **78. S. oreades**

b. Seed and embryo uncinately curved towards the base. **27-15. S. cochinchinensis** ssp. **leptophylla**

211a. Calyx glabrous. 212
b. Calyx hairy. 225
212a. Upper side of leaves hairy. 213
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213a. Calyx tube *c.* $\frac{3}{4}$ mm high. Stamens 5—15. . . . . **82. S. paucistaminea**
b. Calyx tube more than 1 mm high. Stamens more than 15. 214
214a. Inflorescence a fascicle. Calyx lobes 1—$1\frac{1}{2}$ mm long. Bracts 1—2 mm. Corolla *c.* 3 mm. Stamens 25—35. . . . . **38. S. dolichotricha**
b. Inflorescence a (basally branched) spike. Calyx lobes longer than $1\frac{1}{2}$ mm. Bracts 4—6 mm. Corolla 4—9 mm. Stamens more than 45. **86. S. pulchra**
215a. Disk hairy. 216
b. Disk glabrous. 220
216a. Petiole more than 5 mm. 217
b. Petiole 0—5 mm. 218
217a. Bracts persistent, bracteoles 2, persistent. Seeds not straight. Apex of leaves acuminate. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Bracts caducous, bracteoles several, caducous. Seeds straight. Apex of leaves rounded or acute. . . . . **63. S. macrophylla**
218a. Acumen shorter than 5 mm. Apex of leaves rounded or acute. **63. S. macrophylla**
b. Acumen present, longer than 5 mm. 219
219a. Inflorescence a (basally branched) spike. Stamens more than 50. Calyx lobes becoming longer by tearing. Disk 5-glandular or 5-stellate. Style base hairy. Fruits not ampulliform. . . . . **63. S. macrophylla**
b. Inflorescence a very slender raceme. Stamens *c.* 40. Calyx lobes not becoming longer by tearing. Disk annular. Style base glabrous. Fruits ampulliform. **5. S. angustata**
220a. Bracts caducous. Calyx lobes becoming longer by tearing. 221
b. Bracts persistent. Calyx lobes not becoming longer by tearing. 222
221a. Nerves 6—11 pairs. . . . . **25. S. cerasifolia**
b. Nerves more than 10 pairs. . . . . **25-1. S. cerasifolia** var. **grandifolia**
222a. Seed not straight. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Seeds straight. 223
223a. Leaves 16—33 cm. Bracts 3—5 mm. Calyx lobes $1\frac{1}{2}$—2 mm. **23. S. cambodiana**
b. Leaves shorter than *c.* 15 cm. 224
224a. Leaf margin (and petiole) often glandular but glands not closely spaced. Fruits 5—6 mm broad. . . . . **8. S. atjehensis**
b. Leaf margin (and petiole) beset with closely spaced glands. Fruits to *c.* 5 mm broad. . . . . **49. S. glomerata**
225a. Upper side of leaves hairy. 226

b. Upper side of leaves glabrous. 234
226a. Calyx tube glabrous. 227
b. Calyx tube hairy 228
227a. Inflorescence a fascicle. Calyx lobes 1—1½ mm long. Bracts 1—2 mm. Corolla *c.* 3 mm. Stamens 25—35. . . . . **38. S. dolichotricha**
b. Inflorescence a (basally branched) spike. Calyx lobes longer than 1½ mm. Bracts 4—6 mm. Corolla 4—9 mm. Stamens more than 45. . . . **86. S. pulchra**
228a. Angle of leaf base more than 90°. 229
b. Angle of leaf base less than 90°. 230
229a. Reticulation faintly prominent. Pedicels longer than 5 mm. Calyx lobes 4—6 mm. Style base glabrous, not conical. . . . . **22. S. calycodactylos**
b. Reticulation much prominent. Pedicels shorter than 5 mm. Calyx lobes 1½—2½ mm long. Style base hairy, conical. . . . . **86. S. pulchra**
230a. Calyx limb glabrous. . . . . **50. S. groffii**
b. Calyx limb hairy. 231
231a. Bracts longer than 1 mm. Calyx lobes longer than 1½ mm. 232
b. Bracts to *c.* 1 mm long. Calyx lobes ½—1½ mm long. 233
232a. Reticulation present beneath. Bracts 1. Inflorescence more flowered. Disk hairy. Style base hairy. Hairs on twigs less than 2 mm long. **32. S. crassipes**
b. Reticulation not prominent. Bracts several. Inflorescence only 1-flowered. Disk glabrous. Style base glabrous. Hairs on twigs more than 2 mm long. **86. S. pulchra**
233a. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands, petiole 6—12 mm. Calyx tube 1—2 mm high, calyx limb ½—1 mm long. Disk glabrous. Fruits to *c.* 10 mm long, 1-celled. . . . . **3. S. adenophylla**
b. Leaf index 2—3. Leaf margin (and petiole) often glandular but glands not closely spaced, petiole 2—3 mm. Calyx tube *c.* 1 mm high, calyx limb *c.* 2 mm long. Disk hairy. Fruits 10—12 mm long, 2—5-celled. . . **50. S. groffii**
234a. Calyx tube glabrous. 235
b. Calyx tube hairy 246
235a. Inflorescence only 1-flowered. 236
b. Inflorescence more-flowered 237
236a. Reticulation coarse. Bracts 1, 2—3 mm long. Calyx tube *c.* 1 mm high, calyx limb 1—2 mm long. Stamens *c.* 30. Fruits ampulliform, *c.* 9 mm long. Seeds not straight. . . . . **78a. S. ovatilobata**
b. Reticulation fine. Bracts several, 4—8 mm long. Calyx tube 2—3 mm high, calyx limb 3—5 mm long. Stamens more than 80. Fruits spindle-shaped to ovoid or ellipsoid, 17—22 mm long. Seeds straight. . . . . **69. S. multibracteata**
237a. Bracts caducous. 238
b. Bracts persistent. 239
238a. Twigs tomentose or tomentellous. Inflorescence not a spike. Calyx lobes longer than 1½ mm, not becoming longer by tearing. Disk hairy. Style base not conical.

Fruits less than 20 mm long, 1-celled; mesocarp fleshy (shrivelled when dry) or thin, coriaceous. Stone not with high lengthwise uninterrupted ridges.
63. S. macrophylla

b. Twigs with different indument. Inflorescence a (basally branched) spike, forming a cone in bud. Calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long, becoming longer by tearing. Disk glabrous. Style base conical. Fruits more than 20 mm long, 2—5-celled; mesocarp woody or corky. Stone with high lengthwise not interrupted ridges.
25. S. cerasifolia

239a. Disk glabrous. 240
b. Disk hairy. 243
240a. Calyx tube to *c.* 1 mm high. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Calyx tube more than 1 mm high. 241
241a. Twigs (appressedly) pubescent, puberulous or pilose.
27-15. S. cochinchinensis ssp. **leptophylla**
b. Twigs not appressedly pubescent or puberulous 242
242a. Leaves shorter than *c.* 15 cm. Nerves less than 10 pairs. Inflorescence a (basally branched) spike. Bracts shorter than 3 mm. Calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long. Corolla shorter than *c.* 4 mm. Stamens less than 30. Seeds and embryo uncinately curved towards the base. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Leaves longer than 15 cm. Nerves more than 10 pairs. Inflorescence a fascicle. Bracts longer than 3 mm. Calyx lobes $1\frac{1}{2}$—2 mm. Corolla 5 mm. Stamens 30—70. Seeds straight. . . . . **23. S. cambodiana**
243a. Petiole 0—5 mm. 244
b. Petiole more than 5 mm. 245
244a. Bracts longer than 3 mm. Reticulation fine. Calyx lobes longer than $1\frac{1}{2}$ mm. Corolla more than 4 mm. Stamens more than 50. Leaves elliptic, ovate or circular.
63. S. macrophylla
b. Bracts $\frac{1}{2}$—2 mm. Reticulation coarse. Calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long. Corolla $2\frac{1}{2}$—4 mm. Stamens 15—35. Leaves ovate. . . . . **59. S. lancifolia**
245a. Nerves *c.* 20 pairs. Twigs thick. . . . . **33. S. crassiramifera**
b. Nerves less than 15 pairs. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
246a. Calyx limb glabrous. 247
b. Calyx limb hairy. 248
247a. Calyx tube *c.* 1 mm high. Seeds straight. . . . . **83. S. pilosa**
b. Calyx tube more than 1 mm high. Seeds not straight.
27-15. S. cochinchinensis ssp. **leptophylla**
248a. Bracts caducous. 249
b. Bracts persistent. 257
249a. Calyx tube to *c.* 1 mm high. 250
b. Calyx tube more than 1 mm high. 251
250a. Reticulation much prominent, very fine. Inflorescence a short raceme.
77-3. S. ophirensis var. **densireticulata**

b. Reticulation faintly prominent. Inflorescence a (basally branched) spike or a cone **19. S. brachybotrys**

251a. Bracts 1—2 mm long. . . . . **92. S. robinsonii**

b. Bracts longer than 3 mm. 252

252a. Fruits more than 10 mm long. 253

b. Fruits to *c.* 10 mm long. 255

253a. Twigs (appressedly) pubescent, puberulous or pilose. Leaf margin entire. **63. S. macrophylla**

b. Twigs not appressedly pubescent or puberulous. Leaf margin not entire. . . 254

254a. Twigs tomentose or tomentellous. Inflorescence not a spike. Bracts not appressedly pubescent or puberulous. Calyx lobes longer than $1\frac{1}{2}$ mm, not becoming longer by tearing. Disk hairy. Fruits less than 20 mm long, 1-celled; mesocarp fleshy (shrivelled when dry) or thin, coriaceous. Stone not with high lengthwise uninterrupted ridges. . . . . **63. S. macrophylla**

b. Twigs with different indument. Inflorescence a cone in bud, becoming a spike. Bracts (appressedly) pubescent. Calyx lobes 1—$1\frac{1}{2}$ mm long, becoming longer by tearing. Disk glabrous. Fruits more than 20 mm long, 2—5-celled; mesocarp woody or corky. Stone with high lengthwise not interrupted ridges. **25-2. S. cerasifolia** var. **grandifolia**

255a. Fruits 2—5-celled. . . . . **97. S. sumatrana**

b. Fruits 1-celled. 256

256a. Calyx limb regularly 5-lobed, calyx lobes not becoming longer by tearing. Stamens less than 50. Fruits to *c.* 5 mm broad. Stone with low not interrupted ridges or grooves or brain-like grooved. Seeds straight. . . **63. S. macrophylla**

b. Calyx limb often symmetrically cleft. Stamens more than 60. Fruits 5—8 mm broad. Stone with low ridges and a depression or transverse groove near the base. Seeds not straight. . . . . **93. S. rubiginosa**

257a. Inflorescence only 1-flowered. 258

b. Inflorescence more-flowered. 262

258a. Bracts several. Fruits to *c.* 10 mm long. 259

b. Bracts 1. Fruits more than 10 mm long. 260

259a. Bracts *c.* 1 mm long. Calyx lobes 1—$1\frac{1}{2}$ mm long. . . . . **94. S. singuliflora**

b. Bracts 2—4 mm long. Calyx lobes *c.* 3 mm long. . . . . **19. S. brachybotrys**

260a. Angle of leaf base more than 90°. Corolla *c.* 5 mm. Stamens 60—90. Style base glabrous. Fruits ampulliform. . . . . **56. S. johniana**

b. Angle of leaf base less than 90°. 261

261a. Leaf index 4—7. Calyx tube $1\frac{1}{4}$ mm high. Stamens 15—20. Disk hairy. Stone smooth. Leaves elliptic. . . . . **93a. S. salicioides**

b. Leaf index less than 2. Calyx tube to *c.* 1 mm high. Stamens more than 30. Disk glabrous. Stone with ridges or grooves. Leaves ovate.

262a. Leaf margin (and petiole) beset with closely spaced glands. 263

b. Leaf margin (and petiole) often glandular but glands not closely spaced. . . 264

263a. Bracts longer than 1 mm, bracteoles caducous. Calyx lobes longer than $1\frac{1}{2}$ mm. **63. S. macrophylla**

b. Bracts to *c.* 1 mm long, bracteoles persistent. Calyx lobes $\frac{1}{2}$—1 mm long. **3. S. adenophylla**

264a. Seeds straight. 265

b. Seeds not straight. 272

265a. Bracts to *c.* 1 mm long. 266

b. Bracts longer than 1 mm. 268

266a. Reticulation fine. Calyx limb longer than 1 mm. . . . . **32. S. crassipes**

b. Reticulation coarse. Calyx limb to *c.* 1 mm long. 267

267a. Inflorescence a fascicle. Calyx lobes not becoming longer by tearing, calyx tube *c.* 1 mm high. Corolla 2—$4\frac{1}{2}$ mm. Style base hairy. Fruits ampulliform. **41. S. fasciculata**

b. Inflorescence a (basally branched) raceme. Calyx lobes becoming longer by tearing, calyx tube $1\frac{1}{2}$ mm high. Corolla *c.* 3 mm. Style base glabrous. Fruits not ampulliform. . . . . **42. S. filipes**

268a. Calyx tube more than 1 mm high. 269

b. Calyx tube to *c.* 1 mm high. 270

269a. Calyx lobes longer than $1\frac{1}{2}$ mm. Disk hairy. Stamens more than 30. Style base hairy. Fruits more than 10 mm long. . . . . **32. S. crassipes**

b. Calyx lobes 1—$1\frac{1}{2}$ mm long. Disk glabrous. Stamens 17—30. Style base glabrous. Fruits *c.* 10 mm long. . . . . **104. S. vidalii**

270a. Leaves longer than 15 cm. . . . . **32. S. crassipes**

b. Leaves shorter than *c.* 15 cm. 271

271a. Petiole 5—7 mm. Inflorescence a raceme. Calyx lobes 1—$1\frac{1}{2}$ mm long. Style base glabrous. . . . . **83. S. pilosa**

b. Petiole 0—5 mm. . . . . **32. S. crassipes**

272a. Disk glabrous. 273

b. Disk hairy. 274

273a. Petiole 0—5 mm. . . . . **105. S. viridissima**

b. Petiole more than 5 mm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**

274a. Seed and embryo not uncinately curved towards the base. . . **59. S. lancifolia**

b. Seed and embryo uncinately curved towards the base. **27-15. S. cochinchinensis** ssp. **leptophylla**

KEY TO THE SPECIES OF CEYLON

(flowering material)

1a. Underside of leaves hairy. 2

b. Underside of leaves glabrous 7

2a. Leaves crowded towards the end of the twigs. . . . . **63. S. macrophylla**
b. Leaves evenly distributed 3
3a. Calyx glabrous 4
b. Calyx hairy. 6

4a. Apex of leaves rounded or acute. . . . . **63. S. macrophylla**
b. Acumen longer than 5 mm present. 5
5a. Inflorescence a (basally branched) spike. Stamens more than 50. Calyx lobes becoming longer by tearing. Style base hairy. . . . . **63. S. macrophylla**
b. Inflorescence a raceme. Stamens *c.* 40. Calyx lobes not becoming longer by tearing. Style base glabrous. . . . . **5. S. angustata**
6a. Upper side of leaves hairy; angle of leaf base more than 90°. . . **86. S. pulchra**
b. Upper side of leaves glabrous. . . . . **63. S. macrophylla**
7a. Twigs hairy. . . . . **63. S. macrophylla**
b. Twigs glabrous. 8
8a. Leaves crowded towards the end of the twigs. . . . . **63. S. macrophylla**
b. Leaves evenly distributed.. 9
9a. Inflorescence axis hairy. 10
b. Inflorescence axis glabrous. 11
10a. Petiole 0—5 mm. Terminal buds large. . . . . **63. S. macrophylla**
b. Petiole more than 5 mm. Terminal buds small. **27-7. S. cochinchinensis** ssp. **laurina**
11a. Bracts caducous. Disk hairy. . . . . **73. S. obtusa**
b. Bracts persistent. Disk glabrous. . . . **27-7. S. cochinchinensis** ssp. **laurina**

KEY TO THE SPECIES OF CEYLON

(fruiting material)

1a. Twigs glabrous. 2
b. Twigs hairy. 5
2a. Fruits spindle-shaped or otherwise not ampulliform. 3
b. Fruits ampulliform. . . . . **27-7. S. cochinchinensis** ssp. **laurina**
3a. Leaves crowded towards the end of the twigs. . . . . **63. S. macrophylla**
b. Leaves evenly distributed. 4
4a. Bracts persistent. Fruits 1-celled. Terminal buds large. . . **63. S. macrophylla**
b. Bracts caducous. Fruits mostly 3-celled, rarely 1-celled. Terminal buds small. **73. S. obtusa**
5a. Leaves crowded towards the end of the twigs. . . . . **63. S. macrophylla**
b. Leaves evenly distributed. 6
6a. Underside of leaves glabrous. . . . . **63. S. macrophylla**

b. Underside of leaves hairy. 7
7a. Upper side of leaves hairy. . . . . **86. S. pulchra**
b. Upper side of leaves glabrous. 8
8a. Petiole more than 5 mm. . . . . **63. S. macrophylla**
b. Petiole 0—5 mm. 9
9a. Inflorescence a raceme. . . . . **5. S. angustata**
b. Inflorescence a (basally branched) spike or a cone. . . . . **63. S. macrophylla**

KEY TO THE SPECIES OF INDIA AND BURMA

(flowering material)

1a. Midrib prominent on the upper surface. 2
b. Midrib impressed in the upper surface. 4
2a. Twigs glabrous. Calyx glabrous. . . . . **61. S. lucida**
b. Twigs hairy. Calyx hairy. 3
3a. Underside of leaves glabrous. . . . . **7. S. anomala**
b. Underside of leaves hairy. . . . . **59. S. lancifolia**
4a. Twigs hairy. 5
b. Twigs glabrous. 28
5a. Inflorescence terminal. . . . . **80. S. paniculata**
b. Inflorescence axillary. 6
6a. Underside of leaves hairy. 7
b. Underside of leaves glabrous. 14
7a. Upper side of leaves hairy. . . . . **86. S. pulchra**
b. Upper side of leaves glabrous. 8
8a. Petiole 0—5 mm. 9
b. Petiole more than 5 mm. 11
9a. Calyx tube glabrous. . . . . **59. S. lancifolia**
b. Calyx tube hairy. 10
10a. Intramarginal vein absent. Stamens less than 30. . . . . **59. S. lancifolia**
b. Intramarginal vein present. Stamens more than 30. . . . . **105. S. viridissima**
11a. Calyx glabrous. . . . . **63. S. macrophylla**
b. Calyx hairy. 12
12a. Calyx tube hairy. . . . . **63. S. macrophylla**
b. Calyx tube glabrous. 13
13a. Leaves shorter than *c.* 10 cm. Inflorescence not a spike. Bracts caducous. Calyx tube more than 1 mm high, calyx limb longer than 2 mm, calyx lobes longer than $2\frac{1}{2}$ mm. Disk hairy. . . . . **63. S. macrophylla**
b. Leaves longer than 10 cm. Inflorescence a (basally branched) spike. Bracts persistent. Calyx tube *c.* 1 mm high, calyx limb 1—2 mm long, calyx lobes $1\frac{1}{2}$—$2\frac{1}{2}$

mm long. Disk glabrous. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**

14a. Calyx glabrous. 15

b. Calyx hairy. 19

15a. Leaves shorter than 5 cm. Petiole 0—5 mm. Inflorescence only 1-flowered. Bracts several. . . . . **68. S. monantha**

b. Leaves longer than 5 cm. 16

16a. Reticulation fine. 17

b. Reticulation coarse. 18

17a. Intramarginal vein absent. Bracts shorter than 3 mm. Inflorescence not a spike. Disk hairy. . . . . **63. S. macrophylla**

b. Intramarginal vein present. Bracts longer than 3 mm. Inflorescence a spike forming a cone in bud. Disk glabrous. . . . . **43. S. foliosa**

18a. Nerves more than 10 pairs. Inflorescence not a raceme. Bracts persistent, tomentose, shorter than 3 mm. Calyx tube $\frac{1}{2}$—1 mm high. Stamens less than 50. Disk glabrous. . . . . **49. S. glomerata**

b. Nerves less than 10 pairs. Inflorescence a (basally branched) raceme. Bracts caducous, (appressedly) pubescent, 3—4 mm. Calyx tube 1—2 mm high. Stamens *c.* 100. Disk hairy. . . . . **90. S. racemosa**

19a. Calyx tube hairy. 20

b. Calyx tube glabrous. 24

20a. Inflorescence a (basally branched) spike. 21

b. Inflorescence not a spike. 22

21a. Petiole 2—5 mm. Bracts persistent, shorter than 3 mm. Calyx limb $\frac{1}{2}$—1 mm long. Disk glabrous. . . . . **105. S. viridissima**

b. Petiole 5—10 mm. Bracts caducous, 7—9 mm. Calyx limb 3—5 mm long. Disk hairy. . . . . **62. S. macrocarpa**

22a. Bracts caducous, bracteoles caducous. Calyx lobes longer than $1\frac{1}{2}$ mm. **63. S. macrophylla**

b. Bracts and bracteoles persistent. 23

23a. Petiole 2—5 mm. Bracts shorter than 3 mm. Calyx limb $\frac{1}{2}$—1 mm long. Stamens 30—50. Disk glabrous. . . . . **105. S. viridissima**

b. Petiole 5—10 mm. Bracts longer than 3 mm. Calyx limb longer than 1 mm. Stamens *c.* 70. Disk hairy. . . . . **106a. S. wynadense**

24a. Leaves shorter than 5 cm. Stamens 5—15. . . . . **75. S. oligandra**

b. Leaves longer than 5 cm. 25

25a. Bracts persistent. Calyx tube to *c.* 1 mm high. 26

b. Bracts caducous. Calyx tube more than 1 mm high. 27

26a. Calyx limb 1—2 mm long, (appressedly) pubescent, calyx lobes longer than $1\frac{1}{2}$ mm. Disk annular. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Calyx limb 2—$2\frac{1}{2}$ mm, tomentose, calyx lobes 1—$1\frac{1}{2}$ mm long. Disk pulvinate or cylindric. . . . . **48. S. glauca**

27a. Terminal buds small. Calyx limb longer than 2 mm. Inflorescence not a spike

(rarely a cone in bud). Corolla shorter than *c.* 4 mm. Disk hairy. **63. S. macrophylla**

b. Terminal buds large. Calyx limb 1½—2 mm long. Inflorescence a (basally branched) spike, forming a cone in bud. Corolla 5—7 mm. Disk glabrous. **43. S. foliosa**

28a. Inflorescence terminal. . . . . **80. S. paniculata**

b. Inflorescence axillary. 29

29a. Calyx hairy. 30

b. Calyx glabrous. 41

30a. Underside of leaves hairy. 31

b. Underside of leaves glabrous. 32

31a. Petiole more than 5 mm. . . . . **91. S. ramosissima**

b. Petiole 2—5 mm. . . . . **105. S. viridissima**

32a. Calyx tube glabrous. 33

b. Calyx tube hairy. 37

33a. Inflorescence a (basally branched) spike or a cone. 34

b. Inflorescence not a spike (rarely a cone in bud). 35

34a. Intramarginal vein present. Bracts caducous. Reticulation fine. Calyx tube 1—2 mm high, calyx limb 1½—2 mm long. Style base conical. . . . . **43. S. foliosa**

b. Intramarginal vein absent. Bracts persistent. Reticulation coarse. Calyx tube ½—1 mm high, calyx limb 2—2½ mm long. Style base not conical. **48. S. glauca**

35a. Terminal buds glabrous. Fruits 3-celled. . . . . **89. S. pyrifolia**

b. Terminal buds hairy. Fruits 1-celled. 36

36a. Calyx lobes longer than 1½ mm. Disk hairy. Corolla shorter than *c.* 4 mm. **63. S. macrophylla**

b. Calyx lobes ⅓—1½ mm long. Disk glabrous. Corolla more than 4 mm long. **98. S. sumuntia**

37a. Calyx limb glabrous. 38

b. Calyx limb hairy. 39

38a. Intramarginal vein close to margin. Bracts hairy. . . . . **98. S. sumuntia**

b. Intramarginal vein far from margin. Bracts glabrous. . . . **91. S. ramosissima**

39a. Bracts caducous, bracteoles caducous. 40

b. Bracts and bracteoles persistent. . . . . **105. S. viridissima**

40a. Calyx lobes longer than 1½ mm. Disk hairy. Corolla shorter than *c.* 4 mm. **63. S. macrophylla**

b. Calyx lobes ⅓—1½ mm long. Disk glabrous. Corolla more than 4 mm long. **98. S. sumuntia**

41a. Nerves more than 15 pairs. 42

b. Nerves less than 15 pairs. 43

42a. Petiole less than 20 mm. Inflorescence a raceme forming a cone in bud. Bracts caducous, (appressedly) pubescent to sericeous. Calyx tube 1—2 mm high. Stamens more than 30. Disk hairy. . . . . **39. S. dryophila**

b. Petiole more than 20 mm. Inflorescence a fascicle. Bracts persistent, tomentose.

Calyx tube ½—1 mm high. Stamens *c.* 25. Disk glabrous. . . **95. S. spectabilis**

43a. Bracts persistent. 44

b. Bracts caducous. 45

44a. Nerves more than 10 pairs. Inflorescence a fascicle. . . . . **49. S. glomerata**

b. Nerves less than 10 pairs. Inflorescence a spike. **27-7. S. cochinchinensis** ssp. **laurina**

45a. Inflorescence only 1-flowered. . . . . **4. S. anamallayana**

b. Inflorescence more-flowered. 46

46a. Bracts shorter than 3 mm. 47

b. Bracts longer than 3 mm. 49

47a. Intramarginal vein absent. Style base glabrous. . . . . **63. S. macrophylla**

b. Intramarginal vein present. Style base hairy. 48

48a. Terminal buds glabrous. Bracts glabrous, longer than 1 mm. Inflorescence axis glabrous. Calyx tube more than 1 mm high. Calyx lobes longer than ½ mm. Disk hairy. . . . . **73. S. obtusa**

b. Terminal buds hairy. Bracts hairy, to 1 mm long. Inflorescence axis hairy. Calyx tube to c. 1 mm high. Calyx lobes to c. ½ mm long. Disk glabrous. **79. S. oxyphylla**

49a. Terminal buds large. 50

b. Terminal buds small. 51

50a. Reticulation coarse. Calyx lobes ½ to 1½ mm long. Disk hairy. **39. S. dryophila**

b. Reticulation fine. Calyx lobes longer than 1½ mm. Disk glabrous. **43. S. foliosa**

51a. Bracteoles glabrous. Leaves obovate. . . . . **55. S. hookeri**

b. Bracteoles hairy. Leaves elliptic or circular. 52

52a. Bracteoles several. . . . . **63. S. macrophylla**

b. Bracteoles 2. 53

53a. Number of stamens more than 50. Disk pulvinate or cylindric, hairy. **90. S. racemosa**

b. Number of stamens less than 50. Disk annular, glabrous. . . **98. S. sumuntia**

KEY TO THE SPECIES OF INDIA AND BURMA

(fruiting material)

1a. Midrib prominent on the upper surface. 2

b. Midrib impressed in the upper surface. 4

2a. Twigs glabrous. . . . . **61. S. lucida**

b. Twigs hairy. 3

3a. Underside of leaves glabrous. . . . . **7. S. anomala**

b. Underside of leaves hairy. Fruits to *c.* 5 mm broad. . . . . **59. S. lancifolia**

4a. Twigs hairy. 5

b. Twigs glabrous. 23
5a. Inflorescence terminal. . . . . **80. S. paniculata**
b. Inflorescence axillary. 6
6a. Underside of leaves hairy. 7
b. Underside of leaves glabrous. 12
7a. Upper side of leaves hairy. . . . . **86. S. pulchra**
b. Upper side of leaves glabrous. 8
8a. Petiole 0—5 mm. 9
b. Petiole more than 5 mm. 10
9a. Fruits ellipsoid to orbicular. . . . . **59. S. lancifolia**
b. Fruits ampulliform. . . . . **105. S. viridissima**
10a. Fruits more than 10 mm long. . . . . **63. S. macrophylla**
b. Fruits to *c.* 10 mm long. 11
11a. Fruits spindle-shaped or otherwise not ampulliform. Bracts caducous. Seeds straight. . . . . **63. S. macrophylla**
b. Fruits ampulliform. Bracts persistent. Seeds not straight.
27-1. S. cochinchinensis ssp. **cochinchinensis**
12a. Bracts persistent. 13
b. Bracts caducous. 18
13a. Petiole 0—5 mm. 14
b. Petiole more than 5 mm. 15
14a. Leaves shorter than 5 cm. Intramarginal vein faintly prominent. Inflorescence only 1-flowered. . . . . **68. S. monantha**
b. Leaves longer than 5 cm. . . . . **105. S. viridissima**
15a. Fruits more than 5 mm broad. 16
b. Fruits to *c.* 5 mm broad. 17
16a. Leaves shorter than *c.* 10 cm. Intramarginal vein present. Inflorescence a raceme. Fruits to *c.* 10 mm long. . . . . **106a. S. wynadense**
b. Leaves longer than 10 cm. Intramarginal vein absent. Inflorescence a (basally branched) spike. Fruits more than 10 mm long. . . . . **48. S. glauca**
17a. Fruits cylindrical. Inflorescence a fascicle. Seeds straight. . **49. S. glomerata**
b. Fruits ampulliform. Inflorescence a (basally branched) spike. Seeds not straight.
27-1. S. cochinchinensis ssp. **cochinchinensis**
18a. Leaves shorter than 5 cm. . . . . **75. S. oligandra**
b. Leaves longer than 5 cm. 19
19a. Stone smooth. 20
b. Stone with ridges or grooves. 21
20a. Terminal buds small. Inflorescence a raceme. Reticulation coarse.
90. S. racemosa
b. Terminal buds large. Inflorescence a (basally branched) spike or a cone.
43. S. foliosa
21a. Fruits ovoid or obovoid. . . . . **63. S. macrophylla**

b. Fruits cylindric or ellipsoid. 22
22a. Fruits less than 20 mm long, 5—10 mm broad; mesocarp fleshy (shrivelled when dry) or thin, coriaceous. Stone not with high lengthwise uninterrupted ridges. Intramarginal vein absent. Inflorescence not a spike. . . **63. S. macrophylla**
b. Fruits more than 20 mm long, more than 10 mm broad; mesocarp woody or corky. Stone with high lengthwise not interrupted ridges. Intramarginal vein present. Inflorescence a (basally branched) spike or a cone. **62. S. macrocarpa**
23a. Inflorescence terminal. . . . . **80. S. paniculata**
b. Inflorescence axillary. 24
24a. Underside of leaves hairy. 25
b. Underside of leaves glabrous. 26
25a. Petiole more than 5 mm. Stone ellipsoid. . . . . **91. S. ramosissima**
b. Petiole 0—5 mm. Stone ampulliform. . . . . **105. S. viridissima**
26a. Bracts persistent. 27
b. Bracts caducous. 31
27a. Petiole 0—5 mm. . . . . **105. S. viridissima**
b. Petiole more than 5 mm. 28
28a. Inflorescence not a spike (rarely a cone in bud) 29
b. Inflorescence a (basally branched) spike or a cone. 30
29a. Nerves less than 15 pairs. Twigs not thick. Petiole less than 20 mm. Leaves elliptic. **49. S. glomerata**
b. Nerves more than 15 pairs. Twigs thick. Petiole more than 20 mm. Leaves obovate. **95. S. spectabilis**
30a. Fruits ovoid to cylindrical, more than 10 mm long and 5 mm broad. Seeds straight. **48. S. glauca**
b. Fruits ampulliform, to *c.* 5 mm broad. Seeds curved. **27-7. S. cochinchinensis** ssp. **laurina**
31a. Nerves more than 15 pairs. . . . . **39. S. dryophila**
b. Nerves less than 15 pairs. 32
32a. Inflorescence only 1-flowered. . . . . **4. S. anamallayana**
b. Inflorescence more-flowered. 33
33a. Stone smooth. 34
b. Stone with ridges or grooves. 39
34a. Reticulation fine. 35
b. Reticulation coarse. 36
35a. Terminal buds small. Seeds not straight. . . . . **55. S. hookeri**
b. Terminal buds large. Seeds straight. . . . . **43. S. foliosa**
36a. Nerves more than 10 pairs. Seeds not straight. . . . . **39. S. dryophila**
b. Nerves less than 10 pairs. 37
37a. Fruits (1—)3-celled. . . . . **90. S. racemosa**
b. Fruits 1-celled. 38
38a. Acumen shorter than 5 mm. Fruits more than 5 mm broad. **63. S. macrophylla**

b. Acumen longer than 5 mm. Fruits to *c.* 5 mm broad. . . . **91. S. ramosissima**
39a. Fruits ampulliform. . . . . **98. S. sumuntia**
b. Fruits spindle-shaped or otherwise not ampulliform. 40
40a. Fruits ovoid or obovoid. 41
b. Fruits cylindric or ellipsoid. 42
41a. Fruits to *c.* 10 mm long. Reticulation coarse. Stone ampulliform. **79. S. oxyphylla**
b. Fruits more than 10 mm long. . . . . **63. S. macrophylla**
42a. Fruits 1-celled. Intramarginal vein absent. . . . . **63. S. macrophylla**
b. Fruits 3-celled. . . . . **73. S. obtusa** **89. S. pyrifolia**

KEY TO THE SPECIES OF THAILAND

(flowering material)

1a. Midrib prominent on the upper surface. 2
b. Midrib impressed in the upper surface. 3
2a. Twigs hairy. Terminal buds hairy, small. . . . . **7. S. anomala**
b. Twigs glabrous. Terminal buds often large. . . . . **61. S. lucida**
3a. Twigs hairy. 4
b. Twigs glabrous. 14
4a. Underside of leaves glabrous. 5
b. Underside of leaves hairy. 7
5a. Angle of leaf base more than 90°. Petiole 0—5 mm. . . . . **80a. S. pedunculata**
b. Angle of leaf base less than 90°. Petiole more than 5 mm. 6
6a. Nerves more than 10 pairs. Inflorescence a (basally branched) spike. Bracts persistent. Calyx hairy, calyx tube to *c.* 1 mm high. Disk glabrous. **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Nerves less than 10 pairs. Inflorescence a raceme. Bracts caducous. Calyx glabrous, calyx tube more than 1 mm high. Disk hairy. . . . . **90. S. racemosa**
7a. Leaves distichous. . . . . **41. S. fasciculata**
b. Leaves spirally arranged. 8
8a. Upper side of leaves hairy (pulverulent). . . . . **3. S. adenophylla**
b. Upper side of leaves glabrous. 9
9a. Calyx glabrous, calyx limb glabrous. . . . . **25. S. cerasifolia**
b. Calyx hairy. 10
10a. Calyx tube glabrous 11
b. Calyx tube hairy. 12
11a. Nerves less than 10 pairs. Bracts caducous. Calyx tube more than 1 mm high, calyx limb longer than 2 mm, calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long, becoming longer by tearing. . . . . **25. S. cerasifolia**

b. Nerves more than 10 pairs. Bracts persistent. Calyx tube to *c.* 1 mm high, calyx limb 1—2 mm long, calyx lobes longer than $1\frac{1}{2}$ mm, not becoming longer by tearing. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**

12a. Leaf margin (and petiole) beset with closely spaced glands. . **3. S. adenophylla**

b. Leaf margin (and petiole) often glandular but glands not closely spaced. . 13

13a. Reticulation fine. Bracts longer than 3 mm, caducous. Calyx tube more than 1 mm high, calyx limb longer than 1 mm. . . . . **63. S. macrophylla**

b. Reticulation coarse. Bracts to *c.* 1 mm long, persistent. Calyx tube to *c.* 1 mm high, calyx limb to *c.* 1 mm long. . . . . **41. S. fasciculata**

14a. Underside of leaves hairy. . . . . **32. S. crassipes**

b. Underside of leaves glabrous. 15

15a. Calyx hairy. 16

b. Calyx glabrous. 21

16a. Calyx tube glabrous. 17

b. Calyx tube hairy. 19

17a. Leaves shorter than *c.* 10 cm. Inflorescence a raceme, its axis hairy. Stamens less than 50. . . . . **98. S. sumuntia**

b. Leaves longer than 10 cm. 18

18a. Bracts persistent. Calyx tube hidden between bracts and bracteoles. **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Bracts caducous. Calyx tube not hidden between bracts and bracteoles. . . 28

19a. Calyx limb hairy. . . . . **98. S. sumuntia**

b. Calyx limb glabrous. 20

20a. Inflorescence a (basally branched) spike. Bracts shorter than 3 mm, persistent, bracteoles persistent. Calyx lobes becoming longer by tearing. Corolla shorter than *c.* 4 mm. . . . . **32. S. crassipes**

b. Inflorescence a raceme. Bracts longer than 3 mm, caducous, bracteoles caducous. Calyx lobes not becoming longer by tearing. Corolla more than 4 mm long. **98. S. sumuntia**

21a. Nerves more than 10 pairs. . . . . **39. S. dryophila**

b. Nerves less than 10 pairs. 22

22a. Calyx tube to *c.* 1 mm high. 23

b. Calyx tube more than 1 mm high. 25

23a. Inflorescence a (basally branched) spike. Bracts persistent. **27-7. S. cochinchinensis** ssp. **laurina**

b. Inflorescence not a spike (rarely a cone in bud). Bracts caducous. 24

24a. Bracts to *c.* 1 mm long. Calyx lobes to *c.* $\frac{1}{2}$ mm long. . . . . **79. S. oxyphylla**

b. Bracts longer than 1 mm. Calyx lobes longer than $\frac{1}{2}$ mm. . **24. S. celastrifolia**

25a. Inflorescence a (basally branched) spike. Bracts shorter than 3 mm. **27-7. S. cochinchinensis** ssp. **laurina**

b. Inflorescence a raceme (rarely a cone in bud). Bracts longer than 3 mm. . . 26

26a. Terminal buds hairy. Bracteoles hairy. 27

b. Terminal buds glabrous. Bracteoles glabrous. . . . . **55. S. hookeri**

27a. Stamens more than 50. Disk pulvinate or cylindric, hairy, 5-glandular or 5-stellate. . . . . **90. S. racemosa**

b. Stamens less than 50. Disk annular, glabrous, not so. . . . . **98. S. sumuntia**

28a. Reticulation coarse. Bracteoles hairy. Calyx limb 1—2 mm long, calyx lobes not becoming longer by tearing. Corolla more than 4 mm long. **60. S. longifolia**

b. Reticulation fine. Bracteoles glabrous. Calyx limb longer than 2 mm, calyx lobes becoming longer by tearing. Corolla shorter than *c.* 4 mm. Disk glabrous. **65. S. megalocarpa**

KEY TO THE SPECIES OF THAILAND

(fruiting material)

1a. Midrib prominent on the upper surface. 2

b. Midrib impressed in the upper surface. 3

2a. Twigs hairy. Terminal buds hairy, small. Seeds straight. . . . . **7. S. anomala**

b. Twigs glabrous. . . . . **61. S. lucida**

3a. Twigs hairy. 4

b. Twigs glabrous. 13

4a. Leaves distichous. . . . . **41. S. fasciculata**

b. Leaves spirally arranged. 5

5a. Underside of leaves glabrous. 6

b. Underside of leaves hairy. 8

6a. Angle of leaf base more than 90°. Petiole 0—5 mm. Hairs on twigs more than 2 mm long. . . . . **80a. S. pedunculata**

b. Angle of leaf base less than 90°. Petiole more than 5 mm. 7

7a. Nerves more than 10 pairs. Inflorescence a (basally branched) spike. Bracts persistent. Fruits ampulliform, 1-celled. Seeds not straight. **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Nerves less than 10 pairs. Inflorescence a raceme. Bracts caducous. Fruits ellipsoid, (1—)3-celled. Seeds straight. . . . . **90. S. racemosa**

8a. Fruits more than 10 mm long, 3-celled. . . . . **25. S. cerasifolia**

b. Fruits to *c.* 10 mm long, 1-celled. 9

9a. Stone ampulliform. 10

b. Stone spindle-shaped or otherwise not ampulliform. 11

10a. Nerves more than 10 pairs. Inflorescence a (basally branched) spike. Seeds not straight. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Nerves less than 10 pairs. Inflorescence a fascicle. Seeds straight. **41. S. fasciculata**

11a. Upper side of leaves hairy. . . . . **3. S. adenophylla**

b. Upper side of leaves glabrous (pulverulent). 12

12a. Leaf margin (and petiole) often glandular but glands not closely spaced. Bracts and bracteoles caducous. . . . . **63. S. macrophylla**
b. Leaf margin (and petiole) beset with closely spaced glands. Bracts and bracteoles persistent. . . . . **3. S. adenophylla**
13a. Underside of leaves hairy. . . . . **32. S. crassipes**
b. Underside of leaves glabrous. 14
14a. Nerves more than 15 pairs. . . . . **39. S. dryophila**
b. Nerves less than 15 pairs. 15
15a. Mesocarp woody or corky. . . . . **65. S. megalocarpa**
b. Mesocarp fleshy (shrivelled when dry) or thin, coriaceous. 16
16a. Nerves more than 10 pairs. 24
b. Nerves less than 10 pairs. 17
17a. Inflorescence a (basally branched) spike or a cone. 18
b. Inflorescence not a spike (rarely a cone in bud). 20
18a. Fruits spindle-shaped or otherwise not ampulliform. 19
b. Fruits ampulliform. . . . . **27-7. S. cochinchinensis** ssp. **laurina**
19a. Acumen longer than 15 mm. Reticulation fine. Bracts persistent. Fruits cylindric or ellipsoid. . . . . **32. S. crassipes**
b. Acumen shorter than 15 mm. Reticulation coarse. Bracts caducous. Fruits ovoid. **60. S. longifolia**
20a. Stone with ridges or grooves. 21
b. Stone smooth. 22
21a. Fruits ovoid. Intramarginal vein far from margin. Seeds straight. **79. S. oxyphylla**
b. Fruits ampulliform. . . . . **98. S. sumuntia**
22a. Seeds straight. . . . . **90. S. racemosa**
b. Seeds not straight. 23
23a. Fruits more than 10 mm long. . . . . **55. S. hookeri**
b. Fruits to *c.* 10 mm long. . . . . **24. S. celastrifolia**
24a. Bracts and bracteoles caducous. Fruits ellipsoid or globose. Terminal buds often large. . . . . **39. S. dryophila**
b. Bracts and bracteoles persistent. Fruits ampulliform. Terminal buds small. **27-1. S. cochinchinensis** ssp. **cochinchinensis**

KEY TO THE SPECIES OF INDO-CHINA

(flowering material)

1a. Midrib prominent on the upper surface. 2
b. Midrib impressed in the upper surface. 6
2a. Twigs glabrous. 3
b. Twigs hairy. 4

3a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. . . . . **61. S. lucida**
4a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. 5
5a. Underside of leaves glabrous. . . . . **7. S. anomala**
b. Underside of leaves hairy. . . . . **59. S. lancifolia**
6a. Corolla hairy. . . . . **9. S. atriolivacea**
b. Corolla glabrous. 7
7a. Twigs hairy. 8
b. Twigs glabrous. 36
8a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. 9
9a. Inflorescence terminal. Bracteoles several. . . . . **80. S. paniculata**
b. Inflorescence axillary. 10
10a. Underside of leaves hairy. 11
b. Underside of leaves glabrous. 24
11a. Upper side of leaves hairy. 12
b. Upper side of leaves glabrous. 15
12a. Petiole 0—5 mm. . . . . **50. S. groffii**
b. Petiole more than 5 mm. 13
13a. Calyx glabrous. . . . . **38. S. dolichotricha**
b. Calyx hairy. 14
14a. Calyx tube hairy. Leaf margin (and petiole) beset with closely spaced glands. Bracts to *c.* 1 mm long. Calyx limb to *c.* 1 mm long. Disk glabrous. Hairs on twigs less than 2 mm long. . . . . **3. S. adenophylla**
b. Calyx tube glabrous. Leaf margin (and petiole) often glandular but glands not closely spaced. Bracts 1—2 mm long. Calyx limb 1—$1\frac{1}{2}$ mm long. Disk hairy. Hairs on twigs more than 2 mm long. . . . . **38. S. dolichotricha**
15a. Calyx glabrous. 16
b. Calyx hairy. 17
16a. Leaves longer than 15 cm. Leaf margin (and petiole) often glandular but glands not closely spaced. Bracts 3—5 mm long. Calyx tube 1—$1\frac{1}{2}$ mm high, calyx limb 2—$2\frac{1}{2}$ mm long, calyx lobes $1\frac{1}{2}$—2 mm long. . . . . **23. S. cambodiana**
b. Leaves shorter than *c.* 15 cm. Leaf margin (and petiole) beset with closely spaced glands. Bracts shorter than 3 mm. Calyx tube to *c.* 1 mm high, calyx limb 1—2 mm long, calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long. . . . . **49. S. glomerata**
17a. Calyx tube glabrous. 18
b. Calyx tube hairy. 20
18a. Leaves shorter than *c.* 10 cm. . . . . **59. S. lancifolia**
b. Leaves longer than 10 cm. 19
19a. Inflorescence a fascicle. Calyx limb 2—$2\frac{1}{2}$ mm, calyx tube 1—$1\frac{1}{2}$ mm high. **23. S. cambodiana**

b. Inflorescence a (basally branched) spike or a cone. Calyx limb 1—2 mm long, calyx tube to *c.* 1 mm high. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**

20a. Petiole more than 5 mm. 21

b. Petiole 0—5 mm. 22

21a. Leaf margin (and petiole) often glandular but glands not closely spaced. Bracts caducous, longer than 3 mm. Calyx limb longer than 1 mm. . **63. S. macrophylla**

b. Leaf margin (and petiole) beset with closely spaced glands. Bracts to *c.* 1 mm long, persistent. Calyx limb to *c.* 1 mm long. . . . . **3. S. adenophylla**

22a. Disk glabrous. Fruits ampulliform. . . . . **105. S. viridissima**

b. Disk hairy. Fruits not ampulliform. 23

23a. Intramarginal vein absent. Bracts 1. Inflorescence more-flowered. Style base hairy. **59. S. lancifolia**

b. Intramarginal vein present. Bracts several. Inflorescence only 1-flowered. Style base glabrous. . . . . **94. S. singuliflora**

24a. Calyx glabrous. 25

b. Calyx hairy. 28

25a. Calyx tube to *c.* 1 mm long. . . . . **49. S. glomerata**

b. Calyx tube more than 1 mm high. 26

26a. Inflorescence a fascicle. Bracteoles and bracts persistent. Disk glabrous. **23. S. cambodiana**

b. Inflorescence a (basally branched) raceme (rarely a cone in bud). Bracteoles caducous. 27

27a. Reticulation fine. Bracts shorter than 3 mm, glabrous. . . . **63. S. macrophylla**

b. Reticulation coarse. Bracts 3—4 mm, hairy. . . . . **90. S. racemosa**

28a. Calyx tube hairy. . . . . **105. S. viridissima**

b. Calyx tube glabrous. 29

29a. Calyx tube to *c.* 1 mm long. 30

b. Calyx tube more than 1 mm high. 33

30a. Inflorescence a fascicle. . . . . **49. S. glomerata**

b. Inflorescence a (basally branched) spike (or a cone in bud). 31

31a. Calyx limb 1 to 2 mm long, (appressedly) pubescent, puberulous or pilose. **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Calyx limb longer than 2 mm, not appressedly pubescent or puberulous. . 32

32a. Intramarginal vein absent. Reticulation coarse. . . . . **48. S. glauca**

b. Intramarginal vein present. Reticulation fine. **48-2. S. glauca** var. **epapillata**

33a. Bracts caducous. 34

b. Bracts persistent. 35

34a. Acumen longer than 5 mm. Reticulation coarse. Bracts shorter than 3 mm. Calyx limb regularly 5-lobed. Calyx lobes $\frac{1}{2}$ to $1\frac{1}{2}$ mm long, not becoming longer by tearing. Number of stamens less than 50. Apex of leaves acuminate. **78. S. oreades**

b. Acumen shorter than 5 mm. Reticulation fine. Bracts longer than 3 mm. Calyx

limb 2-lobed. Calyx lobes longer than $1\frac{1}{2}$ mm, becoming longer by tearing. Number of stamens more than 100. Disk clearly present. Apex of leaves rounded or acute. **37. S. disepala**

35a. Leaves shorter than *c.* 15 cm. Intramarginal vein faintly prominent. Inflorescence a raceme. Bracts shorter than 3 mm. Calyx lobes $\frac{1}{2}$ to $1\frac{1}{2}$ mm long. **78. S. oreades**

b. Leaves longer than 15 cm. Intramarginal vein much prominent. Inflorescence a fascicle. Bracts longer than 3 mm. Calyx lobes longer than $1\frac{1}{2}$ mm. **23. S. cambodiana**

36a. Leaves crowded towards the end of the twigs. 37

b. Leaves evenly distributed. 38

37a. Underside of leaves glabrous. . . . . **49. S. glomerata**

b. Underside of leaves hairy (minutely!) . . . . . **66. S. microtricha**

38a. Inflorescence terminal. Bracteoles several. . . . . **80. S. paniculata**

b. Inflorescence axillary. 39

39a. Calyx glabrous. 40

b. Calyx hairy. 52

40a. Nerves more than 15 pairs. . . . . **39. S. dryophila**

b. Nerves less than 15 pairs. 42

42a. Bracts caducous. 43

b. Bracts persistent. 49

43a. Bracts shorter than 3 mm. 44

b. Bracts longer than 3 mm. 45

44a. Intramarginal vein present. Calyx lobes $\frac{1}{2}$ to $1\frac{1}{2}$ mm long. Reticulation coarse. Stamens less than 50. Disk glabrous. . . . . **78. S. oreades**

b. Intramarginal vein absent. Calyx lobes longer than $1\frac{1}{2}$ mm. Reticulation fine. Stamens more than 50. Disk hairy. . . . . **63. S. macrophylla**

45a. Nerves more than 10 pairs. Terminal buds large. . . . . **39. S. dryophila**

b. Nerves less than 10 pairs. 46

46a. Bracteoles hairy. 47

b. Bracteoles glabrous. 48

47a. Stamens more than 50. Disk pulvinate or cylindric, hairy, 5-glandular or 5-stellate. **90. S. racemosa**

b. Stamens less than 50. Disk annular, glabrous, not so. . . . **98. S. sumuntia**

48a. Leaves elliptic, mostly shorter than 12 cm. Corolla 5—6 mm.

b. Leaves obovate, longer than 12 cm. Corolla 6—9 mm. . . . . **55. S. hookeri**

49a. Inflorescence not a spike (rarely a cone in bud). 50

b. Inflorescence a (basally branched) spike. **27-7. S. cochinchinensis** ssp. **laurina**

50a. Intramarginal vein much prominent. Inflorescence a fascicle. . **49. S. glomerata**

b. Intramarginal vein faintly prominent. Inflorescence not a fascicle. 51

51a. Inflorescence axis hairy. Calyx tube more than 1 mm high. Bracts longer than 1 mm. Calyx lobes longer than $\frac{1}{2}$ mm. Disk inconspicuous. . . . **78. S. oreades**

b. Inflorescence axis glabrous. Calyx tube to *c.* 1 mm long. Bracts to *c.* 1 mm long. Calyx lobes to *c.* $\frac{1}{2}$ mm long. Disk clearly present. . . . . **85. S. pseudobarberina**

52a. Underside of leaves hairy. 53

b. Underside of leaves glabrous. 56

53a. Petiole more than 5 mm. . . . . **91. S. ramosissima**

b. Petiole to 5 mm. 54

54a. Inflorescence not a spike. . . . . **105. S. viridissima**

b. Inflorescence a (basally branched) spike. 55

55a. Bracts to *c.* 1 mm long. Calyx tube not appressedly pubescent or puberulous, to *c.* 1 mm long. Disk hairy. . . . . **76. S. olivacea**

b. Bracts longer than 1 mm. Calyx tube (appressedly) pubescent, puberulous or pilose, more than 1 mm high. Disk glabrous. . . . . **105. S. viridissima**

56a. Calyx tube glabrous. 57

b. Calyx tube hairy. 62

57a. Leaves shorter than *c.* 10 cm. . . . . **98. S. sumuntia**

b. Leaves longer than 10 cm. 58

58a. Reticulation coarse. 59

b. Reticulation fine. 60

59a. Intramarginal vein absent. Bracts not appressedly pubescent or puberulous. Bracts persistent. Calyx tube to *c.* 1 mm long. Calyx limb longer than 2 mm. Calyx lobes $\frac{1}{2}$ to $1\frac{1}{2}$ mm long. Disk glabrous. . . . . **48. S. glauca**

b. Intramarginal vein present. Bracts (appressedly) pubescent, puberulous or pilose. Bracts caducous. Calyx tube more than 1 mm high. Calyx limb 1 to 2 mm long. Calyx lobes longer than $1\frac{1}{2}$ mm. Disk hairy. . . . . **60. S. longifolia**

60a. Petiole less than 20 mm. 69

b. Petiole more than 20 mm. 61

61a. Bracts caducous. Calyx tube more than 1 mm high. Calyx lobes becoming longer by tearing. Style base hairy, conical. . . . . **13. S. barringtoniifolia**

b. Bracts persistent. Calyx tube to c. 1 mm long. Calyx lobes not becoming longer by tearing. Style base glabrous, not conical. . . **48-2. S. glauca** var. **epapillata**

62a. Leaves longer than 15 cm. . . . . **6. S. annamensis**

b. Leaves shorter than *c.* 15 cm. 63

63a. Calyx limb glabrous. 64

b. Calyx limb hairy. 65

64a. Intramarginal vein close to margin. Bracts hairy. . . . . **98. S. sumuntia**

b. Intramarginal vein far from margin. Bracts glabrous. . . . **91. S. ramosissima**

65a. Inflorescence a (basally branched) spike or a cone. 66

b. Inflorescence not a spike (rarely a cone in bud). 67

66a. Bracts to *c.* 1 mm long. Calyx tube not appressedly pubescent or puberulous, to *c.* 1 mm long. Disk hairy. . . . . **76. S. olivacea**

b. Bracts longer than 1 mm. Calyx tube (appressedly) pubescent, puberulous or pilose, more than 1 mm high. Disk glabrous. . . . . **105. S. viridissima**

67a. Intramarginal vein close to margin. Bracts longer than 3 mm. . **98. S. sumuntia**
b. Intramarginal vein far from margin. Bracts shorter than 3 mm. 68
68a. Bracts longer than 1 mm. Calyx tube more than 1 mm high. Calyx limb to *c.* 1 mm long. Disk glabrous. . . . . **105. S. viridissima**
b. Bracts to *c.* 1 mm long. Calyx tube to *c.* 1 mm long. Calyx limb longer than 1 mm. Disk hairy. . . . . **51. S. guillauminii**
69a. Leaf index more than 3. . . . . **37. S. disepala**
b. Leaf index less than 3. . . . . **65. S. megalocarpa**

KEY TO THE SPECIES OF INDO-CHINA

(fruiting material)

1a. Midrib prominent on the upper surface. 2
b. Midrib impressed in the upper surface. 6
2a. Twigs glabrous. 3
b. Twigs hairy. 4
3a. Leaves crowded towards the end of the twigs. Fruits ovoid. . **66. S. microtricha**
b. Leaves evenly distributed. Fruits ellipsoid. . . . . **61. S. lucida**
4a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. 5
5a. Underside of leaves glabrous. Fruits more than 5 mm broad. . . . **7. S. anomala**
b. Underside of leaves hairy. Fruits to *c.* 5 mm broad. . . . . **59. S. lancifolia**
6a. Twigs hairy. 7
b. Twigs glabrous. 31
7a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. 8
8a. Inflorescence terminal. . . . . **80. S. paniculata**
b. Inflorescence axillar. 9
9a. Underside of leaves glabrous. 10
b. Underside of leaves hairy. 21
10a. Fruits ampulliform. 11
b. Fruits not ampulliform. 13
11a. Petiole 0—5 mm. . . . . **105. S. viridissima**
b. Petiole more than 5 mm. 12
12a. Inflorescence a (basally branched) spike.
27-1. S. cochinchinensis ssp. **cochinchinensis**

b. Inflorescence a raceme. . . . . **78. S. oreades**
13a. Fruits 2—5-celled. 14
b. Fruits 1-celled. 15
14a. Leaf index more than 3. Mesocarp woody or corky. Terminal buds glabrous. Nerves more than 10 pairs. Reticulation fine. . . . . **37. S. disepala**
b. Leaf index 2—3. Mesocarp fleshy (shrivelled when dry) or thin, coriaceous. Terminal buds hairy. Nerves less than 10 pairs. Reticulation coarse. **90. S. racemosa**
15a. Stone smooth. 16
b. Stone with ridges or grooves. 17
16a. Intramarginal vein absent. Reticulation coarse. . . . . **48. S. glauca**
b. Intramarginal vein present. Reticulation fine. . **48-2. S. glauca** var. **epapillata**
17a. Leaf margin (and petiole) beset with closely spaced glands. . **49. S. glomerata**
b. Leaf margin (and petiole) often glandular but glands not closely spaced. . . 18
18a. Intramarginal vein absent. Bracts caducous. Inflorescence a (basally branched) raceme. . . . . **63. S. macrophylla**
b. Intramarginal vein present. Bracts persistent. 19
19a. Nerves less than 10 pairs. . . . . **49. S. glomerata**
b. Nerves more than 10 pairs. 20
20a. Twigs densely (woolly) tomentose, glabrescent. . . . . **23. S. cambodiana**
b. Twigs tomentose or glabrous. . . . . **49. S. glomerata**
21a. Upper side of leaves hairy. 22
b. Upper side of leaves glabrous. 24
22a. Petiole 0—5 mm. Fruits 3-celled. . . . . **50. S. groffii**
b. Petiole more than 5 mm. Fruits 1-celled. 23
23a. Stone with ridges or grooves. Leaf margin (and petiole) beset with closely spaced glands. Seeds straight. Hairs on twigs less than 2 mm long. . . **3. S. adenophylla**
b. Stone smooth. Hairs on twigs more than 2 mm long. . . . . **38. S. dolichotricha**
24a. Leaf margin (and petiole) beset with closely spaced glands. . **3. S. adenophylla** **49. S. glomerata**
b. Leaf margin (and petiole) often glandular but glands not closely spaced. . . 25
25a. Fruits ampulliform. 26
b. Fruits not ampulliform. 28
26a. Nerves more than 10 pairs. 27
b. Nerves less than 10 pairs. . . . . **105. S. viridissima**
27a. Petiole 0—5 mm. . . . . **9. S. atrolivacea**
b. Petiole more than 5 mm. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
28a. Intramarginal vein absent. . . . . **59. S. lancifolia**
b. Intramarginal vein present. 29
29a. Fruits ovoid. Inflorescence only 1-flowered. . . . . **94. S. singuliflora**
b. Fruits cylindric or ellipsoid. 30
30a. Bracts caducous. . . . . **63. S. macrophylla**

b. Bracts persistent. . . . . **23. S. cambodiana**
31a. Leaves crowded towards the end of the twigs. 32
b. Leaves evenly distributed. 33
32a. Underside of leaves glabrous. Fruits cylindric or ellipsoid. . **49. S. glomerata**
b. Underside of leaves hairy. Fruits ovoid. . . . . **66. S. microtricha**
33a. Inflorescence terminal. . . . . **80. S. paniculata**
b. Inflorescence axillary. 34
34a. Underside of leaves hairy. 35
b. Underside of leaves glabrous. 37
35a. Petiole more than 5 mm. . . . . **91. S. ramossissima**
b. Petiole 0—5 mm. 36
36a. Inflorescence a short raceme. . . . . **105. S. viridissima**
b. Inflorescence a (basally branched) spike. . . . . **76. S. olivacea**
105. S. viridissima
37a. Bracts persistent. 38
b. Bracts caducous. 43
38a. Inflorescence a (basally branched) spike. **27-7. S. cochinchinensis** ssp. **laurina**
48. S. glauca
76. S. olivacea
105. S. viridissima
b. Inflorescence not a spike (rarely a cone in bud). 39
39a. Petiole 0—5 mm. . . . . **105. S. viridissima**
51. S. guillauminii
b. Petiole more than 5 mm. 41
41a. Stone not ampulliform. Intramarginal vein much prominent. Inflorescence a fascicle. Seeds straight. . . . . **49. S. glomerata**
b. Stone ampulliform. 42
42a. Fruits narrowly ampulliform or cylindrical. . . . . **78. S. oreades**
b. Fruits ampulliform. . . . . **85. S. pseudobarberina**
43a. Fruits ampulliform. 44
b. Fruits spindle-shaped or otherwise not ampulliform. 46
44a. Fruits to *c.* 10 mm long. . . . . **78. S. oreades**
98. S. sumuntia
b. Fruits more than 10 mm long. 45
45a. Leaves longer than 15 cm. Nerves more than 10 pairs. Seeds not straight.
6. S. annamensis
b. Leaves shorter than *c.* 15 cm. Nerves less than 10 pairs. Seeds straight.
11. S. banaënsis
46a. Stone with ridges or grooves. 47
b. Stone smooth. 49
47a. Petiole more than 20 mm. Stone with high lengthwise not interrupted ridges. Twigs thick. Fruits 3-celled. . . . . **13. S. barringtoniifolia**

b. Petiole less than 20 mm. Stone not with high lengthwise uninterrupted ridges. 48
48a. Fruits cylindric or ellipsoid. Intramarginal vein absent. Inflorescence not a spike. **63. S. macrophylla**
b. Fruits ovoid or obovoid. Intramarginal vein present. Inflorescence a (basally branched) spike, forming a cone in bud. . . . . **60. S. longifolia**
49a. Nerves more than 10 pairs. 50
b. Nerves less than 10 pairs. 51
50a. Acumen shorter than 5 mm. Fruits 3-celled. 53
b. Acumen longer than 5 mm. Fruits 1-celled. . . . . **39. S. dryophila**
51a. Reticulation fine. Seeds not straight. . . . . **55. S. hookeri**
b. Reticulation coarse. Seeds straight. 52
52a. Fruits (1—)3-celled. Bracteoles caducous. . . . . **90. S. racemosa**
b. Fruits 1-celled. . . . . **91. S. ramosissima**
53a. Leaf index more than 3. . . . . **37. S. disepala**
b. Leaf index less than 3. . . . . **65. S. megalocarpa**

KEY TO THE SPECIES OF CHINA (INCL. FORMOSA)

(flowering material)

1a. Midrib prominent on the upper surface. 2
b. Midrib impressed in the upper surface. 6
2a. Twigs glabrous. 3
b. Twigs hairy. 4
3a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. . . . . **61. S. lucida**
4a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. 5
5a. Underside of leaves glabrous. . . . . **7. S. anomala**
b. Underside of leaves hairy. . . . . **59. S. lancifolia**
6a. Corolla hairy. . . . . **9. S. atriolivacea**
b. Corolla glabrous. 7
7a. Twigs hairy. 8
b. Twigs glabrous. 37
8a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. 9
9a. Leaves distichous. Calyx limb 3-lobed. . . . . **44. S. fordii**
b. Leaves spirally arranged. 10
10a. Inflorescence terminal. Bracteoles several. . . . . **80. S. paniculata**
b. Inflorescence axillary. 11

11a. Underside of leaves glabrous. 12
b. Underside of leaves hairy. 23
12a. Petiole 0—5 mm. 13
b. Petiole more than 5 mm. 15
13a. Leaves shorter than 5 cm. 14
b. Leaves longer than 5 cm. . . . . **105. S. viridissima**
14a. Leaf index more than 2. Leaf margin (and petiole) beset with closely spaced glands. Intramarginal vein absent. Bracts *c.* 1 mm long. Calyx hairy. Fruits cylindric. . . . . **40. S. euryoides**
b. Leaf index less than 2. Leaf margin (and petiole) often glandular but glands not closely spaced. Intramarginal vein present. Bracts 2—4 mm. Calyx glabrous. Fruits ovoid. . . . . **71. S. nokoensis**
15a. Calyx hairy. 16
b. Calyx glabrous. 19
16a. Inflorescence a (basally branched) spike. 17
b. Inflorescence not a spike. 18
17a. Calyx limb $1\frac{1}{2}$—2 mm long, (appressedly) pubescent, calyx lobes longer than $1\frac{1}{2}$ mm. Fruits ampulliform, to *c.* 1 mm long. **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Calyx limb 2—$2\frac{1}{2}$ mm, tomentose, calyx lobes 1—$1\frac{1}{2}$ mm long. Fruits not ampulliform, 12—18 mm long. . . . . **48. S. glauca**
18a. Twigs glabrous or tomentose. Inflorescence not a raceme. . . **49. S. glomerata**
b. Twigs (appressedly) puberulous. Inflorescence a (basally branched) raceme. **78. S. oreades**
19a. Bracts (appressedly) pubescent, puberulous or pilose. 20
b. Bracts not appressedly pubescent or puberulous. 21
20a. Leaf index more than 3. Reticulation fine. Inflorescence a fascicle. Bracts persistent, *c.* 1 mm long. Corolla 3—4 mm. Stamens 20—30. Disk glabrous. **10. S. austrosinensis**
b. Leaf index 2—3. Reticulation coarse. Inflorescence a (basally branched) raceme. Bracts caducous, 3—4 mm long. Corolla 5—6 mm. Stamens *c.* 100. Disk hairy. **90. S. racemosa**
21a. Twigs tomentose or tomentellous. 22
b. Twigs not so. . . . . **49. S. glomerata**
22a. Leaf margin (and petiole) often glandular but glands not closely spaced. Calyx tube 1—$1\frac{1}{2}$ mm high, calyx lobes *c.* $\frac{1}{2}$ mm long. Reticulation not prominent. **96. S. stellaris**
b. Leaf margin (and petiole) beset with closely spaced glands. Calyx tube to *c.* 1 mm high, calyx lobes longer than $\frac{1}{2}$ mm. Reticulation present beneath. **49. S. glomerata**
23a. Petiole 0—5 mm. 24
b. Petiole more than 5 mm. 28
24a. Upper side of leaves hairy. . . . . **50. S. groffii**

b. Upper side of leaves glabrous. 25
25a. Calyx tube glabrous. 26
b. Calyx tube hairy. 27
26a. Intramarginal vein present. Calyx lobes $2\frac{1}{2}$—3 mm. Inflorescence only 1-flowered. **78a. S. ovatilobata**
b. Intramarginal vein absent. Calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long. Inflorescence more flowered. . . . . **59. S. lancifolia**
27a. Intramarginal vein absent. Stamens 15—35. Disk hairy. . . **59. S. lancifolia**
b. Intramarginal vein present. Stamens 30—50. Disk glabrous. **105. S. viridissima**
28a. Upper side of leaves hairy. 29
b. Upper side of leaves glabrous. 31
29a. Calyx glabrous. . . . . **38. S. dolichotricha**
b. Calyx hairy. 30
30a. Calyx tube hairy. Leaf margin (and petiole) beset with closely spaced glands. Bracts $\frac{1}{2}$—1(—2) mm long. Calyx limb $\frac{1}{2}$—1 mm long. Disk glabrous. Stone with ridges or grooves. Seeds straight. Hairs on twigs less than 2 mm long. **3. S. adenophylla**
b. Calyx tube glabrous. Leaf margin (and petiole) often glandular but glands not closely spaced. Bracts longer than 1 mm. Calyx limb longer than 1 mm. Disk hairy. Stone smooth. Seeds not straight. Hairs on twigs more than 2 mm long. **38. S. dolichotricha**
31a. Calyx glabrous. . . . . **49. S. glomerata**
b. Calyx hairy 32
32a. Calyx tube glabrous. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Calyx tube hairy. 33
33a. Calyx limb glabrous. . . . . **83. S. pilosa**
b. Calyx limb hairy. 34
34a. Leaf margin (and petiole) beset with closely spaced glands. 35
b. Leaf margin (and petiole) often glandular but glands not closely spaced. . 36
35a. Bracts longer than 1 mm. Calyx limb longer than 1 mm. Bracteoles caducous. **63. S. macrophylla**
b. Bracts $\frac{1}{2}$—1(—2) mm long. Calyx limb $\frac{1}{2}$—1 mm long. Bracteoles persistent. **3. S. adenophylla**
36a. Reticulation fine. Bracts and bracteoles caducous. Calyx tube more than 1 mm high. Stamens less than 50. Disk hairy. Fruits to *c.* 10 mm long. **63. S. macrophylla**
b. Reticulation coarse. Bracts and bracteoles persistent. Calyx tube *c.* 1 mm long. Stamens 60—70. Disk glabrous. Fruits more than 10 mm long. **83. S. pilosa**
37a. Leaves crowded towards the end of the twigs. 38
b. Leaves evenly distributed. 39
38a. Underside of leaves glabrous. . . . . **49. S. glomerata**
b. Underside of leaves hairy. . . . . **66. S. microtricha**

39a. Inflorescence terminal. Bracteoles several. . . . . **80. S. paniculata**
b. Inflorescence axillary. 40
40a. Calyx hairy. 41
b. Calyx glabrous. 49
41a. Underside of leaves hairy. 42
b. Underside of leaves glabrous. 43
42a. Petiole 6—12 mm. . . . . **91. S. ramosissima**
b. Petiole 2—5 mm. . . . . **105. S. viridissima**
43a. Angle of leaf base more than 60°. Reticulation not prominent. Calyx lobes longer than $1\frac{1}{2}$ mm. Disk hairy. . . . . **81a. S. paucinervia**
b. Angle of leaf base less than 60°. 44
44a. Calyx limb glabrous. 45
b. Calyx limb hairy. 46
45a. Intramarginal vein close to margin. Bracts hairy. . . . . **98. S. sumuntia**
b. Intramarginal vein far from margin. Bracts glabrous. . . . . **91. S. ramosissima**
46a. Calyx tube glabrous. 47
b. Calyx tube hairy. 48
47a. Leaves longer than 10 cm. Intramarginal vein absent. Inflorescence a (basally branched) spike. Bracts persistent. Calyx tube to *c.* 1 mm high. Fruits not ampulliform, more than 10 mm long. Stone smooth. Seeds straight. . . . **48. S. glauca**
b. Leaves shorter than *c.* 10 cm. Intramarginal vein present. Inflorescence a raceme. Bracts caducous. Calyx tube more than 1 mm high. Fruits ampulliform, to *c.* 10 mm long. Stone with ridges or grooves. Seeds not straight. . . **98. S. sumuntia**
48a. Intramarginal vein close to margin. Bracts caducous. . . . . **98. S. sumuntia**
b. Intramarginal vein far from margin. Bracts persistent. . . . **105. S. viridissima**
49a. Nerves more than 15 pairs. 50
b. Nerves less than 15 pairs. 51
50a. Petiole less than 20 mm. Inflorescence a (basally branched) raceme, forming a cone in bud. Bracts caducous. Calyx tube 1—2 mm high. Stamens more than 30. Disk hairy. . . . . **39. S. dryophila**
b. Petiole more than 20 mm. Inflorescence a fascicle. Bracts persistent. Calyx tube $\frac{1}{2}$—1 mm high. Stamens *c.* 25. Disk glabrous. . . . . **95. S. spectabilis**
51a. Bracts caducous. 52
b. Bracts persistent. 58
52a. Disk glabrous. 53
b. Disk hairy. 55
53a. Bracts *c.* 1 mm long. Calyx tube to 1 mm high. . . . . **52. S. hainanensis**
b. Bracts longer than 1 mm. Calyx tube more than 1 mm high. 54
54a. Bracts shorter than 3 mm. Disk inconspicuous. . . . . **78. S. oreades**
b. Bracts longer than 3 mm. Disk clearly present. . . . . **98. S. sumuntia**
55a. Nerves more than 10 pairs. Terminal buds large. . . . . **39. S. dryophila**
b. Nerves less than 10 pairs. 56

56a. Terminal buds hairy. Reticulation coarse. . . . . **90. S. racemosa**
b. Terminal buds glabrous. 57
57a. Leaves 6—14 cm. . . . . **31. S. crassilimba**
b. Leaves longer than 14 cm. . . . . **55. S. hookeri**
58a. Leaves shorter than 5 cm. . . . . **67. S. modesta**
b. Leaves longer than 5 cm. 59
59a. Inflorescence a (basally branched) spike.
27-7. S. cochinchinensis ssp. **laurina**
b. Inflorescence not a spike (rarely a cone in bud). 60
60a. Inflorescence a (basally branched) raceme (rarely a cone in bud). Stone ampulliform. 61
b. Inflorescence not a raceme. Stone not ampulliform. 62
61a. Inflorescence axis hairy. Bracts $1\frac{1}{2}$—4 mm. Calyx tube 1—$1\frac{1}{4}$ mm high, calyx lobes $\frac{1}{2}$—$1\frac{1}{4}$ mm long. Disk inconspicuous. Fruits narrowly ampulliform or cylindrical.
78. S. oreades
b. Inflorescence axis glabrous. Bracts *c.* 1 mm long. Calyx tube *c.* 1 mm high, calyx lobes to *c.* $\frac{1}{2}$ mm long. Disk clearly present. Fruits ampulliform.
85. S. pseudobarberina
62a. Calyx tube to *c.* 1 mm high, calyx lobes longer than $\frac{1}{2}$ mm. . . **49. S. glomerata**
b. Calyx tube more than 1 mm high, calyx lobes to *c.* $\frac{1}{2}$ mm long. **96. S. stellaris**

KEY TO THE SPECIES OF CHINA (INCL. FORMOSA)

(fruiting material)

1a. Midrib prominent on the upper surface. 2
b. Midrib impressed in the upper surface. 6
2a. Twigs glabrous. 3
b. Twigs hairy. 4
3a. Leaves crowded towards the end of the twigs. Fruits ovoid. **66. S. microtricha**
b. Leaves evenly distributed. Fruits ellipsoid. . . . . **61. S. lucida**
4a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. 5
5a. Underside of leaves glabrous. Fruits more than 5 mm broad. . . **7. S. anomala**
b. Underside of leaves hairy. Fruits to *c.* 5 mm broad. . . . . **59. S. lancifolia**
6a. Twigs hairy. 7
b. Twigs glabrous. 33
7a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. 8
8a. Leaves distichous. . . . . **44. S. fordii**

b. Leaves spirally arranged. 9
9a. Inflorescence terminal. . . . . **80. S. paniculata**
b. Inflorescence axillary. 10
10a. Underside of leaves glabrous. 11
b. Underside of leaves hairy. 22
11a. Petiole 0—5 mm. 12
b. Petiole more than 5 mm. 14
12a. Leaves longer than 5 cm. . . . . **105. S. viridissima**
b. Leaves shorter than 5 cm. 13
13a. Leaf index more than 2. Leaf margin (and petiole) beset with closely spaced glands. Intramarginal vein absent. Fruits cylindric or ellipsoid. . . . **40. S. euryoides**
b. Leaf index less than 2. Leaf margin (and petiole) often glandular but glands not closely spaced. Intramarginal vein present. Fruits ovoid. . . **71. S. nokoensis**
14a. Fruits ampulliform. Stone ampulliform. 15
b. Fruits and stone not ampulliform. 16
15a. Inflorescence a (basally branched) spike.
27-1. S. cochinchinensis ssp. **cochinchinensis**
b. Inflorescence a raceme. . . . . **78. S. oreades**
16a. Stone smooth. 17
b. Stone with ridges or grooves. 18
17a. Fruits 1-celled. Inflorescence a (basally branched) spike or a fascicle. Bracts persistent. . . . . **48. S. glauca**
b. Fruits (1—)3-celled. Inflorescence a raceme. Bracts caducous. **90. S. racemosa**
18a. Leaf margin (and petiole) beset with closely spaced glands. . **49. S. glomerata**
b. Leaf margin (and petiole) often glandular but glands not closely spaced. . 19
19a. Reticulation not prominent. . . . . **96. S. stellaris**
b. Reticulation present beneath. 20
20a. Nerves more than 10 pairs. Reticulation coarse. . . . . **49. S. glomerata**
b. Nerves less than 10 pairs. 21
21a. Twigs appressedly puberulous. . . . . **10. S. austrosinensis**
b. Twigs tomentose or tomentellous or glabrous. . . . . **49. S. glomerata**
22a. Petiole 0—5 mm. 23
b. Petiole more than 5 mm. 27
23a. Fruits spindle-shaped or otherwise not ampulliform. 24
b. Fruits ampulliform. 25
24a. Upper side of leaves glabrous. Fruits 1-celled. . . . . **59. S. lancifolia**
b. Upper side of leaves hairy. Fruits 3-celled. . . . . **50. S. groffii**
25a. Nerves more than 10 pairs. Intramarginal vein close to margin.
9. S. atriolivacea
b. Nerves less than 10 pairs. 26
26a. Inflorescence only 1-flowered. . . . . **78a. S. ovatilobata**
b. Inflorescence more-flowered. . . . . **105. S. viridissima**

27a. Upperside of leaves hairy. 28
b. Upperside of leaves glabrous. 29
28a. Stone with ridges or grooves. Leaf margin (and petiole) beset with closely spaced glands. Seeds straight. Hairs on twigs less than 2 mm long. . . **3. S. adenophylla**
b. Stone smooth. The longer hairs more than 2 mm. . . . . **38. S. dolichotricha**
29a. Leaf margin (and petiole) beset with closely spaced glands. 30
b. Leaf margin (and petiole) often glandular but glands not closely spaced. . 31
30a. Bracteoles caducous. . . . . **63. S. macrophylla**
b. Bracteoles persistent. . . . . **3. S. adenophylla**
49. S. glomerata
31a. Fruits more than 10 mm long. . . . . **83. S. pilosa**
b. Fruits to *c.* 10 mm long. 32
32a. Fruits not ampulliform. Bracts caducous. Stone not ampulliform. Seeds straight. **63. S. macrophylla**
b. Fruits ampulliform. Bracts persistent. Stone ampulliform. Seeds not straight. **27-1. S. cochinchinensis** ssp. **cochinchinensis**
33a. Leaves crowded towards the end of the twigs. 34
b. Leaves evenly distributed. 35
34a. Underside of leaves glabrous. Fruits cylindric or ellipsoid. Nerves more than 10 pairs. . . . . **49. S. glomerata**
b. Underside of leaves hairy. Fruits ovoid or obovoid. . . . . **66. S. microtricha**
35a. Inflorescence terminal. . . . . **80. S. paniculata**
b. Inflorescence axillary. 36
36a. Underside of leaves hairy. 37
b. Underside of leaves glabrous. 38
37a. Petiole more than 5 mm. Stone not ampulliform. . . . . **91. S. ramosissima**
b. Petiole 0—5 mm. Stone ampulliform. . . . . **105. S. viridissima**
38a. Bracts caducous. 39
b. Bracts persistent. 47
39a. Nerves less than 5 pairs. Reticulation not prominent. . . . **81a. S. paucinervia**
b. Nerves more than 5 pairs. 40
40a. Fruits ampulliform. . . . . **78. S. oreades**
98. S. sumuntia
b. Fruits not ampulliform. 41
41a. Nerves more than 15 pairs. . . . . **39. S. dryophila**
b. Nerves less than 15 pairs. 42
42a. Reticulation fine. 43
b. Reticulation coarse. 44
43a. Fruits ovoid. Leaves shorter than 14 cm. . . . . **31. S. crassilimba**
b. Fruits cylindrical to ellipsoid. Leaves longer than 14 cm. . . . . **55. S. hookeri**
44a. Bracteoles persistent. . . . . **91. S. ramosissima**
b. Bracteoles caducous. 45

45a. Terminal buds hairy. . . . . **90. S. racemosa**
b. Terminal buds glabrous. 46
46a. Fruits ellipsoid. Terminal buds large. . . . . **39. S. dryophila**
b. Fruits ovoid or obovoid. Terminal buds small. . . . . **52. S. hainanensis**
47a. Leaves shorter than 5 cm. . . . . **67. S. modesta**
b. Leaves longer than 5 cm. 48
48a. Inflorescence not a spike (rarely a cone in bud). 49
b. Inflorescence a (basally branched) spike or a cone. 53
49a. Nerves more than 15 pairs. Twigs thick. Leaves obovate. . . **95. S. spectabilis**
b. Nerves less than 15 pairs. 50
50a. Petiole 0—5 mm. . . . . **105. S. viridissima**
b. Petiole more than 5 mm. 51
51a. Stone not ampulliform. . . . . **49. S. glomerata**
96. S. stellaris
b. Stone ampulliform. 52
52a. Fruits narrowly ampulliform or cylindrical. . . . . **78. S. oreades**
b. Fruits ampulliform. . . . . **85. S. pseudobarberina**
53a. Fruits not ampulliform, more than 5 mm broad and more than 10 mm long. Seeds straight. . . . . **48. S. glauca**
b. Fruits ampulliform, to *c.* 5 mm broad. . . **27-7. S. cochinchinensis** ssp. **laurina**
105. S. viridissima

KEY TO THE SPECIES OF JAPAN (INCL. RYU-KYU AND BONIN IS.)

(flowering material)

1a. Midrib prominent on the upper surface. 2
b. Midrib impressed in the upper surface. 4
2a. Twigs glabrous. Calyx glabrous. . . . . **61. S. lucida**
b. Twigs hairy. Calyx hairy. 3
3a. Underside of leaves glabrous. Intramarginal vein present. Inflorescence a short raceme. . . . . **7. S. anomala**
b. Underside of leaves hairy. Inflorescence a spike. . . . . **59. S. lancifolia**
4a. Twigs hairy. 5
b. Twigs glabrous. 10
5a. Leaves shorter than *c.* 10 cm. 6
b. Leaves longer than 10 cm. 7
6a. Inflorescence a terminal panicle. Reticulation fine. Bracts and bracteoles caducous. **80. S. paniculata**
b. Inflorescence an axillary spike. . . . . **59. S. lancifolia**
7a. Underside of leaves hairy. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Underside of leaves glabrous. 8

8a. Calyx glabrous. Reticulation not prominent. Inflorescence a fascicle. **96. S. stellaris**

b. Calyx hairy. 9

9a. Calyx limb 1—2 mm long, (appressedly) pubescent, calyx lobes longer than $1\frac{1}{2}$ mm. Disk annular. Fruits ampulliform, to *c.* 10 mm long and to *c.* 5 mm broad. Seeds not straight. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Calyx limb longer than 2 mm, tomentose, calyx lobes 1—$1\frac{1}{2}$ mm long. Disk pulvinate or cylindric. Fruits ovoid to cylindrical, more than 10 mm long and more than 5 mm broad. . . . . **48. S. glauca**

10a. Inflorescence terminal. Bracteoles several. . . . . **80. S. paniculata**

b. Inflorescence axillary. 11

11a. Calyx hairy. 12

b. Calyx glabrous. 13

12a. Leaves longer than 10 cm. . . . . **48. S. glauca**

b. Leaves shorter than *c.* 10 cm. . . . . **98. S. sumuntia**

13a. Reticulation not prominent. Disk hairy. . . . . **17. S. boninensis**

b. Reticulation present beneath. Disk glabrous. 14

14a. Inflorescence axis glabrous. . . . . **27-7. S. cochinchinensis** ssp. **laurina**

b. Inflorescence axis hairy. 15

15a. Inflorescence a raceme. Bracts 2—5 mm, caducous. . . . . **98. S. sumuntia**

b. Inflorescence a (basally branched) spike. Bracts shorter than 3 mm. **27-7. S. cochinchinensis** ssp. **laurina**

KEY TO THE SPECIES OF JAPAN (INCL. RYU-KYU AND BONIN IS.)

(fruiting material)

1a. Midrib prominent on the upper surface. 2

b. Midrib impressed on the upper surface. 4

2a. Twigs glabrous. . . . . **61. S. lucida**

b. Twigs hairy. 3

3a. Underside of leaves glabrous. Fruits more than 5 mm broad. . . **7. S. anomala**

b. Underside of leaves hairy. Fruits to *c.* 5 mm broad. . . . . **59. S. lancifolia**

4a. Fruits ampulliform. 5

b. Fruits not ampulliform. 7

5a. Twigs hairy. Nerves more than 10 pairs. **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Twigs glabrous. Nerves less than 10 pairs. 6

6a. Inflorescence a raceme. Bracteoles caducous. . . . . **98. S. sumuntia**

b. Inflorescence a (basally branched) spike or a cone. Bracteoles persistent. **27-7. S. cochinchinensis** ssp. **laurina**

7a. Twigs hairy. 8
b. Twigs glabrous. 11
8a. Leaves longer than 10 cm. 9
b. Leaves shorter than *c.* 10 cm. 10
9a. Fruits to *c.* 5 mm broad. Reticulation not prominent. Inflorescence a fascicle. **96. S. stellaris**
b. Fruits more than 5 mm broad. Reticulation present beneath. Inflorescence a (basally branched) spike or a cone. . . . . **48. S. glauca**
10a. Inflorescence terminal. . . . . **80. S. paniculata**
b. Inflorescence axillary. . . . . **59. S. lancifolia**
11a. Leaves longer than 10 cm. . . . . **48. S. glauca**
b. Leaves shorter than *c.* 10 cm. 12
12a. Inflorescence terminal. . . . . **80. S. paniculata**
b. Inflorescence axillary. . . . . **17. S. boninensis**

KEY TO THE SPECIES OF SUMATRA

(flowering material)

1a. Midrib prominent on the upper surface. 2
b. Midrib impressed in the upper surface. 3
2a. Twigs hairy. . . . . **7. S. anomala**
b. Twigs glabrous. . . . . **61. S. lucida**
3a. Corolla hairy. . . . . **74. S. odoratissima**
b. Corolla glabrous. 4
4a. Underside of leaves glabrous. 5
b. Underside of leaves hairy. 17
5a. Twigs hairy. 6
b. Twigs glabrous. 10
6a. Leaves distichous. Calyx limb 2—4-lobed or symmetrically cleft, calyx lobes becoming longer by tearing. . . . . **58. S. laeteviridis**
b. Leaves spirally arranged. 7
7a. 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. . . . . **84. S. polyandra**
b. Leaves evenly distributed. 8
8a. Calyx glabrous. . . . . **8. S. atjehensis**
b. Calyx hairy. 9
9a. Leaves longer than 10 cm. Nerves more than 10 pairs. Inflorescence a (basally branched) spike. Bracts persistent. Calyx tube glabrous, to *c.* 1 mm high, calyx lobes longer than $1\frac{1}{2}$ mm. Disk glabrous, clearly present. Fruits ampulliform,

1-celled. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Leaves shorter than *c.* 10 cm. Nerves less than 10 pairs. Inflorescence a raceme. Bracts caducous. Calyx tube hairy, 1—2 mm high, calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long. Disk hairy, inconspicuous. Fruits ellipsoid, 3-celled. . . . . **92. S. robinsonii**

10a. Nerves less than 5 pairs. . . . . **77. S. ophirensis**

b. Nerves more than 5 pairs. 11

11a. Calyx hairy. 12

b. Calyx glabrous. 13

12a. Leaves distichous. . . . . **58. S. laeteviridis**

b. Leaves spirally arranged. . . . . **77. S. ophirensis**

13a. Inflorescence not a spike. 14

b. Inflorescence a (basally branched) spike. 16

14a. Calyx tube to *c.* 1 mm high. Seeds not straight. . . . . **24. S. celastrifolia**

b. Calyx tube more than 1 mm high. Seeds straight. 15

15a. Inflorescence a fascicle. Bracteoles and bracts persistent. Disk glabrous. Fruits 10—12 mm long. . . . . **8. S. atjehensis**

b. Inflorescence a (basally branched) raceme. Bracteoles and bracts caducous. Disk hairy. Fruits to *c.* 10 mm long. . . . . **14. S. batakensis**

16a. Twigs thick. Terminal buds large. . . . . **12. S. barisani**

b. Twigs not thick. Terminal buds small. . . . **27-7. S. cochinchinensis** ssp. **laurina**

17a. Twigs glabrous. 18

b. Twigs hairy. 20

18a. Leaves distichous. Petiole 0 to 5 mm. Corolla shorter than *c.* 4 mm. **58. S. laeteviridis**

b. Leaves spirally arranged. Petiole more than 5 mm. 19

19a. Leaves shorter than *c.* 15 cm. Reticulation faintly prominent. Inflorescence a fascicle. Bracts persistent, shorter than 3 mm. Calyx glabrous. Calyx lobes not becoming longer by tearing. . . . . **8. S. atjehensis**

b. Leaves longer than 15 cm. Reticulation much prominent. Inflorescence a spike forming a cone in bud. Bracts caducous, longer than 3 mm. Calyx hairy. Calyx lobes becoming longer by tearing. . . . . **93. S. rubiginosa**

20a. Leaves distichous. 21

b. Leaves spirally arranged. 22

21a. Calyx limb hairy. Inflorescence a fascicle. Bracts persistent. Calyx tube to *c.* 1 mm long. Calyx limb to *c.* 1 mm long. Calyx lobes not becoming longer by tearing. Style base hairy. . . . . **41. S. fasciculata**

b. Calyx limb glabrous. Inflorescence not a fascicle. Bracts caducous. Calyx tube more than 1 mm high. Calyx limb longer than 1 mm. Calyx lobes becoming longer by tearing. Style base glabrous. . . . . **58. S. laeteviridis**

22a. Calyx glabrous. 23

b. Calyx hairy. 25

23a. Leaf index 2 to 3. . . . . **8. S. atjehensis**

b. Leaf index more than 3. 24
24a. Nerves less than 10 pairs. . . . . **25. S. cerasifolia**
b. Nerves more than 10 pairs. . . . . **25-2. S. cerasifolia** var. **grandifolia**
25a. Upper side of leaves hairy (pulverulent). . . . . **3. S. adenophylla**
b. Upper side of leaves glabrous. 26
26a. Calyx tube glabrous. 27
b. Calyx tube hairy. 28
27a. Nerves less than 10 pairs. Bracts caducous. Calyx tube more than 1 mm high. Calyx limb longer than 2 mm. Calyx lobes $\frac{1}{2}$ to $1\frac{1}{2}$ mm long, becoming longer by tearing. . . . . **25. S. cerasifolia**
b. Nerves more than 10 pairs. Bracts persistent. Calyx tube to *c.* 1 mm long. Calyx limb 1 to 2 mm long. Calyx lobes longer than $1\frac{1}{2}$ mm, not becoming longer by tearing. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
28a. Leaves longer than 15 cm. . . . . **25-2. S. cerasifolia** var. **grandifolia**
93. S. rubiginosa
b. Leaves shorter than *c.* 15 cm. 29
29a. Bracts to *c.* 1 mm long. 30
b. Bracts longer than 1 mm. 32
30a. Leaf margin (and petiole) beset with closely spaced glands. . . **3. S. adenophylla**
b. Leaf margin (and petiole) often glandular but glands not closely spaced 31
31a. Nerves less than 10 pairs. Reticulation coarse. Inflorescence a fascicle. Bracts persistent. Calyx tube to *c.* 1 mm high. Style base hairy. . . . **41. S. fasciculata**
b. Nerves more than 10 pairs. Reticulation fine. Inflorescence a (basally branched) raceme. Bracts caducous. Calyx tube more than 1 mm high. Style base glabrous.
92. S. robinsonii
32a. Angle of leaf base more than 60°. . . . . **97. S. sumatrana**
b. Angle of leaf base less than 60°. . . . . **92. S. robinsonii**

KEY TO THE SPECIES OF SUMATRA

(fruiting material)

1a. Midrib prominent on the upper surface. 2
b. Midrib impressed in the upper surface. 3
2a. Twigs hairy. Terminal buds hairy, small. Seeds straight. . . . . **7. S. anomala**
b. Twigs glabrous. Terminal buds glabrous. Seeds curved. . . . . **61. S. lucida**
3a. Underside of leaves glabrous. 4
b. Underside of leaves hairy. 17
4a. Twigs hairy. 5
b. Twigs glabrous. 9
5a. Leaves distichous. . . . . **58. S. laeteviridis**
b. Leaves spirally arranged. 6

6a. Leaves crowded towards the end of the twigs. Twigs thick, tapering towards apex. Petiole more than 20 mm. Apex of leaves rounded or acute. **84. S. polyandra**

b. Leaves evenly distributed. 7

7a. Fruits ampulliform. Inflorescence a (basally branched) spike. Seeds not straight. **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Fruits spindle-shaped or otherwise not ampulliform. 8

8a. Fruits more than 10 mm long. Inflorescence a fascicle. Bracts persistent. **8. S. atjehensis**

b. Fruits to *c.* 10 mm long. Inflorescence a (basally branched) raceme. Bracts caducous. . . . . **92. S. robinsonii**

9a. Nerves less than 5 pairs. . . . . **77. S. ophirensis**

b. Nerves more than 5 pairs. 10

10a. Leaves distichous. . . . . **58. S. laeteviridis**

b. Leaves spirally arranged. 11

11a. Inflorescence a (basally branched) spike. 12

b. Inflorescence not a spike (rarely a cone in bud). 13

12a. Fruits ovoid to orbicular. Twigs thick. Terminal buds large. Fruits more than 5 mm broad. . . . . **12. S. barisani**

b. Fruits ampulliform. . . . . **27-7. S. cochinchinensis** ssp. **laurina**

13a. Bracts persistent. 14

b. Bracts caducous. 15

14a. Petiole more than 5 mm. Fruits more than 5 mm broad. . . . . **8. S. atjehensis**

b. Petiole 0—5 mm. Fruits to *c.* 5 mm broad. . . . . **77. S. ophirensis**

15a. Fruits 1-celled. Inflorescence a panicle. . . . . **74. S. odoratissima**

b. Fruits 2—5-celled. Inflorescence a raceme. 16

16a. Leaf margin entire. Seeds straight. . . . . **14. S. batakensis**

b. Leaf margin not entire. Seeds curved. . . . . **24. S. celastrifolia**

17a. Twigs glabrous. 18

b. Twigs hairy. 20

18a. Leaves distichous. Petiole 0—5 mm. Fruits to *c.* 5 mm broad. **58. S. laeteviridis**

b. Leaves spirally arranged. Petiole more than 5 mm. 19

19a. Leaves shorter than *c.* 15 cm. Reticulation faintly prominent. Inflorescence a fascicle. Bracts persistent. Fruits more than 10 mm long. Seeds straight. **8. S. atjehensis**

b. Leaves longer than 15 cm. Reticulation much prominent. Inflorescence a (basally branched) spike (a cone in bud). Bracts caducous. Fruits to *c.* 10 mm long. Seeds not straight. . . . . **93. S. rubiginosa**

20a. Leaves distichous. 21

b. Leaves spirally arranged. 22

21a. Fruits ampulliform. Inflorescence a fascicle. Bracts persistent. Stone ampulliform. **41. S. fasciculata**

b. Fruits not ampulliform. Inflorescence not a fascicle. Bracts caducous. Stone not ampulliform. . . . . **58. S. laeteviridis**

22a. Upper side of leaves hairy (pulverulent). . . . . **3. S. adenophylla**

b. Upper side of leaves glabrous. 23

23a. Bracts persistent. 24

b. Bracts caducous. 27

24a. Fruits more than 10 mm long and more than 5 mm broad. . . **8. S. atjehensis**

b. Fruits to *c.* 10 mm long. 25

25a. Stone ellipsoid. Leaf margin (and petiole) beset with closely spaced glands. **3. S. adenophylla**

b. Stone ampulliform. 26

26a. Nerves more than 10 pairs. Inflorescence a (basally branched) spike. Seeds not straight. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Nerves less than 10 pairs. Inflorescence a fascicle. Seeds straight. **41. S. fasciculata**

27a. Inflorescence not a spike. 28

b. Inflorescence a (basally branched) spike or a cone. 30

28a. Inflorescence a panicle. Seeds not straight. . . . . **74. S. odoratissima**

b. Inflorescence a (basally branched) raceme. 29

29a. Angle of leaf base more than 60°. . . . . **97. S. sumatrana**

b. Angle of leaf base less than 60°. . . . . **92. S. robinsonii**

30a. Fruits to *c.* 10 mm long; mesocarp fleshy (shrivelled when dry) or thin, coriaceous. 31

b. Fruits more than 10 mm long; mesocarp woody or corky. 32

31a. Leaves longer than 15 cm. Fruits 1-celled. Angle of leaf base less than 60°. Stone with low ridges and a depression or transverse groove near the base. Seeds not straight. . . . . **93. S. rubiginosa**

b. Leaves shorter than *c.* 15 cm. Fruits 3-celled. Angle of leaf base more than 60°. Stone with low not interrupted ridges or grooves. Seeds straight. **97. S. sumatrana**

32a. Nerves more than 10 pairs. . . . . **25-2. S. cerasifolia** var. **grandifolia**

b. Nerves less than 10 pairs. . . . . **25. S. cerasifolia**

KEY TO THE SPECIES OF THE MALAY PENINSULA

(flowering material)

1a. Midrib prominent on the upper surface. 2

b. Midrib impressed on the upper surface. 5

2a. Twigs hairy. 3

b. Twigs glabrous. 4
3a. Leaves evenly distributed, underside glabrous. . . . . **7. S. anomala**
b. Leaves crowded towards the end of the twigs, minutely sparsely appressedly hairy beneath. . . . . **66. S. microtricha**
4a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. . . . . **61. S. lucida**
5a. Corolla hairy. . . . . **74. S. odoratissima**
b. Corolla glabrous. 6
6a. Twigs hairy. 7
b. Twigs glabrous. 25
7a. Leaves distichous. 8
b. Leaves spirally arranged. 10
8a. Underside of leaves glabrous. . . . . **58. S. laeteviridis**
b. Underside of leaves hairy. 9
9a. Calyx limb hairy. Inflorescence a fascicle. Bracts persistent. Calyx tube to *c.* 1 mm high, calyx limb to *c.* 1 mm long, calyx lobes not becoming longer by tearing. Style base hairy. Fruits ampulliform. . . . . **41. S. fasciculata**
b. Calyx limb glabrous. Inflorescence not a fascicle. Bracts caducous. Calyx tube more than 1 mm high, calyx limb longer than 1 mm, calyx lobes becoming longer by tearing. Style base glabrous. Fruits not ampulliform. . . **58. S. laeteviridis**
10a. Upper side of leaves hairy. 11
b. Upper side of leaves glabrous. 13
11a. Angle of leaf base more than 90°. Bracts and bracteoles caducous. Hairs on twigs more than 2 mm long. . . . . **22. S. calycodactylos**
b. Angle of leaf base less than 90°. 12
12a. Leaf margin (and petiole) beset with closely spaced glands. Bracts to *c.* 1 mm long. Calyx limb to *c.* 1 mm long, calyx lobes $\frac{1}{2}-1\frac{1}{2}$ mm long. Disk glabrous. Style base not conical. Fruits to *c.* 10 mm long. . . . . **3. S. adenophylla**
b. Leaf margin (and petiole) often glandular but glands not closely spaced. Bracts longer than 1 mm. Calyx limb longer than 1 mm, calyx lobes longer than $1\frac{1}{2}$ mm. Disk hairy. Style base conical. Fruits more than 10 mm long. **32. S. crassipes**
13a. Leaves crowded towards the end of the twigs. . . . . **66. S. microtricha**
b. Leaves evenly distributed. 14
14a. Underside of leaves glabrous. 15
b. Underside of leaves hairy (pulverulent, nearly glabrous, in *S. adenophylla*). 16
15a. Calyx glabrous. Inflorescence a fascicle. Disk pulvinate or cylindric. Fruits not ampulliform. Seeds straight . . . . . **49. S. glomerata**
b. Calyx hairy. Inflorescence a (basally branched) spike. Disk annular. Fruits ampulliform. Seeds not straight. . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
16a. Calyx glabrous. . . . . **25. S. cerasifolia**
b. Calyx hairy. 17
17a. Calyx tube glabrous. 18

b. Calyx tube hairy. 19

18a. Nerves less than 10 pairs. Bracts and bracteoles caducous. Calyx tube more than 1 mm high, calyx limb longer than 2 mm, calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long, becoming longer by tearing. Fruits not ampulliform, more than 10 mm long, 2—5 celled. **25. S. cerasifolia**

b. Nerves more than 10 pairs. Bracts and bracteoles persistent. Calyx tube to *c.* 1 mm high, calyx limb 1—2 mm long, calyx lobes longer than $1\frac{1}{2}$ mm, not becoming longer by tearing. Fruits ampulliform, to *c.* 10 mm long, 1-celled. **27-1. S. cochinchinensis** ssp. **cochinchinensis**

19a. Calyx tube more than 1 mm high. 20

b. Calyx tube to *c.* 1 mm high. 22

20a. Leaf margin (and petiole) beset with closely spaced glands. Bracts to *c.* 1 mm long. Calyx limb to *c.* 1 mm long. . . . . **3. S. adenophylla**

b. Leaf margin (and petiole) often glandular but glands not closely spaced. Bracts longer than 1 mm. 21

21a. Nerves less than 10 pairs. Reticulation faintly prominent. Bracts and bracteoles persistent. Calyx lobes not becoming longer by tearing. Fruits more than 10 mm long. . . . . **32. S. crassipes**

b. Nerves more than 10 pairs. Reticulation much prominent. Bracts and bracteoles caducous. Calyx lobes becoming longer by tearing. Fruits to *c.* 10 mm long. **93. S. rubiginosa**

22a. Leaves longer than 15 cm. . . . . **32. S. crassipes**

b. Leaves shorter than *c.* 15 cm. 23

23a. Reticulation fine. Bracts and bracteoles caducous. Style base glabrous. **77-3. S. ophirensis** var. **densireticulata**

b. Reticulation coarse. Bracts persistent. 24

24a. Inflorescence a (basally branched) spike or a cone. Bracts longer than 3 mm. Calyx limb longer than 1 mm. Stamens more than 50. Fruits not ampulliform, more than 10 mm long. . . . . **32. S. crassipes**

b. Inflorescence a fascicle. Bracts to *c.* 1 mm long. Calyx limb to *c.* 1 mm long. Stamens less than 50. Fruits ampulliform, to *c.* 10 mm long. **41. S. fasciculata**

25a. Nerves more than 10 pairs. 26

b. Nerves less than 10 pairs. 31

26a. Underside of leaves hairy. . . . . **93. S. rubiginosa**

b. Underside of leaves glabrous. 27

27a. Petiole more than 20 mm. Inflorescence a spike or a cone. Fruits 2—5-celled. **13. S. barringtoniifolia**

b. Petiole less than 20 mm. 28

28a. Inflorescence terminal. . . . . **88. S. pyriflora**

b. Inflorescence axillary. 29

29a. Calyx hairy. Bracts to *c.* 1 mm long. Calyx limb to *c.* 1 mm long, calyx lobes to *c.* $\frac{1}{2}$ mm long. Corolla shorter than *c.* 4 mm. . . . . **77. S. ophirensis**

b. Calyx glabrous. 30
30a. Intramarginal vein far from margin. Inflorescence a fascicle. Bracts persistent, hairy, shorter than 3 mm. Calyx tube to *c.* 1 mm high, calyx limb 1–2 mm long, calyx lobes not becoming longer by tearing. Corolla shorter than *c.* 7 mm. Stamens less than 50. Fruits to *c.* 10 mm long. . . . . **49. S. glomerata**
b. Intramarginal vein close to margin. Inflorescence a (basally branched) raceme. Bracts caducous, glabrous, longer than 3 mm. Calyx tube more than 1 mm high, calyx limb longer than 2 mm, calyx lobes becoming longer by tearing. Corolla more than 7 mm long. Stamens more than 50. Fruits more than 10 mm long. . . . . **88. S. pyriflora**
31a. Underside of leaves hairy. 32
b. Underside of leaves glabrous. 34
32a. Leaves crowded towards the end of the twigs. . . . . **.66. S. microtricha**
b. Leaves evenly distributed. 33
33a. Leaves spirally arranged. Inflorescence a (basally branched) spike. Bracts persistent. Disk glabrous. Fruits more than 10 mm long. . . . . **32. S. crassipes**
b. Leaves distichous. Inflorescence not a spike. Bracts caducous. Disk hairy. Fruits to *c.* 10 mm long. . . . . **58. S. laeteviridis**
34a. Calyx hairy. 35
b. Calyx glabrous. 37
35a. Acumen shorter than 5 mm. . . . . **77. S. ophirensis**
b. Acumen longer than 5 mm. 36
36a. Leaves distichous. Disk hairy. . . . . **58. S. laeteviridis**
b. Leaves spirally arranged. Disk glabrous. 39
37a. Inflorescence a (basally branched) spike. Bracts persistent. **27-7. S. cochinchinensis** ssp. **laurina**
b. Inflorescence not a spike. Bracts caducous. 38
38a. Inflorescence not a raceme. Stamens more than 100. . . . . **70. S. nivea**
b. Inflorescence a raceme. Stamens less than 100. 40
39a. Inflorescence a spike. Bracts persistent. . . . . **32. S. crassipes**
b. Inflorescence a raceme. Bracts caducous. . . . . **98. S. sumuntia**
40a. Calyx lobes becoming longer by tearing. . . . . **24. S. celastrifolia**
b. Calyx lobes not becoming longer by tearing. . . . . **98. S. sumuntia**

KEY TO THE SPECIES OF THE MALAY PENINSULA

(fruiting material)

1a. Midrib prominent on the upper surface. 2
b. Midrib impressed on the upper surface. 5
2a. Twigs hairy. 3
b. Twigs glabrous. 4

3a. Leaves evenly distributed. Fruits ellipsoid. . . . . **7. S. anomala**
b. Leaves crowded towards the end of the twigs. Fruits ovoid. . . **66. S. microtricha**
4a. Leaves crowded towards the end of the twigs. Fruits ovoid. . . **66. S. microtricha**
b. Leaves evenly distributed. Fruits ellipsoid. . . . . **61. S. lucida**
5a. Twigs hairy. 6
b. Twigs glabrous. 22
6a. Leaves distichous. 7
b. Leaves spirally arranged. 9
7a. Underside of leaves glabrous. . . . . **58. S. laeteviridis**
b. Underside of leaves hairy 8
8a. Fruits ampulliform. Inflorescence a fascicle. Bracts and bracteoles persistent. **41. S. fasciculata**
b. Fruits not ampulliform. Inflorescence not a fascicle. Bracts and bracteoles caducous. **58. S. laeteviridis**
9a. Upper side of leaves hairy. 10
b. Upper side of leaves glabrous. 12
10a. Angle of leaf base more than 90°. Bracts caducous. Hairs on twigs more than 2 mm long. . . . . **22. S. calycodactylos**
b. Angle of leaf base less than 90°. 11
11a. Fruits to *c.* 10 mm long. Leaf margin (and petiole) beset with closely spaced glands. **3. S. adenophylla**
b. Fruits more than 10 mm long. Leaf margin (and petiole) often glandular but glands not closely spaced. . . . . **32. S. crassipes**
12a. Leaves crowded towards the end of the twigs . . . . . **66. S. microtricha**
b. Leaves evenly distributed. 13
13a. Underside of leaves glabrous. 14
b. Underside of leaves hairy (or pulverulent, nearly glabrous, in *S. adenophylla*). 15
14a. Fruits not ampulliform. Inflorescence a fascicle. Seeds straight. **49. S. glomerata**
b. Fruits ampulliform. Inflorescence a (basally branched) spike. Seeds not straight. **27-1. S. cochinchinensis** ssp. **cochinchinensis**
15a. Bracts caducous. 16
b. Bracts persistent. 19
16a. Stone smooth. . . . . **77-3. S. ophirensis** var. **densireticulata**
b. Stone with ridges or grooves. 17
17a. Fruits 2–5-celled. . . . . **25. S. cerasifolia**
b. Fruits 1-celled. 18
18a. Inflorescence a panicle. . . . . **74. S. odoratissima**
b. Inflorescence a (basally branched) spike (a cone in bud). . . . **93. S. rubiginosa**
19a. Fruits more than 10 mm long. . . . . **32. S. crassipes**
b. Fruits to *c.* 10 mm long. 20
20a. Stone ellipsoid. Leaf margin (and petiole) beset with closely spaced glands. **3. S. adenophylla**

b. Stone ampulliform. 21
21a. Nerves more than 10 pairs. Inflorescence a (basally branched) spike. Seeds not straight. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Nerves less than 10 pairs. Inflorescence a fascicle. Seeds straight. **41. S. fasciculata**
22a. Underside of leaves hairy. 23
b. Underside of leaves glabrous 26
23a. Leaves crowded towards the end of the twigs. Nerves 8–10 pairs. Stone smooth. **66. S. microtricha**
b. Leaves evenly distributed or nerves more than 10 pairs. Stone with ridges or grooves. 24
24a. Leaves distichous. Inflorescence not a spike. . . . . **58. S. laeteviridis**
b. Leaves spirally arranged. 25
25a. Nerves less than 10 pairs. Bracts persistent. Fruits to *c.* 5 mm broad, more than 10 mm long. Stone with low not interrupted ridges or grooves or brain-like grooved. Seeds straight . . . . . **32. S. crassipes**
b. Nerves more than 10 pairs. Bracts caducous. Fruits more than 5 mm broad, to *c.* 10 mm long. Stone with low ridges and a depression or transverse groove near the base. Seeds not straight. . . . . **93. S. rubiginosa**
26a. Leaves distichous. . . . . **58. S. laeteviridis**
b. Leaves spirally arranged. 27
27a. Inflorescence terminal. . . . . **88. S. pyriflora**
b. Inflorescence axillary. 28
28a. Bracts caducous. 29
b. Bracts persistent. 34
29a. Inflorescence a spike. Fruits longer than 25 mm. . . . . **13. S. barringtoniifolia**
b. Inflorescence not a spike. Fruits shorter than 25 mm. 30
30a. Inflorescence not a raceme. 31
b. Inflorescence a (basally branched) raceme (rarely a cone in bud). 32
31a. Petiole 0–5 mm. . . . . **70. S. nivea**
b. Petiole more than 5 mm. . . . . **74. S. odoratissima**
32a. Fruits 2–5-celled. . . . . **24. S. celastrifolia**
b. Fruits 1-celled. 33
33a. Nerves less than 10 pairs. Terminal buds hairy. . . . . **77. S. ophirensis** **98. S. sumuntia**
b. Nerves more than 10 pairs. Terminal buds glabrous. . . . . **88. S. pyriflora**
34a. Fruits spindle-shaped or otherwise not ampulliform. 35
b. Fruits ampulliform. 37
35a. Acumen shorter than 5 mm. Apex of leaves rounded or acute. **77. S. ophirensis**
b. Acumen longer than 5 mm. 36
36a. Nerves more than 10 pairs. Reticulation coarse. Inflorescence a fascicle. Fruits

to *c.* 10 mm long. . . . . **49. S. glomerata**
b. Nerves less than 10 pairs. Reticulation fine. Inflorescence a (basally branched) spike. Fruits more than 10 mm long. . . . . **32. S. crassipes**
37a. Nerves more than 10 pairs. Petiole 0–5 mm. Inflorescence not a spike. Seeds U-shaped. . . . . **77. S. ophirensis**
b. Nerves less than 10 pairs. . . . . **27-7. S. cochinchinensis** ssp. **laurina**

KEY TO THE SPECIES OF JAVA AND THE LESSER SUNDA IS.

(flowering material)

1a. Corolla hairy. . . . . **74. S. odoratissima**
b. Corolla glabrous. 2
2a. Midrib prominent on the upper surface. . . . . **61. S. lucida**
b. Midrib impressed in the upper surface. 3
3a. Twigs hairy. 4
b. Twigs glabrous. 9
4a. Leaves distichous. . . . . **41. S. fasciculata**
b. Leaves spirally arranged. 5
5a. Underside of leaves glabrous. . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Underside of leaves hairy. 6
6a. Upper side of leaves hairy (pulverulent). . . . . **3. S. adenophylla**
b. Upper side of leaves glabrous. 7
7a. Calyx tube glabrous, calyx limb longer than 1 mm. Bracts longer than 1 mm. **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Calyx tube hairy. 8
8a. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Calyx tube 1–2 mm high. . . . . **3. S. adenophylla**
b. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaced. Calyx tube *c.* 1 mm high. . . . . **41. S. fasciculata**
9a. Calyx hairy. 10
b. Calyx glabrous. 11
10a. Calyx tube hairy. Inflorescence a raceme. Calyx limb glabrous. **57. S. junghuhnii**
b. Calyx tube glabrous. Inflorescence a spike. Calyx limb hairy. **27-1. S. cochinchinensis** ssp. **cochinchinensis**
11a. Inflorescence axis glabrous. 12
b. Inflorescence axis hairy. 13
12a. Petiole less than 20 mm. . . . . **27-7. S. cochinchinensis** ssp. **laurina**
b. Petiole more than 20 mm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
13a. Nerves less than 10 pairs. . . . . **27-7. S. cochinchinensis** ssp. **laurina**
b. Nerves more than 10 pairs 14

14a. Angle of leaf base less than 60°. Inflorescence a (basally branched) spike, forming a cone in bud. . . . . **30. S. costata**
b. Angle of leaf base more than 60°. Inflorescence a raceme. . **20. S. brandisii**

KEY TO THE SPECIES OF JAVA AND THE LESSER SUNDA IS.

