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The *Euphorbiaceae* of Siam

H. K. AIRY SHAW

No comprehensive account of the *Euphorbiaceae* of Siam has hitherto appeared. In the Kew Bulletin for 1911, Craib enumerated all the material of the family collected up to that time by Kerr, adding descriptions of a number of new or supposedly new species, and including the few records known to him from earlier collectors and previous writers. At that time by far the greater part of the available material (chiefly that of Hosseus and Kerr) originated in the extreme north-west of the country—the circles of Payap and Maharat in the Northern Region—with an insignificant sprinkling of specimens from Bangkok, from Sriracha and Koh Chang in the south-east, and from the east coast and extreme south of the Peninsular Region.

In the ensuing twenty or more years, Kerr traversed the country repeatedly, from north to south and from east to west, collecting copiously at every opportunity. He was assisted by several Siamese collectors, notably Vanpruk, Winit and Put, as well as by Europeans such as Garrett, Marcan, Mrs. Collins and Eryl Smith. Since the second world war, the various Thai-Danish Expeditions have made substantial contributions to the material available, but it is remarkable how few significant additions to Kerr's actual species have been made. Kerr undoubtedly possessed an unusual flair for scenting out botanically rewarding country and for spotting the more interesting plants which such areas contained. An excellent account of Kerr's collecting activities will be found in the article 'Reliquiae Kerrianae' by Dr. M. Jacobs in *Blumea* 11: 427–493 (1962).

That the flora of Siam should be an unusually rich one would be expected both from its situation, its topography and its curious outline. In the extreme north-west is a mountainous area, abutting on the Shan States of Burma, characterized by an extension of the temperate mountain flora of the Eastern Himalayas and Yunnan. On the east there is an overspill from the rich flora of Indo-China, including an interesting region of dry grassland or savanna, which seems to have been largely neglected by collectors, and is today, alas, probably more or less inaccessible. On the west there is the extensive frontier with Lower Burma, itself the possessor of an unusually interesting and diversified flora; whilst in the extreme south the Peninsular Region is enriched by the northward extension of numerous elements of the tropical flora of Malaya. The frequent limestone outcrops produce their usual quota of special forms, such as the curious and by now well-known *Phyllanthus* (*Phyllanthodendron*) *mirabilis* Muell. Arg. It is noteworthy how frequently a given species occurs both in the north-west and south-east of the country, and sometimes even both in the Peninsula and in the South-Eastern region. At the same time there is of course in all the regions a considerable degree of endemism.

The keys, both generic and specific, are based so far as possible on macroscopic characters, or on features likely to be found on incomplete material, e.g. size and pubescence of leaves, colour on drying, etc. The keys are therefore to be regarded as a rough general guide, rather than as a precise

scientific determinator. In view of the small size of the flowers and their frequent dioecism, it is hoped that this more general approach may prove helpful. In many cases, however, it has obviously been impossible to construct the keys without recourse to more abstruse characters.

In order to save space, the most frequently cited literature references have been reduced to author (often abbreviated), page and date. The titles and volume numbers should be supplied in each case as follows:

- Backer & Bakh. f.—Fl. Java 1 (1963).
 Beille (*Phyllanthus*, *Glochidion*, *Breynia*, *Agyneia*, *Sauropolis*)—in Lecomte, Fl. Gén. Indoch. 5 (1925–7).
 Boiss.—in DC., Prodr. 15(2) (1862).
 Corner—Wayside Trees of Malaya (1940).
 Craib—in Bull. Misc. Inf. Kew 1911 (1911).
 „ „ Aberdeen Univ. Stud. No. 57 (1912).
 Engler—Pflanzenr. IV. 147 (1910–1924).
 Gagnep.—in Lecomte, Fl. Gén. Indoch. 5 (1925–7).
 Hook. f.—in Hook. f., Fl. Brit. Ind. 5 (1886–8).
 Hosseus—in Beih. Bot. Centralbl. 27(2) (1910) & 28(2) (1911).
 Jabl(onszky). (*Bridelia* & *Cleistanthus*)—in Engl., Pflanzenr. IV. 147. viii (1915).
 Lecomte—Fl. Gén. Indoch. 5 (1925–7).
 Merr.—Enum. Philipp. Fl. Pl. 2 (1923).
 Muell. Arg.—in DC., Prodr. 15(2) (1866).
 Pax & Hoffm.—in Engl., Pflanzenr. IV. 147 (1910–24).
 Ridley—Fl. Malay Penins. 3 (1924).
 J. J. Sm.—in Koord. & Valet., Bijdr. No. 12 Boomsoorten Java, in Meded. Dep. Landb. No. 10 (1911).

The information under each species is presented as follows:

In the first paragraph are given accepted name, authority, and place of publication, followed by other important references. Beneath this is given a fairly full selection of synonyms. Where a name is believed to be reduced here for the first time, the reference is followed by the indication *synon. nov.*

The next paragraph gives the geographical distribution. The Siamese distribution is given in accordance with the scheme published by Jacobs in *Blumea* 11: 468 (1962). The 'Regions' are indicated by their initial(s), e.g. N, SE, SW, etc., and the 'Circles' by their running number: thus 'SE 9' indicates Chantaburi Circle in the South-Eastern Region. A slight departure from Jacobs' scheme has been made in one particular, in that Surat Circle (15) has been entirely included in the Peninsular Region, instead of being divided between that and the South-Western Region. An outline map of Siam, giving the approximate boundaries of the Regions and Circles, will be found on p. 204. I am indebted to Miss P. Halliday for the draft of this map. Distribution outside Siam is given without material abbreviation; the term 'Malesia' is used to cover the whole archipelago from Sumatra, Malaya and the Philippines to eastern New Guinea.

The third paragraph is a summary of the information given in the collectors' field notes, and applies (unless otherwise stated) to Siamese collections only. Details include habit, height, ecology and altitude.

The final paragraph gives a thumbnail sketch of the salient features of the plant, or important diagnostic features in relation to its closest relatives. Miscellaneous information is occasionally added.

An alphabetical arrangement of genera and species has been adopted, not only for ease of reference, but also because no scheme of classification hitherto published seems entirely satisfactory, and some are open to serious criticism. A very tentative scheme, eliminating some previous weak points, but obviously still leaving much to be desired, is given below for the sake of those who may be interested in working towards a more natural classification of the family. Attention is drawn to the fact that the genera *Buxus*, *Daphniphyllum* and *Bischofia* are excluded from the enumeration.

TENTATIVE SCHEME
FOR POSSIBLE ROUGH NATURAL GROUPING OF GENERA*

PHYLLANTHEAE

<i>Phyllanthinae</i>	
Phyllanthus	
Glochidion	
Actephila	
<i>Securineginae</i>	
Margaritaria	
Securinega	
Richeriella	
<i>Andrachninae</i>	
Leptopus	
Chorisandracne	

Sauropodinae

Breynia	
Sauropus	
Synostemon	

Drypetinae

Drypetes	
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BRIDELIÆAE

Cleistanthus	
Bridelia	

BACCAUREÆAE

Baccaurea	
Aporusa	

CROTONEAE

<i>Crotoninae</i>	
Croton	

Chrozophorinae

Sumbaviopsis	
Thyrsanthera	
Chrozophora	

Mallotinae

Ptychopyxis	
Trewia	
Mallotus	
Melanolepis	
Macaranga	
Endospermum	

Blumeodendrinae

Blumeodendron	
Botryophora	

Agrostistachydinae

Chondrostylis	
Agrostistachys	

Alchorneinae

Alchornea	
Sampantaea	
Wetria	

Cleidion

Mercurialinae

Claoxylon	
Mercurialis	

Homonoiiinae

Homonoia	
Lasiococca	
Spathiostemon	

* A number of the 'tribal' and 'subtribal' names that follow are mere 'nomina', never having been validly published. They are used here without any formal implication, purely for the convenience of providing approximate groupings. The small 'tribes' *Brideliæae*, *Baccaureæae*, *Acalypheæae*, *Ricinæae*, *Chaetocarpeæae*, *Suregadeæae* and *Cheiloseæae* appear to occupy very isolated positions within the family.

<i>Plukenetiinae</i>	SUREGADEAE
Pachystylium	Suregada
Cnesmone	
Megistostigma	CHEILOSEAE
Pterococcus	Neoscortechinia
<i>Dalechampiinae</i>	EUPHORBIÆAE
Dalechampia	
<i>Cladogyninae</i>	<i>Hippomaninae</i>
Cladogynos	Hura
<i>Erismanthinae</i>	Sapium
Erismanthus	Excoecaria
<i>Epiprininae</i>	Glyphostylus
Epiprinus	Sebastiania
Koilodepas	Homalanthus
ACALYPHEAE	<i>Euphorbiinae</i>
Acalypha	Euphorbia
RICINEAE	Marginally related families appended to the enumeration.
Ricinus	
JATROPHEAE	STILAGINACEAE
<i>Jatrophinae</i>	Antidesma
Jatropha	
Manihot	PANDACEAE
Aleurites	Galearia
Vernicia	Microdesmis
Elateriospermum	
Omphalea	HYMENOCARDIACEAE
<i>Codiaeinae</i>	Hymenocardia
Blachia	
Strophioblachia	Doubtfully related or unrelated families excluded from the enum- eration.
Pantadenia	
Baliospermum	
<i>Ostodinae</i>	BUXACEAE
Fahrenheitia	Buxus
Ostodes	
Dimorphocalyx	DAPHNIPHYLLACEAE
Trigonostemon	Daphniphyllum
CHAETOCARPEAE	BISCHOFIACEAE
Chaetocarpus	Bischofia

ARTIFICIAL KEY TO GENERA

Twining plants, sometimes with stinging hairs:

Inflorescence very condensed, capitate, bisexual, long-peduncled, with 2 large membranous external bracts forming an involucre, and several pectinate inner bracts **Dalechampia L.**

Inflorescence various, often ± racemose, bisexual or occasionally unisexual, not enclosed in 2 involucral bracts:

- Coarse plants, with coriaceous leaves and geniculate petioles; floral bracts elongate, coloured, papery; stamens connate, forming a pileiform body (Burma, Indochina, Malaya, etc.; not yet found in Siam) **Omphalea** L.
- Slender plants, with membranous or chartaceous leaves and obscurely geniculate petioles; floral bracts otherwise; stamens free:
Stamens 8-13; capsule 4-locular, alate or appendiculate **Pterococcus** Hassk.
- Stamens 2-3; capsule 3-locular, without appendages:
Stamens 2; filaments very short and slender; connective neither thickened nor produced; base of flower not hollowed **Pachystylidium** Pax & Hoffm.
- Stamens 3; filaments slightly longer and thicker; connective much thickened, truncate above; base of flower \pm hollowed, with raised rim:
Connective not produced into a deflexed apical appendage; styles thickened and fused into a large subglobose mass **Megistostigma** Hook. f.
(*Clavistylus* J. J. Sm.)
- Connective produced into a slender deflexed apical appendage; styles free, stigmas plumose-papillose . . . **Cnesmone** Bl.
- Plants not twining, but sometimes scrambling; no stinging hairs:
Leaves opposite or apparently so (to p. 196):
Stellate or fascicled hairs present (sometimes very small):
Fruit a drupe, indehiscent; leaves opposite, cordate (rarely broadly rounded) at base; ♀ inflorescence 1-4-flowered; stigmas 2-4, elongate (closely related to *Mallotus*) **Trewia** L.
- Fruit a capsule:
Leaves truly opposite; inflorescence unisexual **Mallotus** Lour. (p.p.)
- Leaves pseudo-vorticillate; inflorescence unisexual or bisexual **Epiprinus** Griff.
- Stellate hairs lacking:
Capsules densely echinate-muricate; filaments branched; leaves in false whorls, not truly opposite (India, Malaya, Hainan; not yet found in SE. Asia) **Lasiococca** Hook. f.
- Capsules not echinate-muricate; filaments not branched:
Capsules large, 2-5 cm. diam., glabrous, tardily dehiscent; petioles often elongate; flowers often in very condensed cymes **Blumeodendron** (Muell. Arg.) Kurz (p.p.)
- Capsules smaller, glabrous or pubescent, dehiscing normally; petioles short or very short; inflorescences various:
Leaves unequally cordate at base; petioles often red; ♂ flowers on long pilose pedicels . . . **Erismanthus** Wall. ex Muell. Arg.
- Leaves mostly symmetrical; petioles not red; ♂ flowers otherwise; milky juice present:
Inflorescence composed of cyathia **Euphorbia** L.
- Inflorescence spicate or racemose, sometimes much abbreviated:
Inflorescence not condensed; bracteoles biglandular at base; styles free **Excoecaria** L. (p.p.)

Inflorescence greatly condensed; bracteoles eglandular; styles connate. **Glyphostylus** Gagnep.

Leaves alternate:

Leaves densely or sparsely granular-glandular below (occasionally above also) (cf. also the minutely lepidote leaves of *Homonoia*):

Anthers 3-4-locellate. **Macaranga** Thou.

Anthers regularly 2-locular:

Petals wanting: styles simple, plumose-papillose

Mallotus Lour. (p.p.)

Petals present (shorter than sepals); styles bifid, smooth or shortly papillose **Pantadenia** Gagnep.

Leaves not granular-glandular:

Leaves pellucid-punctate; inflorescence leaf-opposed, fascicled

Suregada Roxb. ex Rottl.

(*Gelonium* Roxb. ex Willd.)

Leaves not pellucid-punctate; inflorescence not leaf-opposed:

Stellate hairs or scales present (sometimes sparse or minute) (to p. 197):

Inflorescence a ± diffuse cyme or thyrsse:

Inflorescence unisexual; petals absent; fruit a small, indehiscent or partly dehiscent, externally thinly fleshy capsule

Endospermum Benth.

Inflorescence bisexual; petals present in ♂ flower, exceeding the calyx; fruit a large, bilocular, woody capsule

Aleurites J. R. & G. Forst.

Inflorescence a raceme or panicle, or indeterminate, the ♂ flowers sometimes aggregated in dense globose heads:

♂ flowers aggregated in dense globose heads:

Leaves conspicuously white-tomentellous below, coarsely repand-dentate or lobulate; ♂ and ♀ flower-heads few, crowded, on short peduncles, which are usually cernuous in the bud stage

Cladogynos Zipp. ex Span.

Leaves not white-tomentellous below, crenate or entire; ♂ flower-heads sessile, arranged closely or distantly along a slender elongate axis:

Filaments thickened and connate below; glomerules distant **Koilodepas** Hassk.

Filaments free; glomerules crowded

Epiprinus Griff. (*Sympphyllia* Baill.)

♂ flowers racemose, spicate, narrowly thyrsiform, or paniculate:

Inflorescence unisexual; petals wanting (to p. 197):

Leaves conspicuously palmate-lobulate; inflorescence a panicle; indumentum often floccose (closely related to *Mallotus*) . . . **Melanolepis** Reichb. f. & Zoll.

Leaves not palmate-lobulate; inflorescence not paniculate; indumentum rarely floccose:

Leaves willow-like, narrowly elliptic-oblong, densely lepidote below, very short-petioled; inflorescence a spike; filaments branched; ovules 1 per loculus

Homonoia Lour.

Leaves not willow-like, mostly ovate, not lepidote, \pm long-petioled; inflorescence a raceme or very narrow thyrsse; filaments simple; ovules 2 per loculus **Baccaurea** Lour.

Inflorescence bisexual; petals present:

Filaments inflexed in bud; ♂ sepals \pm imbricate
Croton L.

Filaments erect in bud:

♂ sepals imbricate; inflorescence a long, narrow, pendulous thyrsse; inner filaments united into a column; trees **Fahrenheatia** Reichb. f. & Zoll.

♂ sepals valvate; inflorescence a long or short raceme or spike:

Tree; leaves about twice as long as broad; racemes lax; stamens free. **Sumbaviopsis** J. J. Smith

Small shrubs or herbs; leaves only slightly longer than broad; racemes crowded, spike-like; stamens united:

Leaves entire, narrowly but distinctly ferrugineous-tomentose-margined; indumentum of young parts ferrugineous; stellate hairs mostly small, matted, less distinct; stamens not whorled; ♀ sepals elongate, linear-subulate; capsule larger, roughly and unevenly tomentose, not purple-tinged . . . **Thysanthera** Gagnep.

Leaves usually coarsely and shallowly lobed, lobes rounded, not ferrugineous-margined; indumentum greyish-ochraceous throughout; stellate hairs larger, scarcely matted, distinct; stamens in 2-3 whorls; ♀ sepals shortly subulate; capsule smaller, smoothly and evenly stellate-pilose, dull purple-tinged

Chrozophora Neck. ex Juss.

Stellate hairs or scales lacking:

Leaf-base distinctly asymmetrical (flowers fascicled; ovules 2 per loculus):

Fruit a dry or leathery-fleshy 1-2-locular drupe, with 1-2 persistent flabellate stigmas; sepals of ♂ flower commonly 4, much imbricate **Drypetes** Vahl

Fruit a 3-25-locular capsule or small 3-8-locular berry or drupe; stigmas not flabellate; sepals of ♂ flower 5-6:

♂ flower without disk; styles \pm united, erect, often clavate or much abbreviated, rarely free; ovary 3-25-locular

Glochidion J. R. & G. Forst.

♂ flower with disk; styles free, or connate below, often bifid, usually spreading; ovary 3-8-locular **Phyllanthus** L.

Leaf-base symmetrical:

Petals present in ♂ flower (to p. 199):

Inflorescence spicate, racemose, or narrowly thyrsiform:

Petals exceeding calyx, sometimes red (and then drying black); sepals free, imbricate; bracts not glumaceous

Trigonostemon Bl. (p.p.)

Petals equalling calyx, never drying black; calyx at first entire, splitting into 2–3 valvate segments; floral bracts glumaceous. . . . **Agrostistachys** Dalz.

Inflorescence fasciculate, or flowers solitary, axillary (see also 'Inflorescence cymose', etc., below):

Calyx-segments clearly valvate; petals small, obovate or spathulate; ovules 2 per loculus:

Fruit a 3-locular capsule

Cleistanthus Hook. f. ex Planch.

Fruit a 1–2-locular drupe **Bridelia** Willd.

Calyx-segments imbricate:

Petals equalling or exceeding the calyx:

Leaves distichously arranged, base sometimes asymmetric; flowers dioecious; ovules 2 per loculus

Chorisandracne Airy Shaw

Leaves spiral or pseudo-vorticillate; flowers monoecious; ovules 1 per loculus

Trigonostemon Bl. (p.p.)

Petals shorter than calyx; flowers monoecious; ovules 2 per loculus:

Shrubs with larger chartaceous or coriaceous leaves; disk-glands episepalous **Actephila** Bl.

Undershrubs, subherbaceous, with smaller membranous leaves; disk-glands epipetalous (plants of limestone soils or areas with seasonal climate) . **Leptopus** Decne (~Andrachne L.)

Inflorescence cymose or broadly thyrsiform:

♀ sepals fringed with long capitate glandular cilia, at least at base and apex:

Stamens numerous, free; ♀ flowers apetalous

Strophioblacchia Boerl.

Stamens 3, united in a column; ♀ flowers petaliferous

Trigonostemon Bl. (p.p.)

♀ sepals without glandular cilia:

Calyx closed in bud, splitting spathaceously into 2–3 segments; petals with parallel nerves

Vernicia Lour.

Calyx-segments free in bud, or shortly connate below:

Stamens all free:

Filaments pilose below: inflorescence often borne below terminal tuft of leaves; ♀ flowers petaliferous; ♀ calyx not accrescent, mostly caducous **Ostodes** Bl.

Filaments glabrous; inflorescence terminal, often umbellate; ♀ flowers apetalous; ♀ calyx somewhat accrescent in fruit . **Blachia** Baill.

Stamens (at least the inner) connate in a column:

Leaves broadly ovate or orbicular in outline,
sometimes deeply lobed, palmately nerved
(cult.) **Jatropha** *L.*

Leaves elliptic or oblanceolate, occasionally
broadly elliptic-ovate, never lobed, pinnately
nerved (except at base):

Inflorescence usually bisexual; leaves often
triplinerved at base; petals often coloured
(yellow, red or violet); calyx very rarely
accrescent in fruit

Trigonostemon *Bl.* (p.p.)

Inflorescence unisexual, flowers usually
dioecious; leaves not or obscurely tripli-
nerved; petals usually white; calyx fre-
quently accrescent **Dimorphocalyx** *Thw.*

No petals in ♂ flower:

Filaments much branched:

Leaves palmately lobed; stem often glaucous; flowers
large, in terminal bisexual racemes (cult.)

Ricinus *L.*

Leaves undivided, penninerved; stem not glaucous;
flowers smaller, at least the ♂ in axillary unisexual
racemes:

Leaves narrowly oblong, willow-like, densely arranged
along the branches, densely lepidote below; ♀
flowers short-pedicelled in dense axillary racemes;
capsules smooth. **Homonoia** *Lour.*

Leaves not willow-like, not lepidote, scattered or in
false whorls; ♀ flowers long-pedicelled, solitary or
loosely racemose; capsules echinate:

Leaves elliptic-oblanceolate, narrowly cordate at
base, very shortly petioled, crowded in false
whorls; ♀ flowers solitary, with conspicuous
sepals (India, Malaya, Hainan; not yet found
in SE. Asia) **Lasiococca** *Hook. f.*

Leaves broadly elliptic or ovate or obovate, not
cordate, scattered, petiole 1–4 cm. long; ♀
flowers loosely racemose, with very small sepals

Spathostemon *Bl.*

Filaments simple, sometimes united in a column:

Fruit an echinate capsule:

♂ sepals imbricate; filaments connate in a column;
bristles on capsule very dense, fine, brittle

Chaetocarpus *Thw.*

♂ sepals valvate; filaments free; processes on capsule
less dense, less fine, sometimes soft or tomentose

Mallotus *Lour.* (p.p.)

Fruit a smooth or winged capsule or drupe:

♂ flower laterally compressed, with 2 suborbicular sepals; inflorescences racemose or spicate, terminal; 1-2 glands beneath each ♂ flower

Homalanthus Juss.

♂ flower not as above:

♂ flowers fascicled, or solitary, axillary (to pp. 201, 202):

Fruit a hard, massive, tardily dehiscent capsule; leaves rather long-petioled; calyx closed in bud, splitting into 3-4 valvate segments; ovules 1 per loculus

Blumeodendron (Muell. Arg.) Kurz (p.p.)

Fruit a drupe or a normally dehiscent capsule; leaves short-petioled; sepals imbricate; ovules 2 per loculus:

Stamens numerous, free; stigmas 1-2, ± flabellate; fruit an indehiscent drupe

Drypetes Vahl (p.p.)

Stamens few, often 3 or 6:

Stigmas 1-2, shortly flabellate

Drypetes Vahl (p.p.)

Stigmas 3-6, slender, sometimes coiled or very short, not flabellate:

Flowers dioecious; stamens free:

Sepals 5; stamens 3-5; fruit a small globose drupe, with 6 pyrenes

Securinega Juss.

(*Flueggea* Willd.)

Sepals 4; stamens 4:

Styles 3, bifid; fruit large, dry, globose, long-pedicelled, bursting irregularly; leaves deciduous; branches lenticellate **Margaritaria** L. f. (*Prosorus* Dalz.)

Styles 4; fruit drupaceous, with a 3-4-celled bony endocarp; leaves borne on deciduous branchlets resembling pinnate leaves; branches thick, nodulose (cult.)

Phyllanthus § **Cicca** (L.) Muell. Arg.

Flowers monoecious:

Fruit a normally dehiscent capsule; stamens connate or free

Phyllanthus L.

Fruit a tardily dehiscent capsule, or ± fleshy, indehiscent; stamens connate:

Plant often blackening on drying; ♂ calyx turbinate, obconic or hemispheric **Breynia** J. R. & G. Forst.

Plant not blackening on drying; ♂ calyx usually ± disciform or rotate, the apical half of the segments sharply inflexed, the tips forming short lobes round the stamens (genera scarcely distinct from *Brenia*) . . . **Sauropolis** Bl. and **Synostemon** F. Muell.

♂ flowers cymose or thyrsoid (to p. 202):

♂ sepals valvate:

Anthers 3-4-locellate:

Stipules usually conspicuous; leaves often granular-glandular below

Macaranga Thou.

Stipules minute or obsolete; leaves not granular-glandular below; stamens interspersed with small disk-glands; connective peltate **Botryophora** Hook. f.

Anthers 2-locular:

Stipules evident; leaves crenate or dentate; stamens usually 8; no disk-glands

Alchornea Sw.

Stipules minute or obsolete; stamens numerous, interspersed with numerous small disk-glands:

Leaves crenate, decurrent into a non-pulvinate petiole; bracts and bracteoles small but conspicuous; ♂ pedicels very short . . . **Chondrostylis** Boerl.

Leaves entire, not decurrent, petiole pulvinate; bracts and bracteoles minute or obsolete; ♂ pedicels longer

Ptychopyxis Miq.

♂ sepals imbricate:

Leaves manifestly lobed, sinuate, crenate, or glandular-dentate:

♂ calyx large, coloured; leaves usually very deeply lobed; capsule winged

Manihot Mill.

♂ calyx small, green; leaves shallowly lobed or dentate; capsule unwinged:

Capsules small, clearly tricoccous, readily dehiscent, not whitish-tomentellous; habit sometimes subherbaceous

Baliospermum Bl.

Capsules larger, not or obscurely lobed, tardily dehiscent, whitish-tomentellous; habit definitely woody (occurs in Kedah, N. Malaya; to be expected in S. Penins. Siam)

Neoscortechinia Pax & Hoffm.

Leaves entire or obscurely crenate (cf. *Baccaurea*):

Inflorescences terminal, dichotomously branched, bisexual; ovules 1 per loculus; capsule large (to 4·5 cm. diam.), di- or tricoccous . . . **Elateriospermum Bl.**

Inflorescences axillary, not dichotomous, unisexual; ovules 2 per loculus; capsule small or medium, tricoccous, rarely dicoccous:

Inflorescences lax, with wide-spreading branches; flowers very small

Richeriella Pax & Hoffm.

Inflorescences dense, elongate, with very short cymose branches, often apparently racemose; flowers larger

Baccaurea Lour. (p.p.)

♂ flowers spicate or racemose:

Male sepals imbricate; ovules 2 per loculus:

♂ flowers minute or very minute, densely crowded in continuous or interrupted spikes; stamens mostly 2-3; pistillode minute or 0; fruits dehiscent . . . **Aporusa Bl.**

♂ flowers not minute, less densely or even laxly arranged in racemes or narrow thyrses; stamens mostly 5-6; pistillode large; fruits mostly indehiscent

Baccaurea Lour. (p.p.)

Male sepals valvate; ovules 1 per loculus (see also p. 203):

Anthers 4-locellate; capsules 2-locular (if rarely 3-locular, 1 loculus abortive), somewhat tardily dehiscent, borne singly on long rigid pedicels **Cleidion Bl.**

Anthers bilocular; capsules usually 3-locular, not borne on long rigid pedicels:

Anthers with distinct, free, ± erect or spreading thecae:

Anther-thecae short, erect; filaments usually accompanied by short, often pilose 'juxastaminal glands' at base; capsules often with purple sap

Claoxylon Juss.

Anther-thecae elongate, vermiciform, twisted; no juxta-staminal glands; capsules without purple sap . . . **Acalypha L.**

Anthers with adnate or pendulous thecae:

Styles smooth or almost so, shortly connate at base; stamens 8-25; leaves sometimes stipellate. . . **Alchornea Sw.**

Styles papillose or plumose; stamens numerous; leaves never stipellate:

Perennial herb with slender rhizomes; capsules bilocular; styles free

Mercurialis L.

Shrubs or trees; capsules mostly trilocular:

Styles undivided, mostly free; leaves various, rarely oblanceolate or short-petioled; lateral nerves not conspicuously parallel

Mallotus Lour.

Styles bipartite, shortly connate at base; leaves mostly oblanceolate or obovate, very short-petioled:

Lateral nerves very numerous and parallel; inflorescences elongate (δ to 20 cm., φ to 75 cm.); δ floral bracts inconspicuous; flowers long-pedicelled, the δ fascicled; filaments \pm long

Wetria Baill.

Lateral nerves 9–13 pairs, not markedly parallel; inflorescences short (δ to 9 cm., φ to 3 cm.); δ floral bracts brownish, conspicuous; flowers shortly pedicelled or sessile, the δ solitary; filaments very short

Sampantaea Airy Shaw

Male calyx much reduced, aestivation open or obscure; ovules 1 per loculus:

Annual herb of sandy ground, but sometimes perennating from woody rootstock; leaves linear to narrowly elliptic; capsule-lobes dorsally spinose-dentate

Sebastiania chamaelea (L.) Muell. Arg.

Shrubs or trees, with broader leaves; capsules unarmed:

Capsule multilocular, to 8 cm. diam., much depressed **Hura L.**

Capsule 3–4-locular, to 2·5 cm. diam., not or scarcely depressed:

Leaves glaucous or glaucescent beneath

Sapium L. § Triadica

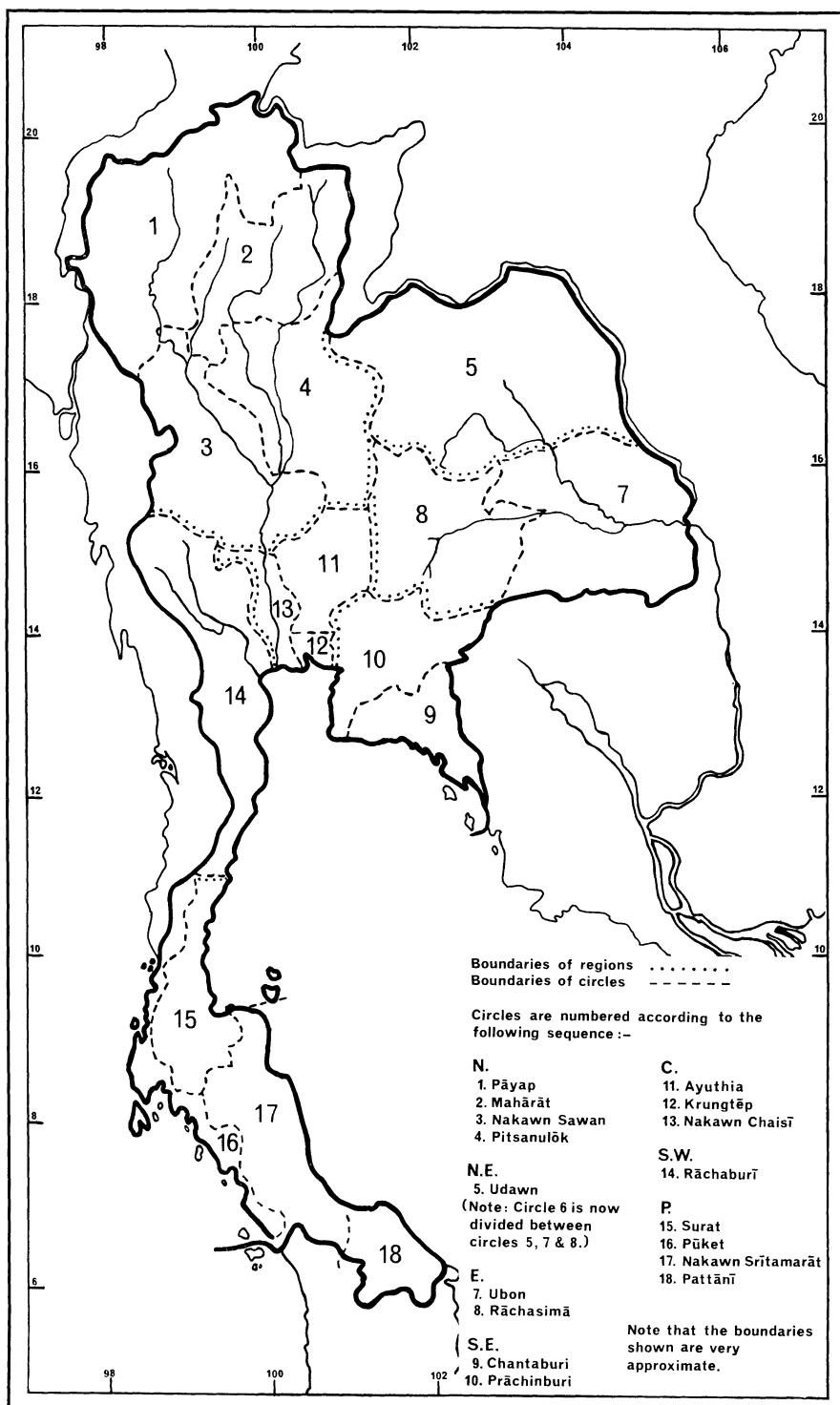
Leaves not glaucous beneath:

Capsule large, globose or ellipsoid, woody, tardily dehiscent

Sapium L. § Parasapium

Capsule small, tricoccous, crustaceous, normally dehiscent

Excoecaria agallocha L.



Acalypha L.

- Inflorescences unisexual, usually dioecious; cultivated shrubs or small trees:
- ♀ bracts small, entire; ♀ inflorescence very dense, with a conspicuous mass of exserted purple styles ***A. hispida***
 - ♀ bracts large, coarsely toothed; ♀ inflorescence less dense, with much less conspicuous styles:
 - ♀ inflorescence ± equaling the leaves ***A. grandis***
 - ♀ inflorescence much shorter than the leaves ***A. wilkesiana***
- Inflorescences usually bisexual, monoecious; wild species, occasionally cultivated:
- Inflorescences very slender, with ♂ flowers below and ♀ above; stigmas elongate, with few slender segments ***A. delpyana***
 - Inflorescences less conspicuously slender, with ♀ flowers below and ♂ above; stigmas less elongate:
 - Annual herbs of waste ground; leaves with long slender petioles; inflorescence with short slender ♂ portion:
 - ♀ bracts broad, shallowly and obtusely toothed; inflorescences terminal or axillary. ***A. indica***
 - ♀ bracts small, strongly parallel-veined, with numerous short acute teeth; inflorescences all axillary ***A. lanceolata***
 - Shrubs or small trees:
 - Leaves cuneate-rhomboid, chartaceous, shining, glabrous, basal half subentire, apically coarsely crenate, very shortly petioled; spikes sessile or shortly peduncled ***A. siamensis***
 - Leaves more or less ovate, membranous, not conspicuously shining, pubescent or glabrous, variously serrate, often long-petioled:
 - Spikes slender, sessile or shortly peduncled ***A. kerrii***
 - Spikes denser, manifestly peduncled:
 - Ovary hirsute and echinate; young parts densely tomentellous ***A. mairei***
 - Ovary pubescent but not echinate; indumentum weakly puberulous ***A. cf. schneideriana***

Acalypha delpyana Gagnep. in Bull. Soc. Bot. France 70: 872 (1923) & in Lecomte: 341 (1925).

C11.—Indochina (Cambodia). (N.B. Squires 884, from Annam, distributed as *A. delpyana*, is not this species, but is probably a form of *A. kerrii* Craib.)

Forming thickets to 1·5 m. high, sometimes climbing, in marshy ground in evergreen forest at 30 m. alt.

A distinctive species with very slender inflorescences bearing numerous minute male flowers below and rather few distant female flowers above; stigmas elongate, with relatively few slender segments.

Acalypha grandis Benth. in Hook., Lond. Journ. Bot. 2: 232 (1843); Muell. Arg.: 806 (1866); Williams in Bull. Herb. Boiss. Sér. 2, 5: 31 (1905); Pax & Hoffm. xvi: 149 (1924); Gagnep.: 334 (1925).

A. consimilis Muell. Arg.: 807 (1866).

C12 (cult.).—Philippines and Moluccas to Polynesia.

Garden shrub, sea-level.

Acalypha hispida Burn. f., Fl. Ind.: 303 (1768); Muell. Arg.: 815 (1866); Hook. f.: 417 (1887); Merr.: 445 (1923); Pax & Hoffm. xvi: 140 (1924); Backer & Bakh. f.: 489 (1963).

N₁ (cult.); **C₁₂** (cult.).—Widely cultivated; country of origin possibly Bismarck Archip.

Garden shrub, up to 300 m.

The long, thick, entirely female inflorescence, with its dense mat of crimson styles, is characteristic.

Acalypha indica L., Sp. Pl.: 1003 (1753); Muell. Arg.: 868 (1866); Hook. f.: 416 (1887); Williams in Bull. Herb. Boiss. sér. 2, 5: 31 (1905); Kenoyer in Journ. Ind. Bot. 1: 3-7 (1919); Merr.: 446 (1923); Ridley: 274 (1924); Pax & Hoffm. xvi: 33 (1924); Gagnep.: 336 (1925); Backer & Bakh. f.: 490 (1963).

A. spicata Forsk., Fl. Aegypt. Arab.: 161 (1775).

A. caroliniana sec. Blanco, Fl. Filip.: 748 (1837), *non* Walt. (1788).

A. chinensis Benth., Fl. Hongk.: 303 (1861).

C₁₂; SW₁₄.—Widespread in the Old World tropics.

Herb to 1·5 m. high, often gregarious in waste places at very low altitudes.

Annual; leaves rhomboid-orbicular, on long slender petioles; inflorescences with longer basal female and short slender apical male portions; female bracts broad, shallowly and obtusely toothed.

Cats are stated to be fond of the roots (*Winit* 558, Rajburi, May 1919).

Acalypha kerrii Craib: 465 (1911) & 192 (1912); Pax & Hoffm. xvi: 110 (1924).

A. lacei Hutch. in Bull. Misc. Inf. Kew 1914: 381 (1914); Pax & Hoffm. xvi: 131 (1924); **synon. nov.**

A. heterostachya Gagnep. in Bull. Soc. Bot. France 70: 874 (1924) & in Lecomte: 341 (1925), **synon. nov.**

A. siamensis Gagnep. in Bull. Soc. Bot. France 70: 874 (1924) & in Lecomte: 340 (1925), *non* Oliv. ex Gage (1922); **synon. nov.**

A. acmophylla (an Hemsl.?)—Gagnep.: 335 (1925).

A. gagnepainii Merr. in Journ. Arn. Arb. 19: 39 (1938), **synon. nov.**

N₁-4; NE₅; SW₁₄; P₁₅.—Burma.

Shrub or small straggling (?scrambling) tree to 3 m. high, locally common in dry mixed or evergreen forest or scrub (sometimes on limestone) up to 1130 m. alt.

Leaves ovate to lanceolate, membranous, coarsely or finely serrate, teeth usually acute, petioles short or long; puberulous or glabrescent; inflorescences slender, entirely male or with 1-2 female flowers at the extreme base, occasionally 1-2 axillary female flowers without a male portion; female bract small, bluntly and shallowly toothed.

Acalypha lanceolata Willd., Sp. Pl. 4: 524 (1805); Merr. & Chun in Sunyatsenia 5: 92 (1940).

Urtica pilosa Lour., Fl. Cochinch.: 558 (1790), *non* *Acalypha pilosa* Cav.

Acalypha boehmerioides Miq., Fl. Ind. Bat. Suppl.: 459 (1860); Muell. Arg.: 871 (1866); Merr.: 445 (1923); Pax & Hoffm. xvi: 96 (1924); Gagnep.: 337 (1925); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 238 (1935); Backer & Bakhu. f.: 490 (1963).

A. fallax Muell. Arg. in Linnaea 34: 43 (1865) & in DC.: 872 (1866); Hook. f.: 416 (1887); Ridley: 274 (1924).

A. wightiana Muell. Arg., ll.cc.

C12.—India to Polynesia.

Herb to 1 m. high, on waste ground, old walls, etc., at very low altitudes.

Annual; leaves ovate, crenate, usually on long slender petioles; inflorescences shorter than or equaling petioles, with very short apical male portion; female bracts small, strongly parallel-veined, with numerous short acute teeth.

Acalypha mairei (Lévl.) Schneid. in Sarg., Pl. Wils. 3: 301 (1916), *in obs.*; Pax & Hoffm. xvi: 137 (1924); Hand.-Mazz., Symb. Sin. 7: 215 (1931); Rehder in Journ. Arn. Arb. 14: 234 (1933).

Morus mairei Lévl. in Fedde, Rep. Sp. Nov. 13: 265 (1914).

?*Acalypha szechuanensis* Hutch. in Sarg., Pl. Wils. 2: 524 (1916); cf. Hand.-Mazz., l.c.: 216 (1931).

N1.—SW. China.

Thin shrub to 1.5 m., in scrub forest up to 750 m. alt.

Young parts rather densely fulvous-tomentellous or sericeous; leaves ovate, bluntly or acutely crenate-serrate, those of long shoots large, of short shoots small and relatively narrower; inflorescences rather short and dense-flowered, female flowers very few, basal; ovary (*testibus* Pax & Hoffmann) echinate and hirsute.

Acalypha cf. **schneideriana** Pax & Hoffm. xvi: 138 (1924) (SW. China).

N1: Wang Tao, 14 Feb. 1958, Sørensen, Larsen & Hansen 1116.

Thin shrub at 350 m. alt.; no further data for Siam.

Closely related to *A. mairei*, but indumentum merely sparsely puberulous, and (*testibus* Pax & Hoffmann) ovary smooth. Further Siamese material is desirable.

Acalypha siamensis Oliv. ex Gage in Rec. Bot. Surv. Ind. 9: 238 (1922); Ridley: 274 (1924); Merr. in Journ. Arn. Arb. 19: 39 (1938). [*Non A. siamensis* Gagnep. 1923=*A. kerrii* Craib.]

A. evardii Gagnep. in Bull. Soc. Bot. France 70: 871 (1923) & in Lecomte: 336 (1925).

A. sphenophylla Pax & Hoffm. xvi: 110 (1924).

N1 (cult.); **E8**; **SE9**; **C12** (cult.); **SW14**; **P16-18**.—Burma (Rangoon distr., cult.?), Indochina (Laos, Annam, Cochinchina), Malaya.

Shrub or small scrambling tree to 4 m., locally common in dry evergreen or mixed forest or scrub up to 375 m. alt.; sometimes on limestone.

Frequently cultivated; dried leaves used for tea.

Leaves rhombic, chartaceous, subentire below, coarsely crenate above (teeth sometimes acute), obtuse at apex, very shortly petioled; inflorescence short, slender, with a few female flowers at the base; female bract bluntly toothed; capsule echinate.

Acalypha wilkesiana Muell. Arg.: 817 (1866); Merr.: 446 (1923); Pax & Hoffm. xvi: 153 (1924); Backer & Bakh. f.: 489 (1963).

C12 (cult.).—Native of Polynesia (?Fiji); widely cultivated.

Garden shrub of 2 m., sea-level.

Acalypha sp. nov.?

SW14: Pak Tawan, Prachuap, 29 July 1931, Kerr 20505.

Shrub 2 m. high, in evergreen forest at 20 m. alt.

Leaves ovate, to 16 × 10 cm., coarsely serrate, membranous; stems, petioles and nerves beneath rather densely covered with short, incurved or crispulous hairs; inflorescences slender, all male or with a few female flowers at the base.

Actephila Bl.

Leaves glaucous or glaucescent beneath; fruiting sepals accrescent

A. collinsae

Leaves green beneath, not glaucescent:

Fruiting sepals conspicuously accrescent **A. ovalis**

Fruiting sepals not or only slightly accrescent **A. excelsa**

Leaves large, coarse, long-petioled var. **javanica**

Leaves smaller, thinner, short-petioled:

Leaves very glossy, thinly coriaceous, more shortly acuminate
var. **excelsa**

Leaves rather dull, chartaceous, longer acuminate and very acute
var. **acuminata**

Actephila collinsae Hunter in Bull. Misc. Inf. Kew 1924: 96 (24 Apr. 1924); Gagnep.: 537 (after 18 Sept. 1924); Smitinand in Nat. Hist. Bull. Siam Soc. 20: 139 (1962).

A. siamensis Pierre ex Gagnep.: 531 (after 18 Sept. 1924); Smitinand in *op. cit.* 20: 140 (1962); **synon. nov.**

C11; SW14.—Endemic.

Spreading shrub to 2 m., in light evergreen forest up to 100 m. alt.; several times noted on limestone.

Very distinct in the accrescent fruiting sepals and the glaucous or glaucescent underside of the leaves. *A. siamensis* was described from a Pierre specimen collected at Petchaburi (**SW14**), the type locality of *A. collinsae*.

Actephila excelsa (*Dalz.*) *Muell. Arg.* in *Linnaea* 32: 78 (1863) & in DC.: 222 (1866); *Hook. f.*: 283 (1887); *Pax & Hoffm.* xv: 191 (1922); *Ridley*: 196 (1924); *Gagnep.*: 535 (1927); *Henderson* in *Journ. Mal. Br. Roy. As. Soc.* 17: 68 (1939); *Backer & Bakh. f.*: 470 (1963).

Anomospermum excelsum *Dalz.* in *Hook. Journ. Bot. & Kew Garden Misc.* 3: 228 (1851).

var. **excelsa** (var. *genuinum* [sic] *Pax & Hoffm.*, *l.c.*: 192)

N1; P17.—W. Peninsular India, Assam, Burma.

Shrub or small tree to 3 m., in evergreen forest on rocky limestone hills, or on limestone outcrops among boulders on lateritic soil, up to 400 m. alt.

Leaves mostly thinly coriaceous, glossy, bright green when dry, short-petioled; female sepals not or only slightly accrescent. In two specimens from **P17** (*Kerr* 15344, 1928) the female sepals are up to 8 mm. long and 3–5 mm. wide, possibly indicating some introgression from *A. ovalis* (*Ridley*) *Gage*, which occurs in the same region.

var. **javanica** (*Miq.*) *Pax & Hoffm.* xv: 192 (1922).

Actephila javanica *Miq.*, *Fl. Ind. Bat.* 1(2): 359 (1859); *Muell. Arg.*: 222 (1866); *Hook. f.*: 283 (1887); *Merr.*: 390 (1923); *Ridley*: 196 (1924); *Gage* in *Journ. As. Soc. Beng.* 75(5): 521 (1936).

SE9; P15–17.—Malaya, Sumatra, Borneo, Java.

Shrub to 4 m. high, in evergreen forest or scrub up to 300 m. alt.

A coarse plant with large, long-petioled, rather shortly and bluntly acuminate leaves. The boundary between var. *javanica* and var. *excelsa* (type from Peninsular India) is by no means clear.

var. **acuminata** *Airy Shaw*, var. nov., a var. *excelsa* foliis minoribus tenuioribus obscurioribus longius et acute acuminatis brevissime petiolatis differt.

P15, 16.—?Assam, ?Burma, Indochina, Malaya.

SIAM. Peninsular Region. Surat Circle; Yanyao, evergreen forest, alt. 100 m., 25 Feb. 1930, *Kerr* 19345.—Shrub 1.5 m. high. Khao Wong, near km. 61 of Surat-Takuapa road, common along foot of limestone hill, alt. . . ., 23 Sept. 1963, *Smitinand & Sleumer* 1246.—Fruit green, pendulous. Puket Circle; Kaw Pipi, Krabi, common in evergreen forest, alt. 50 m., 9 Apr. 1930, *Kerr* 18910.—Shrub 1 m. high.

INDOCHINA. Annam: prov. Thanh-hoa, à Hôï-xhuan, 24 Aug. 1920, *Poilane* 1763.

MALAYA. Perak: 4 miles [6.5 km.] south of Ipoh, side of limestone hill, low alt., 1 Dec. 1966, *Ng* in *FRI* 1799.—Shrub, 90 cm. high; fruits green. Selangor: Batu Caves, 1908, *Ridley* 13375. *Ibid.*, on limestone, Dec. 1920, *Ridley s.n.* (K, holotype)—Shrub.

The numerous variants of *Actephila excelsa* require field study, especially those in Peninsular India, Assam and Burma. In Siam, Indochina and Malaya the situation appears to be simpler, the populations mostly falling

fairly readily into either var. *javanica* or var. *acuminata*. Gagnepain cited Poilane 1763 under *A. excelsa*, without further comment, but this eastern plant is very different from the typical *A. excelsa* of the Western Ghats of Peninsular India.

Actephila ovalis (Ridley) Gage in Rec. Bot. Surv. India 9: 219 (1922); Ridley: 196 (1924); Gage in Journ. As. Soc. Beng. 75(5): 519 (1936); Henderson in Journ. Mal. Br. Roy. As. Soc. 17: 68 (1939); Smitinand in Nat. Hist. Bull. Siam Soc. 20: 139 (1962).

Dimorphocalyx ovalis Ridley in Journ. Roy. As. Soc. Str. Br. 59: 178 (1911); Smitinand, Noteworthy Pl. Thailand, in Thai Forest Bulletin (Bot.) 2: 14 (1955) & in Nat. Hist. Bull. Siam Soc. 20: 52, c. tab. (1961) (the statements regarding lack of specimens at Kew and omission from Ridley's Flora are incorrect).

P14-17.—N. Malaya (Lankawi, Perlis, Kedah, Penang).

Shrub to 4 m., common in evergreen forest up to 300 m.; sometimes noted on limestone.

Differs from the more northerly *A. collinsae* in the green undersurface of the leaves and the usually larger and thinner fruiting sepals. The distributions of the two species do not appear to overlap.

Agrostistachys Dalz.

Leaves entire or obscurely sinuate, usually drying a pure green; inflorescences longer and laxer **A. gaudichaudii**
Leaves usually sharply dentate, at least towards the apex, often drying yellowish-green; inflorescences shorter and denser **A. indica**

Agrostistachys gaudichaudii Muell. Arg. in Linnaea 34: 144 (1865) & in DC.: 725 (1866); Hook. f.: 406 (1887) p.p., excl. specim. Helferi et loc. 'Tenasserim (or Andaman Islands)'; Pax & Hoffm. vi: 103 (1912); Ridley: 268 (1924).

Sarcoclinium gaudichaudii Baill., Ét. Gén. Euphorb.: 310 (1858), *nomen*.
Agrostistachys maingayi Hook. f.: 406 (1887); Pax & Hoffm. vi: 105 (1912).
A. filipendula Hook. f.: 407 (1887); Pax & Hoffm. vi: 99 (1912).

P15-18.—Malay Peninsula.

Shrub or small tree to 8 m. high, common in evergreen forest up to 200 m. Distinguished from *A. indica* by its entire or obscurely sinuate leaves, usually drying a pure green, and by its laxer, more elongate inflorescences. The alleged difference in arrangement of the bracts is more difficult to appreciate.

Agrostistachys indica Dalz. in Hook. Journ. Bot. & Kew Garden Misc. 2: 41 (1850); Muell. Arg.: 726 (1866); Hook. f.: 406 (1887); Pax & Hoffm. vi: 103 (1912); Gagnep.: 465 (1926); Airy Shaw in Kew Bull. 14: 472 (1960).

A. indica ssp. *longifolia* Muell. Arg. var. *subintegra* Pax & Hoffm., *l.c.*: 105 (1912).

Heterocalyx laotica Gagnep. in *Not. Syst.* 14: 33 (1950); cf. Airy Shaw, *l.c.* *supra*.

SE10; PI6.—W. Peninsular India, Ceylon, Burma, Indochina (Cochinchina, Annam), Philippines (var. *maesoana* (Vidal) Pax & Hoffm.), N. Borneo, New Guinea (Papua).

Shrub to 4 m. in evergreen forest at very low altitudes.

Differs from *A. gaudichaudii* in the leaves, which are usually sharply dentate, at least towards the apex (obscurely so in var. *subintegra* Pax & Hoffm.), and often dry a distinct *yellowish* green, and in the shorter and denser inflorescences.

Alchornea L.

Leaves cuneate-obovate to elliptic, penninerved, estipellate, shortly petioled; male inflorescence terminal, compound, paniculate (\S *Cladodes*)

A. rugosa

Leaves cordate-ovate, trinerved and stipellate at base, with longer petioles; male inflorescences \pm cauliflorous, short, almost simple (\S *Stipellaria*):

Plant evidently pubescent; leaves more sharply serrate; capsules oblong, less deeply lobed, strongly muricate ***A. tiliifolia***

Plant weakly pubescent or almost glabrous; leaves usually more obtusely or obscurely toothed; capsules more globose, more strongly lobed, smooth, shortly grey-tomentellous ***A. trewioides***

***Alchornea rugosa* (Lour.) Muell. Arg.** in *Linnaea* 34: 170 (1865) & in DC.: 905 (1866); Hook. f.: 422 (1887); Craib: 465 (1911) & 192 (1912); Pax & Hoffm. vii: 243 (1914); Merr.: 438 (1923); Gagnep.: 379 (1926); Merr. in *Trans. Amer. Philos. Soc. n.s.* 24(2): 237 (1935).

Cladodes rugosa Lour., *Fl. Cochinch.*: 574 (1790).

Conceveibum javanense (!) Bl., *Bijdr.*: 614 (1825).

Adelia glandulosa Blanco, *Fl. Filip.*: 814 (1837).

Aparisthium javense (!) Endl. ex Hassk., *Cat. Pl. Hort. Bog. Alter.*: 235 (1844).

Tragia innocua Blanco, *op. cit. ed. 2*: 479 (1845).

Alchornea javensis (Endl. ex Hassk.) Muell. Arg. in *Linnaea* 34: 170 (1865) & in DC.: 905 (1866); Ridley: 278 (1924).

A. hainanensis Pax & Hoffm. vii: 242 (1914).

A. javanensis (Bl.) Backer & Bakh. f.: 485 (1963).

NI, 2, 4; NE5; E8; SE9, 10; SW14; PI5.—Burma, Nicobars & S. China, throughout Malesia to New Guinea.

Shrub or small tree to 10 m., in evergreen or deciduous forest up to 800 m.

Leaves usually cuneate-obovate, estipellate and penninerved; male inflorescence terminal, compound, paniculate.

var. ***macrocarpa*** *Airy Shaw*, var. nov., capsulis subduplo majoribus usque 13 mm. latis et 10 mm. longis, foliis basi magis cuneatim et minus abrupte in petiolum angustatis differt.

SIAM. N. Region: Payap Circle; 15 km. E. of Mae Sariang, along valley with small stream, $18^{\circ} 8'$ N., $98^{\circ} 3'$ E., alt. 1000 m., 12 July 1968, Larsen, Santisuk & Warncke 2398 (AAU, holotype).

MALAYA. N. Kelantan: Kemahang, storm forest, primary forest, low flat land, 27 June 1968, Whitmore in FRI 8888:—Treelet, height 2.5 m.; fruits shiny green, style tipped red. E. Pahang: Beserah Forest Reserve, Bukit Perlindong, summit ridge, alt. 240 m., 15 May 1967, Whitmore in FRI 3741:—Small bushy tree; male and female flowers on different branches.

Hooker (*l.c.*) states that the capsule of *A. rugosa* is ‘the size of a pea’; Pax & Hoffmann (*l.c.*) give the measurements as 10 mm. wide and 6 mm. long. In the rather abundant material that I have seen the capsules are rarely as much as 10 mm. across, and Hooker’s comparison conveys a more correct impression. The large capsules on the above three specimens at first sight suggest a distinct species, but I can detect no other significant difference. The leaf-base character noted in the diagnosis may well be fortuitous.

Alchornea tiliifolia (Benth.) Muell. Arg. in Linnaea 34: 168 (1865) & in DC.: 903 (1866); Hook. f.: 421 (1887); Craib: 466 (1911) & 192 (1912); Pax & Hoffm. vii: 250 (1914); Ridley: 277 (1924); Gagnep.: 382 (1926); Nath, Bot. Surv. S. Shan States: 109 (1960).

Stipellaria tiliifolia Benth. in Hook. Journ. Bot. & Kew Garden Misc. 6: 4 (1854).

N1; SE9; PI5-17.—E. Himalaya, Assam, Burma, S. China, Indochina, Andamans, Malay Peninsula.

Shrub or small tree to 8 m., in evergreen forest or bamboo scrub up to 1000 m. alt.

Distinguished from *A. trewioides* by its more evident indumentum and more sharply serrate leaves, and especially by its more oblong, less deeply lobed, strongly muricate capsules.

Alchornea trewioides (Benth.) Muell. Arg. in Linnaea 34: 168 (1865) & in DC.: 901 (1866); Pax & Hoffm. vii: 248 (1914); Gagnep.: 384 (1926); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 238 (1935).

Stipellaria trewioides Benth. in Hook. Journ. Bot. & Kew Garden Misc. 6: 3 (1854).

Alchornea liukiensis Hayata in Journ. Coll. Sci. Tok. 30: 268 (1911).
A. coudercii Gagnep. in Bull. Soc. Bot. France 71: 138 (1924) & in Lecomte: 380 (1926), **synon. nov.**

N4.—Indochina, S. China, Formosa.

Shrub to 3 m., locally common in open scrub jungle at 300 m. alt.

Differs from *A. tiliifolia* by its weaker indumentum (often almost wanting) and usually more obtusely or obscurely toothed leaves, and by its more globose, more strongly lobed, smooth capsule, which is very shortly grey-tomentellous.

Aleurites J. R. & G. Forst.

Aleurites moluccana (L.) Willd., Sp. Pl. 4: 590 (1805); Muell. Arg.: 723 (1866); Hook. f.: 384 (1887); Williams in Bull. Herb. Boiss. sér. 2, 5: 31 (1905); Pax in Engler IV. 147 (Heft 42): 129 (1910); Merr.: 448 (1923); Ridley: 253 (1924); Gagnep.: 291 (1925); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 239 (1935); Corner: 231 (1940); Backer & Bakh. f.: 478 (1963); Airy Shaw in Kew Bull. 20: 393 (1966).

Jatropha moluccana L., Sp. Pl.: 1006 (1753).

Aleurites triloba J. R. & G. Forst., Char. Gen. Pl.: 111, t. 56 (1776).

Juglans camirium Lour., Fl. Cochinch.: 573 (1790).

Camirium cordifolium Gaertn., Fruct.: 195 (1791).

Aleurites ambinux Pers., Synops. 2: 587 (1807).

A. commutata Geisel., Croton. Monogr.: 82 (1807).

A. lobata Blanco, Fl. Filip.: 756 (1837).

A. lanceolata Blanco, l.c.: 757 (1837).

A. cordifolia (Gaertn.) Steud., Nomencl. ed. 2, 1: 49 (1840).

Camirium oleosum Reinw. ex Muell. Arg.: 723 (1866).

N₁, 2; C₁₂ (cult.); **P₁₆** (cult.)—India & China to Polynesia and New Zealand.

Tree to 15 m. high, in mixed evergreen forest up to 350 m.

The candlenut, cultivated for the oil obtained from the seeds.

Aporusa Bl.

Stipules rather large, ± persistent, very asymmetrical, ± falcate; ovary 3-locular, pubescent (§ *Grandistipulosa*):

Leaves very large (to 30 cm. long), nerves impressed; stipules 1 cm. long or more **A. lunata**

Leaves smaller (to 15 cm.), nerves not impressed; stipules up to 5 mm. long **A. falcifera**

Stipules smaller, ± caducous:

Ovary glabrous (§ *Gymnogynae*), 2-locular (Except *A. frutescens*):

Capsule pedicellate, ellipsoid, rather thin-walled **A. symplocoïdes**

Capsule sessile or subsessile:

Capsule globose:

Ovary and fruit 3-locular; leaves membranous, drying greenish **A. frutescens**

Ovary and fruit 2-locular; leaves coriaceous, usually drying a strong bright yellowish green **A. aurea**

Capsule ellipsoid or ovoid:

Young branches puberulous; ♂ sepals glabrous; leaves very smooth **A. planchoniana**

Young branches glabrous; ♂ sepals pubescent; leaves less smooth, nerves more reticulate:

Petiole 1·5–2·5 cm. long; lamina broader, almost entire

A. wallichii

Petiole less than 1 cm. long; lamina narrower, slightly glandular-crenulate **A. yunnanensis**

Ovary pubescent (but fruit often glabrescent) (\S *Trichogyna*):

Plant becoming greyish, blackish or lurid bluish or purplish when dry:

Branchlets very slender, terete, smooth; leaves small (to 15 cm. long), chartaceous, smooth; ♂ and ♀ inflorescences very short; capsule 2-locular; plant drying greyish or blackish

A. microstachya

Branchlets more robust; leaves large (to 30 cm. long), more robust; ♂ inflorescence to 5 cm. long:

Capsule ovoid-ellipsoid, to 16 mm. long, 3-locular; leaves drying plumbeous **A. arborea**

Capsule globose, to 12 mm. in diameter, 2-locular; leaves drying lurid bluish-green or purplish **A. nigricans**

Plant drying yellowish, brownish or greenish:

Infructescence 2-3 cm. long, racemose; capsules small (7 mm.), globose, thinly puberulous, 2(?1)-locular; venation incised

A. incisa

Infructescence fasciculate, or, if shortly pedunculate, rarely exceeding 1 cm. in length:

Capsule large, 3-locular:

Densely tomentose; leaves more coriaceous, with stronger nervation **A. ficifolia**

More thinly tomentose; leaves thinner, with weaker nervation **A. pseudo-ficifolia**

Capsule smaller, 2-locular:

Leaves larger, mostly broad-ovate, often truncate or cordate at base, usually densely tomentose but sometimes glabrescent; capsule larger, tomentose. **A. villosa**

Leaves smaller, mostly narrowly ovate or elliptic, usually ± cuneate at base, thinly tomentose or glabrescent; capsule smaller, thinly pubescent. **A. dioica**

Aporusa arborea (Bl.) Muell. Arg.: 470 (1866); Pax & Hoffm. xv: 95 (1922); Ridley: 239 (1924); Backer & Bakh. f.: 456 (1963).

Leiocarpus arboreus Bl., Bijdr.: 582 (1825).

L. arborescens Hassk., Hort. Bog. ed. nov. 1: 59 (1858).

Aporusa arborescens (Hassk.) Muell. Arg.: 470 (1866).

Daphniphyllum kingii Hook. f.: 354 (1887).

P18.—Malay Peninsula, Sumatra, Borneo, Java.

Shrub or small tree to 4 m., in evergreen forest at 200 m. alt.

Leaves large, relatively thin and veiny; petiole conspicuously pulvinate-geniculate at apex; fruiting racemes up to 5 cm. long.

Wood used for furniture.

Aporusa aurea Hook. f.: 351 (1887); Pax & Hoffm. xv: 87 (1922); Ridley: 240 (1924).

P15, 16, 18.—Malay Peninsula, ? Sumatra, ? Borneo.

Tree to 8 m., in evergreen or deciduous forest, often near the sea, up to 200 m. alt.

A somewhat critical species, with rather large, very smooth, elliptic or ovate-elliptic leaves, often drying a bright yellowish-green colour; capsules globose.

Aporusa dioica (Roxb.) Muell. Arg.: 472 (1866); Pax & Hoffm. xv: 103 (1922); Airy Shaw in Kew Bull. 23: 3 (1969), *in obs.*

Alnus dioica Roxb., Fl. Ind. 3: 580 (1832).

Scepa stipulacea Lindl., Nat. Syst. Bot. ed. 2: 441 (1836); Airy Shaw, *l.c.* (1969).

S. aurita Tul. in Ann. Sci. Nat. sér. 3, 15: 254 (1851), **synon. nov.**

S. chinensis Champ. ex Benth. in Hook. Journ. Bot. & Kew Garden Misc. 6: 72 (1854), **synon. nov.**

Aporusa aurita (Tul.) Miq., Fl. Ind. Bat. 1(1): 431 (1855); Muell. Arg.: 474 (1866); Pax & Hoffm. xv: 100 (1922); Merr.: 409 (1923).

