

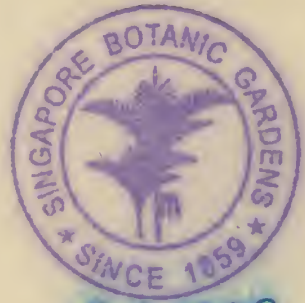


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KING'S COLLEGE, STRAITS SETTLEMENTS  
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THE FLORA OF  
THE MALAY PENINSULA

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THE FLORA  
OF THE  
MALAY PENINSULA

BY  
HENRY N. RIDLEY, C.M.G., F.R.S., F.L.S.

LATE DIRECTOR OF GARDENS AND FORESTS,  
STRAITS SETTLEMENTS

WITH ILLUSTRATIONS BY  
J. HUTCHINSON, F.L.S.

VOL. II.—GAMOPETALÆ

PUBLISHED UNDER THE AUTHORITY OF THE GOVERNMENT  
OF THE STRAITS SETTLEMENTS



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# FLORA OF THE MALAY PENINSULA

## VOLUME II

### ORDER LXXIII. CAPRIFOLIACEÆ.

Shrubs (small trees or herbs). Leaves opposite, simple, no stipules. Inflorescence usually cymose. Flowers bisexual, regular (or irregular). Calyx adnate to ovary, lobes 5. Corolla superior, gamopetalous tubular or rotate, lobes 5 imbricate. Stamens 5 (or 4) insert on corolla-tube, alternate with the lobes; filaments filiform. Ovary inferior 2- to 6-(rarely 1-)celled; ovules solitary or many. Style slender. Stigma capitate. Fruit a drupe (or berry or dry) 1- to many-celled. Seeds one (or many). Species about 230, mostly in Northern Hemisphere, absent from Africa. (*Gamble and King, Journ. As. Soc. Beng. lxxii. (2), 112.*)

#### VIBURNUM, Linn.

Shrubs or small trees. Leaves opposite entire or serrate. Flowers in umbellate terminal corymbs. Calyx-tube turbinate or cylindrical; limb 5-toothed persistent. Corolla white, pink or yellowish, campanulate or tubular. Stamens exsert. Ovary 1- to 3-celled; ovules solitary. Style short, conic. Drupe 1, rarely 2- to 3-celled. Seed oblong. Species 80 to 90, Palæarctic, West Indies, S. America, Madagascar, a few descending to Malaya.

##### Corolla rotate.

- |  |     |                          |
|--|-----|--------------------------|
| Leaves entire nearly glabrous; stamens short . . . . . | (1) | <b>V. sambucinum</b>     |
| Stamens very long . . . . .                            | (2) | <b>V. longistamineum</b> |
| Leaves very hairy beneath . . . . .                    | (3) | <b>V. villosum</b>       |
| Corolla tubular; leaves entire . . . . .               | (4) | <b>V. Beccarii</b>       |
| Leaves serrate; cymes often axillary . . . . .         | (5) | <b>V. lutescens</b>      |

(1) **V. sambucinum** *Bl. Bijdr. 656; Clarke, in Hook. fl. F.B.I. iii. 5; King, l.c. 113.*

Big shrub about 15 to 30 ft. tall; young parts pubescent. Leaves thinly coriaceous, elliptic oblong-lanceolate abruptly acuminate, base cuneate, glabrous except a few tufts of hairs beneath; nerves 4 to 6 pairs; 5 to 8 in. long, 2 to 4.5 in. wide; petioles .75 to 1.5 in. long, pilose or glabrous. Corymbs umbellate, 2.5 to 5 in. across, many-branched. Flowers cream white, .1 in. across. Calyx-tube cylindrical, lobes 5, acute. Corolla rotate, lobes 5, round imbricate.

Stamens 5, filaments little longer than petals. Ovary 1-celled; style conic. Drupe ovate acute flat, 2-grooved on one side, 3-grooved on the other, .35 in. long. *Hab.* Woods from sea level to 5000 ft. altitude. Singapore, Choa Chu Kang; Bukit Panjang; Kranji road. Malacca (Griffith). Pahang, Telom woods 4000 ft. altitude. Selangor, Gunong Mengkuang Lebah at 5000 ft. altitude (Robinson). Perak, Maxwell's Hill. Penang (Wallich 457); Government Hill (Maingay, Curtis) at 2500 ft. altitude. *Distrib.* Java, Sumatra, Borneo.

(2) *V. longistamineum* *Ridl. Journ. F.M.S. Mus.* vi. 151.

A shrub 12 ft. tall. Leaves opposite elliptic cuspidate, base cuneate, membranous glabrous; nerves 5 pairs elevate beneath; 3.5 to 4.5 in. long, 2 in. wide; petioles .05 in. long. Corymbs 2 in. long; branches umbellate, .75 in. long, glabrous except for a few white hairs. Flowers sessile, white. Calyx oblong, lobes 5 short, ovate ciliate. Corolla campanulate, lobes ovate. Stamens 5, four times as long as the corolla, spirally twisted, .25 in. long. *Hab.* Woods by streams on mountains at 4500 ft. altitude. Local. Pahang, Gunong Tahan (Ridley).

Remarkable for its very long stamens.

(3) *V. villosum* *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 10.

Shrub. Branches thickly hairy. Leaves elliptic-lanceolate acuminate, base round, glabrous above, beneath yellow hairy villous, 5 to 6 in. long, 2.5 to 3 in. wide; nerves 4 to 6 pairs; petioles .75 in. long, villous. Corymbs 1.5 to 2 in. long, villous; peduncles stout, .75 in. long. Flowers sessile, green. Calyx-tube cylindric, hairy, lobes ovate acute. Corolla-tube cylindric .1 in. long, lobes 5 ovate. Stamens twice as long. *Hab.* Rare at 3000 ft. altitude, on mountains. Selangor, Bukit Kutu (Ridley).

(4) *V. Beccarii* *Gamble and King, l.c.* 114.

Large shrub. Leaves opposite entire, coriaceous ovate, shortly blunt acuminate, base cuneate; nerves 4 to 6 pairs; 3 to 5 in. long, 2 to 3 in. wide; petioles .75 to 1.25 in. long. All glabrous. Corymbs on peduncles 1.5 to 3 in. long, umbellate about 6 in. across. Flowers .2 in. long. Calyx-tube clavate, glabrous, .1 in. long. Corolla tubular, .15 in. long, lobes 5, acute. Stamens 5, filaments short thick. Drupe 1-grooved on one face, 2-grooved on the other. *Hab.* Perak, Gunong Tambong Batak (Scortechini). *Distrib.* Sumatra.

(5) *V. lutescens* *Bl. Bijdr.* 655; *King, l.c.* 114. *V. sundaicum*, *Miq. Fl. Ind. Bat.* ii. 121.

Shrub or treelet, stellate-pubescent. Leaves opposite, ovate acuminate, base cuneate, crenate, dentate or serrate, thickly coriaceous, glabrous; nerves 6 to 8 pairs elevate slender; 3 to 5 in. long, 1.5 to 2.5 in. wide; petioles .5 to .75 in. long. Corymbs terminal, sometimes axillary on peduncles 1 to 2 in. long, scurfy

pubescent, 2 to 2.5 in. across in flower. Flowers cream white. Calyx glabrous, .05 in. long, lobes 5, ovate acute. Corolla rotate campanulate, lobes 5. Stamens shortly exsert; filaments as long as petals. Drupe oblong-ellipsoid, slightly flattened, 1-grooved on one side, 2-grooved on the other, .3 to .4 in. long, .2 in. wide. *Hab.* Mountains at 4900 ft. altitude. *Local.* Perak, Ulu Batang Padang (Wray) up to Telom, in forest. *Distrib.* Java and Sumatra.

## ORDER LXXIV. RUBIACEÆ.

Herbs, shrubs and trees usually small or medium size. Leaves opposite usually entire. Stipules conspicuous, free or connate. Flowers bisexual, regular. Calyx-tube adnate to ovary. Corolla gamopetalous, 4- or 5-lobed, tube short or long. Stamens as many as lobes. Disc cushion-shaped or lobed. Ovary inferior; style simple or cleft. Fruit capsular, baccate or drupaceous. Species 4800, whole world, but largely in the tropics. (*Gamble and King, Journ. As. Soc. Beng.* lxxii. (2), 113.)

**Series A.** Ovary containing numerous ovules in each cell, rarely few.

### *Fruit capsular.*

Flowers in dense heads.

Trees or shrubs erect not climbing.

Corolla lobes valvate . . . . . 1. MITRAGYNE

Corolla lobes imbricate.

Calyx-tubes joined in a mass . . . . . 2. SARCOCEPHALUS

Calyx-tubes free.

Seeds not winged . . . . . 3. ANTHOCEPHALUS

Seeds winged.

Heads of flowers large, 1 or 2

together . . . . . 4. NAUCLEA

Heads small, numerous . . . . . 5. ADINA

Climbing shrubs; peduncles forming hooks

Flowers in corymbs or panicles; fruit capsular, 2-celled. . . . . 6. UNCARIA

*Seeds winged.*

Climbers; flowers in spreading terminal

panicle . . . . . 7. COPTOSAPELTA

Trees; panicle spike-like . . . . . 8. HYMENODICTYON

Trees; flowers in a lax corymb of cymes;

one sepal much enlarged, white . . . . . 9. MUSSAENDOPSIS

*Seeds not winged; shrubs.*

Flowers in large terminal panicle . . . . . 10. WENDLANDIA

Flowers in terminal paniced scorpioid

cymes . . . . . 11. GREENIA

Flowers in axillary scorpioid racemes . . . . . 12. ALEISANTHIA

Flowers very small in terminal cymes . . . . . 13. BECHERIA

Herbs with 2-(rarely 4-)celled capsule, many-

seeded, rarely few- or 1-seeded.

Leaves large, broad; inflorescence terminal.

Corolla large, rotate; anthers in a cone opening by pores . . . . . 14. ARGSTEMMA

- Corolla tubular, small; flowers secund  
on dichotomous cymes; cap-  
sule obcordate . . . . . 15. OPHIORRHIZA
- Flowers in a terminal head, small.*
- Corolla tubular; capsule urn-shaped . . . . . 16. KLOSSIA
- Corolla-tube short; capsule opening by  
a lid . . . . . 17. POMAZOTA
- Corolla funnel-shaped; capsule opening  
irregularly, involucrel bracts  
very large . . . . . 18. COPTOPHYLLUM
- Leaves small; flowers usually axillary;  
corolla short; capsules small.
- Flowers solitary axillary; prostrate  
weed . . . . . 19. DENTELLA
- Flowers in terminal and axillary panicles  
or heads; capsules splitting  
longitudinally . . . . . 20. HEDYOTIS
- Flowers in terminal and axillary cymes  
or solitary axillary; capsules  
splitting above the calyx-lobes. . . . . 21. OLDENLANDIA
- Flowers in axillary cymes or heads;  
capsule didymous . . . . . 22. XANTHOPHYTUM
- Fruit baccate; seeds many; shrubs or trees.*
- Corolla lobes valvate.
- Flowers in compact heads.
- Climbers; calyx entire; stamens 4 . . . . . 23. LUCINÆA
- Epiphyte; calyx 2- to 4-lobed; stamens 5 . . . . . 24. LECANANTHUS
- Terrestrial shrublet; bracts large;  
stamens 5 . . . . . 25. MYRIONEURON
- Flowers in terminal corymbs medium or  
large; 1 sepal often enlarged  
white; scandent shrubs . . . . . 26. MUSSENDA
- Flowers small in terminal panicles; shrub-  
lets . . . . . 27. ADENOSACME
- Flowers in axillary cymes, long-tubed;  
shrubs . . . . . 28. MYCETIA
- Flowers in axillary cymes, short-tubed;  
shrubs or trees.
- Cymes paniced; flowers unisexual, sta-  
mens 8 to 16 . . . . . 29. AULACODISCUS
- Cymes short, often sessile; flowers few;  
bisexual; corolla 4- to 7-lobed . . . . . 30. UROPHYLLUM
- Corolla lobes twisted in bud.
- Flowers unisexual; cymes axillary . . . . . 31. BRACHYTOME
- Cymes axillary; flowers usually large;  
bisexual.
- Fruit usually with a woody pericarp.
- Fruit 2-celled . . . . . 32. RANDIA
- Fruit 1-celled . . . . . 33. GARDENIA
- Flowers in axillary racemes very small . . . . . 34. PETUNGA
- Fruit baccate; ovules and seeds 2 or 3  
in a cell.*
- Flowers very small in axillary fascicles of  
small cymes . . . . . 35. DIPLOSPORA
- Flowers small in dense axillary corymbs;  
sea-shore bush . . . . . 36. SCYPHIPHORA
- Flowers in large scorpioid cymes; corolla  
valvate; seed 1 . . . . . 37. JACKIA

- Series B.** Ovules 1 in each cell (rarely 2 or more).
- Corolla lobes twisted in bud; trees and shrubs; flowers paniced or corymbose; corolla-tube slender.
- Flowers white, red or yellow, 4-merous, lobes twisted; style shortly exsert; bracts sheathing . . . . . 38. IXORA
- Flowers always white 4-merous; style very long exsert; bracts sheathing . . . . . 39. PAVETTA
- Flowers white 5-merous; style short . . . . . 40. TARENNA
- Flowers white 4- or 5-merous; style long.
- Corolla-lobes valvate; flowers corymbose. . . . . 41. STYLOCORYNA
- Flowers axillary, fascicled; corolla lobes contort . . . . . 42. COFFEA
- Corolla-lobes imbricate.
- Flowers few axillary fascicled . . . . . 43. GARDENIOPSIS
- Flowers in cymes . . . . . 44. GUETTARDA
- Corolla-lobes valvate.
- Flowers unisexual, cymes peduncled axillary.
- Shrubs and trees; corolla-tube rather long; cymes peduncled axillary; flowers unisexual; fruit a drupe with several pyrenes; ovary 4- to 12-celled . . . . . 45. TIMONIUS
- Flowers terminal and axillary white; fruit 1- to 2-seeded . . . . . 46. PRISMATOMERIS
- Flowers bisexual.
- Flowers in heads; shrubs or trees; calyx-tubes cohering.
- Heads many-flowered; flowers white . . . . . 47. MORINDA
- Heads few-flowered; flowers violet . . . . . 48. RENNELLIA
- Climbers; flowers umbelled . . . . . 49. CÆLOSPERMUM
- Climbers; flowers in axillary heads free.
- Shrubs and trees; corolla-tube short; flowers in axillary fascicles, small.
- Ovary 2-celled; stipules small . . . . . 51. CANTHIUM
- Ovary 4-celled; stipules small . . . . . 52. VANGUERIA
- Ovary 2-celled; one stipule very large . . . . . 53. MESOPTERA
- Small shrubs and herbs; corolla short; fruit pulpy with 2 pyrenes; flowers in corymbose terminal and axillary cymes rarely capitate.
- Shrubs or shrublets; corolla small, tube short . . . . . 54. PSYCHOTRIA
- Small shrubs; corolla long curved . . . . . 55. CHASALIA
- Flowers in dense involucrate heads; fruit blue, rarely black . . . . . 56. CEPHAELIS
- Flowers few terminal, slender creeping herbs; leaves cordate . . . . . 57. GEOPHILA
- Flowers axillary in small heads or cymes.
- Herbs; stamens 5; drupes very small dry . . . . . 58. STREBLOSA
- Shrubs; drupe blue or white.
- Flowers crowded in axils or in peduncled cymes . . . . . 59. LASIANTHUS
- Flowers solitary or few in axils.
- Corolla-tube short; leaves large . . . . . 60. SAPROSMA

Corolla-tube long; leaves small . . .	61. AMARACARPUS
Epiphytes with tuberous stems tenanted by ants.	
Pyrenes 2; stem and branches not spiny	62. HYDNOPHYTUM
Pyrenes 3; stem and branches spiny . .	63. MYRMECODIA
Climbing plants; flowers in branched or panicled cymes; stamens from corolla base; pyrenes dry, flat or globose . . . . .	64. PÆDERIA
Herbs with small capsules or 2 cocci; flowers axillary small (habit of <i>Hedyotis</i> ).	
Cocci indehiscent . . . . .	65. DIODIA
Cocci dehiscent on inner face . . . . .	66. BORRERIA
Herbs; flowers in terminal corymbs; cocci indehiscent . . . . .	67. KNOXIA

### 1. MITRAGYNE, Korth.

Trees or shrubs. Flowers sessile, in globose, solitary or paniced heads mixed with spatulate paleaceous bracts; peduncle with 2 petioled leafy bracts near tip. Calyces conoid, separate tube short, truncate or 5-lobed. Corolla funnel-shaped; tube long, a ring of hairs in mouth; lobes 5, thickened at tip. Stamens 5, above a ring of hairs; anthers lanceolate, cordate. Ovary 2-celled. Stigma cylindric or mitriform. Fruit of two 5-ridged cocci dehiscing at top. Seeds numerous, winged. Species 8, Indo-Malayan, 3 African.

- Leaves oblong-ovate; stipules lanceolate . . . . . (1) *M. speciosa*  
 Leaves orbicular or ovate; stipules obovate . . . . . (2) *M. parvifolia*

(1) *M. speciosa* Korth, *Obs. de Naclées Ind.* 19; King, *l.c.* 119.

Large tree 40 to 50 ft. tall, 2 to 3 ft. through. Leaves membranous, oblong-ovate sub-acuminate, base broad round, glabrous or nerves 12 to 15 pairs elevate beneath puberulous, 4 to 5.5 in. long, 2 to 3.5 in. wide; petioles 1.2 in. long. Stipules lanceolate, pubescent. Heads 3, one very shortly peduncled between two on the ends of long branches 2 in. long, 1 in. through in flower, deep yellow. Corolla .3 in. long. Fruit-head .5 in. through. *Hab.* Open country, rather rare. Pahang River at Kwala Berar. Perak, Ulu Bubong (Kunstler). *Distrib.* Malay isles. *Native name:* Kutum.

(2) *M. parvifolia* Korth, *Obs. de Naclées Ind.* 19; *Haviland, Journ. Linn. Soc.* xxxiii. 69.

Tree about 30 ft. tall. Leaves orbicular or ovate blunt acuminate, base round cordate or narrowed, 2 to 6 in. long, 1 to 4 in. wide; petioles .3 in. long. Stipules obovate. Peduncles usually in threes, axillary, 1.5 to 2.5 in. long. Heads 1 in. through. Calyx-tube cupular. Corolla .2 in. long. Fruit-head .5 in. through. *Hab.* Open pastures, rare. Setul Heath (Ridley). *Distrib.* India, Burma.



## 2. SARCOCEPHALUS, Afzel.

Trees (or bushes). Leaves sub-coriaceous. Flowers sessile joined by their confluent calyx-tubes into globose axillary and terminal peduncled ebracteate heads. Calyx-tube short, teeth 4 or 5 imbricate. Corolla funnel-shaped small teeth 4 or 5 short, broad, throat glabrous. Stamens 4 or 5; filaments short or none; anthers ovate. Stigma clubbed, fusiform. Ovary 2-celled. Fruits combined into a fleshy globose mass of 2-celled pyrenes. Seed ovoid, not winged. Species 12, Indo-Malayan, with one in Australia and one in Africa.

- Leaves ovate-lanceolate, pubescent beneath; heads  
 .8 in. through . . . . . (1) *S. hirsutus*  
 Leaves obovate scaly beneath, large; heads 1.5 in.  
 through . . . . . (2) *S. Maingayi*  
 Leaves obovate, glabrous 4 in. across; heads .5 in.  
 through . . . . . (3) *S. Junghuhnii*  
 Leaves broad lanceolate, 2 in. across; heads .5 in.  
 through . . . . . (4) *S. subditus*

(1) *S. hirsutus* Haviland, *Journ. Linn. Soc.* xxxiii. 32; *King, l.c.* 120.

A large bush. Branchlets pubescent. Leaves thickly membranous, oblong-oblancoate, abruptly acuminate, base narrowed; nerves pubescent beneath, drying black, 3 to 5 in. long, 1.5 to 2.25 in. wide; petioles .3 in. long, pubescent. Stipules oblong-oblancoate, .3 in. long. Peduncle solitary, terminal, pubescent. Head .8 in. through. Calyx hairy. Corolla glabrous. *Hab.* Open country, edges of woods, rare. Malacca, Relau at base of Mt. Ophir (Ridley). *Distrib.* Borneo. *Native name:* Magal.

(2) *S. Maingayi* Haviland, *l.c.* 33.

Tall tree with few spreading branches, about 80 ft. high. Branches glabrous. Leaves coriaceous, elliptic sub-acuminate, base narrowed scaly beneath; nerves 9 to 14 pairs, prominent and pubescent beneath, depressed above; 4 to 8 in. long, 2.25 to 3.5 in. across; petioles .5 in. long. Stipules oblong, .65 in. long. Peduncles thick, .25 to .5 in. long. Heads large, 1.5 in. through. Calyx tomentose. Corolla glabrous. *Hab.* In low wet open country on the west side of the peninsula. Negri Sembilan, Bukit Sulu (Cantley). Selangor; Kwala Lumpur (common here). Perak, Goping (Kunstler); Batang Padang (Kunstler). Province Wellesley, Krian; Penang, Telok Bahang (Fox). *Native name:* Tumbong Dayong. *Use:* Fruit edible, sweet.

(3) *S. Junghuhnii* Miq. *Fl. Ind. Bat.* ii. 133; *King, l.c.* 121.

A bushy tree about 20 to 30 ft. tall. Stem about 1 ft. through. Leaves coriaceous, elliptic to obovate-elliptic shortly acuminate, base cuneate, drying yellowish brown; nerves 5 to 7 pairs, elevate beneath; 4 to 6 in. long, 3 to 4 in. wide; petioles stout, .35 to 1 in. long. Peduncles axillary stout, 1 to 3 in an axil, pubescent, with

small bracts half-way. Heads .5 in. through, yellowish cream-colour. Flowers glabrous, .1 in. long. Corolla-lobes round. Style long clubbed. Fruit-head brown, globular, .75 in. through pitted. *Hab.* Common in woods in the lowlands. Singapore, Garden Jungle; Bukit Timah; Siglap. Johor, Bukit Soga. Malacca (Maingay); Mt. Ophir (Griffith); Batang Malacca and Hulu Rejang (Derry). Pahang, Kuantan (Burn-Murdoch). Negri Sembilan, Bukit Kupayang (Cantley). Perak, Thaiping and Goping (Kunstler). Penang Hill at 500 ft. altitude and Batu Feringhi (Curtis). *Distrib.* Sumatra, Borneo, Philippines. *Native names:* Mempelu Tanah; Sebonko Bukit; Lempedu Tanah. *Use:* Timber good and hard, though not large.

(4) *S. subditus* *Miq. Fl. Ind. Bat.* ii. 133; *King, l.c.* 121.

A tree about 30 ft. tall, glabrous. Leaves thick, membranous drying black, elliptic-lanceolate shortly acuminate, base narrowed; nerves 6 to 7 pairs; 3 to 4.5 in. long, 1.25 to 2.5 in. wide; petioles .2 to .4 in. long. Peduncles axillary and terminal, under 1 in. long in flower, 1 in. long in fruit. Flowers yellow in heads, .5 in. through, glabrous. Corolla-lobes oblong. Fruit-head globular, woody, .5 in. through, pitted light brown. *Hab.* Lowland woods and river-banks. Singapore, Kranji. Johor, road to Gunong Pulai; Serom. Pahang, river-banks, Pulau Chengai; Kwala Tembeling. Malacca (Griffith); Merlimau (Derry). Negri Sembilan, Johol. Selangor, Kwala Lumpur. Perak, Bujong Malacca. Kelantan, Chaning, river-bank. *Distrib.* Sumatra; Borneo. *Native names:* Bongak Ayer; Subutu; Markel; Kedinba Dalam.

### 3. ANTHOCEPHALUS, A. Rich.

Large tree. Leaves coriaceous; stipules large. Flowers sessile in solitary globose terminal heads on a peduncle bracteate at base only. Calyx-tubes free, narrow cylindric with 5 linear-oblong pubescent lobes. Corolla funnel-shaped above, lobes long linear imbricate. Anthers linear-oblong apiculate. Style long. Stigma cylindric-fusiform. Ovary 2-celled. Fruit not combined 4-celled. Seeds ellipsoid not winged. Species 2, Indo-Malayan.