(fruiting material)

1a. Midrib prominent on the upper surface. . . . . **61. S. lucida**
b. Midrib impressed in the upper surface. 2
2a. Twigs hairy. 3
b. Twigs glabrous. 9
3a. Leaves distichous. . . . . **41. S. fasciculata**
b. Leaves spirally arranged. 4
4a. Underside of leaves glabrous. . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Underside of leaves hairy. 5
5a. Upper side of leaves hairy (pulverulent). . . . . **3. S. adenophylla**
b. Upper side of leaves glabrous. 6
6a. Seeds not straight. 7
b. Seeds straight. 8
7a. Fruits ampulliform. Inflorescence a (basally branched) spike. Bracts persistent. Seeds twice curved. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Fruits not ampulliform. Inflorescence a panicle. Bracts caducous. Seeds U-shaped. **74. S. odoratissima**
8a. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Stone not ampulliform. . . . . **3. S. adenophylla**
b. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaced. Stone ampulliform. . . . . **41. S. fasciculata**
9a. Fruits ampulliform. . . . . **27. S. cochinchinensis**
b. Fruits spindle-shaped or otherwise not ampulliform. 10
10a. Inflorescence a (basally branched) spike or a cone. 11
b. Inflorescence not a spike (rarely a cone in bud). 12
11a. Angle of leaf base less than 60°. Fruits more than 10 mm long. **30. S. costata**
b. Angle of leaf base more than 60°. Fruits to *c.* 10 mm long. **27-15. S. cochinchinensis** ssp. **leptophylla**
12a. Terminal buds large. . . . . **57. S. junghuhnii**
b. Terminal buds small. 13
13a. Inflorescence a panicle. Seeds not straight. . . . . **74. S. odoratissima**
b. Inflorescence a (basally branched) raceme. . . . . **20. S. brandisii**

KEY TO THE SPECIES OF BORNEO

(flowering material)

1a. Corolla hairy. . . . . **74. S. odoratissima**
b. Corolla glabrous. 2
2a. Midrib flat or prominent on the upper surface. . . . . **7. S. anomala**
b. Midrib impressed in the upper surface. 3
3a. Underside of leaves glabrous. 4
b. Underside of leaves hairy. 24
4a. Twigs hairy. 5
b. Twigs glabrous. 9
5a. Leaves distichous. . . . . **58. S. laeteviridis**
b. Leaves spirally arranged. 6
6a. Leaves shorter than 5 cm. . . . . **19. S. brachybotrys**
b. Leaves longer than 5 cm. 7
7a. Leaves shorter than *c.* 10 cm. Petiole 3–4 mm. . . . . **19. S. brachybotrys**
b. Leaves longer than 10 cm. Petiole more than 5 mm. 8
8a. Leaves evenly distributed. Twigs not thick, cylindrical. Leaf margin not entire. Petiole less than 20 mm. Calyx tube glabrous, to *c.* 1 mm high, calyx limb 1–2 mm long. Corolla shorter than *c.* 7 mm. Fruits ampulliform, 1-celled. Seed 1, not straight. Apex of leaves acuminate. **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Leaves crowded towards the end of the twigs. Twigs thick, tapering towards apex. Leaf margin entire. Petiole more than 20 mm. Calyx tube hairy, *c.* 2 mm high, calyx limb 2–3 mm long. Corolla more than 7 mm long. Fruits not ampulliform, 3-celled. Seeds more than 1, straight. Apex of leaves rounded or acute. **84. S. polyandra**
9a. Calyx hairy. 10
b. Calyx glabrous. 17
10a. Leaves distichous. Calyx limb glabrous. . . . . **58. S. laeteviridis**
b. Leaves spirally arranged. 11
11a. Leaves shorter than 5 cm. 12
b. Leaves longer than 5 cm. 13
12a. Calyx tube glabrous. . . . . **21. S. buxifolia**
b. Calyx tube hairy. . . . . **19. S. brachybotrys**
13a. Petiole more than 20 mm. Twigs thick. . . . . **13. S. barringtoniifolia**
b. Petiole less than 20 mm. 14
14a. Bracts caducous 15
b. Bracts persistent. 16
15a. Inflorescence a (basally branched) spike. Calyx limb longer than 1 mm. **19. S. brachybotrys**

b. Inflorescence not a spike (rarely a cone in bud). Calyx limb to *c.* 1 mm long. **77. S. ophirensis**

16a. Petiole 0–5 mm. Inflorescence only 1-flowered. . . . . **19. S. brachybotrys**

b. Petiole more than 5 mm. . . . . **77. S. ophirensis**

17a. Nerves more than 10 pairs. . . . . **49a. S. goodeniacea**

b. Nerves less than 10 pairs. 18

18a. Bracts persistent. 19

b. Bracts caducous. 20

19a. Leaves shorter than 5 cm. . . . . **21. S. buxifolia**

b. Leaves longer than 5 cm. . . . . **27-7. S. cochinchinensis ssp. laurina**

20a. Calyx tube to *c.* 1 mm high. 21

b. Calyx tube more than 1 mm high. 22

21a. Leaf margin entire. Inflorescence axis glabrous. . . . . **45. S. gambliana**

b. Leaf margin not entire. Inflorescence axis hairy. . . . . **24. S. celastrifolia**

22a. Leaf margin entire. Calyx limb $\frac{3}{4}$–1 mm long. Disk hairy. . . **18. S. borneensis**

b. Leaf margin not entire. Calyx limb longer than 1 mm. Disk glabrous or the style base hairy. 23

23a. Leaves shorter than 5 cm and acumen shorter than 5 mm. Reticulation fine. Inflorescence a (basally branched) raceme. Bracts longer than 3 mm. Calyx tube 2–3 mm high, calyx limb 2–5 mm long. Style base glabrous. Fruits 1-celled. **21. S. buxifolia**

b. Leaves longer than 5 cm and acumen longer than 5 mm. Reticulation coarse. Inflorescence not a raceme. Bracts shorter than 3 mm. Calyx tube 1–2 mm high, calyx limb 1–2 mm long. Style base hairy. Fruits 3-celled. Stone smooth. Seeds more than 1. . . . . **100. S. tricoccata**

24a. Leaves distichous. 25

b. Leaves spirally arranged. 36

25a. Nerves 5 pairs or less. 26

b. Nerves more than 5 pairs 27

26a. Angle of leaf base more than 90°. . . . . **56. S. johniana**

b. Angle of leaf base less than 90°. . . . . **58. S. laeteviridis**

27a. Twigs glabrous . . . . . **58. S. laeteviridis**

b. Twigs hairy. 28

28a. Calyx limb glabrous. . . . . **58. S. laeteviridis**

b. Calyx limb hairy. 29

29a. Leaves longer than 5 cm. 30

b. Leaves shorter than 5 cm. 32

30a. Inflorescence a *c.* 3-flowered raceme. Fruits more than 10 mm long. **28. S. colombonensis**

b. Inflorescence not a raceme. Fruits to *c.* 10 mm long. 31

31a. Inflorescence a fascicle. Bracts to *c.* 1 mm long, persistent. Calyx tube *c.* 1 mm high, calyx limb *c.* 1 mm long, calyx lobes not becoming longer by tearing. Style

base hairy. Fruits ampulliform. . . . . **41. S. fasciculata**

b. Inflorescence not a fascicle (*e.g.* a panicle). Bracts longer than 1 mm, caducous. Calyx limb 2–4-lobed or symmetrically cleft, longer than 1 mm, calyx tube more than 1 mm high, calyx lobes becoming longer by tearing. Style base glabrous. Fruits not ampulliform. . . . . **58. S. laeteviridis**

32a. Inflorescence only 1-flowered. 33

b. Inflorescence more-flowered. 34

33a. Reticulation not prominent. Bracts several. Calyx tube *c.* 1 mm high, calyx limb *c.* 3 mm. Corolla *c.* 4 mm. Fruits to *c.* 10 mm long. . . . . **99. S. trichomarginalis**

b. Reticulation present beneath. Bracts 1. Calyx tube 1—1½ mm high, calyx limb *c.* 2 mm long. Corolla more than 4 mm long. Fruits 10—12 mm long. **107. S. zizyphoides**

34a. Bracts caducous. Bracteoles caducous. . . . . **58. S. laeteviridis**

b. Bracts and bracteoles persistent. 35

35a. Disk hairy. Fruits to *c.* 5 mm broad. . . . . **36. S. deflexa**

b. Disk glabrous. Fruits more than 5 mm broad. . . . . **107. S. zizyphoides**

36a. Twigs glabrous. 37

b. Twigs hairy. 39

37a. Leaves shorter than 5 cm. . . . . **19. S. brachybotrys**

b. Leaves longer than 5 cm. 38

38a. Leaves longer than 10 cm. Nerves more than 10 pairs. . . . **93. S. rubiginosa**

b. Leaves shorter than *c.* 10 cm. Nerves less than 10 pairs. . . **19. S. brachybotrys**

39a. Upper side of leaves hairy (pulverulent). . . . . **3. S. adenophylla**

b. Upper side of leaves glabrous. 40

40a. Calyx glabrous. . . . . **25. S. cerasifolia**

b. Calyx hairy. 41

41a. Calyx tube glabrous. 42

b. Calyx tube hairy. 43

42a. Nerves less than 10 pairs. Bracts caducous. Calyx tube more than 1 mm high, calyx limb longer than 2 mm. Fruits not ampulliform, more than 20 mm long, 3-celled. . . . . **25. S. cerasifolia**

b. Nerves more than 10 pairs. Bracts persistent. Calyx tube to *c.* 1 mm high, calyx limb 1–2 mm long. Fruits ampulliform, to *c.* 10 mm long, 1-celled. **27-1. S. cochinchinensis ssp. cochinchinensis**

43a. Leaves longer than 15 cm. . . . . **93. S. rubiginosa**

b. Leaves shorter than *c.* 15 cm. 44

44a. Inflorescence only 1-flowered. 45

b. Inflorescence more-flowered. 47

45a. Angle of leaf base more than 90° . . . . . **56. S. johniana**

b. Angle of leaf base less than 90°. 46

46a. Bracts 1. Calyx lobes ½–1½ mm long. . . . . **32. S. crassipes**

b. Bracts several. Calyx lobes longer than 1½ mm. . . . . **19. S. brachybotrys**

47a. Leaves shorter than 5 cm. . . . . **19. S. brachybotrys**
b. Leaves longer than 5 cm. 48
48a. Calyx limb to *c.* 1 mm long. 49
b. Calyx limb longer than 1 mm. 50
49a. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Calyx tube more than 1 mm high. . . . . **3. S. adenophylla**
b. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaced. Calyx tube *c.* 1 mm high. . . . . **41. S. fasciculata**
50a. Reticulation coarse. Stamens less than 30. . . . . **32. S. crassipes**
b. Reticulation fine. Stamens more than 30. 51
51a. Bracts caducous. Calyx limb longer than 2 mm. Corolla *c.* 6 mm. Disk hairy. Fruits *c.* 10 mm long. . . . . **19. S. brachybotrys**
b. Bracts persistent. Calyx limb 1–2 mm long. Corolla shorter than *c.* 4 mm. Disk glabrous. Fruits more than 10 mm long. . . . . **32. S. crassipes**

KEY TO THE SPECIES OF BORNEO

(fruiting material)

1a. Midrib flat or prominent on the upper surface. . . . . **7. S. anomala**
b. Midrib impressed in the upper surface. 2
2a. Twigs glabrous. 3
b. Twigs hairy. 19
3a. Underside of leaves hairy. 4
b. Underside of leaves glabrous. 7
4a. Leaves distichous. Seeds straight. . . . . **58. S. laeteviridis**
b. Leaves spirally arranged. 5
5a. Leaves shorter than 5 cm. . . . . **19. S. brachybotrys**
b. Leaves longer than 5 cm. 6
6a. Leaves longer than 15 cm. Nerves more than 10 pairs. . . . **93. S. rubiginosa**
b. Leaves shorter than *c.* 10 cm. Nerves less than 10 pairs. . . **19. S. brachybotrys**
7a. Leaves distichous. . . . . **58. S. laeteviridis**
b. Leaves spirally arranged. 8
8a. Bracts persistent. 9
b. Bracts caducous. 14
9a. Leaves shorter than 5 cm. 10
b. Leaves longer than 5 cm. 11
10a. Fruits to *c.* 10 mm long, to *c.* 5 mm broad. Terminal buds hairy. Reticulation faintly prominent. Seeds not straight. . . . . **19. S. brachybotrys**
b. Fruits more than 10 mm long. . . . . **21. S. buxifolia**
11a. Petiole 0–5 mm. Inflorescence only 1-flowered. . . . . **19. S. brachybotrys**
b. Petiole more than 5 mm. 12

12a. Inflorescence not a spike. . . . . **77. S. ophirensis**
b. Inflorescence a (basally branched) spike or a cone. 13
13a. Nerves more than 10 pairs. Angle of leaf base less than 35°. **49a. S. goodeniacea**
b. Nerves less than 10 pairs. . . . . **27-7. S. cochinchinensis** ssp. **laurina**
14a. Inflorescence a (basally branched) spike or a cone. 15
b. Inflorescence not a spike (rarely a cone in bud). 17
15a. Petiole 0–5 mm. . . . . **19. S. brachybotrys**
b. Petiole more than 5 mm. 16
16a. Leaves longer than 15 cm. Nerves more than 10 pairs. Twigs thick. Terminal buds hairy. Petiole more than 20 mm. . . . . **13. S. barringtoniifolia**
b. Leaves shorter than *c.* 10 cm. Nerves less than 10 pairs. Twigs not thick. Terminal buds glabrous. Petiole less than 20 mm. . . . . **45. S. gambliana**
17a. Inflorescence not a raceme. 18
b. Inflorescence a (basally branched) raceme. . . . . **18. S. borneensis**
21. S. buxifolia
24. S. celastrifolia
77. S. ophirensis
18a. Fruits 1-celled. Inflorescence a panicle. Stone with ridges or grooves. Seed 1, not straight. . . . . **74. S. odoratissima**
b. Fruits 3-celled. Inflorescence a fascicle. Stone smooth. Seeds more than 1, straight. **100. S. tricoccata**
19a. Leaves distichous. 20
b. Leaves spirally arranged. 30
20a. Underside of leaves glabrous. . . . . **58. S. laeteviridis**
b. Underside of leaves hairy. 21
21a. Nerves less than 5 pairs. 22
b. Nerves more than 5 pairs. 23
22a. Angle of leaf base more than 90°. Fruits ampulliform, more than 10 mm long. Bracts persistent. Stone ampulliform, smooth. Leaves ovate. . **56. S. johniana**
b. Angle of leaf base less than 90°. Fruits not ampulliform. . . **58. S. laeteviridis**
23a. Fruits ampulliform. . . . . **41. S. fasciculata**
b. Fruits spindle-shaped or otherwise not ampulliform. 24
24a. Fruits more than 10 mm long. 25
b. Fruits to *c.* 10 mm long. 27
25a. Acumen shorter than 5 mm. . . . . **107. S. zizyphoides**
b. Acumen longer than 5 mm. 26
26a. Leaves longer than 5 cm. Twigs (appressedly) pubescent. . . **28. S. colombonensis**
b. Leaves shorter than 5 cm. Twigs not appressedly pubescent. **58. S. laeteviridis**
27a. Angle of leaf base more than 90°. . . . . **58. S. laeteviridis**
b. Angle of leaf base less than 90°. 28
28a. Intramarginal vein present. Bracts caducous. . . . . **58. S. laeteviridis**
b. Intramarginal vein absent. Bracts persistent. 29

29a. Inflorescence more-flowered. . . . . **36. S. deflexa**
b. Inflorescence only 1-flowered. . . . . **99. S. trichomarginalis**
30a. Leaves crowded towards the end of the twigs. Twigs thick, with large leaf-scars. **84. S. polyandra**
b. Leaves evenly distributed. 31
31a. Underside of leaves glabrous. 32
b. Underside of leaves hairy. 34
32a. Leaves shorter than 5 cm. . . . . **19. S. brachybotrys**
b. Leaves longer than 5 cm. 33
33a. Leaves longer than 10 cm. Petiole more than 5 mm. Nerves more than 10 pairs. Fruits ampulliform. Stone ampulliform. **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Leaves shorter than *c.* 10 cm. Petiole 0–5 mm. . . . . **19. S. brachybotrys**
34a. Upperside of leaves hairy (pulverulent). . . . . **3. S. adenophylla**
b. Upperside of leaves glabrous 35
35a. Seeds not straight 36
b. Seeds straight 39
36a. Petiole 0–5 mm . . . . . **19. S. brachybotrys**
b. Petiole more than 5 mm 37
37a. Fruits ampulliform. Bracts persistent. **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Fruits not ampulliform 38
38a. Inflorescence a panicle . . . . . **74. S. odoratissima**
b. Inflorescence a (basally branched) spike (a cone in bud). . . **93. S. rubiginosa**
39a. Fruits to *c.* 10 mm long 40
b. Fruits more than 10 mm long 41
40a. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Stone ellipsoid . . . . . **3. S. adenophylla**
b. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaced. Stone ampulliform . . . . . **41. S. fasciculata**
41a. Angle of leaf base more than 60° 42
b. Angle of leaf base less than 60° 43
42a. 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 . . . . . **32. S. crassipes**
b. Angle of leaf base more than 90°. Twigs and underside of leaves not appressedly pubescent or puberulous. Fruits ampulliform, 1-celled. Stone smooth **56. S. johniana**
43a. Petiole 0–5 mm. Fruits to *c.* 5 mm broad . . . . . **32. S. crassipes**
b. Petiole more than 5 mm. Fruits more than 5 mm broad . . . . **25. S. cerasifolia**

KEY TO THE SPECIES OF THE PHILIPPINES

(flowering material)

1a. Leaves verticillate . . . . . **103. S. verticillifolia**
b. Leaves not verticillate 2
2a. Midrib prominent in the upper surface. 3
b. Midrib impressed on the upper surface 4
3a. Twigs glabrous. Petiole more than 5 mm . . . . . **61. S. lucida**
b. Twigs hairy. Petiole 0–5 mm . . . . . **59. S. lancifolia**
4a. Corolla hairy . . . . . **74. S. odoratissima**
b. Corolla glabrous 5
5a. Twigs hairy 6
b. Twigs glabrous 17
6a. Leaves distichous . . . . . **41. S. fasciculata**
b. Leaves spirally arranged 7
7a. Leaves crowded towards the end of the twigs. Twigs thick, tapering towards the apex. Fruits 3-celled. Apex of leaves rounded or acute . . . . **84. S. polyandra**
b. Leaves evenly distributed 8
8a. Underside of leaves glabrous 9
b. Underside of leaves hairy 10
9a. Calyx tube hairy. Inflorescence a lax raceme. Bracts to *c.* 1 mm long. Calyx tube *c.* $1\frac{1}{2}$ mm high, calyx lobes *c.* $\frac{1}{2}$ mm long. Stamens *c.* 25. . . . . **42. S. filipes**
b. Calyx tube glabrous (hidden between bracts!). Inflorescence a spike **27-1. S. cochinchinensis** ssp. **cochinchinensis**
10a. Upper side of leaves hairy (pulverulent). . . . . **3. S. adenophylla**
b. Upper side of leaves glabrous 11
11a. Calyx tube glabrous 12
b. Calyx tube hairy 13
12a. Leaves longer than 10 cm. Petiole more than 5 mm. Nerves more than 10 pairs. Calyx lobes longer than $1\frac{1}{2}$ mm. Stamens more than 30. Disk glabrous. Style base glabrous. Fruits ampulliform . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Leaves shorter than *c.* 10 cm. Petiole 0–5 mm. Nerves less than 10 pairs. Calyx lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long. Stamens less than 30. Disk hairy. Style base hairy. Fruits not ampulliform. . . . . **59. S. lancifolia**
13a. Leaf margin (and petiole) beset with closely spaced glands. . . **3. S. adenophylla**
b. Leaf margin (and petiole) often glandular but glands not closely spaced. . . . 14
14a. Style base glabrous. 15
b. Style base hairy. 16
15a. Bracts to *c.* 1 mm long. Calyx lobes *c.* $\frac{1}{2}$ mm long, not triangular. **42. S. filipes**
b. Bracts 2–3 mm. Calyx lobes 1–$1\frac{1}{2}$ mm, triangular. . . . . **104. S. vidalii**

16a. Intramarginal vein present. Inflorescence a fascicle. Fruits ampulliform. **41. S. fasciculata**

b. Intramarginal vein absent. Inflorescence a (basally branched) spike. Fruits not ampulliform. . . . . **59. S. lancifolia**

17a. Calyx glabrous. 18

b. Calyx hairy. 24

18a. Inflorescence a (basally branched) spike. 19

b. Inflorescence not a spike. 21

19a. Acumen longer than 5 mm. . . . . **16. S. betula**

b. Acumen shorter than 5 mm. 20

20a. Angle of leaf base less than 60°. Bracts 2–3 mm. Calyx lobes *c.* 2 mm long. Disk hairy. . . . . **72. S. obovatifolia**

b. Angle of leaf base *c.* 90°. Bracts 3–5 mm. Calyx lobes longer than $2\frac{1}{2}$ mm. Disk glabrous. . . . . **101. S. trisepala**

21a. Bracts and bracteoles persistent. 22

b. Bracts and bracteoles caducous. 23

22a. Leaves 2–$7\frac{1}{2}$ cm. Inflorescence a (basally branched) raceme. Bracts longer than 3 mm. Calyx limb regularly 5-lobed, calyx lobes semi-ovate. Fruits ovoid, 5–7 mm long, 1-celled. . . . . **106. S. whitfordii**

b. Leaves $7\frac{1}{2}$–11 cm. Inflorescence not a raceme. Bracts 2–3 mm long. Calyx limb 3-lobed, the lobes semi-elliptic. Fruits ellipsoid, 11 mm long, 3-celled. **72. S. obovatifolia**

23a. Inflorescence axis glabrous. Corolla 3–4 mm. Calyx lobes not becoming longer by tearing. . . . . **47. S. glabriramifera**

b. Inflorescence axis hairy. Corolla 4–6 mm. . . . . **24. S. celastrifolia**

24a. Underside of leaves hairy. . . . . **42. S. filipes**

b. Underside of leaves glabrous. 25

25a. Leaves shorter than 5 cm. Fruits 3-celled. . . . . **77. S. ophirensis**

b. Leaves longer than 5 cm. 26

26a. Calyx tube glabrous. 27

b. Calyx tube hairy. 28

27a. Calyx tube to *c.* 1 mm high. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Calyx tube more than 1 mm high. . . . . **77. S. ophirensis**

28a. Bracts caducous. . . . . **77. S. ophirensis**

b. Bracts persistent. 29

29a. Petiole 0–5 mm. Terminal buds glabrous. . . . . **77. S. ophirensis**

b. Petiole more than 5 mm. 30

30a. Calyx lobes *c.* $\frac{1}{2}$ mm long. . . . . **42. S. filipes**

b. Calyx lobes longer than $\frac{1}{2}$ mm. . . . . **77. S. ophirensis**

(fruiting material)

1a. Leaves verticillate. . . . . **103. S. verticillifolia**
b. Leaves not verticillate. 2
2a. Midrib prominent on the upper surface. 3
b. Midrib impressed in the upper surface. 4
3a. Twigs glabrous. Petiole more than 5 mm. . . . . **71. S. lucida**
b. Twigs hairy. Petiole 0–5 mm. . . . . **59. S. lancifolia**
4a. Twigs hairy. 5
b. Twigs glabrous. 14
5a. Underside of leaves glabrous. 6
b. Underside of leaves hairy. 8
6a. Fruits spindle-shaped or otherwise not ampulliform. 7
b. Fruits ampulliform. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
7a. Leaves evenly distributed, shorter than *c.* 10 cm. Acumen longer than 5 mm. Twigs not thick, cylindrical. Nerves less than 10 pairs. Petiole less than 20 mm. Fruits 1-celled. Seed 1. Apex of leaves acuminate. . . . . **42. S. filipes**
b. 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. . . . . **84. S. polyandra**
8a. Leaves distichous. . . . . **41. S. fasciculata**
b. Leaves spirally arranged. 9
9a. Leaf margin and petiole beset with closely spaced glands. . . **3. S. adenophylla**
b. Leaf margin and petiole not so. 10
10a. Fruits ampulliform. 11
b. Fruits spindle-shaped or otherwise not ampulliform. 12
11a. Nerves more than 10 pairs. Inflorescence a (basally branched) spike. Seeds not straight. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Nerves less than 10 pairs. Inflorescence a fascicle. Seeds straight. **41. S. fasciculata**
12a. Petiole 0–5 mm. . . . . **59. S. lancifolia**
b. Petiole more than 5 mm. 13
13a. Bracts and bracteoles caducous. Seeds not straight. . . . . **74. S. odoratissima**
b. Bracts and/or bracteoles persistent. Seeds straight. . . . . **42. S. filipes** **104. S. vidalii**
14a. Underside of leaves hairy. . . . . **42. S. filipes**
b. Underside of leaves glabrous. 15
15a. Inflorescence a (basally branched) spike or a cone. 16
b. Inflorescence not a spike (rarely a cone in bud). 17

16a. Leaves shorter than 5 cm. . . . . **16. S. betula**
b. Leaves longer than 5 cm. . . . . **16. S. betula**
27-1. S. cochinchinensis ssp. **cochinchinensis**
72. S. obovatifolia
77. S. ophirensis
101. S. trisepala
17a. Fruits 2–5-celled. 18
b. Fruits 1-celled. 20
18a. Stone with ridges or grooves. . . . . **47. S. glabriramifera**
77. S. ophirensis
b. Stone smooth. 19
19a. Acumen shorter than 5 mm. Inflorescence not a raceme. Bracts persistent. Fruits more than 10 mm long. Seeds straight. . . . . **72. S. obovatifolia**
b. Acumen longer than 5 mm. . . . . **24. S. celastrifolia**
20a. Leaves shorter than 5 cm. . . . . **106. S. whitfordii**
b. Leaves longer than 5 cm. 21
21a. Fruits ampulliform. . . . . **77. S. ophirensis**
b. Fruits spindle-shaped or otherwise not ampulliform. 22
22a. Bracts caducous. 23
b. Bracts persistent. 24
23a. Inflorescence not a raceme. . . . . **74. S. odoratissima**
b. Inflorescence a (basally branched) raceme. . . . . **77. S. ophirensis**
24a. Stone spindle-shaped, with low ridges. . . . . **42. S. filipes**
b. Stone ampulliform. . . . . **77. S. ophirensis**

KEY TO THE SPECIES OF CELEBES AND THE MOLUCCAS

(flowering material)

1a. Corolla hairy. . . . . **74. S. odoratissima**
b. Corolla glabrous. 2
2a. Midrib prominent on the upper surface. . . . . **61. S. lucida**
b. Midrib impressed in the upper surface. 3
3a. Twigs hairy. 4
b. Twigs glabrous. 19
4a. Underside of leaves glabrous. 5
b. Underside of leaves hairy. 10
5a. Leaves distichous. Bracts caducous. . . . . **58. S. laeteviridis**
b. Leaves spirally arranged. 6
6a. Calyx glabrous. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Calyx hairy. 7

7a. Leaves crowded towards the end of the twigs. Twigs thick, tapering towards apex. **84. S. polyandra**
b. Leaves evenly distributed. 8
8a. Calyx tube hairy. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Calyx tube glabrous. 9
9a. Calyx tube to *c.* 1 mm high. . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Calyx tube more than 1 mm high. . . **27-15. S. cochinchinensis** ssp. **leptophylla**
10a. Leaves distichous. 11
b. Leaves spirally arranged. 12
11a. Calyx limb hairy. Inflorescence a fascicle. Bracts persistent. Calyx tube *c.* 1 mm high, calyx limb *c.* 1 mm long, calyx lobes not becoming longer by tearing. Style base hairy. Fruits ampulliform. . . . . **41. S. fasciculata**
b. Calyx limb glabrous. Inflorescence not a fascicle. Bracts caducous. Calyx tube more than 1 mm high, calyx limb longer than 1 mm, calyx lobes becoming longer by tearing. Style base glabrous. Fruits not ampulliform. . . . **58. S. laeteviridis**
12a. Calyx glabrous. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Calyx hairy. 13
13a. Upper side of leaves hairy. . . . . **3. S. adenophylla**
b. Upper side of leaves glabrous. 14
14a. Calyx tube glabrous. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Calyx tube hairy. 15
15a. Calyx limb glabrous. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Calyx limb hairy. 16
16a. Bracts to *c.* 1 mm long. 17
b. Bracts longer than 1 mm. 18
17a. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Calyx tube 1–2 mm high. Stone not ampulliform. . . . . **3. S. adenophylla**
b. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaced. Calyx tube *c.* 3 mm high. Stone ampulliform. . . . . **41. S. fasciculata**
18a. Bracts caducous. Calyx tube *c.* 1 mm high. **77-3. S. ophirensis** var. **densireticulata**
b. Bracts persistent. Calyx tube more than 1 mm high. **27-15. S. cochinchinensis** ssp. **leptophylla**
19a. Underside of leaves hairy. 20
b. Underside of leaves glabrous. 21
20a. Leaves distichous. Petiole 0–5 mm. Bracts and bracteoles caducous. **58. S. laeteviridis**
b. Leaves spirally arranged. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
21a. Calyx glabrous. 22
b. Calyx hairy. 28
22a. Calyx tube to *c.* 1 mm high. 23
b. Calyx tube more than 1 mm high. 24
23a. Inflorescence a raceme. Bracts caducous. . . . . **24. S. celastrifolia**

b. Inflorescence a (basally branched) spike. Bracts persistent. **27-8. S. cochinchinensis** ssp. **laurina**

24a. Twigs thick. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**

b. Twigs not thick. 25

25a. Inflorescence not a spike. Bracts caducous. . . . . **64. S. maliliensis**

b. Inflorescence a (basally branched) spike. Bracts persistent. 26

26a. Disk hairy. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**

b. Disk glabrous. 27

27a. Inflorescence axis glabrous. . . . . **27-8. S. cochinchinensis** ssp. **laurina**

b. Inflorescence axis hairy. . . . . **27-8. S. cochinchinensis** ssp. **laurina** **27-15. S. cochinchinensis** ssp. **leptophylla**

28a. Leaves distichous. . . . . **58. S. laeteviridis**

b. Leaves spirally arranged. 29

29a. Calyx tube glabrous. 30

b. Calyx tube hairy. 31

30a. Calyx tube to *c.* 1 mm high. . . . . **27-1. S. cochinchinensis** ssp. **cochinchinensis**

b. Calyx tube more than 1 mm high. . . . **27-15. S. cochinchinensis** ssp. **leptophylla**

31a. Calyx limb glabrous. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**

b. Calyx limb hairy. 32

32a. Bracts to *c.* 1 mm long. . . . . **77. S. ophirensis**

b Bracts longer than 1 mm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**

KEY TO THE SPECIES OF CELEBES AND THE MOLUCCAS

(fruiting material)

1a. Midrib prominent on the upper surface. . . . . **61. S. lucida**

b. Midrib impressed in the upper surface. 2

2a. Twigs hairy. 3

b. Twigs glabrous. 14

3a. Leaves distichous. 4

b. Leaves spirally arranged. 6

4a. Underside of leaves glabrous. . . . . **58. S. laeteviridis**

b. Underside of leaves hairy. 5

5a. Fruits ampulliform. Inflorescence a fascicle. Bracts persistent. **41. S. fasciculata**

b. Fruits not ampulliform. Inflorescence not a fascicle. Bracts caducous. **58. S. laeteviridis**

6a. Leaves crowded towards the end of the twigs. . . . . **84. S. polyandra**

b. Leaves evenly distributed. 7

7a. Underside of leaves glabrous. 8

b. Underside of leaves hairy. 9

8a. Seed and embryo twice curved. . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Seed and embryo uncinately curved towards the base.
27-15. S. cochinchinensis ssp. **leptophylla**
9a. Upper side of leaves hairy (pulverulent). . . . . **3. S. adenophylla**
b. Upper side of leaves glabrous. 10
10a. Bracts caducous. 11
b. Bracts persistent. 12
11a. Stone smooth. Inflorescence a (basally branched) raceme.
77-3. S. ophirensis var. **densireticulata**
b. Stone with ridges or grooves. Inflorescence a panicle. . . . **74. S. odoratissima**
12a. Seeds not straight. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Seeds straight. 13
13a. Leaf index more than 3. Leaf margin (and petiole) beset with closely spaced glands. Stone ellipsoid. . . . . **3. S. adenophylla**
b. Leaf index 2–3. Leaf margin (and petiole) often glandular but glands not closely spaces. Stone ampulliform. . . . . **41. S. fasciculata**
14a. Underside of leaves hairy. 15
b. Underside of leaves glabrous. 16
15a. Leaves distichous. Petiole 0–5 mm. Bracts caducous. Seeds straight.
58. S. laeteviridis
b. Leaves spirally arranged. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
16a. Fruits 2–5-celled. 17
b. Fruits 1-celled. 18
17a. Leaves longer than 15 cm. Fruits more than 10 mm long. Leaf margin entire. Nerves more than 10 pairs. Stone with ridges or grooves. Seeds straight.
64. S. maliliensis
b. Leaves shorter than *c.* 15 cm. Fruits to *c.* 10 mm long. . . . **24. S. celastrifolia**
18a. Leaves distichous. . . . . **58. S. laeteviridis**
b. Leaves spirally arranged. 19
19a. Bracts caducous. 20
b. Bracts persistent. 21
20a. Inflorescence not a raceme. . . . . **74. S. odoratissima**
b. Inflorescence a (basally branched) raceme. . . . . **77. S. ophirensis**
21a. Twigs (exceptionally) thick. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Twigs not (exceptionally) thick. . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
27-7. S. cochinchinensis ssp. **laurina**
77. S. ophirensis

KEY TO THE SPECIES OF NEW GUINEA (INCL. NEW IRELAND AND NEW BRITAIN)

(flowering material)

1a. Leaves verticillate. . . . . **54. S. herzogii**
b. Leaves not verticillate. 2
2a. Inflorescence only 1-flowered. 3
b. Inflorescence more flowered. 5
3a. Calyx glabrous. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Calyx hairy. 4
4a. Calyx tube hairy. . . . . **93a. S. salicioides**
b. Calyx tube glabrous. . . . . **69. S. multibracteata**
5a. Calyx glabrous. 6
b. Calyx hairy. 24
6a. Twigs hairy. 7
b. Twigs glabrous. 11
7a. Petiole 0 to 5 mm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Petiole more than 5 mm. 8
8a. Under side of leaves glabrous. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Under side of leaves hairy. 9
9a. Upper side of leaves hairy. Calyx tube to *c.* 1 mm long. . . **82. S. paucistaminea**
b. Upper side of leaves glabrous. Calyx tube more than 1 mm high. 10
10a. Bracts caducous. Calyx lobes becoming longer by tearing. . . **25. S. cerasifolia**
b. Bracts persistent. Calyx lobes not becoming longer by tearing. **27-15. S. cochinchinensis** ssp. **leptophylla**
11a. Underside of leaves hairy. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Underside of leaves glabrous. 12
12a. Bracts caducous. 13
b. Bracts persistent. 16
13a. Bracts longer than 3 mm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Bracts shorter than 3 mm. 14
14a. Calyx tube to *c.* 1 mm long. . . . . **24. S. celastrifolia**
b. Calyx tube more than 1 mm high. 15
15a. Disk hairy. . . . . **35. S. cylindracea**
b. Disk glabrous. . . . . **27-10. S. cochinchinensis** ssp. **thwaitesii**
16a. Inflorescence not a spike. 17
b. Inflorescence a (basally branched) spike. 19
17a. Inflorescence a fascicle. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Inflorescence not a fascicle (*e.g.* a panicle). 18
18a. Reticulation fine. Calyx tube to *c.* 1 mm long. . . . . **29. S. composiracemosa**
b. Reticulation coarse. Calyx tube more than 1 mm high. **27-10. S. cochinchinensis** ssp. **thwaitesii**

19a. Petiole 0 to 5 mm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Petiole more than 5 mm. 20
20a. Leaves shorter than 5 cm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Leaves longer than 5 cm. 21
21a. Calyx tube to *c.* 1 mm . . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Calyx tube more than 1 mm high. 22
22a. Twigs not thick. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Twigs thick. 23
23a. Terminal buds hairy, small. Acumen longer than 5 mm. Bracts hairy, shorter than 3 mm. Disk hairy. Leaves elliptic or circular.
27-15. S. cochinchinensis ssp. **leptophylla**
b. Terminal buds glabrous, large. Acumen shorter than 5 mm. Bracts glabrous, longer than 3 mm. Disk glabrous. Leaves obovate. . . . . **87. S. pulvinata**
24a. Calyx tube glabrous. 25
b. Calyx tube hairy. 27
25a. Calyx tube hidden by bracts and bracteoles.
27-1. S. cochinchinensis ssp. **cochinchinensis**
b. Calyx tube not hidden by bracts and bracteoles. 26
26a. Inflorescence a spike, forming a short cone in bud. . . . . **25. S. cerasifolia**
b. Inflorescence sometimes a spike, but never forming a cone in bud.
27-15. S. cochinchinensis ssp. **leptophylla**
27a. Twigs at least 8 mm thick. Leaves 21–62 cm. . . . . **46. S. gigantifolia**
b. Twigs thinner. Leaves at most 33 cm, but usually much smaller. 28
28a. Calyx limb 2- to 4-lobed or symmetrically cleft. Calyx lobes becoming longer by tearing. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Calyx limb regularly 5-lobed. 29
29a. Disk glabrous. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Disk hairy. 30
30a. Bracts and bracteoles caducous. . . . . **35. S. cylindracea**
b. Bracts persistent. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**

KEY TO THE SPECIES OF NEW GUINEA (INCL. NEW IRELAND AND NEW BRITAIN)

(fruiting material)

1a. Leaves verticillate. . . . . **54. S. herzogii**
b. Leaves not verticillate. 2
2a. Twigs glabrous. 3
b. Twigs hairy. 10
3a. Underside of leaves hairy. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Underside of leaves glabrous. 4

4a. Nerves more than 15 pairs. . . . . **46. S. gigantifolia**
b. Nerves less than 15 pairs. 5
5a. Twigs thick. 6
b. Twigs not thick. 7
6a. Acumen shorter than 5 mm. Fruits more than 10 mm long. . . **87. S. pulvinata**
b. Acumen longer than 5 mm. Fruits to *c.* 10 mm long.
27-15. S. cochinchinensis ssp. **leptophylla**
7a. Bracts persistent. . . . . **27-10. S. cochinchinensis** ssp. **thwaitesii**
27-15. S. cochinchinensis ssp. **leptophylla**
29. S. composiracemosa
b. Bracts caducous. 8
8a. Fruits more than 10 mm long. . . . . **35. S. cylindracea**
b. Fruits to *c.* 10 mm long. 9
9a. Fruits 3-celled (often 1 or 2 aborted). . . . . **24. S. celastrifolia**
b. Fruits 1-celled. . . . . **27-10. S. cochinchinensis** ssp. **thwaitesii**
10a. Underside of leaves glabrous. 11
b. Underside of leaves hairy. 16
11a. Inflorescence only 1-flowered. 12
b. Inflorescence more-flowered. 14
12a. Leaves shorter than 5 cm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Leaves longer than 5 cm. 13
13a. 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.
27-15. S. cochinchinensis ssp. **leptophylla**
b. 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 more than 10 mm long. Seeds straight. Apex of leaves acuminate. . . . . **69. S. multibracteata**
14a. Petiole 0–5 mm. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Petiole more than 5 mm. 15
15a. Seed and embryo (twice) curved. . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Seed and embryo uncinately curved towards the base.
27-15. S. cochinchinensis ssp. **leptophylla**
16a. Upper side of leaves hairy. . . . . **82. S. paucistaminea**
b. Upper side of leaves glabrous. 17
17a. Inflorescence only 1-flowered. 18
b. Inflorescence more-flowered. 19
18a. Leaf index more than 3. Angle of leaf base less than 90°. Reticulation coarse.
93a. S. salicioides
b. Leaf index 2–3. Angle of leaf base more than 90°. Reticulation fine.
69. S. multibracteata
19a. Bracts caducous. Seeds straight. . . . . **25. S. cerasifolia**

b. Bracts persistent. Seeds not straight. 20
20a. Seed and embryo (twice) curved. . **27-1. S. cochinchinensis** ssp. **cochinchinensis**
b. Seed and embryo uncinately curved towards the base.
27-15. S. cochinchinensis ssp. **leptophylla**

KEY TO THE SPECIES OF THE PALAU, SOLOMON AND FJI IS., AND THE NEW HEBRIDES

1a. Twigs glabrous. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Twigs hairy. 2
2a. Underside of leaves hairy. . . . . **27-15. S. cochinchinensis** ssp. **leptophylla**
b. Underside of leaves glabrous. 3
3a. Inflorescence only 1-flowered. Seeds straight. Leaves ovate. . **102. S. unicarpa**
b. Inflorescence more-flowered. Seeds not straight. 4
4a. Bracts caducous. Seed and embryo not uncinately curved towards the base. Bracteoles caducous. . . . . **90. S. racemosa**
b. Bracts persistent. Seed and embryo uncinately curved towards the base.
27-15. S. cochinchinensis ssp. **leptophylla**

KEY TO THE SPECIES OF AUSTRALIA

1a. Twigs hairy. 2
b. Twigs glabrous. 5
2a. Underside of leaves hairy. Petiole more than 5 mm. 3
b. Underside of leaves glabrous. Petiole 0–5 mm. 4
3a. Upper side of leaves glabrous. Acumen longer than 15 mm. Twigs thick. Leaf index more than 3. Nerves more than 15 pairs. . . . . **33. S. crassiramifera**
b. Upper side of leaves hairy. Acumen shorter than 15 mm. . . **82. S. paucistaminea**
4a. Angle of leaf base less than 60°. Inflorescence a very short raceme. Bracts caducous. **15. S. bauerlenii**
b. Angle of leaf base more than 90°. . . . . **53. S. hayesii**
5a. Petiole 0–5 mm. . . . . **34. S. cyanocarpa**
b. Petiole more than 5 mm. . . . . **27-10. S. cochinchinensis** ssp. **thwaitesii**

3. Symplocos adenophylla Wall.

S. adenophylla Wall. [Cat. (1828) 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; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 240; Brand, Bull. Herb. Boiss. II, 6 (1906) 747; Merr. Philip. J. Sc. 2 (1907) Bot. 298; Ridl. Fl. Mal. Pen. 2 (1923) 303, t. 101; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 274; Fl. Gén. I.-C. 3 (1933) 1002, t. 117 f.

3, 4; Burkill, Dict. 2 (1935) 2113; Fletcher, Fl. Siam. En. 2 (1938) 384; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 27. — *Eugeniodes adenophyllum* O.K. Rev. Gen. Pl. 2 (1891) 410. — Type: *Wallich Cat. 4427A* (K–W, isotypes in BM, CGE, E, FI, K, MEL, NY, W), Penang.

S. bancana Miq. Fl. Ind. Bat. Suppl. 1 (1861) 476. — Type: *Horsfield 39* (U, isotype in K, CGE), Banka.

S. iteophylla Miq. *l.c.*; Merr. En. Born. (1921) 486. — Type: *Teysmann s.n.* (L, isotypes in BO, LE, MEL), Banka.

S. iteophylla Miq. var. *rostrata* Miq. *l.c.* — Type: *Teysmann s.n.* (BO, K, LE, MEL), Sumatra, Sibolga.

S. iteophylla Miq. var. *elliptica* Miq. *l.c.* — Type: *Teysmann s.n.* (BO), Sumatra, Pajakumbuh.

S. adenophylla var. *virgata* [Wall. Cat. (1828) 4427B, *nomen*] *ex* Brand, Pfl. R. Heft 6 (1901) 48. — Type: *Wallich 4427B* (E, K–W, MEL, NY, W), Singapore.

S. beccarii Brand, Pfl. R. Heft 6 (1901) 49. — Type: *Beccari 147* (K, isotypes in BM, L, MEL), Sumatra, Padang Uplands.

S. adenophylla var. *merrittii* Brand, Philip. J. Sc. 3 (1908) Bot. 7; Merr. En. Philip. 3 (1923) 297. — Lectotype: *Merrill 5752* (NY, US), Mindoro, Mt. Halcon.

S. fulvosa King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 233; Ridl. Fl. Mal. Pen. 2 (1923) 300. — Lectotype: *Scortechini 567* (K, isotype in BO), Malaya, Perak.

S. constricta Brand, Pfl. R. Heft 6 (1901) 41; Merr. En. Born. (1921) 486. — Type: *Creagh s.n.* (K), N. Borneo.

S. adenophylla var. *atrata* Brand, Bull. Herb. Boiss. II, 6 (1906) 748. — Type: *King's coll. 1269* (CAL, isotype in CGE), Singapore.

S. palawanensis Brand, Philip. J. Sc. 3 (1908) Bot. 10; Merr. En. Philip. 3 (1923) 301. — Type: *FB 3870 Curran* (K), Philippines, Palawan.

S. pruniflora Ridl. J. Fed. Mal. St. Mus. 4 (1909) 46; Fl. Mal. Pen. 2 (1923) 304. — *S. pahangensis* Brand, Fedde Repert. 14 (1916) 326. — Type: *Ridley 13685* (B†, K, SING), Malaya, Pahang, Batang Padang.

S. brandii Elmer, Leafl. Philip. Bot. 4 (1912) 1477. — Type: *Elmer 12304* (BISH, BO, E, K, L, LE, W, WRSL), Sibuyan I., Capiz Prov., Mt. Giting-Giting.

S. adenophylla var. *montana* Ridl. Fl. Mal. Pen. 2 (1923) 303. — Lectotype: *Robinson 5320* (BM), Pahang, G. Tahan.

S. maclurei Merr. Philip. J. Sc. 23 (1923) 260. — Type: *CCC 9461 McClure* (A, BISH, HK, P), Hainan, Five Finger Mts.

S. touranensis Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 285. — Lectotype: *Poilane 6908* (P), Annam, Tourane.

S. puncto-marginata Chevalier *ex* Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 174; Fl. Gén. I.-C. 3 (1933) 1004. — Lectotype: *Poilane 10998* (P, isotype in SING), Annam, Quangtri, massif de Dong Tri.

S. clemensorum Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 170; Fl. Gén. I.-C. 3 (1933) 1001. — Lectotype: *Clemens 3789* (P, isotypes in UC, W), Annam, Mt. Bana, près de Tourane.

S. stewardii Sleumer, Fedde Repert. 42 (1937) 266. — Type: *Steward & Cheo 865* (A, *non vidi*, isotypes in BO, P, W), Kwangsi, Yung Hsien, Ta Tseh Tsuen.

Shrub or tree, up to 20 m high and 50 cm ϕ. Twigs pulverulent-puberulous or rarely tomentellous, glabrescent; bud scales small, with same indument, not leaving conspicuous scars. *Leaves* chartaceous-coriaceous, often dark brown *statu sicco*, pulverulous beneath or on both faces soon glabrescent, rarely tomentellous-tomentose beneath, usually narrowly elliptic, 4.5 – 16 by 1.2 – 4.7 cm, index (2 –)3 – 4.5(– 6); base cuneate, attenuate, base angle 20° – 40°(– 50°); apex long acuminate to caudate (acumen 7 – 35

mm, 4–15 mm in var. *touranensis*); margin recurved-revolute, crenate to entire, nearly always with (often pellucid and vesicular) closely spaced glands, these often also on the petiole, bracts and calyx lobes. *Midrib* much prominent beneath; nerves 4–12 pairs, only slightly prominent beneath, sometimes even quite inconspicuous, curved upwards and meeting in a looped intramarginal vein, often at a considerable distance of the margin; reticulation often fine, prominent, but sometimes coarse, and then in the thinner leaves appearing to be fine with translucent light. *Petiole* 6—12 mm. *Inflorescences* pseudoterminal or from the axils of the leaves, a spike or raceme, or mostly a basally branched up to 6 cm long panicle consisting of lax spikes or racemes; axis tomentellous-puberulous, glabrescent. Bracts and bracteoles persistent under the fruit, with same indument as axis, $\frac{1}{2}$–1(–2) mm long. Pedicel often only present in older flowers, up to 3 mm. *Calyx* with same indument as axis (in var. *touranensis* and rarely in var. *adenophylla* axis and calyx with longer, nearly woolly-tomentose indument), tube 1–2 mm high, the limb nearly wholly divided in the $\frac{1}{2}$–1 mm long lobes (in var. *touranensis* the lobes hidden by the indument). *Corolla* 2–5 mm long. *Stamens* (20–)25–50, longer than corolla. *Disk* glabrous or rarely hairy, pulvinate or annular. *Style* glabrous or with some hairs towards the base when the disk is hairy, 2–4 mm. *Fruits* with 0–4 mm long pedicels, ellipsoid to cylindrical, sometimes with *c.* 6 ridges when dry, pulverulent but soon glabrous, crowned by the inconspicuous incurved calyx lobes, 8—10(—11) by 3–5(–6) mm; mesocarp thin, coriaceous; endocarp $\frac{1}{2}$–$\frac{3}{4}$ mm thick; only 1 cell developed. *Seed* 1, with straight embryo.

Distribution. China, Indo-China, Thailand, Malaya, Sumatra, Bawean I. (Java Sea), Borneo, Philippines, Celebes, and Moluccas (Sula Is.).

KEY TO THE VARIETIES

1a. Twigs and inflorescence usually with a very short indument. Leaves beneath usually pulverulent by minute hairs; acumen 7–35 mm. Calyx lobes clearly separate **3-1.** var. **adenophylla**

b. Twigs tomentellous, inflorescence woolly-tomentose. Leaves beneath when young densely tomentellous, acumen 4–15 mm. Calyx lobes hidden by the indument. **3-2.** var. **touranensis**

3-1. var. **adenophylla**

All synonyms except *S. touranensis* Guillaumin.

Distribution. As for the species.

China. Kwangsi: 5 collections. — Kwangtung: *CCC 14527, 14674*, Ying Tak, Wan Tong Shan; *W. T. Tsang 21029, 21297*, Tapu Distr., Tai Mo Shan. — Hainan: *c.* 15 collections.

Indo-China. Annam: 8 collections. — Tonkin: *W. T. Tsang 27390, 27471*, Tien Yen.

Thailand. Nakawn Sritamarat: *van Beusekom c.s. 788, 903*; *Flora of Thailand 12089*, Kao Luang.

alt. 500—1300 m; *Kerr 14315*, low alt. — Puket: *Kerr 13924*, Satul, low alt.; *16958*, Ranawng, alt. 1300 m; *18461*, Pang-nga, alt. 1000 m; *18951*, Krabi, alt. 300 m.

SUMATRA. Atjeh: *van Steenis 6282*, Burni Lintang, alt. 1800 m; *9132*, Goh Lembuh, alt. 3000 m. — Tapanuli: *Alston 14992*; *Rahmat si Boeea 11150*, *11309*, Toba. — Westcoast: *c.* 10 collections, alt. 1700—2200 m. — Eastcoast: *Rahmat si Boeea 11375*, Asahan. — Riouw: *Buwalda 6240*, Kp. Pulian, Tering Bay, low alt.; *Teysmann s.n.*, Lingga. — Banka: 6 collections. — Billiton: *bb 10250*, Tandjong Pandan, alt. 130 m.

MALAY PENINSULA. Penang: *c.* 15 collections. — Kedah: 6 collections, mostly from Kedah Peak, alt. 900—1200 m. — Kelantan: *CF 37645 Symington*; *Kep. FRI 12417*, G. Stong, alt. 750 m. — Perak: 9 collections, alt. 750—1500 m. — Selangor: 10 collections, alt. 300—1500 m. — Pahang: many collections, alt. 300—1350 m. — Trengganu: 8 collections, alt. 300—1000 m. — Negri Sembilan: *CF 104911*, Jelebu, alt. 300 m. — Johore: *CF 98060*; *Kep. FRI 7515*, *8720*, G. Blumut, alt. 900 m; *SF 10666*. — Malacca: *Maingay 959*. — Singapore: *c.* 20 collections.

JAVA SEA. Bawean I.: *Buwalda 3194*, alt. 400 m.

BORNEO. Sabah: Many collections from Mt. Kinabalu and Sandakan, alt. 0—2400 m. — Sarawak: Many collections from Kuching, Miri, and G. Murud, alt. 0—1700 m. — Brunei: *BRUN 7* and *3155*. — Kalimantan: *H. Hallier 2303*, G. Klamm; *2682*, Liang Gagang; *Korthals s.n.*, Sakumbang; *Kostermans 10173*, Balikpapan Distr., Sg. Mentawir.

PHILIPPINES. Mindoro: *Merrill 5752*; *PNH 3257*, Mt. Halcon. — Panay: *BS 30636*, Capiz Prov., Mt. Madiaas. — Sibuyan: *Elmer 12304*, Mt. Giting-Giting.

CELEBES. *bb 20224*, *20889*, Gowa, Lembaja, alt. 1600 m; *Kjellberg 2650*, B. Torema, alt. 1400 m.

MOLUCCAS. Taliabu: *Hulstijn 51*.

Uses. White wood very hard, good for columns (Guillaumin, 1933, *l.c.*) but according to Desch, Mal. For. Rec. 15-2 (1954) 593 the wood is soft and light. The wood is used for light construction (*sec. coll.*). 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 (Skeat & Blagden *ex* Burkill, 1935, *l.c.*).

3-2. var. **touranensis** (Guillaumin) Noot., *comb. nov.*

S. touranensis Guillaumin, Bull. Soc. Bot. Fr. 71 (1974) 285.

INDO-CHINA. Annam: 6 collections, alt. 1000—1900 m.

4. **Symplocos anamallayana** Beddome

S. anamallayana Beddome, For. Man. (1872) 150; Icones (1874) t. 116; Clarke, Fl. Br. Ind. 3 (1882) 581; Brand, Pfl. R. Heft 6 (1901) 65; Gamble, Fl. Pres. Madras 5 (1923) 784. — *S. uniflora* Beddome, Trans. Linn. Soc. 25 (1866) 219, *non* Benth. (1841). — Type: *Beddome 4930* (BM, K), India, Anamallay Hills, 6000 ft.

Twigs glabrous; terminal buds small, glabrous. *Leaves* glabrous, ± elliptic, 2.5—5.3 by 1.7—2.6 cm, index 1.4—2.3; base cuneate-rounded, often attenuate, base angle 50°—80°; apex acute to rounded; margin denticulate, recurved to revolute. *Nerves* 5—7 pairs, prominent beneath, meeting in a looped intramarginal vein; reticulation rather coarse, faintly prominent beneath. *Petiole* 2—3 mm. *Flowers* solitary from the axils of the leaves. Bracts absent; bracteoles glabrous, leafy, caducous, *c.* 2 mm long. Pedicel glabrous (or with some hairs towards the apex), 5—12 mm. *Calyx* glabrous;

tube 1½ mm high; limb nearly wholly divided, *c.* 1 mm; lobes semi-elliptic, ciliolate. *Corolla* 5–6 mm. *Stamens* 40–50. *Disk* flat, inconspicuous, minutely pilose. *Style* glabrous, 3 mm. *Fruits* not seen.

INDIA. *Beddome 4930*; *Fischer 3312*, Anamallay Hills, 10°25′ N 77° E, alt. 1800—2200 m.

5. Symplocos angustata (Thwaites) Clarke – **Pl. 3a.**

S. angustata (Thwaites) Clarke, Fl. Br. Ind. 3 (1882) 585; Trimen, Fl. Ceyl. 3 (1895) 108; Brand, Pfl. R. Heft 6 (1901) 64. — *S. elegans* Thwaites var. *angustata* Thwaites *p.p. excl. C.P. 155 quae est S. minor* Clarke (see under *S. hirsuta* var. *minor*), En. Pl. Zeyl. (1860) 185. — Lectotype: *Thwaites C.P. 78* (K, isotypes in BM, BO, CGE, FI, LE, P), Ceylon, Jatagama.

Twigs appressedly rufous pilose. Terminal buds small, growth discontinuous. *Leaves* ovate-elliptic, very finely appressedly pilose underneath, especially on the midrib (handlens), 2–6.5 by 0.8–2.4 cm, index 2–2.9; base cuneate, base angle 30°–70°; apex long acuminate, acumen 6–17 mm. *Nerves* 7–9 pairs, curved upwards and meeting in a looped intramarginal vein; reticulation fine, prominent, or rather obscure in thicker leaves. *Petiole* 2–5 mm. *Inflorescence* a branched, very slender raceme; axis sparsely appressedly pilose. Bracts and bracteoles sparsely appressedly pilose, narrowly elliptic, ½–1½ mm, both persistent. Pedicel 0–1 mm, in terminal flowers often longer. *Calyx* glabrous, tube ½ mm, limb *c.* 1 mm nearly wholly divided in the semi-orbicular lobes. *Corolla c.* 2 mm. *Stamens c.* 40. *Disk* with few hairs, annular. *Style* glabrous, *c.* 1 mm. *Fruits* flask-shaped, narrowed for the upper 3 mm, *c.* 10 by 4 mm, the persistent calyx lobes not included; stone with same shape, surface smooth, *c.* 10 by 3 mm; exocarp thin, only one cell developed. *Seed* 1, straight, with straight embryo.

CEYLON. *Alexander Moon 705*; *Thwaites C.P. 78.*

6. Symplocos annamensis Noot., *sp. nov.*

Type: *M. Schmid s.n.* (P), South Vietnam, Bao Loc, Prov. Lâm Dông, December 1960.

Ramuli glabri gemmis apicalibus appresse pilosis. Folia glabra anguste elliptica 14—24 cm longa, 4,5—9 cm lata indice 2,7 ad 3,1, base acuta ad truncata apice acuminato acumine 3 ad 10 cm longo, nervis 10—15 paribus in venam intramarginalem convenientibus, petiolo 5—15 cm longo. Inflorescentia spicata 2 cm longa axe puberula glabrescente bracteis non vidi bracteolis pubescentibus 2 mm longis caducis. Calyx appresse puberulus tubo 1½ mm alto limbo fissente demum 3 vel 4 partito c. 3 mm longo. Corolla 3 vel 4 lobata 5 mm longa. Stamina c. 100 ad 7 mm longa. Discus glaber cylindricus. Stylus glabrus. Fructus ampulliformis 15 mm longus 7 mm latus endocarpio duro lignoso fundo irregulariter sulcato. Semen curvatum interordinatum in protuberationibus endocarpii embryone curvato.

Twigs glabrous; terminal buds minutely appressedly pilose. *Leaves* narrowly elliptic, glabrous, 14–24 by 4.5–9 cm; index 2.7–3.1; base acute to truncate, base angle 30°–90°; apex slightly acuminate, acumen 3–10 mm; margin denticulate. *Nerves* 10–15 pairs, meeting in a conspicuous intramarginal vein far from the margin; secondary and tertiary veins forming a prominent coarse reticulation, between them the lesser

veins form a faintly prominent fine reticulation which is clearly visible with translucent light. *Petiole* 5—15 mm, stout. *Inflorescence* a basally branched spike of *c.* 2 cm, becoming longer in fruit; axis puberulous, glabrescent. Bracts not seen; bracteoles puberulous, *c.* 2 mm long, caducous. *Calyx* appressedly puberulous, tube $1\frac{1}{2}$ mm high, the limb torn into 3—4 pieces, *c.* 3 mm long. *Corolla* 3—4-lobed, *c.* 5 mm. *Stamens c.* 100, to 7 mm long. *Disk* glabrous, cylindrical. *Style* glabrous, *c.* 5 mm. *Fruits* ampulliform, the neck *c.* 5 by 5 mm, the belly *c.* 10 by 7 mm; mesocarp thin, fleshy; endocarp hard, woody, the belly irregularly grooved outside, the inside with irregularly divided, rather high protuberances; the neck smooth. Seed 1, U-shaped, the outline of the whole seed ovoid, the belly with intrusions fitting in the protuberances of the stone; embryo U-shaped.

INDO-CHINA. Annam: *Pételot 8918*; *Poilane 21003*, *21804*; *Schmid s.n.*, Haut Donai, Blao; *Poilane 6411*, Nhatrang; *Schmid s.n.*, Bao Loc, Prov. Lâm Dông.

7. Symplocos anomala Brand — **Pl. 1a-f.**

S. anomala Brand, Bot. Jahrb. 29 (1900) 529; Pfl. R. Heft 6 (1901) 67; Rehder in Sargent, Pl. Wils. 2 (1916) 596; J. Arn. Arb. 15 (1934) 300; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 23. — *Bobua anomala* Migo, Bot. Mag. Tokyo 56 (1942) 267. — Lectotype: *Henry 7094* (E, isotype in K), China, Szechwan.

S. alata Brand, Bot. Jahrb. 29 (1900) 529; Pfl. R. Heft 6 (1901) 67; Merr. & Chun, Sunyatsenia 5 (1940) 165.—Type: *Bock & von Rosthorn 2166* (*non vidi*), China, Szechwan.

S. concolor Brand, Pfl. R. Heft 6 (1901) 65; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 242; Ridl. Fl. Mal. Pen. 2 (1923) 304; Fletcher, Fl. Siam. En. 2 (1938) 385.—Type: *Curtis 1039* (K, isotype in SING), P. Penang. Penara Bukit.

S. argentea Brand, Pfl. R. Heft 6 (1901) 67. — Lectotype: *Faber 87* (NY, isotypes in A, K), China, Szechwan, Mt. Omei.

S. okinawensis Matsumura, Bot. Mag. Tokyo 15 (1901) 76; Walker, Imp. Trees Ryu-Kyu Is. (1954) 265, t. 170. — Type: *Matsumura* (*non vidi*), Ryu Kyu Is., Okinawa.

S. morrisonicola Hayata, Fl. Mont. Form. (1908) 160; Ic. Pl. Form. 5 (1915) 110, t. 33; Mori, Trans. Nat. Hist. Soc. Form. 24 (1934) 195; Sylvia 5 (1934) 240; Kanehira, Form. Trees (ed. 1936) 596, t. 552. — *Bobua morrisonicola* Kanehira & Sasaki, List Pl. Form. (1928) 331, *non vidi*; Cat. Govt. Herb. (1930) 408. — Syntypes: *S. Nagasawa 737*, Oct. 1905, Suizan; *G. Nakahara*, Oct. 1906, Tozan; *T. Kawakami & U. Mori 1702*, Oct. 1906, Mt. Morrison (*non vidi*), Formosa.

S. dielsii Lévl. Fedde Repert. 9 (1911) 445. — Type: *Cavalerie 3330* (E, isotype in K), China, Kweichow, Pinfa-Longly.

S. esquirolii Lévl. Fedde Repert. 9 (1911) 445. — Type: *Cavalerie 2380* (E, isotype in K), China, Kweichow, Pinfa-Majo.

S. fusonii Merr. Philip. J. Sc. 15 (1919) 251. — *S. anomala* var. *fusonii* Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 24. — Type: *CCC 2677 To Kang Peng* (A, isotypes in BM, E, K), China.

S. kiraishiensis Hayata, Ic. Pl. Form. 9 (1920) 68, pl. IV. — *S. morrisonicola* var. *kiraishiensis* Mori, Trans. Nat. Hist. Soc. Form. 24 (1934) 195; Sylvia 5 (1934) 240. — Type: *Y. Shimada* (*non vidi*), Formosa, Kiraishi, March 1918, 12000 ft.

S. chevalieri Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 170; Fl. Gén. I.-C. 3 (1933) 1018. — Type: *Chevalier 38805* (P), Annam, Prov. Nhatrang, massif de Honba.

S. anomala var. *l(e)iosiphon* Hand.-Mazz. Symb. Sinicae 7 (1936) 808; Beih. Bot. Centralbl. 62-B (1943) 24. — Type: *Handel-Mazzetti 12400* (W, isotype in E), China, Hunan, Wukang, 1300 m.

S. nagensis C. E. C. Fischer, Kew Bull. (1940) 38. — Type: *Bor 6745* (K), Assam, Naga Hills, Kanjang, 2350 m.

S. anomala var. *nitida* Li, J. Arn. Arb. 24 (1943) 452. — Type: *W. T. Tsang 24423* (A, isotype in NY), China, Kwangsi, Shap Man Taai Shan.

Shrub or tree, up to 21 m. Twigs tomentellous-tomentose to appressedly pubescent, glabrescent when older, rarely very soon glabrescent, but then still hairy directly under the terminal bud, exceptionally buds and twigs totally glabrous (see note). Buds small, with several scales, clothed by the mentioned indument. *Leaves* (narrowly) elliptic, rarely ovate, 2.5–12 by 1.2–3 cm, index 2–3(–4.6); glabrous or rarely the young leaves finely appressedly hairy beneath, brownish or olive to (less often) yellowish green glossy above, coriaceous, but often rather thin in Malesia; base attenuate, base angle 15°–60°; acumen (0–)2–20(–25) mm; tip blunt or acute, sometimes apiculate; margin more or less revolute, finely glandular dentate to nearly entire. *Midrib* above glabrous or hairy, prominent, in Malesia in thin leaves hardly so, often becoming flat, rarely even flat and sunken; nerves 5–11 pairs, more or less prominent, sometimes rather inconspicuous, looped and joined into an intramarginal vein 2–3 mm from the margin. *Petiole* narrowly winged, sometimes with some glands on the wings, 2–7 mm. *Inflorescence* a (rarely basally branched) axillary, lax raceme to 2(–3½) cm; axis tomentose to appressedly pubescent. Bracts 1–2 mm, bracteoles ¾–1½ mm, both (narrowly) ovate, persistent, with same indument as axis. Pedicels *id.*, 2–5 mm. *Calyx tube* tomentose to (finely) appressedly pubescent, *c.* 1 mm high; limb with same indument or less hairy, 1–2½ mm; lobes semi-elliptic (to semi-orbicular), rounded, cili(ol)ate, ½–2 mm; rarely the calyx fully glabrous, with ciliate lobes. *Corolla* 4–6 mm. *Stamens* (20–)50–more than 100, up to 1–2 mm longer than corolla. *Disk* low cylindrical, often 5-(glandular)lobed, tomentose or shortly (soft) hairy. *Style* glabrous or hairy towards the base, 4–7 mm. *Fruits* 3-celled, ellipsoid, *c.* 10 by 6 mm, (in Borneo 10–13 by 6–8 mm); sometimes 1–2 locules aborted and fruit only 4 mm wide; calyx lobes persistent, often inconspicuous; mesocarp fleshy, thin; endocarp woody, faintly ribbed. *Seeds* 1(–2) in each cell, straight; embryo straight or slightly curved towards the base.

Distribution. Burma, Thailand, Indo-China, China, Japan (Ryu Kyu Is.), Formosa, Malaya, Sumatra, Banka, and Borneo.

BURMA. Thaton Distr., Dawne Range: *J. H. Lace 4637.*

THAILAND. Rachaburi: *van Beusekom & Phengklai 176*, Khao Yai, alt. 800—1000 m. — Surat: *Kerr 18161*, Bankrut, alt. 800—1000 m. — Puket: *SF 2934 Haniff & Nur*, Kopah. — Kanchanabury: *van Beusekom & Phengklai 3778.*

INDO-CHINA. Annam: *A. Chevalier 38805*, massif du Honba; *Poilane 27764*, S. of Hue, Nui Bach Ma, alt. 1500 m. — Tonkin: *W. T. Tsang 26901, 26979*, NE. of Moncay; *27198*, Taai Wong Mo Shan; *30647*, Tien Yen, Ho yung Shan.

CHINA. Yunnan: 15 collections, alt. 700—2700 m. — Szechwan: *c.* 20 collections, alt. 1000—1200 m. — Kweichow: 11 collections, alt. 400—600 m. — Kwangsi: *c.* 20 collections. — Hunan: *Fan & Li 431*, Sinning Hsien, alt. 1250 m. — Kwangtung: 7 collections. — Hainan: 7 collections, alt. 1000—1500 m. — Anhwei: *S. S. Chien 1258*, Huang Shan; *S. C. Sun 1453*, Chiuhwashan; *R. C. Ching 2972, 3066*, Wangshan, alt. 600 m; *3258*, Wu Yuan, alt. 1000 m. — Kiangsu: *Ching & Tso 634*,

Chian shan, alt. 180 m. — Hupeh 6 collections. — Chekiang: 9 collections, alt. 150—1200 m. — Fukien: 5 collections. — Formosa: 7 collections, alt. 400—3000 m.

JAPAN. Ryu Kyu Is.: Okinawa: *Hatusima 18013*, Tanyudake; *S. Sonohara c. s. 6307*, Kunigama, Tanyudake; *T. Yamazaki 1958*, Yonahadake, alt. 400 m; *E. H. Walker 8220*, id., alt. 300 m.

SUMATRA. Westcoast: *bb SWK/II-16*, Sg. Darel, Batas Tjuli, alt. 1200 m. — Eastcoast: *J. A. Lörzing 8878*, Dolok Singakan, alt. 1750 m; *Rahmat si Boeea 7119*, Asahan. — Banka: *Kostermans & Anta 12*, 383, Lobok Besar, alt. 20 m.

MALAY PENINSULA. Kedah: *SF 35022*, G. Lang. — Perak: *SF 23666*, Ulu Batang Padang, alt. 1000 m. — P. Penang: *C. Curtis 1039*, Penara Bukit.

BORNEO. Sarawak: *S 26357*, Ulu Sg. Belaban, G. Murud, alt. 1600 m. — Sabah: *c.* 25 collections from Kinabalu, alt. 1000—2200 m; *SAN 16710*, Sipitang, W. side G. Lumaku, alt. 1400 m; *SAN 32095, 41752*, Tambunan, G. Trusmadi, alt. 1650 m. — W. Kutai: *F. H. Endert 4357*, Mt. Kemul, alt. 1600 m.

Note. The collections cited by H. L. Li under his var. *nitida* are probably derived from hybridisation with *S. lucida*. The terminal buds as well as the twigs are totally glabrous. Also cited by Li is *W. T. Tsang 22738* which belongs to *S. cochinchinensis* ssp. *laurina* var. *laurina*.

8. Symplocos atjehensis Noot., *sp. nov.*

Type: *van Steenis 6529* (L, isotype in BO), Sumatra, Atjeh, Laut Pupandji, 3-IX-1934, alt. 2050 m.

Ramuli glabri vel tomentosi gemmis apicalibus glabris vel pubescentibus. Folia parce appresse pilosa vel glabra, elliptica, 8—13 cm longa 3,5—5,5 cm lata indice 2,3—2,6 base acuta ad rotundata attenuata apice acuminato acumine 2—7 mm longo, nervis primariis 8—12 paribus in venam intramarginalem convenientibus petiolo 12—17 mm longo. Inflorescentia fasciculata bracteis bracteolisque persistentibus tomentosis ad pubescentibus c. 2 mm longis calyce glabra tubo 1 mm alto limbo 2 mm longo lobis 1—1,5 mm longis corolla c. 5 mm longa staminibus c. 50 disco cylindrico glabro stylo glabro.

Treelet *c.* 8 m high. Twigs glabrous or tomentose, terminal buds glabrous or pubescent. *Leaves* sparsely appressedly hairy, especially on midrib and nerves, or glabrous, ± elliptic, 8 – 21 by $3\frac{1}{2}$ – 6 cm, index 2.3 – 2.6; base acute to rounded, attenuate, base angle 40° – 80°; apex shortly acuminate, acumen 2 – 7 mm; margin dentate. *Nerves* 8 – 12 pairs, meeting in a looped intramarginal vein; reticulation finely prominent, fine or rather coarse and then fine with translucent light. *Petiole* narrowly winged often with some glands, 12 – 17 mm. *Inflorescence* a fascicle from the axis of the leaves; bracts and bracteoles persistent, red-brown tomentose to pubescent, ovate, *c.* 2 mm long. *Calyx* glabrous, the tube *c.* 1 mm high, the limb 2 mm, the (ciliate) lobes 1 – $1\frac{1}{2}$ mm long. *Corolla c.* 5 mm. *Stamens c.* 50, to 6 mm long. *Disk* cylindrical, glabrous. *Style* glabrous, 4 – 6 mm. *Fruits* ± ellipsoid, 10 – 12 by 5 – 6 mm, crowned by the persistent calyx lobes; stone shallowly lengthwise ribbed, 3-celled but only 1 cell developed. *Seed* 1, straight with straight embryo.

SUMATRA. Atjeh: *van Steenis 6529*, Laut Pupandji, alt. 2050 m; *9697*, G. Kemiri, alt. 2850 m; *de Wilde 13773, 14008*, G. Ketambe, alt. 1700—1900 m.

9. Symplocos atriolivacea Merr. & Chun *ex* Li – Pl. 3b-d.

S. atriolivacea Merr. & Chun *ex* Li, J. Arn. Arb. 25 (1944) 212. — Type: *F. C. How 73262* (BISH, S, SING), China, Hainan.

Shrub or tree, up to 7 m. Twigs brown, sparsely appressedly thin-hairy to densely appressedly pubescent; terminal buds small, appressedly long-pubescent. *Leaves* dark olivaceous-brown *s.s.*, sparsely appressedly thin-hairy to nearly glabrous beneath, ± elliptic, 8–17 by 3–5 cm, index 2.3–3.4; apex acuminate, acumen 10–15 mm; base cuneate to attenuate to nearly rounded, base angle 45°–80°; margin undulate to denticulate. *Nerves* 10–15 pairs, finely but distinctly prominent beneath, meeting in a looped intramarginal vein near the margin; secondary and tertiary veins forming a prominent reticulation in which a dense, fine reticulation of the quaternary veins is visible. *Petiole* stout, 3–5 mm. *Inflorescence* a short, nearly black fasciculate spike of at most 1 cm from the axils of the leaves; axis, the broadly-ovate to boat-shaped 2 mm long bracts and the 1½ mm long bracteoles appressedly whitish pubescent. *Calyx* with same indument, tube 1½ mm high, lobes 1 mm long. *Corolla* sparsely appressedly fine-hairy without, falling soon after anthesis, *c.* 3 mm long. *Stamens c.* 35, as long as corolla, opening already in bud. *Disk* cylindrical, whitish short hairy on top. *Style* glabrous, *c.* 2½ mm, stigma flat, slightly wider than style. *Fruits* ampulliform, *c.* 7 by 3–4 mm, the neck narrow, half as long to nearly as long as the belly, especially the neck finely appressedly pubescent.

INDO-CHINA. Annam: *Poilane 18257*, alt. 1200 m.
CHINA. Hainan *F. C. How 72938, 73262.*

10. Symplocos austrosinensis Hand.-Mazz. – Pl. 2.

S. austrosinensis Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 29. — Type: *Wang 39644* (W, isotype in A), China, Kwangsi.

Shrub or treelet, up to 6 m. Twigs thin, terete, densely appressedly puberulous. Terminal buds small, densely appressedly pubescent to sparsely thin-hairy or glabrous. *Leaves* glabrous, narrowly elliptic, 7–14 by 1½–3½ cm, index 3–4.3; base cuneate, base angle 30°–40°; acumen 10–20 mm, tip acute; margin recurved, entire to glandular denticulate. *Nerves* 6–10 pairs, prominent beneath, looped and joined in a distinct intramarginal vein 1–4 mm from the margin; reticulation rather fine, faintly prominent. *Petiole* thin, narrowly winged (ridged), 8–10 mm. *Inflorescence* an axillary fascicle; axis rudiment pubescent. Bracts and bracteoles persistent, sparsely appressedly pubescent, *c.* 1 mm long. *Calyx* glabrous; tube 1 mm high, lobes ciliolate, semi-elliptic, rounded, *c.* 1 mm long. *Corolla* 3–4 mm. *Stamens* 20–30, up to 6 mm. *Disk* glabrous, high-annular, surrounding the style base. *Style* glabrous, *c.* 2½ mm, broadening towards the end, terminated by the stigma. *Fruits* ± cylindrical, 6–8 by *c.* 3 mm, crowned by the persistent calyx lobes; mesocarp thin, fleshy; stone lengthwise grooved, woody, only one cell developed. *Seed* 1, straight, with straight embryo.

CHINA. Kweichow: *Y. Tsiang 5502*, Kweiting, alt. 400—500 m; *6660, 6712*, Tushan, alt. 550 m. — Kwangsi: *C. Wang 39588, 39644, 40137*. — Kwangtung: *S. P. Ko 52907*, Yu-Yuen.

11. Symplocos banaënsis Guillaumin – Pl. 3e-f.

S. banaënsis Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 169; Fl. Gén. I.-C. 3 (1933) 1007. — Type: *J. & M. S. Clemens 4236* (P, isotypes in BM, K, L, UC), Annam, Mt. Bana, near Tourane.

Shrub, or small tree, up to 10 m. Young shoots long, brown; twigs glabrous, bark after one season light grey, spongy; terminal buds small, *c.* 5 mm, with glabrous or puberulous scales. *Leaves* elliptic, 6.5–12 by 2.8–5 cm, index 2–2.4; glabrous, greenish-brown above, brown beneath; base cuneate, faintly attenuate, base angle 30°–60°; apex (abruptly) acuminate, acumen 5–15 mm, tip blunt; margin finely undulate-denticulate. *Nerves* 3–8 pairs, curved upwards and meeting in an intramarginal vein; reticulation as in *S. hookeri* (p. 207), but often even finer. *Petiole* 5–15 mm. *Inflorescence* forming a very short nearly orbicular cone in bud. Bracts broadly boat-shaped, nearly orbicular, glabrous to light grey appressedly pubescent, 3–5 mm; bracteoles glabrous, long ciliate, *c.* 1 mm, both caducous. Pedicel glabrous *c.* $\frac{1}{2}$ mm. *Calyx* glabrous, tube $1\frac{1}{2}$ mm; limb 2 mm, lobes broadly deltoid, rounded, $1\frac{1}{2}$ mm. *Corolla* 5–6 mm. *Stamens c.* 70, becoming slightly longer than corolla. *Disk* low cylindrical, shortly pubescent. *Style* glabrous, 5 mm; stigma small punctiform. *Fruit* flask-shaped to ovoid, *c.* 18 by 8 mm; exocarp fleshy; stone woody, faintly ribbed without, with high, ± vertical, irregular ridges within. *Seed* 1, deeply irregularly lengthwise grooved, stellate in cross-section; embryo straight.

INDO-CHINA. Annam, vicinity of Tourane: *J. & M. S. Clemens 3917*, Mt. Bana; *4236*, id.; *Poilane 7344*, id., alt. 300 m; *Poilane 7672*, Lien Chieu, alt. 1000 m; *7975*, Col de Nuages, alt. 700 m.

12. Symplocos barisanica Noot., *sp. nov.*

Type: *Jacobs 4366* (L, isotypes in A, K, PNH, SING, US), Sumatra, Westcoast, S. slope Mt. Kerintji, path from Kaju Aro towards the top, 1°40′ S, 101°20′ E.

Ramuli glabri crassi gemmis apicalibus glabris. Folia glabra late elliptica 12—20 cm longa, 5—12 cm lata, indice 1,4—2,3, base acuta ad fere rotundata apice rotundato vel acuminato margine denticulato nervis primariis 8—12 paribus, petiolo 10—30 mm longo. Inflorescentia ramosa spicata ad 5 cm longa axe minute appresse pilosa bracteis bracteolisque persistentibus ovatis 2—3 mm longis calyce glabra tubo c. 1 mm longo lobis semicircularibus 1,5—2 mm longis corolla c. 6 mm longa staminibus c. 50 disco glabro cylindrico stylo glabro. Fructus ovoideus ad globosus 10 mm longus 9 mm latus putamine globoso-urceolato 8 mm longo 7 mm lato semine curvato embryone curvato.

Twigs glabrous, rather thick; terminal buds rather large, glabrous. *Leaves* glabrous, broadly elliptic, 12–20 by 5–12 cm, index 1.4–2.3; base acute to nearly rounded, base angle 40°–80°; apex acuminate to rounded, acumen 0—10 mm; margin denticulate. *Nerves* 8–12 pairs, whether meeting in an intramarginal vein or not; reticulation coarse, with translucent light finer, but hardly visible because of the thickness of the leaves. *Petiole* 10–30 mm. *Inflorescence* a branched spike to 5 cm; axis minutely appressedly

hairy. Bracts and bracteoles persistent, minutely appressedly hairy, ± ovate, 2–3 mm. *Calyx* glabrous, tube *c.* 1 mm, lobes semi-orbicular, ciliolate, $1\frac{1}{2}$–2 mm. *Corolla c.* 6 mm. *Stamens c.* 50. *Disk* glabrous, cylindrical. *Style* glabrous, 4–5 mm, but often reduced. *Fruits* ovoid to globose, *c.* 10 by 9 mm; stone globose-ampulliform, *c.* 8 by 7 mm, the neck 2 mm long, the belly irregular lengthwise grooved, 6 mm high. *Seed* 1, ± U-shaped with U-shaped embryo.

SUMATRA. Westcoast: *Frey-Wyssling 736*; *Jacobs 4366, 4391*; *Meijer 6139, 7624*, G. Kerintji, alt. 2000—2600 m; *A. Ernst 736*, G. Merapi.

13. Symplocos barringtoniifolia Brand – Pl. 4.

S. barringtoniifolia Brand, Ann. Cons. Jard. Bot. Genève 4 (1904) 283. — *Doxomma rigidum* Miers, Trans. Linn. Soc. ser. 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; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 246; Ridl. Fl. Mal. Pen. 2 (1923) 306; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 284; Fl. Gén. I.-C. 3 (1933) 1019, t. 116, 2. — *Eugeniodes rigidum* O.K. Rev. Gen. Pl. 2 (1891) 976. — Lectotype: *Maingay 767* (K), Malaya.

Tree, up to 25 m. Twigs stout, dark brown, glabrous, often marked with prominent round raised scars of the fallen leaves; growth discontinuous; terminal buds covered by leathery scales, the latter more or less appressedly pilose on the back, leaving conspicuous scars. *Leaves* glabrous, (narrowly) elliptic to obovate, 15–35 by 6–11 cm, index 2.4–4.2; in Indo-China 10–$19\frac{1}{2}$ by 4–9 cm, index 2–2.9; base cuneate, base angle 15°–40°; apex acuminate, acumen 5–10 mm; margin entire to glandular crenulate or denticulate. *Midrib* much prominent beneath; nerves 10–14(–16) pairs, much prominent beneath (in Indo-China somewhat less prominent), curving upwards to and along the margin, rarely forming an intramarginal vein along the whole margin, but that vein always present towards the apex of the leaf; secondary veins transverse to nerves; reticulation between them coarse to (in Indo-China) fine, faintly prominent beneath. *Petiole* 2–5 cm. *Inflorescence* a spike from the axils of the leaves or from wood beneath them, cone-like in bud, lengthening when flowers mature and becoming as long as $5\frac{1}{2}$(–8) cm in fruit (in the herbarium there are mostly only buds or fruits, indicating that the flowers blossom during a very short period); axis tomentose. Bracts and bracteoles tomentellous to appressedly pubescent, soon caducous, broadly ovate, 6–10 by *c.* 6 mm and narrowly ovate, $2\frac{1}{2}$–5 mm long respectively. *Calyx tube* glabrous, 1–$1\frac{1}{2}$ mm high; limb tomentellous, 3–$3\frac{1}{2}$ mm long, becoming 2–3-lobed by tearing; lobes originally *c.* 1 mm long. *Corolla* 4–6 mm. *Stamens c.* 60 to more than 100. *Disk* glabrous, 5-glandular. *Style c.* 5 mm, with soft hairy conical base. *Fruits* ovoid or ellipsoid $2\frac{1}{2}$—4 by $1\frac{1}{4}$—2 cm, crowned by the usually persistent calyx rim; mesocarp chartaceous; stone woody, stellate in cross-section with 8 very high ridges; cells 3, often only 1 fertile. *Seeds* straight, with straight embryo.

Distribution. Indo-China, Malay Peninsula and Borneo.

INDO-CHINA. Cambodia: *Pierre 937*, Mt. Tamire; *Poilane 14665, 17605*, N. Kampot, alt. 400—600 m.

MALAY PENINSULA. Perak: *c.* 15 collections, alt. 100—1500 m. — Pahang: 5 collections, alt. 90—250 m. — Trengganu: *CF 10724, 10736, 76082*, alt. 90—150 m. — Selangor: *CF 8266*; *Nur 11888*, Sg. Buloh; *H. N. Ridley s. n.*, Semangkok Pass. — Malacca: *Maingay 767, 965*. — Johore: 7 collections, below 300 m. — Singapore: 5 collections.

BORNEO. Central East Kalimantan, W. Kutai: *Endert 4810*, L. Pukus.

14. Symplocos batakensis Noot., *sp. nov.*

Type: *Robinson & Kloss 125* (BM), Sumatra, Kerintji.

Ramuli glabri gemmis apicalibus glabris. Folia glabra elliptica (vel obovata) 6—10 cm longa 2—4½ cm lata indice 2,1—4; base acuta apice acuminato acumine 3—15 mm longo nervis primariis 7—10 paribus vix prominentibus in venam intramarginalem convenientibus reticulo vix prominente grosso, petiolo 5—8 mm longo. Inflorescentia racemosa ad 8 cm longa bracteis bracteolisque caducis ovatis pedicellis ad 5 mm longis. Calyx glabra tubo 1½ mm alto limbo 1½ mm longo lobis semicircularibus 1—1¼ mm longis. Corolla 6 mm longa. Stamina c. 100. Discus 5-glandularis brevissime pilosus. Fructus globosus vel ellipsoideo-ampulliformis c. 10 mm longus c. 8 vel c. 5mm latus 3-cellularis semine saepe uno recto embryone recto.

Twigs and terminal buds glabrous. *Leaves* glabrous, often coriaceous, elliptic (to obovate), 6 – 10 by 2 – 4½ cm, index 2.1 – 4; base acute, base angle 30° – 50 ; apex acuminate, acumen 3 – 15 mm, tip often blunt; margin entire, recurved to revolute. *Nerves* 7 – 10 pairs, faintly prominent beneath, meeting in an intramarginal vein; reticulations hardly prominent, coarse, but in thinner leaves a fine reticulation visible with translucent light. *Petiole* 5 – 8 mm. *Inflorescense* a raceme to 8 cm; axis glabrous or sparsely minutely pilose. Bracts and bracteoles glabrous or sparsely minutely pilose, ovate, caducous, 1½ and 1 mm respectively. Pedicel to 5 mm long, but mostly not over 2 mm. *Calyx* glabrous, tube ½ mm high, limb 1½ mm, lobes semi-orbicular, ciliolate, 1—1¼ mm long. *Corolla c.* 6 mm. *Stamens c.* 100. *Disk* 5-glandular, shortly pilose. *Style* glabrous, *c.* 5 mm, sometimes reduced. *Fruits* nearly globose, *c.* 10 by 8 mm or ellipsoid-ampulliform, *c.* 10 by 5 mm; 3-celled, often only 1 cell fertile, the other 2 cells in the fruits often hardly developed. *Seeds* often only 1, straight with straight embryo.

SUMATRA. Tapanuli: *bb 3826, 3844, 5271*, Silindung, alt. 1200—1350 m. — Westcoast: *W. Meijer 7581*, Mt. Sago, alt. 1700 m; *Robinson & Kloss 125*, G. Kerintji.

15. Symplocos bauerlenii Baker

S. bauerlenii Baker, J. Linn. Soc. N.S.W. 27 (1902) 594, pl. XXVIII; C. T. White, Proc. Roy. Soc. Queensl. 47 (1936) 69. — Type: *W. Bauerlen* (NSW, isotype in MEL), Australia, Tumbulgun, Tweed River, Murwillumbah.

Twigs thin, the very small terminal buds minutely hairy. *Leaves* glabrous, narrowly elliptic, 3 – 7.5 by 0.7 – 2 cm, index 2.7 – 6.5; base acute, attenuate, base angle *c.* 20°; apex acuminate, acumen 5 – 15 mm; margin dentate. *Nerves* 7 – 10 pairs, meeting in an intramarginal vein; reticulation coarse, faintly prominent beneath. *Petiole* 2—3 mm.

Flowers rarely solitary, or inflorescence a very short raceme from the axils of the leaves to at most 1 cm long; axis minutely hairy. Bracts and bracteoles caducous, triangular, minutely hairy, *c.* 1 and $\frac{1}{2}-1$ mm respectively. Pedicels *c.* $\frac{1}{2}$ mm long. *Calyx* glabrous, the tube $1-1\frac{1}{2}$ mm high; limb *c.* 1 mm, lobes ovate to triangular, *c.* $\frac{3}{4}$ mm long. *Corolla* 3 mm. *Stamens* 15–25. *Disk* annular, pilose. *Style* glabrous. *Fruits* ellipsoid, *c.* 6 by 4 mm; mesocarp fleshy, rather thick; stone ampulliform, belly brain-like grooved. *Seed* 1, ? ovoid; embryo curved towards the base.

AUSTRALIA. Queensland: 6 collections, Moreton Distr., Springbrook, alt. 700—1000 m. — New South Wales: 6 collections, Tumbulgun, Byron Bay, Mullimbimby and Whian Whian.

16. Symplocos betula Brand

S. betula Brand, Philip. J. Sc. 3 (1908) Bot. 8; Merr. En. Philip. 3 (1923) 297. — Type: *FB 6283 Curran* (K), Luzon, Bataan Prov., Lamao Forest Reserve.

Twigs glabrous, terminal buds minutely appressedly pilose. *Leaves* glabrous, 4–6 by 1.5–1.8 cm, index 2.3–4; base acute to rounded, base angle 40°–90°; apex (long) acuminate, acumen 5–15 mm; margin crenate. *Nerves* 6–8 pairs, hardly prominent beneath, meeting in an intramarginal vein; reticulation coarse, but with translucent light a very fine reticulation visible. *Petiole* 2–3 mm. *Inflorescence* a spike to $2\frac{1}{2}$ cm; axis sparsely pubescent. Bracts and bracteoles sparsely pubescent, persistent, *c.* 1 mm long. Pedicel $0-\frac{1}{2}$ mm. *Calyx* glabrous, tube $1-1\frac{1}{4}$ mm high, limb divided in the semi-elliptic rounded ciliolate $\frac{3}{4}-1$ mm long lobes. *Corolla c.* 3 mm. *Stamens* rather thick, 20–30. *Disk* inconspicuously 5-glandular, glabrous. *Style* glabrous, 3–4 mm. *Fruits* not known.

PHILIPPINES. Luzon: only the type.

17. Symplocos boninensis Rehder & Wilson

S. boninensis Rehder & Wilson, J. Arn. Arb. 1 (1919) 119; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 918. — *Dicalyx boninensis* Hara, En. Sperm. Jap. 1 (1948) 104. — Type: *E. H. Wilson 8336* (A, isotypes in BM, E, K), Bonin Is., Mukojima.

Bobua pergracilis Nakai, Bot. Mag. Tokyo 44 (1930) 24. — *Dicalyx pergracilis* Hara, En. Sperm. Jap. 1 (1948) 106. — *S. pergracilis* Yamazaki, J. Jap. Bot. 44 (1969) 366. — Type: *H. Toyoshima* (TI, *non vidi*), Bonin Is., Chichijima.

Twigs glabrous; terminal buds with several glabrous scales, the inner scales often hairy on the midrib and the apex. *Leaves* totally glabrous, coriaceous, 6–9 by 3.3–4.5 cm, index 1.8–2.2; base attenuate, base angle 40°–60°; apex rounded; margin recurved or finely denticulate. *Nerves* 6–8 pairs, hardly prominent beneath, straight or even recurved, meeting in an even less prominent intramarginal vein; reticulation obscure. *Petiole* 10–30 mm. *Flowers* 1–3 from the axils of the leaves. Bracts 8–10, glabrous or ciliate, persistent; $1\frac{1}{2}-3$ mm long. *Calyx* glabrous, tube *c.* 1 mm high; limb *c.* 4 mm, lobes *c.* 3 mm long. *Corolla* ciliolate, 5–6 mm. *Stamens* 60–100. *Disk* flat, softly pilose. *Fruits* ± ellipsoid, *c.* 16–20 by 8–12 mm, crowned by the persistent calyx lobes;

mesocarp chartaceous, *c.* 2 mm thick; stone ± triangular in cross-section, with shallow lengthwise grooves, 3-celled, but usually only 1 cell developed. *Seed* straight with straight embryo.

JAPAN. Bonin Is: only the type.

18. Symplocos borneensis Brand

S. borneensis Brand, Pfl. R. Heft 6 (1901) 56; Merr. En. Born. (1921) 486. — Type: *Beccari 3467* (K, P), Sarawak.

Twigs glabrous; terminal buds small, glabrous. *Leaves* glabrous, narrowly elliptic, 4.7–8 by 1.7–2.6 cm, index 2.8–3.5; base acute, base angle 30°–50°; apex rounded to faintly acuminate and then with a broad rounded tip; margin entire, recurved. *Nerves* 6–9 pairs, faintly prominent beneath, meeting in an also faintly prominent intramarginal vein; reticulation coarse, hardly prominent. *Petiole* 3–4 mm. *Inflorescence* a lax raceme to 5 cm; axis minutely sparsely hairy to glabrous. Bracts and bracteoles caducous, glabrous, ciliolate, *c.* 1 and *c.* $\frac{1}{2}$ mm long respectively. Pedicel to 2 mm. *Calyx* glabrous, the tube 1–$1\frac{1}{4}$ mm high, the limb entirely divided into the $\frac{3}{4}$–1 mm long ciliolate lobes. *Corolla c.* 5 mm. *Stamens* 60–80. *Disk* 5-glandular, with the conical style base shortly pilose. *Style* glabrous, *c.* 5 mm. *Fruits* not known.

BORNEO. Sarawak: *Beccari 3467*. — Kalimantan: *Hallier 2197*, Sg. Kenepai; *Teysmann 8402, 8403*, P. Madjang.

Note. A sterile collection from Central Celebes, *bb 1894*, Malili, possibly belongs to this species.

19. Symplocos brachybotrys Merr.

S. brachybotrys Merr. J. Str. Br. R. As. Soc. 76 (1917) 110; En. Born. (1921) 486; H. Heine, Pfl. Samml. Clemens Kinabalu (1953) 87. — Type: *Clemens 10961* (BO), N. Borneo, Mt. Kinabalu, Marai Parai Spur.

Twigs (sparsely) appressedly pubescent in innovations, soon glabrescent; terminal buds small, appressedly pubescent. *Leaves* sparsely appressedly fine hairy beneath when young, soon becoming glabrous, ovate-elliptic, 4–6 by 2–3.3 cm, index 1.6–2.3; base acute to rounded, base angle 40°–90°; apex acute-acuminate, acumen 0–9 mm; margin denticulate. *Nerves* 6–9 pairs, curved upwards and meeting in a looped intramarginal vein; reticulation rather dense, (faintly) prominent beneath. *Petiole* 3–4 mm. *Inflorescence* a 1–3-flowered short spike, the axis appressedly pubescent at most 7 mm, 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, tube 1 mm, limb entirely divided up in the *c.* 3 mm long lobes. *Corolla* 6 mm. *Stamens c.* 100. *Disk* inconspicuous; style base conical, densely appressed-

ly pubescent. *Style* glabrous, *c.* 4 mm. *Fruits* ovoid to ellipsoid, *c.* 10 by 5 mm; mesocarp fleshy, thin; stone shallowly lengthwise grooved. *Seed* 1, ovoid, slightly curved; embryo S-shaped.

BORNEO. Sarawak: *Brooke 8570*, Berumput, alt. 1500 m; *Clemens 20100*, Mt. Poi. alt. 1800 m. — Sabah, Mt. Kinabalu, Marai Parai: *Clemens 10961*, *32478*, *32525*, alt. 1500 m.

20. Symplocos brandisii K. & V.

S. brandisii K. & V. Bijdr. 7 (1900) 157; Brand, Pfl. R. Heft 6 (1901) 90; Koord. Atlas 2 (1914) t. 381; Backer, Bekn. Fl. Java (em. ed.) 7 (1948) fam. 169, p. 4; Backer & Bakh. *f.* Fl. Java 2 (1965) 206. — Lectotype: *Koorders 8105* (BO, isotypes in A, L.), E. Java, Besuki, Pantjur Idjen.

S. koordersiana Brand, Bull. Herb. Boiss. II, 6 (1906) 748. — Syntypes: *Koorders 32457* and *32503* (BO), Java, Pantjur Idjen.

S. pseudoclethra Hall. *f.* Meded. Rijksherb. 14 (1912) 41. — Type: *Elbert 836* (L, isotypes in BO, K), Lombok, Mt. Rindjani, 800—950 m.

Tree up to 30 m. Twigs glabrous, dark brown. Terminal buds small, with several glabrous or sparsely hairy scales, inner scales appressedly pubescent. *Leaves* glabrous (or some long hairs on the midrib), not yellowish when dry, mostly narrowly elliptic, $(5\frac{1}{2}-)7-13(-22)$ by $2\frac{1}{2}-5(-6\frac{1}{2})$ cm, index 2.2—4.3; base ± rounded, attenuate, base angle $(50°-)90°(-110°)$; apex hardly acuminate, acumen $0-10(-15)$ mm, tip blunt; margin (coarsely) crenate. *Midrib* much prominent beneath; nerves $(7-)10-16(-18)$ pairs, much prominent beneath, distinctly brown, curved upwards and meeting in a looped intramarginal vein 2—5 mm from the margin; secondary veins distinctly prominent, at right angles to nerves; lesser veins forming a rather fine reticulation (hand-lens!). *Petiole* glabrous or with some hairs, 6—15 mm. *Inflorescence* a raceme to 10 cm, but often shorter; axis (sparsely) pubescent. Bracts very soon caducous, appressedly pubescent, obovate, 1—3 mm (or in var. *pseudoclethra* elliptic, boat-shaped, 3—4 mm); bracteoles falling after the bracts, sometimes rather long persistent, less hairy, ovate to narrowly elliptic, $1-2\frac{1}{2}$ mm (in var. *pseudoclethra* broadly ovate, *c.* 2 mm). Pedicels pubescent, at most 6 mm, but often shorter. *Calyx* glabrous, or some appressed hairs on the throat, tube *c.* $1(-1\frac{1}{2})$ mm, limb $1\frac{1}{2}-2\frac{1}{2}$ mm, lobes *c.* $\frac{1}{4}$ mm shorter, sometimes ciliolate. *Corolla c.* 4(—5) mm. *Stamens c.* 60 (or more than 100 in var. *pseudoclethra*), about as long as long as corolla. *Disk* 5-glandular, the glands glabrous, but the broadly conical style base soft-hairy. *Style* glabrous or with few hairs, 4—5 mm. *Fruits* ovoid-ellipsoid, slightly narrowed towards the apex, 10—16 by 5—7 mm, crowned by the spreading, persistent calyx lobes; mesocarp fleshy, rather thin; stone 1-celled, smooth or faintly ribbed, not very thick. *Seeds* 1 (or 2), filling the whole fruit, ovoid, with straight embryo.

Distribution. Java and Lombok.

KEY TO THE VARIETIES

1a. Leaves $5\frac{1}{2}-13$ cm. Bracts obovate, $1-3$ mm. Stamens *c.* 60. **20-1.** var. **brandisii**
b. Leaves $11-22$ cm. Bracts elliptic, $3-4$ mm. Stamens more than 100. **20-2.** var. **pseudoclethra**

20-1. var. **brandisii** – **Pl. 5a-h.**

S. brandisii K. & V. — *S. koordersiana* Brand.

Leaves $5\frac{1}{2}-13$ cm long. Nerves $7-16$ pairs. Bracts obovate, $1-3$ mm; bracteoles ovate to narrowly elliptic, $1-2\frac{1}{2}$ mm. Corolla *c.* 4 mm. Stamens *c.* 60.

JAVA. West Java, Depok, S. of Jakarta: *Beumée 6711*; *Docters van Leeuwen 28*; *Koorders 42767*; *van Steenis 12553*, alt. *c.* 90 m (all the same tree?). — Bantam: *c.* 5 collections (Udjung Kulon, low alt.). — East Java, Besuki, Idjen: 8 collections.
LESSER SUNDA ISLANDS. Lombok, G. Rindjani: *bb 20835*, *23324*; *Sun Hong Fan Herb. 9304*, alt. 800—1800 m.

Note. The collections described by Brand as *S. koordersiana* are deviating in the leaves being smaller and the youngest twigs being puberulous.

20-2. var. **pseudoclethra** (Hall. *f.*) Noot., *comb. nov.* – **Pl. 5i-j.**

S. pseudoclethra Hall. *f.*, Meded. Rijksherb. 14 (1912) 41.

Leaves $11-22$ cm. Nerves $11-18$ pairs. Bracts elliptic, boat-shaped, $3-4$ mm; bracteoles broadly ovate, *c.* 2 mm. Corolla *c.* 5 mm. Stamens more than 100.

LESSER SUNDA ISLANDS. Lombok, G. Rindjani: only the type.

21. Symplocos buxifolia Stapf – **Pl. 6a-d.**

S. buxifolia Stapf, Trans. Linn. Soc. Bot. 4 (1894) 206: Brand. Pfl. R. Heft 6 (1901) 64: Merr. En. Born. (1921) 487. — Type: *Low s.n.* (K, isotypes in CGE, LE), N. Borneo, Mt. Kinabalu.

Shrub or treelet, up to 10 m, with dense, fastigiate crown. Twigs glabrous, in high and exposed places the leaves crowded and the older twigs provided with many prominent leaf-scars. Terminal buds small, glabrous. *Leaves* glabrous, elliptic to nearly circular, $15-50$ by $7-25$ mm, index $1.2-2$; base more or less attenuate, base angle $30°-60°$; apex rounded to acute or slightly acuminate, acumen $0-5$ mm; margin (finely) glandular dentate or crenate; nerves $4-6$ pairs, prominent beneath, curved upwards and meeting

in a looped intramarginal vein; secondary and tertiary veins forming a rather dense reticulation beneath. *Petiole* glabrous, narrowly winged, 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 3 by 1 to 10 by 5 mm; axis glabrous or minutely appressedly hairy. Pedicel between the caducous bract and bracteoles to 2 mm. *Calyx tube* glabrous or rarely finely appressedly hairy, 2–3 mm high; limb glabrous or finely appressedly hairy, 2–5 mm, lobes ciliate, 1–3 mm long. *Corolla* 5–8 mm. *Stamens* 70 to more than 100, in 5 distinct bundles. *Disk* flat, glabrous. *Style* 3–7 mm. *Fruits* ellipsoid to ovoid, 10–15 by 6–8 mm, mesocarp fleshy, thin; stone 8–13 by 5–7 mm, smooth with low lengthwise ridges. *Seed* 1, straight, with straight embryo.

BORNEO. Sabah, Mt. Kinabalu: 17 collections, alt. 2400—4000 m.

Note. This species can hardly be distinguished from the mountain forms of *S. cochinchinensis* ssp. *leptophylla* (p. 162) from New Guinea; in sterile state this is not possible at all, especially the orbicular-leaved plants from the higher regions of the mountain.

22. Symplocos calycodactylos Brand – **Pl. 6e.**

S. calycodactylos Brand, Pfl. R. Heft 6 (1901) 63. — Type: *Curtis 1330* (K, isotypes in BO, L), Perak, Waterloo.

Twigs densely spreadingly long hairy, hairs to 3 mm. Terminal buds small, obscured by the indument. *Leaves* long hairy on both surfaces, ovate to elliptic, 6–14 by $2\frac{1}{2}$–5 cm, index 2.5–3.1; base rounded to subcordate, base angle 90°–100°; apex acuminate, acumen 5–18 mm; margin dentate, long ciliate. *Nerves* 7–8 pairs, much curved upwards, meeting in a finely prominent intramarginal vein; reticulation very fine, slightly prominent beneath. *Petiole* 3–5 mm. *Inflorescence* a fascicle (or flowers solitary?) or a raceme to 10 cm; axis with long spreading brown hairs of 3–4 mm. Bracts and bracteoles soon caducous, up to 7 mm, narrowly elliptic, clothed with long hairs. Pedicels from ?5 mm in fascicles to 13 mm in racemes. *Calyx tube* obscured by the 3 mm long hairs, $1\frac{1}{2}$ mm high, the limb wholly divided in narrowly elliptic to linear 4–6 mm long pubescent lobes. *Corolla c.* 6 mm. *Stamens c.* 100, to 5 mm. *Disk* pilose. *Style* glabrous, *c.* 8 mm. *Fruits* ± cylindrical, densely long hairy, crowned by the persistent calyx lobes (only young fruits seen). Embryo not seen, but undoubtedly straight.

MALAY PENINSULA. Perak, Waterloo: *Curtis 1330*, alt. 900 m. — Kedah, G. Inas For. Res., Sg. Kupang: *Kep. FRI 4657*, alt. 900 m.

Note. This species is closely allied to *S. pulchra* Wight (p. 266); vegetatively there are hardly differences. But the flowers of *S. calycodactylos* with the extreme long calyx lobes are easy to distinguish from those of *S. pulchra.*

23. Symplocos cambodiana (Pierre) Hallier *f.* — Pl. 7a, b.

S. Cambodiana (Pierre) Hallier *f.* Beih. Bot. Centralbl. 39-B (1923) 96; Guillaumin, Fl. Gén. I.-C. 3 (1933) 1016. — *Suringaria cambodiana* Pierre, Bull. Soc. Linn. Paris 1 (1886) 635; Gagnepain, Fl. Gén. I.-C. 2 (1921) 850. — Type: *Pierre 5153* (P, isotypes in BM, BO, L), Cambodia, Kuang Repeu.

S. graveolens Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 280. — Type: *Poilane 4376* (P), Annam, Nhatrang.

Tree, 3–10 m. Twigs densely (woolly) tomentose but sometimes very soon glabrescent. Terminal buds with same indument as twigs. *Leaves* glabrous or the undersurface more or less woolly, especially on midrib and nerves, narrowly elliptic to obovate, 16–33 by 4–9 cm, index 2.2–4.3; cuneate towards the base, base angle 20°–40° but the very base obtuse, subcordate, lying on the petiole; apex acuminate, acumen 3–15 mm. *Midrib* and the 10–17 pairs of *nerves* much prominent beneath, the nerves always meeting in a distinct intramarginal vein; secondary veins perpendicular to the nerves, prominent beneath; reticulation of tertiary and quaternary veins much less prominent, coarse, but fine in translucent light; margin revolute, without glands. *Petiole* with same indument as twigs, often thickened, 0–10 mm. *Inflorescence* a fascicle, in the axils of older leaves or beneath them. Bracts and bracteoles persistent, (abundantly) woolly or tomentose, with vesicular glands on the margin, the former ± orbicular, 3–5 mm long, the latter (narrowly) elliptic, shorter. *Flowers* sessile. *Calyx* glabrous or the (outermost) lobes woolly towards the apex; tube 1–1½ mm high, limb 2–2½ mm long, lobes 1½–2 mm. Corolla glabrous, 5 mm long. *Stamens* 30–70, longer than corolla. *Disk* cylindrical, *c.* 1 mm high, surrounding the base of the glabrous, 6–8 mm long style. *Ovary* 3-celled, each cell with 4 ovules. *Fruits* ellipsoid-cylindrical, with 8 grooves, whether crowned by the calyx lobes or not, 8–12 by 5 mm; woody endocarp with *c.* 8 ridges. *Seed* 1, cylindrical, with straight embryo.

INDO-CHINA. Cambodia: *Pierre 5153.* — Laos: *Poilane 15799*, Prov. Bassac, Plateau de Boloven. — Annam: 5 collections.

24. Symplocos celastrifolia Griff. *ex* Clarke

S. celastrifolia Griff. *ex* Clarke, Fl. Br. Ind. 3 (1882) 575; Brand, Pfl. R. Heft 6 (1901) 48; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 239; Ridl. Fl. Mal. Pen. 2 (1923) 302; Merr. Univ. Calif. Publ. Bot. 15 (1929) 248; Fletcher, Fl. Siam. En. 2 (1938) 385. — *Eugeniodes celastrifolius* O. K. Rev. Gen. Pl. 2 (1891) 975. — Type: *Griffith 3651* (K), Malacca.

S. nigricans Brand, Pfl. R. Heft 6 (1901) 49. — Type: *Haviland & Hose 509* (W, isotypes in BM, BO, CGE), Borneo, Sarawak.

S. candicans Brand, *l.c.* — Type: *Beccari 3632* (FI, G, K, P, W), Borneo, Sarawak, Mattang.

S. hutchinsonii Brand, Philip. J. Sc. 4 (1909) Bot. 109; Merr. En. Philip. 3 (1923) 299. — Type: *FB 6551 Hutchinson* (K, NY), Mindanao, Zamboanga.

S. peninsularis Brand, *op. cit.* 110. — Type: *FB 9188 Whitford & Hutchinson* (*non vidi*), Mindanao, Zamboanga.

Shrub or small tree, rarely up to 30 m high and 40 cm ϕ. Twigs glabrous; terminal buds small, glabrous or pubescent. *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 under surface olive brown, ± elliptic (ovate-obovate), 5.5–15 by 2.2–6 cm, index 1.6–2.8; base cuneate-attenuate, base angle 35°–55°; apex mostly abruptly acuminate, acumen (0–)5–15 mm, tip blunt, often apiculate; margin crenate, often with small tooth-like glands. *Nerves* 5–9 pairs, slightly prominent beneath, often angular, curved upwards and meeting in the intramarginal venation, or an inconspicuous intramarginal vein present; reticulations rather coarse, but sometimes a very fine reticulation of the quaternary veins slightly prominent, in thin leaves this fine reticulation visible with a handlens. *Petiole* winged by the decurrent leaf base, 3—15 mm. *Inflorescence* a raceme, often basally branched; axis finely hairy to appressedly pubescent, 3—12 cm long. Bracts and bracteoles very soon caducous, with same indument as axis or glabrous but ciliate, respectively 2–3(–4, in Morotai) and *c.* 1½ (or 2–2½, in Morotai) mm long. Pedicel with same indument as axis, 1–5 mm long. *Calyx* glabrous, tube *c.* 1 mm high, limb 1½–2½(–3, in Morotai) mm long, lobes ciliate (when young) 1–1½ mm, becoming longer by tearing. *Corolla* 4–6 mm long. *Stamens* 40–*c.* 60, as long as corolla or slightly longer. *Disk* glabrous, with some hairs or pilose, especially after anthesis, flat with 5 opposipetalous glands. *Style* glabrous, 4–5 mm with ± peltate, 3-lobed stigma. *Fruits* pink, green, yellow or dark blue (*sec. coll.*), without the persistent calyx rim 4–10(–20) by 3–8(–15) mm; mesocarp thin, fleshy; stone smooth but the suture of the 3 carpels obvious; endocarp hard but mostly quite thin; cells 3, usually but 1 of them fertile, rarely 2 fertile; the sterile cells larger than the fertile ones, towards the base filled with air. *Seed* and embryo U-shaped.

Distribution. Peninsular Thailand and Malesia, except: Java, the Lesser Sunda Is., and the northern part of the Philippines.

THAILAND. Puket, all from low alt.: *Kerr 11692*, Ranaung, Pakchan, *14177*, Setul; *17301*, Pang Nga; *SF 37462 Kingdon Ward*, Kuey Mood.

SUMATRA. Eastcoast, low alt.: *bb 9139*, Div. Langkat; *Yates 2119*, Batu Bahra. — Siberut: *SF 14592 Boden Kloss.* — Palembang: *Buurman van Vreeden 184, 245.* — Banka: *Teysmann s.n.*, Blinju. — Billiton: *bb 10649*, alt. 30 m.

MALAY PENINSULA. Penang: *Curtis 3459*, Batu Terengi. — Pahang: *CF 15512, 15560, 17113*, Endau Rompin. — Kelantan: *Kep. FRI 5437*, Kuala Mering, Sg. Brok. — Trengganu: *Kep. FRI 10857*, Ulu Sg. Loh, alt. 750 m. — Selangor: *SF 34131*, Sg. Tinggi, Kuala Selangor, low alt. — Malacca: *Griffith 3651*; *Maingay* 957. — Johore: *SF 28069, 28080, 28636, 36807*, low alt. — Singapore: *Ridley 6707, 8423.*

BORNEO. Sarawak: *c.* 30 collections, Kuching, Lundu, Bintulu, alt. low to 750 m. — Brunei: 8 collections. — Sabah: many collections, mostly from low alt., rarely up to 600 m. — Kalimantan: *c.* 20 collections.

PHILIPPINES. Palawan: *Merrill 9334*, Taytay. — Mindanao: *FB 6551 Hutchinson*, Zamboanga. — Sulu Archipelago, Tawi Tawi: *BS 44512.*

CELEBES. SW. Celebes: *Teysmann s.n.*, Pangkadjene. — SE. Celebes: 6 collections.

MOLUCCAS. *Atje* (*exp. Hulstijn*) *286*, Taliabu; *305*, P. Kano. — Morotai: *Main & Aden* (*exp. Kostermans*) *978, 1057, 1144, 1278*, alt. 800—1000 m.

NEW GUINEA. Vogelkop Peninsula: *BW 3847*, Meoswaar, alt. 75 m; *BW 6258*, Beriat, 12 km S. of Teminabuan, alt. low; *Kostermans 2342*, Mt. Arfak, Angi Gita Lake, alt. 1900 m. — Western Div.: *NGF 33223, 33253*, 5°38′ S, 141° E; *LAE 51819*, 10° S, 141°20′ E, alt. 30 m; *M. Jacobs 9036*, Mt. Bosavi, alt. 700—800 m.

Ecology. Usually in coastal forests, especially in the transition between mangroves and fresh water swamp; also along river banks and in peat swamp forests. The fruits are obviously buoyant, the sterile cells being large and filled with air.

Uses. Leaves used for medicinal purposes (*sec. coll.*). Wood used for firewood.

Notes. In Morotai a slightly different population is found, the bracts and the calyx lobes being longer than in other specimens. They occur at a higher altitude; fruits of these plants are not known. From New Guinea only fruits are known, these are thicker walled than in other *S. celastrifolia.*

The following collections are deviating because their twigs are sparsely pilose: Sumatra, Palembang: *Buurman van Vreeden 245*; Borneo, E. Kutai, Samarinda: *Kostermans 6108*; Sabah, Tawau: *SAN 30049, 30054.*

In New Guinea the fruits become larger at higher altitudes; those of *Kostermans 2342* from Mt. Arfak, Angi Gita Lake, at 1900 m altitude measure for example 20 by 15 mm.

25. Symplocos cerasifolia Wall. *ex* DC. — Pl. 7c-f.

S. cerasifolia Wall. [Cat. (1828) 4434, *nomen*] *ex* DC. Prod. 8 (1844) 257; Miq. Fl. Ind. Bat. 1 (1859) 466 (excluding the collection of Zollinger); Clarke, Fl. Br. Ind. 3 (1882) 580; Brand, Pfl. R. Heft 6 (1901) 52; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 245; Ridl. Fl. Mal. Pen. 2 (1923) 306. — *Bobua cerasifolia* Miers, J. Linn. Soc. Bot. 17 (1879) 304. — *Eugeniodes cerasifolium* O.K. Rev. Gen. Pl. 2 (1891) 975. — Type: *Wallich 4434* (G-DC, isotypes in BM, CGE, K-W, LE), Penang.

Tree up to 25 m. Twigs dark brown, the youngest ones often spreadingly thin-pilose; growth discontinuous. Terminal buds with many leathery scales, pilose or glabrous, up to 5 mm long, the scales leaving many scars. *Leaves* long spreadingly to more or less appressedly pilose beneath, especially on midrib and nerves, sometimes wholly glabrous, 7–16(–22) by 2–5(–7) cm, index (2–)3–4.3; in var. *grandifolia c.* 30 by 8 cm; base cuneate, attenuate, base angle 20°–50°; apex (slightly) acuminate, acumen 12–22 mm; margin sharply dentate. *Nerves* 6–9(–11, in Thailand) pairs, in var. *grandifolia* 10–13 pairs, impressed above, much prominent beneath, all of them meeting in a distinct looped intramarginal vein; secondary veins often parallel to each other and transverse to the nerves, tertiary and quaternary veins forming a fine prominent reticulation beneath. *Petiole* slender, often spreadingly pilose, 15—25 mm. *Inflorescence* a spike, forming a short cone in bud, becoming at most 3 cm long in fruit; 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 caducous. *Calyx tube* glabrous, 1–1½ mm high; limb 2½–4 mm long, lobes glabrous or slightly pubescent

without, initially $1-1\frac{1}{2}$ mm long, tearing apart and often becoming as long as the limb. *Corolla* c. 5 mm long. *Stamens* 30 to more than 100 (*sec.* King & Gamble, *l.c.*), becoming as long as corolla. *Disk* 5-glandular, glabrous. Style glabrous except sometimes the conical base, up to 4 mm long. *Fruit* ellipsoid, glabrous, 22–40 by 8–18 mm; mesocarp thick, corky; endocarp woody, with 8 high ridges, 3-celled, with a central canal, often only 1 cell developed. *Seed* cylindrical, with straight embryo.