Tetractinostigma microcalyx Hassk. in Flora 40: 533 (1857) & Hort. Bogor. ed. nov.: 55 (1858), **synon. nov.**

Aporusa roxburghii Baill., Ét. Gén. Euphorb.: 645 (1858); Hook. f.: 347 (1887); Craib: 461 (1911) & 188 (1912).

A. microcalyx (Hassk.) Hassk. in Bull. Soc. Bot. France 6: 714 (1859); Muell. Arg.: 471 (1866); Hook. f.: 346 (1887); Pax & Hoffm. xv: 101 (1922); Ridley: 238 (1924); Gagnep.: 555 (1927).

A. leptostachya Benth., Fl. Hongk.: 317 (1861), **synon. nov.**

A. frutescens sec. Benth. *l.c.*, *non* Bl.

A. microcalyx var. *chinensis* (Champ. ex Benth.) Muell. Arg.: 472 (1866); Pax & Hoffm. xv: 102 (1922).

A. villosula Kurz, For. Fl. Brit. Burma 2: 362 (1877); Hook. f.: 347 (1887); Pax & Hoffm. xv: 100 (1922); Gagnep.: 560 (1927); **synon. nov.**

A. microcalyx var. *intermedia* Pax & Hoffm. xv: 102 (1922).

A. chinensis (Champ. ex Benth.) Merr. in Lingnan Sci. Journ. 13: 34 (1934).

N₁, 2; SE₉; SW₁₄; P₁₆.—E. Himalaya, Assam, Burma, Andamans, Indochina, S. China, and throughout W. Malesia.

Shrub or tree to 9 m., in evergreen forest up to 230 m. alt.

It seems impossible to find reliable characters by which to separate the members of this polymorphic complex. The shallowly crenate (sometimes subentire) leaves, drying brownish, the sparse pubescence and relatively small, sessile, ellipsoid capsules are usually sufficient to distinguish the group from the remainder of the *Trichogynae*.

Aporusa falcifera Hook. f.: 352 (1887); Pax & Hoffm. xv: 83 (1922); Ridley: 236 (1924).

A. hosei Merr. in Philipp. Journ. Sci. ser. C. Bot. 11: 63 (1916); Pax & Hoffm. xv: 84 (1922); **synon. nov.**

P₁₆.—Malay Peninsula, ?Sumatra, Borneo.

Tree of 30 m. in evergreen forest at low altitude.

The lunate stipules and oblong-lanceolate leaves, in which the nerves are not bullately impressed, are characteristic.

Aporusa ficifolia Baill. in Adansonia 11: 177 (1874); Hook. f.: 346 (1887); Pax & Hoffm. xv: 94 (1922); Gagnep.: 558 (1927).

N₂, 4; NE₅; E₇.—Burma, Indochina.

Small tree to 8 m., in moist mixed deciduous or evergreen forest at 200–850 m. alt.

Tomentose throughout, the upper leaf-surface finally glabrescent; leaf-margin mostly conspicuously repand-dentate and narrowly revolute; nerves impressed above, sometimes bullate; inflorescences short and dense; fruit globose, densely tomentose, 1–1·5 cm. diam.

Aporusa frutescens Bl. Bijdr.: 514 (1825); Muell. Arg.: 476 (1866); J. J. Sm.: 229 (1910); Pax & Hoffm. xv: 91 (1922); Ridley: 241 (1924); Backer & Bakh. f.: 457 (1963).

Leiocarpus fruticosus Bl. Bijdr.: 582 (1825).

Aporusa fruticosa (Bl.) Muell. Arg.: 475 (1866).

Baccaurea banahaënsis Elm. Leafl. Philipp. Bot. 4: 1475 (1912); Pax & Hoffm. xv: 70 (1922); **synon. nov.**

Aporusa similis Merr. in Philipp. Journ. Sci. 9, Bot.: 472 (1914); Pax & Hoffm. xv: 92 (1922); **synon. nov.**

A. agusanensis Elm. op. cit. 7: 2636 (1915), **synon. nov.**

A. banahaënsis (Elm.) Merr.: 410 (1923).

SE₉; PI_{5–18}.—Lower Burma and throughout W. Malesia. J. J. Smith's doubtful record from Buru (Moluccas) requires confirmation.

Shrub or small tree to 7 m., scattered or locally common in wet ground in evergreen forest up to 200 m. alt.

The membranous leaves and smaller globose capsules distinguish *A. frutescens* from *A. prainiana* King ex Gage, a species which could well occur in the Peninsular Region of Siam. From *A. aurea* it differs in its smaller trilocular capsules, as well as in the thin leaves which never dry the same luminous yellow-green colour as those of *A. aurea*.

The close relationship of the Philippine taxa to *A. frutescens* has already been commented on by Pax & Hoffmann (l.c.: 92) and Merrill (l.c.: 410 (1923)), and I have no hesitation in making the above reductions.

Aporusa incisa Airy Shaw in Kew Bull. 25: 477 (1971).

N₁.—Endemic.

Tree of 9 m. in evergreen forest at 1650 m. alt.

The incised venation (somewhat resembling that of *A. ficifolia* Baill.) and relatively elongate racemose infructescence with small globose capsules distinguish this montane species from all others.

Aporusa lunata (Miq.) Kurz in Journ. As. Soc. Bengal 42. ii: 239 (1873); Hook. f.: 352 (1887); Pax & Hoffm. xv: 82 (1922); Ridley: 237 (1924); Backer & Bakh. f.: 456 (1963).

Antidesma lunatum Miq., Fl. Ind. Bat. Suppl.: 467 (1860); Muell. Arg.: 251 (1866).

PI₅.—Throughout W. Malesia.

Shrub of 3 m., locally common in bamboo and evergreen forest at 100 m. alt.

Leaves very large (up to 30 × 10 cm.), nerves bullately impressed; stipules large, falcate.

Aporusa microstachya (*Tul.*) *Muell. Arg.*: 474 (1866); *Hook. f.*: 349 (1887); *Pax & Hoffm. xv*: 102 (1922); *Airy Shaw in Kew Bull. 23: 2* (1969), *q.v.*

Scepa microstachya *Tul.* in *Ann. Sci. Nat. sér. 3, 15*: 255 (1851).

Aporusa maingayi *Hook. f.*: 348 (1887); *Pax & Hoffm. xv*: 99 (1922); *Ridley*: 241 (1924); *Corner*: 237 (1940).

SW14; PI5-18.—Burma (Thaton to Mergui); Malaya (Penang to Singapore); a variety or closely related species in Sarawak.

A shrub or small tree to 8 m., in evergreen forest or scrub up to 400 m. alt.

Branchlets very slender, terete, finely grey-puberulous when young, ultimately glabrous. Leaves chartaceous, smooth, markedly caudate-acuminate, often assuming a characteristic blackish or leaden hue on drying. Inflorescences (both male and female) very short; capsules subglobose. A characteristic and easily recognized species.

Aporusa nigricans *Hook. f.*: 347 (1887); *Pax & Hoffm. xv*: 97 (1922); *Ridley*: 239 (1924).

PI8.—Malay Peninsula, Sumatra, Borneo.

Small tree in open forest at 300 m. alt.

Leaves somewhat similar to those of *A. arborea*, but usually recognizable by the lurid bluish-green or purplish-brown colour which they assume (especially beneath) on drying; fruiting racemes much abbreviated.

Aporusa planchoniana *Baill. ex Muell. Arg.*: 475 (1866); *Hook. f.*: 350 (1887); *Pax & Hoffm. xv*: 88 (1922); *Gagnep.*: 560 (1927).

A. lanceolata *Hance* var. *murtoni* *F. N. Williams* in *Bull. Herb. Boiss. sér. 2, 5*: 30 (1905).

SE9, 10; SW14; PI5, 16.—Burma, Indochina, ?S. China.

Shrub or small tree to 4 m., in evergreen forest up to 100 m. alt.

Readily recognized by its small, smooth, lanceolate, coriaceous or chartaceous leaves, dull yellowish-green when dry.

Aporusa pseudo-ficifolia *Pax & Hoffm. xv*: 94 (1922); *Ridley*: 237 (1924).

A. ficifolia sec. *Hook. f.*: 346 (1887), *pro majore parte, non Baill.*

PI5.—N. Malaya (Perak, Penang).

Tree; no ecological data for Siam.

Closely related to the more northern *A. ficifolia* *Baill.*, differing in the thinner, less strongly nerved, less strongly tomentose leaves. The male plant has apparently not yet been collected, either in Siam or Malaya.

Aporusa symplocoïdes (*Hook. f.*) *Gage* in *Rec. Bot. Surv. Ind.* 9: 229 (before 20 March 1922); *Pax & Hoffm. xv*: 90 (19 Sept. 1922); *Ridley*: 240 (1924).

Baccaurea? *symplocoïdes* *Hook. f.*: 376 (1887).

P18.—Malay Penins., Sumatra, Banka, Sarawak, Sabah.

Small tree to 6 m., in evergreen forest at 200 m. alt.

Leaves glabrous, chartaceous, with a slender petiole; male inflorescence slender, interrupted; infructescence slender, lax, pedicels elongate, fruits ovoid or ellipsoid, subacute, somewhat crustaceous, with 2–3 slender ribs.

Aporusa villosa (*Lindl.*) *Baill.*, *Ét. Gén. Euphorb.*: 645 (1858); *Muell. Arg.*: 471 (1866); *Hook. f.*: 345 (1887); *Craib*: 461 (1911) & 188 (1912); *Pax & Hoffm. xv*: 99 (1922); *Gagnep.*: 559 (1927).

Scepa villosa *Lindl.*, *Nat. Syst. Bot. ed. 2*: 441 (1836).

Aporusa glabrifolia *Kurz* in *Journ. Bot.* 13: 330 (1875); *Hook. f.*: 349 (1887); *Pax & Hoffm. xv*: 102 (1922); **synon. nov.**

N1, 2; NE5.—Burma, Nicobar Is., Indochina, ?S. China.

Shrub or small tree to 6 m., in open deciduous or more rarely evergreen forest up to 1400 m. alt.; on limestone in **NE5**.

Leaves broadly ovate, not bullate, usually shortly tomentose beneath; capsules strongly tomentose. Forms also occur in which the leaves are almost glabrous beneath; these probably correspond to *A. glabrifolia* *Kurz*, described from dry grassy places in the Nicobar Is.

Aporusa wallichii *Hook. f.*: 350 (1887); *Craib*: 461 (1911) & 188 (1912); *Pax & Hoffm. xv*: 88 (1922); *Gagnep.*: 562 (1927).

A. wallichii var. *genuina* *Pax & Hoffm. l.c.*

N1; SW14.—Assam, Burma.

Tree to 9 m., in dry evergreen or open deciduous forest at 800–1300 m. alt.

A montane species, distinguished from *A. aurea* by the rougher texture of the leaves and by the ovoid capsules.

Aporusa yunnanensis (*Pax & Hoffm.*) *Metc.* in *Lingnan Sci. Journ.* 10: 486 (1931); *Merr.* in *Journ. Arn. Arb.* 19: 40 (1938).

A. wallichii var. *yunnanensis* *Pax & Hoffm. xv*: 90 (1922).

N2; E8; SE9; SW14; P15, 16.—Assam, Burma, S. China (Yunnan, Kwangtung, Hainan), Indochina (Tonkin).

Shrub or tree to 8 m., locally common in evergreen forest at 600–1300 m. alt.

Leaves relatively small, rather thin, lanceolate, acuminate, veiny, drying greyish-green.

Baccaurea Lour.

Bracts of ♂ inflorescence not adnate to peduncles:

Leaves large, glabrous, shining, drying bright green; ovary and fruit 4–5-locular (§ *Hedycarpus*) **B. lanceolata**

Leaves variously pubescent or almost glabrous, not drying bright green; ovary and fruit 2–3-locular (§ *Pierardia*):

Leaves large, rounded or narrowly cordate at base, shortly pubescent; nerves numerous, parallel **B. motleyana**

Leaves smaller, narrowed or cuneate at base, almost glabrous:

Leaves less fragile when dry, tertiary nerves closely parallel; ♂ inflorescence densely papillose, often borne on branchlets; fruit broadly ovoid, thick-walled, not ribbed, finally dehiscent

B. ramiflora

Leaves more fragile when dry, tertiary nerves not manifestly parallel; ♂ inflorescence less papillose, rarely borne on branchlets; fruit smaller, fusiform, thin-walled, often ribbed, indehiscent

B. parviflora

Bracts of ♂ inflorescence adnate to peduncles:

Indumentum formed of simple hairs (§ *Calyptroön*); leaves large, glabrous, chartaceous, drying reddish brown beneath . . . **B. macrophylla**

Indumentum formed of minute stellate hairs (§ *Everettiodendron*):

Leaves large, rounded to cordate at base, not punctate below; branchlets, petioles and midribs fulvous-tomentellous . . . **B. kunstleri**

Leaves smaller, cuneate to rounded but not cordate at base, strongly brown-punctate below, almost glabrous when mature

B. bracteata

Resembling *B. bracteata*, but more robust, with stronger indumentum; leaves not punctate below; bracts of ♂ inflorescence larger and conspicuous **B. velutina** (?)

Baccaurea bracteata Muell. Arg.: 466 (1866); Hook. f.: 372 (1887); Pax & Hoffm. xv: 65 (1922); Ridley: 246 (1922); Corner: 239 (1940).

P15.—Malay Peninsula, Borneo (there one of the commonest species).

No field data for Siam.

Leaves moderate-sized, coriaceous, prominently nerved and brownish-punctate on the lower surface, almost glabrous when mature.

Baccaurea kunstleri King ex Gage in Rec. Bot. Surv. Ind. 9: 230 (1922); Ridley: 248 (1924).

B. cordata Merr. in Univ. Calif. Publ. Bot. 15: 147 (1929), **synon. nov.**

?*B. reticulata* var. *velutina* sec. Smitinand in Nat. Hist. Bull. Siam Soc. 22: 170 (1967), *e descr., non* Ridley.

P16, 17, ?18.—Malay Peninsula, N. & E. Borneo.

Large tree of 12–30 m., in evergreen forest or scrub at 100 m. alt.

Leaves large, cordate to rounded at base; branchlets, petioles and midribs fulvous-tomentellous; inflorescences and fruits shortly tomentellous.

Baccaurea lanceolata (Miq.) Muell. Arg.: 457 (1866); Hook. f.: 368 (1887); Pax & Hoffm. xv: 60 (1922); Merr.: 411 (1923); Ridley: 248 (1924); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 69 (1939); Corner: 240 (1940); Backer & Bakh. f.: 454 (1963).

Hedycarpus lanceolatus Miq., Fl. Ind. Bat. 1. ii: 359 (1859).

Adenocrepis lanceolata (Miq.) Miq. in Linnaea 32: 82 (1863).

?*Baccaurea glabriflora* Pax & Hoffm. xv: 59 (1922).

P17, 18.—Malay Peninsula, Sumatra, Borneo, Java.

Tree of 6–10 m., in evergreen forest at 100–300 m. alt.

Readily recognized by its almost complete glabrescence and by the branchlets and large thin leaves retaining their green colour on drying.

Baccaurea macrophylla (Muell. Arg.) Muell. Arg.: 460 (1866); Hook. f.: 369 (1887); Pax & Hoffm. xv: 62 (1922); Ridley: 247 (1924).

Pierardia macrophylla Muell. Arg. in Flora 47: 516 (1864).

Baccaurea beccariana Pax & Hoffm. xv: 62 (1922), **synon. nov.**

P18.—Malay Peninsula, ?Sumatra, Borneo.

Tree of 10 m. in evergreen forest at 150 m. alt.

Leaves large, glabrous, chartaceous, broadly cuneate to rounded (rarely subcordate) at base, drying a warm reddish-brown beneath; male inflorescences short, dense, bare at base, fascicled.

Baccaurea motleyana (Muell. Arg.) Muell. Arg.: 461 (1866); Hook. f.: 371 (1887); Pax & Hoffm. xv: 53 (1922); Ridley: 250 (1924).

Pierardia motleyana Muell. Arg. in Flora 47: 516 (1864).

?*Baccaurea brevipes* Hook. f.: 370 (1887); Pax & Hoffm. xv: 58 (1922); Ridley: 250 (1924).

P16–18.—Malay Peninsula, Sumatra, Borneo.

Tree of 6–10 m. in evergreen forest up to 200 m. alt.; also cultivated for its edible fruits.

Leaves large, elliptic or elliptic-obovate, chartaceous, shortly pubescent, base rounded or narrowly cordate, apex cuspidate or shortly acuminate; secondary nerves numerous, parallel, patulous; tertiary nerves scalariform; inflorescences from the branches or trunk, elongate; flowers grey-papillose-puberulous; fruit ovoid, indehiscent.

I am not satisfied that there are reliable characters to distinguish *B. brevipes* from *B. motleyana*, but this needs testing in the field. It seems also possible that both may be conspecific with *B. sylvestris* Lour. (*B. annamensis* Gagnep.), of Indochina.

Baccaurea parviflora (Muell. Arg.) Muell. Arg.: 462 (1866); Hook. f.: 368 (1887); Pax & Hoffm. xv: 59 (1922); Ridley: 243 (1924); Corner: 241 (1940).

Pierardia parviflora Muell. Arg. in Linnaea 32: 82 (1863).

Baccaurea affinis Muell. Arg.: 459 (1866).

B. scortechinii Hook. f.: 368 (1887); Pax & Hoffm. xv: 56 (1922); Ridley: 244 (1924); Corner: 242 (1940); Smitinand, Noteworthy Pl. Thailand, in Thai Forest Bull. (Bot.) 2: 15 (1955), & in Nat. Hist. Bull. Siam Soc. 20: 53, c. tab. (1961); **synon. nov.**
?B. odoratissima Elmer in Leafl. Philipp. Bot. 4: 1276 (1911).

P16-18.—Lower Burma, Malay Peninsula, ?Borneo, ?Philippines.

Tree to 6 m., locally common in evergreen forest up to 450 m. alt.

Differs from *B. ramiflora* in the more fragile texture of the leaves when dry, the tertiary nerves lax, not noticeably parallel; in its less papillose male inflorescences, which are rarely fascicled on the branchlets; and in its smaller, fusiform, thin-walled, often ribbed fruits, which are indehiscent.

Baccaurea ramiflora Lour., Fl. Cochinch.: 661 (1790); Muell. Arg.: 458 (1866); Pax & Hoffm. xv: 71 (1922); Gagnep.: 551 (1927); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 232 (1935).

B. cauliflora Lour., l.c.: 661 (1790); Muell. Arg.: 458 (1866); Gagnep.: 551 (1927); Merr., l.c.: 233 (1935).

Pierardia sapida Roxb., Fl. Ind. 2: 254 (1832).

Baccaurea sapida (Roxb.) Muell. Arg.: 459 (1866); Williams in Bull. Herb. Boiss. sér. 2, 5: 30 (1905); Hosseus: 403 (1911); Craib: 461 (1911) & 188 (1912); Pax & Hoffm. xv: 52 (1922); Gagnep.: 548 (1927); Corner in Gard. Bull. Str. Settlem. 10: 290 (1939) & Ways. Trees: 241 (1940).

B. wrayi King ex Hook. f.: 374 (1887); Pax & Hoffm. xv: 53 (1922); Ridley: 244 (1924); Airy Shaw in Kew Bull. 14: 354 (1960), *in obs.*; **synon. nov.**

B. oxyacarpa Gagnep. in Bull. Soc. Bot. France 70: 431 (1923) & in Lecomte: 549 (1927); Airy Shaw, l.c. (1960); **synon. nov.**

Gatnaia annamica Gagnep., ll. cc. 71: 870 (1924) & 5: 540 (1927); cf. Airy Shaw, l.c.

N1, 2; NE5; SE9, 10; C11, 12; SW14; P15, 16.—E. Himalaya, Assam, Burma, Yunnan, Indochina, Malay Peninsula.

Shrub or tree to 15 m., in evergreen forest up to 1300 m. alt. Frequently cultivated.

Superficially very similar to *B. parviflora*, but leaves less fragile when dry, usually with fine tertiary nerves closely parallel; male inflorescences densely papillose, often fascicled on branchlets as well as on trunk; fruit broadly ovoid, thick-walled, not ribbed, finally dehiscent.

Baccaurea velutina (Ridley) Ridley in Journ. Bot. 62: 300 (Oct. 1924) & Fl. Malay Penins. 5: 331 (1925) (?).

B. reticulata Hook. f. var. *velutina* Ridley, Flora 3: 246 (May-June 1924); Smitinand in Nat. Hist. Bull. Siam Soc. 22: 170 (1967).

P18(?).—Malay Peninsula.

Tree of 35 m., scattered on ridges in tropical rain forest at 250 m. alt. Aril said to be sweet and edible.

I have not seen the specimen upon which the above record is based. The leaves are described by Smitinand (*l.c. supra*) as ‘cordate’, which suggests

the possibility that the plant may have been an example of *B. kunstleri* King ex Gage (see above), since the leaves of *B. velutina* are at the most rounded, and often even cuneate, at the base.

Baliospermum Bl.

- Monoecious (rarely dioecious); inflorescences usually leafy, with short branches; ♂ disk-glands connate into a cup **B. montanum**
 Dioecious (rarely monoecious); inflorescences usually leafless; ♂ disk-glands distinct:
 ♀ calyx not accrescent in fruit; leaves small, narrow, thinly membranous;
 ♂ flowers very small **B. micranthum**
 ♀ calyx accrescent in fruit:
 Leaves narrow, oblong-elliptic or narrowly obovate, firmer in texture;
 ♂ flowers of normal size **B. siamense**
 Leaves broadly ovate or obovate, thinly membranous; ♂ flowers very
 • small **B. effusum**

Baliospermum effusum Pax & Hoffm. iv: 27 (1912).

N1.—Yunnan.

Shrub to 2·5 m., in evergreen forest at 650–1500 m. alt.
 Somewhat intermediate between *B. micranthum* and *B. corymbiferum* Hook. f. Male inflorescence narrow and long-peduncled, and leaves broad, as in the latter, but leaves thinly membranous and male flowers nearly as small as in the former. Female inflorescence long-peduncled; female calyx somewhat accrescent.

Baliospermum micranthum Muell. Arg. in Linnaea 34: 215 (1864) & in DC.: 1126 (1866); Hook. f.: 462 (1887); Pax & Hoffm. iv: 26 (1912); Gagnep.: 430 (1926).

N1.—Assam, Yunnan.

Thin shrub to 2 m., in dense evergreen forest at 1300–2500 m. alt.
 Leaves rather small, narrow, thinly membranous, more or less cuneate at base; male flowers very small; female inflorescence few-flowered; female calyx not accrescent.

Baliospermum montanum (Willd.) Muell. Arg.: 1125 (1866); Backer & Bakh. f.: 497 (1963).

Jatropha montana Willd., Sp. Pl. 4: 563 (1805).

Croton solanifolius Geisel., Croton. Monogr.: 74 (1807).

Baliospermum axillare Bl., Bijdr.: 604 (1825); Hook. f.: 461 (1887); Ostenf. in Bull. Herb. Boiss. sér. 2, 5: 718 (1905); Craib: 467 (1911) & 194 (1912); Pax & Hoffm. iv: 25 (1912); Ridley: 312 (1924); Gagnep.: 429 (1926).
Croton polyandrus Roxb., Fl. Ind. 3: 682 (1832).

Baliospermum indicum Decne in Jacquem., Voy.: 154, t. 155 (1841–4).

B. polyandrum (Roxb.) Wight, Ic. Pl. Ind. Or. 5. ii: 23, t. 1885 (1842).

N1, 3; NE5; SE10; C11, 12; SW14; P16, 17.—W. Himalaya & India to Indochina, Sumatra & Java.

Woody herb or scarcely woody shrub to 1·5 m., common in moist or dry evergreen forest or bamboo forest or thorny scrub, sometimes on open waste ground, from sea level to 700 m. alt.; twice noted on limestone.

Differs from the remainder in its usually monoecious flowers, with the male disk-glands connate into a cup. Inflorescence usually leafy, with relatively short branches.

Stems reported to be full of clear juice.

Baliospermum siamense Craib: 467 (1911) & 194 (1912); Pax & Hoffm. iv: 126 (1912).

N₁, 2; E₈; SW₁₄.—Endemic.

Dioecious (or sometimes monoecious), simple-stemmed, woody herb (scarcely shrubby) to 1·5 m., locally common in evergreen forest up to 1300 m. alt.

Resembles *B. corymbiferum* Hook. f. in its narrow, long-peduncled male inflorescences, but leaves narrow, oblong-elliptic or narrowly obovate; female calyx accrescent in fruit.

Blachia Baill.

Leaves larger (to 18 cm. long), elliptic-obovate; ♂ inflorescence long-peduncled	B. andamanica
Leaves smaller (to 7 cm. long), cuneate-obovate; ♂ inflorescence very shortly peduncled	B. siamensis

Blachia andamanica (Kurz) Hook. f.: 403 (1887); Pax & Hoffm. iii: 38 (1911); Gagnepain: 416 (1926); Airy Shaw in Kew Bull. 23: 121 (1969).

Codiaeum andamanicum Kurz, For. Fl. Brit. Burma 2: 405 (1877).

Dimorphocalyx andamanicus (Kurz) Benth. in Benth. & Hook. f., Gen. Pl. 3: 302 (1880).

N₁, 3; NE₅; SE₉; C₁₂ (?) ; SW₁₄; P₁₆.—Assam, ?Burma, Andamans, ?Malay Peninsula (Perak), Philippines, Celebes.

Shrub, sometimes scandent, or tree, to 7 m., in evergreen forest or scrub up to 200 m. alt.; once noted on limestone.

(*B. denudata* Benth., of W. & S. Peninsular India, differing in the less umbellate male inflorescence and in the glabrous or only minutely puberulous ovary, is scarcely more than varietally distinct from *B. andamanica*.)

I have not seen the Kerr specimen from near Bangkok, **C₁₂**, cited by Gagnepain (*l.c.*).

Blachia siamensis Gagnep. in Bull. Soc. Bot. France 71: 620 (after 18 Sept. 1924) & in Lecomte: 415 (1926).

B. jatrophifolia Pax var. *siamensis* Craib in Bull. Misc. Inf. Kew 1924: 98 (24 Apr. 1924) (based on a different type from *B. siamensis* Gagnep.).

SE₉, 10; SW₁₄; P₁₅.—S. China (Hainan).

Scrambling shrub or small spreading tree to 4 m., locally abundant in dry open evergreen forest or scrub up to 300 m. alt., frequently on limestone.

Differs from *B. andamanica* in its smaller, more shortly cuneate-obovate leaves and very shortly peduncled male inflorescences.

Blumeodendron (*Muell. Arg.*) *Kurz*

Blumeodendron kurzii (*Hook. f.*) *J. J. Sm.*: 463 (1910); *Pax & Hoffm.* vii: 48 (1914); *Ridley*: 281 (1924); *Henderson* in *Journ. Malay. Br. Roy. As. Soc.* 17: 69 (1939); *Backer & Bakh. f.*: 480 (1963).

B. tokbrai sensu Kurz in *Journ. As. Soc. Bengal* 42: 245 (1873) & *For. Fl. Brit. Burma* 2: 391 (1877), *non Elateriospermum tokbrai* Bl.

?*B. muelleri* Kurz, *l.c.* (1873), *in obs.*

Mallotus kurzii Hook. f.: 427 (1887).

P17.—Andaman Is., Burma, W. Malesia.

Tree of 7 m. in evergreen forest at 200 m.

The broadly elliptic, obtusely cuspidate, glabrous, thickly coriaceous leaves, with a dull 'shagreened' lower surface and inconspicuous immersed tertiary nerves, are very characteristic; inflorescence a very condensed cyme.

Botryophora *Hook. f.*

Botryophora geniculata (*Miq.*) *Beumée ex Airy Shaw* in *Kew Bull.* 3: 484 (1949) & 14: 375 (1960) & in *Hook. Ic. Pl.* 36: t. 3576 (1962), *q.v.* for full synonymy; *van Steenis* in *Blumea* 12: 15 (1963).

Sterculia geniculata Miq., *Fl. Ind. Bat. Suppl.*: 164, 400 (1960).

Botryophora kingii Hook. f.: 476 (1888); *Pax* in *Engl. & Prantl, Nat. Pflanzenf.* III. 5: 116 (1891); *Ridley* in *Journ. Fed. Malay States Mus.* 10: 116 (1920) & *Flora*: 282 (1924).

P16.—Lower Burma, Malay Peninsula, Sumatra, Borneo, Java.

Large tree in Lower Siam (elsewhere a small tree or shrub), growing near the coast (probably in evergreen forest) at very low altitude (but ascending to 1500 m. in Kelantan, Malaya).

Branchlets very smooth, usually with a slight apical thickening from which the tuft of leaves arises. Leaves rather similar to those of *Mallotus wrayi* King ex Hook. f., with a long slender petiole markedly pulvinate-geniculate at the apex. Male inflorescence a distinctive pendulous panicle; female inflorescence a short simple spike.

Breynia *J. R. & G. Forst.*

Shortly tomentellous throughout; ♀ calyx only slightly enlarged in fruit

B. discigera

Glabrous or almost so:

♀ calyx much enlarged in fruit:

Leaves thicker and broader (NW. Siam only) **B. retusa**

Leaves membranous, oblong or narrowly ovate (widespread)

B. angustifolia

♀ calyx only slightly enlarged in fruit (but sometimes already broad at flowering stage):

Leaves membranous, rather small; fruit small, ovoid, often shining, with very short styles; fruiting calyx very small . . . **B. vitis-idaea**

Leaves coriaceous, larger, often glaucous beneath; fruit glaucous or hoary above:

Fruiting calyx small; fruit with very short styles; leaves similar to those of *B. vitis-idaea*, but thicker and rigid, with reflexed margins

B. reclinata

Fruiting calyx broadly cupular or patelliform at flowering stage, but scarcely enlarged in fruit; leaves somewhat larger:

Leaves moderately glaucous; styles reflexed in fruit (N. & E. Siam)

B. fruticosa

Leaves intensely glaucous; styles ± erect in fruit (NW. & SW. Siam)

B. glauca

The Siamese species of *Breynia* fall into obvious pairs: *B. fruticosa* and *B. glauca*; *B. retusa* (*B. patens*) and *B. angustifolia*; *B. vitis-idaea* (*B. rhamnoïdes*) and *B. reclinata*. *B. discigera* stands apart on account of its well-developed pubescence, but comes nearest to the last-named group.

Breynia angustifolia Hook. f.: 330 (1887); Ridley: 218 (1924); Beille: 637 (1927).

Ni-3; NE5; SE10; SW14; PI6, 17.—Burma, Malay Peninsula.

Shrub to 3 m., in evergreen or mixed deciduous forest, or in scrub on rocky or stony ground (especially near the sea), up to 1360 m. alt.

Leaves small, oblong or narrowly ovate, membranous; apex of capsule with low annular rim surrounding styles (cf. *Sauvages* § *Cryptogynium*); calyx much enlarged in fruit. Very close to *B. retusa* (see below), of which it may be regarded as a more easterly representative, differing in the narrower, more membranous leaves.

Breynia discigera Muell. Arg.: 440 (1866): Hook. f.: 331 (1887); Ridley: 217 (1924).

Melanthesia racemosa var. *pubescens* Muell. Arg. in Linnaea 32: 73 (1863).

M. rhamnoïdes var. *pubescens* Muell. Arg., l.c.: 74 (1863).

Breynia rhamnoïdes var. *pubescens* (Muell. Arg.) Muell. Arg. in DC.: 441 (1866).

PI5-18.—Malay Peninsula, Sumatra.—N. B. Hooker's (*l.c.*) attribution of this species to 'Siam' probably rests on a specimen in the Wallich Herbarium (no. 7917B) collected by Finlayson, whose collecting places are unfortunately not certainly known. Cf. Williams in Bull. Herb. Boiss. sér. 2, 5: 30 (1905).

Shrub to 1·5 m. in low scrub at low altitude.

Differs from all other species in the region in the shortly tomentellous indumentum of all parts.

Breynia fruticosa (L.) Hook. f.: 331 (1887), *in obs.*; Williams in Bull. Herb. Boiss. sér. 2, 5: 30 (1905); Beille: 632 (1927).

Andrachne fruticosa L., Sp. Pl.: 1014 (1753).

Phyllanthus lucens Poir., Encycl. Méth. Bot. 5: 296 (1804).

Melanthesa chinensis Bl., Bijdr.: 592 (1825).

Phyllanthus turbinatus Sims in Bot. Mag. 44: t. 1862 (1826).

Melanthesopsis lucens (Poir.) Muell. Arg. in Linnaea 32: 75 (1863).

Melanthesopsis fruticosa (L.) Muell. Arg.: 437 (1866), *tantum quoad synon.*

N2; NE5; E8; SE9, 10.—China, Indochina.

Shrub or small tree, locally common in scrub up to 100 m.

Leaves coriaceous, moderate-sized, often glaucous beneath; female sepals more or less equal, broad; fruiting calyx broadly cupular; styles reflexed in fruit.

Breynia glauca Craib: 460 (1911) & 187 (1912); Beille: 633 (1927).

Glochidion subterblancum C. E. C. Fischer in Bull. Misc. Inf. Kew 1927: 211 (1927), **synon. nov.**

Breynia subterblanca (C. E. C. Fischer) C. E. C. Fischer in Bull. Misc. Inf. Kew 1939: 98 (1939).

N1, 2; SW14.—Burma.

Shrub or small tree to 7·5 m., in mixed or evergreen forest or scrub up to 900 m. alt.

Differs from *B. fruticosa* (L.) Hook. f. in the more glaucous leaves and in the styles more or less erect in fruit. Perhaps scarcely specifically distinct, though the two forms appear to be almost vicarious, *B. glauca* being the western representative of the more eastern and north-eastern *B. fruticosa*.

Breynia reclinata (Roxb.) Hook. f.: 331 (1887); Ridley: 219 (1924).

Phyllanthus reclinatus Roxb., Fl. Ind. 3: 669 (1832).

Melanthesa reclinata (Roxb.) Muell. Arg. in Linnaea 32: 74 (1863).

M. rhamnoïdes var. *hypoglauca* Muell. Arg., l.c.: 73 (1863).

Breynia rhamnoïdes var. *hypoglauca* (Muell. Arg.) Muell. Arg.: 440 (1866).

Melanthesopsis fruticosa sec. Muell. Arg.: 437 (1866), *non Andrachne fruticosa* L.

P16, 18.—Malay Peninsula, Sumatra, ?Borneo, ?Java.

Shrub of 3–5 m., often subscandent, in scrub at very low altitudes.

Leaves coriaceous, variable in size, often obtuse or only subacute at apex, glaucous beneath; fruit often hoary above, with minute styles; calyx scarcely enlarged. Closely related to *B. vitis-idaea*, but almost always recognizable by its much thicker, rigid leaves, with conspicuously reflexed or revolute margins.

The statement by Williams, in Bull. Herb. Boiss. sér. 2, 5: 30 (1905), that Hooker records *B. reclinata* as occurring in Siam, is erroneous. All that Hooker did (l.c. *supra*) was to point out that Mueller had erroneously referred *Phyllanthus reclinatus* Roxb. to *Breynia fruticosa*, ‘together with Wallich’s No. 7925, which is a third plant from Siam’. Wallich 7925 bears what appears to be a small original ticket of Finlayson, with the inscription: ‘Baungh oukh, Hue’. This tends to confirm Williams’ contention (l.c.) that Finlayson’s specimens must have been collected either in Burma or in Annam. In Lecomte, Fl. Gén. Indoch. 5: 638 (1927), under *Breynia coriacea* var.

lanceolata, Beille cites the Annamese localities 'Bau-rau' and 'Ba-ngoi', which bear a vague similarity to that given by Finlayson.

Breynia retusa (Dennst.) Alston in Trimen, Handb. Fl. Ceyl. 6 (Suppl.): 261 (1931).

Phyllanthus retusus Dennst., Schlüss. Hort. Malab.: 31 (1818).

P. pomaceus Moon, Cat. Ceyl. Pl.: 65 (1824).

P. patens Roxb., Fl. Ind. 3: 667 (1832).

Melanthesopsis patens (Roxb.) Muell. Arg.: 437 (1866).

Breynia patens (Roxb.) Benth. in Benth. & Hook. f., Gen. Pl. 3: 277 (1883);
Hook. f.: 329 (1887).

N₁, 2.—India, Ceylon, Burma.

Shrub of 3 m., on rocks in open evergreen forest up to 1270 m. alt.

The westerly representative of *B. angustifolia* Hook. f., differing in the thicker and broader leaves. The distributions overlap in Burma and NW. Siam.

Breynia vitis-idaea (Burm. f.) C. E. C. Fischer in Bull. Misc. Inf. Kew 1932: 65 (1932).

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

Phyllanthus rhamnoïdes Willd., Sp. Pl. 4: 580 (1805).

Brynia rhamnoïdes (Willd.) Muell. Arg.: 440 (1866); Hook. f.: 330 (1887); Craib: 461 (1911) & 187 (1912); Merr.: 404 (1923); Ridley: 218 (1924); Beille: 636 (1927).

B. officinalis Hemsl. in Journ. Linn. Soc. 26: 427 (1894), **synon. nov.**

B. accrescens Hayata in Journ. Coll. Sci. Tok. 20: 22 (1904), **synon. nov.**

B. keithii Ridley in Journ. Str. Br. Roy. As. Soc. 59: 174 (1911) & Flora: 219 (1924), **synon. nov.**

B. microcalyx Ridley in Journ. Fed. Mal. States Mus. 10: 114 (1920), **synon.**
nov.

E8; SE10; C12; P15, 16.—India to Formosa, Ryu-kyu Is. and Philippines, south to Malay Peninsula (as far as Penang).

Shrub to 3 m., in open evergreen forest at low altitudes.

Leaves rather small, ovate to broadly ovate, membranous; fruit small, ovoid, often shining, with very short styles; fruiting calyx very small.

Apparently only differs from *B. cernua* (Poir.) Muell. Arg. (Philippines and Java to New Guinea and N. Australia; type from Timor) in its non-acrescent calyx. The two forms seem to exhibit a complete transition in the Philippines; cf. Merrill, *l.c. supra*.

Bridelia Willd.

Flowers large, up to 10 mm. in diameter; drupe large, usually ovoid, bilocular, 8-11 mm. long; plant often scandent, softly rufotomentose (*§ Stipulares*) **B. stipularis**

Flowers small, up to 6 mm. in diameter:

Drupe 1-locular; seeds with a deep longitudinal groove; petals minute; leaves without a marginal nerve (§ *Cleistanthoideae*):

- Drupe globose, red when ripe; leaves distinctly glaucescent or pruinose and crisply puberulous beneath; calyx red **B. affinis**

Drupe ellipsoid, black when ripe; leaves often paler beneath but not distinctly pruinose; calyx green:
 Flowers 4·5–5·5 mm. in diameter; styles shorter than sepals **B. pubescens**
 Flowers 2–3 mm. in diameter; styles exceeding the sepals **B. penangiana**

Drupe 2-locular; seeds plano-convex; petals larger; leaves with a marginal nerve (*§ Scleroneurae*):
 Primary nerves 12–22 pairs; leaf-margin sinuate-undulate; inflorescence usually leafless:
 Glomerules several- or many-flowered; flowers larger; floral bracts and stipules small or minute, caducous **B. retusa**
 Glomerules usually 3-flowered; flowers smaller; bracts small, linear or oblong, tomentose, provided with large ovate stipules, persistent **B. pierrei**

Primary nerves 5–15 pairs:
 Primary nerves 5–10 pairs; leaves rather small:
 Almost all parts shortly tomentose or pubescent; nerves not raised above **B. harmandii**
 Almost glabrous throughout; nerves raised above **B. ovata** var. **curtisii**

Primary nerves 8–15 pairs; leaves glabrous or puberulous:
 Leaves 6–20 cm. long, rounded or obtuse at apex, glabrous below when mature; nerves raised above **B. ovata**
 Leaves 4–12 cm. long, attenuate at apex, ± pubescent below when mature; nerves not raised above **B. monoica**

Bridelia affinis Craib: 456 (1911) & 182 (1912); Jabl. viii: 73 (1915); Airy Shaw in Kew Bull. 23: 65 (1969).

B. colorata Airy Shaw in Kew Bull. 23: 66 (1969), **synon. nov.**

N₁, 2; ?C₁₁.—Indochina (Laos).

A small tree or scrambling shrub in deciduous or moist mixed or evergreen forest at 200–850 m. alt.

Leaves thin, glaucous and crisply puberulous beneath, especially on the midrib and nerves; calyx and fruit red. Closely related to *B. henryana* Jabl., of Yunnan, in which the leaves are smaller and more sparsely puberulous, the calyx is green and the fruit is black. Further study now leads me to feel that my *B. colorata* cannot be satisfactorily distinguished from *B. affinis*.

Bridelia harmandii Gagnep. in Bull. Soc. Bot. France 70: 433 (1923) & in Lecomte: 491 (1926).

N₃; NE₅; E₈.—Indochina (Laos, Cambodia, Cochinchina).

Small shrub, sometimes scrambling, locally common on sandy soil in dry deciduous forest up to 400 m. alt.

A relatively small-leaved species, the stems, leaves, stipules, bracts and outside of calyx shortly tomentose or pubescent.

Bridelia ovata Decne in Nouv. Ann. Mus. Paris 3: 484 (1835); Muell. Arg.: 495 (1866); Hook. f.: 274 (1887); Jabl. viii: 61 (1915); Ridley: 184 (1924); Gagnep.: 489 (1926); Gage in Journ. As. Soc. Beng. 75(5): 488 (1936); Henderson in Journ. Mal. Br. Roy. As. Soc. 17: 69 (1939); Corner: 243 (1940); Backer & Bakh. f.: 475 (1963).

B. kurzii sec. Williams in Bull. Herb. Boiss. sér. 2, 5: 31 (1905), *non* Hook. f.

N₃; NE₅; SE₁₀; C₁₁; SW₁₄.—Burma; Indochina (Annam); N. Malaya (Perlis, Lankawi, Penang); Java, Lesser Sunda Is.; Australia (N. Territory).

Small tree or scrambling shrub in dry evergreen or deciduous forest up to 300 m. alt., sometimes on limestone.

Leaves thin, smooth, glabrous, broadly elliptic or obovate, with the nerves raised above as well as below.

var. **curtisii** (Hook. f.) Airy Shaw, comb. & stat. nov.

Bridelia curtisii Hook. f.: 273 (1887); cf. Gage, l.c.: 489 (1936), *in obs.*

B. pedicellata Ridley in Journ. Roy. As. Soc. Straits Br. 59: 167 (1911); Jabl. viii: 63 (1915); Gagnep.: 490 (1926).

N₁, 3; C₁₁, 12; SW₁₄; P₁₆, 17.—Indochina (Cambodia, Cochinchina); N. Malaya (?Perlis, Lankawi, Penang).

Shrub, sometimes straggling or scandent, or small tree, to 3 m., in scrub or semi-evergreen forest or on tidal riversides, up to 500 m. alt.

Distinguished by its smaller, narrowly elliptic or almost oblong leaves, with 6–10 instead of 8–15 pairs of main nerves. A few intermediate specimens seem to connect it with the typical form.

Bridelia penangiana Hook. f.: 272 (1887); Jabl. viii: 75 (1915); Ridley: 185 (1924); Gage in Journ. As. Soc. Beng. 75(5): 492 (1936).

B. minutiflora Hook. f.: 273 (1887); Jabl. viii: 76 (1915); Merr.: 423 (1923); Gagnep.: 493 (1926); Backer & Bakh. f.: 475 (1963).

B. platyphylla Merr. in Philipp. Journ. Sci. 7, Bot.: 384 (1912).

To be expected in Siam.—Lower Burma, Indochina, and throughout Malesia to the Solomon Is.

Differs from *B. pubescens* Kurz in the much smaller flowers with exserted style.

The rather well-known name *B. minutiflora* must give way to *B. penangiana*, to which it was long ago reduced by Ridley and Gage (*ll.cc.*). The latter author points out that Hooker appears to have described *B. minutiflora* from an abnormal and exceptional specimen showing a solitary style.

Bridelia pierrei Gagnep. in Bull. Soc. Bot. France 70: 434 (1923) & in Lecomte: 494 (1926); Airy Shaw in Kew Bull. 23: 68 (1969).

N₂; NE₅; SW₁₄.—Indochina (Cambodia, Cochinchina).

Tree of 10–15 m. in dry deciduous forest at 100–350 m. alt.; trunk spiny in younger stage.

Related to *B. retusa* (L.) Spreng., but strikingly different in the few-flowered glomerules of flowers, subtended by greatly reduced bracts, which are accompanied by large ovate stipules. For further details see my note in Kew Bull., *l.c. supra*.

Bridelia pubescens Kurz in Journ. As. Soc. Bengal 42: 241 (1873); Hook. f.: 270 (1887); Jabl. viii: 73 (1915).

N₁, 4; NE₅.—E. Himalaya to SW. China; Formosa.

Tree to 15 m. high, sometimes shrubby, in evergreen forest at 600–1300 m. alt.

A more distinctly montane species than most other Siamese members of the genus. Differs from the very similar *B. penangiana* Hook. f. in the larger flowers (4·5–5·5 mm. diam.) with styles shorter than the sepals. The latter species, though recorded by Gagnepain from a number of localities in Indochina, and occurring (rarely) in Lower Burma, does not yet seem to have been noted in Siam.

Bridelia retusa (L.) Spreng., Syst. Veg. 3: 48 (1826); Muell. Arg.: 493 (1866); Hook. f.: 268 (1887); Craib: 457 (1911) & 183 (1912); Jabl. viii: 69 (1915); Ridley: 184 (1924); Gagnep.: 487 (1926).

Clutia retusa L., Sp. Pl.: 1042 (1753).

Cluytia spinosa Roxb., Corom. Pl. 2: 38 (1798).

Bridelia spinosa (Roxb.) Willd., Sp. Pl. 4. ii: 979 (1805); Roxb., Fl. Ind. 3: 735 (1832).

N₁-3; NE₅; E₈; SE₉; C₁₁; SW₁₄.—India, Ceylon, Burma, Indochina, Malay Peninsula, Sumatra.

Shrub (sometimes scrambling) or small thin tree to 15 m., in bamboo or Dipterocarp forest, or open grassy or deciduous or dry evergreen forest, up to 1100 m. alt.

Leaves rather large, coriaceous, with numerous primary nerves, minutely puberulous below, margin reflexed, sinuate-undulate; inflorescence tomentellous, usually leafless, often a terminal panicle; fruit globose, fleshy, bilocular.

Bridelia stipularis (L.) Bl., Bijdr.: 597 (1825); Muell. Arg.: 499 (1866), p.p.; Hook. f.: 270 (1887), p.p.; Craib: 457 (1911) & 183 (1912); Jabl. viii: 55 (1915); Merr.: 424 (1923); Ridley: 183 (1924); Gagnep.: 492 (1926); Gage in Journ. As. Soc. Beng. 75(5): 485 (1936); Corner: 243 (1940); Backer & Bakh. f.: 475 (1963).

Clutia stipularis L., Mant.: 127 (1767).

N₁-4; NE₅; E₈; SE₉, 10; SW₁₄; P₁₅.—India and S. China (Yunnan) throughout W. Malesia to Timor.

Large shrub or woody climber in evergreen or mixed bamboo forest or scrub, up to 400 m. alt.; once noted (**NE₅**) on limestone.

The very large flowers and large oblong-ovoid fruits (edible!) are sufficient to distinguish this species. It is usually markedly tomentose.

Bridelia tomentosa Bl., Bijdr.: 597 (1825); Muell. Arg.: 501 (1866); Hook. f.: 271 (1887); Craib: 457 (1911) & 183 (1912); Jabl. viii: 58 (1915); Ridley: 184 (1924); Gagnep.: 488 (1926); Gage in Journ. As. Soc. Beng. 75(5): 487 (1936); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 69 (1939); Corner in Gard. Bull. Str. Settlem. 10: 291 (1939) & Ways. Trees: 243 (1940).

B. lanceifolia Roxb., Fl. Ind. 3: 737 (1832); Jabl. l.c.: 60 (1915) ('lancaefolia').
B. loureirii Hook. & Arn., Bot. Beech. Voy.: 211 (1841), *excl. synon.*

B. tomentosa var. *lanceifolia* (Roxb.) Muell. Arg.: 502 (1866).

B. monoica sec. Merr. in Philipp. Journ. Sci. 13, Bot.: 142 (1918) & Enum.: 423 (1923) & in Trans. Amer. Philos. Soc. n.s. 24(2): 234 (1935); Backer & Bakh. f.: 475 (1963); *vix Clutia monoica* Lour.

B. glabrifolia Merr.: 422 (1923), **synon. nov.**

Ni-4; E8; SE10; C11; SW14; P15-17.—NE. India to S. China, Formosa, Indochina and Malaya, throughout Malesia to N. Australia; common throughout most of its range, but rare in Borneo, only known from the south-eastern corner.

Shrub or small tree to 10 m., in evergreen or mixed or deciduous forest, scrub, bog or open rocky ground, up to 1000 m. alt.

Leaves rather small, thin, often bluntly subacute; branchlets slender; fruits small, globose.

Chaetocarpus Thw.

Chaetocarpus castanocarpus (Roxb.) Thw., Enum. Pl. Zeyl.: 275 (1861); Muell. Arg.: 1122 (1866) ('*castaneacarpus*'); Hook. f.: 460 (1887); Pax & Hoffm. iv: 8 (1912); Craib: 194 (1912); Corner: 244 (1940) ('*castaneicarpus*').

Adelia castanicarpa Roxb., Fl. Ind. 3: 848 (1832).

Regnaldia cluytioïdes Baill. in Adansonia 1: 188 (1860); Muell. Arg.: 1257 (1866).

R. myrtioïdes Baill., l.c.: 187 (1860).

Ni; E7; SE9, 10; SW14; P16-18.—Ceylon, Assam, Burma, Andamans, Malay Peninsula, ?Sumatra, Borneo.

Shrub or tree to 15 m., common in evergreen forest or scrub up to 275 m. alt.

The densely setose capsules with shining black arillate seeds are characteristic. Leaves coriaceous, smooth, shining, glabrous, madder-brown when dry; flowers in dense axillary clusters; stamens connate in a column.

Chondrostylis Boerl.

Chondrostylis kunstleri (King ex Hook. f.) Airy Shaw in Kew Bull. 14: 359 (1960) & 16: 345 (1963) & 20: 27 (1966).

Mallotus? *kunstleri* King ex Hook. f.: 443 (1887).

Kunstlera glumacea King ex Hook. f., l.c. (1887), in obs., *nom. event.*

Kunstlerodendron sublanceolata [sic] Ridley: 283 (1924).

P18.—Malay Penins., Sumatra, Sarawak.

Tree to 9 m., in evergreen forest up to 400 m. alt.

Differs from *Agrostistachys*, which it superficially resembles, in the paniculate inflorescence and absence of petals.

Chorisandrachne *Airy Shaw*

Chorisandrachne diplosperma *Airy Shaw* in Kew Bull. 23: 40 (1969).

SW14.—Endemic.

Large shrub or small tree (up to 8 m.), locally common in light dry evergreen forest at very low altitudes.

Near *Leptopus* Decne., but with asymmetrical leaves, petals greatly exceeding sepals, a subentire male disk, and large plano-convex seeds cohering in pairs long after being shed. The general habit recalls *Phyllanthus* § *Chorisandra*.

Chrozophora *Neck. ex Juss.*

Chrozophorarottleri (Geisel.) A. Juss. ex Spreng., Syst. Veg. 3: 850 (1826); Pax & Hoffm. vi: 19 (1912); Prain in Bull. Misc. Inf. Kew 1918: 95 (1918), q.v. for full synonymy; van Steenis in Bull. Jard. Bot. Buitenz. sér. 3, 13: 399 (1948); Nath, Bot. Surv. S. Shan States: 109 (1960); Backer & Bakh. f.: 477 (1963).

Crotonrottleri Geisel., Crot. Monogr.: 54 (1807); A. Juss., Euphorb. Gen. Tent.: 28 (1824).

Crozophoraplicata var. *rottleri* (Geisel.) Muell. Arg.: 747 (1866).

N3, 4; E8; C12; SW14.—NW. India and Ceylon to Assam and Burma; Java (?introd.).

Small shrub or woody herb to 60 cm., in waste places at low altitudes (up to 200 m.).

Distinguished from related yellow-flowered species by its erect stem, racemes exceeding the nearest leaves, reddish-purple capsules and red stigmas.

Cladogynos *Zipp. ex Span.*

Cladogynosorientalis *Zipp. ex Span.* in Linnaea 15: 349 (1841); Muell. Arg.: 895 (1866); Pax & Hoffm. vii: 265 (1914); Merr.: 444 (1923); Ridley: 276 (1924); Gagnep.: 478 (1926); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 69 (1939); Backer & Bakh. f.: 486 (1963).

Rottlera? *albicans* sec. Hassk., Hort. Bogor.: 238 (1844), quoad descr., excl. synon. *Adisca albicans* Bl.

Adenogynum discolor Reichb. f. & Zoll. in Verhand. Nat. Vereen. Ned. Ind. 1: 23 (1856) & in Linnaea 28: 325 (1856).

Chloradenia discolor (Reichb. f. & Zoll.) Baill., Ét. Gén. Euphorb.: 472 (1858); Craib: 192 (1912).

Cephalocroton albicans sec. Muell. Arg. in Linnaea 34: 155 (1865), non *Adisca albicans* Bl.

Ceph. discolor (Reichb. f. & Zoll.) Muell. Arg.: 761 (1866).

Adenochlaena siamensis Ridley in Journ. Roy. As. Soc. Str. Br. 59: 180 (1911).

Baprea bicolor Pierre ex Pax & Hoffm. vii: 264 (1914).

N3; NE5; E8; SE10; SW14; P15-17.—S. China, Indochina, N. Malaya, Philippines, Java, Lesser Sunda Is.

Shrub to 3 m. high, common in dry evergreen or moist mixed deciduous forest or scrub up to 450 m. alt.; frequently on limestone.

The white-tomentose stems, long-petioled repand-dentate leaves, which are almost glabrous above and intensely white-hoary below, and the shortly peduncled, tomentose, globose flower-clusters, are unmistakable features of this plant.

***Claoxylon* Juss.**

Usually shortly tomentellous throughout, often with a purplish tinge; ♂ inflorescence very elongate; capsules shortly and softly grey-tomentose, margins of sutures distinctly raised **C. indicum**

Thinly and inconspicuously puberulous to glabrous; ♂ inflorescence elongate or short; capsules (so far as known) not as above:

Leaves distinctly fleshy, shortly petioled; ♂ inflorescences not exceeding petioles; capsules thinly adpressed-puberulous. **C. cf. kingii**

Leaves thin, long-petioled when mature:

Leaves drying green; ♂ inflorescences not more than twice as long as petioles; capsules very smooth, thinly and closely ochraceous-tomentellous **C. longifolium**

Leaves drying purple; ♂ inflorescences many times longer than petioles (to 26 cm.); capsules unknown **C. putii**

***Claoxylon indicum* (Reinw. ex Bl.) Hassk.**, Cat. Hort. Bogor. Alter: 235 (1844); Muell. Arg.: 782 (1866); Hook. f.: 410 (1887); Pax & Hoffm. vii: 108 (1914); Ridley: 271 (1924); Gagnep.: 422 (1926); Corner in Gard. Bull. Str. Settlem. 10: 292-4 (1939) & Ways. Trees: 245 (1940).

Erytrochilus indicus Reinw. ex Bl., Bijdr.: 615 (1825).

E. mollis Bl., l.c. (1825).

E. minor Bl., l.c.: 616 (1825).

Croton halecum Roxb., Fl. Ind. 3: 683 (1832).

Claoxylon parviflorum Hook. & Arn., Bot. Beech. Voy.: 212 (1841).

C. macrophyllum Hassk., Pl. Jav. Rar.: 251 (1848).

C. minus (Bl.) Hassk., l.c. (1848).

C. molle (Bl.) Miq., Fl. Ind. Bat. 1. ii: 386 (1859).

C. polot sec. Merr., Interpr. Rumph. Herb. Amboin.: 200 (1917), *in obs.*; Backer & Bakh. f.: 480 (1963); vix *Croton polot* Burm. f.

N1-4; SE9, 10; SW14; P16.—India & S. China throughout Malesia to New Guinea.

Tree to 15 m., in evergreen or mixed forest or scrub up to 700 m. alt.

Usually shortly tomentellous throughout; leaves broad, usually dentate or serrate, sometimes cordate at base; male inflorescences very elongate; capsules shortly and softly grey-tomentose, cocci dehiscing by distinctly raised sutures.

Claoxylon cf. **kingii** Hook. f. ex Ridley: 272 (1924).

Claoxylon sp. 13, Hook. f.: 414 (1887).

P16.—Kao Bangto, Pang-nga, 22–23 Feb. 1929, Kerr 17199, 17205.

Shrub of 2 m., in evergreen forest at 900 m. alt.

Leaves broadly oblanceolate to cuneate-obovate, distinctly fleshy, glabrous and smooth above, shortly (2–3 cm.) petioled, petiole with 2 conical glands at apex; inflorescences short, about as long as petioles; capsules thinly adpressed-puberulous, stigmas short, depressed, lacinate-plumose.

Further collections of this plant, and of *C. kingii* from the type locality (Perak: Larut), are needed in order to establish the status and relationship of the two forms. *C. kingii* has hitherto been known only from the inadequate type specimen, collected at an altitude of 600–750 m. The leaf-shape and texture and short male inflorescences are similar.

Claoxylon longifolium (Bl.) Endl. ex Hassk., Cat. Pl. Hort. Bogor. Cult. Alter: 235 (1844); Muell. Arg.: 781 (1866), p.p.; Hook. f.: 411 (1887); Pax & Hoffm. vii: 117 (1914); Ridley: 272 (1924); Gagnep.: 421 (1926); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 69 (1939) (var. *brachystachys* Hook. f.); Corner: 245 (1940); Backer & Bakh. f.: 481 (1963).

Erytrochilus longifolius Bl., Bijdr.: 616 (1825).

Claoxylon papyraceum Airy Shaw in Kew Bull. 23: 77 (1969), *quoad typum, synon. nov.*

SW14; P15–18.—NE. India and Indochina, throughout Malesia to New Guinea.

Shrub or tree to 8 m., in evergreen forest up to 1100 m. alt.; once noted (**P16**) on limestone.

Thinly and inconspicuously puberulous, often appearing almost glabrous; leaves thin, variable in size and shape, long-petioled when mature; male inflorescences usually not more than twice as long as petioles; capsules very smooth, thinly and closely ochraceous-tomentellous; sutures not conspicuously raised.

Claoxylon putii Airy Shaw in Kew Bull. 25: 519 (1971).

C. papyraceum Airy Shaw in Kew Bull. 23: 77 (1969), *pro parte, excl. typo.*

N1.—Endemic.

No field data available.

Leaves thinly membranous, almost glabrous, crenulate-dentate, drying purple, petioles up to 9 cm. long; male inflorescences very elongate (to 26 cm.). Combines the thin subglabrous foliage of *C. longifolium* with the greatly elongate male inflorescences of *C. indicum*.

Cleidion Bl.

Cleidion spiciflorum (Burm. f.) Merr., Interpr. Rumph. Herb. Amboin.: 322 (1917), *in obs.*, & Enum. 2: 439 (1923).

Acalyppha spiciflora Burm. f., Fl. Ind.: 203 (sphalm. '303') (1768).

Cleidion javanicum Bl., Bijdr.: 613 (1825); Muell. Arg.: 987 (1866); Hook. f.: 444 (1887); Craib: 466 (1911) & 193 (1912); Pax & Hoffm. vii: 290 (1914); Ridley: 296 (1924); Gagnep.: 450 (1926); Backer & Bakh. f.: 487 (1963).

Lasiostylis salicifolia Presl, Bot. Bemerk.: 149 (1849).

Rottlera urandra Dalz. in Hook. Journ. Bot. & Kew Garden Misc. 3: 229 (1851).

?*Tetraglossa indica* Bedd. in Madr. Journ. Sci. ser. 2, 22: 70 (1861).

Macaranga tamiana K. Schum. in Notizbl. Bot. Gart. Berlin 1: 52 (1895).

N1, 2, 4; NE5; E8; SW14; P15, 18.—India and S. China throughout Malesia to the Bismarcks and Solomon Is.

Tree to 15 m., very common in evergreen forest at low altitudes (to 800 m.), often by streams; once noted (**P15**) from a rocky limestone hill. Sometimes cultivated for the oil obtained from the seeds.

***Cleistanthus* Hook. f. ex Planch.**

Ovary glabrous:

Capsule stipitate (but not pedicelled); leaves finely and closely adpressed-sericeous beneath (§ *Nanopetalum*) **C. myrianthus**

Capsule not stipitate; leaves almost glabrous (§ *Stipulati*?):

Leaves thinly papery when dry, obovate or elliptic, often cuneately narrowed at base **C. papyraceus**

Leaves subcoriaceous, very smooth and shining, ovate or lanceolate or elliptic, very deciduous, base cuneate to narrowly cordate **C. denudatus**

Ovary pubescent:

Capsule stipitate; leaves decurrent on to the short petiole (§ *Chartacei*) **C. decurrens**

Capsule not stipitate, but may be pedicellate:

Flower-clusters on special leafless or small-leaved branchlets (§ *Leiopyxis*):

Capsule pedicellate (sometimes shortly); flowering branchlets short, drying black; leaves very smooth, somewhat glaucous, caudate; dried material slightly aromatic. **C. praetermissus**

Capsule sessile; flowering branchlets not drying black; dried material not aromatic:

More robust; leaves larger and more coriaceous (very variable), gradually acuminate **C. sumatranaus**

Slender; leaves smaller and thinner, more abruptly caudate

C. gracilis

Flower-clusters axillary on main shoots, not on special leafless branchlets (§ *Stipulati*):

Capsules pedicellate; leaves ± pubescent, cuneate to rounded at base but never cordate **C. tormentosus**

Capsule sessile:

Leaves almost glabrous, with lax venation **C. hirsutulus**

Leaves ± pubescent beneath, rounded to subcordate at base:

Rather strongly pubescent; leaves larger; nervation reticulate

C. helferi

Less pubescent; leaves smaller; nervation less reticulate

C. polypyllus

Cleistanthus decurrens Hook. f.: 278 (1887); Jabl. viii: 33 (1915); Ridley: 191 (1924); Gage in Journ. As. Soc. Beng. 75(5): 508 (1936); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 69 (1939).

SW14 (extreme S.); **P15, 18.**—Malaya (Penang, Perak, Johore).

A shrub or small tree to 5 m., in evergreen forest at low altitudes (up to 200 m.), usually on or near limestone.

Leaves elliptic or oblong-elliptic, the base narrowed and usually markedly decurrent on to the short petiole, glabrous or with minute adpressed whitish hairs beneath, nervation lax and prominent below, closely reticulate and prominulous above; capsules long-stipitate.

Cleistanthus denudatus Airy Shaw in Kew Bull. 21: 367 (1968).

SW14; a form or closely related species in **N2.**—Endemic.

A shrub or small tree to 6 m., in dry scrub at low altitudes (up to 50 m.).

Perhaps nearest to *C. hirsutulus* Hook. f., differing in its glabrous branchlets (except when young), very smooth, shining, glabrous, subcoriaceous, usually very deciduous leaves, with very slender scarcely raised venation, and in its inconspicuous bracts and stipules and glabrous capsules.