(1) *A. indicus* *Rich. Mem. Soc. Hist. Nat. Paris*, 1934, p. 237; *King, l.c.* 122. *A. morindæfolius* *Korth. Verh. Nat. Gesch. Bot.* 154, t. 48.

Leaves elliptic-oblong or ovate acute, base cuneate or round, glabrous beneath sometimes puberulous; nerves 10 to 12 pairs, slightly elevate; 5.5 to 8 in. long, 2.5 to 3.5 in. wide; petioles .2 to 1.75 in. long. Stipules triangular. Heads 1 to 2 in. through; peduncles 1.5 to 2 in. long. Fruit 4-celled, upper part containing 4 sub-dehiscent several-seeded pyrenes, lower 2-celled, many-seeded. *Hab.* Selangor, Kwala Lumpur (Foxworthy). Perak. No locality given (Kunstler). *Distrib.* Indo-Malaya. *Native name:* Empoyan or Kelumpayan.

## 4. NAUCLEA, Linn.

Trees or shrubs. Leaves coriaceous. Stipules large. Flowers sessile in 1- or 3-peduncled heads; peduncles thickened at top, with large (caducous) bracts. Flowers mixed with bracteoles of thin stalks and conical hairy heads, or not. Calyx-tubes free, lobes 5, filiform or spatulate thickened at tip, hairy. Corolla funnel-shaped, lobes 5, throat glabrous. Stamens 5; anthers oblong or linear included. Stigma sub-globose. Ovary 2-celled. Fruit of 2 cocci dehiscent. Seed flat, winged, wing bifid at one end, acute at the other. Species 30, chiefly Indo-Malayan.

Corolla lobes glandular, puberulous.

Peduncle bracts minute . . . . . (1) *N. sinkorynes*

Corolla lobes glabrous.

Head enveloped in 2 large bracts . . . . . (2) *N. purpurascens*

Bracts near base of peduncle, small terete . . . . . (3) *N. peduncularis*

(1) *N. sinkorynes* Korth. *Verh. Nat. Gesch. Bot.* 160; King, *l.c.* 124.

Tree 30 to 40 ft. tall. Leaves thinly coriaceous, oblong-ovate abruptly acuminate, base cuneate, glabrous; nerves 7 to 8 pairs, prominent beneath; 3.5 to 5 in. long, 1.5 to 2.5 in. wide; petioles .25 to .4 in. long. Peduncles 2 to 3 together, erect, 1.5 to 2.5 in. long. Heads 1 in. through. Bracts minute. Calyx-tube short, hairy. Corolla lobes glandular, pubescent outside. Capsules cuneiform, tip villous. *Hab.* Perak (Kunstler). *Distrib.* Malay islands.

I have not seen this specimen.

(2) *N. purpurascens* Korth. *Verh. Nat. Gesch. Bot.* 158.

Tree about 30 ft. tall. Leaves thinly coriaceous, elliptic to oblanceolate, acute, base narrowed, glabrous; nerves 7 to 9 pairs, prominent beneath; 4.5 to 8 in. long, 1.75 to 3 in. wide; petioles .35 to .75 in. long. Stipules ovate acute, .75 in. long. Heads 1.75 in. through, on peduncles 1.5 to 3 in. long, yellowish white, solitary or in threes with 2 large boat-shaped bracts at base. Calyx-lobes linear, hairy. Fruit villous at top. *Hab.* Woods and river-banks; not common. Singapore, Chan Chu Kang; Bukit Timah road. Pahang, Tahan woods. Selangor, Rawang. *Distrib.* Malay islands. *Native name:* Munkal.

(3) *N. peduncularis* Don, *Syst.* iii. 469; King, *l.c.* 125.

Tree 40 to 60 ft. tall. Leaves coriaceous, elliptic sub-acute, base cuneate or round, glabrous; nerves 9 to 11 pairs, strongly elevate beneath; 5 to 9 in. long, 2.5 to 4 in. wide; petioles .4 to .6 in. long. Heads globose-ovoid, 1.5 in. through, in threes on thick peduncles about 1 in. long. Bracts at base small, deciduous. Calyx silky, lobes 5 or 6, ovate. Anthers with a broad membranous point. Fruit cuneiform, slightly hairy. *Hab.* Dense rocky jungle. Perak, Larut (Kunstler). Penang Hill (Porter); road to Sungei Penang (Curtis); Waterfall. *Distrib.* Borneo, Siam.

5. **ADINA**, Salisb.

Trees. Flowers sessile in small heads, paniced (or solitary), terminal and axillary. Calyces free, tube angled, lobes 5, short. Corolla funnel-shaped, throat glabrous, lobes 5. Stamens 5 on corolla mouth; filaments short; anthers oblong. Ovary 2-celled. Stigma globose or clavate. Fruits free, 2-coccous. Seeds many, flat-winged. Species 8 or 9, Asiatic and African.

Heads in threes on axillary peduncles; stigma globose (1) **A. rubescens**  
Heads in large panicles; stigma clubbed . . . . . (2) **A. polycephala**

(1) **A. rubescens** *Hemsl. Journ. Bot.* (1887), p. 204; *King, l.c.* 126.

Tree 60 to 80 ft. tall, 2 ft. or more through, with remarkable perforations in the wood formed by peculiar out-growths. Leaves sub-coriaceous, elliptic, shortly caudate-acuminate, base cuneate, light green; nerves 8 to 10 pairs, prominent beneath; 2.5 to 4 in. long, 1.25 in. wide; petioles .25 in. long. Heads .4 in. through, 3 together on slender peduncles, 1 in. long on a common peduncle .5 in. long, pubescent. *Hab.* Common in forest. Singapore, Tanglin; Bukit Timah. Malacca, Ayer Panas (Cantley); Batang, Malacca. Selangor, Rantau Panjang (Kloss); Bukit Kutu. Perak, Ayer Larut (Wray); Tapah. Penang Hill at about 600 ft. altitude (Curtis). Lankawi. *Native name*: Merombong. *Use*: The timber is fine, yellow and hard, but owing to the remarkable structure of the trunk, is seldom fit to use for building. A curious tree of large size at Tapah was a hollow cylinder of lattice work about 80 ft. tall, and large enough to contain more than one person. The perforations were only large enough to admit the hand.

(2) **A. polycephala** *Benth. Flor. Hongkong*, 146; *King, l.c.* 127. *var. macrophylla*.

A big tree. Leaves sub-coriaceous, oblong-oblancoate, shortly caudate-acuminate; nerves 7 to 10 pairs, prominent beneath, glabrous; 6.5 to 10 in. long, 1.5 to 4 in. wide; petioles .2 to .6 in. long. Flower-heads .35 in. through, very numerous in a terminal pubescent panicle, 2 in. long, 3 in. wide. Flowers creamy white, .1 in. long. Corolla-lobes short, blunt. Style long, exsert enlarged upwards. Bracts at base of branches large, round, caducous. *Hab.* Forests; not very common. Malacca, Bukit Sadanen (Derry); Brisu. Penang, near the waterfall and at Telok Bahang (Curtis). *Distrib.* Burma, Cochin-China, Sumatra, Java.

The typical form from Sylhet has smaller leaves, more lanceolate and smaller flower-heads than our form.

6. **UNCARIA**, Schreb.

Woody climbers, often very large. Leaves more or less coriaceous. Flowers in globose heads, peduncled; peduncles without flowers converted into stout hooks. Calyx cylindrical, 5-lobed. Corolla-tube long, narrow, throat glabrous, lobes 5. Stamens short

on corolla mouth. Ovary fusiform; style long, slender. Capsule fusiform, 2-valved. Seeds very numerous, minute, winged at each end. Species 40, mostly Malayan.

The species are commonly known as "Akar Kait" from their hooks.

*Calyx-lobes narrow, acute.*

Flowers and capsules sub-sessile.

Calyx-lobes linear, long . . . . . (1) *U. Roxburghiana*

Calyx-lobes very short . . . . . (2) *U. parviflora*

Capsules pedicelled.

Leaves pubescent beneath.

Calyx-lobes lanceolate shorter than tube;  
flowers .75 in. long; leaves 2 to 3 in. long.

Slender climber . . . . . (3) *U. lanosa*

Big liane; flowers 1.5 in. long, silvery  
velvety; leaves 5 to 7 in. long . . . . . (4) *U. sclerophylla*

Flowers 1 in. long; leaves smaller,  
narrower . . . . . (5) *U. pedicellata*

Calyx-lobes filiform longer than tube, very  
hairy all over . . . . . (6) *U. ferrea*

Nearly glabrous except leaves beneath . . . . . (7) *U. glabrata*

Leaves glabrous.

Calyx-lobes shorter than tube . . . . . (8) *U. Kunstleri*

Calyx-lobes as long . . . . . (9) *U. Wrayi*

*Calyx-lobes short, blunt, broad.*

Slender climbers; nerves 3 to 4 pairs; leaves  
glabrous not glaucous beneath.

Leaves membranous . . . . . (10) *U. ovalifolia*

Leaves coriaceous . . . . . (11) *U. trinervis*

Nerves 5 to 6 pairs . . . . . (12) *U. jasminiflora*

Big liane; leaves coriaceous, glaucescent be-  
neath; petioles winged . . . . . (13) *U. pteropoda*

Slender climbers; leaves more or less hairy.

Leaves thin, hair-tufts on the nerve-axils  
beneath . . . . . (14) *U. Gambir*

Leaves glaucous beneath; nerves hairy . . . . . (15) *U. canescens*

Leaves hairy on midrib and nerves . . . . . (16) *U. dasyoneura*

Leaves hairy beneath; calyx and tube  
long; teeth very short blunt . . . . . (17) *U. attenuata*

(1) *U. Roxburghiana* Korth. *Ver. Nat. Gesch. Bot.* 172; King, *l.c.* 129.

Slender climber, tomentose. Leaves thinly coriaceous, ovate cuspidate, base round, roughly short hairy; nerves 5 pairs depressed above, elevate beneath as are reticulations, 2.5 to 3.5 in. long, 1.5 to 2 in. wide; petioles .15 in. long tomentose. Peduncles .4 in. long, hairy. Heads .75 in. through. Calyx .15 in. long, lobes linear pilose twice as long as tube. Corolla .3 in. long, very slender, light grey tinged pink, glabrous, lobes short, blunt. Capsule sub-sessile, fusiform glabrous, .35 in. long. *Hab.* Borders of woods; Singapore, Bukit Panjang; Chua Chu Kang; Bukit Timah. Johor, Pinerong. Selangor, Kwala Lumpur; Ulu Selangor. Perak, Larut (Kunstler). *Distrib.* Sumatra.

(2) *U. parviflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 75.  
*U. lanosa* var. *parviflora* Ridl. *l.c.* 59, p. 109.

Climber. Stem 4-angled, hairy. Leaves membranous lanceolate acuminate, base broad, scabrid hairy above, velvety hairy beneath; nerves 7 pairs; 2.75 in. long, 1.25 in. wide; petioles .1 in. long. Stipules bifid linear acuminate. Peduncles 1 in. long. Heads .5 in. through. Calyx sessile, obconic silky, lobes very short oblong-lanceolate. Corolla sparsely silky; tube very slender .2 in. long; lobes oblong-ovate. *Hab.* Open country in thickets. Perlis, Chupeng (Ridley).

(3) *U. lanosa* Wall. in Roxb. *Fl. Ind.* (ed. Carey) ii. 131; Wall. *Cat.* 6110.

Slender hairy climber. Leaves membranous, ovate-lanceolate shortly acuminate, base round or shortly narrowed, above sparsely hairy, beneath hairy; nerves both sides, 7 pairs densely hairy; 2.15 to 3.5 in. long, 1 to 1.6 in. wide; petioles .2 in. long, hairy. Peduncles .5 in. long. Heads rather lax, 1.5 in. through. Bracts linear, 4 glabrous. Calyx pedicelled, glabrous, fusiform, lobes 5, hairy, as long. Corolla .75 in. long, tube very slender, yellowish white, lobes linear, glabrous. Fruit-heads 2 in. through. Capsule glabrous, .3 in. long; pedicel .5 in. long. *Hab.* Open woods. Malacca, Chabau. Pahang, Kota Tongkat (Evans). Perak (Scortechini). Penang Hill (Wallich, Curtis). *Distrib.* Siam.

(4) *U. sclerophylla* Roxb. *Hort. Beng.* 86; *Fl. Ind.* i. 520; *King, l.c.* 129 (Fig. 76, p. 13).

Big climber. Branches red-tomentose 4-angled. Leaves coriaceous oblong or ovate, base round minutely cordate, glabrous shining above; nerves 9 to 10 pairs, pubescent above, prominent and pubescent beneath with elevated hairy parallel secondary nerves and reticulations, 5 to 6 in. long, 3 to 5 in. wide; petioles .4 to .6 in. long, pubescent. Heads 4 to 5 in. through; peduncles pubescent, 3 in. long, thick. Flowers silvery velvety. Calyx .2 in. long, tube short. Corolla 1.25 in. long, silvery velvety outside. Capsule 1 in. long, pubescent. *Hab.* Thickets of woods. Common. Singapore, Jurong; Gardens; Reservoir. Johor, Tenggara (Feilding); Tebing Tinggi. Pahang River, Pulau Mawas; Tahan. Malacca, Brisu; Bukit Panthur (Derry). Selangor, Kwala Lumpur; Semangkok Pass. Perak, Goping and Larut (Kunstler); Thaiping (Long); Hermitage Hill. Penang Hill (Maingay). Tringganu, Bundi (Rostados). *Distrib.* Malay islands.

(5) *U. pedicellata* Roxb. *Hort. Beng.* 86; *King, l.c.* 130.

Stem 4-angled, sparsely pubescent. Leaves coriaceous elliptic-ovate, blunt, glabrous above except nerves beneath; nerves 8 pairs elevate as are reticulations and pubescent; 4.5 in. long, 2.75 in. wide; petioles .1 to .75 in. long, pubescent. Heads 2 in. through; peduncles 2 in. long. Flowers .75 in. long. Corolla-tube slender, lobes small. Capsule fusiform .5 in. long, ribbed velvety. *Hab.* Open

country. Common. Singapore, Bukit Timah; Toas. Johor, Batu Pahat. Pahang, Sungei Jelai (Machado); Sungei Pahang (Watson). Malacca, Ayer Panas (Griffith); Durian Tunggul (Derry). Selangor, Kwala Lumpur; Semangkok; Perak, Larut and Batang Padang (Kunstler). Province Wellesley, Ara Kuda (Curtis); Penang Hill. Tringganu, Bundi (Rostados). *Distrib.* Borneo, Sumatra.

(6) *U. ferrea* DC. *Prodr.* iv. 348; *King, l.c.* 131.

Slender climber, hairy all over. Leaves ovate acuminate, base round or shortly narrowed, membranous; nerves 8 pairs, slender,

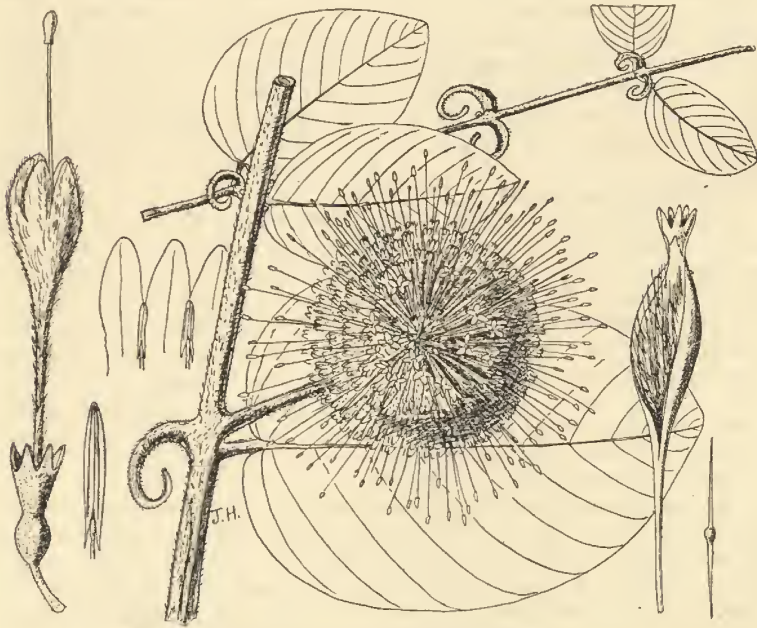


FIG. 76.—*Uncaria sclerophylla*.

elevate; 2.5 to 3.25 in. long, 1.35 to 2 in. wide; petioles .1 to .2 in. long. Peduncles 1 in. long. Heads rather lax, 1.5 in. through in flower, 2 to 3 in. in fruit. Calyx short-stalked, .25 in. long, silky, lobes filiform longer than tube. Corolla .5 in. long, glabrous, lobes oblong, dull red. Capsule fusiform pubescent, .75 in. long; pedicels as long. *Hab.* Borders of woods and rivers in the low country. Pahang, Kwala Lipis; Kwantan (Foxworthy). Perak, road to Kwala Kangsa (Curtis); Larut (Kunstler). Kelantan, Kwala Aring (Yapp); Kwala Lebir (Gimlette). Penang (Curtis).

var. *tomentosa* King, *l.c.*

Leaves coriaceous, whole plant densely red-tomentose. Calyx

and capsules more silky. *Hab.* Pahang, Pulau Chengei, Pahang River; Malacca, Bukit Panchur (Derry); Chabau. Negri Sembilan, Seremban; Johol. Perak, Goping (Kunstler). Kedah, Gerun (Haniff). *Distrib.* Tenasserim.

(7) **U. glabrata** DC. *Prodr.* iv. 348; *King, l.c.* 131. *U. Lobbia* Hook. *fl. F.B.I.* iii. 33.

Slender climber, glabrous. Leaves oblong cuspidate, base rounded, glabrous except midrib and nerves sparsely hairy, 3 in. long, 1.5 in. wide; petioles .1 in. long. Peduncles thick, narrowed upwards 1 in. Heads 1 in. through. Bracts linear .2 in. long. Calyx silky. Corolla .3 in. long, tube slender, glabrous; lobes oblong puberulous. Fruit slender glabrous, .5 in. long; pedicels .25 in. long. *Hab.* Woods, chiefly in the southern lowlands. Singapore, Jurong; Bukit Mandai; Pulau Ubin; Jurong. Johor, Tempayan River. Muar (Curtis). Selangor, Sungei Buloh; Batu Tiga; Rawang. Tringganu, Bundi (Rostados). *Distrib.* Malay islands.

(8) **U. Kunstleri** King, *l.c.* 132.

Stiff climber, 60 to 100 ft. long, 1.5 to 2 in. through. Leaves stiffly coriaceous, elliptic or sub-obovate, base narrowed, short acuminate minutely puberulous; nerves 5 to 6 pairs, prominent beneath, sunk above; 2.5 to 4.5 in. long, 1.25 to 2.25 in. wide; petioles .35 to .5 in. long. Peduncles .2 to .5 in. long. Heads 1 in. through. Flowers cream colour. Calyx .1 in. long, stalked, lobes shorter than funnel-shaped tube pubescent. Corolla .3 in. long, lobes oblong, white with cream-coloured stamens. *Hab.* In dense forest clinging to trees. Apparently very local. Perak, Larut (Kunstler); Waterfall, Thaiping.

(9) **U. Wrayi** King, *l.c.* 132.

Branches slender. Leaves coriaceous, obovate-elliptic, short blunt acuminate, base narrowed, glabrous; nerves 5 pairs inconspicuous, reticulations visible, 2.5 to 3 in. long, 1.35 to 1.9 in. wide; petioles slender .5 in. long. Peduncles more than .5 in. long. Calyx pedicelled pubescent, .2 in. long, tube cylindrical, lobes lanceolate. Corolla pubescent. *Hab.* Perak (Wray).

I have not seen this plant.

(10) **U. ovalifolia** Roxb. *Hort. Beng.* 86; *King, l.c.* 132.

Slender climber. Branches 4-angled glabrous. Leaves membranous, elliptic to ovate-elliptic shortly acuminate, base very short narrowed, glabrous; nerves 3 to 4 pairs; 1.75 to 2.75 in. long, .85 to 1.4 in. wide; petioles .35 to .45 in. long. Peduncles slender .5 to 1 in. long. Heads 1 in. through in flower, 1.5 in. in fruit. Calyx sub-sessile pubescent, lobes oblong nearly glabrous. Corolla .5 in. long, tube slender, pubescent. Capsule fusiform .4 to .5 in. long. Pedicel pilose. *Hab.* Common in woods, often in damp spots, Singapore, Ang Mo Kio; Chan Chu Kang; Garden Jungle.



Johor, Batu Pahat. Malacca, river-bank (Griffith); Merlimau. Selangor, Rantau Panjang (Kloss); Kwala Lumpur. *Distrib.* Burma, Borneo.

A monstrous form with abortive paniced flowers often occurs.

(11) *U. trinervis* *Haviland, Journ. Linn. Soc.* xxxiii. 80; *King, l.c.* 133.

Stems slender. Leaves coriaceous ovate or elliptic, shortly broad acuminate, base narrowed, glabrous minutely reticulate; nerves 3 pairs prominent beneath; 3.5 to 4.5 in. long, 1.75 to 2.5 in. wide; petioles .7 to .9 in. long. Heads racemose 1 in. through; peduncles .75 in. long, pubescent. Flowers sub-sessile. Calyx .1 in. long. Corolla .25 in. long. All tomentose. Capsules fusiform pilose, .5 in. long. *Hab.* Penang Hill (Curtis). Scarce.

(12) *U. jasminiflora* *Hook. fil. F.B.I.* iii. 32.

Branches slender, 4-angled. Leaves thinly coriaceous, glabrous, elliptic shortly blunt acuminate, base cuneate; nerves 5 or 6 pairs; 2 to 5 in. long, 1 to 2.5 in. wide; petioles .5 in. long, puberulous. Peduncles .5 to 1 in. long. Heads 1.25 in. through, 1.75 in. in fruit. Calyx short-pedicelled .15 in. long, pilose, fusiform, lobes campanulate. Corolla .5 in. long, tube slender, silky outside. Capsule .5 in. long, fusiform .4 in. long; pedicel .2 in. long, ribbed. *Hab.* Woods and forests. Singapore, Bukit Mandai; Gardens; Jurong, mangrove swamp. Selangor, Petaling. Perak (Kunstler). *Distrib.* Borneo.

The variety *macrophylla* King has rather large leaves.

(13) *U. pteropoda* *Miq. Fl. Ind. Bat.* ii. 243; *King, l.c.* 134.

A big liane. Branches stout, 4-angled. Leaves coriaceous elliptic round with short blunt point, base round, glabrous; nerves 8 pairs, depressed above, prominent beneath with numerous transverse parallel nerves; 5 to 6.5 in. long, 3.5 to 5 in. wide; petioles .35 to .85 in. long, strongly undulate winged. Peduncle 1.25 in. long. Heads 1.25 in. wide in flower, 4 in. in fruit. Calyx stalked .3 in. long, pubescent, fusiform, lobes oblong. Corolla .9 in. long silky. Capsule fusiform .75 to 1 in. long, stalk as long. *Hab.* Common in open country in thickets and forest edges. Singapore, Bukit Timah; Garden Jungle. Selangor; Kwala Lumpur. Perak, Ulu Bubong (Kunstler). Penang (Curtis). Tringganu, Bundi (Rostados). *Distrib.* Sumatra, Borneo.

(14) *U. Gambir* *Roxb. Hort. Beng.* 86; *King, l.c.* 135.

Slender climber (cultivated into a bush). Leaves membranous ovate acuminate, base round, glabrous except for tufts of hairs at the base of main nerves 4 to 5 pairs beneath; .3 to .5 in. long, 1.85 to 2.25 in. wide; petioles .25 in. long. Peduncles slender, 1 in. long. Heads 1.75 in. across, in fruit 2.75 in. Calyx short-stalked .35 in. long, silky, tube cylindric, lobes ovate. Corolla .5 in. long,

tube slender red, sparsely silky, lobes cream white, oblong blunt. Capsule narrow fusiform, 1 in. long, pubescent. Pedicels .2 to .4 in. long. *Hab.* Cultivated and occasionally remaining in forests where the abandoned cultivation has been overgrown. *Hab.* Singapore, Johor, Malacca, Perak. It occurs in the middle of the Bukit Timah forest apparently wild, but probably an escape from the cultivations which formerly surrounded the hill. It is probably not indigenous to our Flora. *Distrib.* Borneo, Sumatra. *Native name:* Geta Gambir, a perversion of Katé Krambu (Scented Cutch). *Use:* For chewing with betel nut and as an important tanning material, cultivated by Chinese.