Distribution. Thailand, Malaya, Sumatra, Borneo, and New Guinea.

25-1. var. **cerasifolia**

Leaves up to 16(–22) cm long; nerves 6—9 pairs.

Distribution. As for the species.

THAILAND (Peninsular). Nakawn Sritamarat: *van Beusekom & Phengklai 1029*. alt. 400—500 m.

SUMATRA. Eastcoast: *Soepadmo 247*, Pakanbaru, Div. Bengkalis. — Banka: *Kostermans & Anta 527, 553*, Lobok Besar, alt. 20 m; *751*, G. Mangkol, alt. 50 m.

MALAY PENINSULA. Penang: *Curtis 1503, 3096*, Penara Bukit, alt. 350 m; *Wallich 4434*. — Perak: 8 collections, alt. 180—1000 m. — Trengganu: *Kep. FRI 12767*, G. Padang exp. camp 3, alt. 1000 m. — Pahang: *CF 22382*, Fraser's Hill. — Kelantan: *Kep. FRI 5376*, Sg. Brok, Ulu Kelantan, alt. 200 m. — Negri Sembilan: *Mohd Shah 111*, Nilai Jindaram Estate, alt. 180 m.

BORNEO. Sabah: *SAN 45168*, Lamag Distr., Kinabatangan; *SAN 60704*, Ranau Distr., Bukit Hampuan. — Sarawak: *S 13313*, Lundu Distr., G. Perigi, alt. 900 m. — Kalimantan: *Kostermans 4383*, Balikpapan Bay, Muan region, Sg. Riko, alt. 20 m; *7120*, Tandjong Bangko, near mouth of Mahakam River, alt. 20 m.

NEW GUINEA. West Irian, Div. S. New Guinea: *Anta 527*, Merauke.

25-2. var. **grandifolia** Noot., *var. nov.*

Type: *Rahmat si Boeea 7586* (SING, isotypes in A, MICH, S, UC, US), Sumatra, Asahan.

Folia *c.* 30 cm longa; venis primariis 10–14 paribus.

SUMATRA. Asahan: *Rahmat si Boeea 1465, 7586*, Lumban Ria.

Note. This variety differs from the rest of the species in the much larger leaves which possess more nerves. The flowers are not known.

27. Symplocos cochinchinensis (Lour.) S. Moore – **Fig. 2c.**

S. 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. *Dicalix cochinchinensis* Lour. Fl. Cochinch. 1 (1970) 663, *excl. syn. Arbor rediviva* Rumph. — *S. spicata* (*non* Roxb.) H. Heine, Pfl. Samml. Clemens Kinabalu (1953) 89. — Type: *Loureiro s.n.* (BM), Cochinchina.

Myrtus laurinus Retz. Observ. Bot. 4 (1786) 26. — [*Laurus serrata floris spicatis* Burman, Thes. Zeyl.

(1737) 139, t. 62] — *Eugenia laurina* Willd. Sp. Pl. 2 (1799) 967 *p.p.*; Steudel, Nomenclator (1821) 321. — *Bobua laurina* DC. Prod. 3 (1828) 24. — *S. spicata* var. *zeylanica* DC. Prod. 8 (1844) 254. — *S. spicata* var. *laurina* Clarke, Fl. Br. Ind. 3 (1882) 573 *p.p.* — *Eugeniodes laurinum* O.K. Rev. Gen. Pl. 2 (1891) 409 *p.p.* — Type: *Hermann* (P, *non vidi*, isotype in L); paratype: *König* (A, BM, L, LD), Ceylon. The plate of *Laurus serrata etc.* in Burman is made after the holotype; *Myrtus laurinus* Retz. is based on plate and description of Burman and on the collection of König from Ceylon.

Drupatris cochinchinensis Lour. Fl. Coch. 1 (1970) 314. – Type: *Loureiro s.n.* (BM), Cochinchina.

Decadia aluminosa Lour. Fl. Cochinch. 1 (1790) 315. – *Dicalyx aluminosus* Bl. Bijdr. (1826) 1117 *p.p.* – Type: *Loureiro s.n.* (BM), Cochinchina.

S. loha Buch. Ham. *ex* D. Don, Prod. Fl. Nepal. (1825) 144; G. Don, Gen. Syst. 4 (1837) 2; DC. Prod. 8 (1844) 255. – *Lodhra loha* Miers, J. Linn. Soc. Bot. 17 (1879) 298. – Lectotype: *Hamilton* 'Symplocus? Subspinosa' (BM), Nepal, Narainhetty. See note 4.

Dicalyx javanicus Bl. Bijdr. (1826) 1117. – *S. javanica* Kurz, J. As. Soc. Beng. 40, 2 (1871) 64; For. Fl. Burma (1877) 145; J. As. Soc. Beng. 46, 2 (1877) 239 *excl. syn. S. rubiginosa*; Sargent, Pl. Wils. 2(1916)597; Merr. Interpr. Rumph. (1917)420; Heyne, Nutt. Pl. (1927) 1263; Burkill, Dict. 2 (1935) 2114; Backer & Bakh. *f.* Fl. Java 2 (1965) 205. – *Lodhra javanica* Miers, J. Linn. Soc. Bot. 17 (1879) 302. – Type: *Blume s.n.* (BO, isotype in NY), Java.

Dicalyx sessifolius Bl. Bijdr. (1826) 1118. – *S. sessilifolia* Gürke, in E. & P. Nat. Pfl. Fam. 4, 1 (1890) 170; Brand, Pfl. R. Heft 6 (1901) 35; Koord. Atlas 2 (1914) t. 388; Backer & Bakh. *f.* Fl. Java 2 (1965) 205. – *Eugeniodes sessilifolius* O.K. Rev. Gen. Pl. 2 (1891) 409. – *S. cochinchinensis* ssp. *sessifolia* (Bl.) Noot. *ex* Steen. Mt. Fl. Java (1972) pl. 52-4. – Type: *Blume 401* (L, isotype in BO), W. Java, top of G. Gede.

Dicalyx salaccensis Bl. Bijdr. (1826) 1118. – *S. salaccensis* Miq. Fl. Ind. Bat. 1, 2 (1859) 466. – *Eugeniodes salaccense* O.K. Rev. Gen. Pl. 2 (1891) 409. – Type: *Blume 1965 B* (L, isotype in BO), W. Java, G. Salak.

Dicalyx spicatus Bl. Bijdr. (1826) 1118. – Type: *Blume 483* (L), W. Java.

Dicalyx acuminatus Bl. Bijdr. (1826) 1119. *S. acuminata* Miq. Fl. Ind. Bat. 1, 2 (1859) 467. – *S. spicata* forma *acuminata* K. & V. Bijdr. 7 (1900) 145. – *S. spicata* var. *acuminata* Brand, Pfl. R. Heft 6 (1901) 41. – Type: *Blume s.n.* (L), W. Java, G. Salak.

S. ferruginea Roxb. [Hort. Beng. (1814) 40, *nomen*; Wall. Cat. (1831) 4412] Fl. Ind. ed. Carey 2 (1832) 542; G. Don, Gen. Syst. 4 (1837) 2; DC. Prod. 8 (1844) 257; 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; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 238; Brandis, Indian Trees (1906) 441; Koord. Atlas 2 (1914) t. 384; Ridl. Fl. Mal. Pen. 2 (1923) 302; Fletcher, Fl. Siam. En. 2 (1938) 386. – *Lodhra ferruginea* Miers, J. Linn. Soc. Bot. 17 (1879) 299. – *Eugeniodes ferrugineum* O.K. Rev. Gen. Pl. 2 (1891) 975. – Type: *Roxburgh* (BM), 1813, Assam, Garo Hills.

S. spicata Roxb. [Hort. Beng. (1814) 40, *nomen*; Wall. Cat. (1831) 4417] Fl. Ind. ed. Carey 2 (1832) 542; G. Don, Gen. Syst. 4 (1837) 2; DC. Prod. 8 (1844) 254; Wight, Ill. Ind. Bot. 2 (?1850) t. 150; Choisy, in Zoll. Syst. Verz. (1854) 136; Miq. Fl. Ind. Bat. 1, 2 (1859) 465; Thwaites, En. Pl. Zeyl. (1860) 184; Benth. Fl. Hongk. (1861) 212; Beddome, Fl. Sylv. 3 (1872) 149; Brandis, For. Fl. (1874) 300; Kurz, J. As. Soc. Beng. 46, 2 (1877) 239; For. Fl. Burma 2 (1877) 146; Clarke, Fl. Br. Ind. 3 (1882) 573; Gürke, in E. & P. Nat. Pfl. Fam. 4, 1 (1891) 169, t. 88 H; Trimen, Fl. Ceylon 3 (1895) 104; K. & V. Bijdr. 7 (1900) 144, *excl.* forma *subsessilis*; Brand, Pfl. R. Heft 6 (1901) 39; Matsumura & Hayata, Tokyo Bot. Mag. 15 (1901) 77; En. Pl. Form. (1906) 231; Brandis, Indian Trees (1906) 441; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 236; Koord. Atlas 2 (1914) t. 386, 387; Hayata, Ic. Pl. Form. (1915) 115, t. 37; Gamble, Fl. Pres. Madras 5 (1923) 782; Ridl. Fl. Mal Pen. 2 (1923) 301; S. Moore, J. Bot. 63 (1925) Suppl. 65; Heyne, Nutt. Pl. (1927) 1263; Burkill, Dict. 2 (1935) 2115; Backer & Bakh. *f.* Fl. Java 2 (1965) 205. – *Hopea spicata* Dalz. & Gibs. Bombay Fl. (1861) 140. – *Lodhra spicata* Miers, J. Linn. Soc. Bot. 17 (1879) 298. – Type: *Roxburgh* (BM), India.

S. laurina Wall. [Cat. (1831) 4416, *nomen*] *ex* G. Don, Gen. Syst. 4 (1837) 3; Rehder & Wilson in Sargent, Pl. Wils. 2 (1916) 594; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 281; Fl. Gén. I.-C. 3 (1933) 1005; Rehder, J. Arn. Arb. 15 (1934) 298; Merr. Comm. Lour. (1935) 303; Fletcher, Fl. Siam. En. 2 (1938) 387; Corner, Wayside Trees (1940) 623; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 33; H, L, Li, J. Wash. Ac. Sc. 43 (1953) 108; Steen. Fl. Mal. I, 5 (1957) LCXXXI, fig. 30. — *S. spicata* var. *oligostachya* DC. Prod. 8 (1844) 254. — *Bohua oligostachya* Miers, J. Linn. Soc. Bot. 17 (1879) 304. – *S. spicata* var. *laurina* Clarke, Fl. Br. Ind. 3 (1882) 573 p.p. – *Eugeniodes laurinum* O.K. Rev. Gen. Pl. 2 (1891) 409 *p.p.* – Lectotype: *Wallich 4416C* (G-DC, K-W), Rottl. herb. Heyne.

S. mollis Wall. [Cat. (1831) 4433, *nomen*] *ex* G. Don, Gen. Syst. 4 (1837) 3. — Type: *Porter in Herb. Wallich 4428* (K-W, isotypes in CGE, LE, NY, W), Penang.

S. spicata var. *platystachya* G. Don, Gen. Syst. 4 (1837) 2. → *S. polystachya* Wall. [Cat. (1831) 4428, *nomen*] *ex* DC. Prod. 8 (1844) 254; Zoll. Syst. Verz. (1854) 34; Miq. Fl. Ind. Bat. 1, 2 (1859) 465. – *Lodhra polystachya* Miers, J. Linn. Soc. Bot. 17 (1879) 300. – *S. ferruginea* Roxb. var. *polystachya* Clarke, Fl. Br. Ind. 3 (1882) 575. – Type: *Wallich* 4428 (BM, CGE, K-W, LE, W). Sylhet.

S. polycarpa Wall. [Cat. (1831) 4423, *nomen*] *ex* G. Don, Gen. Syst. 4 (1837) 3; DC. Prod. 8 (1844) 255; Miq. Fl. Ind. Bat. 1, 2 (1859) 465; Kurz, J. As. Soc. Beng. 46, 2 (1877) 239; For. Fl. Burma 2 (1877) 146. – *Lodhra polycarpa* Miers, J. Linn. Soc. Bot. 17 (1879) 300. – Type: *Wallich 4423A* (BM, CGE, K-W, LE, W), Burma, Amherst.

S. attenuata Wall. [Cat. (1831) 4426, *nomen*] *ex* DC. Prod. 8 (1844) 256. – *Lodhra attenuata* Miers, J. Linn. Soc. Bot. 17 (1879) 299. – *S. spicata* Roxb. var. *attenuata* Clarke, Fl. Br. Ind. 3 (1882) 573. – Type: *Wallich 4426* (G-DC, isotypes in BM, K-W, LE), Sylhet.

S. spicata Roxb. var. *atroviridis* DC. Prod. 8 (1844) 254. – *Bobua atroviridis* Miers, J. Linn. Soc. Bot. 17 (1879) 304. – Syntypes: *Wallich 178, 554, 1905* (G-DC), Burma.

S. laurina (*non* Wall.) Moritzi, Syst. Verz. (1845) 42.

S. verhuellii Jungh. & De Vriese, Pl. Ind. Bat. Or. 3 (1845) 12; Miq. Fl. Ind. Bat. 1, 2 (1859) 467. – *Lodhra verhuellii* Miers, J. Linn. Soc. Bot. 17 (1879) 302. – Type: *Junghuhn s.n.* (L, isotype in A), Sumatra, Batak Lands.

S. ribes Jungh. & De Vriese, Pl. Ind. Bat. Or. 3 (1845) 11; Miq. Fl. Ind. Bat. 1, 2 (1859) 468; Brand, Pfl. R. Heft 6 (1901) 39; Koord. Atlas 2 (1914) t. 385; S. Moore, J. Bot. 63 (1925) Suppl. 65. – *Lodhra ribes* Miers, J. Linn. Soc. Bot. 17 (1879) 302. – *Eugeniodes ribes* O.K. Rev. Gen. Pl. 2 (1891) 976. – *S. spicata* Roxb. forma *javanica* K. & V. Bijdr. 7 (1900) 144. – Type: *Junghuhn s.n.* (L, isotypes in BO, C, NY), West Java, Wayang Mts.

S. xanthophylla Jungh. & De Vriese, Pl. Ind. Bat. Or. 3 (1845) 11; Miq. Fl. Ind. Bat. 1, 2 (1859) 468. – *Lodhra xanthophylla* Miers, J. Linn. Soc. Bot. 17 (1879) 302. – *S. spicata* Roxb. forma *xanthophylla* K. & V. Bijdr. 7 (1900) 145. – Type: *Junghuhn s.n.* (L, isotype in BO), West Java, Wayang Mts.

S. theophrastaefolia S. & Z. Fam. Nat. 2 (1846) 134; Miq. Prol. Fl. Jap. (1867) 266; Franch. & Sav. En. Pl. 1 (1875) 508; Mori, Sylvia 5 (1934) 246; Kanehira, Form. Trees (ed. 1936) 601, t. 558; H, L, Li, J. Wash. Ac. Sc. 43 (1953) 109; Walker, Imp. Trees (1954) 260, t. 172; Ohwi, Fl. Jap. (1965) 726. – *Bobua theophrastaefolia* Miers, J. Linn. Soc. Bot. 17 (1879) 306; Yamamoto, Suppl. Ic. Pl. Form. 4 (1928) 20. – *Dicalyx theophrastaefolia* Migo, Shangh. Sizenk. Kenk. Iho 13 (1943) 207 (*non vidi*); Hara, En. Sperm. Jap. 1 (1948) 107. – Type: *Siebold s.n.* (L), Japan.

S. subsessilis Choisy [Zoll. Syst. Verz. (1854) 136, *nomen*] *ex* Miq. Fl. Ind. Bat. 1, 2 (1859) 467. – *S. spicata* Roxb. forma *subsessilis* K. & V. Bijdr. 7 (1900) 146. – Type: *Zollinger 459* (*non vidi*), Gedeh; paratype: *Zollinger 1698* (FI, G, GH), West Java, Mt. Salak.

S. horsfieldiana Miq. Fl. Ind. Bat. Suppl. 1 (1861) 475. – Type: *Horsfield 40* (K, CGE), Banka.

S. lachnobotrys Miq. Fl. Ind. Bat. Suppl. 1 (1861) 475. – *Eugeniodes lachnobotryum* O.K. Rev. Gen. Pl. 2 (1891) 975. – Type: *Diepenhorst s.n.* (*HB 2876*, BO, isotype in K), W. Sumatra, Priaman.

S. lachnobotrys Miq. var. *glabrior* Miq. Fl. Ind. Bat. Suppl. 1 (1861) 475. – Type: *Teysmann s.n.*

(BO, isotype in L), Sumatra, Pulu Pisang

S. thwaitesii F. v. Muell. Fragmenta 3 (1862) 22; Benth. Fl. Austr. 4 (1869) 293 *p.p.*; Bailey, Queensl. Fl. 3 (1900) 967 *p.p.*; Brand, Pfl. R. Heft 6 (1901) 38; Francis, Austr. Rain Forest Trees ed. 2 (1951) 362 *p.p.* – Type: *Beckler* (BRI, P), New South Wales, Hastings River.

S. stawellii F. v. Muell. Fragmenta 5 (1865) 60; Brand, Pfl. R. Heft 6 (1901) 37; Francis, Austr. Rain Forest Trees ed. 2 (1951) 362, 448, t. 267, *p.p.* – *S. spicata* Roxb. var. *australis* Benth. Fl. Austr. 4 (1869) 292; Bailey, Queensl. Fl. 3 (1900) 967; C. T. White, Contr. Arn. Arb. 4 (1933) 89. – *Eugeniodes stawellii* O.K. Rev. Gen. Pl. 2 (1891) 976. – Type: *Dallachy* (AAH, BR), Qeensland, Rockingham Bay.

S. spicata Roxb. var. *malasica* Clarke, Fl. Br. Ind. 3 (1882) 573. — Type: *Maingay 957* (K), Malaya.

Eugeniodes diengense O.K. Rev. Gen. Pl. 2 (1891) 409. – Type: *O. Kuntze 5737* (BO), Java, Diëng.

S. orbicularis Hemsley, Kew Bull. (1899) 105. – Type: *Giulianetti s.n.* (K), New Guinea, Mt. Scratchley.

S. englishii Hemsley, *l.c.* Syntypes: *Giulianetti & English s.n.* (K, MEL), 1896, Mt. Scratchley; *id.* (K), 1897, Wharton Range, both E. New Guinea.

S. terminalis Brand, Pfl. R. Heft 6 (1901) 36. – Type: Rel. *Hillebrand* (B†, fragment in W), China.

S. stawellii F. v. Muell. var. *leptophylla* Brand, Pfl. R. Heft 6 (1901) 37. – *S. spicata* (*non* Roxb.) Seemann, Fl. Vit. (1866) 153 *p.p.*; Drake del Castillo, Illustr. (1886) 230. – *S. leptophylla* Turrill, J. Linn. Soc. Bot. 43 (1915) 30; Gillespie, Bern. P. Bish. Mus. Bull. 74 (1930) 15. t. 18. – Type: *Seemann 294* (W, isotypes in BM, G, K, MEL, P), Fiji, Viti Levu.

S. aneityensis Brand, Pfl. R. Heft 6 (1901) 39. – Type: *McGillivray in Herb. Boiss. 42* (G, isotypes in K, P, W) New Hebrides, Aneitum.

S. candelabrum Brand, Pfl. R. Heft 6 (1901) 39. – Type: *Maiden s.n.* (B†, isotypes in BM, BRI), Lord Howe I.

S. syringoides Brand, Pfl. R. Heft 6 (1901) 41; S. Moore, J. Bot. 52 (1914) 148; Merr. Interpr. Rumph. (1917) 421. – *S. spicata* (*non* Roxb.) Vidal, Fl. Filip. 4 (1880) 127. – [*S. ferruginea* Roxb. var. *salaccensis* Brand, Perkins Fragm. Fl. Philip. (1904) 36, *nomen nudum* (*Ahern 440*, Dinagat I.)] – *S. ferruginea* var. *syringoides* Hall. *f.* Beih. Bot. Centralbl. 39-B (1923) 92. – *S. javanica* (*non* Kurz) Merr. En. Philip. 3 (1923) 299. – Lectotype: *Forsten s.n.* (L), Ambon.

S. sogeriensis Brand, Pfl. R. Heft 6 (1901) 49. – Type: *Forbes 652* (K, isotypes in BM, BO, L, MEL, P), New Guinea, Sogeri Region.

S. rhynchocarpa K. Sch. *ex* Brand, in K. Sch. & Laut. Nachtr. (1905) 347; Bot. Jahrb. 54 (1916) 223. – Type: *Schlechter 14366* (BM, BO, K, NO, P, WRSL), New Guinea, Torricelli Mts.

S. schumanniana Brand, in K. Sch. & Laut. Nachtr. (1905) 347; Bot. Jahrb. 54 (1916) 224. – Type: *Nymann 711* (C, S), NE. New Guinea, Sattelberg.

S. maculata Brand, in K. Sch. & Laut. Nachtr. (1905) 348; Bot. Jahrb. 54 (1916) 222. — Type: *Bamler 12* (B†); paratype: *Schlechter 17626* (P), NE. New Guinea, Kani Mts.

S. schechteri Brand, in K. Sch. & Laut. Nachtr. (1905) 348; Bot. Jahrb. 54 (1916) 224. – Type: *Schlechter 14638* (BM, BP, P, WRSL), New Mecklenburg, Punam.

S. bodinieri Brand, Fedde Repert. 3 (1906) 217; Rehder, J. Arn. Arb. 15 (1934) 299. – *Maesa aurea* Lévl. Fedde Repert. 10 (1912) 375. – *S. laurina* var. *bodinieri* Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 34. – Type: *Cavalerie in Herb. Bodinier 2719* (Brand cited erroneously *2179*) (P, isotype in E), China.

S. ahernii Brand, Philip. J. Sc. 3 (1908) Bot. 6; Merr. En. Philip. 3 (1923) 297. – Lectotype: *FB 1511 Ahern* (BO, K, US), Philippines.

S. ferruginea Roxb. var. *philippinensis* Brand, Philips. J. Sc. 3 (1908) Bot. 6. – Lectotype: *Ahern 440* (BO, US), Philippines, Dinagat.

S. imbricata Brand, Philip. J. Sc. 4 (1909) Bot. 109; *op. cit.* 7 (1912) Bot. 31; Merr. En. Phillip. 3 (1923) 299. – Lectotype: *BS 4476* (L, isotype in US), Luzon, Benguet Prov.

S. pinfaensis Lévl. Fedde Repert. 9 (1910) 77; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 35. — Type: *Cavalerie 838 p.p.* (E), China, Kweichow, Pin Fa. (The same number in K is *S.*

S. sumuntia.)

S. balfourei Lévl. Fedde Repert. 9 (1910) 77. – Type: *Cavalerie 2527* (E), China, Kweichow, Pin Fa.

Eurya cavaleriei Lévl. Fedde Repert. 9 (1911) 450. – *Maesa bodinieri* Lévl. Fl. Kouy-Tcheou (1914) 286, *non vidi*. – Type: *Cavalerie 406* (E), China, Kwei Chow.

S. spicata Roxb. var. *malasica* Diels, Not. Bot. Gard. Edinb. 7 (1912) 73, 79, *non* Clarke (1882). – Syntypes: *Forrest 1037, 1095* (E), China.

S. dung Eberh. & Dub. Agron. Colon. 1 (1913) 79, t. 3; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 278; Fl. Gén. I.-C. 3 (1933) 1009; Merr. Comm. Lour. (1935) 305; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 34. — Type: *Eberhardt s.n.* (P), N. Annam.

S. vinoso-dentata Lévl. Bull. Géogr. Bot. 24 (1914) 283; Fl. Kouy-Tcheou (1915) 410. – Type: *E. E. Maire s.n.* (E, isotype in P), China.

S. kotoensis Hayata, Ic. Pl. Form. 5 (1915) 106, t. 31; Kanehira, Form. Woods (1921) 151; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 920; Mori, Sylvia 5, 4 (1934) 235; Kanehira, Form. Trees (ed. 1936) 593, t. 550; Walker, Imp. Trees Ryu Kyu (1954) 263, t. 168; Ohwi, Fl. Jap. (1965) 726. – *S. patens* (*non* Presl) H. L. Li, J. Wash. Ac. Sc. 43 (1953) 109. – *Bobua kotoensis* Yamamoto, Suppl. Ic. Pl. Form. 4 (1928) 19. – *Dicalyx kotoensis* Hara, En. Sperm. Jap. 1 (1948) 104. – Type: *Kawakami & Sasaki*, July 1912 (*non vidi*), Formosa.

S. wikstroemifolia Hayata, Ic. Pl. Form. 5 (1915) 119, t. 25b; Mori, Sylvia 5 (1934) 249; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 924; Kanehira, Form. Trees (ed. 1936) 602, t. 560. – *Bobua wikstroemifolia* Kanehira & Sasaki, Cat. Govt. Herb. (1930) 409. – Type: *Mori 3719* (*non vidi*), Formosa.

S. konishii Hayata, Ic. Pl. Form. 5 (1915) 105, t. 25 a-a ; Mori Sylvia 5 (1935) 234; Kanehira, Form. Trees (ed. 1936) 590, t. 548; H. L. Li, Woody Fl. Taiwan (1963) 737. *Bobua konishii* Kanehra & Sasaki, Cat. Govt. Herb. (1930) 407. – Type: no collector (*non vidi*, TI), Formosa, Hengchun, 1907.

S. stenostachys Hayata, Ic. Pl. Form. 5 (1915) 115; Kanehira, Form. Trees (1917) 361; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 923. – Type: *Kawakami 1438* (*non vidi*), Formosa.

S. divaricativena Hayata, Ic. Pl. Form. 5 (1915) 96, t. 25 g; Mori, Sylvia 5 (1935) 226; Kanehira, Form. Trees (ed. 1936) 584, t. 540; H. L. Li, Woody Fl. Taiwan (1963) 741. – *Bobua divaricativena* Kanehira & Sasaki, Cat. Govt. Herb. (1930) 407. – Type: *Mori 1729* (*non vidi*), Formosa, Mt. Morrison.

S. leptophylla forma *compacta* Turrill, J. Linn. Soc. Bot. 43 (1915) 31. – Type: *Im Thurn 225* (BM, K), Fiji, Nandarivatu.

S. reginae Brand, Bot. Jahrb. 54 (1916) 214. – Lectotype: *Ledermann 9129* (K, L), New Guinea.

S. margarita Brand, Bot. Jahrb. 54 (1916) 215. – Lectotype: *Ledermann 12956* (L), NE. New Guinea, Lordberg.

S. pisifera Brand, Bot. Jahrb. 54 (1916) 216. – Lectotype: *Ledermann 12854* (G), NE. New Guinea, Felsspitze.

S. pisifera Brand var. *miophylla* Brand, *l.c.* – Syntypes: *Ledermann 11013, 11132, 11495* (non vidi), New Guinea.

S. molobros Brand, Bot. Jahrb. 54 (1916) 217. – Lectotype: *Ledermann 10210* (L), NE, New Guinea, Hunsteinspitze.

S. ensicuspis Brand, Bot. Jahrb. 54 (1916) 219. – Type: *Ledermann 9949* (K, L), NE. New Guinea, Lordberg.

S. delectans Brand, Bot. Jahrb. 54 (1916) 219. – *S. ferruginea* Roxb. var. *delectans* Kanehira & Hatusima, Bot. Mag. Tokyo 56 (1942) 487. – Type: *Ledermann 10766* (*non vidi*), NE. New Guinea, Sepik.

S. palmarum Brand, Bot. Jahrb. 54 (1916) 220. – Lectotype: *Ledermann 9281* (K, L), NE. New Guinea, Etappenberg.

S. rupestris Brand, Bot. Jahrb. 54 (1916) 220. – Lectotype: *Ledermann 12542* (L), NE. New Guinea, Felsspitze.

S. myrmecophila Schlechter *ex* Brand, Bot. Jahrb. 54 (1916) 224. – Lectotype: *Schlechter 17897* (P), New Guinea, Kani Mts.

S. pusilliflora S. Moore, Trans. Linn. Soc. Bot. 9 (1916) 107. — Type: *Boden Kloss s.n.* (BM, K), SW. New Guinea, Utakwa, Exp. Mt. Carstensz, Camp VI.

S. klossii S. Moore, *op. cit.* 108. – Type: *Boden Kloss s.n.* (BM, K), SW. New Guinea, Mt. Carstensz, Utakwa River, Camp 13–14.

S. arfakensis Gibbs, Arfak (1917) 175. – Type: *Gibbs 5741* (BM, K, L), New Guinea, Arfak Mts.

S. ramosii Merr. Philip. J. Sc. 12 (1917) Bot. 293; En. Philip. 3 (1923) 302. – Type: *BS 23801* (BM), Philippines.

S. lithocarpoides Nakai, Bot. Mag. Tokyo 36 (1921) 136. – Syntypes: *Y. Tashiro* (*non vidi*) and *T. Uchiyama* (*non vidi*), Ryu Kyu Is., Okinawa and Oshima Is. respectively.

S. schaefferae Merr. Philip. J. Sc. 23 (1923) 260. – Type: *CCC 9781 McClure* (A, isotypes in BISH, BM, C, E, HK, K, P, W), China.

S. angustifolia Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 275; Fl. Gén. I.-C. 3 (1933) 1010; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 34. – Type: *Poilane 7014* (P), Annam, Tourane.

S. harmandii Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 281; Fl. Gén. I.-C. 3 (1933) 1011. – Lectotype: *Harmand 761* (P), Cochinchina, P. Condor.

S. trifurceps Brand, Nova Guinea 14 (1924) 186. – Lectotype: *Lam 1904* (L, isotypes in BO, K), New Guinea, Mt. Doorman.

S. mamberamo Brand, Nova Guinea 14 (1924) 186. – Type: *Lam 1719* (BO, K, L), New Guinea, Mamberamo River.

S. römeri Brand, Nova Guinea 14 (1924) 186. – Type: *von Römer 1240* (BO, K, L), New Guinea Hellwig Mts.

S. versteegii Brand, Nova Guinea 14 (1924) 187. – Type: *Versteeg 1426* (BO, K, L), New Guinea, Lorentz River.

S. doormannensis Brand, Nova Guinea 14 (1924) 187. – Lectotype: *Lam 1985* (BO, L), New Guinea, Mt. Doorman.

S. cyclops Brand, Nova Guinea 14 (1924) 188. – Type: *Gjellerup 492* (BO, K, L), New Guinea, Cycloop Mts.

S. lamii Brand, Nova Guinea 14 (1924) 188. – Type: *H. J. Lam 813* (BO, K, L) New Guinea, Mamberamo, Prauwenbivak.

S. aggregata White & Francis, Proc. Roy. Soc. Queensl. 38 (1927) 256, t. 17. – Type: *Lane Poole 183* (BRI, isotype in K), New Guinea, Papua, Lower Kumusi River.

S. ferruginifolia Kanehira, Trans. Nat. Hist. Soc. Form. 20 (1930) 383; Form. Trees (ed. 1936) 585, t. 524. – Type:? The plate in Formosan Trees is from the type. Formosa.

S. hydrophila Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 172; Fl. Gén. I.-C. 3 (1933) 1007. – Type: *Poilane 13548* (P), Annam, Quang Tri.

S. subolivacea Price, Kew Bull. (1933) 187. – Type: *Price 1142* (K, isotypes in A, W), China, Fukien.

S. theifolia (*non* D. Don) Guillaumin, Fl. Gén. I.-C. 3 (1933) 1008.

S. morobeensis Sleumer, Fedde Repert. 42 (1937) 265. — Type: *Clemens 3960* (B†, *non vidi*), New Guinea, Morobe Distr., 5500 ft.

S. ferruginea Roxb. var. *glabra* Fletcher, Kew Bull. 1937 (1938) 505; Fl. Siam. En. 2 (1938) 386. – Type: *Kerr 15397* (K, isotypes in BM, E, SING), Thailand, Lam Saka.

S. ampulliformis C. T. White, Proc. Roy. Soc. Queensl. 50 (1939) 81. – *S. stawellii* (*non* F.v.M.) Hemsley, Ann. Bot. 10 (1896) 242. – Type: *C. T. White 10581* (BRI, isotypes in A, BM, G, K), Queensland, Mt. Spurgeon.

S. stawellii var. *montana* C. T. White, Proc. Roy. Soc. Queensl. 50 (1939) 81. – Type: *H. Flecker 875* (*non vidi*), Queensland, Mt. Bartle Frere.

S. angiensis Kanehira & Hatusima, Bot. Mag. Tokyo 56 (1942) 485. – Type: *Kanehira & Hatusima 14104* (BO), W. New Guinea, Mt. Arfak.

S. dalmannensis Kanehira & Hatusima, Bot. Mag. Tokyo 56 (1942) 487. – Type: *Kanehira & Hatusima 12113* (FU), New Guinea.

S. luteifolia Kanehira & Hatusima, Bot. Mag. Tokyo 56 (1942) 487. – Type: *Kanehira & Hatusima 13903* (A), W. New Guinea, Mt. Arfak.

S. stenophylla Merr. & Chun *ex* Li, J. Arn. Arb. 25 (1944) 210. – Type: *F. C. How 72325* (A, isotype in BO), Hainan, Lokwui.

S. turrilliana A. C. Smith, J. Arn. Arb. 33 (1952) 111. – Type: *A. C. Smith 4845* (A, isotypes in K, L, P, US), Fiji, Viti Levu, summit of Mt. Nanggaranambuluta.

Small shrub to large tree. *Leaves* very variable in all characters. *Inflorescence* usually a (basally branched) 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. *cochinchinensis* var. *imbricata* ovoid to ellipsoid, in ssp. *thwaitesii* and ssp. *leptophylla* from globose to ellipsoid, ovoid or ampulliform. *Seed* and embryo curved.

Distribution. India, Burma, Thailand, Indo-China, China, Japan, Ryu Kyu Is., Hainan, Formosa, Malesia, Australia (Queensland and New South Wales), Solomon Is., New Hebrides, and Fiji.

Notes. 1. *Myrtus laurinus* Retz. (1786) is the oldest synonym, but this epithet is not available by the existence of *Symplocos laurina* Wall. *ex* G. Don (1837). Rehder & Wilson (in Sargent, Pl. Wils. 2, 1916, 594) assumed that *S. laurina* Wall. was based on *Myrtus laurinus* Retz. They were followed by Merrill (Comm. Lour. 1935, 303),who, however, stated that it is doubtful whether Wallich based his species on Retzius. Wallich cited several collections, *viz.*: '*4416A*: *Myrtus laurina* Hb. Madr. e Colombo et ex itinere Travancoreari; *4416B*: *Myrtus laurinus* Herb. Wight; *4416C*: *Eugenia laurina* Rottl. herb. Heyne; *4416D*: var. *wightiana* Wall. (an distincta?); *4416E*: var. *wightiana* Wall. Nilghiry.' It can not be proved that the epithet '*laurina*' was based on *Myrtus laurinus* Retz., especially because Wallich did not refer to this name with Retzius' authority attached. In other transfers Wallich clearly cites in his Numerical List the basionym including the author. See for instance *Wallich 3052*, *Conyza asteroides*; *Wallich 2245*, *Ternstroemia dumosa*, and *Wallich 3566*, *3569*, *3575*, where Wallich transferred three species from *Eugenia* to *Syzygium*. Other authors dealing with some families in Wallich's Catalogue also followed this procedure, *e.g. Wallich 4951*, *Stauntonia angustifolia* R. Br.

The conclusion must be that *Myrtus laurinus* Retz. and *Symplocos laurina* Wall. are heterotypic. As Wallich's name was validated by G. Don, and the latter mentioned only two of Wallich's sheets, I have chosen a lectotype from these.

The decision reached is not new; it was already expressed by De Candolle, who cited *Myrtus laurinus* Retz. and *Symplocos laurina* Wall. *ex* G. Don under different varieties of *S. spicata* Roxb.

Thus, the specific epithet *laurinus* from Retzius can not be used in *Symplocos* and, though antedating the epithet *cochinchinensis* of Loureiro, the latter must be used.

2. Up till now *Symplocos cochinchinensis* and *S. laurina* have always been treated as different species. Several authors, however, pointed out that the discrimination is very difficult (*e.g.* Handel-Mazzetti, 1943). Careful examination of all the material at hand brought me to the conclusion that they cannot be kept apart at specific level. The two forms behave like different species in large parts of the area. In other regions they obviously hybridise, thus giving rise to hybrid swarms that probably enlarge the variability of both parent species by back crossing. All this results in a large variability, which often makes determination impossible. It is also possible that from the hybrids new taxa arise under influence of different environmental conditions. It is almost certain that forms as var. *sessifolia* and var. *imbricata* are developed in that way, both occurring at high altitudes.

3. The main difference between '*cochinchinensis*' and '*laurina*' is glabrous versus hairy calyx lobes. In true '*cochinchinensis*' the calyx lobes are densely appressedly (long) pubescent, in '*laurina*' they are said to be invariably glabrous. For this reason forms of '*laurina*' with more or less short-pubescent or puberulent calyx lobes have been considered as varieties of *S. cochinchinensis* by several authors. According to my observations the indument of the calyx in this species complex varies from totally glabrous or ciliate in most of the material of '*laurina*' to appressedly puberulous or pubescent in '*cochinchinensis*'. The main differences are thus the longer and denser indument of '*cochinchinensis*' çalyx lobes, and its bracts and bracteoles, the latter forming a calycle appressed to the calyx tube, completely concealing the calyx. In '*laurina*' this calycle is more platter-shaped. Furthermore, in true '*cochinchinensis*' the calyx lobes often enlarge in fruit, forminga conical beak. In '*laurina*' they form a small crown on top of the fruit, but they can also be closed. '*Laurina*' is rather variable in its whole area, while '*cochinchinensis*' becomes variable only in certain regions. I presume that the larger leaves, occurring in otherwise good '*laurina*', resembling in shape and venation the leaves of '*cochinchinensis*' are due to introgression after former hybridisation. This kind of leaves closely resemble those of the glabrous forms of '*cochinchinensis*'. Those forms have been described as *S. polystachya* Wall., *S. lachnobotrya* Miq. var. *glabrior*, *S. mollis* Wall., *S. ferruginea* var. *glabra* Fletcher. Variants of '*laurina*' with this kind of leaves have been described as *S. vinoso-dentata* Lévl. and *Maesa bodinieri* Lévl.

4. In New Guinea, Australia, and the Pacific islands many forms are derived from this complex. Often they do not resemble the true forms at all, but they are linked with them by a continuous variation and there is a total breakdown of any distinction between '*laurina*' and '*cochinchinensis*'. It is remarkable that in most derived forms in New Guinea and the Pacific seed and embryo are only curved at the base ('uncinate') and that there is a tendency to develop unisexuality. Several New Guinean forms are also characterised by the appearance of a condensed fascicle-like inflorescence. The disk often becomes hairy, but in most infra-specific taxa this character is variable.

5. *S. loha* Buch. Ham. *ex* D. Don is based on 3 collections, 2 of them in bud, named '*Symplocos loha*' by Hamilton, 1 of them with flowers, named '*Symplocos subspinosa*' *in sched.* The first two represent *S. pyrifolia* Wall. *ex* G. Don, while the third is *S.*

cochinchinensis ssp. *cochinchinensis* var. *cochinchinensis*. From the description it is clear that this specimen is to be taken as the lectotype of *S. loha* Don.

Palynology. Of the 9 pollen types occurring in subg. *Hopea*, 5 are found in this species. There is, however, a certain regularity in the distribution of the types. Van der Meijden (1971) did not have the final determinations of the infraspecific taxa; it was necessary to reduce several taxa after the time I gave Van der Meijden my preliminary namings. For that reason I give a full account of the findings of Van der Meijden on the material belonging to this species.

Of ssp. *laurina* only collections belonging to var. *laurina* have been studied: *Balansa 3972*; *Blume 483* ('*xanthophylla*'); *Fan & Li 472*; *Helfer s.n.*; *Hohenacker 1053* ('*flavida*' Miq.); *Holstvoogd 331*; *Jenkins s.n.*; *Kerr 6439, 14708*; *King's coll. 208*; *Koorders 27977*; *McLaren F 221*; *Maximowicz 14770*; *Nai Noe 87*; *Simons s.n.*; *Tsiang Ying 1240*; *Walker s.n.*

All but one of these collections belong to Van der Meijden's pollentype 2.5; the only exception, *Simons s.n.*, has abnormal pollen and was assigned with doubt to subtype 2.3.

Of ssp. *cochinchinensis* the pollen of all varieties were studied:

Var. *cochinchinensis*: 20 collections, all belong to type 2.5.

Var. *philippinensis*: the Philippine collections were still named '*ahernii*' by Van der Meijden: *BS 12717, 26299*; *Elmer 11951*; *Vanoverbergh 1467*; from the Lesser Sunda Is.: *Kostermans 18787* ('*laurina*'); from the Moluccas: *Robinson 1927* and *De Vriese s.n.*, and from Java: *DSPW 29* ('*cochinchinensis*'), all these collections belong to type 2.5.

Var. *sessifolia*: *Hochreutiner 2357*; *Junghuhn s.n.*; *van Ooststroom 13291*, also all belong to type 2.5.

Var. *imbricata*: *PNH 7540, 7772*; this variety belongs to type 2.3.

In ssp. *thwaitesii*, var. *stawellii* possesses two pollentypes, type 2.4 (*Hoogland & Schodde 6820*) and type 2.5 (*Brass 5939*); in var. *thwaitesii* only type 2.5 is found (*Curtis s.n.*).

Also studied is a collection of *Clemens s.n.* (L, sheet no 959.30–583) which can belong to var. *gittonsii* or var. *montana*. The pollentype of this collection is 2.2.

In ssp. *leptophylla* the situation is as follows:

In var. *leptophylla* two types are found, type 2.4 (*Brass 22851, 30201*; *Hoogland & Schodde 6918*; *von Römer 1257*) and type 2.6 (*Lam 1565*; *A. C. Smith 5278*; *De Vriese & Teijsmann s.n.* ('*buruensis*')).

Var. *aneityensis*: *De la Rue s.n.* belongs to type 2.4.

Var. *ovata*: *Pullen 330* belongs to type 2.4.

Var. *molobros*: *Ledermann 10210* belongs to type 2.6.

Summarising the results of the palynological situation in *S. cochinchinensis* it appears that the pollentype is constant for ssp. *laurina* var. *laurina* and for ssp. *cochinchinensis* and its varieties *philippinensis* and *sessifolia*, Van der Meijden's type 2.5.

Ssp. *cochinchinensis* var. *imbricata* possesses a different type 2.3. Van der Meijden stated for this type that the difference with type 2.5 is rather arbitrary. Besides the pollen is here partly abnormal.

Of ssp. *thwaitesii* one variety belongs to pollentype 2.5, another to the types 2.4 and 2.5. For one collection, belonging to one of the other two varieties, Van der Meijden found 2.2. This is very strange, because this pollentype occurs furthermore in species of Ceylon and Malesia (New Guinea not included). Re-examination of the herbarium material, as well as the pollen sample from it, proved that no error has been made.

In ssp. *leptophylla* two pollentypes are found, one of them not occurring in the other subspecies. Type 2.6. is found in var. *leptophylla*, in part of var. *schumanniana* and in var. *molobros*. Type 2.4 is found in var. *aneityensis* and in part of var. *schumanniana* including the var. *ovata*. Except in type 2.4 abnormal pollen is found in a considerable number of collections. This could be due to hybridisation.

KEY TO THE SUBSPECIES

1a. 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

b. 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

2a. Calyx lobes hairy (except on Mt. Diëng in Central Java), often enlarged in fruit, forming a conical beak. . . . . **27-1.** ssp. **cochinchinensis**

b. Calyx lobes glabrous, often ciliate, not enlarged in fruit. . . . **27-7.** ssp. *laurina*

3a. Seeds and embryo once curved. (Disk glabrous or rarely pilose.) Calyx lobes glabrous, often ciliate. Flowers bisexual. . . . . **27-10.** ssp. **thwaitesii**

b. 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). . . . . **27-15.** ssp. **leptophylla**

27-1. ssp. **cochinchinensis**

Distribution. India, Burma, Thailand, Indo-China, China, Japan, Sumatra, Malay Peninsula, Java, Borneo, Philippines, and New Guinea.

KEY TO THE VARIETIES

1a. 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. . . . . **27-2.** var. **cochinchinensis**

b. 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

2a. Leaves 3–12 by $1\frac{1}{2}$–6 cm, index 1.4–3; nerves 4–8 pairs; petiole 0–3 mm. Fruit at most 7 mm long. . . . . **27-4.** var. **sessifolia**

b. Leaves 6–18 by $1\frac{1}{2}$–$6\frac{1}{2}$ cm, index 1.6–4.5; nerves 5–11 pairs; petiole 3–25 mm. Fruit at most 7 mm long. . . . . **27-5.** var. **philippinensis**

c. Leaves 4–9 by $2\frac{1}{2}$–$5\frac{1}{2}$ cm, index 1–2; nerves 5–7 pairs; petiole 4–7 mm. Fruit 10–12 mm long. . . . . **27-6.** var. **imbricata**

27-2. var. **cochinchinensis**

Dicalyx cochinchinensis Lour. – *Dicalyx aluminosus* Bl. – *Dicalyx javanicus* Bl. – *S. ferruginea* Roxb. — *S. mollis* Wall. *ex* G. Don — *S. spicata* var. *platystachya* G. Don — *S. verhuellii* Jungh. & De Vriese – *S. horsfieldiana* Miq. – *S. lachnobotrys* Miq. – *S. lachnobotrys* var. *glabrior* Miq. – *S. delectans* Brand – *S. kotoensis* Hayata – *S. lithocarpoides* Nakai – *S. ferruginifolia* Kanehira – *S. ferruginea* var. *glabra* Fletcher.

Shrub or small tree, rarely a large tree to 45 m high and 80 cm ϕ. Twigs rusty tomentose or velvety, glabrescent, rarely pubescent, appressedly pilose or (nearly) glabrous. *Leaves* (densely) rusty or brownishly pubescent or tomentose beneath, especially on midrib and nerves, rarely glabrous and than often the midrib appressedly pilose beneath (in Java sometimes totally glabrous); (narrowly) (ovate-)elliptic(-obovate), (6–)12–25 by (2½–)3–10 cm, index (1.8–)2–4(–4.7), in New Guinea 1.5–2.5; apex usually more or less acuminate, base cuneate, rarely rounded or even cordate (in New Guinea); margin reflexed, glandular dentate or crenulate except towards the base, rarely entire. *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; secondary veins prominent beneath, often ± parallel to each other and at right angles with midrib or nerves. *Petiole* (2–)5–17 mm (rarely to 35 mm in New Guinea). *Inflorescence* a usually branched spike, 3–15 cm long, in topodeme *morobeensis* up to 3 cm, the axis densely rusty tomentose to pubescent, in New Guinea sometimes sericeous. Bracts and bracteoles 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 calyx tube. Flowers faintly scented to fragrant. *Calyx tube* glabrous, ½–1 mm high, the lobes (appressedly) pubescent, in topodeme *morobeensis* indument only towards the apex or on the margins, (1–)2(–3) mm long. *Corolla* white (according to some collectors with a yellow spot on each lobe), [2(sometimes in New Guinea)–]3–5 mm long. *Stamens* monadelphous or obscurely pentadelphous, 30–70 (in New Guinea from 10 at high altitudes to more than 70 at low altitudes), becoming as long as the corolla (2 mm longer in New Guinea). *Disk* glabrous, annular (cylindrical to pulvinate in New Guinea). *Style* glabrous, 3–5 mm, with knob-like or peltate stigma. *Fruits* 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 of the fruit. *Seed* usually 1, twice curved, with similarly curved embryo.

Distribution. India, Burma, Thailand, Indo-China, China, Japan, Sumatra, Malay Peninsula, Java, Borneo, Philippines, and New Guinea.

INDIA. North. Kumaon: *Madden 658*; *M. A. Rau 8763*; *Strachey & Winterbottom 4*, alt. 1500–1700 m. – Nepal: *Stainton, Sykes & Williams 5186*; *Stainton 6279, 6390*, alt. 1500 m. – Darjeeling: *J. M. Cowan s.n.* – Bhutan: *H. H. Haines 1013*, alt. 1200 m. – Assam: *c.* 11 collections, Khasia, Naga Hills and Cachar, alt. *c.* 1500 m.

BURMA. Tenasserim: 5 collections.

THAILAND. Payap: *Flora of Thailand 12935.* – Nakawn Sritamarat: *Kerr 15392, 15832.* – Surat: 6 collections, alt. 100–1700 m. – Puket: *Kerr 14207, 16725*; *Rabil 257.* – Pattani: *Kerr 1808, 7273, 7365*, alt. 0–800 m.

INDO-CHINA. Laos: *Poilane 26237*, alt. 1000 m. – Tonkin: 17 collections. – Annam: *Harmand 1899*; *Poilane 1684, 1799, 10423, 10849.*

CHINA. Yunnan: *K. M. Feng 12547, 12555, 13324*; *H. T. Tsai 59127*, alt. 500–2000 m. – Szechwan: *Y. S. Liu 1790*; *E. H. Wilson 2537A, 2539*, alt. 700–1000 m. – Kwangsi: 7 collections, alt. *c.* 1000 m. – Kwangtung: *CCC 14274*; *W. Y. Chun 6835* (Hong Kong); *Y. W. Taam 179, 901*; *W. T. Tsang 21377.* – Hainan: many collections, alt. 0–1500 m. – Kiangsi: *S. K. Lau 2023.* – Formosa: *Y. Yamamoto s.n.* (intermediate with var. *laurina*); Botel Tobago: *C. E. Chang 3076.*

JAPAN. Ryu Kyu Is.: Iriomote I.: *L. J. Gressitt 535, 605.* – Kyushu: *Faurie 3808*; *M. Togasi TNS 1436*, Takushima.

SUMATRA. Atjeh: *bb 22438*, Gajo Lands; *van Steenis 6588*, Guang Guang, alt. 800 m. – Tapanuli: 6 collections, alt. 350–1500 m. – Westcoast: 17 collections, alt. 500–2500 m. – Eastcoast: *c.* 20 collections. – Djambi: *O. Posthumus 564, 574*; *Rutten-Kooistra 61.* – Bencoolen: *bb 8757*; *Jacobson 37*; *de Voogd 1354.* – Palembang: *bb 13589, T.B. 611, T. 1149*; *Huitema 93*; *de Voogd 1451, 1508*, alt. 0–700 m. – Lampong: *Gusdorf 59, 83.* – Banka: 8 collections. – Billiton: 5 collections.

MALAY PENINSULA. Kedah: *CF 21515.* – Perak: 12 collections, alt. 250–300 m. – Trengganu: *SF 39857*, Sg. Ajil, Ulu Trengganu. – Pahang: 15 collections, alt. 1200–1300 m. – Kelantan: *Kep. FRI 108865*, Chabang, Ton Kat. – Negri Sembilan: *CF 1912.* – Malacca: *Maingay 856, 956.* – Penang: *c.* 10 collections.

WEST JAVA. Bantam: *Backer 1687, 1905, 2042*; *Unesco* (*Kostermans 111*; *Wirawan 210, 171*, alt. 0–600 m. – Bogor: many collections, alt. 150–1500 m; 9 collections from Gedeh-Pangrango. – Priangan: 12 collections, alt. 400–1600 m.

CENTRAL JAVA. Pekalongan: *Koorders 11031*, Bawang. – Banjumas: *Ja 2523*, Watu Agung, alt. 500 m; *Koorders 25797*, Nusa Kambangan. – Semarang: *Docters van Leeuwen-Reijnvaan 811*, NW. Muria, alt. 400 m: *Junghuhn s.n.*, Mt. Ungaran; *Koorders 27973, 36315*, Mt. Telomojo, alt. 1900 m. – Djapara-Rembang: *Kostermans 6300, 6301*, G. Murjo, alt. 800–1400 m.

BORNEO. Sarawak: *Clemens 20392*, Mt. Poi, alt. 1300 m. – W. Borneo: *Hallier 1379, 1409, 2272*; *Jaheri* (*exp. Nieuwenhuis*) *1699, 1893*; *Teysmann 8399, 8401.* – SE. Borneo: *bb 584, 980*; *M. Dachlan 1886*; *Winkler 2096, 2254, 2970.* – Sabah: 16 collections, Mt. Kinabalu area, alt. 1000–1700 m.

PHILIPPINES. Luzon: *PNH 72676*, Mt. Prov., Mt. Taggutu, Ifugao.

NEW GUINEA. West Irian: Div. W. New Guinea: *Kanehira & Hatusima 12990, 13185*, Manokwari; *Beccari 6215.* Sorong. – Div. Hollandia: *BW 13460*, Wandammen Peninsula, Wondiwoi Mts. – Central New Guinea: *Evma 5172*, Wissel Lake region, Barara. – Territory of New Guinea. Sepik Area: *Darbyshire 390*, Torricelli Mts. – W. Highlands: *Robbins 3083*, Wabag area. – E. Highlands: *Robbins 929*, Kainantu Subdistr., Barola. – Morobe Distr.: *NGF 14576, 40517*, Wau: *NGF 9131, 9189, 11139*, Bulolo. – Papua. Central Distr.: *Carr 14344*, Boridi; *Carr 16115*, Buarava; *NGF 12917, 33718*, Woitape. – Milne Bay area: *Brass 24921*, Goodenough I.

Ecology. In India, Burma, and Thailand probably rarely at low altitudes, more often in hills and mountains up to 1700 m, in China up to 2000 m (Hainan 0–1500 m), in Japan and Formosa probably only at low altitudes, in Sumatra mostly in hills and mountains up to 2300 m, in the Malay Peninsula from 0–1300 m, in Java rarely at low altitude, in the mountains up to 1600 m, in Borneo ?1000–1700 m, in New Guinea altitude to over 3000 m.

Uses. The timber is only of slight value. It is, however, recorded to be used for furniture and frames of houses. In Java the bark is used in dyeing (Burkill, Dict.).

Notes. 1. Var. *cochinchinensis* is not very variable in large parts of its area (Continental Asia, Sumatra, Malay Peninsula, and Borneo). In Java this becomes different. Glabrous leaves, sporadically occurring in the mentioned area, become rather common in Java. Towards East Java also the number of lateral nerves decreases, and the leaves begin to resemble those of ssp. *laurina*. Here there is a gradual transition of var. *cochinchinensis* into var. *philippinensis*. The latter variety replaces var. *cochinchinensis* in the Lesser Sunda Is., Celebes, the Moluccas and the Philippines. Transitional forms from Java are mostly named var. *cochinchinensis*.

2. Several plants from the Morobe District in New Guinea differ from the rest of var. *cochinchinensis* in some characters. In order to make it possible to name them I treat them here as a topodeme:

Petioles 5–17 mm. Inflorescence longer than 3 cm. Calyx lobes wholly covered by the indument. . . . . **27-2.** var. **cochinchinensis**
Petioles 15–35 mm. Inflorescence up to 3 cm long; indument of calyx lobes only towards the apex or on the margin. . . . . **27-3.** topodeme '**morobeensis**'

27-3. topodeme '**morobeensis**'

NEW GUINEA. Territory of New Guinea, Morobe Distr., *NGF 17138, 19951*; *TGH 11834*, Mt. Kaindi (Edie Creek), *TGH 12783*, Bakaia, near Garaina.

Note. None of these specimens carry fruit.

27-4. var. **sessifolia** (Bl.) Noot., *comb. nov.*

Dicalyx sessifolius Bl. Bijdr. (1826) 1118 — *Dicalyx salaccensis* Bl. — *S. laurina* (*non* Wall.) Moritzi. – *S. subsessilis* Choisy *ex* Miq. – *Eugeniodes diengense* O.K. – *S. cochinchinensis* ssp. *sessifolia* (Bl.) Noot. *ex* Steen.

Shrub or small tree. Twigs glabrous or nearly so. *Leaves* glabrous, coriaceous, 3–12 by 1½–6 cm, index 1.4–3; base angle 30°–60°; apex faintly acuminate, acumen 2–10 mm. *Nerves* 4–8 pairs, meeting in a faint intramarginal vein at some distance of the margin; reticulation netted, rather coarse; base cuneate to rounded. *Petiole c.* 0–3

(−5) mm. *Inflorescence* a (branched) spike up to 6 cm, often crowded towards the ends of the twigs; axis densely appressedly pubescent. Bracts, bracteoles and flowers as in ssp. *cochinchinensis* var. *cochinchinensis*, but on Mt. Diëng the calyx lobes only ciliate, or only pubescent towards the margin. Calyx lobes on the fruit not enlarged and closed.

WEST JAVA. *Bruggeman 276, 3731*; *Koorders 8034, 8101, 8102, 8103*; *Nooteboom 902, 904, 904B, 906, 909*, and *c.* 40 other collections, Gedeh-Pangrango, alt. 1700−3000 m; *Koorders 36732*; *van Steenis 5077*; *Blume 1965*, G. Salak; *Docters van Leeuwen-Reijnvaan 13175, 13310*; *C. A. Backer 5565*; *van Steenis 4142, 4773*, G. Papandajan, alt. 1800—2650 m; *Ja 4002, 4010*, Pr. Bandung, alt. *c.* 2000 m; *Koorders 8050*, G. Patuha, alt. 1700 m.

CENTRAL JAVA. *Ja 2466*, G. Sumbing, Kedu, alt. 2160 m; *Hochreutiner 2375*; *Koorders 11030*; *O. Kuntze 5737*; *van Slooten 354*; *van Steenis 4612*, Pekalongan, G. Diëng (G. Prahu), alt. 2000−2600 m.

Ecology. Only at high altitude, often in shrubbery on mountain tops and ridges.

Note. On the Gedeh-Pangrango, near Bogor, West Java, it appeared to be possible to collect a complete range of transitions in leaf characters between ssp. *laurina* and ssp. *cochinchinensis* var. *sessifolia*. *Koorders 39355* and *Blume 1965* (type of *Dicalyx salaccensis* Bl.) are transitional between ssp. *laurina* var. *laurina* and ssp. *cochinchinensis* var. *cochinchinensis*. Probably such plants have arisen by hybridisation. True ssp. *laurina* var. *laurina* occurs on the Gedeh-Pangrango between 1200 m (*Junghuhn s.n.*) and 2200 m (*Nooteboom 908*); true ssp. *cochinchinensis* var. *cochinchinensis* from low altitudes up to 1400 m (*Koorders 32100*). True var. *sessifolia* occurs between 1700 m (*van Steenis 12912*) and the top (3020 m, many collections). It is not unlikely that hybridisation occurs in the overlapping area. Probably the hybrids are more vigorous than the parents at high altitudes. The extreme circumstances towards the top provide a selection pressure that favours the development of a mountain form with short petioles and broad coriaceous leaves. Even on the very top, however, young plants and watershoots possess leaves that are much larger than the common ones and variable in shape. Similar forms occur on other mountains in West and Central Java. On Mt. Diëng they possess a nearly glabrous calyx.

27-5. var. **philippinensis** (Brand) Noot., *comb. nov.*

S. syringoides Brand − *Dicalyx aluminosus* Bl. − *S. ahernii* Brand − *S. ferruginea* var. *philippinensis* Brand, Philip. J. Sc. 3 (1908) Bot. 6 − *S. ramosii* Merr. − *S. ferruginea* var. *syringoides* (Brand) Hall. *f.*

Twigs glabrous or appressedly pubescent. *Leaves* glabrous, or the midrib sparsely appressedly fine-hairy, ± elliptic, in the Philippines 5−13 by $2\frac{1}{2}-5\frac{1}{2}$ cm, index $2\frac{1}{2}-3\frac{1}{2}$, outside the Philippines (4−)6−18 by $1\frac{1}{2}-6\frac{1}{2}$ cm, index 1.6−4.5. *Nerves* 5−10 pairs in the Philippines, (6−)9−11(−15) pairs outside the Philippines, mostly ending in an intramarginal vein not far from the often crenate or dentate margin. *Petiole* 10−25 mm

in the Philippines, 3–15 mm outside the Philippines. *Inflorescence* axis and bracts tomentellous or pubescent, bracts 1–2 mm (to 3 mm in the Lesser Sunda Is.), with bracteoles mostly like in ssp. *laurina*. *Calyx tube* glabrous, ½–1 mm high, the lobes (finely) appressedly pubescent, *c.* 1 mm long. *Corolla* 3–6 mm. *Stamens* 35–70, becoming as long as the corolla. *Disk* annular, glabrous. *Style* 2–5 mm with peltate stigma. *Fruits* as in ssp. *laurina*.

Distribution. Java, Lesser Sunda Is., Philippines, Celebes, and the Moluccas.

CENTRAL JAVA. Pekalongan: *van Steenis 4568*, G. Diëng, alt. 2000 m. – Kedu: *Ja 2513*; *Koorders 37835*; *Mousset 1039*, alt. 700–2000 m. – Djapara-Rembang: *Ja 1797*, Kudus.

EAST JAVA. Madiun: *J. H. Coert 34, 59, 954, 1003, 1028*; *Dorgelo 50, 71, S 333*; *DW & PW 29*; *Elbert 281*; *Ja 2705*, G. Lawu, alt. 1000–2600 m; *Koorders 8126*, G. Wilis. – Kediri: *den Berger 697*; *Ja 3017*, G. Wilis, alt. 700–1300 m. – Malang: *Kobus 134*; *Koorders 37834*, G. Tengger, alt. 2000 m. – Besuki: *Koorders 43656*, G. Ijang, alt. 2300 m; *Koorders 8104*, G. Idjen.

LESSER SUNDA ISLANDS. Bali: *A. Dilmy 1002*; *KK & SS 183*, alt. 1300 m. – Sumbawa: *Kostermans 18694, 18787*, Mt. Batulanten, alt. 500–900 m. – Flores: *Schmutz 399, 597, 1984, 1987*; *Verheijen 421, 803*, Ruteng, alt. 800–2400 m.

PHILIPPINES. Mindoro: *FB 8590*. – Luzon: many collections, alt. 400–1000 m. – Sabtang I.: *BS 79893*. – Samar: *PNH 5694, 6300*. – E. Negros: *PNH* 6709, 11640, alt. 1000 m. – Dinagat I.: *Ahern 440*; *BS 83915*. – Mindanao: *BS 48883, 85028*, Mt. Matutum, alt. 2000 m.; *Elmer 11407, 11951*.

CELEBES. Minahassa: *Koorders 18059*. – Toradja: *bb 21986*, Rantepao, alt. 950 m; *Noerkas 435*. – SW. Celebes: *Teijsmann 12630*, Tjamba.

MOLUCCAS. Ternate: *Beccari 6220*; *Beguin 1467*; *bb 24532*, alt. 0–1400 m. – Tidore: *Teijsmann s.n.* – Ceram: *Kornassi 899, 910, 1182*; *Kuswata & Supadmo 206*. – Ambon: *Boerlage 378*; *Robinson 1927, 1928*; *O. Warburg 17474*.

Ecology. In Central Java from 700–2000 m, in East Java from 700–2600 m, in the Lesser Sunda Is. from 500–2400 m, in the Philippines from ? low altitudes to 2000 m, in the Moluccas from 0–1400 m.

Note. Most of the plants belonging to this variety possess '*laurina*' kind of leaves, but at least in the Philippines with much denser reticulation. As is stated under var. *cochinchinensis* this variety probably finds its origin in East Java by hybridisation between ssp. *laurina* var. *laurina* and ssp. *cochinchinensis* var. *cochinchinensis*. Thus its origin is probably similar to that of var. *sessifolia*. In East Java and the Lesser Sunda Is. it also grows at high altitudes and resembles more or less this variety.

27-6. var. **imbricata** (Brand) Noot., *comb. nov.*

S. imbricata Brand, Philip. J. Sc. 4 (1909) Bot. 109.

Shrub or tree, 3–9 mm. Twigs glabrous. *Leaves* glabrous more or less coriaceous, usually broadly ovate, 4–9 by 2½–5½ cm, index 1–2 with (cordate-)rounded or slightly acuminate base and acuminate apex (acumen 2–12 mm); margin glandular dentate. *Nerves* 5–7 pairs, often ending in an intramarginal looped vein. *Petiole* 4–7

mm. *Spikes* axillary or pseudo-terminal. *Calyx lobes c.* 2 mm long, more or less appressed-pubescent, the glabrous tube *c.* 1 mm high. *Corolla c.* 6 mm long. *Stamens c.* 60. *Fruits* black, ovoid to ellipsoid, crowned by the calyx lobes, 10–12 by *c.* 8 mm, exocarp fleshy, stone smooth, *c.* 8 by 5 mm.

PHILIPPINES. Luzon: *BS 4476, 5715, 40427*, Mt. Natoo, Benguet Prov.; *Clemens 17224*; *Elmer 14270*; *Jacobs 7156, 7235*; *Merrill 6584*; *Steiner 2061*, Mt. Pulog, Benguet Prov.; *PNH 7540*, Mt. Prov., Mt. Pauai; *PNH 7772*, Mt. Nangaoto; *PNH* 36913, Mt. S. Thomas.

Ecology. In forest at high altitudes, 2100–2600 m.

Note. This variety is a mountain form, probably directly derived from var. *philippinensis*. It mainly differs from it in the shorter leaves and petioles and in the bigger fruits.

27-7. ssp. **laurina** (Retz.) Noot., *comb. nov.* – **Fig. 2c.**

Myrtus laurinus Retz., Observ. Bot. 4 (1786) 26. – See further under the varieties.

Distribution. India, Ceylon, Burma, Thailand, Indo-China, China, Japan, Sumatra, Malay Peninsula, Java, Borneo and Celebes.

27-8. var. **laurina** – **Fig. 2c.**

Laurus serratus floris spicatis Burman – *Myrtus laurinus* Retz. – *Drupatris cochinchinensis* Lour. – *Decadia aluminosa* Lour. – *S. loha* Buch. Ham. *ex* D. Don – *Dicalvx spicatus* Bl. – *Dicalvx acuminatus* Bl. — *S. spicata* Roxb. — *S. polycarpa* Wall. *ex* G. Don — *S. laurina* Wall. *ex* G. Don — *S. attenuata* Wall. *ex* DC. – *S. spicata* var. *atroviridis* DC. – *S. spicata* var. *oligostachya* DC. – *S. ribes* Jungh. & De Vriese – *S. xanthophylla* Jungh. & De Vriese – *S. theophrastaefolia* S. & Z. – *S. flavida* Miq. – *S. spicata* var. *malasica* Clarke – *S. terminalis* Brand – *S. bodinieri* Brand – *S. pinfaensis* Lévl. – *S. balfourei* Lévl. – *S. spicata* Roxb. var. *malasica* Diels – *Eurya cavaleriei* Lévl. – *Maesa aurea* Lévl. – *S. dung* Eberh. & Dub. – *S. vinoso-dentata* Lévl. – *S. wikstroemifolia* Hayata – *S. konishii* Hayata – *S. stenostachys* Hayata – *S. divaricativena* Hayata – *S. schaefferae* Merr. – *S. harmandii* Guillaumin – *S. subolivacea* Price – *S. theifolia* (*non* D. Don) Guillaumin.

Twigs and leaves glabrous, except sometimes the youngest parts which can be appressedly hairy. *Leaves* ± elliptic, $4\frac{1}{2}$–21 by $(1\frac{1}{2}-)2\frac{1}{2}$–8 cm, index (1.8–)2–4(–7). *Nerves* 6–9 pairs (except in transitional forms, where up to 13 pairs), not strictly parallel to each other, anastomosing at some distance of the margin, often meeting in an intramarginal vein; reticulation netted, rather obscure to prominent, often quite coarse. *Petiole* (5–)10–15(–20) mm. (In transitional forms the leaves are like those of ssp. *cochinchinensis* var. *cochinchinensis* except for the indument.) *Inflorescence* $1\frac{1}{2}$–14 cm, axis glabrous to more or less appressedly puberulous or pubescent. Bracts and bracteoles at most 2 mm long and broad, but usually *c.* 1 mm, only enveloping the base of the calyx tube; exceptionally a short pedicel present. *Calyx tube* glabrous, the lobes glabrous or

nearly so, often ciliate, as long as the tube or shorter, at most 2 mm long, not elongating in fruit, whether closed after anthesis or not.

Distribution. As for the subspecies.

INDIA. West. Bombay Presidency, West of Goa: *Fernandes 450, 901.* – South India: *Anglade 388*; *Anstaed 12*; *Barnes 372, 383, 533, 902*, and many other collections, alt. 0–2300 m. – North India. Sultanpur: *K. G. Jain & R. C. Bharadwaja s.n.* – Sikkim: *J. D. Hooker s.n.* – Darjeeling: *J. M. Cowan s.n.* – Calcutta: *J. W. Helfer 3.* – East Pakistan. Sylhet: *C. B. Clarke 42433*; *Wallich 1417A.* – Chittagong Hills: *J. M. Cowan 1459, 1494, 1958*; *King's coll. 51, 208, 554, 577.* – Assam: many collections, alt. 1200–2100 m. – Manipur: *Kingdon Ward 18341.*

CEYLON. 15 collections.

BURMA. North. Kachin: *Kingdon Ward 1965*; Putao. – South. Amherst: *Lace 5619.* – Tenasserim: 6 collections, alt. 1500–1800 m.

THAILAND, Payap: *Kerr 6439*, Chiengmai, alt. 800 m; *Nooteboom 837*, Doi Inthanon, alt. 2200–2500 m. — Maharat: *Kerr 8826*, alt. 1000 m. — Pitsanulok: *Flora of Thailand 9119* (transitional with ssp. *cochinchinensis*); *Larsen, Smitinand & Warncke 887*, alt. 650 m. — Udawn: *Kerr 8539, 8566*, alt. 200—300 m. — Rachasima: *Kerr 20257*, alt. 900 m. — Prachinburi: *Collins 941, 1704.* — Chantaburi: *Flora of Thailand 471, 7224, 18067, 98105*; *Kerr 17627*; *Nai Noe (Kerr) 87* (transitional with ssp. *cochinchinensis*), low alt. — Surat: *Flora of Thailand 22598, 24211*; *Put 1699*, alt. 0—1900 m. — Nakawn Sritamarat: *Kerr 14305, 14708, 15692*, low alt.

INDO-CHINA. Laos: *Poilane 15643*, Bassac; *26458*, Haut Mekong, alt. 400 m; *J. E. Vidal 1004B*, Sedone, Paksong. – Tonkin: *R. P. Bon 1623*; *Poilane 17217* (transitional with ssp. *cochinchinensis*) and many other collections, alt. 0–1900 m. – Annam: *Chevalier 30846, 41258*; *Clemens 3686, 3951*; *Pételot 1405*; *Poilane 3899, 18129, 22031.* The following collections are transitional with ssp. *cochinchinensis*: *Poilane 1683, 10438, 10612, 11263, 11296, 22025.* – Cambodia: *L. Pierre 1899* (transitional); *Poilane 14111, 14124, 14789.* – Cochinchina: *Pierre 3079, 5042*; *Poilane 21590*; *Thorel 845, 1009.* – Pulu Condor: *de Perry s.n.*

CHINA. Yunnan: many collections, alt. 500–3000 m. Transitional with ssp. *cochinchinensis* are: *E. E. Maire 353, 608.* — Szechwan: *c.* 35 collections, all transitional with ssp. *cochinchinensis*, Mt. Omei and Kiating, alt. 350–1000 m. – Kweichow: 6 collections. – Kwangsi: *c.* 30 collections. Transitional with ssp. *cochinchinensis* are: *R. C. China 6436, 6502, 7659*; *S. P. Ko 55603*; *W. T. Tsang 28347*; *C. Wang 41245.* – Hunan: *Fan & Li 472*; *Handel-Mazzetti 11137*; *W. T. Tsang 23557.* – Hainan: many collections. – Kwangtung: many collections, transitional with ssp. *cochinchinensis* is: *W. Y. Chun 5930.* – Kiangsi: 6 collections. – Fukien: 6 collections. – Chekiang: 4 collections. – Formosa: 6 collections, alt. ?0–2300 m.

JAPAN. Kyushu: *Maximowicz 14770*; *Pierot 485.*

SUMATRA. Atjeh: *van Steenis 8928* (sterile). – Tapanuli: *bb 5741*; *Rahmat si Boeea 9669.* – Westcoast: 12 collections, alt. 1000–2000 m. – Eastcoast: 4 collections, alt. 1000–1800 m.

MALAY PENINSULA. Kedah: *SF 1062*, Langkawi I. – Perak: *King's coll. 6299, 6903*; *SF 12951*; *L. Wray 2798*, alt. 700–1500 m. – Kelantan: *SF 33465*, Tumpat. – Trengganu: *SF 14676, 15154, 33485, 40738*, Kuala Trengganu. – Pahang: *Ridley 405, 1405*; *SF 305*, Pulau Lantai. – Malacca: 6 collections.

WEST JAVA. Bantam: *Koorders 8073, 8075*, Mt. Pulasari, alt. 1400 m. – Bogor: many collections, alt. 1000–2200 m. From Mt. Gedeh-Pangrango: *Nooteboom 908, 910* and many other collections. – Priangan: many collections, alt. 1400–2200 m.

CENTRAL JAVA. Pekalongan: *Koorders 8110, 8111, 8112, 11032*, G. Prahu, alt. 1400–1500 m. – Kedu: *Koorders 27972*; *Lörzing 86*, alt. 1400–1900 m. – Semarang: 7 collections, Telomojo, alt. *c.* 1400 m.

EAST JAVA. Besuki: *Koorders 32503.*

BORNEO. West Borneo: *Jaheri 1758*, Sg. Sak; *Main, exp. Polak 1913*, Batang Belitang river banks; *Polak 2121.*

CELEBES. Minahassa: *Eyma 4121*, Lake Posso; *Koorders 18093*. – Toradja: *bb 20146*; *Kjellberg 1880A*, *2974*, alt. 0–700 m. – SW. Celebes: *Bünnemeijer 12055*, Bonthain, alt. 2000 m.

Ecology. In secondary and primary forest. Altitude in India: 0–2300 m, Burma 0–1800 m, Thailand 0–2500 m, Indo-China 0–2000 m, China 0–3000 m, Sumatra 240–2000 m, Malay Peninsula 500–1500 m, Java 1000–2200 m, Celebes 0–2000 m.

Notes. 1. In Indo-China and Hainan a form with ± obovate leaves and fine, more prominent reticulation has been described as *S. dung* Eberh. & Dub. and as *S. schaefferae* Merr. respectively. I refrain from naming this form because of the many intergrading specimens.

2. The variability of ssp. *laurina* var. *laurina* is large in its whole area. In India, Ceylon and Burma no forms transitional with ssp. *cochinchinensis* occur, if one does not regard specimens of ssp. *cochinchinensis* var. *cochinchinensis* with glabrous leaves as such. In Thailand some true intergrading specimens, with leaf characters of ssp. *cochinchinensis* var. *cochinchinensis* (except the indument), and flower characters of ssp. *laurina* var. *laurina* are found (4 out of a total of 27 examined collections). The same holds for Indo-China (12 out of 69 collections), and China, Szechwan excluded (14 out of 150 collections). In Formosa and Japan no transitions are found.

3. In Java transitional specimens are found eastwards, and in East Java, the Lesser Sunda Is., Celebes, the Philippines and the Moluccas var. *laurina* is not represented; in that area it is replaced by a different variety: ssp. *cochinchinensis* var. *philippinensis*.

4. In China, Szechwan (Mt. Omei, Kiating), the only difference between ssp. *laurina* var. *laurina* and ssp. *cochinchinensis* var. *cochinchinensis* is the indument of twigs, leaves (not always), inflorescence axis and calyx. The shape and nervation of the leaves is that of var. *cochinchinensis*. Thus all the specimens of ssp. *laurina* in this area can be considered as intergradations. It is not unlikely that, together with ssp. *cochinchinensis* (only 3 collections), a hybrid population survives, while the other parent (var. *laurina*) has disappeared.

5. It is remarkable that most fruits contain a shrivelled seed which is apparently abortive. As abnormal pollen is found in about one third of the examined collections, it is probable that the large amount of variability is due to hybridisation. However, there appears to be no connection between pollen sterility and intergrading plants. In spite of abortive seed and pollen, vegetative propagation is, however, ensured. I observed in Thailand, on Mt. Doi Inthanon, that all young plants I examined (several hundreds) were sprouting from detached twigs or fallen trees. In one case a fallen tree gave rise to an offspring of *c.* 30 young plants. As there is sometimes propagation by seed (on the Pangrango in West Java I found young plants growing from seed), the populations are not mere clones, but a large variability can be maintained.

27-9. var. **angustifolia** (Guillaumin) Noot., *comb. nov.*

S. angustifolia Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 281 – *S. hydrophila* Guillaumin – *S. stenophylla* Merr. & Chun *ex* Li.

Leaves 7–15 by 0.9–2 cm, index (4½–)5–10; base angle 15°–25°.

INDO-CHINA. Annam: *Poilane 7014*, Bana, near Tourane; *13548*, Quang Tri. – Tonkin: *W. T. Tsang 27065, 29234*, Ha Coi.
CHINA. Hainan: *F. C. How 72325, 73675*; *S. K. Lau 27948, 28116*; *H. Y. Liang 64650*; *C. Wang 33321*.

Ecology. Altitude up to 600 m. Predominantly on borders of streams or on rocks in streambeds.

Note. This variety is adapted to the extreme conditions of a rheophyte habitat, but it also can be found in forests. Poilane stated (*Poilane 13548*): 'Cet arbre se rencontre toujours au bord de l'eau' and (*Poilane 7014*): 'arbuste récolté dans les roches d'un torrent'.

27-10. ssp. **thwaitesii** (F. v. Muell.) Noot., *comb. nov.*

S. thwaitesii F. v. Muell. Fragmenta 3 (1862) 22 — *S. stawellii* F. v. Muell. — *S. candelabrum* Brand – *S. ampulliformis* C. T. White.

Shrub or tree with glabrous (rarely stiff-hairy) twigs. *Leaves* glabrous, (narrowly) elliptic to obovate, 3–19 cm long, index 1.7–4.5; base broadly to narrowly cuneate; apex acuminate or not; margin entire, denticulate, dentate or crenulate. *Nerves* 6–11 pairs, prominent on the undersurface, usually meeting in an intramarginal looped vein; the latter sometimes becoming obscure in the rather coarse, prominent reticulation. *Petiole* 5–30 mm. *Inflorescence* a (branched) spike or raceme to a panicle of racemes. Bracts and bracteoles caducous or persistent. Pedicels 0–8 mm. *Calyx* glabrous, tube 1–2 mm high, the (ciliate) lobes ¼–2 mm long. *Corolla* 3–7 mm long. *Stamens* 25–more than 100. *Disk* annular, pulvinate or 5-lobed, glabrous or rarely pilose. *Style* glabrous (pilose towards the base in at least 1 collection). *Fruits* ellipsoid, or ovoid-ampulliform. *Seed* once curved, embryo curved.

Distribution. New Guinea, Australia (Queensland and New South Wales).

Note. There always has been a great confusion as to the Australian material belonging to the present species. [See Francis, Austr. Rain Forest Trees ed. 2 (1951) 362, under *S. thwaitesii*: 'It is difficult or impossible to separate satisfactorily this from the preceding species (*S. stawellii*) among the forms in the Queensland Herbarium.'] The confusion already started with the citation of the type material of *S. stawellii*. F. von Mueller mentioned as his type: Rockingham Bay, *Dallachy*. Under the many collections of F. von Mueller from Rockingham Bay that I could study two were marked 'Dall' on the label. But these two collections do not agree with the description, as other collections of F. von Mueller rightly do. Really they belong to var. *montana*. In the literature on the Australian forms they have been mixed up. It is impossible to deduce what the different authors mean by the species they dealt with.

KEY TO THE VARIETIES

1a. Inflorescence a sometimes basally branched raceme or a panicle. Bracts and bracteoles mostly caducous. Fruits ovoid to ampulliform. 2
b. Inflorescence a sometimes basally branched spike. Bracts and bracteoles mostly persistent. Fruits ellipsoid. 3
2a. Leaves narrowly elliptic. Inflorescence axis glabrous. Pedicels 0–8(–10) mm. Corolla 6–7 mm. Stamens *c.* 100. . . . . **27-11.** var. **thwaitesii**
b. Leaves (narrowly) elliptic to obovate. Inflorescence axis puberulous or glabrous, *e.g.* on Lord Howe I. Pedicels 0–3 mm. Corolla 3–6 mm. Stamens 25–60. **27-12.** var. **montana**
3a. Leaves 6–16 cm long. Inflorescence up to 6 cm. Corolla 3–5 mm. Stamens 25–50. Calyx lobes $\frac{1}{4}$–$\frac{3}{4}$ mm long, not or only slightly imbricate. . **27-13.** var. **stawellii**
b. Leaves 13–18 cm long. Inflorescence to 13 cm. Corolla 4–7 mm. Stamens more than 50. Calyx lobes *c.* 1 mm long, much imbricate. . . . **27-14.** var. **gittonsii**

27-11. var. **thwaitesii**

S. thwaitesii F. v. Muell.

Probably a small tree. Twigs glabrous. *Leaves* mostly narrowly elliptic, 9–16 by 2–5$\frac{1}{2}$ cm, index (2–)3–4$\frac{1}{2}$; margin usually dentate; apex slightly acuminate, acumen 0–10 mm, tip acute or blunt; base cuneate. *Nerves* 8–11 pairs. *Petiole* 5–10(–15) mm. *Inflorescence* a totally glabrous, lax, basally branched raceme or panicle, up to 5(–7) cm. Bracts and bracteoles soon caducous, mostly small. Pedicels 0–8 mm. *Calyx* glabrous, tube 2 mm high, lobes 1$\frac{1}{2}$–2 mm long. *Corolla* 6–7 mm. *Stamens c.* 100. *Disk* glabrous, ring-like or 5-lobed. *Style c.* 5 mm. *Fruits* as in var. *montana*.

AUSTRALIA. SE. Queensland, Moreton Distr.: *G. H. Simmons s.n.*, Coolangatta; *F. Gipps s.n.*, Tamborine Mts.; *D. Curtis s.n.*, Albert River; *Anonymus, Oct. 1874*, Maroochie River; *Anonymus, Sept. 1924*, Beechmont River. – New South Wales: *Beckler s.n.*, Hastings River; *C. Fawcett s.n.*, *C. Moore s.n.*; *F. von Mueller s.n.*, Richmond River; *Leichhard 1845*, Morton Bay; *Lindsay&Jones, Nov. '44*, Unumgan; *C. Moore s.n.*, Maclay River; *R. Schodde 5152*, Port Macquarie; *Fraser & Vickery s.n.*, Upper Williams River.

27-12. var. **montana** (C. T. White) Noot., *comb. nov.*

S. ampulliformis C. T. White — *S. candelabrum* Brand — *S. Stawellii* var. *montana* C. T. White, Proc. Roy. Soc. Queensl. 50 (1939) 81.

A shrub or tree to 30 m. Twigs glabrous or with some stiff hairs. *Leaves* (narrowly) elliptic to obovate, (3–)6–15(–19) cm long, index 1.8–3.6; margin recurved, entire or denticulate; apex abruptly acuminate, acumen 5–10(–15) mm, tip mostly acute; base cuneate. *Nerves* 6–11 pairs. *Petiole* 7–20 mm (to 30 mm in Lord Howe I.).

Inflorescence mostly a panicle of racemes, up to 8 cm, but often shorter; inflorescence axis and pedicels appressedly puberulous, but glabrous on Lord Howe I. Bracts and bracteoles very caducous, *c.* 1 mm long (2–3 mm on Lord Howe I.). Pedicels 0–3 mm. *Calyx* glabrous, tube 1–1½ mm high, limb nearly wholly divided in the elliptic to ovate, mostly imbricate lobes of 1–1½ by 1–2 mm. *Corolla* 3–5(–6) mm. *Stamens* 25 (Lord Howe I.) or 35–60, becoming *c.* 1 mm longer than corolla. *Disk* glabrous or sparsely pilose, ring-like or 5-lobed. *Style* 2–5 mm. *Fruits* ovoid to ampulliform, 6–11 by 4–8 mm, often crowned by the persistent calyx lobes. *Seeds* curved with curved embryo.

AUSTRALIA. North Queensland: *Brass 2419*, Mt. Finnegan; *Clemens, Jan. 1950*, Tully; *Clemens, July-Nov. 1947*, Dalrymple Heights; *Gittons, July 1962*, Mt. Fox, Ingham; *Kajewski 1156*, Atherton Tableland; *Martin & Hyland AFO 1890*, Mt. Bartle Frere; *Michael 267*, Innisfail, *F. von Mueller s.n.*, Rockingham River; *L. S. Smith 4279*, Kuranda; *L. S. Smith 14630*, Mt. Bellenden Ker; *L. S. Smith & L. Pedley 10078*, Mt. Lewis, Mossman; *C. T. White 10581*, Mt. Spurgeon. – Lord Howe I.: *McCornish 107*; *Maiden s.n.*; *F. von Mueller s.n.*

Ecology. Rain forest, alt. 0–2000 m.

Note. A collection of *J. C. Baird*, from Herberton, N. Queensland, is intermediate between this variety and var. *thwaitesii*. The flowers have the size of those of var. *thwaitesii* and the number of stamens is also the same.

27-13. var. **stawellii** (F. v. Muell.) Noot., *comb. nov.*

S. stawellii F. v. Muell. Fragmenta 5 (1865) 60.

Tree up to 30 m high and 80 cm ϕ, but already flowering when very small. Twigs glabrous (rarely sparsely stiff-hairy). *Leaves* elliptic, 6–12 cm long (to 16 cm in New Guinea), index 2–3½ (1.7–2.3 in New Guinea); margin entire to denticulate or crenulate; apex not or faintly acuminate, tip blunt or obliquely acuminate, acumen 8–20 mm in New Guinea; base mostly broadly cuneate. *Nerves* 8–11 pairs. *Petiole* 5–25 mm, rarely the leaves nearly sessile. *Inflorescence* an – often branched – spike rarely exceeding 6 cm, axis glabrous or appressedly puberulous. Bracts and bracteoles usually persistent, with same indument as axis. 1—1½ and ½—1 mm long respectively. *Calyx* glabrous, tube 1–1½ mm high, lobes ¼–¾ mm long, not or only slightly imbricate. *Corolla* 3–5 mm long. *Stamens* 25–50. *Disk* glabrous, rarely pilose. *Style* glabrous, 4–5 mm. *Fruits* ellipsoid-ovoid, 5–7 mm long.

NEW GUINEA. Papua, Western Distr.: *Brass 5939, 5977*, Dagwa, Oriomo River. – Bensbach Subdistr.: *NGF 33643*.

AUSTRALIA. Queensland: *H. G. Ladbrook s.n.*, Cook Distr.; *D. J. Curry s.n.*; *Kajewski 1093, 1237*, Atherton Distr.; *F. von Mueller s.n.*, Rockingham Bay; *Clemens s.n.*, Mt. Fox, North Kennedy Distr.; *Clemens s.n.*, Dalrymple Heights; *A. H. Cole 31*, S. Kennedy Distr., Netherdale; *W. D. Francis s.n.*; *C. T. White 12946*, Eungella Range; *Clemens s.n.*, Mt. Coolum, Moreton Distr.; *J.*

Shirley s.n., Brisbane; *L. S. Smith 14616*, Running Creek, Yandina. – New South Wales: *L. J. Webb & J. G. Tracey 3691*, Johns River, near Newcastle. – Lord Howe I.. *F. von Mueller s.n.*

Ecology. Rain forests.

27-14. var. **gittonsii** Noot., *var. nov.*

Type: *G. H. Gittons 494* (BRI).

Folia 13 ad 18 cm longa petiolis 10–25 cm longis; inflorescentiae ad 12 cm longae; calyx lobis 1 mm longis $1\frac{1}{2}$–2 mm latis valde imbricatis; fructus 7–8 mm longus.

This variety differs from the preceding in the following characters: *Leaves* 13–18 cm long, index 2–2.8. *Petiole* 10–25 mm. *Inflorescence* up to 13 cm long, with glabrous axis. *Calyx lobes c.* 1 mm long and $1\frac{1}{2}$–2 mm broad, much imbricate. *Fruit* 7–8 mm long.

AUSTRALIA. Queensland: *Clemens, 7-11-1947*, Dalrymple Heights, S. Kennedy Distr.; *Francis, 3-10-1922*, Eungella Range; *Gittons 494*, N. Kennedy Distr., Mt. Spec Range; *Macfarlane, 12-6-1965*, Paluma Dam; *Smith & Webb 3293*, Cook Distr., Topaz.

Ecology. Rain forest.

27-15. ssp. **leptophylla** (Brand) Noot., *comb. nov.*

S. stawellii var. *leptophylla* Brand, Pfl. R. Heft 6 (1901) 37 – *S. mamberamo* Brand.

This subspecies consists of many groups which are reticulately allied to each other and are often connected by intermediate specimens. This made it very difficult to describe the variability in an adequate way.

I refrain from giving a description of the subspecies itself as there are no characters common to all the varieties, except those mentioned in the key to the subspecies.

S. mamberamo Brand could not be placed in any of the varieties because of the incompleteness of the type collection. Probably it is a hybrid between var. *leptophylla* and one of the other varieties.

The following collections also did not match with one of the varieties: *NGF 5302 Womersley*, *NGF 16555*, *R. Pullen 7813*, *Robbins 419*.

Distribution. Lesser Sunda Is, Moluccas, New Guinea, Bismarck Archipelago, Solomon Is, Fiji, and the New Hebrides.

Note. The varieties of ssp. *leptophylla* are – more or less – distinct. The relations between them are probably reticulate as the relationships between the species of *Symplocos*. They all represent the same level, giving the impression that they form the beginning of new species.

KEY TO THE VARIETIES

1a. Underside of leaves hairy. 2
b. Underside of leaves glabrous. 20
2a. Twigs glabrous. . . . . **27-16.** var. **leptophylla**
b. Twigs hairy. 3
3a. Calyx glabrous. 4
b. Calyx hairy. 6
4a. Disk hairy. . . . . **27-16.** var. **leptophylla**
b. Disk glabrous. 5
5a. Twigs (appressedly) pubescent, puberulous or pilose. . . **27-16.** var. **leptophylla**
b. Twigs sericeous or tomentose. . . . . **27-29.** var. **ovata**
6a. Calyx tube glabrous. 7
b. Calyx tube hairy. 10
7a. Disk glabrous. 8
b. Disk hairy. 9
8a. Twigs (appressedly) pubescent, puberulous or pilose. . . **27-16.** var. **leptophylla**
b. Twigs sericeous or tomentose. . . . . **27-29.** var. **ovata**
9a. Twigs (appressedly) pubescent, puberulous or pilose. . . **27-16.** var. **leptophylla**
b. Twigs indument different. . . . . **27-32.** var. **versteegii**
10a. Calyx limb glabrous. 11
b. Calyx limb hairy. 12
11a. Twigs sericeous or tomentose. . . . . **27-29.** var. **ovata**
b. Twigs (appressedly) pubescent, puberulous or pilose. . . **27-16.** var. **leptophylla**
12a. Disk glabrous. 13
b. Disk hairy. 15
13a. Twigs (appressedly) pubescent, puberulous or pilose. . . **27-16.** var. **leptophylla**
b. Twigs not appressedly pubescent or puberulous, *e.g.* tomentose. 14
14a. Bracts shorter than 3 mm, fruits to *c.* 10 mm long. . . . . **27-29.** var. **ovata**
b. Bracts longer than 3 mm, fruits more than 10 mm long. . . . **27-30.** var. **revoluta**
15a. Twigs (appressedly) pubescent, puberulous or pilose. . . **27-16.** var. **leptophylla**
b. Twigs not appressedly pubescent or puberulous, *e.g.* tomentose. 16
16a. Petiole more than 20 mm. . . . . **27-19.** var. **tomentosa**
b. Petiole less than 20 mm. 17
17a. Inflorescence a (basally branched) spike. 18
b. Inflorescence not a spike. 19
18a. Bracts shorter than 3 mm. . . . . **27-25.** var. **reginae**
b. Bracts longer than 3 mm. . . . . **27-30.** var. **revoluta**
19a. Nerves in 7–11 pairs. . . . . **27-23.** var. **molobros**
b. Nerves in 4–8 pairs. . . . . **27-25.** var. **reginae**
20a. Calyx glabrous. 21
b. Calyx hairy. 35

21a. Twigs hairy. 22
b. Twigs glabrous. 26
22a. Petiole 0 to 5 mm. 23
b. Petiole more than 5 mm. 24
23a. Leaves shorter than 5 cm. . . . . **27-28.** var. **orbicularis**
b. Leaves longer than 5 cm. . . . . **27-22.** var. **longilobata**
24a. Reticulation fine, usually prominent on both under- and upper surface. **27-31.** var. **sogeriensis**
b. Reticulation fine or coarse, usually only prominent on the undersurface. . 25
25a. Leaves obovate. . . . . **27-18.** var. **insularis**
b. Leaves ± elliptic. . . . . **27-16.** var. **leptophylla**
26a. Inflorescence a very slender, often branched spike (or raceme) of 2–10 cm. 27
b. Inflorescence a fascicle or a (reduced) often branched, stout spike (or raceme). 29
27a. Twigs (exceptionally) thick. . . . . **27-26.** var. **schumanniana**
b. Twigs not (exceptionally) thick. 28
28a. Intramarginal vein far from margin. . . . . **27-26.** var. **schumanniana**
b. Intramarginal vein close to margin. . . . . **27-33.** var. **maculata**
29a. Petiole 0 to 5 mm. . . . . **27-28.** var. **orbicularis**
b. Petiole more than 5 mm. 30
30a. Bracts and bracteoles caducous. . . . . **27-20.** var. **aneityensis**
b. Bracts persistent. 31
31a. Reticulation fine, usually prominent on both under- and upper surface. **27-31.** var. **sogeriensis**
b. Reticulation fine or coarse, usually only prominent on the undersurface. . 32
32a. Leaves usually less than 5(–8) cm long. . . . . **27-17.** var. **monticola**
b. Leaves usually more than 5 cm long. 33
33a. Inflorescence axis glabrous. . . . . **27-27.** var. **floresana**
b. Inflorescence axis hairy. 34
34a. Leaves obovate. . . . . **27-18.** var. **insularis**
b. Leaves elliptic or circular. . . . . **27-16.** var. **leptophylla**
35a. Petiole 0 to 5 mm. . . . . **27-34.** var. **parvifolia**
b. Petiole more than 5 mm. 36
36a. Calyx tube glabrous. 37
b. Calyx tube hairy. 43
37a. Disk glabrous. 38
b. Disk hairy. 41
38a. Twigs glabrous. 39
b. Twigs hairy. 40
39a. Reticulation fine or coarse, usually only prominent on the undersurface, calyx lobes longer than $\frac{1}{2}$ mm. . . . . **27-16.** var. **leptophylla**
b. Reticulation fine, usually prominent on both under- and upper surface, calyx lobes to *c.* $\frac{1}{2}$ mm long. . . . . **27-31.** var. **sogeriensis**

40a. Reticulation fine or coarse, usually only prominent on the undersurface, calyx lobes longer than $\frac{1}{2}$ mm. . . . . **27-16.** var. **leptophylla**
b. Reticulation fine, usually prominent on both under- and upper surface, calyx lobes to *c.* $\frac{1}{2}$ mm long. . . . . **27-31.** var. **sogeriensis**
41a. Leaves usually less than 5(−8) cm long. . . . . **27-17.** var. **monticola**
b. Leaves usually more than 5 cm long. 42
42a. Inflorescence axis glabrous . . . . . **27-21.** var. **doormannensis**
b. Inflorescence axis hairy . . . . . **27-16.** var. **leptophylla**
43a. Twigs hairy. 44
b. Twigs glabrous. 46
44a. Calyx limb glabrous. . . . . **27-16.** var. **leptophylla**
b. Calyx limb hairy. 45
45a. Leaves obovate. . . . . **27-18.** var. **insularis**
b. Leaves elliptic or circular. . . . . **27-16.** var. **leptophylla**
46a. Calyx limb glabrous. . . . . **27-16.** var. **leptophylla**
b. Calyx limb hairy. 47
47a. Inflorescence a very slender, often branched spike (or raceme) of 2−10 cm. **27-26.** var. **schumanniana**
b. Inflorescence a fascicle or a (reduced), often branched, stout spike (or raceme). 48
48a. Calyx limb 2−4-lobed or symmetrically cleft, calyx lobes becoming longer by tearing. . . . . **27-24.** var. **pedicellata**
b. Calyx limb regularly 5-lobed. 49
49a. Leaves obovate. . . . . **27-18.** var. **insularis**
b. Leaves elliptic or circular. . . . . **27-16.** var. **leptophylla**

27-16. var. **leptophylla**

S. stawellii var. *leptophylla* Brand − *S. aggregata* White & Francis − *S. turrilliana* A. C. Smith − *S. leptophylla* forma *compacta* Turrill − *S. luteifolia* Kanehira & Hatusima − *S. palmarum* Brand − *S. römeri* Brand − *S. trifurceps* Brand.

Shrub or tree up to 20 m high and 45 cm ϕ. Twigs glabrous or pubescent; terminal buds glabrous or pubescent, small. *Leaves* glabrous or pubescent, in New Guinea sometimes finely appressedly pilose beneath, (4−)5−23 by 2−12 cm, index 1.6−4; base angle 30°−110°; apex usually acuminate, acumen 0−17 mm; margin entire to dentate; nerves (4−)6−12 pairs, meeting in an intramarginal vein; reticulations rather coarse to fine. *Petiole* 5−25(−40) 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 glabrous to appressedly pubescent or even sericeous, 1−10 and 1−4 mm long respectively. Pedicels 0−2 mm. *Flowers* male, female or bisexual. Calyx tube glabrous or pubescent to sericeous, 1−$2\frac{1}{2}$ mm high; limb $\frac{3}{4}$−3 mm long, whether wholly divided into the $\frac{3}{4}$−3 mm long hairy or glabrous

lobes or not. *Corolla* 2–5 mm long. *Stamens c.* 10 to more than 100, in ♀ flowers less than 20. *Disk* inconspicuous or 5-stellate, softly hairy in New Guinea, but glabrous or with only few hairs in Fiji and the Solomon Is. *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.

Distribution. Moluccas, New Guinea, Bismarck Archipelago, Solomon Is, Fiji.

MOLUCCAS. Ceram: *Eyma 3025*; *Rutten 1974, 2168, 2253.* – Buru: *Toxopeus 216*; *De Vriese & Teysmann s.n.* – Ambon: *Kuswata & Supadmo 282*; *Teysmann s.n.*

NEW GUINEA. West Irian. Div. West New Guinea: *BW 4970, 7772* and *c.* 10 other collections. – Div. Central New Guinea: *Eyma 5290.* – Div. South New Guinea: *Kalkman 4369*; *von Römer 1240, 1257.* – Div. Hollandia: *Brass 10501* and *c.* 15 other collections. – Territory of New Guinea. Sepik Distr.: *Ledermann 9281, 9282* and *c.* 10 other collections. – W. Highlands: *ANU 2027, 2610*; *NGF 4488, 7773* and *c.* 40 other collections. – E. Highlands: *van Balgooy 529*; *Brass 30201, 32035*; *Hoogland & Pullen 5421*; *NGF 6030, 11424*; *TGH 12150, 13086* and *c.* 30 other collections. – Morobe Distr.: *Brass 29586*; *Clemens 163*; *Hoogland 8967* and *c.* 40 other collections. – Papua. Northern Distr.: *Forbes 618*; *Lane Poole 183*; *Pullen 5477, 5484.* – Milne Bay Distr.: *Brass 22574, 23487*; *NGF 1391* and *c.* 20 other collections. – Central Distr.: *Brass 4377, 4638*; *NGF 20272*; *TGH 12907, 13067* and *c.* 10 other collections. – S. Highlands: *Kalkman 4743, 4951*; *Schodde 1444, 1485*; *Vink 16824, 16826* and *c.* 10 other collections. – Western Distr.: *NGF 45793* and *c.* 20 other collections.

BISMARCK ARCHIPELAGO. New Ireland: *NGF 40487.* – New Britain: *NGF 24172.*

SOLOMON & SANTA CRUZ ISLANDS. Guadalcanal: 7 collections: – New Georgia: 6 collections. – Vangunu I.: *BSIP 1216.* – Gatukai I.: *BSIP 1256.* – Tevai I.: *BSIP 1602.* – Vanikoro I.: *BSIP 1625, 1683*; *Kajewski 529, 591.* – Kolombangara I.: *BSIP* 2064; *RSS 2515.* – Kendova I.: *BSIP 7487.* – Santa Isabel: *BSIP 7669.* – Barora Ite I.: *BSIP 16019, 16188.* – Small Malaita: *BSIP 16261, 16302.* – Santa Cruz: *BSIP 17015.* – San Jorge: *RSS 2709.*

FIJI ISLANDS. *c.* 60 collections.

27-17. var. **monticola** Noot., *var. nov.*

Type: *W. Vink 17455* (L), Papua, Southern Highlands District, Tari Subdistrict, Mt. Ambua, alt. 3155 m.

Frutex vel arbor ramulis glabris gemmis apicalibus glabris foliis glabris ellipticis 2 ad 8 cm longis 1 ad 3 cm latis indice 1.4 ad 2.7; acumine acuto vel rotundato; petiolo 4 ad 10 mm longo. Inflorescentia spicata ad 1½ cm longa bracteis bracteolisque glabris persistentibus, calyce tubo glabro 1 ad 1½ mm alto lobis puberulis vel glabris 1 ad 1½ mm longis, corolla 1–2½ mm longa, staminibus 15 ad 35, disco piloso.

Shrub or tree to 16 m. Twigs glabrous; terminal buds small, glabrous. *Leaves* glabrous, ± elliptic, 2–8 by 1–3 cm, index 1.4–2.7; base cuneate, base angle 30°–70°; apex acute or rounded; margin entire or denticulate; nerves 5–7 pairs, meeting in an intramarginal vein; reticulations rather fine to rather coarse. *Petiole* 4–10 mm. *Inflorescence* a small spike to 1½ cm; axis glabrous or sparsely appressedly hairy. Bracts and bracteoles glabrous, persistent, 1–2 and 1–1½ mm long respectively. *Flowers* functionally uni-

sexual or bisexual. *Calyx tube* glabrous, $1-1\frac{1}{2}$ mm high, the limb usually divided into the appressedly pubescent to puberulous or glabrous $1-1\frac{1}{2}$ mm long lobes. *Corolla* $1-2\frac{1}{2}$ mm long. *Stamens* 15–35, but probably fewer in ♀ flowers. *Disk* pilose, low cylindrical, annular or inconspicuous. *Style* glabrous. *Fruit* ovoid to ellipsoid, 8–10 by 4–6 mm.

NEW GUINEA, Territory of New Guinea, W. Highlands: *Pullen 5059*, Kubor Range, alt. 3400 m; *ANU 2782*, Wabag, 2700 m. – E. Highlands: *LAE 54649*, Mt. Kerigomma, alt. 3500 m. – Papua. S. Highlands: several collections, Mt. Ambua, Mt. Kerewa, Mt. Giluwe, alt. 2700–3500 m.

Ecology. Mainly in rain forest, alt. 2700–3500 m.

27-18. var. **insularis** Noot., *var. nov.*

Type: *Brass 28343* (L, isotype in K), Papua, Rossel I., Abaleti.
Ramunculi glabri vel appresse pubescentes foliis obovatis glabris, 10–25 cm longis, $5\frac{1}{2}-15$ cm latis, indice 1,2–2,5; acumine 5–13 mm, petiole 10–40 mm longo. Infrutescentia fasciculata vel spicata ad $5\frac{1}{2}$ cm longa, fructibus sparsim pubescentibus.

Twigs glabrous or appressedly pubescent. *Leaves* glabrous, predominantly (broadly) obovate, 10–25 by $5\frac{1}{2}-15$ cm, index 1.2–2.5; acumen 5–13 mm; base angle 40°–70°. *Petiole* 10–40 mm. *Flowers* not seen. *Fruits* sparsely pubescent, ovoid to globose, 8–13 mm, sessile in a fascicle or in an up to $5\frac{1}{2}$ cm long spike.

NEW GUINEA. Papua. Sudest I.: *Brass 27769, 27866*. – Misima I.: *Brass 27395, 27481*. – Rossel I.: *Brass 26362, 28263, 28343, 28362, 28466*.

Ecology. Rain forest, alt. 0–800 m.

27-19. var. **tomentosa** Noot., *var. nov.*

Type: *Brass 27180* (L, isotype in K), Papua, Fergusson I., mountains between Agamoia and Ailulai.
Ramuli, petiolisque tomentosi. Folia obovata infra pubescentia, 18–23 cm longa, 10–12 cm lata, indice c. 2; baso cuneata angulo 50°–60°, petiolo 2–3 cm longo. Inflorescentia fasciculata, bracteis, bracteolis atque calicibuscum pubescentia.

Twigs and midrib tomentose beneath. *Leaves* predominantly obovate, pubescent beneath, especially on the nerves, 18–23 by 10–12 cm, index *c.* 2; apex rather abruptly acuminate, acumen 5–10 mm; base cuneate, base angle 50°–60°. *Nerves* 8–9 pairs, much prominent on the undersurface; secondary veins at right angle with the nerves. *Petiole* tomentose, 2–3 cm. *Inflorescence* a fascicle in the axils of the leaves or more often beneath them, including the broadly boat-shaped 5 mm long bracts, the 3 mm long

bracteoles and the calyx appressedly pubescent. *Calyx tube* 1–2 mm high, lobes 1–2 mm long. *Corolla* 4–6 mm. *Stamens* 25, the longest as long as the corolla in functionally ♀ flowers, to more than 100 and up to 10 mm long in functionally ♂ flowers. *Disk* inconspicuous, softly pilose. *Style* small, without stigma in ♂, 4–5 mm long, with peltate stigma in ♀ flowers. *Fruits* not seen.

NEW GUINEA. Fergusson I.: *Brass 27149, 27180.*

Ecology. Rain forest, alt. 700–800 m.

27-20. var. **aneityensis** (Brand) Noot., *comb. nov.*

S. aneityensis Brand, Pfl. R. Heft 6 (1901) 39.

Small tree, but sometimes attaining 20 m. Twigs glabrous. *Leaves* glabrous, ± elliptic, $4\frac{1}{2}$–9 by $2\frac{1}{2}$–$5\frac{1}{2}$ cm, index 1.6–2; nerves *c.* 6 pairs, base cuneate, decurrent, base angle 40°–70°; apex faintly acuminate, acumen 5–15 mm. *Petiole* 0.7–2 cm. *Inflorescence* a branched raceme, axis more or less appressedly puberulous; pedicels $\frac{1}{2}$–2 mm; bracts and bracteoles soon caducous, not seen. *Calyx* glabrous with ciliate lobes, tube *c.* 1 mm, lobes *c.* $1\frac{1}{2}$ mm. *Disk* densely softly pilose. *Fruits* ellipsoid to ovoid, *c.* 6 by 4 mm.

NEW HEBRIDES. Aneitum: *Herb. Boissier 42 (coll. MacGillivray).* – Eromanga I.: *Kajewski 295, 720*; *De La Rue s.n.* – Santo: *Armand s.n.*

Ecology. Common in rain forest up to 300 m.
Use. Wood used for making canoe paddles (Kajewski).

27-21. var. **doormannensis** (Brand) Noot., *comb. nov.*

S. doormannensis Brand, Nova Guinea 14 (1924) 188 – *S. dalmannensis* Kanehira & Hatusima.

Twigs sparsely pilose to glabrous, buds appressedly pilose. *Leaves* glabrous, coriaceous, elliptic, 6–12 by $2\frac{1}{2}$–6 cm, index 2–3; margin entire to glandular denticulate; apex not or faintly acuminate, acumen 0–8 mm; base cuneate, base angle 25°–50°. *Nerves* 5–10 pairs, prominent beneath, sunken to slightly prominent above, meeting in a looped intramarginal vein; reticulation prominent below, sunken to slightly prominent above. *Petiole* 7–10 mm. *Inflorescence* a fascicle in the axils of the leaves or on wood, including the *c.* 5 mm long broadly boat-shaped bracts and the 3–4 mm long bracteoles appressedly (long) pilose to pubescent. *Calyx tube* glabrous, $1\frac{1}{2}$–2 mm high, lobes appressedly pilose to pubescent, 2–3 mm long. *Corolla* 4–5 mm. *Stamens* 30–50, up to as long as corolla or sometimes half as long in ♀ flowers. *Disk* 5-lobed in ♂ flowers, inconspicuous in ♀ flowers, softly pilose. *Style* glabrous, inconspicuous in ♂ flowers,

stout, with peltate stigma in ♀ flowers. *Fruits* ellipsoid, only young fruits seen.

NEW GUINEA. West Irian: *Lam 1840, 3985*, Mt Doorman; *Brass 11345*, Lake Habbema; *Brass 12097, 12123*, Bernhard Camp, Idenburg River; *Kanehira & Hatusima 12113*, Vogelkop Peninsula. – Papua. Wharton Range: *Brass 4612.*

Ecology. In forest between 1800 and 2600 m.

27-22. var. **longilobata** Noot., *var. nov.*

Type: *Hoogland & Pullen 5738* (L, isotypes in A, BM), Territory of New Guinea, Eastern Highlands, E. slope of Mt. Wilhelm, 3350 m alt.

Folia glabra elliptica ad orbicularis, 10–24 mm longa, 6–14 mm lata, indice 1,2–1.9: nervis 2–4 paribus. Flores solitarii vel ad 3 in spica calyce glabro tubo 1–2 mm longo limbo $2\frac{1}{2}$–$4\frac{1}{2}$ mm longo, corolla 3–4 mm longa, staminibus 14–24, disco breviter pubescente.

Shrub or small tree, 0.20—8 m, to 15 cm ϕ. Twigs sparsely appressedly fine-pilose, glabrescent. *Leaves* glabrous elliptic (to orbicular), 10—23 by 6—14 mm, index 1.2—1.9; base rounded to more often cuneate, base angle 30°—90°; apex acute (to rounded); margin recurved, crenulate by 4—12 glands. *Nerves* 2—4 pairs, often meeting in a looped, intramarginal vein; secondary veins faintly prominent. *Petiole* 2—3 mm. *Flowers* solitary or *c.* 3 in a condensed spike, up to 1 cm, axis pubescent. Bracts (bracteoles) 3—5—6, narrowly triangular, 3—5 mm long, glabrous, with glandular margins. *Calyx* glabrous, tube 1—2 mm, limb $2\frac{1}{2}$—$4\frac{1}{2}$ mm, lobes (ovate to) triangular, ciliate, glandular, as long as the limb or shorter, 2—4 mm long. *Corolla* 3—4 mm. *Stamens* 14—24, sometimes with sterile anthers. *Disk* flat to broadly conical, shortly pubescent. *Style* glabrous, 2—4 mm, whether with developed stigma or not. *Ovary* 3-celled, each cell with 2—4 ovules, or sterile. *Fruits* ovoid-ellipsoid, *c.* 10 by 6 mm, the exocarp hard, brittle, easily peeling off when dry, stone *c.* 7—8 by 6 mm, rather smooth.

NEW GUINEA. Territory of New Guinea. E. Highlands, Mt. Wilhelm: *ANU 2317*; *van Balgooy 995*; *Brass 29919*; *Hoogland & Pullen 5738.*

Ecology. In alpine shrubberies and forest edges, alt. 3200—3400 m.
Note. The variety is closely related to var. *orbicularis*.

27-23. var. **molobros** (Brand) Noot., *comb. nov.*

S. molobros Brand, Bot. Jahrb. 54 (1916) 217.

Small shrub to slender tree, up to 6 m. Twigs densely (woolly) pilose. *Leaves* (broadly) elliptic, softly pilose beneath, especially the nerves, 6—18 by $3\frac{1}{2}$—8 cm, index $1\frac{1}{2}$—2.3;

margin entire to glandular dentate; apex acuminate or not, acumen 0—10 mm; base cuneate to rounded or even subcordate, base angle 40°—110°. *Nerves* 7—11 pairs, much prominent on the undersurface, often immersed in the upper surface, meeting in a looped intramarginal vein; secondary veins often at right angle with midrib or nerves, reticulations mostly much prominent, rather fine. *Petiole* with same indument as twigs, 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 2—4 mm, bracteoles 1—3 mm, both rusty long-pilose to appressedly sericeous. *Calyx tube* greyish sericeous, 1—2 mm high, the lobes appressedly rusty sericeous or long pubescent, 1—2 mm long. *Corolla* $2\frac{1}{2}$—5 mm. *Stamens* 20—60, becoming as long as the corolla or sometimes up to 8 mm in functionally ♂ flowers. *Disk* small, stellate, pilose. *Style* glabrous, inconspicuous in ♂ flowers, with peltate stigma in ♀ flowers. *Fruits* ovoid to orbicular, 10—15 mm long, pubescent, becoming glabrous.

New Guinea. West Irian: *BW 7949*, Kebar Valley; *NGF 33074, 33167, 33312*, Div. Hollandia, 5°02′ S, 140°55′ E. – Territory of New Guinea: *Ledermann 8420, 8946, 10210*, Sepik Distr.; *Schlechter 19059*, Finisterre Mts.; *Schlechter 17233*, Kani Mts.; *ANU 2730*, W. Highlands, Wabag; *TGH 13135*, E. Highlands, Okapa; *NGF 6023 Womersley*, E. Highlands, Aiyura.

Ecology. Rain forest, alt. 700—2600 m.

27-24. var. **pedicellata** Noot., *var. nov.*

Type: *R. Pullen 295* (L, isotypes in BM, CANB, US), New Guinea, E. Highlands, Chimbu Subdistr., Kuaki River, alt. 2700 m.

Arbor ramuli glabro foliis glabris ellipticis 5–11 cm longis $2\frac{1}{2}$–6 cm latis reticulo denso prominente. Inflorescentia racemosa pedicellis 1 ad 3 mm longis calyce tubo 2 mm alto limbo symmetrico 2 mm longo disco piloso. Fructus ovoideus-ampulliformis 10 mm longus 7 mm latus.