The related form in **N2** has larger and less caducous leaves than the type; it is noted as common in open jungle at an altitude of 280 m. A similar form has been collected also in **SW14**, in mixed deciduous forest at 70 m., and it seems possible that this represents in fact the more 'normal' state of the species, the 'denuded' condition of the type form being perhaps associated with the dry scrub habitat.

Cleistanthus gracilis Hook. f.: 277 (1887); Jabl. viii: 15 (1915); Ridley: 190 (1924) (incl. var. *parvifolia* Ridl.); Gage in Journ. As. Soc. Beng. 75(5): 506 (1936); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 70 (1939).

C. dasypyllyus F. N. Williams in Bull. Herb. Boiss. sér. 2, 5: 31 (1905); Jabl., l.c.: 18 (1915).

SW14; P16-17.—N. Malaya (Lankawi, Perlis, Kedah, Pahang).

Shrub or tree to 8 m. high, locally common in dry evergreen forest at low altitudes (to 100 m.); sometimes on limestone.

Very variable in leaf- and fruit-size. Branchlets slender; leaves quite glabrous, thinly coriaceous, ovate or elliptic, conspicuously and bluntly caudate; capsules rather thinly crustaceous. Closely related to *C. sumatranaus*, but smaller and slenderer in all parts, with a relatively longer and more abruptly demarcated drip-tip.

Cleistanthus helferi Hook. f.: 280 (1887); Jabl. viii: 24 (1915).

?*C. meeboldii* Jabl. l.c.: 20 (1915), e descr.

P15, 16, 18.—Lower Burma.

A shrub, more rarely a small tree, to 4·5 m., locally rather frequent in savannah, bamboo forest, evergreen scrub or forest, up to 1000 m. alt.

Branchlets shortly tomentose; leaves oblong-ob lanceolate, rounded or slightly cordate at base, shortly and acutely acuminate, shortly pubescent beneath and on the nerves above, chartaceous, nerves prominently raised and reticulate beneath; stipules and bracts usually conspicuous, elongate-filiform-subulate. Differs from *C. hirsutulus* in the pubescent leaves, with more reticulate venation, and in the much longer bracts and stipules, and from *C. tomentosus* (SE. Siam), which it most closely resembles, in the stronger indumentum, cordate leaf-base and sessile capsule.

Cleistanthus hirsutulus Hook. f.: 278 (1887); Jabl. viii: 26 (1915); Ridley: 192 (1924); Gage in Journ. As. Soc. Beng. 75(5): 511 (1936); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 70 (1939).

C. siamensis Craib in Bull. Misc. Inf. Kew 1913: 71 (1913); Jabl. viii: 23 (1915); Ridley: 190 (1924); Gage in Journ. As. Soc. Beng. 75(5): 507 (1936); **synon. nov.**

C. penangensis Jabl., l.c.: 21 (1915).

C. cochinchiniae Jabl., l.c. (1915).

Paracleisthus siamensis (Craib) Gagnep. in Bull. Soc. Bot. France 70: 497 (1923) & in Lecomte, 5: 497 (1926).

N₁, 4; NE₅; E₈; SE₉, 10; C₁₁; SW₁₄; P₁₅, 18.—Indochina, Malaya and Borneo (Sabah).

Shrub or small tree to 8 m., in evergreen or deciduous or mixed forest up to 400 m. alt.; sometimes noted from limestone; locally common.

With a considerable quantity of material now available, I find it impossible to separate *C. siamensis* Craib from *C. hirsutulus* Hook. f. (*C. penangensis* and *C. cochinchiniae* have already been reduced to *C. siamensis* by Ridley and Gagnepain respectively.) The supposed differences in the length and persistence of the stipules do not hold. The species is rather near *C. helferi* Hook. f., differing in the practically glabrous leaves, with laxer venation.

Cleistanthus myrianthus (Hassk.) Kurz, For. Fl. Brit. Burma: 370 (1877); Hook. f.: 275 (1887); Jabl. viii: 37 (1915); Merr.: 421 (1923); Ridley: 194 (1924); Gagnep.: 482 (1926); Gage in Journ. As. Soc. Beng. 75(5): 515 (1935); Backer & Bakh. f.: 474 (1963).

Nanopetalum myrianthum Hassk. in Verh. Kon. Akad. Wetensch. Amsterd. 24: 140 (1855).

N₂; SE₉; P₁₅₋₁₇.—Burma, Andamans, Malaya, Indochina, and throughout Malesia to New Guinea and Solomon Is. The most widespread species of *Cleistanthus* in tropical Asia.

Tree to 25 m., in evergreen forest or scrub up to 600 m. alt.; not noted from limestone.

Very variable, but usually recognizable by the thin golden-brown sericeous indumentum on the underside of the leaves, which are borne on rather slender petioles.

Cleistanthus papyraceus Airy Shaw in Kew Bull. 21: 368 (1968).

P1-3; E8; SW14.—Burma (Lower Chindwin).

Shrub or small tree to 5 m., locally common in dry open deciduous forest up to 500 m., sometimes associated with limestone.

The deciduous, thinly papery or scarcely chartaceous, obovate leaves, often markedly cuneate in the lower half, are characteristic.

Cleistanthus polypyllus F. N. Williams in Bull. Herb. Boiss. sér. 2, 5: 31 (1905); Jabl. viii: 24 (1915); Ridley: 193 (1924); Gage in Journ. As. Soc. Beng. 75(5): 512 (1936).

P15-18.—N. Malaya (Perlis, Lankawi, Kedah, Perak, Penang).

Shrub or small tree to 7 m., in evergreen forest or open scrub at low altitudes, sometimes noted as 'very common'.

Resembles a small-leaved version of *C. helferi*, and occurring in the same region, but less strongly pubescent and with much less reticulate venation. These differences appear to be constant.

Cleistanthus praetermissus Gage in Bull. Misc. Inf. Kew 1914: 240 (1914); Ridley: 193 (1924); Gage in Journ. Roy. As. Soc. Beng. 75(5): 511 (1936); Airy Shaw in Kew Bull. 21: 372 (1968), *q.v.*

P16.—Malaya (Penang, Johore); Borneo (Sabah). Very scarce in Siam and Malaya, but apparently more frequent in Sabah.

Shrub or tree to 18 m., in primary tall shady evergreen forest at low altitudes; once recorded from 'dry *Dryobalanops* forest' in Johore. One Siamese specimen (from Krabi, 4 Apr. 1930, Kerr 18850) was growing at the foot of a limestone hill.

Cleistanthus praetermissus, like *C. tomentosus* Hance (*q.v.*), is notable for its conspicuously pedicellate capsules. It is almost completely glabrous, with long-caudate leaves and short axillary inflorescences drying black. In the field notes to one specimen (*Beusekom & Phengklai* 697) the collectors note that the bark is 'remarkably whitish and smooth'. The dried herbarium material gives off a distinct aromatic odour.

Cleistanthus sumatrana (Miq.) Muell. Arg.: 504 (1866); Jabl. viii: 13 (1915); Backer & Bakh. f.: 474 (1963).

Leioptyxis sumatrana Miq., Fl. Ind. Bat. Suppl. (Fl. Sum.): 446 (1860).
?*Cleistanthus blancoi* Rolfe in Journ. Linn. Soc. Bot. 21: 315 (1884); Jabl. viii: 13 (1915) (with f. *dubius* Jabl.); Merr.: 419 (1923).

C. heterophyllus Hook. f.: 276 (1887); Jabl. viii: 14 (1915); Ridley: 190 (1924); Gage in Journ. As. Soc. Beng. 75(5): 505 (1936); **synon. nov.**
C. laevis Hook. f.: 277 (1887); Jabl. l.c.: 13 (1915).

?*C. vidalii* C. B. Rob. in Philipp. Journ. Sci. 3, Bot.: 193 (1908); Jabl. viii: 15 (1915); Merr.: 422 (1923).

C. saichikii Merr. in Philipp. Journ. Sci. 23: 248 (24 July 1923); **synon. nov.**

Paracleisthus subgracilis Gagnep. in Bull. Soc. Bot. France 70: 500 (Aug. 1923) & in Lecomte: 500 (1926); **synon. nov.**

N₁, 4; NE₅; SW₁₄; P₁₇, 18.—Indochina, Hainan, Malaya (Pahang, Malacca, Johore, Singapore), Sumatra, Borneo, ?Philippines, Celebes, Java, Moluccas.

Tree to 13 m., in moist places in dry evergreen or deciduous forest at altitudes up to 600 m.; sometimes forming almost pure stands (**SW₁₄**); not on limestone, but once noted (**NE₅**) from among sandstone boulders.

A markedly heterophyllous species, with a wide though scattered distribution. This has been largely responsible for the above extensive synonymy. The correctness of the suggested Philippines synonymy needs testing from more abundant material.

Resembles a more robust version of *C. gracilis*, with more gradually acuminate leaves.

Cleistanthus tomentosus Hance in Journ. Bot. 15: 337 (1877); Jabl. viii: 19 (1915); Airy Shaw in Kew Bull. 23: 62 (1969).

C. eburneus Gagnep. in Bull. Soc. Bot. France 70: 501 (1923), & in Lecomte: 483 (1926).

C. eburneus var. *sordidus* Gagnep., ll.cc.: 502 (1923) & 484 (1926).

N₂ (var.?), **4; SE₉, 10.**—Indochina (Cambodia, Cochinchina).

Small tree (to 10 m.) in evergreen forest at low altitudes (up to 200 m.); not noted from limestone; locally common.

The single collection (*Kerr* 4798) from **N₂**, from deciduous jungle at an altitude of 350 m., differs from the remainder in having smaller oblong leaves arranged distichously on elongate somewhat fastigiately arranged side-shoots, curiously resembling the habit of *Phyllanthus columnaris* Muell. Arg. Further material is needed in order to establish the status of this form.

Gagnepain suspected the identity of his *C. eburneus* var. *sordidus* with *C. tomentosus*, but rightly pointed out that Hance had described the latter as having sessile flowers and capsules, whereas those of *C. eburneus* were conspicuously pedicellate. Hance's statement seems to have been due either to an unfortunate slip of the pen, or possibly to the state of the material, since a probable syntype preserved at Kew shows only young inflorescences and detached broken fruits, in which the pedicels of the flower-buds are inconspicuous and those of the fruits are missing. Hance's own type has not been seen.

In their conspicuously pedicelled capsules *C. tomentosus* and *C. praetermissus* Gage differ markedly from almost all other Asiatic species, except for the small isolated group comprising Sect. *Pedicellati* Jabl. Gagnepain referred his *C. eburneus* to this latter section on the pedicel character, but in other respects (especially foliage and venation) it differs considerably. In Kew Bull. 21: 372 (1968) I have suggested that the affinities of *C. praetermissus* seem to be principally with Sect. *Leiopyxis* (Miq.) Jabl. *C. tomentosus*, on the other hand, appears to be referable to Sect. *Stipulati* Jabl., since the flower-clusters are borne in the axils of ordinary leaves on the long shoots, rather than on special more or less leafless lateral branchlets. Pedicel development thus seems to have taken place in three distinct groups of species, and is apparently not an indication of close affinity.

C. tomentosus is superficially very similar to *C. helferi* (Penins. Siam), but differs (in addition to the pedicelled capsule) in the weaker indumentum and in the cuneate to rounded but never cordate leaf-base.

Cleistanthus sp.

P16.—Kao Pawta Chongdong, Ranawng, 19 Jan. 1929, *Kerr* 16733.

Small tree to 6 m., in evergreen forest at 50 m. alt.

In leaf-shape and indumentum the specimen somewhat recalls *C. helferi*, but the flowers are very small and borne in 1–2-flowered glomerules. It may represent an undescribed species, but further material is desirable.

Cnesmone Bl.

Strongly hirsute; leaves closely denticulate or serrulate; stipules large, conspicuous, often brownish when dry **C. javanica**
Thinly pubescent, often appearing glabrous; leaves mostly shallowly dentate; stipules inconspicuous:

Leaves larger, membranous, shallowly or shortly cordate at base

C. laotica

Leaves smaller, firmer in texture, truncate at base. **C. laevis**

Cnesmone javanica Bl., Bijdr.: 630 (1825), corr. Bl., Fl. Jav. Praef. p. vi (1828); Muell. Arg.: 926 (1866); Hook. f.: 466 (1888); Pax & Hoffm. ix-xi: 102 (1919); Ridley: 306 (1924); Gagnep.: 385 (1926); (*Cnesmosea*) Backer & Bakh. f.: 490 (1963).

Tragia hastata Reinw. ex Hassk., Pl. Jav. Rar.: 245 (1868).

?*Cenesmon tonkinense* Gagnep. in Bull. Soc. Bot. France 71: 869 (1924) & in Lecomte: 389 (1926), *e descr.*

?*Cnesmone tonkinensis* (Gagnep.) Croiz. in Journ. Arn. Arb. 22: 429 (1941).

N1, 4; SE9, 10; P15, 17.—Assam, Burma, Indochina, Malay Peninsula, Sumatra, Borneo, Java.

Herbaceous climber in evergreen, mixed or bamboo forest, sometimes in clearings, up to 500 m. alt.

Strongly hirsute and urticating; leaves sometimes oblong or slightly panduriform, deeply cordate at base, with a wide sinus, closely denticulate or serrulate; stipules large, conspicuous, often brownish when dry.

Cnesmone laevis (Ridley) Airy Shaw in Kew Bull. 23: 118 (1969).

Tragia laevis Ridley in Bull. Misc. Inf. Kew 1923: 368 (1923) & Fl. Mal. Penins. 3: 307 (1924); Henderson in Journ. Mal. Br. Roy. As. Soc. 17: 72 (1939); Croiz. in Journ. Arn. Arb. 22: 422 (1941), *in obs.*

P15.—N. Malaya (Lankawi Is.)

Stinging vine, on limestone rocks or slopes at 200 m.; stated to be locally common.

Sparingly and shortly pubescent, smooth in general appearance; stems slender; leaves small, triangular-ovate, truncate at base, shallowly sinuate-denticulate.

Cnesmone laotica (*Gagnep.*) *Croiz.* in *Journ. Arn. Arb.* 22: 428 (1941), *e descr.*; *Airy Shaw* in *Kew Bull.* 23: 117 (1969).

Genesmon laoticum *Gagnep.* in *Bull. Soc. Bot. France* 71: 867 (1924) & in *Lecomte*: 390 (1926).

N1, 2; NE5.—Indochina (Laos, Cambodia).

Herbaceous undershrub to 1 m., or climber, with stinging hairs, in evergreen or deciduous forest at 250–600 m. alt.

Leaves membranous, shallowly or shortly cordate at base, with a narrow sinus, shallowly or prominently dentate, thinly pubescent.

Croton L.

Leaves densely silvery or coppery or white-lepidote beneath:

Leaves strongly trinerved at base; lepidote scales on upper surface relatively large, subentire, less dense and more persistent than in *C. argyratus* **C. kongensis**

Leaves penninerved:

♀ sepals large, up to 12 mm. long; leaves narrowly elliptic-lanceolate **C. sepalinus**

♀ sepals considerably smaller:

Leaves not distinctly pseudo-verticillate, not separated by long bare portions of stem, not cordate at base, acutely acuminate at apex; stipules linear, elongate; inflorescence elongate (to \pm 15 cm.); capsule large **C. argyratus**

Leaves distinctly pseudo-verticillate, separated by long bare portions of stem, rounded or narrowly cordate at base, less acute at apex; stipules smaller; inflorescence short, mostly under 7 cm. (rarely reaching 13 cm.); capsule small:

Leaves larger (to 20 cm. long), drying green or grey (rarely yellowish-brown) above, usually attenuate at apex **C. cascarilloides**

Leaves smaller (to 9 cm. long), drying dark brown above, rounded and sometimes mucronate at apex **C. mekongensis**

Leaves densely or sparsely stellate-pubescent or hirsute beneath, or glabrous:

No stellate hairs on any part of plant; stems finely puberulous; leaves narrow, shallowly serrulate; capsule broadly truncate above, with a conspicuous horizontal flange **C. colobocarpus**

Stellate hairs present at least on young inflorescence; capsule not as above:

Leaves \pm hirsute or scabrid or tomentose:

Floral bracts shortly subulate, fringed with conspicuous black capitate glands; plant densely ochraceous-tomentose **C. crassifolius**

Floral bracts without such glands:

Usually scandent shrubs:

Capsule large, smooth, thick-walled, globose or \pm oblong, to 2.5 cm. long; leaves membranous, brittle when dry, coarsely toothed **C. caudatus**

Capsule small, tricoccous, muriculate; leaves chartaceous, suborbicular, denticulate **C. calococcus**

Erect shrubs or trees, with \pm membranous leaves:

Tree; leaves softly tomentellous, broadly elliptic-ovate, entire, broadly cuneate at base **C. laccifer**

Slender shrubs; leaves rounded to cordate at base:

Leaves very shortly whitish-tomentellous beneath, mostly finely, closely and irregularly denticulate, subchartaceous **C. krabas**

Leaves harshly hirsute, sometimes coarsely lobulate-toothed, thinly membranous. **C. trachycaulis**

Leaves neither hirsute nor scabrid nor tomentose:

Leaves membranous, elliptic to ovate or suborbicular, strongly 3-5-nerved at the base:

δ (and usually φ) sepals glabrous; δ pedicels longer and slenderer; leaves elliptic to ovate **C. tiglium**

δ and φ sepals yellow-stellate-strigose; δ pedicels shorter and less slender; leaves ovate to suborbicular **C. birmanicus**

Leaves chartaceous to coriaceous, elliptic, ovate, obovate or oblanceolate, not or weakly 3-5-nerved at the base:

Leaves below and inflorescences densely minutely whitish-stellate-pubescent; capsule woody, 1 cm. in diameter; robust plant **C. hutchinsonianus**

Leaves below and inflorescences not densely whitish stellate-pubescent:

Leaves narrowly oblong-elliptic, 3-10 cm. long, 1-2 cm. (rarely 3 cm.) wide, glabrous when mature; petiole 2-5 mm. (rarely 9 mm.) long **C. kerrii**

Leaves larger on average, and especially broader:

Styles connate below into a column 1.5 mm. long, shortly bifid above; capsule densely minutely lepidote; petiole 3-17 mm. long; closely resembling *C. thorellii* **C. columnaris**

Styles free or almost so:

Inflorescence exceptionally robust, to 30 cm. long in flowering stage, but δ portion very caducous; rhachis strongly grooved and angled; φ sepals conspicuous, 2-3 mm. broad, persistent **C. poilanei**

Inflorescence less robust (but may be 30 cm. long or more), δ portion less caducous:

φ sepals conspicuous, short, broad, mostly obtuse, almost 2 mm. wide, almost glabrous; leaves almost glabrous, drying dark brown **C. leiophyllus**

φ sepals less conspicuous, either narrower or acute or stellate-pubescent:

Petioles 1-4 mm. (rarely up to 10 mm.) long; leaves elliptic-oblanceolate, 10-25 cm. long **C. thorellii**

Petioles longer:

Leaves \pm membranous:

Petiole 2-7 cm. long; leaves mostly drying ochraceous, or sometimes green; basal glands sessile **C. griffithii**

Petiole 0·5–4 cm. long:

Leaves mostly drying green, not lyrate; basal glands slenderly stipitate; not precocious flowering; ♀ sepals 2 mm. long in fruit

C. hookeri

Leaves drying ochraceous-brownish, sublyrate at base; basal glands sessile; often flowering and fruiting precociously; ♀ sepals to 5 mm. long in fruit, acuminate

C. sublyratus

Leaves chartaceous or coriaceous:

Inflorescence under 8 cm. long; leaves elongate, 10–25 cm. long, long-acuminate

C. longissimum

Inflorescence usually much longer:

Indumentum of ♀ sepals tomentellous; ♀ pedicels usually elongate (5–8 mm.)

C. wallichii

Indumentum of ♀ sepals stellate-lepidote; ♀ pedicels shorter:

Capsule ovoid-ellipsoid or oblong, 2·5–3·5 cm. long, obscurely lobed; seeds oblong

C. joufra

Capsule subglobose, tricoccous, 1 cm. long; seeds short:

Leaves mostly larger, very coarsely toothed, mostly drying light green; inflorescences very elongate

C. oblongifolius

Leaves mostly smaller, less coarsely toothed to entire, mostly drying brown, as in *C. joufra*; inflorescences shorter:

Leaves serrate, almost devoid of scales beneath

C. delpyi

Leaves entire or almost so, with distantly scattered brownish scales on lower surface

C. robustus

Croton argyratus Bl. (*sensu lato*), Bijdr.: 602 (1825); Muell. Arg.: 526 (1866); Hook. f.: 385 (1887); Merr.: 425 (1923); Ridley: 260 (1924); Gagnep.: 277 (1925); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 70 (1939); Corner: 247 (1940); Backer & Bakh. f.: 476 (1963).

C. budopensis Gagnep. in Bull. Soc. Bot. France 58: 549 (1922) & in Lecomte: 281 (1925), **synon. nov.**

C. maieuticus Gagnep.: 284 (1925), **synon. nov.**

SE9; SW14; PI5–18.—Burma to Moluccas and Bali.

Tree or shrub to 10 m., scattered in evergreen forest or scrub up to 300 m. alt.

The dense coppery-silvery covering of peltate scales on the stems, inflorescences and lower leaf-surface distinguishes the *argyratus* complex from

most other species of the area. *C. potabilis* Croiz., which is very similar vegetatively, differs in its very small capsule. *C. maieuticus* Gagnep. appears to be a shade form with more pronounced basal nerves. In *C. kongensis* Gagnep. the scales on the upper surface of the leaves are much larger, almost entire, more scattered and often persistent, whereas in *C. argyratus* they are minute, lacerate-stellate, very dense and quickly evanescent.

Var. **microcarpus** Gagnep.: 277 (1925); Croiz. in Journ. Arn. Arb. 23: 42 (1942), *in obs.*

SW14.—Endemic.

I am equally at a loss with Croizat (*J.c.*) to know what this plant is. Gagnepain based it upon two collections of Pierre (Muong-pran and Mt. Luang), which I have not yet seen, nor have I seen any other collections from Rachaburi Circle (**SW14**) which could be referred to it, or indeed which belong to the *argyratus* affinity at all. On account of the small fruit, Croizat wondered whether it might be the same as his *C. potabilis* from Annam, which would give a curious distribution. The matter can only be settled by inspection of Gagnepain's type material.

Croton birmanicus Muell. Arg. in Linnaea 34: 112 (1865) & in DC.: 601 (1866); Hook. f.: 389 (1887); Airy Shaw in Kew Bull. 23: 72 (1969).

N1, 2 (cult.); **C12** (cult.).—Burma.

Shrub or small tree, in cultivation, up to 500 m. alt.; not certainly known from a wild locality in Siam.

Leaves broadly elliptic-ovate to suborbicular, strongly 3(-5)-nerved at base, acutely, finely and unevenly denticulate, thinly stellate below; pedicels, calyces and ovary densely and coarsely ochraceous-stellate-tomentose.

Further collections are needed to show whether this is more than a well-marked form of the widely cultivated *C. tigillum*.

Croton cascarilloides Raeusch., Nomencl. ed. 3: 280 (1797); Merr. in Lingnan Sci. Journ. 13: 60 (1934) & in Trans. Amer. Philos. Soc. n.s. 24(2): 234 (1935); Croiz. in Journ. Arn. Arb. 23: 46 (1942); Airy Shaw in Kew Bull. 16: 344 (1963).

C. punctatus Lour., Fl. Cochinch.: 581 (1790); Muell. Arg.: 565 (1866); Gagnep.: 290 (1925); *non* Jacq. (1787).

C. cumingii Muell. Arg. in Linnaea 34: 101 (1865) & in DC.: 566 (1866); Craib: 463 (1911) & 190 (1912); Merr.: 426 (1923); Ridley: 261 (1924); Gagnep.: 264 (1925); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 30, 70 (1939).

C. pierrei Gagnep. in Bull. Soc. Bot. France 58: 558 (1922) & in Lecomte: 265 (1925), **synon. nov.**

N3; SE10; SW14; P15-17.—Lower Burma; Indochina to Ryu-Kyu Is., and throughout W. Malesia (rare in Sumatra & Borneo).

Shrub to 4·5 m., in dry evergreen forest up to 200 m. alt.; once noted as common on a limestone hill (**P15**). (Cultivated in the Palace Gardens at Bangkok in 1882.)

Readily distinguished from *C. argyratus* by its abbreviated inflorescences, small capsules, and pseudo-vorticillate leaves separated by long bare portions of stem.

Croton calococcus Kurz, For. Fl. Brit. Burma 2: 376 (1877); Hook. f.: 389 (sphalm. "coelococcus") (1887); Gagnep.: 274 (1925); Airy Shaw in Kew Bull. 23: 73 (1969).

C12.—Burma, Indochina (Cambodia).

Scandent shrub, used as fence in garden, at very low altitude.

All parts (except older stems) ochraceous-scabrid or shortly hispid with rough stellate hairs; leaves broadly elliptic or suborbicular, quintuplinerved at base; inflorescences short; capsules tricoccous, muriculate-scabrid.

Croton caudatus Geisel., Croton. Monogr.: 73 (1807); Muell. Arg.: 599 (1866); Hook. f.: 388 (1887); Merr.: 425 (1923); Gagnep.: 286 (1925); Backer & Bakh. f.: 477 (1963).

C. caudatus var. *malaccanus* Hook. f.: 389 (1887); Ridley: 259 (1924).

C. caudatus var. *harmandii* Gagnep., l.c. (1925).

NE₅; SE₉; C₁₁, 12; SW₁₄; P₁₇, 18.—E. Himalayas to Ceylon & S. China, SE. Asia, and throughout W. Malesia.

Shrub or woody climber, locally common in evergreen or deciduous forest up to 100 m. alt.

Sparingly stellate-scabrid; leaves narrowly to broadly ovate, rather coarsely toothed, membranous, brittle when dry, nerves often incised above; capsule globose, bluntly 3- or 6-angled; seeds with scattered stellate hairs.

Croton colobocarpus Airy Shaw in Kew Bull. 23: 76 (1969).

NE₅.—Endemic.

Hemicryptophyte of 10–15 cm., from woody rootstock, locally common in open grassy ground at 200 m. alt.

Plant entirely lacking stellate hairs, but stems finely puberulous; leaves narrow, oblong-ob lanceolate, shallowly serrulate; inflorescence usually with 1 distant basal female and several crowded terminal male flowers; capsule tricoccous, broadly truncate above, with a conspicuous horizontally projecting flange. A very distinct species, evidently pyrophytic.

Croton columnaris Airy Shaw in Kew Bull. 23: 69 (1969).

N₂, 4.—Endemic.

Shrub to 1·5 m., in open evergreen or deciduous forest at 100–200 m. alt.

Differs from the very similar *C. thorelli* Gagnep. in the bifid (not quadrifid) styles, which are connate below into a conspicuous column, and in the almost continuous covering of minute stellate hairs on the capsule.

Croton crassifolius Geisel., Croton. Monogr.: 19 (1807); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 235 (1935).

Tridesmis tomentosa Lour., Fl. Cochinch.: 576 (1790), *non Croton tomentosus* Link (1822).

T. hispida Lour., l.c. (1790), *non Croton hispidus* Kunth (1817).

C. tomentosus (Lour.) Muell. Arg. in Linnaea 34: 107 (1865) & in DC.: 588 (1866); Craib: 190 (1912); Gagnep.: 262 (1925); *non* Link (1822).

N1; NE5; E8.—Indochina, S. China.

Low shrub to 30 cm., locally common in open dry deciduous forest, old clearings, etc., at 300–400 m. alt.

Densely ochraceous-tomentose, the leaves scabrid above; floral bracts shortly subulate, fringed with conspicuous black capitate glands.

Croton delpyi Gagnep. in Bull. Soc. Bot. France 58: 552 (1922) & in Lecomte: 272 (1925).

N1; NE5; SE9, 10; P15-18.—Yunnan (?), Indochina.

Tree to 15 m., common in evergreen or mixed forest and scrub from very low altitudes up to 1050 m.

Very close to *C. joufra* Roxb., from which it is apparently only certainly distinguishable by its small tricoccous capsules. See note under *C. joufra*, below.

Croton griffithii Hook. f.: 392 (1887); Ridley: 261 (1924).

C. laevifolius sec. Corner in Gard. Bull. Str. Settlem. 10: 294 (1939), *an* Bl.?

P16.—Malay Peninsula, Borneo, Sangië & Talaud Is.

Shrub or small tree to 5 m., in scrub up to 150 m. alt.

A thin-leaved plant, usually drying a pale ochraceous-brown colour; leaves shallowly crenate to subentire, usually long-petioled, with inconspicuous sessile basal glands; young parts and inflorescences sparsely stellate-lepidote, eventually almost glabrous.

With great respect to my good friend Prof. E. J. H. Corner, I am not yet wholly convinced that *C. griffithii* is conspecific with *C. laevifolius* Bl., though I believe he is right in reducing *C. confusus* Gage to Blume's species. *C. laevifolius* (?*C. oblongus* Burm. f.) seems to represent a plant with coriaceous leaves, usually drying a dark colour—sometimes a dull reddish-brown—giving a very different effect from the thin yellowish or greenish leaves of *C. griffithii*. It may be that these two entities represent the extremes of a polymorphic complex, but for the present I prefer not to subsume them under one specific name.

Croton hookeri Croiz. in Journ. Arn. Arb. 21: 498 (1940).

C. laevifolius sec. Hook. f.: 391 (1887); Craib: 463 (1911) & 190 (1912) (var. ?); Kanjilal, De & Das, Fl. Assam 4: 195 (1940); *non* Bl.

C. khasianus Hook. f.: 392 (1887), *in obs.*, *nom. event.*; vide Croizat, l.c.

N1, 4; NE5; SE10; P15-17.—Assam; SW. China (Yunnan).

Shrub of 1–2 m., locally common in evergreen forest from 50 to 1300 m. alt.; once noted (**P16**) at foot of a limestone hill.

Near *C. griffithii*, but leaves short-petioled, usually drying green or brown, with conspicuous often long-stipitate basal glands.

Croton hutchinsonianus Hosseus in Fedde, Rep. Sp. Nov. 10: 64 (1911); Craib: 463 (1911) & 190 (1912); Gagnep.: 278 (1925).

NI-3; SW14.—Endemic.

Shrub or small tree to 4·5 m., locally common in dry mixed deciduous forest or open scrub, on lateritic or sandstone soil, up to 420 m. alt.

Bark corky and deeply cracked; deep red sap.

A coarse plant, with large coriaceous leaves densely minutely stellate-pubescent below; inflorescence densely whitish stellate-tomentose.

Croton joufra Roxb., Fl. Ind. 3: 685 (1832); Muell. Arg.: 519 (1866); Hook. f.: 387 (1887); Gagnep.: 280 (1925).

To be expected in Siam.—Assam, Burma; Indochina.

Apparently almost indistinguishable from *C. delphyi* Gagnep. except by the much larger, somewhat oblong, obscurely lobed capsules and large oblong seeds. Some of the Siamese records of *C. delphyi* based on flowering material may be referable to *C. joufra*.

Croton kerrii Airy Shaw in Kew Bull. 23: 71 (1969).

NE5; E8.—Endemic.

Shrub to 2 m., in open grassy ground or scrub or evergreen forest at 100–200 (–1300?) m. alt.

Slender plant; leaves narrowly elliptic to narrowly oblanceolate, finely and shallowly denticulate-serrate, very shortly petioled; all parts sparsely stellate-lepidote when young, finally almost glabrous, leaves sometimes black-punctate; inflorescences short, slender.

Croton kongensis Gagnep. in Bull. Soc. Bot. France 58: 555 (1922) & in Lecomte: 287 (1925); Croiz. in Journ. Arn. Arb. 21: 500 (1940).

C. tonkinensis Gagnep., ll.cc.: 560 (1922) & 269 (1925); Merr. & Metc. in Lingnan Sci. Journ. 16: 389 (1937); **synon. nov.**

NI, 4; E8.—SW. China (Yunnan), Indochina.

Shrub or small tree to 4 m., in evergreen forest up to 1200 m. alt.

Close to *C. argyratus*, differing in the clearly and strongly trinerved leaf-base, and in the larger, subentire, less dense and more persistent lepidote scales on the upper leaf-surface. *C. tonkinensis* represents a more narrow-leaved form, stated to be cultivated around Hanoi for medicinal purposes. Both it and *C. kongensis* are recorded by Gagnepain from Hue.

Croton krabas Gagnep. in Bull. Soc. Bot. France 58: 555 (1922) & in Lecomte: 286 (1925).

N3; NE5(?); **CII, 13.**—Indochina (Laos, Cambodia, Annam).

Straggling shrub to 3 m., in evergreen scrub, in swampy places or on river banks, at very low altitudes.

A characteristic species, related to *C. caudatus*, with slender branches and smallish, narrowly ovate, ovate or rhombic-ovate, irregularly denticulate or lobulate-denticulate leaves, which are densely whitish-stellate-tomentellous beneath; nerves usually distinctly incised above. Capsule (only present on one gathering) small, thin-walled, slightly oblong, shallowly 6-angled; seeds oblong, with numerous stellate hairs.—A closely related plant, apparently with glabrous seeds, occurs in Sabah (N. Borneo).

Croton laccifer ('lacciferum') L., Sp. Pl.: 1005 (1753); Muell. Arg.: 588 (1866); Gamble, Fl. Pres. Madras 2: 1315 (1925); Alston in Trimen, Handb. Fl. Ceylon 6: 264 (1931).

Aleurites laccifera (L.) Willd., Sp. Pl. 4: 590 (1805).

Croton aromaticus sec. Hook. f.: 388 (1887), pro parte, *non* L.

C. aromaticus var. *lacciferus* [sic] (L.) Trimen, Handb. Fl. Ceylon 4: 48 (1898).

N1.—Penins. India & Ceylon.

Tree of 8 m., in evergreen forest on limestone at 700 m. alt.

Closely resembling the Indian and Singhalese material, but the female flowers are almost sessile. Further gatherings will be needed in order to establish the status of this Siamese plant. The distribution is curious, but can be paralleled in e.g. species of *Phyllanthus* (cf. *P. polyphyllus* Willd. var. *siamensis* Airy Shaw) and *Sauvagesia* (cf. *S. quadrangularis* Willd.). Cf. also *Mallotus eriocarpus* (Thw.) Muell. Arg. (*Coelodiscus montanus* Muell. Arg.) in Ceylon and Penang.

Croton laccifer differs from *C. caudatus* in its arborescent habit, subentire, fulvous-tomentose leaves and much smaller thin-walled capsule.

Croton leiophyllus Muell. Arg. in Linnaea 34: 103 (1865) & in DC.: 573 (1866); Merr.: 426 (1923); Croiz. in Journ. Arn. Arb. 23: 506 (1942).

P18.—Borneo, Philippines.

Tree in evergreen forest at 540 m. alt.

The specimen closely matches the Philippine material, but the status of the species in relation to *C. laevifolius* Bl. (?*C. oblongus* Burm. f.) has yet to be established.

Leaves chartaceous, conspicuously serrate, with reflexed margins, smooth, glabrous, drying brown; female sepals conspicuous, 2–3 mm. long, oblong-ovate, obtuse, apiculate, very sparsely lepidote, drying brown; ovary densely white-lepidote; styles rather short.

Croton longissimus Airy Shaw in Kew Bull. 23: 70 (1969).

N2 (cult.).—Endemic?

Shrub in cultivation at 300 m. alt.

Resembles *C. columnaris* in its thin acuminate leaves and in the close brown minutely stellate indumentum of the young parts, but differs in the much finer and closer serration of the leaves, the longer inflorescences and the styles free almost to the base.

Croton mekongensis Gagnep. in Bull. Soc. Bot. France 58: 558 (1922) & in Lecomte: 276, fig. 29/6-8 (1925), *e descr. et ic.*

N₃.—Indochina (Laos, Cambodia).

Thin shrub to 3 m., in high-grass savannah at very low altitudes.

I have not yet seen authentic material of *C. mekongensis*, but two Siamese gatherings (*Kerr* 3936, *Vanpruk* 1021) agree so closely with the description and illustration of this species that I feel almost certain of the identification. The rather small, narrowly elliptic-oblong leaves, obtuse or rounded at base and apex, densely white-lepidote beneath, glabrous and drying dark brown above, appear to be highly characteristic.

Croton oblongifolius Roxb., Fl. Ind. 3: 685 (1832); Muell. Arg.: 573 (1866); Hook. f.: 386 (1887); Craib: 464 (1911) & 190 (1912); Gagnep.: 279 (1925); *non sec.* Hosseus: 404 (1911).

N₁₋₃; NE₅; E₈; SE₉; SW₁₄.—India, Ceylon, Assam, Burma, Yunnan, Indochina.

Shrub or tree to 10 m., common in evergreen or dry deciduous or mixed bamboo forest or scrub, up to 700 m. alt.

Usually recognizable by its large, glabrous, very coarsely crenate-serrate leaves, which often remain more or less green when dry, and by its very elongate inflorescences. It is sometimes dioecious.

Merrill (in Lingnan Sci. Journ. 13: 59-60 (1934)) treated this species as conspecific with *C. laevigatus* Vahl, of Hainan, but I agree with Croizat (in Journ. Arn. Arb. 23: 46 (1942)) that this was erroneous. The Hainan gatherings have uniformly smaller, subentire leaves, and appear to represent a local endemic.

Croton poilanei Gagnep. in Bull. Soc. Bot. France 58: 559 (1922) & in Lecomte: 270 (1925).

N₁, 3; SE₉, 10.—Indochina (Laos, Cambodia, Cochinchina).

Shrub or small tree to 8 m., in evergreen and moist mixed forest up to 200 m. alt.

A robust species, with thick, densely minutely brownish-lepidote stems, rather large, oblong-elliptic, distantly crenate-serrate leaves, almost glabrous when mature, elongate inflorescences (the male portion usually finally caducous), and female flowers with conspicuous broad sepals; ripe capsules unknown (probably small).

Croton robustus Kurz, For. Fl. Brit. Burma 2: 372 (1877); Hook. f.: 387 (1887); Craib: 464 (1911) & 190 (1912); Gagnep.: 289 (1925).

C. oblongifolius sec. Hosseus: 404 (1911), *non Roxb.*

C. siamensis Craib in Bull. Misc. Inf. Kew 1918: 369 (1918); Gagnep.: 288 (1925); **synon. nov.**

N₁; SE₁₀.—Burma.

Tree of 6-10 m., locally frequent in evergreen (chestnut and oak) forest and scrub up to 800 m. alt.

The distinctive features of *C. robustus* appear to be the entire or subentire leaves (up to 25 cm. long) with scattered brown scales on the lower surface. The upper surface sometimes turns a blackish-green colour on drying.

Croton sepalinus *Airy Shaw* in Kew Bull. 25: 514 (1971).

C11.—Endemic.

Shrub or small tree to 4 m., in evergreen forest at 100 m. alt.

In the general affinity of *C. argyratus*, perhaps closest to *C. potabilis* Croiz. in its small capsule, but differing in its narrower, elliptic-lanceolate leaves and especially in the much larger oblong sepals of the female flower, up to 12 mm. long.

Croton sublyratus *Kurz*, For. Fl. Brit. Burma 2: 374 (1877); Hook. f.: 390 (1887).

SE10; PI6.—Andamans, Burma, ?Malay Peninsula.

Small tree of 5 m., locally common in open scrub up to 120 m. alt.

Recognizable in fruit by the small, strongly 3-lobed, very thinly stellate-pubescent capsules, which may be almost ripe when the young leaves are still unfolding. Leaves cuneate-obovate, shortly cordate at extreme base and often slightly contracted (subpanduriform) above it, but apparently very variable, judging by Andamans material.

Croton thorelii *Gagnep.* in Bull. Soc. Bot. France 58: 560 (1922) & in Lecomte: 264 (1925).

E7, 8; SE10.—Indochina (Laos, Cambodia, Cochinchina).

Shrub or small tree to 4 m., by streams in evergreen forest up to 200 m. alt.

Close to *C. columnaris* and *C. longissimus*, differing especially in the exceptionally short petioles; styles quadrifid, free; capsules with scattered, small, subfasciculate stellate hairs.

Croton tiglium *L.*, Sp. Pl.: 1004 (1753); Muell. Arg.: 600 (1866); Hook. f.: 393 (1887); Merr.: 427 (1923); Ridley: 262 (1924); Gagnep.: 285 (1925); Corner: 248 (1940); Backer & Bakh. f.: 477 (1963).

N1 (cult.); **C12** (cult.).—India, Ceylon, China, and throughout Malesia.

Shrub or tree to 6 m. high, cultivated for medicinal purposes, up to 600 m. alt.

Croton trachycaulis *Airy Shaw* in Kew Bull. 23: 74 (1969).

C. calococcus sec. *Gagnep.*: 274 (1925), pro parte, *non Kurz.*

E8; SW14; PI7.—Endemic.

Shrub to 2 m., in dry evergreen forest or scrub on limestone up to 200 m. alt.

Closely related to *C. murex* Croiz. and less closely to *C. lachnocarpus* Benth., differing from both in its harsh, almost hispid indumentum. Leaves thinly membranous, very remotely and sometimes coarsely dentate.

Leaves reported to be sticky (*Winit* 589).

Croton wallichii Muell. Arg. in Linnaea 34: 118 (1865) & in DC.: 623 (1866); Hook. f.: 390 (1887); Gagnep.: 282 (1925).

P15, 16.—Burma, ?Malay Peninsula.

Tree to 10 m. high, locally common in evergreen forest or scrub up to 100 m. alt.

Leaves cuneate-ovate, narrowly cordate at the extreme base, shallowly serrate or crenate, petiole slender, sometimes densely puberulous; inflorescences very slender, elongate, sinuous; flowers softly stellate-tomentose; female pedicels usually elongate.

The characters of *C. wallichii* are somewhat elusive; the species is sometimes difficult to separate from *C. sublyratus*.

Dalechampia L.

Stem glabrous or minutely puberulous; leaves deeply 3-lobed, minutely puberulous on the nerves beneath: inflorescence bulky. **D. bidentata**

Stem manifestly pilosulous; leaves trifoliate, shortly grey-tomentellous beneath; inflorescence smaller. **D. elongata**

Dalechampia bidentata Bl., Bijdr.: 632 (1825); Muell. Arg.: 1243 (1886); J. J. Sm.: 531, 756 (1910); Pax & Hoffm. xii: 31 (1919); Backer & Bakh. f.: 493 (1963); Airy Shaw in Kew Bull. 23: 121 (1969).

?*Dalechampia* sp., Gagnep.: 345 (1925), *in adnot.*

SE9; SW14.—Burma, S. China (var. *yunnanensis* Pax & Hoffm.), ?Indochina (Laos); Sumatra, Java.

Climber in evergreen forest at 400–800 m.

Stem glabrous or very minutely puberulous; leaves deeply 3-lobed, minutely puberulous on the nerves beneath; inflorescence bulky, with large membranous bracts and pectinate sepals, conspicuous in the fruiting stage.

Dalechampia elongata Craib in Bull. Misc. Inf. Kew 1918: 369 (1918).

N₂, 3.—Endemic.

Herbaceous climber in deciduous forest at 100–300 m.

Stem manifestly pilosulous; leaves completely trifoliolate, shortly grey-tomentellous beneath; inflorescence smaller than in *D. bidentata*, with smaller bracts and sepals.

Dimorphocalyx Thw.

Leaves entire or almost so; fruiting calyx accrescent; capsule smooth

D. luzoniensis

Leaves dentate or denticulate; fruiting calyx not accrescent; capsule tuberculate **D. muricatus**

Dimorphocalyx luzoniensis Merr. in Philipp. Journ. Sci. 5: 192 (1910);
Pax & Hoffm. iv: 284 (1912); Merr.: 455 (1923).

P16.—Borneo, Philippines.

Shrub of 2·5 m., or tree to 7 m., in evergreen forest at 100 m. alt.

Readily distinguished from the related *D. muricatus* (Hook. f.) Airy Shaw, *D. denticulatus* Merr. (*D. pauciflorus* (Merr.) Airy Shaw, **synon. nov.**) and *D. murinus* Elm., by its entire or very obscurely denticulate leaves. From *D. murinus*, with which it agrees in having an accrescent fruiting calyx, it differs further in its glabrous capsule.

Dimorphocalyx muricatus (Hook. f.) Airy Shaw in Kew Bull. 20: 412 (1966).

Ostodes muricatus Hook. f.: 401 (1887); Pax & Hoffm. iii: 21 (1911); Ridley: 269 (1924).

P18.—Malaya, Sumatra, Borneo.

Shrub of 4 m., locally common by stream in evergreen forest (altitude unknown).

Distinguished from its immediate relatives by its non-accrescent fruiting calyx and by its densely verrucose or tuberculate capsule. Male or sterile material can usually be distinguished from *D. denticulatus* and *D. murinus* by the petiole generally exceeding 1·5 cm., and from *D. luzoniensis* by the manifestly toothed leaves.

Drypetes Vahl

Stamens 1–4; ♂ flowers very small, crowded; disk 0; drupe long-pedicelled, small, hard, ovoid, often subacute at apex, 1-locular, 1-seeded; leaves obliquely ovate, closely serrulate (§ *Putranjiva*) **D. roxburghii**

Stamens 3–25 or more; ♂ flowers larger; disk present, central; drupe various, 1–4-seeded:

Styles relatively elongate, slender, 2–3 mm. long; stamens 4–8; drupes rather small, long-pedicelled; stipules often large and membranous (§ *Stenogynium*) **D. indica**

Styles short or obsolete; stamens 8–12 or more; drupes more shortly pedicelled; stipules smaller:

Ovary 1-locular; leaves usually rather small, crenate-serrate (§ *Drypetes [Hemicyclia]*):

Young parts and inflorescences golden-sericeous; leaves thinly chartaceous; stamens 20–25 **D. ochrothrix**

Young parts and inflorescences grey-puberulous or glabrous:
Leaves chartaceous; stamens \pm 28; drupes small, oblong-ovoid, glabrous, with oblique subterminal style and sculptured endocarp **D. cambodica**

Leaves coriaceous, small, ovate, shallowly crenate-serrate; nervation \pm reticulate:

Leaves coarsely reticulate; stipules conspicuous, linear, persistent; stamens \pm 24; fruit about 18 \times 14 mm. **D. perreticulata**

Leaves minutely reticulate (appearing smooth); stipules minute, fugacious; stamens 12–15; fruit about 10 \times 8 mm. **D. hoaënsis**

Ovary 2-locular; leaves various, often large (§ *Sphragidia*):

Leaves 4–10 cm. long, narrowly to broadly ovate, acuminate, entire; nerves somewhat reticulate below; stamens ± 20; drupe globose, 2–2·5 cm. in diameter, shortly fulvous-furfuraceous

D. hainanensis

Leaves 7–60 cm. long:

Leaves 30–60 cm. long and 10–25 cm. wide, unequally cordate at base; male flowers 12 mm. wide, glabrous; drupe 5–6·5 cm. in diameter, subglobose

D. pendula

Leaves 7–35 cm. long, not or scarcely cordate at base; male flowers smaller, externally pubescent; drupe up to 2 cm. in diameter:

Petiole exceptionally short, 1–3 mm. long; leaf oblong-lanceolate, up to 25 cm. long, glabrous, usually green when dry; stamens unknown; drupe transverse, bilobed, glabrous

D. curtisii

Petiole longer, 3–15 mm. long:

Stamens 3–6; disk plicate-dentate, with short inner processes embracing the base of the filaments; leaves 10–18 cm. long, shallowly and obscurely serrulate

D. subsessilis

Stamens 8–12 or more; disk otherwise:

Leaves serrate or dentate:

Leaves very large, 20–35 cm. long; drupes subsessile; ♂ flowers unknown

D. harmandii

Leaves smaller, 7–22 cm. long; drupes long-pedicelled; ♂ flowers sessile on a short axillary peduncle

D. helferi

Leaves entire:

Flowers on the older branches, large; drupe globose, up to 2 cm. in diameter

D. longifolia

Flowers in small axillary fascicles, smaller; drupe subcubical, 1–1·5 cm. in diameter .

D. assamica

Drypetes assamica (Hook. f.) Pax & Hoffm. xv: 241 (1922); Gagnep.: 566 (1927).

Cyclostemon assamicus Hook. f.: 342 (1887)

NE5; PI6.—E. Himalayas, Assam, Andamans, Indochina, Borneo (?), Lesser Sunda Is. (?).

Tree of 5–6 m., in evergreen forest up to 200 m. alt.

Leaves coriaceous, smooth and shining, quite entire; flowers shortly pedicelled, in small axillary fascicles; fruit subcubical, 1–1·5 cm. in diameter, thinly adpressed-fulvous-pubescent.

Drypetes cambodica Gagnep. in Bull. Soc. Bot. France 71: 258 (1924) & in Lecomte: 569 (1927) (sphalm. ‘*cambodica*’).

D. kurziana C. E. C. Fischer in Bull. Misc. Inf. Kew 1926: 439 (1926); Airy Shaw in Kew Bull. 19: 303, *in obs.*, 306, *in clavi* (1965); **synon. nov.**

N3; SE9, 10; SW14; PI5.—Burma, Indochina (Cambodia).

Tree of 4–8 m., in evergreen forest to 100 m. alt.

Leaves small to medium-sized, elliptic-ovate to lanceolate, acuminate, very shallowly crenate-serrate, smooth and somewhat shining, with fine, lax, rather inconspicuous venation, not reticulate; drupes small, oblong-ovoid, glabrous, with oblique subterminal style and characteristic sculptured endocarp (*vide* Fischer, *l.c.*). This South-East Asiatic plant may not be specifically distinct from *D. sumatrana* (Miq.) Pax & Hoffm., but more copious Sumatran material is required in order to settle the point.

Leaves used as tea by the Karens (N₃, Kerr 6094).

Drypetes curtisii (Hook. f.) Pax & Hoffm. xv: 250 (1922); Ridley: 223 (1924).

Cyclostemon curtisii Hook. f.: 343 (1887).

P15.—Malay Peninsula, ?Sumatra, ?Borneo.

Shrub to 3 m., in evergreen forest up to 500 m. alt.

Leaves chartaceous to coriaceous, glabrous, very shortly (2–3 mm.) petioled; fruit transverse, bilobed, glabrous.

Drypetes hainanensis Merr. in Journ. Arn. Arb. 6: 134 (1925), & in Lingnan Sci. Journ. 5: 107 (1927).

N₂, 4; C₁₁; SW₁₄; P15.—Hainan; to be expected in Indochina.

Tree to 12 m., in evergreen forest or among limestone rocks at 200–400 m. alt.

Near *D. microphylla* (Merr.) Pax & Hoffm., of the Philippines and North Borneo, with small ovate leaves and a globose, thin-walled, thinly fulvous-pilose fruit, but the leaves gradually (not abruptly) acuminate, the tip subacute (not rounded), and the fruit much more shortly pedicelled.

Drypetes harmandii Pierre ex Gagnep. in Bull. Soc. Bot. France 71: 259 (1924) & in Lecomte: 569 (1927).

SE₉, 10.—Indochina (Laos).

Tree to 15 m., in evergreen forest at low altitudes.

Leaves large, coriaceous, oblong, coarsely serrate; young branchlets sometimes egg-yellow; female sepals broadly obovate, 6–8 mm. long; fruit globose, 4 cm. in diameter, densely pubescent. Closely related to *D. oxyodonta* Airy Shaw (Malay Peninsula) and *D. oblongifolia* (Bedd.) Airy Shaw (S. India), differing from the former in the much laxer venation and less strong serration, and from the latter in the more manifest serration of the leaves.

Drypetes helferi (Hook. f.) Pax & Hoffm. xv: 244 (1922).

Cyclostemon helferi Hook. f.: 342 (1887).

P17.—Lower Burma.

Tree of 10 m., locally common in evergreen forest at 800 m. alt.

Young growth shortly adpressed-golden-puberulous, soon glabrous; leaves oblong or elliptic-oblong, to 22 × 7·5 cm., subspinulose-dentate or

sometimes subentire, abruptly or gradually acuminate, glossy, glabrous, strongly reticulate-nerved, chestnut-brown when dry; male flowers very shortly pedicelled, golden-puberulous or almost glabrous, with numerous stamens; fruit subglobose, ochraceous-puberulous, peduncle 1·5 cm. long, stigmas very large, flabellate.

Drypetes hoaënsis Gagnep. in Bull. Soc. Bot. France 71: 259 (1924) & in Lecomte: 570 (1927).

SE10; C11; PI5, 16.—Indochina (Cochinchina).

Tree to 12 m., locally very common in dry open evergreen forest on rocky limestone hills up to 100 m. alt.

Twigs rather densely leafy, with smallish ovate leaves, which are coriaceous, smooth, but dull owing to the densely and minutely reticulate nerves, acuminate, very shallowly crenate-serrate, drying a pale pinkish-brown colour; flowers small; fruit (not seen; teste Gagnepain) ovoid, 10 × 8 mm. Differs from *D. perreticulata* in its smooth leaves and minute fugacious stipules.

Drypetes indica (Muell. Arg.) Pax & Hoffm. xv: 278 (1922), *sensu lato*.

Cyclostemon indicus Muell. Arg. in Linnaea 32: 81 (1863) & in DC.: 481 (1866); Hook. f.: 340 (1887).

C. lanceifolius Hook. f., *l.c.*, **synon. nov.**

C. griffithii Hook. f., *l.c.*, **synon. nov.**

C. karapinensis ('-se') Hayata, Ic. Pl. Formos. 5: 198 (1915), *e descr.*

C. hieranensis Hayata, op. cit. 6: 42 (1916), *e descr.*

Drypetes karapinensis (Hayata) Pax & Hoffm. xv: 248 (1922).

D. hieranensis (Hayata) Pax & Hoffm., *l.c.*: 248 (1922).

D. lanceifolia (Hook. f.) Pax & Hoffm., *l.c.*: 277 (1922).

D. griffithii (Hook. f.) Pax & Hoffm., *l.c.*: 277 (1922).

D. nienkui Merr. & Chun in Sunyatienia 2: 258 (1935), **synon. nov.**

D. karapinensis var. *hieranensis* [sic!] (Hayata) Hurusawa in Journ. Fac. Sci.

Tok. Sect. III Bot., 6(6): 334 (1954).

N2; SE9; PI5, 16.—E. Himalaya, Assam, Burma, Hainan, Formosa.

Shrub or tree to 15 m., locally common in dense evergreen forest at 400–1600 m. alt.

Branches slender; leaves smallish or medium, variable in shape and texture, elliptic-oblong or ovate-oblong, entire; young shoots issuing from conspicuous fusiform strobili of chaffy perulae (cf. *Fagus*!); flowers scattered, long-pedicelled; styles long and slender, with small stigmas; fruit globose or sometimes lobed, on long pedicels.

Although certain specimens and populations look very different, I have been unable to find reliable means of distinguishing *D. lanceifolia* and *D. griffithii* from Mueller's original *D. indica*. Some later collections appear to bridge the gaps and to be not definitely referable to any of the three supposed species. Whether there is here a swarm of micro-species or of segregates from hybridization, or just an exceptionally polymorphic species, can only be elucidated by study in the field.

The Siamese populations largely bridge the geographical gap between the Indian-Assamese-Burmese plants and the species later described from

Hainan and Formosa. The Siamese gatherings approximate most closely to some of those from Assam included by Hooker in his *Cyclostemon lanceifolia*, and also to those of *D. nienkui* Merr. & Chun, of Hainan. Until satisfactory distinctions between these variable taxa can be found, the best course seems to be to treat them as conspecific.

Drypetes longifolia (Bl.) Pax & Hoffm. xv: 245 (1922); Ridley: 222 (1924); S. Moore in Journ. Bot. 63, Suppl.: 97 (1925); Backer & Bakh. f.: 473 (1963); Airy Shaw in Kew Bull. 23: 55 (1969), *q.v.*

Cyclostemon longifolius Bl., Bijdr.: 598 (1825); Hook. f.: 341 (1887).

C. macrophyllus Bl., *l.c.* (1825).

C. macrophyllus var. *malaccensis* Hook. f.: 341 (1887).

Drypetes macrophylla (Bl.) Pax & Hoffm. *l.c.*: 247 (1922); Backer & Bakh. f., *l.c.* (1963).

P16.—?Burma, ?Andamans; widely distributed throughout Malesia.

Tree of 15 m. in evergreen forest at 500 m. alt.

Leaves large, oblong, entire, coriaceous or chartaceous, often very oblique at base, and with the midrib impressed above (this character readily distinguishes it from similar species in which it is raised above); flowers on the older branches, large; fruit globose, up to 6 cm. diam., finely ochraceous-tomentellous.

Drypetes ochrothrix Airy Shaw in Kew Bull. 21: 361 (1968) & 25: 501 (1971).

P16.—Sabah (N. Borneo).

Tree of 12 m. in evergreen forest at 100 m. alt.

Related to *D. kurziana*, but differing in its rather more thinly chartaceous leaves and especially in the short golden indumentum of the young parts and inflorescences. Kerr's material is very floriferous, bearing fascicles of golden-sericeous flowers in every leaf-axil.

Drypetes pendula Ridley in Bull. Misc. Inf. Kew 1923: 365 (1923) & Fl. Malay Penins. 3: 222 (1924); Corner in Gard. Bull. Str. Settlem. 10: 295 (1939).

Cyclostemon longifolius sec. Hook. f.: 341 (1887), *non* Bl.

Diospyros betongensis Fletcher in Bull. Misc. Inf. Kew 1937: 382 (1937), **synon. nov.**

P18.—Malay Penins.

Slender tree 5 m. high, in evergreen forest at 400 m. alt.

Characteristic tree (up to 24 m. high in Malaya) with long pendent branches and huge oblong leaves up to 60 cm. long and 25 cm. wide, unequally cordate at the base, borne on a short thick petiole; male flowers shortly pedicelled, 12 mm. wide, glabrous; drupe globose, 5–6·5 cm. in diameter, shortly velutinous.

It is surprising what a diversity of plants have at various times been mistaken for *Diospyros*. In *Blumea* 18: 412 (1970) details of four other instances of this error are given by Mr. F. S. P. Ng, to whom I am indebted for drawing my attention to *D. betongensis*.

Drypetes perreticulata Gagnep. in Bull. Soc. Bot. France 71: 260 (1924) & in Lecomte: 570 (1927).

SW14.—Indochina (Annam).

Tree to 7 m., locally common in dry evergreen forest at low altitudes; once noted on a rocky limestone hill.

Related to *D. hoaensis*, differing in the much more coarsely reticulate nervation of the leaves and in the conspicuous, subpersistent, linear stipules; the fruit also appears to reach a considerably greater size.

Fruit edible (*Kerr* 10985).

Drypetes roxburghii (Wall.) Hurusawa in Journ. Fac. Sci. Univ. Tokyo, Sect. III Bot., 6: 337 (1954).

Putranjiva roxburghii Wall., Tent. Fl. Nap.: 61 (1826); Muell. Arg.: 443 (1866); Hook. f.: 336 (1887); Craib: 461 (1911) & 187 (1912); Beille: 658 (1927); van Steenis in *Blumea* 8: 515 (1957); Backer & Bakh. f.: 465 (1963).

Nageia putranjiva Roxb., Fl. Ind. 3: 766 (1832).

Pycnosandra timorensis Bl., Mus. Bot. Lugd. Bat. 2: 192 (1856); cf. van Steenis, l.c. *supra*.

Putranjiva sphaerocarpa Muell. Arg.: 443 (1866).

P. amblyocarpa Muell. Arg.: 444 (1866).

Drypetes timorensis (Bl.) Pax & Hoffm. xv: 278 (1922).

N1-3; E8; SE10; C11; SW14.—W. Himalaya to Ceylon and Burma; Indochina (Laos, Cambodia), Java, Moluccas, Lesser Sunda Is., E. New Guinea (rare).

Dioecious tree to 15 m., in mixed forest or scrub up to 500 m. alt.

The chartaceous, finely veined, closely and sharply, though shallowly, serrulate leaves, dense glomerules of very small male flowers, 2-4 stamens, and indehiscent, rhombic-ellipsoid, long-pedicelled fruits are characteristic.

Leaves and fruit used medicinally for rheumatism (*Witt* 36, *Vanpruk* 442).

I agree with Hurusawa (*l.c.*) that *Putranjiva* Wall. is no more than a rather distinct section of *Drypetes*.

Drypetes subsessilis (Kurz) Pax & Hoffm. xv: 248 (1922); Airy Shaw in Kew Bull. 25: 501 (1971).

Cyclotemon subsessilis Kurz, For. Fl. Brit. Burma 2: 364 (1877); Hook. f.: 342 (1887).

N1.—Burma, ?Andamans.

Tree to 4 m., in dense evergreen forest at 1300-1400 m. alt.

Leaves large, oblong, rather similar to those of *D. harmandii*, but thinner and very shallowly and obscurely, though regularly, serrulate, very oblique at base; differing from almost all other species of continental Asia in the very

few (3–6) long-exserted stamens of the male flowers, and in the plicate-dentate disk, with short inner processes embracing the base of the filaments. Apparently not closely related to the only Asiatic (Philippines) species referred by Pax & Hoffmann to Sect. *Oligandrae*.

Elateriospermum Bl.

Elateriospermum tapos Bl., Bijdr.: 621 (1825); Muell. Arg.: 1131 (1866); Benth. in Hook. Ic. Pl. 13: 73, t. 1294 (1879); Hook. f.: 382 (1887); Pax in Engler IV. 147 (Heft 42): 17 (1910); Ridley: 252 (1924); Corner: 249 (1940); Backer & Bakh. f.: 497 (1963).

P16-18.—Malay Peninsula, Sumatra, Borneo.

Tree of 10(–30) m., common in evergreen forest up to 200 m.

The glabrous, chartaceous, oblong-elliptic leaves, with strongly reticulate nervation beneath, and borne on slender geniculate petioles; the subapical tufts of peduncled dichotomous cymes of small flowers; and the massive bilocular drupaceous fruits, are very characteristic.

Fruit edible.

Endospermum Benth.

Inflorescence a simple raceme or spike, rarely with very short side-branches;	
petiolar glands 0–2	E. diadenum
Inflorescence compound; petiolar glands 2:	
Petiolar glands globose, 2–3 mm. in diam.	E. chinense
Petiolar glands cylindrical	E. peltatum

Endospermum chinense Benth., Fl. Hongk.: 304 (1861); Muell. Arg.: 1131 (1866); Pax & Hoffm. iv: 35 (1912); Gagnep.: 453 (1926); Corner in Gard. Bull. Str. Settlem. 10: 298 (1939); Kanjilal, Das & De, Fl. Assam 4: 204 (1940); Hundley & Ko, List Trees etc. Burma, ed. 3: 236 (1961); Schaeffer in Blumea 19: 187 (1971), *q.v.*

To be expected in N. Siam.—Assam, Burma; Indochina (N. Vietnam), S. China (Hainan, Hongkong, Swatow I.).

Endospermum diadenum (Miq.) Airy Shaw in Kew Bull. 14: 395 (1960); Schaeffer in Blumea 19: 186 (1971), *q.v.* for full synonymy.

Melanolepis? *diadena* Miq., Fl. Ind. Bat. Suppl. (Fl. Sum.): 455 (1860); Pax & Hoffm. vii: 144 (1914).