(15) *U. canescens* Korth. *Verh. Nat. Gesch. Bot.* 172; *King, l.c.* 135.

Slender climber. Leaves coriaceous elliptic to ovate blunt short acuminate, round or narrowed at base, glabrous except midrib and nerves 5 to 6 pairs on both sides, glaucous beneath, 3 to 5 in. long, 1.85 to 3 in. wide; petioles .7 in. long, pubescent. Peduncles slender, .5 in. long. Heads 1 in. through. Calyx .15 in. long, short-stalked, pilose fusiform, lobes broad blunt. Corolla .3 in. long, pilose cylindric, lobes short lanceolate. *Hab.* Forests, not common, chiefly in the northern part. Perak, Goping (Kunstler). Penang Hill. *Distrib.* Sumatra.

(16) *U. dasyoneura* Korth. *Verh. Nat. Gesch. Bot.* 169; *King, l.c.* 136.

Branches slender. Leaves membranous shortly acuminate, base round or narrowed, glabrous except the hairy midrib and nerves 4 to 6 pairs; 3 to 4 in. long, 1.75 to 2.25 in. wide; petioles .5 in. long. Peduncle .2 in. long, pubescent above. Heads 1 in. through. Flowers sub-sessile. Calyx urceolate tomentose, .15 in. long, lobes blunt. Corolla .45 in. long, tube narrow, cylindric, hairy limb campanulate. Capsule fusiform, glabrous .8 in. long; pedicels slender .2 in. long. *Hab.* Malacca (Griffith); Perak, Larut (Kunstler); Penang Hill (Porter, Phillips, Curtis). *Distrib.* Java, Ceylon.

(17) *U. attenuata* Korth. *Verh. Nat. Gesch. Bot.* 170, t. 34.

Slender. Leaves coriaceous elliptic, base shortly narrowed, tip bluntly acuminate, glabrous above; nerves transverse nerves and reticulations hairy beneath; nerves 6 to 8 pairs prominent beneath; 3 to 5 in. long, 1.75 to 3 in. wide; petioles .4 to .5 in. long. Peduncles 1 in. long, velvety. Heads 1.5 in. through. Calyx short-pedicelled, .15 in. long, red-tomentose, tube inflated, limb as long with short teeth. Corolla .3 in. long, slender, lobes oblong blunt. Capsule fusiform, .7 to .9 in. long. *Hab.* Forests, Singapore, Bukit Mandai. Malacca, Brisu (Holmberg); Nyalas (Derry). Province Wellesley, Nibong Tebal (Curtis). Penang Hill and Mount Elvira (Curtis). Tomoh (Machado). Kelantan, Kwala Lebir. *Distrib.* Tenasserim, Borneo.

## DOUBTFUL SPECIES

U. ACIDA Roxb. *Fl. Ind.* i. 520; *Nauclea acida* Hunter, is not sufficiently well described to identify. It was collected by Hunter at Sungei Clooan in Penang.

## 7. COPTOSAPelta, Korth.

Climbing shrubs. Branches terete. Leaves coriaceous, softly hairy beneath. Stipules triangular. Flowers in many-flowered thyrsoïd panicles; buds 5-angled. Calyx-tube ovoid, 5-ridged, limb 5-toothed. Corolla coriaceous, salver-shaped, tube narrow, lobes oblong, blunt, valvate as long as tube or longer. Stamens 5; filaments short; anthers long, linear, bifid at base, backs hairy. Ovary 2- to 3-celled; style short. Capsule sub-globose, loculicidally dehiscent by 3 or 4 valves. Seeds numerous, peltate, winged. Species 3 or 4, Malayan.

- |   |                          |
|---|--------------------------|
| Flowers 1 in. long, white; tube nearly as long as lobes;<br>capsule glabrous  | (1) <i>C. flavescens</i> |
| Flowers .85 in. long, white; tube much shorter; capsule<br>pubescent          | (2) <i>C. Griffithii</i> |
| Flowers .3 in. long, green; tube nearly as long as lobes;<br>capsule glabrous | (3) <i>C. parviflora</i> |

(1) *C. flavescens* Korth. *Ned. Kruidk. Arch.* ii. 113; King, *l.c.* 138.

Lofty climbers. Branches, panicles, under surface of leaves minutely soft hairy when young. Leaves elliptic or ovate, base round, above light shining green; nerves 4 to 5 pairs; 2.5 to 4 in. long, 1.5 to 2.5 in. wide; petioles .2 to .3 in. pubescent. Stipules acuminate. Flowers 1 in. long, white, fragrant. Calyx .05 in. long, tubular, pilose, teeth small. Corolla .3 in. long, narrow, lobes oblong, .4 in. long. Capsule obovoid, glabrous .2 to .4 in. long, yellow. *Hab.* Common in forests climbing to tops of trees; a very pretty fragrant climber. Singapore. Malacca, Selandor (Cantley); Jus; Ayer Panas (Goodenough). Pahang, Temerloh. Selangor, Ulu Gombak (Burn-Murdoch). Perak, Cheroh and Kwala Kangsa (Wray); Goping (Kunstler); Batang Padang (Kunstler). Penang, highlands (Porter). *Distrib.* Burma, Malaya. *Native names:* Akar Mumbanang; Meroyan putih; Balingon Akar; Prual. *Use:* Root-bark used as dart poison by Sakais.

(2) *C. Griffithii* Hook. *fl. Ic. Pl. t.* 1089; King, *l.c.* 138.

Leaves orbicular-ovate, hairy beneath, 2.5 in. long, 1.75 in. wide, base broad; nerves 3 or 4 pairs. Panicles few-flowered, terminal and axillary. Flowers .85 in. long. Calyx .2 in. long, tube obconic, grooved tomentose, limb as long as tube campanulate, teeth broad. Corolla-tube .25 in. long, white, throat woolly; lobes linear-oblong blunt. Capsule obovoid .4 in. long, pubescent. *Hab.* Not rare in woods. Singapore, Garden Jungle; Chan Chu

Kang. Malacca, Merlimau (Holmberg); Bukit Sadanen (Derry). Pahang, Temerloh. Negri Sembilan, Gunong Berumban (Cantley); Perak, Goping (Kunstler). *Native names*: Akar Malong; Sumpuh Puchut. *Use*: For colic.

(3) *C. parviflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 75, p. 76.

Lofty climber nearly glabrous. Branches slender, sparsely white hairy. Leaves elliptic acuminate, base narrow, nearly glabrous, membranous; nerves 4 pairs finely reticulate; 3 in. long, 1.5 in. wide; petioles .1 in. long. Panicles terminal, lax spreading, 3 in. long, sparingly white hairy; branches bracteate with narrow linear bracts. Flowers green. Calyx pedicelled .1 in. long, obconic silky; limb campanulate, lobes 5, ovate. Corolla-tube .2 in. long, white silky, lobes linear-oblong nearly as long glabrous, keeled, mouth of tube silky. Fruit panicle enlarged, 3 in. long, 6 in. across; branches angled, nearly glabrous. Fruit .2 in. long globular-ovoid glabrous. *Hab.* Climbing to tops of trees in forests, Singapore, Bukit Timah (Ridley). Penang (Curtis). *Distrib.* Borneo.

### 8. HYMENODICTYON, Wall.

Trees or shrubs. Branches thick. Leaves deciduous. Flowers small spicate in axillary and terminal nodding panicles. Calyx-tube short, lobes 5 or 6. Corolla funnel-shaped glabrous inside, lobes 5, short, valvate. Stamens 5; filaments short dilate upward. Ovary 2-celled; style filiform. Stigma fusiform. Capsule loculicidally 2-valved. Seeds many, broadly winged. Species 4 to 5, African and Asiatic.

(1) *H. excelsum* Wall. *Roxb. Fl. Ind. (ed. Carey)*, ii. 149; *Hook. fil. F.B.I.* iii. 35.

Tree 30 to 40 ft. tall. Leaves membranous ovate elliptic or obovate abruptly acuminate, pubescent narrowed to petiole; nerves 5 pairs, depressed above, slightly elevate beneath, 4 to 10 in. long, 3 to 5 in. wide; petioles 1 to 4 in. long. Panicles large, 8 in. long, pubescent. Flowers small, .2 in. long, white. Capsule ellipsoid .75 in. long. Seeds .2 in. long. *Hab.* Lankawi at Telok Sinn (Haniff). *Distrib.* Indo-Malaya.

### 9. MUSSAENDOPSIS, Baillon.

A big glabrous tree. Leaves very coriaceous, broad, petiolate. Stipules oblong, coriaceous. Flowers in axillary cymose lax panicles; branches spreading. Calyx puberulous, campanulate; limb truncate with 5 minute and frequently 1 large obovate stalked, white. Corolla-tube short, lobes thick, oblong 5. Stamens 5; anthers linear-oblong. Ovary 2-celled; ovules numerous; style fleshy, short. Capsule oblong clavate. Seeds small, winged. Species 2, Malayan.

(1) **M. Beccariana** *Baill. Adans.* xii. 282; *King, l.c.* 139; *Stapf Ic. Pl.* 2388. *Creaghia fagræopsis* *Scort. Journ. Bot.* 1884, p. 370.

Leaves sub-orbicular dark green; nerves 6 pairs, yellow; nervules inconspicuous, parallel; 4 to 6 in. long, 2.75 to 4.5 in. wide; petioles .75 in. long. Stipules oblong, blunt, 1 in. long. Panicles 6 in. long, 8 in. wide; peduncles 4 in. long. Calyx .15 in. long, foliaceous lobe 1 to 1.25 in. long, .8 in. wide. Corolla-lobes .15 in. long. Capsule .6 in. long, puberulous, .2 in. through. *Hab.* Woods in low country. Singapore, Chan Chu Kang; Johor, Penyabong (Foxworthy). Malacca, Merlimau (Derry). Perak, Larut near coast and Goping (Kunstler); Sungkai (Foxworthy). *Distrib.* Borneo, Sumatra. *Native names:* Selumar; Malabira Bukit.

#### 10. WENDLANDIA, Bartl.

Small tree or shrub. Stipules entire or bifid. Flowers small white (or rose) in dense terminal panicles. Calyx-lobes 4 to 5, small. Corolla tubular or funnel-shaped, lobes 4 to 5, imbricate. Stamens 4 to 5. Anthers versatile exsert. Ovary 2-celled; ovules numerous; style filiform. Capsule small, globose 2-valved, many-seeded. Seeds minute. Species 16, tropical Asia.

(1) **W. paniculata** *DC. Prodr.* iv. 411; *Hook. fil. F.B.I.* iii. 39.

Small tree 15 to 20 ft. tall. Leaves membranous elliptic sub-acute, base narrowed, slightly pubescent beneath, 4 to 7 in. long, 2 to 4 in. wide; petioles .4 in. long. Panicles 6 to 9 in. long spreading, villous. Flowers very numerous, waxy-white, .12 in. long. Corolla-tube cylindric, lobes short. *Hab.* Forests, from 3000 to 4400 ft. altitude. Perak, Thaiping Hills (Curtis, Kunstler, etc.). *Distrib.* Assam, Borneo, Java.

#### 11. GREENIA, W. and A.

Shrub. Branches terete. Leaves soft, membranous large. Flowers in panicle scorpioid cymes, small. Calyx turbinate, lobes 4 or 5, subulate or ovate, one longer than the others. Corolla funnel-shaped, pubescent outside, tube long almost glabrous inside, lobes 4 to 5, ovate. Stamens 4 to 5 insert in corolla mouth; filaments short; anthers bifid at both ends. Ovary 2-(or 3)-celled; style filiform. Stigmas 2, linear revolute. Capsule small, globose, 2-celled dehiscing into 2 valves septically. Seeds falcate. Species 5 to 6, Indo-Malaya.

(1) **G. Jackii** *W. and A. Prodr.* 404; *King, l.c.* 140.

Shrub about 12 ft. tall. Branches and stem slender. Leaves oblanceolate, shortly acuminate, light green, pubescent on both surfaces; nerves 20 to 30 pairs; 12 in. long, 2 to 3.5 in. wide; petioles .5 to 1 in. long. Panicles branched tomentose; peduncles 2 to 3 in. long; branches 3 to 4 in. long. Flowers numerous,

second sessile, .3 in. long, light green. Capsule globose less than .1 in. through, epicarp peeling off. *Hab.* Dry rocky banks and low hills. Pahang River. Malacca, Bukit Naning (Cantley); Selangor, Rantau Panjang (Kloss); Bukit Kayu Kapur (Goodenough). Negri Sembilan, Linsum; Seremban. Perak, Ulu Bubong (Kunstler); Temengoh. Dindings, Lumut. Penang, hill common; Tanjong Bunga. Province Wellesley, Bukit Mertajam. Kelantan, Lebir River; Chaning. *Native names:* Landas Payah; Lida Burong Besar; Sukam Bulan.

## 12. ALEISANTHIA, Ridl.

Shrubs, hairy. Leaves white beneath, many-nerved. Stipules free lanceolate. Inflorescence axillary of 2 or more racemes with distant second flowers, short pedicelled, small. Calyx-lobes nearly free or forming a cup. Corolla-tube short, cylindrical; limb above campanulate of 5 short lobes (or 6) woolly at mouth of tube within. Stamens 5 or 6 adnate to corolla included. Style cylindrical. Stigma globose. Capsule hairy splitting into 2 woody carpels dehiscing on the inner face. Seeds small, angular reticulate. Species 2, Malay Peninsula.

Tall shrub; leaves lanceolate, 7 in. long; racemes 4 in.

long (1) *A. sylvatica*

Dwarf bush; leaves obovate, 1 to 2 in. long; inflorescence 1 in. long

(2) *A. rupestris*

(1) *A. sylvatica* Ridl. *Journ. F.M.S. Mus.* x. 138.

Tall shrub about 15 ft. high, hairy. Leaves lanceolate cuspidate-acuminate long, narrowed to base, glabrous above, white and hairy beneath; nerves 25 pairs, nervules transverse parallel; 7.5 in. long, 2.25 in. wide; petioles winged to base. Stipules lanceolate cuspidate, .4 in. long. Inflorescence axillary; peduncles .5 in. long, racemes 2, slender, 4 in. long with second distant short-pedicelled flowers all hairy. Calyx-tube cylindrical hairy, limb campanulate, glabrous with 5 short points. Corolla-tube cylindrical very short, limb campanulate hairy, coriaceous yellow with 5 or 6 short lobes densely woolly at base, .25 in. wide and long. Stamens 5 or 6; filaments very short attached to tube; anthers with a short appendage, all glabrous. Style cylindrical longer than tube. Stigma clubbed. Capsule fusiform, .25 in. long, hairy outside. *Hab.* Dry woods on low hill-tops. Kelantan, hill woods Kwala Lebir (Ridley).

(2) *A. rupestris* Ridl. *Journ. F.M.S. Mus.* x. 138. *Xanthophytum rupestre* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 44.

Small shrub 6 to 8 in. tall. Branches silky. Leaves obovate to ovate acuminate acute, both ends coriaceous, glabrous above, white-felted beneath; nerves 10 pairs, prominent beneath; 1 to 2 in. long, .75 to 1 in. wide; petioles .08 in. long. Stipules as long, ovate acuminate. Panicles very short scorpioid axillary,

2-branched. Calyx-lobes 5, triangular acute. Corolla .25 in. long, yellow, densely white-woolly outside, tube abruptly dilate above, lobes 5, ovate. Stamens 5, included adnate to tube. Stigma oblong large capitate. Capsule .13 in. long, cylindric-turbinate, woody. Seeds numerous, reticulate angular. *Hab.* On sandstone rocks 600 to 1000 ft. altitude, in clefts. Local. Selangor; Klang Gates (Ridley).

### 13. BECHERIA, Ridl.

Small branched shrub. Leaves thin elliptic cuspidate. Stipules ovate triangular. Inflorescence terminal cymose. Flowers small, white, bracts lanceolate to orbicular. Calyx-lobes 4, orbicular, enlarging after fall of the corolla, thin, oblong obtuse. Corolla-tube short, glabrous; lobes valvate 4, ovate, shorter than tube. Anthers sub-sessile, linear acuminate in mouth of tube. Style short. Stigma clubbed. Fruit globose, woody, 2-celled, 2-ovuled.

(1) *B. parviflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 20.

Bark pale. Leaves glabrous; nerves 12 to 13 pairs; 7 to 8 in. long, 3.5 to 3.75 in. wide; petioles .25 in. long. Stipules cuspidate, nearly .25 in. long. Peduncles 1 to 2 in. long with 3 or 4 branches, pubescent. Flowers .12 in. long, crowded at branch ends. Bracts, lower lanceolate, upper orbicular ciliate. Calyx-lobes ciliate. Corolla greenish white, sub-coriaceous. *Hab.* Forests; not common, in shady spots. Selangor, Batu Caves. Pahang, Kwala Tembeling. Perak, Tapah (Ridley). *Distrib.* St. Barbe Isle.

### 14. ARGOSTEMMA, Wall.

Small herbs. Leaves membranous to fleshy, equal or very unequal. Stipules entire. Flowers in peduncled cymes, white. Calyx-tube short, campanulate, lobes 4 or 5, star-like. Stamens 4 to 5 with large connivent anthers, often opening by pores; filaments short. Capsule membranous, 2-celled, many-seeded. Seeds minute. Species 40 to 50, sub-tropical and tropical Asiatic mountain forests, 1 African.

(a) *Leaves of pairs equal or nearly so.*

Leaves 2 to 7 whorled at top of stem.

Leaves lanceolate acuminate; flowers rather small

(1) *A. acuminatum*

Leaves ovate-acute, broad; flowers rather large

(2) *A. diversifolium*

Leaves ovate-oblong, base truncate

(3) *A. subinæquale*

Leaves 2 to 4, broad ovate, blunt veined white; petioles very short

(4) *A. pictum*

Leaves scattered in pairs on the stem.

Leaves quite glabrous, fleshy; stem 12 in. tall.

(5) *A. Yappii*

Leaves ovate-cordate, sparsely hairy on upper surface

(6) *A. membranaceum*

Leaves and stem hairy; stem erect, 6 in. or more long; leaves broad.

Leaves mostly towards top, ovate

(7) *A. nutans*

- Leaves in distant pairs, elliptic . . . (8) *A. urticifolium*  
 Leaves small, ovate-lanceolate, very  
 viscid . . . (9) *A. viscidum*  
 Stems slender, creeping; leaves small, all  
 hairy.  
 Leaves oval or lanceolate, 1·8 in. long . (10) *A. æquifolium*  
 Leaves under 1 in. long; flowers solitary. (11) *A. muscicola*  
 Leaves under 1 in. long; flowers 2 to 3  
 in an umbel . . . (12) *A. albociliatum*
- (b) *Leaves very unequal, one not much bigger than a stipule.*  
 Leaves 1 terminal pair; large leaf ovate, cor-  
 date, broad.  
 Flower-buds acute . . . . . (13) *A. unifolium*  
 Flower-buds ovoid . . . . . (14) *A. unifolioides*  
 Leaves narrow, lanceolate acuminate . . (15) *A. tenue*  
 Leaves numerous, scattered on the erect stem  
 more or less hairy.  
 Leaves oblong, base oblique, tip blunt;  
 petioles very short.  
 Leaf smooth above; nerves beneath hairy. (16) *A. elatostemma*  
 Leaf nerves prominent above, very hairy  
 on edge and nerves . . . . . (17) *A. nervosum*  
 Leaf elliptic-lanceolate, acute beneath  
 white . . . . . (18) *A. Klossii*  
 Leaves narrow, lanceolate acuminate,  
 densely hairy . . . . . (19) *A. involucrellum*  
 Leaves as above, but sub-glabrous . . . var. *glabrescens*  
 Leaves large, elliptic acute, 6 by 2 in.;  
 petioles 4 in. long . . . . . (20) *A. propinquum*  
 Leaves lanceolate acuminate, 4 by 5 in.  
 denticulate . . . . . (21) *A. lanceolatum*  
 Leaves lanceolate acuminate, 1 to 3 in.  
 long, viscid hairy . . . . . (22) *A. trichanthum*
- Plant glabrous except nerves and stem.  
 Leaves oblong, 6 to 7 in. long, base blunt;  
 nerves beneath hairy . . . . . (23) *A. spinulosum*  
 Leaves obovate oblong; nerves scurfy;  
 stipules large . . . . . (24) *A. stipulaceum*  
 Leaves oblong, 3 in. long; stem and nerves  
 rugose . . . . . (25) *A. rugosum*  
 Leaves oblong acuminate; base narrowed,  
 5 in. long . . . . . (26) *A. subcrassum*  
 Leaves oblong-elliptic, base narrowed, 2 to  
 3·5 in. long . . . . . (27) *A. perakense*  
 Leaves unequally bilobed at base, 2 to 3 in.  
 long . . . . . (28) *A. oblongum*  
 Leaves elliptic or oblong, base unequal  
 cordate, 2·15 in. long . . . . . (29) *A. bicolor*
- Plant quite glabrous or sparsely scurfy on  
 stem.  
 Leaves 2 in. long, base blunt, oblique. . (30) *A. johorensis*  
 Leaves 1 to 2·15 in. long, base blunt, cordate.  
 Leaves narrowed to base, lanceolate;  
 flowers numerous.  
 Leaves 3 by 1·5 in., numerous, entire . (31) *A. ophirensis*  
 Leaves 4 by 1·75 in., few, edge denticulate (32) *A. denticulatum*  
 Leaves 3 by 1 in.; nerves quite invisible;  
 flowers 1 to 3; stamens shorter . . . (33) *A. debile*



- Leaves 2 by 1 in.; nerves quite invisible;  
flowers 2 to 4; stamens as long . . . (34) **A. enerve**
- Leaves 1 by .3 in.; nerves invisible,  
flower 1 . . . (35) **A. grandiflorum**
- Leaves linear acuminate, 3 by .1 in. . . (36) **A. Curtisii**
- Stems slender, creeping; whole plant densely  
softly hairy; leaves ovate . . . (37) **A. hirsutum**
- Plant not densely hairy.
- Leaf oblong blunt, 1 by 4 in. . . (38) **A. Hookeri**
- Leaf lanceolate, rhomboid .75 in. long,  
crenulate . . . (39) **A. reptans**
- Leaves ovate acute, 3 by 1.5 in. . . (40) **A. elongatum**
- Leaves lanceolate acuminate, 2 to 3 by .6  
to .9 in. . . (41) **A. Wrayi**

(1) **A. acuminatum** King, l.c. 143. -

Glabrous except for a few minute scattered hairs. Stem fleshy, erect, simple, 4-angled. Leaves crowded at top of stem, membranous, 6 or 7, lanceolate acuminate, base narrowed, unequal in size; nerves 10 to 15 pairs; 3.5 to 6.5 in. long, 1 to 1.5 in. wide, glaucous beneath; petioles .1 to .4 in. long. Stipules broad-based, acuminate. Cymes terminal; peduncles 2 in. long, simple or branched. Flowers .3 in. long, 7 or 8 together; pedicels .2 in. long. Calyx campanulate, lobes broad. Corolla three times as long as calyx. Capsule hemispheric, 15 in. through. *Hab.* Rare usually on limestone rocks. Selangor, Batu Caves. Perak, Leng-gong; Padang Rengas. Penang (Wallich).

var. *pubescens* Ridl. l.c. with midrib and inflorescence pubescent. Perak, Temengoh (Ridley).

(2) **A. diversifolium** Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 52.

Succulent plant about 6 in. tall, glabrous. Leaves in a pseudo-whorl, 2 to 5, dark green above, pale beneath, base rounded or narrowed, the largest 5 in. long, 3 in. across; nerves 6 pairs. Stipules acuminate lanceolate. Cyme 3 in. long or less, many-flowered; pedicels .5 in. long. Bracts lanceolate to ovate. Calyx-lobes lanceolate-acute. Corolla lobes lanceolate sub-acute. Staminal cone longer, .4 in. long. *Hab.* Limestone rocks. Perak, Lenggong (Ridley).

(3) **A. subinaequale** Benn. *Pl. Jav. Rar.* 95; King, l.c. 144.