Slender tree 2—15 m. Twigs glabrous, terminal buds small, glabrous or finely puberulous. *Leaves* glabrous, stiff, ± elliptic, 5—11 by $2\frac{1}{2}$—6 cm, index 1.6—2.2; apex (abruptly) acuminate, acumen 5—20 mm; base cuneate to rounded, decurrent. *Nerves* 6—10 pairs, prominent on both surfaces, intramarginal vein present but often not distinct from the larger veins; reticulation fine, prominent on the undersurface, slightly less so on the upper surface. *Petiole* 5—16 mm. *Inflorescence* a raceme up to 4 cm; axis sparsely appressedly puberulous; same indument on the 1—2 mm long bracts, the 1—3 mm long pedicel, the 1 mm long bracteoles and the calyx. *Calyx tube* 2 mm high, limb *c.* 2 mm long, wholly symmetrically cleft. *Corolla* 3—4 mm. *Stamens c.* 40 in ♂ flowers, *c.* 10 in ♀ flowers. *Disk* small, stellate, with the style base softly pilose. *Style c.* 3 mm, without stigma in ♂ flowers, stout, *c.* 4 mm, with knob-like stigma in ♀ flowers. *Fruits* ovoid-ampulliform, *c.* 10—15 by 7—9 mm. *Seeds* strongly ruminate, embryo probably curved.

NEW GUINEA. Territory of New Guinea. W. Highlands: *ANU 2708*, Wabag. – E. Highlands: *Brass 30482, 30583, 30602. 30680*, Mt. Wilhelm; *Brass 31501*, Mt. Michael; *Brass 30897*, Mt. Otto; *Pullen 295*, Chimbu; *Pullen 497*; *Robbins 819, 1233*; *TGH 13281*, Goroka. – Papua. Central Div.: *Brass 4669*, Wharton Range, Murray Pass. – Papua. Milne Bay Distr. *Brass 22747, 22850*, Mt. Dayman.

Ecology. Substage in mossy forest between 2000 and 2850 m.

Note. This variety is directly related with var. *schumanniana*. It is recognisable because of the constant characters: glabrous leaves with fine reticulation, glabrous twigs, pedicelled flowers and symmetric calyx.

27-25. var. **reginae** (Brand) Noot., *comb. nov.*

S. reginae Brand, Bot. Jahrb. 54 (1916) 214.

Shrub or small tree up to 10 m. Twigs densely short and long pilose, only long pilose, or woolly to tomentose, growth discontinuous. *Leaves* softly pilose to pubescent beneath, especially on the nerves, elliptic, 1.5—11 by 0.7—6.5 cm, index 1.7—3; apex acuminate, acumen 5—10(—15) mm; base acuminate to rounded, base angle 40°—90°; margin entire to glandular denticulate. *Nerves* 4—8 pairs, prominent on the undersurface, meeting in an intramarginal looped vein; reticulation rather fine to coarse. *Petiole* with same indument as twigs, 2—10 mm. *Flowers* solitary or few together in the axils of the leaves or beneath them, or in the apical part of an up to 3(—7) cm long spike; axis patently pilose. Bracts 2—4 mm, bracteoles 1—2 mm, both (appressedly) pilose. *Calyx* appressedly (sericeously) pilose, tube $\frac{3}{4}$—2 mm, lobes 1—$1\frac{1}{2}$ mm. *Corolla* 2—3 mm long. *Stamens* 10—25, the longest becoming as long as corolla or slightly shorter. *Disk* pulvinate, 5-lobed, pilose. *Style* glabrous or with pilose base, inconspicuous in functionally ♂ flowers, 2 mm long with peltate stigma in ♀ flowers. *Fruits* sessile on the twigs or in a spike to 7 cm, ovoid, pubescent, 9—15 by 7—8 mm; stone faintly ampulliform. *Seeds* 1—2, curved towards the base, embryo ?uncinate.

NEW GUINEA. West Irian: *van Royen & Sleumer 5873*, Cycloop Mts. – Territory of New Guinea. Sepik area: *Ledermann 9129*, Etappenberg. – W. Highlands: *Robbins 113*, Hagen-Ogelberg road. – E. Highlands: *NGF 24646, 29298*; *Stauffer & Sayers 5601*; *TGH 12111*, Kainantu; *TGH 13157*, Wanatabi, SW. of Okapa. – Morobe Distr.: *Clemens 41694*, Boana; *NGF 21516*, Wagau. – Papua. S. Highlands: *NGF 28402*, Mt. Ne.

Ecology. In rain forest, alt. 900—2000 m.

27-26. var. **schumanniana** (Brand) Noot., *comb. nov.*

S. schumanniana Brand, K. Schum. & Laut. Nachtr. (1905) 347 – *S. cyclops* Brand – *S. lamii* Brand – *S. myrmecophila* Brand – *S. pusilliflora* Brand – *S. rhynchocarpa* Brand – *S. rupestris* Brand – *S. schlechteri* Brand.

Twigs sometimes very thick, glabrous, sometimes the innovations appressedly pubescent, often the branches thickened in some places, hollow, lodging ants. Terminal buds small, pubescent. *Leaves* ± elliptic, glabrous, 9—33 by 3½—14 cm, index 2—5; base angle 30°—60°; apex acuminate, rarely caudate, acumen 5—30 mm; margin ± entire. *Nerves* 8—15 pairs, curved upwards and meeting in an intramarginal vein often quite far from the margin; reticulations coarse, prominent beneath. *Petiole* 5—22 mm. *Inflorescence* a slender spike (or rarely raceme) to 6 cm, often branched towards the base, rarely branched for its whole length; axis pubescent or puberulous to glabrous. Bracts and bracteoles mostly persistent, rarely caducous, pubescent or puberulous, 1—2½ mm and ½—1½ mm long respectively; pedicel if present at most 1 mm. *Flowers* male, female or bisexual. *Calyx* glabrous or puberulous, tube 1—1½ mm high; limb wholly divided into the *c.* ½ mm long lobes, or limb 1½ mm, and then the lobes *c.* 1 mm. *Stamens* 10—30 in ♀ and bisexual flowers, 30—80 in ♂ and bisexual flowers; in ♀ flowers the stamens are small with reduced anthers. *Disk* pulvinate or inconspicuous, pilose. *Style* glabrous or with some hairs towards the base and with large peltate stigma in ♀ flowers. *Corolla* 1½—5 mm. *Fruits* 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.

MOLUCCAS. Morotai: *Kostermans 987, 1008, 1262, 1323*, G. Pare Pare and G. Sangowo, alt. 800–1000 m.

NEW GUINEA. Vogelkop Peninsula: *van Royen & Sleumer 7520*, Tsjon River valley, alt. 650 m; *Beccari 885*, Mt. Arfak. – W. Irian, Fak Fak: *Koch 8, 40*, Etna Bay. – W. Irian, Geelvink Bay: *BW 10650*, Wandammen, Wondiwoi Mts., alt. 300 m. – W. Irian, Biak; *Aet & Idjan (exp. van Dijk) 279, 453*, Japen. – W. Irian, Distr. Hollandia: *c.* 10 collections, Cycloop Mts., Idenburg River, Mt. Carstensz, alt. 0–1000 m. – W. Irian, Distr. S. New Guinea: *NGF 33186*, 5°02′ S, 140°55′ E, alt. 1200 m. – Territory of New Guinea: several collections, Sepik area, Torricelli Mts., Ibo Mts., Rani Mts., New Ireland, New Britain, Morobe Distr., alt. 100–1500 m. – Papua: several collections, Central Distr. and Milne Bay Distr., alt. 850–2100 m.

27-27. var. **floresana** Noot., *var. nov.*

Types: *Kostermans & Wirawan 755* (L, isotypes in BO, G, K), Lesser Sunda Is., Flores, vicinity of Ruteng.

Ramuli glabri foliis glabris ellipticis 9 ad 16 cm longis 5 ad 10 cm latis indice 1.1 ad 2.2 apice non vel tenuiter acuminato nervis 7 ad 12 paribus petiolo 2½ ad 4½ cm longo. Inflorescentia spicata ad 7 cm longa bracteis bracteolisque glabris vel parce appresse pubescentibus calyce glabro tubo ½ ad ¾ mm alto lobis c. 1 mm longis corolla 3–4 mm longa disco glabro.

Small, glabrous tree. *Leaves* (broadly) elliptic, 9—16 by 5—10 cm, index 1.1—2.2, base angle 60°—90°; apex not or slightly acuminate. *Nerves* 7—12 pairs, meeting in an intramarginal vein; reticulations coarse, prominent. *Petiole* stout, 2½—4½ cm long. Inflorescence a basally branched spike to 7 cm, axis glabrous. Bracts and bracteoles

glabrous or sparsely appressedly pubescent, often ciliate. *Calyx* glabrous, tube $\frac{1}{2}$—$\frac{3}{4}$ mm, lobes *c.* 1 mm. *Corolla* 3—4 mm. *Stamens* 25—35, in 5 distinct bundles. *Disk* glabrous, 5-stellate. *Style* reduced or present, and then *c.* 5 mm with peltate stigma. *Fruits* ± ovoid, 5—6 by 4—5 mm.

LESSER SUNDA ISLANDS. Flores: vicinity of Ruteng: *Kostermans & Wirawan 755, 878, 902*; *E. Schmutz 423.*

Ecology. Alt. 1000—1500 m.

27-28. var. **orbicularis** (Hemsley) Noot., *comb. nov.*

S. orbicularis Hemsley, Kew Bull. (1899) 105 – *S. klossii* S. Moore – *S. englishii* Hemsley.

Shrub or small tree. Twigs glabrous or hairy; terminal buds small, glabrous or pubescent. *Leaves* orbicular to elliptic, $\frac{1}{2}$—3(—3$\frac{1}{2}$) by $\frac{1}{2}$—2 cm, index 1—2; base cuneate to rounded or slightly cordate, base angle 35°—100°; apex rounded or acute; margin dentate-denticulate, in small leaves often only towards the apex. *Nerves* 2—7 pairs, whether meeting in an intramarginal vein or not; reticulations fine or rather coarse, rarely inconspicuous. *Petiole* 1—3 mm. *Inflorescence* a spike to 4 cm, or flowers solitary. Bracts 1—3 mm, several when flowers solitary, or 1, with the $\frac{1}{2}$—3 mm long bracteoles mostly persistent, glabrous or hairy. *Flowers* male, female or bisexual. *Calyx* glabrous; tube ($\frac{1}{2}$—)1—2 mm; limb wholly divided into the 1—1$\frac{3}{4}$ mm long lobes or $\frac{1}{2}$—1 mm longer. *Corolla* 2$\frac{1}{2}$—4(—6) mm. *Stamens* from less than 10 in ♀ flowers to 25 in ♂ and ☿ flowers. *Disk* discoid or pulvinate, glabrous. *Fruits* ellipsoid, 7—15 by 4—6 mm.

NEW GUINEA. W. Irian: *Brass 9937, 10127, 10237*, Mt. Wilhelmina, alt. 3800–3900 m; Lake Habbema, alt. 3225 m, several collections; Star Mts., Mt. Antares, alt. 3300–3400 m, several collections; *ANU 16002*; *Boden Kloss s.n.*, Mt. Carstensz, alt. 3700 m. – Territory of New Guinea: *Robbins 335, 1075*, Hagen Subdistr., alt. 2500–3300 m; *Pullen 5137, 5150, 5166*, Mt. Kinkain, alt. 3600 m; E. Highlands, Mt. Wilhelm, Mt. Michael, Mt. Kerigomma, Mt. Otto, alt. 3400–4000 m, several collections. – Papua: S. Highlands, alt. 3000–3800 m, several collections; Central Div., alt. 3000–3900 m, several collections.

Note. The collection *BW 14047*, of W. Irian, Mt. Arfak, Angi Gita Lake, resembles this variety, except that the reticulations are inconspicuous and the disk pilose.

27-29. var. **ovata** Noot., *var. nov.*

Type: *W. Vink 17517* (L), New Guinea, Papua, S. Highlands, 6° S, 143° E, alt. 2760 m.

Frutex vel arbor ad 12 m alta ramulis pubescentibus ad villosis vel tomentosis foliis infra appresse pilosis ovatis-ellipticis 4 ad 12 cm longis 2 ad 7 cm latis indice 2 ad 2,9, apice acuminato acumine 5 ad 15 mm longo nervis lateralibus 5 ad 10 paribus, petiolo 5 ad 20 mm longo. Inflorescentia spicata bracteis bracteolisque persistentibus pubescentibus vel tomentosis calyce tubo glabro vel parce appresse pilosa 1 ad 1$\frac{1}{2}$ mm longa lobis glabris ad appresse pilosis $\frac{1}{2}$ ad 1$\frac{1}{2}$ mm longis corolla 2 ad 3 mm longa staminibus 8 ad 25 disco glabro raro piloso.

Shrub or tree to 12(—20) m high. Twigs appressedly sericeous to (finely) pubescent or tomentose, glabrescent, rarely glabrous. *Leaves* appressedly thin-hairy underneath, ovate to elliptic, 4—12 by 2—7 cm, index 2– 2.9; base angle 40°—110°; apex acuminate, acumen 5—15 mm. *Nerves* 5—10 pairs, reticulations prominent on the undersurface, usually fine. *Petiole* 5—20 mm. *Inflorescence* a basally branched spike, axis fine pubescent to tomentose. Bracts 1—3 mm, bracteoles 1—2 mm, both with same indument as axis or less hairy. *Calyx tube* glabrous or sparsely appressedly fine-hairy, 1—1½(—2) mm high, lobes glabrous but ciliate to appressedly fine-hairy, ½—1½(—2) mm long. *Corolla* 2—3(—4) mm. *Stamens* 8—25. *Disk* glabrous or with few hairs, rarely shortly pilose; style glabrous, 1¼—2 mm. *Fruits* ellipsoid to ovoid, 5—10 by 3—8 mm, crowned by the persistent calyx lobes; mesocarp fleshy, *c.* ½ mm thick, stone ovoid, rather smooth without. *Seeds* 1—2, ruminate, fitting into the grooves of the stone.

NEW GUINEA. Western Highlands: *ANU 754, 2650, 2813, 2831*; *Hoogland & Schodde 7091*; *NGF 39857*; *Pullen 5016, 5232, 5331*; *Robbins 197, 1087, 3184, 3215*; *J. C. Saunders 762.* – Eastern Highlands: *van Balgooy 545*; *Brass 30131, 30203, 30516, 30534, 30615, 30633*; *Hoogland & Pullen 5468*; *NGF 15358, 15460, 19923, 23704, 39531, 39584, 47030*; *W. R. & M. N. Philipson 3497*; *Pullen 330*; *Robbins 677, 722, 1252*; *J. C. Saunders 815, 868.* – Morobe District: *Brass 29620*; *NGF 17155, 17960, 21204, 24512, 37442*; *TGH 11641, 11805, 12543, 12549, 12587, 12757.* – Central District: *NGF 30063.* – Southern Highlands: *Kalkman 4746, 4870, 5127, 5128*; *NGF 28257, 28484, 37048, 40010*; *Schodde 1994*; *Vink 17173,17314, 17517.*

Ecology. Shrub or substage tree in mossy forest or shrub in alpine shrubbery, alt. 1900—3700 m.

27-30. var. **revoluta** Noot., *var. nov.*

Type: *R. Pullen 5006* (L, isotype in G), New Guinea, Western Highlands, Minj-Nona Divide, alt. 3200 m.

Frutex vel arbor ad 10 mm alto ramulis pubescentibus ad villosis vel tomentosis foliis infra sericeis ad pubescentibus vel tomentosis, glabrescentibus ovatis ad ellipticis 4 ad 10 cm longis, 2½ ad 6 cm latis indice 1,3 ad 2,5 margine revoluta apice rotundato vel acuminato acumine 0 ad 13 mm longo nervis primariis 7 ad 10 paribus petiolo 20 ad 15 mm longo. Inflorescentia spicata ad 3 cm longa bracteis bracteolisque pubescentibus vel villosis calyce pubescente vel villoso tubo 1 ad 2 mm alto lobis 1 ad 2 mm longis corolla 2 ad 4 mm longa staminibus 10 ad 60 disco glabro vel piloso.

Shrub 1.2 m to tree 10 m. Twigs appressedly pubescent to villous or tomentose. *Leaves* appressedly sericeous to pubescent or tomentose, especially on midrib and nerves, glabrescent, ovate to elliptic, (2½—)4—10 by (1—)2½—6 cm, index 1.3—2.5; base angle 45°—110°; apex rounded to acuminate, acumen 0—13 mm; margin often strongly recurved or revolute. *Nerves* (4—)7—10 pairs, prominent below; reticulation mostly fine, prominent below. *Petiole* (2—)10—15 mm. *Inflorescence* a basally branched spike 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 (appres-

sedly) long pubescent to villous. *Calyx* with same indument, tube 1—2 mm high, limb 1—2 mm long wholly divided or the lobes slightly shorter. *Corolla* 2—4(—5) mm long. *Stamens* 10—60. *Disk* glabrous, with few hairs, or densely pilose. *Style* glabrous, 1—2 mm. *Fruits* ovoid to ellipsoid, 10—11 by 6—7 mm, calyx lobes persistent. *Seed* more or less curved towards the base, embryo from (rarely) straight to nearly U-shaped (on the same specimen).

NEW GUINEA. West Irian. Div. Hollandia: *Lam 1803*, Mt. Doorman. – Territory of New Guinea. W. Highlands: *Pullen 245, 5006, 5176*, Minj-Nona Divide; *Saunders 714*; *Vink 16079*, Mt. Kinkain, Kubor Range; *Pullen 5104*. Mt. As. – E. Highlands: *Hoogland & Pullen 5628*. Mt. Kerigomma (intermediate with *var. orbicularis*). – Morobe District: *NGF 37433*; *TGH 12550, 12553*, Mt. Shungol.

Ecology. In mossy forest between 2200 and 3600 m.

27-31. var. **sogeriensis** (Brand) Noot., *comb. nov.*

S. sogeriensis Brand, Pfl. R. Heft 6 (1901) 49 – *S. angiensis* Kanehira & Hatusima.

Twigs glabrous (or the youngest ones sparsely appressedly pilose); terminal buds small, glabrous. *Leaves* glabrous, ovate or elliptic, $2\frac{1}{2}$—11 by $1\frac{1}{2}$—7 cm, index 1.5—2.5; base cuneate to rounded, often attenuate, base angle 30°—90°; apex rounded to faintly acuminate, acumen 0—10 mm; margin mostly crenate. *Nerves* 5—9 pairs, often meeting in an intramarginal vein; reticulations fine, prominent below, and often also above. *Petiole* 5—20 mm. *Inflorescence* a basally branched spike to *c.* 3 cm; axis glabrous or appressedly pilose. Bracts and bracteoles persistent, glabrous or appressedly pilose, $\frac{1}{2}$—$1\frac{1}{2}$ and $\frac{1}{2}$—1 mm long respectively. *Calyx* glabrous (or the lobes shortly pilose towards the apex), tube $\frac{1}{2}$—$1\frac{1}{2}$ mm high, limb $\frac{1}{2}$—$1\frac{1}{4}$ mm, lobes $\frac{1}{2}$ mm long. *Corolla* 2—3 mm. *Stamens* less than 10 in ♀ flowers, to 30 in ♂ flowers. *Disk* glabrous (or with few hairs), annular or inconspicuously 5-glandular. *Style* glabrous small, without stigma in ♂, stout with peltate stigma in ♀ flowers. *Fruit* (ovoid to) ellipsoid, 5—9 by 3—5 mm; endocarp shallowly lengthwise or irregularly grooved.

NEW GUINEA. West Irian. Vogelkop Peninsula, Mt. Arfak, Angi Gita Lake, several collections, alt. 2000–2600 m; *Brass 10437, 10707*, Lake Habbema, alt. 2800–3325 m; *Brass 9912, 10014*, Mt. Wilhelmina, alt. 3360–3560 m; *Pulle 1022*, Mt. Wichmann, alt. 3100 m. – Territory of New Guinea. Morobe District: *NGF 17922*, 7°30′ S, 146°40′ E, 3400 m; *NGF 45467*, 7°18′ S, 146°07′ E, alt. 2200 m. – Papua: several collections from Central District, alt. 2400–3500 m; several collections from Milne Bay District (Mt. Mon, Mt. Dayman, Mt. Suckling, Goodenough I.), alt. 1900–3100 m.

Note. The collection *Brass & Meyer Drees 10437* can not with certainty be referred to this variety.

27-32. var. **versteegii** (Brand) Noot., *comb. nov.*

S. versteegii Brand, Nova Guinea 14 (1924) 188.

Shrub or treelet up to 5 m. Twigs densely tomentose or pilose. *Leaves* elliptic, 10—16 by 4—6½ cm, index 2—3.2; except the tomentose or pilose midrib and nerves glabrous, or the whole surface covered with a soft cob-webbed, or a long-pilose indument; apex not or slightly acuminate to mucronate-caudate, acumen 0—13 mm; base ± cuneate, base angle 25°—60°. *Nerves* 6—14 pairs, much prominent beneath, often sunken above; reticulation prominent. *Petiole* 6—18 mm, with same indument as twigs. *Inflorescence* a fascicle in the axils of the upper leaves or on wood. Bracts broadly boat-shaped, 4—5 mm long, bracteoles 2—3 mm, both and the 2—3 mm long calyx lobes appressedly long pubescent to sericeous. *Calyx tube* glabrous, 1—2 mm high. *Corolla c.* 5 mm. *Stamens c.* 50. *Disk* stellate, pilose. *Style* glabrous, inconspicuous (only ♂ flowers seen). *Fruit* not seen.

NEW GUINEA. West Irian: *Versteeg 1426*, Lorentz River; *Brass 12969, 13017*, Idenburg River, Bernhard camp. – Papua. Western District, Palmer River: *Brass 6997.*

27-33. var. **maculata** (Brand) Noot., *comb. nov.*

S. maculata Brand, K. Sch. & Laut. Nachtr. (1905) 348 – *S. ensicuspis* Brand – *S. pisifera* Brand – *S. pisifera* var. *miophylla* Brand (see note) – *S. margarita* Brand – *S. arfakensis* Gibbs – *S. morobeensis* Sleumer.

Twigs glabrous. Terminal buds small, pubescent or glabrous. *Leaves* ± elliptic, glabrous, 2—13 by 1.3—4 cm, index 1.5—4.5; base cuneate, often decurrent, base angle 25°—70°; apex shortly acuminate to caudate, acumen 3—20 mm; margin entire, sometimes crenulate. *Nerves* 4—10 pairs, meeting in an intramarginal vein which lies often close to the margin; reticulations quite fine to coarse, often prominent, sometimes obscure. *Petiole* 3—15 mm. *Inflorescence* a very slender, often branched spike of 2—10 cm; axis pubescent or puberulous to glabrous. Bracts caducous or persistent, 1—1¼ mm long, with the *c.* ¾ mm long bracteoles pubescent or puberulous to glabrous. *Flowers* male, female or bisexual. *Calyx* glabrous, tube ½—1¼ mm high, lobes ¼—1 mm long, ciliate. *Corolla* 2—4 mm. *Stamens* from few (less than 10), and sterile in ♀ flowers to 25 in ♂ flowers. *Disk* pilose, mostly 5-stellate. *Style* reduced in ♂ flowers, stout, *c.* 2 mm long and with peltate stigma in ♀ flowers. *Fruits* ovoid to ampulliform, 4—6 by 3—4 mm. *Seed* and embryo U-shaped.

NEW GUINEA. West Irian: several collections from Manokwari, Angi Gita Lake, alt. 1800–1900 m; *E. mayr 465, 562, 637*, Cycloop Mts., alt. 1100–1600 m; *Kalkman 4191, 4322*, Star Mts., 1200–1500 m. – Territory of New Guinea. Sepik, E. Highlands, W. Highlands and Morobe District: several collections, alt. 700–2800 m. – Papua: *M. Jacobs 9009, 9428*, S. Highlands, Mt. Bosavi; *NGF 39785*, S. Highlands, 6°05′ S, 143°50′ E, alt. 2800 m; *NGF 20320, 20356, 20755*, Central District, 7° S, 147° E, alt. 1900 m; several collections from Milne Bay District (Mt. Dayman), Rossel I., Misima I., Sudest I., alt. 0–1250 m.

Note. Since I did not see the types of *S. pisifera* var. *miophylla* Brand (probably lost during World War II) and their identity is not absolutely certain, I did not accept the epithet for this variety.

27-34. var. **parvifolia** Noot., *var. nov.*

Type: *Brass 30227* (L, isotype in US). New Guinea, Eastern Highlands, forest edge on bank of Pengagl Creek, Mt. Wilhelm, alt. 2800 m.

Frutex vel arbor parva ramulis pubescentibus vel puberulis foliis glabris 1,2 ad 4 cm longis 0,7 ad 1,7 cm latis indice 1,6 ad 3 apice acuto vel acuminato acumine 0 ad 5 mm nervis lateralibus 5 ad 7 paribus petiolo 2 ad 4 mm longo. Inflorescentia spicata ad 1 cm longa bracteis bracteolisque persistentibus puberulis calyce tubo glabro vel appresse puberulo 1 ad $1\frac{1}{2}$ mm alto lobis appresse puberulis c. 1 mm longis corolla 2 ad $2\frac{1}{2}$ mm longa staminibus c. 10 ad 25 disco piloso.

Twigs (appressedly) pubescent or puberulous; terminal buds small, pubescent. *Leaves* ± elliptic, glabrous beneath, 1.2—4 by 0.7—1.7 cm, index 1.6—3; base cuneate, often attenuate, base angle 30°—50°; apex acute or acuminate, acumen 0—5 mm; margin mostly denticulate or dentate. *Nerves* 5—7 pairs, prominent beneath, usually meeting in an intramarginal vein; reticulations rather fine, prominent beneath. *Petiole* 2—4 mm. *Inflorescence* a small few-flowered spike to *c.* 1 cm long; axis puberulous. Bracts and bracteoles persistent, puberulous, 1—2 and $\frac{1}{2}$—1 mm long respectively. *Calyx tube* glabrous or appressedly puberulous, 1—$1\frac{1}{2}$ mm high, lobes appressedly puberulous, *c.* 1 mm long. *Corolla* 2—$2\frac{1}{2}$ mm. Stamens *c.* 10 in ♀ flowers, to 25 in ♂ flowers. *Disk* cylindrical, *c.* $\frac{1}{2}$ mm high, densely soft hairy. *Style* glabrous or hairy towards the base, small, or stout with peltate stigma in ♀ flowers. *Fruits* ovoid to ellipsoid, 7—10 by *c.* 4 mm.

New Guinea. Territory of New Guinea. E. Highlands, Mt. Wilhelm and vicinity: *c.* 20 collections, alt. 2000–3300 m. – Papua. S. Highlands: *Schodde 1627*, Anga Valley, alt. 2200 m.

28. Symplocos colombonensis Noot., *sp. nov.*

Type: *Clemens* 33706 (L, isotypes in BM, BO, G, K), N. Borneo, Mt. Kinabalu, Colombon River basin, 7500 ft.

Arbor parva ramulis appresse pubescentibus. Folia (anguste) ovata base cuneata vel rotunda apice acuminato vel caudato nervis secundis prominentibus cum nervis tertiis minus prominentibus recticulatis. Inflorescentia laxe racemosa plusminus 3 flora. Calyx appresse pubescens tubo $1\frac{1}{2}$–2 mm alto lobis triangulatis minore.

Small tree, up to *c.* 10 m. Twigs appressed-pubescent; terminal buds pubescent, small. *Leaves* alternate, glabrous above, sparsely appressed-pilose, especially on the often sharply glandular-dentate, often revolute margin beneath, (narrowly) ovate, 4—9 by $1\frac{1}{2}$—$3\frac{1}{3}$ cm, index 1.8—4; base cuneate to rounded, often shortly attenuate, base angle 40°—90°; apex long acuminate to caudate, acute, acumen (7—)9—16 mm;

midrib much prominent beneath, appressedly pubescent. *Nerves* 7—11 pairs, arching upwards and merging into the reticulation or an inconspicuous intramarginal vein visible; secondary veins prominent, forming a rather coarse reticulation with the less prominent tertiary veins. *Petiole* with same indument as twigs, 3—4 mm. *Flowers c.* 3 in an up to 3 cm long lax raceme, axis finely appressedly pubescent. Bracts and bracteoles pubescent, soon caducous, pedicel with same indument, 1—5 mm. *Calyx* appressedly brown-pilose, tube $1\frac{1}{2}$—2 mm high, limb $1\frac{3}{4}$—3 mm long, the triangular lobes $1\frac{1}{2}$—$2\frac{1}{2}$ mm. *Corolla* glabrous or thinly red-hairy on the outside in bud, *c.* 5 mm long. *Stamens c.* 90 or more, in 5 distinct bundles, up to 7 mm long. *Disk* glabrous or with some hairs, 5-glandular. *Style* glabrous, thickened towards the base, 4—5 mm, with small peltate stigma. *Fruits* (obliquely) ovoid or ellipsoid, without the persistent (but in the herbarium often lacking) calyx lobes, 10—14 by 6 mm, mesocarp thin, stone except the apical 2—3 mm brain-like grooved. *Seeds* not seen, but embryo probably straight.

BORNEO. Sabah: 7 collections, all from the west slopes of Mt. Kinabalu, alt. 2200–2700 m.

Note. This species resembles *S. zizyphoides* Stapf (p. 293), but differs in being a tree, the twigs are less zigzag and the leaves larger, with longer acuminate apex; furthermore in *S. colombonensis* the calyx lobes are longer in relation to the tube.

29. Symplocos composiracemosa Noot., *sp. nov.*

Type: *NGF 17839 Womersley* (L, isotypes in BISH, E, K, LAE), New Guinea, Morobe District, Wagau, Buang region, 6°45′ S, 146°60′ E, alt. 4500 ft.

Ramuli glabri gemmis apicalibus pubescentibus. Folia glabra elliptica 8–13,5 cm longa 2,5–7 cm lata indice 1,7–3,2, base acuta apice acuminata acumine 8–13 mm longo, nervis 5–9 paribus convenientem in venam intramarginalem reticulo paulo tenui sed in lumine translucido reticulum valde tenuem, petiolo 13–15 mm longo. Inflorescentia racema composita (pedicellis longitudine maxima 1 mm) axe parce minute pilosa, bracteis bracteolisque cum eodem indumento persistentibus 1 atque $\frac{1}{2}$ mm longis. Calyx glabra tubo 1 mm alto lobis recurvatis distinctis semi-ellipticis rotundatis $\frac{1}{2}$–1 mm longis. Corolla c. 2 mm longa. Stamina 15–25. Discus angulatus glabrus. Stylus glabrus 1 mm altus.

Twigs glabrous; terminal buds small, pubescent. *Leaves* glabrous, ± elliptic, 8—$13\frac{1}{2}$ by $2\frac{1}{2}$—7 cm, index 1.7—3.2; base acute, base angle 40°—60°; apex acuminate, acumen 8—13 mm; margin entire or slightly undulate. *Nerves* 5—9 pairs, meeting in a looped intramarginal vein; reticulations rather fine, with translucent light often very fine. *Petiole* 13—15 mm. *Inflorescence* a compound raceme to 5 cm (but pedicels not over 1 mm); axis sparsely minutely pilose. Bracts and bracteoles with same indument, persistent. 1 and $\frac{1}{2}$ mm long respectively. *Calyx* glabrous; tube *c.* 1 mm high, lobes recurved, clearly distinct from the tube, semi-elliptic, rounded, $\frac{1}{2}$—1 mm long. *Corolla c.* 2 mm. *Stamens* 15—25, rather stiff. *Disk* glabrous, often *c.* 5-angular. *Style* glabrous, 1 mm. *Fruits*: only young fruits known, elliptic. *Seeds* not yet developed.

NEW GUINEA. Morobe District: *NGF 17839, 17901*, Wagau, Baung region, alt. 1350 m; *NGF 44127*, Wau Subdistrict, Yamap, alt. 1800 m.

30. Symplocos costata (Blume) Choisy — Pl. 8a-d, photogr. 1 & 2.

S. costata (Blume) Choisy, in Zoll. Syst. Verz. (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; Backer, Bekn. Fl. Java (em. ed.) 7 (1948) fam. 169, p. 4; Backer & Bakh. *f.* Fl. Java 2 (1965) 206. – *Dicalyx costatus* Blume, Bijdr. (1826) 1117. – *S. cerasifolia* (*non* Wall. *ex* DC.) Choisy, in Zoll. Syst. Verz. (1854) 136; Miq. Fl. Ind. Bat. 1,2 (1859) 466, for the coll. of Zollinger. – *Eugeniodes costatum* O.K. Rev. Gen. Pl. 2 (1891) 975. – Type: *Blume 1416* (L), West Java, G. Burangrang.

S. caryophylloides [Zoll. Syst. Verz. (1854) 136, *nomen*] Zoll. Nat. Tijd. Ned. Ind. 14 (1857) 161; Miq. Fl. Ind. Bat. 1,2 (1859) 467. – Type: *Zollinger 2122* (BM, FI, G, L, LE, MEL, P), West Java, Mt. Gedeh.

S. arcuata Brand, Pfl. R. Heft 6 (1901) 58. – Type: *Forbes 867* (B†, isotypes in BM, L, LE), West Java. Brand erroneously cited *Forbes 687*.

S. sericea Brand, Pfl. R. Heft 6 (1901) 58; Bull. Herb. Boiss. II, 6 (1906) 748. – Type: *Koorders 26393* (B†, isotypes in BO, L), West Java, Tjigenteng.

Tree, up to 20 m high and 25(—50) cm ϕ. Twigs glabrous, leaf-scars whether or not cushion-shaped; terminal buds with many sparsely appressedly pilose to glabrous scales. 5—10 mm long, leaving obvious scars; growth discontinuous. *Leaves* glabrous, narrowly ovate to elliptic, 6—21 by 2—7 cm, index $2\frac{1}{2}$—$5\frac{1}{2}$; base acute, base angle 25°—40°; apex acuminate, acumen 6—15 mm; margin slightly dentate, often nearly entire. *Midrib* beneath glabrous or sparsely appressedly pillose. *Nerves* (8—)10—13 (—14) pairs, slightly prominent beneath, meeting in a not very conspicuous intramarginal vein; secondary veins transverse to nerves; reticulations fine, prominent beneath. *Petiole* 10—25 mm. *Inflorescence* a spike from the axils of the leaves or from wood, cone-shaped in bud, becoming at most 4 cm long; axis tomentose-pubescent. Bracts and bracteoles densely sericeous to pubescent, broadly boat-shaped, soon caducous, 5—8 mm long, and later caducous, 2—3 mm long respectively. *Calyx* glabrous, tube *c.* $\frac{1}{2}$ mm high, the limb wholly divided into 5 (narrowly) ovate to triangular, parallel-nerved, $2\frac{1}{2}$—3 mm long lobes. *Coroila* 3—5 mm. *Stamens* 60—more than 100, becoming as long as corolla or *c.* 1 mm longer. *Disk* shortly pilose, 5-glandular-stellate. *Style* glabrous, except sometimes the very base, 3—6 mm long. *Fruit* ellipsoid to cylindrical, often slightly curved, blue *in vivo*, 20—40 by 8—20 mm; mesocarp thick, corky; stone woody with *c.* 8 high ridges, 3-celled with a central canal, often only 1 cell developed. *Seeds* cylindrical; embryo straight with short cotyledons and long radicle.

JAVA. West Java, more than 30 collections, mainly from Mt. Gedeh, the vicinity of Garut and Mt. Patuha, alt. 900–2000 m. – Semerang: *Koorders 8108, 27974, 36313*, G. Telomojo; *Junghuhn s.n.*, Mt. Ungaran.

31. Symplocos crassilimba Merr. — Pl. 8e-h.

S. crassilimba Merr. Lingn. Sc. J. 14 (1935) 47, t. 15; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 22. – Type: *S. K. Lau 260* (BM, E, K, P, W), Hainan, Naan Shan Leng.

Treelet or thick tree, 5—30 m. Twigs glabrous, young shoots very short, after the first season bark light gray, spongy. Terminal buds rather small, 5—8 mm, with glabrous, ciliate scales. *Leaves* glabrous, dark olive-green above, lighter green beneath, elliptic obovate, 6—14½ by 3—6 cm, index 1.6—2.8; base cuneate to rounded, base angle (30°—) 50°—90°, abruptly attenuate; apex faintly acuminate, acumen 0—5 mm, tip blunt (or acute); margin denticulate to serrulate. *Nerves* 7—11 pairs, curved upwards and merging into the reticulation, or intramarginal vein faintly visible; secondary veins faintly prominent, tertiary and quaternary veins forming a fine, prominent reticulation which is also conspicuously prominent above. *Petiole* stout, narrowly winged towards the apex, 15—30 mm. *Inflorescence* in bud forming a short cone as in *S. hookeri* (p. 207), axis glabrous. Bracts glabrous to appressedly puberulous, broadly boat-shaped, ± orbicular, 5—9 mm; bracteoles (narrowly) elliptic, glabrous, ciliate; both soon caducous. Pedicel glabrous, ½—1 mm. *Calyx* glabrous; tube 1½—2 mm; limb *c.* 1¾ mm, lobes *c.* 1½ mm. *Corolla c.* 6 mm. *Stamens c.* 100. *Disk* 5-glandular, flat, shortly pubescent. *Style c.* 6 mm, glabrous. *Fruit* ovoid, 15—18 by 6—8 mm; mesocarp fleshy, rather thick; stone smooth, 12—15 by *c.* 4 mm; endocarp woody, rather thick (nearly 1 mm). *Seed* 1, straight, with straight embryo.

CHINA. Hainan: 16 collections – Kwangtung: *Fenzel 14* (W), an incomplete collection, probably also belonging to this species.

32. Symplocos crassipes Clarke — Pl. 9-10.

S. crassipes Clarke, Fl. Br. Ind. 3 (1882) 580; Brand, Pfl. R. Heft 6 (1901) 52; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 245; Ridl. Fl. Mal. Pen. 2 (1923) 305. – Type: *Maingay 2597 = Kew Distr. 960* (K), Malacca, Mt. Ophir.

S. curtisii Oliv. in Hook. Ic. Pl. 18 (1888) t. 1757; Brand, Pfl. R. Heft 6 (1901) 69; King & Gamble, J. As. Soc. Beng. 74. 2 (1906) extra number 244; Ridl. Fl. Mal. Pen. 2 (1923) 305; Fletcher. Fl. Siam. En. 2 (1938) 385: – Type: *Curtis 1099* (SING, W), Penang, Penara Bukit.

S. havilandii Brand, Pfl. R. Heft 6 (1901) 41; Merr. En. Born. (1921) 486. – Type: *Haviland, c.l.o.t.* (K, isotype in BO), Sarawak, March 1891, Matang, 2000 ft. The Bogor sheet is numbered *2792/2314.*

S. ernae Brand, Pfl. R. Heft 6 (1901) 58; Merr. En. Born. (1921) 486. – Lectotype: *Beccari 3499* (K, isotypes in FI, G, P), Sarawak, Kuching.

S. monticola King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 235; Ridl. Fl. Mal. Pen. 2 (1923) 301. – Lectotype: *King's coll. 3804* (K), Perak, Larut, 4000–4500 ft.

S. brandiana King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 242; Ridl. Fl. Mal. Pen. 2 (1923) 304. – Lectotype: *King's coll. 1887* (K, NY), Perak, Larut, 500–800 ft.

S. penangiana King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 245; Ridl. Fl. Mal. Pen. 2 (1923) 306. – Type: *Curtis 325* (SING), Penang, West Hill.

Shrub, or small tree to 18 m. Twigs glabrous, or (obliquely) pubescent to appressedly or spreadingly long hairy, sometimes with a double indument of a short tomentum and long spreading hairs. Terminal buds small, pubescent to long hairy. *Leaves* (narrowly) ovate to elliptic, sparsely appressedly pilose, nearly glabrous to densely appressedly to spreadingly long hairy beneath, rarely also hairy above, 6—27 by 1.1—8.5 cm, index 2.1—3.5; base cordate to cuneate, base angle 25°—180°; apex acuminate to caudate, acumen 5—40 mm; margin recurved, entire to glandular denticulate. *Midrib* mostly much prominent beneath. *Nerves* 3—11 pairs, often much curved upwards, the second pair reaching halfway up the margin, all meeting in an intramarginal vein in var. *curtisii*, var. *penangiana*, and often also in var. *ernae*, in the other varieties the nerves not so much curved; secondary veins often transverse to nerves or midrib, lesser veins usually forming a sometimes rather inconspicuous very fine reticulation, but reticulation only visible with transmitted light in var. *brandiana*, var. *crassipes*, and var. *rufomarginata*. *Petiole* 1—10 mm. *Inflorescence* a short, often clustered spike to 1(—2) cm from the axils of the upper leaves, rarely flowers solitary. Axis from nearly glabrous to appressedly pubescent, or with long, spreading to appressed, stiff, brown to ferrugineous hairs, of 1—4 mm long. Bracts and bracteoles persistent,(broadly) ovate, triangular, or semi-elliptic, rarely (long) acuminate, appressedly brown pubescent, or ferrugineously villous to hirsute. *Calyx* often with not wholly divided limb, and then with the following characters: tube appressedly brown pubescent, often narrowly funnel-shaped, 1—2 mm high; limb (nearly) glabrous to appressedly brown pubescent, 1½—2 mm long, lobes mostly semi-elliptic, rounded or ovate, acutish, ½—1½ mm long. When the limb is wholly divided the calyx possesses the following characters: tube (sparsely) appressedly long dark- brown or rusty hirsute, or greyish pubescent 1—1½ mm high; lobes (narrowly) ovate to elliptic, often acuminate, acute, appressedly long brown hirsute, 1½—4 mm long. *Corolla* 2½—6 mm. *Stamens* from *c.* 30 to *c.* 100, not longer than the corolla. *Disk* glabrous, 5-stellate or 5-glandular, but often the conical style base pilose. *Style* except at base glabrous, often becoming 1—2 mm longer than corolla, with peltate stigma. *Fruit* mostly 1—2 from each inflorescence, sometimes more, glabrous, or sparsely long hairy, bright blue, cylindrical, narrowed towards the apex, 13—18 by 3—5 mm; mesocarp crustaceous, *c.* ½ mm thick; stone with *c.* 12 lengthwise grooves, slightly narrowing from base to apex, attenuate above, cells 1—3. *Seeds* usually 1, with membranous testa and (according to King & Gamble) fleshy albumen; embryo straight.

Distribution. Peninsular Thailand, Penang, Malaya, and Borneo.

Note. The type of this species, *Maingay 2597*, is probably an aberrant specimen of var. *brandiana* or var. *penangiana*. It is the only specimen known of var. *crassipes*, and it is incomplete because the fruits are not known.

KEY TO THE VARIETIES

1a. Leaves ovate, to 6 cm long and 2.8 cm broad. Nerves 3—6 pairs. Flowers solitary. **32-5.** var. **havilandii**

b. Leaves (narrowly) ovate to elliptic, 5½—27 by 2—8½ cm. Nerves 3—11 pairs . 2
2a. Base of leaf cordate, base angle 90°—180°. 3
b. Base of leaves not cordate, base angle 25°—90°. 4
3a. Leaves 5½—14 cm long. Petiole 1—2 mm. . . . . **32-2.** var. **brandiana**
b. Leaves 16—18 cm long. Petiole *c.* 5 mm. . . . . **32-1.** var. **crassipes**
4a. Leaves sparsely appressedly pilose beneath, the hairs very inconspicuous and thus the leaves seemingly glabrous. 5
b. Leaves densely appressedly hairy to sparsely more or less appressedly long hairy beneath, hairs always evident. 6
5a. Twigs glabrous, rarely appressedly pubescent. Limb of calyx often glabrous or nearly so, rarely appressedly pubescent. Style base glabrous, rarely pilose. **32-3.** var. **curtisii**
b. Twigs appressedly (long) hairy, rarely glabrous. Limb of calyx appressedly pubescent. Style base pilose. . . . . **32-4.** var. **ernae**
6a. Twigs densely patently dark brown hairy, hairs often to 2 mm long. Leaves sparsely (appressedly) long hairy beneath. Nerves 6—11 pairs. . . . **32-6.** var. **penangiana**
b. Twigs densely obliquely pubescent. Leaves densely appressedly pilose beneath. Nerves 4—6 pairs. . . . . **32-7.** var. **rufomarginata**

32-1. var. **crassipes — Pl. 9a.**

S. crassipes Clarke

Twigs sparsely appressedly long hairy. *Leaves* sparsely appressedly pilose beneath, the hairs inconspicuous, elliptic, 16—18 by 6—8 cm, index 2.2—2.7. *Nerves c.* 10 pairs, straight or curved upwards to meet into a looped intramarginal vein; base cordate, base angle 90°—110°; apex acuminate, acumen *c.* 15 mm; reticulations fine, only visible with transmitted light. *Petiole* much swollen, 5 mm. *Inflorescence* and flowers as in var. *brandiana* (according to the description of Clarke).

MALAY PENINSULA. Johore: only the type.

32-2. var. **brandiana** (King & Gamble) Noot., *comb. nov.*

S. brandiana King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 245.

Small tree, 3—8 m. Twigs patently dark brown pubescent-tomentose *and* long hairy, the longer hairs becoming 1½—2 mm. Terminal buds small, appressedly long hairy. *Leaves* narrow elliptic-ovate, (appressedly) long hairy beneath, midrib and nerves beneath patently long hairy, 5½—14 by 1.7—5 cm, index 1.8—3.3; base cordate, base angle 90°—180°; apex acuminate, acumen 5—17 mm; margin recurved, glandular denticulate, often densely appressedly long hairy beneath, the hairs emerging from the margin. *Midrib* much prominent beneath; nerves 6—10 pairs, much prominent beneath, curved upwards and meeting in a much prominent intramarginal vein; second-

ary veins often transverse to the nerves, prominent beneath, other veins prominent to inconspicuous, forming a coarse reticulation; with translucent light a fine reticulation visible. *Petiole* 1—2 mm. *Inflorescence* a short spike, often on a reduced twig with many cataphyls. Bracts and bracteoles narrowly ovate, appressedly long hairy, 3—8 mm. Pedicel 0—1 mm. *Calyx tube* densely appressedly greyish hairy, 1 mm; lobes ovate, acuminate, appressedly brown hairy, $2\frac{1}{2}$—3 mm long. *Stamens* 60 or more. *Disk* 5-glandular, glabrous. *Style* glabrous, 4 mm, the base conical, hairy. *Fruits* hairy.

MALAY PENINSULA. Perak: *Curtis 2030*, Cottage Hill, alt. 1500 m; *King's coll. 1887*, Larut, alt. 150 m; *Scortechini 346, 349*; *SF 38834*, all from Maxwell's Hill, alt. 100–300 m; *Wray 677*, Larut, Waterfall Hill. – Selangor: *Ridley, June 3, 1896*, Bukit Kutu. – Johore: *SF 19890*, G. Muntahak, alt. 600 m; *Ridley, June 13, 1892*, G. Ledang.

32-3. var. **curtisii** (Oliv.) Noot., *comb. nov.* — **Pl. 9b-c.**

S. curtisii Oliv. in Hook. Ic. Pl. 18 (1888) *t.* 1757 – *S. monticola* King & Gamble.

Treelet or shrub to 5 m. Twigs glabrous, or rarely appressedly pubescent. Terminal buds small, pubescent. *Leaves* (narrowly) ovate to elliptic, usually sparsely appressedly pilose, nearly glabrous beneath, the hairs very inconspicuous, $8\frac{1}{2}$—18 by 3—$8\frac{1}{2}$ cm, index 2.1—3.5; base cuneate, slightly attenuate, base angle 25°—70°(—90°); apex long acuminate, acumen (5—)15—30 mm; margin ± entire to sharply dentate. *Midrib* much prominent beneath, often appressedly pilose towards the base; nerves 4—9 pairs, curved upwards and meeting in an intramarginal vein, at least in the apical half; reticulations often appearing to be coarse, but with a handlens a very fine reticulation visible; primary veins usually transverse to the nerves. *Petiole* 3—7 mm. *Inflorescence* a contracted, often branched spike, to 1(—2) cm long; axis from nearly glabrous to appressedly pubescent. Bracts and bracteoles ovate to triangular, appressedly pubescent, 1—$1\frac{1}{2}$ and *c.* 1 mm long respectively. *Calyx tube* appressedly pubescent, often narrowly funnel-shaped, $1\frac{1}{2}$—2 mm high; limb often glabrous or nearly so, rarely appressedly pubescent, tearing when older, $1\frac{1}{2}$—2 mm long, the lobes $\frac{1}{2}$—$1\frac{1}{2}$ mm long. *Corolla* $3\frac{1}{2}$—4 mm long. *Stamens* 30—*c.* 70, becoming as long as corolla or up to 3 mm longer. *Disk* 5-stellate or 5 glandular, glabrous. *Style* glabrous, 5—6 mm, the conical base glabrous or rarely pilose. *Fruits* glabrous.

THAILAND (Peninsular). Puket: *Kerr 14578*, Setul, alt. 200 m. – Nakawn Sritamarat: *van Beusekom 837*; *Flora of Thailand 12115*, Khao Luang, alt. 800 m; *Kerr 15281*, Patalung, alt. 400 m; *E. Smith 610*, Kaw Ram. – Pattani: *Flora of Thailand 40235*, Bacho, Narathiwat.

MALAY PENINSULA. Perak: 10 collections, alt. 300 m (only once recorded). – Selangor: *CF 24222*, Sg. Lalang Kajang; *kep. FRI 12201*, Ulu Langkat, alt. 1000 m. – Pahang: 8 collections, alt. 1200–1400 m. – Johore: *CF 97979*, Kluang For. Res.; *99107*, G. Benom For. Res., alt. 600 m. – Trengganu: *SF 30403*, Bukit Kajang, Kemaman.

32-4. var. **ernae** (Brand) Noot., *comb. nov.* — **Pl. 10b.**

S. ernae Brand, Pfl. R. Heft 6 (1901) 58.

Shrub or slender tree to 18 m. Twigs appressedly (long) hairy, rarely glabrous. Terminal buds small, pubescent. *Leaves* (narrowly) elliptic to ovate, sparsely appressedly pilose, nearly glabrous beneath, hairs very inconspicuous, 6—15(—18) by 2.6—6(—7) cm, index (2—)2.4—4; base cuneate, often attenuate, base angle 30°—45°; apex acuminate to caudate, acumen 10—25 mm; margin recurved, entire to denticulate. *Midrib* much prominent; nerves 3—6 pairs, curved upwards and meeting in an intramarginal vein at least in the upper half; secondary veins often transverse to nerves, lesser veins sometimes obscure, often forming a rather dense reticulation, at least with translucent light. *Petiole* 3—5 mm. *Inflorescence* a – basally branched – contracted spike; axis appressedly pubescent. Bracts and bracteoles broadly ovate, often boat-shaped, appressedly pubescent, *c.* 1 mm long. *Calyx* appressedly pubescent, tube 1—1½ mm high, limb 1¼—2 mm long, whether or not tearing in older stage, the lobes 1—1½ mm. *Corolla* 3—5 mm. *Stamens c.* 30—*c.* 70, up to as long as corolla. *Disk* 5-glandular, glabrous. *Style* glabrous, *c.* 5 mm, the base conical with some hairs to densely pilose. *Fruit* 3-celled, with thin endocarp, glabrous.

BORNEO. Sarawak: *c.* 12 collections, from low alt. to 1200 m. – Brunei: *BRUN 359*, Batu Aloi. – Sabah: *c.* 17 collections, from low alt. to 1500 m. – Kalimantan: *Endert 2580, 3619, 3629*, W. Kutai, Long Hut and G. Kemul, 130 and 1200 m alt.

32-5. var. **havilandii** (Brand) Noot., *comb. nov.* — **Pl. 10c.**

S. havilandii Brand, Pfl. R. Heft 6 (1901) 41.

Treelet. Twigs pubescent. Terminal buds very small, pubescent. *Leaves* ovate, rather densely appressedly pilose, especially on midrib and nerves and along the margin, 2.7—6 by 1.1—2.8 cm, index 1.6—2.1; base rounded, base angle 60°—90°; apex long acuminate, acumen 5—15 mm. *Nerves* 3—6 pairs, curved upwards and meeting in an intramarginal vein; epidermis beneath wrinkled by the very dense, otherwise obscure, reticulation. *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 respectivelv. *Calyx* appressedly pubescent, tube 1 mm high, limb 2 mm, lobes 1½ mm long. *Corolla* 2½ mm. *Stamens c.* 35. *Disk* 5-glandular, glabrous. *Style* glabrous, 2 mm, the base conical, pilose; stigma peltate.

BORNEO. Sarawak: *Haviland 632/247, c.l.o.t.*, Matang, alt. 600 m; *Ridley 12297*, same locality; *S 17783 Anderson*, G. Serapi, alt. 900 m.

32-6. var. **penangiana** (King & Gamble) Noot., *comb. nov.* — **Pl. 9d.**

S. penangiana King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 245.

Shrub or treelet to 10 m. Twigs densely patently dark brown pilose, hairs often to 2 mm long, rarely a double indument of a short tomentum and longer hairs. Terminal buds small, sometimes to 7 mm, densely dark brown hairy. *Leaves* narrowly elliptic, sparsely (appressedly) long hairy beneath, especially on midrib and nerves, rarely appressedly long hairy above, 6—27 by $2\frac{1}{2}$—8 cm, index 2.6—3.6; base rounded-acute, base angle 40°—90°; apex caudate, acumen 1—4 cm; margin often sharply glandular dentate, appressedly long hairy beneath. *Midrib* much prominent beneath; nerves 6—11 pairs, much prominent beneath, curved upwards and meeting in an intramarginal vein, at least in the upper half of the leaf; secondary veins often many, transverse to midrib; tertiary and quaternary veins faintly prominent, forming a rather dense reticulation. *Petiole* 2—10 mm. *Inflorescence* a contracted, branched spike; axis densely more or less appressedly villous, hairs 1—4 mm. Bracts and bracteoles appressedly long dark brown hairy, narrowly elliptic to ovate, sometimes caudate, 1—7 mm long. *Calyx tube* (sparsely) appressedly long dark brown hairy, 1—$1\frac{1}{2}$ mm high; the limb wholly divided in the densely appressedly dark brown hairy $1\frac{1}{2}$—4 mm long lobes. *Corolla* 3—6 mm. *Stamens* 30—more than 100, up to as long as corolla. *Disk* probably pilose with the conical style base. *Fruits* hairy.

MALAY PENINSULA. Kelantan: *SF 19712*, Sg. Tekal; *SF 24820*, Sg. Ketil. – Penang: *Curtis 325, 2383*, alt. 150 m. – Perak: *Ridley 14581*, Tengong. – Pahang: *CF 97832*, G. Benom Game Reserve, alt. 500 m. – Trengganu: *SF 40451*, Kuala Trengganu. – Selangor: *Hume 8374*, Semenyih. – Negri Sembilan: *Dennys 34*, Semawang. – Johore: *SF 24934*, Sg. Endau.

32-7. var. **ruformarginata** Noot., *var. nov.* — **Pl. 10a.**

Type: *Haviland 2792/2314* (K, isotype in BO), Sarawak, Jan. 11, 1893, Kuching.

Frutex vel arbor parva, ramulis dense oblique pubescentibus. Folia ovata vel elliptica base cuneata apice caudata acumine 15–25 mm longo, margine dense appresse rufo piloso.

Shrub or treelet to 5 m. Twigs densely obliquely pubescent. Terminal buds small, pubescent. *Leaves* ovate to elliptic, rather densely appressedly hairy beneath, even more so on midrib and nerves, $5\frac{1}{2}$—$11\frac{1}{2}$ by 2—$3\frac{1}{2}$ cm, index 2.3—2.8; base cuneate, base angle 40°—60°; apex long acuminate to caudate, acumen 15—25 mm; margin densely appressedly rufous hairy beneath, hairs visible outside the margin. *Nerves* 4—6 pairs, curved upwards and meeting in an intramarginal vein; secondary veins transverse to nerves, only faintly prominent; other veins obscure, but fine reticulation visible with translucent light. *Petiole* 2—3 mm. *Inflorescence* a much reduced contracted spike; axis hairy. Bracts and bracteoles (broadly) elliptic, *c.* 3 mm. *Calyx* densely, appressedly,

long sericeously pubescent; tube 1 mm high, limb wholly divided in the *c.* 2 mm long, rounded lobes. *Corolla c.* $2\frac{1}{2}$ mm. *Stamens c.* 25, up to as long as corolla. *Disk* glabrous, *Style* with conical base, densely long pilose halfway up, *c.* 2 mm long.

BORNEO. Sarawak: 5 collections near Kuching.

33. Symplocos crassiramifera Noot., *sp. nov.*

Type: *L. S. Smith 3965* (BRI), Australia, Queensland, Cook Cistrict, Devil Devil Creek, *c.* 8 miles SSW. of Mossman, alt. *c.* 1200 ft.

Ramuli tomentosi valde crassi. Folia pubescentes glabrescentes anguste elliptica vel obovata 31–41 cm longa 5–$8\frac{1}{2}$ cm lata indice 5–7 base cuneata ultimo truncata apice acuminato acumine 17–20 mm longo margine revoluto nervis 20 paribus convenientem in venam intramarginalem marginem approximatam reticulo denso, petiolo 15–20 mm longo. Inflorescentia spicata c. 5 cm longa axe pilosa bracteis bracteolisque persistentibus appresse pubescentibus c. 2 mm longis. Calyx tubo glabro c. 1 mm alto limbo $1\frac{1}{2}$–2 mm longo lobis semicircularibus appresse pubescentibus. Corolla c. 4 mm longa. Stamina c. 25. Stylus glaber base pilosa. Fructus ampulliformis 7–10 mm longus 4–5 mm latus. Semen unum ovatum originaliter curvatum embryone curvato.

A slender little branched shrub or small tree, 1.8—2.5 m high. Twigs very thick, tomentose, at least 1 cm ϕ. *Leaves* narrowly elliptic to obovate, 31—41 by 5—$8\frac{1}{2}$ cm, index 5—7; base cuneate, the very base rounded; apex long acuminate, acumen 17—20 mm; margin entire, revolute. *Nerves* 15 to *c.* 20 pairs, meeting in a slightly looped intramarginal vein close to the margin; reticulation fine, with translucent light even very fine. *Petiole* stout, 15—20 mm. *Inflorescence* a spike from the axils of the leaves of *c.* 5—15 cm; axis brown hairy. Bracts and bracteoles persistent, appressedly brown hairy, ovate, *c.* 2 mm long. *Calyx tube* glabrous, *c.* 1 mm high; limb $1\frac{1}{2}$—2 mm, the appressedly brown pubescent, semi-orbicular lobes *c.* 1 mm long. *Corolla* persistent on young fruits, *c.* 4—5 mm. *Stamens c.* 25. *Disk* inconspicuous, conical style base pilose. *Style* glabrous, *c.* 4 mm. *Fruits* ampulliform, 7—10 by 4—5 mm, unripe. *Seed* 1, ovate (originally probably curved and U-shaped, but in mature state the U-shaped embryo is embedded in a fused, almost globular albumen).

AUSTRALIA. Queensland. Only known from the type and *Wrigley & Telford NQ 140*, Mt Lewis forestry rd.

34. Symplocos cyanocarpa C. T. White.

S. cyanocarpa C. T. White, Proc. Roy. Soc. Queensl. 47 (1936) 69. – Type: *Brass 2050* (A, isotypes in BISH, BRI, MEL), Australia, N. Queensland, Mossman River, 4-2-1932.

Shrub or small tree to 3 m. Twigs glabrous, terminal buds small, only the margin of the bud-scales sometimes pubescent. *Leaves* glabrous, narrowly elliptic to obovate, 8—18 by $2\frac{1}{2}$—$5\frac{1}{2}$ cm, index 2.8—5; base narrowly cuneate, base angle 10°—50°; apex acu-

minate, acumen 10—20 mm; margin entire to remotely glandular denticulate. *Nerves* 7—14 pairs, meeting in an intramarginal, looped vein; reticulations coarse, faintly prominent beneath, but with translucent light a fine reticulation visible. *Petiole* 3—5 mm. *Inflorescence* contracted to a small fascicle of flowers from the axils of the leaves or on wood. Bracts and bracteoles several, persistent, + ovate, appressedly pubescent to puberulous, 1—2 mm long. *Calyx* appressedly puberulous; tube $\frac{3}{4}$—1 mm high, limb divided into 1—1$\frac{1}{2}$ mm long, ovate, acute lobes. *Corolla* 3—4 mm often minutely ciliate. *Stamens* 15—30, up to as long as corolla, minutely pilose. *Disk* pulvinate, softly pilose. *Style* glabrous or softly pilose, *c.* 1 mm, in ♂ flowers without stigma. *Fruits* long ellipsoid to spindle-shaped to cylindrical, 15—25 by 6—7 mm; mesocarp fleshy, 1—2 mm thick; stone cylindrical to spindle-shaped, rather smooth; endocarp woody, *c.* 1 mm thick. *Seed* 1, large, filling the whole stone, ± spindle-shaped; embryo straight, cotyledons finally *c.* 2 mm.

AUSTRALIA. N. Queensland. Cook District: *Brass 2050* (type); *L. S. Smith 3974*, Mossman River; *Brass 20003, 20043, 20050*, Cape York Peninsula, Mt. Finnegan, alt. 800—900 m; *Brass & White 261*, Daintree River; *L. S. Smith 11120, 11212, 14410*; *E. Volck AFO 2730*, Gap Creek, 24 miles S. of Cooktown, alt. 300 m; *C. T. White 10641*, Mt. Spurgeon; *E. Hyland AFO 2753*, Malanda.

35. **Symplocos cylindracea** Noot., *sp. nov.*

Type: *NGF 9916 Millar* (L, isotypes in BO, K, LAE), New Guinea, Morobe Distr., Markham road near Omosis.

Ramuli glabri gemmis apicalibus pubescentibus. Folia glabra costa minute pilosa elliptica 9—15 cm longa 3,5—9,5 cm lata, base acuta ad rotundata apice acuminato acumine 3—20 mm longo, nervis 6—9 paribus convenientibus in venam intramarginalem, petiolo 7—20 mm longo. Inflorescentia racemosa composita ad 8 cm longa axe parce vel dense minute vel breviter pilosa bracteis bracteolisque caducis pedicello $\frac{1}{2}$—3 mm longo. Calyx tubo glabro vel pubescente 1—1$\frac{1}{2}$ mm alto lobis glabris vel parce minute pilosis 2—3$\frac{1}{2}$ mm longis. Corolla 5—6 mm longa. Stamina ultra 100. Discus 5-glandulatus pilosus. Stylus pilosis. Fructus cylindricus 15 mm longus 5—6 mm latus endocarpio 1—3-cellulato. Semen rectum embryone recto.

Tree 10—30 m. Twigs glabrous, or pubescent in innovations; terminal buds pubescent. *Leaves* glabrous or midrib (and nerves) minutely hairy, ± elliptic, 9—15 by 3$\frac{1}{2}$—9$\frac{1}{2}$ cm, index 1.6—2.6; base acute to rounded, attenuate, base angle 40°—90°; apex acuminate, acumen 3—20 mm; margin crenate or crenulate. *Nerves* 6—9 pairs, curved upwards and meeting in an intramarginal vein; reticulations prominent beneath, coarse or fine. *Petiole* 7—20 mm. *Inflorescence* a panicle to 8 cm, axis minutely or shortly pilose. Bracts and bracteoles caducous, minutely hairy or glabrous, ciliate, ovate, *c.* 3 and *c.* 2 mm long respectively. Pedicel $\frac{1}{2}$—3 mm, sometimes seemingly much longer when only one flower is left on a small branch. *Calyx tube* glabrous or pubescent, 1—1$\frac{1}{2}$ mm high; limb 2—3$\frac{1}{2}$ mm, nearly wholly 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, except the glands pilose. *Style* (minutely) pilose, 2—4 mm.

Fruits cylindrical 15 by 5—6 mm, mesocarp fleshy, the stone with low lengthwise ridges, 3-celled, 1, 2 or all 3 cells developed. *Seeds* 1 in each fertile cell, straight with straight embryo.

NEW GUINEA. West New Guinea: *bb 22503*, Taniba. – North New Guinea: *Brass & Versteegh 13156*, Idenburg River, Bernhard camp, alt. 800 m. – Morobe District: *NGF 10191, 35838, 99116*, Omosis, near Lae, alt. 60–450 m. – Central Division: *Womersley & van Royen 5852*, Sogeri Subdistrict. – New Britain: *NGF 36785*, 4°52′ S, 151°43′ E.

36. Symplocos deflexa Stapf

S. 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. – Type: *Haviland 1105* (K, isotype in SING), N. Borneo, Mt. Kinabalu, 8800 ft.

Treelet, *c.* 5 m, 8 cm ϕ. Twigs densely obliquely patently brown-hairy, ± zigzag. Terminal buds densely appressed-pilose. *Leaves* alternate, elliptic, glabrous above, statu sicco rather light coloured (yellow-green) beneath, darker (brownish) above, rather densely pilose beneath especially towards the recurved to revolute sharply glandular dentate margin, 3—5 by 1½—2½ cm, index 1.8—2.5; base rounded or sharply attenuate, base angle 60°—90°; apex acuminate, obtuse or acute (acumen 3—9 mm). *Nerves* 5—7 pairs, at an angle of 60°—70°, gradually arching upwards, merging into the reticulation (or rarely an intramarginal vein visible); secondary veins prominent, often ± transverse to the nerves; tertiary veins visible. *Petiole* 1—2 mm, densely patently brown-hairy. *Inflorescence* an up to 6-flowered, 1—4 cm long, lax raceme, appressedly to patently brown-pilose in all parts except the corolla (hairs *c.* ¾ mm long). Bracts *c.* 5 by 3 mm, bracteoles *c.* 3 by 1½ mm, both boat-shaped. Pedicel 2—4 mm. *Calyx tube* 1½—2 mm high, lobes obtuse and semi-elliptic to acute and triangular, *c.* 1½ mm long. *Petals* 5—7, white, glabrous or the outer ones minutely appressedly hairy, 4—6 mm long, connate only at the very base. *Stamens* 60—90, in 5—6 distinct bundles, connate for 1 mm and adnate to corolla for *c.* ½ mm. *Disk* low, ± 5-glandular, sparsely long-pilose. *Style c.* 5 mm, gradually thickened towards the base, lower half sparsely long-pilose (hairs ½—1 mm); stigma small, hardly wider than the style. *Fruits* ovoid, often curved, including the 1½—2 mm long, pilose, erect calyx lobes *c.* 10 by 5 mm; stone *c.* 8 by 4 mm, with shallow grooves and large apical pore; endocarp thick, mesocarp thin, fleshy. *Seed* straight; embryo straight, endosperm very hard.

BORNEO. Sabah: 8 collections, all near the Paka Cave on Mt. Kinabalu, alt. *c.* 3200 m.

37. Symplocos disepala Guillaumin — Pl. 11.

S. disepala Guillaumin, Bull. Soc. Bot. Fr. 69 (1932) 171; Fl. Gén. I.-C. 3 (1933) 1025. – Type: *Poilane 10563* (P). Annam, massif de Dong Che, Prov. Quang Tri (Guillaumin erroneously cited *Poilane 10503*).

Tree, 12 m, 70 cm ϕ. Twigs stout, glabrous, but sparsely long villous towards the base of the shoots; older twigs marked with prominent rounded raised scars. Terminal buds with leathery glabrous outer scales and pubescent inner scales. *Leaves* glabrous, narrowly elliptic-obovate, 10—20 by 4—5 cm, index 3—4; base cuneate, base angle 30°—40°; apex acute, acumen 0—2 mm; margin distinctly dentate. *Midrib* beneath much prominent, glabrous or sparsely long hairy (hairs to 2 mm long); nerves 11—15 pairs, much prominent, curved upwards and joined into an intramarginal vein *c.* 2 mm from the margin which often is hardly distinct; reticulation fine, prominent beneath. *Petiole* stout, 8—17 mm. *Inflorescence* axillary, cone-like in bud, becoming cylindrical and at last a *c.* 4 cm long raceme; axis glabrous, but sparsely long soft-hairy towards the base. Bracts appressedly pubescent-sericeous, caducous when the flower matures, *c.* 10 by 8 mm, but smaller towards the top of the inflorescence; bracteoles falling after the bracts, glabrous, ciliate, *c.* 3 by 2 mm. Pedicel glabrous *c.* 1 mm. *Calyx tube* glabrous, 1½—2 mm; limb 4—5 mm long, appressedly pubescent towards the apex, symmetrically cleft into 2 large lobes, the original lobes not distinct. *Corolla* 7 mm. *Stamens* more than 100, up to 8 mm. *Disk* glabrous, 5-glandular. *Style* glabrous, *c.* 6 mm, with small peltate stigma. *Fruits* ellipsoidal-cylindrical, 30—40 by *c.* 10 mm; mesocarp hard, corky, *c.* 2 mm thick. Stone woody, smooth (no ridges!), 3-celled, with a central canal. *Seeds* 3, straight, with straight embryo.

INDO-CHINA. Annam: only the type.

38. Symplocos dolichotricha Merr.

S. dolichotricha Merr. Lingn. Sc. J. 7 (1931) 320; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 32. – Type: *Tsiang Ying 1196* (*non vidi*), Kwangtung, Loting, Tseh quan ou.

S. indochinensis Li, J. Arn. Arb. 24 (1943) 371. – Type: *W. T. Tsang 26902* (E, K), Tonkin, Pac-si, NE. of Mon-cay.

S. kwangtungensis Li, J. Arn. Arb. 25 (1944) 424. – Type: *H. Y. Liang 69487* (A), Kwangtung, Na Leung River, Sup Man Ta Shan.

Treelet. Young twigs covered by a patent mixed indument of short hairs and slender, to 2½ or 3 mm long hairs; terminal buds with appressedly long hairy scales; growth discontinuous. *Leaves* sparsely long pilose, often soon glabrescent above, densely patently soft hairy beneath, the hairs bulbous-based, (narrowly) elliptic, 6—15½ by 2½—5½ cm, index 2.5—3.4; base acute to cordate, base angle 40°—120°; apex acuminate, acumen 5—12 mm; margin minutely denticulate or entire. *Nerves* 6—8 pairs, curved upwards, the apical one meeting in an intramarginal vein; secondary veins forming a coarse reticulation, the lesser veins forming a very fine, faintly prominent reticulation which is clearly visible with translucent light. *Petiole* 4—7 mm. *Inflorescence* a fascicle, from the axils of the leaves or from young wood. Bracts and bracteoles persistent, densely to sparsely appressedly-pubescent, 1—2 mm long. *Calyx tube* glabrous, 1—2 mm high, the limb divided into 1—1½ mm long, glabrous to sparsely appressedly pubescent

lobes. *Corolla c.* 3 mm. *Stamens* 25—35. *Disk* flat or annular, pilose, with 5 epipetalous glands. *Style* glabrous, but with hairy conical base, *c.* 4 mm long. *Fruits* globose, *c.* 5 by 5 mm, with very thin mesocarp, stone smooth. *Seed* 1, curved with curved embryo; endosperm with much fatty oil.

INDO-CHINA. Tonkin: 7 collections.
CHINA. Kwangsi: *Sin c.s. 354, 1627, 8005*, Yao Shan; *C. Wang 39949.* – Kwangtung: *H. Y. Liang 69487*; *Sin 5091*, Win Foo; *W. T. Tsang 26564.*

39. Symplocos dryophila Clarke — Pl. 12.

S. dryophila Clarke, Fl. Br. Ind. 3 (1882) 578; Brand, Pfl. R. Heft 6 (1901) 42; Brandis, Indian Trees (1906) 439; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 21. – Type: *Herb. Ind. Or. H.f. & T. 53* (K, isotypes in BM, GH, L, P, W).
S. siamensis Brand, Pfl. R. Heft 6 (1901) 57; Fletcher, Fl. Siam. En. 2 (1938) 389. – Type: *Smiles s.n.* (K), N. Thailand, top of Pu Sai Lai Seng, 10-4-1893.
S. delavayi Brand, Fedde Repert. 3 (1906) 217. – Type: *Delavay* 4407 (P), Yunnan.
S. longipetiolata Rehder, in Sargent Pl. Wilson. 2 (1916) 599. – Type: *Henry 10874* (K, isotype in A, NY), Yunnan.
S. forrestii W. W. Smith, Notes Bot. Gard. Edinb. 13 (1921) 185. – Lectotype: *G. Forrest 15653* (E, isotypes in K, P), Yunnan.

Shrub, or small tree to 12 m. Twigs glabrous, except the base of the young shoots which is pubescent between the scars of the bud-scales, mostly rather thick. Terminal buds often large, more than 1 cm, with coriaceous, glabrous outer scales and densely appressedly pubescent to sericeous inner scales; the latter enlarging when the bud opens; growth discontinuous. *Leaves* (narrowly) obovate to elliptic, (6—)9—23 by (2½—) 3—5(—6) cm, index 2.2—4.3, glabrous, coriaceous; base cuneate, attenuate, base angle 20°—45°; apex (abruptly) acuminate, acumen 5—18 mm, tip acute; margin recurved, entire or glandular denticulate. *Nerves* (7—)9—18 pairs, (faintly) prominent, intramarginal vein (faintly) distinct or not; reticulations coarse, more or less prominent. *Petiole* often stout, 10—20(—25) mm. *Inflorescence* forming a globose cone in bud, the base surrounded by several glabrous, coriaceous scales. Raceme up to 10(—15) cm; axis sparsely soft hairy to densely (appressedly) sericeous. Bracts appressedly pubescent to sericeous, boat-shaped, elliptic, 5—9 by 3—7 mm; bracteoles (obliquely) elliptic to linear, pubescent, *c.* 3 by 1 mm; both soon caducous. Pedicel with same indument as axis, becoming 2—10 mm. *Calyx tube* glabrous, 1—2 mm; lobes glabrous or rarely sericeous towards the apex, triangular (to semi-elliptic), 1—1½ mm. Corolla 5—6(—10) mm. *Stamens* 40—75, becoming *c.* 2 mm longer than the corolla. *Disk* inconspicuous, annular or pulvinate, the conical style base minutely soft hairy to densely sericeous. *Style* glabrous, 3—9 mm, with small, punctate stigma. *Fruit* ellipsoid, rarely nearly globose, 5—12 by 3—7 mm; mesocarp fleshy, *c.* 1 mm thick; stone smooth, woody, nearly cylindrical. *Seed* 1, from nearly straight to curved; embryo similar.

Distribution. India, Burma, Thailand, Indo-China, and China.

INDIA. Darjeeling: 10 collections. – E. Nepal: *Hara c.s. 6303843*, alt. 2600 m. – Sikkim: *Gamble 8438*; *Herb. Ind. Or. H.f. & T. 53.* – Bhutan: *c.* 5 collections, alt. 2100–2700 m. – Assam: *c.* 5 collections, alt. 1600–3000 m.

BURMA, North (Myitkyina, Kachin State, Northern triangle): *c.* 15 collections, alt. 2100–2700 m.

THAILAND (North). *H. H. Smiles s.n.*, Pu sai; *Flora of Thailand 36315*; *Kerr 5315*, Doi Inthanon, 2400–2500 m.

INDO-CHINA. Tonkin: *Pételot 7965*, *8042*; *Poilane 17197*, Chapa, massif de Phan tsi pan.

CHINA. SE. Tibet: *Ludlow c.s. 1232* Shakti, alt. 2100 m; *J. F. Rock 10246*, Champutong region; *22116*, Tsarung Prov., alt. 3300 m; *22118*, *id.*, alt. 3000 m. – Yunnan: *c.* 15 collections, alt. 1850–3200 m.

Note. S. dryophila is narrowly allied to *S. sumuntia* (p. 284). Probably there is much hybridisation, resulting in hybrid swarms which make determination difficult. In *S. dryophila* the bracts are so long as to conceal the flower buds, while in *S. sumuntia* at least the apical buds are visible. But in most material there are no buds. The difficulties only arise in small-leaved forms with few nerves. I regard the indument of the disk as decisive.

40. Symplocos euryoides Hand.-Mazz.

S. euryoides Hand. – Mazz. Beih. Bot. Centralbl. 62-B (1943) 27. – Type: *Wang 35908* (A, NY, W), Hainan.

S. permicophylla Merr. & Chun *ex* Li, J. Arn. Arb. 25 (1944) 211. – Type: *F. C. How* 72972 (BISH, BM, BO, P, S, SING), Hainan, Poting.

Shrub with densely appressedly red-brown pubescent twigs and (small) terminal buds. *Leaves* glabrous (rarely hairy towards the base), ± elliptic, 1.8—3 by 0.6—1 cm, index 2.2—3.5; base acute, base angle *c.* 40°; apex acute to faintly acuminate, acumen 0—6 mm; margin sharply dentate. *Nerves* and reticulations obscure, but in translucent light *c.* 5 pairs of nerves visible, meeting in a looped intramarginal vein, and also a fine reticulation. *Petiole* slender, with 2 rows of dentate glands, 3—5 mm. *Flowers* solitary from the axils of the leaves, on a 1—3 mm long pedicel; pedicel, the several *c.* 1 mm long bracts and the calyx minutely (pulverulent) villous. *Calyx tube c.* 1 mm high; the limb nearly wholly divided into *c.* 2 mm long narrowly ovate to semi-elliptic acute lobes. *Corolla* 3—4 mm. *Stamens* 25—50. *Disk* glabrous, cylindrical, *c.* ½ mm high. *Style* 2—3½ mm, glabrous. *Young fruits* oblong, *c.* 6 by 2 mm.

CHINA. Hainan: *F. C. How 72900*, *72972*; *Wang 35908*, alt. 700–900 m.

41. Symplocos fasciculata Zoll. — Pl. 13.

S. fasciculata Zoll. Syst. Verz. (1854) 136; Nat. Tijd. Ned. Ind. 14 (1857) 161; Miq. Fl. Ind. Bat. 1, 2 (1859) 467; Suppl. 1 (1861) 474; Clarke, Fl. Br. Ind. 3 (1882) 574; K. & V. Bijdr. 7 (1900) 150; Brand, Pfl. R. Heft 6 (1901) 34; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 235; Koord. Atlas 2 (1914) t. 383; Ridl. Fl. Mal. Pen. 2 (1923) 301; Heyne, Nutt. Pl. (1927) 1262;

Merr. Univ. Cal. Publ. Bot. 15 (1929) 248; Burkill, Dict. (1935) 2113; Corner, Wayside Trees (1940) 622, t. 231; Backer & Bakh. *f.* Fl. Java 2 (1965) 205. – *Dicalyx tinctorius* Blume, Bijdr. (1826) 1116, *non S. tinctoria* L'Hérit. (1791). – *Eugeniodes fasciculatum* O.K. Rev. Gen. Pl. 2 (1891) 409. – *S. fasciculata* var. *genuina* K. & V. Bijdr. 7 (1900) 151. – Lectotype: *Blume 2154* (L), Java.
Sariava Reinwardt, Syll. Ratisb. 2 (1825) 12. – Type: *Reinwardt s.n.* (L, isotype in W), Java.
S. fasciculata var. *minor* Miq. Fl. Ind. Bat. Suppl. 1 (1861) 475. – Type: *Horsfield 38* (BM), Banka.
S. fasciculata var. *blumeana* K. & V. Bijdr. 7 (1900) 151. – Type: *Blume s.n.* (L, isotype in BO), Java.
S. phanerophlebia Merr. Philip. J. Sc. 9 (1914) Bot. 382; J. Str. Br. R. As. Soc. 76 (1917) 112; En. Philip. 3 (1923) 301. – Type: *Wenzel 552* (BM, G, S), Philippines, Leyte.

A shrub or less often a tree to 22 m high and 50 cm ϕ. Twigs sparsely pilose, puberulous, or appressedly pubescent, glabrescent, often zigzag. *Leaves* glabrous above, (sparsely) appressedly fine-hairy beneath, rarely patently hirsute, especially on midrib and nerves and towards the margin, (narrowly) elliptic (or ovate), alternately or spirally arranged, often on the same shrub, depending on the position of the twig, 5—13(—18) by 2—4½(—6) cm, index 2—3, base acute to rounded, base angle 40°—140°; apex acuminate to caudate, acumen 5—20 mm, blunt or acute, sometimes apiculate. *Nerves* (4—)6—8(—11) pairs, curved upwards and meeting in an intramarginal vein, sometimes also a less conspicuous intramarginal vein originating from the lowermost nerve; secondary veins at the undersurface usually faintly visible, tertiary veins often obscure, reticulation coarse. *Petiole* 2—8 mm. *Inflorescence* a true fascicle of (sometimes branched) racemes, up to 2½ cm long; often several bracteoles under each flower, indicating the origin from a more branched inflorescence. Bracts and bracteoles persistent, minute, at most 1 mm, rarely up to 3 mm long, with the axis and the 1—5 mm long pedicel (appressedly) pubescent. *Calyx tube c.* 1 mm high, appressedly hairy, the limb divided into (4—)5(—6) lobes, usually *c.* 1 mm long, sometimes different in size, broadly ovoid, rounded, appressedly pubescent or glabrous, often some of the lobes petaloid. *Corolla* glabrous or more often with minute hairs at the very base, rarely with some hairs on the back of the lobes too, 2—4½ mm long. *Stamens* 12—35, the longest slightly exceeding the corolla. *Disk* glabrous to more or less pilose, low-annular, often 5(—10)-lobed. *Style* hairy, predominantly towards the suddenly (or rarely gradually) thickened base, rarely minutely hairy or glabrous, 2—3½ mm long; stigma peltate, 3-lobed (or punctate). *Ovary* 3-celled; 4 ovules in each cell. *Fruits* broadly or narrowly ampulliform, often curved, the belly globose or ovoid, the neck perforate, ± broadly conical with broad apex, crowned by the persistent calyx lobes (the latter often lacking in herbarium material), 5—7 by 3—5 mm; mesocarp thin; stone hard, brain-like grooved without, or with *c.* 10 shallow grooves, furnished with 3—6 strong ribs within, enclosing a much lobed seed; neck of stone usually ± cylindrical. *Seed* 1, with thin testa and fleshy endosperm; embryo slightly curved, 1½—3 mm long; endosperm rich in starch.

Distribution. Peninsular Thailand and Malesia except: Lesser Sunda Islands, Moluccas, and New Guinea.

THAILAND. Pattani: *Sangkhachand & Nimanong 1357.*

SUMATRA. Simalur I.: 7 collections. – Eastcoast: *c.* 20 collections, alt. 500–1800 m. – Mentawi Is.: *Boden Kloss 14639*, Pagai. – Westcoast: 7 collections, alt. 900–2000 m. – Palembang: 6 collections, low alt. – Banka: 5 collections. – Billiton: *bb 7266*, Tandjong Pandan, alt. 30 m.

MALAY PENINSULA. Trengganu: *Corner s.n.*, Pohun Padi Kuala Brang; *SF 40466*. – Perak: 15 collections, alt. 90–1500 m. – Selangor: *c.* 10 collections. – Pahang: *Kep. FRI 8595*, S. Belau; *Mohd. Shah 1314*. – Malacca: *Holmberg 779*, Sg. Udang; *867*, Busu; *Maingay 958*, *1935*. – Singapore: 12 collections.

JAVA. West Java: many collections, Bantam, Batavia, Bogor, Preanger, alt. 50–2200 m. – Central Java: 16 collections, Pekalongan, Banjumas, Semarang, alt. 400–1750 m.

BORNEO. Sarawak: *c.* 20 collections, Baram, Kapit, Bintulu, Kuching, alt. low up to 1100 m. – Sabah: many collections. – Kalimantan: *c.* 25 collections.

PHILIPPINES. Luzon: *BS 20501*, San Antonio, Laguna Prov.; *FB 26795*, Laguna Prov., alt. 300 m. – Panay: *BS 30926*, *30932*, Capiz Prov. – Leyte: *Wenzel 552*, *763*.

CELEBES. Menado: *Eyma 4069*, Poso, Pape. – Central Celebes: *Kjellberg 2284*, Timampu, Towuti-Lake. – SW. Celebes: *Kjellberg 1789*, *1928*, Todjambu, alt. 800–900 m; *Teysmann 12619*, Tjamba.

Note. The vernacular names in Malaya (*menasi*, *nasi-nasi*) refer to the often white fruit, resembling grains of cooked rice. The species is sometimes mistaken for *Eurya acuminata*, which often has the same vernacular names (Corner). Vesque mistook it in this way (Bull. Soc. Bot. Fr. 42, 1895, 153). The fruits are of the type that usually contain a curved seed with curved embryo. For that reason often erroneously a curved embryo is recorded in literature.

42. **Symplocos filipes** Noot., *sp. nov.* — **Pl. 14a-d.**

Type: *BS 40610* (L, isotypes in BM, BO, K, MEL, P, US, W). Mindoro, Mt. Halcon.

Ramuli glabri vel parce pulverulento-puberuli gemmis apicalibus parvis pulverulento-puberulis. Folia glabra vel infra parce pulverulento-puberula elliptica $4\frac{1}{2}-7\frac{1}{2}$ cm longa 2–3 cm lata indice 2–3, base acuta apice longa acuminato acumine 12–20 mm longo margine glandibus vesiculosis instructo nervis 5–6 paribus in venam intramarginalem convenientibus, petiolo 7–8 mm longo. Inflorescentia laxe racemosa 4–10 cm longa axe parce pulverulento-puberula bracteis bracteolisque eodem indumento persistentibus $\frac{1}{2}$ atque 1 mm longis pedicellis gracilibus 2–15 mm longis. Calyx parce pulverulento-puberulus tubo $1\frac{1}{2}$ mm alto lobis semi-ellipticis rotundatis $\frac{1}{2}$ mm longis. Corolla 3 mm longa. Stamina c. 25. Discus annulatus glaber. Fructus ellipsoideus 10 mm longus 5 mm latus endocarpio 1-cellulat. Semen 1, rectum, embryone recto.

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, $4\frac{1}{2}$—$7\frac{1}{2}$ by 2—3 cm, index 2—3; base acute, often attenuate, base angle 40°—60°; apex long acuminate, acumen 12—20 mm; margin entire or slightly denticulate, in the margin a row of large vesicular glands. *Nerves* 5—6 pairs, faintly prominent, curved upwards and meeting in a looped intramarginal vein; reticulation rather coarse, hardly prominent, but with translucent light a very fine reticulation visible. *Petiole* 7—8 mm. *Inflorescence* a lax raceme of 4—10 cm; axis sparsely pulverulent puberulous (nearly glabrous). Bracts and bracteoles with same indument, persistent, with large vesicular glands on the

margin, ½ and 1 mm long respectively. Pedicel slender, 2—15 mm. Calyx sparsely pulverulent puberulous; tube 1½ mm high, lobes semi-elliptic, rounded, ½ mm long. *Corolla* c. 3 mm. *Stamens* c. 25. *Disk* annular, glabrous. *Style* glabrous, c. 3 mm. *Fruits* ellipsoid, c. 10 by 4 mm, the small calyx lobes incurved; mesocarp thin, fleshy; stone spindle-shaped, with shallow lengthwise grooves, 1-celled. *Seed* 1, straight with straight embryo.

PHILIPPINES. Mindoro, Mt. Halcon: *BS 40610*; *Merrill 6148*.

43. Symplocos foliosa Wight

S. foliosa Wight, Icones 4 (1848) 1234; Clarke, Fl. Br. Ind. 3 (1882) 582; Brand, Pfl. R Heft 6 (1901) 58; Brandis, Indian Trees (1906) 439; Gamble, Fl. Pres. Madras 5 (1923) 783. – *S. nervosa* (*non* DC.) Wight, Icones 4 (1848) 1235; Beddome, For. Man. (1872) 149. – *Lodhra foliosa* Miers, J. Linn. Soc. Bot. 17 (1879) 300. – Type: *Wight s.n.* (K, Kew Distr. 1695; L, P), India, Neilgherries, Pycarrah.

Twigs glabrous or the youngest (appressedly) hairy; terminal buds large, with many appressedly pubescent to sericeous scales, the outer scales often glabrous; growth discontinuous. *Leaves* glabrous but midrib beneath sparsely long hairy, ± elliptic, 5.5—15 by 2.2—4.2 cm, index 2—4; base cuneate to rounded, base angle 20°—80°; apex acute or rounded to acuminate, acumen 0—15 mm; margin crenate. *Nerves* 7—13(—15) pairs, much prominent beneath, curved upwards and meeting in a looped intramarginal vein; secondary veins transverse to nerves, much prominent; tertiary and quaternary veins forming a rather fine reticulation between them. *Petiole* slender, glabrous or with some hairs, 5—18 mm. *Inflorescence* forming a short cone in bud resembling the terminal buds, growing out to a spike of at most 5 cm (but longer in fruit); axis densely pubescent, glabrescent. Bracts caducous when the flower matures, appressedly sericeous, semi-elliptic to ovate, boat-shaped, the lowermost often glabrous 6—12 mm long; bracteoles caducous after the bracts, with same indument or glabrous, 2—5 mm long. Pedicel absent or very short. *Calyx tube* glabrous, 1—2 mm high; limb wholly divided into the semi-orbicular to semi-elliptic glabrous to sparsely appressedly hairy 1½—2 mm long lobes. *Corolla* 5—7 mm. *Stamens* 60—90. *Disk* obviously 5-glandular, glabrous or with some hairs. *Style* glabrous, but the conical base glabrous to hairy, 4—6 mm. *Fruits* ± elliptic, truncate at both ends, 12—15 by c. 7 mm; mesocarp rather hard; stone smooth. *Seed* 1, straight with straight embryo.

INDIA. Madras, Nilgiris: 14 collections, alt. 2100–2250 m. – Pulney Hills: 6 collections, alt. 1500 m (one record).

44. Symplocos fordii Hance — Pl. 14e.

S. fordii Hance, J. Bot. 20 (1882) 78; Brand, Pfl. R. Heft 6 (1901) 66; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 32. – Lectotype: *Ford s.n.*, Nov. 1881 (*Herb. Hance 21799*) (BM, isotypes in GH, K), Hong Kong, Victoria Peak.

S. cordatifolia Li, J. Arn. Arb. 25 (1944) 424. – Type: *W. T. Tsang 26027* (A), Kwangtung, Lin Fa Shan, Hwei-Yang Distr.

Shrub; twigs patently (long) soft hairy, soon becoming dark brown. Terminal buds small, long soft hairy. *Leaves* alternate, ovate, $3\frac{1}{2}$—7 by $1\frac{1}{2}$—3.2 cm, index 1.7—2.3; sparsely soft-hairy beneath; base cordate, base angle *c.* 110°; acumen 6—15 mm, tip acute; margin glandular denticulate. *Midrib* patently soft hairy beneath; nerves 6—11 pairs, faintly prominent, meeting in a looped intramarginal vein, which runs as near as 1—2 mm from the margin; reticulations very finely prominent beneath. *Petiole* 2—3 mm, patently long soft hairy. *Inflorescence* an axillary spikelet of *c.* 1 cm; peduncle *c.* $\frac{1}{2}$ cm; axis and peduncle sparsely fine-hairy. Bracts 1 mm, bracteoles $1\frac{1}{2}$ mm, both nearly orbicular, sparsely fine-hairy to glabrous, quite thin, nearly membranaceous. *Calyx* glabrous, tube 1 mm, lobes 3, semi-elliptic, rounded, $1\frac{1}{4}$—$1\frac{1}{2}$ mm. *Corolla* 3-lobed, *c.* 5 mm. *Stamens* 15—30. *Disk* annular, glabrous. *Style* glabrous, *c.* 7 mm, with small peltate stigma. *Fruits* (according to Hance) ovoid, glabrous, crowned by the calyx lobes.

CHINA. Kwangtung: *W. T. Tsang 26027.* – Hongkong: *Ford s.n.*, Victoria Peak.

45. **Symplocos gambliana** Brand

S. gambliana Brand, Bull. Herb. Boiss. II, 6 (1906) 748; Merr. En. Born. (1921) 484. – *S. havilandii* King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 251, *non* Brand (1901). – Type: *Haviland 1954* (BM, BO, K), Sarawak, near Kuching, Garaman.

Twigs glabrous; terminal buds small, glabrous. *Leaves* glabrous, ± elliptic, 6—9 by 3—$4\frac{1}{2}$ cm, index 2—2.3; base acute, attenuate, base angle 40°—60°; apex abruptly oblique acuminate, acumen 5—10 mm; margin entire, recurved. *Nerves* 6—8 pairs, faintly prominent beneath, curved upwards and meeting in an also faintly prominent intramarginal vein; reticulations coarse, nearly obscure beneath. *Petiole* 5—10 mm. *Inflorescence* a (basally branched) lax spike or raceme to 6 cm; axis glabrous. Bracts and bracteoles ?minute, soon caducous. Pedicel less than 1 mm long. *Calyx* glabrous; tube *c.* 1 mm high, limb wholly divided into semi-orbicular, ciliate, $\frac{3}{4}$—$1\frac{1}{4}$ 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. *Style* glabrous, 4 mm. *Fruits* not known.

BORNEO. Sarawak: only the type.

46. **Symplocos gigantifolia** Noot., *sp. nov.*

Type: *Brass 3894* (L, isotype in BO), New Guinea, Central Division, Dieni, Ononge road, alt. 500 m.

Ramuli glabri valde crassi gemmis apicalibus grandis pubescentibus. Folia glabra obovata 21–62 cm longa 7–19 cm lata indice 2,8–3,1 basi cuneata ultimo truncata apice acuminato acumine 5–10 mm longo nervis 13–20 paribus reticulo denso, petiolo c. 1 cm longo. Inflorescentia fasciculata vel breviter spicata bracteis bracteolisque persistentibus pubescentibus semi-ellipticis 1–2 mm longis. Calyx minute appresse pubescens tubo c. 1 mm alto limbo c. 2 mm longo lobis 3 semi-ellipticis rotundatis $1\frac{1}{2}$ mm longis. Corolla 4–5 mm longa. Stamina c. 50 ad 10 mm longa. Discus glaber 5-glandulatus. Stylus glaber sed base pilosa reductus (tantum flores masculos vidi).

Twigs glabrous, very thick (at least 8 mm); terminal buds large, pubescent. *Leaves* glabrous, obovate, 21—62 by 7—19 cm, index 2.8—3.1; base cuneate, but the very base truncate, base angle 20°—30°; apex shortly acuminate, acumen 5—10 mm; margin ± entire. *Nerves* 13—20 pairs, curved upwards and merging into the venation; reticulations rather fine, with translucent light very fine. *Petiole c.* 1 cm. *Inflorescence* a fascicle or very short spike on wood. Bracts and bracteoles persistent, appressedly pubescent, semi-elliptic, rounded, 1—2 mm. *Calyx* minutely appressedly pubescent, the tube *c.* 1 mm high, limb 2 mm, the 3 semi-elliptic rounded lobes *c.* $1\frac{1}{2}$ mm long. *Corolla* 4—5 mm. *Stamens c.* 50, to 10 mm. *Disk* 5-glandular, glabrous, but style base pilose. *Style* glabrous, reduced (only ♂ flowers seen). *Fruits* very young. *Seeds* not seen.

NEW GUINEA. Central Division: *Brass 3894*, Dieni, Ononge road, alt. 500 m. – Southern Highlands: *Schodde 2377*, near Moro, Lake Kutubu, alt. 800 m. – Western District: *NGF 31962*, 5°38′ S, 141°00′ E, alt. 90 m.

47. Symplocos glabriramifera Noot., *sp. nov.* — Pl. 15a-d.

Type: *Merrill 8005* (L, isotypes in BM, K, P, US), Luzon, Benguet Subprovince.

Ramuli glabri gemmis apicalibus glabris. Folia glabra elliptica ad obovata 4–6,5 cm longo 1,5–2,5 cm lata, indice 2,3–3,5 base acuta apice acuminata acumine 2–10 mm longo, nervis 6–8 paribus in venam intramarginalem convenientibus petiolo 5–7 mm longo Inflorescentia laxe racemosa ad $1\frac{1}{2}$ cm longa axe glabra bracteis bracteolisque caducis $1\frac{1}{2}$ atque 1 mm longis pedicellis 1–2 mm longis. Calyx glaber tubo 1 mm alto limbo 1,5 mm longo lobis tres semi-ellipticis apice rotundo $1\frac{1}{4}$ mm longis. Corolla 3–4 mm longa. Stamina 30–50. Discus glaber, 3–5 glandulatus. Fructus ellipsoideus, truncatus 8–12 mm longus 4–6 mm latus endocarpio crasso lignoso 3-cellulari. Semen rectum embryone recto.

Twigs glabrous; terminal buds small, glabrous. *Leaves* glabrous, elliptic to obovate, 4—$6\frac{1}{2}$ by $1\frac{1}{2}$—$2\frac{1}{2}$ cm, index 2.3—3.5; base acute, attenuate, base angle 20°—40°; apex (faintly) acuminate, acumen 2—10 mm; margin crenate or crenulate. *Nerves* 6—8 pairs, meeting in an intramarginal vein; reticulations rather coarse, and then a very fine reticulation visible with translucent light, or very fine, prominent. *Petiole* 5—7 mm. *Inflorescence* a short, lax raceme to $1\frac{1}{2}$ cm; axis glabrous. Bracts and bracteoles caducous, glabrous, ciliolate. $1\frac{1}{2}$ and 1 mm long respectively. Pedicel 1—2 mm. *Calyx* glabrous; tube *c.* 1 mm high, limb *c.* $1\frac{1}{2}$ mm long, lobes 3, semi-elliptic, rounded, *c.* $1\frac{1}{4}$ mm long. *Corolla* probably 3-merous, 3—4 mm. *Stamens* 30—50. *Disk* glabrous, 3—5-glandular. *Style* glabrous, *c.* 2 mm. *Fruits* ellipsoid, truncate at both ends, 8—12 by 4—6 mm; mesocarp thin, fleshy; exocarp woody, thick, shallowly length-wise grooved without, 3-celled. *Seed* 1 in each cell, straight, with straight embryo.

PHILIPPINES. Luzon: 8 collections, Benguet Subprov., Mt. Pulog, Mt. S. Tomas and Pinauisan, alt. 1900 m (once recorded) and Prov. Nueva Vizcaya, Mt. Alzapan.

48. Symplocos glauca (Thunb.) Koidz. — Pl. 15e-h.

S. glauca (Thunb.) Koidz. Bot. Mag. Tokyo 39 (1925) 313; Mori, Sylvia 5 (1934) 229; Kanehira,

Form. Trees (ed. 1936) 587, t. 544; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 31; Li, Taiwania 1 (1950) 313; Walker, Imp. Trees Ryu Kyu Is. (1954) 262; Ohwi, Fl. Jap. (1965) 726. – *Laurus glauca* Thumb. Fl. Jap. (1784) 173. – *Litsea glauca* Sieb. Verh. Bat. Gen. K. & W. 12 (1830) 24; S & Z. Fam. Nat. (1845) 207. – *Myrsine thunbergii* Tanaka, Bull. Sc. Fak. Terk. Kyushu Univ. 1 (1925) 208. – *Bobua glauca* Nakai, Trees & Shrubs Indig. Jap. Prop. ed. 2, 1 (1927) 322, t. 151; Masamune, Mem. Fac. Sc. & Agr. Taihoku Imp. Univ. 11, Bot. (1934) 364. – *S. stellaris* (non Brand) Merr. & Chun, Sunyatsenia 5 (1940) 166. – *Dicalyx glauca* Hara, En. Sperm. Jap. 1 (1948) 104. – Type: *Thunberg* (UPS), Japan.

S. neriifolia S. & Z. Fam. Nat. (Abh. Akad. Münch. IV, 3) (1846) 134; Franch. & Savat. En. Pl. Jap. (1875) 308; Brand, Pfl. R. Heft 6 (1901) 69; Kanehira, Form. Trees (1917) 358, t.; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 282; Fl. Gén. I.-C. 3 (1933) 1011, t. 115, f. 5 & 6. – *Bobua neriifolia* Miers, J. Linn. Soc. Bot. 17 (1879) 306. – *Eugeniodes neriifolium* O.K. Rev. Gen. Pl. 2 (1891) 975. – Type: *von Siebold s.n.* (L), Japan.

S. tashiroi Matsumura, Bot. Mag. Tokyo 15 (1901) 77. – *S. glauca* var. *tashiroi* Walker, J. Jap. Bot. 46 (1971) 68. – Type: *Y. Tashiro & Tanaka 179* (*non vidi*), Okinawa.

S. koshunensis Kanehira, Trans. Nat. Hist. Soc. Form. 20 (1930) 382; Form. Trees (ed. 1936) 591, t. 549; H. L. Li, Woody Fl. Taiwan (1963) 745. – Type: *S. Sasaki 22386-9* (*non vidi*), Formosa, Hengchun.

S. sordida Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 176; Fl. Gén. I.-C. 3 (1933) 1003. – Type: *Poilane 11245* (P), Annam, Massif de Dong Tho, Prov. Quang Tri.

S. peallii King *ex* Das, Assam For. Rec. (Bot.) 1 (1934) 19, t. 8. – Syntypes: *Kanjilal 3385, 4744, 6868* (*non vidi*), Cachar and Lakhimpur; *Parkinson 2979* (*non vidi*), Myitkyina; *Peal 59, 279* (*non vidi*), Subsagar.

S. grandis Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 15. – Type: *Forrest 24641* (E, isotypes in K, W), W. Yunnan, Shweli-Salween Divide, 25°40′ N, 98°45′ E.

Shrub or tree to 20 m high and 60 cm ϕ. Twigs glabrous or rusty tomentellous-tomentose, the small pith lamellated, often disappeared when dry; terminal buds rusty pubescent with thick scales, 5—10 mm; growth discontinuous. *Leaves* coriaceous, glabrous, rarely cobweb-like hairy beneath, except in var. *epapillata* the undersurface papillate (only visible with high magnification), light coloured, dull, the upper surface glossy, darker coloured (rarely the papillae only on some places near the base and very short), narrowly elliptic, rarely elliptic, 10—18(—26) by 2—5(—10) cm, index 2—6½; base cuneate, base angle 20°—60°(—90° in var. *epapillata*); apex faintly to abruptly acuminate, acumen 3—15 mm; margin recurved entire or denticulate-dentate, often with pellucid, tooth-like glands. *Midrib* very prominent beneath; nerves 7—18 pairs, usually anastomosing, rarely an intramarginal vein present; reticulations coarse, faintly prominent beneath or rather fine in var. *epapillata*. *Petiole* 1½—4 cm. *Inflorescence* a contracted, branched, up to 20-flowered spike sometimes elongated up to 2 cm, from the axils of the leaves or on wood beneath them, sometimes many inflorescences for more than 30 cm along the branches. *Flowers* white, fragrant. Bracts and bracteoles tomentose, persistent under the fruit, broadly elliptic 1—4 mm long and elliptic 1—3 mm long respectively. *Calyx tube* glabrous, ½—1 mm high; limb 2—2½ mm long, only the lobes tomentose, semi-elliptic or triangular, rounded, 1—1½ mm long. *Corolla* rarely with some hairs along the apical margin, 3—5 mm. *Stamens* 20—60, up to as long as corolla or longer. *Disk* cylindrical or pulvinate, glabrous, rarely villous, surrounding

the 5 mm long glabrous style. *Ovary* 3-celled, each cell with 2—4 ovules. *Fruits* bluish black, ovoid to cylindrical, only 1 cell developed, 12—18 by 6—8 mm, slightly corrugated, with narrow apical rim; calyx lobes caducous; usually 1 or 2 fruits from each spike, rarely many (often all the flowers sterile); exocarp papyraceous, mesocarp thin, fleshy, endocarp hard, woody, up to $\frac{3}{4}$ mm thick, with rather smooth surface. *Seed* 1, with thin testa and copious endosperm, *c.* 9 by 4 mm; embryo straight, *c.* 7 by 1 mm, the radicle pointing upwards; cotyledons *c.* $1\frac{1}{2}$ mm long.

Distribution. N. India, N. Burma, Indo-China, S. China, Hainan, Formosa, Ruy Kyu Is., Japan.

48-1. var. **glauca** — **Pl. 15e-h.**

Leaves papillate underneath; reticulation coarse; base angle 20°—60°.

Distribution. As for the species.

INDIA. North: *Dika 13213*; *Kanjilal 3385, 6868*, Lakhimpur; *Peal 59, 279*, Sibsagar; *Kanjilal 4744*; *Prain's coll. 275*, Assam, Cachar.

BURMA. North: *Maung Mya 5434, 5465*; *Parkinson* 2797, Myitkyina.

INDO-CHINA. Annam: 11 collections, Quang Tri, Haut Donai and Kontum, alt. 700–900 m. – Tonkin: *Bon 2670*; *Pételot 1093, 4494*.

CHINA. Yunnan: *Forrest 24641, 25241*; *C. W. Wang 77209*, alt. 1400–2700 m. – Szechwan: *W. P. Fang 1336*, Kikiang Hsien, alt. 1200 m. – Kwangsi: 6 collections. – Hunan: *Fan & Li 154*, Changning Hsien, alt. 300 m. – Kwangtung: 8 collections, Hong Kong, Wung Yuen Distr. and Tapu Distr. – Hainan: 10 collections, alt. ? to 1500 m. – Fukien: 5 collections, alt. 600 m. – Chekiang: *R. C. Ching 1887, 1916, 1990*, Wenchow, alt. 250–450 m; *H. H. Hu* 200, Nan Hoo. – Formosa: 11 collections.

JAPAN. Kyushu: *Maximowicz s.n.*; *Oldham 295, 492, 531*, Nagasaki. – Shikoku: *Faurie 11908*, Kochi. – Amakusa: *Togashi NSM 670*, Hondo. – Tokunoshima I.: *Hatusima 19092*, Mt. Amigadake, alt. 200 m. – Amami-Oshima I.: *Hatusima 19644*, alt. 100 m. – Okinawa: *Field & Low 1345*; *Yamazaki 195*, alt. 300 m; *Wilson 8083 p.p.*

Ecology. In bushes, often on exposed ridges. In the Ryu Kyu Is. in the mountain forests of most islands, in Formosa as an understory shrub.

Note. The endosperm cells are thin-walled and contain many starch grains, fatty oils and probably some aleuron. The placentation is central-apical to apical.

48-2. var. **epapillata** Noot., *var. nov.*

Type: *Poilane 4494* (P, isotype in A), Tonkin, Chapa, alt. 1700 m.

Folia infra haud papillata subtiliter reticulatavenosa.

Leaves glabrous, elliptic to slightly obovate, 12—19 by 4—6 cm, index 2.5—4.3; base often oblique, base angle 30°—90°. Nerves 11—14 pairs, meeting in a looped intramarginal vein; secondary veins transverse to nerves, between them a rather fine prominent reticulation. Petiole 30—40 mm.

INDO-CHINA. Tonkin: 5 collections, all from Chapa, alt. 1500–1700 m.

49. Symplocos glomerata King *ex* Clarke — **Pl. 16a-d.**

S. glomerata King [*ex* Gamble, Darjeeling List (1878) 54, *nomen*] *ex* Clarke, Fl. Br. Ind. 3 (1882) 577; Brand, Pfl. R. Heft 6 (1901) 69; Brandis, Indian Trees (1906) 438; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 30. – *Eugeniodes glomeratum* O.K. Rev. Gen. Pl. 2 (1891) 975. – Type: *Herb. Ind. Or. Hook. f. & Th. 55* (K, isotypes in C, CGE, FI, L, P, W), India, Khasia.

S. congesta Benth. Fl. Hongk. (1861) 211, *non* Zoll. (1857); Brand, Pfl. R. Heft 6 (1901) 69; Merr. J. Arn. Arb. 20 (1939) 353; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 29; Li, Taiwania 1 (1950) 313; J. Wash. Ac. Sc. 43 (1953) 107; Woody Fl. Taiwan (1963) 747. – *Bobua congesta* Migo, Bot. Mag. Tokyo 56 (1942) 267. – Type: *Champion 413* (K), Hong Kong.

S. adenopus Hance, J. Bot. (1883) 322; Brand, Pfl. R. Heft 6 (1901) 68; Rehder, J. Arn. Arb. 15 (1934) 301; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 28. – Type: *E. Faber in Herb. Hance 22138* (BM), China, Lo Fau Shan, Prov. Canton.

S. cuspidata Brand, Pfl. R. Heft 6 (1901) 69. – Type: *Herb. Hongk. Bot. Gard. 32* (K), Hong Kong, North River.

S. prainei Lévl. Fedde Repert. 9 (1911) 445. – Type: *Cavalerie 2966* (E, isotypes in A, K, L, P), China, Kweichow, Pin Fa à Tou Yun.

S. adinandrifolia Hayata, Ic. Pl. Form. 5 (1915) 93, t. 23; Kanehira, Form. Trees (1917) 350, t.; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 917; Mori, Trans. Nat. Hist. Soc. Form. 24 (1934) 193; Sylvia 5 (1934) 222; Kanehira, Form. Trees (ed. 1936) t. 537. – *Bobua adinandrifolia* Kanehira & Sasaki, List Pl. Form. (1928) 330; Sasaki, Cat. Govt. Herb. (1930) 406. – Type: *U. Mori s.n.* (*non vidi*), Formosa, Central Mts.

S. adinandrifolia Hayata var. *theifolia* Hayata, Ic. Pl. Form. 5 (1915) 95. – *S. theifolia* Hayata, Ic. Pl. Form. 6 (1916) 29, *non* D. Don (1825); Kanehira, Form. Trees (1917) 362. – *Bobua theifolia* Kanehira & Sasaki, List Pl. Form. (1928) 332. – *S. hayatae* Mori, Trans. Nat. Hist. Soc. Form. 24 (1934) 193, *non* Guillaumin (1932). – *Bobua taiwaniana* Hatusima, J. Jap. Bot. 13 (1937) 680. – Type: *H. Inaba s.n.* (*non vidi*), Formosa, Aug. 1911.

S. nakaii Hayata, Ic. Pl. Form. 5 (1915) 110, t. 25e; Kanehira, Form. Trees (1917) 358, t.; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 922. – *Bobua nakaii* Kanehira & Sasaki, List Pl. Form. (1928) 331. – Type: *S. Sasaki s.n.* (*non vidi*), Formosa, Shinsuiyei.

S. phaeophylla Hayata, Ic. Pl. Form. 5 (1915) 11, t. 34; Kanehira, Form. Trees (1917) 359, t.; Mori, Sylvia 5 (1934) 242; Kanehira, Form. Trees (ed. 1936) 598. – Type: *R. Kanehira s.n.* (*non vidi*), Formosa.

S. mairei Lévl. Monde des Pl. 18 (1916) 28; Rehder, J. Arn. Arb. 15 (1934) 301; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 28. – Type: *E. E. Maire s.n.* (E, isotype in BM), Yunnan, Long Ky.

S. myriadena Merr. Univ. Cal. Publ. Bot. 10 (1924) 428; Guillaumin, Fl. Gén. I.-C. 3 (1933) 1014; Li, J. Arn. Arb. 24 (1942) 452. – Type: *Pételot 1518* (?UC, *non vidi*, isotype in P), Tonkin, Massif du Tam Dao.

S. poilanei Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 282; Fl. Gén. I.-C. 3 (1933) 1013, t. 115, 7; t. 116, 1; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 29. – Lectotype: *Poilane 1522* (P, isotypes in A, BO, E), Annam, Bana.

S. garcinifolia Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 280; Fl. Gén. I.-C. 3 (1933) 1013. – Lectotype: *B. Balansa 3171* (P, isotype in K), Tonkin, Yen Cao, Bat Bac.

S. chunii Merr. J. Arn. Arb. 6 (1925) 138; in Chun & Hu, Ic. Pl. Sin. 1 (1927) t. 46; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 30. – Type: *W. Y. Chun 642* (*non vidi*), Hainan, Lotus Range near Nodoa.

S. fasciculiflora Merr. J. Arn. Arb. 6 (1925) 139; Lingn. Sc. J. 5 (1927) 147. – Type: *W. Y. Chun 1873* (*non vidi*, isotype in A), Hainan, Five Finger Mts.

S. nubium Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 173; Fl. Gén. I.-C. 3 (1933) 1019. – Type: *Poilane 8081* (P, isotypes in A, K), Annam, Col des Nuages près de Tourane.

S. hayatae Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 172; Fl. Gén. I.-C. 3 (1933) 1012. – Type: *Hayata 610* (P, isotype in TI), Annam, Dalat.

S. kudoi Mori, Trans. Nat. Hist. Soc. Form. 24 (1934) 193; Sylvia 5 (1934) 236, t.; Kanehira, Form. Trees (ed. 1936) 594. – Type: *Y. Kudo & S. Sasaki 15682 (non vidi*, Herb. Univ.Taihoku), Formosa.

S. spathulata Li, J. Arn. Arb. 25 (1944) 425. – Type: *H. Y. Liang* 69359 (A), China, Kwangsi.

Shrub or treelet. Twigs glabrous, or the youngest ones tomentose or tomentellous; terminal buds with glabrous or hairy scales; growth discontinuous. *Leaves* evenly distributed along the twigs or crowded towards the ends of the flushes, glabrous, when young sometimes hairy beneath, rarely also hairy when mature, elliptic or obovate, 4—20 by 1½—5½ cm, index 2—5; base cuneate to nearly rounded, mostly attenuate, base angle 10°—80°; apex rounded to acuminate, acumen 0—25 mm; margin entire, glandular dentate, or denticulate, in var. *adenopus* with many fine glands. *Nerves* (faintly) prominent beneath, meeting in an intramarginal vein; reticulation mostly fine, more or less prominent, often coarse in var. *glomerata* and var. *adenopus*. *Petiole* sometimes with 2 rows of glands, 5—18 mm. *Inflorescence* a fascicle from the axils of the leaves or from wood, in var. *poilanei* often a reduced spike to 15 mm long. Bracts and bracteoles persistent under the fruit, tomentose (at least towards the apex), often with large vesicular glands on the margin, 1—3 and 1—2 mm long respectively. *Calyx tube* glabrous or appressedly pubescent, ½—1 mm high; limb glabrous, 1—4 mm, lobes often ciliate, semi-elliptic, rounded, 1—3½ mm long. *Corolla* glabrous or with some appressed hairs towards the base in var. *congesta*, 3—5 mm. *Stamens* 25—70, becoming at most 2(—3) mm longer than corolla. *Disk* glabrous, flat, annular, or cylindrical. *Style* glabrous. *Fruits* cylindrical, crowned by the mostly persistent calyx lobes, 7—13 by 2½—3 mm; mesocarp very thin, fleshy; stone *c.* 10-ribbed. *Seeds* 1(—3), straight, with straight embryo.

Distribution. N. India, N. Burma, Malaya, Indo-China, S. China, Hainan, and Formosa.

Notes. 1. Ssp. *glomerata* var. *adenopus* forms the transition to *S. macrophylla* ssp. *sulcata* var. *glandulifera*. Of some of the collections, *e.g. Feng 11572* and *11884* from Yunnan, it is hardly possible to tell to which taxon they belong. I still keep *S. macrophylla* Wall. and *S. glomerata* King apart, because of the disk being hairy in *S. macrophylla* and glabrous in *S. glomerata*.