Endospermum malaccense Benth. ex Muell. Arg. in Flora 47: 469 (1864) & in DC.: 1132 (1866); Hook. f.: 458 (1887); Pax & Hoffm. iv: 34 (1912); Ridley: 305 (1924); Corner in Gard. Bull. Str. Settlem. 10: 296–8 (1939) & Ways. Trees: 251 (1940).

E. borneense Benth. ex Muell. Arg., *ll.cc.* (1864 & 1866); Corner, *l.c.* 10: 298 (1939).

Mallotus diadenus (Miq.) Muell. Arg.: 959 (1866); Pax & Hoffm. vii: 206 (1914).

Rottlera diadema (Miq.) Scheff. in Ann. Mus. Bot. Lugd.-Bat. 4: 125 (1869).
E. ovalifolium Pax & Hoffm. iv: 34 (1912); Ridley: 305 (1924); Corner, l.c. 10: 297 (1939).

E. beccarianum Pax & Hoffm. iv: 35 (1912); Corner, l.c. 10: 298 (1939).
Endospermum chinense var. *malayanum* Pax & Hoffm. iv: 36 (1912), pro parte,
typo excluso.
E. malayanum Chatterjee in Kew Bull. 4: 564 (1950).

P16.—Malay Peninsula, Sumatra, Banka, Billiton, Borneo.

Tree of 20–25 m., in evergreen forest up to 200 m. alt.

Endospermum peltatum Merr. in Govt. Lab. Publ. (Philipp.) 35: 35 (1906); Pax & Hoffm. iv: 37 (1912); Merr.: 457 (1923); Schaeffer in Blumea 19: 188 (1971), q.v.

P15, 16.—Malaya, Borneo, Philippines, Celebes.

Tree to 25 m., in evergreen forest up to 100 m. alt.

Epiprinus Griff.

Leaves large, ovate to broadly lanceolate, long-petioled; inflorescence robust with relatively large flowers; ♀ sepals large, membranous, purplish, greatly accrescent in fruit; capsule large.	E. malayanus
Leaves smaller, panduriform-elliptic or panduriform-ob lanceolate, very shortly petioled or subsessile; ♀ sepals small, not accrescent; capsule small	E. siletianus

Epiprinus malayanus Griff., Notulae 4: 487 (1854); Muell. Arg.: 1024 (1866); Hook. f.: 464 (1888); Pax & Hoffm. ix–xi: 110 (1919); Ridley: 279 (1924); Gagnep.: 474, *in clavi* (1926); Corner: 252 (1940); Airy Shaw in Kew Bull. 16: 356 (1963).

P18.—?Burma, Malay Peninsula, Sumatra.

Small tree of 6 m., in evergreen forest at 300 m. alt.

Leaves large, ovate to broadly lanceolate, long-petioled; inflorescence bisexual, the males aggregated in a robust, dense, terminal false spike, the females few, basal, distant. Pubescence minutely stellate. The very large, membranous, purplish, accrescent sepals make this an unmistakable plant in the fruiting stage.

Epiprinus siletianus (Baill.) Croiz. in Journ. Arn. Arb. 23: 53 (1942);
 Airy Shaw in Kew Bull. 16: 356 (1963).

Sympyllia siletiana Baill., Ét. Gén. Euphorb.: 474 (1858).
S. silhetiana Baill. mut. Muell. Arg.: 764 (1866); Pax & Hoffm. ii: 16 (1910);
 Gagnep.: 477 (1926).

Sympyllium silhetense Baill. mut. Benth. in Journ. Linn. Soc. 17: 228 (1878),
pro synon.

Adenochlaena silhetensis (Baill. mut. Benth.) Benth. l.c. (1878).

A. silhetiana (Baill. mut. Muell. Arg.) Benth. in Benth. & Hook. f., Gen. Pl. 3: 308 (1880); Hook. f.: 418 (1887).

Epiprinus hainanensis Croiz. in Journ. Arn. Arb. 21: 504 (1940) & 23: 53 (1942), *in obs.*; Airy Shaw, l.c. *supra*, *in obs.* (1963).

E8; P15.—Assam, Burma, Yunnan, Indochina, Hainan.

Shrub or tree to 7 m. high, locally common in evergreen forest at 400–600 m. alt.

Leaves pseudo-vermicillate, panduriform-elliptic or panduriform-ob lanceolate, very shortly petioled or subsessile, narrowly cordate at base; female sepals small, not accrescent.

Epiprinus sp. nov.? vel gen. nov.?

SW14: Klang Dong, 30 Jan. 1962, Larsen 9390.

Tree of 5 m. in evergreen forest at 750 m. alt.

The inflorescences differ from those of *Epiprinus* in bearing male flowers only, with no female at the base. They are also more evenly and loosely branched. The foliage, stellate indumentum and male floral structure, however, are very similar to those of *Epiprinus* spp. Complete material of this interesting tree is very desirable.

***Erismanthus* Wall. ex Muell. Arg.**

Leaves chartaceous, more evidently toothed, more distinctly nerved, more oblique at base; average size larger	E. obliquus
Leaves coriaceous, more obscurely toothed, more obscurely nerved, less oblique at base; average size smaller	E. sinensis

***Erismanthus obliquus* Wall. ex Muell. Arg.:** 1138 (1866); Hook. f.: 405 (1887); Pax & Hoffm. iii: 34 (1911); Ridley: 271 (1924); Gagnep.: 464 (1926).

P18.—Malay Peninsula, Sumatra, E. Borneo.

Tree of 7–9 m. on hillside; no further information for Siam.

Leaves chartaceous, more evidently toothed, more distinctly nerved, more oblique at base; average size larger.

***Erismanthus sinensis* Oliv.** in Hook. Ic. Pl. 16: t. 1578 (1887); Pax & Hoffm. iii: 35 (1911); Gagnep.: 461 (1926); Merr. & Metc. in Lingnan Sci. Journ. 16: 393 (1937).

E. indochinensis Gagnep. in Bull. Soc. Bot. France 71: 622 (1924) & in Lecomte: 462 (1926).

SE9, 10.—Indochina (Annam, Cochinchina), S. China (Hainan).

Shrub or small tree to 8 m. high, common in evergreen forest up to 300 m.

Leaves coriaceous, more obscurely toothed, more obscurely nerved, less oblique at base; average size smaller.

Euphorbia L.

by A. R. SMITH*

Spiny, commonly succulent plants (*§ Euphorbia-Diacanthium*):

Spines commonly 1 cm. long or more, not borne on spine-shields; leaves subtending cyathia scarlet **E. milii**

Spines much shorter than 1 cm., paired on spine-shields of differing texture from the stem:

Sinuses between the spine-shields commonly as deep as the width of the narrowest parts of the stem; spine-shields (in the same row) up to 6 cm. apart **E. lacei**

Sinuses between the spine-shields much shallower than the narrowest parts of the stem; spine-shields in any one row commonly less than 4 cm. apart:

Spine-shields readily caducous; stems commonly 3-angled **E. cf. barnhartii**

Spine-shields persistent; stems 3-5-angled:

Stems usually 4-angled; leaves oblanceolate, up to 20 cm. long **E. ligularia**

Stems usually 5-angled (though occasionally 3-angled); leaves ovate-elliptic, not more than 5 cm. long:

Stem segments up to 5 cm. across **E. antiquorum**

Stem segments not more than 2 cm. across **E. cf. antiquorum**

Spineless subsucculent or non-succulent plants, or, if spiny, then spines minute, single and axillary:

Subsucculent plants:

Stems branched (*§ Euphorbia-Tirucalli*) **E. tirucalli**

Stems unbranched (*§ Euphorbia*, subsect.?):

Stems arising from a stout, woody rootstock; minute spines present on young shoots **E. kerrii**

Stems not arising from a rootstock **E. Synadenium**

Non-succulent plants:

Leaves alternate below, opposite above:

Cyathia each with only a single gland (*§ Poinsettia*) **E. heterophylla**

Cyathia each with 4 or 5 glands (*§ Tithymalus-Esulae*):

Perennial herb with linear-lanceolate caudine leaves, the umbels often proliferating as leafy shoots **E. prolifera**

Annual herb with oblanceolate caudine leaves; umbels never proliferating **E. saxicola**

Leaves all opposite (*§ Anisophyllum*):

Perennial herbs:

Leaves obliquely elliptic-ovate (*Sclerophylleae*) **E. atoto**

Leaves linear to linear-oblong, rarely elliptic-ovate (*Chamaesyceae*):

Leaves serrulate:

Cyathia and capsules glabrous **E. vachellii**

Cyathia and capsules pubescent **E. cf. harmandii**

* I am greatly indebted to my colleague Mr A. R. Smith for providing this account of *Euphorbia*.

Leaves entire or almost so:

Leaves up to 3·5 cm. long and 7 mm. broad

E. coudercii

Leaves not more than 2 cm. long and 4 mm. broad

E. linearifolia

Annual herbs:

Cyathia aggregated into dense axillary globular clusters; young shoots densely covered with yellow multicellular hairs (*Hypericifoliae*) **E. hirta**

Cyathia sparsely distributed, or, if aggregated, then clusters not globular; hairs, when present, white and unicellular:

Appendages of cyathial glands fimbriate (*Elegantes*) **E. cristata**

Appendages entire:

Ultimate branches very slender, hairlike (*Chamaesyceae*)

E. capillaris

Ultimate branches not hairlike:

Capsule ripening within the cyathium, causing it to split down the side (*Chamaesyceae*) . . . **E. thymifolia**

Capsule ripening outside the cyathium on an elongated, decurved pedicel:

Capsules glabrous:

Leaves commonly up to 3 cm. long (*Hypericifoliae*)

E. hypericifolia

Leaves not more than 5 mm. long (*Chamaesyceae*)

E. microphylla

Capsules hairy (*Chamaesyceae*):

Capsules hairy on the keels only . . . **E. prostrata**

Capsules densely hairy all over:

Leaves not more than 1·3 cm. long **E. reniformis**

Leaves up to 2·5 cm. long . . . **E. cf. reniformis**

Euphorbia antiquorum L., Sp. Pl.: 450 (1753); Boiss. in DC.: 81 (1862); Hook. f.: 255 (1887); Ridley: 180 (1924); Gagnep.: 240 (1925); Croiz., Euph. Antiq. Offic.: 6 (1934); Merr. in Trans. Amer. Philos. Soc. n.s. 24 (2): 242 (1935); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 70 (1939); Backer & Bakh. f.: 501 (1963).

N1, 3; E8; SE10; C12; SW14; P16, 17.—S. India, Ceylon, Burma, Indochina (Laos, Tonkin).

Common in dry, open, evergreen forest, on rocky limestone hills and on sandy ground, from sea-level up to about 750 m. alt.

Spiny, succulent tree up to 5–7 m. high, with a round trunk, and usually branching only at the top. Branches tufted, ascending, 3–5-angled.

Euphorbia sp. cf. **antiquorum** L.

P17: Kuo Hua Tek, Patalung, 2 May 1930, Kerr 19288.

Shrub up to 2 m., on limestone rocks up to 50 m. alt.

Spiny succulent with 3–5-angled stems. Although much less robust than typical *E. antiquorum*, this may be nothing more than a variety or form thereof.

Euphorbia atoto Forst. f., Prodr.: 36 (1786); Boiss. in DC.: 12 (1862); Hook. f.: 248 (1887); Merr.: 461 (1923); Ridley: 181 (1924); Gagnep.: 245 (1925); Backer & Bakh. f.: 503 (1963).

Chamaesyce atoto (Forst. f.) Croiz. in Degener, Fl. Hawaii, Fam. 190, Chamaesyce, leafl. 4 (1936), *in obs.*

SE9, 10; SW14; PI5-17.—Old World tropics from S. India to Polynesia and from the Ryu Kyu islands to Queensland.

A typical strandline plant confined to sandy beaches.

Procumbent or prostrate glaucous subshrub c. 30 cm. high, usually glabrous (tomentose form from Aran Pratet, **SE10**—Put 2074).

Euphorbia sp. cf. **barnhartii** Croiz., Euph. Antiq. Offic.: 54 (1934); Backer & Bakh. f.: 501 (1963).

E. cf. trigona Roxb., Fl. Ind.: 469 (1832); Boiss. in DC.: 82 (1862); Hook. f.: 256 (1887); Merr.: 464 (1923); *non* Haworth, Succ. Pl.: 127 (1812).

SW14: Wangka, Kanburi, 8 Feb. 1926, Kerr 10471. (Typical *E. barnhartii* in India.)

Shrub to 2 m., growing amongst limestone rocks at 200 m. alt.

Succulent shrub with 3-angled stems, the spine-shields soon falling.

Euphorbia capillaris Gagnep. in Bull. Soc. Bot. France 48: 298 (1921), & in Lecomte: 252 (1925).

E. hypericifolia sec. Hosseus: 404 (1911); Craib: 181 (1912); *non* L.

N1-3; SW14.—Indochina (Laos, Cambodia, Cochinchina).

Annual herb on grassy slopes or on limestone outcrops in open deciduous or mixed evergreen forest from 50–1400 m. alt.

Much-branched annual with very slender wiry ultimate branches, the leaves diminishing in size distally.

Euphorbia couderci Gagnep. in Bull. Soc. Bot. France 48: 299 (1921), & in Lecomte: 250 (1925).

N1-3; NE5; SW14.—S. India, Indochina (Cambodia, Cochinchina).

Perennial herb among grass in open deciduous jungle, in dry dipterocarp forest or on edge of teak forest, on dry burnt ground and on granite outcrops up to about 500 m. alt.

Perennial with woody rootstock; leaves usually linear, entire; glands with prominent white petaloid appendages; cyathia and capsules glabrous.

This plant bears a striking resemblance to two species, one S. American (*E. chamaerrhodos* Boiss., Cent. Euph.: 13, t. 25 (1866)), the other African (*E. zambesiana* Benth. in Hook. Ic. Pl. 14: 3, t. 1305 (1880)), which grow in similar ecological situations. However, it would perhaps be stretching things a bit far to regard them as conspecific.

Euphorbia cristata Heyne ex Roth, Nov. Pl. Sp.: 226 (1821); Boiss. in DC.: 19 (1862); Hook. f.: 247 (1887).

N1.—C. & S. India, Ceylon, SE. Upper Burma.

Annual herb, in deciduous jungle at 200–240 m. alt.

Prostrate annual, with pilose, deeply laciniate-fimbriate appendages to the cyathial glands.

Euphorbia sp. cf. **harmandii** Gagnep. in Bull. Soc. Bot. France 48: 299 (1921), & in Lecomte: 250 (1925).

N1: Mî Tûn, Chiengmai, 4 July 1922, Kerr 6233. (Typical *E. harmandii* in Laos).

Perennial herb in open marshy ground at about 1000 m. alt.

Perennial with woody rootstock; cyathia & capsules pubescent. The Siamese gathering has narrower leaves than the type from Laos.

Euphorbia heterophylla L., Sp. Pl.: 453 (1753); Boiss. in DC.: 72 (1862); Merr.: 462 (1923); Ridley: 181 (1924); Gagnep.: 244 (1925); Backer & Bakh f.: 502 (1963).

Euphorbia geniculata Ort., Hort. Matr. Dec.: 18 (1797); Boiss. in DC.: 72 (1862).

E. pruinifolia Jacq., Hort. Schoenbr. 3: 15, t. 277 (1798); Hook. f.: 266 (1887), *in adnot.*; Backer & Bakh. f.: 502 (1963)

Poinsettia heterophylla (L.) Klotzsch & Garcke ex Klotzsch in Monatsber. Akad. Berl. 1859: 253 (1859); Dressler in Ann. Miss. Bot. Gard. 48: 329 (1961), *q.v.*

P. geniculata (Ort.) Klotzsch & Garcke ex Klotzsch, *l.c.* (1859).

N1, 4; E8; C12.—Pantropical. Origin in C. America.

Cultivated, and frequently escaping to become a weed.

Herb to c. 1 m. in height, with simple, broadly ovate or panduriform leaves, the upper ones frequently red or white at the base, and densely clustered cyathia.

Euphorbia hirta L., Sp. Pl.: 454 (1753); Merr.: 462 (1923); Ridley: 181 (1924); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 70 (1939); Backer & Bakh. f.: 504 (1963).

E. pilulifera L., Sp. Pl.: 454 (1753); Boiss. in DC.: 21 (1862); Hook. f.: 250 (1887); Williams in Bull. Herb. Boiss., sér. 2, 5: 32 (1905); Gagnep.: 245 (1925).

Chamaesyce pilulifera (L.) Small, Fl. SE. U.S.: 708 (1903).

Ch. hirta (L.) Millsp. in Publ. Field Columb. Mus., Bot. 2: 303 (1909).

N1, 2; NE5; SE10; C11, 12; SW14; P15-17.—Pantropical weed, originating in C. America.

A low diffuse weedy herb up to 10 cm. high; young stems densely covered with yellow multicellular hairs.

Euphorbia hypericifolia L., Sp. Pl.: 454 (1753); Boiss. in DC.: 23 (1862); Hook. f.: 249 (1887); Backer & Bakh. f.: 504 (1963).

Chamaesyce hypericifolia (L.) Millsp. in Publ. Field Columb. Mus., Bot. 2: 303 (1909).

E. indica sec. Gagnep.: 248 (1925), *non* Lam.

N₁-3; NE₅; C₁₁, 12; SW₁₄; P₁₅.—Pantropical weed.

Herb to 30 cm., in open grassy mixed or deciduous forest, teak forest, bamboo jungle, on limestone rock outcrops, on sandbanks of rivers, in rice-fields and along railway-lines, from sea-level up to about 500 m. alt.

Erect-ascending herb with markedly asymmetrical opposite leaves.

Euphorbia kerrii Craib: 456 (1911) & 181 (1912); Gagnep.: 255 (1925).

N₁, 2.—Burma (Southern Shan States).

Growing in deciduous bamboo jungle at 300 m. alt.

An unbranched, subsucculent perennial geophyte, leafless at flowering time, with a large woody rootstock. A plant with young, leafy shoots, 30–35 cm. long, was collected by Larsen, Santisuk & Warncke (no. 3041) in August 1968 (10 km. N. of Doi Chieng Dao), the leaves of which are obovate-oblong, c. 10 cm. long and 4–5 cm. wide.

Root used for poisoning fish.

Euphorbia lacei Craib: 456 (1911), & 182 (1912); Gagnep.: 255 (1925).

N₁, 2; SE₉; C₁₂ (cult.).; P₁₇.—Burma (Pegu & Hantawaddy Districts).

Spiny succulent tree to 8 m., on limestone slopes and on rocky ground by streams from sea-level up to 670 m. alt. Sometimes cultivated as a hedge-plant.

Differs from other succulent spiny euphorbias in Siam in having the spine-shields (1–)2–6 cm. apart, in having a pronounced narrowing of the branches at their point of departure from the stem, and in having the sinuses between the spine-shields somewhat deeper in relation to the thickness of the stem.

Euphorbia ligularia Roxb., Fl. Ind. 2: 465 (1832); Backer & Bakh. f.: 501 (1963).

E. neriiifolia sec. Boiss. in DC.: 79 (1862); Hook. f.: 255 (1887); Merr.: 462 (1923); Ridley: 182 (1924), *in adnot.*; Gagnep.: 239 (1925); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 242 (1935); *non* L.

N₁; C₁₂.—W. Tropical Asia. Commonly cultivated.

Spiny succulent tree up to c. 4 m. high.

Euphorbia linearifolia Heyne ex Roth, Nov. Pl. Sp.: 224 (1821); Boiss. in DC.: 33 (1862); Hook. f.: 249 (1887); ?Hosseus: 404 (1911); Craib: 182 (1912); Gagnep.: 253 (1925).

N₄ (acc. to Gagnepain; material not seen by A. R. S.).—S. India; Indo-china (Cambodia).

No ecological data for Siam.

Perennial herb, similar to *E. coudercii* but with shorter (up to 2 cm. long), narrower leaves.

Euphorbia microphylla Heyne ex Roth, Nov. Pl. Sp.: 229 (1821); Hook. f.: 252 (1887); Gagnep.: 252 (1925).

E. serpens Kunth var. *indica* Engelm. ex Boiss. in DC.: 30 (1862).

C12.—India, Burma.

Growing by waysides, at sea-level.

Prostrate weedy herb with leaves 2–3(–5) mm. long.

Euphorbia milii Desmoul. in Bull. Hist. Nat. Soc. Linn. Bordeaux, 1: 27 (1826).

E. splendens Boj. ex Hook., Bot. Mag. 56: t. 2902 (1829); Boiss. in DC.: 79 (1862); Gagnep.: 239 (1925).

E. bojeri Hook., Bot. Mag. 63: t. 3527 (1836); Boiss. in DC.: 78 (1862).

Cult.; origin Madagascar.

Trailing spiny semi-succulent perennial, with conspicuous scarlet bracts.

Euphorbia prolifera Buch.-Ham. ex D. Don, Prodr. Fl. Nep.: 62 (1825); Hook. f.: 264 (1887).

E. nepalensis Boiss. in DC.: 157 (1862).

E. himalayensis sec. Gagnep.: 244 (1925), *non* Boiss.

N1.—W. China (Sinkiang—Yarkand, Szechuan, Yunnan), Himalayas, Upper Burma (Shan States), Laos.

Herb to 15 cm., in *Dipterocarpus* and pine forest at about 1000 m. alt.

Weak herb with the umbels often proliferating as leafy shoots.

Euphorbia prostrata Ait., Hort. Kew., ed. 1, 2: 139 (1789); Boiss. in DC.: 47 (1862); Hook. f.: 266 (1887), *in adnot.*; Merr.: 463 (1923); Backer & Bakh. f.: 503 (1963).

Chamaesyce prostrata (Ait.) Small, Fl. SE. U.S.: 711 (1903).

C12.—Widespread in the tropics and subtropics of both hemispheres. Origin Jamaica.

A weed of waste ground.

Prostrate herb, characterized by having the capsules hairy on the keels only.

Euphorbia reniformis Bl., Bijdr.: 634 (1825); Boiss. in DC.: 20 (1862); Gagnep.: 251 (1925).

?*E. congenera* Bl., Bijdr. 634 (1825), sec. Williams in Bull. Herb. Boiss., sér. 2, 5: 32 (1905); see Craib: 182 (1912).

E. hypericifolia sec. Backer & Bakh. f.: 504 (1963), *non* L.

SE10; C11, 12; ?SW14.—Java, W. New Guinea.

A weed of waste ground, paths and gardens, from sea-level up to about 50 m. alt.

Villous herb with opposite obliquely ovate leaves.

Euphorbia cf. reniformis Bl.

Kerr 19306, collected 12 May 1930 at Aran Pratet, **SE10**, growing at below 50 m. on open grassy ground, resembles *reniformis* in every respect save for the leaves, which are larger and less hairy than is usual for this species. However, it may merely be a luxuriant form growing in highly nitrogenous conditions.

Euphorbia saxicola A. R. Smith in Kew Bull. 25: 552 (1971).

N1.—Endemic.

Annual herb to 30 cm., on open rocky slopes at 2000 m. alt.

Differs from all Old World species of Sect. *Tithymalus* Subsect. *Esula* in the combination of the annual habit with smooth grey seeds. Apparently without close relatives.

Euphorbia Synadenium Ridley in Journ. Roy. As. Soc. Str. Br. 61: 36 (1912), & Fl. Mal. Penins. 3: 180 (1924); *non E. synadenia* Baill. (1862).

E. ridleyi Croizat in Gard. Bull. Str. Settlem. 9: 147 (1937), *pro nom. nov.*

P17, 18.—Malaya (Perak, Penang, Dindings, Selangor).

Shrub to 1·5 m., in evergreen forest from 50–330 m. alt.

Subsucculent shrub, with leaves up to 20 cm. long and solitary axillary cyathia.

The epithet ‘*Synadenium*’ is a noun (generic name) in apposition, and so not a homonym of ‘*synadenia*’, which is an adjective agreeing with *Euphorbia*. It is therefore not necessary to replace the former by a ‘*nom. nov.*’

Euphorbia thymifolia L., Sp. Pl.: 454 (1753); Boiss. in DC.: 47 (1862); Hook. f.: 252 (1887); Craib: 182 (1912); Merr.: 464 (1923); Ridley: 182 (1924); Gagnep.: 246 (1925); Backer & Bakh. f.: 503 (1963).

Chamaesyce thymifolia (L.) Millsp. in Publ. Field Mus. Nat. Hist. Chicago, Bot. 2: 412 (1916).

N1, 3; ?NE5 or E8; E7; C12; SW14; P16.—Widespread in the Old World Tropics, possibly introduced into Africa.

A prostrate weed of open, grassy places, on paths and in gardens, on railroads with no competition, in sandy scrub and on dunes, from sea-level up to 400 m. alt.

This species is distinct from all its allies in that the capsule ripens within the cyathium, thus eventually causing it to split down the side. The usual situation is for the female pedicel to elongate before the capsule ripens, thus thrusting it out of the cyathium before it expands.

Euphorbia tirucalli L., Sp. Pl.: 452 (1753); Boiss. in DC.: 96 (1862); Hook. f.: 254 (1887); Merr.: 464 (1923); Ridley: 182 (1924), *in adnot.*; Gagnep.:

254 (1925); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 242 (1935); Backer & Bakh. f.: 502 (1963).

SW14; PI6.—Widespread in the Old World Tropics, often naturalized.

In open scrub from sea-level up to c. 100 m. alt.

Decumbent-ascending or erect leafless succulent up to 3 m. in height.

Euphorbia vachellii Hook. & Arn., Bot. Beech. Voy.: 213 (1837); v. Steenis in Bull. Bot. Surv. India 10; 393 (1968).

E. serrulata Reinw. ex Bl., Bijdr.: 635 (1825); Boiss. in DC.: 25 (1862); Craib: 182 (1912); Merr.: 463 (1923); Gagnep.: 248 (1925); *non* Thuij. (1799), *nec* Vell. (1825).

E. reinwardtiana Steud., Nomencl. ed. 2, 1: 614 (1840), *pro nom. nov.*

E. parannaquensis Blanco, Fl. Filip. ed. 2; 286 (1845).

E. backeri Pax & Hoffm. in Blumea 3: 60 (1938).

Chamaesyce vachellii (Hook. & Arn.) Hara, Enum. Spermat. Jap. 3: 44 (1954); Hurus. in Journ. Fac. Sci. Univ. Tokyo, Sect. III Bot., 6: 283 (1954).

E8; SW14; PI5, 17, 18.—S. China, Ryu-Kyu Is., Formosa, Indochina (Tonkin, Cochinchina), Philippines, E. Malesia, Bismarck Archip., Solomon Is., New Hebrides, Australia (Northern Territory & Queensland).

Herb to 60 cm., on rocky ground, in open grassy scrub or deciduous forest on both limestone and granite hills, and on rotten tree stumps, from sea-level up to about 200 m. alt.

Erect herb, with opposite linear serrulate leaves and prominent white appendages to the cyathial glands.

The complete absence of this species from W. Malesia (except the Philippines) will be noted.

Excoecaria L.

Leaves alternate, entire to obscurely and distantly crenate; inflorescences unisexual; ♂ inflorescence densely spicate, almost catkin-like when young **E. agallocha**

Leaves opposite, manifestly shallowly crenate; inflorescences unisexual or bisexual; ♂ inflorescence (or portion) slenderer and laxer:

Leaves very large and coriaceous (to 30 × 13 cm.); capsule large (4–5 cm. long) **E. oppositifolia**

Leaves and capsules much smaller:

Sepals of ♂ flower ovate, lacero-dentate; leaves somewhat more coriaceous, with closer nerves; ♂ inflorescence elongate (to 15 cm.)

E. bantamensis

Sepals of ♂ flower linear-lanceolate; leaves somewhat thinner, with fewer nerves; ♂ inflorescence much shorter (to 3 cm.):

Leaves green beneath **E. cochinchinensis** var. **viridis**

Leaves wine-red beneath

E. cochinchinensis var. **cochinchinensis**

Excoecaria agallocha L., Sp. Pl. ed. 2: 1451 (1763); Muell. Arg.: 1220 (1866); Hook. f.: 472 (1888); Pax & Hoffm. v: 165 (1912) (incl. vars.); Ridley: 314 (1924); Gagnep.: 407 (1926); Merr. in Trans. Amer. Philos.

Soc. n.s. 24(2): 240 (1935); Corner: 254 (1940); Backer & Bakh. f.: 499 (1963).

Commia cochinchinensis Lour., Fl. Cochinch.: 606 (1790).

Excoecaria camettia Willd., Sp. Pl. 4: 864 (1805).

E. affinis Endl., Prodr. Fl. Norfolk.: 83 (1833).

Stillingia agallocha (L.) Baill., Ét. Gén. Euphorb.: 518 (1858).

SE₉, 10; CI₂, 13; PI₅₋₁₈.—S. India & Ceylon to Formosa & the Ryu-Kyu Is., and throughout Malesia to the Pacific.

Shrub or tree to 15 m. high, common in mangrove forests or in tidal thickets by rivers, up to 100 m. alt.

The alternate, crenulate-serrate leaves and densely spicate male inflorescences distinguish *E. agallocha* from the remaining Siamese species.

Excoecaria cf. bantamensis Muell. Arg. in Linnaea 32: 124 (1863) & in DC.: 1219 (1866); J. J. Sm.: 610 (1910); Pax & Hoffm. v: 161 (1912); Backer & Bakh. f.: 499 (1963).

E. macrophylla J. J. Sm.: 611 (1911); Pax & Hoffm. v. 162 (1912); Merr.: 458 (1923).

SE₉: Chanthaburi, Pong Nam Ron, alt. 600 m., 21 Jan. 1956, *Smitinand* 3198 (Fl. Thail. 14394).

SW₁₄: Prachuab, Huay Wa Toon, 30 June 1921, *Winit* 587.

Small dioecious tree to 15 m., in evergreen forest up to 600 m. alt.

Further Siamese material is needed in order to confirm the identification of these geographically widely separated specimens. *E. bantamensis* occupies a more or less intermediate position between *E. cochinchinensis* and *E. oppositifolia*, and is sometimes not easy to separate from small-leaved forms of the latter species.

Excoecaria cochinchinensis Lour., Fl. Cochinch.: 612 (1790); Muell. Arg.: 1215 (1866) (excl. synon.!); Pax & Hoffm. v: 160 (1912), *in obs.*; S. Moore in Journ. Bot. 63: 289 (1925); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 241 (1935); Backer & Bakh. f.: 499 (1963).

Antidesma bicolor Hassk., Cat. Bogor.: 81 (1844) [non Pax & Hoffm. 1922!].

Excoecaria bicolor (Hassk.) Zoll. ex Hassk., Retzia 1: 158 (1855); Muell. Arg.: 1220 (1866); Pax & Hoffm. v: 159 (1912); Ridley: 315 (1924); Gagnep.: 404 (1926).

E. crenulata sec. Hosseus: 404 (1911); Craib: 195 (1912); *non* Wight.

var. **cochinchinensis**:

E. bicolor var. *purpurascens* Pax & Hoffm. v: 159 (1912).

N₁ (cult.); **CI₂** (cult.).—Native in Indochina, but widely cultivated as an ornamental.

Shrub of 1.5 m., in gardens, up to 300 m. alt.

Leaves deep red-purple beneath.

var. **viridis** (Pax & Hoffm.) Merr. in Philipp. Journ. Sci. 15: 244 (1919) & in Lingnan Sci. Journ. 11: 46 (1932).

- E. quadrangularis* Muell. Arg.: 1219 (1866); Hook. f.: 474 (1888); Ridley in Journ. Roy. As. Soc. Str. Br. 59: 183 (1911); Pax & Hoffm. v: 160 (1912); Ridley: 314 (1924); cf. Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 70 (1939); **synon. nov.**
- ?*E. crenulata* Wight var. *formosana* Hayata in Journ. Coll. Sci. Tok. 30 (1): 271 (1911).
- E. bicolor* var. *viridis* Pax & Hoffm. v: 159 (1912).
- E. orientalis* Pax & Hoffm. v: 160 (1912); Kaneh., Form. Trees, rev. ed.: 340 (1936).
- ? *E. formosana* (Hayata) Hayata, Ic. Pl. Formos. 3: 173 (1913); *nom. illegit. (superfl.)*; Pax & Hoffm. vii: 423 (1914).
- E. bicolor* var. *orientalis* (Pax & Hoffm.) Gagnep.: 406 (1926).
- ?*E. cochinchinensis* var. *formosana* (Hayata) Hurusawa in Journ. Fac. Sci. Tok. Sect. III Bot., 6(6): 313 (1954).

N1, 4; NE5; E8; SE10; C11, 12; SW14; P15, 16, 18.—Burma, Malay Peninsula, S. China, ? Formosa.

Shrub to 2 m., more rarely a tree to 15 m., common in evergreen, mixed or deciduous forest or scrub, often by streams or on rocks in streams, sometimes on limestone, up to 800 m. alt.

Leaves green, opposite, crenulate-serrate, smaller and narrower than the two other species, broadest above middle, with lax nervation, the primary nerves usually with clear arcuate anastomoses; male inflorescence short, slender.

Excoecaria oppositifolia Griff. in Calcutta Journ. Nat. Hist. 4: 386 (1844); Muell. Arg.: 1219 (1866); Hook. f.: 474 (1888); Pax & Hoffm. v: 161 (1912); Gagnep.: 406 (1926); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 70 (1939).

N1, 2; E8; SE9; SW14; P16.—Assam, Burma, Indochina.

Shrub or tree to 10 m., in evergreen forest up to 700 m.; once noted on limestone.

Leaves very large, broadly oblong-elliptic or oblong-ovate, sharply to obscurely serrulate, laxly and strongly nerved, anastomoses obscure; male inflorescence elongate; capsule very large.

Fahrenheitia Reichb. f. & Zoll.

Fahrenheitia pendula (Hassk.) Airy Shaw in Kew Bull. 20: 410 (1966).

Croton pendulus Hassk., Pl. Jav. Rar.: 266 (1848).

Fahrenheitia collina Reichb. f. & Zoll. in Linnaea 28: 600 (1856); Muell. Arg.: 1256 (1866).

Paracroton pendulus (Hassk.) Miq., Fl. Ind. Bat. 1: 382 (1859); Pax & Hoffm. iii: 12 (1911).

Tritaxis macrophylla Muell. Arg. in Flora 47: 482 (1864).

Trigonostemon macrophyllus (Muell. Arg.) Muell. Arg. in Linnaea 34: 213 (1865).

Ostodes macrophyllus (Muell. Arg.) Benth. ex Pax & Hoffm. iii: 18 (1911); Ridley: 269 (1924).

O. pendula (Hassk.) A. Meeuse in Blumea 5: 508 (1945); Backer & Bakh. f.: 493 (1963).

P15, 16, 18.—?Burma, W. Malesia (throughout).

Tree to 8 m., in evergreen forest up to 150 m. alt.

Distinguished from the related *Ostodes* by the stellate indumentum, and by the elongate, usually pendulous inflorescence.

Glochidion J. R. & G. Forst.

A. *Branches and leaves glabrous or almost so* (for B, see p. 272)

Leaves broadly obovate, rounded at apex; capsule multilocular **G. littorale**
Leaves not rounded at apex, usually acute or acuminate:

Inflorescences markedly supra-axillary, pedunculate; leaves oblong or elliptic-oblong, 8–18 cm. long, broadly cuneate to cordate at base, coriaceous; capsule depressed; styles very short, almost free, convergent into a cone or very brief column **G. hongkongense**

Inflorescences not or scarcely supra-axillary:

Capsules mostly 4-locular, not or shallowly lobed, thinly crustaceous, rather small (6–8 mm. diam.), depressed; ♂ flowers on long slender pedicels **G. assamicum**

Capsules rarely 4-locular:

Capsules glabrous:

Capsule 3–6-lobed, depressed, crowned by the persistent, sub-clavate, unequally 3-toothed style; veins of leaves somewhat reticulate below; ♀ sepals 6, free **G. khasicum**

Capsule 8–12-lobed:

Style subglobose, persistent in depressed apex of capsule; ♂ flowers long-pedicelled; leaves often slightly falcate **G. sphaerogynum**

Style elongate, clavate or columnar:

Capsule 10–15 mm. diam., with rounded lobes; style clavate, deeply lobed; leaves and stems not glaucous; leaf margins tending to curl downwards when dry (cf. *G. perakense*) **G. daltonii**

Capsule 5–7 mm. diam., crustaceous, scarcely lobed; style not clavate; leaves and/or stems often glaucous **G. hypoleucum**

Capsules ± pubescent:

Capsules unlobed, depressed-globose, rather thick-walled; style shortly columnar, persistent; leaves lanceolate, glossy, margins often curling downwards when dry (cf. *G. daltonii*) **G. perakense**

Capsules 3–12-lobed:

Capsule small, 4–6 mm. diam., 3–6-lobed, shortly grey-puberulous, crowned with the broad flat glabrous stigma; inflorescences often with numerous ♀ and 0–2 ♂ flowers **G. glomerulatum**

Capsule larger, stigma not broad and flat:

Leaves 2–10(–13) cm. long, very variable, chartaceous or submembranaceous, often curling on drying, not glaucous; capsule 6–9 mm. diam., with 3–6 rounded lobes; style often slender **G. rubrum**

Leaves 8–14 cm. long, 3–7 cm. wide, coriaceous, not curling on drying, often somewhat pale or glaucous; capsule 10–18 mm. diam., with 8–12 rounded lobes; style minute

G. lanceolarium

B. Branches and leaves manifestly pubescent or puberulous

Capsules unlobed, subglobose, 12–13 mm. diam., thick-walled, tardily dehiscent; pedicel 1.5–2 cm. long; leaves distichous, 5–8 cm. long, very oblique, glaucous and grey-puberulous beneath . . . **G. obscurum**

Capsules variously lobed or, if unlobed, smaller and normally dehiscent and borne on shorter pedicels:

Inflorescences usually supra-axillary and pedunculate (rarely axillary, sessile); plant strongly pubescent; capsule obscurely lobed; style inconspicuous:

Capsule up to 11 mm. diam., usually strongly pubescent (NW. Region) **G. hirsutum**

Capsule up to 7 mm. diam., minutely puberulous (Peninsular Region) **G. arborescens**

Inflorescences axillary, sessile:

Capsule not or very obscurely lobed:

Capsule 13–17 mm. in diam., thick-walled, 4-locular

G. aff. oblatum

Capsule 5–8 mm. diam., thinly crustaceous, subtruncate above, 3-locular; plant strongly tomentose; leaves cordate or subcordate at base **G. superbum** (cf. also *G. insigne*)

Capsule evidently, though sometimes shallowly, lobed:

Capsule 16–20-lobed; leaves usually ± rounded at apex; branchlets shortly rufous-pubescent, ± anfractuose when young

G. coccineum

Capsule 3–12-lobed; leaves usually narrowed to apex:

Fruiting pedicels very slender, almost filiform, 10–12 mm. long, pilose; capsule thin-walled, deeply 3-lobed; style long and slender, trifid at apex **G. kerrii**

Fruiting pedicels shorter and stouter; capsule stouter; style not long and slender:

Leaves glaucous beneath **G. acuminatum** var. **siamense**

Leaves not glaucous beneath:

Capsules very deeply 6-lobed, very depressed, 5–6 mm. diam., thinly grey-puberulous; stems distinctly angled

G. wallichianum

Capsules less deeply lobed, less depressed, larger; stems less clearly angled:

Stems, leaves and capsules thinly pubescent to glabrous; very variable **G. rubrum**

Stems, leaves and capsules rather densely grey- or rufous-tomentose:

Leaves densely grey-tomentellous beneath, sometimes strigose along the nerves . . . **G. eriocarpum**

Leaves puberulous on the nerves beneath only

G. nubigenum

Glochidion acuminatum Muell. Arg. in Linnaea 32: 68 (1863); Hook. f.: 323 (1887); Beille: 625 (1927).

Phyllanthus bicolor Muell. Arg.: 311 (1866), *non P. acuminatus* Vahl (1791).

var. **siamense** Airy Shaw, var. nov., a var. *acuminato* foliis crassioribus densius pubescentibus, capsulis submajoribus brevius crassiusque pedicellatis recedit.

SIAM. N. Region: Payap Circle; Doi Sutep, *Hosseus* 501; *Kerr* 675, 1321 (K, holotype); *Sørensen, Larsen & Hansen* 2538, 3221; Doi Angka, Doi Pa Mawn spur, *Garrett* 500; Doi Nang Ka, *Put* 3766; Doi Chieng dao, *Suvanakoses* 1097 in *For. Dept.* 15504. Pitsanulök Circle; Phu Miang, thicket along mountain path, alt. 12–1300 m., 2 Oct. 1967, *Shimizu, Iwatsuki et al.* T11348. —NE. Region: Udawn Circle; Kao Krading, Loi, *Suvatabandhu* 81; Poo Kradeng, *Sørensen, Larsen & Hansen* 6190.

CHINA. SE. Yunnan: Szemao, *Henry* 13443.

N1, 4; NE5.—S. China (SE. Yunnan). (Var. *acuminatum* in E. Himalaya, Assam and SW. Yunnan).

Shrub or small spreading tree to 8 m., in open grassy evergreen forest up to 1750 m. alt.

Typical *G. acuminatum* has thin, smooth, very thinly puberulous foliage, and smaller capsules on rather slender pedicels. The whole affinity of *G. acuminatum*, *G. velutinum* Wight, etc., requires careful revision.

Glochidion arborescens Bl., Bijdr.: 584 (1825); J. J. Sm.: 114 (1910); Ridley: 211 (1924); Backer & Bakh. f.: 462 (1963).

Phyllanthus arborescens (Bl.) Muell. Arg. in Flora 48: 370 (1865) & in DC.: 279 (1866).

P. silheticus Muell. Arg. in Flora 48: 377 (1865) & in DC.: 297 (1866), **synon. nov.**

Glochidion sclerophyllum Hook. f.: 313 (1887).

G. silheticum (Muell. Arg.) Croiz. in Journ. Arn. Arb. 21: 492 (1940).

P15, 16, 18.—Assam, Malay Peninsula, Banka, Borneo, Java, ?Celebes.

Small spreading tree to 8 m., common in evergreen forest at very low altitudes.

It does not seem possible to distinguish the Assam population (*G. silheticum*) specifically from the Malesian plant.

G. arborescens is closely allied to *G. hirsutum*, differing principally in its smaller, less pubescent capsules.

Glochidion assamicum (Muell. Arg.) Hook. f.: 319 (1887); Craib: 458 (1911) & 184 (1912); Beille: 620 (1927); Croiz. & Hara in Journ. Jap. Bot. 16: 320 (1940); Nath, Bot. Surv. S. Shan States: 107 (1960).

Phyllanthus assamicus Muell. Arg. in Flora 48: 378 (1865) & in DC.: 297 (1866).

P. andersonii Muell. Arg. in Flora 55: 3 (1872).

N1; E8; CII; SW14.—W. & E. Himalaya, Assam, Burma, Indochina, SW. China, Hainan, Formosa.

Small tree to 10 m., in evergreen or moist deciduous forest or scrub up to 1000 m. alt.

An almost glabrous plant, with broadly elliptic leaves, often drying a characteristic brownish colour below, long slender pedicels to the male flowers, and rather small, thinly crustaceous, depressed, usually tetrapterous, not or only shallowly lobed, shortly pedicellate capsules.

Glochidion coccineum (Buch.-Ham.) Muell. Arg. in Linnaea 32: 60 (1863); Hook. f.: 308 (1887); Craib: 458 (1911) & 184 (1912); Beille: 615 (1927).

Agyneia coccinea Buch.-Ham. in Symes, Account Embassy Kingd. Ava: 479 (1800).

Phyllanthus coccineus (Buch.-Ham.) Muell. Arg. in Flora 48: 370 (1865) & in DC.: 280 (1866).

N1; SW14.—Burma.

Shrub of 1–2 m., more rarely tree to 6 m., locally common in damp places in dry deciduous or evergreen forest up to 450 m. alt.; once noted (SW14) on limestone rocks.

Leaves oblong, elliptic-oblong or lanceolate-oblong, usually more or less rounded at the apex; branchlets shortly rufous-pubescent and often anfractuous when young. Capsule multilocular.

Glochidion daltonii (Muell. Arg.) Kurz, For. Fl. Brit. Burma 2: 344 (1877); Hook. f.: 320 (1887); Craib: 458 (1911) & 184 (1912); Beille: 626 (1927).

Phyllanthus daltonii Muell. Arg.: 310 (1866).

Glochidion hohenackeri sec. Hosseus: 405 (1911), non (Muell. Arg.) Bedd.

N1, 2.—E. Himalaya, Assam, Burma, S. China, Indochina.

Shrub or tree to 10 m., in open *Quercus*-Dipterocarp forest up to 1550 m. alt.

Glabrous, with narrow-lanceolate, acuminate, sometimes subfalcate leaves (cf. *G. sphaerogynum*), which tend to roll downwards at the margins on drying. Style conspicuous, clavate and deeply lobed at the apex. Capsules medium-sized, shortly pedicelled, depressed, 8–10-lobed, more or less crustaceous, glabrous.

Glochidion eriocarpum Champ. in Hook. Journ. Bot. & Kew Garden Misc. 6: 6 (1854); Benth., Fl. Hongk.: 314 (1861); Croiz. in Journ. Arn. Arb. 21: 493 (1940).

Phyllanthus eriocarpus (Champ.) Muell. Arg. in Linnaea 32: 67 (1863) & in Flora 48: 387 (1865) & in DC.: 306 (1866).

?*G. anamiticum* Kuntze, Rev. Gen. Pl.: 601 (1891).

G. velutinum sec. Hosseus: 405 (1911); Beille: 624 (1927), pro majore parte; non Wight.

G. esquirolii Lévl. in Fedde, Rep. Sp. Nov. 12: 186 (1913), teste Croiz. l.c. supra.

?*G. annamense* Beille: 627 (1927).

N1; SE9, 10.—Indochina, S. China, Formosa [?Philipp., Sumatra, Java].

Shrub or tree to 5 m., common on rocky or grassy ground in deciduous, *Dipterocarpus*, grassy pine or open evergreen forest up to 1700 m. alt.

Stems densely rufous or fulvous-pubescent; leaves thin, ovate, usually strongly pubescent below, often densely arranged; stipules setaceous; capsule pubescent, rather soft, often tetramerous, shallowly and broadly lobed, subsessile.

Glochidion glomerulatum (Miq.) Boerl., Handl. Fl. Ned. Ind. 3. i: 276 (1900); Ridley: 209 (1924); Corner: 286 (1940); Backer & Bakh. f.: 463 (1963).

Ayneia? glomerulata Miq., Fl. Ind. Bat. Suppl.: 447 (1860).

Phyllanthus glomerulatus (Miq.) Muell. Arg. in Flora 23: 375 (1865) & in DC.: 293 (1866).

P. nanogynus Muell. Arg. in Flora 23: 376 (1865) & in DC.: 293 (1866).

Glochidion nanogynum (Muell. Arg.) Hook. f.: 318 (1887); Ridley: 214 (1924); Beille: 619 (1927).

SE10; C12; PI5.—Indochina (Cochinchina), Malaya, N. & E. Borneo, Java.

Small spreading tree of 4 m., on edge of marsh in scrub jungle near sea-level.

Stem and leaves (sometimes recalling those of *G. rubrum*) glabrous. Inflorescences sessile, axillary, with numerous female and 0–2 male flowers. Capsule small, depressed, shallowly 3- or 6-lobed, shortly grey-puberulous, crowned with the broad flat glabrous stigma.

Glochidion hirsutum (Roxb.) Voigt, Hort. Suburb. Calcutt.: 153 (1845); Muell. Arg. in Linnaea 32: 61 (1863); Hook. f.: 311 (1887).

Bradleia hirsuta Roxb., Fl. Ind. 3: 699 (1832).

Glochidion molle sec. Hook. & Arn., Bot. Beech. Voy.: 210 (1836), non Bl.

G. dasypyllyum K. Koch, Hort. Dendr.: 85 (1853); Rehder in Journ. Arn. Arb. 8: 30 (1926); Croiz. & Hara in Journ. Jap. Bot. 16: 317 (1940), q.v. [Non *G. dasypyllyum* Miq., Fl. Ind. Bat. Suppl.: 451 (1860).]

G. arnottianum Muell. Arg. in Linnaea 32: 60 (1863).

Phyllanthus arnottianus (Muell. Arg.) Muell. Arg. in Flora 48: 370 (1865) & in DC.: 279 (1866).

P. hirsutus (Roxb.) Muell. Arg., ll. cc.: 371 (1865) & 283 (1866).

N1, 2.—E. Himalaya to Hainan, Hongkong & Formosa.

Shrub or small tree of 4–5 m., sometimes forming thickets, in low-lying or marshy ground in deciduous forest up to 510 m. alt.

Densely, shortly and finely pubescent, with broadly ovate or elliptic leaves, rounded or cordate at base, often drying purplish-brown below. Inflorescences usually pedunculate and supra-axillary, but apparently sometimes sessile and axillary; flowers rather large. Capsule subglobose or somewhat depressed, shallowly lobed; style inconspicuous.

Glochidion hongkongense Muell. Arg. in Linnaea 32: 60 (1863).

G. littorale sec. Benth. Fl. Hongk.: 314 (1861), *non* Bl.

Phyllanthus hongkongensis (Muell. Arg.) Muell. Arg. in Flora 48: 371 (1865) & in DC.: 282 (1866).

N1.—Indochina, S. China, Formosa, Ryu-Kyu Is. and Japan.

Shrub; no further details for Siam.

Very similar to *G. brunneum*, but capsule (resembling that of *G. hirsutum*) smaller, depressed, with minute style. Distinguished vegetatively from *G. hirsutum* by its almost complete glabrescence. Leaf-base variable, cordate to cuneate; inflorescence strongly supra-axillary.

Glochidion hypoleucum (Miq.) Boerl., Handl. Fl. Ned. Ind. 3(1): 275 (1900); Airy Shaw in Kew Bull. 23: 8 (1969), *q.v.* [Non *G. hypoleucum* Hayata (1920)=*G. hayatae* Croiz. & Hara].

Anisonema hypoleucum Miq., Fl. Ind. Bat. Suppl.: 449 (1860).

Glochidion glaucifolium Muell. Arg. in Linnaea 32: 65 (1863); Hook. f.: 321 (1887); Beille in Lecomte: 618 (1927).

Phyllanthus laevigatus Muell. Arg. in Flora 48: 374 (1865).

P. kollmannianus Muell. Arg., *l.c.*: 378 (1865).

Glochidion laevigatum (Muell. Arg.) Hook. f.: 319 (1887); Ridley: 215 (1924) (*excl. var. cuspidatum* Ridl.).

G. breynioïdes C. B. Rob. in Philipp. Journ. Sci. 4, Bot.: 95 (1909); Merr.: 398 (1923).

G. kollmannianum (Muell. Arg.) J. J. Sm.: 166 (1910); Backer & Bakh. f.: 463 (1963).

G. hollandianum J. J. Sm. in Nova Guinea 12: 544, t. 228A (1917), **synon. nov.**

P18.—Burma, Indochina, S. China, and throughout Malesia to New Guinea.

Small tree by roadside at 60 m. alt.

Glabrous; leaves chartaceous, acute, usually more or less glaucescent beneath; capsule 5–7 mm. diam., depressed, shallowly 10-lobed, often slightly widened upwards, thinly crustaceous, light chestnut when dry, glabrous.

Glochidion insigne (Muell. Arg.) J. J. Sm.: 160 (1910); Beille: 618 (1927); Backer & Bakh. f.: 462 (1963).

Phyllanthus insignis Muell. Arg.: 1271 (1866).

‘SIAM: (*R. Schomburgk*)’.—Beille, *l.c.*

I have seen no Siamese material of this very distinct species, which is otherwise confined to Java, Sumatra and Borneo. It is closely related to *G. superbum* (*q.v.*), from which it differs in its curiously extended pulvinate in-

florescences and in its larger, more depressed and clearly lobed capsules. It is possible that the Schomburgk collection cited by Beille, which I have not seen, may have been a specimen of *G. superbum*.

Glochidion kerrii Craib: 458 (1911) & 184 (1912); Beille: 627 (1927).

Ni.—Endemic? (but see below).

Shrub or small bushy tree to 6 m., common in underscrub of evergreen forest up to 1300 m. alt.

Almost certainly conspecific with *G. dasystylum* Kurz, described from the Martaban district of Burma and at present known only from the type. In Kurz's species the styles are united at the base only, whilst in *G. kerrii* they are connate for three-quarters of their length; in other respects the two plants seem identical. Further collections of *G. dasystylum* are required in order to settle the point.

G. kerrii and *G. dasystylum* are related to *G. eriocarpum* Champ., with a similar but thinner pubescence. The capsule of *G. kerrii*, however, is deeply 3-lobed, and is borne on a slender pedicel 10–12 mm. long.

Glochidion khasicum (Muell. Arg.) Hook. f.: 324 (1887); Kanjilal, De & Das, Fl. Assam 4: 187 (1940).

Phyllanthus khasicus Muell. Arg. in Flora 48: 389 (1865) & in DC.: 311 (1866).

Ni.—E. Himalaya, Assam.

Small rigid shrub on rocky limestone slope, on ridge below mountain summit, at 1900–2175 m. alt.

Glabrous; leaves coriaceous, elliptic-ovate, drying greenish, veins reticulate below; anthers 3; sepals of female flower 6, free, unequal; ovary glabrous, style elongate, stout, subclavate, unequally 3-toothed, persistent; capsule depressed, intruded at base and apex, 3–6-lobed, lobes rounded.

Glochidion lanceolarium (Roxb.) Voigt, Hort. Suburb. Calcutt.: 153 (1845); Dalz. in Dalz. & Gibbs., Bombay Fl.: 235 (1861); Muell. Arg. in Linnaea 32: 60 (1863); Hook. f.: 308 (1887); Hosseus: 405 (1911); Beille: 611 (1927).

Bradleia lanceolaria Roxb., Fl. Ind. 3: 697 (1832).

Glochisandra acuminata Wight, Ic. Pl. Ind. Or. 5(2): 28, t. 1905 (1852). [Non *Glochidion acuminatum* Muell. Arg. (1863).]

Glochidion macrophyllum Benth., Fl. Hongk.: 315 (1861), **synon. nov.**

Phyllanthus lanceolarius (Roxb.) Muell. Arg. in Flora 48: 371 (1865) & in DC.: 282 (1866).

Ni; SE9, 10; SW14.—NW. Himalaya to Assam; Indochina and SE. China.

Shrub or tree to 12 m., locally common in mixed evergreen forest up to 800 m. alt.

Leaves very smooth and rigidly coriaceous when mature, acute at the apex, never cordate at base; nerves inconspicuous. Inflorescences axillary

and sessile, thus distinguishing it readily from *G. hongkongense*. Capsule minutely puberulous, 8-12-lobed.

Glochidion littorale Bl., Bijdr.: 585 (1825); Hook. f.: 308 (1887); Merr.: 399 (1923); Ridley: 207 (1924); Beille: 610 (1927); Corner: 287 (1940); Backer & Bakh. f.: 461 (1963).

Phyllanthus littoralis (Bl.) Muell. Arg. in Flora 48: 370 (1865) & in DC.: 280 (1866).

N₄; C₁₂; P₁₇.—India, Ceylon, Indochina, W. Malesia.

Shrub or tree to 6 m. at low altitudes; no further data for Siam; cultivated in **C₁₂**, and perhaps in **N₄**; usually near the sea in Malesia.

The coriaceous, broadly obovate leaves with rounded apex, and the multilocular capsules, are usually sufficient to identify this well-known coastal species.

Glochidion nubigenum Hook. f.: 315 (1887).

N₁.—E. Himalaya.

Spreading tree of 5 m., in open evergreen forest on steep slope of rocky ridge at 1900–2175 m. alt.

Stems shortly tomentellous; leaves broadly elliptic, thin, shortly and bluntly cuspidate, pubescent or puberulous on nerves beneath with shining vitreous hairs; inflorescences sessile, axillary, with numerous female and 0–2 male flowers; capsule much depressed, deeply 6–8-lobed. The style and stigmas show a considerable range of form, from a short cylindric projection to a thick, convex, button-like structure, which may ‘spread’, as the capsule matures, to form a broad rough disc with a slightly raised margin. I can find no associated vegetative differences, and only one species seems to be represented.

Glochidion aff. **G. oblatum** Hook. f.: 312 (1887). (E. Himalaya, Assam & Burma.)

N₁: Pong Pho, 12 km. N. of Doi Chieng Dao, 1 Aug. 1968.

N₄: Phetchabun, Phu Miang, 2 Oct. 1967.

Small tree of 4 m., in mountain thicket or grassland clearing in evergreen forest at 900–1300 m. alt.

The specimens in question (Larsen, Santisuk & Warncke 2997; Shimizu, Iwatsuki et al. T11349) agree closely in vegetative characters with *G. oblatum*. The fruits, however, though also very similar in size and general outline, show certain differences which make me hesitate to identify this plant definitely with the Indian species. The capsule of *G. oblatum* is about 10–12 mm. in diameter, and almost berry-like, showing no sign of spontaneous dehiscence, except under pressure; there are a few faint longitudinal grooves, between which the outer wall of the capsule is slightly rounded. In the Siamese plant the capsule is 13–17 mm. across, thick-walled, and is dehiscing clearly into 8 dorsally flat segments, with no indication of grooves between them. Further material is needed in order to elucidate the status of this puzzling entity.

Glochidion obscurum (*Roxb. ex Willd.*) *Bl.*, *Bijdr.*: 585 (1825); *Hook. f.*: 317 (1887); *J. J. Sm.*: 122 (1910), *q.v.* for detailed synonymy; *Ridley*: 208 (1924); *Beille*: 623 (1927); *Henderson* in *Journ. Malay. Br. Roy. As. Soc.* 17: 70 (1939); *Corner*: 287 (1940); *Backer & Bakh. f.*: 461 (1963).

Phyllanthus obscurus *Roxb. ex Willd.*, *Sp. Pl.* 4: 581 (1804); *Muell. Arg.*: 287 (1866).

Glochidion roxburghianum *Muell. Arg.* in *Linnaea* 32: 61 (1863).

P16, 17.—Indochina (Cambodia, Tonkin), W. Malesia (except Philippines), Celebes, Moluccas, W. New Guinea (var.).

Tree to 8 m., locally common in scrub near sea-level.

The rather small, distichous, very oblique leaves, glaucous and finely grey-puberulous beneath, and the subglobose, unlobed, thick-walled, tardily dehiscent capsules, borne on long pedicels, and often surmounted by a conspicuous funnel-shaped style, are diagnostic for this widespread and somewhat variable species.

Glochidion perakense *Hook. f.*: 317 (1887); *Ridley*: 213 (1924).

?*Phyllanthus ferdinandi* *Muell. Arg.* var. ? *supra-axillaris* *Benth.*, *Fl. Austr.* 6: 96 (1873).

G. zeylanicum var. *malayanum* *J. J. Sm.*: 118 (1910); *Backer & Bakh. f.*: 462 (1963); **synon. nov.**

G. glaberrimum *Ridley* in *Bull. Misc. Inf. Kew* 1923: 363 (1923) & *Fl. Malay Penins.* 3: 208 (1924), **synon. nov.**; *non* *Merr.* (1916).

?*G. lanceilimbum* *Merr.* in *Philipp. Journ. Sci., Bot.* 26: 462 (1925).

?*G. supra-axillare* (*Benth.*) *Domin* in *Biblioth. Bot.* 22: 872 (Heft 89: 318) (1927).

P15-17.—Throughout Malesia to New Guinea, Queensland, the Bismarck Archip. and probably the Solomon Is.

Shrub or small tree to 7 m., in swampy scrub near the sea.

Almost glabrous; leaves lanceolate, chartaceous, somewhat glossy, brownish beneath, the margins tending to curl downwards when dry as in *G. daltonii*. Capsules depressed-globose, not or scarcely lobed, relatively thick-walled, puberulous (in Siam), with short persistent columnar style.

This widespread and variable Malesian plant is, I think, most conveniently treated as specifically distinct from *G. zeylanicum* of India, Ceylon and Assam, which has larger and especially broader leaves, rounded or cordate at the base, and larger female flowers. A definite break in the populations seems to occur between Assam and Peninsular Siam. There is a tendency for the inflorescences of *G. perakense* to become supra-axillary and pedunculate (as in the closely related *G. brunneum* *Hook. f.*), especially in the eastern part of its range, and for the capsule to become more flattened and glabrous, but there is much variation everywhere. The coastal swamp habitat applies mainly to the Siamese (and Malay Peninsular) occurrences of the species, since elsewhere it is noted from hill forests up to 300 m.

Glochidion rubrum *Bl.*, *Bijdr.*: 586 (1825); *J. J. Sm.*: 149 (1910), *q.v.* for detailed synonymy; *Merr.*: 402 (1923); *Beille*: 621 (1927); *Corner*: 288 (1940); *Backer & Bakh. f.*: 464 (1963).

Phyllanthus diversifolius Miq., Fl. Ind. Bat. Suppl.: 448 (1861); Muell. Arg.: 297 (1866); Oliver ex Williams in Bull. Herb. Boiss. sér. 2, 5: 30 (1905).

P. penangensis Muell. Arg.: 310 (1866), **synon. nov.**

Glochidion leiostylum Kurz, For. Fl. Brit. Burma 2: 345 (1877); Hook. f.: 324 (1887); Ridley: 212 (1924).

G. coronatum Hook. f.: 326 (1887); Ridley: 212 (1924); Corner: 286 (1940); **synon. nov.**

G. diversifolium (Miq.) Merr. in Philipp. Bur. For. Bull. 1: 29 (1903).

G. rubrum f. *longistylis* J. J. Sm. l.c.: 152 (1910).

G. thorelii Beille: 622 (1927), **synon. nov.**

G. penangense (Muell. Arg.) Airy Shaw in Kew Bull. 23: 6 (1969).

N1, 2; SE9, 10; SW14; P15–18.—Burma, Indochina, and throughout W. Malesia to Moluccas & Lesser Sunda Is.

Shrub or small tree to 5 m., in evergreen forest up to 1100 m. alt.

Though variable in leaf-shape, degree of pubescence, and length of style, the relatively small, ovate, coriaceous leaves, often tending to curl in drying, with a slight dimpling or puckering of the nerves on the underside, and the thinly pubescent, broadly and shallowly 3-lobed capsules, are usually sufficient to identify this common Malesian species.

Glochidion sphaerogynum (Muell. Arg.) Kurz, For. Fl. Brit. Burma 2: 346 (1877); Hook. f.: 317 (1887).

Phyllanthus sphaerogynus Muell. Arg. in Flora 48: 375 (1865) & in DC.: 317 (1866).

N1; NE5; E8.—E. Himalaya, Assam, Burma, Indochina.

Tree to 15 m., locally common in evergreen or mixed deciduous forest at 1000–1200 m. alt.

A well-marked species on account of its almost complete glabrescence, rather narrowly lanceolate, often slightly falcate leaves, long-pedicelled male flowers, and depressed, glabrous, strongly 8–12-lobed capsule, with the large subglobose style in the depressed apex.

Glochidion superbum Baill., Ét. Gén. Euphorb.: 638 (1858); Muell. Arg. in Linnaea 32: 64 (1863); Hook. f.: 323 (1887); Ridley: 208 (1924); Corner: 289 (1940); Backer & Bakh. f.: 462 (1963).

G. dasypetalum Miq. Fl. Ind. Bat. Suppl.: 451 (1860), *non* K. Koch (1853). *Phyllanthus superbus* (Baill.) Muell. Arg. in Flora 48: 375 (1865) & in DC.: 292 (1866).