Fleshy herb 4 to 8 in. tall. Stem short. Leaves membranous. 2 (rarely 3) broad ovate-oblong acute or acuminate, base broad or shortly cuneate, pale beneath, glabrous except a few hairs on the nerves beneath. Leaves slightly unequal, larger, 4 to 6 in. long, 2.5 to 3.5 in. wide, smaller, 2 to 3 in. long, 1.75 to 2 in. wide; petioles .1 to .2 in. long. Stipules lanceolate, .3 to .75 in. long. Cymes 1 or 2. Flowers .3 in. long; pedicels longer or shorter pubescent. Calyx-tube campanulate, 4 lobes thin lanceolate longer. Corolla longer, lobes ovate-lanceolate acute. Anthers apiculate, bases thick, cordate. *Hab.* Perak (Kunstler). *Distrib.* Sumatra.

I have seen no specimen from this region.

(4) **A. pictum** Wall. in Roxb. *Fl. Ind.* (ed. Carey) ii. 327; King, *l.c.* 144.

Succulent herb 2 to 5 in. tall with 2 (or in large plants 4) leaves at the top, fleshy round-ovate, base broad or cordate glabrous (rarely sparsely hairy), deep black green with white markings above or plain; nerves 4 or 5 pairs; 1 to 3.5 in. long, 1.25 to 2.5 in. wide; petioles very short or none. Umbel 1; peduncle .75 to 3 in. long. Flowers 8 to 12, .15 in. long. Calyx campanulate, puberulous. Corolla twice as long, lobes oblong obtuse. Anthers blunt. *Hab.* Damp rocks in forest; not rare. Johor, Gunong Pant. Pahang, Gunong Tahan; Gunong Irau (Kloss); Telom. Selangor, Klang Gates. Perak, Maxwell's Hill; Bujong Malacca. Penang Hill to 2000 ft. altitude (Phillips, Maingay and others); Lankawi. *Distrib.* Tenasserim, Lingga.

(5) **A. Yappii** King, *l.c.* 145.

Succulent glabrous herb 12 in. tall. Stem rather thick. Leaves several in distant pairs, fleshy nearly equal, elliptic narrowed to both ends; nerves very faint; 2 to 3.5 in. long, .75 to 1.35 in. wide; petioles .15 to .5 in. long. Stipules ovate-oblong blunt, .4 to .7 in. long. Cymes terminal trichotomous, 2 in. long on a peduncle as long. Flowers few, .5 in. long on pedicels 1 in. long. Calyx campanulate, 5-lobed. Corolla 1 in. across, white, lobes oblong-lanceolate longer than stamens. *Hab.* Banks in mountains at about 5000 ft. altitude; not rare. Pahang, Gunong Tahan; Gunong Berumbun (Ridley). Selangor; Ulu Semangkok; Gunong Mengkuang Lebah (Robinson). Perak, Gunong Inas (Yapp).

(6) **A. membranaceum** King, *l.c.* 145.

Glabrous herb 8 to 10 in. tall. Leaves sub-equal, few, thin membranous sub-acute, base ovate-cordate; nerves 4 or 5 pairs; 2.5 to 5 in. long, 1.5 to 3.5 in. wide; petioles as long. Cymes axillary and terminal, dense, 6- to 12-flowered on slender peduncles. Calyx ovoid, .1 in. long, puberulous; teeth narrow lanceolate. *Hab.* Penang (Curtis).

(7) **A. nutans** King, *l.c.* 146.

Succulent herb 3 to 12 in. tall, scurfy-hairy. Leaves slightly unequal, fleshy membranous, oblong to elliptic, base cuneate rarely rounded, above glandular hairy, beneath pale; nerves pubescent 5 to 8 pairs; 1.75 to 4 in. long, .75 to 2 in. wide; petioles .2 to .8 in. long, pubescent. Stipules ovate-lanceolate, .25 in. long. Umbels terminal usually solitary, at first nodding, white tinted violet; peduncles pubescent 1.5 to 3 in. long, a whorl of lanceolate bracts at top. Flowers numerous .3 in. long. Calyx campanulate, tube hairy outside, lobes ovate, glabrous. Capsule ovoid-globular ridged hairy, .05 in. through. *Hab.* Forests. Local, rather variable in size, occasionally glabrous (var. *glabra*), and often with few leaves or only one pair lying flat on the ground, and with a long peduncle. Perak, Gunong Batu Putih and Larut (Kunstler); Tapah (Ridley).

(8) *A. urticifolium* King, l.c. 146.

Stem ascending 8 to 12 in. thick. Leaves membranous, oblanceolate, short acuminate, cuneate sparsely hairy on both sides; nerves 7 to 8 pairs; leaves slightly unequal, largest 3 to 4 in. long, 1·7 to 2 in. wide, smaller 2 to 2·5 in. long, ·9 to 1·2 in. wide; petioles ·3 to ·7 in. long, pubescent. Cyme umbellate; peduncle 4-angled, scurfy 1·5 in. long. Flowers 10 to 12; pedicels hairy, ·3 to ·4 in. long. Calyx globular, campanulate, glandular-hairy, teeth short, acute. Capsule globular, hairy at first. *Hab.* Mountain forests 4000 to 5000 ft. altitude. Selangor, Gunong Semangkok (Curtis); Bukit Hitam (Kelsall). Perak (Scortechini). Pahang, Telom. *Distrib.* Sumatra.

(9) *A. viscidum* Ridl. *F.M.S. Mus. Journ.* iv. 97.

Viscid herb, erect 4 to 6 in. tall. Leaves equal ovate-lanceolate, entire, obtuse, 1·25 in. long, ·5 in. wide, base round, above glabrous pustular, beneath paler; nerves viscid-hairy. Stipules ovate, ·1 in. long. Cyme ·75 in. long; peduncle ·5 in. long. Flowers few; pedicels hairy, short. Calyx cupular, dense hairy, lobes ovate, blunt. Corolla ·5 in. across, lobes lanceolate, blunt hairy. Staminal cone ·25 in. long, glabrous. Capsule ·25 in. wide, hairy. *Hab.* Rocks by streams, rare and local. Pahang, Telom Cascade (Ridley).

(10) *A. æquifolium* Ridl. *Journ. Roy. As. Soc. S. Br.* 35, p. 15. A. Ridley King, l.c. 147.

Stem slender, creeping and rooting, pubescent. Leaves slightly unequal, membranous, narrow, oval or lanceolate acute, base cuneate, midrib and nerves pubescent on both sides, ·8 to 1·8 in. wide; petioles ·15 to ·6 in. long, pubescent. Stipules lanceolate bifid, acute, ·2 in. long. Cyme terminal, 2 in. long, pubescent, a whorl of bracteoles in the middle. Flowers 2 or 3. Calyx campanulate, lobes ovate acute, longer. Capsule obconic ·15 in. through, pubescent. *Hab.* Rare in a stream at 4000 ft. altitude. Malacca, Mt. Ophir (Ridley).

(11) *A. muscicola* Ridl. *Journ. Linn. Soc.* xxxviii. 310.

Small herb 2 in. tall, creeping. Stem very slender, leafy. Leaves elliptic lanceolate, nearly equal, acuminate at both ends, hairy on nerves and edge above; nerves 7 pairs; ·5 to ·75 in. long; petioles very slender, hairy, under ·1 in. long. Stipules ovate blunt, ·1 in. long. Flowers solitary, terminal on a slender pedicel, 1 in. long, hairy. Calyx short campanulate. *Hab.* Local, mossy banks of streams 3500 to 5000 ft. altitude. Pahang, Gunong Tahan, and Wray's Camp (Robinson, Ridley).

(12) *A. albociliatum* Ridl. *Journ. Linn. Soc.* xxxviii. 311.

Creeping herb with slender stem thickly hairy all over, about 6 or 8 in. long. Leaves round or rounded ovate, blunt or short-acuminate, base round, densely hairy above; nerves hairy beneath; ·75 in. long, ·5 in. across, nearly equal; petioles ·1 in. long or less.

Stipules ovate rounded. Peduncle slender, erect, hairy, 2 in. long, a whorl of small bracts in the middle. Flowers 2 or 3 umbelled, on pedicels 3 in. long. Calyx globose-campanulate, .1 in. long, lobes very short, blunt. *Hab.* Mossy banks at 3500 ft. altitude. Pahang, Gunong Tahan (Robinson), Wray's Camp, growing with *A. muscicola*.

(13) *A. unifolium* Benn. *Pl. Jav. Rar.* 94; *King, l.c.* 147.

Rhizome tuberous large. Stem 6 to 8 in. tall, fleshy, with a whorl of small bract-like leaves, ovate .2 to 1 in. long, at the top. Leaf single, ovate, long acuminate, base cordate, dark green, paler beneath, 5 to 9 in. long, 3 to 5 in. wide; petioles .5 to 1 in. long; nerves 9 pairs. Peduncle 2 to 2.5 in. long, bearing a branched panicle 3 in. long or less of umbelled cymes. Flowers rather numerous, .25 in. across. Calyx campanulate. Corolla narrow in bud, about .25 in. across, lobes narrow, lanceolate. Capsule hemispheric, .1 in. wide. *Hab.* On rocks in dense forest at 2000 ft. altitude and upwards. Johor, Gunong Pulai. Malacca, Mt. Ophir. Penang Hill 2000 ft. altitude; Muka Head (Curtis). Kedah Peak (Robinson).

(14) *A. unifolioides* King, *l.c.* 148.

Rhizome large, tuberous; stem 6 to 8 in. tall, succulent. Leaf 1, large orbicular-ovate cordate sessile, 3 to 9 in. long, 3 to 8 in. wide, sparsely sprinkled with cellular hairs or glabrous, fleshy, many-nerved, smaller leaf just below it, about 5 in. long. Peduncle 2 to 4 in. long, glabrous, ending in an umbel of branches 2 to 4 in. long, with about 8 flowers on each, umbelled pedicels .2 to .5 in. long. Flowers .25 in. wide. Calyx small with rounded lobes, .1 in. long. Corolla-lobes broad, lanceolate. *Hab.* On rocks at about 2500 ft. altitude. Perak, Thaiping Hills; Bujong Malacca (Scortechini and others).

(15) *A. tenue* Ridl. *Journ. F.M.S. Mus.* vi. 39.

Rhizome tuberous, very small; stem slender, 1 to 2 in. long. Leaf, large one fleshy, lanceolate-acuminate, base cuneate; nerves very inconspicuous, elevate on upper surface; 2 to 5 in. long, .3 to .75 in. wide; petioles .1 in. long or none. Small leaves 2 to 3, ovate or lanceolate, .2 to .3 in. long. Peduncle slender, 1 to 1.5 in. long with a terminal umbel of branches 1 in. long. Flowers .15 in. long; pedicels .2 in. long or less. Calyx campanulate, .05 in. long. Petals narrow, lanceolate. *Hab.* On rocks in the stream, disappearing in the rainy season. Negri Sembilan, Tampin Hill, at 500 to 1500 ft. altitude (Robinson, Burkill). Apparently a very local plant only known from this spot; flowers August to November.

(16) *A. elatostemma* Hook. *fil. F.B.I.* iii. 45; *King, l.c.* 150.

Stem 4 to 12 in. long, creeping and ascending 4 or 5 in. long, leafy hairy. Leaves thickly membranous, very unequal, larger one oblong oblique, tip broad apiculate or round, base narrowed, unequally cordate, above glabrous except nerves occasionally

pubescent beneath, minutely scaly; nerves 9 pairs and reticulations strongly elevate, hairy; 1.25 to 2.25 in. long, .75 to 1 in. wide; petioles .1 to .2 in. long. Small leaves ovate-lanceolate, .15 to .2 in. long. Stipules similar. Cyme peduncle 1.5 in. long, pubescent. Flowers 2 to 5 on pedicels .4 in. long. Calyx campanulate, pubescent lobes short, tooth-like acute. Corolla .6 in. across, lobes narrow, lanceolate linear. Fruit globose, campanulate, .1 in. long, glabrous or pubescent. *Hab.* Banks in forest; not rare. Negri



FIG. 77.—*Argostemma involuclatum*.

Sembilan, Tampin Hill; Bukit Tinggi, Seremban (Napier). Perak near Bera (Kunstler).

var. *obovata* King (a form with shorter rounder leaves). Perak, Bujong Malacca, Thaiping Hills to 5000 ft. altitude. Penang Hill (all collectors).

(17) *A. nervosum* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 78.

Stem long, creeping ascending 8 in. long, densely hairy. Leaves unequal, larger ones rather stiffly membranous, sessile, oblong blunt or minutely apiculate, base narrowed, unequally cordate, sparsely hairy above; nerves beneath prominent, 11 to 12 pairs, densely

hairy, reticulations inconspicuous, 2.5 in. long, 1.25 in. wide. Small leaves ovate, acute sessile, edge ciliate, .5 in. long, .3 in. wide. Stipules similar, smaller. Cymes terminal and axillary; peduncles .25 in. long; pedicels two, 1.5 in. long, all densely hairy. Calyx campanulate with short teeth, hairy. Corolla .6 in. across, lobes narrow linear-lanceolate, hairy on back. Stamen-column longer. Capsule .2 in. long, hairy. *Hab.* Mountain forests, rare. Selangor, Sempang Mines, Semangkok (Ridley).

(18) **A. Klossii** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 13.

Stem erect 4 to 5 in. tall, hairy, internodes short. Leaves unequal, larger one elliptic-lanceolate acute, base round inæquilateral, glabrous or sprinkled with hairs above, 2 in. long, .5 in. wide, back white, nerves hairy; petioles .1 in. long. Small leaves cordate-ovate .12 in. long. Stipules orbicular-round. Peduncle 1 in. long, hairy with 4 ovate bracts in middle. Flowers 4 to 5 in a simple or branched cyme; pedicels .12 in. long. Calyx cupular, lobes lanceolate, hairy. Corolla .25 in. across, lobes narrow lanceolate. Staminal cone as long, thick. Fruit hairy. *Hab.* Forests. Johor, Ulu Sayong (Kloss). Negri Sembilan, Bukit Sulu (Cantley). *Native name*: Sumpa Kring.

(19) **A. involucreatum** *Hemsl. Ic. Pl.* 1556; *King, l.c.* 151 (Fig. 77, p. 27).

A slender creeping ascending plant, more or less hairy with short internodes; stem ascending to 6 in. tall, leafy. Leaves membranous, very unequal, the larger ones oblique lanceolate, ovate or elliptic, narrowed to base, blunt, tip sub-acuminate, light green, edge often denticulate, densely or sparsely hairy on both sides, rarely glabrous; nerves 5 to 8 pairs, slightly conspicuous when dry; 1.25 to 4 in. long, .3 to 1.5 in. wide; petioles .1 to .4 in. long; small leaves ovate, sessile, .1 to .4 in. long. Stipules smaller ovate. Flowers 1 to 5 in a cyme; peduncle .2 in. long or more, generally hairy; pedicels .2 to .5 in. long. Bracts lanceolate, whorled. Calyx densely hairy, lobes long, lanceolate acuminate. Corolla .4 in. across, lobes lanceolate, often hairy outside. Anthers about as long. Capsule .1 to .2 in. long, hairy. Sepals persistent, longer. *Hab.* Mountain forests from about 3000 ft. altitude upwards on banks and hill slopes, widely scattered over the mountain chain of the peninsula, and very variable, especially in its hairiness.

var. *glabrum*, with nearly glabrous leaves (Hemsley's type-form), occurs on the Thaiping Hills and on Bujong Malacca, in Perak.

var. *hirsutum* *Ridl. A. hirtum* *Ridl. Journ. Roy. As. Soc. S. Br.* 35, p. 14.

Whole plant very hairy; leaves silvery beneath. Pahang, Gunong Tahan; Telom; K'luang Terbang (Barnes). Malacca, Mt. Ophir. Selangor, Semangkok Pass; Gunong Mengkuang Lebah (Robinson); Menuang Gasing (Kloss). Perak, Thaiping

Hills; Gunong Kerbau (Robinson); Bujong Malacca. Penang Hill (Curtis); Richmond Pool.

(20) **A. propinquum** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 53.

Stem erect 3 in. tall, densely hairy. Leaves unequal, larger ones lanceolate, acute, base narrowed, obtusely unequally bilobed at base, sub-coriaceous, glabrous above, hairy beneath; nerves 10 to 11 pairs, midrib and nerves densely hairy; 4 to 6 in. long, 2.5 in. wide; petioles .5 to .75 in. long, woolly hairy; small leaves .25 in. long, lanceolate, sessile. Stipules lanceolate acute. Peduncle 4 in. tall, pubescent. Cymes 1 to 2 pubescent, 2 in. long; cymules of 3 flowers each. Corolla and stamens not seen. Ovary urn-shaped. Sepals short triangular, lanceolate. *Hab.* Forests, local and little known. Perak, Temengoh (Ridley), out of flower. Tringganu, Bundi (Rostados).

(21) **A. lanceolatum** *Ridl. Journ. F.M.S. Mus.* iv. 26.

Stem erect 8 in. tall, simple or with one branch. Leaves unequal, larger ones lanceolate, long acuminate, base narrowed, edge sub-serrate, denticulate above, glabrous beneath, hairy; nerves 6 to 9 pairs; 4 in. long, .5 in. wide; small ones lanceolate, .25 in. long. Cymes 3, umbelled; peduncles .5 to 1 in. long. Flowers 12. Calyx-lobes ovate acute, short. Corolla nearly .5 in. across, lanceolate acuminate, narrow. Stamen-cone longer; anthers with a long process. Fruit .12 in. long. *Hab.* Forests at 4000 ft. altitude. Pahang, Telom (Ridley).

(22) **A. trichanthum** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 77.

Whole plant 4 in. long. Stem ascending hairy with curled viscid hairs. Leaves very unequal, large ones lanceolate sub-acutely acuminate, narrowed to the unequal rounded cordate base, membranous glabrous above, sparse hairy beneath, midrib and 7 pairs of nerves densely hairy, 1.75 to 3 in. long, 1 to 1.5 in. wide; petioles hairy, .1 in. long; small leaves ovate-round acute sessile. Stipules similar. Cymes several in uppermost axil, 1.5 to 2 in. long hairy, branched. Bracts oblong-lanceolate, glabrous. Calyx campanulate hairy, lobes short ovate triangular. Corolla .4 in. across, lobes narrow acuminate, hairy on back. Fruit hairy. *Hab.* Selangor, Ulu Langat (Kloss).

(23) **A. spinulosum** *Clarke F.B.I.* iii. 46; *King, l.c.* 149.

Stem stout, 3 to 8 in. tall, erect. Leaves usually only at the top, crowded fleshy, very unequal, large ones oblong-oblancheolate acute, narrowed gradually to the blunt inæquilateral base, glabrous above; nerves 10 to 14 pairs, hairy beneath, prominent; 3 to 5 in. long, 1.5 in. wide; petioles .2 to .5 in. long; small leaves lanceolate, sessile, .5 to .75 in. long. Stipules like the small leaf, 1-nerved. Peduncle terminal, 2 to 3 in. long, with an umbel of branches as long at the top. Calyx campanulate, .1 in. long; lobes triangular shorter. Corolla .4 in. across, lobes lanceolate shorter than the stamens. *Hab.* Mountain forests, Johor, Gunong Pantai; Gunong

Janing (Kelsall). Selangor, Bukit Kutu; Semangkok Pass; Menuang Gasing (Kloss); Ginting Bidai; Perak, Thaiping Hills at 5000 ft. altitude.

Clarke's type is a specimen in Herb. Kew labelled "Singapore Lobb." Being a mountain plant it cannot have been collected in Singapore, but is possibly from Penang.

(24) **A. stipulaceum** *Ridl. Journ. F.M.S. Mus.* x. 139 (by error *stipulacea*).

Whole plant 9 to 12 in. tall, ascending; stem and nerves scurfy. Leaves membranous, large ones oblong-obovate, tip round, base narrowed, blunt unequal, dark green with grey centre; nerves 15 pairs, nervules conspicuous beneath; 5 in. long, 2 in. wide; small leaves linear-oblong, .5 in. long, .12 in. wide. Stipules oblong, tip round, .5 in. long, .2 in. wide. Peduncle 1 in. long with 3 branches umbelled; pedicels slender, .1 in. long. Calyx small. Corolla-bud lanceolate, open, .5 in. across, lobes narrow lanceolate acute. *Hab.* Damp forests. Kelantan, Kwala Lebir (Ridley).

(25) **A. rugosum** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 76.

Stem fleshy transversely wrinkled, branched, 4 in. or more tall. Leaves, large ones oblong or elliptic acute, base round or cuneate unequal, glabrous above; midrib and nerves rugose, hairy beneath, reticulations conspicuous; nerves 11 to 12 pairs; 2 to 3 in. long, 1 to 1.5 in. wide; petioles .2 in. long; small leaves lanceolate sub-acute .2 in. long. Stipules similar. Peduncle 1 in. long or less. Flowers umbelled on pedicels .5 to .75 in. long with lanceolate bracts at base. Calyx-tube short, campanulate lanceolate acute longer lobes. Corolla .8 in. across, lobes oblong-lanceolate acute. Staminal column shorter. *Hab.* Selangor, Gunong Mengkuang Lebah at 5600 ft. altitude (Robinson).

(26) **A. subcrassum** *King, l.c.* 152.

Erect succulent herb 12 to 18 in. tall. Leaves fleshy, membranous very unequal, larger ones elliptic or oblanceolate oblique acuminate, edges minutely denticulate, base narrowed, pale beneath, glabrous except sometimes midrib and nerves beneath; nerves 7 to 12 pairs, slender, midrib broad and flat beneath; 3.5 to 7 in. long, 1 to 1.5 in. wide; petioles .1 to .25 in. long; small leaves ovate-cordate, sessile .1 to .25 in. long. Stipules similar, smaller. Cyme-peduncle .5 to 1 in. long; branches several spreading, re-branched. Flowers 10 to 12 or more, large. Bracts lanceolate sub-acute at bases of branches .1 in. long or less. Pedicels .3 in. long. All glabrous. Calyx small with blunt ovate lobes. Corolla .6 in. across, lobes lanceolate. Stamen-column longer. Capsule obovoid. *Hab.* Forests usually at about 3000 to 4000 ft. altitude. Pahang, Telom. Selangor, Kwala Lumpur; Gunong Semangkok 3000 to 4000 ft. altitude (Curtis); Ginting Bidai. Perak, Bujong



Malacca; Gunong Kerbau at 4500 ft. altitude (Robinson), form with leaves hairy beneath and stem hairy.

(27) **A. perakense** King, *l.c.* 152.

Stem erect 8 in. tall, stout, a few hairs at base only. Leaves 2 pairs, thin membranous, larger ones oblanceolate-elliptic acuminate, base much narrowed; nerves 5 to 6 pairs; 2.5 to 3.5 in. long, 1.2 to 1.5 in. wide; petioles .4 in. long; smaller leaves .1 in. long, lanceolate, sessile. Peduncle 3 in. long, minutely hairy, a whorl of lanceolate bracts at base and another at base of umbel. Flowers 10 to 12; pedicels .3 in. long. Calyx-tube ovate-round, puberulous, .1 in. long; teeth minute. *Hab.* Perak (Ridley 110).

This is taken from King's description, and I do not know what plant he refers to. My specimen 110 did not come from Perak, and is not an *Argostemma*.

(28) **A. oblongum** King, *l.c.* 143.

Stem rather slender, ascending about 6 in. tall. Leaves very unequal, close or distant, membranous, large ones elliptic blunt or sub-acute, base round oblique cordate, glabrous above, mottled grey in centre, pale beneath; nerves 6 to 8 pairs, slender elevate, hairy; 2 to 3 in. long, 1 to 1.35 in. wide; petioles .1 to .2 in. long; small leaves sessile, ovate-cordate, .25 to .4 in. long. Stipules smaller. Cymes pubescent; peduncle 1 to 2 in. long, slender, 2 small bracts near base. Flowers about 4, umbelled; pedicels .1 to .5 in. long, pubescent. Calyx-tube short, lobes longer ovate acute, pubescent. Corolla .5 in. across, lobes lanceolate acuminate, hairy on the back. Staminal column slightly longer. Capsule sub-globular pubescent, .1 in. long. *Hab.* Forests, usually rather high up. Johor (King). Negri Sembilan, Bukit Tangga. Selangor, Sempang; Ginting Bidai. Perak, Ulu Bubong (Kunstler). *Sumatra*

(29) **A. bicolor** King, *l.c.* 155.