2. In *S. glomerata* two types of pollen are found, A and B. Type A occurs in ssp. *glomerata* var. *glomerata*, ssp. *congesta* var. *congesta* and part of ssp. *glomerata* var. *adenopus*. Type B occurs in ssp. *congesta* var. *poilanei* and in the other part of ssp. *glomerata* var. *adenopus*. In the collection *Pételot 4758*, which is transitional between var. *glomerata* and var. *adenopus*, an intermediate hybrid-like B type of pollen is found; in *Watt 6333*, which is also transitional between these two varieties, a hybrid-like A type of pollen is found (R. van der Meijden, 1970).

KEY TO INFRASPECIFIC TAXA

1a. Disk cylindrical, ½—1 mm high. Leaves always glandular dentate or denticulate. **49-1.** ssp. **glomerata** 2
b. Disk flat, low cylindrical or annular. Leaves mostly entire. **49-4.** ssp. **congesta** . 3
2a. Less than 6 glands to each cm of the margin. . . . . **49-2.** var. **glomerata**
b. More than 6 glands to each cm of the margin. . . . . **49-3.** var. **adenopus**
3a. Twigs tomentellous, or at least with some patches of indument. Leaves evenly distributed along the twigs, ± elliptic. . . . . **49-5.** var. **congesta**
b. Twigs glabrous. Leaves mostly crowded towards the end of the flushes, usually obovate. . . . . **49-6.** var. **poilanei**

49-1. ssp. **glomerata**

S. glomerata King *ex* Clarke, Fl. Br. Ind. 3 (1882) 577.

Distribution. N. India, N. Burma, Malay Peninsula, Indo-China, and S. China.

49-2. var. **glomerata** — **Pl. 16a, b.**

S. glomerata King *ex* Clarke – *S. mairei* Lévl.

Twigs glabrous, or tomentellous and then soon glabrescent. Terminal buds with glabrous or tomentellous scales. *Leaves* evenly distributed, (narrowly) elliptic, 7—20 by 2—4½ cm, index 2½—5; base angle 20°—60°; apex acuminate, acumen 5—20 mm; margin glandular dentate, flat or only slightly recurved. *Midrib* prominent beneath, glabrous or sparsely hairy; nerves 10—16 pairs, mostly meeting in a conspicuous intramarginal vein quite far from the margin; reticulations rather coarse, sometimes a fine reticulation visible with translucent light. *Petiole* without glands, with some glands or rarely with 2 dense rows of glands, 5—12 mm. *Inflorescence* a fascicle from the axils of the leaves or from wood beneath them. *Calyx* glabrous; tube *c.* 1 mm high, limb 1—2 mm long, the ciliate lobes only slightly shorter. *Corolla* 4—5 mm. *Stamens c.* 25—*c.* 50. *Disk* cylindrical, *c.* 1 mm high. *Fruits* 7—10 by *c.* 3 mm.

Distribution. India, Burma, Malay Peninsula, Indo-China and China.

INDIA. North. Darjeeling: *c.* 6 collections. – Nepal: *D. H. Nicolson 3221*, Mechizone, Ilam District, alt. 2100 m; *Stainton 6832*. – Sikkim: *c.* 15 collections, alt. 2100–2400 m. – Bhutan: *c.* 5 collections. – Assam: *c.* 10 collections, alt. 1300–1800 m.
BURMA. Upper Burma, Myitkyina: *c.* 10 collections, alt. 1800–2400 m.
MALAY PENINSULA. Trengganu: *Kep. FRI 8263*, G. Lawut Besut, alt. 1500 m.
INDO-CHINA. Tonkin: *Pételot 4758, 4769, 5183*, Chapa, alt. 1600–1800 m.
CHINA. Yunnan: *c.* 30 collections, alt. 2100–3000 m.

49-3. var. **adenopus** (Hance) Noot., *comb. nov.* — **Pl. 16c, d.**

S. adenopus Hance, J. Bot. (1883) 322. – *S. prainei* Lévl. – *S. myriadena* Merr.

Twigs tomentose or tomentellous, sometimes only towards the very apex, glabrescent; terminal buds with pubescent scales. *Leaves* often sparsely appressedly pilose-tomentose when young, rarely also when mature, usually glabrescent, ± elliptic, 5—16 by 2.2—5 cm, index 2—4; base angle 30°—80°; apex acuminate, acumen 5—20 mm; margin recurved, finely irregularly glandular dentate-denticulate, 6—12 glands to each cm. *Midrib* prominent beneath, often sparsely hairy; nerves 6—14 pairs, meeting in a conspicuous intramarginal vein at some distance from the margin; reticulations rather coarse, sometimes appearing to be fine with translucent light. *Petiole* with 2 dense rows of tooth-like glands above, 5—18 mm. *Inflorescence* a fascicle from the axils of the leaves or from wood beneath them. *Calyx* glabrous, tube ½—1 mm high, limb 1½—2 mm, lobes sometimes ciliate, 1—1½ mm long. *Corolla* 3—5 mm. *Stamens* 25—50. *Disk* cylindrical, ½—1 mm high. *Style* to 7 mm. *Fruits* 8—13 by 2½—3 mm.

INDO-CHINA. Cochinchina: *d'Alleizette s.n.*, Bien Hoa, – Laos: *Kerr 21213*, Pak Munung, alt. 1400 m. – Tonkin: *Pételot 1518*, Tam Dao.

CHINA. Yunnan: *c.* 15 collections, alt. 1100–2000 m. – Kweichow: *Cavalerie 2966*, Pin fa – Tou yun; *S. W. Teng 90453*, Hsu feng; *Y. Tsiang 7862*, Yinkiang, alt. 600 m. – Kwangsi: 8 collections. – Kwangtung: 8 collections. – Hainan: *C. Wang 77374*, Fo Hai, alt. 2000 m.

49-4. ssp. **congesta** (Benth.) Noot., *comb. nov.*

S. congesta Benth, Fl. Hongk. (1861) 211.

Distribution. Indo-China and S. China.

49-5. var. **congesta**

S. congesta Benth. – *S. cuspidata* Brand – *S. adinandrifolia* Hayata – *S. adinandrifolia* Hayata var. *theifolia* Hayata – *S. nakai* Hayata – *S. phaeophylla* Hayata – *S. nubium* Guillaumin – *S. kudoi* Mori.

Twigs tomentellous, or at least with some patches of indument, especially towards the apex or at the beginning of the flushes, glabrescent; terminal buds tomentellous, with several scales. *Leaves* evenly distributed along the twig, ± elliptic, brown when dry, glabrous, rarely the youngest ones tomentose, 7½—15(—18) by 3—5½ cm, index 2.2—3.6; base angle 25°—60°; apex acuminate, acumen 7—25 mm; margin recurved, cartilaginous, entire or rarely dentate. *Midrib* prominent beneath; nerves 7—10 pairs, prominent beneath, meeting in a prominent looped intramarginal vein; reticulations fine, prominent beneath. *Petiole* 5—15 mm. *Inflorescence* a fascicle. *Calyx tube* glabrous or appressedly pubescent, ½—1 mm high; limb glabrous, 2—4 mm, lobes 1½—3½ mm

long. *Corolla* 4—5 mm, with some appressed hairs towards the base. *Stamens* 30—*c.* 70. *Disk* annular or rather flat. *Style* 4—7 mm. *Fruit* 8—13 by 3—4 mm.

INDO-CHINA. Annam: *Poilane 8081*, Tourane. – Tonkin: *Pételot 6369, 6938*, Chapa, alt. 1500 m; *6599*, Mt. Bai, alt. 1800 m; *W. T. Tsang 26960*, Mon Cay.

CHINA. Yunnan: *K. M. Feng 12275*, Si Chour Hsien, alt. 1300–1500 m; *13550*, Mar Li Po, alt. 1200–1500 m; *Forrest 26241*, 25° N 98°36′ E. – Kwangsi: 6 collections. – Kwangtung: *c.* 15 collections. – Hong Kong. *c.* 20 collections – Hainan: *F. C. How 73439*; *S. K. Lau 28232*; *H. Y. Liang 65258*. – Kiangsi: *S. K. Lau 4755*, Lungnan Distr. – Fukien: *S. G. Tang 5738, 5821, 13585, 13595*, Kushan Monastery. – Chekiang: *Fortune 59*. – Formosa: 6 collections, 1200–1800 m.

49-6. var. **poilanei** (Guillaumin) Noot., *comb. nov.*

S. poilanei Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 282 – *S. garcinifolia* Guillaumin – *S. chunii* Merr. – *S. fasciculiflora* Merr. – *S. hayatae* Guillaumin – *S. spathulata* Li.

Twigs glabrous; terminal buds with appressedly pubescent scales. *Leaves* mostly crowded at the end of the flushes, between the 'whorls' many glabrous, soon caducous cataphylls, bearing pellucid glands at the apical margin; blade glabrous (yellowish) green, obovate, 4—14(—18) by 1½—5½(—6) cm, index 2½—3½; base angle 10°—70°; apex rounded to acuminate, acumen 0—15 mm; margin recurved, cartilaginous, sometimes glandular dentate, often entire. *Midrib* prominent beneath; nerves 10—14 pairs, faintly prominent beneath, sometimes nearly obscure, meeting in a looped intramarginal vein which often is rather inconspicuous; reticulation fine, faintly prominent, sometimes only obvious with translucent light. *Petiole* 8—15 mm, often with narrow ridges. *Inflorescence* a fascicle or a much reduced spike to 15 mm, from the axils of the leaves, and many of them from wood between and under the 'whorls' of leaves; axis tomentose-pubescent. *Calyx* glabrous, tube *c.* 1 mm high, limb *c.* 2 mm long, lobes sometimes sparsely ciliate, *c.* 1½ mm long, often becoming longer by tearing. *Corolla* 4—5 mm. *Stamens* 40—*c.* 60. *Disk* low cylindrical or annular. *Style c.* 4 mm. *Fruits c.* 7—8 by *c.* 3 mm, with thin, fleshy mesocarp. *Seed* 1; embryo straight, *c.* 5 by ½ mm, with upwards pointing radicle; cotyledons *c.* ¾ mm long; the endosperm contains much fatty oil, no starch.

INDO-CHINA. Annam: 8 collections, alt. 1200–1500 m. – Tonkin: *c.* 15 collections.

CHINA. Kwangtung: *H. Y. Liang 69359*, Hop Po Distr.; *W. T. Tsang 26562*; *C. L. Tso 21015*, Lok Chong. – Hainan: more than 40 collections.

Note. The collection *R. C. Ching 2537*, from Chekiang, King Yuan, alt. 900—1200 m, is probably of hybrid origin. It differs in the leaves being evenly distributed with an index of *c.* 4. The terminal buds are glabrous. The corolla is 6 mm long and the disk is cylindrical, *c.* ½ mm high. Probably the other parent species is *S. stellaris* Brand.

49a. Symplocos goodeniacea Noot., *sp. nov.*

Type: *SAN 74567* (L, isotypes in K, SAR, SING), N. Borneo, Sabah, Sandakan, along logging trail from mile 79½ Labuk road, north of road, alt. 150 m.

Arbor parva ramuli glabra foliis glabris anguste ellipticis 17 ad 30 cm longis 3½ ad 7 cm latis basi anguste cuneata attenuata apice acuminato nervis primariis utroque latere 11 ad 13 petiolo 1,5 ad 2,5 cm longo. Inflorescentia spicata ad 4 cm longa bracteis bracteolisque persistentibus glabris calyce glabro tubo 1½ ad 2 mm alto lobis 1½ ad 2 mm longis corolla 6 ad 8 mm longa staminibus ultra centum disco annulato minute piloso.

Small tree to 7½ m. Twigs glabrous, much angular, terminal buds small, glabrous. *Leaves* narrowly elliptic, 17—30 by 3½—7 cm, index 3½—5; base cuneate, attenuate, base angle 20°—30°; apex shortly acuminate, acumen 10—15 mm; margin recurved, entire or denticulate; nerves 11—13 pairs, meeting in an intramarginal vein close to the margin at least in the apical part; reticulation coarse, prominent beneath. *Petiole* 15—25 mm. *Inflorescence* a spike to 4 cm; axis puberulous. Bracts and bracteoles persistent, glabrous but ciliate, boat-shaped, *c.* 2 mm long. *Calyx* glabrous, tube 1½—2 mm high, lobes broadly rounded, 1½—2 mm long. *Corolla* 6—8 mm. *Stamens* more than 100. *Disk* annular, minutely pilose, surrounding the style base. *Style* glabrous. *Fruits* not known.

BORNEO. Sabah: only the type.

50. Symplocos groffii Merr. — **Pl. 16e, f.**

S. groffii Merr. Philip. J. Sc. 12 (1917) Bot. 107; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 32. — *Bobua groffii* Migo, Bot. Mag. Tokyo 56 (1942) 267. — Type: *Merrill 10257* (A, HK), China, Lo Faushan.

S. lungtauensis Merr. J. Arn. Arb. 8 (1927) 14. — Type: *CCC 12066* (A, BM, E, P, W), China, Lung T'au shan, near Iu.

S. mollipila Li, J. Arn. Arb. 24 (1943) 452. — Type: *S. K. Lau 28725* (A), Kwangsi, Ling Wan Distr.

Shrub, or treelet to 5 m. Twigs densely patently soft hairy to nearly tomentose, glabrescent; terminal buds small, densely soft hairy. *Leaves* alternate, ± elliptic, 5½—10 by 1.7—4.5 cm, index 2—3(—3.3), (patently) soft hairy beneath; above with the same indument, but soon glabrescent; base cuneate to rounded, base angle 50°—90°; acumen 5—10(—15) mm, tip acute; margin recurved to revolute, denticulate. *Midrib* flat to slightly prominent, densely hairy above, prominent, densely patently long soft hairy beneath; nerves 7—10(—12) pairs, faintly prominent; intramarginal vein present, but even less conspicuous; reticulation coarse, rather obscure. *Petiole* with same indument, 2—3 mm. *Inflorescence* an axillary fascicle or very short raceme; axis appressedly pubescent to sericeous. Bracts and bracteoles with same indument, triangular to semi-elliptic, 1(—2) mm. Pedicel 0—2 mm. *Calyx tube* appressedly pubescent to sericeous, *c.* 1 mm high, gradually interpassing into the less hairy to glabrous 2 mm long limb;

lobes ciliate, rounded, ¾—1 mm. *Corolla c.* 5 mm. *Stamens c.* 50, up to 8 mm. *Disk* densely shortly soft-hairy, annular, surrounding the style base. *Style* glabrous, slender, up to 8 mm. Stigma small, punctate. *Fruits* ± ellipsoid, 10—12 by 4—6 mm, crowned by the persistent calyx limb; mesocarp fleshy, thin; stone lengthwise grooved, 3-celled. *Seeds* 1—3, straight, or hook-shaped curved towards the base.

CHINA. Kwangsi: 6 collections. – Kwangtung: *c.* 15 collections, alt. 500–1100 m.
INDO-CHINA. Tonkin: *Poilane 18983*, Khaoson, Prov. Caobang, alt. 1200 m.

51. Symplocos guillauminii Merr. — Pl. 16g, h.

S. guillauminii Merr. J. Arn. Arb. 19 (1938) 62. – *S. trisepala* Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 176, *non* Merr. (1917); Fl. Gén. I.-C. 3 (1933) 1024. – Type: *Poilane 18663* (P), Annam, Lang Bian, N. of Dankia.
S. fasciculata var. *chinensis* (*non* Brand) Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 280; Fl. Gén. I.-C. 3 (1933) 1020, *pro coll. Indo-Chinensis.*

Shrub or treelet to 6 m. Twigs slender, dark brown, or the youngest green, glabrous or with some appressed fine hairs. Terminal buds small, appressedly pubescent *Leaves* glabrous (or some appressed fine hairs on the midrib beneath), ± elliptic, 6½—14 by 2—5 cm, index 2—4, acumen 8—15 mm, base angle 30°—60°. *Nerves* (faintly) prominent beneath, 6—9 pairs, anastomosing at a distance of ½—⅔ to the margin, meeting in a looped intramarginal vein which is as prominent as the nerves; reticulation rather coarse, much less prominent than nerves. *Petiole c.* 2 mm. *Inflorescence* a (basally branched) short, lax raceme to 1 cm long; axis, the 1 mm long ovate to triangular bracts, the ½ mm long bracteoles and the up to 1 mm long pedicel between them thinly appressedly short hairy. *Calyx* with the same indument to nearly glabrous, tube ½—1 mm, lobes (2—)3, 1—1½ mm. *Corolla* 2—2½ mm long. *Stamens* 20—40. *Disk* pulvinate, at least in older flowers shortly soft hairy. *Style* glabrous, *c.* 2 mm, with peltate stigma. *Fruits* ampulliform, *c.* 10 by 4 mm, neck 2—3 mm long, calyx lobes caducous.

INDO-CHINA. Annam: *Herb. d'Alleizette s.n.*; *Poilane 18663.* – Cochinchina: *Pierre 121, 1808, 1941.*

52. Symplocos hainanensis Merr. & Chun *ex* Li — Pl. 17a.

S. hainanensis Merr. & Chun *ex* Li, J. Arn. Arb. 25 (1944) 210. – Type: *F. C. How 73130* (BISH, S, SING), Hainan, Poting.

Tree 10—15 m. Twigs dark brown, glabrous, rather slender. Terminal buds small, glabrous. *Leaves* glabrous, (narrowly) elliptic, 8—11½ by 2½—4 cm, index 2—4; base obtuse to cuneate, base angle 35°—80°; acumen 3—15 mm, tip blunt; margin crenate. *Midrib* much prominent beneath; nerves 8—12 pairs, thin, but much prominent be-

neath, contrasting with the leaf by being darker coloured, arching upwards towards the margin and meeting in an intramarginal vein 2—3 mm from the margin; secondary veins distinctly prominent, at right angles with nerves; tertiary veins less distinct, forming a rather coarse reticulation. *Petiole* dark brown, 7—16 mm. *Inflorescence* an axillary spike (or raceme) up to 6 cm, becoming longer in fruit; axis sparsely finely short hairy, soon glabrescent. Bracts very soon caducous, ovate, sparsely finely short-hairy, *c.* 1 mm; bracteoles ovate, glabrous, ciliate, $\frac{1}{2}$—$\frac{3}{4}$ mm. Pedicels less than 1 mm, but mostly distinct in the lower flowers, becoming $2\frac{1}{2}$ mm in fruit. *Calyx* glabrous; tube $\frac{1}{2}$—1 mm; limb $1\frac{1}{4}$—$1\frac{1}{2}$ mm, nearly wholly divided. *Corolla* 3—4 mm. *Stamens c.* 40. *Disk* consisting of 5 large glands, glabrous. *Style* glabrous, *c.* 3 mm, with broadly conical base; stigma small, punctate. *Fruit* (only unripe fruits seen) up to $1\frac{1}{2}$ by $\frac{1}{2}$ cm, ovoid, crowned by the calyx lobes.

CHINA. Hainan: *F. C. How 73130, 73264, 73424, Po-ting*; *F. C. How 73764*, Lingshui, alt. 400–600 m.

53. Symplocos hayesii White & Francis

S. hayesii White & Francis, Proc. Roy. Soc. Queensl. 33 (1921) 157, t. 2. – Type: *Hayes s.n.* (BRI, isotype in K), Australia, Glenallan, Malanda, Atherton Tableland.

Slender shrub. Twigs and innovations clothed with long hairs; terminal buds small, with long hairs, growth discontinuous, often a series of cataphylls on the youngest twigs. *Leaves* glabrous (but midrib with some long hairs), (narrowly) elliptic, 6—12 by $2\frac{1}{2}$—$5\frac{1}{2}$ cm, index 1.8—2.5(—3.6); base rounded to cordate, base angle 90°—110°, apex acuminate, acumen 5—15 mm; margin sharply dentate. *Nerves* 7—9 pairs, prominent below, often impressed above, curved upwards and meeting in a looped intramarginal vein; reticulation rather coarse, but with translucent light a fine reticulation visible. *Petiole* with same indument as twigs, 3—5 mm. *Inflorescence* a condensed spike or fascicle, to 15 mm, from the axils of the leaves or from a *c.* 10 mm long cataphyll; axis long hairy. Bracts and bracteoles persistent, sparsely appressedly long pilose and long ciliate, ovate to narrowly triangular, 3—9 mm and ovate, 2—3 mm respectively. *Calyx tube* glabrous, $\frac{1}{2}$—$1\frac{1}{2}$ mm high, lobes glabrous or ciliate, ovate, acute, 1—$1\frac{1}{2}$ mm long. *Corolla c.* $2\frac{1}{2}$ mm long. *Stamens c.* 15, in ♂ flowers up to as long as corolla, in ♀ flowers about half as long and sterile. *Disk* pilose, annular. *Style* glabrous, *c.* 1 mm long, in functionally ♀ flowers with a stout peltate stigma. *Fruits* spindle-shaped to cylindrical but narrowed towards the apex, often slightly curved, 15—20 by *c.* 5 mm; mesocarp thin, fleshy; stone rather smooth. *Seed* 1, slightly curved, *c.* 12 mm long, embryo slightly curved, *c.* 5 mm with very small plumule and cotyledons.

AUSTRALIA. N. Queensland. Cook Distr.: *Hayes s.n.*; *L. S. Smith* 10839; Walsh 168, Malanda; Flecker 12900, Timaroo Range; *L. S. Smith 418*; *E. Volck 873*, Danbulla, 12 miles N. of Atherton; E. Volck 5274, N. Kennedy Distr., Koolmon Creek area, alt. 700 m; *Webb & Tracey 8173*; *C. T. White s.n.*, Boonjie, Atherton Tableland.

54. Symplocos herzogii Sleumer

S. herzogii Sleumer, Fedde Repert. 42 (1937) 264. – Type: *Dr. E. Mayr s.n.* (Bt), neotype: *R. Schodde 4998* (L, isotype in CANB), New Guinea, Morobe District, east slope of Spreader Divide, *c.* 6 miles west of Aseki, alt. *c.* 5800 ft.

Small tree or leaning shrub, 4—6 m high. Twigs thick, densely tomentose; terminal buds sericeous. *Leaves* in whorls of 3—5, (sparsely) hairy above, rather densely hairy beneath especially on midrib and nerves, ± elliptic, 13—20 by 5—9.5 cm, index 1.9—2.8; base cuneate, but the very base truncate, base angle 30°—40°, but the very base 80°—90°; apex acute to acuminate, acumen 0—15 mm; margin sharply dentate. *Midrib* seemingly prominent above by the dense tomentose indument, much prominent beneath; nerves 10—17 pairs, meeting in a looped intramarginal vein which is often hardly more prominent than the reticulation; secondary and tertiary veins forming a much prominent coarse reticulation, between them the lesser veins form a fine reticulation. *Petiole* with same indument as twigs, very thick, 7—20 mm. *Inflorescence* a fascicle or spike to 2 cm. Bracts *c.* 5 mm, broadly boat-shaped, bracteoles *c.* 3 mm, much narrower, both persistent, densely redbrown sericeous. *Calyx tube* glabrous, ½—1 mm high, the limb densely appressedly redbrown hairy, 2—2½ mm long, lobes ± ovate, acute, 1½—2 mm long. *Corolla* 3—4 mm. *Stamens c.* 40 in ♂ flowers (according to Sleumer absent in ♀ flowers). *Disk* pilose. *Style* reduced in ♂ flowers, in ♀ flowers 3½ mm (according to Sleumer). *Fruits* globose to ampulliform, *c.* 8 by 6 mm, the stone ribbed. *Seed* 1, curved with curved embryo.

New Guinea. Morobe District: *T. G. Hartley 12509, Mt. Shungol*, 1650 m alt.; *Schodde 4998*, Aseki, alt. 1700 m.

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

55. Symplocos hookeri Clarke — Pl. 17b-e, photogr. 4.

S. hookeri Clarke, Fl. Br. Ind. 3 (1882) 578; Brand, Pfl. R. Heft 6 (1901) 53; Brandis, Indian Trees (1906) 440; Fletcher, Fl. Siam. En. 2 (1938) 386; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 28. – Type: *Herb. Ind. Or. H. f. & T.* (K, isotypes in BM, C. FI, L, P, W), India, Mt. Khasia.
S. chapaensis Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 170; Fl. Gén. I.-C. 3 (1933) 1027. – Type: *Pételot 4997* (P, isotype in BO), Tonkin, Chapa.
S. sempervirens Fletcher, Kew Bull. 1937 (1938) 508; Fl. Siam. En. 2 (1938) 389. – Type: *Garrett 709* (K, isotype in L), Thailand, Payap, Doi Pa Kao.

Shrub, or tree to 15 m. Twigs glabrous, young shoots long, bark smooth or wrinkled, mostly brownish; terminal buds very small, up to 5 mm, with glabrous, often ciliate scales. *Leaves* obovate (rarely elliptic), (12—)14—22(—30) by 4—8(—12½) cm, index 1.9—3.6, glabrous, dark (greenish) brown above, lighter brown beneath; base cuneate,

base angle (20°—)30°—50°; acumen 3—15 mm, tip acute; margin sharply dentate-denticulate. *Nerves* 6—11 pairs, curved upwards and meeting in an intramarginal vein; secondary veins obvious, at right angles with nerves; reticulation of tertiary veins prominent, usually a fine reticulation of quaternary veins also prominent; reticulations mostly not very conspicuous above. *Petiole* slender to stout, mostly very shortly winged towards the apex, 12—30 mm. *Inflorescence* forming a short cone in bud, obvious by the light grey appressedly pubescent bracts, or cone dark brown and bracts glabrous; axis glabrous to pubescent, becoming at most 5 cm long. Bracts broadly boat-shaped, nearly orbicular, 5—8 mm long, falling as soon as the flowers mature; bracteoles pubescent or glabrous but then ciliate, ovate to obovate, 1—3 mm long, falling during anthesis. Pedicels glabrous or pubescent, 1—3 mm. *Calyx* glabrous; tube smooth or wrinkled, 1—2 mm; lobes with rounded apex, broadly triangular, semi-orbicular or semi-elliptic, 1—2 mm, sometimes limb not wholly divided. *Corolla* 6—9 mm. *Stamens* *c.* 80, becoming slightly longer than corolla. *Disk* 5-glandular, flat (or cylindrical, 1 mm high), shortly pubescent. *Style* glabrous, 5—8 mm, stigma small, punctate. *Fruits* elliptic-cylindrical, often slightly narrowed towards the apex, 13—24 by 5—9 mm; mesocarp rather stiff; stone 12—22 by 4—7 mm, endocarp woody, thin. *Seed* 1, straight, with straight embryo.

Distribution. India, Thailand, Indo-China, and China.

INDIA. Assam, Garo hills: 7 collections.

THAILAND. Payap: 12 collections, alt. 1400–1850 m. – Chantaburi: *Flora of Thailand 6921*; *Kerr 17859*, Krat, low alt: – Rachaburi: *van Beusekom & Phengklai 2226*; *Kerr 10424*, Khao Yai, alt. 900–1300 m.

INDO-CHINA. Laos: *Poilane 20718*, near Luang Prabang, alt. 1000 m; *25902*: – Tonkin: *Pételot 4497, 4997*, Chapa, alt. 1700 m.

CHINA. Yunnan: 7 collections, alt. 1200–2000 m.

56. Symplocos johniana Stapf — **Pl. 17f, g.**

S. 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. – Type: *Haviland 1161* (K, isotype in BO), N. Borneo, Mt. Kinabalu, alt. 6000 ft.

Shrub or small tree to 3 m. Twigs densely obliquely to patently rusty hirsute (hairs *c.* 1(—2) mm). Terminal buds small, with same indument. *Leaves* brown to green-brown *statu sicco*, spirally arranged or alternate, ovate, glabrous above, rather densely patently hirsute beneath, or only the nerves and midrib hairy, $2\frac{1}{2}$—7 by $1\frac{1}{4}$—$3\frac{1}{2}$ cm, index *c.* 2; base rounded to cordate, base angle 90°—130°; apex acuminate (to caudate), acute (acumen 5—15 mm); margin usually rather coarsely sharp-dentate, flat, or recurved towards the base. *Midrib* and the 3—6 pairs of nerves usually impressed above, very prominent below, the latter arching upwards and meeting in an intramarginal vein; usually the lowermost nerves strictly parallel to the leaf-margin; secondary veins pro-

minent, usually ± transverse to the nerves, between them a fine reticulation visible. *Petiole* 1—2 mm. *Raceme* 1-flowered, axis ½ mm, with bract, bracteoles and the *c.* 1 mm long pedicel loosely appressedly rusty hirsute (hairs *c.* 1 mm). Bract *c.* 1½ mm, bracteoles *c.* 1 mm long, both elliptic. *Calyx* with same indument, tube *c.* 1 mm, the semi-elliptic, rounded lobes 1—1½ mm long. *Corolla* white to cream, *c.* 5 mm long. *Stamens* rather stiff, 60—90, in 5 distinct bundles, up to 7 mm, connate only at the very base and there adnate to the corolla. *Disk* 5-stellate, densely hirsute. *Style* glabrous, *c.* 6 mm with small stigma. *Fruits* indigo-blue *in vivo* narrowly flask-shaped, often sparsely hairy, *c.* 13 by 4 mm, the persistent calyx lobes not included; mesocarp fleshy, *c.* ¾ mm thick. *Seed* 1, straight, narrowly elliptic, *c.* 8 by 2½ mm; embryo straight.

BORNEO. Sabah: 20 collections, Kinabalu, alt. 1500–3200 m. – Kalimantan: *Endert 3933, 4116*, W. Kutai, G. Kemul, alt. 1500 m.

Ecology. In forest, often in crevices of granite rocks, in damp, shady places.

57. Symplocos junghuhnii Koord.

S. junghuhnii Koord. Proc. Kon. Acad. Wet. Amsterdam 10 (1908) 160. – Type: *Pl. Junghuhn. ined. 426* (L, isotype in K), Java.

Tree; twigs glabrous. Terminal buds rather large (7—10 mm), outer scales glabrous. *Leaves* glabrous, or with some appressed hairs beneath, obovate to elliptic, 9—13 by 4½—5 cm, index 2—3; base cuneate to cordate, base angle 30°—110°; acumen 5—10 mm, tip acute; margin entire or denticulate. *Midrib* beneath much prominent, sparsely hairy; nerves 7—10 per side; intramarginal vein ± distinct; secondary veins at right angles with nerves, between them a fine reticulation (hand-lens). *Petiole* 10—17 mm. *Inflorescence* a raceme to 6 cm; axis pubescent to tomentose, glabrescent. Bracts and bracteoles very soon caducous, not seen. Pedicels tomentose, up to 3 mm. *Calyx tube* tomentose, 2—3 mm; lobes glabrous, ciliate, ± semi-circular with cordate base, *c.* 2 mm. *Corolla* 8—10 mm. *Stamens* more than 100, becoming slightly longer than corolla. *Disk* 5-glandular, included the broadly conical style base soft hairy. *Style* glabrous, *c.* 7 mm. *Fruits* (only young fruits seen) ± elliptic, 15 by 8 mm, crowned by the persistent calyx lobes, embryo probably straight.

JAVA. West Java, Preanger: Ja 1424, Bandung, Tjigenteng, alt. 1740 m; *Pl. Junghuhnianae ineditae 426*; *Koorders 26420*, same locality.

58. Symplocos laeteviridis Stapf — Pl. 18-19.

S. laeteviridis Stapf, Trans. Linn. Soc. Bot. 4 (1894) 205; Brand, Pfl. R. Heft 6 (1901) 53; Merr. En. Born. (1921) 487; Airy Shaw, Kew Bull. (1939) 408; H. Heine, Pfl. Samml. Clemens Kinabalu (1953) 88. – Type: *Haviland 1320* (K, isotype in BO), N. Borneo, Mt. Kinabalu, Penokok, 1200 m.

S. forbesii Brand, Pfl. R. Heft6 (1901) 63. – Type: *Forbes 2355* (BM, BO, L, LE), Sumatra.

S. mjöbergii Merr. Sar. Mus. J. 3 (1928) 546. – Type: *Mjöberg 97* (UC, isotypes in BM, K), Sarawak, Mt. Murud, alt. 1900–2400 m.

S. kinabaluensis H. Heine, Mitt. Bott. Staatssamml. München 6 (1953) 217; Pfl. Samml. Clemens Kinabalu (1953) 88. – Lectotype: *Clemens 28123* (BM, BO, K, L, SING), N. Borneo, Mt. Kinabalu.

Shrub or tree to 10(—21) m. Twigs glabrous or clothed by a much variable indument, often faintly zigzag. Terminal buds small, often twigs terminated by a tuft of young leaves. *Leaves* alternate, glabrous above, glabrous to more or less (appressedly) pilose beneath, (narrowly) ovate to elliptic, 1.7—12 by 1—4.5 cm, index 1—3; base acute to cordate, base angle 40°—190°; apex acuminate to caudate, acumen 3—30 mm; margin nearly entire, finely glandular dentate or sharply dentate, flat or recurved. *Nerves* (3—) 4—11 pairs, usually meeting in a more or less conspicuous intramarginal vein; reticulation usually fine, rarely coarse or obscure. *Inflorescence* a raceme or panicle to $4\frac{1}{2}$ cm; axis clothed with hairs. Bracts and bracteoles hairy, soon caducous. Pedicels 0—5 mm. *Calyx tube* (appressedly) hairy, 1—$1\frac{1}{2}$ mm; limb less hairy to glabrous 2—3 mm, symmetrically teared, lobes 1—3 mm. *Corolla* 3—5 mm, often with minute hairs on the outside. *Stamens* 25—70, becoming as long as corolla or *c.* 1 mm longer. *Disk* 5-stellate, flat or conical, shortly minutely pilose. *Style* glabrous, as long as corolla. *Fruits* white to bluish-black, (obliquely) ovoid to ellipsoid, 7—12 by (3—)5—6 mm, crowned by the persistent calyx lobes; mesocarp thin, fleshy, endocarp very hard, mostly with shallow lengthwise grooves. *Seed* 1, cylindrical to ellipsoidal or ovoid with straight embryo.

Distribution. North Sumatra, Malaya, Borneo, and Celebes.

KEY TO THE VARIETIES

1a. Base of leaf distinctly cordate. 2
b. Base of leaf cuneate to rounded. 3
2a. Twigs clothed with an indument of *c.* 2 mm long hairs. Leaves 5—12 cm long. **58-5.** var. **mjöbergii**
b. Twigs clothed by an indument of $\frac{1}{4}$—1 mm long hairs. Leaves 1.7—4.5 cm long. **58-4.** var. **kinabaluensis**
3a. Twigs velutinous. 4
b. Twigs glabrous, pilose or pubescent. 5
4a. Leaves *c.* 4 cm long. . . . . **58-6.** var. **pauciflora**
b. Leaves 9—12 cm long. . . . . **58-7.** var. **velutinosa**
5a. Twigs glabrous, or pubescent, hairs much shorter than 2 mm. 6
b. Twigs obliquely to patently long pilose, clothed by an indument of *c.* 2 mm long hairs. **58-3.** var. **basirotunda**
6a. Twigs glabrous or appressedly pubescent. Nerves in 6—9 pairs. **58-1.** var. **laeteviridis**
b. Twigs loosely-appressedly pubescent. Nerves in 3—6 pairs. **58-2.** var. **alternifolia**

58-1. var. **laeteviridis** — **Pl. 18e-f, 19b.**

S. laeteviridis Stapf – *S. forbesii* Brand.

Shrub or tree to 10(—21) m. Twigs glabrous or appressedly pubescent. *Leaves* often yellowish green above, brownish beneath *in sicco*, (narrowly) elliptic to ovate, 4—11 by 1½—4 cm, index 2.3—3, glabrous to appressedly finely pilose beneath; base cuneate to rounded, base angle 40°—90°; apex acuminate to caudate, acumen 10—30 mm. *Midrib* much prominent beneath and there glabrous to obliquely or appressedly pilose; nerves 6—9 pairs, straight or arching upwards, usually meeting in a looped intramarginal vein; reticulations from rather coarse to very fine, prominent below. *Petiole* 1—3(—4) mm. *Inflorescence* a predominantly basally branched, often very short lax panicle of racemes, rarely a simple raceme, up to 3 cm long; axis loosely – appressedly to obliquely – patently pubescent, hairs ¼—½ mm. Bracts and the 0—1 bracteoles very soon caducous. Pedicel with same indument as axis, 0—2(—5) mm.

Distribution. As for the species.

SUMATRA. Atjeh: *van Steenis 6544*, alt. 2300 m; *Pringgo Atmodjo 511*. – Eastcoast: 16 collections, alt. 500–1500 m. – Tapanuli: *Bartlett 7939*, Bataklands. – Banka: *Horsfield 38*.

MALAY PENINSULA. Perak: *Hardiat & Samsuri 283*, Maxwell's Hill.

BORNEO. Sabah: *c.* 25 collections, few from G. Alab, the rest from Mt. Kinabalu, alt. (400–)900–2100 m. – Sarawak: 7 collections, alt 600–2000 m. – Kalimantan: *Endert 3900, 4194*, W. Kutai, near G. Kemul, alt. 1500 m; *Hallier B602*, G. Damus.

CELEBES. *Kjellberg 2889*, Toradja Lands, Todjambu, alt. 850 m; *Teysmann 13686*, Bonthain.

58-2. var. **alternifolia** Noot., *var. nov.* — **Pl. 18a.**

Type: *SAN 20964* (L, isotypes in K, S), Sabah, Ranau District, Bukit Ampuon.

Arbuscula vel frutex ramulis dense appresse pubescentibus. Folia alternata elliptica subtus dense vel sparse appresse pilosa, base acuta apice acuminato vel caudato, venis secundis et tertiis subtus prominentibus dense reticulatis. Racemi pauciflori usque 3 cm longi. Calyx tubo 2 mm alto limbo symmetrico 3 mm longo disco piloso stylo glabro.

Shrub or treelet, *c.* 4 m. Twigs densely loosely-appressedly brown-pubescent, hairs ½—1 mm. *Leaves* glabrous above, rather densely to sparsely appressed-pilose beneath, especially at the margin, ± elliptic, 4—5½ by 1½—2½ cm, index 2—3; apex acuminate to caudate, acumen 7—17 mm; base cuneate, shortly attenuate, base angle 50°—60°; margin ciliate, recurved, entire to finely glandular dentate. *Midrib* much prominent, loosely appressed-pilose beneath; nerves (3—)4—6 pairs, arching upwards and meeting in a looped intramarginal vein, sometimes obscured by the indument; reticulation fine. *Petiole* with same indument as twigs, *c.* 2 mm. *Inflorescence* a sometimes branched raceme to 3 cm or flowers solitary; axis red-brown pilose. Pedicel 0—½ mm (to 4 mm in solitary flowers).

BORNEO. Sabah, Mt. Kinabalu: 4 collections, alt. 1000–1500 m.

58-3. var. **basirotunda** Noot., *var. nov.* — **Pl. 18b.**

Type: *Nooteboom 1819* (L), Sarawak, Kalabit Highlands, Trail Bario to Pa Ukat, alt. 1000 m.

Frutex vel arbor parva, ramulis oblique ad patenter pilosis. Folia alternata apice acuminato ad caudato, base rotunda ad subcordata venis subtus subprominentibus. Petiolus 1–2 mm longus. Inflorescentia racemosa vel paniculata ad 2 cm longa bracteis mox deciduis. Calyx tubo 1 mm alto limbo symmetrico 2 mm longo lobis $\frac{1}{2}$–2 mm longis.

Shrub or treelet. Twigs obliquely to patently long pilose, hairs *c.* 2 mm. *Leaves* glabrous above, glabrous to sparsely appressedly long pilose beneath, elliptic, 3—11 by 1.8—3$\frac{1}{2}$ cm, index 2.7—3; base rounded to subcordate, base angle *c.* 90°; apex acuminate to caudate, acumen 7—20 mm; margin sharply glandular dentate to nearly entire. *Midrib* impressed above, much prominent beneath, patently to appressedly long pilose; nerves 6—9 pairs, faintly prominent beneath, meeting in a looped intramarginal vein; reticulation coarse, often hardly visible. *Petiole* with same indument as twigs, 1—2 mm. *Inflorescence* a raceme or panicle, up to 2 cm; axis obliquely-patently pilose, hairs $\frac{1}{2}$—1 mm. Pedicels 0—2(—3) mm.

BORNEO. Sarawak, Kalabit Highlands: 8 collections, alt. 1000–1700 m.

58-4. var. **kinabaluensis** (Heine) Noot., *comb. nov.* — **Pl. 19c.**

S. kinabaluensis Heine, Mitt. Bot. Staatssamml. München 6 (1953) 217.

Shrub or small tree to 4 m. Twigs shortly obliquely hairy, hairs $\frac{1}{4}$—1 mm. *Leaves* ovate to elliptic, 1.7—4.5 by 1—2.7 cm, index 1—3, glabrous except the midrib and sometimes the finely glandular-dentate margin beneath; margin flat, or recurved towards the base; base cordate, base angle 110°—170°; apex acuminate, acumen 3—10 mm. *Nerves* 4—6 pairs, more or less prominent beneath, sometimes difficult to see without a hand-lens; reticulation fine, mostly only visible with a hand-lens. *Petiole c.* $\frac{1}{2}$ mm. *Inflorescence* a *c.* 3-flowered raceme, up to 3 cm; flowers alternately arranged; axis with same indument as twigs. Bracts 3—5 mm, resembling miniature leaves, soon caducous. Pedicel $\frac{1}{2}$—5 mm, loosely appressedly hairy, hairs *c.* $\frac{1}{2}$ mm.

BORNEO. Sabah, Mt. Kinabalu: 22 collections, alt. 1400–2300 m.

58-5. var. **mjöbergii** (Merr.) Noot., *comb. nov* — **Pl. 18g.**

S. mjöbergii Merr., Sar. Mus. J. 3 (1928) 546.

Small tree. Twigs densely patently brown or rusty pilose, hairs *c.* 2 mm. *Leaves* (narrowly) elliptic or ovate, 5—12 by 2$\frac{1}{2}$—4$\frac{1}{2}$ cm, index 2—3; glabrous above, appressedly long pilose beneath; base cordate, base angle 120°—190°, the basal lobes 2—10 mm long;

apex acuminate, acumen 3—15 mm; margin finely glandular dentate. *Midrib* and nerves strongly impressed above, much prominent beneath; midrib beneath patently long pilose; nerves 6—9 pairs, meeting in a very conspicuous, much prominent looped intramarginal vein; secondary veins prominent, forming a rather coarse reticulation with the faintly prominent tertiary veins. *Petiole c.* 1½ mm, with same indument as twigs. *Inflorescence* a predominantly basely branched panicle to 4 cm; axis ± patently brown or rusty pilose, hairs ½—1 mm. Bracts often leaf-like, and then up to 10 mm. Pedicels 1—5 mm.

BORNEO. Sabah, Mt. Kinabalu: 15 collections, alt. 1200–1500 m. – Sarawak: *Mjöberg 97*; *Nooteboom 1909*; *S 26429*, all from Mt. Murud, alt. 1400–2400 m; *Nooteboom 2191*, Apa Batu Buli Range, 115°28′ E, 3°46′ N, alt. 1650 m.

58-6. var. **pauciflora** Noot., *var. nov.* — **Pl. 18c-d.**

Type: *H. P. Fuchs 21064* (L, isotypes in A, K, SAR, SRR), Sabah, Mt. Kinabalu.
Ramuli velutinosi. Folia alterna praeter costam et marginem glabra, nervis prominentibus, venis secundis et tertiis subtus et supera prominentibus dense reticulatis. Racemi pauciflori usque 3 cm longi. Calyx tubo 1½ mm longo, limbo symmetrico 2 mm longo disco pilosiusculo stylo glabro.

Shrub, twigs velutinous. *Leaves* glabrous except the appressedly pilose midrib and the recurved finely dentate margin underneath, or appressedly fine-pilose beneath, elliptic, *c.* 4 by 2 cm; base rounded, base angle 70°—90°; apex acuminate, acumen 5—10 mm. *Nerves c.* 5—7 pairs, meeting in a looped intramarginal vein; secondary and tertiary veins forming a fine reticulation or reticulation rather obscure. *Petiole* with same indument as twigs, *c.* 2 mm. *Inflorescence* a 1—5-flowered raceme up to 3 cm; axis patently pubescent. Pedicel 0—½ mm, much longer when flowers are solitary.

BORNEO. Sabah: *H. P. Fuchs 21064*, Kinabalu, above Kamburanga, alt. 2570 m. – Sarawak: *S 26334*, *26391*, both from Mt. Murud, alt. 1700–2000 m; *Nooteboom 2207*, *2208*, Apa Batu Buli Range, 115°28′ E, 3°46′ N, alt. 1700 m.

58-7. var. **velutinosa** Noot., *var. nov.* — **Pl. 19a.**

Type: *SAN 53955* (L, isotype in S), N. Borneo, Kinabalu, above Kiau II, Gurulau spur.
Arbor parva ramulis velutinosis. Folia alterna elliptica base rotunda apice acuminata, nervis lateralibus in venam intramarginalem terminantibus, venis secundis et tertiis prominentibus, reticulatis. Inflorescentia paniculata ad 3 cm longo. Limbus calycis symmetricus tubo duplo longior.

Treelet, up to *c.* 10 m. Twigs velutinous. *Leaves* glabrous above, sparsely, more or less appressedly, pilose beneath, especially on the nerves and the sharply dentate flat margin, (narrowly) elliptic, 9—12 by 3—4 cm, index *c.* 2½; base rounded, base angle *c.* 90°, apex acuminate. acumen 7—12 mm. *Midrib* much prominent below, obliquely-patently pilose; nerves 7—11 pairs, meeting in a conspicuous looped intramarginal vein, usually

the basal nerves running into a second, fine, intramarginal vein; secondary veins much prominent, often perpendicular to the nerves; tertiary and quaternary veins prominent, forming a fine reticulation. *Petiole* with same indument as twigs, 3—4 mm. *Inflorescence* a panicle to 3 cm, axis patently pilose, hairs *c.* $\frac{1}{2}$ mm. Bracts and the 0—3 mm long pedicels with same indument.

BORNEO. Sabah, Mt. Kinabalu: 6 collections, alt. 1200—1500 m. — Sarawak, 3rd Division: *S 25870*, Kapit, Ulu Samparau, Melinau, Bt. Sarong, alt. 1000 m.

59. Symplocos lancifolia S. & Z. — Pl. 21a-d.

S. lancifolia S. & Z. Fam. Nat. 2 (1846) 133; Miq. Prol. Fl. Jap. (1867) 265; Clarke, Fl. Br. Ind. 3 (1882) 577; Forbes & Hemsley, J. Linn. Soc. Bot. 26 (1889) 73; Brand, Pfl. R. Heft 6 (1901) 41; Brandis, Indian Trees (1906) 440; Matsumura & Hayata, En. Pl. Form. (1906) 230; Rehder, J. Arn. Arb. 15 (1934) 299; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 36; H. L. Li, Taiwania 1 (1950) 314; J. Wash. Ac. Sc. 43 (1953) 108; Ohwi, Fl. Japan (1965) 726. — *Bobua lancifolia* Miers, J. Linn. Soc. Bot. 17 (1879) 306. — *Dicalyx lancifolia* Hara, En. Sperm. Jap. 1 (1948) 105. — *S. okinawensis* (*non* Matsumura) Walker, Imp. Trees Ryu-Kyu (1954) 265, t. 170. — Lectotype: *von Siebold s.n.* (L), Japan.

S. leptostachys S. & Z. Fam. Nat. 2 (1846) 134. — *S. lancifolia* var. *leptostachys* Miq. Prol. Fl. Jap. (1867) 265. — *Bobua leptostachya* Miers, J. Linn. Soc. Bot. 17 (1879) 306. — Lectotype: *von Siebold s.n.* (L), Japan.

S. microcarpa Champ. Hook. J. Bot. 4 (1852) 303; Benth. Fl. Hongkong (1861) 212; Hayata, Ic. Pl. Form. 5 (1915) 109. — *Lodhra microcarpa* Miers, J. Linn. Soc. Bot. 17 (1879) 302. — *S. lancifolia* var. *microcarpa* Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1934) 37. — Type: *Champion s.n.* (GH, K), Hong Kong.

S. lancifolia var. *cyrtostachya* Miq. Prol. Fl. Jap. (1867) 265. — Lectotype: *Textor* (L), Japan.

S. lancifolia var. *fulvipes* Clarke, Fl. Br. Ind. 3 (1882) 578. — *S. fulvipes* Brand, Pfl. R. Heft 6 (1901) 41. — Lectotype: *Hook. f. & Thomson 50* (K, isotypes in BM, E, FI, GH, L, MEL, NY, W), India, Khasia.

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. — Lectotype: *Vidal 67* (A, K), Luzon, Banahao, Prov. Tayabas.

S. formosana Brand, Pfl. R. Heft 6 (1901) 67; Hayata, Mat. Fl. Form. (1911) 188; Mori, Sylvia 5 (1934) 228; Kanehira, Form. Trees (ed. 1936) 586, t. 543. — *Bobua formosana* Kanehira & Sasaki, List Pl. Form. (1928) 331, *non vidi*; Cat. Govt. Herb. (1930) 407. — Lectotype: *Henry 127* (K, isotypes in A, BM), Formosa.

S. depauperata Merr. Bur. Govt. Lab. Publ. 29 (1905) 45; Brand, Philip. J. Sc. 3 (1908) Bot. 10; *ditto* 7 (1912) Bot. 36; Merr. En. Philip. 3 (1923) 298. — Lectotype: *Elmer 5909* (K, L), Philippines, Baguio, Prov. Benguet, Luzon.

S. merrilliana Brand, Philip. J. Sc. 3 (1908) Bot. 9. — Type: *BS 2415* (*non vidi*); syntype: *FB 876* (US), Luzon, Mt. Banajao.

S. depauperata var. *sordida* Brand, Philip. J. Sc. 3 (1908) Bot. 10; Merr. En. Philip. 3 (1923) 298. — Type: *A. E. Yoder s.n.* (*non vidi*), Philippines, Mt. Midiaas, Panay, April 1905.

S. inconspicua Brand, Philip. J. Sc. 4 (1909) Bot. 110; Merr. En. Philip. 3 (1923) 299. — Type: *BS 5022 Ramos* (*non vidi*), Philippines, Luzon, Prov. Zambales, Mt. Tapulao.

S. arisanensis Hayata, Mat. Fl. Form. (1911) 187; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 918;

Mori, Sylvia 5 (1934) 223; Kanehira, Form. Trees (ed. 1936) 582, t. 538. – *Bobua arisanensis* Kanehira & Sasaki, List Pl. Form. (1928) 330; Cat. Govt. Herb. (1939) 406. – Type: *Kawakami & Mori 3710* (*non vidi*), Mt. Arisan, Formosa.

S. aurea Lévl. Fedde Repert. 9 (1911) 445. – Type: *Cavalerie 2312* (E, isotypes in K, P), China, Kweichow, Pin Fa.

S. depauperata var. *angustissima* Brand, Philip. J. Sc. 7 (1912) 36. – Type: *M. Vanoverbergh 1095* (BR, L. W. WRSL), Luzon, Bontoc Subprov., Bauco, 3-1-1911 (and not Febr. 28, 1914, as written on all labels except in BR. Probably the numbering and dating of most of the material was done 3 years after collecting it).

S. mollifolia Dunn, Kew Bull. add. series 10 (1912) 163; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 20; H. L. Li, J. Wash. Ac. Sc. 43 (1953) 109. – Type: *Dunn s.n.* (K), China, Chekchiliu, near Chaochavfu.

S. trichoclada Hayata, Ic. Pl. Form. 5 (1915) 118, t. 25 f; Mori, Sylvia 6 (1935) 30, f. 32; Kanehira, Form. Trees (ed. 1936) f. 559. – *Bobua trichoclada* Kanehira & Sasaki. List Pl. Form. (1928) 332. – Type: *S. Sasaki 1* (TI), Jan. 1907, *non vidi*, Formosa. According to Li conspecific with *S. mollifolia* Dunn.

S. suishariensis Hayata, Ic. Pl. Form. 5 (1915) 116, t. 39; Mori, Sylvia 5 (1934) 245; Kanehira, Form. Trees (ed. 1936) 600. – *Bobua suishariensis* Kanehira & Sasaki, List Pl. Form. (1928) 332; Cat. Govt. Herb. (1930) 409. – Type: *Kanehira, Tanaka & Hayata s.n.* (*non vidi*), Formosa, Mt. Arisan, April 1914.

S. microcalyx Hayata, Ic. Pl. Form. 5 (1915) 108, t. 32. – *Dicalyx microcalyx* Hara, En. Sperm. Jap. 1 (1948) 106. – Type: *G. Nakahara* (*non vidi*), Ryu Kyu Is., April 1909.

S. zamboangensis Brand, Fedde Repert. 14 (1916) 325; Merr. En. Philip. 3 (1923) 303. – Type: *Merrill 8033* (B†, Manila†), Philippines, Mindanao, Zamboanga Distr.

S. tythantha Gontsch. Not. Syst. Hort. Bot. Rei Publ. Ross. 5 (1924) 133. – Type: *Henry 11422* (K, NY), Yunnan.

S. microcalyx var. *taiheizanensis* Mori, Trans. Nat. Hist. Soc. Form. 24 (1934) 194; Sylvia 5 (1934) 238, t. – Type: *S. Suzuki* (*non vidi*; Herb. Univ. Imp. Taihoku), Formosa, 27-3-1930.

S. trichoclada var. *koshunensis* Mori, Trans. Nat. Hist. Soc. Form. 24 (1934) 195. – Type: *Kudo & Mori 1392* (Herb. Univ. Imp. Taihoku) (*non vidi*), Formosa, Koshun, Araurayuwan, 8 April 1930. Reduced here following Li, J. Wash. Ac. Sc. 43 (1953) 108.

Bobua pseudolancifolia Hatusima, J. Jap. Bot. 12 (1936) 283. – *S. pseudolancifolia* Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 35. – Type: *C. L. Tso 20605* (*non vidi*), Kwantung, May.

S. ovalifolia Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 35. – Type: *W. T. Tsang 27868* (UC), Kwangsi, Yang Wu village.

S. latouchei Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 37.– Type: *La Touche 128* (E), China, Kwangsi.

S. kwangsiensis Li, J. Arn. Arb. 24 (1943) 451. – Type: *W. T. Tsang 24383* (A), China, Kwangsi, Shangse Distr.

Low shrub to tree up to 20 m. Twigs appressedly to patently hairy (pilose, silky, pubescent or puberulous, rarely sparsely villous, sometimes with a double indument), soon glabrescent; terminal buds small, with several scales, appressedly hairy (pubescent); growth discontinuous. *Petiole* with same indument as midrib, 1—3(—5) mm. *Leaves* (narrowly) ovate, 2—10 by (0.6—)1.5—4.3 cm, index (1.4—)2—3(—5), brownish or greenish, often sparsely appressedly fine-hairy beneath; base cuneate to nearly rounded, base angle 45°—70°; acumen 5—20(—35) mm, irrespective of the length of the leaf; margin mostly finely glandular dentate or undulate. *Midrib* above prominent to slightly

sulcate, finely puberulous, pilose, or glabrous, beneath prominent and silky to pilose; nerves (4—)6—11 pairs, beneath mostly rather inconspicuous, faintly prominent, often looped and joined near the margin or at some distance from it; reticulation rather coarse, beneath faintly prominent, even less conspicuous than nerves. *Inflorescence* axillary, usually a spike (or raceme, but pedicels very short), up to 3(—7) cm long, rarely a few-flowered fascicle; axis (sparsely) pubescent, pilose or villous, or with 2 kinds of indument. Bracts ½—2 mm, bracteoles ½—1½ mm, both persistent but falling in fruit, broadly ovate, rarely triangular or circular, appressedly (long) pubescent or sericeous, rarely nearly glabrous. Pedicel 0—1(—2) mm. *Calyx* mostly sparsely appressedly fine short hairy or (sparsely) pubescent, or only the tube glabrous, rarely fully glabrous; tube ½—1½ mm high, lobes sometimes ciliate, about elliptic (or broadly triangular, with blunt, rarely acute, tip), irrespective of the length of the tube ½—1½ mm long. *Corolla* 2½—4 mm. *Stamens* 15—40, at most 2 mm longer than corolla. *Disk* 5-glandular, mostly (with the style base) shortly pilose to sericeous, rarely glabrous or minutely pilose. *Style* about as long as to 2 mm longer than corolla with small peltate stigma. *Fruit* ellipsoid (to orbicular), 3—5 by 2—5 mm, excluded the persistent calyx lobes which form a blunt beak on top; mesocarp thin, endocarp woody, smooth. *Seed* 1, filling the whole fruit, with U-shaped embryo.

Distribution. N. India, Indo-China, China, Hainan, Japan, Ryu Kyu Is., Formosa, and the Philippines.

INDIA. Assam: *T. R. Chand 5676, 5706, 6367*; *Griffith 3648*; *Hooker f. & Thomson 50*; *W. N. Koelz 28863, 33654*, Khasia Hills, alt. 1000–1200 m; *Rep. Ec. Prod.* (= *Watt*) *10393*, Sibsagar.

INDO-CHINA. Annam: *E. Poilane 7219*, Bana, Tourane, alt. 1500 m. – Tonkin: *Pételot 7825*, Chapa, alt. 1500 m; *W. T. Tsang 26887*, Moncay; *27362, 30648*, Tienyen.

CHINA. Szechwan: *Bock & von Rosthorn 501*; *W. P. Fang 822a, 5696, 5799*, Nanchuan Hsien. – Kweichow: 8 collections. – Kwangsi: 16 collections. – Hainan: *Chun & Tso 44208*, Fan Yah, alt. 1300 m; *F. C. How 73211*, Po Ting, alt. 900 m; *S. K. Lau 25927*, Bak sa; *62959*, Yiai Hsien; *H. Y. Liang 63452*. – Hunan: *Fan & Li 211*, Changning Hsien, alt. 700 m; *Handel-Mazzetti 11132*, Wukang, alt. 900–1150 m; *W. T. Tsang 23433, 23485*, Yi Chang Distr. – Hupeh: *H. C. Chow 1853*, Enshih Hsien. – Kiangsi: 8 collections. – Kwangtung: *c.* 40 collections. – Hong Kong: *c.* 25 collections. – Fukien: 7 collections. – Chekiang: 5 collections. – Formosa: 14 collections, alt. 500–2500 m.

JAPAN. Honshu: *G. Murata 636*, Kyoto. – Kyushu: several collections. – Ryu Kyu Islands: Amani-Oshima: *S. Hatusima 19917, 20294*; Tokonoshima: *S. Hatusima 19150*; Okinawa: *T. Amano 10472*; *J. T. Conover 1138*, alt. 300 m; *Field & Loew 101c.* on cliff along shore; *Sonohara c.s. 6303*, riverside.

PHILIPPINES. Luzon: many collections, alt. 400–2500 m. – Mindoro: *BS 40591*, Mt. Halcon. – Panay: *FB 32431*, Antique Prov. – Negros: *FB 13684*; *Merrill 6987*, Canlaon volcano. – Mindanao: 8 collections.

Ecology. Very diverse, from dense woods to steep open places, along streams and even along the coast.

Palynology. The pollen belong to Van der Meijden's pollen type 2.1 (*Elmer 8805*, '*S. depauperata*'). Most of the other species belonging to this pollen type possess straight embryos.

Note. The type of *S. tythantha* Gontsch. possesses abnormal flowers.

60. Symplocos longifolia Fletcher — Pl. 20 f-h.

S. longifolia Fletcher, Kew Bull. (1937) 505; Fl. Siam. En. 2 (1938) 388. – *S. caryophylloides* (*non* Zoll.) Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 276; Fl. Gén. I.-C. 3 (1933) 997, t. 115, f. 1. – Type: *Winit 1435* (K, isotype in E), Thailand, Maharat, Lampang.

Shrub or tree to 10 m. Twigs glabrous, shoots mostly long; terminal buds small, pubescent. *Leaves* obovate to elliptic, 11—24(—40) by 4—6(—9) cm, index 2.4—4, glabrous, glossy above, opaque, darker coloured (olive) beneath; base cuneate, attenuate, base angle 15°—30°; acumen 7—15(—20) mm, tip usually acute; margin crenate to dentate. *Nerves* 6—11 pairs, curved upwards and joined into a distinct intramarginal vein; secondary veins faintly prominent, often just visible, tertiary veins often forming a rather fine reticulation which is only visible with a hand-lens. *Petiole* narrowly winged, 5—12 mm. *Inflorescence* forming a short cone in bud, growing out to 4(—7) cm; axis glabrous. Bracts caducous appressedly pubescent, (broadly) boat-shaped, ovate-to nearly orbicular, 3—7 mm; bracteoles caducous with same shape and indument. *c.* 2 mm. Pedicel 0—1 mm. *Calyx tube* glabrous, 1—1½ mm; limb 1½—2 mm, lobes appressedly pubescent, semi-elliptic, 1¼—2 mm. *Corolla c.* 6 mm. *Stamens c.* 70, up to 8 mm. *Disk* 5-glandular, flat, hairy (sericeous). *Style* stout, hairy only at the base, 6 mm, with peltate stigma. *Fruits* ± ovoid, gradually narrowed towards the apex, sessile or pedicel up to 1 mm, 15—28 by 4—10 mm; mesocarp fleshy, thin (*c.* ½ mm); stone with low but distinct ridges on the outside, woody. *Seed* 1, straight, with straight embryo.

THAILAND. Payap: *Winit 230* (*non vidi*), Lampun, alt. 600 m. – Maharat: *Winit 1435*, *1597*, Lampang, alt. 200 m – Udawn: *Kerr 8531*, Nawnkai, Chanjaburi, alt. 200 m.

INDO-CHINA. Cambodia: *Bejeaud 399*; *Godefroy 13*, I. de Phu Quoc; *299*, bords de la rivière Pursat; *Harmand 299*. – Laos: *Harmand 1212*, bassin d'Attopeu; *J. E. Vidal 4351*, Prov. Borikhane, Ban Phon Ngam; *4518*, Prov. Sedone, Paksé.

61. Symplocos lucida (Thunb.) S. & Z.

S. lucida (Thunb.) S. & Z. Fl. Jap. 1 (1835) 55, t. 24, *excl. syn. Myrtus laevis*; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 921; Ohwi, Fl. Jap. (1965) 727. – *Laurus lucida* Thunb. Fl. Jap. (1784) 174. – *Hopea lucida* Thunb. Ic. Fl. Jap. (1800) t. 4. – *S. japonica* DC. Prod. 8 (1844) 255; S. & Z. Fam. Nat. 2 (1846) 133; Miq. Prol. Fl. Jap. (1867) 265; Brand, Pfl. R. Heft 6 (1901) 31; Hayata, Ic. Pl. Form. 5 (1915) 103; Mori, Sylvia 5 (1934) 233; Kanehira, Form. Trees (ed. 1936) 590, t. 547; Walker, Imp. Trees Ryu Kyu (1954) 264, t. 169. – *Bobua japonica* Miers, J. Linn. Soc. Bot. 17 (1879) 306. – *Bobua lucida* Kanehira & Sasaki, List Pl. Form. (1928) 331. – *Dicalyx lucida* Hara, En. Sperm. Jap. (1948) 105. – Type: *Thunberg* (UPS), Japan. The drawing of *Hopea lucida* in Thunberg Ic. Fl. Jap. is made after the type.

S. theaefolia D. Don, Prod. Fl. Nepal. (1825) 145; G. Don, Gen. Syst. 4 (1837) 2, *excl. syn. S. attenuata* Wall. *ex* DC.; Clarke, Fl. Br. Ind. 3 (1882) 575; Brand, Pfl. R. Heft 6 (1901) 66 ('*S. theifolia*'); Brandis, Indian Trees (1906) 441; Gamble, Fl. Pres. Madras 5 (1923) 784; Backer & Bakh. *f.* Fl. Java 2 (1965) 205. – *Eugeniodes theaefolium* O. K. Rev. Gen. Pl. 2 (1891) 409. – *S. racemosa* (*non* Roxb.) DC. Prod. 8 (1844) 255; Brandis, For. Fl. (1874) 300. – Type: *Hamilton* (BM), Nepal, Narainhetty.

Dicalyx ciliatus Blume, 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; Koord. Atlas 2 (1914) t. 389. – *Eugeniodes ciliatum* O.K. Rev. Gen. Pl. 2 (1891) 975. – Type: *Blume 1598* (L, isotype in BO), Java, Mt. Tjeremai.

S. lucida Wall. [Cat. (1831) 4414, *nomen*] *ex* G. Don, Gen. Syst. 4 (1837) 3; DC. Prod. 8 (1844) 225; Kurz, For. Fl. Burma 2 (1877) 144; J. As. Soc. Beng. 46, 2 (1877) 238, t. 2. – *Lodhra lucida* Miers, J. Linn. Soc. Bot. 17 (1879) 299. – Type: *Wallich 4414* (K-W, isotypes in BM, CGE, G, LE).

S. crassifolia Benth. Fl. Hongk. (1861) 212; Brand, Pfl. R. Heft 6 (1901) 31; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 17. – *Lodhra crassifolia* Miers, J. Linn. Soc. Bot. 17 (1879) 302. – Type: *Champion 136* (K), Hong Kong, Mt. Victoria.

S. phyllocalyx Clarke, Fl. Br. Ind. 3 (1882) 575; Brand, Pfl. R. Heft 6 (1901) 31; Brandis, Indian Trees (1906) 438; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 16. – Lectotype: *Herb. Ind. Or. Hk. f. & Th. coll. Hook. f. 54* (K, isotypes in CGE, L, P, W), Sikkim.

S. setchuensis Brand, Bot. Jahrb. 29 (1900) 528; Pfl. R. Heft 6 (1901) 31; Rehder & Wilson, J. Arn. Arb. 8 (1927) 187; Rehder, J. Arn. Arb. 15 (1934) 296; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 13. – Syntypes: *Bock & von Rosthorn 928* (*non vidi*), *976* (W, sterile), China.

S. acutangula Brand, Pfl. R. Heft 6 (1901) 65; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 16. – Lectotype: *Warburg 5855* (K), China, Futschan.

S. henryi Brand, Pfl. R. Heft 6 (1901) 67; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 16. – Lecto(iso)type: *Henry 11415* (K), China, Yunnan.

S. warburgii Brand, Pfl. R. Heft 6 (1901) 66; Brandis, Indian Trees (1906) 441. – Type: *Warburg 560* (B†), India, Nilgiri.

S. tanakae Matsumura, Bot. Mag. Tokyo 15 (1901) 79. – *Bobua tanakae* Masamune, Prel. Rep. Veg. Yak. (1929) 110. – *Dicalyx tanakae* Hara, En. Sperm. Jap. 1 (1948) 107. – Type: *S. Tanaka 436* (*non vidi*), Japan, Tanegashima I.

S. multipes Brand, Fedde Repert. 3 (1906) 216; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 16. – Syntypes: *Wilson 4* (K, W), *Farges 796a* (P), China.

S. discolor Brand, Fedde Repert. 3 (1906) 216; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 15. – Type: *Delavay 4331* (P, isotype in K), Yunnan.

S. wilsonii Brand, Fedde Repert. 3 (Dec. 1906) 216, *non* Hemsley (July 1906). – *S. ernestii* Dunn, J. Linn. Soc. Bot. 34 (1911) 499; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 13; Li, J. Arn. Arb. 25 (1944) 424. – Lectotype: *Wilson 58* (E, isotypes in A, E, K, NY, P), China, Hupeh.

S. ridleyi King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 239; Ridl. Fl. Mal. Pen. 2 (1923) 302. – Type: *Ridley 5684* (K, isotypes in BM, SING), Singapore, Kranji.

S. coronigera Lévl. Fedde Repert. 10 (1912) 431; Rehder, J. Arn. Arb. 15 (1934) 296. – Type: *Cavalerie 3106* (E, isotype in P), Kweichow, Ma-jo.

S. argyi Lévl. Fedde Repert. 10 (1912) 431. – Type: *d'Argy* (E, isotype in A, L), Kiangsu, Longtze.

S. loheri Brand, Phillip. J. Sc. 7 (1912) Bot. 32; Merr. En. Philip. 3 (1923) 300. – Type: *Loher 6192* (K), Luzon, Rizal Prov., Angiloc.

S. xanthoxantha Lévl. Bull. Géogr. Bot. 24 (1914) 283. – Type: *E. E. Maire* (E), Mo-Tsou, alt. 3000 m, April 1913.

S. laeviramulosa Elmer, Leafl. Philip. Bot. 7 (1914) 2323; Merr. En. Philip. 3 (1923) 300. – Type: *Elmer 14123* (BISH, BM, BO, E, K, L, LE, P, W), Philippines, Mindanao, Cabadbaran.

S. glomeratifolia Hayata, Ic. Pl. Form. 5 (1915) 100, t. 27; Mori, Sylvia 5 (1935) 230; Kanehira, Form. Trees (ed. 1936) 589; H. L. Li, Woody Fl. Taiwan (1963) 744. – Type: *S. Sasaki, 1911* (*non vidi*), Formosa, Arisan.

S. ilicifolia Hayata, Ic. Pl. Form. 5 (1915) 102, t. 29; Mori, Sylvia 5 (1934) 232; Kanehira, Form. Trees (ed. 1936) 589, t. 546. – *Bobua ilicifolia* Kanehira & Sasaki, List Pl. Form. (1928) 331, *non vidi*; Sasaki, Cat. Govt. Herb. (1930) 407. – Type: *Mori 2688* (*non vidi*), Formosa.

S. japonica var. *nakaharai* Hayata, Ic. Pl. Form. 5 (1915) 103. – *Bobua japonica* Miers var. *nakaharai*

Sasaki, Cat. Govt. Herb. (1930) 407; Nemoto, Fl. Jap. Suppl. (1936) 581. – *S. nakaharai* Masamune, Trans. Nat. Hist. Soc. Form. 30 (1940) 62. – Type: *G. Nakahara* (*non vidi*), Formosa, Nagotake, April 1907.

S. sinuata Brand, Fedde Repert. 14 (1916) 326; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 14. – Lectotype: *Henry 13401* (A, isotype in K), Yunnan.

S. elephantis Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 279; Fl. Gén. I.-C. 3 (1933) 998. – Lectotype: *Poilane 341* (P, isotypes in BM, BO, W), Cambodia, Mts. de l'Eléphant.

S. potanini Gontsch. Not. Syst. Ross. 5 (1924) 100. – Type: *Potanin* (*non vidi*), Szechwan, Mt. Omei, 2-4-1893.

S. howii Merr. & Chun *ex* Li, J. Arn. Arb. 25 (1944) 211. – Type: *F. C. How 73286* (A), Hainan, Poting.

Shrub or tree up to 15(—30) m high. Twigs glabrous (or rarely puberulous at one side of the youngest part), mostly (yellowish) green, angular when dry; growth discontinuous. Terminal buds often large with glabrous (or rarely ciliate or puberulous towards the margins), coriaceous scales which leave obvious scars; often innovations within the scales pubescent, sometimes the scales themselves hairy at their inner sides. *Leaves* coriaceous, glabrous (narrowly) elliptic or rarely ovate or obovate, often yellow or yellowish green-brown, 5—12(—15) by 2—4½ cm, index 2—4; base cuneate (to rounded), attenuate, apex acute or obtuse, acumen 5—25 mm, in Japan sometimes apex cuneate or rounded, margin revolute, entire or glandular dentate. *Midrib* more or less prominent on the upper surface, often sulcate (at least towards the base), prominent on the undersurface; nerves 5—15 pairs, *prominent* on both upper and undersurface, usually meeting in a fine intramarginal vein; reticulation mostly prominent above, a very fine reticulation often also prominent on the undersurface in the Himalayan area, Java and Indo-China; in the rest of the area the reticulations mostly obscure beneath. *Petiole* narrowly winged, 5—15(—20) mm long. *Inflorescence* a basally branched short, dense raceme or condensed spike, 1½—4 cm long; axis mostly puberulous or pubescent. Bract and bracteoles glabrous, or sometimes pubescent or puberulous on the midrib and base (rarely throughout) mostly keeled, usually with cordate base, semi-orbicular to semi-elliptic (to triangular), ciliate to ciliolate. 1—3 mm long. Pedicels with same indument as inflorescence axis. 0—5 mm. *Calyx* mostly glabrous, tube ½—2 mm, limb 1—3 mm, lobes often slightly shorter, ciliate to ciliolate, rarely somewhat appressedly pubescent in the middle. *Corolla* 3—5 mm. *Stamens* 10—70, in 5 distinct bundles, mostly becoming longer than the corolla. *Disk* densely hairy (woolly-sericeous). *Style* glabrous, or hairy, mostly towards the base, ± as long as the corolla or much shorter. *Fruits* subtended by the persistent bract and bracteoles and crowned by the calyx lobes, ellipsoid (to rarely nearly orbicular), 1—3-celled, 5—18(—20) mm by 4—13(—15) mm; the wider ones only in Java and then 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 two legs of the U are either separated by a septum or not, in the latter case they can be connivent or may be even connate, but the embryo stays U-shaped; when the septum is present there seem to be 2 seeds in cross-section, each with an embryo.

Distribution. N. India, N. Burma, N. Thailand, Indo-China, China, Hainan, Japan,

Ryu Kyu Is., Formosa, and Malesia except the Moluccas and New Guinea.

INDIA. N. India: *c.* 20 collections, alt. 1500–3600 m. – Nepal: 8 collections, alt. 1800–3200 m. – Sikkim: 5 collections, alt. 2100–2700 m. – Bhutan: *Ludlow, Sherriff & Hicks 18668*, Tunle, alt. 2700 m; *21477*, Julu Tsawan, alt. 2400 m; *Ludlow, Sherriff & Taylor 6780*, Chungkar. – Assam: 8 collections, alt. 1200–1800 m. – East Bengal: *Wallich 4414, 4418B p.p.* (L, LE), *4418D* (E, FI, LE, P), Sylhet.

BURMA. Arakan, Mt. Victoria: *Dickason 8527*; *F. Kingdon Ward 21936, 22745*; *R. Uniwin 3057*, alt. 2300–3000 m. – Upper Burma: *J. F. Rock 7393*, between Sadon and Yunnan border.

THAILAND. Doi Inthanon: *Nooteboom 832*, alt. 2570 m.

INDO-CHINA. Cambodia: *Pierre 632*; *Poilane 239, 431.* – Laos: *Poilane 15633*, Prov. Bassac, Plateau de Boloven; *15919*, Prov. Attapeu, Plateau de Boloven. – Annam: *Pételot 8873*, Prov. de Haut Donai, Blao, alt. 900; *Poilane 21008, 21778*, id., alt. 800 m; *31190*, Hue, alt. 1200–1500 m. – Tonkin: *Pételot 6201*, Thai Nguyen, Bat Nganh; *W. T. Tsang 30168*, Sai wong mo shan.

CHINA. SE. Tibet: *Ludlow c.s. 2746*, Chayul, alt. 2500 m; *3660*, Pachakshiri Distr., alt. 2700 m; *J. F. Rock 10234*, Champutong region, alt. 3000 m. – Yunnan: many collections, alt. 1500–3400 m. – Kansu: *J. F. Rock 12058, 12060*, Motzuping. – Szechwan: many collections, alt. 700–2800 m. – Kweichow: 8 collections. – Kwangsi: *c.* 10 collections. – Hunan: 7 collections, alt. 150–1200 m. – Hupeh: 7 collections. – Kwangtung: 12 collections. – Kiangsi: 6 collections, alt. 300–800 m. – Anhwei: *R. C. Ching 3114*, Li Shan, Chemen, alt. 1200 m. – Kiangsu: *d'Argy s.n.*, Tsang fou (A, E, L); *Y. L. Keng 2433.* – Chekiang: 13 collections, alt. 700–1400 m. – Fukien: 9 collections. – Hong Kong: *c.* 15 collections. – Hainan: 8 collections. – Formosa: *Keng & Kao 2614*, Mt. Daroko, alt. 2000 m; *Liao & Kao 1524*, Mt. Mao-i-li, Chu-tong, Hsi-Chu-Hsien, alt. 2000 m.

JAPAN. Honshu: *Togasi TNS 1800*, Hikarishi in Suwo. – Kyushu: *Hayakawa T 525*, Mt. Kinukasa; *Oldham 534, 535*, Nagasaki; *Togasi TNS 1427*, Uchinomaki in Higo. – Tsushima: *R. Moran 5381.* – Shikoku: *G. Murata 17978*, Pref. Kochi, Ouchicho, Hatagun. – Amami-Oshima: *S. Sako s.n.*, 11 Nov. 1956, Akakina, Kasari-Mura, alt. 30 m. – Okierabu: *Hatusima & Sako 21411*, Mt. Koshiyama; *21569*, Mt. Ohyama. – Okinawa: 6 collections.

SUMATRA. Eastcoast. Asahan: *Rahmat si Boeea 9320*; *H. S. Yates 2259*, alt. 500 m.

MALAY PENINSULA. Singapore. Kranji: *Ridley 5684, 6755.*

JAVA. West Java. Priangan: *Docters van Leeuwen 13136, 13176*; *van Steenis 4862*, G. Papandajan, alt. 2100–2500 m; *Koorders 8071*, Bandung. – Cheribon: *Houter 112*, Kuningan; *Blume 1598*; *van Steenis 12796*, 21 Dec. 1940 (A, L), Mt. Tjeremai, alt. 1800 m. – Central Java. Pekalongan: *Brinkman 376*; *Junghuln 419*; *Koorders 8116*, G. Slamet, alt. 2500 m; *Koorders 11029, 11074*; *van Slooten 398*; *van Steenis 4621*, G. Prahu, 2550 m. – Kedu: *Junghuhn s.n.* (in L & BO), Mt. Diëng; *Lörzing 278*, G. Sumbing, alt. 2100 m; *511*, G. Sendoro, alt. 2700 m. – Semarang: G. Telomojo: 6 collections. – East Java. Madiun: *Elbert 279, 280*, G. Lawu, alt. 2300–2800 m. – Kediri: *Ja 3041*, G. Wilis, alt. 1850 m. – Malang: *Backer s.n.*, 9-6-1929 (BO), G. Kembar, alt. 2800 m; *Docters van Leeuwen 12246, 12263*, G. Kawi, alt. 2700 m; G. Ardjuno, 5 collections, alt. 2400–3000 m. – Besuki: G. Ijang, 5 collections, alt. 2000–2600 m.

LESSER SUNDA ISLANDS. Bali: *Sarip 425*, G. Batu Kau, alt. 1900 m. – Lombok: *Elbert 2285, 2327*, G. Rindjani, alt. 2000–2650 m. – W. Sumbawa: *Kostermans 18476*, G. Batulanteh, alt. 800–900 m. – Flores: *E. Schmutz 1952*, W. Ruteng, Potjo Kasteno, alt. 1500 m.

CELEBES. SE. Bonthain: *Teysmann 13986.*

PHILIPPINES. Mindanao: *Elmer 14123*, Agusan, near Mt. Urdaneta, Cabadbaran; *PNH 9931*, Bukidnon Prov., Mt. Katanglad. – Luzon: *Loher 6192*, Rizal Prov., Angiloc.

62. **Symplocos macrocarpa** Wight *ex* Clarke.

S. macrocarpa Wight *ex* Clarke, Fl. Br. Ind. 3 (1882) 582; Brandis, Indian Trees (1906) 439; Gamble, Fl. Pres. Madras 5 (1923) 782. – Lectotype: *Wight 467* (K), India, Courtallum.

S. kanarana Talbot, J. Bomb. Nat. Hist. Soc. 11 (1897) 238; Brandis, Indian Trees (1906) 439; Gamble, Fl. Pres. Madras 5 (1923) 782. – Type: *Talbot 3673* (K), India, North Kanara.

Small or moderate-sized tree. Twigs pubescent; terminal buds small pubescent; scales only few, not leaving obvious scars; growth probably continuous. *Leaves* glabrous, ± elliptic, 8—21½ by 3—6½ cm, index 2.1—3.6; base acute to nearly rounded, base angle 20°—80°; apex acuminate, acumen 6—20 mm; margin denticulate or crenate. *Midrib* beneath minutely appressedly pilose to glabrous; nerves 5—12 pairs, meeting in a looped intramarginal vein, or only so towards the apex of the leaf; secondary veins transverse to nerves; reticulation fine, but hardly prominent beneath, or coarse. *Petiole* 5—10 mm. *Inflorescence* a spike to 4½ cm; axis pubescent. Bracts and bracteoles appressedly pubescent-tomentellous on both outer and inner surface, caducous, spathulate, 7—9 by *c.* 4 mm and narrowly elliptic, 4—6 by 1½—2 mm respectively. *Calyx* appressedly pubescent to tomentellous [but in ssp. *kanarana* the lobes (in young fruits) glabrous], tube 1½ mm high, limb 3—5 mm long, nearly wholly divided into the narrowly semi-elliptic to semi-ovate lobes. *Corolla c.* 4 mm (*sec.* Clarke). *Stamens c.* 40 (*sec.* Clarke). *Disk* 5-glandular, shortly pilose, at least in the centre. *Style base* hairy. *Fruits* 25—33 by 10—15 mm; mesocarp corky, thick; stone woody, with *c.* 8 high ridges.

Distribution. India: Deccan Peninsula.

KEY TO THE SUBSPECIES

1a. Nerves 9—12 pairs, intramarginal vein only towards the apex of the leaf. **62-3.** ssp. **macrocarpa**

b. Nerves 5—8 pairs, intramarginal vein from all the nerves. . . **62-2.** ssp. **kanarana**

62-1. ssp. **macrocarpa.**

S. macrocarpa Wight *ex* Clarke.

Leaves 8—21½ by 3—6½ cm, index 2.2—3.6; base angle 20°—50°; margin denticulate. *Nerves* 9—12 pairs, meeting in an intramarginal vein only towards the apex of the leaf; reticulations fine but hardly prominent. For the flowers see description of the species. *Fruits* 25—33 by 12—15 mm.

INDIA. Kerala: 6 collections, Travancore, Courtallum, alt. 600–750 m.

62-2. ssp. **kanarana** (Talbot) Noot., *comb. nov.*

S. kanarana Talbot, J. Bomb. Nat. Hist. Soc. 11 (1897) 238.

Leaves 9½—13 by 3.7—6 cm, index 2.1—2.6; base angle 30°—80°; margin crenate. *Nerves* 5—8 pairs, meeting in a conspicuous intramarginal vein; reticulation coarse. *Flowers* not seen. *Fruits* 25—30 by *c.* 10 mm.

INDIA. North Kanara: *Talbot 3673.* – Kerala: *Bourdillon 48*; *Lawson 67*, Travancore, alt. 150–350 m.

63. Symplocos macrophylla Wall. *ex* DC. — *Fig.* **4f, g.**

S. macrophylla Wall. [Cat. (1831) 4431, *nomen*] *ex* DC. Prod. 8 (1844) 257; Clarke, Fl. Br. Ind. 3 (1882) 578; Brand, Pfl. R. Heft 6 (1901) 61; Brandis, Indian Trees (1906) 439. – *Lodhra macrophylla* Miers, J. Linn. Soc. Bot. 17 (1879) 299. – Type: *Wallich 4431* (G-DC, isotypes in BM, K), India, Sylhet.

S. grandiflora Wall. [Cat. (1831) 4421, *nomen*] *ex* DC. Prod. 8 (1844) 257; Clarke, Fl. Br. Ind. 3. (1882) 578; Brand, Pfl. R. Heft 6 (1901) 54; Brandis, Indian Trees (1906) 440. – *Lodhra grandiflora* Miers, J. Linn. Soc. Bot. 17 (1879) 299. – Type: *Wallich 4421* (G-DC, isotypes in BM, CGE, K, L), India, Sylhet.

S. gardneriana Wight, Icones 4 (1848) 10, t. 1231; Neilgherry Pl. 2 (1851) 39, t. 144; Beddome, Fl. Sylv. (1872) t. 237; Clarke, Fl. Br. Ind. 3 (1882) 582; Brand, Pfl. R. Heft 6 (1901) 61; Brandis, Indian Trees (1906) 439; Gamble, Fl. Pres. Madras 5 (1923) 782. – *Lodhra gardneriana* Miers, J. Linn. Soc. Bot. 17 (1879) 300. – Type: *Wight 1704* (K, isotypes in L, P), India, Neilgherries.

S. microphylla Wight, Icones 4 (1848) 10, t. 1232; Neilgherry Pl. 2 (1851) 39, t. 145; Clarke, Fl. Br. Ind. 3 (1882) 581; Brand, Pfl. R. Heft 6 (1901) 61; Brandis, Indian Trees (1906) 438; Gamble, Fl. Pres. Madras 5 (1923) 784. – *Lodhra microphylla* Miers, J. Linn. Soc. Bot. 17 (1879) 300. – Lectotype: *Wight 1694* (K, isotypes in L, LE, P). India, Neilgherries.

S. bractealis Thwaites, En. Pl. Zeyl. (1860) 185; Beddome, For. Man. Bot. (1872) 151; Clarke, Fl. Br. Ind. 3 (1882) 584; Trimen, Fl. Ceyl. 3 (1895) 106; Brand, Pfl. R. Heft 6 (1901) 59. – *Lodhra bractealis* Miers, J. Linn. Soc. Bot. 17 (1879) 301. – Type: *Thwaites C. P. 174* (K, isotypes in BM, BO, CGE, FI, LE, P), Ceylon, Adam's Peak, March 1846.

S. hirsuta Wight & Gardn. *ex Thwaites*, En. Pl. Zeyl. (1860) 185, *non* DC. (1844). – *S. nervosa* DC. var. *hirsuta* Beddome, For. Man. Bot. (1872) 149. – *S. latiflora* Clarke, Fl. Br. Ind. 3 (1882) 585; Trimen, Fl. Ceyl. 3 (1895) 108. – Type: *Thwaites C. P. 368* (BM, BO, FI, K, P), Ceylon.

S. hirsuta Wight & Gardn. *ex* Thwaites var. *minor* Thwaites, En. Pl. Zeyl. (1860) 185 *p.p* – *S. minor* Clarke, Fl. Br. Ind. 3 (1882) 586; Trimen, Fl. Ceyl. 3 (1895) 109; Brand, Pfl. R. Heft 6 (1901) 64. – *S. elegans* Thwaites var. *angustata* Thwaites, En. Pl. Zeyl. (1860) 186, *pro coll. C.P. 155.* – Lectotype: *Thwaites C. P. 273* (BM, BO, FI, LE, P), Ceylon (excl. *Thwaites C. P. 2204*, see under *S. minor* var. *glabrescens* Clarke, 1882).

S. elegans Thwaites, En. Pl. Zeyl. (1860) 185; Beddome, For. Man. Bot. (1872) 151; Clarke, Fl. Br. Ind. 3 (1882) 586; Trimen, Fl. Ceyl. 3 (1895) 108; Brand, Pfl. R. Heft 6 (1901) 62; Livera, Ann. Roy. Bot. Gard. Perad. 10 (1927) 318. – *Lodhra elegans* Miers, J. Linn. Soc. Bot. 17 (1879) 301. – Type: *Thwaites C. P. 23 p.p.* (BM, CGE, FI, K, P), Ceylon.

S. cuneata Thwaites, En. Pl. Zeyl. (1860) 186; Clarke, Fl. Br. Ind. 3 (1882) 584; Trimen, Fl. Ceyl. 3 (1895) 107; Brand, Pfl. R. Heft 6 (1901) 61. – *Lodhra cuneata* Miers, J. Linn. Soc. Bot. 17 (1879) 301. – Type: *Thwaites C. P. 2920* (K, isotypes in BM, BO, CGE, FI, LE, P), Ceylon.

S. jucunda Thwaites, En. Pl. Zeyl. (1860) 186; Beddome, For. Man. Bot. (1872) 151; Clarke, Fl. Br. Ind. 3 (1882) 585; Trimen, Fl. Ceyl. 3 (1895) 107; Brand, Pfl. R. Heft 6 (1901) 61. – *Lodhra* jucunda Miers, J. Linn. Soc. Bot. 17 (1879) 301. – Type: *Thwaites C. P. 2435* (K, isotypes in BISH, BM, BO, FI, LE, MEL, P), Ceylon.

S. acuta Thwaites, En. Pl. Zeyl. (1860) 186; Beddome, For. Man. Bot. (1872) 151; Clarke, Fl. Br. Ind. 3 (1882) 584; Trimen, Fl. Ceyl. 3 (1895) 106; Brand, Pfl. R. Heft 6 (1901) 62. – *Lodhra acuta* Miers, J. Linn. Soc. Bot. 17 (1879) 301. – Type: *Thwaites C. P. 2681* (K, isotypes in BM, FI, P), Ceylon, Saffragam, alt. 2000 ft.

S. apicalis Thwaites, En. Pl. Zeyl. (1860) 187; Beddome, For. Man. Bot. (1872) 151; Clarke, Fl. Br. Ind. 3 (1882) 586; Trimen, Fl. Ceyl. 3 (1895) 110; Brand, Pfl. R. Heft 6 (1901) 53; Alston, in Trimen, Fl. Ceyl. 6 (1931) 187. – *S. apicalis* var. *strigosa* Thwaites, En. Pl. Zeyl. (1860) 187. – *Lodhra apicalis* Miers, J. Linn. Soc. Bot. 17 (1879) 302. – Type: *Thwaites C. P. 438* (K, isotypes in BM, BO, FI, P), Ceylon, Reigam Corle.

S. apicalis var. *glabrifolia* Thwaites, En. Pl. Zeyl. (1860) 187; Beddome, For. Man. Bot. (1872) 152; Alston, in Trimen, Fl. Ceyl. 6 Suppl. (1931) 187. – *S. glabrifolia* Brand, Pfl. R. Heft 6 (1901) 53. – Type: *Thwaites C. P. 2933* (K, isotypes in BM, CGE, FI, P), Ceylon, between Ratnapura and Galle.

S. coronata Thwaites, En. Pl. Zeyl. (1860) 187; Beddome, For. Man. Bot. (1872) 152; Clarke, Fl. Br. Ind. 3 (1882) 587; Trimen, Fl. Ceyl. 3 (1895) 11; Brand, Pfl. R. Heft 6 (1901) 51, t. 6. – *S. coronata* var. *obovata* Clarke, Fl. Br. Ind. 3 (1882) 587. – *Lodhra coronata* Miers, J. Linn. Soc. Bot. 17 (1879) 302. – Type: *Thwaites C. P. 127* (K, isotypes in BM, CGE, FI, LE, P), Ceylon, Central Prov., alt. 2000–4000 ft.

S. cordifolia Thwaites, En. Pl. Zeyl. (1860) 187; Beddome, For. Man. Bot. (1872) 151; Clarke, Fl. Br. Ind. 3 (1882) 586; Trimen, Fl. Ceyl. 3 (1895) 110; Brand, Pfl. R. Heft 6 (1901) 51, t. 5. – *Lodhra cordifolia* Miers, J. Linn. Soc. Bot. 17 (1879) 301. – Type: *Thwaites C. P. 271* (K, isotopes in BM, CGE, FI, LE, MEL, P), Ceylon, Central Prov., alt. 6000–7000 ft.

S. marginalis Thwaites, En. Pl. Zeyl. (1860) 187; Beddome, For. Man. Bot. (1872) 151; Clarke, Fl. Br. Ind. 3 (1882) 587; Trimen, Fl. Ceyl. 3 (1895) 110; Brand, Pfl. R. Heft 6 (1901) 50. – *Lodhra marginalis* Miers, J. Linn. Soc. Bot. 17 (1872) 301. – Type: *Thwaites C. P. 2688* (K, isotypes in BM, CGE, FI, LE, P), Ceylon, Ambagamowa Distr.

S. rosea Beddome, Trans. Linn. Soc. 25 (1866) 219; For. Man. Bot. (1872) 150; Icones (1874) t. CXV; Clarke, Fl. Br. Ind. 3 (1882) 583; Brand, Pfl. R. Heft 6 (1901) 54; Brandis, Indian Trees (1906) 440; Gamble, Fl. Pres. Madras 5 (1923) 783, – Type: *Beddome 4935* (BM, isotype in K), India, Anamallays, alt. 2000–4000 ft.

S. sulcata Kurz, J. As. Soc. Beng. 40, 2 (1870) 65; *op. cit.* 46, 2 (1877) 238; For. Fl. Burma 2 (1877) 145; Clarke, Fl. Br. Ind. 3 (1882) 579; Brandis, Indian Trees (1906) 440; Brand, Pfl. R. Heft 6 (1901) 57. – *S. sulcata* var. *pubescens* Kurz, J. As. Soc. Beng. 46, 2 (1877) 238. – *Lodhra sulcata* Miers, J. Linn. Soc. Bot. 17 (1879) 300. – Type: *Brandis (non vidi)*, India, Martaban, Dunat Pass, 4000 ft.

S. sulcata var. *glabrior* Kurz, J. As. Soc. Beng. 46, 2 (1877) 238. – Lectotype: *Kurz 1015* (K), Burma.

S. leiostachya Kurz, J. As. Soc. Beng. 42, 2 (1873) 89; *op cit.* 46, 2 (1877) 239; For. Fl. Burma 2 (1877) 144; Clarke, Fl. Br. Ind. 3 (1882) 580; Brand, Pfl. R. Heft 6 (1901) 57; Brandis, Indian Trees (1906) 440. – *Lodhra leiostachya* Miers, J. Linn. Soc. Bot. 17 (1879) 300. – Type: *Helfer 3656* (K, isotypes in LE, P), Tenasserim.

S. kurgensis Clarke, Fl. Br. Ind. 3 (1882) 576; Brand, Pfl. R. Heft 6 (1901) 62; Brandis, Indian Trees (1906) 441. – Type: *Thomson, Herb. Ind. Or. Hook. f. & Th. 31* (K, isotypes in L, LE, P), India, Kurg.

S. hohenackeri Clarke, Fl. Br. Ind. 3 (1882) 582; Brand, Pfl. R. Heft 6 (1901) 90; Brandis, Indian Trees (1906) 439; Brand, Bull. Herb. Boiss. II, 6 (1906) 749. – Type: *Hohenacker 456* (K, isotypes in BM, P), India, Mercara.

S. rosea var. *glabrior* Clarke, Fl. Br. Ind. 3 (1882) 583. – Lectotype: *Wight 1706* (K, isotype in LE), India, Cochin.

S. bractealis var. *revoluta* Wight & Gardn. *ex* Clarke, Fl. Br. Ind. 3 (1882) 584. – Type: *Walker* (K, isotype in E), Ceylon.

S. minor Clarke var. *eugenioides* Champ. *ex* Clarke, Fl. Br. Ind. 3 (1882) 586. – *S. eugenioides* Livera, Ann. Roy. Bot. Gard. Perad. 10 (1927) 317. – Syntypes: *Champion s.n.* (K) and *Walker 239* (K), Ceylon, Horton Plains.

S. minor var. *glabrescens* Clarke, Fl. Br. Ind. 3 (1882) 586. – *S. hirsuta* Thwaites var. *minor* Thwaites, En. Pl. Zeyl. (1860) 185, *pro coll. C. P. 2204.* – *S. glabrescens* Brand, Pfl. R. Heft 6 (1901) 64. – Type: *Thwaites C. P. 2204* (BM. FI. K, P), Ceylon, Central Prov.

S. hebantha Thwaites *ex* Clarke, Fl. Br. Ind. 3 (1882) 586; Trimen, Fl. Ceyl. 3 (1895) 109; Brand, Pfl. R. Heft 6 (1901) 62. – Type: *Thwaites C. P. 3918* (K, isotypes in BM, P), Ceylon, Songalla.

S. jucunda var. *diversifolia* Alston, in Trimen, Fl. Ceyl. 6 Suppl. (1931) 187. – *S. diversifolia* Brand,

Pfl. R. Heft 6 (1901) 62. – Type: *Thwaites C. P. 3454* (K, isotypes in BM, CGE, P), Ceylon, Saffragam.

S. amabilis Brand, Pfl. R. Heft 6 (1901) 63. – *S. elegans* Thwaites, En. Pl. Zeyl. (1860) 185, *pro coll. C. P. 23 p.p.* – Type: *Thwaites C.P. 23 p.p.* (BM, FI, K, P), Ceylon.

S. glandulifera Brand, Pfl. R. Heft 6 (1901) 68, t. 7; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 28. – Lectotype: *Henry 11260* (K), Yunnan, Meng-tze, 5000 ft.

S. yunnanensis Brand, Pfl. R. Heft 6 (1901) 68; Guillaumin, Fl. Gén. I.-C. 3 (1933) 1017; Fletcher, Fl. Siam. En. 2 (1938) 390; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 28. – Type: *Henry 12014* (B†, isotypes in A, E, K, NY), Yunnan.

S. hossei Brand *ex* Hosseus, Beih. Bot. Centralbl. 28-B (1911) 424, *nomen*. – Type: *Hosseus 185* (W, isotypes in BM, E, K, L, P, WRSL), Thailand, Doi Sutep.

S. kerrii Craib, Kew Bull. (1920) 304; Guillaumin, Fl. Gén. I.-C. 3 (1933) 1028; Fletcher, Fl. Siam. En. 2 (1938) 387. – Lectotype: *Kerr 890* (K, isotypes in BM, E), Thailand, Doi Sutep, 3400 ft.

S. barberi Gamble, Kew Bull. (1921) 219; Fl. Pres. Madras 5 (1923) 783. – Lectotype: *Barber 3066* (K), India, Kalivarjalpil, Tinnevelly.

S. rajaniana Craib, Kew Bull. (1922) 239. – Type: *Kerr 4684* (K, isotype in BM), Thailand, Doi Sutep, 1000 m.

S. evrardii Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 171; Fl. Gén. I.-C. 3 (1933) 1029. – Type: *Evrard 2032* (P), Annam, Dalat.

S. langbianensis Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 172; Fl. Gén. I.-C. 3 (1933) 1029. – Syntypes: *Poilane 18691* and *18715* (P), Annam, Langbian: grand sommet près et à l'est de Dankia.

S. kerrii var. *glabra* Fletcher, Kew Bull. (1937) 506; Fl. Siam. En. (1938) 387. – Type: *Kerr 5390* (K, isotype in BM), Thailand, Doi Pa Kao, 1800 m.

S. ifsiana C. E. C. Fischer, Kew Bull. (1940) 37. – Type: *Bor 22* (K), Assam, Naga Hills, Thevopesini.

S. pochinii C. E. C. Fischer, Kew Bull. (1940) 438. – Type: *Parkinson 4394* (E, isotype in K), Burma, Toungo Distr., Pathi.

S. subintegra Chatterjee, Kew Bull. (1948) 62. – Type: *Parkinson 323* (K), Burma, Myitkyina Distr.

Young twigs glabrous or (often only innovations) with various kinds of indument. Growth discontinuous. *Leaves* very variable, 1.7—20 by 1½—9 cm (to 40 by 15 cm in ssp. *cordifolia*), index 1.3—6; base cuneate to cordate, base angle 20°—130°; apex acute or rounded to caudate, acumen 0—4 cm; margin entire, or more often glandular dentate or denticulate. *Nerves* 6—18 pairs, curved upwards and meeting in a looped intramarginal vein, but in ssp. *grandiflora* mostly produced along the margin and intramarginal vein sometimes present for the uppermost nerves; secondary veins often transverse to nerves; reticulation fine, sometimes only visible by using a hand-lens. *Petiole* (0—)2—15(—20) mm. *Inflorescence* a fascicle, short spike or raceme, sometimes up to 11 cm. Bracts and bracteoles persistent or caducous. *Calyx* glabrous or with various kinds of indument, tube (½—)1—2 mm high, limb 1½—4 mm, nearly wholly divided into the semi-elliptic, acute or rounded lobes, or lobes *c.* ½ mm shorter than limb. *Corolla* 2½—9 mm. *Stamens* 30—more than 100. *Disk* 5-glandular, or pulvinate 5-stellate, hairy at least in the centre, included the conical style base. *Style* often hairy halfway up. *Fruits* ovoid to ellipsoid to cylindrical, 6—20 by 3—8 mm; stone with smooth surface or lengthwise grooved, sometimes with a depression or transverse groove at one side near the base. *Seed* 1, ovoid to cylindrical; embryo straight or S-shaped curved.

Distribution. Mainly in India and Ceylon, also in Burma, Thailand, Indo-China, and S. China.

Note. The variability of this species results in the species description being rather vague. There are only few characters common to all the infraspecific taxa, but the nearly continuous variation makes it necessary to unite them. It is not surprising that some collections do not fit in any of the infraspecific taxa. The collections *Koelz 32654*, *32709*, and *32816*, all from Assam, Lushai hills, belong together, and are intermediate between ssp. *grandiflora* and ssp. *sulcata* var. *sulcata*; as there are no flowers I refrain from describing a new taxon.

KEY TO THE SUBSPECIES

1a. Nerves 7—13 pairs running along the margin, but at most the apical 2—3 nerves meeting in an intramarginal vein. Leaves glabrous to sparsely minutely pilose beneath, 7—18 cm, index 2.6—5.2. Inflorescence a raceme, (5—)6—11 cm. Calyx glabrous. . . . . **63-16.** ssp. **grandiflora**

b. Nerves meeting in an intramarginal vein. Inflorescence a fascicle, spike or raceme, rarely exceeding 5 cm. 2

2a. Calyx lobes acute (the very tip!) 3

b. Calyx lobes rounded (the very tip!). 5

3a. Leaves 3—6 cm. . . . . **63-7.** ssp. **microphylla**

b. Leaves 7½—20 cm. 4

4a. Leaves 7½—20 cm, index 2.7—6; acumen 5—40 mm. Petiole 6—20 mm. Inflorescence a fascicle, or a raceme to 3 cm. Calyx appressedly sericeous, pilose, pubescent or tomentose, limb 1—2 mm. Stamens 30—50. Fruits ellipsoid to cylindrical, 6—10 mm. . . . . **63-9.** ssp. **sulcata**

b. Leaves 7½—15 cm, index 2—3.2; acumen 6—13 mm. Petiole 3—12 mm. Inflorescence a spike or raceme to 3(—10) cm. Calyx tube glabrous or pubescent, limb appressedly pubescent, 2—3 mm. Stamens 30—100. Fruits ovoid, 12—20 mm. **63-8.** ssp. **rosea**

5a. Stamens 30—*c.* 50. Inflorescence a raceme or fascicle. Calyx limb 1—2½ mm. . 6

b. Stamens 60—more than 100. Inflorescence a spike or raceme. Calyx limb 1½—4 mm. 7

6a. Leaves 7½—20 cm. . . . . **63-9.** ssp. **sulcata**

b. Leaves 3—6 cm. . . . . **63-7.** ssp. **microphylla**

7a. Leaves usually subverticillate at the end of the flushes. Base cordate to auriculate, or rounded. Nerves 11—18 pairs. Bracts persistent under the fruit. Calyx tube glabrous or appressedly sericeous. . . . . **63-12.** ssp. **cordifolia**

b. Leaves not subverticillate. Base cuneate to cordate, not auriculate. Nerves 6—13 pairs. 8

8a. Leaves 3½—20 cm, index 1½—4, glabrous, or the midrib beneath appressedly hairy or the undersurface spreadingly pubescent to tomentose, especially on midrib and nerves; base angle 20°—100°. Nerves 7—13 pairs. Petiole 2—25 mm.

Calyx tube glabrous, or appressedly (long) pubescent to sericeous. Fruit 10—20 by 3—8 mm. . . . . **63-1.** ssp. **macrophylla**

b. Leaves 1.7—8.5 cm, index 1.3—3; finely appressedly (long) pilose beneath, especially on the midrib; base angle 50°—120°. Nerves 6—10 pairs. Petiole 2—6 mm. Calyx tube glabrous. Fruit 6—12 by *c.* 5 mm. . . . . **63-17.** ssp. **hirsuta**

63-1. ssp. **macrophylla**

Twigs glabrous, appressedly hairy, tomentose or tomentellous. *Leaves* glabrous, or the midrib beneath appressedly hairy, or leaves spreadingly pubescent to tomentose, especially on midrib and nerves; (narrowly) elliptic, $3\frac{1}{2}$—20 by $1\frac{1}{2}$—9 cm, index $1\frac{1}{2}$—4; base cuneate to subcordate, base angle 20°—100°; apex acuminate, or rounded, acumen 0—15 mm; margin recurved to revolute, entire or dentate to denticulate. *Nerves* 7—13 pairs, much prominent beneath, meeting in a looped intramarginal vein, at least in the apical half of the leaf; secondary veins transverse to nerves, tertiary and quaternary veins forming a fine reticulation which is often only visible by hand-lens. *Petiole* 2—25 mm. *Inflorescence* a (short) raceme or spike to 6 cm; axis sparsely or densely appressedly to spreadingly (long) pubescent. Bracts and bracteoles persistent or caducous, glabrous or hairy, ovate, to elliptic, 4—10 mm and ovate-elliptic, 2—7 mm respectively. Pedicels 0—3 mm. *Calyx tube* glabrous, or appressedly (long) pubescent to sericeous, 1—2 mm high; limb 2—3 mm, lobes rounded as long as the limb or $\frac{1}{2}$ mm shorter, glabrous or appressedly long pubescent (sericeous). *Corolla* 4—8 mm. *Stamens* 60—more than 100. *Disk* 5-glandular or pulvinate 5-stellate, minutely pilose to sericeous. *Style* glabrous, or the base hairy, or with some long hairs halfway up, 3—6 mm. *Fruits* ellipsoid-ovoid to cylindrical, 10—20 by 3—8 mm; mesocarp thin, fleshy; stone with shallow lengthwise grooves; depressed at one side towards the base in var. *macrophylla* and var. *kurgensis*, narrowed towards the apex in var. *acuta*. *Seeds* straight or ovoid, often slightly S-shaped. Embryo straight or slightly curved.

Distribution. India and Ceylon.

KEY TO THE VARIETIES

1a. Twigs glabrous. Leaves glabrous, acumen 0—3 mm. . . . . **63-4.** var. **revoluta**

b. Twigs appressedly-hairy or tomentose to tomentellous, acumen of leaves 5—15 mm. 2

2a. Nerves in 6—8 pairs. Base angle 20°—30°. Petiole 5—7 mm. . **63-5.** var. **cuneata**

b. Nerves 8—12 pairs. Base angle (20°—)40°—90°. Petiole (5—)8—25 mm . . . 3

3a. Calyx tube glabrous, the limb appressedly silky. . . . . **63-6.** var. **kurgensis**

b. Calyx tube appressedly (long) pubescent or sericeous. 4

4a. Calyx limb glabrous. . . . . **63-3.** var. **acuta**

b. Calyx limb appressedly long pubescent. . . . . **63-2.** var. **macrophylla**

63-2. var. **macrophylla**

S. macrophylla Wall. - *S. gardneriana* Wight – *S. jucunda* Thwaites – *S. marginalis* Thwaites – *S. jucunda* var. *diversifolia* Alston – *S. ifsiana* C. E. C. Fischer.

Tree. Twigs stout, densely tomentellous or tomentose. Terminal buds with hairy scales. *Leaves* (narrowly) elliptic, spreadingly long pubescent or densely tomentose on nerves and midrib beneath, sparsely hairy on the blade beneath, 7—20 by $3\frac{1}{2}$—9 cm, index 1.5—3.8; base cuneate to rounded, base angle 20°—90°; apex (faintly) acuminate, acumen 5—15 mm; margin revolute, dentate-denticulate. *Midrib* much prominent beneath. *Nerves* 8—12 pairs, much prominent beneath, usually meeting in a looped intramarginal vein; secondary veins transverse to midrib and nerves; tertiary veins often only visible with a handlens, forming a moderately fine reticulation. *Petiole* 5—25 mm. *Inflorescence* a raceme to 5 cm; axis densely appressedly to spreadingly long pubescent. Bracts and bracteoles caducous, appressedly sericeous, the lowermost up to 10 and 7 mm long respectively. Pedicel stout, at most 2 mm. *Calyx tube* appressedly long pubescent to sericeous, *c.* 2 mm high; the limb appressedly long pubescent, 2—3 mm, often wholly divided into the rounded, $1\frac{1}{2}$—3 mm long lobes. *Corolla* 4—8 mm. *Stamens* often becoming 1—2 mm longer than corolla, 60—100. *Disk* 5-glandular, or pulvinate, 5-stellate, shortly pilose to sericeous. *Style* glabrous, only the very base hairy with the disk, or halfway up sericeous, *c.* 5 mm. *Fruits* ovoid-cylindrical, 13—20 by 6—8 mm; mesocarp thin, fleshy; stone with shallow lengthwise grooves, depressed at one side towards the base. *Seeds* straight or ovoid, often slightly S-shaped; embryo often slightly curved.

INDIA. Assam: 5 collections, Khasia and Naga Hills, alt. 1500–1800 m. – S. India: 11 collections, in the mountains, alt. 1500–2100 m.
CEYLON. *Beddome 4950*, Galle; *Thwaites C.P. 2435, 2688, 3454.*

63-3. var. **acuta** (Thwaites) Noot., *comb. nov.*

S. acuta Thwaites, En. Pl. Zeyl. (1860) 187.

Small tree. Twigs appressedly hairy. Terminal buds rather small, with several appressedly hairy scales. *Leaves* glabrous, or the midrib beneath appressedly hairy, ± elliptic, $6\frac{1}{2}$—$11\frac{1}{2}$ by 2—4 cm, index 2—2.8; base cuneate, base angle 40°—60°; apex acuminate, acumen 6—15 mm; margin recurved, entire. *Nerves* much prominent, 8—10 pairs, curved upwards and meeting in a looped intramarginal vein at least in the upper half of the leaf; secondary veins transverse to nerves, much prominent; tertiary veins less prominent, with the even less prominent quaternary veins forming a fine reticulation. *Petiole* 8—15 mm. *Inflorescence* a short raceme to $1\frac{1}{2}$ cm; axis densely appressedly pubescent. Bracts and bracteoles persistent with same indument, broadly ovate, boat-shaped, 4 mm long and ovate, boat-shaped, 2 mm long respectively. Pedicel up to 1 mm.

Calyx tube appressedly pubescent, 1 mm high; limb glabrous, $2\frac{1}{2}$ mm long, the lobes 2 mm, rounded. *Corolla* 4—5 mm. *Stamens c.* 100. *Disk* 5-glandular, shortly pilose. *Style* glabrous, *c.* 3 mm. *Fruits* nearly cylindrical, narrowed towards the apex, 12—13 by 3—4 mm; stone nearly smooth, with very shallow lengthwise grooves.

CEYLON. Only the type.

63-4. var. **revoluta** (Wight & Gardn. *ex* Clarke) Noot., *comb. nov.*

S. bractealis var. *revoluta* Wight & Gardn. *ex* Clarke, Fl. Br. Ind. 3 (1882) 584. – *S. bractealis* Thwaites.

A small tree or shrub. Twigs glabrous. Terminal buds with large, glabrous scales. *Leaves* glabrous, elliptic, $3\frac{1}{2}$—8 by $1\frac{1}{2}$—4 cm, index 1.7—2.4; base cuneate to subcordate, base angle 40°—100°; apex rounded to slightly acuminate, acumen 0—3 mm; margin strongly revolute, denticulate. *Nerves* 7—13 pairs, much prominent beneath, rather straight, meeting in a looped intramarginal vein; secondary veins transverse to nerves; tertiary veins less prominent, with the even less prominent quaternary veins forming a fine reticulation. *Petiole* 2—7 mm, often pilose in the groove above. *Inflorescence* a spike or raceme to 4 mm; axis sparsely pilose, nearly glabrous. Bracts and bracteoles persistent, broadly ovate, glabrous, but ciliate, 4—10 mm and 4—5 mm respectively. Pedicel up to 3 mm. *Calyx* glabrous, tube 2 mm high, limb 3 mm long, lobes rounded, $2\frac{1}{2}$—3 mm. *Corolla* 7 mm. *Stamens c.* 100. *Disk* 5-glandular, minutely pilose. *Style* often with pilose conical base, the rest glabrous, *c.* 6 mm. *Fruits* ellipsoid to ovoid, 10—15 by 6—7 mm, with thin, fleshy mesocarp; stone shallowly lengthwise grooved. *Seed* straight with straight embryo.

CEYLON. *c.* 5 collections, in the mountains, alt. 2100 m (once recorded).

63-5. var. **cuneata** (Thwaites) Noot., *comb. nov.*

S. cuneata Thwaites, En. Pl. Zeyl. (1860) 186.

Tree. Twigs densely appressedly rufous hairy. Terminal buds with several densely appressedly hairy scales. *Leaves* (narrowly) elliptic, appressedly pilose on midrib and nerves beneath, 6—$13\frac{1}{2}$ by 2—4 cm, index 2.4—4; base cuneate, base angle 20°—30°; apex slightly acuminate, acumen 7—10 mm; margin recurved, ± entire. *Nerves* 6—8 pairs, curved upwards and meeting in a looped intramarginal vein, reticulation as in var. *macrophylla*. *Petiole* 5—7 mm. *Inflorescence* and flowers as in var. *macrophylla*. *Fruits* ± cylindrical, narrowed towards the apex, 14—17 by *c.* 4 mm; stone with shallow lengthwise grooves. *Seed* and embryo straight.

CEYLON. *Beddome 4951*, Galle, Nilowe Hill; *Thwaites C.P. 2681*, Ratnapoora; *2920*.

63-6. var. **kurgensis** (Clarke) Noot., *comb. nov.*

S. kurgensis Clarke, Fl. Br. Ind. 3 (1882) 576. – *S. hohenackeri* Clarke – *S. hebantha* Clarke.

Twigs tomentose. Terminal buds small, with tomentose scales. *Leaves* especially on midrib and nerves spreadingly pubescent to tomentose or sparsely appressedly fine pilose beneath, ± elliptic, 9—14½ by 4—6½ cm, index 1.9—3.1; base cuneate to rounded, base angle 40°—90°; apex acuminate, acumen 5—15 mm; margin (revolute) glandular dentate to denticulate. *Nerves* much prominent beneath, 8—12 pairs, subparallel, meeting in a looped intramarginal vein; secondary veins transverse to nerves, reticulation often only visible by handlens, moderately fine. *Petiole* 10—20 mm. *Inflorescence* a raceme to 6 cm; axis densely spreadingly long soft hairy, hairs *c.* ½ mm. Bracts and bracteoles caducous, appressedly long pubescent, broadly ovate to elliptic, *c.* 7 mm and ovate to elliptic, *c.* 5 mm long respectively. Pedicel *c.* 1 mm, with same indument as axis. *Calyx tube* glabrous, *c.* 2 mm high, the limb wholly divided into 3 mm long densely appressedly silky rounded lobes. *Corolla* glabrous, 5 mm. *Stamens c.* 80. *Disk* 5-glandular, shortly pilose. *Style* glabrous, 5 mm. *Fruits* as in var. *macrophylla*.