P16, 18.—Malay Peninsula, Sumatra, Banka, Borneo.

Tree to 10 m., in evergreen forest up to 600 m. alt.

Unmistakable by reason of its large, ovate-lanceolate, strongly pubescent leaves, more or less cordate at base, its dense, many-flowered, axillary inflorescences, and its small, subglobose, scarcely lobed, thinly crustaceous capsules, truncate above.

Glochidion wallichianum Muell. Arg. in Linnaea 32: 67 (1863); Hook. f.: 315 (1887); Ridley: 213 (1924); Corner: 289 (1940).

Phyllanthus wallichianus (Muell. Arg.) Muell. Arg. in Flora 48: 387 (1865) & in DC.: 309 (1866).

Glochidion desmocarpum Hook. f.: 318 (1887); Ridley: 214 (1924); **synon. nov.** *G. curtisii* Hook. f.: 327 (1887).

G. trilobum Ridley in Bull. Misc. Inf. Kew 1923: 364 (1923) & Fl. Malay Penins. 3: 210 (1924), *p.p.*, quoad specimen Burkhill 7004 (Negri Sembilan). (The first specimen cited by Ridley under *G. trilobum*, Ridley 8440, from Singapore, is a puberulous form of *G. microbotrys* Hook. f.).

P16, 17.—Malay Peninsula, Sumatra, Banka, Borneo.

Tree of 8 m., in evergreen forest at 100–450 m. alt.

The small, much depressed, deeply 6-lobed, puberulous capsules and distinctly angled stems are characteristic. There is some variation in the length of the style: in the type material of *G. wallichianum* (Penang, Wallich 7873) the style is somewhat developed, whilst in that of *G. desmocarpum* (Penang, without collector or number; Perak, King's Collector 6092, Wray 761) it is almost obsolete. I am convinced, however, that only one species is represented.

Glyphostylus Gagnep.

Glyphostylus laoticus Gagnep. in Bull. Soc. Bot. France 71: 871 (1925) & in Lecomte: 402 (1926); (sphalm. 'laoticus') Airy Shaw in Kew Bull. 16: 372 (1963).

NE5; E8; C11; SW14.—Indochina (Laos).

Shrub to 1.5 m., locally common in evergreen or moist mixed deciduous forest up to 300 m. alt.; once noted (**SW14**) from a limestone area.

Closely related to *Excoecaria* and vegetatively very similar to *E. cochinchinensis*, differing in the greatly condensed, capitate, subsessile, bisexual inflorescences, the absence of glands beneath the flowers, and the styles connate into a column.

Homalanthus Juss.

Homalanthus populneus (Geisel.) Pax in Engl. & Prantl, Nat. Pflanzenfam. III. 5: 96, fig. 60 (1890); J. J. Sm.: 621 (1910); Pax & Hoffm. v. 46 (1912); Merr.: 460 (1923); Backer & Bakh. f.: 498 (1963); Airy Shaw in Kew Bull. 21: 409 (1968).

Stillingia populnea Geisel., Croton. Monogr.: 80 (1807).

Omalanthus leschenaultianus Juss., Euph. Gen. Tent.: 50, t. 16, fig. 53 (1824).

Carumbium populifolium Reinw. in Bl., Cat. Gewassen Buitenz.: 105 (1823), *nomen*, & in Syll. Pl. Ratisb. 2: 6 (1825–6) [non *Omalanthus populifolius* Grah. in Edinb. New Philos. Journ. [3]: 175 (1827)].

C. populneum (Geisel.) Muell. Arg.: 1144 (1866).

Homalanthus populifolius (Reinw.) Hook. f.: 469 (1888); Ridley: 313 (1924) [non *Omal. populifolius* Grah. l.c. *supra*].

P18.—Throughout W. & E. Malesia, except New Guinea; Bismarck Archip.

Tree to 6 m., in evergreen forest at unknown altitude.

This characteristic species is well known in Malaya, as far north as Kelantan, but has only recently been collected in adjoining Siamese territory (Amphoe Bacho, Narathiwat, 10 Dec. 1969, *Sangkhachand* 1549).

Homonoia Lour.

Leaves larger (to 20 cm. long), usually long-attenuate at apex, densely lepidote beneath; ♂ inflorescence longer (to 11 cm.) . **H. riparia**
Leaves smaller (to 5 cm. long), rounded to emarginate at apex, sparsely lepidote beneath; ♂ inflorescence abbreviated (to 2·5 cm.). **H. retusa**

Homonoia retusa (*Grah. ex Wight*) Muell. Arg. in Linnaea 34: 200 (1865) & in DC.: 1022 (1866); Hook. f.: 456 (1887); Hosseus: 405 (1911); Pax & Hoffm. xi: 116 (1917); Gagnep.: 332 (1925).

Adelia retusa Grah. ex Wight, Ic. Pl. Ind. Or. 5. ii: 20, t. 1869 (1852).

N.I.—Peninsular India; Indochina (Cochinchina, possibly escaped from the Saigon Botanic Garden? cf. Gagnep. l.c.).

Shrub on river-bank by rapids at 200 m. alt. (*Hosseus*; specimen not seen by me). Apparently not obtained by other collectors.

The leaf-apex of *H. riparia* is usually long-attenuate, but is sometimes broadly rounded and cuspidate, or even subtruncate. It is possible that Hosseus's specimen, upon which the above record of *H. retusa* was based, represented one of these forms of *H. riparia*.

Homonoia riparia Lour., Fl. Cochinch.: 637 (1790); Muell. Arg.: 1023 (1866); Hook. f.: 455 (1887); Craib: 467 (1911); Pax & Hoffm. xi: 114 (1917); Merr.: 448 (1923); Ridley: 309 (1924); Gagnep.: 330 (1925); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 239 (1935); Corner: 258 (1940); Li, Woody Fl. Taiwan: 430, fig. 152 (1963); Backer & Bakh. f.: 492 (1963).

Croton salicifolius Geisel., Crot. Monogr.: 6 (1807).

Adelia nerifolia Heyne ex Roth, Nov. Pl. Spec.: 375 (1821); Wight, Ic. Pl. Ind. Or. 5: 20, t. 1868 (1852).

Lumanaja fluviatilis Blanco, Fl. Filip. ed. 1: 821 (1837), ed. 2: 568 (1845) & ed. 3, 3: 236, t. 338 (1879).

Ricinus salicinus Hassk., Cat. Hort. Bogor.: 237 (1844) & Pl. Jav. Rar.: 264 (1848).

Spathiostemon salicinus (Hassk.) Hassk., Retzia: 41 (1858).

Haematostemon salicinus (Hassk.) Baill., Ét. Gén. Euphorb.: 293 (1858).

Spathiostemon salicinus var. *angustifolius* Miq., Fl. Ind. Bat. Suppl. (Fl. Sum.): 452 (1860).

P1-3; E8; SE9, 10; SW14; P15, 16, 18.—India to S. China & Formosa, and throughout W. Malesia to the Moluccas & Lesser Sunda Is.; not yet reported from New Guinea.

Rheophytic shrub, 1-3 m. high, on stream banks, rocky and gravelly stream beds, sand-bars, etc., up to 500 m. alt. 'More or less totally submerged for a portion of the rainy season, when it loses its leaves' (Kerr).

An unmistakable plant from its habitat, willow-like leaves, dense racemose inflorescences and branched stamens.

Mashed and powdered leaves used against skin eruptions (**SW14**, 1946, *Kostermans* 354).

Hura L.

Hura crepitans L., Sp. Pl.: 1008 (1753); Muell. Arg.: 1229 (1866); J. J. Sm.: 28 (1910); Pax & Hoffm. v: 272 (1912); Gagnep.: 329 (1925); Backer & Bakh. f.: 500 (1963).

NE5 (cult.); **C12** (cult.).—Native of Central and N. trop. S. America and W. Indies.

Shrub or tree to 13 m. tall; cultivated as an ornamental.

Jatropha L.

Petals coherent to middle (subgen. *Curcas*); leaves orbicular-ovate to triangular-ovate, shortly 3–5-lobed or unlobed, margin entire, glabrous except for nerves beneath; petals greenish yellow **J. curcas**
Petals free or almost so (subgen. *Adenoropium*):

Stipules small, simple or divided, not persistent (§ *Polymorphae*); leaves ovate or obovate or panduriform or 3-lobed, often repand-dentate at base; petals scarlet **J. integerrima**

Stipules larger, setaceous dissected or rarely reduced to numerous glands; leaves lobed (§ *Glanduliferae*):

Petiole bearing branched glandular setulae; leaves 3–5-partite, glandular-ciliate; petals purple **J. gossypiifolia**

Petiole eglandular; petals scarlet:

Leaves not peltate; lobes deeply lobulate, glaucous beneath

J. multifida

Leaves peltate; lobes entire **J. podagraria**

Jatropha curcas L., Sp. Pl.: 1006 (1753); Muell. Arg.: 1080 (1866); Hook. f.: 383 (1887); Pax in Engler IV. 147 (Heft 42): 77 (1910); Merr.: 449 (1923); Ridley: 251 (1924); Gagnep.: 324 (1925); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 239 (1935); Corner: 259 (1940); Backer & Bakh. f.: 494 (1963).

N1; **NE5** (or **E7**?); **C12**; **SW14**; **P15**.—Native of Tropical America.

Cultivated soft-wooded deciduous shrub to 4 m., grown for hedges, and oil extracted from seeds for pomades.

Jatropha gossypiifolia L., Sp. Pl.: 1006 (1753); Muell. Arg.: 1086 (1866); Hook. f.: 383 (1887); Pax in Engler IV. 147 (Heft 42): 26 (1910); Craib: 463 (1911) & 190 (1912); Merr.: 449 (1923); Ridley: 254 (1924); Gagnep.: 326 (1925); Corner: 260 (1940); (var. *elegans* Muell. Arg.) Backer & Bakh. f. 494 (1963).

N1; **SE9**; **C12**; **SW14**; **P18**.—Native of Tropical America.

Somewhat succulent shrub to 3 m., with bronze foliage, often abundant on waste ground and in spiny scrub forest at low altitudes.

Cultivated. Fruit used as aperient.

Jatropha integrifolia Jacq., Stirp. Sel. Amer.: 256 (1763); Pax in Engler IV. 147 (Heft 42): 50 (1910); cf. McVaugh in Bull. Torrey Bot. Cl. 72: 274 (1945).

J. hastata Jacq., l.c. (1763); Williams in Bull. Herb. Boiss. sér. 2, 5: 31 (1905); Pax in Engler, l.c.: 51 (1910).

J. pandurifolia Andr., Bot. Repos. 4: t. 267 (1799); Muell. Arg.: 1095 (1866), p.p.; Pax & Hoffm. l.c.: 49 (1910); Gagnep.: 326 (1925).

C12; SW14.—Native of West Indies.

Cultivated garden shrub to 3 m. high.

Jatropha multifida L., Sp. Pl.: 1006 (1753); Muell. Arg.: 1089 (1866); Hook. f.: 383 (1887); Williams in Bull. Herb. Boiss. sér. 2, 5: 32 (1905); Pax in Engler IV. 147 (Heft 42): 40 (1910); Merr.: 449 (1923); Gagnep.: 325 (1925); Backer & Bakh. f.: 494 (1963).

C12.—Native of Tropical & Subtropical America.

Cultivated garden shrub to 2 m. high.

Jatropha podagraria Hook. in Curt. Bot. Mag. 74: t. 4376 (1848); Muell. Arg.: 1093 (1866); Pax in Engler IV. 147 (Heft 42): 44 (1910); Merr.: 450 (1923), *in obs.*; Backer & Bakh. f.: 494 (1963).

C12; SE10.—Native of Central America.

Shrub of 2 m. with woody stem swollen at base. Cultivated as ornamental garden plant, and 'for the seeds that are believed to make them [sic] proof against steel when eaten' (*Mrs. D. J. Collins* 1350, 15 Nov. 1926).

Koilodepas Hassk.

Koilodepas longifolium Hook. f.: 420 (1887); Pax & Hoffm. vii: 270 (1914); Ridley: 275 (1924); Airy Shaw in Kew Bull. 14: 388 (1960) (excl. var. *integrifolium* Airy Shaw).

Coelodepas glanduligerum Pax & Hoffm. l.c. (1914).

C. subcordatus [sic] Gage in Rec. Bot. Surv. Ind. 9: 239 (1922), *pro parte*, quoad *Curtis* 1374 tantum.

Nephrostylus poilanei Gagnep. in Bull. Soc. Bot. France 72: 467 (Aug. 1925) & in Lecomte: 327 (Dec. 1925).

P15-18.—Malay Peninsula, Indochina, Banka, Borneo.

Tree to 20 m., in evergreen or semi-deciduous forest or scrub up to 500 m. alt.

Inflorescence usually fulvous or ferruginous (often galled); male glomerules of 10–20 small (about 1 mm. diam.) flowers, with 4–6 stamens and a small pistillode.—Much more work is needed on specific distinctions in *Koilodepas*. The genus is related to *Epiprinus* Griff. (*Sympyllia* Baill.)

Leptopus Decne.

Yellowish or brownish green when dry; leaves larger, cuneate at the base
L. australis

Greyish green when dry; leaves smaller, less cuneate at the base
L. calcareus

Leptopus australis (*Zoll. & Mor.*) *Pojarkova* in *Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS* 20: 270 (1960).

Andrachne australis Zoll. & Mor. in *Natuurk. Geneesk. Arch. Neerl. Ind.* 2: 17 (1845) & in *Flora* 30: 663 (1847); Muell. Arg.: 235 (1866); Craib: 183 (1912) (*var. genuina*); Pax & Hoffm. xv: 172 (1922); Merr.: 389 (1923); Ridley: 197 (1924); Beille: 539 (1927), *pro parte*, tantum quoad specim. Siam.; Hend. in *Journ. Mal. Br. Roy. As. Soc.* 17: 30, 68 (1939); Backer & Bakh. f.: 470 (1963); Airy Shaw in *Kew Bull.* 19: 299 (1965).

A. fruticosa sec. Hook. f.: 284 (1887); Ridley in *Journ. Str. Br. Roy. As. Soc.* 59: 172 (1911), *p.p.*; Gage in *Journ. As. Soc. Beng.* 75(5): 522 (1936), *p.p.*; *non L.**, *nec Decne.**

Thelypetalum pierrei Gagnep. in *Bull. Soc. Bot. France* 71: 876 (1924), & in Lecomte: 417 (1926); cf. Airy Shaw in *Kew Bull.* 19: 299 (1965).

?*Andrachne lanceolata* Pierre ex Beille, *l.c.*: 537 (1927); Airy Shaw in *Kew Bull.* 19: 300 (1965), *in obs.*

NE5; SE9, 10; SW14; PI5.—Indochina, Malaya, Philippines, Java, Tenimber Is.

Small shrub 10–25 cm. high, in dense or light, moist or dry, evergreen or deciduous forest at low altitudes (to 200 m.). Not noted on limestone in Siam.

See note under *L. calcareus*, below.

Leptopus calcareus (*Ridley*) *Pojarkova* in *Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS*, 20: 271 (1960).

Andrachne fruticosa sec. Ridley in *Journ. Str. Br. Roy. As. Soc.* 59: 172 (1911); Gage in *Journ. As. Soc. Beng.* 75(5): 522 (1936), *p.p.*; *non L.*, *nec Decne.*

A. calcarea Ridley in *Bull. Misc. Inf. Kew* 1923: 361 (1923) & *Fl. Malay Penins.* 3: 198 (1924); Hend. in *Journ. Mal. Br. Roy. As. Soc.* 17: 69 (1939), *in obs.*; Airy Shaw in *Kew Bull.* 19: 300 (1965), *in obs.*

PI5-17.—Malaya (Lankawi Is., Selangor).

Small shrub 10–25 cm. high, on limestone rocks in evergreen forest at low altitudes (up to 150 m.).

The status of this calciphilous plant in relation to *L. australis* would be worth testing by means of transplant experiments. It may be no more than a distinct ecotype. In the herbarium it dries a greyish rather than a yellowish or brownish green, and the leaves are on the whole smaller and less cuneate at the base.

* *A. fruticosa* L. = *Breynia fruticosa* (L.) Hook. f.; *A. fruticosa* sec. Decne = *Leptopus decaisnei* (Benth.) Pojarkova.

Macaranga Thou.

Leaves penninerved (\S *Pseudo-Rottlera*):

♀ inflorescence capitate, few-flowered, usually subtended by 2 bracts; capsule smooth, densely lepidote, usually bearing a few short conical processes at the apex **M. andamanica**

♀ inflorescence ± elongate and racemose (but flowers sometimes crowded towards apex); floral bracts relatively small and inconspicuous, often caducous; capsule ± echinate:

Plant drying brown or brownish; leaves more coriaceous, with closer nerves; ♂ inflorescence often galled; capsules densely echinate

M. lowii

Plant drying greenish or greyish; leaves less coriaceous, with laxer nerves; ♂ inflorescence rarely galled; capsules sparsely echinate

M. auriculata

Leaves palmately nerved, or at least trinerved at base:

Leaves lobed:

Stipules large (5–10 cm. long), erect, tomentellous, caducous (\S *Giganteae*)

M. gigantea

Stipules smaller, often reflexed and persistent:

Capsules without raised sticky glandular patches, but densely covered with yellow glandular granules (\S *Pruiñosae*) **M. hosei**

Capsules with 4–8 raised sticky yellow patches (\S *Pachystemon*):

Leaves beneath and stems usually brilliantly white-waxy; capsules mostly 3-locular **M. hypoleuca**

Leaves and stems not brilliantly white-waxy, but may be glaucous:

Stipules mostly caducous; bracts of ♂ inflorescence acuminate, drying black **M. griffithiana**

Stipules persistent; bracts of ♂ inflorescence not acuminate, not drying black:

Stem hollow; fruit without horns; young leaves not magenta beneath **M. triloba**

Stem solid; fruit with 4 short blunt horns; young leaves magenta beneath **M. quadricornis**

Leaves not lobed:

Ovary smooth:

Bracts without patellar glands within:

Bracts entire; plant softly grey-tomentellous; fruit 3–5-locular, fleshy, over 10 mm. wide (\S *Semiglobosae*) **M. curtisii**

Bracts strongly laciniate; plant thinly cinnamomeo-tomentellous; fruit 2-locular, not fleshy, 2–3 mm. wide (\S *Stachyella*)

M. laciniata

Bracts patellar-glandular within:

Ovary 2–3-locular; plant thinly ochraceous-pulverulent; bracts 1–3 mm. long, with several small glands (\S *Adenoceras*)

M. denticulata

Ovary 1-locular; plant somewhat pruinose; bracts 4–8 mm. long, with 1–2 large flat glands (\S *Indicae*) **M. indica**

Ovary softly echinate:

Leaves broadly ovate, deeply peltate; capsule large, tricoccous, glabrous, with rather sparse long soft processes and covered with yellow glandular granules (§ *Tanarius*) . . . **M. tanarius**

Leaves rhombic-ovate, not or very narrowly peltate; capsule smaller, dicoccous, pubescent:

♀ inflorescence capitate, long-peduncled, subtended by 2–3 large membranous bracts; capsule covered with reddish granules, without shining setae (§ *Echinocarpace*) . . . **M. kurzii**

♀ inflorescence short, branched; bracts small; capsule without reddish granules, spines bearing shining vitreous setae (§ *Trichocarpa*) **M. trichocarpa**

Macaranga andamanica Kurz, For. Fl. Brit. Burma 2: 389 (1877); Pax & Hoffm. vii: 365 (1914); Parkinson, For. Fl. Andaman Is.: 238 (1923); Airy Shaw in Kew Bull. 19: 318 (1965); Whitmore in Malayan Nature Journ. 20: 95 (1967) & in Biol. Journ. Linn. Soc. 1: 225 (1969).

M. brandisii King ex Hook. f.: 453 (1887); Brandis, Ind. Trees: 592 (1906); Pax & Hoffm. l.c. (1914); Ridley, 5: 333 (1925).

M. bracteata Merr. in Lingnan Sci. Journ. 6: 281 (1928).

?*M. rosuliflora* Croiz. in Journ. Arn. Arb. 23: 51 (1942).

P16, 18.—S. China (Yunnan, Hainan), Indochina (Tonkin), Andaman Is., Lower Burma, Malay Peninsula (Kedah).

Shrub or tree to 10 m., in evergreen forest at 700–900 m.

In the section *Pseudo-Rottlera*, distinguished by the capitate few-flowered female inflorescence usually subtended by 2 bracts, and by the smooth densely lepidote capsule, usually bearing a few short conical processes at the apex.

Macaranga auriculata (Merr.) Airy Shaw in Kew Bull. 19: 325 (1965).

Mallotus auriculatus Merr. in Philipp. Journ. Sci., Bot. 7: 396 (1912); Pax & Hoffm. vii: 194 (1914); Ridley, 5: 333 (1925).

Macaranga poilanei Gagnep. in Bull. Soc. Bot. France 69: 703 (1923) & in Lecomte: 448 (1926); Croiz. in Journ. Arn. Arb. 23: 51 (1942).

Mallotus tsiangii Merr. & Chun in Sunyatsenia 1: 63 (1930).

Macaranga lowii sec. Whitmore in litt.

P15–18.—Hainan, Indochina, Malay Peninsula, Borneo, Philippines.

Shrub or small spreading tree to 6 m., locally common in evergreen forest up to 650 m.

In sect. *Pseudo-Rottlera*, distinguished from *M. lowii* (with which it agrees in its more or less racemose female inflorescence) by the less coriaceous and less closely nerved leaves, drying greenish or greyish, the petiole and midrib below bearing sparse weak spreading hairs, and the capsule only sparsely echinate. Possibly only a form of *M. lowii*, as Whitmore believes.

Macaranga curtisii Hook. f.: 448 (1887); Pax & Hoffm. vii: 318 (1914); Ridley: 301 (1924); Whitmore in Malayan Nature Journ. 20: 96 (1967).

M. semiglobosa J. J. Sm.: 501 (1910); Pax & Hoffm. xv: 320 (1914); Backer & Bakhu. f. : 488 (1963); **synon. nov.**

P17.—N. Malaya, Java.

Tree of 8 m. at edge of evergreen forest at very low altitude.

Softly grey-tomentellous; leaves triangular-ovate, deeply peltate; stipules lanceolate, caducous; male inflorescence laxly paniculate; female inflorescence short, almost simple; female calyx cupuliform; fruit somewhat fleshy, 3-5-locular, densely glandular, 10-13 mm. wide.

In spite of its entire bracts, *M. curtisii* was referred by Pax & Hoffmann to the § *Sampsonianae*, in which the bracts are denticulate.

Macaranga denticulata (Bl.) Muell. Arg.: 1000 (1866); Hook. f.: 446 (1887); Craib: 467 (1911) & 194 (1912); Pax & Hoffm. vii: 334 (1914); Ridley: 303 (1924); Gagnep.: 446 (1926); Corner: 265 (1940); Backer & Bakhu. f.: 488 (1963); Whitmore in Malayan Nature Journ. 20: 94, 96 (1967).

Mappa denticulata Bl., Bijdr.: 625 (1825).

Rottlera glauca Hassk. in Flora 25. ii. Beibl. 2: 41 (1842).

Mappa gummiflua Miq., Fl. Ind. Bat. Suppl.: 430 (1858).

M. wallichii Baill., Ét. Gén. Euphorb.: 430 (1858).

M. truncata Muell. Arg. in Linnaea 34: 198 (1865).

Macaranga gummiflua (Miq.) Muell. Arg. in DC.: 1000 (1866).

M. perakensis Hook. f.: 447 (1887).

M. henricorum Hemsl. in Journ. Linn. Soc. London 26: 442 (1894); Gagnep.: 446 (1926).

N1; SW14; P16, 17.—Widely distributed from the E. Himalaya and S. China to Sumatra and Java.

Shrub or tree to 20 m., locally common in evergreen forest up to 1100 m. alt.

Thinly rufous-tomentellous or ochraceous-pulverulent; leaves triangular-ovate, peltate, with closely parallel tertiary nerves; capsule small, dicoccous, with very short reflexed stigmas.

Bark yields fibres (**N1**, 1949, Native Collector S.406, Roy. For. Dept. 4491).

Macaranga gigantea (Reichb. f. & Zoll.) Muell. Arg.: 995 (1866); Corner: 265 (1940); Whitmore in Malayan Nature Journ. 20: 94, 96 (1967); Whitmore & Airy Shaw in Kew Bull. 25: 241 (1971).

Mappa gigantea Reichb. f. & Zoll. in Linnaea 29: 465 (1857).

M. megalophylla Muell. Arg. in Flora 47: 467 (1864).

M. rugosa Muell. Arg. in Linnaea 34: 197 (1865).

Macaranga megalophylla (Muell. Arg.) Muell. Arg.: 995 (1866); Hook. f.: 449 (1887); Ridley: 298 (1924).

M. incisa Gage in Rec. Bot. Surv. Ind. 9: 245 (1922) (sapling).

N1, 3; SE9, 10; CI1/E8; SW14; P18.—Malay Peninsula, Sumatra, Borneo.

Tree to 20 m., in evergreen forest up to 700 m. alt.

The large, erect, tomentellous stipules distinguish *M. gigantea* from all others in the region. Leaves peltate, shortly trilobed; floral bracts shortly pectinate-dentate; capsule didymous, smooth, puberulous, with short reflexed stigmas.

Macaranga griffithiana Muell. Arg.: 993 (1866); Hook. f.: 452 (1887); Ridley: 299 (1924); Corner: 265 (1940); Whitmore in Malayan Nature Journ. 20: 94, 97 (1967).

SE₉, 10; PI₈.—Malay Peninsula.

Tree to 7 m., by streamsides and roadsides, and in open spaces, at low altitudes.

Branchlets smooth, often somewhat pruinose; leaves shortly and broadly trilobed, deeply peltate, the basal area below the insertion of the petiole often somewhat extended basally, with almost straight sides, giving the leaf a slightly rhombic outline; floral bracts usually large, conspicuous, acuminate, glabrescent, drying black; capsules mostly 4-locular, smooth, with a conspicuous glandular patch on each loculus.

Macaranga hosei King ex Hook. f.: 449 (1887); Pax & Hoffm. vii: 309 (1914); Ridley: 298 (1924); Whitmore in Malayan Nature Journ. 20: 95, 97 (1967).

M. pseudopruinosa Pax & Hoffm. vii: 308 (1914), **synon. nov.**

M. pearsonii Merr. in Philipp. Journ. Sci. 29: 383 (1926) & in Univ. Calif. Publ. Bot. 15: 160 (1929), **synon. nov.**

PI₈.—Malay Peninsula, Sumatra, Borneo.

Tree of 10–15 m. in evergreen forest at 400 m. alt.

Very close to *M. pruinosa* (Miq.) Muell. Arg. (*M. maingayi* Hook. f., **synon. nov.**), differing in its non-peltate or narrowly peltate leaves and (according to Whitmore) in its different habitat, being a plant of upland or at least non-inundated situations, whilst *M. pruinosa* is found in low-lying country, in 'disturbed freshwater and peat swamp forests'. It seems doubtful whether the habitat distinction is constant in Borneo, where both species occur.

Macaranga hypoleuca (Reichb. f. & Zoll.) Muell. Arg.: 992 (1866); Hook. f.: 448 (1887); Ridley: 300 (1924); Corner: 266 (1940); Whitmore in Malayan Nature Journ. 20: 93, 97 (1967).

Mappa (?) *hypoleuca* Reichb. f. & Zoll. in Verh. Natuurk. Vereen. Ned. Ind. 1: 30 (1856) & in Linnaea 28: 309 (1856).

PI₆, 18.—Malay Peninsula, Sumatra, Borneo.

Tree to 20 m., locally common in evergreen forest at low altitudes.

Leaves deeply 3-lobed, peltate, usually brilliantly white-waxy beneath; male inflorescence lax, elongate; capsules smooth, mostly 3-locular, with two raised glandular patches at the apex of each loculus; styles very short, recurved.

Macaranga indica Wight, Ic. Pl. Ind. Or. 5: 23, t. 1883 (1852) & 6: 5, t. 1949, ii (1853); Muell. Arg.: 1009 (1866); Hook. f.: 446 (1887); Pax & Hoffm. vii: 349 (1914); Airy Shaw in Kew Bull. 23: 93 (1969); Whitmore & Airy Shaw in Kew Bull. 25: 241 (1971).

?*Trewia hernandiifolia* Roth, Nov. Pl. Sp.: 374 (1821); cf. Hook. f.: 424 (1887). *M. flexuosa* Wight, Ic. Pl. Ind. Or. 5: 23 (1852) & 6: t. 1949, iii (1853).

?*M. adenantha* Gagnep. in Bull. Soc. Bot. France 69: 701 (1923) & in Lecomte: 443 (1926), *e descr.*

N1; E8.—W. Peninsular India, Ceylon, E. Himalaya, SW. China, Assam, ?Burma, Andaman Is.

Tree of 15–20 m., in evergreen forest at 1200–1300 m. altitude.

Recognizable by the usually more or less zigzag branches of the male inflorescence, and by the conspicuous male floral bracts, which are more or less subulate, bearing 1–2 very large patelliform glands towards the base; the tip when present is often incurved, but may be quite absent.

If J. D. Hooker's suggestion (*l.c. supra*) that Roth's *Trewia hernandiifolia* is this species should prove to be correct, this would provide a considerably earlier epithet.

Macaranga kurzii (Kuntze) Pax & Hoffm. vii: 360 (1914).

M. membranacea Kurz in Journ. As. Soc. Bengal 42: 246 (1873) & For. Fl.

Brit. Burma 2: 389 (1877); Hook. f.: 454 (1887); *non* Muell. Arg. (1866).

Tanarius kurzii Kuntze, Rev. Gen. Pl.: 619 (1891).

M. andersonii Craib: 466 (1911) & 193 (1912); Gagnep.: 437 (1927).

N1; NE5.—Burma, SW. China, Indochina.

In Siam apparently confined to, but abundant in, two small mountain areas in the extreme north.

Tree of 5–7.5 m., occasionally shrubby, locally common in open evergreen or mixed deciduous or grassy pine-forest at 1000–1700 m. altitude.

Leaves membranous, rhomboid-ovate or occasionally tricuspidate, long and slenderly caudate, minutely denticulate or subentire; petioles and peduncles sparsely or densely long-pilose; female inflorescence capitate, long-peduncled, subtended by 2–3 large ovate membranous bracts, as in § *Pseudo-Rottlera*; capsule sparsely softly echinate, covered with reddish granules.

Macaranga laciniata Whitmore & Airy Shaw apud Whitmore in Biol. Journ. Linn. Soc. 1: 226 (1969), *anglice*, & in Kew Bull. 25: 241 (1971), *latine*.

P18.—NE. Malaya.

Tree of 10 m. near stream at 150 m. alt.

Closely related to *M. heynei* I. M. Johnst. (*M. robinsonia* Ridl.), but differing in its more congested inflorescences with deeply laciniate bracts; cf. Whitmore (1969), fig. 2.

Macaranga lowii King ex Hook. f.: 453 (1887); Pax & Hoffm. vii: 364 (1914); Ridley: 304 (1924); Airy Shaw in Kew Bull. 19: 323 (1965); Whitmore in Malayan Nature Journ. 20: 95, 98 (1967).

- ?*Mallotus auriculatus* Merr. in Philipp. Journ. Sci., Bot. 7: 396 (1912).
M. affinis Merr. in Philipp. Journ. Sci., Bot. 13: 82 (1918); Pax & Hoffm. xvii (Euph.-Addit. vii): 183 (1924).
? *Macaranga auriculata* (Merr.) Airy Shaw in Kew Bull. 19: 325 (1965) & 26: 287 (1971) (*supra*); cf. Whitmore, Tree Fl. Malaya, in press (1972).

SE10; PI5-18.—Malay Peninsula, Borneo.

Shrub or small tree to 10 m., in evergreen forest up to 300 m. alt.

Macaranga lowii differs from the closely related *M. auriculata* in usually drying brownish, in its more coriaceous leaves with closer nerves, and in its more densely echinate capsules.

Macaranga quadricornis Ridley in Bull. Misc. Inf. Kew 1923: 367 (1923) & Fl. Mal. Penins. 3: 300 (1924); Whitmore in Biol. Journ. Linn. Soc. 1: 227-230 (1969).

'*M. ?tenuifolia*' sec. Corner: 269 (1940), *an* Muell. Arg.? Cf. Whitmore in Malayan Nature Journ. 20: 99 (1967), *in obs.*

PI7, 18.—Malay Peninsula.

Shrub or small tree of 5-6 m., by streams in evergreen forest at 600 m. alt.

Very near *M. triloba*, but leaves with margin conspicuously glandular-denticulate, and characteristically magenta-coloured beneath when young; stipules flatter, less convex, less shining; stem solid; fruits usually 4-locular, shortly and bluntly 4-horned.

Macaranga tanarius (L.) Muell. Arg.; 997 (1866); Hook. f.: 447 (1887); Pax & Hoffm. vii: 352 (1914) (excl. synon. *M. clavata* Warb.); Merr.: 443 (1923); Ridley: 302 (1924); Gagnep.: 442 (1926); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 71 (1939); Corner: 268 (1940); Backer & Bakh. f.: 488 (1963); Whitmore in Malayan Nature Journ. 20: 94, 99 (1967); Airy Shaw in Kew Bull. 23: 99 (1969), *in clavi*.

Ricinus tanarius L. in Stickm. Herb. Amboin.: 14 (1754) & in Amoen. Acad. 4: 125 (1759).

Mappa tanarius (L.) Bl., Bijdr.: 624 (1825).

M. tomentosa Bl., Bijdr.: 624 (1825).

Macaranga molliuscula Kurz in Journ. As. Soc. Bengal 42: 245 (1873).

SE10; PI6.—Andamans, Nicobars, Cochinchina, S. China, Formosa & Ryu-Kyu Is., throughout Malesia to N. Australia and Melanesia.

Small tree to 6m., in evergreen forest up to 150 m. alt.

The apparently scarce or extremely local occurrence in SE. Asia of this otherwise widespread and common species is remarkable.

Leaves membranous, orbicular-ovate, deeply peltate; male inflorescence diffuse, floral bracts conspicuously laciniate-dentate; fruits rather large, covered with orange-yellow granules and bearing a few long soft subulate processes and noted as 'sticky'.

Macaranga trichocarpa (Reichb. f. & Zoll.) Muell. Arg.: 1003 (1866); Hook. f.: 450 (1887); Pax & Hoffm. vii: 358 (1914); Ridley: 303 (1924);

Gagnep.: 441 (1926); *Corner*: 268 (1940); *Whitmore* in *Malayan Journ.* 20: 95, 99 (1967); *Airy Shaw* in *Kew Bull.* 23: 97 (1969), *q.v.* for full synonymy.

Mappa trichocarpa Reichb. f. & Zoll. ex Zoll. in *Verhand. Natuurk. Vereen. Ned. Ind.* 1: 8 (1856), & in *Linnaea* 28: 307 (1856).

Macaranga minutiflora Muell. Arg. in *Flora* 47: 466 (1864) & in DC.: 1012 (1866); Pax & Hoffm. vii: 358 (1914); Pax apud Schmidt in *Bot. Tidsskr.* 32: 390 (1916).

M. helferi Muell. Arg.: 1004 (1866).

M. trichocarpa var. *trilobulata* Gagnep.: 442 (1926).

SE9.—Indochina, Lower Burma, Malay Peninsula, Sumatra, Borneo.

Shrub of 2–3 m., sometimes scrambling, forming thick growth in scrub or bamboo forest up to 500 m. alt.

A very distinct species, shortly pubescent throughout, with more or less rhombic-ovate (occasionally trilobed) denticulate leaves, strongly trinerved at the base, lateral nerves unusually straight and parallel; inflorescences short, axillary; capsule dicoccous, pubescent, softly echinate, the spines bearing conspicuous shining vitreous setae (alleged to be stinging).

Macaranga triloba (Bl.) Muell. Arg.: 989 (1866); *Hook. f.*: 452 (1887); Pax & Hoffm. vii: 380 (1914); *Ridley*: 298 (1924); *Gagnep.*: 439 (1926); *Corner*: 268 (1940); *Backer & Bakhu. f.*: 488 (1963); *Whitmore* in *Malayan Nature Journ.* 20: 94, 99 (1967).

Ricinus trilobus Reinw. ex Bl., *Cat. Gew. Buitenz.*: 108 (1823), *nomen*.

Pachystemon trilobus Bl., *Bijdr.*: 626 (1825).

P. bancanus Miq., *Fl. Ind. Bat. Suppl.*: 462 (1860).

Macaranga cornuta Muell. Arg.: 988 (1866).

M. bancana ('-us') (Miq.) Muell. Arg.: 990 (1866).

P17, 18.—Lower Burma and throughout W. Malesia.

Tree to 12 m., in evergreen forest or scrub jungle up to 400 m. alt.

Leaves large, broadly peltate, usually rather deeply trilobed; stipules strongly convex-recurved, shining; stem hollow; fruits with glandular patches but without horns. (Cf. *M. quadricornis*.)

***Mallotus* Lour.**

In the arrangement of the species here I have broken up the genus into its sections, which are unusually distinct and well-marked. The species are then arranged alphabetically under each section.

KEY TO SECTIONS OF MALLOTUS

Leaves penninerved:

Leaves glandular-punctate above, opposite or alternate; fruit indehiscent, winged § **Polyadenii** (*Coccoceras*)

Leaves not glandular-punctate above, opposite; fruit a dehiscent capsule, not winged:

- Leaves truly opposite, but exceedingly unequal, the smaller either suborbicular or stipuliform; stems terete; nodes swollen § **Hancea**
- Leaves opposite, equal or somewhat unequal, but similar in shape; stems and nodes somewhat flattened § **Axenfeldia**
- Leaves palmately nerved or trinerved (cf. also *M. cuneatus* in § *Axenfeldia*):
- Leaves all opposite, epeltate, mostly granular-glandular beneath; ♀ calyx not spathaceous; plant not smelling of coumarin § **Rottleropsis**
(*Echinocrotion* & *Plagianthera*)
- Leaves opposite and alternate on the same branch; ♀ calyx spathaceous; dried plant smelling of coumarin § **Stylanthus**
- Leaves all alternate:
- Capsule smooth; leaves granular-glandular beneath § **Rottlera**
(*Philippinenses*)
- Capsule echinate:
- Leaves eglandular; ♂ and ♀ inflorescences abbreviated, 1–5-flowered, mostly below the leaves; flowers large; styles elongate; capsules large (to 2·5 cm. diameter) § **Oligantha**
- Leaves granular-glandular beneath; inflorescences normal, axillary; flowers, styles and capsules smaller:
- Stamens 45–100; ♀ calyx not or scarcely spathaceous, persistent; plant not smelling of coumarin § **Mallotus** (*Echinus*)
- Stamens 15–45; ♀ calyx spathaceous, deciduous; plant smelling of coumarin § **Stylanthus**

§ AXENFELDIA

- Petiole only 2–5 mm. long; foliage recalling that of *Alchornea rugosa*
M. brevipetiolatus
- Petiole 3–15 mm. long:
- ♀ inflorescence reduced to a single flower; capsule 2 cm. or more in diameter **M. calocarpus**
- ♀ inflorescence several-flowered; capsule mostly smaller:
- Small tree; ♂ and ♀ inflorescences often precocious, very lax and elongate, with long pedicels and long plumose stigmas; capsule sometimes 2 cm. in diameter **M. khasianus**
- Shrubs; ♂ and ♀ inflorescences not precocious, much shorter, pedicels and stigmas shorter; capsule 1–1·2 cm. in diameter:
- Leaf-base not trinerved; nerves weaker; capsules less shortly echinate **M. resinosis**
- Leaf-base shortly trinerved (basal nerves ± parallel to margin); nerves stronger; capsules more shortly echinate **M. cuneatus**

Mallotus brevipetiolatus Gage in Rec. Bot. Surv. Ind. 9: 242 (1922); Ridley: 287 (1924); Airy Shaw in Kew Bull. 21: 393 (1968).

P15–17.—N. Malaya (Perlis, Kedah, Perak).

Small tree to 8 m., in evergreen forest up to 200 m. alt., always associated with limestone but not listed by Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 71 (1939).

Leaves opposite, somewhat unequal, elliptic, cuneately narrowed to the abruptly rounded or minutely cordate base, glabrous, margin distantly and

shallowly notched, petiole only 2–5 mm. long. Foliage superficially resembling that of *Alchornea rugosa*, but the very short petioles and opposite arrangement of the leaves immediately distinguish it.

Mallotus calocarpus Airy Shaw in Kew Bull. 21: 395 (1968).

SE9.—Endemic.

Shrubby tree to 4 m., in evergreen forest at 100–300 m. alt.

Stems and petioles softly shortly tomentellous; leaves rather large, oblong-elliptic, opposite, usually very unequal in each pair, distantly sinuate-serrate, with a group of large brown macular glands at the base; male inflorescence unknown, probably very abbreviated; female inflorescence reduced (? always) to a single flower; capsule rather large, densely and shortly stellate-tomentellous, greenish-yellow in colour, smooth or bearing very short scattered warts.

Mallotus cuneatus Ridley in Journ. Roy. As. Soc. Str. Br. 59: 181 (1911); Pax & Hoffm. vii: 155 (1914); Ridley: 288 (1924); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 71 (1939); Airy Shaw in Kew Bull. 21: 389 (1968), *in obs.*

Coelodiscus muricatus sec. Gagnep.: 369 (1925), *pro parte, non Claoxylon muricatum* Wight = *Mallotus muricatus* (Wight) Muell. Arg.

N3; SW14; PI5, 17.—Malay Peninsula, Indochina (Tonkin).

Shrub or small tree to 3 m., locally common in dry evergreen forest up to 450 m. alt.; several times noted on limestone.

Closely related to *M. resinosus*, but clearly distinguishable by the trinerved leaf-base (the basal nerves not spreading as in *M. resinosus*, but parallel to the margin), the stronger nervation in general, and the smaller and more shortly echinate capsules. The trinerved leaf-base led Pax & Hoffmann (*l.c.*) to refer this species, erroneously, to their sect. *Echinocroton*.

Mallotus khasianus Hook. f.: 438 (1887); Pax & Hoffm. vii: 191 (1914); Kanjilal et al., Fl. Assam 4: 125 (1940); Airy Shaw in Kew Bull. 21: 396 (1968).

M. filiformis Hook. f.: 435 (1887); Pax & Hoffm. vii: 196 (1914).
M. polyneurus Hook. f.: 439 (1887); Pax & Hoffm. vii: 195 (1914).

NI; SW14.—Assam, Burma.

Small spreading tree to 15 m. high, locally common in dense evergreen forest, especially along streams, at altitudes of 800–1900 m.

A lax, ‘leggy’ plant, tending to precocious flowering. Leaves rather large, opposite, elliptic, entire to coarsely and distantly serrate, almost glabrous; inflorescences (both male and female) very lax and elongate, the pedicels also elongate; female flowers with long plumose-papillose stigmas; capsules sparsely and shortly echinate.

Mallotus resinosus (Blanco) Merr., Sp. Blanco.: 222 (1918), & Enum. Philipp. Fl. Pl. 2: 436 (1923).

Adelia resinosa Blanco, Fl. Filip. ed. 2: 562 (1845); Muell. Arg.: 731 (1866).
Claoxylon muricatum Wight, Ic. Pl. Ind. Or. 5(2): 24, t. 1886 (1852).

Axenfeldia intermedia Baill., Ét. Gén. Euphorb.: 419 (1858).
Rottlera muricata (Wight), Thw., Enum. Pl. Zeyl.: 273 (1864).
Mallotus muricatus (Wight) Muell. Arg. in Linnaea 34: 191 (1865) & in DC.: 972 (1866), *pro parte*; Hook. f.: 436 (1887); Pax & Hoffm. vii: 190 (1914).

P15, 16.—S. India & Ceylon, Andamans & Nicobars; N. Malay Peninsula, Indochina, Philippines, N. Borneo, Celebes, Java, Lesser Sunda Is. & New Guinea.

Shrub of 3 m. in evergreen forest on limestone at 100 m. alt.
 Glabrous; branchlets often very flattened; leaves cuneate-obovate, repand-dentate to entire, penminerved, usually with a few macular glands near the base on the upper side, very short-petioled, densely granular-glandular beneath; capsule shortly echinate.

Mallotus (*§ Axenfeldia*) sp. nov.; cf. Airy Shaw in Kew Bull. 21: 396 (1968).

S10: Prachinburi, Kao Singto, Krabin, 10 Nov. 1930, Kerr 19835.—Endemic.

Shrub of 50 cm., in evergreen forest on limestone at 50 m. alt.

§ HANCEA

Reduced leaf of each pair suborbicular or broadly ovate; petiole of normal leaf only 2–5 mm. long. **M. miquelianus**

Reduced leaf of each pair stipuliform; petiole of normal leaf 1–4 cm. long:
 Leaves membranous or thinly chartaceous; petioles up to 4 cm. long;
 stipules subulate, very acute; capsule larger, long-echinate **M. kingii**

Leaves chartaceous or coriaceous; petioles up to 2 cm. long; stipules broadly oblong or elliptic or lanceolate, ± obtuse; capsule smaller, more shortly echinate **M. stipularis**

Mallotus kingii Hook. f.: 439 (1887); Pax & Hoffm. vii: 197 (1914); Ridley: 293 (1924).

P18.—Malay Peninsula.

Tree to 4 m., scattered in evergreen forest at 300 m. alt.

Mallotus kingii was based upon a solitary specimen collected in Perak, Malaya, over 80 years ago. It is evidently rare in Malaya, since it has only recently been re-collected there. The type-specimen bore male flowers, whereas the Siamese gathering (Smitinand 10945, BKF 46620) bears ripe capsules, but there is satisfactory agreement in vegetative characters. The membranous or scarcely chartaceous leaves, which are green when dry; the long petioles, acute stipules and large fruits, distinguish it well from *M. stipularis*.

Mallotus miquelianus (Scheff.) Boerl., Handl. Fl. Ned. Ind. 3. i: 290 (1900); Pax & Hoffm. vii: 200 (1914); Merr.: 434 (1923).

Rottlera miquelianiana Scheff. in Ann. Mus. Bot. Lugd.-Bat. 4: 124 (1868-9).
Mallotus anisophyllus Hook. f.: 436 (1887); Ridley: 293 (1924).

P17, 18.—Throughout W. Malesia.

Shrub to 4·5 m. in evergreen forest at very low altitudes.

Unmistakable on account of its extreme anisophylly, one leaf of each opposite pair being reduced to a relatively small suborbicular lamina, up to 4 cm. in diameter, cordate at base; petioles of normal leaves very short, 2-5 mm. long.

Mallotus stipularis Airy Shaw in Kew Bull. 21: 398 (1968).

P16-18.—Sumatra, Borneo.

Tree to 15 m., in evergreen forest at 400-700 m. alt.

Closely related to the common W. Malesian species *M. penangensis* Muell. Arg. and to the S. Chinese *M. hookerianus* (Seem.) Muell. Arg., but differing from both in the relatively broad, subobtuse, oblong or elliptic or lanceolate (not acutely subulate) stipules, and broader floral bracts. There is usually a variable development of pubescence.

§ MALLOTUS (*Echinus*)

Aculei of the capsule very dense, forming a continuous layer:

Leaves narrowly peltate; branches shortly rufous-tomentellous

M. macrostachyus

Leaves broadly peltate; branches, petioles and inflorescence densely floccose-tomentose **M. barbatus**

Aculei of the capsule less dense, not forming a continuous layer:

Aculei filiform, elongate, close; leaves thin, triangular-ovate, broadly cuneate to cordate at the base **M. mollissimus**

Aculei robust, short, rigid:

Capsule densely echinate; leaves usually coriaceous, triangular-ovate, ± truncate at the base **M. tetracoccus**

Capsule distantly echinate; leaves thin, rhombic-ovate, cuneate at the base **M. paniculatus**

Mallotus barbatus Muell. Arg. in Linnaea 34: 184 (1865) & in DC.: 957 (1866); Hook. f.: 418 (1887); Hosseus: 405 (1911); Pax & Hoffm. vii: 164 (1914); Gagnep.: 357 (1925); Corner: 270 (1940); Backer & Bakh. f.: 482 (1963).

N1, 2, 4; NE5; SE10; SW14; P15.—India, Burma, China, Indochina, Malay Penins., ?Sumatra, ?Java.

Shrub or small tree to 6 m., in scrub jungle, by streams, often springing up in clearings, once noted as on sandy soil, up to 1150 m. alt.

Stems, petioles and inflorescences densely floccose-tomentose; leaves large; peltate, often tricuspidate or shortly and acutely 3-lobed; infructescence elongate-racemose; capsules globose, densely covered with soft stellate-tomentose processes forming a continuous uniform layer.

var. ***pedicellaris*** Croiz. in Journ. Arn. Arb. 19: 135 (1938).

N1.—China (Szechuan).

Tree of 6 m. at 480 m. alt.—Fruiting pedicels much elongate.

Mallotus macrostachyus (Miq.) Muell. Arg.: 963 (1866); Hook. f.: 429 (1887); Pax & Hoffm. vii: 163 (1914); Ridley: 288 (1924); Gagnep.: 357 (1925); Corner: 271 (1940).

Rottlera macrostachya Miq., Fl. Ind. Bat. Suppl. (Fl. Sum.): 454 (1860).

Mallotus albus sec. Muell. Arg. in Linnaea 34: 188 (1865) & in DC.: 965 (1866); Hook. f.: 429 (1887); Pax & Hoffm. vii: 168 (1914); in all cases excl. syn. *Rottlera tetracocca* Roxb.; cf. Croiz. in Journ. Arn. Arb. 21: 503 (1940); non *Rottlera alba* Roxb. ex Jack = *M. paniculatus* (Lam.) Muell. Arg.; nec *M. albus* auctorum = *M. tetracoccus* [Roxb.] Kurz.

P16, 17.—Malay Peninsula, Banka, Borneo.

Shrub or small tree to 10 m., in and at the margins of evergreen forest up to 400 m. alt.

Branches robust, shortly rufous-tomentellous; leaves alternate, large, triangular-ovate, ochraceous-tomentellous beneath, very long-petioled; inflorescences frequently leaf-opposed, the male much branched, the female simple; capsule globose, with a dense covering of tomentose processes forming a thick uniform layer, as in *M. barbatus*.

Mallotus mollissimus (Geisel.) Airy Shaw, comb. nov.

Croton mollissimus Geisel., Croton. Monogr.: 73 (March 1807); cf. Croiz. in Journ. Arn. Arb. 19: 141-2 (1938) & 21: 502 (1940), *in obs.*

C. ricinoïdes Pers., Syn. 2: 586 (Sept. 1807).

Rottlera ricinoïdes (Pers.) A. Juss., Euphorb. Gen. Tent.: 33 (1824).

Adisca zippelii Bl., Bijdr.: 611 (1825).

Chrozophora mollissima (Geisel.) Spreng., Syst. 3: 851 (1826).

Mallotus ricinoïdes (Pers.) Muell. Arg. in Linnaea 34: 187 (1865) & in DC.: 963 (1866); Hook. f.: 430 (1887); Hosseus: 406 (1911); Craib: 193 (1912); Pax & Hoffm. vii: 170 (1914); Merr.: 436 (1923); Gagnep.: 356 (1925); Backer & Bakh. f.: 482 (1963).

Echinus mollissimus (Geisel.) Baill., Adansonia 6: 316 (1866).

N1?.—Lower Burma (Kurz, unconfirmed), Indochina, and throughout Malesia (except Malay Peninsula) to New Guinea, Australia & Melanesia.

Shrub of 4 m. at 1000 m. alt. (*Hosseus*, l.c.).

This is a very doubtful record; I have not seen the specimen of Hosseus upon which it was based. The species has apparently never been reported from India, northern Burma or China, though Gagnepain (l.c.) has several records from various parts of Indochina. Its occurrence in NW. Siam is improbable, and the record requires confirmation. The species is usually recognizable by the thinly floccose indumentum of the lower leaf-surface and by the long, rough, shaggy-woolly covering of the capsules.

A new combination is required for this species, since Geiseler's name has apparently six months' clear priority over that of Persoon.

Mallotus paniculatus (Lam.) Muell. Arg. in Linnaea 34: 189 (1865) & in DC.: 965 (1866); Kurz, For. Fl. Brit. Burma 2: 383 (1877); Merr.: 434 (1923); Corner: 272 (1940); Backer & Bakh. f.: 483 (1963).

Croton paniculatus Lam., Encycl. Méth. Bot. 2: 207 (1786).

Echinus trisulcus Lour., Fl. Cochinch. 2: 633 (1790).

Mallotus cochinchinensis Lour., l.c.: 635 (1790); Hook. f.: 430 (1887); Craib: 466 (1911) & 193 (1912); Pax & Hoffm. vii: 166 (1914); Ridley: 289 (1924); Gagnep.: 355 (1925).

Trewia tricuspidata Willd., Sp. Pl. 4: 835 (1805).

Rottlera alba Roxb. ex Jack*, Mal. Misc. 1: 26 (1820); Roxb., Fl. Ind. 3: 829 (1832).

R. paniculata (Lam.) Juss., Euphorb. Gen. Tent.: 33 (1824).

Mappa cochinchinensis (Lour.) Spreng., Syst. Veg. 3: 878 (1826).

Mallotus albus (Roxb. ex Jack) Muell. Arg.* in Linnaea 34: 188 (1865) & in DC.: 965 (1866), *tantum quoad synon.*

M. chinensis Muell. Arg.: 965 (1866).

N₁, 2; NE₅; E₈; SE_{9, 10; P₁₅, 16}.—Burma, S. China, Formosa, Indo-china, and throughout Malesia to New Guinea and Queensland.

Shrub (sometimes scrambling) or tree to 20 m., common in evergreen or dry deciduous forest or scrub at low and medium altitudes, ascending to 750 m. in **N₁**.

Stems, petioles and inflorescences very shortly rufous-stellate-furfuraceous; leaves alternate, rhombic or ovate, often tricuspidate or trilobed, acuminate, whitish-tomentellous below, thinly chartaceous, long-petioled, sometimes narrowly peltate, with two large macular glands at base; inflorescence usually paniculate, or the female sometimes almost simple; capsules tomentellous, bearing a number of coarse soft subulate processes, not densely arranged; seeds small, black, shining, often remaining attached to the columella after dehiscence of the capsule.

Mallotus tetracoccus (Roxb.) Kurz, For. Fl. Brit. Burma 2: 382 (1877); Alston in Trimen, Handb. Fl. Ceylon 6: 267 (1931); Croizat in Journ. Arn. Arb. 21: 503 (1940).

Rottlera tetracocca Roxb., Fl. Ind. 3: 826 (1832).

R. ferruginea Roxb., l.c.: 828 (1832).

R. mappoides Dalz. in Hook. Journ. Bot. & Kew Garden Misc. 3: 122 (1851).

Mallotus ferrugineus (Roxb.) Muell. Arg.: 982 (1866).

M. albus sec. Muell. Arg. in Linnaea 34: 188 (1865) & in DC.: 965 (1866); Hook. f.: 429 (1887); Pax & Hoffm. vii: 168 (1914); *non Rottlera alba* Roxb. ex Jack (*quaes = M. paniculatus* (Lam.) Muell. Arg.).

To be expected in **N₁**.—India, Ceylon, E. Himalayas, Assam, SE. Yunnan.—The closely related *M. metcalfeanus* Croiz. occurs in Tonkin.

* Merrill's interpretation of this species (in Journ. Arn. Arb. 33: 243 (1952)) as *M. macrostachyus* (Miq.) Muell. Arg., appears to be erroneous. In Jack's original description of *Rottlera alba* the leaves are described as 'rhomboidal-ovate, often approaching to three-lobed, long acuminate'. Three-lobed, long acuminate leaves are almost unknown in *M. macrostachyus*, but are of frequent occurrence in *M. paniculatus*. (Cf. the synonym *Trewia tricuspidata* Willd.) See also Croizat in Journ. Arn. Arb. 21: 503 (1940).

§ OLIGANTHAE

- Only species **M. subpeltatus**

Mallotus subpeltatus (Bl.) Muell. Arg. in Linnaea 34: 189 (1865) & in DC.: 968 (1866); Hook. f.: 433 (1887); Pax & Hoffm. vii: 177 (1914); Ridley: 290 (1924); Backer & Bakh. f.: 483 (1963); Airy Shaw in Kew Bull. 21: 390 (1968), *q.v.*

Adisca subpeltata Bl., Bijdr.: 610 (1825).

Rottlera subpeltata (Bl.) Baill., Ét. Gén. Euphorb.: 423 (1858); Miq., Fl. Ind. Bat. 1. ii: 394 (1859).

Mappa rhynchophylla Miq., l.c.: 403 (1859).

Rottlera rhynchophylla (Miq.) Miq., Fl. Ind. Bat. Suppl.: 181, 454 (1861).

P16-18.—Lower Burma, Malay Peninsula, Sumatra, Java.

Shrub or tree to 12 m., locally common in evergreen forest up to 200 m. alt.

A species without close relatives; cf. Airy Shaw, *l.c. supra*. Glabrous or very shortly grey-puberulous; leaves alternate, thinly chartaceous, narrowly peltate or epeltate, trinerved, caudate-acuminate, long-petioled, petioles sometimes shrinking at base and apex on drying, stipules striate, denticulate; inflorescences very abbreviated, the male 2-5-flowered, the female reduced to 1 flower; male flowers large, stamens very numerous (200-250); female calyx persistent, styles very long, capsule up to 2.5 cm. in diameter, softly long-echinate.

§ POLYADENII (*Coccoceras*)

- Only species in Siam **M. anisopodus**

Mallotus anisopodus (Gagnep.) Airy Shaw in Kew Bull. 16: 351 (1963).

Coccoceras anisopodum Gagnep. in Bull. Soc. Bot. France 71: 1021 (1925) & in Lecomte: 378 (1926).

CII.—Indochina.

Tree of 10 m. in mixed deciduous forest on bank of river at 40 m. alt.

Immediately recognizable by its elliptic-oblong, distantly and obscurely crenate leaves, which are glandular-punctate above as well as below (sometimes requiring careful scrutiny to recognize) and by its characteristic 3-4-winged indehiscent capsule, the wings triangular, somewhat horn-like, ascending and incurved towards the apex.

§ ROTTLERA (*Philippinenses*)

♂ inflorescence simple, exceedingly long and slender (to 30 cm.); leaves chartaceous; indumentum cinnamomeous; ovary trilocular

M. leptostachyus

♂ inflorescence ± compound, to 17 cm.:

Climbing shrub; leaves about as long as broad, membranous, slenderly nerved, with yellow granules below; ovary bilocular; fruit densely yellow-tomentellous **M. repandus**

Erect shrub or tree; leaves longer than broad, coriaceous, strongly nerved, covered with red granules beneath; ovary and fruit trilocular; fruit covered with carmine-red granules. . . . **M. philippensis**

Mallotus leptostachyus Hook. f.: 435 (1887); Pax & Hoffm. vii: 183 (1914).

SW14; PI5, 16.—Lower Burma.

Shrub or small tree to 6 m., by streams in evergreen forest at very low altitudes.

Leaves alternate, medium to large, elliptic, entire or shallowly denticulate, membranous; stems, petioles, leaves beneath and inflorescences thinly and softly rufous-tomentellous; petioles long and slender; male inflorescences very long and slender, flowers small; capsule smooth, tomentose.

Mallotus philippensis (Lam.) Muell. Arg. (corr. Merr.) in Linnaea 34: 196 (1865) & in DC.: 980 (1866); Hook. f.: 442 (1887); Pax & Hoffm. vii: 184 (1914); Merr.: 435 (1923); Ridley: 291 (1924); Gagnep.: 362 (1925); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 71 (1939); Corner: 272 (1940); Backer & Bakh. f.: 483 (1963); Airy Shaw in Kew Bull. 21: 392 (1968).

Croton philippense [!] Lam., Encycl. Méth., Bot. 2: 206 (1786).

C. punctatus Retz., Obs. Bot. 5: 30 (1789).

C. coccineus Vahl, Symb. Bot. 2: 97 (1791).

Rottlera tinctoria Roxb., Pl. Corom. 2: 36 (1802).

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

Rottlera aurantiaca Hook. & Arn., Bot. Beech. Voy.: 270 (1841).

R. affinis Hassk. in Flora 25,ii. Beibl. 2: 41 (1842).

Mappa stricta Reichb. f. & Zoll. in Verh. Natuurk. Vereen. Ned. Ind. 1: 31 (1856).

Macaranga stricta (Reichb. f. & Zoll.) Muell. Arg.: 1004 (1866) (*orth. mut.*).

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

Rottlera philippinensis (Lam.) Scheff. in Miq. Ann. Mus. Bot. Lugd.-Bat. 4: 124 (1868-9).

Mallotus reticulatus Dunn in Journ. Linn. Soc. Lond. 38: 365 (1908).

NI-4; E8; SE10; C11; SW14; PI5, 17.—Widespread from W. Himalaya and Ceylon to Formosa and throughout Malesia to Australia & Melanesia.

Shrub or tree to 15 m., common in evergreen forest or scrub or open rocky ground up to 1100 m. alt. Sometimes cultivated for purgative obtained from seeds.

Stems and petioles reddish-brown; leaves alternate, coriaceous, ovate to lanceolate, glaucous and minutely red-punctate beneath, strongly trinerved, the secondary nerves conspicuously transverse or scalariform; inflorescences short; capsules subglobose, shallowly 3-lobed, covered with a layer of crimson glandular granules, sometimes used as a dye.

var. **pallida** Airy Shaw, var. nov., a var. *philippensi* ramulis petiolis inflorescentiis capsulis pallide ochraceis, foliis subtus obscure aureo-granulosoglandulosis (nec rubro-punctatis) recedit.

SW14. Sam Roi Yawt, Prachuap, in evergreen forest on rocky limestone hill, under 50 m. alt., 11 July 1926, Kerr 10923: Shrub 4 m. high. *Ibid.*, 30 Nov. 1929, Put 2489 (K, holotype).

This plant looks at first sight very different from typical *M. philippensis*, but it may be no more than a kind of albino form, lacking all trace of red pigment.

Mallotus repandus (*Willd.*) Muell. Arg. in Linnaea 34: 197 (1865) & in DC: 981 (1866); Hook. f.: 442 (1887); Craib: 466 (1911) & 193 (1912); Pax & Hoffm. vii: 181 (1914); Merr.: 435 (1923); Ridley: 292 (1924); Gagnep.: 365 (1925); Backer & Bakh. f.: 483 (1963).

Croton repandus Willd. in Neue Schrift. Naturf. Freunde Berlin 4: 206 (1803). *C. rhombifolius* Willd., Sp. Pl. 4: 555 (1805).

?*Helwingia populifolia* Spreng., Pl. minus cogn. Pugillus secundus: 89 (1815); cf. Airy Shaw in Kew Bull. 15: 419 (1962).

Rottlera scabrifolia Juss., Euph. Gen. Tent.: 111, t. 9, fig. 29B (1824).

R. viscosa Bl., Bijdr.: 608 (1825).

R. dicocca Roxb., Fl. Ind. 3: 829 (1832).

R. scandens Span. in Linnaea 15: 348 (1841).

R. trinervis Zipp. in Linnaea 15: 348 (1841).

Adisca timoriana Span. in Linnaea 15: 348 (1841).

Rottlera laccifera sec. Voigt, Hort. Suburb. Calcutta.: 157 (1845), excl. synon.