Whole plant 3 to 4 in. tall; stem pubescent. Leaves thickly membranous unequal, larger ones sub-sessile elliptic or oblong acuminate to sub-acute tip and narrowed to the oblique, cordate base, pale beneath, midrib and 5 or 6 pairs of nerves pubescent, 1.5 to 2.15 in. long, .65 to .85 in. wide; small leaves .25 to .3 in. long, ovate sessile. Stipules broad, round shorter. Peduncles 1 to 2 in axillary or terminal pubescent with 2 whorls of ovate-lanceolate bracts. Pedicels .2 to .25 in. long, dense pubescent. Corolla rotate, .05 in. long; lobes triangular. Corolla .5 in. across; lobes oblong-lanceolate puberulous. *Hab.* Perak (Scortechini and Curtis).

I have not seen this.

(30) **A. johorensis** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 11.

Stem ascending 6 to 10 in. long, appressed hairy. Leaves unequal, larger ones elliptic or lanceolate acuminate, base slightly

narrowed, membranous glabrous above; nerves 6 to 7 pairs, midrib hairy; 2 to 4 in. long, .75 to 1.25 in. wide; petioles .1 in. long; small leaves ovate-cordate acuminate or round, .25 in. long. Stipules oblong-ovate as small. Cyme of 3 branches compound; peduncle 1 in. long; branchlets 1 in. long, 5-flowered; pedicels .25 in. long. Calyx-lobes ovate-acute hairy. Corolla .5 in. across, lobes very narrow, lanceolate-linear. Staminal cone thick, as long. Capsule cupular, densely hairy, .12 in. long. *Hab.* Low wet forests. Johor, Tempayan; Sungei Tebrau; Serom.

var. *Kelsalli* Ridl. l.c. 12.

Leaves lanceolate, hairy beneath and glaucous, small leaves orbicular, hairy; Selangor, Bukit Hitam (Kelsall).

(31) *A. ophirens* Maing. *Hook. fil. F.B.I.* iii. 45; *King, l.c.* 153.

Stem ascending, scurfy hairy, 4 to 10 in. tall. Leaves, larger ones fleshy glabrous except nerves, scurfy pubescent, oblanceolate or elliptic oblique acute, base narrowed, white beneath; nerves 5 to 8 pairs; 2 to 3.5 in. long, .7 to 1.25 in. wide; petioles .1 to .35 in. long; small leaves oblique ovate-cordate or lanceolate acute, .1 to .2 in. long. Stipules similar, smaller. Cyme-peduncle 1 to 2 in. long, branched or not, glabrous. Flowers 5 or 6; pedicels .5 in. long. Calyx pubescent, campanulate, lobes ovate. Corolla .4 in. wide, lobes lanceolate. Staminal column with anthers long appendaged. Fruit obconic, .15 in. across. *Hab.* Mountain forests, Johor, Gunung Janeng (Kelsall). Pahang, Gunung Tahan (Robinson). Malacca, Mt. Ophir, woods below Padang Batu. Selangor, Semangkok. Perak (Wray).

(32) *A. denticulatum* Ridl. *Roy. As. Soc. S. Br.* 61, p. 12.

Erect, 12 in. tall, internodes 1 in. long. Leaves unequal, fleshy, large ones lanceolate acuminate narrowed to base, edges minutely denticulate at tip, pale beneath, glabrous except a few hairs on midrib, 3 to 4.5 in. long, .5 to 1 in. wide; petioles .25 in. long; small leaves oblong-ovate, .1 in. long. Cyme compound 9-flowered, .5 in. long; pedicel .25 in. long. Calyx-lobes ovate-lanceolate acuminate, .1 in. long. Corolla-lobes triangular acute, .12 in. long. Staminal cone .25 in. long. *Hab.* Thick forest; Selangor, Ginting Simpah at 3990 ft. altitude (Ridley).

(33) *A. debile* Ridl. *Journ. F.M.S. Mus.* v. 35.

Long rooting. Stem ascending succulent, 6 to 8 in. tall. Leaves remote in few pairs, unequal, larger ones lanceolate acuminate, base shortly narrowed oblique, dark green above, white beneath; nerves 5 pairs hardly or not visible, very fine; 2.5 to 3 in. long, 1 to 1.25 in. wide; petioles .2 in. long; small leaves ovate sessile. Stipules lanceolate acute. Peduncle 2 in. long, fleshy. Flowers 1 to 3 on pedicels 5 in. long. Calyx rotate, lobes ovate sub-acute. Corolla .6 in. across, lobes 4, lanceolate-oblong, acuminate broad. Staminal cone shorter. *Hab.* Selangor, Mengkuang Lebah (Robinson).

(34) **A. enerve** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 13.

Stem creeping ascending, 5 to 8 in. tall, glabrous. Leaves unequal, large ones ovate-lanceolate, base round or slightly narrowed, equal, glabrous, beneath glaucous, nerves invisible, 2.5 in. wide; petioles .25 in. long; small leaves ovate cordate acute, .12 in. long. Stipules orbicular. Cymes 2- to 4-flowered. Peduncle 1 in. long; pedicels .25 in. long, hairy. Calyx campanulate, hairy; teeth short triangular. Corolla .5 in. across, lobes lanceolate acute. Staminal cone narrow curved, as long. Capsule .2 in. long, campanulate hairy on pedicel 1 in. long. *Hab.* Mountain forests. Negri Sembilan, Gunong Angsi (Ridley).

(35) **A. grandiflorum** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 77.

Ascending herb, glabrous except for the slender stem, covered with short pubescence up to the peduncle. Leaves fleshy, glabrous nerveless, larger ones lanceolate narrowed to both ends, 1 to 1.5 in. long, .3 to .4 in. wide; petioles .1 in. long; small leaves ovate-lanceolate, .2 in. long, 1 in. wide. Stipules similar. Flowers solitary on peduncles, pubescent, 1.5 in. long with 2 pairs of involucre bracts, obcuneate and ovate, strongly toothed. Calyx and tube obconic, lobes narrow linear acuminate, .15 in. long. Corolla .7 in. across, lobes broad ovate acute, .2 in. across. Staminal column shorter. *Hab.* Mountains. Perak, Gunong Kerbau (Robinson).

(36) **A. Curtisii** King, *l.c.* 151.

An erect glabrescent herb, 4 to 8 in. long. Leaves unequal, larger ones linear-elliptic, narrowed to both ends, nerves invisible, 1.25 to 2.75 in. long, .1 to .4 in. wide; petioles .1 to .25 in. long; smaller ones linear, .3 in. long. Stipules similar, smaller. Peduncle slender 1.4 in. long with one or two whorls of linear bracteoles; pedicels slender, short. Calyx campanulate, teeth triangular, acute, as long. Corolla .35 in. long, lobes lanceolate acuminate. Staminal cone about as long. *Hab.* In rocky mountain streams. Perak, streams on Bujong Malacca (Curtis).

(37) **A. hirsutum** Ridl. *Journ. F.M.S. Mus.* x. 139.

Slender creeping herb. Stem, leaves and flowers densely hairy. Leaves unequal, larger ones thin ovate acute, base round, hairy all over; nerves fine, about 10 pairs; 2 in. long, 1 in. wide; petioles .1 in. long; small leaves ovate, .18 in. long, sessile. Stipules similar. Flowers 1 to 2 on a terminal very hairy peduncle, 2 in. long. Bracts lanceolate acute, very hairy; pedicels .25 in. long. Calyx campanulate, lobes lanceolate acute, very hairy. Corolla .25 in. wide, lobes acute hairy. *Hab.* Kedah, Gunong Bintang (Kloss).

Near *A. viscidum*, but creeping, with ovate leaves.

(38) **A. Hookeri** King, *l.c.* 155. *A. parvifolium* Hook. *fil. F.B.I.* iii. 45 (not of Bennett).

A very slender creeper ascending to about 6 in. tall, soft hairy, F.I.M.P., 2, D

internodes long. Leaves very unequal; larger ones elliptic, blunt or shortly acuminate or lanceolate, glabrous except midrib and nerves about 8 pairs, slender beneath, base unequally cordate, deep green with a white central band, .5 to 1.5 in. long, .3 to .5 in. wide; petioles .1 to .15 in. long; small leaves ovate-lanceolate, sessile. Cymes 2- or 3-flowered; peduncles pubescent, 1.5 in. long, with a central whorl of bracteoles. Flower-pedicels .2 in. long. Calyx-tube short, lobes longer ovate acute, hairy. Corolla .4 in. across, lobes lanceolate. Staminal column thick, longer. Capsule obconic, hairy, .15 in. through. *Hab.* Banks in forests. Johor, Gunong Pulai. Pahang, Gunong Tahan. Selangor, Sempang; Menuang Gasing (Kloss); Petaling; Bukit Kutu. Penang Hill (all collectors).

The southern forms have much broader leaves and are altogether stouter than the slender small-leaved Penang plant; they are dark green with a grey-white feather. The type form is the Penang one.

(39) **A. reptans** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 11.

Creeping slender herb. Stems 2 or 3 in. tall, corky. Leaves unequal, larger ones lanceolate-rhomboid, narrowed to both ends, crenulate, denticulate, glabrous, sub-coriaceous, nerves usually invisible, .5 to .75 in. long, .25 in. wide; petioles .1 in. long; smaller leaves linear-lanceolate, .12 in. long. Stipules similar. Flower, one terminal on a peduncle .75 in. long; bracts 2, linear-lanceolate half-way. Calyx-lobes .1 in. long, lanceolate-acuminate. Corolla, .75 in. wide; lobes lanceolate acute. Staminal cone acute, shorter. *Hab.* Kedah Peak on rocks in stream at 3000 ft. altitude (Ridley).

(40) **A. elongatum** *Ridl. Journ. F.M.S. Mus.* vi. 151.

Stem succulent, creeping for 2 ft. or more, internodes 3 in. long. Leaves very unequal, large ones thin, succulent, glabrous, ovate-acuminate, base round obliquely cordate, pale beneath; nerves 10 or 12 pairs, slender; 3 in. long, 1 in. across; petioles .5 in. long; small leaves sessile, lanceolate acuminate, .2 in. long. Stipules ovate obtuse. Peduncle 1 in. long; bracts 4, upper part pubescent. Pedicels .25 in. long, pubescent. Calyx campanulate, hairy, .12 in. long, lobes lanceolate-acuminate shorter than tube. Corolla .5 in. across, lobes lanceolate-acuminate, acute. Staminal column as long. *Hab.* Thick woods on river-bank at 4600 ft. altitude. Pahang, Kwala Teku, Gunong Tahan (Ridley).

(41) **A. Wrayi** *King, l.c.* 154.

Stem slender, procumbent, hairy above. Leaves unequal, membranous, larger ones lanceolate-acuminate, narrowed and unequal at base, pale beneath; midrib and nerves 6 to 7 pairs, pubescent beneath, 2 to 3 in. long, .6 to .9 in. wide; petioles .3 to .4 in. long puberulous; small leaves ovate-lanceolate, sessile, .15 to .2 in. long. Stipules similar, smaller. Peduncle .5 in. long, glabrous, with a whorl of lanceolate bracts; branches 2. Pedicels .25 in. long, pubescent. Calyx puberulous, lobes lanceolate longer

than tube. Corolla .5 in. across, lobes lanceolate. Staminal cone shorter. *Hab.* Perak at 3400 ft. altitude (Wray).

I have not seen this plant.

### 15. OPHIORRHIZA, Linn.

Small herbs, sometimes slightly woody at base. Leaves herbaceous, usually slightly unequal, elliptic-lanceolate or lanceolate. Stipules setaceous. Flowers small, white or more or less pink (rarely green), secund in dichotomous branched terminal (rarely axillary) cymes. Calyx short, 5-toothed or lobed. Corolla-tube cylindrical or funnel-shaped, lobes 5-valvate. Stamens 5, usually included, inserted in tube; anthers linear. Disc large fleshy, 2-lobed. Ovary 2-celled; ovules numerous; style filiform. Stigmas 2, linear or oblong. Capsules coriaceous, flattened, obreniform or obcordate broader than long, dehiscent at the top by 2 broad valves. Seeds many, minute. About 50 species, Tropical Asia.

Not an easy genus to sort; the species are not very distinct as a rule and vary and approach each other. Some of the plants identified by King I have not seen.

Corolla long, lobes not reflexed. Stamens included.

Leaves quite glabrous.

- |   |                              |
|---|------------------------------|
| Leaves lanceolate narrowed both ends, olive colour above, pale beneath, 4.5 by 1.5 in. . . . .            | (1) <i>O. discolor</i>       |
| Leaves ovate-lanceolate, whitish beneath; cymes often very long . . . . .                                 | (2) <i>O. major</i>          |
| Leaves ovate-lanceolate, very thin; flowers distant on long branches . . . . .                            | (3) <i>O. remotiflora</i>    |
| Leaves ovate 4 to 9 in. long, 1.25 to 4 in. wide; fruit .4 in. wide . . . . .                             | (4) <i>O. costata</i>        |
| Leaves ovate-lanceolate, .6 by 1.75 in.; cymes capitate; bracts large persistent; flowers large . . . . . | (5) <i>O. Klossii</i>        |
| Leaves lanceolate-acuminate; plant suffruticose branched.   |                              |
| Leaves 4 by 1 in., drying red . . . . .   | (6) <i>O. rosacea</i>        |
| Leaves 2 by .25 in.; flowers small . . . . .  | (7) <i>O. lancifolia</i>     |
| Leaves ovate to lanceolate, pale green, 1 to 2 in. by .3 to .25 in. . . . .                               | (8) <i>O. fontinalis</i>     |
| Leaves more or less pubescent beneath; fruit glabrous.  |                              |
| Base woody; leaves whitish beneath; nerves beneath hairy only.  |                              |
| Leaves unequal, base round or unequally cuneate . . . . .   | (9) <i>O. pallidula</i>      |
| Leaves equal, base acuminate . . . . .  | (10) <i>O. scabrella</i>     |
| Base herbaceous.  |                              |
| Little-branched, drying red; nerves and edge hairy; panicle hairy . . . . .                               | (11) <i>O. communis</i>      |
| Sparingly hairy both sides; stem densely hairy above . . . . .  | (12) <i>O. singaporensis</i> |

- Much-branched yellow pubescent; leaves  
 sparsely hairy . . . . . (13) *O. tenella*  
 Leaves glabrescent or sprinkled with hairs.  
 Cyme short; fruit hairy . . . . . (14) *O. rugosa*  
 Leaves nearly glabrous; cyme spreading . . . . . (15) *O. hispidula*  
 Leaves densely hairy beneath, glabrous above.  
 Peduncle 2 in. long . . . . . (16) *O. nervosa*  
 Peduncle .25 in. long to 1 in. in fruit . . . . . (17) *O. Kingiana*  
 Leaves hairy on both sides.  
 Fruit .15 in. wide . . . . . (18) *O. tomentosa*  
 Fruit .25 in. wide . . . . . (19) *O. Kunstleri*  
 Corolla very short, lobes reflexed; stamens and  
 style exert.  
 Slender branched shrublet; leaves lanceolate . . . . . (20) *O. fruticosa*  
 Herb, weak; leaves ovate . . . . . (21) *O. tenuis*

(1) *O. discolor* *R. Br. Wall. Cat. 6232A; King, l.c. 172.*

Herb about 8 in. tall, glabrous. Leaves deep brown, purple beneath, narrow elliptic-oblong acuminate, narrowed at base; nerves 7 to 12 pairs; 2.5 to 7 in. long, 1 to 2.75 in. wide; petioles .35 to 1 in. long. Stipules linear-lanceolate .1 to .2 in. long. Cyme solitary, terminal, puberulous; branches .75 to 1 in. long; peduncle 1.5 in. long. Calyx narrow campanulate. Corolla cylindrical, hairy outside and inside, a hairy ring in the mouth, .2 in. long, all white or pink at base. Capsule narrowed, sinus obsolete, .2 in. across, less than .1 in. long. *Hab.* In rocky and stony woods, often at an altitude of 3000 ft. Johor, Batu Pahat; Gunong Pantai. Pahang, Tahan River. Selangor, Batu Caves; Sungei Buluh. Perak, Thaiping Hills; Gunong Keledang. Penang, near the Waterfall (Wallich, Curtis, etc.).

var. *elegans* *Ridl.*

Leaves lanceolate-acuminate at both ends. Branches of the inflorescence slender with distant flowers as in *O. remotiflora*. Flowers pinkish or white. *Hab.* Kelantan, Glam Wood near Kota Bharu (Ridley).

(2) *O. major* *Ridl. O. erubescens King, l.c. 172, not of Wallich.*

Stem woody slender, 1 to 3 ft. tall, puberulous. Leaves subequal thin, elliptic-lanceolate or narrow-elliptic acuminate, base narrowed, pale beneath; nerves 10 to 14 pairs, prominent beneath, often mealy-pubescent, otherwise the whole leaf is glabrous, 4 to 9 in. long, 1.5 to 4 in. wide; petioles .35 to 1.2 in. long. Cymes terminal solitary and axillary; peduncles 1 to 2 in. long, all puberulous. Pedicels as long as the calyx. Calyx sub-globose, obscurely ribbed, with short broad teeth. Corolla .3 in. long, cylindrical, lobes short, white tipped pink or all dark pink. Capsule narrow crescentic glabrous, .2 in. across, .05 in. long. *Hab.* Forests, not uncommon. Malacca, base of Ophir; Bukit Sadanen (Derry). Pahang, Kota Glanggi. Selangor, Kwala Lumpur (Curtis); Ulu Gombak; Ginting Peras. Negri Sembilan, Bukit Sulu (Cantley); Tampin Hill. Dindings, Lumut. Perak, Lenggong; Thaiping

Hills; Temengoh. Penang, Waterfall (Curtis); Penara Bukit. Tomoh (Machado). Kelantan, Chaning Woods.

*O. erubescens*, Wall. *Cat.* 6233, was based on a plant collected in Ava. The specimen is in a poor condition and unrecognisable, but it is certainly not the plant described by King as *erubescens*.

(3) *O. remotiflora* Ridl. *Journ. F.M.S. Mus.* x. 140.

Herb. Leaves very thin, glabrous, ovate-lanceolate acuminate acute, base cuneate; nerves slender 12 pairs; 7 in. long, 3 in. wide or less; petioles slender, 1 in. long. Inflorescence scurfy, 4 in. long; branches 3.5 in. long or less, slender. Flowers numerous, distant, secund; pedicels .05 in. long, scurfy. Calyx tubular, lobes linear acute, .08 in. long. Corolla slender, tubular, .25 in. long, lobes short, lanceolate. Stamens included. Capsule .25 in. wide, slightly indented at tip. *Hab.* Pahang, Gunong Senyum and Kota Tongkat (Evans); Kwala Tahan (Seimund).

(4) *O. costata* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 14.

Herb about 12 to 14 in. tall. Stems stout, scurfy, branched almost woody. Leaves sub-equal elliptic-lanceolate, rather thin, membranous, acuminate, narrowed to base, glabrous or mealy pubescent on the 10 to 14 prominent nerves below, dark green above, pale beneath, 4 to 9 in. long, 1.25 to 4 in. wide; petioles 1 to 1.5 in. long. Stipules linear-acuminate, glabrous. Cymes terminal solitary; peduncles 2 in. long, scurfy puberulous as are cyme branches, .75 in. long in flower, 1.25 in. long in fruit. Flowers pedicelled; pedicels as long as sub-globose pubescent ribbed calyx nearly .1 in. long; teeth short, broad. Corolla funnel-shaped .2 in. long, lobes very short and blunt. Fruit glabrous, .4 in. across, .1 in. long, sinus distinct usually; pedicels .2 in. long. *Hab.* Forests, Malacca, Bukit Sadanen (Derry). Pahang, Telom. Selangor, Menuang Gasing (Kloss); Semangkok Pass; Bukit Hitam (Kelsall).

(5) *O. Klossii* Ridl. *Journ. Linn. Soc.* xli. 291.

A stout herb over 12 in. tall, upper part velvety pubescent. Leaves thin ovate or oblong-lanceolate, long blunt acuminate, base narrowed glabrous except the 11 pairs of nerves pubescent beneath, under-surface pale, 3.75 to 6 in. long, 1.3 to 1.75 in. wide; petioles pubescent, .5 to 1.25 in. long. Stipules linear. Peduncles from upper axis 1 in. long pubescent. Cymes umbellate, 3 or 4 together, whole umbel dense, nodding. Bracts linear green, longer than the fruit, persistent. Flowers for the genus large not secund; pedicels short, thick, pubescent. Calyx globose, cupulate pubescent, lobes ovate. Corolla thick tubular, glabrous except at tip, lobes blunt, .4 in. long. Capsule obreniform, sinus wide and deep, pubescent. *Hab.* Selangor, Menuang Gasing (Kloss).

Very distinct in its leaf-like, long, persistent bracts, in which it resembles *O. fasciculata* Don, but the flowers are cymose, not in scorpioid cymes, and much larger.

(6) *O. rosacea* Ridl. *O. rosea* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 55, *not of Hooker*.

Much-branched herb, woody at base, 1 ft. tall, above pubescent. Leaves lanceolate acuminate at both ends, glabrous above, dark green, beneath red (or pale whitish); midrib and nerves scurfy, 3 to 4 in. long, 1 in. wide; petioles .25 to .5 in. long. Stipules setaceous pubescent. Cymes solitary terminal and axillary pubescent.; peduncles .5 to 1 in. long; branches in flower short, in fruit 1 in. long. Calyx urceolate, teeth lanceolate very short, pubescent. Corolla .25 in. long, red, cylindrical dilate upwards pubescent, lobes oblong. Capsule .12 in. across, linear-oblong, margin straight glabrous. *Hab.* Forests, Perak, Temengoh (Ridley).

(7) *O. lancifolia* Ridl. *Journ. F.M.S. Mus.* v. 162.

Simple or branched, suffruticose 3 to 8 in. tall; young parts scurfy. Leaves narrow lanceolate-acuminate at both ends; nerves 7 pairs, glabrous; 2 to 4 in. long, .25 to .5 in. wide; petioles long winged .4 to 1 in. long. Stipules very small reduced to points. Peduncle .3 to 1 in. long; cyme-branches slender, 1 in. long or less. Calyx small campanulate. Corolla .3 in. long, white (red when dry), tube cylindrical, narrowed just below the campanulate short-lobed limb. Stamen-tips exsert at mouth. *Hab.* Naung Chik, Kota Bharu, Bukit Sembilan (Gwynne Vaughan). *Distrib.* Koh Samui, off southern peninsular Siam.

(8) *O. fontinalis* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 55.

Herbs 3 to 5 in. tall. Stem scurfy, pubescent. Leaves lanceolate or ovate-lanceolate, shortly acuminate, blunt, above sparsely pustular hairy especially on edge, beneath glaucous green; nerves scurfy, 1 to 3 in. long, .3 to .25 in. wide; petioles slender, .2 in. long. Stipules truncate. Peduncles .5 in. long, scurfy pubescent. Cymes .5 to .75 in. long; branches 3, slender. Calyx .1 in. long, pubescent. Corolla white, .25 in. long, tube cylindrical, lobes lanceolate acute. Capsule transverse elliptic, not emarginate, .12 in. long. *Hab.* On rocks in streams in the north. Pulau Adang, on Rawei Island. Lankawi, Telaya Tujoh (Ridley).

(9) *O. pallidula* Ridl.

Stems slightly woody and creeping below, ascending and branching above, puberulous scurfy in upper parts. Leaves usually unequal, membranous elliptic acuminate, base rounded or very shortly cuneate, glabrous or obscurely pustular above, beneath pale; nerves 6 to 10 pairs, scurfy beneath; 1.5 to 3 in. long, .75 to 1.25 in. wide; petioles .3 in. long or less, scurfy. Stipules lanceolate. Cymes terminal and in upper axils; peduncle .25 in. long, pubescent. Flowers crowded on short branches .2 in. long, sub-sessile, few, white. Calyx pubescent, short, cylindrical. Corolla .15 in. long or more, lobes short broad. Capsule obreniform, sinus shallow, glabrous .2 in. wide. *Hab.* Hill forests, not common. Pahang, Tahan river woods. Selangor, Ulu Gombak,



top of Batu Caves; Ginting Bidai; Semangkok. Perak, Ipoh (Curtis).

This is in part the plant referred by King to *O. Harrisiana* var. *argentea*, an Indian plant.

(10) *O. scabrella* Ridl.

Shrubby plant over a foot tall, branched; young parts mealy velvety. Leaves sub-equal, membranous, oblong-lanceolate, base long narrowed, edge slightly thickened, scabrid above; nerves 10 pairs, slender distant, upper surface smooth, dark green, beneath pale whitish, glabrous except midrib and nerves scurfy, 5 in. long, 2 in. wide or less; petioles slender, 1 in. long. Stipules very small, acuminate. Cymes terminal, .25 in. long, few-flowered, pubescent, on a pubescent peduncle .5 in. long. Calyx short campanulate, pubescent, with short teeth. Corolla .15 in. long, white. Fruit not seen. *Hab.* Woods, rare. Adang islands, Pulau Butang (Ridley 15894). *Distrib.* Siam.