INDIA. Mysore: *Hohenacker 456*, Mercara; *Herb. Ind. Or. Hook. f. & Th. 31*, Coorg.
CEYLON. *Thwaites C.P. 3981*.

63-7. ssp. *microphylla* (Wight) Noot., *comb. nov.*

S. microphylla Wight, Icones 4 (1848) 10, t. 1232.

Shrub. Twigs glabrous or appressedly pilose. Terminal buds with several glabrous or appressedly pilose scales. *Leaves* coriaceous, glabrous or sparsely appressedly pilose, especially on midrib and nerves, ± elliptic, 3—6 by 1.2—3.5 cm, index 1½—2½; base decurrent into the petiole, base angle 40°—50°; apex acute; margin revolute, glandular denticulate. *Nerves* 6—8(—10) pairs, straight, towards the margin curved upwards and meeting in a looped intramarginal vein; reticulation faintly prominent, rather coarse, the lesser veins mostly also obscure with translucent light. *Petiole c.* 5(—10) mm. *Inflorescence* a short raceme, forming a short cone in bud; axis densely pubescent-tomentose. Bracts enveloping the buds, soon caducous, appressedly pubescent broadly ovate, 3—6 mm; bracteoles later caducous, ovate, *c.* 2 mm. Pedicel 0—1 mm. *Calyx* glabrous; tube 1½ mm high; limb *c.* 2 mm long; wholly divided into the broadly elliptic acute or rounded, ciliate lobes. *Corolla* 5 mm. *Stamens c.* 50, shorter than corolla. *Disk* 5-glandular, densely pilose. *Style* with some hairs in the lower half, *c.* 4 mm. *Fruits* ovoid-elliptic, *c.* 15 by 8 mm, excluded the persistent calyx lobes; stone rather smooth, *c.* 15 by 7 mm, 3-celled. *Seeds* straight with probably straight embryo (not seen).

INDIA. Nilgiris: *Gamble 13432, 20586*; *Wight 1694, 4931*, alt. 2250–2400 m.

63-8. ssp. **rosea** (Beddome) Noot., *comb. nov.*

S. rosea Beddome, Trans. Linn. Soc. 25 (1866) 219 – *S. rosea* var. *glabrior* Clarke ÷ *S. barberi* Gamble.

Shrub. Twigs sparsely (appressedly) long pilose or glabrous. Terminal buds small, with several appressedly pilose scales. *Leaves* glabrous, ± elliptic-obovate, 7½—15½ by 3.6—6 cm, index 2—3.2; base cuneate to subcordate, base angle 30°—50°(—130°); apex acuminate, acumen 6—13(—15) mm; margin denticulate. *Nerves* 6—10(—13) pairs, curved upwards and meeting in a looped intramarginal vein; secondary veins faintly prominent, often only visible by hand-lens, transverse to midrib and nerves; reticulation fine, often only visible with translucent light. *Petiole* 3—12 mm. *Inflorescence* a raceme to 3½ cm; axis spreadingly (soft) pilose. Bracts and bracteoles appressedly pubescent, caducous, 3—6 and 2—3 mm long respectively. Pedicel to 2½ mm. *Calyx tube* glabrous or pubescent, 1½ mm high; limb appressedly pubescent, 2—3 mm, nearly wholly divided into the elliptic, acute lobes. *Corolla* 3—4 mm. *Stamens* 30—more than 100, shorter than corolla. *Disk* pulvinate, 5-glandular, sparsely pilose. *Style* glabrous, or some hairs towards the base, *c.* 4 mm. *Fruits* (narrowly) ovoid, 12—20 by *c.* 5 mm, with fleshy mesocarp; stone lengthwise grooved. *Seeds* and embryo straight.

INDIA. South India: *c.* 10 collections, Kerala and Madras, alt. *c.* 600 m.

63-9. ssp. **sulcata** (Kurz) Noot., *comb. nov.*

S. sulcata Kurz, J. As. Soc. Beng. 40, 2 (1870) 65.

Twigs tomentose, tomentellous, woolly or appressedly (long) pubescent, rarely soon glabrescent. Terminal buds small, with appressedly pubescent scales. *Leaves* spreadingly pubescent, arachnoid-hairy or (minutely) appressedly pilose beneath, narrowly (ovate-) elliptic, 7½—20 by 2.2—6.5 cm, index (2—)2.7—6; base cuneate (to nearly rounded), base angle 20°—70°; apex (long) acuminate, to even caudate, acumen 5—40 mm; margin (finely) glandular dentate. *Nerves* 6—17 pairs, curved upwards and meeting in a looped intramarginal vein; secondary veins transverse to nerves, sometimes only visible by hand-lens; reticulation fine, sometimes only visible with translucent light, sometimes obscure in thick leaves. *Petiole* (3—)6—20 mm. *Inflorescence* a fascicle, or a raceme to 3 cm from the axils of the upper leaves, forming a cone in bud in var. *sulcata*; axis densely patently or obliquely (long) pubescent or appressedly pilose to densely puberulous. Bracts and bracteoles persistent or caducous, appressedly pubescent or tomentose, 3—5 and 1½—4 mm long respectively. Pedicel to 2 mm. *Calyx tube* appressedly sericeous. pilose, puberulous, or tomentose, 1—1½ mm high; limb with same indument or less hairy, 1—2½ mm long, nearly wholly divided into the semi-elliptic to (rarely) triangular lobes, rarely calyx entirely glabrous. *Corolla* 2½—6 mm. *Stamens* 30—50, becoming 1—2 mm longer than corolla. *Disk* (low) pulvinate, 5-angular, sometimes obviously 5-glandular, densely hairy. *Style* glabrous or with some hairs towards the base, *c.* 5 mm. *Fruits* ellipsoid to cylindrical, 6—10 by *c.* 4 mm, mesocarp fleshy, very thin; stone with *c.* 10 lengthwise grooves. *Seeds* and embryo straight.

Distribution. Burma, Thailand, Indo-China, and China.

Note. A. R. K. Sastry 40917, from Shillong, NE. India, is deviating in the inflorescence becoming longer (10 cm) and the fruit being ovoid. This specimen is assumed to have originated from a crossing with a tree belonging to a taxon with long racemes *S. macrophylla* ssp. *sulcata* itself does not occur in the region.

KEY TO THE VARIETIES

1a. Nerves 7—12 pairs. Petiole *c.* 20 mm. . . . . **63-11.** var. **glandulifera**
b. Nerves 6—17 pairs. Petiole 6—13 mm. . . . . **63-10.** var. **sulcata**

63-10. var. **sulcata**

S. sulcata Kurz – *S. sulcata* var. *glabrior* Kurz – *S. yunnanensis* Brand – *S. hossei* Brand *ex* Hosseus – *S. kerrit* Craib – *S. rajaniana* Craib – *S. evrardii* Guillaumin – *S. langbianensis* Guillaumin – *S. kerrii* var. *glabra* Fletcher.

Shrub or tree to 15 m. Twigs tomentose, tomentellous, woolly, or appressedly (long) pubescent, rarely soon glabrescent. Terminal buds small, with appressedly pubescent scales. *Leaves* spreadingly pubescent or (minutely) appressedly pilose beneath, narrowly (ovate-)elliptic, 7½—20 by 2.2—6.5 cm, index (2—)2.7—6; base angle 20°—70°; apex faintly to long acuminate or sometimes caudate, acumen 6—40 mm; margin glandular dentate. *Nerves* 6—17 pairs, meeting in a looped intramarginal vein; secondary veins prominent, transverse to nerves; reticulation often fine and prominent, sometimes appearing to be less fine, in thick leaves even obscure with translucent light. *Petiole* (3—)6—13 mm. *Inflorescence* a fascicle or raceme to 3 cm, forming a cone in bud; axis densely patently or obliquely (long) pubescent or appressedly pilose to densely puberulous. Bracts and bracteoles caducous, appressedly pubescent, 3—5 and 1½—4 mm respectively. Pedicel to 2 mm. *Calyx* appressedly sericeous, pubescent or minutely pilose, tube 1—1½ mm high, limb 1—2½ mm long, nearly wholly divided into the semi-elliptic to rarely triangular, acute or rounded lobes; rarely calyx entirely glabrous. *Corolla* 2½—6 mm. *Stamens* 30—50. *Disk* (low) pulvinate, densely hairy, 5-angular, sometimes obviously 5-glandular. *Style* glabrous or with some hairs towards the base. *Fruits* elliptic to cylindrical, 7—9 by *c.* 4 mm, in Indo-China 6—7 mm long.

Distribution. As for the subspecies.

BURMA. Kachin: *Kingdon Ward 21321*, alt. 1000 m. – Shan States: *MacGregor 30, 1050*, alt. 1200–1750 m. – Pegu: *Kurz 1011, 1015*. – Tenasserim: *Gallatly 404*.

THAILAND. Payap: more than 20 collections, alt. 900–1800 m. – Maharat: *Kerr 4934, 4984*, alt. 1100–1700 m. – Pitsanulok: *Kerr 5932*, alt. 1000 m. – Udawn: *Flora of Thailand 33543*, Loi, alt. 1000 m. – Rachasima: *Kerr 20223*, Chanjapun, alt. 1000 m.

INDO-CHINA. Cambodia: *Pierre 938*, Kuang, alt. 1200 m. – Annam: *Evrard 2032*, Dalat; *Poilane 18691, 18715*, Langbiang, alt. 2000 m. – Tonkin: *Pételot 4770*; *Poilane 12631*, Chapa, alt. 2000 m.

CHINA. Yunnan: 12 collections, alt 1300–2300 m.

63-11. var. **glandulifera** (Brand) Noot., *comb. nov.*

S. glandulifera Brand, Pfl. R. Heft 6 (1901) 68, t. 7.

Twigs tomentose. *Leaves* arachnoid-hairy beneath glabrescent narrowly elliptic, 9½—18½ by 3—4½ cm, index 2.6—6; base cuneate, base angle 25°—60°; apex acuminate, acumen 5—17 mm; margin finely glandular denticulate (in one collection no glands), more than 8 glands to each cm. *Nerves* 7—12 pairs; secondary veins transverse to nerves, often only visible with a hand-lens; a very fine reticulation visible with translucent light. *Petiole c.* 20 mm. *Inflorescence* a fascicle. Bracts and bracteoles persistent, tomentose, *c.* 3 mm long. *Calyx* tomentose; tube 1½ mm high, limb 2 mm, nearly wholly divided into the semi-elliptic acute lobes. *Corolla c.* 5 mm, sparsely appressedly pilose towards the base. *Stamens c.* 40. *Disk* pulvinate, densely hairy. *Style* glabrous, *c.* 5 mm. *Fruits* nearly cylindrical, *c.* 10 by 4 mm.

CHINA. Yunnan: *Henry 10699, 11260, 11456*, Mengtze, alt. *c.* 1500 m; *H. T. Tsai 60146*, Ping Pien Hsien, alt. 1400 m. – Kwangsi: *S. P. Ko 55959*, Chen Pien Distr. – Hunan: *Fan & Li 154*, Changning Hsien, alt. 300 m.

63-12. ssp. **cordifolia** (Thwaites) Noot., *comb. nov.* — **Fig. 4f-g.**

S. cordifolia Thwaites, En. P. Zeyl. (1860) 187.

Twigs glabrous or (appressedly) pilose to pubescent. Terminal buds with large glabrous or hairy scales. *Leaves* glabrous or hairy beneath, nearly verticillate at the end of the flushes, between the whorls often small, caducous cataphylls; blade (narrowly) elliptic to obovate, 7—40 by 3—15 cm, index 1½—4½; base cordate-auriculate, rarely rounded, apex 0—15 mm. *Midrib* much prominent beneath. *Nerves* 11—18 pairs, much prominent beneath, curved upwards and meeting in a looped intramarginal vein at least in the upper half of the leaf; secondary veins transverse to midrib and nerves; reticulations fine. *Petiole* 0—15 mm. *Inflorescence* a spike or raceme to 8 cm from the axils of the upper leaves or from wood beneath them, the axis hairy. Bracts and bracteoles hairy, persistent under the fruit. 4—12 and 3—4 mm respectivelv. *Calyx tube* glabrous or appressedly sericeous, 1—2 mm high, limb appressedly hairy, 2—3½ mm long, wholly divided into the rounded lobes, or lobes 1—½ mm shorter than the limb. *Corolla* 6—8 mm. *Stamens c.* 100. *Disk* 5-glandular, centre hairy. *Style* with hairy base, or also hairy halfway up. *Fruits* ovoid-cylindrical, 8—14 by 6—7 mm; stone ovoid smooth or lengthwise grooved, often with a depression at one side near the base, or transversally grooved. *Seed* and embryo from nearly straight to S-shaped.

Distribution. Ceylon.

KEY TO THE VARIETIES

1a. Acumen of leaves 0—5 mm. Calyx tube glabrous. . . . . **63-13.** var. **cordifolia**
b. Acumen of leaves 5—15 mm. Calyx tube appressedly sericeous. 2
2a. Leaves 27—40 cm long. Petiole 0—5 mm. . . . . **63-15.** var. **glabrifolia**
b. Leaves 13—31 cm long. Petiole 5—15 mm. . . . . **63-14.** var. **apicalis**

63-13. var. **cordifolia**

S. cordifolia Thwaites.

Twigs glabrous, with ridges from the leaf insertions downwards. Terminal buds with many large, nearly glabrous scales, or margins of scales densely long pubescent. *Leaves* glabrous, elliptic to obovate, 7—14 by 3—6 cm, index 1.5—2.2; base cordate to auriculate; apex shortly acuminate to rounded, acumen 0—5 mm; margin strongly revolute, denticulate. *Nerves* 13—18 pairs, the lower ones very fine, pointing downwards, secondary veins many, transverse to nerves and midrib; tertiary and quaternary veins forming a rather fine reticulation. *Petiole* 1—5 mm. *Inflorescence*: several spikes crowded towards the end of the twigs; axis densely villous to long pubescent, to 8 cm long. Bracts and bracteoles appressedly sericeous, ovate to cordate, 6—12 and 3—6 mm respectively. *Calyx tube* glabrous, 2 mm; lobes rounded, appressedly sericeous, 3—3½ mm. *Corolla* 8 mm. *Stamens c.* 100. *Disk* 5-glandular, glabrous. *Style* with conical, densely long sericeous base, hairy halfway up, 7 mm. *Fruits* ovoid, *c.* 12 by 6 mm; stone ovoid, smooth, *c.* 10 by 5 mm. *Seed* slightly S-shaped curved with nearly straight embryo, *c.* 7 by 2 mm.

CEYLON. 7 collections, alt. 600–900 m (once recorded).

63-14. var. **apicalis** (Thwaites) Noot., *comb. nov.* — **Fig. 4f, g.**

S. apicalis Thwaites, En. Pl. Zeyl. (1860) 187. – *S. coronata* Thwaites.

Twigs sparsely appressedly pilose to long pubescent. Terminal buds with several appressedly pilose scales. *Leaves* sparsely appressedly pilose to spreadingly pubescent beneath, especially on midrib and nerves, elliptic to obovate, 13—31 by 5—15 cm, index 1.6—3.1; base (cuneate to) rounded to shortly cordate; apex acuminate, acumen 5—15 mm; margin nearly entire to denticulate. *Nerves* 11—16 pairs; secondary veins transverse to nerves and midrib; tertiary veins transverse to secondary ones; quaternary veins forming a fine reticulation. *Petiole* 5—15 mm. *Inflorescence* a spike from wood beneath the upper whorl of leaves, 5—7 cm, the axis tomentose. Bracts and bracteoles appressedly sericeous, broadly ovate, 4—7 and 3—4 mm respectively. Pedicel *c.* 1 mm. *Calyx tube* appressedly sericeous, *c.* 1 mm high; limb appressedly pubescent, 2½—3 mm

long, lobes rounded, 1—2½ mm. *Corolla* 6 mm. *Stamens c.* 100. *Disk* 5-glandular, with the style base sericeous. *Style* hairy only towards the base, 5 mm. *Fruit* ovoid to cylindrical, 8—14 by 6—7 mm; stone shallowly lengthwise grooved with a depression at one side towards the base, or transversally grooved. *Seed* and embryo from nearly straight to S-shaped.

CEYLON. *c.* 10 collections, alt. 600 m (once recorded).

63-15. var. **glabrifolia** (Thwaites) Noot., *comb. nov.*

S. apicalis var. *glabrifolia* Thwaites, En. Pl. Zeyl. (1860) 187.

Twigs glabrous or the youngest ones hairy. Terminal buds with many large glabrous or ciliate scales. *Leaves* glabrous, narrowly obovate, 27—45 by 6—11 cm, index 2.9—4.5; base cordate to auriculate; apex acuminate, acumen 7—12 mm; margin nearly entire. *Nerves* 13—17 pairs; secondary veins much prominent, transverse to the nerves; tertiary veins transverse to secondary veins; quaternary veins forming a fine reticulation. *Petiole* 0—5 mm. *Inflorescence* a raceme from the axils of the upper whorl of leaves or from wood beneath them; axis hirsute. Bracts and bracteoles hirsute, boat-shaped, elliptic to ovate, *c.* 5—15 and *c.* 3 mm respectively. Pedicel *c.* 1 mm. *Calyx tube* appressedly sericeous, 1½ mm high; limb sparsely appressedly pilose, 2—4 mm long, lobes rounded, 1—4 mm. The rest of the flower not seen. (Young) *fruits* ovoid, 13 by 6 mm, probably as in var. *apicalis*.

CEYLON. *Thwaites 2933*, between Ratnapura and Galle; *Ashton 2050*, Kanneliya F. R., S. province.

63-16. ssp. **grandiflora** (Wall.) Noot., *comb. nov.*

S. grandiflora Wall. ex DC. Prod. 8 (1844) 257 – *S. leiostachya* Kurz – *S. pochinii* C. E. C. Fischer – *S. subintegra* Chatterjee.

Shrub to large tree. Twigs glabrous, with few hairs, or the youngest spreadingly pilose. Terminal buds with appressedly pubescent or glabrous scales. *Leaves* glabrous to sparsely minutely pilose, especially on midrib and nerves, narrowly elliptic to obovate, 7—18 by 2—6½ cm, index 2.6—5.2; base cuneate to rounded, base angle (15°—)35°—90°; apex acuminate, acumen 7—12(—17) mm; margin nearly entire, or denticulate to sharply dentate. *Nerves* much prominent, 7—13 pairs produced along the margin, rarely the apical nerves meeting in an intramarginal vein; secondary veins prominent, transverse to the nerves; tertiary veins usually only visible with a hand-lens, forming a moderately fine reticulation. *Petiole* 6—15 mm. *Inflorescence* a raceme, 5—11 cm; axis glabrous, with few hairs or sparsely short pilose to densely pubescent. Bracts soon, bracteoles later caducous, glabrous or ciliate, 1½—3 and 1—2 mm respectively. Pedicel at most 3 mm.

Calyx glabrous; tube 1—2 mm; limb 1½—2 mm, nearly wholly divided into the semi-elliptic, rounded lobes. *Corolla* 3—6 mm. *Stamens* shorter to 2 mm longer than corolla, from 60 to more than 100. *Disk* low pulvinate, 5-glandular, sparsely to densely (soft) hairy. *Style* glabrous, 3—6 mm. *Fruits* ellipsoid, with fleshy mesocarp, 16—17 by 6—7 mm; stone with shallow lengthwise grooves, 12—13 by *c.* 5 mm. *Seeds* ovoid, with straight embryo.

Distribution. India, Burma, and Indo-China.

INDIA. Assam, Khasia Hills: *c.* 7 collections, most from Cherrapunjee, alt. 1200 m. – E. Bengal, Chittagong Hills: *King's coll. 296.*

BURMA. Myitkyina: *Parkinson 323.* – Sirhoi: *Kingdon Ward 18168*, alt. 2100 m. – Tungoo: *Po-chin 4394*, alt. 250 m. – Tenasserim: *Flora of Burma 10178*; *Helfer 3656.* – Mergui: *Parker 2366.*

INDO-CHINA. Laos: *Poilane 16030*, Prov. Banac.

63-17. ssp. **hirsuta** (Wight & Gardn. *ex* Thwaites) Noot., *comb. nov.*

S. hirsuta Wight & Gardn. *ex* Thwaites, En. Pl. Zeyl. (1860) 185 *p.p.*

Young twigs (often only innovations) with an appressed or patent indument of soft to rather stiff hairs which become as long as 2 mm in some individual plants. Terminal buds rather small, with several mostly hairy scales. *Leaves* coriaceous, (finely) appressedly (long) pilose beneath, especially on the midrib, glabrescent, rarely glabrous from the beginning, (broadly) elliptic, 1.7—8 by 1.2—3.5 cm, index 1.3—3(—4); base cuneate-cordate, base angle 50°—120°; apex acute to rounded, or acuminate, acumen 0—12 mm; margin often recurved to revolute, dentate or denticulate. *Nerves* 6—10 pairs, curved upwards and – at least in the apical half of the leaf – meeting in a looped intramarginal vein; secondary veins often transverse to nerves, reticulation fine, prominent beneath. *Petiole* 2—6 mm. *Inflorescence* an often slender spike or raceme to 3(—10) cm long; axis appressedly or patently hairy, sometimes flowers only towards the apex, and then towards the base of the axis several sterile bracts. Bracts elliptic to (broadly) ovate, 1—9 mm, bracteoles (narrowly) elliptic, 1—5 mm, both hairy, persistent. *Calyx* glabrous (or the lobes with some appressed hairs, more hairy towards the margin), tube (½—)1—1½ mm high, limb 1½—4 mm, lobes semi-elliptic, rounded, often ciliate, mostly ½ mm shorter than limb, sometimes becoming longer by tearing. *Corolla* 3—9 mm. *Stamens* 70—more than 100. *Disk* 5-glandular to 5-stellate, (shortly) pilose, especially in the centre. *Style* often with conical pilose base, in the lower half often with some hairs, 3—8 mm. *Fruits* ovoid-ellipsoid, 6—12 by *c.* 5 mm.

Distribution. Ceylon.

KEY TO THE VARIETIES

1a. Leaves acuminate, acumen 2—12 mm. 2

b. Leaves with acute to rounded, rarely shortly acuminate apex, acumen 0—2 mm. **63-20.** var. **minor**

2a. Calyx tube $\frac{1}{2}$—$1\frac{1}{2}$ mm high, the limb *c.* 2 mm long. . . . . **63-19.** var. **elegans**

b. Calyx tube *c.* $1\frac{1}{2}$ mm high, limb $3\frac{1}{2}$—4 mm long. . . . . **63-18.** var. **hirsuta**

63-18. var. **hirsuta**

Twigs patently long pilose, hairs *c.* 2 mm. Terminal buds with several small densely long-hairy scales. *Leaves* long pilose beneath, especially on the midrib, glabrescent, narrowly elliptic, $4\frac{1}{2}$—8 by 1.5—2.7 cm, index 2.4—4; base cuneate to rounded, base angle 50°—90°; apex shortly acuminate, acumen 2—7 mm; margin dentate. *Nerves* 6—8 pairs, curved upwards, in the upper half of the leaf meeting in a looped intramarginal vein; secondary veins transverse to the nerves, between them a fine reticulation prominent beneath. *Petiole c.* 5 mm. *Inflorescence* a spike to 5 cm, flowers often only towards the apex, but axis with sterile bracts towards the base, patently (long) hairy, hairs to 1 or to $1\frac{1}{2}$ mm long. Bracts and bracteoles long hairy, broadly ovate, 4—9 mm and narrowly elliptic, 3—5 mm respectively, in bud the bracts longer than the buds. *Calyx tube* glabrous, *c.* $1\frac{1}{2}$ mm high, limb $3\frac{1}{2}$—4 mm long, lobes semi-elliptic, ciliate, with some appressed hairs, often more hairs towards the apex, $2\frac{1}{2}$—3 mm long. *Corolla* $6\frac{1}{2}$—9 mm. *Stamens c.* 100. *Disk* 5-glandular or even 5-stellate, (obscurely) short-pilose in the centre. *Style* glabrous or with long pilose base, 7—8 mm.

CEYLON. *Moon 552*; *Macrae 704*; *Thwaites C. P. 368 p.p.*; *Wight 140*; *Walker 162.*

Notes. 1. *Thwaites C. P. 368* consists of 3 different taxa. One of them is *S. hispidula* Thwaites (in BM, BO, FI, K, P), one of them is *S. elegans* Thwaites (in MEL, P), at least the same as one of the plants belonging to its type and the third one is the very type of *S. hirsuta* Thwaites (BM, BO, K, MEL).

2. *Thwaites C. P. 3363* although undoubtedly belonging to this variety, deviates in the calyx tube being appressedly fine pilose.

63-19. var. **elegans** (Thwaites) Noot., *comb. nov.*

S. elegans Thwaites, En. Pl. Zeyl. (1860) 185 – *S. amabilis* Brand.

Young twigs densely rusty pubescent, (sparsely) hirsute or sparsely sericeous. *Leaves* (sparsely) finely appressedly pilose underneath, especially on the midrib, sometimes nearly glabrous, ± elliptic, 3—7 by $1\frac{1}{2}$—$3\frac{1}{2}$ cm, index $1\frac{1}{2}$—3; base cuneate to subcordate, base angle 50°—*c.* 90°; apex acuminate, acumen 5—12 mm; margin denticulate. *Petiole c.* 3 mm. *Nerves* 6—8 pairs, curved upwards and meeting in a looped intramarginal vein; reticulations fine, prominent. *Inflorescence* a slender, few-flowered, spike or raceme to 3(—6) cm long; axis rufous pilose. Bracts and bracteoles appressedly

pilose, 1—2 mm long, persistent. Pedicel 0, rarely 2—3 mm. *Calyx* glabrous, tube ½—1½ mm high, limb *c.* 2 mm long, the lobes semi-elliptic, rounded, 1—1½ mm, often becoming longer by tearing. *Corolla* 3—5 mm. *Stamens c.* 70. *Disk* 5-glandular, with the style base shortly pilose. *Style* with some hairs towards the base.

CEYLON. *Thwaites C. P. 23, 307.*

Note. Thwaites C. P. 23, which is the type of *S. elegans* Thwaites, consists of 3 or more different plants. The most complete duplicate is present in P, stitched on 2 different sheets. Because of the heterogeneity in this collection, Brand (1901) based his *S. amabilis* on one of these specimens. The characters, however, are so variable, that it is not in all cases possible to decide which plant is *S. amabilis*. The characters used by Brand '*ramulis hirsutis versus ramulis splendide ferrugineis, folia 3—6 cm longa versus folia 3—5 cm longa*' are of no use, because they vary even in a single specimen.

63-20. var. **minor** (Thwaites) Noot., *comb. nov.*

S. hirsuta var. *minor* Thwaites, En. Pl. Zeyl. (1860) 185 *p.p.* – *S. minor* var. *eugeniodes* Champ. *ex* Clarke – *S. minor* var. *glabrescens* Clarke.

Young twigs (densely) appressedly pilose-pubescent or patently long soft hairy, hairs to 2 mm, in innovations even densely sericeous. Terminal buds small, glabrous or pubescent. *Leaves* coriaceous, glabrous or (sparsely) appressedly (long) pilose beneath, especially on midrib and nerves, broadly (ovate-)elliptic, 1.7—5.5 by 1.2—3 cm, index 1.3—1.9; base cuneate to cordate, base angle 60°—120°; apex acute to rounded, rarely a short acumen to 2 mm; margin denticulate, recurved to revolute. *Nerves* 6—10 pairs, meeting in an intramarginal vein; reticulations fine, prominent beneath. *Petiole* 2—6 mm. *Inflorescence* a short spike or raceme to 3 cm; axis appressedly or patently (long) hairy. Bracts and bracteoles appressedly villous or sericeous, persistent, ovate (or elliptic) 2—4 mm long and (narrowly) elliptic, 1—2 mm respectively; pedicels 0—1 mm. *Calyx* glabrous, tube 1—1½ mm high, limb 1½—2 mm long, lobes ½ mm shorter, semi-elliptic, rounded. *Corolla* 5—6 mm. *Stamens c.* 100. *Disk* glandular 5-stellate, pilose, especially the centre and the style base. *Style* glabrous (except the base) or hairy towards the base, 3—6 mm. *Fruits* ovoid-ellipsoid, 10—12 by *c.* 5 mm.

CEYLON. *c*: 10 collections, alt. 2200 m (once recorded).

64. Symplocos maliliensis Noot., *sp. nov.*

Type: *Cel. II/374* (L, isotype in BO), Celebes, Malili, Usu, alt. 200 m.

Ramuli glabri gemmis apicalibus glabris. Folia glabra (anguste) obovata 15–22 cm longa 4,5–8,5 cm lata indice 2–4,2 base cuneata demum rotundata apice acuminato acumine 10–15 mm longo nervis primariis 9–14 paribus in venam intramarginalem convenientibus. Inflorescentia racemosa

ad 8 cm longa bracteis bracteolisque caducis pubescentibus ovatis calyce glabra tubo 1–2 mm alto limbo 3–4 mm longo lobis ovatis 2–3 mm longis corolla ciliolata c. 6 mm longa staminibus ultra 100 disco 5-glandulifero breve piloso. Fructus ellipsoideus 15–20 mm longus 10–12 mm latus mesocarpio crasso putamine c. 6 costato.

Tree, 25—30 m high, *c.* 40 cm ϕ. Twigs glabrous, terminal buds small, glabrous. *Leaves* glabrous, (narrowly) obovate, 15—22 by $4\frac{1}{2}$—$8\frac{1}{2}$ cm, index 2—4.2; base cuneate, often rounded at the very base, base angle 30°—90°; apex acuminate, acumen 10—15 mm; margin entire, recurved. *Nerves* 9—14 pairs, meeting in an intramarginal vein; reticulation coarse or rather fine. *Petiole* 8—15 mm. *Inflorescence* a raceme to 8 mm long; axis pubescent. Bracts and bracteoles caducous, pubescent, ovate, 3—4 and 2—3 mm long respectively. Pedicel to 2 mm. *Calyx* glabrous; tube 1—2 mm high; limb oblique, 3—4 mm, the ± ovate lobes 2—3 mm long. *Corolla* with ciliolate apex, *c.* 6 mm. *Stamens c.* 100 or more. *Disk* inconspicuously 5-glandular, shortly pilose. *Style* with broadly conical shortly pilose base, the rest glabrous, *c.* 5 mm. *Fruits* ellipsoid, 15—20 by 10—12 mm; mesocarp thick fleshy, becoming corky when dry; stone with *c.* 6 lengthwise ridges, mostly 2-celled. *Seeds* not seen.

CELEBES. *Cel. II/312, II/374*, Malili.

65. Symplocos megalocarpa Fletcher

S. megalocarpa Fletcher, Kew Bull. 1937 (1938) 507; Fl. Siam. En. 2 (1938) 388. – Type: *Kerr 5795* (K, isotypes in BM, E), Thailand, Udawn, Kao Keo Kang, alt. 1500 m.

Tree *c.* 15 m. Twigs rather thick, glabrous; growth discontinuous; terminal buds small, with glabrous or appressedly pubescent scales leaving large scars. *Leaves* glabrous, obovate, 12—19 by $4\frac{1}{2}$—8 cm, index 2.2—3; base cuneate, base angle 20°—40°; apex acuminate, acumen 2—6 mm; margin glandular dentate-crenate. *Midrib* much prominent; nerves 9—13 pairs, curved upwards and meeting in an intramarginal vein at least towards the apex of the leaf; secondary veins transverse to nerves, lesser veins forming a fine prominent reticulation. *Petiole* 15—20 mm. *Inflorescence* a spike; axis glabrous, becoming at most 4 cm long in fruit. Bracts caducous, appressedly pubescent in the middle, but the outer ones glabrous, broadly ovate boat-shaped, 5—10 mm long; bracteoles glabrous, ciliate, narrowly elliptic, to 5 mm long. *Calyx tube* glabrous, $1\frac{1}{2}$—2 mm high, limb glabrous except the lobes, 3—5 mm; lobes pubescent at both outer and inner surface, 1—2 mm long, tearing apart when older and thus the limb often becoming symmetric or *c.* 3-lobed. *Corolla c.* 4 mm. *Stamens c.* 70. *Disk* glabrous, 5-glandular. *Style* glabrous, with broadly conical base. *Fruits* ellipsoid to cylindrical, 30—35 by *c.* 15 mm; mesocarp hard, corky, *c.* 3 mm thick; stone woody, very hard, with many shallow longitudinal ridges, 3-celled with a central canal. *Seeds* straight with straight embryo.

THAILAND. Only the type.

66. Symplocos microtricha Hand.-Mazz.

S. microtricha Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 17. – Syntypes: *Steward & Cheo 143* (W, isotypes in BO, P); *Tsang 22752* (W), Kwangsi.

Shrub, or tree to 20 m. Twigs sometimes soon thickened, often tapering towards the apex, with spongy greyish bark (or in innovations brownish, sparsely appressedly short hairy). Terminal buds appressedly pubescent, small, or elongate. *Leaves* only towards the end of the twigs, (narrowly) elliptic to obovate, 6—15.5 by 1.8—4.5 cm, index 2.5—4.6, glabrous and glossy above ('deep lustrous green') *in vivo*, (minutely) sparsely appressedly very fine short hairy beneath, the hairs regularly distributed on the surface; base cuneate, slightly attenuate, base angle 20°—35°; acumen (0—)3—10 mm, tip blunt or acute; margin entire or obsoletely undulate-serrate, more or less recurved. *Midrib* above prominent or sulcate, flat or slightly sulcate; nerves 8—10 pairs, straight, curved upwards and joined into an intramarginal looped vein 1—3 mm from the margin; reticulation coarse, rather obscure. *Petiole* appressedly fine short hairy or glabrous, 3—10 mm. *Inflorescence* an often branched spike, axillary, but the lower ones from wood; axis pubescent. Bracts broadly ovate, keeled, 1—1¼ mm; bracteoles ovate, 1 mm or shorter, both appressedly pubescent, very soon caducous. *Flowers* ♂ or ☿, probably all flowers on one plant alike. *Calyx tube* glabrous to very fine appressedly short hairy, ½ mm in ♂, 1—1½ mm in ☿ flowers, lobes semi-orbicular to semi-elliptic, *c.* 1 mm long, glabrous or the outer lobes sometimes appressedly fine pubescent. *Corolla* 2—3 mm. *Stamens* 15—20 in ♂ flowers, 5, alternipetalous, in ☿ flowers (observed in only one collection: *Y. Tsiang 582*). *Disk* pulvinate, glabrous or (minutely) shortly pilose. *Style* glabrous, 2 mm, with thick, knob-like peltate stigma, aborted in ♂ flowers. *Fruits* ovoid, or slightly constricted towards the apex, 10—12 by 6—8 mm; mesocarp fleshy, thin; endocarp woody, with smooth surface. *Seed* 1, curved, with curved embryo.

Distribution. Indo-China, China, and Malay Peninsula.

INDO-CHINA. Tonkin: *Pételot 4493*; *Poilane 19085*, Massif de Piahouac, Prov. Cao Bang, alt. 1930 m; *W. T. Tsang 27206*, Ha–Coi.

CHINA. Yunnan: *K. M. Feng 12379*, Si Chour Hsien, Tsing Man, alt. 1300–1500 m; *H. T. Tsai 51801*, Wen Shan Hsien, alt. 1800 m. – Kweichow: *Y. Tsiang 6988*, Tuh Shan. – Kwangsi: 5 collections, alt. 1500–1800 m. – Kwangtung: *c.* 10 collections. – Fukien: *J. L. Gressitt 1693*, Gang Keu, S. of Shan Hang, alt. 660 m. – Chekiang: *H. H. Hu 239*, Jen Tang, alt. 150 m. – Hainan: *Chun & Tso 44204*, Fau Yah, alt. 1400 m; *F. C. How 73678*, Po ting, Alt. 3800 m; *S. K. Lau 25830* Bak Sa. – Formosa: *J. L. Gressitt 388*, Taiheizan, alt. 1700 m.

MALAY PENINSULA. Pahang: G. Paking, G. Benom, Fraser's Hill, G. Tahan, Cameron Highlands: 6 collections, alt. 300–1500 m.

67. Symplocos modesta Brand

S. modesta Brand, Pfl. R. Heft 6 (1901) 66; Hayata, Fl. Mont. Form. (1908) 159; Ic. Pl. Form. 2 (1912) 120, t. XX; Kanehira, Form. Trees (1917) 357, t.; Mori, Sylvia 5 (1935) 238; Kanehira, Form. Trees (ed. 1936) 595, t. 551; H, L. Li, J. Wash. Ac. Sc. 43 (1953) 108. – *Bobua modesta*

moto, Suppl. Ic. Pl. Form. 4 (1928) 19; Sasaki, List Pl. Form. (1928) 331. – Type: *Warburg 10742* (B†, isotype in K), Formosa.

S. eriostroma Hayata, Ic. Pl. Form. 5 (1915) 99, f. 25, c; Mori, Sylvia 5 (1935) 228; Kanehira, Form. Trees (ed. 1936) 585. – Type: *S. Sasaki, Jan. 1911 (no 2) (non vidi)*, Formosa, Mt. Arisan.

Shrub or small tree to 6 m. Twigs glabrous, slender; terminal buds small, glabrous; growth discontinuous. *Leaves* glabrous, thin, ± elliptic, 2—8 by 1—3 cm, index 1.3—3; acumen caudate, 5—22 mm, often apiculate; base shortly attenuate into the petiole, base angle 40°—70°; margin dentate or denticulate. *Nerves c.* 6 pairs, faintly prominent beneath, meeting in an intramarginal looped vein; reticulation coarse, inconspicuous. *Petiole* 2—4 mm. *Inflorescence* a loose, few-flowered (3—7 flowers) raceme; axis with the 3—10 mm long pedicels glabrous to sparsely pubescent. Bracts glabrous (or hairy?), ciliate, triangular, 1—1½(—5?) mm; bracteoles directly under the calyx, glabrous to pilose, ½—1(—2½?) mm long; both bracts and bracteoles persistent under the flowers, but fallen under the fruit. *Calyx tube* glabrous, 2 mm high, lobes ciliate, *c.* 1 mm long. *Corolla* 4—5 mm long. *Stamens c.* 25, up to 6 mm. *Disk* glabrous, annular. *Style* glabrous, 4—6 mm. *Fruit* as in *S. sumuntia* (p. 284).

FORMOSA. In the mountains: *c.* 10 collections, alt. 1000–2300 m.

Note. Because of the similarity with the Japanese plants belonging to *S. sumuntia* (*S. myrtacea*) (p. 284) there has been a confusion between these two species. Ohwi (Sylvia 5, 1935, 238) cited *S. myrtacea* (*non* S. & Z.) Hemsley in the synonymy of *S. modesta* Brand, denying the occurrence of *S. myrtacea* (= *S. sumuntia*) in Formosa, and so did several other authors. However, the collection *Oldham 297* cited by Forbes & Hemsley (J. Linn. Soc. 26, 1889, 72) under *S. myrtacea* certainly represents *S. sumuntia*.

68. Symplocos monantha Wight

S. monantha Wight, Icones 4 (1848) 1236; Beddome, For. Man. (1872) 150; Clarke, Fl. Br. Ind. 3 (1882) 581; Brand, Pfl. R. Heft 6 (1901) 65; Gamble, Fl. Pres. Madras 5 (1923) 784. – *Lodhra monantha* Miers, J. Linn. Soc. Bot. 17 (1879) 300. – Type: *Wight 3514* (K, isotype in NY), India, Shevagherry Hills, August 1836.

Very much branched shrub. Twigs appressedly pilose, soon glabrescent; terminal buds small, appressedly pilose. *Leaves* glabrous beneath, but the midrib sparsely appressedly hairy, ± elliptic, 2.5—4.7 by 1—2 cm, index *c.* 2.5; base cuneate, often attenuate, base angle 30°—50°; apex acuminate, acumen 3—8 mm; margin denticulate. *Nerves* 5—7 pairs, faintly prominent beneath, intramarginal vein only visible by hand-lens; reticulation very fine, faintly visible, but obvious with translucent light. *Petiole* 2—6 mm. *Flowers* solitary from the axils of the leaves. Bracts several, bracteoles 2, all persistent, appressedly pubescent, 1—1½ mm. Pedicel very short. *Calyx tube* glabrous, 1 mm; limb glabrous, nearly wholly divided, 1—1½ mm; lobes ovate, ciliolate. *Corolla* 4—5 mm. *Stamens c.* 50. *Disk* 5-glandular, glabrous, but the conical style base hairy. *Style* glabrous 3 mm. *Fruits* not seen.

INDIA. Only the type.

69. Symplocos multibracteata Noot., *sp. nov.*

Type: *Robbins* 535 (L, isotypes in BM, CANB), New Guinea, W. Highlands, Kubor Range between Kuli and Minj, 7300 ft.

Frutex vel arbor parva, ramunculis dense vel sparsim appresse vel patenter pilosis; foliis ellipticis-ovatis, 5–14 cm longis, $2\frac{1}{2}$–$5\frac{1}{2}$ cm latis, indice 2–2,6; nervis utroque costae latere 7–13, infra prominentibus; reticulo tenui prominenti; basi rotundato ad cordato apice acuminato. Inflorescentia parva flore solitario multibracteato, calyce tubo glabro 2–3 mm alto, lobis appresse pubescentibus 3–5 mm longis; corolla 5–8 mm longa; staminibus 80–150 vel ultra; disco piloso stylo glabro. Fructus oblique ovoideus-ellipsoideus vel fusiformis, 17-22 mm longus 8–10 mm latus, semine ruminato recto vel leviter curvato, embryone recto vel subrecto.

Small shrub or treelet, up to 4 m high. Twigs densely appressedly to patently (softly) pilose to nearly glabrous, growth discontinuous. *Leaves* elliptic-ovate, glabrous to sparsely pilose, midrib and nerves pilose, 5—14 by $2\frac{1}{2}$—$5\frac{1}{2}$ cm, index 2—2.6; apex acuminate, acumen 5—10 mm, base rounded to cordate, base angle 90°—140°; margin glandular denticulate to dentate. *Nerves* 7—13 pairs, prominent on the undersurface, impressed above, meeting in a looped intramarginal vein; reticulation fine, prominent below. *Petiole* with same indument as twigs, 2—10 mm. *Inflorescence* a reduced spike, at most 2 cm long with only 1 (sub)terminal flower left, sometimes another flower present in bud; axis glabrous. Bracts many, appressedly pubescent, (broadly) elliptic, 4—8 mm long. *Calyx tube* glabrous, 2—3 mm high, lobes appressedly pubescent, 3—5 mm long. *Corolla* 5—8 mm. *Stamens* 80—more than 150. *Disk* 5-lobed, softly pilose. *Style* glabrous, up to $2\frac{1}{2}$ mm, stigma not seen. *Fruits* obliquely ovoid-ellipsoid to spindle-shaped, glabrous when ripe, crowned by the persistent calyx lobes, 17—22 by 8—10 mm, with fleshy, *c.* $1\frac{1}{2}$ mm thick mesocarp; stone 15—20 by 5—7 mm. *Seed* 1, filling nearly the whole stone, straight or slightly curved; embryo straight or slightly curved with *c.* 1 mm long cotyledons.

NEW GUINEA. Territory of New Guinea. W. Highlands *ANU 2867*, Wabag Subdistr. near Kompian, alt. 2000 m; *Hoogland & Pullen 5882*, *5887*, Mt. Hagen, alt. 2200 m; *Robbins 335*, Kubor Range between Kuli and Minj, alt. 2200 m. – E. Highlands Distr.: *Brass 31520*, Mt. Michael, alt. 2000 m; *NGF 14157*, 6°5′ S, 145°5′ E, alt. 2300 m.

70. Symplocos nivea Brand

S. nivea Brand, Pfl. R. Heft 6 (1901) 36; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 234; Ridl. Fl. Mal. Pen. 2 (1923) 300. – Type: *Curtis 715* (K, isotypes in BM, P, SING, W), Penang, P. Butong, Govt. Hill and Muka Head.

Tree to 18 m. Twigs glabrous. Terminal buds small, with glabrous scales, inner scales densely pubescent. *Leaves* glabrous, (narrowly) elliptic, 7—11 by 2—$4\frac{1}{2}$ cm, index 2.6—3.6; base cuneate, attenuate, base angle 30°—50°; acumen 3—13 mm, tip blunt; margin entire to obscurely undulate-crenate. *Midrib* much prominent beneath. *Nerves*

5—8 pairs, meeting in an intramarginal vein 2—5 mm from the margin; secondary veins forming a coarse network, sometimes filled with a faintly prominent reticulation of the lesser veins. *Petiole* 7—10 mm. *Inflorescence* a panicle of racemes; axis villous. Bracts glabrous, ciliate, ± elliptic, 2½—3 mm; bracteoles *ditto*, narrowly elliptic, *c.* 2½ mm, both very soon caducous. Pedicel pubescent, the lowermost up to 5 mm, but mostly shorter. *Calyx* glabrous; tube 1 mm; limb 2½—3 mm, lobes 1—2 mm, becoming longer by tearing. *Corolla c.* 5 mm. *Stamens* more than 100, becoming as long as corolla. *Disk* 5-glandular, with the broadly conical style base soft hairy. *Style* glabrous, *c.* 5 mm, stigma punctate. *Fruits* unknown.

MALAY PENINSULA. Penang: *Curtis 715, 717.* – Johore: *SF 21180*, Mawai Sg. Sedili.

Note. This species is probably narrowly allied to *S. pyriflora* Ridl. (p. 270), but differs in the number of nerves and in the corolla being shorter. It is not impossible that when more material of these extremely rare species will have been collected they will appear to be conspecific.

71. Symplocos nokoensis (Hayata) Kanehira

S. nokoensis (Hayata) Kanehira, Anat. Char. Ident. Form. Woods (1921) 151; Form. Trees (ed. 1936) 596, t. 553; Mori, Sylvia 5 (1934) 241; H. L. Li, Woody Fl. Taiwan (1963) 747. – *Ilex nokoensis* Hayata, J. Coll. Sci. Univ. Tokyo 30 (1911) 56. – *Bobua nokoensis* Kanehira & Sasaki, List Pl. Form. (1928) 332. – Type: *Kawakami & Mori 4582* (TI, *non vidi*), Formosa.
Bobua crenatifolia Yamamoto, Suppl. Ic. Pl. Form. 4 (1928) 18, t. 11. – *S. crenatifolia* Makino & Nemoto, Fl. Jap. ed. 2 (1931) 919. – Type: *Hayata, 1916* (TI, *non vidi*), Formosa, Mt. Hohuan-shan.

Twigs inconspicuously puberulous, soon glabrescent. Terminal buds small. *Leaves* glabrous, ± elliptic, 10—21 by 8—12 mm, index 1.2—1.8; base acute to rounded, base angle 40°—90°; apex acute-rounded; margin crenate. *Nerves* 4—5 pairs, faintly prominent beneath, intramarginal vein present but hardly visible; reticulations obscure. *Petiole c.* 2 mm. *Flowers* sessile from the axils of the leaves. Bracts many, glabrous or minutely appressedly puberulous, often ciliate, 2—4 mm long. *Calyx* glabrous, tube ½ mm high, limb wholly divided into the 2 mm long lobes (only buds seen). The rest of the flower not seen. *Fruits* ovoid, with thin mesocarp, *c.* 7 by 5 mm; stone smooth, *c.* 6 by 4 mm. *Seeds* ovoid; embryo probably curved.

FORMOSA. *c.* 10 collections, alt. 3000–3200 m.

72. Symplocos obovatifolia Merr.

S. obovatifolia Merr. Philip. J. Sc. 12 (1917) Bot. 290; En. Philip. 3 (1923) 300. – Type: *BS 26447* (K), Luzon, Prov. Nueva Ecija, Mt. Umingan.

Twigs and terminal buds glabrous. *Leaves* glabrous, obovate, 7½—11 by 3½—6 cm,

index 1.7—2.1; base cuneate, decurrent into the petiole, base angle 25°—60°; apex rounded or shortly acuminate, acumen 0—2 mm; margin entire or glandular denticulate. *Nerves* 7—9 pairs, meeting in an intramarginal vein; reticulations rather coarse, but often a fine reticulation of the lesser veins faintly prominent (hardly visible). *Petiole* winged towards the apex, 7—12 mm. *Inflorescence* a fascicle or short spike to $1\frac{1}{2}$ cm; axis glabrous. Bracts and bracteoles persistent glabrous, 2—3 mm. *Flowers* not seen. *Calyx lobes* 5, glabrous elliptic, rounded, *c.* 2 mm long. *Disk* glabrous, 5-glandular, style base shortly pilose. *Fruits* (obliquely) ellipsoid, *c.* 11 by 5 mm, the persistent calyx lobes not included; mesocarp fleshy, stone smooth, 3-celled, endocarp thick, woody. *Seed* 1 in each cell, straight with straight embryo.

PHILIPPINES. Luzon: *BS 26446*, *26447*, Prov. Nueva Ecija, Mt. Umingan.

73. Symplocos obtusa Wall. *ex* G. Don.

S. obtusa Wall. [Cat. (1828) 4424, *nomen*] *ex* G. Don, Gen. Hist. 4 (1837) 3; DC. Prod. 8 (1844) 255; Wight, Icones 4 (1848) 1233; Ill. Ind. Bot. 2 (1850 t. 151 b, A; Neilgherry Pl. 2 (1851) 39, t. 146; Thwaites, En. Pl. Zeyl. (1860) 185; Beddome, For. Man. (1872) 149; Clarke, Fl. Br. Ind. 3 (1882) 583; Trimen, Fl. Ceyl. 3 (1895) 105; Brand, Pfl. R. Heft 6 (1901) 56; Gamble, Fl. Pres. Madras 5 (1923) 783; Alston, Fl. Ceyl. Suppl. 6 (1931) 186. – *Lodhra obtusa* Miers, J. Linn. Soc. Bot. 17 (1879) 300. – Type: *Wallich 4424* (K-W), India, Nilghiri.

S. laeta Thwaites, En. Pl. Zeyl. (1860) 184; Beddome, For. Man. (1872) 151; Clarke, Fl. Br. Ind. 3 (1882) 584; Trimen, Fl. Ceyl. 3 (1895) 105; Brand, Pfl. R. Heft 6 (1901) 57. – *Lodhra laeta* Miers, J. Linn. Soc. Bot. 17 (1879) 301. – Type: *Thwaites C. P. 165 p.p.* (K, isotypes in BM, BO, CGE, FI, LE, MEL, P), Ceylon.

S. rufescens Thwaites, En. Pl. Zeyl. (1860) 184; Beddome, For. Man. (1872) 150, *non* H.B.K. (1808). – *S. versicolor* Clarke, Fl. Br. Ind. 3 (1882) 584; Trimen, Fl. Ceyl. 3 (1895) 106; Livera, Ann. Roy. Bot. Gard. Perad. 10 (1927) 315. – Type: *Thwaites C.P. 3639* (= *C.P. 473 p.p.*) (K, LE, P), Ceylon. Because the other part of Thwaites C.P. 473 belongs to *S. cochinchinensis* ssp. *laurina* var. *laurina*, and probably only the collection in PDA bears the number *C.P. 3639*, this species has been reduced by Brand to *S. spicata*.

S. obtusa var. *cucullata* Thwaites, En. Pl. Zeyl. (1860) 185. – *Lodhra cucullata* Miers, J. Linn. Soc. Bot. 17 (1879) 301. – *S. cucullata* Brand, Pfl. R. Heft 6 (1901) 56; Alston, Fl. Ceyl. Suppl. 6 (1931) 186. – Type: *Thwaites C.P. 2835* (K, isotypes in BM, LE, P), Ceylon.

S. obtusa var. *obovata* Thwaites, En. Pl. Zeyl. (1860) 185. – *S. obovata* Livera, Ann. Roy. Bot. Gard. Perad. 10 (1927) 317; Alston, Fl. Ceyl. Suppl. 6 (1931) 187. – *S. suborbicularis* Abeywickrama, Ceyl. J. Sci. Biol. Sc. 2 (1959) 209. – Type: *Thwaites C.P. 1819* (K), Ceylon.

S. obtusa var. *major* Thwaites, En. Pl. Zeyl. (1860) 185. – *S. major* Brand, Pfl. R. Heft 6 (1901) 56. – Type: *Thwaites C.P. 1820* (S, isotypes in BM, BO, CGE, FI, LE, MEL, P), Ceylon.

S. laeta var. *pedicellata* Clarke, Fl. Br. Ind. 3 (1882) 584; Brand, Pfl. R. Heft 6 (1901) 57. – Type: *Thwaites C.P. 165 p.p.* (K, isotypes in P, CGE), Ceylon.

S. furcata Brand, Pfl. R. Heft 6 (1901) 57. – Lectotype: *Thwaites C.P. 626* (L, isotypes in BM, BO, CGE, FI, K, MEL, P), Ceylon.

Twigs glabrous; terminal buds with several glabrous scales. *Leaves* glabrous, elliptic or obovate, $3\frac{1}{2}$—16 by $1\frac{1}{2}$—8 cm, index 1.5—2.6; base cuneate to nearly rounded, base angle 30°—70°; apex rounded or acuminate, acumen 0, or 3—10 mm; margin recurved

to revolute, nearly entire to denticulate. *Nerves* 6—11 pairs, intramarginal vein hardly distinct from the much prominent rather fine to rather coarse reticulation. *Petiole* narrowly winged by the decurrent leaf base, thin, 3—7 mm or rather thick, or sometimes very thick, 3—18 mm. *Inflorescence* a spike or raceme, 3—15 cm; axis glabrous. Bracts and bracteoles soon caducous, glabrous. Pedicel 0—3(—10) mm. *Calyx* glabrous, tube $1\frac{1}{2}$—3 mm high, the limb wholly divided into the semi-orbicular (or ovate, sometimes auriculate), $\frac{3}{4}$—$1\frac{1}{2}$ mm long, ciliate lobes. *Corolla* 5—9 mm. *Stamens* 25—*c.* 50, becoming as long as corolla or at most 1 mm longer. *Disk* inconspicuously 5-glandular, (minutely) soft hairy included the conical style base, or only the style base hairy. *Style* glabrous or with some hairs towards the base. *Fruits* ellipsoid, 7—15 by 4—8 mm; stone with lengthwise ridges, 3-celled but sometimes only one cell developed. *Seeds* and embryo straight.

Distribution. South India and Ceylon.

KEY TO THE VARIETIES

1a. Apex of leaves acute to rounded, rarely an acumen of at most 2 mm. **73-1.** var. **obtusa**

b. Apex of leaves acuminate, acumen 3—10 mm. . . . . **73-2.** var. **pedicellata**

73-1. var. **obtusa**

S. obtusa Wall. *ex* G. Don — *S. obtusa* var. *cucullata* Thwaites — *S. obtusa* var. *obovata* Thwaites — *S. obtusa* var. *major* Thwaites — *S. furcata* Brand.

Leaves coriaceous (elliptic-)obovate, $3\frac{1}{2}$—16 by 2—8 cm, index $1\frac{1}{2}$—$2\frac{1}{2}$; base cuneate nearly rounded, base angle 50°—70°; apex acute-rounded, rarely an acumen of at most 2 mm; margin recurved to revolute, denticulate. *Nerves* 6—11 pairs. *Petiole* rather thick, sometimes very thick and then very short and the leaves revolute, 3—18 mm. *Inflorescence* 3—15 cm; bracts and bracteoles ciliate, leaf-like, elliptic, 5—6 mm and ovate, $2\frac{1}{2}$ by $2\frac{1}{2}$ mm respectively. Pedicel 0—3 mm. *Calyx tube* $1\frac{1}{2}$—3 mm high, the limb wholly divided into the semi-orbicular often auriculate ciliate, 1—$1\frac{1}{2}$ mm long lobes. *Corolla* 5—9 mm. *Stamens* 25—*c.* 50, becoming about as long as corolla. *Disk* inconspicuous, 5-glandular, (minutely) soft hairy with the conical style base. *Style* (excluded the base) glabrous or with some hairs towards the base. *Fruits* 7—15 by 4—8 mm.

INDIA, 12 collections, Nilgiris, alt. 1800–2400 m.
CEYLON. *c.* 20 collections, alt. 1800–2400 m.

73-2. var. **pedicellata** (Clarke) Noot., *comb. nov.*

S. laeta var. *pedicellata* Clarke, Fl. Br. Ind. 3 (1882) 584. — *S. laeta* Thwaites. — *S. rufescens* Thwaites.

Leaves elliptic, 3½—6½(—9½) by 1½—3(—3.7) cm, index 2.1—2.6(—3.2); base cuneate, attenuate, base angle 30°—40°; apex acuminate, acumen 3—10 mm; margin recurved. *Nerves* 7—10 pairs; reticulation prominent, rather coarse. *Petiole* thin, 3—7 mm. *Inflorescence* to 8 cm. Pedicel 0(—10) mm. *Calyx* glabrous, tube *c.* 2 mm; limb wholly divided into the semi-orbicular (or ovate) ciliate ¾—1 mm long lobes. *Corolla* 5—6 mm. *Stamens* 25—*c.* 40, becoming at most 1 mm longer than the corolla. *Disk* inconspicuous, 5-glandular. *Style base* conical, soft hairy, the rest of the style glabrous with peltate stigma. *Fruits* ellipsoid, *c.* 10 by 6 mm, crowned by the persistent calyx lobes.

CEYLON. *c.* 10 collections.

74. Symplocos odoratissima (Bl.) Choisy *ex* Zoll.

S. odoratissima (Bl.) Choisy *ex* Zoll. Syst. Verz. (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; Brand, Pfl. R. Heft 6 (1901) 35; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 233; Koord. Atlas 2 (1914) t. 382; Ridl. Fl. Mal. Pen. 2 (1923) 299; Heyne, Nutt. Pl. (1927) 1263; Burkill, Dict. 2 (1935) 112; Backer, Bekn. Fl. Java (em. ed.) 7 (1948) fam. 169; Backer & Bakh. *f.* Fl. Java 2 (1965) 205. – *Dicalyx odoratissimus* Bl. Bijdr. (1826) 1116. – *Eugeniodes odoratissima* O.K. Rev. Gen. Pl. 2 (1891) 975. – Type: *Blume 1947* (L, isotypes in BO, NY, S), Java.

Dicalyx aluminosus (*non* Lour.) Bl. Bijdr. (1826) 1117, *p.p.* – *S. odoratissima* var. *aluminosa* K. & V. Bijdr. 7 (1900) 150; Brand, Pfl. R. Heft 6 (1901) 35. – *S. aluminosa* Brand, Pfl. R. Heft 6 (1901) 35. – Type: *Blume 1826* (L, isotype in BO), Java, Nusa Kambangan.

S. ciliata Presl, Rel. Haenk. 2 (1831) 61; F.-Vill. Nov. App. (1880) 127. – *S. patens* var. *ciliata* Brand, Pfl. R. Heft 6 (1901) 35. – *S. patens* forma *ciliata* Brand, Philip. J. Sc. 3 (1908) Bot. 5; Merr. En. Philip. 3 (1923) 301. – Type: *Haenke 152* or *153* (I did not see the holotypes; in W the numbering has been done later and Brand cited the numbers alternately in different publications) (PR, isotype in W), Luzon.

S. patens Presl, Rel. Haenk. 2 (1831) 61; F.-Vill. Nov. App. (1880) 127; Brand, Pfl. R. Heft 6 (1901) 34; Philip. J. Sc. 3 (1908) Bot. 4; Merr. En. Philip. 3 (1923) 301. – *S. patens* forma *eupatens* Brand, Philip. J. Sc. 3 (1908) Bot. 5. – Type: *Haenke 152* or *153*. See *S. ciliata* Presl above.

S. repandula Miq. Fl. Ind. Bat. Suppl. 1 (1861) 474. – Type: *Diepenhorst* (U), NW. Sumatra, Priaman.

S. villarii Vidal, Rev. Pl. Vasc. Filip. (1886) 178, *excl. syn. Guettarda polyandra* Blanco, *nom. illeg.* – *S. racemosa* (*non* Roxb.) F.-Vill. Nov. App. (1880) 127. – Syntypes: *Vidal 446* (FI, L), Philippines, Angat; *Vidal 828* (FI, L), Sipocot; *Vidal 1581* (FI, L), Luzon, Prov. Ilocos Norte.

S. pseudospicata Vidal, Rev. Pl. Vasc. Filip. (1886) 179. – *S. spicata* (*non* Roxb.) F.-Vill. Nov. App. (1880) 127; Vidal, Sinopsis Atlas (1883) t. 64. – *S. polyandra* Brand, Pfl. R. Heft 6 (1901) 36, *quoad descr. et syn.* Vidal. – Type: *Vidal 448* (FI, L), Philippines, San Mateo.

Pygeum grandiflorum King, J. As. Soc. Beng. 66, 2 (1897) 228; *cf.* Kalkman, Blumea 13 (1965) 107. – Type: *King's coll. 7425* (K, P, SING), Perak.

S. floridissima Brand, Pfl. R. Heft 6 (1901) 35; Philip. J. Sc. 3 (1908) Bot. 5; *op cit.* 7 (1912) Bot. 32; Merr. En. Philip. 3 (1923) 298. – Type: *Cuming 1305* (BM, CGE, FI, G, K, L, MEL, P, W), Luzon, Prov. Albay.

S. odoratissima var. *divaricata* Brand, Pfl. R. Heft 6 (1901) 35. – Lectotype: *Beccari 4014* (K), Borneo, Sarawak.

S. elmeri Brand, in Perkins Fragm. Fl. Philip. (1904) 36. – *S. patens* forma *elmeri* Brand, Philip. J. Sc. 3 (1908) Bot. 4; Merr. En. Philip. 3 (1923) 301. – Type: *Merrill 2356* (US), Luzon, Tanay. Morong.

S. pulverulenta King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 234; Ridl. Fl. Mal. Pen. 2 (1923) 300; Burkill, Dict. 2 (1935) 112. – Type: *Ridley 4786* (K), Singapore, Chanchukam.
S. floridissima Brand var. *serrata* Brand, Philip. J. Sc. 4 (1909) Bot. 108. – Type: *FB 11147* (*non vidi*), Luzon, Aquilar.
S. pulgarensis Elmer, Leafl. Philip. Bot. 5 (1913) 1841; Merr. En. Philip. 3 (1923) 302. – Type: *Elmer 12979* (BISH, BM, BO, E, K, L, LE, W, WRSL), Palawan, Puerto Princesa, Mt. Pulgar.
S. apoensis Elmer, Leafl. Philip. Bot. 7 (1914) 2319; Merr. En. Philip. 3 (1923) 297. – Type: *Elmer 11961* (A, BO, E, FI, G, K, L, LE, NY, P, W, WRSL), Mindanao, Davao, Mt. Apo.
S. megabotrys Merr. Philip. J. Sc. 9 (1914) Bot. 383; En. Philip. 3 (1923) 300. – Type: *Wenzel 298* (GH, isotypes in A, G), Leyte, Dagami.
S. wenzelii Merr. Philip. J. Sc. 10 (1915) Bot. 282; En. Philip. 3 (1923) 302. – Type: *Wenzel 1022* (GH, isotypes in BM, G), Leyte.
S. dagamensis Brand, Fedde Repert. 14 (1916) 324; Merr. En. Philip. 3 (1923) 298. – Type: *BS 15356* Ramos (K), Leyte, Dagami.
S. salix Brand, Fedde Repert. 14 (1916) 325; Merr. En. Philip. 3 (1923) 302. – Type: *BS 16540* (BM, K, L, P, SING), Luzon, Laguna Prov., San Antonio.
S. acuminatissima Merr. Philip. J. Sc. 11 (June 1916) Bot. 31; En. Philip 3 (1923) 296. – Type: *BS 23690* (A, K, P), Luzon, Sorsogon Prov., Bulusan Volcano.
S. trichophlebia Merr. Univ. Cal. Publ. Bot. 15 (1929) 248. – Type: *Elmer 21124* (BISH, BM, BO, K, L, P, SING), North Borneo, Tawao.
Pygeum viride Baker *f.* J. Bot. 62 (1924) Suppl. 34; *cf.* Kalkman, Blumea 13 (1965) 107. – Type: *Forbes 2876* (BM, L), Sumatra.
S. odoratissima var. *leptocarpa* S. Moore, J. Bot. 63 (1925) Suppl. 65. – Type: *Forbes 1740A* (BM, isotypes in FI, GH, L, LE, SING), Sumatra, Penangungan, 500 ft.
S. bulusanensis Elmer, Leafl. Philip. Bot. 10 (1939) 3972. – Type: *Elmer 17132* (BO, G, L, P, W), Luzon, Sorsogon Prov., Mt. Bulusan.
S. verdifolia Elmer, Leafl. Philip. Bot. 10 (1939) 3793. – Type: *Elmer 15356* (BO, K, L, US, W), Luzon, Mt. Bulusan.
S. chengapae Raizada & Sahni, Indian For. 85 (1959) 190, t. et phot. – Type: *Sahni 22990* (DD) (*non vidi*), Great Nicobar I.

Tree (shrub) up to 30 m high and 50 cm ϕ. Twigs glabrous or tomentellous to tomentose or pubescent. Terminal buds rather small, with glabrous or hairy scales. *Leaves* glabrous or pubescent beneath, especially on midrib and nerves, (narrowly) elliptic to obovate with entire or mostly crenulate or dentate margin 7—20(—40) by (2½—)5—10(—20) cm, index (1.6—)2—3(—4.5); apex blunt, usually acuminate, acumen 5—20(—30) mm; base acute, to rarely rounded, mostly decurrent into the petiole. *Nerves* 5—13(—16) pairs, rather inconspicuous above, much prominent beneath, whether strictly parallel or not, arching upwards and meeting in an usually inconspicuous intramarginal vein; secondary and tertiary veins often prominent and then forming a dense or lax reticulation. *Petiole* stout (or slender), often verrucose, glabrous or with same indument as twigs, 1—5 cm. *Inflorescence* a mostly many-flowered panicle, sometimes only branched near the base, rusty tomentellous (whitish *in vivo*), 5—30 cm long. *Flowers* fragrant. Bracts at base of pedicel, tomentellous on both surfaces, caducous, 3—5 by 2—4 mm; bracteoles with the same indument, sometimes with a bud in the axil, directly under the flower, ½—2 mm long. Pedicels 3—7 mm, becoming longer in fruit. *Calyx* pale green *in vivo*, tomentellous, tube 1½—2½ mm high, lobes blunt ½—1½ mm long. *Corolla* usually

tomentellous, at least in bud, rarely nearly glabrous, 5—8 mm long. *Stamens* more than 100, in 5 sometimes obscure bundles, the free filaments in several rows, slightly longer to shorter than the corolla. *Disk* hairy, with 5 conspicuous glands; style pilose towards the conical style base, ± as long as the corolla. *Ovary* 3-celled, each cell with 4 ovules. *Fruit* glabrous or tomentellous, (obliquely) ovoid (or rarely narrowly flask-shaped, pear-shaped or globular), more or less narrowed towards the apex, crowned by the calyx lobes, 8—25 by 5—20 mm; mesocarp thin, fleshy in var. *odoratissima*, thick, woody in var. *wenzelii*; endocarp woody, with *c.* 5(—10) ridges, which can become rather high, to 4 mm, in var. *wenzelii*. *Seed* curved, with curved embryo (in the herbarium most fruits are empty).

Distribution. Throughout Malesia, except in New Guinea.

KEY TO THE VARIETIES

1a. Twigs mostly glabrous. Leaves 7—23 cm long. Fruits 8—15(—20) by 5—10 mm. **74-1.** var. **odoratissima**

b. Twigs mostly patently pilose, pubescent or tomentose. Leaves 15—27 cm long. Fruits 17—25 by 12—20 mm. . . . . **74-2.** var. **wenzelii**

74-1. var. **odoratissima**

S. odoratissima Choisy – *Dicalyx aluminosus* Bl. – *S. ciliata* Presl → *S. patens* Presl. – *S. villarii* Vidal – *S. pseudospicata* Vidal – *Pygeum grandiflorum* King – *S. floridissima* Brand – *S. odoratissima* var. *divaricata* Brand – *S. elmeri* Brand – *S. pulverulenta* King & Gamble – *S. pulgarensis* Elmer – *S. apoensis* Elmer – *S. megabotrys* Merr. – *S. dagamensis* Brand – *S. Salix* Brand – *S. acuminatissima* Merr. – *Pygeum viride* Baker *f.* – *S. bulusanensis* Elmer – *S. verdifolia* Elmer – *S. chengapae* Raizada & Sahni.

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. *Fruits* with thin, fleshy mesocarp, 8—15 by 5—10 mm, ovoid, or up to 20 mm, flask-shaped.

Distribution. As for the species.

SUMATRA. Atjeh: *van Steenis 9844*, Gajo Lands. – Simalur: *Achmad 1514*. – Eastcoast: *bb 7194*, Karolanden, 1540 m; *Krukoff 4414*; *Rahmat si Boeea 8052*, Asahan. – Westcoast: *Beccari 834*, Padang, alt. 360 m; *Meijer 3453*, G. Merapi, alt. 2000–2500 m; *5408a*, G. Sago. – Palembang: *Kostermans S 135*, Tjaban For. Res. near Muara Enim, alt. 20 m. – Lampong: *Forbes 1656*, *1740a*, *1752*, *2876*. – Banka: *Bünnemeijer 2189*, G. Pading, 450 m alt.

MALAY PENINSULA. Perak: *King's coll. 7425*, alt. 200 m; *10030*, *10411*, *10777*. – Pahang: *CF 20470*. – Johore: *SF 32404*, Sg. Kayo, low alt. – Singapore: *Ridley 4786*.

JAVA. West Java: *c.* 30 collections, alt. 0–1500 m. – Central Java: *c.* 20 collections, alt. 0–1000 m. – East Java: *Bremekamp s.n.*, G. Ardjuno; *Koorders 13597*, *15399*, Kediri, Sukaradja and Gadungan Pare; *14728*, Besuki, Pantjur-Idjen, alt. 1000 m.

LESSER SUNDA ISLANDS. Bali: *Sarip* 235, G. Pala, alt. 425 m.

BORNEO. Sabah: 9 collections, alt. 0–1500 m. – Sarawak: *Beccari 3753, 4014*, Bint lu; *S 21195*, 3rd Div. Ulu Kapit, alt. 500 m; *S 28883*, 1°36′ N, 114°30′ E. – W. Borneo: 13 collections.

PHILIPPINES. Luzon: *c.* 80 collections (Rizal Prov., Laguna Prov., Isabella Prov., Sorsogon Prov., Tayabas Prov., Bataan Prov., Cagayan Prov., Camarines Sud Prov., Sambales Prov., Ilocos Norte). – Mindoro: *BS 39445*, Mt. Calavite; *BS 39769*, Paluan; *BS 40995*, Pinamalayan. – Samar: *FB 24640*; *PNH 6418*, Mt. Calbiga. – Biliran I.: *PNH 21669*, Mt. Suitc. – Leyte: *BS 15356*, Dagami; *FB 27019*; *Wenzel 298, 888*. – Palawan: *Elmer 12979*, Puerto Princesa, Mt. Pulgar.

CELEBES. Minahassa: *Forman 265*; *Koorders 18094*, G. Klabat, alt. 600 m; *bb 12660*, Menado, Kinalasau, alt. 800 m. – Luwu: *bb 20761*, Muna, Raha; *Cel. II/131*, Malili, alt. 250 m.

MOLUCCAS. Talaud I.: *H. J. Lam 3097*, Salibatu, G. Ajambana, alt. 260 m.

Ecology. In everwet and in monsoon forest.

74-2. var. **wenzelii** (Merr.) Noot., *comb. nov.*

S. wenzelii Merr., Philip. J. Sc. 10 (1915) Bot. 282 – *S. trichophlebia* Merr.

Twigs usually patently pilose, pubescent or tomentose. *Leaves* mostly densely pubescent, 15—27 by 7—16 cm, index 1.6—2.6. *Fruits* ovoid to pear-shaped, with thick, woody mesocarp, 17—25 by 12—20 mm; ridges on stone up to 4 mm, but mostly lower.

BORNEO. Sabah: 14 collections. – Sarawak: *Haviland & Hose 3378*, Kuching; *S 30403*, 4th Div., G. Api. – Kalimantan: *bb 34561*; *Kostermans 9034*; *Paymans 142, 182*, all from Nunukan I.; *Kostermans 4861*, Sangkuliran I.; *5790*, N. of Sangkuliran I., Sg. Kerajaän.

PHILIPPINES. Leyte: *Wenzel 1022*.

Note. The size and shape of the leaves in *S. odoratissima* are very variable; the leaves of var. *wenzelii*, however, fit well in this variability, they belong to the bigger and most hairy leaves. The flowers are perfectly alike to those of var. *odoratissima*, and of collections without fruits it is not always possible to decide to which variety they belong.

75. Symplocos oligandra Beddome

S. oligandra Beddome, For. Man. (1872) 150; Icones (1874) 65, t. 272; Clarke, Fl. Br. Ind. 3 (1882) 574; Brand, Pfl. R. Heft 6 (1901) 32; Gamble, Fl. Pres. Madras 5 (1923) 782. – Type: *Beddome 4963* (BM, isotype in K), Tinnevelly Hills, 4000 ft.

Twigs finely appressedly hairy in innovations, soon glabrescent; terminal buds with appressedly puberulous scales. *Leaves* glabrous, ± elliptic to obovate, 2.5—5 by 1—2.2 cm, index 2.2—3.6; base cuneate, base angle 20°—30°; apex acute to faintly acuminate, acumen 0—3 mm; margin recurved, entire or denticulate. *Nerves* 6—10 pairs, faintly prominent beneath, meeting in a hardly prominent intramarginal vein; reticulation rather coarse, only well visible with translucent light. *Petiole* 3—5 mm. *Inflorescence* a short spike from the axils of the leaves; axis sparsely short hairy, to 1 cm long. Bracts

and bracteoles caducous, appressedly puberulous, *c.* 1½ mm. *Calyx tube* glabrous, 1½—2 mm high; limb nearly wholly divided, appressedly puberulous, 1½ mm, lobes triangular. *Corolla* 2½—3 mm. *Stamens c.* 10. *Disk* 5-glandular, low cylindrical, *c.* ¼ mm high, hairy. *Style* stout, glabrous, *c.* 2 mm. *Fruits* ± elliptic, 10 by 5 mm (only one fruit seen).

INDIA. Travancore: only the type.

76. Symplocos olivacea Merr.

S. olivacea Merr. Univ. Cal. Publ. Bot. 13 (1926) 140; Guillaumin, Fl. Gén. I.-C. 3 (1933) 1018. – Type: *Pételot 1902 leg. du Pasquier* (UC, isotype in P), Indo-China, Tonkin, Mau Son.

Twigs glabrous but the very apex appressedly pubescent; terminal buds small, appressedly pubescent. *Leaves* glabrous or sparsely appressedly fine hairy beneath, elliptic, 7—10 by 3—4 cm, index 2.3—2.6; base acute, base angle 40°—50°; apex acuminate, acumen 5—12 mm; margin entire, recurved. *Nerves* 8—11 pairs, meeting in an intramarginal vein; reticulations coarse, but sometimes a fine reticulation of the lesser veins faintly prominent. *Petiole* 3—5 mm. *Inflorescence* a very short spike; axis appressedly long pubescent. Bracts and bracteoles persistent, appressedly long pubescent, 1 and 1½ mm long respectively. *Calyx tube* appressedly sericeous, ½ mm high, light coloured; limb dark coloured, appressedly pubescent, 1 mm long, lobes ovate, ¾ mm long. *Corolla c.* 3 mm. *Stamens c.* 40. *Disk* globose, densely soft hairy, *c.* ½ mm high. *Style* with some hairs towards the base, 5 mm long. *Fruits* not known.

INDO-CHINA. Only the type.

77. Symplocos ophirensis Clarke — Fig. 4a-e.

S. ophirensis Clarke, Fl. Br. Ind. 3 (1882) 579; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 243; Ridl. Fl. Mal. Pen. 2 (1923) 305. – *Eugeniodes ophirense* O.K. Rev. Gen. Pl. 2 (1891) 975. – Lectotype: *Griffith 3650* (K, isotype in P), Malacca, summit of Mt. Ophir.

S. cumingiana Brand, Pfl. R. Heft 6 (1901) 58; Philip. J. Sc. 3 (1908) Bot. 8; *op. cit.* 7 (1912) Bot. 34: Merr. En. Philip. 3 (1923)297; H. Heine, Pfl. Samml. Clemens Kinabalu (1953) 87. – Prov. Camarines Sud.

S. perakensis King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 241; Ridl. Fl. Mal. Pen. 2 (1923) 304; Burkill, Dict. 1 (1935) 2114. – *S. caudata* (*non* Wall. *ex* G. Don) Ridl. Fl. Mal. Pen. 2 (1923) 304. – Lectotype: *King's coll. 10985* (L, isotypes in BM, CGE, W), Malaya, Perak.

S. fragrans Elmer, Leafl. Philip. Bot. 2 (1908) 508; Brand, Philip. J. Sc. 7 (1912) Bot. 33; Merr. En. Philip. 3 (1923) 299. – Type: *Elmer 9873* (BISH, BM, BO, E, K, L, W, WRSL), Negros, Dumaguete, Cuernos Mts.

S. curtiflora Elmer, Leafl. Philip. Bot. 2 (1908) 509; Merr. En. Philip. 3 (1923) 298. – Type: *Elmer 9802* (BISH, BM, BO, E, K, L, LE, P, W), Negros, Dumaguete, Cuernos Mts.

S. angularis Elmer, Leafl. Philip. Bot. 2 (1908) 510. – Lectotype: *Elmer 8554* (BM, BO, E, LE, US, W, WRSL), Luzon, Benguet, Prov. Bagüio.

S. purpurascens Brand, Philip. J. Sc. 7 (1912) Bot. 33; Merr. En. Philip. 3 (1923) 302: – Type: *FB 8254 Curran & Merritt* (*non vidi*), Luzon, Prov. Zambales, Mt. Tapulao.

S. minutiflora Elmer, Leafl. Philip. Bot. 7 (1914) 2320; Merr. En. Philip. 3 (1923) 300: – Type: *Elmer 14121* (BISH, BM, BO, E, K, L, LE, P, W), Mindanao, Cabadbaran, Mt. Urdaneta.

S. agusanensis Elmer, Leafl. Philip. Bot. 7 (1914) 2321. – Type: *Elmer 14039* (BISH, BM, BO, E, G, K, L, LE, P, W), Mindanao, Cabadbaran, Mt. Urdaneta.

S. pachyphylla Merr. Philip. J. Sc. 10 (1915) Bot. 283; En. Philip. 3 (1923) 300: – Type: *Wenzel 1132* (BM, G, L), Leyte, Buenavista near Jaro, alt. 500 m.

S. elliptifolia Merr. Philip. J. Sc. 12 (1917) Bot. 292; En. Philip. 3 (1923) 298: – Type: *BS 26512* (A, isotype in K), Luzon, Prov. Nueva Ecija, Mt. Umingan.

S. brachybotrys Merr. Philip. J. Sc. 14 (1919) Bot. 447, *non* Merr. (1917); Merr. En. Philip. 3 (1923) 297. – *S. ilocana* Merr. Philip. J. Sc. 35 (1928) Bot. 7. – Type: *BS 33277* (A, isotypes in BM, K, P), Luzon, Prov. Ilocos Norte, Mt. Palimlin.

Shrub, or tree to 18 m high and 50 cm ϕ. Twigs glabrous, or sometimes the youngest parts appressedly pubescent. Terminal buds small, or up to 10 mm, glabrous to densely appressed-pubescent. *Leaves* glabrous, except sometimes the very youngest, (narrowly) elliptic to ovate or obovate, 5—22 by 1½—7 cm, index 2—4; base cuneate, often narrowed into the petiole; base angle 20°—65°; apex cuneate or rounded to caudate; margin often slightly cartilaginous, recurved, entire, glandular crenulate to denticulate or serrate, often with black glands prominent on the margin or on the teeth. *Nerves* 4—13(—16) pairs, either anastomosing or meeting in a looped intramarginal vein; reticulation from very fine, much prominent beneath to coarse. *Petiole* flat or grooved above, winged, except towards the very base, in ssp. *cumingiana*, or only with faint ridges near the blade, 2—10(—20) mm. *Inflorescence* a short raceme, a 3—5-branched panicle of racemes, or a spike (in ssp. *cumingiana* var. *pachyphylla*), rarely reduced to 1—3 flowers (in ssp. *perakensis* var. *lingaensis*), 1—3 cm (to 6 cm in Sumatra); axis appressedly pubescent to minutely puberulous or nearly glabrous. Bracts ½—1½ (—3) mm long, bracteoles as long as bracts or shorter, both caducous or persistent, with same indument as axis. *Calyx tube* mostly with same indument as inflorescence axis, or densely appressedly pubescent, rarely glabrous, *c.* 1½ mm high (2½ mm in ssp. *cumingiana* var. *pachyphylla* according to Merrill); lobes with same indument as tube, or less hairy, ½—1 mm long (2½—3 mm in ssp. *cumingiana* var. *pachyphylla*). *Corolla* 2—5 mm. *Stamens* 20—60, as long as corolla or up to 1 mm longer (more than 75, to 9 mm long in var. *pachyphylla*). *Disk* glabrous to shortly pilose, 5-glandular, annular or globose. *Style* glabrous to pilose, 3—5(—8) mm. *Fruits* ampulliform, with long neck, to ovoid, rarely ellipsoid or cylindrical; mesocarp thin, fleshy; stone with coarse surface, low lengthwise ridges or high, interrupted ridges and in that case often with hollow base, filled with fleshy mesocarp. *Seed* 1, (narrowly) ovoid to horse-shoe-shaped; embryo obscurely S-shaped, curved with an angle of ± 90° about halfway its length, or twice, screw-like curved.

Distribution. Sumatra, Malaya, Borneo, Celebes, and the Philippines.

Notes. 1. This species could easily be conceived as a subspecies of *S. cochinchinensis*

(p. 141). Especially ssp. *cumingiana* closely resembles *S. cochinchinensis* ssp. *leptophylla* var. *schumanniana*. In fact the only difference is the embryo, which in the latter taxon is uncinately curved towards the base, and which is rectangular curved about the middle in ssp. *cumingiana*. But in ssp. *cumingiana* var. *pachyphylla* it is already curved beneath the middle. If *S. ophirensis* would be conspecific with *S. cochinchinensis*, the same would be true for other species, *e.g.* for *S. sumuntia* (p. 284), to which it is also allied as can be concluded from the fruit characters. The fruits of *S. ophirensis* ssp. *perakensis* and of *S. sumuntia* closely resemble each other. In *S. sumuntia* two kinds of seed are found, with once and with twice curved embryo. Both kinds are also found in *S. ophirensis*. Because in the area where these species occur there can be no doubt as to their identity, it appears to me convenient to deal with them as separate species.

2. In Celebes two collections were made, *Bloembergen 3930* and *4009*, from Central Celebes, G. Ngilalaki, of which the identity is not certain because there are no ripe fruits. Provisionally I consider these collections as belonging to *S. ophirensis* ssp. *cumingiana* var. *cumingiana* and not to *S. cochinchinensis* ssp. *leptophylla* var. *schumanniana*. The flowers and young fruits of these specimens are very similar to those of *S. ophirensis* ssp. *perakensis* while the fruits resemble those of *S. ophirensis* ssp. *cumingiana*.

KEY TO THE INFRASPECIFIC TAXA

1a. Calyx tube at most 1 mm high. . . . . **77-3.** ssp. **ophirensis** var. **densireticulata**
b. Calyx tube *c.* 1½ mm high. 2
2a. Fruit ampulliform, with long neck. Calyx tube 1½ mm high, lobes *c.* ½ mm long. Corolla 2—3 mm. Disk globose or annular, shortly pilose. **77-7.** ssp. **perakensis,** 3
b. Fruit ovoid, ellipsoid, or cylindrical. Calyx tube 1½(—2½) mm high, lobes ½—1 (—1½) mm long. Corolla 3—5 mm. Disk 5-glandular, glabrous or sparsely hairy. 4
3a. Terminal buds glabrous. Secondary veins forming a rather coarse reticulation with the slightly less prominent tertiary veins. Inflorescence a many-flowered panicle of racemes, 1—4 cm long. Style shortly pilose for its whole length. **77-8.** var. **perakensis**
b. 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. . . . . **77-9.** var. **lingaensis**
c. Terminal buds pubescent. Secondary and tertiary veins much prominent, forming a fine reticulation with the often also prominent quaternary veins. Style glabrous. **77-10.** var. **sumatrana**
4a. Fruit ovoid to cylindrical; stone with shallow lengthwise grooves. Seeds ovoid, with small, nearly straight embryo. Disk sparsely hairy. Reticulation beneath very dense. . . . . **77-2.** ssp. **ophirensis** var. **ophirensis**
b. 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. **77-4.** ssp. **cumingiana** 5

5a. Inflorescence a raceme. Calyx tube $1\frac{1}{2}$ mm, lobes $\frac{1}{2}$—1 mm. Corolla 3—$4\frac{1}{2}$ mm. Stamens 20—60. . . . . **77-5.** var. **cumingiana**

b. Inflorescence a spike. Calyx tube $2\frac{1}{2}$ mm, lobes *c.* $1\frac{1}{2}$ mm. Corolla *c.* 5 mm. Stamens more than 75. . . . . **77-6.** var. **pachyphylla**

77-1. ssp. **ophirensis**

S. ophirensis Clarke.

Distribution. Malay Peninsula and Celebes.

77-2. var. **ophirensis**

Shrub or small tree to 6 m. *Leaves* (narrowly) elliptic, $5\frac{1}{2}$—$9\frac{1}{2}$(—$11\frac{1}{2}$) cm by $1\frac{1}{2}$—$4\frac{1}{2}$(—6) cm, index 2.3—3.5; base cuneare to rounded, not narrowed into the petiole, base angle 30°—65°(—90°); apex cuneate to rounded, sometimes obscurely acuminate. *Nerves* 5—6 pairs, much prominent, meeting in a looped intramarginal vein. Reticulation very dense, prominent beneath (often also above). *Petiole* only with faint ridges towards the blade, 2—3 mm. *Racemes* up to 10 mm, from the axils of the upper leaves or from new wood beneath them. Bracts caducous or persistent. Pedicels 1—3 mm, calyx tube $1\frac{1}{2}$ mm, lobes $\frac{1}{2}$—1 mm. *Corolla* 3—5 mm. *Stamens* 25—60. *Disk* 5-glandular, usually sparsely hairy. *Style* glabrous, $3\frac{1}{2}$—5 mm. *Fruits* ovoid to cylindrical, 6—12 by 5—6 mm; stone with shallow lengthwise grooves, 5—11 by 4—5 mm. *Seed* ovoid, with small, nearly straight embryo.

MALAY PENINSULA. Perak: *Wray 3919*, G. Bubu, Larut, alt. 1500 m. – Selangor: 11 collections, mainly from Fraser's Hill (Pine Tree Hill), alt. 1200–1350 m. – Johore: 5 collections, Mt. Ophir, alt. 1200–1500 m.

77-3. var. **densireticulata** Noot., *var. nov.*

Type: *CF(KEP.)31551*(K), Malay Peninsula, locality unknown, notes lost.

Ramuli pubescentes vel tomentosae gemmis apicalibus minutis pubescentibus. Folia subtus pubescentes ovata ad elliptica 3,5–11 cm longa 1,5–4,5 cm lata indice 2,5–3,8 base cuneata apice acuto vel acuminato acumine 0–15 mm longo nervis primariis 6–9 paribus reticulo dense subtus prominente. Inflorescentia racemosa ad 3 cm longa bracteis bracteolisque pubescentibus mox caducis. Calyx glabra tubo 1 mm alto limbo 1–1,5 mm longo lobis triangulatis c. 1 mm longis. Corolla $2\frac{1}{2}$ cm longa. Stamina delicata c. 40. Discus pilosus inconspicuus. Fructus pubescens ellipsoideus 5–8 mm longus 4–5 mm latus.

Twigs (appressedly) pubescent to tomentose; terminal buds small, pubescent. *Leaves* ovate-elliptic, (appressedly) pubescent beneath, $3\frac{1}{2}$—11 by $1\frac{1}{2}$—$4\frac{1}{2}$ cm, index 2.5—3.8;

base cuneate, base angle 30°—60°; apex cuneate to acuminate, acumen 0—15 mm; margin entire or dentate. *Nerves* 6—9 pairs, curved upwards, whether meeting in an intramarginal vein or anastomosing; reticulation beneath very fine. *Petiole* 2—9 mm. *Inflorescence* a short raceme to *c.* 3 cm; axis pubescent; bracts and bracteoles pubescent, soon caducous, 2 and 1 mm long respectively. *Calyx* pubescent, tube 1 mm high, limb 1—1½ mm long, lobes ± triangular, *c.* 1 mm long. *Corolla* 2—2½ mm. *Stamens* delicate, *c.* 40. *Disk* inconspicuous, pilose. *Style* glabrous, *c.* 2 mm. *Fruit* pubescent, ellipsoid, 5—8 by 4—5 mm, crowned by the persistent, often closed, pubescent calyx limb; endocarp smooth. *Seeds* not seen, probably straight with straight embryo.

MALAY PENINSULA. Pahang: *SF 31237*, Cameron Highlands, alt. *c.* 1500 m. *CF* (*Kep.*) *31551* (locality unknown, notes lost).

CELEBES. SW. Celebes: *Kjellberg 1504*, B. Poka Pindjang, alt. 2500 m. – SE. Celebes: *bb 24087*, Malili, alt. 1500 m.

77-4. ssp. **cumingiana** (Brand) Noot., *comb. nov.*

S. cumingiana Brand, Pfl. R. Heft 6 (1901) 58.

Shrub or small tree to 6 m. *Leaves* ± elliptic (to obovate), 6—22 by 3—7 cm; base cuneate, base angle 20°—65°; apex as in ssp. *ophirensis* to abruptly acuminate, acumen 0—20 mm. *Nerves* 6—13(—16) pairs, much prominent or more often faintly prominent, usually meeting in a looped intramarginal vein; reticulation very fine, much prominent, to coarse, faintly prominent. *Petiole* 1—10(—20) mm, narrowly winged, except to its very base. *Inflorescence* to 3(—5) cm long, a (branched) raceme or a spike. Pedicels 0—3 mm. *Calyx tube* 1½(—2½) mm high, lobes ½—1(—1½) mm. *Corolla* 3—5 mm. *Disk* 5-glandular, glabrous, rarely with some hairs. *Fruits* 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. *Seeds* ovoid to horse-shoe-shaped, embryo curved with an angle of about 90° to twice, screw-like curved.

Distribution. Borneo, Philippines, and Celebes.

77-5. var. **cumingiana** — **Fig. 4d, e, pl. 20a-e.**

S. cumingiana Brand – *S. curtiflora* Elmer – *S. angularis* Elmer – *S. purpurascens* Brand – *S. minutiflora* Elmer – *S. agusanensis* Elmer – *S. elliptifolia* Merr. – *S. brachybotrys* Merr., *non* Merr. (1917).

Shrub or small tree to 6 m. *Leaves* ± elliptic, 6—18 by 3—7 cm, index 2—3.6. *Nerves* 6—13(—16) pairs, much prominent or more often faintly prominent, usually meeting in a looped intramarginal vein; reticulation very fine, much prominent, to coarse, faintly prominent. *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 tube* 1½ mm; lobes ½—1 mm, both pubescent. *Corolla* 3—4½ mm. *Stamens* 20—60. *Disk* 5-glandular, glabrous, rarely with some hairs. *Fruits* ovoid, ellipsoid or rarely cylindrical, 5—12 by 3—7 mm. *Seeds* ovoid to horse-shoe-shaped, embryo curved with an angle of about 90° about its middle to twice, screw-like curved.

Distribution. As for the subspecies.

BORNEO. Sabah: *c.* 25 collections, all from Mt. Kinabalu, alt. 1200–2700 m (up to 3700 m? sterile collection). – Sarawak: *S 25848*, Kapit, Bt. Salong, Melinau, alt. 1000 m; *S 21400*, Miri, Sg. Ukong; *Nooteboom 2229*, Ulu Limbang, 115°28′E, 3°49′N. – Kalimantan: *Endert 4135*, W. Kutai, G. Kemul, alt. 1600 m.

PHILIPPINES. Luzon: many collections, alt. 500–2800 m. – Catanduanes: *BS 75496, 75501*. – Mindoro: *BS 40587*, Mt. Halcon. – Negros: 5 collections, in the mountains. – Biliran I.: *PNH 21515, 21711*, Mt. Suiro, alt. 600–1160 m. – Leyte: *Wenzel 806, 1117, 1126, 1127*. – Mindanao: 10 collections, alt. 800–2000 m.

CELEBES. Menado: *Bloembergen 3930, 4009*, Palu, G. Ngilalaki, alt. 1000 m (see under the notes, p. . . .).

77-6. var. **pachyphylla** (Merr.) Noot., *comb. nov.*

S. pachyphylla Merr. Philip. J. Sc. 10 (1915) Bot. 283.

Leaves 10—20 by 6—8½ cm, index 1.7—2.4. *Nerves c.* 10 pairs, anastomosing, or an intramarginal vein faintly visible; reticulations coarse, faintly prominent. *Petiole* 10—20 mm. *Inflorescence* a spike. Bracts and bracteoles appressedly pubescent. 2½ and 3 mm long respectively. *Calyx tube* glabrous, 2½ mm high; lobes densely appressedly pubescent, *c.* 1½ mm long. *Corolla c.* 5 mm long. *Stamens* more than 75, up to 9 mm. *Disk* glabrous, 5-glandular. *Style* glabrous, *c.* 8 mm long. *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. *Seeds* ovoid to curved, and then as the embryo with an angle of about 90° beneath the middle.

PHILIPPINES. Leyte: *Wenzel 1132*. – Mindanao: *PNH 83753*, Agusan Prov., Diuata Mts.

77-7. ssp. **perakensis** (King & Gamble) Noot., *comb. nov.*

S. perakensis King & Gamble, J. As. Soc. Beng. 74,2 (1906) extra number 241 = *S. fragrans* Elmer.

Tree to 18 m high and 50 cm ϕ. *Leaves* (narrowly) elliptic, 5—12 by 2—4½ cm, index 2—4; base cuneate, often slightly attenuate, base angle 30°—50°; apex faintly acuminate to caudate, acumen 10—18 mm. *Nerves* 4—7 pairs, except in var. *sumatrana* meeting in a looped intramarginal vein; reticulation very fine to rather coarse. *Petiole* 3—9 mm, not winged. *Inflorescence* a (basally) 3—5-branched very slender panicle of racemes,

a raceme, or reduced to 1—3 flowers in var. *lingaensis*. Bracts and bracteoles persistent, minute. Pedicels 1—4 mm. *Calyx tube* 1½ mm high, lobes ± semi-orbicular, *c.* ½ mm long. *Corolla* 2—3 mm. *Stamens* 30—50. *Disk* globose or annular, shortly pilose. *Style* pilose to glabrous, *c.* 3 mm, with small peltate stigma. *Fruits* ampulliform, *c.* 7 by 5 mm, with long beak; mesocarp fleshy, *c.* ½ mm thick; surface of the stone coarse, the inner wall following the grooved surface of the deeply grooved ruminate cerebrum-like seed. *Embryo* curved with an angle of not yet 90°, small, 3 mm long and *c.* ⅓ mm thick.

Distribution. Sumatra, Malay Peninsula, and the Philippines.

77-8. var. **perakensis** — **Fig. 4a-c.**

S. perakensis King & Gamble - *S. fragrans* Elmer.

Terminal buds small glabrous, or the initial leaves ciliate. *Leaves* (narrowly) elliptic, 5—11 by 2—4½ cm, index 2—3; base angle 35°—45°; apex (long) acuminate, acumen 10—20 mm; intramarginal vein obvious; secondary veins prominent, forming a rather coarse reticulation with the often slightly less prominent tertiary veins. *Petiole* 3—6 mm. *Inflorescence* a usually many-flowered panicle of racemes, 1—4 cm long. *Calyx* appressedly pubescent. *Style* shortly pilose for its whole length.

MALAY PENINSULA. Perak: *c.* 10 collections, alt. below 350 m. – Selangor: *Burkill 1013*, Sg. Buloh, alt. 200 m; *CF 7968, id.*; *CF 98890, 99380*, Ulu Gombak For. Res., alt. 350–600 m. – Pahang: *CF 4508*, Belingo For. Res., Temerloh. – Negri Sembilan: *M. Shah 2593*, Nilai Jindaram Estate, alt. 100 m.

PHILIPPINES. Negros: *Elmer 9873*, Cuernos Mts., Dumaguete, alt. 1350 m.

Note. I wonder whether the fruits described by King & Gamble, and included in a separate envelope with *Scortechini 646*, really belong to this subspecies. In my opinion these fruits are detached from material belonging to another species.

77-9. var. **lingaensis** Noot., *var. nov.*

Type: *Teysmann s.n.*(L, isotype in BO), Lingga, B. Una Taloh.

Petiolus c. 5 mm longus. Inflorescentia 1.–3 flora ad 1 cm longa. Calyx minute puberulus. Stylus basem versus pilosus.

Terminal buds glabrous. *Leaves* narrowly elliptic, 7—12 by 2—3½ cm, index 2½—4; base angle 30°—50°; apex caudate, acumen 10—35 mm; intramarginal vein obvious; secondary veins prominent, forming a rather fine reticulation with the faintly prominent tertiary veins. *Petiole c.* 5 mm. *Inflorescence* a 1—3-flowered raceme, up to 1 cm. *Calyx* minutely puberulous. *Style* pilose only towards its base. *Fruits* unknown.

LINGGA ARCH. Only the type.

77-10. var. **sumatrana** Noot., *var. nov.*

Type: *Meijer 9518* (L), Sumatra, Mt. Sago.

Petiolus 4–9 mm longus. Inflorescentia laxe paniculata vel racemosa $1\frac{1}{2}$–6 cm longa. Calyx minute appresse pubescens. Stylus glaber.

Terminal buds pubescent. *Leaves* narrowly elliptic, 6—10 by 2—3 cm, index *c.* 3; base angle 30°—45°; apex faintly acuminate, acumen 10—18 mm. *Nerves* 4—5 pairs; intramarginal vein quite inconspicuous; secondary and tertiary veins much prominent, forming a fine reticulation with the often also prominent quaternary veins. *Petiole* 4—9 mm. *Inflorescence* a lax panicle or raceme, $1\frac{1}{2}$—6 cm long. *Calyx* minutely appressedly pubescent. *Style* glabrous. *Fruits* not known.

SUMATRA. Westcoast: *Bünnemeijer 3114*, Agam, Brani, alt. 900 m; *Maradjo 434*; *W. Meijer 3379, 5918*, all Mt. Sago, alt. 900–1300 m.

78. Symplocos oreades Guillaumin

S. oreades Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 174, *excl. syn. S. poilanei* Guillaumin; Fl. Gén. I.-C. 3 (1933) 1032. – Type: *Poilane 17046* (P, isotype in NY), Tonkin, Col de Lo qui ho, près Chapa.

S. risekiensis Hayata, Ic. Pl. Form. 5 (1915) 112, t. 35; Kanehira, Form. Woods (1921) 149; Mori, Sylvia 5 (1935) 242. – *Bobua risekiensis* Kanehira & Sasaki, List Pl. Form. (1928) 332. – Type: *T. Kawakami & U. Mori 3551* (*non vidi*), Formosa, Nanto, Risekisan.

S. pittosporifolia Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 25. – Type: *Ching 7843* (W, isotype in NY), Kwangsi, Seh-feng Dar Shan, S. Nanning.

Twigs glabrous or puberulous; terminal buds with glabrous or puberulous scales. *Leaves* glabrous, ± elliptic, $5\frac{1}{2}$—13 by 1.1—4 cm, index 2.4—5; base cuneate, attenuate, base angle 20°—50°; apex (abruptly) acuminate, acumen 6—15 mm; margin entire or crenulate. *Nerves* 8—14 pairs, faintly prominent beneath, meeting in a hardly visible intramarginal vein; reticulation coarse, faintly prominent, often nearly obscure. *Petiole* with narrow ridges from the decurrent leaf blade, 7—13 mm. *Inflorescence* a raceme to 4 cm; axis puberulous or grey-tomentose to tomentellous, glabrescent, glabrous in fruit. Bracts and bracteoles whether or not persistent, semi-orbicular, appressedly puberulous to glabrous, sometimes only puberulous (or tomentellous) towards the base, $1\frac{1}{5}$—4 and 1—2 mm long respectively. *Calyx tube* glabrous, 1—$1\frac{1}{4}$ mm high; limb $\frac{3}{4}$—$1\frac{1}{2}$ mm long, lobes semi-elliptic to semi-orbicular, glabrous or sparsely appressedly puberulous, $\frac{1}{2}$—$1\frac{1}{4}$ mm long. *Corolla* $3\frac{1}{2}$—5 mm. *Stamens* 20—50. *Disk* glabrous, low. *Style* glabrous, 3—4 mm. *Fruits* long-ampulliform, nearly cylindrical, 5—6 by 2—3 mm; mesocarp fleshy, thin; stone with low lengthwise ridges, 1-celled. *Seed* and embryo slightly curved.

CHINA. Yunnan: *H. T. Tsai 51748*. Wen Shan Hsien, alt. 1800 m. – Kwangsi: 9 collections, alt. 400–800 m. – Kwangtung: *W. T. Tsang 26875*, Tang Ch'eng Distr. – Hainan: *Chun & Tso 44206*, Fan Yah. – Formosa: 6 collections, alt. 1000–2600 m.

INDO-CHINA. Tonkin: *Poilane 17046, 25418*, Chapa; *W. T. Tsang 26924*, Mon Cay; *27395*, Tien Yen.

78a. Symplocos ovatilobata Noot., *sp. nov.*

Type: *F. C. How 71750* (A, isotype in S), Hainan, Po-ting.

Frutex ramulis pilosis gemmis apicalibus parvis pubescentibus foliis 3,5 ad 7 cm longis 1,5 ad 2,8 cm latis indice 2—4 infra appresse pilosis basi rotundata vel cordata apice acuminato margine dentato nervis primariis utroque latere 5 ad 7 in venam intramarginalem convenientibus petiolo 2 ad 3 mm longo. inflorescentia uniflora bracteis bracteolisque persistentibus pubescentibus calyce tubo glabro lobis pubescentibus ovatis $2\frac{1}{2}$ ad 3 mm longis corolla 3 ad 5 mm longa staminibus, c. 30 disco cylindrico paucipiloso. Fructus ampulliformis 9 mm longus 4 mm latus.

Shrub. Twigs patently pilose; terminal buds small, pubescent. *Leaves* ± elliptic, appressedly pilose underneath, 3.5—7 by 1.5—2.8 mm, index 2—4; base rounded to cordate, base angle 90°—100°; apex abruptly acuminate, acumen 6—15 mm long. *Nerves* 5—8 pairs, meeting in an intramarginal vein quite far from the margin; reticulation rather sparse, prominent beneath. *Petiole* 2—3 mm. *Inflorescence* 1-flowered. Bracts and bracteoles persistent, pubescent, 2—3 and 2 mm long respectively. *Calyx tube* glabrous, *c.* 1 mm high, the limb wholly divided into the ovate, pubescent, $2\frac{1}{2}$—3 mm long lobes. *Corolla* 3—5 mm. *Stamens c.* 30. *Disk* with few hairs, cylindrical, *c.* $\frac{1}{2}$ mm high. *Style* glabrous, *c.* 3 mm. *Fruits* ampulliform, *c.* 9 by 4 mm. *Seed* and embryo probably curved.

China. Hainan: *F. C. How 71570, 72927*; *Wang 36142*, Po-ting.

79. Symplocos oxyphylla Wall. *ex* DC.

S. oxyphylla Wall. [Cat. (1828) 4430, *nomen*] *ex* DC. Prod. 8 (1844) 256; Clarke, Fl. Br. Ind. 3 (1882) 574; Brand, Pfl. R. Heft 6 (1901) 39; Brandis, Indian Trees (1906) 441. – *Lodhra oxyphylla* Miers, J. Linn. Soc. Bot. 17 (1879) 300. – Type: *Wallich 4430* (G-DC, isotypes in BM, K, LE), Silhet.

S. pedicellata Kurz, J. As. Soc. Beng. 42, 2 (1873) 89; *op. cit.* 46, 2 (1877) 239; For. Fl. Burma 2 (1877) 147. – *Lodhra pedicellata* Miers, J. Linn. Soc. Bot. 17 (1879) 300. – Type: *Kurz 1016* (K), Burma, Pegu.

Twigs glabrous; terminal buds naked or only with few scales, pubescent; growth continuous. *Leaves* glabrous, ± elliptic, 7—15 by 3—5 cm, index 2.3—3; base attenuate, base angle 20°—50°; apex acuminate, acumen 7—20 mm; margin nearly entire, crenulate. *Nerves* 6—9 pairs, curved upwards and meeting in a looped intramarginal vein at a distance of $\frac{1}{2}$—$\frac{1}{4}$ from the margin; reticulation coarse, quite obscure. *Petiole* 7—12 mm. *Inflorescence* a basally branched raceme to 4 cm; axis puberulous. Bracts and bracteoles caducous or the bracteoles persistent, puberulous, $\frac{1}{2}$—1 mm. Pedicel puberulous, to $1\frac{1}{2}$ or in other specimens to 3 mm in the lowermost flowers. *Calyx* glabrous; tube $\frac{1}{2}$—1 mm, limb nearly wholly divided, *c.* $\frac{1}{2}$ mm long; lobes ciliolate, rounded-triangular to semi-orbicular. *Corolla* (?3—)5 mm. *Stamens c.* 50. *Disk* 5-glandular, the broadly conical style base shortly pilose. *Style* glabrous or minutely hairy towards the base, *c.* 3 mm. *Fruits* ovoid, *c.* 9 by 6 mm, crowned by the persistent calyx lobes; mesocarp

wrinkled; stone ± ampulliform, the belly lengthwise ribbed, the conical beak smooth. *Seed* 1, much lobed; embryo falcate.

Distribution. India, Burma, and Thailand.

INDIA. Assam, Khasia and Svlhet: *Hook. f. & Thomson 1140*; *Masters s.n.*; *Wallich 4430.*
BURMA. Myitkyina: *Kyaw 50*, Seniku-Lankhaung, alt. 750 m. – Pegu: *Kurz 1016.* – Tenasserim: *Keenan c.s. 1709*, 14°. N, 98°30′ E, alt. 250 m.
THAILAND. (Peninsular). Puket: *Kerr 18541*, Pang-nga, alt. 100 m.

80. Symplocos paniculata (Thunb.) Miq. — **Pl. 21e-i, fig. 2b, 6, photogr. 5.**

S. paniculata (Thunb.) Miq. Ann. Mus. Bot. Lugd. Bat. 3 (1867) 102 (= Prol. Fl. Jap. (1867) 266); Sargent, Pl. Wils. 2 (1916) 593; Kanehira, Form. Trees (ed. 1936) 597, t. 554; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 39; Hara, En. Sperm. Jap. 1 (1948) 109; Li, Taiwania 1 (1950) 315; Bailey, Man. Cult. Pl. ed. 2 (1954) 792, t. 164; Ohwi, Fl. Jap. (1965) 725. – *Prunus paniculatus* Thunb. Fl. Jap. (1784) 200; Pers. Syn. Pl. 2 (1807) 34; Steud. Nomencl. ed. 1 (1821) 663. – *Eugeniodes paniculatum* O.K. Rev. Gen. Pl. 2 (1891) 410. – *Palura paniculata* Nakai, Tr. & Shr. ed. 1 (1922) 299; Fl. Sylv. Koreana 13 (1923) 32. – *Palura ciliata* Nakai *ex* Hara, Bot. Mag. Tokyo 47 (1933) 897. – Type: *Thunberg* (UPS, *non vidi*), Japan.

Myrtus chinensis Lour. Fl. Coch. (1790) 313. – *S. chinensis* Druce, Rep. Bot. Exch. Cl. Br. Isles 4 (1917) 650; Merr. Philip. J. Sc. 15 (1919) 251; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 276; Fl. Gén. I.-C. 3 (1933) 1030; Merr. Comm. Lour. (1935) 303; Hand.-Mazz. Beih. Bot. Centralbl. 56-B (1937) 451; Li, Taiwania 1 (1950) 312; Ohwi, Fl. Jap. (1965) 725. – *Palura paniculata* var. *chinensis* Nakai, Tr. & Shr. ed. 2 (1927) 310. – *Palura chinensis* Koidz. Bot. Mag. Tokyo 43 (1929) 397. – *S. crataegoides* var. *chinensis* Makino & Nemoto, Fl. Jap. ed. 2 (1931) 918. – Type: *Loureiro* (P), Canton, *vide* Merrill (1935).

S. sinica Ker, Bot. Reg. 9 (1823) t. 710; G. Don, Gen. Syst. 4 (1837) 3, t.; DC. Prod. 8 (1844) 258; Miq. Prol. Fl. Jap. (1867) 267; Brand, Pfl. R. Heft 6 (1901) 34. – *Palura sinica* Miers, J. Linn. Soc. Bot. 17 (1879) 297. – *Eugeniodes sinicum* O.K. Rev. Gen. Pl. 2 (1891) 410. – *Palura paniculata* var. *pilosa* Nakai, Tr. & Shr. ed. 2 (1927) 310, t. 144. – *Palura chinensis* var. *pilosa* Nakai. Bot. Mag. Tokyo 48 (1934) 774. – *Palura pilosa* Nakai *ex* Honda, Nom. Pl. Jap. (1939) 274, *non vidi*. – *Palura chinensis* var. *leucocarpa* forma *pilosa* Hara, En. Sperm. Jap. (1948) 108. – *S. chinensis* var. *leucocarpa* forma *pilosa* Ohwi, Bull. Nat. Sc. Mus. Tokyo 33 (1953) 83. – Type: as no collection is mentioned, I designate the plate of Ker as the type.

S. crataegoides Ham. *ex* D. Don, Fl. Nepal. (1825) 145; G. Don, Gen. Syst. 4 (1837) 3; Decne in Jacquemont, Voy. Bot. 4 (1844) 103, Atlas 2 (1844) t. 110; DC. Prod. 8 (1844) 258; Kurz, For. Fl. Burma 2 (1877) 147; J. As. Soc. Beng. 46, 2 (1877) 239; Clarke, Fl. Br. Ind. 3 (1882) 573; Gürke, in E. & P. Nat. Pfl. Fam. 4, 1 (1897) t. 88, a-b, d-g; Brand, Pfl. R. Heft 6 (1901) 33; Collett, Fl. Simlensis (1902) 305, t. 95; Matsumura & Hayata, Ic. Pl. Form. (1906) 229; Matsumura, Ind. Pl. Jap. 2, 2 (1912) 486; Mori, Sylvia 5 (1934) 224. – S. *paniculata* Wall. [Cat. (1831) 4429, *nomen*; D. Don, Fl. Nepal. (1825) 145, *in synon.*] *nom. inval.* – *Lodhra crataegoides* Decne in Jacquemont, Voy. Bot. 4 (1844) 103, Atlas 2 (1844) t. 110. – *Eugeniodes crataegoides* O.K. Rev. Gen. Pl. 2 (1891) 410. – Type: *Hamilton* (BM), Nepal.

S. paniculata var. *glabrifolia* Miq. Prol. Fl. Jap. (1867) 266. – *S. crataegoides* var. *glabrifolia* Koidz. Fl. Symb. Or. Asia (1930) 19. – Type: *Keiske* (L), Japan, Prov. Figo, Mt. Hirujawa.

S. paniculata var. *parvifolia* Miq. Prol. Fl. Jap. (1867) 266. – Type: *Keiske* (L), Japan.

S. pallida Franch. & Savatier, En. Pl. Jap. 1 (1875) 308, *nomen.* – *Palura paniculata* var. *pallida* Nakai, Tr. & Shr. ed. 2 (1927) 307, *nomen* (*Savatier 2908*), Japan.

S. sinica var. *vestita* Hemsley, J. Linn. Soc. Bot. 26 (1889) 75. – *S. chinensis* var. *vestita* Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 39. – Type: *Ford* (K), Kwangtung, Lantao I.

S. paniculata var. *glabra* Makino, Bot. Mag. Tokyo 18 (1904) 112. – *S. crataegoides* var. *glabra* Matsumura, Ind. Pl. Jap. 2 (1912) 486, *non vidi*. – *Palura paniculata* var. *glabra* Honda, Bot. Mag. Tokyo 47 (1933) 298. – Syntypes: *K. Mori, G. Nagura, T. Makino* (*non vidi*), Central Japan.

Cotoneaster coreanus Lévl. Fedde Repert. 11 (1912) 64. – *Palura coreana* Nakai, Bot. Mag. Tokyo 48 (1934) 773; Hara, En. Sperm. Jap. (1948) 109. – *S. coreana* Ohwi, Bull. Nat. Sc. Mus. Tokyo 33 (1953) 83; Fl. Jap. (1965) 725. – Type: *Taquet 1106* (E), Korea.

Crataegus lyi Lévl. Fl. Kouy Tcheou (1915) 346. – Type: *Cavalarie 2098 p.p.* (E, isotype in P), China, Prov. Kouy Tcheou.

Crataegus biloba Lévl. Fl. Kouy Tcheou (1915) 346. – *S. paniculata* forma *biloba* Rehder, J. Arn. Arb. 15 (1934) 298. – Type: *Cavalerie 2098 p.p.* (E), China, Prov. Kouy Tcheou.

Prunus mairei Lévl. Bull. de Géogr. Bot. 25 (1915) 45. – Lectotype: *E. E. Maire s.n.* (E, isotype in A), China, flanc de mont à Pé-long-tsin, alt. 3200 m.

S. tanakana Nakai, Bot. Mag. Tokyo 32 (1918) 227. – *Palura tanakana* Nakai, Fl. Sylv. Koreana 13 (1923) 34, t. 19; Tr. & Shr. ed. 2 (1927) 213, t. 146. – Syntypes: *Nakai 454*, *6410*, *6411* and *Taquet 5801* (*non vidi*), Korea and Quelpart I.

S. argutidens Nakai, Bot. Mag. Tokyo 32 (1918) 228. – *Palura argutidens* Nakai, Tr. & Shr. 1 (1922) 231, fig. 129, *non vidi*; Fl. Sylv. Koreana 13 (1923) 35; Tr. & Shr. ed. 2 (1927) 310, t. 145. – Syntypes: *Faurie 2137* and *Nakai 6408-9* (*non vidi*), Quelpart (island between Japan and Korea).