Croton laccifer L.

R. (?) cordifolia Benth., Fl. Hongk.: 307 (1861).

R. rhombifolia (*Willd.*) Thw., Enum. Pl. Zeyl.: 272 (1864).

Mallotus scandens (Span.) Muell. Arg.: 982 (1866).

Rottlera repanda (*Willd.*) Scheff. in Miq. Ann. Mus. Bot. Lugd.-Bat. 4: 124 (1868-9).

N1, 3; E8; SE10; SW14; PI5, 17.—W. Peninsular India & Ceylon to Formosa & Philippines, scattered throughout Malesia to Australia & New Caledonia.

Scendent shrub (once noted, **SW14**, as a 3 m. high tree), scattered in scrub or evergreen forest up to 420 m. alt.

Leaves alternate, rhombic-ovate, trinerved, chartaceous, small to medium-sized, densely golden-granular beneath; stems, petioles and inflorescences mostly shortly fulvous-tomentellous; inflorescences terminal, branched or sometimes simple; capsule dicoccous, fulvous-tomentellous, finely wrinkled; seeds large, blackish-brown, dull.

§ ROTTLEROPSIS (*Echinocroton* & *Plagianthera*)

Coastal or littoral plant; densely minutely greyish-ochraceous-tomentellous; leaves triangular or rhombic-ovate; ultimate nerves on lower surface forming a dense grey-papillose areolation **M. tiliifolius**

Not coastal; ultimate nerves not densely areolate:

Capsule unarmed:

Leaves thicker, dark brown beneath when dry; capsule larger; fruiting peduncle and pedicels elongating, forming a candelabrum-like infructescence **M. glabriusculus**

Leaves thinner, grey-green or pale brownish, with reddish nerves beneath, when dry; capsule smaller (to 12×8 mm.); fruiting peduncle and pedicels not accrescent . . . **M. spodocarpus**

Capsule sparsely or densely echinate:

Plant turning brownish or reddish when dry:

♀ inflorescence subumbellate; capsules larger . . . **M. clellandii**

♀ inflorescence racemose, slender; capsules small (5–6 mm.)

M. lanceolatus

Plant remaining green or greenish when dry:

Leaves large, broadly ovate or suborbicular, cordate, with a single marginal row of glandular granules on the underside; capsules glabrous, sparsely echinate, borne on long slender pedicels; stellate hairs absent **M. hymenophyllum**

Leaves not as above, glandular granules densely or sparsely scattered; capsules ± pubescent; stellate hairs present:

♀ inflorescences very lax and slender, with a few flowers toward the apex; capsules whitish-tomentellous, with numerous blackish subulate setae **M. pierrei**

♀ inflorescence either short or, if elongate, with flowers along most of length:

♀ inflorescence slender, elongate-racemose; capsules small (5–6 mm.) **M. lanceolatus**

♀ inflorescence shorter and more robust:

Leaves entire or almost so, ovate or elliptic; stipules and floral bracts small, inconspicuous, soon caducous: capsule 14–15 mm. diam., sparsely echinate **M. subcuneatus**

Leaves usually repand-dentate towards apex, often cuneate at base:

Stipules and floral bracts conspicuous, pale, silky; capsule larger, densely echinate; leaves variable **M. dispar**

Stipules and floral bracts fuscous or dark-coloured; capsules small, sparsely echinate; leaves distinctly cuneate below

M. decipiens

Mallotus clellandii Hook. f.: 435 (1887); Pax & Hoffm. vii: 205 (1914); Airy Shaw in Kew Bull. 21: 381 (1968).

M. tristis Pax & Hoffm. vii: 154 (1914).

Coelodiscus glabriusculus sec. Gagnep.: 372 (1925), non Kurz.

Ni-3; NE5.—Burma, Indochina.

Dioecious straggling shrub to 2 m., in evergreen or mixed deciduous or dry bamboo forest or thorny scrub up to 450 m. alt.

Leaves opposite, ovate to ovate-oblong, dark brown above when dry, rather long-petioled; inflorescences abbreviated, shortly stellate-pubescent, the male subsessile, the female peduncled with the flowers subumbellate at the apex; male flowers rather large, with densely ochraceous-tomentose sepals; capsules densely echinate and setulose.

The last-mentioned character distinguishes *M. clellandii* from the closely related *M. glabriusculus*, in which the capsules are unarmed, the leaves are very broadly ovate and cordate at base, and the pubescence is more scanty.

Mallotus decipiens Muell. Arg. in Linnaea 34: 194 (1865) & in DC.: 977 (1866); Hook. f.: 434 (1887); Pax & Hoffm. vii: 161 (1914).

N₂, 4; SE₉, 10.—Burma.

Shrub or small tree to 5 m., in evergreen forest up to 300 m. alt.

Closely related and deceptively similar to *M. dispar* Bl., but differing in its small sparsely echinate capsules and dark-coloured stipules. Leaves mostly narrower and more cuneately narrowed to the base; teeth mostly blunter and less prominent; floral bracts very small.

Mallotus dispar (Bl.) Muell. Arg.: 971 (1866); J. J. Sm.: 432 (1910); Pax & Hoffm. vii: 152 (1914); Ridley: 286 (1924); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 30, 71 (1939); Backer & Bakh. f.: 484 (1963); Airy Shaw in Kew Bull. 21: 380 (1968).

Rottlera dispar Bl., Bijdr.: 608 (1825).

Mallotus leucocalyx Muell. Arg.: 970 (1866); Pax & Hoffm. vii: 150 (1914) (excl. synon. !); Merr.: 434 (1923); Ridley: 286 (1924); Henderson, l.c. (1939).

Coelodiscus dispar (Bl.) Kurz in Journ. As. Soc. Bengal 42. ii: 244 (1873).

SE₁₀; SW₁₄; PI₅₋₁₈.—Indochina, and throughout W. Malesia.

Shrub or small tree to 5 m., common in evergreen forest or scrub up to 300 m. alt.; several times noted on limestone. Flowers scented.

Stems, petioles and inflorescences densely fulvous-tomentellous; leaves opposite, very broadly elliptic or ovate, often shortly but acutely repand-denticulate; stipules and bracts conspicuous, subulate, sericeous-tomentose, pallid or whitish when dry, readily distinguishing the species from the closely related *M. decipiens*. Capsules densely covered with long soft processes.

Mallotus glabriusculus (Kurz) Pax & Hoffm. vii: 162 (1914); Airy Shaw in Kew Bull. 20: 42 (1966), *in obs.*

Coelodiscus glabriusculus Kurz, For. Fl. Brit. Burma 2: 393 (1877); Hook. f.: 426 (1887); *non* sec. Gagnep.: 372 (1925).

C. coudercii Gagnep. in Not. Syst. 4: 49 (1923) & in Lecomte: 374 (1926), **synon. nov.**

Mallotus coudercii (Gagnep.) Airy Shaw in Kew Bull. 20: 42 (1966), *in adnot.*, & 21: 381 (1968).

To be expected in Siam.—Burma and Indochina (Cambodia, Cochinchina, Annam); apparently rare.

See note under *M. clellandii*.

Mallotus hymenophyllus Airy Shaw in Kew Bull. 21: 381 (1968).

PI₅.—Endemic.

Small lax shrub to 2 m., by streams in evergreen or bamboo forest up to 100 m. alt.; once noted on limestone.

Leaves opposite, large, broadly ovate or suborbicular, cordate, membranous or papery to thinly chartaceous, long-petioled, glabrous or minutely puberulous, without glandular granules except for a single marginal row on

the underside; capsules very sparsely and shortly echinate, borne on long slender pedicels.

A remarkable species, without obvious relatives, agreeing in many points with sect. *Rottleropsis*, but totally lacking stellate hairs. There is perhaps some distant connection with *M. khasianus*, in sect. *Axenfeldia*.

***Mallotus lanceolatus* (Gagnep.) Airy Shaw** in Kew Bull. 21: 380 (1968).

Coelodiscus lanceolatus Gagnep. in Not. Syst. 4: 50 (1923) & in Lecomte: 370 (1926).

N₄; NE₅; E₈; SE₁₀; C₁₁.—Indochina.

Shrub or small tree to 6 m., sometimes scrambling, locally common in dry open evergreen forest up to 300 m. alt.

Leaves small to medium, opposite, elliptic or narrowly elliptic, sometimes ovate or obovate, thinly chartaceous, entire or subsinuate, glabrous; inflorescences slender, usually shorter than the leaves, shortly tomentose; capsule small, 5–6 mm. in diameter, shortly and rather sparsely echinate.

***Mallotus pierrei* (Gagnep.) Airy Shaw** in Kew Bull. 21: 380 (1968).

Coelodiscus pierrei Gagnep. in Not. Syst. 4: 51 (1923) & in Lecomte: 371 (1926).

N₁, 2; NE₅; SW₁₄; P₁₅.—Indochina.

Shrub or small tree to 5 m., in bamboo or mixed deciduous or dry evergreen forest or scrub up to 600 m. alt.; once noted on limestone (**P₁₅**), once on laterite (**SW₁₄**).

Lax, thinly stellate-scaberulous, young growth tomentellous; leaves opposite, very variable in size and shape, membranous to chartaceous, trinerved, green when dry; inflorescences lax, the female few-flowered and borne on very slender elongate peduncles; capsules strongly trilobed, whitish-tomentellous, with numerous blackish subulate setae.

Closely resembling *M. distans* Muell. Arg., of S. India and Ceylon, differing from it in the more scanty indumentum and echinate fruit. (Cf. the similar differences between *M. clellandii* and *M. glabriusculus*, above.)

***Mallotus spodocarpus* Airy Shaw** in Kew Bull. 21: 383 (1968).

N₃; C₁₁; SW₁₄.—Indochina (Annam).

Small, thin shrub to 50 cm., in mixed deciduous or bamboo forest or scrub at very low altitudes; sometimes noted on limestone.

Near *M. glabriusculus* (*M. couderci*), differing in the often thinly membranous-chartaceous leaves, which do not turn dark brown beneath when dry; in the smaller capsule; and especially in the non-accrecent fruiting peduncle and pedicels, the latter not exceeding 2 mm. in length.

***Mallotus subcuneatus* (Gage) Airy Shaw, comb. nov.**

Coelodiscus subcuneatus Gage in Rec. Bot. Surv. Ind. 9: 240 (1922); Ridley: 280 (1924); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 70 (1939).

Mallotus dispar sec. Airy Shaw in Kew Bull. 21: 380 (1968), *non* (Bl.) Muell.

Arg.

SW₁₄; PI₅, 16.—Malaya (Kedah, Lankawi Is.).

Shrub or small tree to 8 m., locally common in evergreen forest up to 100 m. alt.

Softly fulvous-tomentellous; leaves opposite, unequal, cuneate-ovate to broadly lanceolate, entire or minutely denticulate, strongly trinerved, with a few small black macular glands near the base on the upper surface; capsules shortly fulvous-tomentellous and shortly, softly and sparsely echinate.

Closely related to *M. eriocarpus* (Thw.) Muell. Arg., of Ceylon and the Malay Peninsula, which differs in the rounded or cordate base of the leaves and in the capsules being completely devoid of processes. *M. dispar* (Bl.) Muell. Arg., to which I erroneously reduced *M. subcuneatus* in 1968 (*l.c. supra*), is quite distinct in its conspicuous whitish bracts and stipules and in its densely echinate capsules.

Mallotus tiliifolius (Bl.) Muell. Arg. in Linnaea 34: 190 (1865) & in DC.: 969 (1866); Pax & Hoffm. vii: 148 (1914); Merr.: 436 (1923); Ridley: 285 (1924); Corner: 273 (1940); Backer & Bakh. f.: 484 (1963).

Croton tiliifolius Lam. var. *aromaticus* Lam., Encycl. Méth. Bot. 2: 206 (1786), quoad synon. Rumph.

Rottlera acuminata A. Juss., Euphorb. Gen. Tent.: 33 (1824), *non Mallotus acuminatus* (Bl.) Muell. Arg. [= *M. peltatus* (Geisel.) Muell. Arg.]

R. tiliifolia Bl., Bijdr.: 607 (1825).

R. blumei Decne in Nouv. Arch. Mus. [Paris] 3: 486 (1835).

Mallotus playfairii Hemsl. in Journ. Linn. Soc. 26: 441 (1894).

PI₆, 17.—Formosa, Hainan, and throughout Malesia to N. Australia and Fiji.

Shrub to 3 m., in scrub or at edge of evergreen forest at very low altitudes, usually near the sea.

Densely minutely greyish-ochraceous-tomentellous; leaves opposite, broadly triangular-ovate or rhombic-ovate, base rounded to cordate, trinerved, the ultimate nerves forming a characteristic dense grey-papillose areolation or pitting under the lens; this last feature is absolutely diagnostic, and found in no other species. Capsule softly echinate.

§ STYLANTHUS

Leaves sparsely granular-glandular above, densely so below, peltate; capsule small, very shortly and closely echinate, grey-tomentellous

M. thorelii

Leaves without glandular granules above; capsule larger, more laxly echinate, less closely tomentellous:

Leaves oblong or elliptic, not or scarcely glaucous beneath:

Leaves clearly peltate **M. peltatus**

Leaves narrowly cordate, not or scarcely peltate **M. oblongifolius**

Leaves ovate or orbicular, usually glaucous beneath:

Leaves clearly peltate, sometimes broader than long, tawny-barbate in the lower nerve-axils **M. floribundus**

Leaves not or scarcely peltate, less broadly ovate, quite glabrous

M. garrettii

Mallotus floribundus (Bl.) Muell. Arg. in Linnaea 34: 187 (1865) & in DC.: 962 (1866); Hook. f.: 432 (1887); Pax & Hoffm. vii: 173 (1914); Merr.: 433 (1923); Ridley: 290 (1924); Corner 271: (1940); Backer & Bakh. f.: 483 (1963).

Adisca floribunda Bl., Bijdr.: 610 (1825).

Rottlera floribunda (Bl.) Hassk., Cat. Hort. Bogor. Alter: 238 (1844).

Mappa floribunda (Bl.) Zoll. & Mor., Syst. Verz.: 17 (1855).

Mallotus anamiticus Kuntze, Rev. Gen. Pl. 2: 608 (1891); Pax & Hoffm. vii: 204 (1914); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 236 (1935); **synon. nov.**

Coelodiscus anamiticus (Kuntze) Gagnep.: 375 (1926).

SW14; PI5-18.—Burma, Indochina, and throughout Malesia to Melanesia.

Shrub or small tree to 10 m., common in evergreen forest or scrub, especially along streams, at low altitudes (up to 100 m.). Flowers scented.

Leaves alternate, very broadly ovate or orbicular, sometimes broader than long, peltate, membranous to thinly chartaceous, often glaucescent beneath, with conspicuous tufts of fulvous hair in the basal nerve-axils, petiole long and slender; inflorescences often precocious or borne with the young leaves; capsule sparsely and softly echinate. Dried material emits a powerful odour of fenugreek.

Mallotus garrettii Airy Shaw in Kew Bull. 21: 387 (1968).

N2.—Indochina (Laos).

Small tree to 8 m., in high, rather wet, evergreen forest at 1100–1600 m.

A rare, montane species, closely related to *M. floribundus*, from which it differs in its ovate, completely glabrous, not or scarcely peltate leaves, which are glaucous beneath.

Mallotus oblongifolius (Miq.) Muell. Arg. in Linnaea 34: 192 (1865) & in DC.: 973 (1866); J. J. Sm.: 425 (1910); Pax & Hoffm. vii: 193 (1914); Ridley: 293 (1924); Backer & Bakh. f.: 484 (1963).

Rottlera oblongifolia Miq., Fl. Ind. Bat. 1. ii: 396 (1859).

Mallotus porterioides Muell. Arg. in Linnaea 34: 185 (1865) & in DC.: 960 (1866); Hook. f.: 432 (1887); Ridley: 292 (1924); Corner: 273 (1940); **synon. nov.**

M. furetianus Muell. Arg. in Linnaea 34: 190 (1865) & in DC.: 968 (1866); Gagnep.: 352 (1925); **synon. nov.**

M. helsei Muell. Arg., l.c.: 190 (1865) & 968 (1866); Hook. f.: 431 (1887).

M. puberulus Hook. f.: 435 (1887); Pax & Hoffm. vii: 172 (1914); Ridley: 290 (1924); **synon. nov.**

M. columnaris Warb. in Engl., Bot. Jahrb. 13: 349 (1891); Pax & Hoffm. vii: 176 (1914); Airy Shaw in Kew Bull. 20: 38 (1966); **synon. nov.**

M. odoratus Elm., Leafl. Philipp. Bot. 4: 1299 (1911); Pax & Hoffm. l.c. (1914); Merr.: 434 (1923); **synon. nov.**

M. alternifolius Merr. in Philipp. Journ. Sci. 7, ser. C Bot.: 395 (1912), **synon. nov.**

M. camiguinensis Merr. in *op. cit.*: 397 (1912), **synon. nov.**

M. oblongifolius var. *helpferi* (Muell. Arg.) Pax & Hoffm. vii: 194 (1914).

M. oblongifolius var. *siamensis* Pax & Hoffm. l.c. (1914).

M. maclarei Merr. in Philipp. Journ. Sci. 21: 347 (1922), & in Lingnaam Agric. Rev. 2: 29 (1924) & in Lingnan Sci. Journ. 5: 110 (1927), **synon. nov.**

N₂; NE₅; SE₉; P₁₅₋₁₈.—Burma, Andamans, Indochina, and throughout Malesia to New Guinea.

Shrub or small tree to 8 m., common in evergreen forest (especially near the sea), up to 660 m. alt.

This widespread and variable species is nevertheless usually readily recognizable by its variously opposite and alternate leaves, by their narrowly cordate or scarcely peltate base, by the spathaceous female calyx and by the conspicuous stylar column. The only species with which it can be confused is *M. peltatus*, in which however the leaves are clearly peltate. The two taxa are perhaps scarcely specifically distinct.

Mallotus porteri and *M. furetianus* are certainly not specifically distinct from *M. oblongifolius*. *M. maclarei* has already been reduced to *M. furetianus* by Gagnepain (1925); cf. Merrill (1927). *M. puberulus* represents merely a form with more strongly developed indumentum. I now find it impossible to maintain the long-styled *M. columnaris*, or the variants represented by *M. odoratus* etc. in the Philippines.

The fenugreek odour of dried material is usually very faint, sometimes imperceptible.

Mallotus peltatus (*Geisel.*) Muell. Arg. in Linnaea 34: 187 (1865) & in DC.: 967 (1866); Pax & Hoffm. vii: 174 (1914); Corner: 272 (1940); Backer & Bakh. f.: 483 (1963).

Aleurites peltatus Geisel., Croton. Monogr.: 81 (1807).

Adisca acuminata Bl., Bijdr.: 610 (1825).

Rottlera acutifolia Hassk., Cat. Hort. Bogor. Alt.: 238 (1844).

R. longifolia Reichb. f. & Zoll. in Verh. Natuurk. Vereen. Ned. Ind. 1: 31 (1856).

R. acuminata (Bl.) Baill., Ét. Gén. Euphorb.: 426 (1858), *non* Juss. (1824).

Mallotus acuminatus (Bl.) Muell. Arg. in Linnaea 34: 187 (1865) & in DC.: 966 (1866); Hook. f.: 431 (1887); Ridley: 290 (1924).

M. longifolius (Reichb. f. & Zoll.) Muell. Arg.: 967 (1866).

N₁, 2; SE₉, 10; SW₁₄; P₁₅₋₁₇.—Burma, Andamans, Indochina (Cochinchina), Malay Peninsula, Sumatra, Banka, Java.

Shrub or small tree to 7 m., common in evergreen or bamboo forest up to 550 m. alt.

As indicated above, very close to *M. oblongifolius*, and only differing in the clearly peltate leaves. If treated as conspecific, *M. peltatus* would be the correct name for the aggregate.

Fenugreek odour slightly stronger than in *M. oblongifolius*.

Mallotus thorelii Gagnep. in Not. Syst. 4: 53 (1923) & in Lecomte: 358 (1926).

N₃, 4; E₈; SE₁₀; C₁₁.—Indochina (Laos, Cambodia, Cochinchina).

Shrub or straggling tree to 7 m., in mixed or evergreen forest or scrub at very low altitudes (up to 50 m.).

Leaves alternate or subopposite, broadly orbicular-ovate or triangular-ovate, peltate, shortly abruptly caudate, sinuate-dentate or subentire, with scattered glandular granules above, thinly grey-pubescent beneath, at least on the nerves, and densely glandular-granular; petiole long and slender; inflorescences unbranched, usually terminal on leafy shoots, but males sometimes borne laterally as short shoots on bare leafless branches (*Kerr* 19846, **SE₁₀**); capsule rather small, tricoccous, shortly, bluntly and rather densely echinate or verrucose, shortly grey-tomentellous. Related to the common N. Bornean *M. lackeyi* Elm. The granules on the upper surface need careful searching for, and are most easily seen on the younger leaves.

Manihot Mill.

Manihot esculenta Crantz, Inst. 1: 167 (1766); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 240 (1935); Corner: 273 (1940); Backer & Bakh. f.: 496 (1963).

Jatropha manihot L., Sp. Pl.: 1007 (1753).

Janipha manihot (L.) Kunth in Humb., Bonpl. & Kunth, Nov. Gen. & Spec. 2: 85 (1817).

Manihot utilissima Pohl, Pl. Bras. Ic. & Descr.: 32, t. 24 (1827); Muell. Arg.: 1064 (1866); Hook. f.: 239 (1887); Pax & Hoffm. ii: 67 (1910); Merr.: 450 (1923); Gagnep.: 434 (1926).

Mandioca utilissima (Pohl) Link, Handb. 2: 436 (1831).

Jatropha stipulata Vell., Fl. Flum. 10: t. 82 (1835).

Manihot edule A. Rich. in Sagra, Fl. Cuban. ed. hisp. 3: 208 (1853).

Mandioca dulcis Parodi in An. Soc. Cienc. Argent. 4: 127 (1877).

Manihot manihot (L.) Cockerell in Bull. Torr. Bot. Cl. 19: 95 (1892).

M. aipi Rusby in Mem. Torr. Bot. Cl. 6: 120 (1896).

SE₉; C₁₂; P₁₈.—Native of tropical Brazil.

Cultivated shrub of 2·5 m. at very low altitudes.

Root yields tapioca.

Margaritaria L.f.

Margaritaria indica (Dalz.) Airy Shaw in Kew Bull. 20: 387 (1966) & 25: 492 (1971).

Prosororus indicus Dalz. in Hook. Journ. Bot. & Kew Garden Misc. 4: 346 (1852); Gamble, Fl. Pres. Madras 2: 1294 (1925); Airy Shaw in Kew Bull. 16: 342 (1963).

Phyllanthus indicus (Dalz.) Muell. Arg. in Linnaea 32: 52 (1863) & in DC.: 417 (1866); Hook. f.: 305 (1887); J. J. Sm.: 84 (1910); Merr.: 392 (1923); Beille: 596 (1927); Backer & Bakh. f.: 468 (1963).

Calococcus sundaeicus Kurz apud Teijsm. & Binnend. in Nat. Tijdschr. Ned. Ind. 27: 48 (1864).

Phyllanthus sundaeicus (Kurz) Muell. Arg.: 1272 (1866).

N₂; E₈; SE₁₀; C₁₁, 12; P₁₅.—India and Ceylon to Formosa; Indochina (Tonkin); scattered through Malesia from the Philippines and Sumatra to New Guinea; not yet known from the Malay Peninsula.

Deciduous tree to 25 m., in moist deciduous or evergreen forest up to 400 m. alt.

Closely related to *Securinega*, differing in the numerous small conspicuous whitish lenticels of the branches, in the sepals only 4, in the large flattened disk of the male flower, which lacks a pistillode, and in the relatively large capsule, with seeds enclosed in a metallic blue testa.

Megistostigma Hook. f.

Megistostigma burmanicum (Kurz) Airy Shaw in Kew Bull. 23: 119 (1969).

Tragia burmanica Kurz in Journ. As. Soc. Bengal 42: 244 (1873) & For. Fl. Brit. Burma 2: 398 (1877); Hook. f.: 466 (1888); Pax & Hoffm. ix-xi: 99 (1919).

T. involucrata L., var., Ridley in Journ. Str. Br. Roy. As. Soc. 59: 182 (1911).

N₁; SW₁₄; P₁₆.—Burma, Malay Penins. (Perlis), S. China?

Herbaceous climber in evergreen forest or scrub up to 750 m.; once noted on limestone.

Distinguished from the remaining species of the genus by its cordate, non-peltate, shallowly dentate leaves and bisexual inflorescences. Stinging hairs on calyx and fruit, and on upper surface of leaves.

Melanolepis Reichb. f. & Zoll.

Melanolepis multiglandulosa (Reinw. ex Bl.) Reichb. f. & Zoll. in Verhand. Natuurk. Vereen. Nederl. Ind. 1: 22 (1856) & in Linnaea 28: 324 (1856); Merr., Interpr. Rumph. Herb. Amb.: 318 (1917) & Enum. 2: 431 (1923); Ridley: 284 (1924); Corner: 274 (1940); Backer & Bakhu. f.: 481 (1963).

Croton multiglandulosus Reinw. ex Bl., Cat. Gew. Buitenz.: 105 (1823).

Rottlera multiglandulosa (Reinw. ex Bl.) Bl., Bijdr.: 609 (1825).

Adelia monoica Blanco, Fl. Filip. ed. 2: 561 (1845).

Mallotus moluccanus sec. Muell. Arg. in Linnaea 34: 185 (1865) & in DC.: 958 (1866), excl. synon. *Croton moluccanus* L. [= *Aleurites moluccanus* (L.) Willd., quoad synon. Burm. et loc.]

Melanolepis moluccana sec. Pax & Hoffm. vii: 142 (1914); Gagnep.: 347 (1925), *in clavi*; excl. synon. *Croton moluccanus* L.

P₁₈.—Formosa, Ryu-Kyu Is., Guam, and throughout Malesia to the Bismarck Archip.

Apparently absent from SE. Asia, but represented in Cambodia by the related *M. vitifolia* (Kuntze) Gagnep., which should be looked for in the SE. Region of Siam.

Tree of 6 m. in scrub jungle at 50 m. alt.

Closely related to *Mallotus* (especially Sect. *Philippines*), differing principally in its rather large male flowers with 3–5 sepals, very numerous (>200) stamens with elongate anthers bearing a subapical purple gland, and in the presence of an annular disk in the female flower. Whole plant loosely floccose-stellate-tomentose; leaves alternate, not granular-glandular beneath, acutely 3–5-lobed; capsule mostly dicoccous; leaves, sepals and capsules often purplish-tinged.

Mercurialis L.

Mercurialis leiocarpa Sieb. & Zucc. in Abh. Bayr. Akad. Math. Phys. Kl. 4. ii: 145 (1845); Muell. Arg.: 795 (1866); Hosseus: 406 (1911); Craib: 465 (1911) & 192 (1912); Pax & Hoffm. vii: 280 (1914).

N1.—E. Himalaya, N. Assam, SW. & C. China, Korea, Japan & Formosa.

Herb of 1 m., frequent in dense forest on summit of mountain at 2500–2600 m. alt.

Closely related to the European *M. perennis* L., from which it differs chiefly in its glabrous ovary and glabrous (though sometimes sparsely setulose) capsule.

Neoscortechinia Pax & Hoffm.

Neoscortechinia forbesii (Hook. f.) Pax ex S. Moore in Journ. Bot. 62: 54 (1924), *in obs.*; C. T. White in Journ. Arn. Arb. 31: 93 (1950); Airy Shaw in Kew Bull. 16: 369 (1963).

Scortechinia forbesii Hook. f. in Hook. Ic. Pl. 18, sub t. 1706 (1887), *in obs.*; Pax & Hoffm. xiv: 53 (1919).

Alcinaeanthus philippensis Merr. in Philipp. Journ. Sci. 7, Bot.: 380 (1912). *A. parvifolius* Merr. in Philipp. Journ. Sci. 9, C: 461 (1914).

Neoscortechinia arborea var. *parvifolia* (Merr.) Pax & Hoffm.: xiv: 52 (1919).

N. coriacea Merr. in Univ. Calif. Publ. Bot. 15: 164 (1929).

To be looked for in **P16–18**. It occurs in Kedah, in northern Malaya, and probably extends across the border into Siamese territory.

The genus *Neoscortechinia* has sometimes been included in the subfamily *Phyllanthoideae* because of the alleged presence of 2 ovules in the ovary-loculi. Dissection of young ovaries of *N. forbesii* and *N. sumatrensis* S. Moore confirms the statements of e.g. Merrill and Pax & Hoffmann that the ovary, which is initially 2-locular, has only a solitary pendulous ovule in each loculus. One of the ovules aborts at an early stage, and the septum shrivels and vanishes. The genus scarcely differs from *Cheilosia* Bl., except that its fruit is thin-walled, ellipsoid and 1-seeded, with short styles, instead of thick-walled, globose and 3-seeded, with longer styles, and the stamens are 5–6 instead of 8–10.

Omphalea L.

Omphalea bracteata (Blanco) Merr., Sp. Blancoanae: 230 (1918) & Enum. 2: 457 (1923); Chatterjee in Kew Bull. 3: 374 (1949).

Tragia bracteata Blanco, Fl. Filip. ed. 2: 480 (1845) & ed. 3, 3: 94 (1879). *Pimeleodendron amboinicum* sec. F.-Vill., Novis. App.: 196 (1880), *non* Hassk.

Omphalea philippinensis Merr. in Philipp. Journ. Sci. 3, Bot.: 236 (1908); Pax & Hoffm. v. 17 (1912).

To be expected in Siam.—Burma (Tenasserim), Indochina (Laos), Malaya (Johore), Borneo (Sabah & E. Indonesian Borneo), Philippines (Luzon), Celebes.

It seems possible that *O. sargentii* Merr., described from the small island of Bancalan, near Palawan, SW. Philippines, may not be specifically distinct from *O. bracteata*. The principal differences between the two taxa are that the leaves of *O. bracteata* are usually narrower, thinner and more acuminate, with less strong but more regular venation, and usually remain green or greenish when dry, whereas those of *O. sargentii* are usually broader, more coriaceous and less acuminate (sometimes rounded), with very strong but more irregular venation, and turn a dull brown hue in drying. It is often easy to sort dried material into two groups on these characters, but a small residue remains which seems intermediate. *O. sargentii* is, however, otherwise confined to Borneo, and does not come into question in regard to SE. Asia.

Ostodes Bl.

Inflorescence glabrous or weakly pubescent; ♂ flowers smaller, 3–5 mm. in diameter **O. paniculata**

Inflorescence strongly pubescent; ♂ flowers larger, about 15 mm. in diameter **O. katherinae**

Ostodes katherinae Pax apud Pax & Hoffm. iii: 19 (1911); Airy Shaw in Kew Bull. 20: 411 (1966).

N1.—SW. China.

Tree to 15 m., in evergreen forest at 1200–2000 m. alt.

Scarcely more than a local race of *O. paniculata*, from which it differs in its stronger pubescence and larger male flowers with about twice as many stamens.

Ostodes paniculata Bl., Bijdr.: 620 (1825); Muell. Arg.: 1115 (1866); Hook. f.: 400 (1887); Pax & Hoffm. iii: 20 (1911); Gagnep.: 322 (1925); Backer & Bakh. f.: 493 (1963); Airy Shaw in Kew Bull. 20: 411 (1966).

O. kerrii Craib: 464 (1911) & 191 (1912); Pax & Hoffm. vi: 126 (1912); Airy Shaw in Kew Bull. 20: 411 (1966).

?*O. thyrsanthus* Pax apud Pax & Hoffm. iii: 18 (1911); Airy Shaw, l.c.: 412 (1966).

N1; SE9; SW14.—E. Himalaya, Assam, Burma, S. China, Indochina, Malay Peninsula, ?Sumatra, ?Borneo, Java.

Tree to 15 m. tall, in evergreen forest at 400–1400 m. alt.

Pachystylidium Pax & Hoffm.

Pachystylidium hirsutum (Bl.) Pax & Hoffm. ix-xi: 108 (1919); Backer & Bakh. f.: 491 (1963); Airy Shaw in Kew Bull. 23: 115 (1969).

Tragia hirsuta Bl., Bijdr.: 630 (1825); Muell. Arg.: 937 (1866); Merr.: 446 (1923).

T. irritans Merr. in Philipp. Journ. Sci. 9, Bot.: 491 (1914).

Pachystylidium hirsutum var. *irritans* (Merr.) Pax & Hoffm., l.c. (1919).

Tragia gagei Haines in Journ. As. Soc. Bengal, n.s., 15: 317 (1920) & Bot. Bihar & Orissa: 116 (1921).

T. hirsuta var. *irritans* (Merr.) Merr.: 446 (1923).

T. delpyana Gagnep. in Bull. Soc. Bot. France 71: 1027 (1924) & in Lecomte: 393 (1926); Croiz. in Journ. Arn. Arb. 22: 425 (1941).

SE9; SW14; PI6.—E. Peninsular India, Indochina (Laos, Cambodia, Cochinchina), Philippines, Java.

Prostrate herb or climber, on rocky ground (granite) in open grassy forest or scrub, or at edge of evergreen forest, at very low altitudes.

Closely related to *Tragia*, only differing in the very short thick styles, connate below into a short conical column and shortly divergent above, and in the widely expanded, subconvex male perianth, with only 2 stamens, the anthers subsessile.

Pantadenia Gagnep.

Pantadenia adenantha Gagnep. in Bull. Soc. Bot. France 71: 873 (1925) & in Lecomte: 470 (1926); Airy Shaw in Kew Bull. 23: 122 (1969).

E8; C11.—Indochina (Laos, Cambodia, Cochinchina).

Low, dioecious shrub from woody rootstock, to 50 cm. high; locally common in mixed deciduous forest, or in wet evergreen forest with *Corypha* and *Tetrameles*, from very low altitudes up to 300 m.

Distinguished from *Blachia* by the copious orange-yellow glandular granules on the lower surface of the leaves and by the presence of a terminal gland on the petals of the male flower.

Phyllanthus L.

Herbs (sometimes ± woody at base):

Fruiting pedicels slender, 5–8 mm. long, often sharply deflexed; sepals small, narrow, not conspicuously white-edged; nerves of leaf not sharply raised; capsule smooth (§ *Macraea*) **P. virgatus**

Fruiting pedicels much shorter, not or less sharply deflexed; sepals broader, conspicuously white-edged:

Nerves of leaf not sharply raised; capsule not scaly (§ *Phyllanthus*)

P. amarus

Nerves of leaf finely and sharply raised; capsule usually scaly (§ *Urinaria*):

Leaves thinner, more obtuse; stem slenderer, less strongly grooved, not purplish; plant not rheophytic **P. urinaria**

Leaves stiffer, more acute; stem stouter, more strongly grooved, purplish; plant rheophytic **P. chamaepeuce**

Shrubs or trees:

Fruit ± fleshy, drupaceous or baccate:

Fruit a small berry, 3–5 mm. in diameter; leaves thin, membranous to chartaceous, to 5 × 1·5 cm.; flowers axillary (§ *Anisomena*)

P. reticulatus

Fruit a drupe, 1–3 cm. in diameter:

Leaves ovate, 5–9 × 2·5–4·5 cm., borne on deciduous branchlets resembling pinnate leaves; flowers mostly borne on short leafless branchlets on the thick older stems; sepals 4; stamens 4, free; ♀ flowers sometimes with staminodes (§ *Cicca*) **P. acidus**

Leaves linear-oblong, 12–20 × 2–5 mm. closely distichous; flowers mostly axillary; sepals 6; stamens 3, connate; no staminodes in ♀ flower (§ *Emblica*) **P. emblica**

Fruit a dry dehiscent capsule:

Connective of anthers with long subulate prolongation; sepals (some or all) frequently drawn out into a slender apical awn or acumen (§ *Phyllanthodendron*):

Stunted podagric tree, trunk ± succulent and spiny; leaves obliquely cordate when mature, borne on deciduous branches resembling pinnate leaves; flowers in a copious leafy or bracteate terminal panicle **P. mirabilis**

Normal tree or shrub, sometimes climbing; leaves not cordate, not borne on deciduous branches; flowers axillary; bracts inconspicuous:

Sepals very shortly acuminate or merely acute or even obtuse; leaves drying brown, very variable in size and shape; erect shrub or small tree **P. roseus**

Sepals long-acuminate or aristate; leaves usually drying a grey or leaden colour, less variable; climbing or scrambling shrub:

Leaves stiffly coriaceous; tertiary nerves conspicuously reticulate-elevate beneath; margin obscurely cartilagineous

P. ridleyanus

Leaves chartaceous or only subcoriaceous; tertiary nerves immersed or invisible beneath; margin distinctly cartilagineous

P. lingulatus

Connective of anthers without subulate prolongation; sepals not aristate:

Disk of ♀ flower urceolate, ± fleshy, almost completely enclosing the ovary; leaves thick, ± oblong, mostly obtuse, with a dull and pale surface beneath; nerves rather numerous, immersed (§ *Ceramanthus*) **P. albidiscus**

Disk of ♀ flower not urceolate, not enclosing the ovary:

Capsules strongly rugulose or verrucose, borne at the tips of lateral leafy branches; leaves small, narrowly oblong, distichous; venation finely and sharply raised, somewhat as in *P. urinaria* (§ *Paraphyllanthus*) **P. collinsae**

Capsules smooth or obscurely rugulose:

Staminal column long, slender, exserted; stylar column stout, exserted; fascicles very dense-flowered, of numerous minute ♂ and one ♀ flower; capsules on 5–10 mm. long pedicels, often laterally declinate; leaves ± oblong, 2–5 cm. long, membranous (§ *Paraphyllanthus*) **P. columnaris**

Staminal column not as above, or filaments free:

Leaves rounded or retuse at apex, to 3·5 × 2·2 cm.; nerves numerous, fine, close, widely spreading; stipules finely

subulate from a subauriculate base; inner sepals of ♀ flower ± reniform, shortly unguiculate, with raised nerves (§ *Anisolum*) **P. welwitschianus**

Leaves, if rounded or retuse, much smaller, or else ± acute:

Leaves very small, linear-oblong, less than 6×2 mm., resembling *P. emblica* in miniature, contiguously or imbricately distichous; flowers minute; sepals of ♂ 4, ± valvate, of ♀ 6; stamens 2; capsules to 5 mm. long, thin-walled, dull ochraceous when dry; seeds with adpressed fibrils (§ *Eriococcus*) . . . **P. taxodiifolius**

Leaves larger, not linear-oblong:

Sepals of ♂ flower (and often of ♀) 4; seeds covered with transverse adpressed fibrils (§ *Eriococcus*):

♂ and ♀ sepals entire; ♀ flowers fascicled, very shortly pedicelled; capsule 3–4 mm. in diameter; stems, petioles and pedicels usually papillose

P. acutissimum

♂ sepals (and often ♀) erose, denticulate, lacerate or glandular; ♀ flowers mostly solitary, long-pedicelled; capsule larger:

Leaves 3–12 cm. long:

Stems glabrous; leaves pale beneath, margin often reddish; capsule inflated, 10–15 mm. diam., glabrous **P. elegans**

Stems shortly rufo-puberulous; leaves less pale beneath, margin not reddish; capsule up to 6 mm. diam., puberulous. . . **P. gracilipes**

Leaves 0·5–3·5 cm. long:

Leaves thinly minutely puberulous on both surfaces; capsule papillose-puberulous

P. sikkimensis

Leaves and capsules glabrous:

♀ sepals fimbriate; stems puberulous:

Ovary glabrous; occurring below 450 m. altitude **P. pulcher**

Ovary fibrillose-lanuginose, occurring at over 1000 m. altitude **P. hullettii**

♀ sepals subentire; stems glabrous; occurring above 450 m. altitude:

Branchlets longer; pedicels shorter (to 7 mm.); ♀ flowers smaller, sepals $1\cdot25 \times 0\cdot75$ mm. **P. sootepensis**

Branchlets shorter; pedicels longer (to 20 mm.); ♀ flowers larger, sepals $3\cdot4 \times 2\cdot5$ –3 mm. **P. winitii**

Sepals of ♂ and ♀ flowers 5–6:

Leaves 3–17 cm. long; branches sharply quadrangular (§ *Paraphyllanthus*):

Leaves 8–17 cm. long, not glaucous beneath, variable in size, shape and texture; flowers either in

axillary fascicles or on special slender leafless branchlets; capsules very shortly pedicelled

P. pachyphyllus

Leaves 3–9 cm. long:

Leaves broad-ovate (to 5 cm. broad), often glaucous beneath; ♀ flowers and capsules long-pedicelled (to 1 cm.) . . . **P. geoffrayi**

Leaves mostly lanceolate-oblong, 1–2 cm. broad, more rarely ovate; ♀ flowers and capsules very shortly pedicelled **P. oxyphyllus**

Leaves 0.5–3 cm. long; branches not sharply quadrangular:

Pedicels of ♀ flowers 4–9 mm. long; leaf-base ± cuneate:

Fruiting sepals elliptic, broadly membranous-margined, spreading; pedicel somewhat thicker; twiggy undershrub of high altitudes (?§ *Macraea*) **P. clarkei**

Fruiting sepals ± subulate, narrowly membranous-margined, ± reflexed; thin lax shrub of low altitudes (?§ *Chorisandra*) **P. orientalis**

Pedicels of ♀ flowers 1–3 mm. long; leaf-base less cuneate, more rounded:

Leaves stiffly chartaceous, shining, drying brown above with pale slightly raised nerves, closely and regularly distichous; flowers very numerous, fascicled, with oblong sepals drying brown; branchlets densely puberulous (§ *Paraphyllanthus*)

P. polyphyllus var. **siamensis**

Leaves thinly membranous, dull, drying green, laxly distichous, nerves neither pale nor raised; flowers few, in small few-flowered cymules, sepals obovate drying green; branchlets glabrous (?§) **P. kerrii**

Phyllanthus acidus (L.) Skeels in U.S. Dept. Agric. Bur. Pl. Ind. Bull. 148: 17 (1909); Webster in Journ. Arn. Arb. 38: 66 (1957), *q.v.* for full synonymy; Backer & Bakh. f.: 467 (1963).

Averrhoa acida L., Sp. Pl.: 428 (1753).

Cicca disticha L., Mant.: 124 (1767); Ridley: 216 (1924).

C. acidissima Blanco, Fl. Filip.: 700 (1837).

Phyllanthus acidissimus (Blanco) Muell. Arg. in Linnaea 32: 50 (1863) & in DC.: 417 (1866).

P. distichus (L.) Muell. Arg. 413 (1866); Hook. f.: 304 (1887); Beille in Lecomte: 594 (1927).

Cicca acida (L.) Merr., Interpr. Rumph. Herb. Amboin.: 314 (1917), & Enum. 2: 396 (1923); Corner: 282 (1940).

N1 (cult.); **C12** (cult.).—Probably native of the coastal region of NE. Brazil (cf. Webster, *l.c. supra*: 70–72).

Tree to 8 m., commonly cultivated, up to 300 m. alt.

Cauliflorous; deciduous leafy branchlets resemble pinnate leaves.

Phyllanthus acutissimus Miq., Fl. Ind. Bat. 1(2): 369 (1859); Muell. Arg.: 419 (1866); J. J. Sm.: 88 (1910); Backer & Bakh. f.: 469 (1963); Airy Shaw in Kew Bull. 23: 39 (1969), *q.v.*

Scepasma longifolium Hassk. in Tijdschr. Nat. Geschied. & Physiol. 10: 143 (1843) & Cat. Pl. Hort. Bot. Bogor. Cult. Alter: 242 (1844); *non Phyllanthus longifolius* Lam. (1789).

Phyllanthus curtipes Airy Shaw in Kew Bull. 23: 37 (1969), **synon. nov.**

NE5; E8; PI6.—Lower Burma (*Kerr* 21647, 1932), Sumatra, Java.

Thin shrub of 30–75 cm., in evergreen forest or open scrub up to 1300 m. alt.

Stems, petioles and pedicels papillose, more rarely smooth; leaves obliquely ovate, up to 11 × 3.5 cm., acutely long-acuminate, membranous, glabrous; male and female flowers shortly pedicelled (female up to 4 mm.); sepals entire; stigmas cuneate-spathulate, shortly bifid, spreading; capsule sub-globose, 3–4 mm. diam., smooth; pedicel up to 7 mm. Superficially very similar to *P. gomphocarpus* Hook. f., of the Malay Peninsula, but differing in the shortly pedicelled, often fascicled female flowers and small capsule. The seeds are covered with adpressed fibrils as in § *Eriococcus*.

Phyllanthus albidiscus (Ridley) Airy Shaw in Kew Bull. 23: 26 (1969).

Ceramanthus gracile Hassk., Cat. Pl. Hort. Bot. Bogor. Cult. Alter: 240 (1844); *non Phyllanthus gracilis* Roxb. (1832).

Phyllanthus gracilis (Hassk.) Baill. [Ét. Gén. Euphorb.: 630 (1858)] ex Muell. Arg. in Linnaea 32: 14 (1863) & in DC.: 350 (1866); J. J. Sm.: 77 (1910); *non Roxb.* (1832).

Cleistanthus albidiscus Ridley in Bull. Misc. Inf. Kew 1923: 360 (1923) & Fl. Mal. Penins. 3: 191 (1924).

Phyllanthus ceramanthus Webster in Journ. Arn. Arb. 37: 233 (1956), *in adnot.*; Bakh. f. in Blumea 12: 62 (1963) & in Backer & Bakh. f.: 468 (1963).

PI5, 16 (incl. Siamese Lankawi Is.).—Java.

Shrub to 1.5 m., locally common in evergreen forest or open rocky ground up to 500 m. alt.

Stems terete, smooth, glabrous; leaves of a thick, firm consistency, oblong-lanceolate to oblong-elliptic, to 9.5 × 3.5 cm., obtuse or sometimes acute at apex, surface very dull; nerves rather numerous, slender, immersed; flowers in very few-flowered fascicles, subtended by a tuft of small ferruginous bracts, which are deeply lacerate-fimbriate below; pedicels short (female up to 5 mm.); stamens 3; female flower shortly campanulate in outline, truncate at base, ovary almost completely enclosed in an urceolate fleshy disk; capsule depressed, 6–7 mm. diam., shallowly 6-lobed, slightly rugose, glabrous, seeds smooth or minutely granular, neither pitted nor fibrillose, castaneous.

The species appears to be related to *P. petraeus* A. Chev. ex Beille, of W. Africa, especially in its leaf-texture and venation and fimbriate ferruginous bracts. The African species however has only 2 stamens.

Phyllanthus amarus Schumacher & Thonn. in Kongl. Danske Vidensk. Selsk. Skr. 4: 195 (1829); Webster in Journ. Arn. Arb. 37: 6 (1956) & 38: 313 (1957), *q.v.* for full synonymy.

P. niruri auctt., pro parte, *non* L.

P. nanus Hook. f.: 298 (1887).

N₁, 3; C₁₂; SW₁₄; P₁₅, 16.—Native of America; now pantropical.

Weedy herb of open ground, waste places, grassy scrub, dry deciduous forest, damp sandy soil, etc., at low altitudes (to 300 m. in **N₁** & **3**).

Branches very slender; leaves very thin, rounded or obtuse at apex; cymules mostly of 1 male and 1 female flower; sepals 5; stamens 3(-2), connate; styles 3, free, shortly bifid; seeds with 5-6 longitudinal dorsal ribs.

[**Phyllanthus angkorensis** Beille in Lecomte: 583 (1927).

Phyllanthus sp. n.? Craib: 459 (1911) & 186 (1912).

Craib's record as from 'Siam' was based upon *Godefroy-Lebeuf* 682, from Angkor. This locality is in Cambodia, not in Siam.]

Phyllanthus chamaepeuce Ridley in Trans. Linn. Soc. London. ser. 2, 3: 345 (1893), & Fl. Mal. Penins. 3: 200 (1924); Airy Shaw in Kew Bull. 23: 33 (1969).

P. quangtriensis Beille: 584 (1927).

P. urinaria sec. Webster in Journ. Arn. Arb. 38: 196 (1957), *vix* L.

N₂; E₉.—Indochina (Annam), Malay Peninsula, Borneo.

Shrub to 1 m., growing on wet rocks in streams at 100-280 m. alt.

A rheophyte. Closely related to *P. urinaria* L., but differing in the slightly stiffer and more acute leaves, in the stouter, strongly grooved, purple stem, and especially in the totally different habitat. Cf. remarks in Kew Bull. l.c. *supra*. The rheophytic habit should be compared with that of *P. lamprophyllus* Muell. Arg. (Java), *P. hellwigii* Warb. (Philippines, New Guinea, etc.) and *P. watsonii* Airy Shaw (Malaya), belonging to subgen. *Eriococcus* Sect. *Emblicastrum*.

Phyllanthus clarkei Hook. f.: 297 (1887); Cowan & Cowan, Trees N. Bengal: 117 (1929); Kanjilal, De & Das, Fl. Assam 4: 154 (1940).

P. simplex var. *tonkinensis* Beille in Lecomte: 578 (1927).

N₁.—E. Himalaya, Assam, Burma, Indochina (Tonkin).

Densely branched, low, spreading undershrub to 30 cm., on open rocky ground, limestone ridges, etc., at 2100 m. alt.

A twiggy shrublet of high exposed situations; branchlets slightly angled, minutely papillose-scaberulous on the angles; leaves subcoriaceous, cuneate-obovate, 5-10 × 3-5 mm., rounded or retuse at the apex, very shortly petioled, glabrous, margin narrowly revolute; flowers solitary, axillary, pedicels 3-6 mm. long; capsules globose, 3-4 mm. diam., smooth.

These specimens from the Doi Chiengdao region, with small, rigid, cuneate-obovate leaves, closely match the type gathering of *P. clarkei* from

Sikkim; they appear to represent the form assumed by the species under conditions of extreme altitude or exposure. Other gatherings, including those of *P. simplex* var. *tonkinensis*, and specimens from Assam and Burma, show leaves that are somewhat larger and thinner and more elliptic, and appear at first sight specifically distinct, but seem to be connected with the type by intermediates.

Phyllanthus collinsae Craib in Bull. Misc. Inf. Kew 1913: 72 (1913); Beille in Lecomte: 589 (1927).

P. bienhoënsis Beille in Lecomte: 588 (1927), **synon. nov.**

N₃; E₈; SE₁₀; C₁₁; SW₁₄.—Indochina (Cochinchina).

Shrub or small tree to 6 m., locally common in dry evergreen forest, occasionally in clearings or on river-banks, up to 200 m. alt.

Among species with small, narrowly oblong, pinnately arranged leaves, *P. collinsae* is notable for the fine, striate, patulous venation (cf. *P. urinaria*), and for the small, strongly rugulose capsules, borne at the tips of the lateral branchlets.

Phyllanthus columnaris Muell. Arg. in Linnaea 32: 15 (1863) & in DC.: 354 (1866); Kurz, For. Fl. Brit. Burma 2: 347 (1877); Hook. f.: 291 (1887); Craib: 459 (1911) & 185 (1912); Beille in Lecomte: 581 (1927); Henderson in Journ. Malay Br. Roy. As. Soc. 17: 71 (1939); Nath, Bot. Surv. S. Shan States (Burma Res. Soc. Fiftieth Anniv.): 106 (1960).

N₁, 2; SW₁₄.—Burma, N. Malaya (Lankawi, Perlis).

Small deciduous tree to 7 m. high, in mixed or bamboo or teak forest or scrub up to 540 m. alt.; once noted as dominant in deciduous forest with bamboo; occurs on limestone in N. Malaya.

Flowering branches sometimes superficially recall forms of *Securinega virosa* (Roxb. ex Willd.) Pax & Hoffm. or *Cleistanthus tomentosus* Hance. The slender exserted staminal column, with the small group of anthers at the tip, and the stout stylar column, render Mueller's epithet doubly appropriate.

Phyllanthus elegans Wall. ex Muell. Arg. in Linnaea 32: 46 (1863) & in DC.: 420 (1866); Hook. f.: 300 (1887); Beille in Lecomte: 597 (1927).

P. glaucifolius Ridley in Journ. Roy. As. Soc. Str. Br. 61: 59 (1912).

P. gomphocarpus sec. Ridley: 204 (1924), quoad loc. 'Siam', non Hook. f.

N₁, 2; SE₉, 10; P₁₅₋₁₇.—Burma, N. Malay Peninsula (Kedah), Indochina.

Shrub to 3 m., locally common in evergreen forest or scrub up to 600 m. alt.

Glabrous; branches terete, flexuous; leaves broad-ovate, up to 12 × 5 cm., thin, pale or glaucous beneath, base often asymmetrical, margin often reddish and reflexed or revolute, nerves very slender, lax; male flowers minute, in dense fascicles; female flowers much larger, long-pedicelled, often borne in long leafless terminal false racemes, subtended by conspicuous subulate bracts; capsules large, thin, smooth, inflated, pale when dry, on long slender pedicels.

Phyllanthus emblica L., Sp. Pl.: 982 (1753); Muell. Arg.: 352 (1866); Hook. f.: 289 (1887); Craib: 459 (1911) & 185 (1912); Beille in Lecomte: 580 (1927).

Emblica officinalis Gaertn., Fruct. 2: 122 (1791); Corner: 282 (1940).
Dichelactina nodicaulis Hance in Walp., Ann. 3: 376 (1852).

N1-3; NE5; E8; SE9, 10; C12; SW14; P16.—India, S. China, Indochina, Sumatra, Borneo, Java, Lesser Sunda Is.

Tree to 23 m., in dry open deciduous forest or scrub, from sea-level up to 1200 m. in **N1**.

The S. Malayan (Singapore) population, distinguished by Hooker (*l.c.*: 290) as *P. pectinatus* Hook. f. (*Emblica pectinata* (Hook. f.) Ridley: 217 (1924)), and apparently differing consistently from those of Siam and other areas in the strongly rufous-tomentellous branchlets, is probably scarcely specifically distinct from *P. emblica*.

Phyllanthus geoffrayi Beille in Lecomte: 584 (1927); Airy Shaw in Kew Bull. 23: 31 (1969).

E8; SE10.—Indochina (Laos).

Shrub of 1·5 m., locally common in evergreen forest at 200–400 m. alt. Glabrous; lateral branchlets elongate, slender, angled; leaves thinly chartaceous, broadly ovate to rhombic-ovate, glaucous or glaucescent below, up to 9 × 5 cm., nerves lax, slender but prominent beneath; male flowers short-pedicelled, filaments connate, anthers free, dehiscing vertically; female flowers campanulate, cernuous, long-pedicelled; capsule depressed-tricoccous, dark brown, finely reticulate; stigmas short, flattened, reniform; seeds deeply and closely pitted.

Phyllanthus gracilipes (Miq.) Muell. Arg. in Linnaea 32: 47 (1863) & in DC.: 423 (1866); J. J. Sm.: 98 (1910); Ridley: 204 (1924); Backer & Bakh. f. 466 (1963); Airy Shaw in Kew Bull. 23: 35 (1969).

Eriococcus gracilis Hassk. in Tijdschr. Nat. Geschied. & Physiol. 10: 143 (1843) & Cat. Pl. Hort. Bot. Bogor. Cult. Alter: 243 (1844); *non Phyllanthus gracilis* (Hassk. sub *Ceramantho*) Baill. ex Muell. Arg.
Reidia gracilis (Hassk.) Miq., Fl. Ind. Bat. 1(2): 373 (1859).
R. gracilipes Miq., *l.c.*: 374 (1859).
Phyllanthus concinnus Ridley in Journ. Roy. As. Soc. Str. Br. 59: 171 (1911).
P. hullettii Ridley in Bull. Misc. Inf. Kew 1923: 363 (1923).
P. discofractus Croiz. in Journ. Arn. Arb. 23: 31 (1942).

E8; P16, 18.—Indochina (Tonkin), Sumatra, Borneo, Java. (Not yet known in Malaya proper; only in the Siamese Lankawi Is.)

Simple-stemmed shrub to 3 m., in evergreen forest at 900 m. alt.

Stems shortly crisply rufo-puberulous; leaves membranous, obliquely oblong-lanceolate, to 10 × 2·5 cm., acute, glabrous or minutely pilose beneath; capsules 6 mm. diam., densely crisply rufo-lanate, on long slender pedicels (to 5 cm. long), sepals elongate-subulate, with long capitate glands.

Phyllanthus hullettii Ridley in Bull. Misc. Inf. Kew 1923: 363 (1923) & Fl. Malay Penins. 3: 204 (1924).

P. gracilipes sec. Whitmore in Whitmore (ed.), Tree Flora Malaya 2 (4): 000 (1972), *vix* (Miq.) Muell. Arg.

NE5.—Malaya (Malacca).

Shrub of 1 m., growing in shade in evergreen forest and among rocks along streams at 1100–1380 m. alt.

Two recent collections from near Loei (*Tagawa, Iwatsuki & Fukuoka* T 527; *Chermisirivathana* 1152) agree closely with the type (and so far only known collection) of *P. hullettii* from Malacca. I believe this plant to be specifically distinct from *P. gracilipes*, though closely related. The leaves do not exceed $3\cdot5 \times 1\cdot2$ cm. as against $4\cdot10\cdot5 \times 1\cdot5\text{--}3\cdot5$ cm. for *gracilipes*, and may be as small as $1\cdot5 \times 0\cdot5$ cm., whilst the fruiting pedicels are only 1·5 cm. long or less, and are very sparsely setulose-puberulous or practically glabrous. The pedicels are somewhat more markedly thickened beneath the calyx in the Malaccan plant than in the Siamese, but this is probably a trivial point of distinction. The disjunction in distribution is remarkable, but compare that of *P. acutissimus* Miq., above.

Phyllanthus kerrii Airy Shaw in Kew Bull. 23: 32 (1969).

NE5.—Endemic.

Shrub to 2 m., in bamboo forest at 200 m. alt.

Glabrous; leaves oblong, membranous, to 3×1 cm., base slightly truncate-cordate to broadly cuneate, symmetrical or asymmetrical, apex rounded, apiculate, or sometimes subacute; flowers very small, in small, shortly pedunculate, often supra-axillary, bifid inflorescences; filaments united in a column, anthers dehiscing vertically; styles slender, bifid, recurved; capsule unknown. Differs from *P. parvifolius* Ham. ex D. Don in the much larger, oblong (not elliptic or obovate) leaves.

Phyllanthus lingulatus Beille in Bull. Soc. Bot. France 72: 161 (1925) & in Lecomte: 592 (1927).

Phyllanthodendron lingulatum ('*ligulatum*') (Beille) Croiz. in Journ. Arn. Arb. 23: 34 (1942); Airy Shaw in Kew Bull. 14: 471 (1960), *in clavi*.

P15, 18.—Indochina.

Climbing or straggling shrub in evergreen forest or scrub at low altitudes.

Closely related to *P. ridleyanus* (below), differing from it in its chartaceous or only slightly coriaceous leaves, with the tertiary nerves immersed and almost or quite invisible beneath, and in the distinct cartilaginous margin.

Phyllanthus mirabilis Muell. Arg. in Flora 47: 513 (1864) & in DC.: 355 (1866); Beille in Lecomte: 589 (1927).

Phyllanthodendron mirabile (Muell. Arg.) Hemsl. in Hook. Ic. Pl. 26: tt. 2563–4 (1898); Craib: 460 (1911); Croiz. in Journ. Arn. Arb. 23: 34 (1942); Airy Shaw in Kew Bull. 14: 469–470 (1960), *in obs.*; van Steenis in Dansk Bot. Arkiv 23 (1): 93–99 (1963).

N₂, 3; NE₅; E₈; C₁₁.—Endemic.

Stunted podagric tree or shrub to 8 m. high, on rocky limestone hills up to 500 m. alt.; occasionally cultivated as a curiosity.

Trunk succulent, covered with smooth whitish bark, and bearing broad-based conical spines in groups of three (1 bracteal, 2 stipular); leafy branches resemble large pinnate leaves; inflorescence a copious terminal panicle with conspicuous whitish bracts.

Phyllanthus orientalis (*Craib*) *Airy Shaw* in *Kew Bull.* 25: 495 (1971).

Chorisandra ('*Chorizandra*') *orientalis* *Craib* in *Bull. Misc. Inf. Kew* 1914: 285 (1914).

N₁.—Endemic.

Thin shrub, known from one locality only, where it is abundant on limestone rocks in deciduous jungle at 180–300 m.

Rather closely related to *P. jullienii* Beille, of Indochina, differing in its puberulous branchlets and much broader leaves.

Phyllanthus oxyphyllus *Miq.*, *Fl. Ind. Bat., Suppl. (Fl. Sum.)*: 179, 448 (1860); *Muell. Arg.*: 356 (1866); *Airy Shaw* in *Kew Bull.* 23: 29 (1969).

P. frondosus Wall. ex *Muell. Arg.* in *Linnaea* 32: 17 (1863); *Hook. f.*: 292 (1887); *Ridley*: 202 (1924) (excl. var. *rigido* *Ridl.*); *Corner*: 290 (1940); *Henderson* in *Journ. Mal. Br. Roy. As. Soc.* 17: 71 (1939); *Planters' Bull. Rubber Res. Inst. Malaya* no. 96: 83, t. 81 (1968).

P. kunstleri *Hook. f.*: 292 (1887).

P₁₅, 16, 18.—Malay Peninsula, Sumatra.

Shrub or small tree to 3 m., in evergreen forest up to 100 m. alt.

Glabrous, with sharply quadrangular branchlets; differs from *P. pachyphyllus* in the smaller leaves, 3–7 cm. long, 1–2 cm. wide, and in the fascicles of flowers always borne directly in the leaf-axils, never on special leafless axillary branches or inflorescences.

Phyllanthus pachyphyllus *Muell. Arg.*: 353 (1866); *Airy Shaw* in *Kew Bull.* 23: 29 (1969).

P. coriaceus Wall. [Numer. List no. 7946 (1847), *nomen*] ex *Hook. f.*: 292 (1887); *Ridley*: 203 (1924); *nom. illegit.*

?*P. klossii* *Ridley* in *Journ. Fed. Malay States Mus.* 10: 114 (1920).

P. campanulatus *Ridley* in *Bull. Misc. Inf. Kew* 1923: 362 (1923) & *Fl. Malay Penins.* 3: 203 (1924); *Airy Shaw* in *Kew Bull.* 23: 30 (1969); **synon. nov.**

P. frondosus var. *rigidus* *Ridley*: 203 (1924).

?*P. annamensis* *Beille*: 585 (1927); *Merr. & Chun* in *Sunyatsenia* 5: 93 (1940).

?*P. sciadiostylus* *Airy Shaw* in *Kew Bull.* 23: 30 (1969).

P₁₆.—Malaya (S. to Singapore); ?Burma; ?Indochina; ?Hainan.

Shrub to 2 m., in evergreen forest or open ground up to 800 m. alt.

I am unable to find convincing character-correlations or dividing lines between the synonyms cited above. The material shows a bewildering range

of permutations and combinations. In specimens from high altitudes and greater exposure (*pachyphyllus*, *coriaceus*, *campanulatus*, *rigidus*) the leaves are smaller and more coriaceous and the flowers are borne directly in the leaf-axils on the main branches. In material from evergreen forest at lower altitudes (*klossii*, *sciadiostylus*) the leaves are larger and thinner, and the flowers are often borne on long, slender, leafless, axillary branchlets; in *sciadiostylus*, however, the flower-fascicles are borne in the axils of the large thin leaves. In Indochina a syntype of *annamensis* (Harmand 3136) is much like *klossii*, with large thin leaves and leafless axillary inflorescences, but other gatherings approach the *pachyphyllus* type, and intermediate conditions occur. For the present, therefore, I am provisionally treating all these taxa as conspecific. It is not impossible that *P. baeobotryoïdes* Muell. Arg. (Linnaea 32: 15 (1863)), of Burma, should be included, in which case it would provide the earliest name for the aggregate. So far as the available material goes, however, this species seems to differ from the remainder in always having shorter and slenderer axillary inflorescences.