This has been called by me *Harrisiana* var. *argentea*, but the leaves are equal, much larger and with a peculiar edging of short processes, making it scabrid, and the flowers are smaller.

(11) *O. communis* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 16. *O. mungos* King in part, not of Linné.

Herb not or little branched except in strong plants, pubescent or hairy. Leaves ovate or lanceolate-acuminate, both ends equal, glabrescent with a few scattered hairs above; nerves beneath and occasionally whole surface pubescent, 4 to 6 in. long, 1 to 1.5 in. wide; petioles 1 in. long. Stipules setaceous. Peduncle 1 in. long or more. Cyme-branches slender, often over 1 in. long, glabrous or puberulous. Flowers white, rarely pink; pedicels as large as calyx. Calyx ovoid, lobes short, blunt. Corolla tubular, lobes short. Capsule transverse oblong, upper margin straight, slightly puberulous. *Hab.* Common in forests low country to 5000 ft. altitude. Negri Sembilan, Tampin; Bukit Sulu (Cantley). Selangor, Rawang; Ginting Bidai (flowers pink). Sempang. Dindings, Pangkor. Perak, Thaiping Hills to top; Telok Pinang. Pahang, Telom; Kwala Lipis (Machado). Kedah, Yan. *Distrib.* Borneo.

(12) *O. singaporensis* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 17.

About a foot tall, little-branched; stem succulent, hairy above. Leaves oblong-lanceolate acuminate, blunt, base narrowed, pale beneath, 5 to 6 in. long, 1.5 to 2 in. wide; petioles hairy 1 in. long. Stipules setaceous, hairy. Cyme hairy; peduncle .5 in. long; branches as long. Flowers white, short, pedicelled. Calyx short sub-cylindric, lobes lanceolate. Corolla-tube .25 in. long, cylindric, lobes very short, oblong, hairy outside. Capsule hairy, .25 in. wide, broad and shaped rather deeply indented. *Hab.* Common

in woods in the south. Singapore, Bukit Timah; Pulau Ubin. Johor, Gunong Pulau; Gunong Pantai. Negri Sembilan, Bukit Sulu (Cantley). Dindings, Lumut. *Distrib.* Lingga.

(13) *O. tenella* King, *l.c.* 175.

Erect or decumbent, 6 to 12 in. tall, slender, much-branched, minutely yellow pubescent. Leaves membranous, elliptic-ovate to ovate-lanceolate sub-acute, narrowed or round at base, glabrous except for a few hairs above; nerves 6 to 8 pairs, puberulous; 1 to 2 in. long, .5 to 1 in. wide. Stipules cupular, toothed. Cyme terminal, few-flowered, short. Flowers .3 in. long, sub-sessile. Calyx cylindric, lobes lanceolate, hairy. Corolla .25 in. long, funnel-shaped, dilate at base, lobes ovate-lanceolate. Capsule narrow, obreniform, .25 in. across. *Hab.* Forests up to 5500 ft. altitude. Pahang, Kota Glanggi; Pasir Loyang, Pahang River. Selangor, Ginting Bidai. Perak, Sungei Siput; Thaiping Hills; (Kunstler); Gunong Keledang. Kedah Peak.

(14) *O. rugosa* Wall. *Cat.* 6235; King, *l.c.* 175.

Weak herb 4 to 6 in. tall, not branched, tomentose. Leaves membranous, oblong-oblancoate, sub-acute, base narrowed, glabrous or sparse-hairy above, beneath paler, shortly pubescent on nerves 12 to 14 pairs, and reticulations; 1 to 3.5 in. long, .5 to 1.25 in. wide; petiole .2 to .4 in. long. Stipules linear-lanceolate, base broad, .2 in. long. Cyme terminal, umbellate; peduncle 1 in. long; branches .25 in. long. Flowers ".05 in. long cleistogamic" fide King (.3 in. long in type). Calyx cylindric. Corolla "slightly exceeding" (long and well developed in type). Capsule oblong, reniform, sinus shallow, pubescent, .2 in. long. *Hab.* Perak at 3900 ft. altitude (Wray), Ulu Batang Padang, Gunong Berumbun. *Distrib.* Himalayas.

King's description of form of flowers and large bracts differs entirely from the type (Wallich, Nepal, No. 6235). I have not seen flowers of his plant, and doubt the correctness of the identification.

(15) *O. hispidula* Wall. *Cat.* 6234; King, *l.c.* 173.

Herb 8 in. tall with few, rather thick branches roughly short hairy. Leaves nearly equal, thin, elliptic or ovate-lanceolate acuminate, blunt, narrowed into petiole, paler beneath, glabrous above, or very sparse hairy; midrib and 6 or 7 pairs of nerves, pubescent beneath; 2.5 to 3.5 in. long, 1.5 in. wide; petioles 1 in. long. Peduncle terminal, 1 in. long, pubescent. Cyme-branches several, .5 in. long, densely pubescent, teeth prominent, acute. Corolla narrow, cylindric, pubescent. Capsule oblong, reniform, sinus distinct, scabrid hairy, .2 in. long, .05 in. wide. *Hab.* Mountain forests. Pahang River, Tahan. Perak, Temengoh. Jalor, Biserat (Gwynne Vaughan). *Distrib.* Tenasserim.

(16) *O. nervosa* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 18.

Stout hairy stem over a foot tall. Leaves ovate-acuminate, base broad, abruptly cuneate, glabrous above, hairy beneath;

midrib and nerves 15 pairs, brown-hairy beneath, branching and inarching at tips; 4 to 6 in. long, 3 in. wide; petioles brown-hairy, .5 in. long. Stipules setaceous. Peduncle 2 in. long, hairy; branches 1.5 in. long; pedicels short. Calyx cupular ribbed, hairy. Corolla glabrous, cylindric, lobes short, oblong. *Hab.* Selangor, Semangkok Pass (Machado).

(17) *O. Kingiana* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 17.

Stem unbranched, rather woody, 6 to 15 in. tall, velvety above. Leaves ovate to oblanceolate, tip acute, base narrowed, above scabrid, beneath shortly velvety, edge fringed with hairs 2 in. long, 1 in. wide; petioles .25 in. long, velvety. Peduncles axillary and terminal, .25 in. long in flower, 1 in. in fruit; branches short. Flowers white, .12 in. long, glabrous. Calyx minute campanulate, teeth short. Corolla tubular, lobes short. Fruit .12 in. across, oblong, deeply emarginate, glabrous. *Hab.* Rare, near limestone rocks. Perak, Goping (Kunstler).

(18) *O. tomentosa* Jack. *Roxb. Fl. Ind. (Carey ed.)* ii. 546; *King, l.c.* 176.

Herb, 8 to 18 in. tall, branched, base woody, shortly hairy. Leaves membranous, slightly unequal, narrow elliptic oblong-acuminate, acute, base narrow, sparsely hairy above, velvety hairy beneath; nerves 8 to 12 pairs; 1.75 to 3.75 in. long, .75 to 1.25 in. wide; petioles .2 to .8 in. long, pubescent. Cymes terminal, puberulous; peduncle 1.2 in. long; branches .75 to 1 in. long, crowded. Flowers .2 in. long, puberulous, white. Calyx tubular. Corolla-tube cylindric, dilate at top, limb campanulate with short blunt lobes. Capsule obreniform, puberulous, .15 in. wide. *Hab.* Hill forests. Malacca, Mt. Ophir. Pahang, Tahan valley. Perak (Kunstler). Penang (Wallich 6231); West Hill, etc. (all collectors). Kedah, Alor Sta (less hairy); Kedah Peak. Lankawi, Kwah. *Distrib.* Siam.

(19) *O. Kunstleri* King, *l.c.* 176.

Stem erect, woody, simple, 12 in. tall, brown or yellow-hairy. Leaves membranous, elliptic or ovate-elliptic acuminate acute, base short, narrowed, sparsely hairy above; nerves and midrib thickly hairy beneath; nerves 8 to 12 pairs; 1.75 to 3.75 in. long, .75 to 1.25 in. wide; petioles .2 to .8 in. long, pubescent. Stipules linear. Peduncle 1.5 in. long, terminal. Cyme-branches few, eventually 1.5 in. long, dense yellow-hairy. Flowers .1 in. long. Calyx campanulate. Corolla hardly longer, wide, cylindric, dense yellow-hairy. Capsule obreniform, densely yellow-hairy. *Hab.* Woods. Perak, Kwala Dipang (Kunstler). Lankawi (Curtis), Setul. *Distrib.* S. Siam.

(20) *O. fruticosa* Ridl. *O. fruticulosa* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 15, *not of Nadeaud.*

Slender much-branched shrublet. Leaves equal, lanceolate-acuminate, base cuneate, minutely pubescent above, more so on

edge, hair long scattered, beneath glabrous, 1.5 to 2.5 in. long, 1 to 1.5 in. wide; petioles .25 to .5 in. long. Stipules ovate, rounded. Peduncle pubescent, .5 in. long; branches as long in fruit. Flowers .12 in. long on pedicels as long. Calyx semi-globose, lobes ovate. Corolla-tube narrow, lobes lanceolate, reflexed. Stamens exsert. Capsule oblong, sub-reniform, upper edge nearly straight, glabrous, .12 in. wide. *Hab.* Rare, on limestone rocks. Selangor, Batu Caves, high up (Ridley).

I find the name *fruticulosa* already occupied by Nadeaud.

(21) *O. tenuis* Ridl. *Journ. As. Soc. S. Br.* 61, p. 16.

Weak herb 4 to 8 in. tall, little or not branched; stem succulent, hairy. Leaves ovate thin, base broad slightly cuneate, sub-obtuse, sparsely hairy above and on nerves 5 pairs beneath or glabrous, 2 to 4 in. long, 1 to 1.2 in. wide; petioles .5 in. long. Peduncle very short; flowers few, .12 in. long. Calyx dilate, teeth short pubescent. Corolla-tube very short, cylindric, lobes nearly as long, reflexed; mouth white, hairy. Stamens exsert. Capsule linear-oblong, upper edge indented, .12 in. wide. *Hab.* Forests, not common. Selangor, Sempang, Semangkok Pass; Dusun Tua. Perak, Telor Pinang (Ridley).

var. *minor*. Plant 6 in. tall; stem somewhat woody at base. Leaves 1 in. long, .5 in. wide, pustular above. Occurs at Ulu Gombak, in Selangor.

#### DOUBTFUL SPECIES

- O. FASCICULATA* Don, *Prod. Fl. Nep.* 136?; *King, l.c.* 173. Herb, 10 to 14 in. tall, puberulous. Leaves very unequal narrow-elliptic, sub-acute, base cuneate, glabrous above midrib and 9 to 11 pairs of nerves and reticulations puberulous beneath; large leaves 5 to 6 in. long, 1.5 to 2 in. wide; smaller .8 to 2.5 in. long, .85 to 1.5 in. wide; petioles .2 to .8 in. long. Stipules .15 in. long, subulate, bases dilate. Cymes 1 or 2 to 3 together, ebracteate terminal puberulous; branches shorter than peduncles. Flowers under .25 in. long. Calyx narrow campanulate. Corolla .2 in. long, cylindric inflated, base mouth expanded. Capsules obreniform glabrous, .25 in. across. *Hab.* Perak (Kunstler, Wray) fide King.

I have not seen the specimens quoted by King, but his description does not fit with *O. fasciculata* Don, which has remarkably long bracts and a long corolla.

- O. MUNGOS* Linn.; *King, l.c.* 174, is probably a mixture of several species. The real *O. Mungos* Linn. is an endemic Ceylon plant, very distinct.

#### 16. KLOSSIA, Ridl.

Herb with habit of *Ophiorrhiza*; stem simple or branched, hairy. Leaves herbaceous elliptic or lanceolate-acuminate equal. Stipules

ovate-acuminate. Cymes 3-flowered, several crowded into a head with ovate leafy bracts at base on a terminal peduncle. Calyx campanulate, lobes 5, obovate blunt. Corolla white, tubular, longer, lobes 5, short. Stamens 4, included; filaments long free above. Anthers linear-oblong. Style cylindric. Stigma of 2 large elliptic lobes. Capsule urn-shaped, 2-celled, many-seeded. Seeds brown punctate sub-quadrate. Species 1.

(1) **K. montana** Ridl. *Journ. F.M.S. Mus.* iv. 28.

Whole plant 6 to 18 in. tall. Leaves dark green above, white beneath, a few hairs above, red-scurfy, pubescent on nerves 13 pairs beneath, 3.5 in. long, 1.25 in. wide; petioles hairy, .25 to 1 in. long. Peduncle red-hairy, 1.5 in. long. Bracts glabrous. Head .5 in. across. Calyx glabrous. Corolla .3 in. long, tube narrowed in middle, mouth hairy. Capsule .12 in. long, glabrous. *Hab.* Wet spots near streams. Selangor, Ginting Bidai; Ginting Sempah; Bukit Hitam; Semangkok Pass. Pahang, Telom (Ridley).

### 17. POMAZOTA, Ridl.

A small herb. Leaves lanceolate acute, sessile, hairy. Stipules lanceolate acute. Inflorescence a head of small flowers surrounded by ovate bracts hairy on a peduncle. Flowers small sessile. Bracteoles in pairs ovate-lanceolate. Calyx-lobes 5, ovate. Corolla-tube short, dilate above, lobes ovate acute spreading 4 to 5. Stamens 4, free; filaments linear included; anthers oblong emarginate both ends. Style short, thick. Stigma round, bilobed large. Ovary ribbed; ovules numerous axillary. Capsule oblong-ovoid beaked dehiscent by a lid. Seeds numerous, punctate.

(1) **P. sylvestris** Ridl. *Trans. Linn. Soc.* iii. 308, fig. lxi.

Hairy 3 to 4 in. tall, few-branched. Leaves 3 in. long, 1 in. wide or less, dark green, paler beneath hairy. Peduncle 1.5 in. long. Flowers .12 in. long, white tinted pink, white ciliate. Calyx ciliate. Capsule white. *Hab.* Open paths in forests, very local but abundant where it occurs. Pahang, Pulau Tawar; Kota Tongkat, Bentan-Kwantan Road (Evans).

### 18. COPTOPHYLLUM, Korth.

Small erect simple shrubs. Leaves oblanceolate hairy. Stipules ciliate. Flowers pentamerous in heads surrounded by large white involucre bracts. Calyx-tube ovoid, lobes 5. Corolla infundibuliform, throat naked, lobes 5, short. Stamens 5, insert below the corolla included. Disc annular. Ovary 2-celled; style with 2 truncate arms. Capsule membranous, 2-celled. Seeds scrobiculate. Species 2 to 3, Malayan.

(1) **C. capitatum** Miq. *Fl. Ind. Bat.* ii. 348; *King, l.c.* 180.

About a foot tall or less, hairy. Leaves sparsely strigose above; nerves beneath and edges hairy, 4.5 to 8 in. long, 1.5 to 3 in. wide,

reticulate and whitish beneath; petioles .5 to 1 in. long. Heads axillary and terminal on a peduncle 1 in. long, .75 in. wide, surrounded by a whorl of oblong rounded white bracts .4 in. long or less. Flowers .2 in. long, white mixed up with hairy linear or spatulate bracts. Calyx hairy. *Hab.* In damp woods, local, rather scarce. Johor, Gunong Pantai in streams. Selangor, Semangkok Pass. Perak, Kol (Kunstler). *Distrib.* Sumatra, Borneo.

### 19. DENTELLA, Forst.

A low prostrate herb. Stems thin 4 to 12 in. long. Leaves obovate spatulate, very small. Flowers solitary, large for the plant, white, axillary. Calyx-tube sub-globose, limb tubular, toothed. Corolla funnel-shaped, hairy inside, lobes 5, 2- to 3-toothed. Stamens 5, in middle of corolla-tube dorsifixed, linear. Ovary 2-celled; style short. Stigmas 2, filiform. Fruit globose 2-celled indehiscent, many-seeded. Species 1, Asia and Australasia.

(1) *D. repens* Forst. *Char. Gen.* 26, t. 13; *King, l.c.* 141.

Leaves puberulous, .2 to .3 in. long, under .1 in. wide. Flowers .3 in. long. Capsule hispid or glabrous, ovoid with 2 vertical grooves, .1 in. long. *Hab.* In waste ground and damp spots in heaths, not rare. Singapore, Tanglin; Kalang. Malacca (Griffith, Maingay). Pahang, Rumpin River. Penang, Sepoy Lines (Curtis). Tringganu (Yapp). Perlis, Kanga, rice-fields.

### 20. HEDYOTIS, Linn.

Erect decumbent or climbing herbs hardly shrubby. Stems 4-angled or terete. Leaves sometimes whorled, usually narrow. Stipules free or united with the petioles to form a cup and often bristly. Flowers in terminal or axillary often condensed cymes, small, usually white or lilac. Calyx-tube globose ovoid or turbinate, teeth 4. Corolla funnel-shaped or campanulate, lobes 4, valvate, throat sometimes hairy. Stamens 4 in the throat. Ovary 2-celled; ovules many. Fruit small capsular, crustaceous, rarely fleshy, many-seeded. Species about 100, chiefly Asiatic.

Scandent plants; flowers in leafy terminal panicle.

- |  |                           |
|--|---------------------------|
| Cymes umbelled; plant glabrous . . . . .                     | (1) <i>H. mollis</i>      |
| Cymes capitate, small; whole plant tomentose . . . . .       | (2) <i>H. Prainiana</i>   |
| Cymes capitate, rather large; whole plant glabrous . . . . . | (3) <i>H. capitellata</i> |

Half-shrubby erect plants.

- |   |                        |
|---|------------------------|
| Flowers in terminal panicles with often some axillary.                                |                        |
| Panicle large lax, .7 in. long by 6 in. wide . . . . .                                | (4) <i>H. patens</i>   |
| Panicles short, dense; flowers crowded . . . . .                                      | (5) <i>H. Maingayi</i> |
| Panicle lax, 3 in. across; branches flexuous; flowers distant; leaves broad . . . . . | (6) <i>H. flexuosa</i> |
| Panicles short lax, axillary and terminal, flexuous; leaves narrow . . . . .          | (7) <i>H. rivalis</i>  |

- Flowers in terminal heads.  
 Leaves narrow, coriaceous linear, glabrous . . . (8) *H. peduncularis*  
 Leaves sub-membranous elliptic acute hairy . . . (9) *H. stelligera*  
 Leaves lanceolate, long acuminate both ends . . . (10) *H. globiceps*
- Small herbs.  
 Flowers few in a sessile terminal head rather large,  
 pink . . . . . (11) *H. coronata*  
 Flowers in axillary panicles, very small; panicles  
 .5 to 1 in. long . . . . . (12) *H. glabra*  
 Flowers axillary in peduncled heads; thin  
 glabrous herbs; flowers white.  
 Peduncles .2 to .5 in. long . . . . . (13) *H. stipulata*  
 Peduncles 1.25 in. long; heads larger . . . . . (14) *H. andamanica*  
 Erect rough herb, hairy; flowers violet . . . . . (15) *H. vestita*
- Flowers in axillary sessile heads; leaves broad.  
 Leaves lanceolate narrow, hairy 4 by 1 in. . . . . (16) *H. auricularia*  
 Leaves lanceolate, glabrous, 6.25 by 1.4 in. . . . . (17) *H. pachycarpa*  
 Leaves elliptic thin, 1.5 by .5 in. . . . . (18) *H. Havilandi*  
 Leaves elliptic, glabrous; heads very small . . . . . (19) *H. Kunstleri*  
 Leaves ovate, 2.5 in. wide, glabrous; heads  
 large . . . . . (20) *H. macrophylla*  
 Leaves ovate to lanceolate, glabrous, coria-  
 ceous; fruit baccate white . . . . . (21) *H. congesta*  
 Leaves linear-oblong or linear, slender plants.  
 Leaves glabrous sessile narrow linear to  
 lanceolate; flowers .15 in. long . . . . . (22) *H. tenelliflora*  
 Leaves broad oblong-lanceolate 1 in. long,  
 .25 in. wide; flowers .2 in. long . . . . . (23) *H. nitida*  
 Leaves hairy.  
 Whole plant rough hairy; leaves rigid .2 in.  
 wide; heads large . . . . . (24) *H. hispida*  
 Scabrid hairy; leaves narrow-linear.  
 Calyx-teeth much shorter than capsule . . . . . (25) *H. pinifolia*  
 Calyx-teeth nearly as long as capsule,  
 pointed; leaves bristle-pointed . . . . . (26) *H. cærulea*

(1) *H. mollis* Wall. *Cat.* 859; *King, l.c.* 157.

Scandent slender, minutely pubescent on stem, underside of leaves, stipules. Leaves membranous, lanceolate-acuminate, base cuneate; nerves 3 to 4 pairs, prominent; 1.75 to 3.5 in. long, .6 to 1.15 in. wide; petioles .05 in. long. Stipules broad truncate with 3 to 4 black bristles. Panicles 1 to 2.15 in. long, lateral and terminal, with 4 to 5 short branches, ending in umbels of 6 to 8 or fewer small white flowers on short pedicels about .15 in. long. Calyx narrow, campanulate, teeth triangular. Corolla twice as long. Capsule obovoid under .7 in. long. *Hab.* Hill woods. Negri Sembilan, Bukit Tangga. Perak, Larut (Kunstler). Bukit Kapang. Penang (Wallich); Penara Bukit (Curtis). Kelantan, Pehi River near Chaning.

var. *laxa* King, is a larger form than Wallich's very slender weak one, with small leaves and flowers.

(2) *H. Prainiana* King, *l.c.* 158.

Scandent, rather stout, yellow-velvety all over. Leaves thickly membranous, ovate-lanceolate acuminate, base shortly narrowed; nerves 4 to 5 pairs; 2 to 4 in. long, 1 to 1.5 in. wide; petioles .3 to

·8 in. long (lowest leaves biggest). Stipules ·3 in. long with numerous linear lobes. Inflorescence of globose heads ·3 to ·4 in. through, on peduncles ·75 to 1 in. long, terminal and lateral on the branch ends. Flowers 10 to 12 in a head, ·1 in. long. Calyx campanulate, lobes lanceolate densely hairy. Corolla glabrous, tubular. Fruit oblong, pubescent. Seeds 2 or 3 in each coccus. *Hab.* Penang, Telok Bahang (Curtis). Very rare.

(3) *H. capitellata* Wall. *Cat.* 837; *Hook. fil. F.B.I.* iii. 57; *King, l.c.* 159.

Scandent, glabrous stems 4-angled or terete. Leaves thick membranous, shining green, lanceolate broad acuminate or at ends of branches quite narrow, base cuneate; nerves 3 or 4 pairs conspicuous; 1·5 to 3 in. long, ·25 to 1·25 in. wide; petioles ·1 to ·15 in. long. Stipules large with coarse teeth. Panicles mostly terminal; peduncles 2 in. long. Umbels solitary or 3 or 4 on the branches, ·2 to ·75 in. through. Flowers numerous, cream-colour, fragrant, ·15 to ·2 in. long, sub-sessile. Calyx campanulate, ribbed, teeth ovate-acute. Corolla tubular, lobes oblong, hairy inside. Capsule obovoid, glabrous, ·1 in. long. Seeds several. *Hab.* Very common, climbing over bushes and hedges; sea level to 3500 ft. altitude. Singapore. Malacca, Ayer Panas, etc. Selangor, Bukit Kutu. Perak, Gunong Kerbau 3500 ft. altitude (Robinson); Jalor, Biserat (Annandale); Kedah Peak (Robinson and Kloss). Penang (Wallich). Kelantan, Chaning. *Distrib.* Tavoy, Tenasserim, Malay islands. *Native name:* Kemeniyan Hantu; Anga Besi; Akar Lidah Jin; Sampu Keladi; Kersek Pisang; Sutribut.

(4) *H. patens* Ridl. *Journ. Linn. Soc.* xxxviii. 311; *Journ. F.M.S. Mus.* vi. 152.