S. paniculata var. *leucocarpa* Nakai, Bot. Mag. Tokyo 32 (1918) 227. – *Palura paniculata* var. *leucocarpa* Nakai, Fl. Sylv. Koreana 13 (1923) 33. – *Palura chinensis* var. *pilosa* forma *leucocarpa* Nakai, Bot. Mag. Tokyo 48 (1934) 774. – *Palura chinensis* var. *leucocarpa* (Nakai) Hara, En. Sperm. Jap. 1 (1948) 108. – *S. chinensis* var. *leucocarpa* (Nakai) Ohwi, Bull. Nat. Sc. Mus. Tokyo 33 (1953) 83. – Type: *Nakai 6074* (*non vidi*), Korea.

Palura paniculata var. *pubescens* Nakai, Tr. & Shr. ed. 2 (1927) 310, *nomen*. – *S. paniculata* var. *pubescens* Ohwi, Fl. Jap. (1953) 931; *op. cit.* English ed. (1965) 726, *descr. angl.* – *Palura chinensis* var. *pubescens* Nakai, Bot. Mag. Tokyo 48 (1934) 774, *nomen*. – *Pulura pilosa* var. *pubescens* Nakai *ex* Honda, Nom. Pl. Jap. (1939) 274, *nomen* (*non vidi*), Japan.

S. hunanensis Hand.-Mazz. Symb. Sinica 7 (1936) 807, t. 14, 3. – Type: *Handel-Mazzetti 12095* (W, isotype in E), Hunan.

Palura papyracea Nakai, Bull. Nat. Sc. Mus. Tokyo 33 (1953) 20, *nomen, not in angl.*

Decideous shrub or small tree, in exposed places often dwarfed. Twigs glabrous or more or less pilose (villous, pubescent or silky). *Leaves* membranous to coriaceous, sparsely appressedly-hairy to glabrous above, beneath glabrous, minute uncinate-hairy or longer hairy, sometimes hairs ± bulbous-based, especially on the nerves, ovate to obovate, usually slightly thomboid, 1½—10(—13½) by 1—5½ cm, index 1.3—3; base (subcordate) to acute, base angle 30°—95°; apex (rounded) or acuminate, acumen (0—)1—12 mm; margin often ciliate, coarsely to finely glandular dentate, teeth often curved upwards. *Nerves* 5—10 pairs, merging into the reticulation or an often inconspicuous intramarginal vein present; reticulation rather fine, the lesser veins prominent or sunken. *Petiole* (0—)7 mm. *Inflorescence* an essentially terminal panicle, consisting of a raceme of cymose corymbs, 2—10 cm long, axis glabrous, minutely uncinate-hairy at one side to villous or pubescent. Bracteoles 1—2 directly under each flower, one bract at the base of the pedicel and 1—2 bracteoles on the pedicel (often with an aborted bud), linear to narrowly elliptic, usually ciliate and glandular-dentate, 1(—3) mm long,

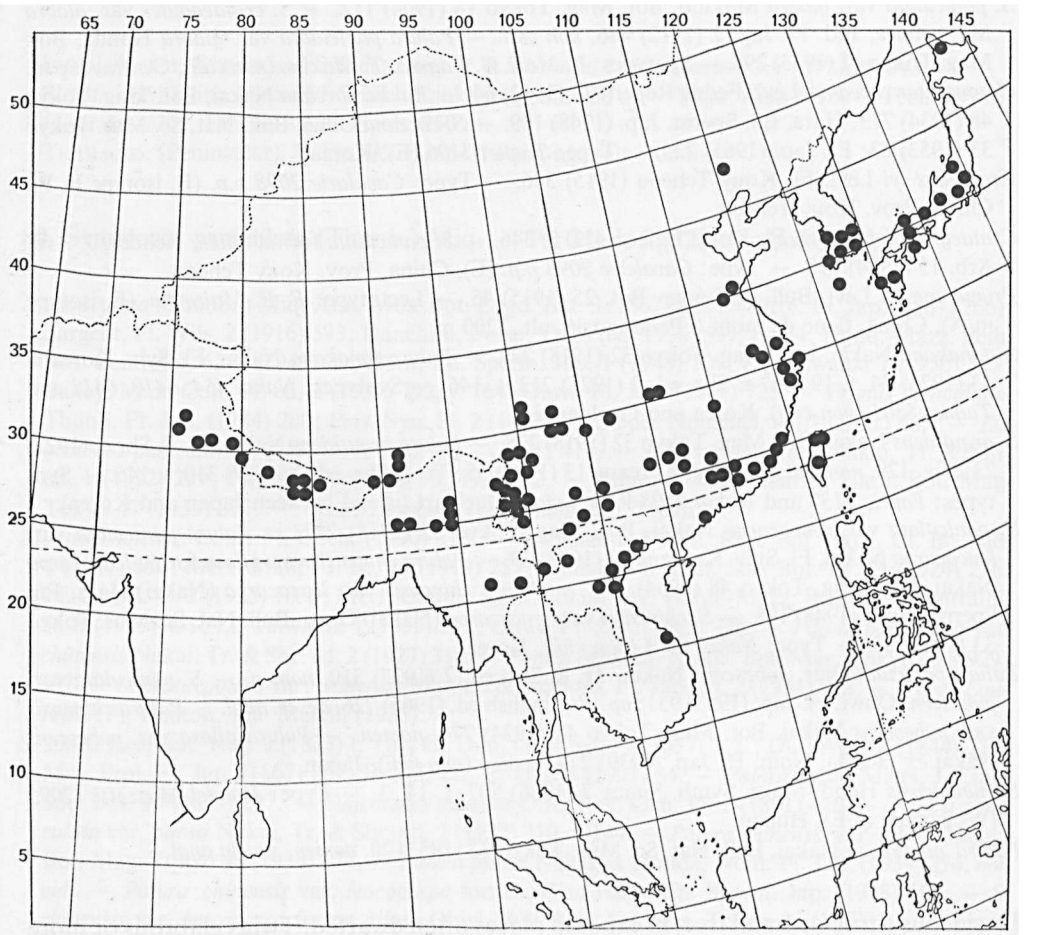

Fig. 8. Localities of *Symplocos paniculata* (Thunb.) Miq.

often soon caducous. Pedicels slender, thickening in fruiting stage, articulate at the apex (thus no real pedicels as is already indicated by the distribution of the bracts), 0—10 mm, with similar indument as the axis. *Flowers* fragrant, mostly white, but sometimes golden, green or orange yellow (*sec. coll.*). *Calyx tube* obconic, 1—1½ mm high, with similar indument as the pedicel, or glabrous or only with few hairs even when the pedicel is densely hairy; lobes semi-elliptic to triangular, rounded to acute, 1—1½ mm long irrespective of the tube length, ciliate, sometimes pilose without. *Corolla* often with ciliate or fimbriate margin, 5—6 mm. *Stamens* 25—50. *Disk* 5-lobed, the central part glabrous, with few hairs or villous, and in that case the calyx tube also hairy. *Style* 1½—5 mm, glabrous. *Ovary* 2-celled, each cell with 4 ovules. *Fruits* globose or ovoid, blue, black or rarely white *in vivo*, black when dry, 3—7 mm long, crowned by the persistent calyx lobes. *Seeds* usually 1, reniform, with thin testa and copious endosperm; embryo curved with long radicle and short cotyledons.

Distribution. North India, Upper Burma, Indo-China, China, Korea, Manchuria, Japan, and Formosa. Fig. 8.

INDIA. North Kashmir, Punjab, Garhwal, Nepal, Bhutan, Assam: many collections, alt. (600–) 1000–3000 m.

BURMA. Upper Burma: *c.* 20 collections, alt. 1200–1500 m.

INDO-CHINA. Laos: *Pételot 4496, 4500*, Kranninh, alt. 1100 m; *Vidal 1477*, Xieng Khouang; *Kerr 21119.* – Tonkin: *c.* 10 collections.

CHINA. Tibet: *Kingdon Ward 3927, 10409*, alt. 1500–2700 m; *Ludlow* c.s. *6466, 13033.* – Yunnan: many collections, alt. up to 3000 m. – Szechwan: many collections. – Kweichow: *W. Y. Chun 8921*; *Clemens 6314*; *Léveillé 2098*; *Steward, Chiao & Cheo 523.* – Shensi: *G. Fenzel 152*, alt. 1500–1700 m; *Giraldi 2728.* – Kwangsi: *c.* 20 collections. – Hupeh: *c.* 40 collections, alt. 800–2000 m. – Hunan: 20 collections. – Kwangtung: many collections. – Macao: *M. Callery 9.* – Honan: *c.* 10 collections, alt. 1400–2000 m. – Kiangsi: *c.* 30 collections, alt. 400–650 m. – Shantung: 5 collections, alt. 300–1000 m. – Anhwei: *c.* 15 collections. – Fukien: many collections. – Kiangsu: *c.* 30 collections, alt. 100–200 m. – Chekiang: *c.* 40 collections, alt. 200–1200 m. – Formosa: *c.* 15 collections.

MANCHURIA. *F. N. Meyer 41*, 46° N, 127° E.

KOREA (incl. Quelpart). *c.* 40 collections.

JAPAN. Many collections.

Ecology. Wet, even silt places near the coast in E. China to dry, rocky slopes in Yunnan and the Himalaya; sometimes preferring shade in mixed or pine forests, sometimes in open brush and grasslands. From sea-level in E. China up to 3000 m in Yunnan and the Himalaya. This is the only deciduous species in the genus.

Uses. The bark is considered a tonic; it is also used in ophthalmia (see Kirtikar & Basu, Indian Medicinal Plants ed. 2, 2, 1935, 1510). A yellow dye is extracted from the leaves with which people in the NW. Himalaya colour wool. The species is cultivated in temperate countries.

Notes. 1. A very variable species, as is reflected by the complicated synonymy. Already Guillaumin (*S. chinensis*, 1924) concluded that *S. chinensis*, *S. crataegoides* and *S. paniculata* should be treated as conspecific. Although typical drought forms occur,

there usually is neither any correlation between ecology and hairiness or leaf shape, nor between geography and these varying characters.

2. The endosperm contains much fatty oil, no starch.

3. H. Hara (Univ. Mus. Tokyo Bull. 2, 1971, 104) stated that in Japan three or four races can be clearly distinguished. He adopted the name *S. crataegoides* because 'the typical specimen of *Prunus paniculatus* Thunb.... differs from the common Japanese race'.

81. Symplocos paucinervia Noot., *sp. nov.*

Type: *S.P. Ko 55688* (A), China, Kwangsi, Lok of Village Ching Sai.

Frutex ramulis glabris foliis glabris anguste ellipticis 4 ad 8 cm longis 1 ad 2 cm latis indice 2,5 ad 5 venis primariis inconspicuis utroque latere 3 ad 5 reticulatio inconspicuo petiolo 5 ad 7 mm longo. Inflorescentia racemosa bracteis bracteolisque caducis puberulis vel tomentellis calyce tubo glabro limbo puberulo vel tomentello $1\frac{1}{2}$ ad 2 mm longo lobis semi-ellipticis $1\frac{1}{2}$ mm longis corolla 5 ad 6 mm longa disco piloso staminibus 20 ad 35. Fructus ignotus.

A shrub with glabrous twigs and small pubescent terminal buds. *Leaves* glabrous, narrowly elliptic, 4—8 by 1—2 cm, index $2\frac{1}{2}$—5; base cuneate-attenuate, base angle 15°—30°; apex faintly acuminate, acumen 0—10 mm. *Nerves* 3—5 pairs, inconspicuous, at least towards the apex meeting in an intramarginal vein close to the margin; reticulation inconspicuous. *Petiole* 5—7 mm. *Inflorescence* a raceme to 5 cm; axis puberulous to tomentellous. Bracts and bracteoles caducous, 3—4 and *c.* $1\frac{1}{2}$ mm respectively, the *c.* 1 mm long pedicel having the same indument as the axis. *Calyx tube* glabrous, 1 mm high, limb puberulous to tomentellous, $1\frac{1}{2}$—2 mm, lobes semi-elliptic, $1\frac{1}{2}$ mm long. *Corolla* 5—6 mm. *Disk* 5-glandular, annular, as the style base densely pilose. *Style* glabrous, 5 mm. *Stamens* 20—35.

CHINA. Kwangsi: only the type.

82. Symplocos paucistaminea F. v. Mueller & Bailey

S. paucistaminea F. v. Mueller & Bailey, 3rd Suppl. Syn. Queensl. Fl. (1890) 46; Bailey, Queensl. Fl. 3 (1900) 967; C. T. White, Bot. Bull. 20 (1918) 16; Contr. Arn. Arb. 4 (1933) 89: — Type: *Bailey, Bellenden Kerr Expedition s.n.* (BRI, isotypes in BM, K, MEL), Queensland, Cook Distr., Harvey's Creek.

Twigs densely spreadingly pubescent to tomentose, terminal buds small, densely spreadingly pubescent. *Leaves* above sparsely pubescent, glabrescent, the groove of the midrib densely pubescent, beneath sparsely pubescent, elliptic to obovate, 8—20 by 3—8 cm, index 1.9—3.2; base acute to rounded, base angle 25°—90°; apex (abruptly) acuminate, acumen 6—15 mm; margin dentate. *Midrib* densely pubescent beneath. *Nerves* 7—12 pairs, much prominent, meeting in a looped intramarginal vein; reticulations rather fine to rather coarse, with translucent light a very fine reticulation visible. *Petiole* 5—10

mm. *Inflorescence* a basally branched spike from the axils of the leaves to 5 cm, becoming longer in fruit; axis spreadingly brown hairy. Bracts and bracteoles persistent, spreadingly hairy, ovate, *c.* 2 and *c.* 1½ mm long respectively. *Calyx tube* glabrous, *c.* ¾ mm high, limb divided into glabrous (or sparsely hairy on the midrib) *c.* 1 mm long, ± ovate lobes. *Corolla c.* 2½ mm. *Stamens c.* 10, half as long as corolla. *Disk* glabrous or pilose, cylindrical. *Style* glabrous, stout, with peltate stigma, *c.* 1½ mm long. *Fruits* ampulliform, *c.* 6 by 4 mm, the stone ampulliform with globose, lengthwise grooved belly and narrow nearly cylindrical neck, 1-celled. *Seed* 1, filling the stone, twice curved, embryo twice curved.

NEW GUINEA. Milne Bay District: *LAE 56096*, Mayu I., junction of Mayu and Ugat Rivers, Mt. Suckling, alt. 350 m.

AUSTRALIA. Queensland: *c.* 15 collections: Dalrymple Heights, Tully, Atherton Tableland, Innisfail, alt. 0–700 m.

82a. **Symplocos pedunculata** Noot., *sp. nov.*

Type: *Kerr 15536* (K, isotypes in BM, E), Thailand, Nakawn Sritamarat, Kao Luang, alt. 1500 m.

Frutex ramulis patenter longissime pilosis foliis ovatis basi cordatis apice acuminatis 7–11 cm longis 3–4 cm latis nervis primariis utroque latere 7 ad 8 petiolo c. 4 mm longo. Inflorescentia pauciflora racemosa longe pedunculata bracteis bracteolisque pubescentibus calyce tubo dense pubescente limbo glabro disco piloso 5-stellato.

Shrub with densely patently long-pilose twigs, hairs longer than 2 mm. Terminal buds small, pubescent. *Leaves* ovate, glabrous beneath, 7—11 by 3—4 cm, index 2—2.5; base cordate, base angle 120°—160°; apex acuminate, acumen 7—15 mm long; margin denticulate. Nerves 7—8 pairs, meeting in an intramarginal vein; reticulations very fine but hardly prominent. *Petiole c.* 4 mm. *Inflorescence* a long peduncled raceme to 3 cm (only 2 seen); peduncle 1—?3 cm long, with the axis patently pubescent. Bracts and bracteoles persistent, appressedly pubescent, 2—3 and 2 mm long respectively; pedicel 1—4 mm. *Calyx tube* densely pubescent, *c.* 1½ mm high, limb glabrous, 1½ mm long, lobes *c.* 1¼ mm. *Corolla c.* 4 mm. *Stamens* 50—100. *Disk* 5-glandular, sparsely pilose with the conical style base. *Fruits* not known.

THAILAND. Only the type.

83. **Symplocos pilosa** Rehder

S. pilosa Rehder, Pl. Wilson. 2 (1916) 598; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 26. – Type: *A. Henry 10698* (E, K), Yunnan, Mengtze, mountain forests, 5000 ft.

Twigs densely pilose; terminal buds with same indument. *Leaves* spreadingly long pilose beneath, especially on midrib and nerves, ± elliptic, 7—15 by 3—5 cm, index

2.8—3.8; base cuneate-emarginate, base angle 50°—120°; apex acuminate, acumen 10—20 mm; margin dentate. *Nerves* 7—12 pairs, at least towards the apex meeting in an intramarginal vein about halfway to the margin; reticulations prominent beneath, rather coarse, but a finer reticulation visible with translucent light. *Petiole* with same indument as twigs, 5—7 mm. *Inflorescence* a basally branched raceme to 4 cm from the axils of the leaves or from wood beneath them; axis densely patently (long) pilose. Bracts 2—5 mm, bracteoles *c.* 2 mm, both with same indument, persistent. Pedicels with same indument, to 4 mm long. *Calyx tube* long pilose, *c.* 1 mm high; limb 1—1½ mm long, nearly wholly divided into the glabrous or sparsely long pilose, ciliate, semi-elliptic lobes. *Corolla* 5—6 mm. *Stamens* 60—70, slender, to 8 mm long. *Disk* glabrous, inconspicuous, 5-glandular. *Style* glabrous, 3—6 mm. *Fruit* (immature) cylindric, *c.* 14 by 4 mm, crowned by the persistent calyx lobes. *Seed* not seen, but probably straight with straight embryo.

CHINA. Yunnan: *Henry 10698*, Mengtze and *H. T. Tsai 62684*, Pingpien Hsien, alt. 1500 m.

84. Symplocos polyandra (Blanco) Brand

S. polyandra (Blanco) Brand, Pfl. R. Heft 6 (1901) 36, *quoad syn.* Blanco, *excl. descr. et stirp.*; Merr. Sp. Blanc. (1918) 304; En. Philip. 3 (1923) 301; Steen. Bull. Jard. Bot. Btzg III. 12 (1932) 170, f. 5. – *Guettarda polyandra* Blanco, Fl. Filip. ed. 2 (1845) 500; ed. 3 (1879) 126. – Neotype: *BS 34206* (A), see Merrill, J. Arn. Arb. 32 (1951) 409.

Carlea oblongifolia Presl, Epim. Bot. (1851) 216. – *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. – Type: *Cuming 1054* (PR. isotypes in CGE, FI, G, K, L, LE, MEL, P. W), Luzon, Pampanga Prov.

Baranda angatensis Llanos, Mem. Acad. Cienc. Madr. 3, 2 (1857) 502; F.-Vill. & Naves in Blanco, Fl. Filip. ed. 3, 4 (1880) 102. – Type: *Llanos s.n.* (L), Luzon, Bulacan Prov., Angat.

S. superba Brand, Pfl. R. Heft 6 (1901) 55. – Type: *Beccari 3658* (K, isotype in P), Sarawak.

Tree up to 30 m, rarely a shrub, with straight bole and full goblet-shaped crown; outer bark brownish black to greyish brown, smooth or cracked to heavily fissured, 2—12 mm thick; inner bark (orange)-yellow to brownish, 2—2½ cm thick, cambium whitish-yellow; sapwood yellow-orange to light grey, hardwood greyish, moderately heavy, not hard to cut (*sec. coll.*). Twigs puberulous, glabrescent, tapering off towards the apex, thick, at least 5 mm ϕ beneath the leaves and there usually with many pulvinate leaf-scars; from the leaf-scars ridges decurrent on the twigs; terminal buds with few pubescent scales leaving no obvious scars. *Leaves* crowded towards the end of the twigs, glabrous (except in innovations and then puberulous) narrowly elliptic to obovate, 9—22 by 2½—7(—9) cm, index 2.7—5; base cuneate, attenuate, base angle 25°—35°; apex rounded or cuneate-obtuse, rarely faintly short acuminate; margin entire, revolute; lower surface of the leaves covered with numerous stomata which are visible as low papillae with a hand-lens. *Midrib* much prominent beneath; nerves 11—15 pairs, often difficult to distinguish from the bigger veins running parallel with them, soon anastomosing and meeting in an angular intramarginal vein which is only slightly more pro-

minent than the reticulation; reticulations rather coarse, prominent beneath. *Petiole* slightly winged in the apical part, with a ridge decurrent on the twigs, triangular in cross-section, 2—4 cm. *Inflorescence*: many spikes from old wood beneath the leaves; axis densely rusty appressedly puberulous, often glabrescent, 4—15 cm long. Bracts and bracteoles with same indument, persistent under the fruit, 1½—2 mm. *Calyx tube* with same indument, *c.* 2 mm high; limb with same indument, but becoming glabrous towards the apex, 2—3 mm; lobes semi-orbicular to broadly triangular, ciliolate, *c.* 2 mm. *Corolla* 8—10 mm. *Stamens* 50—more than 100, about as long as corolla. *Disk* glabrous, annular, and then surrounding a lower, rarely shortly pilose, receptacle, or low pulvinate, only surrounding the glabrous, 7—9 mm long style. *Fruits* ellipsoid, crowned by the persistent calyx lobes, sparsely puberulous, glabrescent, *c.* 10 by 7 mm *in vivo*; mesocarp fleshy, 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, *c.* 4 by 2 mm, with copious endosperm; embryo very small, straight.

Distribution. Islands in the S. China Sea (Banka, Billiton, Ste Barbe, Natuna), Borneo, Philippines, and S. Celebes.

SUMATRA. Banka: 6 collections. — Billiton: *Riedel s.n.*

BORNEO. Ste Barbe I. (P. Pendjatan): *Langlassé 268.* — Natuna Is.: *van Steenis 1467*, P. Sedane, G. Ajer Muru. — Karimata: *Mondi 169*; *Teysmann 11633*, Sg. Tajan. — Sarawak: 6 collections, near Kuching; *S 15927*, Bintulu District. — Brunei: 8 collections. — Sabah: *Nooteboom 1268*; *SAN 55669*, Labuan; *CF 80251*, Sipitang; 14 collections from Sandakan; 5 collections from Kota Kinabalu (Jesselton); *SAN 3070*, Kudat, Labua For. Res.; *SAN 33092*, Beaufort Distr., P. Gaya For. Res. — Kalimantan: *Polak 275*, Pontianak.

PHILIPPINES. Palawan: 5 collections. — Dumaran I.: *BS 21616.* — Culion I.: *Merrill 577.* — Luzon: Bataan Prov., Lamao (Mt. Mariveles): *c.* 15 collections; *BS 34058*; *Llanos s.n.*, Bulacan Prov., Angat; *BS 33694*; *FB 24791*, Camarines Prov., *BS 44546*, *44651*, Zambales Prov., Anuling; *Cuning 1054*, Pampanga Prov.; *FB 21680*, *25437*, Pangasinan Prov.; *Jacobs 7840*, Sierra Madre Mts., NNE. of Dingalan, alt. 1000—1100 m. — Mindoro: *BS 39536*, Paluan. — Panay: *FB 24033*, Iloilo. — Guimaras: *FB 269*; *Vidal 1214.* — Dinagat: *BS 83961.*

CELEBES. Makassar: *Teysmann 12746*, Baleh Angien.

Ecology. In primary and secondary forest, often on poor sandy soil (kerangas forest), locally common. The flowers are faintly fragrant, especially at night.

Uses. The wood is stated to be very perishable, although the timber is likely to be immune to powder-post beetle attack because of the small size of the vessels (Desch, Mal. For. Rec. 15, 1954, 592). Collectors state that the timber is used for light constructions.

Note. There has been much confusion on the proper identity of this species, because Brand (1901) used the name *S. polyandra*, based on the basionym *Guettarda polyandra* Blanco, provided with a question mark, for material belonging to a different species. In doing this he followed Vidal who placed *Guettarda polyandra* Blanco in the synonymy of his *S. villarii* which is *S. odoratissima* (p. 245).

85. Symplocos pseudobarberina Gontscharow

S. pseudobarberina Gontscharow, Not. Syst. Ross. (1924) 133; Just's Bot. Jahresber. 53 (1932) 1032; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 25. — *S. lancilimba* (*non* Merr.) H. L. Li, Arn. Arb. 25 (1944) 424. — Type: *A. Henry 11204* (E, K, LE), Yunnan.

S. loquihoensis Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 173; Fl. Gén. I.-C. 3 (1933) 1023. — Type: *Poilane 12954* (P), Tonkin, Chapa.

Shrub or treelet to 10 m. Twigs glabrous; terminal buds glabrous rather small; growth ?discontinuous. *Leaves* glabrous, ± elliptic, 5—10 by 1½—4 cm, index 1.9—3.3; base cuneate, mostly slightly decurrent into the petiole, base angle 30°—60°(—90°); apex acuminate to nearly caudate, acumen 5—20 mm; margin nearly entire, or finely dentate, crenulate or undulate. *Nerves* 6—8(—9) pairs, slightly prominent beneath, meeting in an – often rather inconspicuous – intramarginal vein; reticulation faintly prominent beneath, coarse, sometimes inconspicuous. *Petiole* 5—15 mm. *Inflorescence* a lax raceme from the axils of the leaves, or from wood beneath them, short, to *c.* 6 cm few-flowered to many (*c.* 20)-flowered; often branched at the base; axis glabrous. Bracts and bracteoles both persistent under the fruit, glabrous but often ciliate, (ovate to) triangular, *c.* 1 mm long. Pedicels mostly quite patent, glabrous, 1—5 mm. *Calyx* glabrous, tube 1 mm high, lobes sometimes ciliate, ⅓—½ mm long. *Corolla* 1½—3(—4) mm. *Stamens* 20—30(—40), up to 3 mm long. *Disk* glabrous, annular or 5-glandular. *Style* glabrous, 2½—4 mm. *Fruits* as in *S. sumuntia* (p. 284).

CHINA. Yunnan: *A. Henry 11204.* — Kwangsi: *Sin 1582*; *C. Wang 40278.* — Kwangtung: 8 collections. — Hainan: 7 collections.

INDO-CHINA. Cambodia: *Pierre 5044.* — Tonkin: *Poilane 12954*; *W. T. Tsang 30555.*

Note. Poilane 12954 from Tonkin, Chapa, the type of *S. loquihoensis* Guillaumin, is somewhat deviating in the larger sizes of the flower parts, the greater number of stamens and in the intramarginal vein being much pronounced. All this may be due to introgression of characters from *S. ramosissima*. The species is also much allied to *S. sumuntia* (p. 284).

86. Symplocos pulchra Wight

S. pulchra Wight. Ic. Pl. 4 (1848) 10, t. 1230; Neilgherry Pl. 2 (1851) 39, t. 143; Clarke, Fl. Br. Ind. 3 (1882) 583; Brand, Pfl. R. Heft 6 (1901) 63; Brandis, Indian Trees (1906) 440; Gamble, Fl. Pres. Madras 5 (1923) 784. — *Lodhra pulchra* Miers, J. Linn. Soc. Bot. 17 (1879) 300. — Syntypes: *Hohenacker 1448* (BM, L, LE, P) and *Wight 1688* (K, L, LE, P), India, Nilgherries.

S. hispidula Thwaites, En. Pl. Zeyl. (1860) 186; Beddome, For. Man. Bot. (1872) 151; Clarke, Fl. Br. Ind. 3 (1882) 585; Trimen, Fl. Ceyl. 3 (1895) 107; Brand, Pfl. R. Heft 6 (1901) 63. — *Lodhra hispidula* Miers, J. Linn. Soc. Bot. 17 (1879) 301. — Type: *Thwaites C. P. 407* (BM, BO, CGE, FI, K, P), Ceylon.

S. villosa Brand, Pfl. R. Heft 6 (1901) 63; Brandis, Indian Trees (1906) 437; Gamble, Fl. Pres. Madras 5 (1923) 784. — Syntypes: *Bourdillon 21* and *901* (K), India, Travancore.

S. walkeri Brand, Pfl. R. Heft 6 (1901) 63. — Type: *Walker s.n.* (K, isotypes in GH, L, P), Ceylon.

Twigs sparsely to more often densely patently long soft hairy, hairs to 3(—4) mm long. Terminal buds with several appressedly hairy scales. *Leaves* hairy on both upper and undersurfaces, (broadly or narrowly) ovate to elliptic, 5—19 by 2—7 cm, index 1.4—3.4; base cuneate to cordate, base angle 40°—130°; apex acuminate, acumen 5—15 mm; margin entire or dentate to denticulate, often ciliate. *Nerves* 6—11 pairs, meeting in a looped intramarginal vein, which is often only visible by hand-lens in ssp. *villosa*; reticulation often fine, prominent, sometimes only visible with translucent light, rarely coarse. *Petiole* 3—6 mm. *Inflorescence* a 1-flowered short spike, or a spike or raceme to 6 and 8 cm respectively; axis patently long hairy. Bracts and bracteoles appressedly or patently hairy, 4—6 and 2—6 mm respectively. Pedicel 0—4 mm. *Calyx tube* glabrous or densely appressedly (silky) long hairy, $1\frac{1}{2}$—2 mm high, limb with same indument as tube or less hairy, but when tube glabrous, the limb often shortly pilose towards the margin of the lobes, $1\frac{3}{4}$—3 mm long; lobes $\frac{1}{2}$—1 mm shorter than the limb. In ssp. *hispidula* the limb is sometimes symmetrically torn. *Corolla* 4—9 mm. *Stamens* c. 45—more than 100. *Disk* 5-glandular to 5-stellate, pilose. *Style* glabrous or with pilose base. *Fruits* (not known in ssp. *pulchra*) obliquely ellipsoid to flask-shaped or cylindrical, 13—15 by 5 mm; stone with smooth surface or lengthwise grooved. *Seed* 1, straight, with straight embryo.

Distribution. India (Deccan Peninsula) and Ceylon.

KEY TO THE SUBSPECIES

1a. Inflorescence a 1-flowered spike. . . . . **86-3.** ssp. **villosa**
b. Inflorescence with more than 1 flower. 2
2a. Calyx tube glabrous. . . . . **86-1.** ssp. **pulchra**
b. Calyx tube densely appressedly long hairy. . . . . **86-2.** ssp. **hispidula**

86-1. ssp. **pulchra**

S. pulchra Wight.

Twigs densely spreadingly long hairy, hairs to 3(—4) mm long. Terminal buds obscured by the long indument, with several scales. *Leaves* long hairy on both surfaces, papyraceous, elliptic, 7—19 by 3—$6\frac{1}{2}$ cm, index 2.2—3.3; base rounded to cordate, base angle 90°—130°; apex acuminate, acumen 5—15 mm; margin dentate, long ciliate. *Nerves* 7—9 pairs, much curved upwards, the lowermost reaching nearly halfway up; in the apical half of the leaf a finely prominent intramarginal vein visible; reticulation fine to coarse. *Petiole* 3—6 mm. *Inflorescence* a few-flowered spike to 6 cm; axis spreadingly long hairy, hairs to 3 mm. Bracts 4—5 by 1 mm, bracteoles 2—3 mm long, both spreadingly long hairy, triangular to linear, persistent; often several sterile bracts on the axis. *Calyx tube* glabrous, $1\frac{1}{2}$—2 mm high, limb $1\frac{3}{4}$—$2\frac{1}{2}$ mm long, glabrous but often shortly

pilose towards the margin of the ovate *c.* 2 mm long lobes. *Corolla* 8—9 mm. *Stamens* becoming as long as corolla, *c.* 100. *Disk* 5-stellate, the arms shortly pilose, the central part and style base long hairy. *Fruits* not known.

INDIA. Nilgiris: *c.* 10 collections, alt. 1200—1500 m.

86-2. ssp. **hispidula** (Thwaites) Noot., *comb. nov.*

S. hispidula Thwaites, En. Pl. Zeyl. (1860) 186 — *S. walkeri* Brand.

Twigs (sparsely) spreadingly long hairy, hairs to *c.* 3 mm. Terminal buds with several hairy scales. *Leaves* sparsely (long) hairy on both surfaces, above soon, beneath later glabrescent, rarely glabrous above, broadly ovate to elliptic, 6—13 by 3.2—7 cm, index 1.4—2.5; base rounded to cordate, base angle 90°—110°; apex (abruptly) acuminate, acumen 5—12 mm; margin entire or denticulate, long ciliate. *Nerves* 6—10 pairs, curved upwards and meeting in a looped intramarginal vein; reticulations fine, prominent. *Petiole* 5—6 mm. *Inflorescence* a raceme to 8 cm; axis patently long hairy, hairs *c.* 2 mm. Bracts villous, ovate, 5—6 mm, bracteoles hirsute, linear, *c.* 5 mm, both caducous in older flowers. Pedicel 0—4 mm. *Calyx tube* hairy, *c.* $1\frac{1}{2}$ mm high; limb much less and shorter hairy, 2—3 mm, sometimes symmetrically torn, lobes $1\frac{1}{2}$—2 mm. *Corolla* 5—7 mm. *Stamens c.* 80. *Disk* 5-glandular, the conical style base densely hairy. *Style* glabrous, 4—5 mm. *Fruits* obliquely ellipsoid to flask-shaped, and then narrowed for the upper 4 mm, hairy, glabrescent, *c.* 15 by 5 mm; stone with smooth surface, *c.* 15 by 4 mm; endocarp thin, 1-celled. *Seed* 1, straight, with straight embryo.

CEYLON. 7 collections.

86-3. ssp. **villosa** (Brand) Noot., *comb. nov.*

S. villosa Brand, Pfl. R. Heft 6 (1901) 63.

Treelet *c.* 6 m. Twigs densely patently soft-hairy, hairs to 3 mm. Terminal buds with several appressedly long soft-hairy scales. *Leaves* long, appressedly villous, glabrescent above, long soft hairy beneath, especially on midrib and nerves, ± elliptic, 5—$8\frac{1}{2}$ by 2—$2\frac{1}{2}$ cm, index 2.5—3.4; base cuneate to rounded, base angle 40°—90°; apex acuminate, acumen 5—15 mm; margin glandular denticulate. *Nerves* 8—11 pairs, inserted at an angle of 70°—90° to midrib, but soon curved upwards, meeting in an intramarginal vein near the margin which is often only visible with a hand-lens; secondary veins transverse to nerves, reticulation mostly obscure, but a fine reticulation visible with translucent light. *Petiole c.* 5 mm. *Inflorescence* a 1-flowered short spike from the axils of the leaves, with several sterile bracts, 1—$1\frac{1}{2}$ cm long; axis sericeous. Bracts appressedly sericeous, 4—6 mm. *Calyx* appressedly sericeous; tube 2 mm high, limb 3 mm, lobes narrowly

semi-elliptic 2½—3 mm long. *Corolla* 4—5 mm. *Stamens* c. 45. *Disk* 5-glandular. *Style* glabrous, 3 mm. *Fruits* narrowly cylindrical, c. 13 by 5 mm, the persistent lobes not included; stone lengthwise grooved.

INDIA. Travancore: *Bourdillon 21*, *901* and *1088*, alt. 900—1200 m.

87. Symplocos pulvinata Noot., *sp. nov.*

Type: *Brass 25658* (L, isotypes in K, US), New Guinea, Normanby I., Mt. Pabinama, alt. 825 m.
Ramuli glabri crassi vetustiores cicatricibus pulvinatis tecti gemmis apicalibus magnis glabris. Folia coriacea obovata glabra 12—21 cm longa 4,5—10,5 cm lata indice 2—2,5 basi cuneata apice acuta vel acuminata acumine 0—5 mm longo nervis 8—12 paribus reticulo grosso petiolo crasso 1½—2½ cm longo. Inflorescentia spicata c. 3 cm longa floribus saepe cum bracteis bracteolisque caducis; axe glabra bracteis bracteolisque glabris semiellipticis. Calyx glabra tubo obliquo 1—2 mm alto limbo 3 mm longo lobis 5 semiellipticis 2—2½ mm longis. *Corolla* 3(—4) lobata 5 mm longa, interdum staminibuscum destituta vel obsoleta. Stamina 20—35 c. 5 mm longa. Discus glaber conicus Stylus glaber 6 mm longus. Fructus ovoideus c. 13 mm longus, 6—8 mm latus mesocarpio crasso endocarpio linoso crasso putamine pro parte basale cristis altis, pro parte apicale cristis demissis tecto, in medio sulco lato profundo exaratus.

Sparsely foliaged glabrous tree, 12—18 m high. Twigs thick, at least 5 mm, terminated by a large glabrous terminal bud with leathery scales; older twigs with large pulvinate leaf scars. *Leaves* coriaceous, glabrous, obovate, 12—21 by 4½—10½ cm, index 2—2½; base cuneate, base angle 30°—50°; apex acute or faintly acuminate; acumen 0—5 mm; margin glandular crenate or dentate. *Nerves* 8—12 pairs, prominent beneath, curved upwards and anastomosing or an intramarginal vein faintly prominent; reticulation coarse, faintly prominent. *Petiole* stout, 1½—2½ cm. *Inflorescence* a glabrous spike from the axils of the leaves, c. 3 cm long; axis glabrous. Bracts and bracteoles probably persistent, glabrous, broadly semi-elliptic, 5—7 mm and c. 4 mm long respectively, (older flowers often fallen including bracts and bracteoles, leaving conspicuous pulvinate light coloured scars on the dark inflorescence axis). *Calyx* glabrous, tube oblique, 1—1½ mm at one side, c. 2 mm at the other side, limb c. 3 mm, divided into 5 semi-elliptic rounded ciliolate 2—2½ mm long lobes. In some flowers corolla and stamens absent or obsolete, in other flowers corolla 5 mm, 3(—4)-lobed, stamens 20—35, as long as corolla. *Disk* glabrous, conical. *Style* glabrous, 6 mm. *Fruits* ovoid, c. 13 by 6—8 mm; mesocarp fleshy, rather thick; stone with rather high lengthwise ridges in the basal half, low ridges in the apical half, in the middle a deep transverse groove, endocarp woody, thick, cell 1, following the shape of the seed. *Seed* 1, uncinately curved towards the base; embryo curved.

NEW GUINEA. Papua: *Carr 12782*, Koitaki, alt. 450 m; *Brass 25658*, Normanby I., alt. 825 m.

88. Symplocos pyriflora Ridl.

S. pyriflora Ridl. J. Fed. Mal. St. Mus. 6 (1915) 159; Fl. Mal. Pen. 2 (1923) 307. — Type: *H. N. Ridley 16102* (K, isotypes in BM, SING), Malaya, Pahang, G. Tahan, 5500 ft.

S. bakeri Symington, J. Mal. Br. R. As. Soc. 14 (1936) 356, t. XX. — Type: *SF 28833 Symington & Kiah* (KEP, isotypes in L, SING), Malaya, Pahang, Kuantan, G. Tapis.

Shrub or small to medium-sized tree. Twigs often stout, glabrous; growth discontinuous; terminal buds small or rather large, with glabrous, coriaceous scales. *Leaves* glabrous, elliptic, 5—15 by 2.2—6 cm, index 2—2.7; base cuneate to rounded, base angle 30°—90°; apex mostly faintly acuminate, acumen 0—15 mm, tip blunt; margin undulate to crenate. *Midrib* (much) prominent beneath; nerves 9—14 pairs, intramarginal vein present, 2—4 mm from the margin; secondary veins more or less prominent, forming a rather coarse reticulation; lesser veins forming a very fine reticulation, which can be absent. *Petiole* stout, 3—10 mm. *Inflorescence* a subterminal, rarely terminal, raceme or a panicle of racemes; axis pubescent to glabrous. Bracts glabrous, ciliate, triangular to elliptic, *c.* 8 by 5 mm, bracteoles glabrous, ciliate, ovate, *c.* 5 by 3 mm, both very soon caducous. Pedicel at most 3 mm, pubescent to glabrous. *Calyx* glabrous; tube $1\frac{1}{2}$—2 mm; limb 3—5 mm, sometimes becoming symmetric by tearing, lobes semi-elliptic, 2—3 mm, becoming longer by tearing. Corolla 8—10 mm. *Stamens c.* 100 or more, becoming as long as corolla. *Disk* 5-glandular, included the conical style base glabrous or soft-hairy. *Style* glabrous, *c.* 5 mm. *Fruits* ellipsoid, c. 15 by 8 mm, the persistent calyx lobes not included, mesocarp fleshy, stone smooth or with faint ridges; 1-celled. *Seed* not seen, probably with straight embryo.

MALAY PENINSULA. Pahang: *H. N. Ridley 16102*, G. Tahan, alt. 1650 m; *SF 28833*, G. Tapis, Kuantan, alt. *c.* 1400 m.

Note. See the note under *S. nivea* (p. 241).

89. Symplocos pyrifolia Wall. *ex* G. Don

S. pyrifolia Wall. [Cat. (1828) 4415, *nomen*] *ex* G. Don, Gen. Syst. 4 (1837) 3; DC. Prod. 8 (1844) 256; Clarke, Fl. Br. Ind. 3 (1882) 579; Brand, Pfl. R. Heft 6 (1901) 60. — *Lodhra pyrifolia* Miers, J. Linn. Soc. Bot. 17 (1879) 299, *excl. syn. S. obtusa* Thw. var. *obovata*. — Type: *Wallich 4415* (BM, CGE, K-W, LE), India, Sylhet.

S. nervosa Wall. [Cat. (1828) 4418, *nomen*] *ex* DC. Prod. 8 (1844) 256. — *Lodhra nervosa* Miers, J. Linn. Soc. Bot. 17 (1879) 299. — Type: *Wallich 4418C* (G-DC), Nepal, Noakote.

S. pyrifolia var. *decipiens* Brand, Pfl. R. Heft 6 (1901) 60. — Type: *Wallich 4418* (BR, *non vidi*, isotype in CGE).

S. pyrifolia var. *stenocarpa* Brand, Pfl. R. Heft 6 (1901) 60. — Type: *Gammie 387* (B†, L), India, Khasia Hills.

Shrub or tree to 10 m. Twigs glabrous except the base of young shoots which is ± sericeous; terminal buds at least 5 mm, often longer, with glabrous, coriaceous outer

scales and appressedly pubescent to sericeous inner scales. *Leaves* glabrous, mostly narrowly elliptic, 6—15½ by 2—4 cm, index (2—)3—5; base cuneate, attenuate, base angle 25°—30°(—80°); apex (faintly) acuminate, acumen 5—20 mm, tip acute; margin recurved, entire to glandular denticulate. *Nerves* 7—13 pairs, intramarginal vein clearly distinct; reticulation very fine, prominent beneath. *Petiole* often quite thin, 10—20 mm. *Inflorescence* forming a cone in bud, surrounded by glabrous, coriaceous scales at the base. Raceme up to 4 cm, axis ± appressedly soft hairy. Bracts elliptic to orbicular, boat-shaped, appressedly pubescent, 6—7 by 5—7 mm, falling as soon as the flower matures; bracteoles ± elliptic to linear, appressedly pubescent, 2—3 by 1—1½ mm, falling after the bracts. Pedicel 1—3 mm, with same indument as axis. *Calyx tube* glabrous, *c.* 1½ mm; lobes sparsely appressedly pubescent, ovate to triangular, 1—1¾ mm long. *Corolla* 3—5 mm. *Stamens* 30—35, up to 2 mm longer than corolla. *Disk* 5-glandular, inconspicuous or low-cylindrical, with the conical style base soft hairy. *Style* glabrous, 5—7 mm, with small punctate stigma. *Fruits* (ellipsoidal to) cylindrical, 6—10 by 3—7 mm, crowned by the persistent calyx lobes, 3-celled, one cell more developed; mesocarp fleshy, thin; stone with shallow but distinct lengthwise grooves. *Seeds* 1—3, straight, thickened towards the base; embryo straight (or curved towards the base?).

INDIA (North). Nepal: *Banerji 59/2*, Katmandu Valley, alt. 1300 m; *A. C. Nicolson 41*, Nagarkot, alt. 1900 m; *2388*, Bagmati zone; *J. D. A. Stainton 1771*, Arun Valley, alt. 2100 m; *Wallich 4418B p.p.* — Sikkim: *J. D. Hooker s.n.*, alt. 2100 m. — Darjeeling: *J. M. Cowan* 103. — Bhutan: according to Clarke: *Griffith.* — Assam, Khasia: many collections, alt. 1200—1500 m.

Note. Wallich 4418 is a mixture of different species. The type of *S. pyrifolia* var. *decipiens* Brand, *Wallich 4418* in BR, is probably the same specimen as *Wallich 4418C* in BM and LE and *Wallich 4418B* in E and NY. *Wallich 4418B* in L and LE is a mixture of *S. pyrifolia* and *S. sumuntia*. Another collection numbered *Wallich 4418B*, in L and BM, and *Wallich 4418D* in E and FI is *S. lucida*.

90. Symplocos racemosa Roxb. — **Photogr. 3.**

S. racemosa Roxb. [Hort Beng. (1814) 40, *nomen*] Fl. Ind. ed. 2 (Carey) 2 (1832) 539; G. Don, Gen. Syst. 4 (1837) 3; Kurz, J. As. Soc. Beng. 46, 2 (1877) 238; For. Fl. Burma 2 (1877) 144; Clarke, Fl. Br. Ind. 3 (1882) 576; Forbes & Hemsley, J. Linn. Soc. Bot. 26 (1884) 74; Brand, Pfl. R. Heft 6 (1901) 59; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 283; Fl. Gén. I.-C. 3 (1933) 1026, t. 116, f. 5, 6; Kirtikar & Basu, Indian Medic. Pl. ed. 2, 2 (1935) 1511; Fletcher, Fl. Siam. En. 2 (1938) 388; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 20. — *Hopea racemosa* Dalzell & Gibson, Bomb. Fl. (1861) 140. — *S. racemosa* var. *composita* Kurz, J. As. Soc. Beng. 46, 2 (1877) 238. *Lodhra racemosa* Miers, J. Linn. Soc. Bot. 17 (1879) 298. — Type: *Roxburgh* (P), Bengal, Burdwan and Midnapore.

S. hamiltoniana Wall. [Cat. (1831) 4420, *nomen*] *ex* &. Don, Gen. Syst. 4 (1837) 3; DC. Prod. 8 (1844) 254. — *Lodhra hamiltoniana* Miers, J. Linn. Soc. Bot. 17 (1879) 299. — Type: *Hamilton*? *in Herb. Wallich 4420* '*Decadia racemosa*' (K-W, isotypes in CGE, G), India.

S. rigida Wall. [Cat. (1831) 4422A, *nomen*] *ex* G. Don, Gen. Syst. 4 (1837) 3; Brand, Ann. Cons. Jard. Bot. Genève 4 (1904) 283. — *S. racemosa* var. *roxburghiana* Kurz, J. As. Soc. Beng. 46, 2 (1877) 238. — *S. racemosa* var. *composita* (*non* Kurz) Clarke, Fl. Br. Ind. 3 (1882) 377. — Type: *Wallich 4422A* (K-W, isotypes in CGE, LE), Burma, Moulmein.

S. propinqua Hance, Seem. J. Bot. 6 (1868) 329; Brand, Pfl. R. Heft 6 (1901) 36; H. L. Li, Taiwania 1 (1950) 315. — Type: *Sampson & Hance 13796* (BM, isotypes in GH, K, NY, W), China, Shuitung, Prov. Canton.

S. leucantha Kurz, J. As. Soc. Beng. 42, 2 (1873) 89; For. Fl. Burma 2 (1877) 148; Clarke, Fl. Br. Ind. 3 (1882) 579; Brandis, Indian Trees (1906) 438. — *Lodhra leucantha* Miers, J. Linn. Soc. Bot. 17 (1879) 300. — Type: *Kurz 2997* (K), Burma, Pegu.

S. racemosa var. *khasiana* Clarke, Fl. Br. Ind. 3 (1882) 576. — Type: *Griffith 1275* (K), India, Khasia, Nongkreem.

S. nicobarica Clarke, Fl. Br. Ind. 3 (1882) 580; Brandis, Indian Trees (1906) 440. — *S. leiostachya* Kurz, For. Fl. Burma 2 (1877) 144, for the fruiting coll. only. — Type: *Kurz* (K), Nicobars, Kamorta.

S. beddomei Clarke, Fl. Br. Ind. 3 (1882) 582. — *S. reticulata* Graham [Cat. Bomb. Pl. (1839) 104] *ex* Brand, Pfl. R. Heft 6 (1901) 59. — Type: *Herb. Wight 62* (K), India.

S. beddomei var. *glabrata* Clarke, Fl. Br. Ind. 3 (1882) 582. — Type: *Herb. Ind. Or. Hook. f. & Thomson 32, coll. G. Thomson* (K, isotypes in GH, LE, P), India, W. Ghats, Kurg.

S. beddomei var. *flagellaris* Clarke, Fl. Br. Ind. 3 (1882) 582. — Type: *Dalzell* (K), Bombay Pres.

S. candolleana Brand, Pfl. R. Heft 6 (1901) 49. — Syntypes: *DC. Pl. Ind. Or.* 2317 (G), Coorg, and *Beddome s.n.* (K) = *Beddome 4954* (BM), India, Anamallay Hills.

S. stocksii Brand, Pfl. R. Heft 6 (1901) 59. — Type: *Stocks (& Law), Herb. Ind. Or. Hook. f. & Thomson* (C, GH, K, P), Malabar, Concan.

S. subglabra Brand, Pfl. R. Heft 6 (1901) 59. — Type: *Hügel 4127* (?W, *non vidi*), India, ?Nilgiri.

S. racemosa var. *vestita* Brand, Pfl. R. Heft 6 (1901) 59. — No type or other collections mentoned.

S. khasiana Brand, Pfl. R. Heft 6 (1901) 58, *excl. syn. S. racemosa* var. *khasiana* Clarke. — Type: *Griffith* 3663 (K, LE), Khasia.

S. orogenes Brand, Pfl. R. Heft 6 (1901) 42. — Type: *Pierre 2867* (K, isotypes in BM, BO, GH, L, P), Cochinchina, Mt. Dinh, near Baria.

S. macrostachya Brand, Pfl. R. Heft 6 (1901) 36, t. 4. — Type: *Balansa 1050* (P, isotypes in K, L, LE), Tonkin, Hong Ay.

S. macrostachya var. *leducii* Brand, Fedde Repert. 3 (1906) 217. — Type: *Leduc 46* (P), Yunnan, Möngtze.

S. intermedia Brand, Fedde Repert. 3 (1901) 217; Hand.-Mazz. Symbolae Sinica 7 (1936) 807. Type: *Henry 12503A* (B†, isotype in K), Yunnan, 1600 m.

S. palauensis Koidzumi, Bot. Mag. Tokyo 30 (1916) 402; Kanehira, Fl. Micron. (1933) 310, t. 157; J. Dept. Agr. Kyushu Imp. Univ. 4 (1935) 389. — Type: *G. Koidzumi Febr. 1, 1915* (*non vidi*, Herb. Sc. Coll. Imp. Univ. Tokyo), Palau Is.

S. chabdui Brand, Bot. Jahrb. 56 (1921) 558. — Syntypes: *Kersting 1204, Ledermann 14106, Raymundus 55, 289* (*non vidi*), Palau Is.

S. petelottii Merr. Univ. Cal. Publ. Bot. 10 (1924) 429. — Type: *Pételot 765* (A, isotypes in NY, P, SING), Indo-China, Cho-Ganh.

S. intermedia var. *trichantha* Hand.-Mazz. Sinensia 5 (1934) 5. — Type: *R. C. Ching 7796* (W, isotypes in A, NY), Suan-Tze, S. Nanning.

S. impressa Fletcher, Kew Bull. 1937 (1938) 505; Fl. Siam. En. 2 (1938) 387. — Type: *Kerr 9789* (K, isotypes in BM, E), Thailand, Prachinburi, Krabin, Watana.

Shrub, or treelet to 5 m (rarely deciduous *sec. coll.*). Twigs glabrous, often soon thickened and then spongy grey barked [or twigs (sparsely) long hairy, in innovations even wool-

ly]; terminal buds small, appressedly pubescent; growth mostly discontinuous. *Leaves* (narrowly to broadly) elliptic, (3—)8—15(—22) by 1½—5(—8) cm, index (1.4—)2—3(—4.4), glabrous (or young leaves sparsely appressedly long hairly), yellowish to brownish green, coriaceous, often the cuticle above very thick, and wrinkled when dry; base attenuate, cuneate to rounded, base angle 10°—70°(—90°); acumen 0—10 mm, apex blunt, sometimes apex rounded, margin entire to undulate or serrulate. *Midrib* beneath glabrous or rarely pubescent; nerves 5—9(—11) pairs, curved upwards, merged into the reticulation, or joined into an intramarginal vein; reticulation coarse, faintly prominent beneath. *Petiole* sometimes narrowly winged, glabrous, (or appressedly long hairy when young), 7—15(—20) mm. *Inflorescence* an axillary (sometimes branched) raceme to 10(—17) cm, when pedicels very short appearing to be a spike, but lowermost flowers always pedicelled; axis pubescent to woolly or tomentose [in the W. Ghats (India) sometimes nearly glabrous]. Bracts broadly ovate to triangular, sometimes even orbicular, 3—4 mm, bracteoles (broadly) ovate to rhomboid, 2—3 mm, both appressedly pubescent and caducous. Pedicel with same indument as axis, (½—)1—3(—8) mm. *Calyx tube* glabrous, 1—1½(—2) mm; limb 1½—3 mm; lobes semi-elliptic, glabrous (or the outermost minutely appressedly hairy to pubescent), ¼—½ mm shorter than the limb. *Corolla* 5—6 mm. *Stamens c.* 100, becoming 2 mm longer than corolla. *Disk* low cylindrical 5-glandular short to woolly hairy. *Style* glabrous, or hairy towards the base, 4—6 mm; stigma knob-like, peltate. *Fruits* ellipsoid (to ovoid in W. Ghats and Palau Is.), 8—11 by 4—10 mm, crowned by the persistent erect calyx lobes (in the Carolines the latter even enlarged); mesocarp fleshy, *c.* 1 mm thick; endocarp woody, smooth; cells (2—)3, or 1 in the W. Ghats. *Seed* mostly 1, straight, with straight embryo, or seed and embryo S-shaped to spirally (corkscrew-like) twisted in var. *palauensis*.

Distribution. India, Burma, Thailand, Indo-China, China, Hainan, and a variety in Micronesia (Palau).

KEY TO THE VARIETIES

1a. Fruits ellipsoid, 4—7 mm broad. Seed and embryo straight. **90-1.** var. **racemosa**

b. Fruits ovoid, 5—10 mm broad. Seed and embryo S- to corkscrew-shaped. **90-2.** var. **palauensis**

90-1. var. **racemosa**

All synonyms except *S. palauensis* and *S. chabdui*.

Fruits (narrowly) ellipsoid, excluded the persistent erect calyx lobes 8—11 by 4—7 mm, 3-celled, rarely 2-celled, each cell with one straight seed, or 2 of the seeds aborted; embryo straight.

Distribution. As for the species but not in Micronesia.

INDIA. Western Ghats: *Fernandes 557, 732, 958*, Bombay Presidency; *Herb. Ind. Or. H. f. & T. 32, Coll. Thomson*, Kurg. — N. India. Bihar, Darjeeling, Kumaon. — Nepal: *M. S. Bista 3326*; *J. Makin 56*; *J. B. A. Stainton* 6641. — Assam: Khasia Hills, Manipur: several collections. — ?S. Andaman: *S. Kurz s.n.* (Mt. Harriet), incomplete. — Nicobars. Kamorta: *Kurz s.n.* — E. Bengal. Chittagong: *J. M. Cowan s.n.*

BURMA. Upper Burma: 7 collections, alt. 130—1500 m. — Arakan: *Kingdon Ward 22736*, Mindat. — Shan States: *MacGregor 78, 1069*, King Yun, alt. 750 m. — Yamethin Distr.: *Po Khant 51*, Myaukhlain Res., Inein Distr., alt. 30 m.; *Rogers 554*, alt. 180 m. — Amherst Distr.: *Dickason 6886*, Kyain; *Falconer 440*; *Lace 38*, Moulmein; *Wallich 4422A*, Moulmein. — Tenasserim: *R. N. Parker 2164*, Nabule, Tavoy; *Gallatly* 672.

THAILAND. Payap: *c.* 20 collections, alt. 350—1500 m. — Maharat: *Kerr 3096*, Che Som-che Sawn, alt. 370 m; *Kerr 4892*, A Nan, Muang Pong, alt. 250 m. — Pitsanulok: 6 collections, alt. *c.* 1000 m. — Udawn: *Kerr* 8836, Loi, Pu Jung, alt. 1000 m. — Ubon: *Kerr 8328*, Kukan, Kantoraram, alt. 100 m. — Rachasima: *Kerr 8078, 19902*, Korat, Sikui, alt. 200 m; *Kerr 19965*, Chanyapum; *Put 2229*, Korat, Hui Jaleng. — Prachinburi: *Kerr 9789, 9802, 19320*; *Put 2030*, Krabin, low alt. — Rachaburi: *Flora of Thailand 28495*, Thun Pa; *Kerr 10519, 20580*, Petchaburi, Tung Luang, low alt.

INDO-CHINA. Laos: *c.* 13 collections. — Cambodia: *Harmand 983*, Prov. Sese; *Poilane 14091*, Aulong Ven; *14203*, Stung Streng; *14604*, Kampot. — Cochinchina: 5 collections. — Annam: *c.* 10 collections. — Tonkin: *c.* 10 collections.

CHINA. Yunnan: many collections, alt. 800—1800 m. — Kwangsi: *R. C. Ching 7796*, Suan Tze, S. Nanning; *Sin & Wang 8*, Sha Ping, alt. 120 m; *W. T. Tsang 21932, 21952*, SW. of Nanning, Sui Luk—Kwangtung: *CCC 4348*; *Sampson & Hance 13796*; *Y. Tsiang 2546*, Pon Tan, Luichow, alt. 700 m. — Hainan: many collections, alt. 0—400 m.

90-2. var. **palauensis** (Koidz.) Noot., *comb. nov.*

S. palauensis Koidz., Bot. Mag. Tokio 30 (1916) 402 — *S. chabdui* Brand.

Twigs (sparsely) appressedly to spreadingly long hairy, glabrescent. *Leaves* 6—12 by 2—5½ cm, index 2—3. *Fruits* ovoid (to nearly orbicular), excluded the persistent, erect, somewhat enlarged calyx rim 8—11 by 5—10 mm; probably mostly 2-celled, but sometimes 1- or 3-celled. *Seeds* and embryo S- to corkscrew-shaped.

PALAU ISLANDS. *c.* 14 collections.

91. **Symplocos ramosissima** Wall. *ex* G. Don

S. ramosissima Wall. [Cat. (1828) 4425, *nomen*] *ex* G. Don, Gen. Syst. 4 (1837) 3; DC. Prod. 8 (1844) 257; Brandis, For. Fl. (1874) 299; Gamble, List of Trees (1878) 54; Clarke, Fl. Br. Ind. 3 (1882) 577; Brand, Pfl. R. Heft 6 (1901) 53; Brandis, Indian Trees (1906) 440; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 26; H. L. Li, Taiwania 1 (1950) 311; Banerji, Rec. Bot. Surv. India 19 (1965) 64. — *Lodhra ramosissima* Miers, J. Linn. Soc. Bot. 17 (1879) 299. *Eugeniodes ramosissima* O.K. Rev. Gen. Pl. 2 (1891) 409. — Type: *Wallich 4425* (K-W, isotypes in BM, C, CGE, FI, G-PC, GH, L, LE, NY, W), Nepal, Sheopore.

S. fasciculata var. *chinensis* Brand, Fedde Repert. 3 (1906) 217; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 280, *p.p.*; Fl. Gén. I.-C. 3 (1933) 1020. The collections *Pierre 121* and *1803* belong to *S. guillauminii*; Rehder, J. Arn. Arb. 15 (1934) 298. — Type: *Delavay 5103* (P), Yunnan.

S. stapfiana Lévl. Fedde Repert. 9 (1911) 444; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 26, *excl. syn. S. mairei* Lévl. *quae est S. glomerata.* — Type: *Cavalerie 3287* (E, K, P), Yunnan.

S. myriantha Rehder, in Sargent Pl. Wilson. 2 (1916) 596; Chun, Sunyatsenia 1 (1934) 297. — Type: *Wilson 2550* (BM, E, K), W. Szechwan, Wa-Shan.

S. ramosissima var. *salwinensis* Hand.-Mazz. Symb. Sin. 7 (1936) 808. — Type: *Handel-Mazzetti 9019* (W, isotypes in AA, S, K), Yunnan, Salween River, 27°58′ N.

S. stapfiana var. *leiocalyx* Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 26. — Type: *Forrest 24589* (E, K), Burma, 26°27′ N, 98°46′ E.

Shrub to (big) tree. Youngest twigs mostly glabrous, sometimes finely sparsely arachnoid or appressedly pilose, or appressedly pubescent; terminal buds up to 1 cm, but mostly smaller, nearly glabrous or appressedly pubescent. *Leaves* glabrous or sparsely appressedly fine short hairy beneath, especially on the much prominent midrib, (narrowly) elliptic, 6—13(—19) by 2—5 cm, index 2.3—4; apex (often long) acuminate, acumen (5—)10—25 mm; base angle 30°—60°; margin glandular undulate to dentate. *Nerves* (4—)6—10(—12) pairs, more or less prominent beneath; intramarginal vein present, at least in the apical half, whether or not conspicuous, often at some distance from the margin; secondary veins often at right angles to midrib and nerves, with the tertiary veins forming a coarse, sometimes inconspicuous reticulation. *Petiole* 6—12 (—17) mm, often with some glands. *Inflorescence* an often basally branched raceme or a panicle to 3(—5) cm long from the axils of the leaves and from wood beneath them; axis patently puberulous to (sparsely) appressedly short-pilose or pubescent, rarely glabrous. Bracts and bracteoles mostly nearly glabrous, ciliolate, the former usually caducous, narrowly triangular to elliptic, (1—)2—3 mm long, the latter persistent (narrowly) ovate to triangular, *c.* 1 mm long. Pedicels with same indument as axis, up to 3(—5) mm long. *Calyx tube* appressedly minutely puberulous, pubescent or shortly pilose, at least at its base, rarely totally glabrous, 1—1½(—2) mm high, lobes (nearly) glabrous, ciliolate, (½—)1(—2) mm. *Corolla* 3—5 mm long. *Stamens* 25—50(—70), becoming 1(—2) mm longer than the corolla. *Disk* glabrous, 5-glandular. *Style* glabrous, often thickened towards the base, 3—5 mm, with small peltate stigma, rarely stigma absent. *Fruits* ± ellipsoid, rarely ovoid, with a small beak on top formed by the persistent calyx lobes, 7—10 by 4—5 mm, mesocarp thin when dry, endocarp thin, easy to cut! *Seed* 1, filling the whole fruit when ripe, surface rather smooth; embryo straight, nearly as long as the seed, the radicle pointing upwards in a small beak on top of the seed, cotyledons small, nearly reaching the base of the seed.

Distribution. N. India, N. Burma, Indo-China, and S. China.

India (North). Kumaon: *R. Strachey & J. E. Winterbottom 3*; *H. M. Heybroek 158.* — Nepal: *c.* 10 collections. — Sikkim: 8 collections. — Bhutan: *R. E. Cooper 1276, 2659*; *Ludlow, Sherriff & Hicks 186, 16550, 20479.* — Darjeeling: 7 collections. — Assam. Khasia: *Hooker f. & Thomson s.n.*

Burma. *G. Forrest 24589* (26°10′ N 98°25′ E), *26842* (16°20′ N 98°48′ E), *27104, 27307* (26°17′ N 98°46′ E); *F. Kingdon Ward 22387* (Mt. Victoria).

Indo-China. Tonkin: *Pételot 2688, 6159, 6366*, Chapa.

CHINA. Yunnan: many collections. — Szechwan: *F. T. Wang 22868*; *Wilson 2550*; *Yu-Shi Liu 2137*, Mt. Omei. — Kweichow: 9 collections. — Kwangsi: *R. C. Ching 6027*; *A. N. Steward & H. C. Cheo 283, 425*; *C. Wang 40531*. — Kwangtung: 6 collections.

Ecology. In primary and secondary forest, often in ravines and along streams. In India, Burma, and Indo-China at 1500—2700 m alt., in China at 400—3000 m.

Note. In *Pételot 6159* the leaves are up to 19 cm and the petioles 17 mm.

92. Symplocos robinsonii Ridley

S. robinsonii Ridley, J. Fed. Mal. St. Mus. 8 (1917) 60. — Type: *Robinson & Kloss 199* (BM, K), Sumatra, Westcoast, Korinchi Peak, at 7300 ft.

Twigs tomentose, dark brown pubescent, or (sparsely) appressedly pubescent or puberulous, glabrescent; terminal buds small, pubescent. *Leaves* sparsely long pubescent, appressedly fine dark-pilose or sparsely appressedly minutely pilose, glabrescent, narrowly to broadly elliptic, 3—9½ by 1½—4 cm, index 1.3—3.6; base acute, base angle 20°—60°; apex acute or acuminate, acumen 2—12 mm; margin dentate, denticulate or crenulate. *Nerves* 7—14 pairs, whether or not meeting in an intra-marginal vein; secondary veins ± transverse to nerves, smaller veins less prominent, reticulation fine or rather coarse, but always fine with translucent light. *Inflorescence* an often branched raceme to 1, 2 or 4 cm; axis pubescent or appressedly puberulous. Bracts and bracteoles caducous, with same indument as axis, ovate, 1—2 and ¾—1½ mm long respectively. Pedicel to 2 or 3(—4) mm. *Calyx tube* pubescent or (fine, minutely) puberulous; limb with same indument or less hairy, 1—2 mm, lobes ovate, semi-elliptic or semi-orbicular, ½—1½ mm long. *Corolla* 4—5 mm. *Stamens* 25—55. *Disk* inconspicuously 5-glandular, with some hairs or shortly pilose, often the indument hardly visible. *Style* glabrous, whether or not with conical base, the last shortly pilose or glabrous. *Fruits* ellipsoid, crowned by the persistent calyx lobes, 7—10 by 3—6 mm; stone inconspicuously lengthwise grooved, 3-celled. *Seeds* 1—3, straight with straight embryo.

Distribution. Endemic in Sumatra, alt. 1900—3000 m.

KEY TO THE VARIETIES

1a. Twigs tomentose . . . . . **92-1.** var. **robinsonii**
b. Twigs not tomentose 2
2a. Inflorescence to 4 cm long. Leaves 3—6 by 2—4 cm, index 1.3—2.3 **92-2.** var. **latifolia**
b. Inflorescence to 1 or 2 cm long 3
3a. Twigs densely dark brown pubescent. Leaves 4—6½ by 1½—3½ cm, index 1.8—2.7. **92-3.** var. **pilosa**

b. Twigs sparsely appressedly pubescent or puberulous. Leaves 5—9½ by 2—3 cm, index 2.3—3.6. . . . . **92-4.** var. **angustifolia**

92-1. var. **robinsonii**

Twigs tomentose; terminal buds small, long appressedly pubescent. *Leaves* sparsely long pubescent, especially on midrib and nerves, ± elliptic, 4½—9 by 2—3.7 cm, index 2.2—2.9; base angle 30°—60°; apex acuminate acumen 3—10 mm; margin dentate, flat or recurved. *Nerves* 7—9 pairs, whether meeting in an intramarginal vein or not; secondary veins prominent, ± transverse to nerves, lesser veins less prominent, reticulations fine or rather coarse, but a very fine reticulation visible with translucent light. *Petiole* 7—10 mm. *Inflorescence* a raceme to 2 cm; axis rusty pubescent. Bracts and bracteoles caducous, appressedly pubescent, ovate, 1½ and 1 mm long respectively. Pedicel to 3 mm. *Calyx* appressedly pubescent; tube *c.* 1½ mm high, limb *c.* 1 mm, ±, ovate lobes ¾—1 mm long. *Corolla c.* 4 mm. *Stamens* 25—40. *Disk* inconspicuous, with some hairs. *Style* with conical base, glabrous, *c.* 4 mm. *Fruits* ellipsoid, *c.* 7 by 3 mm, with very thin mesocarp; stone smooth, 3-celled. *Seeds* straight with straight embryo.

SUMATRA. Westcoast: *Bünnemeijer 9752, 9965*; *Jacobs 4367*; *Robinson & Kloss 199*, Mt. Kerintji, alt. 2200—2500 m.

92-2. var. **latifolia** Noot., *var. nov.*

Type: *M. Jacobs 4410* (L, isotypes in A, K, SING), Sumatra, S. slope Mt. Kerintji, path from 'Kaju Aro' towards the top, 1°40′ S, 101°20′ E, alt. 2900—3000 m.

Ramuli (parce) appresse pubescentes, glabrescentes. Folia parce minute appresse pilosa vel glabra late elliptica 3—6 cm longa 2—4 cm lata indice 1,3—2,3 apice breviter acuminato acumine 2—5 mm longo nervis 7—8 paribus reticulo denso. Inflorescentia racemosa ad 4 cm longa. Calyx tubo appresse puberulo c. 1¼ mm alto limbo parce appresse puberulo 1¼—2 mm longo lobis semicircularibus 1—1½ mm longis. Fructus ellipsoideus 10 mm longus 6 mm latus putamine 3-cellulare seminibus 1—3 rectis embryone recto.

Twigs (sparsely) appressedly pubescent, glabrescent; terminal buds appressedly pubescent. *Leaves* sparsely minutely appressedly pilose, especially on midrib and nerves, or glabrous, broadly elliptic, 3—6 by 2—4 cm, index 1.3—2.3; base acute, base angle 30°—60°; apex shortly acuminate, acumen 2—5 mm; margin revolute, entire or denticulate. *Nerves* 7—8 pairs, whether meeting in an intramarginal vein or not; secondary veins prominent, ± transverse to nerves, lesser veins less prominent, forming a rather fine reticulation. *Petiole* 4—7 mm. *Inflorescence* a branched raceme to 4 cm; axis (sparsely) appressedly puberulous. Bracts and bracteoles caducous, appressedly puberulous, ovate, 1—1½ mm. Pedicel to 3 (or 4) mm long. *Calyx tube* densely appressedly puberulous, *c.* 1¼ mm high, limb sparsely appressedly puberulous, 1¼—2 mm long,

lobes ± semi-orbicular, 1—1¼ mm. *Corolla* c. 5 mm. *Stamens* 35—55. *Disk* inconspicuously 5-glandular, with the conical style base shortly pilose; style glabrous, c. 4 mm. *Fruits* ellipsoid, crowned by the persistent calyx lobes, c. 10 by 6 mm; stone inconspicuously lengthwise grooved, 3-celled. *Seeds* 1—3, straight, with straight embryo.

SUMATRA. Atjeh: *van Steenis 8655*, Gajo & Alas Lands, G. Losir, alt. 2950 m. — Westcoast: *Bünnemeijer 10025, 10026, 10376*; *Jacobs 4410*; *Meijer 7665*; *Robinson & Kloss 135*, G. Kerintji, alt. 2800—3000 m.

Note. The altitude of the collection *Meijer 7665* is recorded to be 2000—2500 m.

92-3. var. **pilosa** Noot., *var. nov.*

Type: *W. Meijer 5839* (L), W. Sumatra, Mt. Singgalang near Bukittingi, alt. 2700—2800 m.

Ramuli dense atrobrunnei pubescenti. Folia appresse atra pilosa glabrescentia elliptica 4—6½ cm longa 1,5—3,5 cm lata indice 1,8—2,7 apice acuto ad acuminato acumine 0—8 mm longo, nervis 7—10 paribus reticulo grosso petiolo 5—7 cm longo. Inflorescentia racemosa ad 1 cm longa. Calyx tubo appresse puberulo 1¼—1½ mm alto limbo parce puberulo 1½ mm longo lobis semi-ellipticis ad ovatis c. 1 mm longis.

Twigs densely dark brown pubescent; terminal buds small, pubescent. *Leaves* appressedly fine dark pilose, especially on midrib and nerves, glabrescent, ± elliptic, 4—6½ by 1½—3½ cm, index 1.8—2.7; base acute, base angle 40°—50°; apex acute to acuminate, acumen 0—8 mm; margin recurved, denticulate. *Nerves* 7—10 pairs, meeting in a looped intramarginal vein, secondary veins ± transverse to nerves, lesser veins forming a rather coarse reticulation, but with translucent light a fine reticulation visible. *Petiole* 5—7 mm. *Inflorescence* a raceme to c. 1 cm, axis appressedly brown pubescent. Bracts and bracteoles caducous, with the same indument, ovate, 1½—2 and 1—1½ mm respectively. Pedicel to 2 mm. *Calyx tube* appressedly fine puberulous, 1¼—1½ mm high, limb sparsely fine puberulous, c. 1½ mm, lobes semi-elliptic to ovate, c. 1 mm long. *Corolla* 4—5 mm. *Stamens* 30—45. *Disk* inconspicuously 5-glandular, minutely pilose, hairs sometimes very inconspicuous. *Style* glabrous, 4—5 mm.

SUMATRA. Westcoast: *Meijer 3486*, G. Merapi, alt. 2500—2600 m; *5839*, G. Singgalang, alt. 2700—2800 m.

92-4. var. **angustifolia** Noot., *var. nov.*

Type: *Bünnemeijer 735* (L, isotype in BO), Sumatra, NW. slope of Mt. Talamau (Mt. Ophir).

Ramuli appresse pubescentes vel puberuli. Folia parce appresse minute pilosa 5—9,5 cm longa 2—3 cm lata indice 2,3—3,6 apice acuminato acumine 5—12 mm nervis 9—14 paribus reticulo denso petiolo 5—12 mm longo. Inflorescentia ad 2 cm longa. Calyx tubo minute appresse puberulo 1—1,5 mm alto limbo minus piloso c. 1 mm longo lobis ovatis ½—¾ mm longis.

Twigs sparsely appressedly pubescent or puberulous; terminal buds small, pubescent. *Leaves* sparsely appressedly minutely pilose, (narrowly) elliptic, 5—9½ by 2—3 cm, index 2.3—3.6; base acute, base angle 20°—40°; apex acuminate, acumen 5—12; margin denticulate or crenulate. *Nerves* 9—14 pairs, meeting in an intramarginal looped vein, secondary veins ± transverse to nerves, smaller veins forming an often hardly prominent fine reticulation. *Petiole* 5—12 mm. *Inflorescence* a raceme to 2 cm, axis minutely appressedly puberulous. Bracts and bracteoles caducous, with same indument, ovate, *c.* 1 and ¾ mm long respectively. Pedicel to 3 mm. *Calyx tube* minutely appressedly puberulous, 1—1½ mm high; limb less hairy, *c.* 1 mm, divided into 5 ovate ½—¾ mm long lobes. *Corolla c.* 4 mm. *Stamens c.* 35. *Disk* inconspicuously 5-glandular, minutely pilose. *Style* with conical base, glabrous.

SUMATRA. Westcoast: *Büinnemeijer 735, 803, 851*, Mt. Ophir, alt. 1900—2700 m.

93. Symplocos rubiginosa Wall. *ex* DC.

S. rubiginosa Wall. [Cat. (1828) 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; King & Gamble, J. As. Soc. Beng. 74, 2 (1906) extra number 247; Ridl. Fl. Mal. Pen. 2 (1923) 306. — *Lodhra rubiginosa* Miers, J. Linn. Soc. Bot. 17 (1879) 299. — Type: *Wallich 4432* (G-DC, isotypes in C, CGE, E, FI, K, L, LE, MEL, W), Penang.

Shrub, or tree to 30 m high and 50 cm ϕ. Twigs tomentose, pubescent, tomentellous or glabrous, rather thick (3—5 mm); terminal buds pubescent, 5—10 mm, with scales, but usually no evidence of discontinuous growth. *Leaves* sparsely appressedly pilose to more or less densely patently soft-villous beneath, especially on midrib and nerves, rarely nearly glabrous, narrowly elliptic to obovate, 15—45 by 5.7—17 cm, index (2.1—) 2.6—5; base cuneate, base angle 20°—40°; apex mostly abruptly acuminate, acumen 5—20 mm; margin finely to rather coarsely dentate. *Midrib* much prominent beneath; nerves 12—17 pairs, much prominent beneath abruptly decurrent into the midrib, arching upwards and merging into the venation, often meeting in an intramarginal vein towards the apex of the leaf; secondary veins many, transverse to nerves; tertiary veins slightly prominent, between them a fine prominent reticulation. *Petiole* thickened, glabrous, sparsely appressedly pilose to soft tomentose, 10—25 mm. *Inflorescence* a spike from wood beneath or between the leaves, forming a short cone in bud by the large bracts which surpass the buds; axis pubescent-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 long respectively. *Calyx tube* pubescent-tomentellous or with same indument as limb, 1—2 mm high; limb appressedly puberulous to silky pubescent, often symmetrically torn, 1½—3 mm long; originally ½—2 mm. *Corolla* (minutely to) sparsely stiff hairy towards the outer base, 4—5 mm. *Stamens* 60—100, the longer ones up to 5—7 mm long. *Disk* glabrous or sparsely pilose, 5-glandular. *Style* glabrous or pilose, sometimes with thick conical pilose base. *Fruits* blue

in vivo, ovoid-ellipsoid, sparsely short pilose to glabrous, 8—10 by 5—8 mm, crowned by the persistent calyx rim; mesocarp thin, friable in dry state; stone 10 by 5—7 mm, lengthwise grooved, at one side with a (deep) transverse constriction at $\frac{1}{4}$ from the base. *Seed* 1, once or twice and then S-shaped curved due to the constriction of the stone.

Distribution. Sumatra, Malaya, and Borneo.

SUMATRA. Atjeh: *van Steenis 5945*, above Takengon, alt. 1275 m; *6304*, Burni Lintang, alt. 1800 m, *6449*, Burni Geredong, alt. 1500 m. — Eastcoast: *c.* 15 collections, alt. 0—1600 m.— Westcoast: *Ismael 9*, Taram, E. Pajakumbuh, alt. 500—1000 m; *Jacobs 333*, *4633*; *Maradjo 197*, Mt. Sago, alt. 900—1100 m. — Bencoolen: *de Voogd 1190.* — Djambi: *Posthumus 823.* — Palembang: *71 T 1 P 130*, Banjuasin & Kubu Districts. — S. Sumatra: *bb 35717*, Muara Enim, alt. 50 m. — Riouw: *Buwalda 6593*, Indragiri Uplands, low alt.

MALAY PENINSULA. Penang: 8 collections. — Perak: 10 collections, alt. 60—650 m. — Selangor: *CF 822*, *99285*, alt. 150 m; *Wright 6440*, Weld Hill. — Pahang: *c.* 15 collections, alt. 1100—1300 m. — Trengganu: *Kep. FRI 12709*, G. Padang, alt. 1000 m. — Negri Sembilan: *CF 109403*, G. Berembun For. Res.; *CF 13032 Ridley*, Bukit Tangga; *SF 11520 Nur*, G. Angsi. — Malacca: *Alvins 49826*; *Maingay 955*; *SF 448 Burkill.* — Johore: *Ridley 11115*, Bt. Pattani Kechil; *SF 29263 Corner*, Sg. Sedili, Mawai, low alt.; *Teruya 968*, Kota Tinggi. — Singapore: *c.* 10 collections.

BORNEO. Sarawak: 17 collections, Kuching, Mt. Poi, Mt. Matang, Mt. Perumput, alt. 300—1500 m. — Kalimantan: *Teysmann 8028*, Singkawang, Westcoast; *Amdjah 472*, Batu Lessung, Mahakam.

Uses. The wood is very hard and used for house building (Burkill, Dict. 2, 1935, 2115).

93a. Symplocos salicioides Noot., *sp. nov.*

Type: *R. Pullen 1548* (CANB, isotype in LAE), New Guinea, Territory of New Guinea, Sepik Distr., Prince Alexander Range, E. side of Mt. Tuni on Ambakanja-Wainjo track, alt. 1000 m.

Frutex ramulis pubescentibus foliis anguste ellipticis 3,5 ad 7 cm longis, 0,7 ad 1,4 cm latis venis primariis utroque latere 6 ad 8, in venam intramarginalem convenientibus petiolo 3 ad 4 mm longo. Inflorescentia uniflora bracteis bracteolisque pubescentibus calyce pubescente tubo $1\frac{1}{4}$ mm alto lobis 1 ad $1\frac{1}{4}$ mm longis corolla 2 ad $2\frac{1}{2}$ mm longa staminibus 15 ad 20 disco piloso. Fructus pubescens longe ellipticus 13 mm longus 5 mm latus.

Shrub with pubescent twigs. Terminal buds small, pubescent. *Leaves* pubescent beneath, narrowly elliptic, 3.5—7 by 0.7—1.4 cm, index 4—7; base cuneate to rounded, base angle 30°—80°; apex faintly acuminate to sharply acute, acumen *c.* 10 mm long. *Nerves* 6—8 pairs, rather inconspicuous, meeting in a looped intramarginal vein; reticulation coarse, hardly visible. *Petiole* 3—4 mm. *Inflorescence* a 1-flowered spike. Bracts and bracteoles pubescent, 2 and 1 mm long respectively. *Calyx* densely pubescent, tube $1\frac{1}{4}$ mm high, limb wholly divided in the 1 to $1\frac{1}{4}$ mm long triangular acute lobes. *Corolla* 2—$2\frac{1}{2}$ mm long. *Stamens* 15—20. *Disk* inconspicuously 5-glandular, with the conical style base softly long hairy. *Style* hairy for its lower half, *c.* 2 mm long, with peltate stigma. *Fruits* long ellipsoid, pubescent, 13 by 5 mm, only seen immature.

NEW GUINEA. Sepik area: only the type.

94. Symplocos singuliflora Guillaumin

S. singuliflora Guillaumin, Bull. Soc. Bot. Fr. 79 (1932) 175; Fl. Gén. I.-C. 3 (1933) 996. — Lectotype: *Balansa 3847* (P), Tonkin, Vallée de Langkok, Mont Bavi.

Twigs and the very small terminal buds appressedly pubescent. *Leaves* appressedly pilose beneath, especially on the margin, ovate, 2—6 by 1.1—2.5 cm, index 2.2—2.9; base rounded, base angle *c.* 90°; apex acuminate, acumen 3—8 mm; margin dentate. *Nerves* 4—7 pairs, slightly prominent beneath, meeting in a looped intramarginal vein; reticulation obscure or faintly prominent, rather fine. *Petiole* 1—2 mm. *Flowers* solitary, axillary, on a 1—2 mm long appressedly pubescent pedicel. Bracts and bracteoles several, appressedly pubescent, *c.* 1 mm. *Calyx* appressedly puberulous, tube 1 mm, limb 1—1½ mm long, nearly wholly divided in the triangular, acute lobes. *Corolla c.* 3 mm. *Stamens c.* 30. *Disk* hairy, cylindrical, *c.* ⅓ mm high. *Style* glabrous. *Ovary* 3-celled, 4 ovules in each cell (according to Guillaumin the ovary is 1-celled, with 1 ovule). *Fruits* ovoid, narrowed in a narrow neck, 9—10 by 3½ mm (according to Guillaumin).

INDO-CHINA. Tonkin: *Balansa 3846, 3847.*

95. Symplocos spectabilis Brand

S. spectabilis Brand, Pfl. R. Heft 6 (1901) 69; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 28. — Type: *Henry 10844* (B†, isotype in K), Yunnan, Fen Chen Len, alt. 7500 ft.

Small tree to 7 m. Flower-bearing twigs glabrous, up to 10 mm ϕ, with inconspicuous leaf-scars and *c.* 2 mm wide lamellated pith. *Leaves* glabrous, thinly coriaceous, obovate, *c.* 17 by 5—7 cm, index 2.6—3.4; base cuneate (rounded) narrowing into petiole, base angle 30°—60°; apex shortly acuminate, acumen 5—7 mm; margin entire or denticulate, recurved, cartilaginous. *Midrib* much prominent beneath; nerves 14—18 pairs, anastomosing towards the margin, or a faint intramarginal vein present; secondary veins transverse to nerves, reticulation coarse, faintly prominent beneath. *Petiole* 2½—3 cm, often with several lengthwise ridges. *Inflorescence* a dense multiflowered fascicle; many fascicles from wood beneath the leaves. Bracts and bracteoles tomentose, 3—4 and 2—3 mm respectively. *Calyx* glabrous, tube ½—1 mm high, limb 1½ mm long, the semi-orbicular lobes *c.* 1 mm, with ciliate margin. *Corolla* 5—7 mm. *Stamens c.* 25, up to 9 mm long. *Disk* glabrous, annular. *Style* glabrous, *c.* 7 mm. *Fruits* unknown.

BURMA. North: *Maung Po Khant (Flora of Burma) 15296*, Lwelonkwe.
CHINA. Yunnan: *Henry 10844*, Fen Chen Len, alt. 2250 m.

Ecology. In woods, often on steep slopes.

96. Symplocos stellaris Brand

S. stellaris Brand, Bot. Jahrb. 29 (1900) 528; Pfl. R. Heft 6 (1901) 68; Sargent, Pl. Wils. 2 (1916) 597; Rehder, J. Arn. Arb. 15 (1934) 301; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 31; Li, J. Wash. Ac. Sc. 43 (1953) 109. — *Bobua stellaris* Migo, Bot. Mag. Tokyo 56 (1942) 267. — Type: *Bock & von Rosthorn 135* (W), S. Nanchuan, Tientai and Ningpo.

S. wilsonii Hemsley, Kew Bull. (1906) 161. — Type: *Wilson 4067* (K), Szechwan.

S. dunniana Lévl. Fedde Repert. 9 (1911) 445. — Type: *Cavalerie 3016* (E, isotype in K), Kweichow, Pin fa.

Litsea chaffanjoni Lévl. Fedde Repert. 12 (1913) 182. — Type: *Chaffanjon (Bodinier) 2244* (E, isotype in P), Kweichow,environs de Kouy Yang, Mont du Collège.

S. eriobotryaefolia Hayata, Ic. Pl. Form. 5 (1915) 98, f. 26 and pl. X; Kanehira, Form. Trees (1917) 354, f.; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 919; Mori, Sylvia 5 (1934) 227. — *Bobua eriobotryaefolia* Kanehira & Sasaki, List Pl. Form. (1928) 330; Sasaki, Cat. Govt. Herb. (1930) 407. Type: *Hayata (non vidi)*, Formosa, April 1914.

S. limprichtii Winkler, Fedde Repert. Beih. 12 (1922) 461. — Type: *Limpricht 1287* (K, S), Szechwan Kwan Hsien.

S. aenea Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 30. — Type: *Wang 22741* (A, P, W), Szechwan, Ping Shan Hsien, alt. 1400 m.

Shrub or small tree. Young twigs with the bud-scales red-brown tomentellous, soon glabrescent; twigs and buds glabrous in var. *aenea*. *Leaves* coriaceous, glabrous, often light coloured, smooth and very dull beneath, narrowly elliptic, rarely ovate or obovate, 9—23 by 1.8—5 cm, index (2.8—)3.5—6; base acute slightly attenuate, rarely nearly rounded, base angle 20°—50°(—70°); apex acute or mostly slightly acuminate, rather abruptly acuminate in var. *aenea*, acumen 0—10 mm, *c.* 15 mm in var. *aenea*; margin entire, strongly revolute, but denticulate in var. *aenea*. *Midrib* much prominent beneath; nerves 7—15 pairs, only slightly prominent, nearly obscure beneath, impressed or prominent above, meeting in a looped intramarginal vein which is only visible on the upper surface (except in var. *aenea*); reticulation obscure beneath, or very coarse, nearly obscure, in var. *aenea*. Petiole 10—30 mm, with 2 ridges on either side. *Inflorescence* a condensed spike from the axils of the leaves or from wood, often many clustered on a twig. Bracts and bracteoles densely rusty-tomentose, 2—2½(—3½) mm long, sometimes with large, vesicular glands on the margin, glabrous, but ciliate in var. *aenea*. *Flowers* sessile. *Calyx* glabrous, tube 1—1½ mm high, limb 1½—2 mm, lobes ciliate, *c.* ½ mm long. *Corolla* 5—8 mm, lobes ciliate towards the apex. *Stamens c.* 25, or *c.* 50 in var. *aenea*, about as long as corolla to twice as long. *Disk* glabrous, cylindrical, *c.* ½ mm high, surrounding the 6—8 mm long glabrous style. *Fruits* (ovoid to) cylindrical, slightly curved, the persistent calyx limb excluded 6—11 by 2½—5 mm; exocarp papyraceous, mesocarp fleshy, thin, endocarp hard, woody, with *c.* 7 lengthwise grooves. *Seed* 1, with straight embryo; endosperm with much fatty oil and possibly aleuron.

Distribution. China, Formosa, and Ryu Kyu Is. (Okinawa).

KEY TO THE VARIETIES

1a. Twigs and bud scales tomentellous. Leaf margin entire, strongly revolute.
96-1. var. **stellaris**

b. Twigs and bud scales glabrous. Leaf margin denticulate, not revolute.
96-2. var. **aenea**

96-1. var. **stellaris**

S. stellaris Brand — *S. wilsonii* Hemsley — *S. dunniana* Lévl. — *Litsea chaffanjoni* Lévl. — *S. eriobotryaefolia* Hayata — *S. limprichtii* Winkler.

Twigs and bud scales tomentellous. *Leaves* with entire, strongly revolute margin, the reticulation obscure, index 3.5—6; apex acute to faintly acuminate, acumen 0—10 mm.

CHINA. Yunnan: *Delavay 4968*, Long Ky; *Wilson 4067*. — Szechwan: 12 collections, alt. 1200—1350 m (twice recorded). — Kweichow: 6 collections, alt. 400—1000 m. — Kwangsi: *T. S. Tsoong 81649*. — Kwangtung: 11 collections. — Kiangsi: 5 collections, alt. 300—1200 m. — Anhwei: *S. S. Chien 1033*, Huangshan; *R. C. Ching 2920*, Wang Shan. — Fukien: *H. H. Chung* 2208, Foochow, *Dunn Hongk. Herb. 2906, 2907*. — Kiangsu: *Courbois 25517*,Chang Hai; *Ching & Tso 427*, Lung-ge. — Chekiang: 13 collections, alt. 350—600 m. — Formosa: *Faurie 157*; *Satow 202*; *E. H. Wilson 9727*, Mt. Arisan; *Susuki s.n.*, Taihaizan, Prov. Taihoku.
JAPAN. Okinawa: *S. Hatusima 18043*; *E. H. Wilson 8083 p.p.*, alt. 60—300 m.

Ecology. In woods, often on steep slopes.

96-2. var. **aenea** (Hand.-Mazz.) Noot., *comb. nov.*

S. aenea Hand.-Mazz., Beih. Bot. Centralbl. 62-B (1943) 30.

Twigs and bud scales glabrous (or the latter hairy only towards the margin). *Leaves* denticulate, often somewhat obovate, index 2.8—4; apex abruptly acuminate, acumen *c.* 15 mm; reticulations very coarse, faintly prominent beneath.

CHINA. Yunnan: *Ducloux 2142*, Tchen Fong Shan. — Szechwan: *W. P. Fang 1092*, Nanchuan Hsien, alt. 1800—2100 m; *Y. S. Liu 2257*, O Pien Hsien, alt. 1500—1800 m; *F. T. Wang 22741*, Ping Shan Hsien, alt. 1400 m; *22882*, Ha-Pien Hsien.

97. Symplocos sumatrana Brand

S. sumatrana Brand, Pfl. R. Heft 6 (1901) 62. — Type: *Beccari 106* (K, isotypes in BM, L, MEL), Sumatra, Padang Uplands, Mt. Singgalan.

Twigs densely patently red-brown long hairy or tomentose; terminal buds with many

scales, the outer scales hairy; growth discontinuous, the bud scales leaving glabrous scars. *Leaves* softly pilose beneath, especially on midrib and nerves, narrowly elliptic-ovate, 6—14 by 2—4 cm, index 3.2—3.8; base rounded, base angle *c.* 90°; apex acuminate, acumen 3—15 mm; margin denticulate. *Nerves* 7—15 pairs, much impressed above, much prominent beneath, curved upwards and meeting in a looped much prominent intramarginal vein; secondary veins transverse to nerves, much prominent; lesser veins forming a slightly prominent fine reticulation. *Petiole* 5—7 mm. *Inflorescence* a spike or raceme, 2—4 cm long; axis brown tomentose or spreadingly hairy, hairs *c.* 1 mm. Bracts and bracteoles soon caducous, the first not seen, the latter appressedly long hairy, *c.* 2½ mm long. Pedicels 0—4 mm. *Calyx tube* sericeous, *c.* 1½ mm; limb divided into 5 appressedly pilose semi-elliptic 2 mm long lobes. *Corolla c.* 5 mm, with some appressed hairs towards the base. *Stamens* 45—70. *Disk* pulvinate, pilose. *Style* with some hairs in the lower half, 2—5 mm. *Fruits* ellipsoid, hairy, crowned by the persistent calyx lobes, *c.* 10 by 6 mm; mesocarp fleshy, thin; stone lengthwise ribbed, 3-celled, 1, 2 or 3 cells fertile. *Seeds* straight with straight embryo.

SUMATRA. Atjeh: *van Steenis 9718*, Gajo Lands, Mt. Kemiri, alt. 2700—3000 m. — Westcoast: *Beccari 106*, Padang Uplands, Mt. Singgalan.

98. Symplocos sumuntia Buch. Ham. *ex* D. Don

S. sumuntia Buch. Ham. *ex* D. Don, Prod. Fl. Nepal. (1825) 145; G. Don, Gen. Syst. 4 (1837) 2; DC. Prod. 8 (1844) 255; Clarke, Fl. Br. Ind. 3 (1882) 578; Brandis, Indian Trees (1906) 439. — *Lodhra samuntia* Miers, J. Linn. Soc. Bot. 17 (1879) 298. — Type: *Hamilton* (BM, isotype in K), India, Narainhetty.

S. caudata Wall. [Cat. (1830) 4413, *nomen*] *ex* G. Don, Gen. Syst. 4 (1837) 3; DC. Prod. 8 (1844) 256; Kurz, J. As. Soc. Beng. 46, 2 (1877) 237; For. Fl. Burma 2 (1877) 147; Clarke, Fl. Br. Ind. 3 (1882) 577; Brand, Pfl. R. Heft 6 (1901) 42; Brandis, Indian Trees (1906) 440; Sargent, Pl. Wilson. 2 (1916) 595; Gontscharow, Not. Syst. Ross. 5 (1924) 103; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 276; Fl. Gén. I.-C. 3 (1933) 1021; Fletcher, Fl. Siam. En. 2 (1938) 385; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 18; H. L. Li, J. Wash. Ac. Sc. 43 C1953) 107. — *Lodhra caudata* Miers, J. Linn. Soc. Bot. 17 (1879) 300. — *Eugeniodes caudatum* O.K. Rev. Gen. Pl. 2 (1891) 975. — Type: *Wallich 4431* (K-W, isotypes in BM, CGE, E, G-DC, L, LE, NY, W), India, Sylhet.

S. sumuntia var. *floribunda* DC. Prod. 8 (1844) 255; Clarke, Fl. Br. Ind. 3 (1882) 579. [*S. floribunda* Wall. Cat. (1830) 4419, *nomen.*] — *Lodhra floribunda* Miers, J. Linn. Soc. Bot. 17 (1879) 299. — *Wallich 4419* (G-DC, isotypes in BM, CGE, E, GH, K, L, LE, NY, P).

S. myrtacea S. & Z. Fam. Nat. 2 (1846) 133; Franch. & Sav. En. Pl. 1 (1875) 509; Miq. Prol. Fl. Jap. (1867) 267; Brand, Pfl. R. Heft 6 (1901) 66; Matsumura & Hayata, En. Pl. Form. (1906) 230; Ohwi, Fl. Jap. Engl. ed. (1965) 726. — *Bobua myrtacea* Miers, J. Linn. Soc. Bot. 17 (1879) 306; Nakai, Tr. & Shr. ed. 2, 1 (1927) 317, t. — *Dicalyx myrtacea* Hara, En. Sperm. Jap. 1 (1948) 106. — Type: *von Siebold s.n.* (L, LE), Japan.

S. prunifolia S. & Z. Fam. Nat. 2 (1846) 133; Miq. Prol. Fl. Jap. (1867) 265; Forbes & Hemsley, J. Linn. Soc. Bot. 26 (1889) 74; Hayata, Mat. Fl. Form. (1911) 188; Gontscharow, Not. Syst. Ross. 5 (1924) 104; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 22; Walker, Imp. Trees Ryu Kyu Is. (1954) 266; Ohwi, Fl. Jap. Engl. ed. (1965) 727. — *Bobua prunifolia* Miers, J. Linn. Soc. Bot. 17 (1879) 306; Nakai, Tr. & Shr. ed. 2, 1 (1927) 317, t. — *Dicalyx prunifolia* Hara, En. Sperm. Jap.

1 (1948) 107. — Type: *von Siebold s.n.* (L), Japan.

S. swinhoeana Hance, Ann. Soc. Nat. sér. 4, 15 (1861) 226. — *Bobua swinhoeana* Migo, Bot .Mag. Tokyo 56 (1942) 267. — Type: *de Grijs in Herb. Hance 6697* (BM), Fu Kien.

S. decora Hance, J. Bot. 12 (1874) 369; *op. cit.* 14 (1876) 307; Forbes & Hemsley, J. Linn. Soc. Bot. 26 (1889) 72; Brand, Pfl. R. Heft 6 (1901) 60; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 20; H. L. Li, Taiwania 1 (1950) 313. — Type: *Ford* (BM, GH, K), Hong Kong.

S. urceolaris Hance, J. Bot. 14 (1876) 307; Brand, Pfl. R. Heft 6 (1901) 66; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 20. — Type: *Herb. Hance 19309* (BM), Hong Kong.

S. botryantha Franchet, Pl. David, 2 (1888) 98; Sargent, Pl. Wilson. 2 (1916) 596; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 275; Rehder, J. Arn. Arb. 15 (1934) 300; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 19. — Type: *David, May 1869* (P). Tibet, Moupine Tl.

S. caudata var. *maculata* Brand, Pfl. R. Heft 6 (1901) 42. — Lectotype: *Warburg 5851* (K), China, Futschau.

S. leucophylla Brand, Pfl. R. Heft 6 (1901) 60. — Type: *A. Henry 7486* (BM, GH, K), China, Hupeh.

S. tonkinensis Brand, Pfl. R. Heft 6 (1901) 66; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 285; Fl. Gén. I.-C. 3 (1933) 1022. — Type: *Balansa 3971* (K, isotypes in LE, P), Tonkin.

S. liukiuensis Matsumura, Bot. Mag. Tokyo 15 (1901) 78; Walker, Imp. Trees Ryu Kyu Is. (1954) 268. — *Dicalyx liukiuensis* Hara, En. Sperm. Jap. 1 (1948) 105. — Type: *Y. Tashiro*, Okinawa (*non vidi*), Japan, Ryu Kyu Is.

S. punctata Brand, Fedde Repert. 3 (1906) 217; Guillaumin, Bull. Soc. Bot. Fr. 71 (1924) 283. — *S. bodinieri* Lévl. Fedde Repert. 9 (1910) 76, *non* Brand (1906). — *S. splendens* Lévl. Fedde Repert. 12 (1913) 186. — *S. caudata* var. *macrantha* Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 18. — Type: *Bodinier 2224* (P, isotypes in E, K, W), China, Kwei Chow, Kouy Yang.

S. botryantha var. *stenophylla* Brand, Fedde Repert. 3 (1906) 217. — Type: *Farges 796-c* (P, isotype in E), China, Szechwan, Tchen Keou Tin.

S. cavaleriei Lévl. Fedde Repert. 9 (1910) 77; Rehder, J. Arn. Arb. 15 (1934) 300; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 18. — Type: *Cavalerie 1022* (E, isotypes in P, W), China, Kwei Chow.

S. caerulea Lévl. *l.c.* — Lectotype: *Cavalerie 2293* (E, K, P), China, Kwei Chow.

S. martini Lévl. *l.c.*; Rehder, J. Arn. Arb. 15 (1934) 300; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 20. — Type: *Bodinier s.n.* (E), China, Kouy Tcheou, Kouy Yang, mont du Collège.

S. heishanensis Hayata, Ic. Pl. Form. 5 (1915) 101, t. 28; Mori, Sylvia 5 (1934) 231; Kanehira, Form. Trees (ed. 1936) t. 545; H. L. Li, Woody Fl. Taiwan (1963) 740. — *Bobua heishanensis* Kanehira & Sasaki, List Pl. Form. (1928) 331. — *Dicalyx heishanensis* Migo, Bull. Shanghai Sc. Inst. 13 (1943) 201, *non vidi.* — Syntypes: *T. Ito & B. Hayata, April 1914* (*TOFO, non vidi*), Formosa, Arisan, and *R. Kanehira & I. Tanaka, April 1914* (*non vidi*), Formosa, Nimandaira.

S. sasakii Hayata, Ic. Pl. Form. 5 (1915) 114, t. 36; Makino & Nemoto, Fl. Jap. ed. 2 (1931) 923; Kanehira, Form. Trees (ed. 1936) 598, t. 555; Mori, Sylvia 5 (1934) 243. — *Bobua sasakii* Kanehira & Sasaki, List Pl. Form. (1928) 332; Sasaki, Cat. Govt. Herb.(1930) 408. — Type: *S. sasaki* (*non vidi*), Formosa, Hiernazan.

S. somai Hayata, Ic. Pl. Form. 9 (1919) 69; Mori, Sylvia 5 (1934) 244; Kanehira, Form. Trees (ed. 1936) 599, t. 556. — *Bobua somai* Kanehira & Sasaki, List Pl. Form. (1928) 332; Sasaki, Cat. Govt. Herb. (1930) 408. — Type: *T. Soma, Dec. 1915* (*non vidi*), Formosa, Toyencho, Daikwaikei.

S.sozanensis Hayata, Ic. Pl. Form. 9 (1919) 70; Mori, Sylvia 5 (1934) 244; Kanehira, Form. Trees (ed. 1936) 599, t. 557. — *Bobua sozanensis* Kanehira & Sasaki, List Pl. Form. (1928) 332; Sasaki, Cat. Govt. Herb. (1930) 408. — Type: *Y. Shimida, July 1918* (*non vidi*), Formosa, Sozan.

S. prunifolia var. *paucistaminea* Gontscharow, Not. Syst. Ross. 5 (1924) 104. — Lectotype: *Fortune 25* (BM, K, P, W), China.

S. punctata var. *setchuensis* Gontscharow, *l.c.* — Type: *N. Potanin 26* (*non vidi*), China.

S. prunifolia var. *uiae* Makino, J. Jap. Bot. 3 (1926) 10. — *Bobua prunifolia* var. *uiae* Nakai, Tr. &

Shr. ed. 2 (1927) 319. — *Bobua uiae* Nakai, Bot. Mag. Tokyo 43 (1929) 448. — *Bobua prunifolia* forma *uiae* Sugimoto, Key Tr. & Shr. Jap. (1936) 323, *non vidi*. — *Dicalyx prunifolia* var. *uiae* Hara, En. Sperm. Jap. 1 (1948) 107. — *S. prunifolia* forma *uiae* Ohwi, Fl. Jap. Engl. ed. (1965) 727. — Type: *N. ui* (TI, *non vidi*), Japan, Inari Prov. ii.

Bobua austrosinensis Migo, Bot. Mag. Tokyo 56 (1942) 267. — Type: *CCC 13164* McClure (SH) Kwangtung.

S. koidzumiana Tatewaki & Yosimura, Act. Phytotax. Geobot. 13 (1943) 215, t. — Type *M. Tatewaki, April 16, 1932* (Herb. Hokkaido Imp. Univ., *non vidi*), Formosa, Taichu.

S. caudata var. *macrocalyx* Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 18. — Type: *Sin 1746* (W), China, Kwangsi, Yaoshan.

S. subconnata Hand.-Mazz. *l.c.* 23. — Type: *W. T. Tsang 23519* (W, isotype in A), China, Hunan, Ping Ton Shan.

S. myrtacea var. *pubescens* Uyeki & Tokui, J. Jap. Bot. 29 (1954) 229. — Type: *O. Tokui* (Herb. Fac. Agr. Univ. Ehime, *non vidi*), Shikoku.

Low shrub to medium-sized tree. Twigs glabrous (or nearly so), in innovations sometimes hairy, often dark brown; terminal buds small, with several scales, usually hairy; growth (obscurely) discontinuous. *Leaves* glabrous (or rarely the midrib sparsely pilose), 2—10(—13) by 0.7—4.5 cm, index 1.4—3.2; margin glandular dentate, denticulate to crenulate; base attenuate, base angle (20°—)30°—60°(—90°); apex acuminate to caudate, acumen 3—20 mm. *Nerves* 5—8(—10) pairs, slightly prominent below (often also above), meeting in a rather inconspicuous intramarginal vein, not far from the margin; reticulations fine, prominent on both surfaces, to rather coarse, sometimes even inconspicuous. *Petiole* 2—10(—15) mm. *Inflorescence* a few- to many-flowered axillary raceme, 1—6(—9) cm long, with several cataphylls surrounding the base; axis and the ½—13 mm long pedicels from nearly glabrous (and indument on the axis especially under the bracts) to pilose or pubescent. Bract at base of pedicel elliptic, boat-shaped (or obovate) to linear, appressedly hairy, 2—5 mm long; bracteoles boat-shaped (or obovate) to linear, with same indument, ½—4 mm; all very soon caducous. *Calyx tube* glabrous to shortly sparsely appressedly hairy, 1—2 mm high; lobes glabrous to (sparsely) appressedly hairy, ciliate ⅓—1½ mm long, from much shorter than the tube to slightly longer. *Corolla* white to yellow, sometimes bluish or blue *in vivo*, 4—8 (—11) mm long. *Stamens* 25—40 becoming as long as corolla or *c.* 2 mm longer. *Disk* glabrous, mostly annular. *Style* glabrous, 2—11 mm. *Fruits* ovoid to ampulliform, crowned by the persistent calyx lobes, 6—10(—15) by 3—6(—10) mm; mesocarp chartaceous, brittle when dry; endocarp shallowly (brain-like) grooved. *Seeds* curved, embryo once or twice curved.

Distribution. India, Burma, Thailand, Malaya, Indo-China, China, Hainan, Formosa, Korea, Ryu Kyu Is., and Japan.

INDIA. Nepal: 6 collections, alt. 2100—2400 m. — Sikkim: *Lace 2673*, alt. 1800 m. — East Bengal, Sylhet: *Wallich 4413*, Chittagong Hills; *J. M. Cowan 491, 1756*; *Hooker & Thomson s.n.* — Assam, Khasia Hills: *c.* 15 collections, alt. 1200—1800 m.

BURMA. Amherst: *J. H. Lace 5640.*

THAILAND. Payap, Phu Krading: *Flora of Thailand 6165*; *Roy. For. Dep. 3905* (= *DE 345*); Doi

Inthanon: *Garrett 312*; *Hennipman 3372*; *Kerr 5274*. — Ubon: *Kerr 8334*. — Chantaburi: *Kerr 17794, 18005A*; *Put 2937, 3014*. — Puket: *Kerr 16975*.

MALAY PENINSULA. Pahang, Cameron Highlands: *Chew Wee Lek 803*, 4°29′N 101°23′E; G. Tahan: *Ridley 16079*; *SF 7966*.

INDO-CHINA. Several collections.

CHINA. Yunnan: *c.* 15 collections. — Szechwan: several collctions. — Kweichow: *c.* 20 collections. — Kwangsi: 13 collections. — Hupeh: 14 collections. —Hunan: 10 collections. — Kiangsi: 7 collections. — Kwangtung: *c.* 20 collections. — Hong Kong: 8 collections. — Fukien: many collections. — Chekiang: several collections. — Hainan: 9 collections. — Formosa: *Faurie 182*; *Oldham 274, 297*. — Korea: Quelpart I.: *Faurie 1889*; *Taquet 284, 1107*.

JAPAN. Ryu Kyu Archipelago. Okinawa: *Hatusima 17803*; *T. Kanashiro 1637*; *S. Sonohara 5995*; Okierabu: *Hatusima & Sako 21498,21500, 21572*; Amami-Oshima: *Hatusima & Sako 23815*; *Warburg s.n.* — Tsushima: *Faurie 4815*; *C. Wilford s.n.* — Kyushu: 6 collections. — Honshu, Fujijama: *S. Inoue s.n.*; *Pierot s.n.*; *Togasi 1043*.

Notes. 1. In Japan it is possible to distinguish two forms: '*S. myrtacea*' with few flowers on long pedicels, and '*S. prunifolia*' with many flowers on short pedicels. But '*S. liukiuensis*' is already intermediate and in continental Asia all distinctions disappear, except the longer pedicels.

2. *S. caudata* var. *maculata* Brand was described on plants that are infected by a fungus, *Phomopsis symploci* Petrak.

3. In one collection, *Ching-en Chang 1600*, from Hengchun, Formosa, the fruits are up to *c.* 15 mm long.

4. The pollen belong to pollentype 2.8 of Van der Meijden (3 collections).

5. See the note under *S. pyrifolia* (p. 270).

99. **Symplocos trichomarginalis** Noot., *sp. nov.*

Type: *Clemens 33116* (L, isotypes in BM, BO, G), N. Borneo, Kinabalu, Marai Parai, 8000 ft.

Frutex ramulis appresse pilosis. Folia alterna elliptica ad $3\frac{1}{2}$ cm longa et 1,7 cm lata subtus sparse appresse pilosa, costa et margine subtus dense pilosa. Flores singulares. Calyx appresse longe pilosus, tubo c. 1 mm alto, lobis anguste ellipticis 3 mm longis et 1 mm latis.

Shrub 1—4 m. Twigs often zigzag, usually terminated by a tuft of young leaves, appressedly brown-pilose (hairs *c.* $\frac{1}{2}$ mm). *Leaves* alternate, glabrous above, sparsely appressedly pilose beneath, the midrib and finely glandular-dentate recurved margin beneath conspicuously densely appressedly brown-pilose, elliptic, 2—$3\frac{1}{3}$ by 1.1—1.7 cm, index 1.8—2.5; epidermis beneath muricate; base cuneate to rounded, often attenuate, base angle 50°—90°; apex acuminate, acute, often mucronate (acumen 1—3 mm). *Nerves* 5—7 pairs, inconspicuous above, slightly prominent below, secondary and tertiary veins inconspicuous. *Petiole* with same indument as twigs, 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—2 mm, persistent. *Pedicel* from twig to flower up to 1 cm. *Calyx* loosely appressed-pilose (hairs $\frac{1}{2}$—$\frac{3}{4}$ mm), tube *c.* 1 mm high, lobes narrowly elliptic, acute, *c.* 3 by 1 mm. *Corolla* white to cream

in vivo, *c.* 4 mm long, glabrous. *Stamens c.* 50, in 5 indistinct bundles, up to 6 mm. *Disk* glabrous, 5-glandular. *Style* glabrous, *c.* 5 mm, slender, with small peltate stigma. *Fruits* deep indigo, sparsely pilose, ellipsoid to ovoid, without the persisting, erect calyx lobes 8—9 by *c.* 4½ mm; mesocarp thin, *c.* ¼ mm; stone narrowly ovoid, 8—9 by 4 mm, muricate with shallow lengthwise grooves, endocarp thin. *Seed* 1, embryo straight (only young seeds seen).

BORNEO. Sabah: *Clemens 32559, 33116*, Marai Parai, alt. 1500—1800 m; *Clemens 40028*, above Colombon River, alt. 1200 m.

Ecology. Open places and forest edges.

Note. Some collections were named *S. zizyphoides* Stapf, but this new species differs from *S. zizyphoides* in the veins being obscure and in the long pilose calyx, the lobes of which are narrowly triangular and longer than those of *S. zizyphoides*.

100. Symplocos tricoccata Noot., *sp. nov.*

Type: *SAN 61303* (L, isotypes in K, SAN), N. Borneo, Sabah, Tawau, Hot Spring For. Res., alt. 450 ft.

Ramuli glabri gemmis apicalibus glabris. Folia glabra 7—29 cm longa 4—9½ cm lata indice 1,4—3,2 basi acuta attenuata apice acuminato acumine 5—20 mm longo, nervis 5—10 paribus marginem versus in venam intramarginalem convenientibus, petiolo 5—15 mm longo. Inflorescentia fasciculata vel spicata axe glabra ad 5 mm longa bracteis bracteolisque ciliolatis mox caducis 1—1¾ mm longis. Calyx tubo glabro 2 mm alto limbo glabro vel parce pilose 2 mm longo lobis ovatis acutis ciliolatis 1—1¾ mm longis. Corolla ciliolata 5—8 mm longa. Stamines 40 ad ultra 100. Discus 5-glandulatus. Stylus glabrus praeter basem conicam breviter pilosam. Fructus anguste oblique ellipsoideus 3-cellularis cellulis singularibus in sectione transversali circularibus putamine 3-lobato endocarpo tenui lignoso. Semen cylindricum embryone recto.

Twigs glabrous; terminal buds small, glabrous. *Leaves* glabrous, yellowish or olive-grey or water green, sometimes glossy beneath, ± elliptic, 7—29 by 4—9½ cm, index 1.4—3.2; base acute, attenuate, base angle 40°—70°; apex (faintly) acuminate, acumen 5—20 mm; margin dentate to denticulate. *Nerves* often much prominent beneath, 5—10 pairs, curved upwards and meeting in an intramarginal vein; reticulations sometimes obscure, but mostly secondary veins transverse to nerves, tertiary veins forming a rather coarse reticulation, between them the lesser veins form a very dense network which usually is only visible with translucent light. *Petiole* 5—15 mm. *Inflorescence* a fascicle or very short spike from the axils of the leaves, axis glabrous, to 5 mm long. Bracts and bracteoles very soon caducous, ciliolate, *c.* 1½ mm long. Pedicel 0—1 mm. *Calyx tube* glabrous, *c.* 2 mm high; limb glabrous or with some hairs, *c.* 2 mm long, the lobes ± ovate, acute, ciliolate, 1—1¾ mm. *Corolla* 5—8 mm, ciliolate. *Stamens* 40—more than 100. *Disk* 5-glandular, the conical style base with some hairs to softly short-pilose. *Style* glabrous, to 7 mm. *Fruits* narrowly obliquely ellipsoid, 12—16 by 4—6 mm, ± triangular in cross-section, 3-celled, each cell circular in cross-section;

mesocarp thin, fleshy; stone 3-lobed in cross-section; endocarp thin, woody. *Seeds* cylindrical, with straight embryo.

BORNEO. Sarawak: *S 3719*, Mt. Kalulong, 3°14′N 114°41′E, alt. 700 m; *S 26305*, G. Murud, alt. 1700 m. — Sabah: 13 collections, Lahad Datu, Tawau, Kinabalu, alt. 75—1900 m. — Kalimanten: *Endert 4151*, G. Kemul, alt. 1500 m; *Winkler 977*, Batu Raja, alt. 1500 m.