Phyllanthus polyphyllus Willd., Sp. Pl. 4: 586 (1805); Muell. Arg.: 352 (1866); Hook. f.: 290 (1887).

var. **siamensis** Airy Shaw in Kew Bull. 23: 33 (1969).

NE5.—Endemic. (Var. *polyphyllus* in S. India and Ceylon).

Shrub or small spreading tree to 5 m., locally common in low-lying ground up to 200 m. alt.

Differs from the typical form (S. India and Ceylon) in its densely white-puberulous branches (ferruginous when young), elliptic-oblong leaves (not constricted in the middle), and more shortly pedicelled female flowers.

Phyllanthus pulcher Wall. ex Muell. Arg. in Linnaea 32: 49 (1863) & in DC.: 421 (1866); Hook. f.: 301 (1887); Hosseus: 407 (1911); Beille in Lecomte: 598 (1927); Henderson in Journ. Mal. Br. Roy. As. Soc. 17: 71 (1939); Backer & Bakh. f.: 466 (1963).

N1, 3, 4; SE9, 10; PI5-18.—Burma, Indochina, Malay Peninsula, Sumatra, Borneo, Java.

Shrub to 1 m., rarely a tree to 10 m. high, scattered in evergreen forest up to 420 m. alt.; widely cultivated as a medicinal plant, and occurring as a weed in old clearings, fruit gardens, etc.

Stems terete, minutely crisply rufo-puberulous; leaves obliquely oblong or ovate-oblong, closely distichous or imbricate-distichous, subacute or apiculate, glabrous, somewhat glaucous, up to $3 \times 1\cdot3$ cm.; male and female sepals strongly fimbriate; capsule small, subglobose, 3 mm. diam., smooth, dull, pale brown, pedicel 2·5 cm. long.

Phyllanthus reticulatus Poir. in Lam., Encycl. Méth. 5: 298 (1804); Muell. Arg.: 344 (1866); Hook. f.: 288 (1887); Hosseus: 407 (1911); Craib: 459 (1911) & 185 (1912); Merr.: 394 (1923); Ridley: 202 (1924); Beille in Lecomte: 575 (1927); Webster in Journ. Arn. Arb. 38: 57 (1957); Backer & Bakh. f.: 467 (1963); *sensu lato*.

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

Phyllanthus microcarpus (Benth.) Muell. Arg. in Linnaea 32: 51 (1863) & in DC.: 343 (1866); Merr.: 393 (1923).

P. dalbergioides Wall. [Num. List no. 7934 (1847), *nomen*] ex J. J. Sm.: 67 (1910); Ridley: 201 (1924).

Glochidion microphyllum Ridley in Journ. Str. Br. Roy. As. Soc. 59: 173 (1911).

Phyllanthus erythrocarpus Ridley in Bull. Misc. Inf. Kew 1923: 362 (1923) & Flora: 202 (1924); cf. Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 71 (1939).

N₁, 2; S_E10; C₁₂; SW₁₄; P₁₇.—India, Ceylon and China to Eastern Malesia.

Shrub, scrambler, or tree to 15 m. high, in mixed evergreen forest, scrub, etc., up to 800 m. alt.; frequently near streams.

The status of the complex forms centring around *P. reticulatus* is in much need of clarification. Distinguished from all other Asiatic members of the genus, except *P. glaucus* Wall. ex Muell. Arg., by the small black (sometimes red) globose baccate fruit, and from *P. glaucus* by the female pedicel being filiform (not thickened upwards), by the short styles, and by the union of the inner stamens.

***Phyllanthus ridleyanus* Airy Shaw, nom. nov.**

Cleistanthus? minutiflorus Ridley in Journ. Str. Br. Roy. As. Soc. No. 59: 169 (1911), non *Phyllanthus minutiflorus* F. Muell. ex Muell. Arg. (1865).

Phyllanthodendron coriaceum Gage in Rec. Bot. Surv. Ind. 9: 219 (sphalm. ‘*P. dubium*’ [alterum!]), et in indice, post p. [250] (1922); Ridley: 205 (1924); Henderson in Journ. Mal. Br. Roy. As. Soc. 17: 71 (1939); Croiz. in Journ. Arn. Arb. 23: 35 (1942); non *Phyllanthus coriaceus* Muell. Arg. (1865), nec Wall. ex Hook. f. (1887).

Phyllanthodendron minutiflorum (Ridley) Airy Shaw in Kew Bull. 14: 471 (1960) & 16: 343 (1963).

SW₁₄.—Malay Peninsula.

Climbing shrub, or tree, on limestone; no further data.

Distinguished from *P. lingulatus* by its stiffly coriaceous leaves, with the tertiary nerves conspicuously reticulate-elevate beneath, and by its much more obscure cartilaginous margin.

***Phyllanthus roseus* (Craib & Hutch.) Beille in Lecomte: 590 (1927).**

Phyllanthodendron roseum Craib & Hutch. in Bull. Misc. Inf. Kew 1910: 23 (1910); Craib in Hook. Ic. Pl. 30: t. 2935 (1911) & in Aberdeen Univ. Stud. 57: 186 (1912); Croiz. in Journ. Arn. Arb. 23: 35 (1942).

P. album Craib & Hutch., l.c.: 279 (1910); Craib: 459 (1911) & 186 (1912); **synon. nov.**

Uranthera siamensis Pax & Hoffm. iii: 95 (Feb. 1911).

Cleistanthus? dubius Ridley in Journ. Roy. As. Soc. Str. Br. 59: 168 (Aug. 1911); **synon. nov.**

Glochidion flavum Ridley, l.c.: 173 (1911).

Phyllanthodendron roseum var. *glabrum* Craib ex Hosseus: 406 (Nov. 1911).

- P. roseum* var. *siamensis* [sic] (Pax & Hoffm.) Craib in Bull. Misc. Inf. Kew 1911: 460 (Dec. 1911) & 186 (1912).
- P. siamense* (Pax & Hoffm.) Hosseus in Fedde, Rep. Sp. Nov. 10: 116 (1912); Pax & Hoffm. vi: 128 (1912), *in obs.*
- P. dubium* [prius!] (Ridley) Gage in Rec. Bot. Surv. Ind. 9: 219 (1922); Ridley: 205 (1924).
- Phyllanthus albus* (Craib & Hutch.) Beille in Lecomte, *l.c.* (1927).
- P. roseus* var. *glabrum* [sic] (Craib ex Hoss.) Craib ex Beille, *l.c.* (1927).

N1, 2; SE9, 10; SW14; PI6, 18.—Indochina, Malay Peninsula.

Shrub or small tree to 6 m., locally common in moist or dry mixed or evergreen forest or scrub up to 1600 m. alt.

Although local populations in this complex are to some extent distinguishable, there are many specimens which do not fall clearly into any one of them. In typical *roseus*, from north-western Siam (one specimen also from the south-east), the leaves are elongate (to 24 cm. long), oblanceolate, and long-attenuate into a symmetrical cuneate base; the apex is acutely long-acuminate. In *albus*, from the same region, the leaves are broadest towards the base, which is either asymmetrical, with one side rounded, or almost symmetrical and rounded on both sides; the apex is much more shortly and bluntly acuminate. In *dubius*, from the peninsular and south-eastern regions, the leaves are usually shorter and often relatively much broader (up to 6·5 cm. broad), and are more or less elliptic in outline (broadest at the middle). I do not believe that these forms deserve specific rank; they could at most be treated as varieties. Variations in pubescence seem unimportant.

Phyllanthus sikkimensis Muell. Arg. in Linnaea 32: 48 (1863) & in DC.: 425 (1866); Airy Shaw in Kew Bull. 23: 35 (1969).

Agyneia? *tetrandra* Buch.-Ham. in Trans. Linn. Soc. 15: 125 (1826); *non* *Phyllanthus tetrandrus* Roxb. (1832) (=*P. roxburghii* Muell. Arg., 1863).

Phyllanthus hamiltonianus Muell. Arg. in Linnaea 34: 75 (1865) & in DC.: 424 (1866); Hook. f.: 304 (1887); Henderson in Journ. Mal. Br. Roy. As. Soc. 17: 71 (1939).

P. secundiflora [sic] Ridley in Journ. Str. Br. Roy. As. Soc. 59: 170 (1911).

P. perlensis Ridley, *l.c.*: 171 (1911).

Reidia hamiltoniana (Muell. Arg.) A. M. & J. M. Cowan, Trees N. Bengal: 117 (1929).

Eriococcus hamiltonianus (Muell. Arg.) Hurus. & Tan. in Hara, Fl. E. Himal.: 117 (1966).

N3; E8; C11; PI5.—E. Himalaya; N. Malay Peninsula (Perlis).

Shrub to 1 m., in mixed deciduous forest up to 200 m.; once noted on limestone.

Branchlets slender, terete, glabrous or very minutely puberulous; leaves thinly membranous, obliquely ovate, shortly and acutely cuspidate, glaucous beneath, with a very characteristic thin minute puberulence on both surfaces; male flowers small, in axillary fascicles in the lower half of the branchlets, with long-fimbriate sepals; female flowers in bare racemes at the tips of the branchlets, or sometimes from leaf-axils, sepals dentate; capsule 2–3 mm. diam., crisply papillose-puberulous.

Phyllanthus sootepensis Craib in Bull. Misc. Inf. Kew 1911: 459 (1911) & 189 (1912); Beille in Lecomte: 599 (1927); Airy Shaw in Kew Bull. 23: 36 (1969).

P. subpulchellus Croiz. in Journ. Jap. Bot. 16: 652 (1940).

N₁, 4.—S. China (Yunnan).

Shrub of 1 m. in mixed or evergreen forest at 480–1300 m. alt.

Similar to *P. pulcher*, but differing in its glabrous stems and branchlets, rather smaller leaves and erose-denticulate (male) or subentire (female) sepals, and occurring at much higher altitudes. The Yunnan material described as *P. subpulchellus* Croiz. matches the Siamese perfectly.

Phyllanthus taxodiifolius Beille in Lecomte: 605 (1927); Airy Shaw in Kew Bull. 23: 38 (1969).

N₃; NE₅[6]; SE₁₀; C₁₁, 13.—Indochina (Cambodia, Cochinchina).

Thin shrub, from woody rootstock, with slender drooping branches to 1 m. long, in open evergreen scrub or deciduous forest at low altitudes.

An appropriately named species: the small, oblong, densely distichously arranged leaves bear a striking resemblance to those of *Taxodium*. The minute flowers are borne on the underside of the branchlets. The capsules are 4–5 mm. in length, 3-valved, shortly ovoid in outline, intrude at the base, glabrous, and of a dull ochraceous colour when dry.

Phyllanthus urinaria L., Sp. Pl.: 982 (1753); Muell. Arg.: 364 (1866); Hook. f.: 293 (1887); Merr.: 396 (1923); Ridley: 200 (1924); Beille in Lecomte: 586 (1927); Croiz. in Journ. Jap. Bot. 16: 657 (1940); Webster in Journ. Arn. Arb. 38: 194 (1957); Backer & Bakh. f.: 469 (1963).

N₁, 4; E₈; SE₉, 10; C₁₁, 12; SW₁₄; P₁₅, 16.—Pantropical.

Herb to 60 cm., common on waste ground, also in clearings and pathsides in evergreen or bamboo forest up to 350 m. alt.; noted from limestone as well as from sandy soil, and once recorded (**N₁**) from marshy ground.

Very variable, but unmistakable when in fruit from its small scaly capsules. The venation is often finely and sharply raised, almost as in *P. collinsae* Craib.

Phyllanthus virgatus ['virgata'] Forst. f., Fl. Ins. Austr. Prodr.: 65 (1786); Backer & Bakh. f.: 469 (1963).

P. simplex Retz., Obs. Bot. 5: 29 (1789); (var. *genuinus*) Muell. Arg.: 391 (1866); Hook. f.: 295 (1887); Craib: 459 (1911) & 185 (1912); Merr.: 395 (1923); Ridley: 200 (1924); Beille in Lecomte: 578 (1927) (excl. var. *tonkinensi* Beille).

P. simplex var. *virgatus* (Forst. f.) Muell. Arg. in Linnaea 32: 32 (1863) & in DC.: 392 (1866).

N₁, 3; NE₅(?); E₈; SE₁₀; C₁₂; SW₁₄; P₁₅, 17, 18.—India, Indochina, S. China, and throughout Malesia to Polynesia.

Erect or prostrate herb in mixed deciduous forest, savannah, etc.; also as a weed in waste ground, paddy fields, etc.; ascending to 450 m. in **N₁**.

Readily recognizable from its usually erect, often simple stems, leafy throughout their length, 10–30 cm. high, its small, narrowly oblong, obtuse, strictly ascending leaves, its small, solitary, axillary flowers, and small sub-globose capsules (2–3 mm. diam.) borne on slender spreading or reflexed pedicels (5–8 mm.); sepals persistent, very small, often reflexed.

Phyllanthus welwitschianus Muell. Arg. in Journ. Bot. 2: 330 (1864) & in DC.: 351 (1866); Hutch. in Fl. Trop. Afr. (ed. Dyer) 6(1): 723 (1912).

P. beillei Hutch. in op. cit. 6: 733 (1912), & in Hutch. & Dalz., Fl. W. Trop. Afr. 1: 291 (1928) & ed. Keay, 1: 388 (1958); Airy Shaw in Kew Bull. 23: 27 (1969), q.v.; **synon. nov.**

P. stolzianus Pax & Hoffm. ex Pax in Engl., Pflanzenw. Afr. III. 2. 2: 27 (*in clavi*), 29 (1921), **synon. nov.**

P. fasciculatus (Lour.) Muell. Arg. [= *P. cochinchinensis* Spreng.], 'var. à feuilles plus grandes', etc., Beille in Lecomte: 579 (1927).

?*P. nyassae* Pax & Hoffm. in Notizbl. Bot. Gart. Berlin 10: 383 (1928).

P. grahamii Hutch. & M. B. Moss in Battiscombe & Dale, Trees & Shrubs Kenya Col.: 49 (1936) & in Bull. Misc. Inf. Kew 1937: 413 (1937), **synon. nov.**

NE5; E8; SE10.—Indochina (Cambodia); W. & E. Trop. Afr.

Shrub to 1·5 m., in evergreen or deciduous forest up to 400 m. alt.

Glabrous; leaves broadly oblong or obovate-oblong or elliptic-oblong, to 3·5 × 2 cm., broadly rounded or slightly retuse at base and apex, membranous to thinly chartaceous, dull, finely and closely nerved, very short-petioled; male flowers (not yet seen in Asiatic material) on slender pedicels up to 6 mm. long; female flowers short-pedicelled, outer sepals ovate, inner sub-orbicular, minutely papillose-ciliolate; capsule depressed-globose, 7–8 mm. diam., shallowly 3-lobed, dull and obscurely reticulate, styles short, shortly bifid, reflexed; seeds smooth, brown, minutely and densely elevate-puncticulate.

Certainly related to *P. cochinchinensis* Spreng. (*Cathetus fasciculata* Lour., non *P. fasciculatus* Poir.; *P. cinerascens* Hook. & Arn.), which differs in its smaller, cuneate-spathulate, rigidly coriaceous leaves.

In Kew Bull. 23: 27 (1969) I referred to the manifestly close relationship between *P. beillei* Hutch. and *P. welwitschianus* Muell. Arg. After a further detailed examination of the rather copious representation of these and related taxa at Kew, Mr. A. R. Smith and I have concluded that it is in fact not possible to keep them separate; the aggregate must therefore bear the name of Mueller's species. I am indebted to Mr. Smith for bringing this to my attention.

Phyllanthus winitii Airy Shaw in Kew Bull. 23: 36 (1969).

N1.—Endemic, or possibly also in New Guinea.

Shrub to 1·5 m., in open deciduous forest at 500–800 m. alt.

Differs from *P. sootepensis* in its shorter branchlets, longer pedicels, larger ♀ flowers and much broader sepals. The New Guinea plant is under investigation.

Pterococcus Hassk.

Pterococcus corniculatus (Sm.) Pax & Hoffm. ix-xi: 22 (1919); Backer & Bakh. f.: 490 (1963).

Plukenetia corniculata Sm. in Nova Acta Upsal. 6: 4 (1799); Muell. Arg.: 772 (1866); Hook. f.: 464 (1888); Merr.: 447 (1923).

Pterococcus glaberrimus Hassk. in Flora 25(2), Beibl.: 41 (1842); Ridley: 309 (1924).

Hedraiostylus glaberrimus (Hassk.) Hassk. in Tijdschr. Nat. Geschied. & Phys. 10: 141 (1843).

H. corniculatus (Sm.) Hassk., Cat. Hort. Bog. Alt.: 234 (1844).

Sajoriaum corniculatum (Sm.) Dietr., Synops. Pl. 5: 331 (1852); Baill., Ét. Gén. Euphorb.: 484 (1858).

SE9.—E. Himalaya, Assam, Burma, and scattered throughout W. Malesia to the Moluccas.

Climber in evergreen forest or clearings at low altitudes.

Closely related to *Plukenetia* L., differing principally in the very short thick stylar column and in the conspicuously 4-winged or 4-horned capsule.

Ptychopyxis Mig.

Ovary 3-locular, styles 3; fruits globose or pyriform, mostly 3-seeded, brown-tomentellous. **P. javanica**

Ovary 2-locular, styles 2; fruits usually very asymmetrical, oblique and gibbous at the base, 1-(rarely 2-)seeded, minutely golden-tomentellous

P. plagiocarpa

Ptychopyxis javanica (J. J. Sm.) Croiz. in Journ. Arn. Arb. 23: 49 (1942); Airy Shaw in Kew Bull. 14: 371 (1960); Backer & Bakh. f.: 479 (1963).

Podadenia javanica J. J. Sm.: 387 (1910); Pax & Hoffm. vii: 21 (1914).

Ptychopyxis angustifolia Gage in Rec. Bot. Surv. Ind. 9: 248 (1922); Ridley: 296 (1924); Croiz., l.c.: 48 (1942).

P17.—Malay Peninsula, Borneo, Java.

Tree (height not stated) in evergreen forest at 200 m.

Leaves elliptic-ob lanceolate, glabrous; capsule trilocular, broadly obovoid, wrinkled, fulvous-tomentellous.

Ptychopyxis plagiocarpa Airy Shaw in Kew Bull. 14: 372 (1960).

SW14.—Endemic.

Tree of 30 m. on slope near river at 150 m. alt.

Extremely similar in foliage to *P. javanica*, but very distinct in its bilocular ovary, usually developing into an oblique smooth 1-seeded capsule, gibbous at base, with a minute shining golden indumentum.

Richeriella Pax & Hoffm.

Richeriella cf. **gracilis** (*Merr.*) *Pax & Hoffm.* xv: 30 (1922); *Merr.* in *Lingnan Sci. Journ.* 14: 22 (1935); *Airy Shaw* in *Kew Bull.* 25: 489 (1971), *q.v.*

Baccaurea gracilis *Merr.* in *Philipp. Journ. Sci., Suppl.* 1: 203 (1906) & *Enum.*: 411 (1923).

P16.—Hainan, Philippines.

Small tree of 3–5 m.; no details of habitat. The closely related and perhaps not specifically distinct *R. malayana* *Hend.* is listed by *Henderson* in *Journ. Malay. Br. Roy. As. Soc.* 17: 71 (1939) as one of the limestone-loving plants of the Malay Peninsula.

Leaves rather large, broadly oblong-elliptic, chartaceous, glabrous, very shortly petioled; male flowers very small, in slender, axillary inflorescences, stamens long-exserted, pistillode present. Related to *Securinega*, differing in its evergreen chartaceous leaves and slender non-fasciculate inflorescence.

Ricinus L.

Ricinus communis *L.*, Sp.: Pl.: 1007 (1753); *Muell. Arg.*: 1017 (1866); *Hook. f.*: 457 (1887); *Ostenf.* in *Bull. Herb. Boiss. sér. 2, 5*: 718 (1905); *Hosseus*: 407 (1911); *Pax & Hoffm.* ix-xi: 119 (1919); *Merr.*: 447 (1923); *Ridley*: 309 (1924); *Gagnep.*: 327 (1925); *Corner*: 274 (1940); *Backer & Bakh. f.*: 492 (1963).

N₂, 3; NE₅; C₁₂; presumably always as an escape from cultivation.—Widely cultivated in all tropical countries; perhaps native in north-east tropical Africa (Somaliland, N. Kenya, etc.), preferring stream-beds and soils with high nitrogen or saline content.

Erect herb or large shrub, on waste ground, by stream in clearing, or on dry sandy river-bed, up to 360 m. alt.

Sampantaea Airy Shaw

Sampantaea *Airy Shaw*, gen. nov., *Wetriae Baill.* affinis, sed foliorum nervis lateralibus longe paucioribus (9–13-jugis) nec conspicue parallelis, inflorescentiis brevibus (♂ usque 9 cm., ♀ usque 3 cm. longis), bracteis floralibus ♂ latis brunneis conspicuis, floribus ♂ in quaque bractea solitariis sessilibus, filamentis brevissimis, sepalis ♀ erectis vel patulis valde discedit.—Sola cognita species, *S. amentiflora*, Siamiae et Cambodiae incola.

Sampantaea amentiflora (*Airy Shaw*) *Airy Shaw*, comb. nov.

Alchornea (?) *amentiflora* *Airy Shaw* in *Kew Bull.* 20: 45 (1966) & 21: 400 (1968), *qq.v.* for detailed citation of specimens.

NE₅; E₈; SE₁₀; C₁₁.—Indochina (Cambodia).

Erect shrub or slender tree of 3–6 m., with short leafy branches along the whole length of the trunk, locally common in evergreen forest and scrub jungle at low altitudes (to 300 m.).

It is evident that this plant is more closely related to the genus *Wetria* Baill. than to *Alchornea* Sw., to which it was at first doubtfully referred. But the considerable differences from *Wetria* forbid its inclusion in that genus, and it would seem premature to widen the concept of *Alchornea* so as to include both it and *Wetria*, and possibly other related taxa. In the circumstances the establishment of a special genus seems the only reasonable course. The generic name is derived from the Siamese name, 'sām pan tā', under which the plant is evidently well known locally, being cited by several collectors. No fruiting material is yet available, and only one collection bearing female inflorescences. Collectors in the relevant areas are asked to keep a look-out for these desiderata.

Sapium L.

Leaves entire:

No glands at apex of petiole; inflorescence unisexual, somewhat branched; ripe fruit baccate, bilocular **S. baccatum**

Two conspicuous glands at apex of petiole; inflorescence usually bisexual, almost unbranched; fruit a trilocular dehiscent capsule **S. discolor**

Leaves serrate or crenate:

Petiole without or sometimes with obscure glands at apex; inflorescence unbranched; fruit a large, globose, thick-walled, woody capsule **S. indicum**

Petiole biglandular at apex; inflorescence simple, elongate; fruit small, baccate, in dense spikes **S. insigne**

Sapium baccatum Roxb., Fl. Ind. 3: 694 (1832); Wight, Ic. Pl. Ind. Or. 6: 6 (1853); Hook. f.: 470 (1888); Pax & Hoffm. v: 240 (1912); Ridley: 315 (1924); Gagnep.: 400 (1926); Corner: 276 (1940).

Excoecaria affinis Griff., Notulae 4: 486 (1851); Muell. Arg.: 1223 (1866).

Sapium populifolium Wall. ex Wight, Ic. Pl. Ind. Or. 6: t. 1940 (1853).

Stillingia baccata (Roxb.) Baill., Ét. Gén. Euphorb.: 513 (1858).

S. paniculata Miq., Fl. Ind. Bat. Suppl.: 461 (1860).

Excoecaria baccata (Roxb.) Muell. Arg.: 1211 (1866).

Carumbium baccatum (Roxb.) Kurz, For. Fl. Brit. Burma 2: 412 (1877).

N1, 2; E8; SE9; P15-18.—E. Himalaya, Assam, Burma, S. China, Indochina, Malay Peninsula, Andamans, Sumatra.

Lofty tree to 25 m., in mixed evergreen or bamboo forest or scrub up to 1000 m. alt.

Leaves entire; no glands at apex of petiole; inflorescences unisexual, somewhat branched; ripe fruit baccate, bilocular.

Sapium discolor (Champ. ex Benth.) Muell. Arg. in Linnaea 32: 121 (1863); Hook. f.: 469 (1888); Pax & Hoffm. v: 239 (1912); Ridley: 316 (1924); Gagnep.: 399 (1926); Corner: 276 (1940).

Stillingia discolor Champ. ex Benth. in Hook. Journ. Bot. & Kew Garden Misc. 6: 1 (1854).

Excoecaria discolor (Champ. ex Benth.) Muell. Arg.: 1210 (1866).

N1; SE9; PI6.—S. China, Indochina, Malay Peninsula, ?Borneo.

Tree of 10 m. at edge of evergreen forest, from sea-level to —?

Leaves entire, usually smaller than in *S. baccatum*, with two conspicuous glands at apex of petiole; inflorescence usually bisexual, almost unbranched; fruit a trilocular dehiscent capsule.

Sapium indicum Willd., Sp. Pl. 4: 572 (1853); Hook. f.: 471 (1888); Williams in Bull. Herb. Boiss. sér. 2, 5: 32 (1905); Pax & Hoffm. v: 251 (1912); Ridley: 317 (1924); Gagnep.: 396 (1926); Corner: 277 (1940).

Stillingia indica (Willd.) Baill., Ét. Gén. Euphorb.: 513 (1858).

Excoecaria indica (Willd.) Muell. Arg. in Linnaea 32: 123 (1863) & in DC.: 1216 (1866), *b.p.*

C12 (cult.?) ; **P16-18**.—S. & E. India, Burma, Indochina, and W. Malesia (except Philippines) ; New Guinea and Solomon Is.

Tree to 12 m. high, often at sea-level, near tidal marshes or rivers, but also in evergreen forest up to 240 m. alt.

Leaves closely crenate-serrate, without or sometimes with obscure glands at apex of petiole; inflorescences unbranched; fruit a large, globose, thick-walled, woody capsule.

For a note on Williams's supposed Siamese locality of Butong, 'one of the Langkawi group', from which he records *S. indicum*, see under *Suregada multiflora* Juss., below. The specimen of *S. indicum* in question is preserved in the Kew Herbarium, with the following details: 'Flora of Penang. Polo Botong, coast, tree growing by roadside, May 1886, Curtis 892.'

Sapium insigne (Royle) Benth. in Benth. & Hook. f., Gen. Pl. 3: 335 (1880) & in Hook. f.: 471 (1888); Craib: 467 (1911) & 195 (1912); Pax & Hoffm. v: 241 (1912); Gagnep.: 395 (1926).

Falconeria insignis Royle, Ill. Bot. Himal.: 354, t. 98 (84a), fig. 2 (1839).

F. wallichiana Royle, l.c.: 354 (1839).

F. wallichii Royle, l.c.: t. 98 (84a), fig. 3, b-f (1839).

Excoecaria insignis (Royle) Muell. Arg.: 1212 (1866).

Carumbium insigne (Royle) Kurz, For. Fl. Brit. Burma 2: 412 (1877).

N1; E8.—W. Himalaya to Burma and Indochina (Cambodia, Cochin-china); also in the Malay Peninsula, if a recent sterile collection from Selangor represents this species.

Erect high branching deciduous tree of 12 m. height, at 450 m. alt.; no ecological data for Siam.

Leaves very large, closely crenulate; branchlets thick, with smooth rather loose bark; inflorescences simple, elongate; fruit small, baccate, in dense spikes.

Sauropus Bl.

Stems and/or leaves manifestly pubescent or puberulous:

♀ flowers large, outer sepals 5-10 mm. long, dark brown when dry; pubescence usually rather coarse; nervation often conspicuously reticulate. **S. hirsutus**

♀ flowers small or minute; nervation less conspicuously reticulate:

Margin of ♂ perianth clearly 6-lobed (lobes often bilobulate); leaves 1-2·5 cm. long; pubescence very short; habit not suggesting *Glochidion* **S. quadrangularis**
var. **puberulus**

Margin of ♂ perianth entire or shortly lobed; leaves 1·5-5·5 cm. long; habit often recalling *Glochidion*:

Pubescence denser, often tomentose; plant suffrutescent; ♂ flower 1-2 mm. wide, subturbinate, shortly pedicelled **S. villosus**

Pubescence shorter and finer; plant subherbaceous; ♂ flower 4 mm. wide, concave-disciform, pedicel 4-5 mm. long. **S. amabilis**

Stems and leaves glabrous or almost so (but stems and midribs may bear asperities):

♀ flowers and fruit on exceptionally long pedicels (to 11 cm.); capsules to 2 cm. in diameter; leaves very large (to 18 × 8 cm.) **S. macranthus**

♀ pedicels much shorter:

A rheophyte; main shoots elongate, bearing numerous very abbreviated lateral leafy short shoots less than 8 mm. long; leaves cuneate-obovate, rounded or retuse at apex **S. heteroblastus**

Not rheophytic; long and short shoots not as above:

Cauliflorous or partly so:

Inflorescences short and much branched; ♂ calyx deeply divided; leaves up to 11 cm. long **S. thorelii**

Inflorescences elongate or flagelliform, almost simple; ♂ calyx entire or almost so; leaves up to 20 cm. long:

Old stems without thick fissured corky bark; young branchlets with 2 raised lines; lateral nerves 6-7 pairs, the lowest steeply ascending; inflorescence glabrous **S. bonii**

Old stems with thick fissured corky bark; young branchlets without raised lines; lateral nerves 9-12 pairs, the lowest not steeply ascending; inflorescence puberulous **S. suberosus**

Not cauliflorous:

♂ flower not flattened; sepals ± cucullate; anthers rather large (*§ Hemisauropus*):

Nerves conspicuously elevate on both surfaces, forming a beautifully regular pattern, dense at margins

S. pulchellus

Nerves immersed or only slightly raised, relatively inconspicuous:

Leaves 10-15 × 6-10 mm., grey-green and granular when dry **S. granulosus**

Leaves 5-12 × 3-6 mm., dark brown above and smooth when dry **S. kerrii**

♂ flower flattened (orbicular or lobed); sepals sharply inflexed, the region or line of flexion produced radially outwards as a flange or lobe, forming false apices or a continuous false margin; anthers small:

♂ flower discoid, entire or almost so:

Segments of ♀ calyx obovate, much imbricate; capsule ± globose, up to 1·5 cm. in diameter **S. androgynus**

Segments of ♀ calyx ± elliptic, not or slightly imbricate; capsule ± ovoid, to 2·5 cm. long **S. garrettii**

- ♂ flower star-shaped; lobes long or short, equal or unequal, acute or obtuse:
 Venation prominently raised on lower surface of leaves, forming a slender beautifully regular pattern, much as in *S. pulchellus*; leaves membranous, suborbicular to broadly elliptic, 0·7–3 cm. long ***S. orbicularis***
- Venation not prominently raised on lower surface; pattern less regular:
 ♂ perianth acutely and ± unequally 12-dentate:
 Stems and branches acutely tetragonal
S. amoebiflorus
 Stems and branches slightly compressed, not acutely tetragonal. ***S. asteranthos***
- ♂ perianth shortly, truncately or obtusely and ± equally 12-dentate:
 Angles of branchlets and leaf-margins bearing a row of upward-pointing asperities ***S. similis***
 Angles of branchlets and leaf-margins without asperities:
 Stems ± angled or compressed; leaves up to 2·5 cm. long ***S. quadrangularis***
 Stems terete, neither angled nor compressed (except when very young):
 Leaves up to 6 cm. long, rigidly chartaceous, usually drying dark brown above and glaucous or reddish beneath, margins strongly reflexed; no odour of fenugreek when dry ***S. bicolor***
 Leaves up to 2·5 cm. long, thinly membranous, mostly drying greenish-grey, margins scarcely reflexed; often a distinct odour of fenugreek when dry ***S. brevipes***

Sauropus amabilis Airy Shaw in Kew Bull. 23: 49 (1969).

N₃, NE₅.—Endemic.

Hemicryptophyte to 40 cm. high, in mixed deciduous forest up to 200 m. Differs from *S. villosus* in its herbaceous habit, less dense pubescence and much larger, long-pedicelled, widely open cupular male flowers. See Kew Bull. l.c. *supra* for further discussion.

Sauropus amoebiflorus Airy Shaw in Kew Bull. 23: 45 (1969).

N₁, 2; SW₁₄.—Endemic.

Small undershrub to 70 cm., in open mixed deciduous or bamboo forest at low altitudes, up to 360 m. in **N₁**.

Closely related to *S. similis* Craib, but differing in the smooth, not scabrid, angles of the stem. It is remarkably similar to *Synostemon bacciformis* (L.) G. L. Webster in general appearance. The epithet *amoebiflorus* was suggested by the conspicuously and unequally narrow-lobulate outline of the male flower.

Sauropus androgynus (*L.*) Merr. in Philipp. Bur. For. Bull. 1: 30 (1903); Pax & Hoffm. xv: 217 (1922); Merr.: 405 (1923); Beille in Lecomte: 645 (1927); Backer & Bakh. f.: 471 (1963).

Clutia androgyna L., Mant. 1: 128 (1767).

Sauropus albicans Bl., Bijdr.: 596 (1825); Muell. Arg.: 240 (1866); Hook. f.: 332 (1887); Ridley in Journ. Str. Br. Roy. As. Soc. 59: 176 (Aug. 1911); Craib: 457 (Dec. 1911) & 183 (1912); Ridley: 220 (1924).

S. sumatranus Miq., Fl. Ind. Bat. Suppl.: 446 (1860); Ridley: 220 (1924).

S. parviflorus Pax & Hoffm. xv: 218 (1922), *e descr. et loc.*, **synon. nov.**

N₁; NE₅; SE₁₀; C₁₂; SW₁₄; P₁₅₋₁₈.—W. Peninsular India & Ceylon to S. China & Indochina, and throughout W. Malesia to Celebes and Moluccas; ?New Guinea.

Shrub or suffrutescent herb 0·5–2 (–3) m. high, common in evergreen forest, clearings, scrub, rocky or waste ground, roadsides, etc., from sea-level to 1000 m. alt.

Stems weak, terete or angled, glabrous; leaves ovate or lanceolate, obtuse or acute, mostly pale or yellowish green when dry; male flowers disc-shaped, 5–12 mm. in diameter; segments of female calyx obovate, much imbricate; capsule large, inflated, whitish, thinly crustaceous, up to 1·5 cm. in diameter.

Sauropus asteranthos Airy Shaw in Kew Bull. 28: 47 (1969).

N₅.—Endemic.

Hemicryptophyte to 30 cm., in open deciduous forest at 100 m.

At present known only from the type (*Kerr* 21530). The acutely 12-rayed male flower recalls that of *S. amoebiflorus* Airy Shaw, but the general habit is rather that of *S. quadrangularis* (Willd.) Muell. Arg., to which it is certainly related. Leaves only 5–12 mm. long.

Sauropus bicolor Craib in Bull. Misc. Inf. Kew 1914: 11 (1914); Pax & Hoffm. xv: 223 (1922); Beille in Lecomte: 654 (1927).

S. rigidus Craib: 457 (1911) & 183 (1912), *non* Thw. (1864).

N₁; NE₅.—Burma (Tenasserim), *teste* Craib; Indochina.

Small thin shrub to 50 cm., in open grassy deciduous and pine-forest, up to 1560 m. alt.

Stem neither angled nor compressed (except when quite young); leaves ovate to lanceolate, up to 6 cm. long, rigidly chartaceous, obtuse to subacute, apiculate, drying dark brown above and glaucous or reddish below, with strongly reflexed margins; tertiary nerves almost invisible; male calyx-lobes emarginate-truncate.

var. **microphyllus** (*Craib*) Airy Shaw, comb. nov.

Phyllanthus sp., Hosseus in Engl., Bot. Jahrb. 45: 373 (Feb. 1911).

P. parvifolius sec. Hosseus: 407 (Nov. 1911), *non* Ham.

Sauropus similis Craib var. *microphylla* Craib: 184 (1912).

N₃.—Endemic.

Leaves 5–15 mm. long.

A much greater range of material is necessary in order to establish the status of this form. (Compare *S. orbicularis* var. *minor*, p. 337.) The stems entirely lack the asperities on the angles which are the main distinguishing feature of *S. similis*, to which Craib originally attached it. The flowers show no sign of developing the acute marginal lobules of the related *S. amoebiflorus*; in fact they agree closely with those of *S. bicolor*. I believe I am right in referring this plant to the latter species.

The type-specimen (*Hosseus* 48), from Wang-Djao, Nakawn Sawan, was growing on porphyry (*vide* *Hosseus* in *Beih. Bot. Centralbl.* 28(2): 407 (1911)). The only other specimen that I have seen that approaches it is the following one from the same district, growing on limestone: **N₃**. Kao Hua Mot, Kampêng Pêt, common in savannah on limestone hill, alt. 800–900 m., 12 June 1922, *Nai Nôe* in *Kerr* 6124.

Sauropus bonii Beille in Lecomte: 651 (1927), *e descr.***SW₁₄; PI₅.**—Indochina (Tonkin).

Shrub or ‘shrub-like tree’ to 3 m., in evergreen forest at 200–500 m. alt.

Stem thick, woody; branches green when dry; leaves large, elliptic to oblanceolate, over 20 cm. long, chartaceous, glabrous, green when dry; inflorescences slender, leafless, arising from the base of the stem at ground level; male calyx widely cup-shaped, 3–5 mm. in diameter, yellow to red; female sepals spatulate, thick; capsule (scarcely mature) 2 cm. in diameter, 1·5 cm. long, prominently 6-ribbed.

The dried material gives off a rather strong odour of fenugreek.

Sauropus brevipes Muell. Arg. in Linnaea 32: 73 (1863) & in DC.: 242 (1966); Hook. f.: 335 (1887); Craib: 457 (1911) & 183 (1912); Pax & Hoffm. xv: 222 (1922); Beille in Lecomte: 653 (1927); Airy Shaw in Kew Bull. 23: 44 (1969).

S. parvifolius Ridley in Journ. Roy. As. Soc. Str. Br. 59: 175 (1911) & Fl. Mal. Penins. 3: 221 (1924); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 72 (1939).

?*S. quadrangularis* sec. Kurz, For. Fl. Brit. Burma 2: 350 (1877); Beille: 654 (1927), *saltem pro parte; non* (Willd.) Muell. Arg.

NE₅; SW₁₄; PI₅.—Burma, Indochina, N. Malaya (Lankawi, Perlis).

Thin shrub to 1 m., in evergreen or bamboo forest or scrub up to 300 m. alt.

Branches very slender, terete; leaves thinly membranous, obovate or elliptic, broadly cuneate at base, rounded or obtuse (rarely subacute) at apex, 1–2·5 cm. long; flowers rather shortly pedicellate.

The dried material sometimes has a distinct odour of fenugreek, as in *S. bonii*, and as in *Mallotus* § *Stylanthus*.

Sauropus garrettii Craib in Bull. Misc. Inf. Kew 1914: 284 (1914); Pax & Hoffm. xv: 218 (1922) (“*Garettii*”); Beille in Lecomte: 646 (1927) (“*Garetti*”).

S. yunnanensis Pax & Hoffm. xv: 220 (1922), **synon. nov.**

S. grandifolius sec. Beille in Lecomte: 648 (1927), *pro parte, non* Pax & Hoffm.

N₁; NE₅; SE₉.—Burma, S. China (Yunnan).

Shrub or slender tree to 4 m., in evergreen forest up to 1500 m. alt.

Branches somewhat compressed, usually sharply bicarinate; leaves rhombic-ovate to lanceolate-ovate, up to 13 cm. long, broadly cuneate at base, membranous or rarely thinly chartaceous, glabrous, dark green above when dry, glaucous or glaucescent beneath; male flowers disc-shaped; segments of female calyx more or less elliptic, not or only slightly imbricate; ripe capsule more or less obovoid, up to 2·5 cm. long.

Beille (*l.c.*: 644) describes the leaves as ‘thick, coriaceous’, and gives the geographical distribution as ‘Malesia’, but I can find no warrant for either statement.

Sauropolis granulosus Airy Shaw in Kew Bull. 23: 53 (1969).

NE₅; ?SE₁₀.—Endemic.

Small shrub (?hemicyclopediae) to 20 cm., in open grassy deciduous forest at 200 m. alt.

Differs from *S. kerrii* in the much larger leaves, which dry greyish green and exhibit a minute granulation under a lens, and in the much shorter styles with incurved branches. The vertical rather than horizontal carriage of the anthers may be an effect of age, as in *S. pulchellus* Airy Shaw.

Sauropolis heteroblastus Airy Shaw in Kew Bull. 23: 47 (1969).

S. compressus sec. Beille in Lecomte: 655 (1927), *pro parte, non* Muell. Arg.

NE₅.—Indochina (Annam, Cambodia, ?Cochinchina).

Straggling shrub to 2 m. high, on sandy river banks at 200 m. alt.

A very distinct species, evidently a rheophyte. Compare the pantropical *Rotula aquatica* Lour. (*Ehretiaceae*). The main shoots are elongate and very sparsely branched, and bear numerous abbreviated lateral short shoots, which in turn bear the leaves and inflorescences. Leaves cuneate-spathulate, rounded or retuse at the apex, membranous, glabrous, 1–3·5 cm. long.

Sauropolis hirsutus Beille in Lecomte: 657 (1927).

N₁–4; NE₅; E₈; SW₁₄.—Indochina (Laos, Cambodia).

Herbaceous shrublet to 30 cm. high, frequent on sandy soil in open mixed deciduous or bamboo forest up to 600 m. alt.

A very distinctive species, on account of its leafy appearance, short hispidulous indumentum, and large female flowers with often elongate outer perianth-segments. The nerves are often conspicuously reticulate on the lower surface of the leaves. Very occasionally the indumentum is reduced to papillosity, or may be practically absent. Many specimens show signs of having been cut down by fire.

Sauropus kerrii Airy Shaw in Kew Bull. 23: 52 (1969).

N3; E7.—Endemic.

Hemicryptophyte up to 30 cm. tall, on poor sandy soil in deciduous or dry Dipterocarp forest at 100 m.

Very similar to *S. asteranthos* Airy Shaw in general appearance, but having the less specialized flower-structure of § *Hemisauropus*. Fruiting calyx accrescent, up to 8 mm. diam.; styles free, elongate, spreading, 2·5 mm. long, bifid to the middle.

Sauropus macranthus Hassk., Retzia 1: 166 (1855) & Hort. Bog. s. Retziae ed. nova: 52 (1858); Muell. Arg.: 240 (1866); Backer & Bakh. f.: 471 (1963); Airy Shaw in Dansk Bot. Arkiv 25(2): 34, fig. 13 (1967).

S. spectabilis Miq., Fl. Ind. Bat. Suppl.: 446 (1860); Muell. Arg.: 240 (1866); Pax & Hoffm. xv: 219 (1922); Ridley: 220 (1924); Beille in Lecomte: 647 (1927); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 72 (1939).

S. macrophyllus Hook. f.: 333 (1887), *pro parte*; Pax & Hoffm. xv: 226 (1922), *pro parte*.

?*S. forcipatus* Hook. f.: 334 (1887); Pax & Hoffm. xv: 218 (1922); Ridley: 220 (1924).

S. robinsonii Merr. in Philipp. Journ. Sci. 7: 407 (1912) & Enum. 2: 405 (1923); Pax & Hoffm. xv: 220 (1922); **synon. nov.**

S. wichurae Muell. Arg. ex Pax & Hoffm. xv: 222 (1922).

S. grandifolius Pax & Hoffm. xv: 220 (1922), **synon. nov.**; *non* sec. Beille in Lecomte: 648 (1927).

S. longipedicellatus Merr. in Sunyatsenia 2: 34 (1934), **synon. nov.**

N1; SW14; P16.—NE. India, S. China, SE. Asia and throughout Malesia to N. Australia.

Shrub to 4 m., in evergreen forest at 400–1400 m. alt.

Glabrous; leaves ovate-oblong to elliptic-oblong, up to 15 cm. long, chartaceous, somewhat shining; stipules subulate-lanceolate, conspicuously white-margined; male flower small, with narrowly triangular sepals; female flower large, long-pedicelled; capsule large, 2 cm. wide and 1 cm. long, 3-lobed, borne on a robust pedicel up to 5 cm. long.

I am convinced that the small differences in the stipules, male perianth, etc., which have been utilized by different authors as the basis for the establishment of various supposedly distinct species, have scarcely even varietal value, and I have therefore little hesitation in sweeping them together into synonymy.

Sauropus orbicularis Craib in Bull. Misc. Inf. Kew 1914: 284 (1914); Pax & Hoffm. xv: 223 (1922); Beille in Lecomte: 655 (1927); Airy Shaw in Kew Bull. 23: 45 (1969).

N1, 2; SW14 (?).—Endemic.

Shrub to 60 cm., in evergreen or dry deciduous forest up to 700 m. alt.

Leaves membranous, suborbicular or broadly elliptic, up to 3 cm. long, the venation slender but prominently raised on the lower surface.

var. **minor** Airy Shaw in Kew Bull. 23: 45 (1969).

N1; SW14.—Endemic.

Shrub to 1 m., in open grassy deciduous forest up to 330 m. alt.
Leaves only 7–20 mm. long, 5–13 mm. broad.

Sauropolis pulchellus Airy Shaw in Kew Bull. 23: 54 (1969).

E8; SE10.—Endemic.

Small shrub to 33 cm. in open deciduous forest up to 200 m. alt.

The raised reticulate venation of the leaves is similar to that of *S. orbicularis* Craib, but the floral structure is that of § *Hemisauropus*. The styles are free and relatively elongate, shortly bifid, with incurved branches. The anthers are at first horizontal but finally erect.

Sauropolis quadrangularis (Willd.) Muell. Arg., sensu lato.

var. **quadrangularis**:

Phyllanthus quadrangularis Willd., Sp. Pl. 4: 585 (1805).

P. rhamnoïdes Roxb., Fl. Ind. 3: 663 (1832) (*non* Willd. l.c.: 580 (1805), *nec Sauropolis rhamnoïdes* Bl., 1825).

Sauropolis quadrangularis (Willd.) Muell. Arg. in Linnaea 32: 73 (1863) & in DC.: 242 (1866); Hook. f.: 335 (1887); Pax & Hoffm. xv: 223 (1922); Gamble, Fl. Pres. Madras 2: 1303 (1925); ?Beille in Lecomte: 654 (1927), p.p.

N1, 3; NE5; PI5.—India (C. & S.); China (Yunnan); ?Indochina.

Small shrublet in deciduous forest at 100–500 m.; noted from crevices of limestone rocks in **PI5**.

Stems more or less angled or compressed; leaves small, 5–20(–25) mm. long, ovate or elliptic or suborbicular, membranous or thinly chartaceous, nerves slender, not raised.

var. **compressus** (Muell. Arg.) Airy Shaw, comb. nov.

Sauropolis compressus Muell. Arg.: 243 (1866); Hook. f.: 336 (1887); Pax & Hoffm. xv: 224 (1922); Beille in Lecomte: 655 (1927), *pro parte*.

N1, 3; SW14; PI5.—C. & E. Himalaya; Burma (?); Indochina.

Shrub to 1 m. high, on sandy or rocky ground in deciduous or evergreen forest, up to 2100 m. alt.

Only differs from var. *quadrangularis* in its more strongly compressed branchlets.

var. **puberulus** Kurz, For. Fl. Brit. Burma 2: 350 (1877); (sphalm. ‘*pubescens*’) Hook. f.: 335, *in obs.* (1887) (pariter Pax & Hoffm. et Beille, l.l.c., *in synon.*).

Sauropolis pubescens Hook. f.: 335 (1887); Ridley in Journ. Str. Br. Roy. As. Soc. 59: 175 (1911); Pax & Hoffm. xv: 224 (1922); Beille in Lecomte: 656 (1927).

NE5; E8; SE10; SW14; PI5.—E. Himalaya, Burma, Indochina.

Straggling suffrutescent herb or small shrub to 1 m., in open deciduous or dry evergreen forest up to 300 m. alt.

Differs from var. *quadrangularis* in the variable (sometimes strong) development of pubescence on all parts.

I have found it impossible to distinguish *S. compressus* Muell. Arg. and *S. pubescens* Hook. f. specifically from *S. quadrangularis* (Willd.) Muell. Arg. The supposed distinction between the compressed branches of the first-named and the angled branches of the last-named species seems to be entirely a matter of degree, the Himalayan populations tending to exhibit stronger compression than the remainder. I believe Kurz was right in treating the pubescent form as merely a variety, for which I have here restored his epithet. The glabrous and pubescent states apparently grow together, as witnessed by two mixed collections from E. Siam: *Kerr* 8601, from Pù, Udawn Circle (**E8**), and *Nai Nôe* 285, from Ban Chum Seng, Korat, Rachasima Circle (**SE10**).

Sauropus similis Craib: 457 (1911) & 183 (1912); Airy Shaw in Kew Bull. 23: 46 (1969), *in obs.*

NI.—Endemic.

Shrub of 1–3 m., locally common in dry evergreen forest at 700–1000 m. alt.

Closely related to *S. amoebiflorus*, of which it could be a montane derivative, but the angles of the branchlets (and the leaf-margins) bear a row of strong upward-pointing asperities, whilst the male flowers have a rounded outline, lacking the acute angles of *S. amoebiflorus*.

Sauropus suberosus Airy Shaw in Kew Bull. 23: 42 (1969) & 25: 500 (1971).

PI6.—Malaya.

Cauliflorous shrub to 1 m., probably in evergreen forest, at 80 m. alt.

Related to *S. bonii* Beille (Indochina) and *S. micrasterias* Airy Shaw (Sarawak), differing in the remarkable, thick, longitudinally fissured corky bark of the main stem, in the absence of raised ridges on the young branches, which are dark brown when dry, in the dark green-brown colour of the leaves on drying, and in the sometimes enormous elongation of the flagelliform inflorescences (to 40 cm. or more). There is no perceptible odour of fenugreek. The plant is evidently close to *S. bonii*, but the differences are striking.

Sauropus thorelii Beille in Lecomte: 649 (1927); Smitinand, Noteworthy Pl. Thailand, in Thai Forest Bulletin (Bot.) 2: 14 (1955).

NI (cult.).—Indochina (Laos).

Shrub of 1·5 m., at 240–300 m. alt.; in Siam only known from cultivated specimens. Cultivated for the scented 'flowers.'

Stems thick and woody; branchlets slender, angled, green; leaves narrowly elliptic, up to 9 cm. long, membranous, glabrous, green when dry; flowers

small, borne in rather dense clusters on the old stems or at the base of the lateral branchlets, deeply divided, dark red when fresh, strongly scented; female calyx accrescent; capsule (according to Beille) 7 mm. broad, 4 mm. long, bearing longitudinal rows of asperities.

The cultivated Siamese material differs from the Laotian (according to the Kew isotype) in the thinner texture and mostly more cuneate-attenuate base of the leaves, but these differences are scarcely specific.

Sauropus villosus (*Blanco*) Merr. in Contrib. Arn. Arb. 8: 86 (1934); Airy Shaw in Kew Bull. 23: 49 (1969).

Kirganelia villosa Blanco, Fl. Filip.: 712 (1837).

Phyllanthus pubescens Klotzsch in Nova Acta Leop.-Carol. Acad. Nat. Cur. 19, Suppl. 1: 420 (1843) [*non Sauropus pubescens* Hook. f. (1887)].

Glochidion llanosii Muell. Arg. in Linnaea 32: 68 (1863); Ridley in Journ. Roy. As. Soc. Str. Br. 59: 173 (1911); Merr.: 400 (1923).

Phyllanthus llanosii (Muell. Arg.) Muell. Arg. in Flora 48: 387 (1865) & in DC.: 308 (1866).

Sauropus llanosii (Muell. Arg.) Gage in Rec. Bot. Surv. Ind. 9: 223 (1922); Ridley: 221 (1924); Henderson in Journ. Malayan Br. Roy. As. Soc. 17: 30, 72 (1939).

SE10; PI5-17.—Indochina (Annam), Philippines, N. Malaya, Sumatra.

Small shrub to 50 cm., in savannah, coconut plantations, open sandy ground, etc., at very low altitudes, often near the sea; in N. Malaya chiefly on limestone.

The *Glochidion*-like habit, tomentose stems and smooth yellow depressed-globose fruits make this an unmistakable species.

Sauropus sp., ?aff. *S. stipitato* Hook. f.: 333 (1887); Pax & Hoffm. xv: 221 (1922).

N1. Mê Chêm, Chiengmai, thick evergreen forest, alt. 1300 m. 15 July, 1922, Kerr 6287:—Shrub about 1 m. high. Doi Angka, Me Ka Pak drainage, in evergreen forest, alt. 1350 m., 18 June 1934, Garrett 864:—Plant of 4 ft. [1·2 m.]; flowers yellow-green.

NE5. Chaiyaburi, Nawng Kai, clearing in evergreen forest, alt. 200 m., 20 Feb. 1924, Kerr 8522:—Shrub 2 m. high. Vernacular name: 'pak kān tong'.

It is not certain that the collection from **NE5** is conspecific with those from **N1**. An affinity with the Sikkimese *S. stipitatus* is suggested because the male flowers in these specimens show an infundibular-cupuliform structure, perhaps approaching the globose form described for *S. stipitatus* by Pax & Hoffmann on the basis of material collected by Mebold, which however I have not seen. A greater range of material both from Sikkim and from N. Siam is needed in order to elucidate the status of these forms. The general affinity with *S. androgynus* is evident.

Sebastiania *Spreng.*

Sebastiania chamaelea (*L.*) Muell. Arg.: 1175 (1866); Hook. f.: 475 (1888); Craib: 468 (1911) & 195 (1912); Pax & Hoffm. v: 116 (1912); Ridley: 317 (1924); Gagnep.: 454 (1926); Backer & Bakh. f.: 498 (1963).

- Tragia chamaelea* L., Sp. Pl.: 981 (1753).
Microstachys chamaelea (L.) Juss., Euphorb. Gen. Tent.: 49 (1824).
Cnemidostachys chamaelea (L.) Spreng., Syst. Veg. 3: 835 (1826).
Elachocroton asperococcus F. Muell. in Hook. Journ. Bot. & Kew Garden Misc. 9: 17 (1857).
Stillingia chamaelea (L.) Baill., Ét. Gén. Euphorb.: 516 (1858).
Cnemidostachys linearifolia Miq., Fl. Ind. Bat. Suppl.: 460 (1860).
Stillingia asperococca (F. Muell.) Muell. Arg.: 1161, 1175 (1866).
Excoecaria chamaelea (L.) Baill. in Adansonia 6: 323 (1867).

E8; SE9; SW14; PI5-18.—Widespread from India and Ceylon to Australia and the Pacific.

Herb to 30 cm., usually on open sandy ground near the sea, but in **E8** in deciduous or secondary forest at 200 m. alt.

The herbaceous habit, narrowly oblong leaves, minute bisexual spicate inflorescences, and especially the shortly oblong, tricoccous, red or yellow capsules, with two rows of short spines down the back of each coccus, are unmistakable features.

Securinega Juss.

- Leaves mostly larger, obovate or elliptic, acute or subacute; branchlets rarely ending in a spine **S. virosa**
 Leaves mostly smaller, often narrowly spatulate-obovate, sometimes retuse or orbcordate; branchlets usually ending in a spine **S. leucopyrus**

Securinega leucopyrus (Willd.) Muell. Arg.: 451 (1866); Airy Shaw in Kew Bull. 25: 493 (1971).

- Flueggea leucopyrus* Willd., Sp. Pl. 4: 757 (1805); Hook. f.: 328 (1887); Gamble, Fl. Pres. Madras 2: 1296 (1925).
Xylophyllea lucena Roth, Nov. Pl. Spec.: 185 (1821).
Flueggea xerocarpa A. Juss., Euphorb. Gen. Tent.: 106, t. 2, fig. 7B (1824).
Phyllanthus leucopyrus (Willd.) König ex Roxb., Fl. Ind. 3: 658 (1832).
Flueggea wallichiana Baill., Ét. Gén. Euphorb.: 592 (1858).
Cicca leucopyrus (Willd.) Kurz, For. Fl. Brit. Burma 2: 353 (1877).

SW14.—India, Ceylon, Burma.

Tree of 4 m. at very low altitude.

Only differs from *S. virosa* in its narrowly spatulate-obovate leaves and in the development of spines on the smaller branchlets. Doubtfully specifically distinct.

Securinega virosa (Roxb. ex Willd.) Baill. in Adansonia 6: 334 (1866), quoad synon. tantum, emend. Pax & Hoffm. in Engl., Pflanzenfam. ed. 2, 19c: 60 (1931); Backer & Bakhu. f.: 466 (1963); Airy Shaw, l.c. supra (1971).

- Phyllanthus virosus* Roxb. ex Willd., Sp. Pl. 4: 578 (1805).
Xylophyllea obovata Willd., Enum. Hort. Berol.: 329 (1809).
Flueggea microcarpa Bl., Bijdr.: 580 (1825); Hook. f.: 328 (1887); Hosseus: 404 (1911); Craib: 460 (1911) & 187 (1912); Ridley: 216 (1924); Beille: 528 (1927).

F. virosa (Roxb. ex Willd.) Baill., Ét. Gén. Euphorb.: 593 (1858); Merr.: 390 (1923); Gage in Journ. As. Soc. Beng. 75(5): 525 (1936); Corner: 255 (1940).

Securinaga microcarpa (Bl.) Muell. Arg.: 434 (1866).

S. obovata (Willd.) Muell. Arg.: 449 (1866).

Flueggea obovata (Willd.) Wall. ex F.-Vill., Novis. App.: 189 (1880).

Ni-3; SE10; SW14; PI5.—Widespread in Trop. Africa and Asia, northward to Japan and eastward to Australia and Polynesia.

Deciduous shrub to 4·5 m., common in evergreen or mixed deciduous forest or scrub, also in fields and other open situations, sandy areas by rivers, etc.; occasionally on limestone; from sea-level to 500 m. alt., ascending to 1660 m. in **Ni**.

Frequently noted as thorny in **Ni**, but not elsewhere. Flowers sweet-scented. The fruit appears occasionally to be dry and capsular.

Spathiostemon Bl.

Spathiostemon moniliformis Airy Shaw in Kew Bull. 16: 357 (1963) & 20: 408 (1966).

PI5, 16.—Endemic.

Small tree to 10 m., locally common in evergreen forest at low altitudes (up to 100 m.).

Differs from the widespread *S. javensis* Bl. (not yet found in Siam) in the very elongate male inflorescences, sessile male and female flowers, glabrous ovary and very short styles. The fruit has not yet been collected.

Strophioblachia Boerl.

Strophioblachia glandulosa Pax apud Pax & Hoffm. iii: 36 (1911); Gagnep.: 409 (1926).

var. **cordifolia** Airy Shaw in Kew Bull. 25: 545 (1971).

NE5[6]; E8.—Endemic. (Var. *glandulosa* in Cambodia and Cochin-china.—N.B. Var. *tonkinensis* Gagnep., l.c.: 410, from Tonkin and Annam, is *S. fimbrialyx* Boerl.!)

Small shrub of 25–50 cm., locally abundant on sandy soil in deciduous (*Shorea-Pentacme*) forest, at 100–200 m. alt.

Strophioblachia glandulosa differs from *S. fimbrialyx* Boerl. in its much more evident, though still short, indumentum and in its usually broader, duller, ovate rather than obovate leaves. Var. *cordifolia* differs from var. *glandulosa* in its cordate-based, mostly panduriform leaves.

Sumbaviopsis J. J. Sm.

Sumbaviopsis albicans (Bl.) J. J. Sm.: 357 (1910); Pax & Hoffm. vi: 14 (1912); Merr.: 428 (1923); Gagnep.: 418 (1926) (incl. var. *disperma* Gagnep.); Airy Shaw in Kew Bull. 14: 357 (1960); Backer & Bakh. f.: 477 (1963).

Adisca? albicans Bl., Bijdr.: 611 (1825).

Rottlera? albicans (Bl.) Hassk., Hort. Bogor.: 238 (1844), quoad synon. tantum, excl. descr.

Croton albicans (Bl.) Reichb. f. & Zoll. in Verh. Nat. Vereen. Ned. Ind. 1: 21 (1856) & in Linnaea 28: 322 (1856).

Sumbavia macrophylla Muell. Arg. in Flora 47: 482 (1864) & in DC.: 727 (1866); Hook. f.: 408 (1887); Pax & Hoffm. vi: 12 (1912).

Coelodiscus speciosus Muell. Arg. in Linnaea 34: 154 (1865) & in DC.: 758 (1866); Hook. f.: 426 (1887).

Cephalocroton? albicans (Bl.) Muell. Arg.: 760 (1866).

Mallotus speciosus (Muell. Arg.) Pax & Hoffm. vii: 205 (1914).

Doryxylon albicans (Bl.) Balakr. in Bull. Bot. Surv. Ind. 9: 58 (1967).

N₁, 2, 4; E8.—Assam, Burma, Indochina, and W. Malesia (N. to Palawan).

Tree to 12 m., locally common in evergreen forest up to 400 m. alt.

Leaves large, ovate, thinly chartaceous, narrowly peltate, glabrous above, very shortly white- or ochraceous-tomentellous beneath (like the rest of the plant); inflorescence an elongate lax bisexual raceme, male above, female below, the male flowers usually petaliferous, the female apetalous, on long pedicels; capsule large, 2–3-locular.

Suregada Roxb. ex Rottl.

Suregada multiflora (A. Juss.) Baill., Ét. Gén. Euphorb.: 396 (1858).

Gelonium multiflorum A. Juss., Euphorb. Gen. Tent.: 111, t. 10, fig. 31A (1824); Muell. Arg.: 1127 (1866); Hook. f.: 459 (1887); Williams in Bull. Herb. Boiss. sér. 2, 5: 32 (1905); Pax & Hoffm. iv: 16 (1912); Ridley: 311 (1924); Gagnep.: 425 (1926).

G. fasciculatum Roxb., Fl. Ind. 3: 832 (1832).

?*G. tenuifolium* Ridley in Journ. Roy. As. Soc. Str. Br. 59: 181 (1911) & Fl. Malay Penins. 3: 312 (1924); Smitinand, Noteworthy Pl. Thailand, in Thai Forest Bull. (Bot.) 2: 15 (1955).

N₁–4; NE₅; E8; SE₁₀; C₁₁; SW₁₄; P₁₅–18.—India, Burma, Indochina, Malay Peninsula.

Shrub or small tree to 9 m., in deciduous, mixed or evergreen forest up to 550 m. alt.

Used medicinally for fever (**SE₁₀**, Collins 853, 4 Apr. 1923).

The only distinction that appears to be moderately reliable in distinguishing this species from the Malesian *S. glomerulata* (Bl.) Baill. lies in the larger and more fleshy fruit, that of *glomerulata* being smaller, drier and more evidently capsular. The leaves and flowers of the latter species are also probably on the average smaller, the leaves being usually rounded and very rarely acuminate at the apex, but there is great variation in both taxa in this respect.