Shrublet erect, branched, 2 ft. tall or less. Leaves lanceolate acute, base cuneate, glabrous, ·5 to ·75 in. wide. Stipules wide, triangular, acute. Panicle lax spreading, terminal, 6 to 8 in. long, 6 in. wide or less; branches dichotomous, slender. Flowers pedicelled, single on the branch ends, greenish white. Calyx obconic, lobes triangular acute. Corolla-lobes linear, recurved. Stamens long, projecting, purple. Capsule obovoid, ·09 in. long. *Hab.* Mountains on rocky slopes, local but abundant. Pahang, Gunong Tahan, 4000 to 6000 ft. altitude (Robinson and Ridley).

(5) *H. Maingayi* *Hook. fil. F.B.I.* iii. 49.

Shrubby plant glabrous, about 12 in. tall. Leaves coriaceous, lanceolate acute, base round or narrowed, nerveless, 1·5 to 1·75 in. long, ·4 to ·6 in. wide; petioles ·05 to ·1 in. long. Stipules triangular, acute. Cymes terminal and axillary; peduncles from ·25 to 1 in. long. Bracts thick, lanceolate. Flowers white, ·3 in. long; pedicels under ·1 in. long. Calyx campanulate, deeply cut into linear-lanceolate lobes. Corolla salver-shaped, lobes oblong blunt. Capsule ovoid globular, less than ·1 in. long. *Hab.* Malacca, Mt. Ophir at Padang Batu in open grassy spots (all collectors).



(6) *H. flexuosa* Ridl. *Journ. Roy. As. Soc. S. Br.* xxxv. 15.

A slender herb over a foot tall, simple or branched. Leaves ovate-lanceolate acuminate, base narrowed, coriaceous, 3 in. long, 1 in. wide; petioles .25 in. long. Stipules ovate. Panicles terminal and axillary lax; branches flexuous. Flowers .12 in. long, white; pedicels short. Calyx campanulate, lobes ovate-acute. Corolla-tube shorter than the blunt lobes, mouth hairy. Capsule subglobose, less than .12 in. long. Seed 1 in each cell. *Hab.* On rocks, rare, from sea level to 3700 ft. altitude. Johor, Kwala Batu Pahat. Malacca, Mt. Ophir at 3000 ft. altitude (Ridley). Kedah Peak (Robinson and Kloss).

(7) *H. rivalis* Ridl. *Journ. F.M.S. Mus.* vi. 153.

A weedy herb 2.5 to 3 ft. tall. Stem 1 in. through, 4-angled. Leaves linear acuminate, base narrowed to petiole, glabrous subcoriaceous, 3.5 in. long, .12 in. wide or less. Stipules broad, triangular, mucronate, .12 in. long. Cymes dichotomous, paniced, 1 in. long, axillary and terminal with a few flowers at base and branches, .5 in. long with 3 flowers at end. Flowers white, .12 in. long, shortly pedicelled. Calyx campanulate, lobes longer than tube, ovate pubescent. Corolla cylindric, glabrous, twice as long as calyx-lobes, lobes oblong acute, pubescent. Capsule ovoid, .1 in. long. *Hab.* Pahang, on rocks at Jeram Ampat, Tembeling River (Ridley).

(8) *H. peduncularis* King, *l.c.* 161.

Low shrubby plant. Branches slender, angled. Leaves coriaceous, linear-lanceolate acuminate both ends, nerveless, 1.5 to 2.5 in. long, .2 to .35 in. wide; petioles .15 to .4 in. long, winged. Stipules bases broad, triangular acuminate, hairy. Peduncle one terminal, 2 to 4 in. long with a dense-flowered head of white flowers, .75 in. through (occasionally 2 smaller in axils), with 2 linear bracts below. *Hab.* Kedah Peak, 4000 ft. altitude on grassy open spots (Ridley, Robinson).

(9) *H. stelligera* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 109.

Herbs with 4-angled stems 2 ft. tall; branches rough, hairy. Leaves sub-coriaceous, lanceolate acuminate acute sub-sessile, glabrous above, dense-hairy beneath; nerves 2 pairs ascending; 1.5 in. long, .5 in. wide. Stipules ovate cuspidate. Flowers white in dense sessile globose heads, .25 in. through, axillary and terminal. Calyx .1 in. long, lobes linear, as long as tube, hairy, spreading out flat star-like after flowering. Corolla .2 in. long, glabrous except the short ovate lobes tipped with hairs. Capsule urn-shaped, hairy, .12 in. long. *Hab.* Sandy heaths. Setul Heath (Ridley).

(10) *H. globiceps* Ridl.

Erect under-shrub, little-branched, 12 in. tall, densely grey hairy. Leaves chartaceous, lanceolate long-acuminate at both ends; nerves 6 pairs elevate above when dry; pubescent all over, glaucescent beneath, 4.5 to 5.5 in. long, 1.25 to 1.5 in. wide; petioles

·25 in. long. Stipules connate at base with numerous long bristles ·25 in. long. Heads globose, dense on lateral branches ·25 to ·3 in. through sessile terminal, 2 to 4 axillary on ·2 in. long peduncles. Calyx sub-globose, lobes lanceolate-acuminate as long as tube, dense hairy. Corolla greenish white. Capsule oblong, ·05 in. long, hairy. Seeds 4 to 5 in a cell semi-ellipsoid brown. *Hab.* In wet places. Lankawi islands, Burau (Robinson, No. 6248).

(11) *H. coronata* Wall. *Cat.* 856. *H. connata* Hook. *fil. F.B.I.* iii. 62; *King, l.c.* 162; *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 54.

A wiry herb decumbent, 6 to 8 in. tall. Leaves membranous oblong acuminate, very shortly narrowed at base, glabrous except the midrib puberulous beneath; nerves 4 to 5 pairs, faint; 1·75 to 2·75 in. long, ·35 to ·75 in. wide; petioles ·1 in. long, puberulous. Stipules campanulate with about 10 long bristles about ·45 in. long. Heads in a terminal whorl of 4 leaves, sessile, about ·2 in. across. Calyx-lobes long lanceolate, long acuminate, pubescent. Corolla ·25 in. or more long, tube broad, lobes oblong, 4 or 5 densely woolly at base, violet or rose pink. Fruit many-seeded, ellipsoid. *Hab.* Shady banks in woods up to 5500 ft. altitude. Perak, Temengoh; Ipoh (Curtis); Gunong Hijau 5500 ft. altitude. Kelantan, Chaning. Lankawi (Curtis). Perlis (Ridley). *Distrib.* Burma, Siam.

(12) *H. glabra* R. Br. Wall. *Cat.* 848; *King, l.c.* 160.

A glabrous, slender branched herb about 2 ft. tall. Stems slender. Leaves linear-lanceolate acuminate to both ends with a long terminal point, rather thin nerves, 3 to 4 pairs ascending, 2·5 to 5 in. long, ·5 to ·6 in. wide; petioles ·1 in. long. Stipules a campanulate cup with a few bristles. Cymes axillary, dichotomous, ·4 in. long, puberulous. Flowers under ·1 in. long, white, shortly pedicelled. Calyx campanulate, lobes acute. Corolla tubular, lobes blunt. Fruit globular, ·1 in. through. *Hab.* On dry stony spots in woods. Penang Waterfall (all collectors). Kedah Peak. Perlis, Chupeng (var. *ovata*). *Native names:* Rumput Chenkering; Rumput Sibueh Jantan; Rumput Srigala.

The typical plant seems peculiar to Penang. The Indian ones referred to it by Hooker are different in having much broader ovate-lanceolate leaves and bigger panicles. The Perlis plant seems intermediate, the lower leaves are ovate-lanceolate 1 in. across. King's Malacca localities are erroneous; there is no specimen from Griffith in Herb. Kew, and Maingay's is obviously from Penang.

(13) *H. stipulata* R. Br. Wall. *Cat.* 6195, 863A; *King, l.c.* 160.

A weak creeping ascending slender herb, slightly branched and about 1 ft. tall. Leaves thin membranous, ovate to elliptic oblong, sub-acute, base narrowed, glabrous above, pubescent on 3 or 4 pairs of nerves usually very inconspicuous, ·75 to 1·75 in. long, ·4 to ·8 in. wide; petioles ·2 to ·3 in. long. Stipules cupular, short with a few bristles. Peduncles axillary and terminal ·2 to ·5 in. long, bearing dense 3- to 6-flowered heads ·35 in. through. Flowers

·15 in. long, sub-sessile white. Calyx obovoid, lobes lanceolate-acuminate. Corolla short, lobes oblong blunt. Capsules obovoid dehiscent by apical valves. *Hab.* Mountain streams on rocks. Pahang, Kota Glanggi; Telom. Perak, Temengoh (Ridley). *Distrib.* India, Java.

(14) **H. andamanica** Kurz, *Journ. As. Soc.* 1872, ii. 311.

Slender creeping and ascending 12 in. long, nodes 2 in. apart. Leaves thin membranous, glabrous ovate elliptic blunt, base cuneate decurrent; nerves fine about 7 pairs; 2 to 2·75 in. long, 1·25 in. wide; petioles ·25 in. long. Stipules of setaceous bristles ·4 in. long. Peduncle 1·25 in. long, slender, terminal with 2 branches ·25 in. long with a head on each and one between the two ·25 in. through. Flowers about 12 in a head sessile. Calyx glabrous campanulate, lobes lanceolate acuminate. Corolla small, white. Capsule sub-globose. *Hab.* Pahang, Gunong Senyum (Evans). *Distrib.* Andamans.

This resembles *H. stipulata* Br., but is much larger.

(15) **H. vestita** R. Br. *Wall. Cat.* 847; *King, l.c.* 159.

Diffuse herb about 1 to 4 ft. tall, pubescent except the upper side of leaves. Leaves membranous, elliptic lanceolate acuminate, base narrow; nerves 5 to 6 pairs, ascending conspicuous; 2 to 3·5 in. long, ·6 to 1 in. wide; petioles ·15 to ·25 in. long. Inflorescence axillary of several umbelled cymes about ·2 in. through on peduncles as long, sometimes paniced. Flowers ·05 in. long, sessile or nearly so, lilac. Calyx cupular, lobes deltoid or lanceolate. Corolla hairy outside and in throat, funnel-shaped. Fruit obovate less than ·05 in. long. *Hab.* Common weed in open ground. Singapore, Bukit Timah; Changi. Johor, Kota Tinggi. Pahang, Pekan. Malacca, Pulau Besar. Selangor, Sepang. Negri Sembilan; Kwala Pedas; Pantai (Cantley). Perak, Temengoh; Ulu Bubong (Kunstler). Penang, Tanjong Bunga (Curtis). Tomoh (Machado), Kelantan, Chaning. *Distrib.* Indo-Malaya. *Native name:* Tokong Bulu.

A variety with narrow lanceolate acuminate leaves 2 in. long and only ·25 in. wide, occurs on the Pahang River at Tanjong Gajah Mati.

(16) **H. auricularia** Linn. *Sp. Pl.* 101; *King, l.c.* 163.

Tall wiry pubescent herb about 2 ft. tall. Leaves lanceolate acute, narrowed to base, more or less pubescent on both sides, sometimes glabrous; nerves 4 to 6 pairs, ascending; 1·5 to 2·25 in. long, ·35 to ·85 in. wide; petioles ·2 to ·35 in. long. Stipules cup-shaped, 2- to 3-bristled. Cymes dense, many-flowered axillary. Flowers nearly sessile, less than ·1 in. long, white. Calyx hairy campanulate, lobes ovate or lanceolate-acute. Corolla small salver-shaped. Fruit globular, hairy. *Hab.* Common in open places, roadsides, etc. Singapore, Toas; Chan Chu Kang; Chua Chu Kang. Pahang, Tahan River; Pekan. Malacca (Maingay). Selangor, Ulu Gombak; Rantau Panjang (Kloss); Kwala Lumpur.

*Distrib.* India, Australia. *Native names*: Kenika Batu; Kerukoh Batu.

(17) **H. pachycarpa** *Ridl. Journ. F.M.S. x. 140.*

Stem simple, erect obscurely angled, stout over 12 in. tall. Leaves lanceolate acuminate acute, base long narrowed; nerves prominent ascending, 8 pairs; 6.25 in. long, 1.4 in. wide; petioles .1 in. long. Stipules oblong with 3 to 4 long bristles. Heads sessile dense, .25 in. through. Calyx small, lobes lanceolate rather broad acute. Corolla hardly as long, white. Capsule globose smooth shortly pedicelled, very hard. Seeds 3 or more, black. *Hab.* Kelantan, Glam Woods near Kota Bharu (Ridley). *Distrib.* Indo-China.

Near *H. paradoxa* Kurz of the Andamans, but that has nerveless leaves.

(18) **H. Havilandi** *King, l.c. 163.*

Weedy herb, base woody; stems 4-angled scurfy hairy at first 6 to 12 in. long. Leaves membranous elliptic acuminate, base narrowed, finely hispid especially above; nerves 3 or 4 pairs faint; 1 to 1.5 in. long, .5 to .7 in. wide; petioles .3 to .5 in. long. Stipules triangular acuminate with long teeth pilose. Cymes axillary small many-flowered, sessile .25 in. across. Flowers .1 in. long on short hairy pedicels. Calyx pubescent campanulate with linear-lanceolate teeth. Corolla little longer, lobes broad oblong. Capsule ovoid, hispid or glabrous. *Hab.* Perak (Kunstler, Scortechini). Pahang, Kwala Teku (Seimund). Penang (Curtis). *Distrib.* Burma, Borneo.

(19) **H. Kunstleri** *King, l.c. 162.*

An erect herb 18 in. tall, glabrous; stem 4-angled. Leaves membranous oblong-elliptic tapering to both ends; nerves 5 or 6 pairs; 3.5 to 4.5 in. long, 1.5 to 2 in. wide; petioles .5 to .6 in. long. Stipules cupular, teeth long subulate many pubescent, .3 in. long. Cymes in axillary sessile dense heads, .2 in. through, hairy all over. Flowers .15 in. long pedicelled. Calyx-tube narrow, lobes lanceolate 4. Corolla shorter, white, lobes short oblong. Capsule ovoid less than .1 in. long. *Hab.* By streams in forest, 400 to 600 ft. altitude. Perak, near Ulu Kerling (Kunstler).

(20) **H. macrophylla** *Wall. in W. and A. Prodr. 408; King, l.c. 162.*

A shrubby herb, little-branched, about 1 ft. tall; stem rather stout. Leaves membranous, ovate to ovate-lanceolate acuminate or acute, base broad, round or narrowed, glabrous or slightly puberulous; nerves 6 or 7 pairs; 3 to 6 in. long, 1.5 to 3 in. wide; petioles .3 to .7 in. long. Stipules cupular hairy with 8 to 10 pubescent bristles. Cymes axillary sessile, globular, dense-flowered .5 in. or more through. Flowers .1 in. long, white, sessile or subsessile with linear hairy bracts. Calyx funnel-shaped, pubescent, lobes lanceolate. Corolla pubescent, shorter lobes blunt. Capsule ovoid, hairy. Seeds many. *Hab.* Forests, rather sporadic but

widely spread, not common; Malacca (Griffith). Pahang, Telom. Penang (Wallich 841); Balik Pulau. Kedah Peak (Robinson).  
*Distrib.* Mergui.

(21) *H. congesta* Wall. *Cat.* 844; *King, l.c.* 161.

A shrubby herb about 2 ft. tall with 4-angled usually simple stems, erect. Leaves coriaceous shining green often tinted purple, lanceolate or ovate lanceolate acuminate, base cuneate, or round in ovate leaves; nerves 5 or 6 pairs; 2.5 to 5 in. long, 1.7 to 2 in. across; petioles .15 to .35 in. long. Stipules triangular acuminate with many linear lobes. Cymes dense, axillary sessile. Flowers white, under .15 in. long with numerous scarious bracts. Calyx campanulate, .15 in. long, lobes large triangular ciliate. Corolla tubular, lobes lanceolate. Fruit oblong baccate pulpy white, .15 in. long. *Hab.* In lowland forests; common up to 3000 ft. altitude. Singapore, Garden Jungle, Bukit Timah, etc. Malacca, Ayer Panas (Griffith). Negri Sembilan, Johol. Selangor, Kwala Lumpur. Penang Hill. Pulau Adang.

var. *nicobarica* King, *l.c.* 162.

A narrow-leaved form, leaves narrow elliptic, 3.5 to 5.5 in. long, .8 to 1.4 in. wide, much narrowed to both ends; petioles .3 to .4 in. long. Cymes half as long with fewer flowers. Usually occurs in drier spots. Griffith's plant from Mt. Ophir has very stiff leaves 4 in. long, .25 in. wide. *Hab.* Malacca, Mt. Ophir (Griffith); Perak, Changkat Mentri (Kloss); Perlis, Kanga (leaves thin, 1 in. across). *Distrib.* Borneo, Sumatra, Mergui, Nicobars. *Native names:* Bunga Ka-karang; Lida Jin; Sumpu Puchut. *Use:* In native medicine.

The fleshy white baccate fruit is, I believe, unique in the genus. It is an adaptation for bird-dispersal, the plant being an inhabitant of jungles. A similar adaptation occurs in the Labiate *Gomphostemma*.

(22) *H. tenelliflora* Bl. *Bijdr.* 971; *King, l.c.* 165.

Slender erect herb, glabrous, 12 to 16 in. tall, branched. Leaves in whorls of 5 or 6, coriaceous sessile linear sub-acute, .5 in. long, .05 in. wide. Stipules cup-shaped with 6 bristles. Cymes very small, under .2 in. wide axillary. Flowers .15 in. long, sessile 2 to 3. Bracts bristly. Calyx obovoid campanulate pilose, lobes lanceolate acute. Corolla little longer. Capsule with the long sepals nearly .2 in. long. *Hab.* Rather rare in open country and on dry paths. Malacca (Griffith). Province Wellesley, Kubang Ulu (Curtis); Permatang Bertam. Penang Hill (Wallich); paths up the hill. *Distrib.* Java.

(23) *H. nitida* W. and A. *Fl. Penin. Ind.* 412; *King, l.c.* 165.

Diffuse wiry herb from a woody root; stems 4-angled, angles hispid, 12 to 18 in. long. Leaves coriaceous sessile narrow lanceolate or linear, nerveless, .6 to 1 in. long, .1 to .25 in. wide. Stipules campanulate, pubescent with 6 to 8 long bristles. Cymes axillary dense, 2- to 4-flowered. Flowers .2 in. long, sessile or sub-sessile.

Calyx tubular campanulate, hispid, lobes large ovate acute, ciliate. Corolla no longer, pubescent tubular, lobes narrow ovate. Capsule ovoid, .2 in. long with the large persistent sepals. *Hab.* Perak (Kunstler); Penang (King). *Distrib.* India, Ceylon, Borneo.

I have seen no specimens.

(24) *H. hispida* Retz *Obs.* iv. 23; *King, l.c.* 166.

Erect little or not branched herb about 2 ft. tall, pubescent. Leaves thin, coriaceous, glabrous, oblong-lanceolate, narrow acuminate, base slightly narrowed, .8 to 2 in. long, .25 to .5 in. wide; petioles .1 in. long. Stipules forming a campanulate pubescent cup with 6 to 8 bristles. Cymes few-flowered, axillary. Flowers .2 in. long sessile. Calyx campanulate hispid, lobes linear. Corolla-lobes lanceolate acuminate, hairy. Capsule .1 in. long, ovoid, hairy large. *Hab.* Dry open spots. Pahang, Sungei Tembeling. Malacca, Panchur (Goodenough). Perak, Thaiping Hills; Tapah. Penang Hill. Kelantan, Chaning. *Distrib.* India, Java.

(25) *H. pinifolia* Wall. *Cat.* 850; *Hook. fil. F.B.I.* iii. 60; *King, l.c.* 166.

A diffuse prostrate much-branched wiry herb; root woody, stems slender 6 to 12 in. long. Leaves coriaceous sessile, linear, acute, puberulous above, .5 to 1.5 in. long, .05 in. wide. Stipules cupular with a few bristles. Cymes axillary and terminal, sessile 1- to 4-flowered. Flowers .1 in. long, white. Calyx hispid ovoid campanulate, lobes narrow acute as long as tube. Corolla-tube longer, lobes lanceolate. Capsule pubescent, ovoid, dehiscing at tip. *Hab.* Common on sandy places by the sea and big rivers. Singapore, Jurong; McPherson Road. Johor, Batu Pahat. Pahang, Kwala Pahang; Rumpin River. Malacca, Tanjong Kling; Bukit Bruang (Derry). Selangor, Salak (Seimund). Perak, Tapah. Dindings, Pangkor. Penang, Waterfall; Jelutong (Curtis). Langkawi (Curtis). Setul Heath. Tringganu, Bundi (Rostados). *Distrib.* India, Borneo. *Native name:* Rumput Biring.

(26) *H. cærulea* W. and A. *Prodr.* 412; *Hook. fil. F.B.I.* iii. 60.

Erect and spreading branched wiry herb, closely resembling *H. pinifolia*, but the leaves have a subulate point and the calyx teeth are triangular with hair points. *Hab.* Penang at the Waterfall (Curtis). Setul Heath (Ridley). *Distrib.* India, Ceylon.

## 21. OLDENLANDIA, Linn.

Slender erect or diffuse herbs. Flowers small, white, violet or pink in axillary or terminal dichotomous cymes or solitary. Calyx cbovoid or turbinate 4- (or 5-)toothed. Corolla funnel- or salver-shaped, lobes 4 (or 5). Ovary 2-celled, many-ovuled. Capsule sub-globular or compressed, top loculicidal. Seeds minute. Species about 80, chiefly Asiatic.

- Leaves whorled at base of stem, elliptic . . . . (1) *O. nudicaulis*  
 Leaves scattered.  
 Flowers in terminal or axillary cymes not much  
 longer than the elliptic oblong leaves.  
 Calyx-tube winged . . . . . (2) *O. alata*  
 Calyx-tube not winged . . . . . (3) *O. paniculata*  
 Cymes 1 to 2 in. long, slender branched.  
 Flowers on slender branches violet . . . . (4) *O. dichotoma*  
 Flowers 2 to 4 on slender axillary pedicels white. (5) *O. corymbosa*  
 Flowers cymose pink . . . . . (6) *O. rosea*  
 Flowers solitary axillary, white pedicelled; leaves  
 linear . . . . . (7) *O. Heynei*  
 Flowers solitary axillary sessile.  
 Leaves narrow . . . . . (8) *O. diffusa*  
 Leaves round-ovate . . . . . (9) *O. trinervia*

(1) *O. nudicaulis* Roth. Nov. Sp. 85; King, l.c. 167.

Small glabrous annual 4 to 6 in. tall; stem 1 to 2 in. tall with several whorls of 3 to 4 elliptic-blunt leaves narrowed at base, .7 to 1.5 in. long, .35 to .65 in. wide. Cymes lax corymbose simple or branched, 1 or more terminal, 1.5 to 3.5 in. long. Flowers .15 in. long, white. Calyx cylindrical, teeth small lanceolate. Corolla much longer, lobes blunt. Capsule turbinate. *Hab.* Lankawi islands (Curtis). *Distrib.* Indo-Malaya.

(2) *O. alata* Koen. in W. and A. Prodr. 413; Hook. fil. F.B.I. iii. 70.

Glabrous succulent annual, 6 to 12 in. tall, branched, stout. Leaves elliptic or elliptic-lanceolate (upper ones ovate) blunt or sub-acute, nerves invisible, narrowed at base to a distinct petiole or sub-sessile, 1.75 to 2 in. long, .3 to .4 in. wide; petioles .3 in. or less long. Cymes axillary capitate, 3- to 5-flowered. Calyx-tube 4-winged. Capsule .2 in. long, obovoid 4-angled and winged with 4 large calyx-lobes. *Hab.* Gardens or open country. Not common. Malacca, Residency. Gardens. Perlis, Kanga (Ridley). *Distrib.* India, Java, Siam.

(3) *O. paniculata* Linn. Sp. Pl. 1667; King, l.c. 168.

Glabrous annual erect, branched; branchlets 4-angled or winged. Leaves thin elliptic sub-acute, base narrowed; nerves indistinct; .4 to .75 in. long, .2 to .3 in. wide; petioles .1 in. long. Cymes terminal or in upper axils on peduncles as long or twice as long as leaves, lax few-flowered. Flowers under .1 in. long, white. Calyx campanulate, teeth 4. Corolla little longer. Capsule turbinate over .1 in. across. *Hab.* Waste places. Singapore, Tanglin. Perak (Scortechini). Tringganu (Yapp). *Distrib.* Indo-Malaya, China, Polynesia.

(4) *O. dichotoma* Hook. fil. F.B.I. iii. 67; King, l.c. 168.