101. Symplocos trisepala Merr.

S. trisepala Merr. Philip. J. Sc. 12 (1917) Bot. 291; En. Philip. 3 (1923) 302. — Type: *BS 26515* (BM, K, P), Luzon, Prov. Nueva Ecija, Mt. Umingan.

Twigs glabrous, but sparsely long pilose in innovations; terminal buds not seen. *Leaves* sparsely appressedly pilose on the midrib beneath, ± elliptic, 5—9 by 2.7—5 cm, index 1.8—2.2; base rounded or subcordate, base angle *c.* 90°; apex faintly acuminate, acumen 2—5 mm; margin glandular denticulate. *Nerves* 7—9 pairs, meeting in an intramarginal vein; reticulation rather coarse, but with translucent light a very fine reticulation visible. *Petiole* 15—25 mm. *Inflorescence* a short spike to 1½ cm; axis glabrous. Bracts and bracteoles persistent, glabrous, ciliate, 3—5 mm. *Calyx* glabrous, tube 1 mm high, the limb divided into three 2½—3 mm long semi-elliptic rounded lobes. *Corolla* 5—6 mm. *Stamens* 40—70. *Disk* glabrous, 5-glandular, but style base hairy. *Style* (except the base) glabrous. *Fruits* not known.

PHILIPPINES. Luzon: only the type.

102. Symplocos unicarpa Noot., *sp. nov.*

Type: *NGF 31111* (L, isotypes in A, BRI, CANB), Solomon Is., Bougainville, Pavari, ält. 900 m.
Arbor parva ad 6 m alta ramulis sparsim pilosis foliis glabris costa sparsim pilosa, anguste ad late ovatis 4½—12 cm longis 3—4½ cm latis, indice 1,1—3,5; nervis utroque costae latere 7—11, infra prominentibus; reticulo grosso leviter prominenti; base cuneato ad cordato apice acuminato. Inflorescentia parva flore solitario multibracteato; calyce tubo glabro 1 mm alto lobis appresse pubescentibus 2—3 mm longis; corolla 4—5 mm longa; staminibus c. 70 vel ultra; disco glabro stylo glabro. Fructus cylindricus ad apicem angustatus, 10—15 mm longus, 3 mm latus.

Treelet to 6 m. Twigs sparsely pilose; growth discontinuous. *Leaves* glabrous except the sparsely pilose midrib, narrowly to broadly ovate, 4½—12 by 3—4½ cm, index 1.1—3.5; base cuneate to cordate, base angle 50°—140°; apex (long) acuminate, acumen 7—25 mm; margin almost entire. *Nerves* 7—11 pairs, prominent below, meeting in a looped intramarginal vein; reticulation coarse, faintly prominent below. *Petiole* with same indument as twigs, 5—7 mm. *Inflorescence* a very short 1-flowered spike. Bracts many, finely pubescent to puberulous, broadly ovate, 1—3 mm long. *Calyx tube* glabrous, *c.* 1 mm high, lobes appressedly pubescent to puberulous, 2—3 mm long. *Corolla* 4—5 mm. *Stamens* more than 70, up to as long as corolla or much longer, up

to *c.* 8 mm. *Disk* 5-lobed, glabrous. *Style* glabrous, stigma not seen. *Fruits* cylindrical but narrowed in the apical part, crowned by the persistent calyx lobes, without the latter 10—15 by 3 mm.

SOLOMON ISLANDS. Bougainville, Pavairi: *NGF 31099, 31111.* — Choiseul: *BSIP 2995, 5320, 18551.*

Ecology. Rain forests, alt. 0—900 m.

103. Symplocos verticillifolia Noot., *sp. nov.*

Type: *PNH 14397* (L, isotypes in A, K), Philippines, Samar, Mt. Cansayao, Catarman.

Arbor parva 7—9 m alta ramulis sordide hirsutis gemmis apicalibus multisquamosis appresse pilosis. Folia 4 vel 5 verticillata infra parce longe pilosa obovata 6,5—11 cm longa 2,2—5 cm lata indice 2,2—3, base cuneata apice acuminato acumine 4—15 mm longo nervis 6—9 paribus in venam intramarginalem convenientibus petiolo 8—10 cm longo. Inflorescentia brevissime spicata ut videtur fasciculata axillaris axe glabra bracteis ovatis appresse pilosis 8—10 mm longis bracteoliscum 4 mm longis persistentibus. Calyx tubo glabro lobis inaequalibis 2—4 mm longis anguste triangularibus appresse pilosis. Stamina 70—100. Discus glaber (nonnisi gemmas parvas vidi). Fructus ellipsoideus-cylindricus 10—12 mm longus c. 5 mm latus. Semen 1, rectum embryone recto.

Treelet, 7—9 m. Twigs hirsute, glabrescent, bark spongy; terminal buds hidden between the inflorescences, with many appressedly long hairy scales of 4—10 mm; growth discontinuous. *Leaves* in worls of 4 or 5, sparsely long pilose beneath, especially on the midrib, obovate, 6.5—11 by 2.2—5 cm, index 2.2—3; base cuneate, base angle 25°—40°; apex acuminate, acumen 4—15 mm; margin glandular denticulate. *Nerves* 6—9 pairs, strongly impressed above, curved upwards and meeting in an intramarginal vein; secondary and tertiary veins forming a coarse reticulation, the lesser veins forming a fine reticulation which is just visible. *Petiole* 8—10 mm. *Inflorescence* a much reduced, axillary, fascicle-like spike; axis glabrous, *c.* 3 mm long. Bracts ovate, appressedly long hairy, 8—10 mm long; bracteoles narrowly ovate, *c.* 4 mm, both persistent under the fruit. *Flowers*: only young buds seen. *Calyx tube* glabrous, the limb wholly divided into the unequal narrowly triangular appressedly long hairy 2—4 mm long lobes. *Stamens* 70—more than 100. *Disk* pilose, flat. *Fruits* ellipsoid to cylindrical, crowned by the persistent calyx lobes, 10—12 by *c.* 5 mm, mesocarp fleshy, thin; stone with shallow lengthwise grooves, cylindrical, a little swollen towards both ends, 3-celled, mostly only one cell fertile. *Seed* mostly 1, straight with straight embryo.

PHILIPPINES. Samar: *PNH 14397, 14569,* Mt. Cansayao, Catarman, alt. 200 m.

104. Symplocos vidalii Rolfe

S. vidalii Rolfe, Kew Bull. (1912) 157; Merr. En. Philip. 3 (1923) 302. — *S. luzoniensis* (*non* Rolfe) Brand, Pfl. R. Heft 6 (1901) 61, *pro descr. et specim. Vidal 2141.* — Type: *Vidal 2141* (K, isotype

in A), Luzon, Prov. Nueva Ecija Caraballo Mts.

S. cagayanensis Brand, Philip. J. Sc. 7 (1912) Bot. 35; Merr. En. Philip. 3 (1923) 297. — Type: *FB 16725 Curran (non vidi)*, Luzon, Prov. Cagayan, Mission River.

Twigs villous-tomentose; terminal buds small, densely pilose. *Leaves* patently soft-pilose, especially on the midrib, ± elliptic, 2.7—8 by 1—3 cm, index 2.2—3.8; base acute to rounded, base angle 40°—90°; apex acuminate, acumen 2—8 mm; margin recurved, entire to denticulate. *Nerves* 7—10 pairs, meeting in a looped intramarginal vein; reticulation coarse to rather fine. *Petiole* 5—7 mm. *Inflorescence* a lax raceme to 5 cm; axis villous. Bracts and bracteoles linear, villous, at least the latter persistent under the fruit, 2—3 and 1⅓—2⅔ mm respectively. Pedicel 1—2 mm. *Calyx* (appressedly) pilose; tube 1—1½ mm high, limb wholly divided in the narrowly triangular acute 1—1½ mm long lobes. *Corolla* 2½—3 mm. *Stamens* 17—30. *Disk* glabrous, 5-glandular. *Fruits* cylindrical, *c.* 10 by 3 mm; mesocarp thin, chartaceous; endocarp thin, woody, stone shallowly lengthwise ribbed; cells 1. *Seed* 1, straight with straight embryo.

PHILIPPINES. Luzon: *c.* 20 collections.

Note. The description in Brand (1901) of *S. luzoniensis* was made after a misidentified specimen, *Vidal 2141.* Rolfe *l.c.* based *S. vidalii* on the description of Brand and Vidal's collection; *S. cagayanensis* Brand is apparently the same. I did not see the type, but the other collections cited by Brand all belong to this species.

105. Symplocos viridissima Brand

S. viridissima Brand, Pfl. R. Heft 6 (1901) 41; Hand.-Mazz. Beih. Bot. Centralbl. 62-B (1943) 37. — Type: *Griffith 3659* (GH, K, LE, W), Assam.

S. lancifolia (*non* S. & Z.) Clarke, Fl. Br. Ind. 3 (1882) 377, *pro coll. Griffith 3659.*

S. lancilimba Merr. Philip. J. Sc. 23 (1923) 259. — Type: *McClure (CCC) 9672* (E, HK, K, P).

S. araioura Merr. Brittonia 4 (1941) 164. — Type: *Kingdon Ward 10213* (A, isotypes in BM, LE), Upper Burma, hills east of Fort Hertz.

Shrub to small tree up to 6 m. Twigs glabrous or finely appressedly pubescent; terminal buds small, appressedly pubescent. *Leaves* sparsely appressedly thin hairy beneath to glabrous, ± elliptic, 3½—13 by 1½—4½ cm, index 1.2—3.7; base attenuate, base angle 25°—65°; apex (faintly) acuminate to more often caudate, acumen 10—20(—30) mm; margin entire, denticulate, crenulate or serrulate. *Nerves* (3—)4—6(—7) pairs, often quite straight, anastomosing at a distance of c. 2/3 to the margin, meeting in an intramarginal vein which is as prominent and as obvious as the nerves; rarely a second intramarginal vein originating from the lowermost nerves; reticulation very fine to coarse, faintly prominent beneath. *Petiole* 2—5(—7) mm. *Inflorescence* a short raceme up to 2 cm, rarely reduced to 1 or few flowers, or a spike; axis (glabrous) to finely

(sparsely) appressedly pubescent or puberulous. Bracts persistent, 1—2 mm (the lowermost sometimes longer), bracteoles persistent, ½—⅔ mm, both triangular to ovate, with the ½—3(—5) mm long pedicel in between with the same indument. *Calyx* finely appressedly pubescent to puberulous, tube 1—1½ mm high, lobes ½—1 mm long. *Corolla* 3—5 mm. *Stamens* 30—50, finally as long as the corolla or slithly longer. *Disk* glabrous, cylindrical (or pulvinate). *Style* glabrous, 2½—6 mm; stigma small, not or only slightly broader than the style. *Fruits* ampulliform, *c.* 7 by 3—4 mm; neck from half as long to quite as long as belly; exocarp easily peeling off in dry state. *Seed* curved with boomerang-shaped embryo (only 1 seed seen).

Distribution. Assam, Burma, Indo-China, and China.

ASSAM. Patkai Hills (Burma frontier): *Griffith* 3659.
BURMA. Kachin: 9 collections.
INDO-CHINA. Annam, Tourane: *Clemens 3428.* — Tonkin, Ha Coi: *W. T. Tsang 27186.*
CHINA. Yunnan: 7 collections. — Kwei Chow: *Y. Tsiang 4695.* — Hainan: 17 collections.

Ecology. A shrub in open places and ravines, a treelet in forest, alt. 300—1800 m.

Note. The collections *Pételot 3864* and *3885* from Tonkin, massif de Tam Dao, are intermediate with *S. guillauminii* (p . . .); they possess also a 3-lobed calyx limb as in the latter species.

106. Symplocos whitfordii Brand

S. whitfordii Brand, Philip. J. Sc. 3 (1908) Bot. 8; Merr. En. Philip. 3 (1923) 302. — Type: *Whitford 962* (K, NY, P), Luzon, Prov. of Tayabas, Mt. Banahao (fruiting coll.). Syntype: *BS 2389* (US), same locality, flowering collection.

Twigs glabrous; terminal buds small, inconspicuous, with few glabrous scales. *Leaves* glabrous, ± elliptic, coriaceous, 2—5.7 by 1—2.5(—3) cm, index (1.7—)2—2.7; base acute, attenuate, base angle 20°—50°; apex acuminate, acumen 3—7 mm; margin crenate. *Nerves* 5—9 pairs, with the intramarginal vein usually faintly prominent, or the intramarginal vein not distinct from the coarse reticulation; in thin leaves a fine reticulation visible with translucent light. *Petiole* 2—9 mm. *Inflorescence* a basally branched raceme from the axils of the leaves; axis glabrous or sparsely (long) pilose, 1½—3½ cm. Bracts and bracteoles persistent, glabrous or sparsely pilose on the midrib, ovate to elliptic, 3—8 and 1½—3 mm respectively. Pedicel (0—)½—1½ mm. *Calyx* glabrous, tube 1½—3 mm high limb 1½—2½ mm long, lobes ovate, acute, 1½—2 mm long. *Corolla* 5—7 mm. *Stamens* stout, 20—30. *Disk* annular, low to very high, glabrous. *Style* glabrous, 5—7 mm. *Fruits* ovoid, 5—7 by 3—5 mm, the mesocarp fleshy, rather thick, wrinkled when dry; stone ampulliform, the belly irregularly grooved. *Seed* 1, U-shaped but the outline ovoid, the basal parts with grooves fitting in ridges of the inner endocarp wall; embryo U-shaped.

PHILIPPINES. Luzon: many collections from Benguet and Tayabas Prov., alt. 1600—2400 m. — Negros: *Merrill 239, 7031*; *PNH 16702, 21985*, Canlaon Volcano.

106a. Symplocos wynadense (O.K.) Noot., *comb. nov.*

S. wynadense (O.K.) Noot., *comb. nov.* — *S. acuminata* Beddome, For. Man. (1872) 150, *non* Miq. (1859); Icones (1874) t. 117; Clarke Fl. Br. Ind. 3 (1882) 583; Brandis Indian Trees (1906) 440; Gamble, Fl. Pres. Madras 5 (1923) 783. — *Eugeniodes wynadense* O.K. Rev. Gen. Pl. 2 (1891) 975. — *S. clarkei* Gürke, in E. & P. Nat. Pfl. Fam. 4, 1 (1891) 170. — *Type*: *Beddome 4936* (BM), India, Travancore, Attraymallay, 4000 ft.

S. tenella Brand, Pfl. R. Heft 6 (1901) 54. — Type: *Bourdillon* 546 (K), India Chimunjee, 4000 ft.

Twigs sparsely (appressedly) pilose, glabrescent; terminal buds small, appressedly pilose. *Leaves* glabrous, ovate-elliptic, $4\frac{1}{2}$—8 by 1.7—3.7 cm, index 1.9—3; base cuneate, attenuate, base angle 35°—50°; apex acuminate, acumen 9—12 mm; margin entire to denticulate. *Nerves* 5—6 pairs, faintly prominent beneath, meeting in a looped intramarginal vein; reticulations quite obscure, but fine with translucent light. *Petiole* 5—10 mm. *Inflorescence* a lax raceme to $5\frac{1}{2}$ cm; axis sparsely pilose, nearly glabrous. Bracts and bracteoles persistent, sparsely pilose, ciliate, the former sometimes adnate to the pedicel, otherwise linear, to 6 mm long, the latter linear, 1—2 mm. Pedicel 1—10 mm, but mostly much shorter. *Calyx tube* (glabrous or) sparsely appressedly pubescent, $1\frac{1}{2}$—2 mm high; limb nearly wholly divided *c.* $1\frac{1}{2}$ mm; lobes sparsely appressedly pubescent. *Corolla c.* 6 mm. *Stamens c.* 70. *Disk* 5-glandular, shortly soft hairy. *Style* glabrous, *c.* 6 mm. *Fruits* ellipsoid, *c.* 10 by 6 mm, only one seen. *Embryo* probably straight.

INDIA. Madras: 6 collections, from Wynaad to Travancore and Tinnevelly, alt. 1000—1650 m.

107. Symplocos zizyphoides Stapf

S. zizyphoides Stapf Trans. Linn. Soc. Bot. 4 (1894) 205; Brand, Pfl. R Heft 6 (1901) 65; Gibbs, J. Linn. Soc. Bot. 42(1914)109; Merr. En. Born.(1921)488; H. Heine, Pfl. Samml. Clemens Kinabalu (1953) 89. — Type: *Haviland 1088* (K, isotypes in BM, BO), N. Borneo, Mt. Kinabalu, 10500 ft.

S. clementis Merr. J. St. Br. R. As. Soc. 76 (1917) 111; En. Born. (1921) 486. — Type: *Clemens 10559* (A), N. Borneo, Mt. Kinabalu, above Paka-Paka, 3200 m.

Shrub, or treelet up to 4(—10) m. Twigs appressedly brown-pubescent, glabrescent, often distinctly zigzag; terminal buds small, appressed-pubescent. *Leaves* when dry rather light coloured (olive-yellow) beneath, dark brown to green above, alternate, ovate to elliptic, glabrous above, nearly glabrous to appressedly fine-pilose beneath, especially on the much prominent midrib and towards the revolute, sharply glandular-dentate margin, glabrescent, $2\frac{1}{2}$—$5\frac{1}{2}$ by 1—$2\frac{1}{2}$ cm, index 1—$3\frac{1}{2}$; base rounded to cuneate base angle 50°—90°; apex faintly acuminate, acute, acumen *c.* 5 mm. *Nerves* 5 to 8 pairs, arching upward and merging into the reticulation, or intramarginal vein faintly discernible, secondary veins ± transverse to the nerves, prominent, tertiary veins faintly visible to obscure. *Petiole* 1—2 mm, appressedly brown-pubescent. *Flowers* solitary

and pedicels to 12 mm, or flowers up to 3(—4?) togather in a raceme and then with very short pedicel (except sometimes the uppermost flower); axis, pedicels, bracts and bracteoles appressedly brown-pubescent (hairs *c.* ½ mm). Bracts *c.* 4 by 2 mm, bracteoles 2—3 by 1—2 mm, both boat-shaped. *Calyx tube* 1—1½ mm high, appressedly pubescent, limb *c.* 2 mm, lobes obtuse to acute, triangular to ovate, 1—1½ mm long, less hairy than the tube, often shortly ciliate. *Corolla* white to yellowish, glabrous, 4—6 mm long. *Stamens* 40 to more than 100, in 5 more or less distinct bundles, connate for the lowest 1 mm, adnate to the corolla for ½ mm, becoming *c.* 1 mm longer than corolla. *Disk* inconspicuous, *c.* 5-glandular, orange with purple glands *in vivo* glabrous or with some minute hairs. *Style* glabrous or with some hairs, gradually thickened towards the base, 4—5 mm, with small peltate stigma. *Fruits* purple, ellipsoid to ovoid, sometimes a little curved, 10—12 by 5—6 mm, mesocarp very thin (½ mm), endocarp very hard. *Seed* 1, straight, embryo straight.

Ecology. Subalpine shrub forest and open places.

BORNEO. Sabah, Kinabalu: *c.* 20 collections, alt. 2400—3700 m.

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 complanata Brand, Pfl. R. Heft 6 (1901) 50; Brandis, Indian Trees (1906) 440. — Type: *Hügel 3472* (W, *non vidi*), India, probably the Nilgiris.

Symplocos doii Hayata, Ic. Pl. Form. 5 (1915) 96, t. 25 h; Mori, Sylvia 5 (1935) 226; Kanehira, Form. Trees (ed. 1936) 584; H. L. Li, Woody Fl. Taiwan (1963) 745. — *Bobua doii* Kanehira & Sasaki, List. Pl. Form. (1928) 330. — Type: *T. Doi, 1912* (*non vidi*), Formosa.

Symplocos euryaefolia Masamune & Syozi, Act. Phytotax. Geobot. 14 (1951) 89. — Type: *F. C. How, July 1935* (TAI, *non vidi*), Hainan, Poting.

Symplocos fukienensis Ling, Act. Phytotax. Sin. 1 (1951) 218. — Type: *L. K. Ling 939* (*non vidi*), China, Fukien.

Symplocos huegeliana Brand, Pfl. R. Heft 6 (1901) 57; Brandis, Indian Trees (1906) 439. — Syntypes: *Hügel 4365 & 4421* (?W, *non vidi*), India, ?Nilgiris.

Symplocos imperialis Brand, Philip. J. Sc. 4 (1909) Bot. 109; Merr. En. Philip. 3 (1923) 299. — Type: *BS 4133 Fénix* (*non vidi*), Philippines, Babuyanes Is.

Symplocos kawakamii Hayata, Ic. Pl. Form. 5 (1915) 104, t. 30. — *Bobua kawakamii* Nakai, Riggakkai 26 (1927) 7; Bot. Mag. Tokyo 44 (1930) 24. — *Dicalyx kawakamii* Hara, En. Sperm. Jap. 1 (1948) 104. — Type: *Kawakami* (*non vidi*), Bonin 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 macrostroma Hayata, Ic. Pl. Form. 5 (1915) 107, t. 25 d; Mori, Sylvia 5 (1935) 237. — *S. japonica* Hayata, Mat. Fl. Form. (1911) 188, *non* DC. (1844). — *Palura macrostroma* Kanehira & Sasaki, List Pl. Form. (1928) 332. — *Bobua macrostroma* Kanehira & Sasaki, Cat. Govt. Herb. (1930) 409. — Type: *Mori 2658* (*non vidi*), Formosa, Kappan-zan.

Symplocos obana Masamune, Trans. Nat. Hist. Soc. Form. 30 (1940) 62. — *Dicalyx obana* Hara, En. Sperm. Jap. 1 (1948) 106. — Type: *Ohba 12* (*non vidi*), Ryu Kyu Is., Tina, Okinoerabu.

Symplocos oranjeensis Brand, Fedde Repert. 26 (1929) 172. — Type: *Versteeg 2481* (*non vidi*), New Guinea, Oranje Mts.

Symplocos otomoi Rehder & Wilson, J. Arn. Arb. 1 (1919) 119. — Type: *H. Otomo* (*non vidi*), Bonin Is., Chichi-jima.

This is probably the same as *S. kawakamii* Hayata (see above) and possibly a good species or a variety of *S. boninensis*. As I have not seen any collections I place this provisionally under dubious species.

Symplocos sanaensis Masamune & Syozi, Act. Phytotax. Geobot. 12 (1950) 201. — Type: *Mori* (TAI, *non vidi*), Formosa, San'a.

Symplocos subsecunda Brand, Fedde Repert. 14 (1916) 326. — Type: *Herb. Link* (B†), Nepal.

Symplocos taririkensis Mori, J. Jap. Bot. 12 (1936) 892, t. 2. — Type: *S. Sasaki* (Herb. Imp. Univ. Taihoku, *non vidi*), Formosa, Taito.

Symplocos ulotricha Ling, Act. Phytotax. Sin. 1 (1951) 216. — Type: *Y. Ling 4423* (*non vidi*), China, Fukien, Lungyien.

Symplocos yaeyamensis Masamune, Trans. Nat. Hist. Soc. Form. 30 (1940) 61. — Type: *Takamine N. F. 6913 (non vidi)*, Ryu Kyu Is., Kare-zan.

EXCLUDED

Symplocos atro-cyanea Elmer = **Mastixia philippinensis** Wang (*Cornaceae*).

Symplocos courtoisii Lévl. Mem. Ac. Cienc. Art. Barc. Ser. III, 12 (1916) 256 = **Ilex buergeri** Miq. *Cf.* Hara, En. Sperm. Jap. 3 (1954) 69. (*Aquifoliaceae*).

Symplocos fasciculata Roxb. *ex* Vesque, Bull. Soc. Bot. Fr. 42 (1805) 153 = **Eurya japonica** Thunb. (*Theaceae*).

Symplocos multiflora Eberh. & Dub. Agronomie Coloniale 1 (1913) 76, t. = **Barringtonia acutangula** (L.) Gaertn. *Cf.* Payens, Blumea 15 (1967) 226. (*Lecythidaceae*).

Symplocos seguinii Lévl. Fedde Repert. 10 (1912) 431 = **Eriobotrya seguinii**(Lévl). Card. *ex* Guillaumin (*Rosaceae*).

Symplocos tetramera Rehder, in Sargent, Pl. Wilson. 2 (1916) 598 = **Ilex tephrophylla** (Loes.) S. Y. Hu (*Aquifoliaceae*).

INCOMPLETELY KNOWN TAXA

The following collections are incomplete but represent possibly new taxa:

Brass 13178 (L), West New Guinea, Bernhard Camp, Idenburg River, alt. 850 m. Only known with one fruit and one calyx.

BRUN 216 (BO, BRUN, K, L, SAR), Brunei, Ulu Belait, alt. 45 m. and *SAN 72131* (L), G. Lumaku F. R., Sarawak. Only fruits known.

CF 71628 (K, KEP, L), Sabah, Jesselton, Kumu Rengis, alt. 25 m.

Eyma 3638 (BO, K, L), E. Celebes, G. Lumut. Possibly allied to *S. cochinchinensis* ssp. *leptophylla*.

Hyland AFO 2558 (BRI), Australia, Queensland, Forest Reserve E. of Malanda. Male flowers only.

Kjellberg 3963 (BO, L, S), Celebes, B. Rante Mario, alt. 2700 m. May be allied to *S. cochinchinensis* ssp. *leptophylla*.

Kostermans 4480 (BO, L), Borneo, N. of Balikpapan, alt. 10 m; *SAN 56991* (K, L, SAN), Sabah, Lahad Datu, alt. 100 m. Only fruits known.

Lörzing 8872 (BO, L), N. Sumatra, Mt. Singgalan, alt. 1750 m. Only known in fruit.

F. & M. Panoff 500 (L, LAE), New Britain, Matong area, 5°30′S 151°30′E. Male flowers only.

Poilane 8348 (P), Indo-China, Annam, 25 km from Nhatrang, alt. 600 m. In young fruit only.

SF 33361 (BO, L, SING), Malaya, Trengganu, G. Padang, alt. 1200 m. Only young fruits.

W. T. Tsang 27186 (K), Indo-China, Tonkin, Ha-coi.

de Voogd 2265 (BO, L), Timor, Mt. Mutis, alt. 1600 m. Only known in fruit.

SUMMARY

A survey has been made on the taxonomic history of the *Symplocaceae* and various opinions on its place in the Angiosperm system. From this it is tentatively concluded that a position in *Ebenales* is doubtful or even unlikely.

The present range of *Symplocos* in East Asia (Manchuria and Japan to East Australia and some West Pacific islands) and the New World is supplemented by Eocene, Oligocene, Miocene and Pliocene fossils from Europe and Pliocene fossils from Japan. The structure of these fossils (largely drupes) is very much alike that of living species; three fossil Japanese species are matched by recent species.

In *c.* 80% of the Asiatic-Malesian and all the American species of subg. *Hopea* the seed and embryo are straight; this feature, which is assumedly the most primitive condition, is also found in all species of subg. *Symplocos*. It is remarkable that all fossil fruits from Europe (Eocene to Pliocene) share this feature, but the three fossil Japanese species from the Pliocene have curved seeds and embryos. In this respect it is noteworthy that the *c.* 20% of Asiatic-Malesian species with curved seeds and embryos form the bulk of the material represented as specimens and the spread of this obviously successful feature occurs apparently in abundant development.

The genus *Symplocos* is subdivided into two subgenera; among these subg. *Hopea* is the latitudinally wider distributed one and is found as far north as temperate Asia (to 45—46° N) and North America (to 37° N); subg. *Symplocos* is, however, only found within the tropical zone of both hemispheres.

Whereas for the genesis of these ranges it could be assumed that subg. *Hopea* has, in Cretaceous or early Tertiary, warmer geological periods migrated over the warm-temperate northern hemisphere, by evergreen or deciduous species, this access for dispersal cannot be assumed for the tropical trans-Pacific range of subg. *Symplocos*; it is a testimony of the high antiquity of the genus.

Research was done on the palynology (285 collections of 40 species of the Old World and 38 unrevised 'species' of the New World) followed by a discussion on its application for taxonomical purpose. In distinct species mostly one pollen type prevails, but in variable species there are usually more types and subtypes, some of which being characteristic for infraspecific taxa.

An account is given of chromosome countings (base number 11), the phytochemistry, anatomy (wood and leaf), germination and seedlings, and a survey of morphological characters and their bearing on taxonomy. These data have been used towards an attempt to estimate affinities for the position of *Symplocaceae* in the Angiosperm system. The conclusion is that in all probability *Symplocaceae* do not belong in *Ebenales*, but show more affinity to *Cornaceae* and possibly *Theaceae*.

In the taxonomical part 111 species are distinguished, 21 of which are new. Subdivision of the genus is not found possible beyond subgeneric rank. The species of *Symplocos* subg. *Hopea* form a rather solid block of species with reticulate affinities.

It has been found that some species are very variable which led to a heavy reduction of names. I have felt it undesirable to ignore the structure of the varability, which is often regional, and to restrict an account of its expression to a mere discussion. I have preferred a formal, nomenclatural distinction in the way of infraspecific taxa, subspecies, varieties, and subvarieties, and in a single case a topodeme.

Several keys are given to facilitate identification, but none of these keys is entirely waterproof, which is due to extreme variation of some of the variable species. It is likely that this variability is partly due to hybridisation, an idea which is sustained by palynology.

Species are provided with full synonymy and description and keys are given for the identification of infraspecific taxa.

Specimens examined total far over 8.000, but only a selection is cited there of in this work; a separate Identification List embodying all examined numbers will be published separately.

PLATES

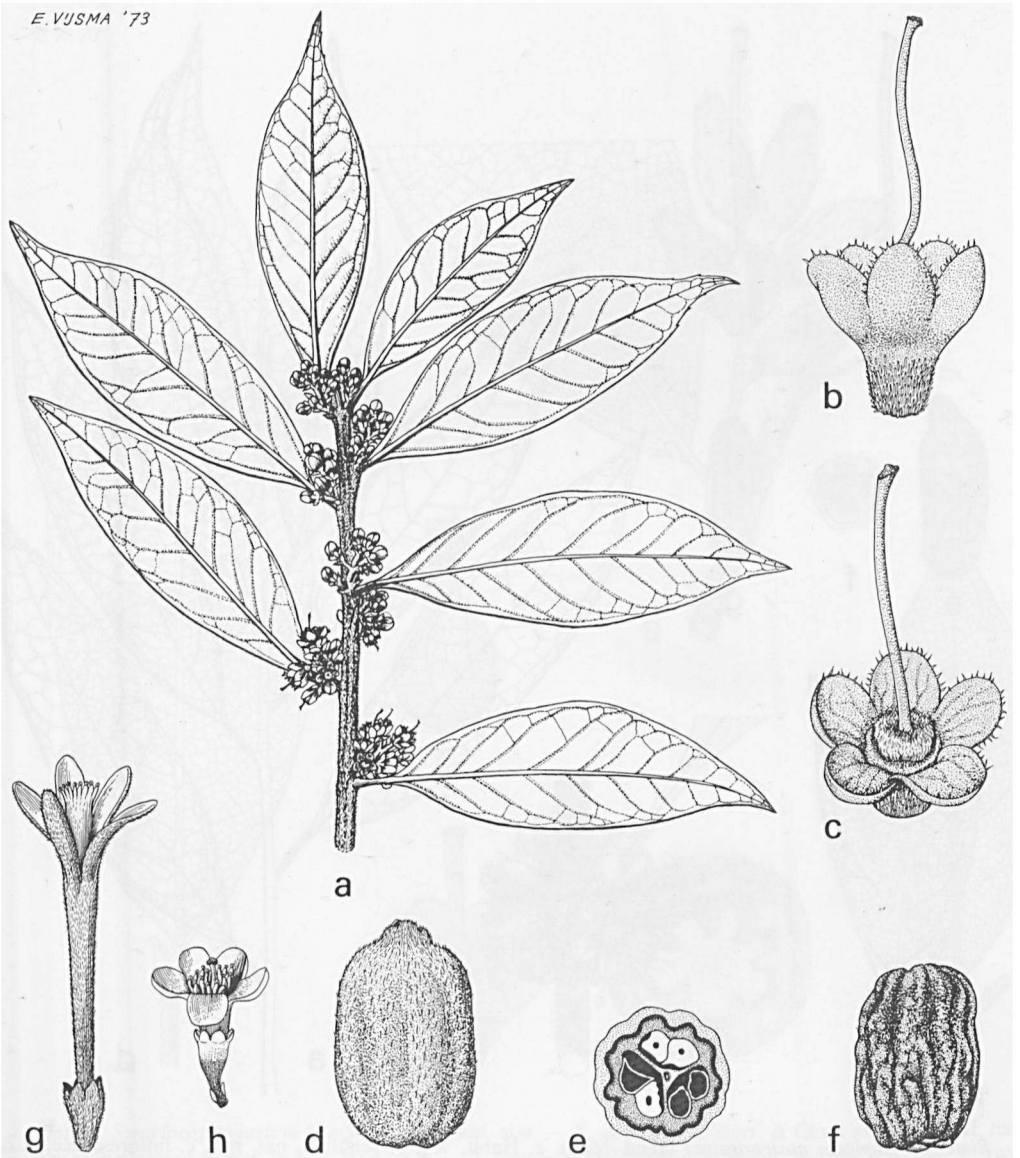

Plate 1. Symplocos anomala Brand. a. Habit, × ⅔, b—c. deflorated flowers, × 8, d. fruit, e. *ditto* in CS, f. stone all × 3. — *S. henschelii* (Mor.) Benth. *ex* Clarke ssp. *henschelii* var. *henschelii*. g. Flower, nat. size. — *S. pendula* Wight var. *pendula*. h. Flower, nat. size (a—c *E. H. Wilson 2547*, d—f *W. T. Tsang 22471*, g *Nooteboom 1932*, h *Father Anglade* s.n. in A).

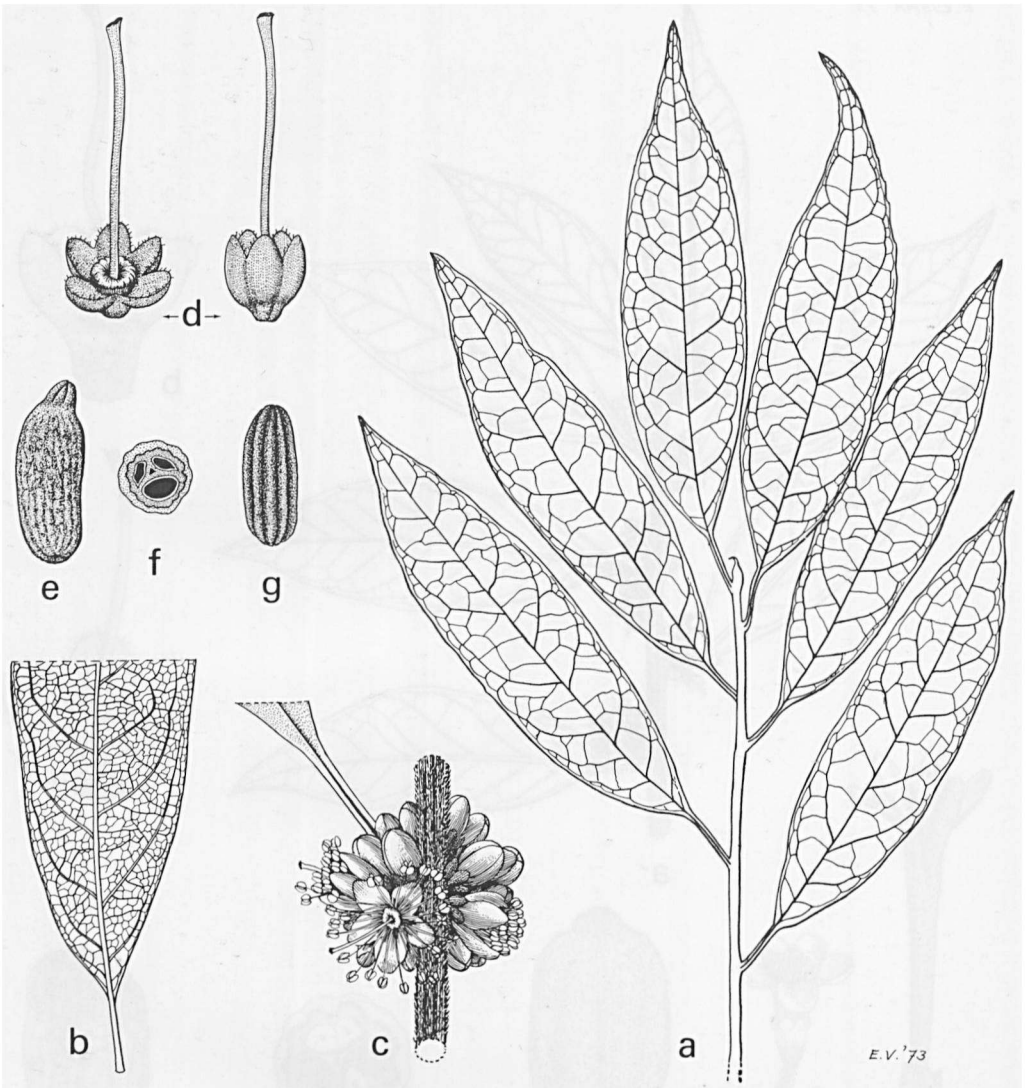

Plate 2. Symplocos austrosinensis Hand.-Mazz. a. Habit, ×⅔, b. venation, nat. size, c. inflorescence, ×2, d. deflorated flowers, ×8, e. fruit, f. *ditto* in CS, g. stone, all ×3 (a, b, e–g *Wang 39588*, c, d *Wang 39644*).

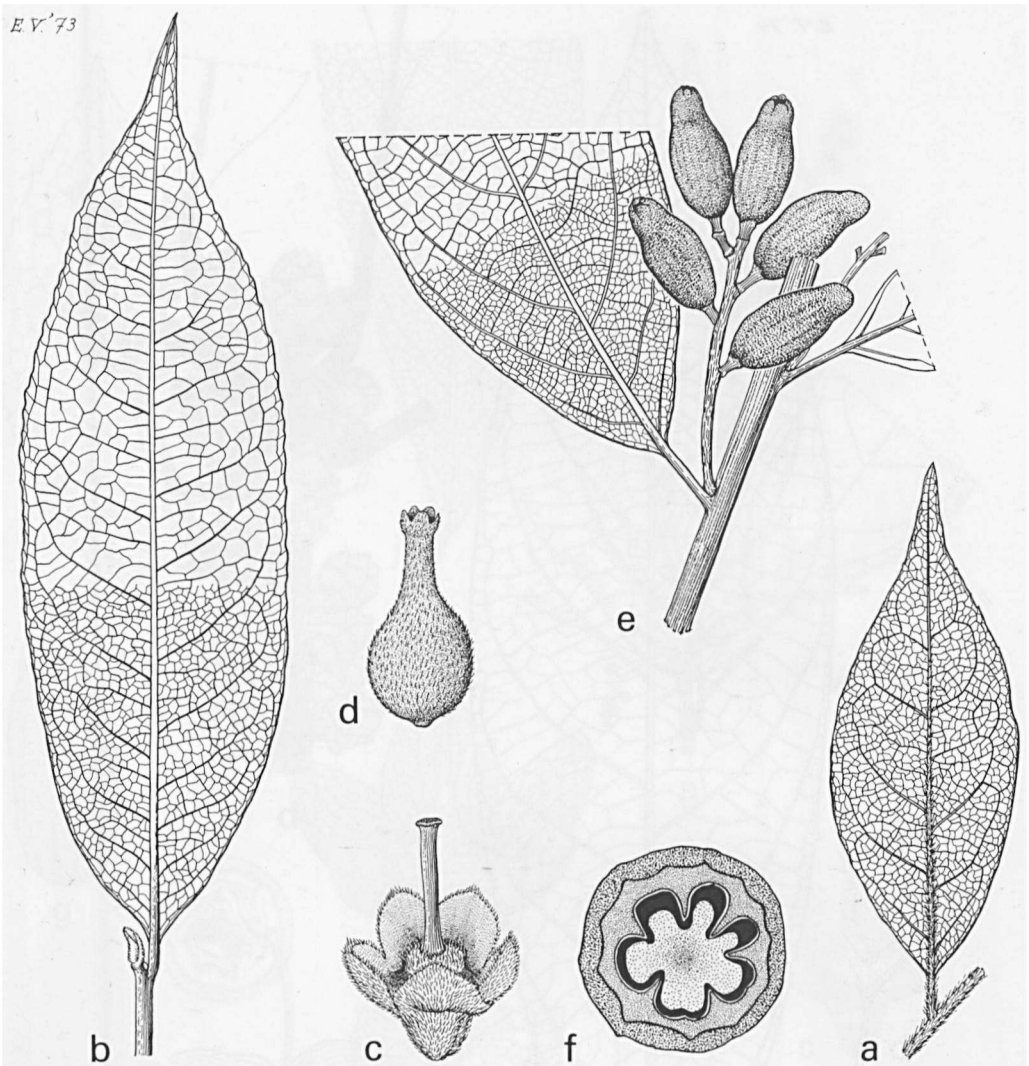

Plate 3. Symplocos angustata Clarke. a. Leaf, nat. size. — *S. atriolivacea* Merr. & Chun *ex* Li. b. Leaf, nat. size, c. deflorated flower, ×8, d. fruit, ×3. — *S. banaënsis* Guillaumin. e. Habit, in fruit, nat. size, f. fruit, in CS, ×3 (a *Thwaites C. P. 78*, b, c *F. C. How 73262*, d *Lau 28008*, e, f *Poilane 7975*).

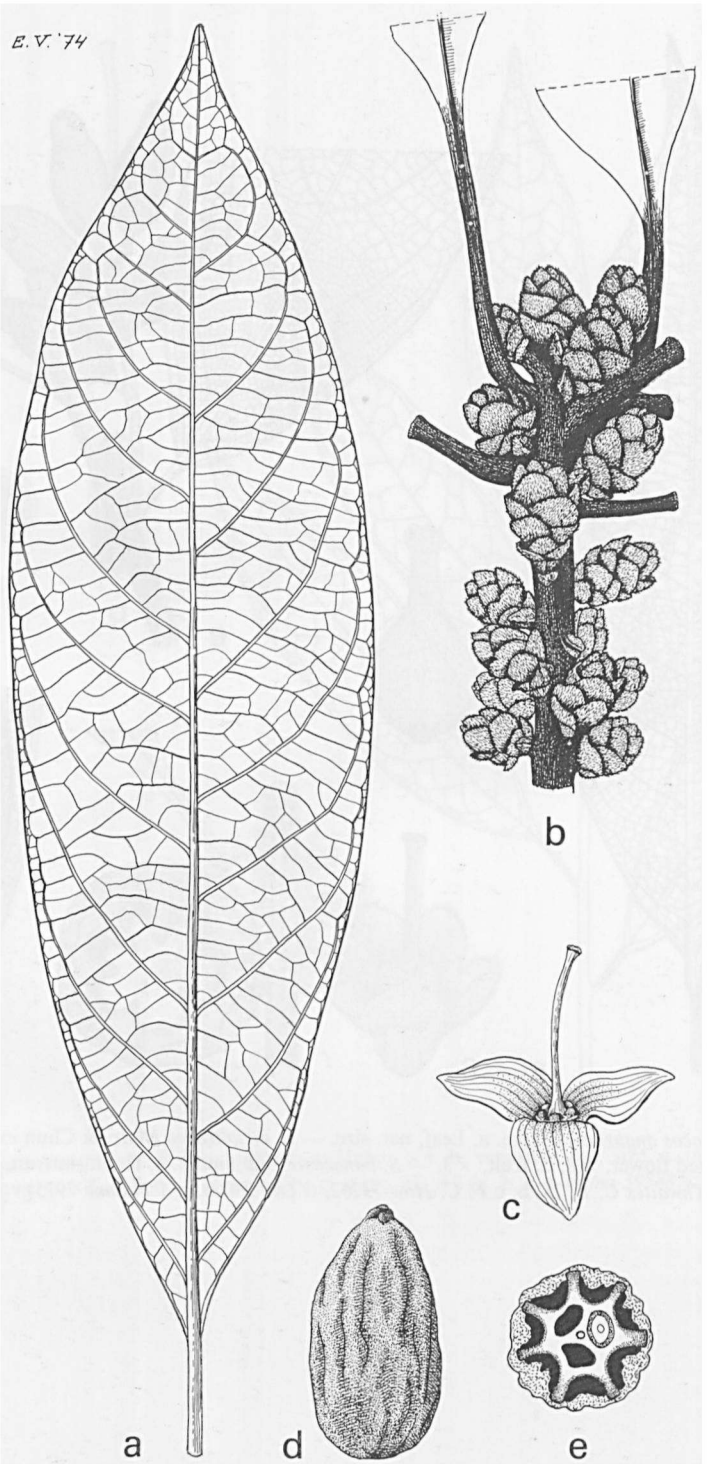

Plate 4. Symplocos barringtoniifolia Brand. a. Leaf, × ⅔, b. inflorescences in bud, nat. size, c. deflorated flower, × 3, d. fruit, e. *ditto* in CS, both nat. size (a, b, d, e *KEP/FRI 10736 Cockburn*, c *KEP/FRI 12347 Whitmore*).

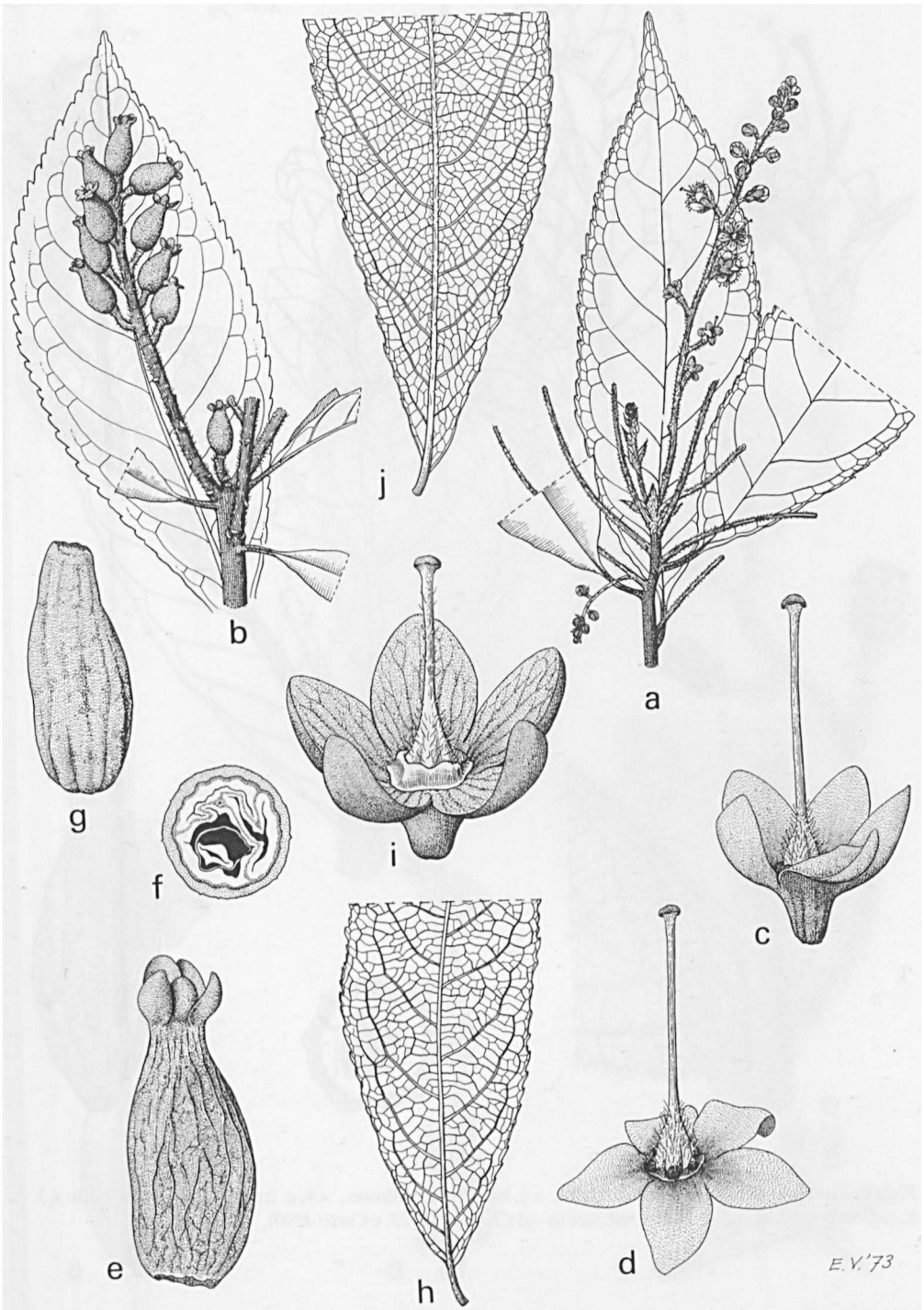

Plate 5. Symplocos brandisii K. & V. var. *brandisii*. a. Habit, × ⅔, b. *ditto*, in fruit, × ⅓, c—d. deflorated flowers, × 8, e. fruit, f. *ditto* in CS, g. stone, all × 3, h. venation, × ⅔. — *S. brandisii* var. *pseudoclethra* (Hall. *f.*) Noot. i. Deflorated flower, × 6, j. venation, × ⅔ (a, c, d, h *Kostermans 4534*, b, e—g *bb 25324*, i, j *Elbert* 836).

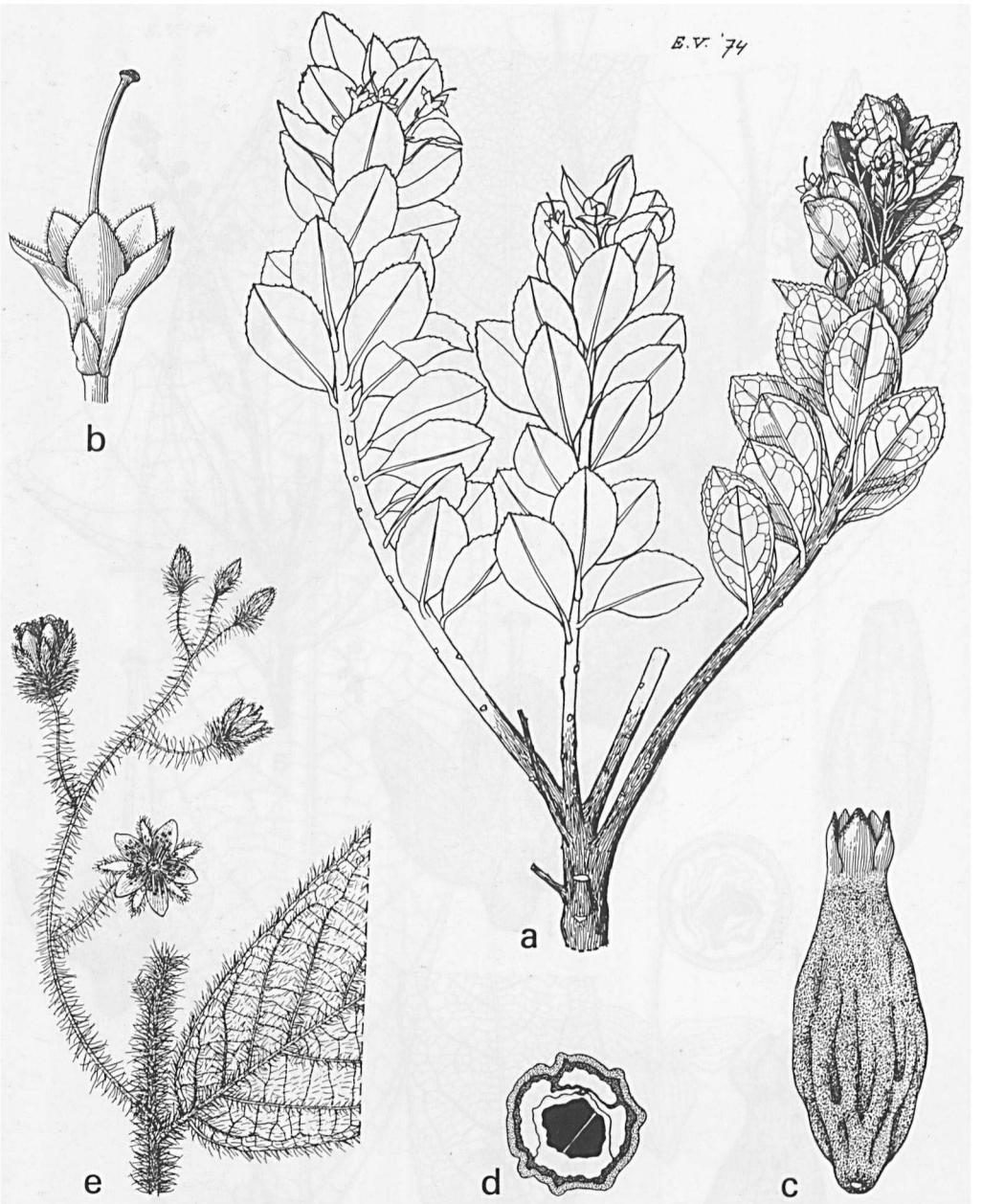

Plate 6. Symplocos buxifolia Stapf. a. Habit, $\times \frac{2}{3}$, b. deflorated flower, $\times 4$, c. fruit, d. *ditto* in CS, both $\times 3$. *S. calycodactylos* Brand. e. Habit, nat. size (a—d *Clemens 51123*, e *Curtis 1330*).

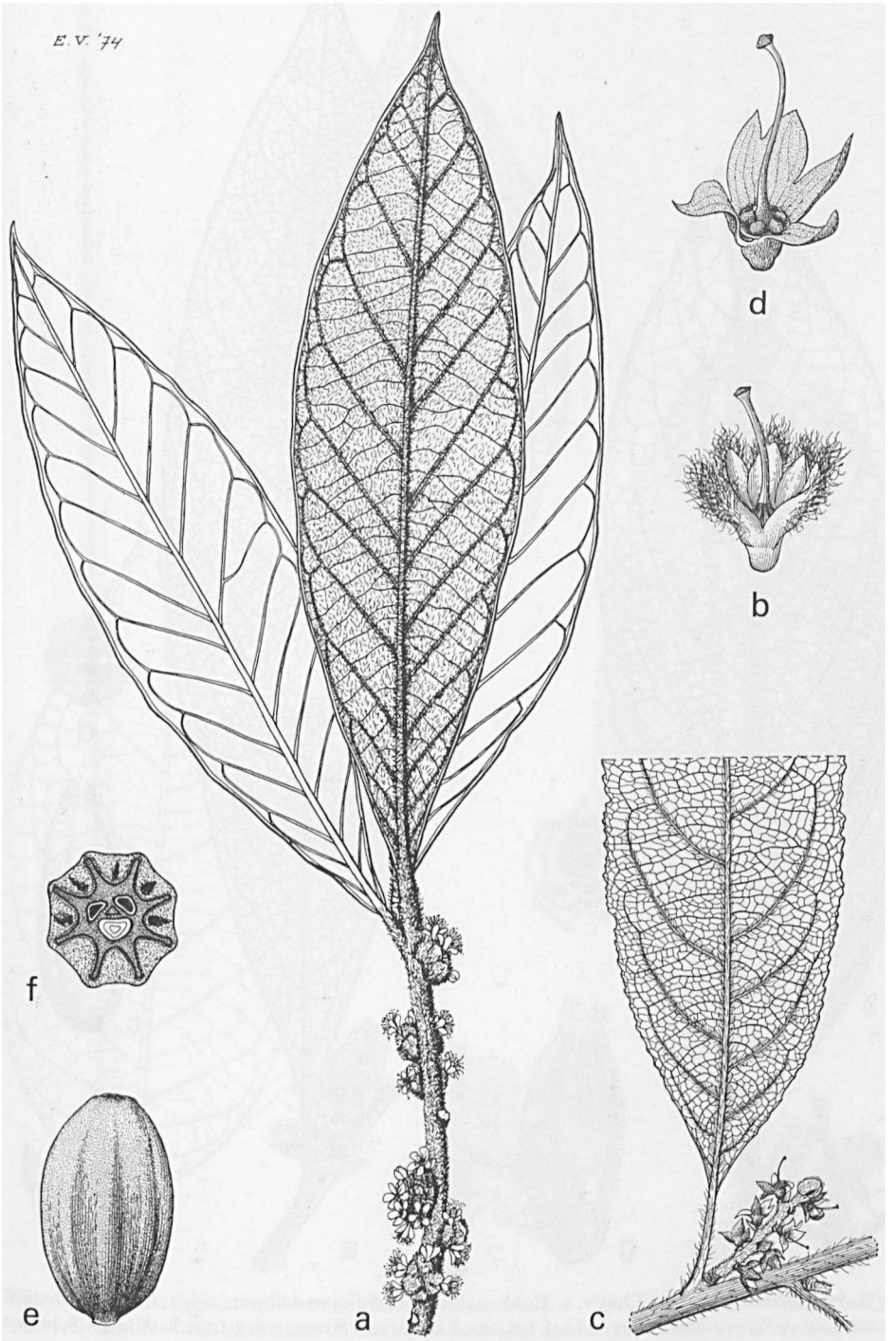

Plate 7. Symplocos cambodiana (Pierre) Hall. *f.* a. Habit, $\times \frac{2}{3}$, b. deflorated flower, $\times 4$. — *S. cerasifolia* Wall. *ex* DC. c. Habit, beyond flowering, nat. size, d. deflorated flower, $\times 4$, e. fruit, f. *ditto* in CS, both nat. size (a, b *Poilane 6801*, c, d *Kostermans 7120*, e, f *SAN 45168 Radimas*).

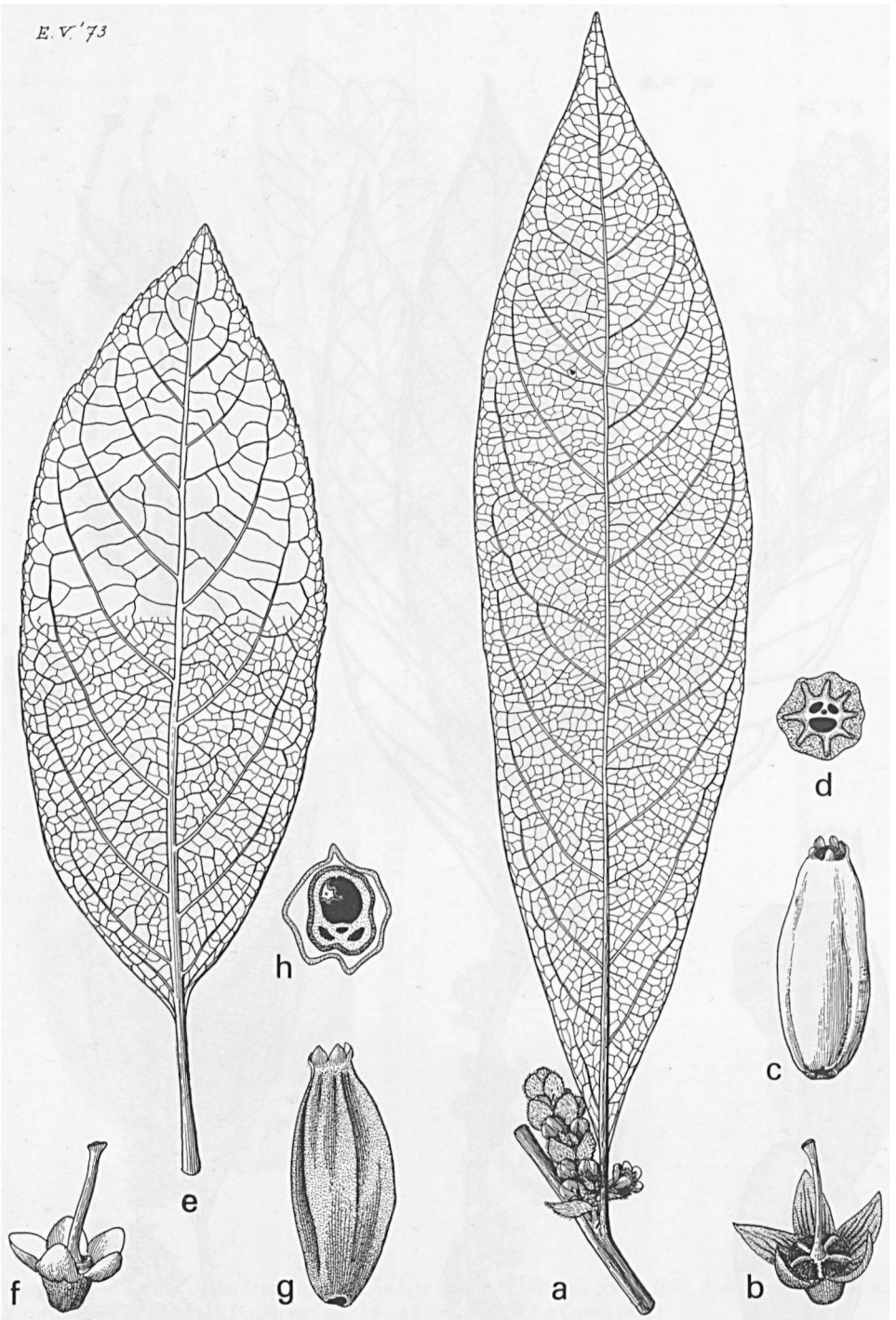

Plate 8. Symplocos costata (Bl.) Choisy. a. Habit, nat. size, b. deflorated flower, × 4, c. fruit, d. *ditto* in CS, both nat. size. — *S. crassilimba* Merr. e. Leaf, nat. size, f. deflorated flower, × 4, g. fruit, h. *ditto* in CS, both × 2 (a, b *den Berger 559*, c, d *Koorders 10996*, e, f *Wang 35052*, g, h *S. K. Lau 25899*).

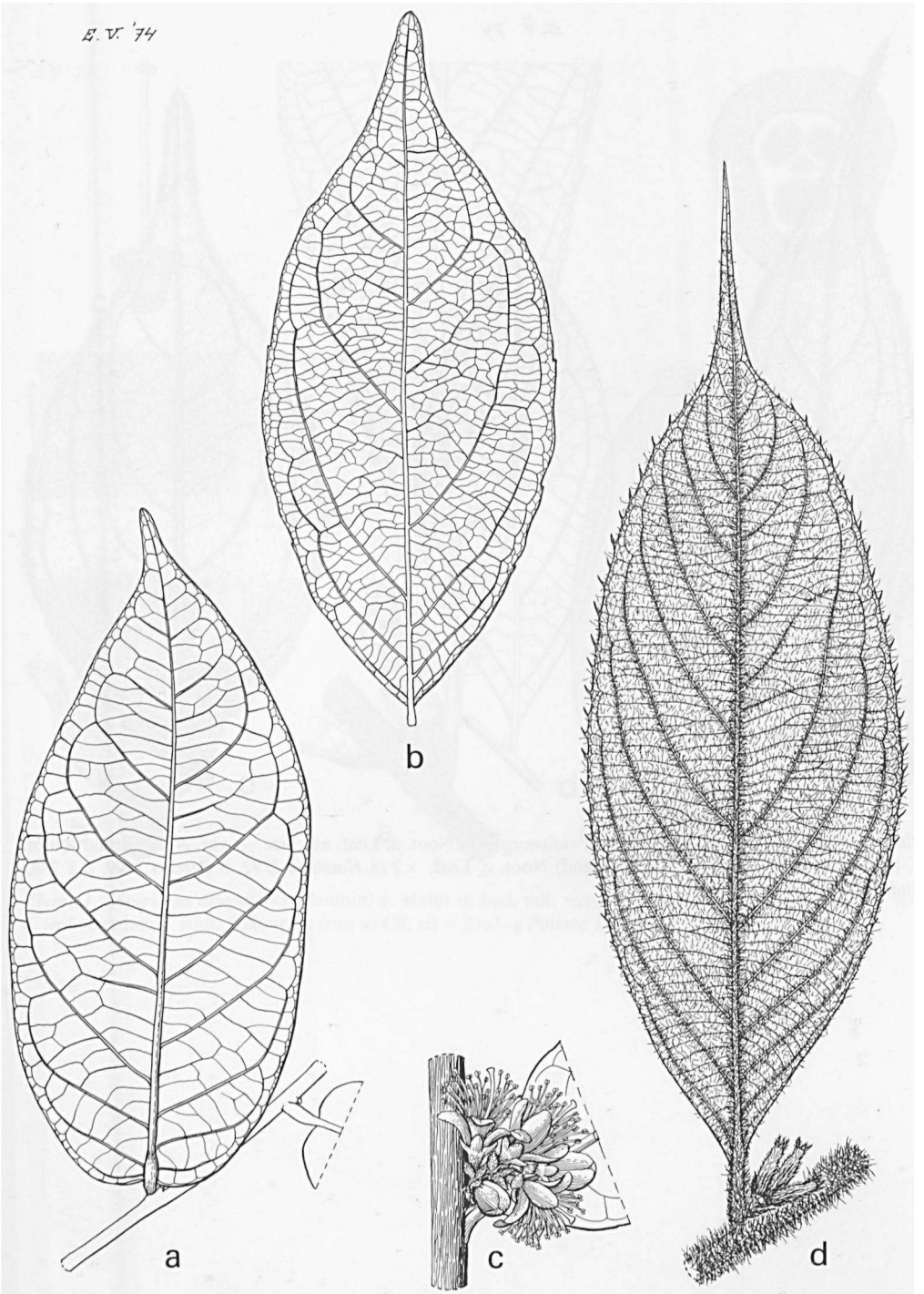

Plate 9. Symplocos crassipes Clarke var. *crassipes*. a. Leaf, ×½. — var. *curtisii* (Oliv.) Noot. b. Leaf, ×⅓, c. inflorescence, × 2. — var. *penangiana* (K. & G.) Noot. d. Leaf and infructescence, ×½ (a *Maingay K. D. 960*, b, c *KEP/FRI 12201 Whitmore*, d *CF 97832 Ismail*).

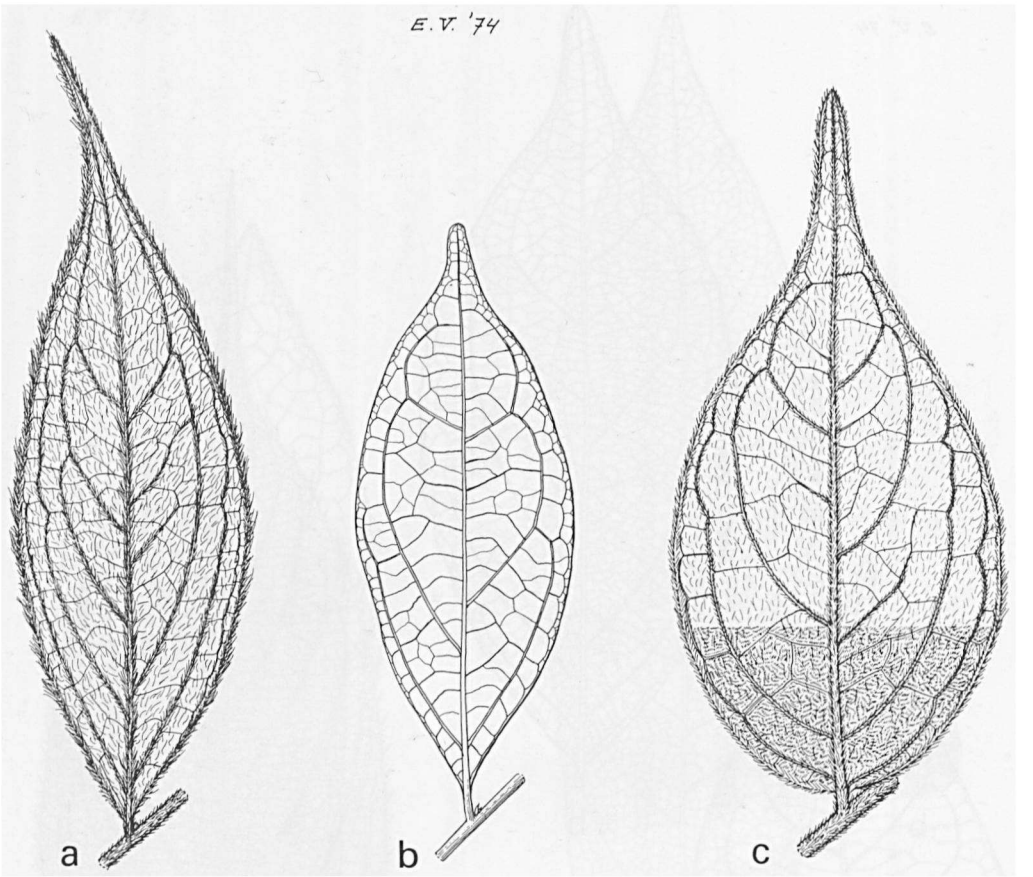

Plate 10. Symplocos crassipes Clarke var. *rufomarginata* Noot. a. Leaf, nat. size. — var. *ernae* (Brand) Noot. b. Leaf, nat. size. — var. *havilandii* (Brand) Noot. c. Leaf, ×2 (a *Haviland 2792*, b *Beccari 3499*, c *S 7783 Anderson*).

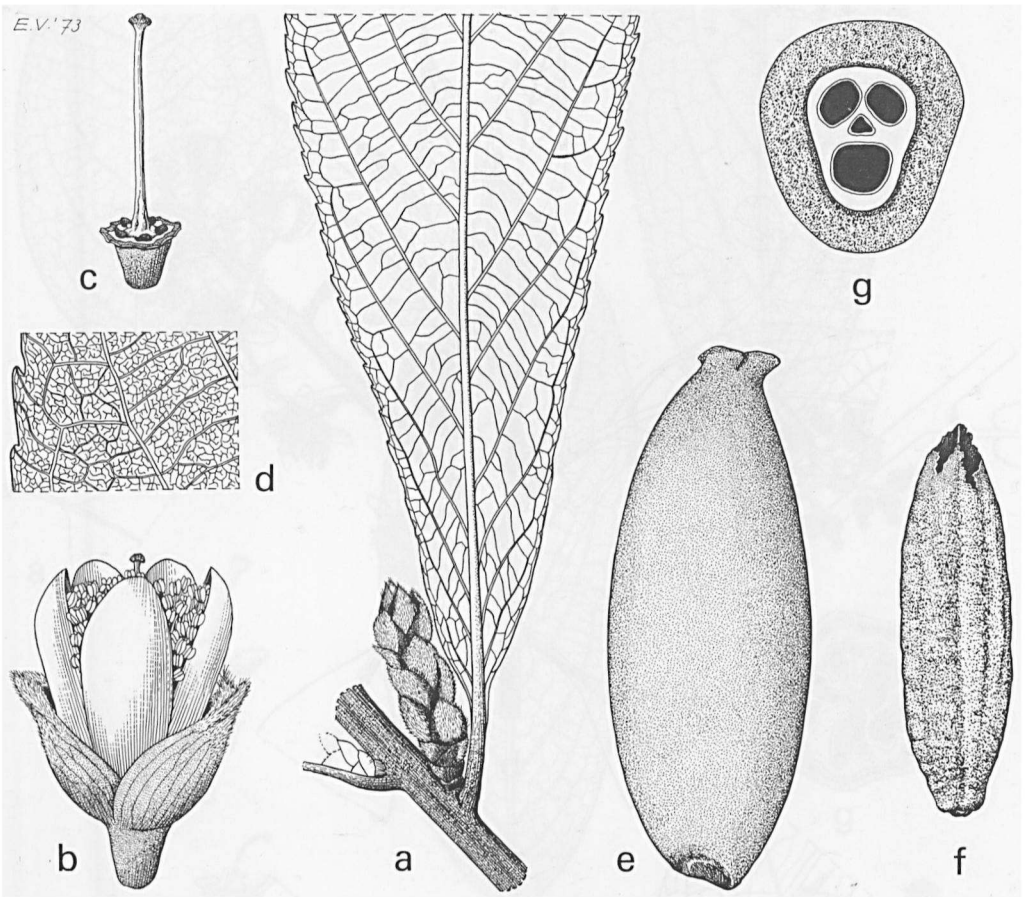

Plate 11. Symplocos disepala Guillaumin. a. Habit in bud, nat. size, b. flower, ×4, c. pistil and disk, ×4, d. leaf venation, e. fruit, f. stone, g. fruit in CS, all ×2 (a—g *Poilane 10563*).

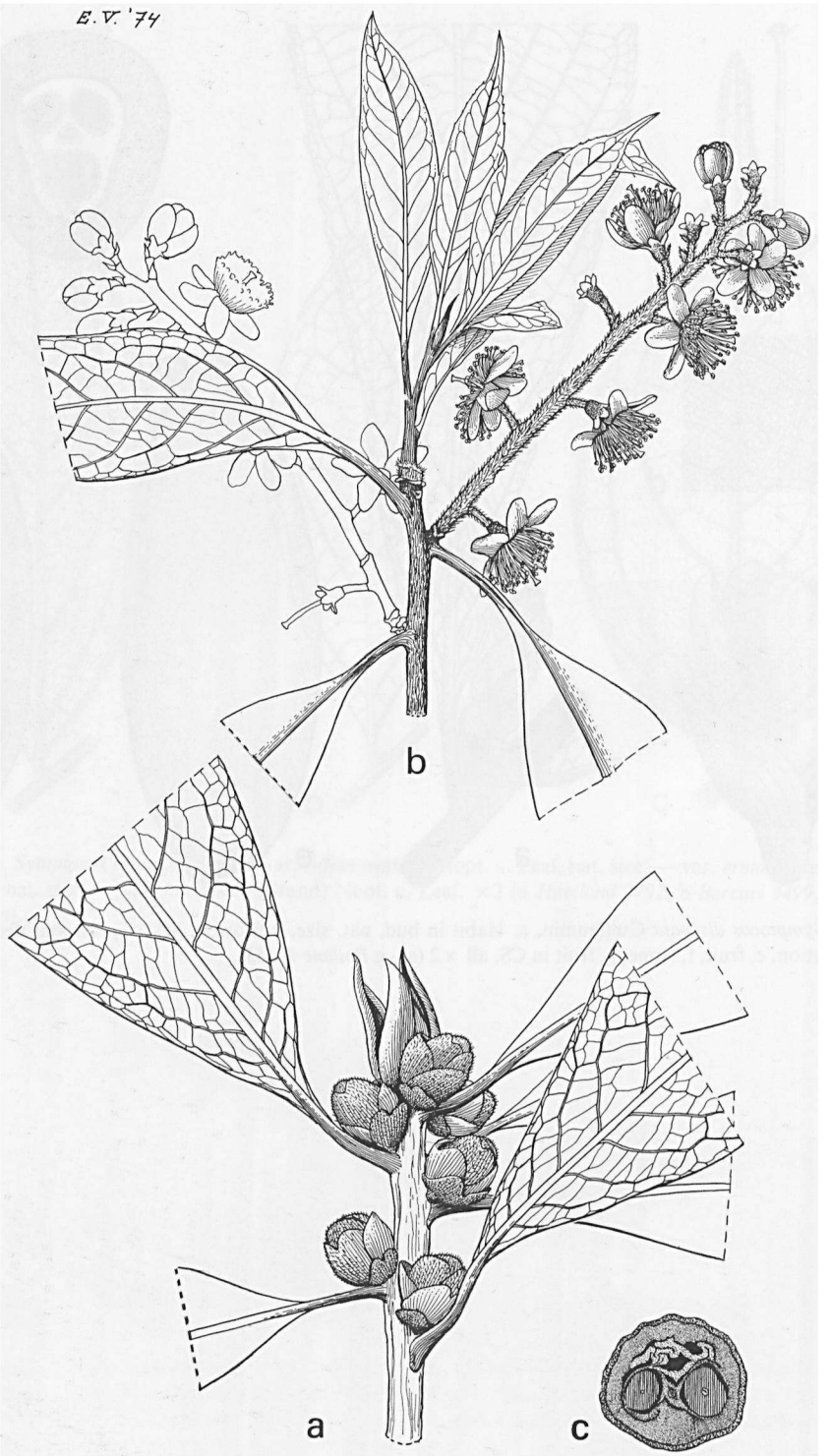

Plate 12. Symplocos dryophila Clarke. a. Habit, with immature inflorescence and terminal bud scales, b. habit in flower, both nat. size, c. fruit in CS, × 3 (a, c *Hooker f. & Thomson 53*, b *Ludlow, Sherriff & Hicks 18758*).

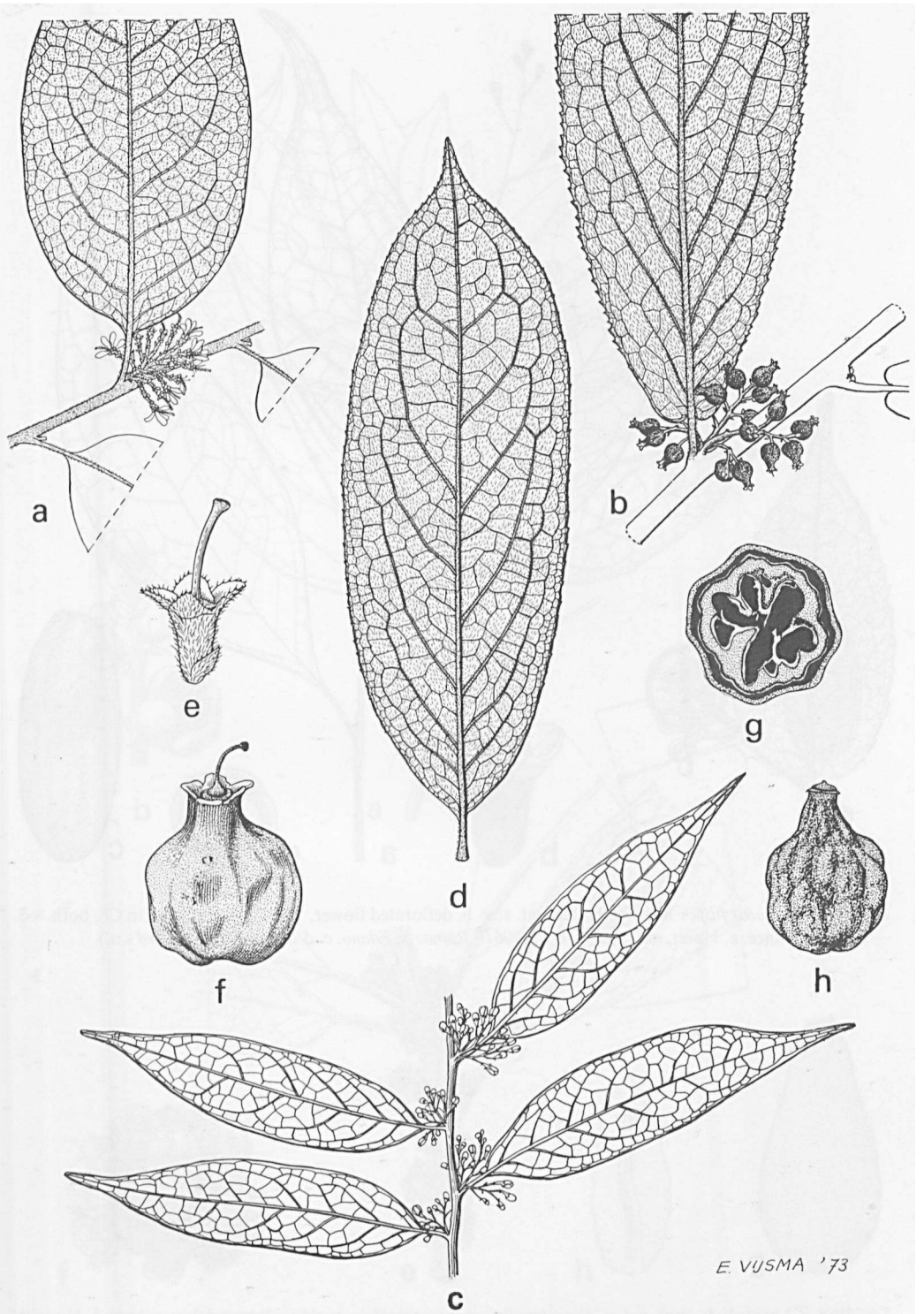

Plate 13. Symplocos fasciculata Zoll. a. Habit, in flower, nat. size, b. *ditto*, in fruit, $\times \frac{2}{3}$, c. *ditto*, in bud, $\times \frac{2}{3}$, d. leaf, $\times \frac{1}{3}$, e. deflorated flower, $\times 8$, f. fruit, g. *ditto* in CS, h. stone, all $\times 3$ (a *Beccari 2380*, b *Nooteboom 1096*, c, e *Nooteboom 2129A*, d, f—h *SAN A 2519*).

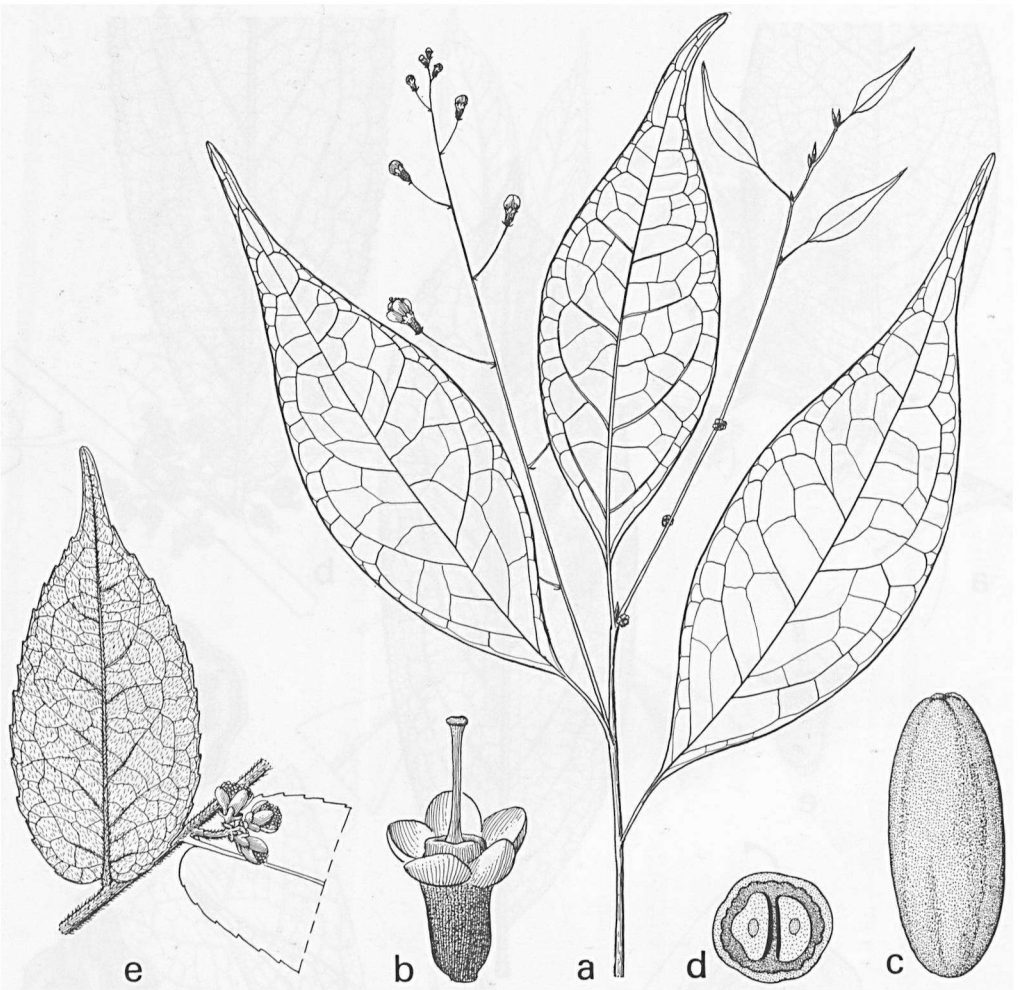

Plate 14. Symplocos filipes Noot. a. Habit, nat. size, b. deflorated flower, ×8, c. fruit, d. *ditto* in CS, both ×3. — *S. fordii* Hance. e. Habit, nat. size (a, b *BS 40610 Ramos & Edano*, c. d *Merrill 6148*, e *Ford* s.n.).

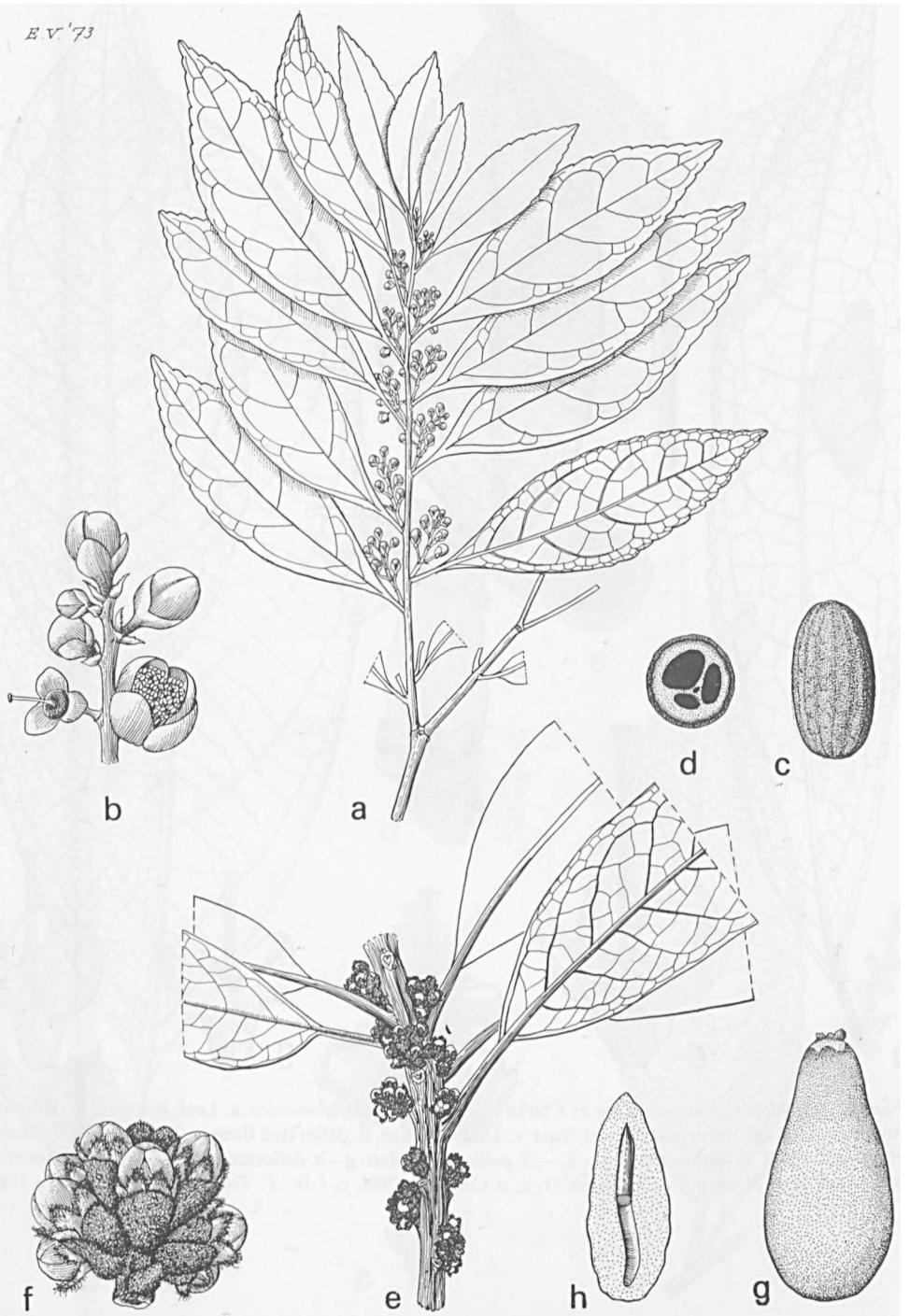

Plate 15. Symplocos glabriramifera Noot. a. Habit, ×⅔, b. inflorescence, ×3, c. fruit, d. *ditto* in CS, both ×2. —*S. glauca* (Thunb.) Koidz. var. *glauca*. e. Habit, nat. size, f. inflorescence, g. fruit, h. seed in LS, all ×3 (a, b *Merrill 8005*, c, d *BS 40376 Ramos & Edano*, e, f *Y. S. Lau 1123*, g, h *Oldham 531*).

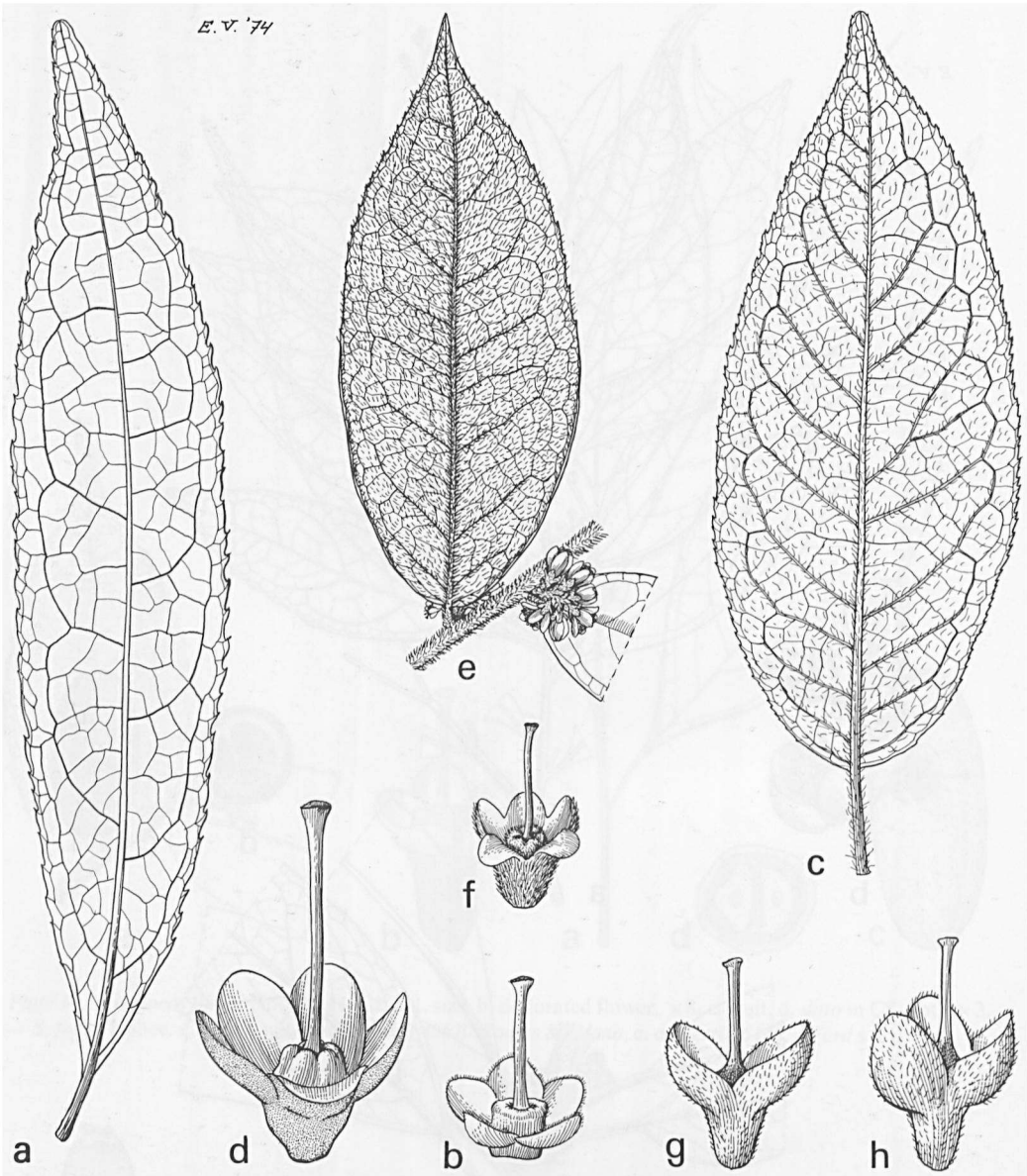

Plate 16. Symplocos glomerata King *ex* Clarke ssp. *glomerata* var. *glomerata*. a. Leaf, nat. size, b. deflorated flower, ×4. — var. *adenopus* (Hance) Noot. c. Leaf, nat. size, d. deflorated flower, ×8. — *S. groffii* Merr. e Habit, nat. size, f. deflorated flower, ×8. — *S. guillauminii* Merr. g—h. deflorated flowers, with 2- or 3-merous calyx, ×8 (a, b *Hooker f. & Thomson 55*, c, d *Cavalerie 2966*, e, f *W. T. Tsang 20776*, g, h *Pierre 1941*).

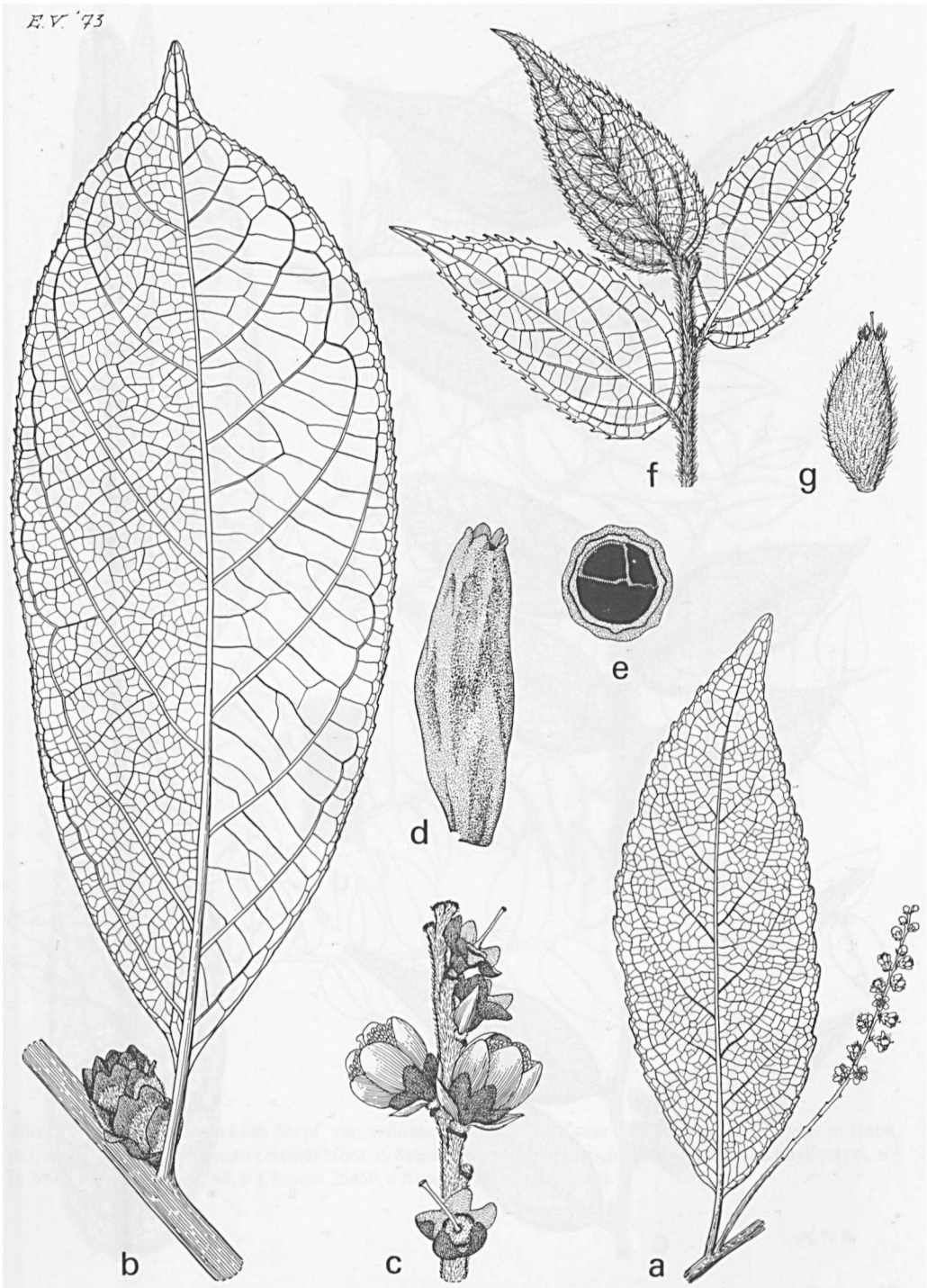

Plate 17. Symplocos hainanensis Merr. & Chun *ex* Li. a. Habit, nat. size. — *S. hookeri* Clarke. b. Leaf and inflorescence in bud, nat. size, c. inflorescence, ×3, d. fruit, e. *ditto* in CS, both ×2. — *S. johniana* Stapf. f. Habit, nat. size, g. fruit, ×2 (a *F. C. How 73130*, b, c *Garrett 709*, d, e *Nooteboom 799*, f, g *Nooteboom & Aban 1500*).

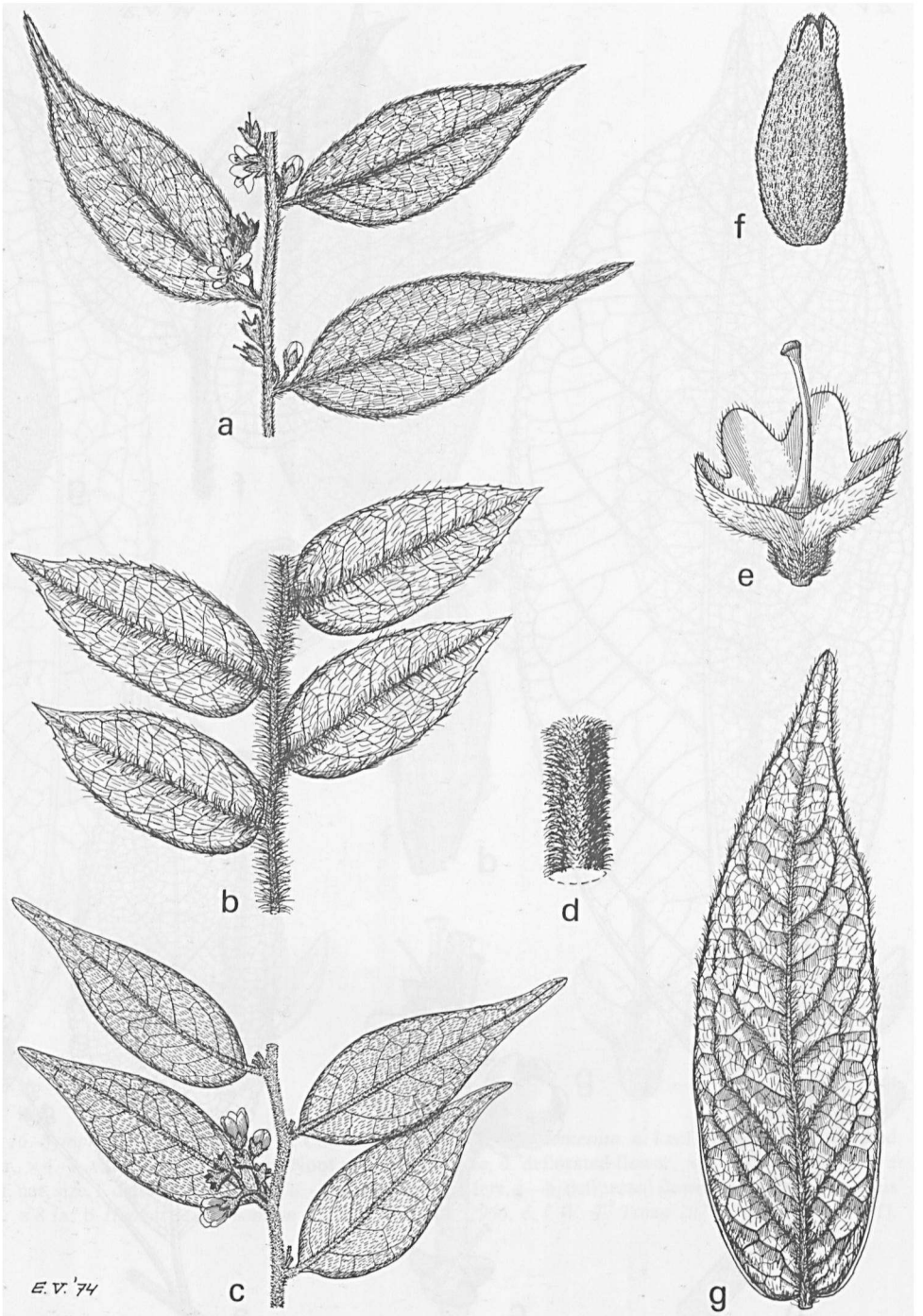

Plate 18. Symplocos laeteviridis Stapf var. *alternifolia* Noot. a. Habit, nat. size. — var. *basirotunda* Noot. b. Habit, nat. size. — var. pauciflora Noot. c. Habit, nat. size, d. twig piece, × 6. — var. *laeteviridis*. e. Deflorated flower, × 8, f. fruit, × 3. — var. *mjöbergii* (Merr.) Noot. g. Leaf, nat. size (a *SAN 20964*, b *Nooteboom & Chai 2203*, c, d *Nooteboom & Chai 2207*, e *Clemens 26469*, f *Clemens 28042*, g *Nooteboom & Chai 2191*).

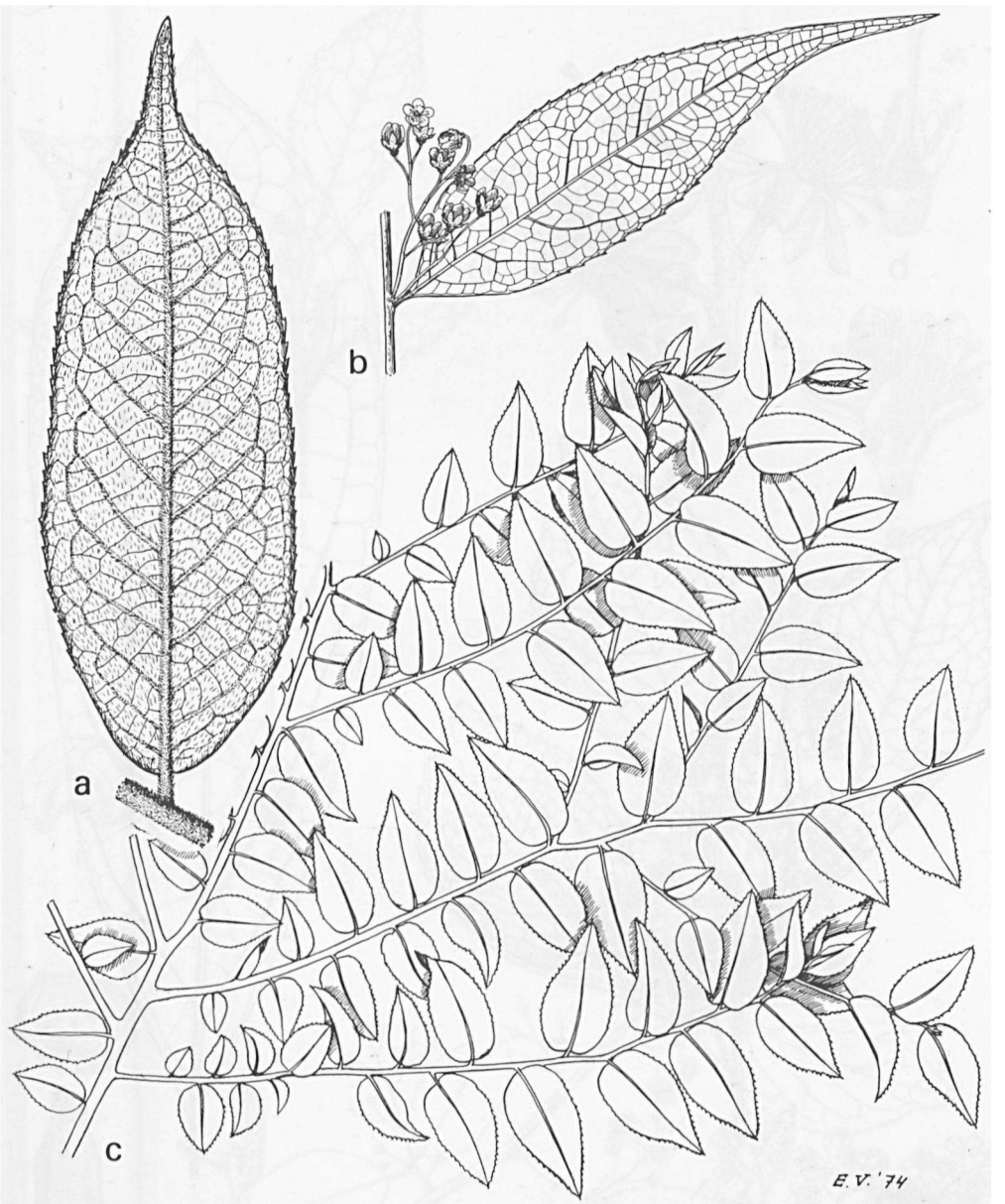

Plate 19. Symplocos laeteviridis Stapf var. *velutinosa* Noot. a. Leaf, nat. size. — var. *laeteviridis*. b. Habit, nat. size. — var. *kinabaluensis* (Heine) Noot. c. Sterile twig showing distichous branching and phyllotaxis, $\times \frac{2}{3}$ (a *Nooteboom & Aban 1588*, b *Clemens 26469*, c *Nooteboom & Aban 1499*).

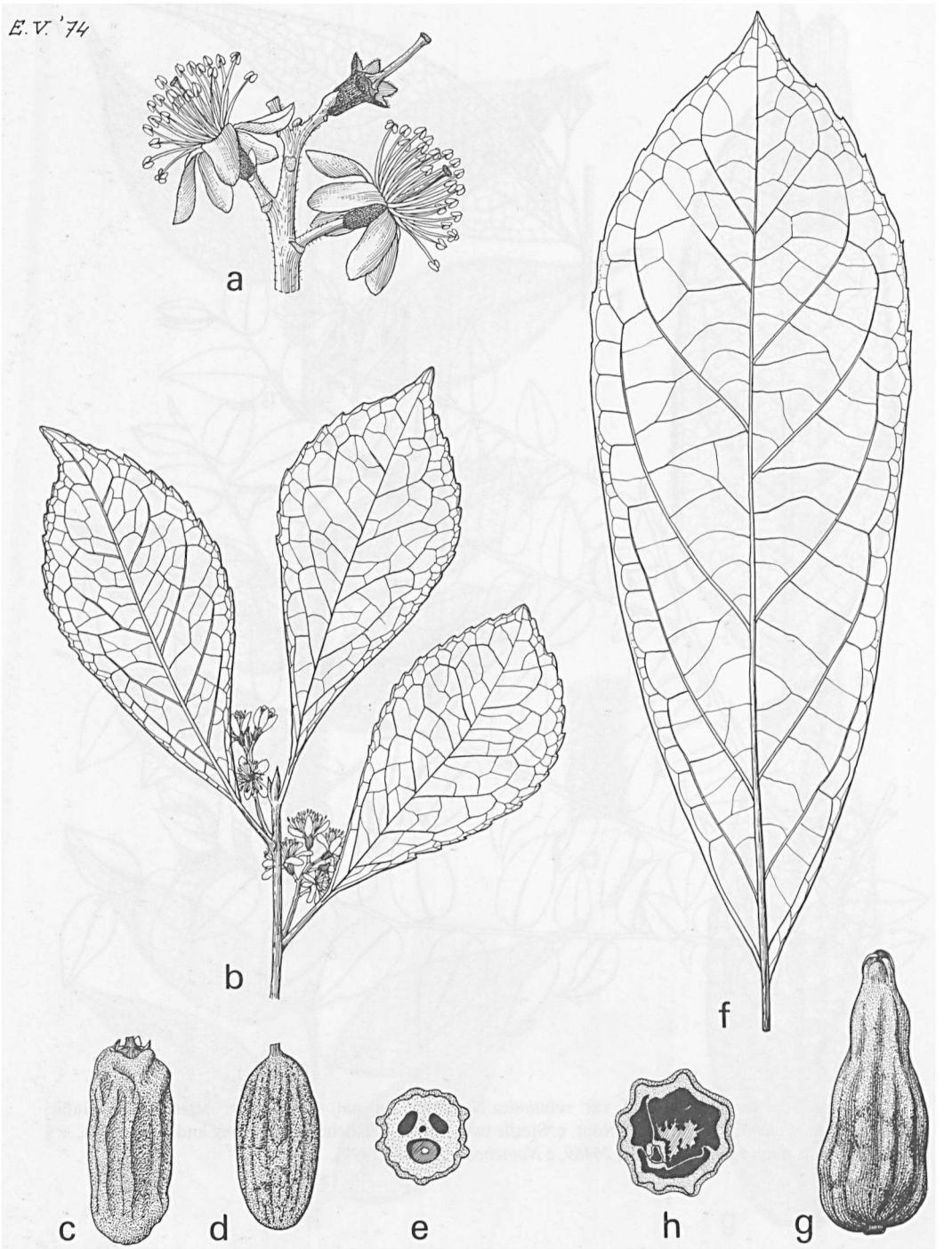

Plate 20. Symplocos ophirensis Clarke var. *cumingiana* a. Habit, nat. size, b. flowers, c. fruit, d. stone, e. *ditto* in CS, all ×3. — *S. longifolia* Fletcher. f. Leaf, ×⅔, g. fruit, h. *ditto* in CS, both ×2 (a, b *Clemens 16469*, c—e *BS 40401 Ramos & Edano*, f—h *Harmand 1212*).

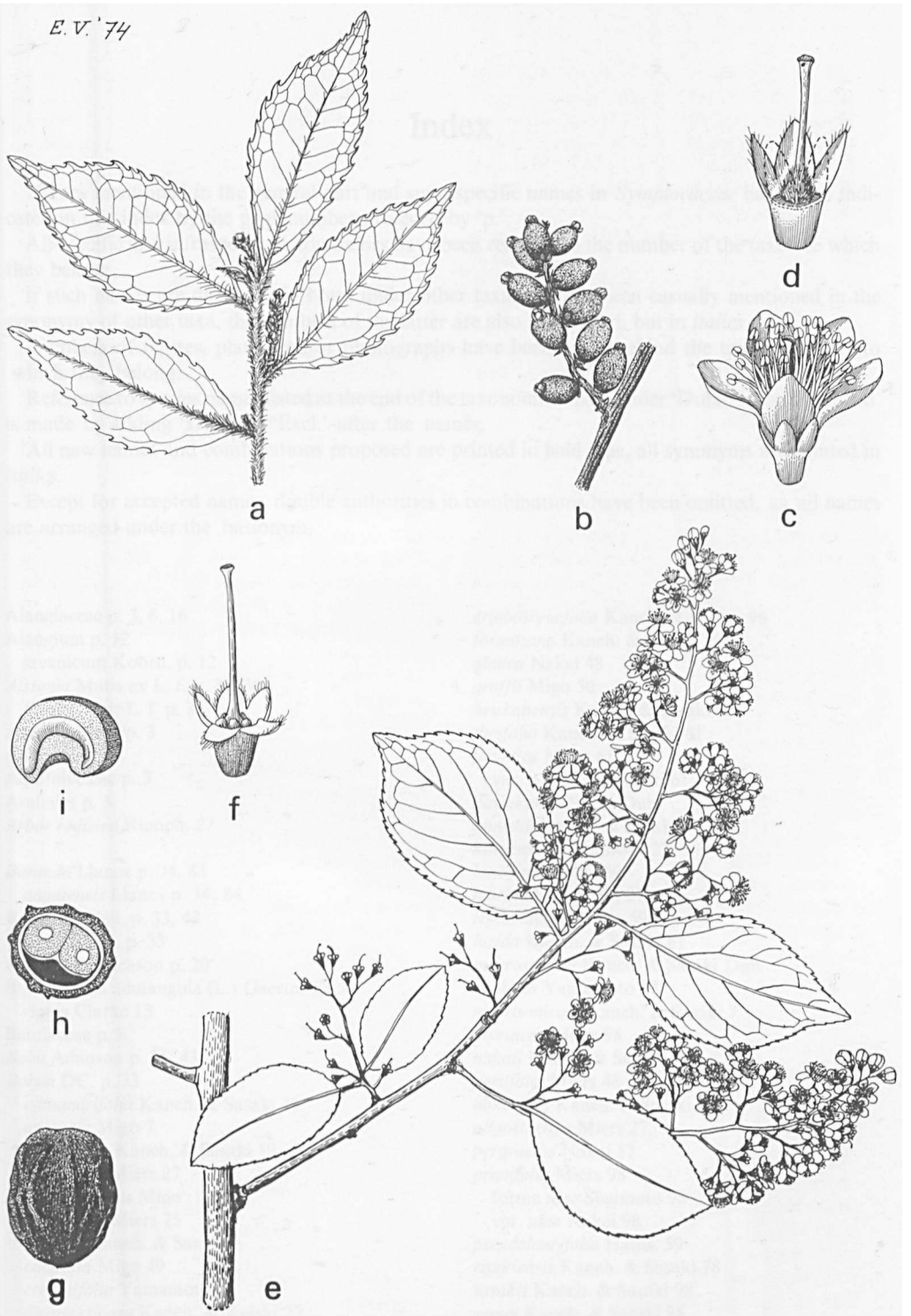

Plate 21. Symplocos lancifolia S. & Z. a. Habit, b. infructescence, both nat. size, c. flower, ×4, d. *ditto*, deflorated, two sepals removed, ×8. — *S. paniculata* (Thunb.) Miq. e. Habit, ×⅔, f. calyx and pistil, ×4, g. fruit, h. *ditto* in CS, both ×3, i. seed in LS, showing embryo, ×4 (a, c, d *Jacobs 7009*, b *Ren-Chang Ching 2188*, e, f *Forrest 7457*, g—i *T. S. Chien 257*).

Index

Names mentioned in the general part and supraspecific names in *Symplocaceae* have been indicated in this index by the page number preceded by 'p.'.

All specific and infraspecific Latin names have been referred to the number of the taxon to which they belong.

If such names are discussed in notes under other taxa, or have been casually mentioned in the synonymy of other taxa, the numbers of the latter are also mentioned, but in *italics*.

Numbers of figures, plates and/or photographs have been given behind the taxon numbers to which they belong.

Reference to species names listed at the end of the taxonomical part under 'Dubious' or 'Excluded' is made by adding 'Dub.' or 'Excl.' after the names.

All new names and combinations proposed are printed in **bold type,** all synonyms are printed in *italics*.

Except for accepted names, double authorities in combinations have been omitted, as all names are arranged under the basionym.

ERRATUM

Page, 17, 4th name from bottom, *S. pendula* Wight var. *confusa* (Brand) Noot., change into: *S. pendula* Wight var. *hirtistylis* (Clarke) Noot.