Williams (*l.c. supra*) includes a record of this species from the 'islet of Butong, 1886,—the most western of the Langkawi group, and not marked on maps (*Curtis*, n. 924)'. The islet in question, however, is that of Pulo Beton, just off the SW. corner of Penang Island, in Malaya. I have not succeeded in tracing Curtis's specimen in the Kew Herbarium. Cf. note under *Sapium indicum* Willd., above.

Synostemon F. Muell.

Synostemon bacciformis (L.) G. L. Webster in Taxon 9: 26 (1960), *in adnot.*; Backer & Bakh. f.: 471 (1963).

Phyllanthus bacciformis L., Mant. Alt.: 294 (1771).

Agyneia bacciformis (L.) Juss., Euphorb. Gen. Tent.: 24, t. 6 (1824); Muell. Arg.: 238 (1866); Hook. f.: 285 (1887); Pax & Hoffm. xv: 213 (1922); Ridley: 198 (1924); Beille: 642 (1927); Gage in Journ. As. Soc. Beng. 75(5): 524 (1936); Merr. & Chun in Sunyatsenia 5: 91 (1940); van Steenis in Bull. Bot. Gard. Buitenz. ser. 3, 17: 410 (1948).

Phyllanthus goniocladus Merr. & Chun in Sunyatsenia 2: 260, t. 51 (1935).

NE₅; E₇; SE₁₀; C₁₂; SW₁₄; P₁₅.—Mauritius, India, Ceylon, S. China, Indochina, Malaya, Banka, Borneo, Java, Celebes.

Erect herb to 50 cm., on saline sandy or clayey soil, mostly at very low altitudes (up to 200 m. in **NE₅**); especially frequent on sandy beaches.

The leaves vary greatly in size and shape. An exceptionally narrow-leaved form is represented by *Kerr* 8472, from Tā Utēn, Nakawn Panom, Udawn Circle (**NE₅**), perhaps corresponding to var. *angustifolia* Muell. Arg. (*l.c.*).

The genus *Synostemon* F. Muell. (*Heterocalymmantha* Domin) is otherwise confined to Australia, with a dozen or more species. Though it has been widely, but unjustifiably, treated as a section of *Phyllanthus*, it is in fact much closer to *Sauvagesia*, from which it is scarcely generically distinct; cf. especially *S. amoebiflorus* Airy Shaw, etc.

Thyrsanthera Pierre ex Gagnep.

Thyrsanthera suborbicularis Pierre ex Gagnep. in Bull. Soc. Bot. France 71: 878 (1925) & in Lecomte: 299 (1925); Airy Shaw in Kew Bull. 19: 308 (1965).

N₄; SE₁₀.—Indochina (Cambodia).

Dwarf shrub (?hemicryptophyte) to 20 cm., in thorny scrub, on roadsides, waste ground, etc., at low altitudes (up to 100 m.).

Closely related to *Doryxylon* Zoll. and *Sumbaviopsis* J. J. Sm., on the one hand, and especially to *Chrozophora* Neck. ex Juss., on the other. Densely covered with stellate hairs. Differs from *Chrozophora* in the non-whorled arrangement of the anthers. For other characters see generic key, p. 197.

Trewia L.

Trewia nudiflora L., Sp. Pl. 1193 (1753); Muell. Arg.: 953 (1866); Hook. f.: 423 (1887); Craib: 466 (1911) & 193 (1912); Pax & Hoffm. vii: 140 (1914); Merr.: 431 (1923); Gagnep.: 343 (1925); Backer & Bakh. f.: 481 (1963); Airy Shaw in Kew Bull. 20: 405 (1966) & 23: 79 (1969).

Tetragastris ossea Gaertn., Fruct. 2: 130 (1788).

Rottlera indica Willd. in Götting. Journ. Naturwiss. 1: 8, t. 3 (1797).

Trewia macrophylla Roth, Nov. Pl. Sp.: 373 (1821) [*non* Bl. (1825), *quaæ* = *Wetria insignis* (Steud.) Airy Shaw (*W. trewioides* Baill.)].

T. macrostachya Klotzsch in Ergebni. Bot. Reise Pr. Waldem.: 117, t. 23 (1862).
Mallotus cardiophyllus Merr. in Philipp. Journ. Sci. 7: 398 (1912).

N1, 2; C12 (?planted).—India, Ceylon, S. China (Yunnan, Hainan), Indochina, W. Malesia.

Deciduous dioecious tree 5–20 m. high, usually by streams, at altitudes up to 450 m. (to 1200 m. in adjacent Yunnan). (Cf. Kew Bull. 20: 406 (1966).)

Closely related to *Mallotus*, especially § *Rottleropsis*, differing in its large male flowers, few-flowered female inflorescences, greatly elongate styles and large drupaceous fruit.

Trigonostemon Bl.

Petioles variable in length, some very long:

♀ sepals large, 8–10 mm. long, accrescent in fruit to 17 mm. long, with serrulate margin **T. phyllocalyx**

♀ sepals smaller, not or scarcely accrescent in fruit, margin mostly entire: Petals dark purple; inflorescence simple, narrowly pseudo-racemose, terminal flower usually ♀ and remainder ♂; stamens 5; leaves ± coriaceous **T. verticillatus**

Petals white; inflorescence pyramidal-paniculate; ♂ flowers shortly, ♀ flowers long-pedicelled; stamens 3; leaves ± membranous **T. albiflorus**

Petals yellow:

Stamens 5; capsule 12–15 mm. in diameter, sparsely and very shortly aculeolate **T. thyrsoides**

Stamens 3; capsule 10 mm. in diameter, thinly adpressed pubescent **T. quocensis**

Petioles all short:

Leaves penninerved:

Leaves 12–26 cm. long, fleshy-leathery; ♂ flowers with white petals and 5 stamens; ♀ flowers with red petals and 5 styles **T. pachyphyllus**

Leaves 9–12 cm. long, not fleshy-leathery; flowers purplish-red; stamens 3:

Leaves rounded at base, coriaceous, entire; sepals eglandular

. **T. murtonii**

Leaves usually cuneate at base, thinly chartaceous, minutely dentate; ♀ sepals fringed with elongate capitate glands **T. kerrii**

Leaves trinerved at base (often only shortly):

Leaves often subopposite, glabrous, very variable in shape; inflorescences all short, cymose, terminal or leaf-opposed; petals shortly bilobed, very variable in colour **T. laevigatus**

Leaves never subopposite; ♀ and ♂ inflorescences ± elongate:

Leaves 4–11 cm. long, entire, closely tomentellous beneath, densely reticulate-nerved, drying reddish-brown; petals very variable in colour **T. reidioides**

Leaves 10–55 cm. long, obscurely or manifestly crenate or dentate, obovate to spatulate-ob lanceolate, neither tomentellous nor reticulate:

Inflorescences bisexual, very narrow and elongate, strongly pubescent; petals blackish-crimson; plant usually drying yellowish **T. longifolius**

Inflorescences unisexual, the ♂ cauliflorous, the ♀ axillary or terminal, ± elongate, few-flowered; plant not drying yellowish; leaves almost glabrous:

♂ inflorescence very slender, often much branched; ♀ inflorescence very slender, petals dark red . **T. capillipes**

♂ inflorescence very abbreviated, fasciculate; ♀ inflorescence rather stout, with a few foliaceous bracts; petals orange

T. aurantiacus

Trigonostemon albiflorus Airy Shaw in Kew Bull. 25: 547 (1971).

N2.—Endemic.

Shrub to 3 m. in evergreen forest at 100–200 m. alt.

Thinly adpressed-pubescent; leaves elongate-oblong-elliptic, membranous to thinly chartaceous, trinerved at base, acuminate, petiole slender; inflorescences bisexual, pyramidal-paniculate, lax; male flowers shortly pedicelled, petals white, membranous; female flowers long-pedicelled, petals not seen, styles free, divaricate, stigmas inconspicuous, not or scarcely enlarged.

Trigonostemon aurantiacus (Kurz ex Teijsm. & Binnend.) Boerl., Handl. Fl. Ned. Ind. 3(1): 232 (1900); Pax & Hoffm. iii: 93 (1911); Airy Shaw in Kew Bull. 28: 126 (1969), *q.v.* for fuller discussion.

Tylosepalum aurantiacum Kurz ex Teijsm. & Binnend. in Natuurk. Tijdschr. Ned. Ind. 27: 50 (1864).

Codiaeum aurantiacum (Kurz ex Teijsm. & Binnend.) Muell. Arg.: 1118 (1866).

Actephila aurantiaca Ridley (*pro sp. nov.*) in Bull. Misc. Inf. Kew 1923: 360 (1923) & Fl. Malay Penins. 3: 197 (1924).

Actephilopsis malayana Ridley, *ll.cc.*: 361 (1923) & 252 (1924); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 68 (1939).

Trigonostemon malayanus (Ridley) Airy Shaw in Kew Bull. 20: 413 (1966).

P15-18.—N. Malaya (Lankawi, Penang, Perak, Kelantan, Pahang), Banka, Java.

Shrub to 3 m., in evergreen forest up to 200 m. alt.

Leaves large, cuneate-obovate or broadly oblanceolate, shallowly denticulate or obscurely distantly crenate-serrate, chartaceous, glabrous; lateral nerves numerous, pinnate, conspicuously arcuate-anastomosing; male inflorescences on the trunk or older branches, very abbreviated, fasciculate; female inflorescences stout, elongate, subterminal, few-flowered, usually bearing a few large foliaceous bracts; petals of both male and female flowers orange-yellow; capsule deeply 3-lobed, smooth, glabrous, dark brown when dry, up to 1.5 cm. diam.

Trigonostemon capillipes (Hook. f.) Airy Shaw in Kew Bull. 20: 413 (1966).

Dimorphocalyx capillipes Hook. f.: 404 (1888); Pax & Hoffm. iii: 33 (1911); Ridley: 266 (1924).

Trigonostemon diffusus Merr. in Sarawak Mus. Journ. 3: 525 (1928), **synon. nov.**

P16.—Malay Peninsula (Perlis; Singapore??), Borneo.

Shrub to 3·5 m., in evergreen forest at low altitudes.

Leaves obovate to oblanceolate, rounded at base, shortly caudate, very shallowly and distantly crenate-dentate, membranous, short-petioled, almost glabrous; inflorescences very slender, the peduncle and branches almost filiform; male inflorescences cauliflorous, often copiously branched, female inflorescences axillary on the branches, few-flowered, almost simple; capsule smooth, minutely adpressed-puberulous.

The type of *Dimorphocalyx capillipes* is a fruiting specimen labelled in Sir W. J. Hooker's handwriting, 'Singapore, Lobb'. That of *Trigonostemon diffusus* is a male flowering specimen, *Mjöberg* 145, from Sarawak. As Ridley (*l.c.*: 267) has pointed out, the species has never been collected again in Singapore, or elsewhere in Malaya (except in Perlis, in the extreme north), and Lobb's localities are frequently suspect. The discovery of the identity of *T. diffusus* with *T. capillipes* leads me to think it very probable that Lobb's specimen originated in Borneo, where Lobb certainly collected. It is a curious coincidence that all the Bornean gatherings so far seen (except Lobb's) bear male inflorescences, whilst those from Siam and Perlis are female or fruiting.

Trigonostemon kerrii Craib in Bull. Misc. Inf. Kew 1924: 97 (1924); Gagnep.: 321 (1925).

N₃, 4.—Endemic.

Shrub to 4 m., in evergreen or mixed forest at 100–200 m. alt.

Related to *T. murtonii*, which see.

Trigonostemon laevigatus Muell. Arg. in Flora 47: 538 (1864) & in DC.: 1111 (1866); Pax & Hoffm. iii: 94 (1911); Ridley: 625 (1924).

T. anomalus Merr. in Philipp. Journ. Sci. 16: 569 (1920), & Enum. 2: 451 (1923), **synon. nov.**

?*T. petelotii* Merr. in Univ. Calif. Publ. Bot. 10: 425 (1924), *e descr.*

P₁₅, 16.—Andamans, Malay Peninsula, Borneo, Philippines, ?Indo-China.

Thin shrub to 3 m. high, in evergreen forest at 300–900 m. alt.

Leaves frequently subopposite, extraordinarily variable in size and shape, from broadly ovate with rounded base and shortly cuspidate apex to narrowly oblong-elliptic with cuneate base and long-acuminate apex, membranous to firmly chartaceous, obscurely to manifestly trinerved at base, the basal nerves often submarginal, glabrous, relatively short-petioled; inflorescences short, condensed, cymose, terminal or leaf-opposed, males often many-flowered, more or less dichotomously branched, females few-flowered; petals shortly bilobed, pink, coral, carmine or dark brown-red, occasionally yellow or greenish (? when young); capsule smooth, minutely papillose-puberulous.

Pax & Hoffmann (*l.c.*) doubted whether this plant was correctly referred to *Trigonostemon*. In the light, however, of the comparatively abundant material that has accumulated during the past 50 years, it is clear that it is rightly included here. Merrill (*l.c.*) proposed a special section *Dichotomae* for his *T. petelotii*. I have seen no authentic material of this species, but if I

am right in assuming (from description) that it is conspecific with *T. laevigatus*, it is possible that Merrill's sectional name could be taken up for this rather distinct plant. Cf. also Kew Bull. 23: 127 (1969), footnote.

Trigonostemon longifolius Baill., Ét. Gén. Euphorb.: 341 (1858); Muell. Arg.: 1108 (1866); Hook. f.: 396 (1887); Pax & Hoffm. iii: 88 (1911); Ridley: 264 (1924).

?*Athroisma serratum* Griff., Notulae 4: 477 (1854). (N.B. Certe non *A. dentatum* Griff., l.c. 478, ut voluit Hook. f.) [Non *Trigonostemon serratus* Bl.].

P16-18.—Burma, Malay Peninsula, Sumatra, Borneo.

Shrub or small tree to 4 m., locally common in evergreen forest up to 400 m. alt.

Thinly ochraceous-pubescent, often yellowish when dry; leaves narrowly oblanceolate to spatulate-obovate, up to 55 cm. long and 14 cm. broad, long-attenuate into a short stout petiole; inflorescences elongate, very narrow, falsely racemose, strongly pubescent; sepals dorsally long-setose; petals blackish-crimson; capsules shortly ochraceous-tomentellous, sometimes sparsely minutely verruculose.

In one specimen (**P16**) the leaves are abruptly contracted at the base into a longer petiole, and the pubescence is stronger than usual.

Trigonostemon murtonii Craib in Bull. Misc. Inf. Kew 1911: 464 (1911) (*murtonii*) & 190 (1912); Pax & Hoffm. vi: 128 (1912).

T. pinnatus Gagnep. in Bull. Soc. Bot. France 69: 752 (1923) & in Lecomte: 318 (1925), **synon. nov.**

SE9.—Indochina (Cochinchina).

No field data for Siam.

Leaves oblong-oblanceolate, pseudo-verticillate, coriaceous, smooth and shining above, more dull below, very shortly petioled, rounded at base, shortly and bluntly acuminate, penninerved; inflorescences short, ochraceous-pilose, bracts sometimes conspicuous, oblong, flowers crowded at apex; petals purple; styles short, shortly bifid. The pinnate venation distinguishes this species from most others in the area, except *T. kerrii* Craib, in which the leaves are usually cuneate at the base, minutely denticulate on the margin and thinly chartaceous in texture, and the female sepals are fringed with elongate capitate glands, and *T. pachyphyllus* Airy Shaw, in which the leaves are much larger and fleshy-leathery in texture, and the flowers contain 5 stamens (♂) and 5 styles (♀).

Trigonostemon pachyphyllus Airy Shaw in Kew Bull. 25: 546 (1971).

P16, 17.—Endemic.

Shrub of 1·5 m. in evergreen forest at 700 m. alt.

Leaves elongate, oblanceolate or narrowly elliptic, shortly petioled, fleshy-leathery in texture, penninerved; inflorescences abbreviated, very few-flowered, rhachis slender, adpressed pubescent; male flower white, stamens 5, anthers subsessile on a stout column; female flower red, ovary tomentose, styles 5, entire, free, thick, spreading stellately.

Trigonostemon phyllocalyx Gagnep. in Bull. Soc. Bot. France 71: 469 (1925) & in Lecomte: 312 (1925), *e descr.*

SE9.—Indochina (Annam).

Small tree of 6 m., in evergreen forest at 200 m. alt.

Leaves elliptic, 12–26 cm. long, narrowly rounded at base, gradually acuminate to apex, chartaceous, minutely remotely denticulate, almost glabrous, petiole long and slender; inflorescence narrow, axillary, 3–8 cm. long, puberulous; female flowers large, sepals 8–10 mm. long, 5–8 mm. broad, subcordate at base, with 3 parallel median nerves, finely puberulous and sparsely pilose, accrescent in fruit to 17 mm. long, margin serrulate; capsule smooth, finely puberulous, 12 mm. long.

The large foliaceous fruiting calyx seems to be unique in the genus.

Trigonostemon quocensis Gagnep. in Bull. Soc. Bot. France 69: 753 (1923) & in Lecomte: 316 (1925).

NE5; E8; PI5–17.—Indochina (Cambodia, Cochinchina).

Shrub or small straggling tree to 7 m., in evergreen forest up to 500 m. alt.; several times noted on limestone.

Leaves rather large, membranous, trinerved at base, long-petioled, mostly drying greyish-green, glabrous or sparsely puberulous; inflorescences elongate, branched; petals yellow; stamens 3; ovary densely white-hirsute; styles entire, narrowly spatulate, spreading; capsule thinly crustaceous, shallowly trilobed, 10 mm. diam., thinly adpressed-pubescent.

Trigonostemon reidiooides (Kurz) Craib: 464 (1911) & 191 (1912); Pax & Hoffm. vi: 128 (1912); Gagnep.: 316 (1925).

Baliospermum reidiooides Kurz, For. Fl. Brit. Burma 2: 411 (1877); Hook. f.: 461 (1887), *in obs.*; Williams in Bull. Herb. Boiss. sér. 2, 5: 32 (1905); Pax & Hoffm. iv: 29 (1912).

N1, 3, 4; NE5; E8; SE9, 10; SW14.—?Burma, Indochina (widespread).

Thin shrub to 1·5 m., common on sandy ground in open dry grassy deciduous teak forest, up to 450 m. alt.

Densely tomentellous throughout; leaves narrowly or broadly oblong or oblanceolate, trinerved at base, tertiary nerves transverse or reticulate; inflorescences branched, long-peduncled; petals white, pink, dark purple or almost black; capsule tomentose, 3-lobed, 12 mm. diam., long-pedicelled.

Root or rootstock used in native medicine; for birth control according to informant of Mrs. D. J. Collins, Rachaburi Circle, **SW14**, 30 Sept. 1927 (*Collins* 1596).

Trigonostemon thyrsoideus Stapf in Bull. Misc. Inf. Kew 1909: 264 (1909).

N1.—Yunnan.

Tree of 4·5 m. (in Yunnan; no data for Siam), in evergreen forest at 600 m. alt.

Stems rather robust, angled, almost glabrous; leaves with long or very long (12 cm.) petioles, obovate or oblong-elliptic, 20–25 cm. long, 8–9 cm. broad, distantly and shallowly crenate, membranous, glabrous; inflorescences terminal, pyramidal, adpressed-puberulous, branches angled or flattened; petals yellow; stamens 5, connate, anthers vertical, connectives conspicuously produced, erect, emarginate; capsule 12–15 mm. diam., sparsely and very shortly aculeolate.

Trigonostemon verticillatus (Jack) Pax ex Pax & Hoffm. iii: 87 (1910).

Enchidium verticillatum Jack in Malayan Misc. 2. vii: 89 (1822) & in Comp. Bot. Mag. 1: 257 (1836) (excl. synon. Rumph. !); Muell. Arg.: 1256 (1866); Merr. in Journ. Arn. Arb. 33: 224 (1952).

Telogyne indica Baill., Ét. Gén. Euphorb.: 328 (1858).

Trigonostemon indicus (Baill.) Muell. Arg. in Linnaea 34: 214 (1865) & in DC.: 1107 (1866); Hook. f.: 398 (1887); Ridley: 264 (1924).

P16.—Malay Peninsula, Sumatra.

Shrub or small tree to 6 m., in evergreen forest or scrub at very low altitudes.

Glabrous; leaves large, crowded towards tips of branches, ovate-elliptic or elongate-elliptic, up to 30 cm. long and 9·5 cm. broad, rounded or cuneate at base, acuminate at apex, entire or very obscurely and remotely denticulate, chartaceous to coriaceous, petiole up to 20 cm. long; inflorescence simple, narrowly pseudo-racemose, glabrous, or sometimes puberulous towards the apex, the terminal flower usually female and the remainder male; petals dark purple; stamens 5; ovary densely hairy; capsule smooth, 3-lobed, dark brown, 1 cm. diam., usually finely and very shortly velutinous, rarely glabrous.

Trigonostemon sp. nov.?

SE9. Chanburi, Pong Nam Rawn, common in evergreen jungle, alt. 350 m., 13 Oct. 1955, Sangkhachand 531 (For. Dept. 13185):—Shrub, 4 m. tall, 20 cm. girth; fls. yellow, frs. green [no fruit with specimen], bark brown.

Evidently related to *T. albiflorus*, and to *T. leucanthus* Airy Shaw, of Kwangsi, S. China, but differing in the fewer (5–7) pairs of primary nerves, in the conspicuous, closely parallel, transverse secondary venation, and in the yellow colour of the flowers. The specimen seen bears only a male inflorescence, and is scarcely sufficient for description.

Vernicia Lour.

Vernicia montana Lour., Fl. Cochinch.: 586 (1790); Airy Shaw in Kew Bull. 20: 394 (1966).

Dryandra vernicia Correa in Ann. Mus. Hist. Nat. (Paris) 8: 69 (1806).

Elaeococca vernicia (Corr.) A. Juss. ex Spreng., Syst. 3: 884 (1826).

Aleurites vernicia (Corr.) Hassk. in Flora 25, Beibl. 2: 40 (1842); Gagnep.: 1093 (1931).

A. montana (Lour.) Wilson in Bull. Imp. Inst. 11: 460 (1913); Pax & Hoffm. xiv: 8 (1919); Merr. in Trans. Amer. Philos. Soc. n.s. 24(2): 239 (1935); Backer & Bakh. f.: 478 (1963).

A. cordata sec. Gagnep.: 294 (1925), *non* (Thunb.) R. Br. ex Steud.

N1.—Burma, Indochina, S. China.

Side of path at 5–600 m. alt.; no further information.

Vernicia montana only differs from the closely related *V. fordii* (Hemsl.) Airy Shaw, of S. China and Indochina, in its ovoid, verrucose fruit, that of *fordii* being smooth and spherical.

Wetria Baill.

Wetria insignis (Steud.) Airy Shaw, comb. nov.

Trewia macrophylla Bl., Bijdr.: 612 (1825), *non* Roth (1821) [quae = *T. nudiflora* L.].

T. insignis Steud., Nomencl. ed. 2, 2: 698 (1841), *pro nom. nov.*; Pax & Hoffm. vii: 142 (1914).

Wetria trewioides Baill., Ét. Gén. Euphorb.: 409 (1858), *pro nom. nov.*; Ridley: 282 (1924).

Pseudotrewia macrophylla (Bl.) Miq., Fl. Ind. Bat. 1(2): 414 (1859).

Alchornea blumeana Muell. Arg. in Linnaea 34: 167 (1865) & in DC.: 900 (1866).

Agrostistachys pubescens Merr. in Philipp. Journ. Sci. 4, Bot.: 274 (1909); Pax & Hoffm. vi: 99 (1912).

Wetria macrophylla (Bl.) J. J. Sm.: 471 (1910); Pax & Hoffm. vii: 219 (1914); Merr.: 437 (1923); Airy Shaw in Kew Bull. 14: 473 (1960) & 16: 353 (1963); Backer & Bakh. f.: 485 (1963).

P15, 16.—Burma, Malaya (Pahang), W. Malesia, New Guinea (Papua).

Tree to 20 m., in evergreen forest up to 300 m. alt., on or near limestone.

The elongate, oblanceolate, sharply dentate leaves, with very numerous parallel lateral nerves, and the very elongate inflorescences, are unmistakable. The genus is closely related to *Alchornea*.

The combination *W. macrophylla* (Bl.) J. J. Sm., widely employed for this species by previous authors (including myself, *ll.cc. supra*), is found to be untenable, having been based upon a later homonym. Substitute epithets were supplied long ago, not only by Baillon (1858) when founding the genus *Wetria*, but also by Steudel as far back as 1841. This latter name, *Trewia insignis* Steud., has hitherto been strangely overlooked. It was listed by Pax & Hoffmann (*l.c.*: 142) among the species to be excluded from the genus *Trewia*, but was omitted by them from their synonymy of *Wetria macrophylla* (*l.c.*: 219).

APPENDIX

STILAGINACEAE

Antidesma L.

Stamens 2; leaves deciduous, obovate or oblanceolate, usually cuneate-based; ovary glabrous; stigmas terminal **A. acidum**

Stamens 3–6:

Leaves distinctly cordate at base and often rounded at apex; plant pubescent; inflorescences much branched; stigmas terminal

A. ghaesembilla

Leaves not distinctly cordate at base, usually acute or acuminate at apex:
Inflorescences often cauliflorous or ramiflorous:

♀ inflorescences short, simple, fascicled, whitish-puberulous; fine venation of leaves often distinctly tessellated, forming a minute roughly quadrate reticulum **A. thwaitesianum**

♀ inflorescences often very elongate (10–12 cm. or more):

Leaves mostly dull greenish when dry, at least beneath; midrib flat or impressed on upper surface; tertiary nerves usually closely parallel, at right angles to midrib **A. leucopodium**

Leaves drying plumbeous above and brown below; midrib conspicuously raised on upper surface; tertiary nerves lax, irregularly arranged **A. laurifolium**

Inflorescences axillary or terminal:

Stipules mostly ovate:

Shortly tomentose, mostly drying greenish; leaves up to 25 × 7·5 cm.; inflorescences terminal, paniculate; fruits ellipsoid, 3–4 mm. long; related to *A. montanum* **A. martabanicum**

Glabrous, mostly drying reddish; leaves up to 13 × 4·5 cm.; inflorescences axillary, short, simple; fruits ovoid-subglobose, 7–10 mm. long **A. neurocarpum**

Stipules subulate or linear:

Bracts of ♂ inflorescence narrow, exserted, long-pilose, giving the inflorescence a comose appearance; ovary pubescent:

Fruit lenticular, pubescent, rather long-pedicelled; sepals persistent, ± conspicuous **A. velutinosum**

Fruit compressed at right angles to sutural keel, with tumid sides; apex shortly and obliquely beaked **A. orthogynum**

Bracts of ♂ inflorescence not as above:

Leaves less than 1·5 cm. wide, less than 7·5 cm. long; plant rheophytic **A. microphyllum**

Leaves more than 1·5 cm. wide:

Leaves 1·5–3(–4) cm. wide:
Leaves very willow-like, to 14 cm. long, long and slenderly attenuate at apex, very acute, ± membranous, greenish when dry; nervation lax; rheophytic plant

A. salicinum

Leaves not strikingly willow-like, 5–10 cm. long, more shortly acuminate or shortly caudate or cuspidate, often obtuse, chartaceous, usually brown when dry; nervation rather dense; not rheophytic

A. sootepense

Leaves mostly over 3 cm. wide:

Leaves manifestly tomentellous beneath:

Very robust; leaves to 27×9 cm.; inflorescences simple or almost so, to 14 cm. long; anthers almost 1 mm. diam. **A. cf. nienkui**

Less robust; leaves to 17×7 cm.; inflorescences mostly branched, about 5 cm. long; anthers of normal size

A. velutinum

Leaves glabrous or thinly pubescent beneath:

Very robust, almost glabrous; leaves chartaceous to coriaceous, to 23×10 cm., smooth and shining, prominently nerved; inflorescences simple or almost so; ♂ flowers sessile, filaments elongate, anthers almost 1 mm. diam. **A. bunius**

Less robust; anthers of normal size:

Leaves dull beneath, not conspicuously smooth and shining, chartaceous when mature; inflorescences simple or few-branched; ovary pubescent

A. helferi

Leaves smooth and shining beneath:

Ovary pubescent:

Stamens 2–3 mm. long; stipules about 4 mm. long; fruits flattened, beaked, 10–12 mm. long; branchlets and inflorescences glabrous or minutely puberulous . . . **A. leucocladon**

Stamens 1 mm. long; stipules 2–3 mm. long; fruits unknown; branchlets and inflorescences manifestly tomentellous. **A. kerrii**

Ovary glabrous:

Fruit ± orbicular, distinctly flattened; stigmas subterminal; plant slender; leaves membranous. **A. japonicum**

Fruit rhomboid-fusiform, not flattened; stigmas terminal:

Leaves less than $15(-20) \times 7$ cm.; puberulence of branches more evident **A. montanum**

Leaves up to 30×10 cm.; puberulence of branches weaker **A. paxii**

Antidesma acidum Retz., Obs. Bot. 5: 30 (1789); Muell. Arg.: 249 (1866); C. E. C. Fischer in Bull. Misc. Inf. Kew 1932: 65 (1932).

Stilago diandra Roxb., Pl. Coromandel 2: 35, t. 166 (1798).

Antidesma diandrum (Roxb.) Roth, Nov. Spec.: 369 (1821); Muell. Arg.: 266 (1866); Hook. f.: 361 (1887); J. J. Sm.: 274 (1910); Craib: 462 (1911) & 189 (1912); Pax & Hoffm. xv: 143 (1922); Gagnep.: 521 (1926); Backer & Bakh. f.: 458, 460 (1963).

Stilago lanceolaria Roxb., Fl. Ind. 3: 760 (1832).

Antidesma lanceolarium (Roxb.) Wight, Ic. Pl. Ind. Or. 3(1): 4, t. 766 (1843).

A. wallichianum Presl, Epimel. Bot.: 235 (1847).

[*A. ghaesembilla* sec. Hook. f. in Hook. f.: 357 (1887) & Pax & Hoffm. xv: 155 (1922), *pro parte*, quoad synon. *A. acidum* Retz.; *non* Gaertn.]

N₁, 2, 4; NE₅; E₇; SE₁₀; SW₁₄; P₁₆.—Himalayas to Madras, Burma, S. China, Indochina; Java (f. *javanicum* J. J. Sm.).

Deciduous shrub or small tree to 6 m., locally common in evergreen or deciduous or bamboo forest up to 2000 m. alt.

Distinguished from the related *A. ghaesembilla* by its obovate or oblanceolate, usually strongly cuneate-based leaves, its simple or little-branched, usually glabrous inflorescences, and its two stamens with longer filaments. The form with leaves strongly pubescent beneath, and often with pubescent inflorescences, distinguished by J. J. Smith (*l.c.*: 275 (1910)) as *A. diandrum* forma *javanicum* (var. *javanicum* (J. J. Sm.) Pax & Hoffm. *l.c.*: 144 (1922)), occurs in **N₄** (*Nilphanit* 42), **NE₅** (*Kerr* 21470, *Bunpheng* 18, *Makharn* 276), and **SW₁₄** (*Kerr* 19548); also in India and Burma.

The distribution of the species, both in Siam and elsewhere, seems curiously patchy. It is so far unknown in the Malay Federation, and the records from Ceylon (Hook. f., etc.) are certainly erroneous; see Pax & Hoffm. xv: 118 (1922), sub *A. walkeri* (Tul.) Pax & Hoffm.

Antidesma bunius (L.) Spreng., Syst. Veg. 1: 826 (1825); Muell. Arg.: 262 (1866); Hook. f.: 358 (1887); J. J. Sm.: 270 (1910); Pax & Hoffm. xv: 160 (1922); Merr.: 412 (1923); Gagnep.: 524 (1926); Corner: 233 (1940); Backer & Bakh. f.: 458, 460 (1963).

Stilago bunius L., Mant.: 122 (1767).

Antidesma collettii Craib: 461 (1911) & 188 (1912); Gagnep.: 509 (1926).

A. thorelianum Gagnep. in Bull. Soc. Bot. France 59: 124 (1923) & in Lecomte: 514 (1926), **synon. nov.**

N₁; NE₅; SW₁₄.—S. India, Ceylon, E. Himalaya, Assam, Burma, Indochina, S. China, and throughout Malesia (exc. Malay Peninsula & Borneo!) to New Guinea and Queensland.

Shrub or tree to 10 m., locally common in evergreen or moist deciduous forest at 600–1500 m. alt.; planted at lower altitudes.

A characteristic robust, almost glabrous, montane species; leaves variable in size and shape, chartaceous to coriaceous, smooth and shining, prominently nerved, rather short-petioled, drying brown, stipules small and very early caducous; inflorescences robust, simple or almost so, often elongate, puberulous; male flowers sessile, cupuliform, with 4 stamens, filaments elongate, anthers large for the genus; infructescence very robust, fruits compressed-ovoid, pedicellate, with terminal style.

Antidesma ghaesembilla Gaertn., Fruct. 1: 189 (1788); Muell. Arg.: 251 (1866); Hook. f.: 357 (1887); J. J. Sm.: 287 (1910); Pax & Hoffm. xv: 155 (1922); Merr.: 414 (1923); Ridley: 230 (1924); Gagnep.: 505 (1926); Backer & Bakh. f.: 458 (1963).

A. pubescens Roxb., Pl. Corom. 2: 35, t. 167 (1798).

A. frutescens Jack in Mal. Misc. 2: 91 (1822); Pax & Hoffm., xv: 157 (1922); cf. Merr. in Journ. Arn. Arb. 33: 216 (1952).

A. paniculatum Bl., Bijdr.: 1128 (1825).

Ni-4; NE5; E7; SE9, 10; Ci2; SW14; Pi5-17.—W. Himalaya & Ceylon to S. China and throughout Malesia to Bismarck Archip. & N. Australia.

Shrub or tree to 20 m., in savannah, open scrub, deciduous or evergreen or mixed dry forest up to 1050 m. alt.

The broadly rounded, often cordate leaves of this common and widespread species are usually unmistakable. This feature and the much-branched inflorescences, 4–5 stamens and shorter filaments distinguish it from the sometimes similar *A. acidum*.

Fruit used as purgative (**E7**, *Lakshnakara* 899, June 1932).

Antidesma helferi Hook. f.: 357 (1887); Pax & Hoffm. xv: 121 (1922); Ridley: 228 (1924).

A. macgregorii C. B. Rob. in Philipp. Journ. Sci. 6, Bot.: 207 (1911); Pax & Hoffm. xv: 138 (1922); Merr.: 415 (1923); **synon. nov.**

?*A. cambodianum* Gagnep. in Bull. Soc. Bot. France 70: 118 (1923) & in Lecomte: 519 (1927), *pro parte*.

A. pachystemon Airy Shaw in Kew Bull. 23: 279 (1969), **synon. nov.**

Pi6, 17.—Lower Burma, Malay Peninsula (Perak, Kelantan), Philippines.

Shrub of 3–4 m., locally common in evergreen forest at 400–1100 m. alt. Glabrous; leaves broadly rhomboid-elliptic to lanceolate, 10–19 × 2·5–6 cm., chartaceous to coriaceous, with rather dull surface, cuneate at base, petiole short, 3–9 mm., sometimes rather stout; stipules linear; male inflorescences slender, short (to 5 cm.), simple, minutely puberulous; male flowers subsessile, sepals 4, suborbicular, stamens 3, filaments rather thick; female inflorescences axillary or subterminal, stout, elongate (to 14 cm.), minutely puberulous; female flowers subsessile or shortly pedicelled, sepals 5, almost free, ovary shortly adpressedly grey-puberulous, stigmas conspicuous, sub-lateral, deeply bifid, strongly recurved or revolute; fruit ellipsoid, 7 mm. long, slightly compressed, keeled, coarsely alveolate, puberulous, apex rounded, base of stigmas minute, persistent.

Compare also remarks under *A. japonicum* var. *robustius*.

Antidesma japonicum Sieb. & Zucc. in Abh. Bayr. Akad. München 4: 212 (1846) & Fl. Jap. Fam. Nat.: 88 (1846); Muell. Arg.: 258 (1866); Pax & Hoffm. xv: 130 (1922); Gagnep.: 518 (1927).

A. delicatulum Hutch. in Sarg., Pl. Wils. 2: 522 (1916); Pax & Hoffm. xv: 128 (1922); Gagnep.: 522 (1927); **synon. nov.**

A. gracillimum Gage in Rec. Bot. Surv. Ind. 9: 227 (1922), *e descr.*, **synon. nov.**

SE9; SW14; Pi5-18.—China, Japan, Formosa, Indochina, Malay Peninsula.

Shrub or small tree to 8 m., in evergreen forest or scrub up to 1200 m. alt.; noted on limestone in **Pi7**.

Branches slender, leaves often more or less oblong, superficially similar to those of *A. sootepense* in size and shape, but much thinner in texture, often membranous and shining, with finer, laxer, less closely reticulate, less prominent nervation; inflorescences very slender, simple or almost so, rather lax-flowered; fruits flattened, with oblique stigmas.

var. **robustius** *Airy Shaw*, var. nov., ramulis subrobustioribus, foliis chartaceis nec membranaceis, infructescentiis robustioribus, drupis brevius pedicellatis differt.

A. cambodianum Gagnep. in Bull. Soc. Bot. France 70: 118 (1923) & in Lecomte: 519 (1927), *pro parte*.

E8.—Nakhon Ratchasima, Pak Thong Chai, Wang Nam Khieo, in dry evergreen forest, alt. 495 m., 16 June 1968, *Phengnaren* 477 (*Fl. Thail.* no. 36332):—Shrub 1 m. tall; fruits green. Pak Thong Chai ('TREND Camp'), eastern part of Khao Yai National Park, evergreen forest, alt. 500 m., 8 Aug. 1968, *Larsen, Santisuk & Warncke* 3117 (AAU; ♂), 3118 (AAU, K; fr.), 3137 (holotype, K; isotype AAU; fr.):—Undershrub or small tree to 3 m. tall.

INDOCHINA. Annam: près Nha-trang, 3 May 1923, *Poilane* 6206; sine loc., *Poilane* 8294. Hue and vicinity, near streams, May–July 1927, *J. & M. S. Clemens* 4199:—Shrub; fruit green when collected. Mt. Bani, near summit, May–July 1927, *J. & M. S. Clemens* 4226:—Small tree.

Antidesma cambodianum was described by Gagnepain (1923) from about eight different collections, originating from Tonkin, Laos, Cambodia and Cochinchina. Of these collections, only one is represented in the Kew herbarium, but it is fortunately a Cambodian specimen (monts Knang-krépeuh, prov. Thepong, alt. 1000 m., May 1870, *Pierre s.n.*), and is therefore most likely to represent Gagnepain's idea of the type. So far as the material goes, it appears to come very close to *A. helferi* Hook. f. (see above), perhaps only differing in the glabrous rather than pubescent ovary. It will be necessary to examine the remainder of Gagnepain's material in order to clarify the relationship of these two taxa.

Poilane 6206, from Annam, cited above under var. *robustius*, was distributed by Gagnepain as *A. cambodianum*, and was cited by him as such, with other collections from Annam, in the Flora (1927). This, and the other Annamese and Siamese collections cited above, differ conspicuously from the Cambodian specimen of Pierre in the smooth, shining, bright green under-surface of the leaves. In the Cambodian material (as in all the material that I have seen of *A. helferi*) the lower surface of the leaves is somewhat matt, and dull brownish in colour. The Annamese and Siamese specimens appear to represent a form of *A. japonicum*, with stronger growth and less membranous leaves.

It may be mentioned that Gagnepain's description of the fruit of *A. cambodianum* as 'fusiformis . . . basi apiceque valde attenuatus' is scarcely applicable to the fruit of *A. japonicum* var. *robustius* or of *A. helferi*, in both of which it is compressed and suborbicular, with an oblique style. The description, however, must have been drawn up from some specimen other than the Cambodian one of Pierre, which bears young female flowers.

Antidesma kerrii Craib: 462 (1911) & 189 (1912); Pax & Hoffm. xv: 118 (1922); Gagnep.: 525 (1926).

P1.—Endemic.

Shrub or small tree to 7·5 m., in thick evergreen forest at 1200–1850 m. alt.

A species of uncertain status, superficially similar to forms of *A. montanum*, but differing in its short petioles, short, slender inflorescences and adpressed-pubescent ovary. The stamens are inserted in excavations of the disk; the fruit is unknown. The species apparently grows at higher altitudes than most others in the region.

Antidesma laurifolium Airy Shaw, sp. nov., *A. helferi* Hook. f. affine, sed foliis majoribus crassioribus et praesertim costa crassiore conspicue elevato bene distinctum.

SE9 (type: *Kerr* 18012, K).—Malaya (Johore).

Shrub or slender tree to 5 m., in evergreen forest up to 600 m. alt.

A well-marked species, related to *A. helferi* Hook. f., with oblong or elliptic-oblong, acuminate, glabrous, chartaceous to coriaceous leaves, up to 23 × 6 cm., drying plumbeous above and brown below, margins reflexed or almost revolute, the midrib strongly raised on the upper surface; petiole 3–5 mm. long; stipules subulate, acute, 3 mm. long, adpressed-puberulous; male flowers unknown; female inflorescences axillary or cauliflorous, to 12 cm. long, simple, puberulous; female flowers sessile, ovary densely pubescent; fruit compressed, broadly elliptic-ovate, puberulous, 9 × 7 mm., coarsely alveolate, rounded or subacute at apex, with 3 terminal recurved bifid stigmas.

For full description and detailed citation of specimens, see Airy Shaw in Kew Bull. 26 (3): 458 (1972).

Antidesma leucocladon Hook. f.: 358 (1887); Ridley: 233 (1924); Airy Shaw in Kew Bull. 23: 279 (1969).

A. leucocladum Pax & Hoffm. xv: 157 (1922).

P16.—Malaya, Sumatra.

Shrub of 4 m., locally common in evergreen forest at 80 m. alt.

The above record is based on a single poor specimen (Khao Chong, Trang, Puket, 11 Jan. 1966, *Bunnab & Phuphatthanaphong* 288, Fl. Thail. 35740), bearing male flowers. The thinly membranous, slenderly caudate leaves, smooth and satiny below, the long narrow stipules, the rather long filaments, and the rather large, compressed, subrostrate, usually puberulous fruits are characteristic features of the species. Cf. note in Kew Bull., *l.c. supra*.

Antidesma leucopodium Miq., Fl. Ind. Bat. Suppl. (Fl. Sum.): 465 (1860); Pax & Hoffm. xv: 136 (1922); Airy Shaw in Kew Bull. 23: 280 (1969).

A. cauliflorum W. W. Sm. in Notes Roy. Bot. Gard. Edinb. 8: 313 (1915); Pax & Hoffm. xv: 122 (1922).

- A. cauliflorum* Merr. (*pro sp. nov.*) in Journ. As. Soc. Str. Br. 76: 89 (1917).
A. trunciflorum Merr. (*nom. nov.*) in *op. cit.*, Spec. No.: 333 (1921).
A. hirtellum Ridley in Bull. Misc. Inf. Kew 1923: 366 (1923) & Fl. Mal. Penins. 3: 229 (1924); Airy Shaw in Kew Bull. 23: 278 (1969); **synon. nov.**

P16?, **18**.—Malay Peninsula, Sumatra, Borneo, Philippines (Mindanao).

Shrub in evergreen forest at 180 m. alt.

A very characteristic cauliflorous species, especially abundant in Borneo. The tertiary nerves are frequently closely parallel and arranged at right angles to the midrib. Both male and female flowers are usually sessile. The ovary and fruit are usually pubescent, but glabrous forms also occur.

The specimens from **P16** (Ranong, Khao Saideng, up to 400 m., 4 May 1968, *van Beusekom & Phengklai* 547; Phangnga, 30 km. E. of Takua Pa, few 100 m. alt., 11 May 1968, *van Beusekom & Phengklai* 704) may represent a distinct species. The leaves are large and somewhat membranous, the tertiary nerves not closely parallel, and the midrib and other nerves more or less bullately impressed. The male inflorescence and fruits, however, so far as they go, appear to agree closely with those of *A. leucopodium*.

Antidesma martabanicum Presl, Epimel. Bot.: 232 (1849); Muell. Arg.: 261 (1866); Hook. f.: 363 (1887); Pax & Hoffm. xv: 141 (1922).

A. oblongifolium Bl. var. *wallichii* Tul. in Ann. Sci. Nat. sér. 3, 15: 221 (1851); Muell. Arg.: 264 (1866).

P15-17.—Lower Burma.

Small tree to 10 m., in evergreen forest or scrub at low altitudes (up to a few 100 m.).

Closely related to *A. montanum* Bl. and *A. acuminatum* Wall. ex Wight, but distinguished by its broad ovate stipules, by the tendency of the inflorescences to be aggregated into terminal panicles, and by the smaller subglobose fruits.

A very local species; only five collections seen from Siam, and only four from Lower Burma, including (besides the three old ones cited by Hooker, l.c.: 364) the following recent gathering from a higher altitude:—Tavoy District, hills south of Paungdaw Power station, mostly found in damp valleys, scattered under the overhead shade of evergreen trees, alt. 570 m., Sept. 1961, *J. Keenan et al.* 1417:—Fruiting tree of 4·5 m., girth breast height 15 cm.

Antidesma microphyllum Hemsl. in Journ. Linn. Soc. 26: 432 (1894); Pax & Hoffm. xv: 139 (1922); Gagnep.: 520 (1926); Hand.-Mazz., Symb. Sin. 7: 218 (1931); Rehder in Journ. Arn. Arb. 14: 232 (1933).

A. seguini Lévl. in Fedde, Rep. Sp. Nov. 9: 460 (1911); Pax & Hoffm. xv: 166 (1922).

NE5.—SW. China, Indochina (Laos, Tonkin).

Spreading shrub of 1·5 m., in rocky stream bed at 300 m. alt.

A rheophyte, with finely tomentellous stems and narrowly oblong-elliptic leaves 7–14 mm. wide (rarely to 22 mm. in China), narrowed to an obtuse

but conspicuously mucronate apex; inflorescences short, slender, simple or little branched, puberulous; male flowers shortly pedicelled, glabrous, stamens 3-4; fruits small, ovoid, glabrous, with terminal stigmas.

Related to *A. wattii* Hook. f., of Assam, with which *A. neriifolium* Pax & Hoffm., of Hong Kong, may be conspecific.

Antidesma montanum Bl., Bijdr.: 1124 (1825); Muell. Arg.: 264 (1866); J. J. Sm.: 276 (1910); Pax & Hoffm. xv: 158 (1922); Ridley: 231 (1923); Gagnep.: 515 (1926); Corner: 234 (1940); Backer & Bakh. f.: 458 (1963).

A. moritzii Muell. Arg. in Linnaea 34: 67 (1865) & in DC.: 252 (1866); Hook. f.: 362 (1887).

?*A. henryi* Hemsl. in Journ. Linn. Soc. 26: 431 (1894); cf. Pax & Hoffm. l.c.: 159 (1922), but see Gagnep. l.c., & Merr. in Lingnan Sci. Journ. 5: 108 (1927) & Metc. in l.c. 10: 485 (1931), *in obs.*

A. rostratum sec. [Oliv. ex] Williams in Bull. Herb. Boiss. sér. 2, 5: 31 (1905), *non* Tul.

Ni-4; NE5; SE9, 10; PI5-18.—Burma, Indochina, ?S. China (Gagnep.), ?Hainan, and throughout W. Malesia to Celebes and Lesser Sunda Is.

Shrub or small tree to 15 m., in evergreen or deciduous forest or scrub up to 800 m. alt.

Very variable. Stems finely puberulous; leaves membranous, elliptic-oblong, with conspicuous lateral nerves, stipules subulate; male inflorescences branched, slender, puberulous; female inflorescences often simple; fruits small, rhombic-ovoid or obovoid, rugose.

The gaps in the Siamese distribution of this common and widespread species (especially from **SW14**) are curious, and seem unlikely to be entirely due to accidents of collecting, in view of Kerr's thorough collecting methods.

Antidesma neurocarpum Miq., Fl. Ind. Bat. Suppl.: 466 (1860); Muell. Arg.: 253 (1866); Pax & Hoffm. xv: 136 (1922).

A. alatum Hook. f.: 358 (1887); Pax & Hoffm. xv: 119 (1922); Ridley: 227 (1924); Corner: 232 (1940); **synon. nov.**

A. rubiginosum Merr. in Philipp. Journ. Sci., ser. C, 11: 61 (1916), **synon. nov.**

A. inflatum Merr. in Journ. As. Soc. Str. Br. 76: 91 (1917), **synon. nov.**

PI5-17.—Malay Peninsula, Sumatra, Banka, Borneo.

Shrub or small tree to 10 m., in evergreen forest up to 700 m. alt.

Glabrous or almost so (in Siam); branches whitish; leaves chartaceous, elliptic-obovate, abruptly caudate, drying reddish-brown below; stipules large, foliaceous, ovate; inflorescences short, slender, laxly few-flowered, simple; fruits at first compressed, finally ovoid-subglobose, 7-10 mm. long, with slightly excentric stigmas.

The reddish foliage, conspicuous stipules and largish flattened or inflated fruits make this an unmistakable species. The pubescence-characters upon which *A. alatum* and *A. rubiginosum* were partly founded appear to be unreliable for specific distinction. Although apparently only the subglabrous form occurs in Siam and Malaya, both glabrous and rufous-pubescent plants seem to occur together in Borneo.

Antidesma cf. **nienkuii** Merr. & Chun in Sunyatsenia 2: 263, t. 54 (1935).

N1: Mê Li, Lampun, 25 Apr. 1915, Winit 295.

N4: Phetchabun, Nam naw, 3 May 1953, Nilphanit 29 (Roy. For. Dept. 10524). Phetchabun, Lom Kao, 8 May 1955, Smitinand 2676 (Roy. For. Dept. 11761).

Dioecious tree of 10 m., near streams in evergreen forest at 600–1020 m. alt.

A robust, strongly pubescent plant, similar in general appearance to *A. fordii* Hemsl. (*A. yunnanense* Pax & Hoffm.; cf. Metcalf in Lingnan Sci. Journ. 10: 484 (1931)), but differing in its simple or almost simple, non-paniculate inflorescences and glabrous ovary. Unfortunately the Siamese collections are in flower (male and female) and have dropped all their stipules, whilst the type (and so far only known) collection of *A. nienkuii* (from Hainan) is in fruit; a more direct comparison is therefore not possible. The largest leaf of the Siam plant measures 27 × 9 cm. The male flowers are sessile or almost so; there are 4 stamens, and the anthers are unusually massive. This structure is, in fact, almost identical with that of *A. bunius*, which is certainly the closest affinity of the Siamese material; but flowering material from Hainan will be needed before the same can be said of *A. nienkuii* and the specific identity of the two populations established.

Antidesma orthogyne (Hook. f.) Airy Shaw, comb. et stat. nov.

A. velutinosum Bl. var. *orthogyne* Hook. f.: 357 (1887); Pax & Hoffm.: xv: 113 (1922); Ridley: 231 (1924).

P17.—Malaya.

Thin shrub of 2 m., in evergreen forest at 700 m. alt.

Closely related to *A. velutinosum* Bl., and virtually indistinguishable except by the entirely different fruit, which, instead of being lenticular, with a marginal keel and lateral style, is compressed in the opposite plane, at right angles to the sutural keel, the sides being very tumid; the apex is drawn out into a short slightly oblique beak. In the flowering stage the ovary is ovoid-oblong, with terminal styles. See Airy Shaw in Kew Bull. 26(3): 459 (1972), for fuller details.

Antidesma paxii Metc. in Lingnan Sci. Journ. 10: 485 (1931).

A. henryi Pax & Hoffm. xv: 132 (1922), *non* Hemsl. (1894).

N1–3; ?SW14; ?P17.—SW. China (Yunnan; Kwangsi: Lungchow, Morse 621).

Shrub or tree to 20 m., in evergreen forest up to 1020 m. alt.

Stems puberulous or shortly velutinous (rarely glabrescent); leaves rather large, up to 30 × 10 cm., membranous to chartaceous, glabrous, shining, with rather strong primary nerves, stipules linear-subulate (often falcate) or occasionally ovate; inflorescences mostly branched, often forming terminal panicles; male flowers subsessile or shortly pedicellate; stamens mostly 3, with rather long filaments; ovary glabrous, fruit ovoid, 4–6 mm. long, shortly beaked.

This is very close to *A. acuminatum* Wall. ex Wight, but the fruits are twice as large, and ovoid rather than ellipsoid. The type collections (from Yunnan) differ from the Siamese material in their much weaker pubescence, but seem otherwise indistinguishable.

The doubtful record for **SW14** is based upon a single fruiting specimen, *Kostermans* 802, in which the fruits are finely adpressed-puberulous, and more ellipsoid in outline. This may well represent a distinct species.

Antidesma salicinum Ridley: 228 (1924); Corner: 234 (1940).

A. salicifolium sec. Hook. f.: 366 (1887); Pax & Hoffm. xv: 166 (1922), quoad specim. coll. Wray; *non* Miq. (?), *nec* Presl.

P18.—Malay Peninsula.

Rheophytic shrub in evergreen forest at 135 m. alt.

Stems slender, finely puberulous; leaves willow-like, up to 14 × 2·5 cm., acute at base, long-acuminate, membranous to thinly chartaceous, glabrous except for puberulous midrib and ciliate margin, petiole 2–4 mm. long, stipules subulate, up to 10 mm. long; inflorescences little-branched, rhachis puberulous; male flowers small, glabrous, stamens 3–4; fruits obovoid, glabrous.

The relationship of this plant to the Sumatran *A. salicifolium* Miq. (1860; *non* Presl 1849!) needs clarification. The isotype material of Miquel's species in Herb. Kew is poor.

Antidesma sootepense Craib: 463 (1911) & 189 (1912); Pax & Hoffm. xv: 163 (1922); Gagnep.: 523 (1927).

N1, 2, 4; NE5; SE9, 10; SW14.—Burma (N. Shan States), Indochina (Laos).

Shrub or small tree to 9 m., locally common in mixed deciduous or evergreen forest up to 1150 m. alt.

Stems slender, finely tomentellous when young; leaves mostly under 10 cm. long, usually distinctly oblong in outline, chartaceous to subcoriaceous, often dark brown beneath when dry, variable in pubescence, the ultimate nerves forming a close, fine, elevate reticulum; inflorescences slender, simple or little-branched; male flowers sessile, with 4 stamens; female flowers subsessile; fruiting pedicels up to 4 mm. long, fruits small, obovoid, stigmas terminal. The venation, non-flattened fruits and terminal stigmas distinguish the species from the superficially similar *A. japonicum*, q.v.

Antidesma thwaitesianum Muell. Arg.: 263 (1866); Alston in Trimen, Handb. Fl. Ceylon 6 (Suppl.): 262 (1931); Airy Shaw in Kew Bull. 26 (3): 462 (1972).

A. bunius var. *thwaitesianum* (Muell. Arg.) Trimen, Syst. Cat. Fl. Pl. Ceyl.: 81 (1885) & Handb. Fl. Ceyl. 4: 43 (1898).

A. bunius sec. Hook. f.: 358–9 (1887); Pax & Hoffm. xv: 160–1 (1922); *non* L.

A. coriaceum sec. Gagnep.: 513 (1926), *non* Tul.

N₂, 4; SE₉, 10; SW₁₄; P₁₆, 17.—Ceylon, Burma, Indochina, Malay Peninsula (Kedah, Pahang), Borneo, Philippines (Palawan).

Shrub or tree to 20 m., in evergreen forest up to 200 m. alt.

Leaves coriaceous, glabrous, shining, 10–20 × 3–8 cm., ovate-lanceolate, oblong or elliptic, nervation prominent, finely reticulate, often giving a tessellated appearance; petiole relatively long, up to 2·5 cm., conspicuously pulvinate at apex. Inflorescences short, simple, fascicled, often from the bare branchlets below the leaves, rhachis whitish-puberulous; male flowers sessile; fruits flattened, quadrate-orbicular, glabrous, with terminal stigmas.

Long confused with *A. coriaceum* Tul. (and formerly with *A. bunius* (L.) Spreng.), but quite distinct in its tessellated venation and in the whitish, not rusty, puberulence of the inflorescences, which apparently are never panicled.

Antidesma velutinosum Bl., Bijdr.: 1125 (1825); Muell. Arg.: 248 (1866); Hook. f.: 356 (1887); J. J. Sm.: 284 (1910); Pax & Hoffm. xv: 113 (1922); Ridley: 231 (1924); Gagnep.: 506 (1926); Corner: 234 (1940); Backer & Bakh. f.: 459 (1963).

A. attenuatum Wall. ex Tul. in Ann. Sci. Nat. sér. 3, 15: 235 (1851).

A. molle Wall. ex Muell. Arg. in Linnaea 34: 67 (1865) & in DC.: 248 (1866).

N₂, 3; SW₁₄; P_{15–18}.—Burma, Indochina (Annam), Malay Peninsula, Sumatra, Banka, Anambas, Java.

Shrub or small tree to 5 m., in evergreen forest up to 1200 m. alt.

All parts except upper leaf-surface shortly fulvous-tomentose; stipules linear to lanceolate or rarely narrowly ovate; inflorescences dense, bracts (especially in the male) usually conspicuous, comose, long-pilose; female sepals free, subulate; fruits rather long-pedicelled, orbicular, lenticular, with excentric style.

Antidesma velutinum Tul. in Ann. Sci. Nat. sér. 3, 15: 223 (1851); Muell. Arg.: 258 (1866); Hook. f.: 361 (1887); Pax & Hoffm. xv: 156 (1922).

A. gymnogyne Pax & Hoffm. xv: 135 (1922), **synon. nov.**

SE₉ (Koh Chang only); **SW₁₄; P_{15–17}.**—Burma.

Shrub or tree to 10 m., in evergreen forest up to 300 m. alt.

Shortly tomentellous; leaves elliptic-oblong or sometimes obovate, abruptly shortly cuspidate-caudate, drying brown, fine nerves often somewhat reticulate below; stipules small, subulate, early caducous; inflorescences rather short, dense, branched or sometimes simple, rufous-tomentellous; male flowers sessile, stamens 3–4; ovary glabrous or puberulous, with terminal stigmas; fruit small, somewhat compressed, elliptic-ovate, glabrous or puberulous, pedicellate.

The glabrous and puberulous states of the ovary and fruit occur together (on separate branchlets) both on the Kew isotype of *A. gymnogyne* (Helfer 4945, Lower Burma) and also on *Kostermans* 805 (**SW₁₄**, Kuae Noi River Basin Expedition). They appear to be of negligible taxonomic significance.

PANDACEAE

Galearia Zoll. & Mor.

Galearia fulva (Tul.) Miq., Fl. Ind. Bat. 1. ii: 430 (1859); Hook. f.: 378 (1887); Pax & Hoffm. iii: 101 (1911); Ridley: 257 (1924); Forman in Kew Bull. 26: 160 (1971).

Cremostachys fulva Tul. in Ann. Sci. Nat. sér. 3, 15: 261 (1851).

Galearia affinis (R. Br.) Miq., Fl. Ind. Bat. 1(2): 430 (1859); Pax in Bot. Tidsskr. 32: 390 (1916).

Bennettia fulva (Tul.) Muell. Arg. in Linnaea 34: 205 (1865) & in DC.: 1037 (1866).

Galearia wallichii (R. Br.) Kurz, Prelim. Rep. For. Veg. Pegu, App. A: p. cxiii, App. B: 80 (1875); Williams in Bull. Herb. Boiss. sér. 2, 5: 32 (1905). *G. lindleyana* (Tul.) Hook. f., *G. affinis* (R. Br.) Miq., *G. phlebocarpa* (R. Br.) Miq., *G. wallichii* (R. Br.) Kurz, *G. finlaysonii* (R. Br.) Miq., *G. splendens* Miq., *G. helferi* Hook. f., *G. jackiana* (R. Br.) Miq., *G. caudata* Forman (*G. pedicellata* (R. Br.) Miq., *non* Zoll. & Mor.), *G. subulata* (Muell. Arg.) Hook. f., *G. ridleyi* Gage, *G. minor* Gage, *G. fusca* Ridley, *G. dongnaiensis* Pierre ex Gagnep., etc.: *vide* Forman in Kew Bull. 26: 153 (1971) for discussion and full synonymy. Cf. also Forman in Kew Bull. 14: 311 (1960) & 20: 309 (1966).

SE9; SW14; PI5-18.—Lower Burma, Indochina (Cochinchina, Annam), Malaya, Sumatra, Borneo.

Shrub or small tree to 8 m., common in evergreen or bamboo forest or scrub from low altitudes up to 750 m. alt.

An exceedingly variable species; *vide* Forman, *l.c.* (1971).

Microdesmis caseariifolia Planch. in Hook. Ic. Pl. 8: t. 758 (1848), *in adnot.*; Muell. Arg.: 1041 (1866); Hook. f.: 380 (1887); Pax & Hoffm. iii: 106 (1911); Merr.: 451 (1923); Ridley: 258 (1924); Gagnep.: 460 (1926); Henderson in Journ. Malay. Br. Roy. As. Soc. 17: 71 (1939).

Tetragyne acuminata Miq., Fl. Ind. Bat. Suppl.: 463 (1860); Muell. Arg.: 1254 (1866).

Microdesmis philippinensis Elm., Leafl. Philipp. Bot. 4: 1300 (1911).

N3; SE9, 10; PI5-17.—Burma, S. China, Indochina, Malay Peninsula, Sumatra, Borneo (Sabah, SE. Indonesian Borneo), Philippines.

Shrub or tree to 8 m., locally common in evergreen forest up to 300 m. alt.

The foliage shows considerable variation; it is possible that when the fruits are better known further species may be recognizable, as in tropical Africa (cf. Léonard in Bull. Jard. Bot. Brux. 31: 159–197, fig. 22–25 (1961) & in Fl. Congo & Rwanda-Bur. 8(1): 102–115, fig. 7 (1962)). For discussion of relationships, *vide* Forman in Kew Bull. 20: 209 (1966).

HYMENOCARDIACEAE

Hymenocardia *Wall. ex Lindl.*

Hymenocardia punctata *Wall. ex Lindl.*, Nat. Syst. Bot.: 441 (1826); Hook. f.: 377 (1887); Ridley: 251 (1924); Airy Shaw in Kew Bull. 18: 262 (1965).

H. wallichii Tul. in Ann. Sci. Nat. sér. 3, 15: 256 (1851); Muell. Arg.: 476 (1866); Williams in Bull. Herb. Boiss. sér. 2, 5: 30 (1905); Pax & Hoffm. xv: 78 (1922); Gagnep.: 544 (1927) (incl. var. *dasyarpa* Gagnep.).

Samaropyxis elliptica Miq., Fl. Ind. Bat. Suppl.: 465 (1860).

Hymenocardia laotica Gagnep.: 546 (1927), **synon. nov.**

N₃, 4; NE₅; E₇, 8; SE₉, 10; Cr₁₂; SW₁₄; P₁₅, 16.—Burma, Indochina (Laos, Cambodia, Cochinchina), Malay Peninsula (Pahang), Sumatra.

Straggling shrub or small spreading tree to 8 m., in evergreen, mixed, or dry deciduous forest or scrub, sometimes in marshy ground or swamps, up to 200 m. alt.

Stem spiny; flowers precocious; fruit said to be edible (**P₁₆**, *Vanpruk* 689). *H. laotica*, with obcordate fruits, appears to represent an unimportant local variant.