Much-branched slender annual over 12 in. tall glabrous or sparsely hairy. Leaves membranous narrow-oblong lanceolate sparsely hairy, .75 to 1.25 in. long, .1 to .2 in. wide; petioles .05 in. long or less. Cymes axillary and terminal with numerous long slender dichotomous branches, 1 to 2 in. long, axillary .3 to .5 in.

long, terminal. Flowers  $\cdot 2$  in. long solitary at the ends of branches, violet. Calyx campanulate, lobes lanceolate. Corolla twice as long, teeth spreading. Capsules sub-globular,  $\cdot 1$  in. long or less. *Hab.* Sandy or dry places often near the sea. Singapore, Galang; Telok Kurau. Johor. Malacca, Panchur (Goodenough). Selangor, Kwala Lumpur. Dindings, Lumut. Province Wellesley, Permatang Bertam. Penang, Waterfall (Curtis); Balik Pulau. Setul Heath. *Distrib.* India.

(5) *O. corymbosa* Linn. *Sp. Pl.* 119; *King, l.c.* 169.

Shorter, stouter and denser than *O. dichotoma*. Leaves linear acuminate,  $\cdot 5$  in. long,  $\cdot 05$  in. wide. Cymes axillary and terminal,  $\cdot 5$  in. long or less, or solitary on short pedicels. Flowers white. Capsule semiglobose,  $\cdot 1$  in. long. *Hab.* Open sandy places, common. Singapore, Changi. Johor, Tanah Merah Road; Batu Pahat; Pengerang. Malacca, Tanjong Kling; Ayer Panas (Cantley). Muar, Bukit Keyara (Foxworthy). Selangor, Klang (Foxworthy). Perak, Tapah. Penang, Esplanade; Jelutong (Curtis). *Distrib.* All tropics. *Native names:* Telor B'ankas; Siku-Siku; Sibiu. *Use:* For poulticing sores.

(6) *O. rosea* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 110.

Erect tufted herb 10 in. tall, much-branched sparsely hairy. Leaves ovate or oblong-ovate, hairy, narrowed to petiole, tip sub-acute,  $\cdot 5$  in. long,  $\cdot 25$  in. wide; petioles  $\cdot 1$  in. long. Flowers cymose solitary or 3 or 4 together; pedicels  $\cdot 12$  in. long. Calyx-tube funnel-shaped, hairy, lobes ovate-acute. Corolla tube longer, lobes nearly as long, acute, rose pink. Capsule  $\cdot 1$  in. long, sub-globose, top flat, hairy. *Hab.* Sandy heaths. Setul (Ridley).

(7) *O. Heynei* Don *Gen. Syst.* iii. 531; *King, l.c.* 169.

A tall much-branched erect annual, bushy, 2 ft. tall or less, stems scabrid; branches 4-angled. Leaves linear-acuminate, 1 in. long, 1 in. wide or less. Flowers solitary axillary or 2 together. Pedicels slender,  $\cdot 4$  in. long. Corolla white sometimes tipped red, tube short. Capsule ovoid,  $\cdot 1$  in. long. *Hab.* Common in sandy spots, grass plots, etc. Singapore, McPherson Road; Tanglin. Johor, Bukit Banang. Perak, Thaiping Waterfall. Dindings, Lumut. Penang, Tanjong Bunga (Curtis).

(8) *O. diffusa* Roxb. *Hort. Beng.* 11; *King, l.c.* 170.

Diffuse annual, glabrous, 6 to 12 in. tall, branched from base. Leaves linear-oblong, narrowed both ends,  $\cdot 5$  to  $1\cdot 5$  in. long,  $\cdot 05$  to  $\cdot 1$  in. wide. Flowers white,  $\cdot 15$  in. long, solitary, axillary sessile. Calyx wide campanulate, teeth erect acute. Corolla wide campanulate. Capsule depressed globular, sepals small, hardly  $\cdot 1$  in. long. *Hab.* Sandy open spots. Singapore, Government Hill; Chan Chu Kang; Reservoir Woods. Dindings, Lumut. Perak, Kwala Temengoh. Kedah, Alor Sta. Setul Heath. Tringganu (Yapp). Kelantan, Kwala Aring (Yapp). *Distrib.* Tropical Asia and Japan. *Native name:* Rumpit Injah.



(9) *O. trinervia* Retz, *Obs.* iv. 23; *King, l.c.* 170.

Annual weak prostrate herb, rooting at the nodes, hairy. Leaves round or obovate, .2 to .3 in. long and nearly as wide; petioles .05 in. long. Flowers .05 in. long, white, solitary axillary on very short pedicels, deflexed. Calyx campanulate, pilose. Corolla little longer, glabrous. Capsule ovate, compressed, very small. *Hab.* Open sandy spots. Singapore, Gelang. Pahang River, Kwala Bruas. Penang, Dato Kramat and Pulau Betong (Curtis). *Distrib.* India, Malay isles, Africa.

## 22. XANTHOPHYTUM, Bl.

Slender erect herbs more or less red-hairy. Leaves membranous hairy, ovate to lanceolate, petioled. Stipules rather large. Inflorescence axillary, cymose paniced lax or compact, hairy. Flowers very small, white. Sepals short, lanceolate-acuminate. Corolla funnel-shaped, lobes 4 to 5, valvate. Stamens 4 to 5, insert at base of corolla. Styles short. Stigma bilobed. Capsule small didymous, crowned with the calyx. Seeds very numerous, minute. Species 4 or 5, Malaya and Polynesia.

(1) *X. capitatum* Ridley, *Journ. F.M.S. Mus.* x. 139.

Stem woody about 12 in. tall, red-hairy as are the leaves and inflorescence. Leaves alternate, the opposite leaf alternately being reduced to a stipule-like organ, blade ovate elliptic acuminate acute; nerves 18 pairs, above sprinkled with long hairs, beneath very hairy especially on the nerves, 6.5 in. long, 3.25 in. wide; petioles .5 in. long. Inflorescence of peduncled heads in the leaf axils .3 in. through; peduncles .2 in. long, red-hairy. Bracts obcuneate, toothed. Calyx-tube globular hairy, lobes triangular acuminate. Corolla very small, white. Fruit minute, white. *Hab.* Muddy stream banks, rare. Kelantan, banks of the Pehi River, Chaning (Ridley).

## 23. LUCINÆA, DC.

Epiphytic climbers or terrestrial shrubs, glabrous or nearly so. Leaves usually coriaceous. Flowers in axillary and terminal heads solitary or paniced, pedunculate. Calyx-tube turbinate, limb annular or cupular, entire. Corolla funnel-shaped, white or red, tube densely pilose inside with 5 or 6 oblong-lanceolate lobes. Stamens 4 to 5 inserted on the tube on short villous filaments or sessile. Anthers included. Ovary 2-celled; style filiform. Stigmas 2, linear or spatulate. Fruit baccate sub-confluent. Seeds numerous. Species 18, Malayan.

Flower-heads in a terminal panicle . . . . .	(1) <i>L. paniculata</i>
Flower-heads solitary or in fascicles of 3 ovate glabrous; corolla .75 in. long . . . . .	(2) <i>L. Ridleyi</i>

Young parts and inflorescence pubescent; epiphyte; leaves membranous; flowers 5-merous . . . . .	(3) <b>L. membranacea</b>
Terrestrial shrub; leaves coriaceous; flowers 4-merous . . . . .	(4) <b>L. morinda</b>

(1) **L. paniculata** King, l.c. 177.

Glabrous climber. Leaves oblanceolate to elliptic, short acuminate, base narrowed; nerves 10 pairs; 6 to 10 in. long, 2.25 to 4.25 in. wide; petioles .18 to 1.5 in. long. Stipules ovate lanceolate. Heads in a terminal panicle 5 to 6 in. long; branches .5 to 1 in. long, each bearing a head of 3 to 4 sessile flowers. *Hab.* Perak (Scortechini).

(2) **L. Ridleyi** King, l.c. 178.

Epiphytic climber. Branches glabrous. Leaves thin, coriaceous, glabrous, obovoid oblong or narrow elliptic, acute or acuminate, base narrowed; nerves 6 to 8 pairs; 4 to 6 in. long, 1.5 to 2.5 in. wide; petioles .75 in. long. Stipules lanceolate connate at base, .5 to .75 in. long. Peduncle one, terminal, 1 to 2 in. long. Head of 8 to 12 flowers, 1 in. through. Calyx subquadrangular, truncate. Corolla .75 in. long, thick, ovate-oblong white, lobes narrow, oblong. Fruit .4 to .6 in. long, claret-colour. *Hab.* Mountain forests. Perak, Gunong Batu Putih (Wray); Thaiping Hills, 2000 to 3500 ft. altitude. *Distrib.* Borneo.

(3) **L. membranacea** King, l.c. 178.

Slender epiphytic branched climber, pubescent. Leaves membranous, oblong or elliptic acuminate or acute, shortly narrowed at base; nerves 8 to 9 pairs, faint, midrib puberulous, red beneath, 3.5 to 5.5 in. long, 1.25 to 2.25 in. wide; petioles .1 to .15 in. long. Stipules broad ovate keeled, pubescent connate at base. Peduncles 1 to 3 terminal and axillary, usually 1 in. long, often shorter pubescent. Head .75 in. through of 8 to 10 sessile dark red flowers. Corolla .15 in. long, tube cylindrical, hairy inside, lobes shorter than tube. Fruit sub-globular confluent at base, .15 in. through, forming a head about .3 in. through, red. *Hab.* Forests in mountains or at low levels. Singapore, Bukit Mandai; Chan Chu Kang. Johor, Batu Pahat; Ulu Simpai (Kelsall). Selangor, Semangkok Pass. Perak, Relau Tujor (Wray); Goping and Ulu Bubong (Kunstler). *Distrib.* Borneo.

(4) **L. morinda** DC *Prodr.* iv. 368; King, l.c. 179.

Scandent bush; stems rather stout, glabrous. Leaves coriaceous, dark shining green, lanceolate elliptic or ovate acute or sub-acute, base round or cordate; nerves slender, 8 to 12 pairs; 1.5 to 2.5 in. long, .9 to 1.25 in. wide. Stipules triangular. Peduncles 1 to 6 together, terminal or axillary, pubescent, .1 in. long. Heads .75 in. through. Calyx whitish green. Corolla .25 in. long, white, fragrant. Fruits turbinate, .2 in. across in a head .75 in. through, green. *Hab.* Usually on the coast in open

sandy spots, common. Singapore (Jack); Thomson Road. Johor, Kota Tinggi. Pahang, Pekan. Malacca, Alor Gajah (Griffith); Merlimau (Goodenough). Selangor, Kwala Lumpur. Perak, Thaiping; Goping (Kunstler). *Distrib.* Malay isles.

#### 24. LECANANTHUS, Jack.

Epiphytic shrub. Flowers in involucrate axillary, sessile or peduncled heads. Calyx-tube ovoid, limb oblique, campanulate, lobes 2 to 4 obtuse unequal or 2-lipped. Corolla funnel-shaped, inflate below, lobes 5, blunt, bearded. Stamens 5; filaments short insert in throat. Disc urn-shaped. Ovary 2-celled. Stigmas 2 linear. Fruit membranous, 2-celled, many-seeded. Seeds smooth. Species 1, Malay Peninsula and Borneo.

(1) *L. erubescens* Jack. *Mal. Misc.* ii. 83; *King, l.c.* 179.

Glabrous except calyx, 12 to 18 in. tall, branched 4-angled. Leaves fleshy membranous, ovate-elliptic or narrow oblong, abruptly short-acuminate; nerves slender; 3 to 8 in. long, 1.25 to 3 in. wide; petiole .2 in. long. Stipules ovate-lanceolate acuminate. Heads globular or oblong, .75 to 1 in. across. Involucre bracts and calyx purple. Flowers white, more or less tinted purple or violet. *Hab.* Common in wet woods creeping on trees. Singapore, Jurong (Burkill); Krangi. Johor, Tempayan River; Tanjong Kupang. Malacca, Sungei Hudang (Derry); Merlimau (Cantley). Negri Sembilan, Bukit Kandang (Cantley). Selangor, Kwala Lumpur; Petaling. Perak, Ulu Selama (Scortechini). Dindings, Bruas. Penang, Telok Bahang (Curtis). *Distrib.* Borneo, Sumatra. *Native names:* Achar-Achar; Akar ambon; A. Muru; A. Susor Payah; Poko Dato Rajah.

#### 25. MYRIONEURON, Wall.

Small shrubs with white spongy bark. Leaves rather large membranous. Flowers white in small (or large) terminal capitate or corymbose cymes. Bracts lanceolate-acuminate, stiff. Calyx-tube ovoid, lobes 5 lanceolate, longer than the corolla. Corolla small tubular, throat villous, lobes short, hispid, valvate. Stamens 5 in the tube; filaments short; stigmas 2 linear-oblong. Berry ovoid, white with many seeds. Seeds minute. Species 8, India and Borneo.

(1) *M. microcephalum* Ridl. *Journ. F.M.S. Mus.* vii. 43.

Glabrous. Branches slender. Leaves elliptic acuminate with a long point shining green, 3.5 in. long, 1.5 in. wide; nerves very fine, 7 pairs; petioles .15 in. long. Head small, few-flowered, .3 in. long. Bracts lanceolate, long subulate as long as the flower. Flowers 2 or 4 in a head, sub-sessile. Corolla-lobes linear acuminate, much longer than tube. *Hab.* Kedah, Gerun (Robinson and Kloss).

## 26. MUSSÆNDA, Linn.

Sarmentose shrubs, rarely erect. Leaves membranous. Stipules solitary or paired, free or connate. Flowers in terminal compound cymes. Calyx-tube turbinate or oblong, lobes 5, one on the central flower in a cyme very large petaloid white (or coloured) petioled or all similar, small. Corolla tubular, tube elongate, usually silky, throat villous, lobes 5, short, valvate, orange or yellow or large red. Stamens 5, insert on the throat or below; filaments short. Ovary 2-celled; style filiform. Stigmas linear. Fruit green, baccate oblong. Seeds minute. Species 40, tropics of Asia, Africa, Polynesia.

- Calyx-lobes all small and similar; flowers large.  
 Corolla-lobes shorter than the tube . . . . . (1) *M. mutabilis*  
 Corolla-lobes longer than the tube . . . . . (2) *M. spectabilis*  
 One calyx-lobe in one flower in three, large white  
 petioled; branches and leaves hairy.  
 Calyx lobes large, broad.  
 Corolla little longer than calyx . . . . . (3) *M. Wrayi*  
 Corolla considerably longer.  
 Calyx-lobes broad lanceolate . . . . . (4) *M. malaccensis*  
 Calyx-lobes narrow linear long . . . . . (5) *M. angustisepala*  
 Calyx-lobes short.  
 Leaves softly hairy . . . . . (6) *M. villosa*  
 Leaves glabrescent except midrib and nerves  
 beneath . . . . . (7) *M. purpurascens*  
 Leaves glabrous or nearly so.  
 Leaves oblong or lanceolate, base narrowed.  
 Nerves 5 or 6 pairs . . . . . (8) *M. glabra*  
 Nerves 9 to 10 pairs . . . . . (9) *M. polyneura*  
 Leaves obovate-oblong . . . . . (10) *M. oblonga*  
 Leaves round cordate at base . . . . . (11) *M. cordifolia*

(1) *M. mutabilis* Hook. *fil. Ic. Pl.* 1718; King, *l.c.* 182. *M. Maingayi* Stapf, *Trans. Linn. Soc.* iv. 172.

A sarmentose bush, glabrous. Leaves membranous elliptic to ovate acuminate, base long, narrowed; nerves 7 to 9 pairs, 5 to 7 in. long, 3 to 4.5 in. wide; petioles .25 to 1.25 in. long. Stipules a toothed ciliate ring. Cymes terminal, spreading lax; peduncles .5 in. long; branches about as long. Flowers few. Calyx cylindrical, lobes long narrow lanceolate acuminate silky. Corolla-tube 1.5 in. long, cylindrical, glabrous or velvety, limb of 5 acute oblong-ovate hairy lobes 2 in. across, bright red turning yellow, mouth hairy. Fruit cylindrical clavate, .5 to .7 in. long, .3 in. through. *Hab.* Forests. Common on the main chain of mountains. Singapore, Selitar. Johor, Gunong Pulau. Malacca, Gunong Mering; Bukit Sadanen (Derry). Pahang, Tahan River; Kwala Tenok. Selangor, common, Ulu Gombak; Ginting Bidai (Kloss). Negri Sembilan, Bukit Sulu; Pantai (Cantley). Perak, Relau Tujur (Wray); Goping (Kunstler); Thaiping Hills.

var. *hirsuta* King. Stem and leaves beneath densely velvety;

nerves hairy above. Johor, Gunong Pantai; Tebing Tinggi. Malacca, Ayer Panas (Derry). Tringganu, Bundi (Rostados).

var. *montana* Ridl. A dwarf compact form with small leaves, Malacca, Mt. Ophir on Padang Batu. *Native names*: Akar Bunga, Bintang Kuning, or Merah; Chempaka hutan; Akar Supucha; Poko Pudin Blachan; Poko Broah hutan (Tringganu); Balik Adap Bukit.

One of the finest shrubs in the peninsula, the brilliant flowers like a scarlet or yellow star.

(2) *M. spectabilis* Ridl.

Hairy shrub. Leaves chartaceous, ovate oblong, base round or cuneate, acute cuspidate, glabrous above except midrib, beneath sprinkled with short hairs, midrib and nerves fine 10 pairs appressed hairy, 5 to 6 in. long, 3 in. wide. Cymes terminal, densely hairy. Calyx-lobes lanceolate-acuminate sub-falcate, 1 in. long, hairy, 1 in. across. Corolla-tube as long, dense hairy; limb 2.25 in. across, pubescent on the back, mouth with short dense yellow hairs. *Hab.* Pulau Tiunan (C. B. Kloss).

Allied to *M. mutabilis* var. *hirsuta*, but the calyx-lobes much larger and the corolla-lobes larger and as long as the tube. Flowers apparently red or yellow.

(3) *M. Wrayi* King, l.c. 182.

Shrub more or less scandent, entirely covered with stiff white hairs. Leaves elliptic or nearly obovate, long narrowed to the base; nerves 9 to 14 pairs; 4 to 8 in. long, 1.75 to 4 in. wide; petioles .4 to .75 in. long. Stipules lanceolate-acuminate. Cymes terminal dense, 1 to 2 in. long, 2 to 3 in. wide; peduncles under 1 in. long. Calyx funnel-shaped, .5 to .7 in. long, one lobe enlarged narrow-elliptic or oblanceolate acute, hairy especially on edge, 1.5 in. long, .75 in. wide. Corolla red, pilose, little longer than calyx. Fruit oblong-ovoid, sparsely pilose. *Hab.* Mountain forests, Selangor, Ulu Gombak. Perak, Thaiping Hills; Ayer Larut (Wray); Kwala Dipang (Curtis). Penang, Pulau Jerajah (Curtis).

(4) *M. malaccensis* Ridl.

Branches red-hairy. Leaves broad elliptic narrowed to the base, sparsely hairy above, hairy on the nerves beneath; nerves 10 pairs elevate beneath; 4 to 5 in. long, 3 in. wide; petioles .5 in. long. Stipules lanceolate-acuminate, .3 in. long, red-hairy especially at the base. Cymes in upper axils 2 in. long, hairy. Ovary .15 in. long, densely hairy. Calyx-lobes lanceolate-acuminate, .25 in. long, .12 in. wide, hairy, 5-nerved, enlarged one obovate narrowed to the base, 3.5 in. long, 2.25 in. wide; petioles 1 in. long, 5-nerved; nerves hairy. Corolla not seen. Fruit .3 in. long, sparsely hairy. *Hab.* Malacca (Maingay 8352).

This has been by King referred to *M. macrophylla* Wall., a Himalayan species with very different foliage and much broader and larger calyx-lobes. It seems to me quite distinct from that or any other species.

(5) *M. angustisepala* Ridl. *M. Teysmanniana* King, *l.c.* 186, not of Miquel.

A long climber; upper part of branches pilose. Leaves broad elliptic to ovate, shortly narrowed to the petiole, shortly abrupt blunt acuminate, thickly sprinkled with hairs above and densely hairy on the midrib above and on all nerves beneath, 5 to 7 in. long, 2 to 3 in. wide; petioles .25 to .5 in. long, villous hairy. Stipules lanceolate subulate villous. Cymes large, 4 in. long, 6 in. wide; peduncles short; branches spreading, all pilose. Calyx-tube short, lobes linear acuminate, much longer, pilose, large white one ovate to orbicular-ovate, base broad or shortly narrowed,



FIG. 78.—*Mussænda angustisepala*.

3 to 5 in. long, 2.5 to 4.5 in. wide; petioles 1.5 in. long, hairy. Corolla 1 in. long, base slender, cylindric above fusiform hairy, lobes short, round. Fruit .3 in. long, oblong glabrous. *Hab.* Edges of forests, often on river-banks. Pahang, Kwala Tembeling. Perak, Plus River (Wray); Goping and Kol (Kunstler). Kelantan, Kwala Lebir (Dr. Gimlette).

The East coast form is more hairy and the sepals are longer than in the Perak form.

(6) *M. villosa* Wall. *Cat.* 6254; King, *l.c.* 183.

Branches red-hairy. Leaves oblong-elliptic or ovate acute, very shortly narrowed at the base, pilose on both surfaces; nerves 9 to 12 pairs, elevate beneath; 3 to 5 in. long, 1.25 to 2.25 in. wide;

petioles .25 to 1 in. long, pilose. Stipules lanceolate caudate pilose. Cymes terminal and axillary, densely pilose, 1.5 to 3 in. across, many-flowered. Calyx .3 to .4 in. long, pilose narrow campanulate, lobes narrow, linear-lanceolate, large lobe ovate round, acuminate, glabrous above, pubescent on nerves beneath, 2 to 2.5 in. long and wide; petioles long. Corolla orange, .75 in. long, slightly dilate upwards, limb .25 in. across, lobes short, broad, mouth hairy. Fruit oblong, sparsely hairy, .5 in. long. *Hab.* Not rare in the north in open places in forest. Malacca, Mt. Ophir. Selangor, Ulu Gombak; Dusun Tua. Perak, Thaiping Hills; Kwala Kangsa. Penang Hill (Wallich, Curtis, etc.). Kedah, Yan. Perlis, Chupeng. Kelantan, Kwala Aring (Yapp); Kwala Lebir (Gimlette); Lankawi, Kuah (Curtis). *Distrib.* Singgora, Siam, Borneo.

var. *Herveyana* King, is the commonest form in the south. Leaves more rounded and woolly. Malacca (Hervey).

(7) *M. purpurascens* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 18.

Sarmentose shrub covered with purple hairs. Leaves elliptic acuminate, base broad, sub-coriaceous, above glabrescent except the midrib and beneath paler; nerves 10 pairs and midrib densely purple-hairy; 4 in. long, 2 in. wide; petioles .12 in. long, hairy. Compound cymes terminal, very many-flowered, dense hairy. Flowers nearly sessile. Calyx cylindric, urn-shaped with short acute points, enlarged, lobe oblanceolate much narrowed to base, tip round, white, hairy; petiole 1.5 in. long. Corolla-tube 1 in. long, base .75 in. long, cylindric, upper part urn-shaped; lobes ovate acute, hairy outside. *Hab.* In mountain forests. Selangor, Sempang Mines, Semangkok (Ridley).

(8) *M. glabra* Vahl. *Symb.* iii. 38; *King, l.c.* 185.

Bush or climber, glabrous lenticellate. Leaves oblong-lanceolate or elliptic, short, acuminate, glabrous or puberulous on nerves; nerves 5 or 6 pairs, coriaceous, bright polished green, 2.5 to 3.5 in. long, .5 to 1.6 in. wide; petioles .2 in. long. Stipules bifid, narrow-lanceolate. Bracts lanceolate, persistent. Cymes rather dense, terminal, puberulous. Calyx campanulate, narrow, teeth linear-lanceolate pubescent, tube nearly glabrous, large lobe (sometimes absent) glabrous, acute, base round or narrow; petiole long. Corolla orange-red, pubescent, papillose hairs in mouth yellow, .75 in. long, .2 in. across, lobes broad ovate. Fruit oblong, .5 in. long. *Hab.* The commonest species in open country and secondary growth. Singapore and Johor, common. Malacca, Brisu (Derry). Pahang, Pekan. Negri Sembilan, Kwala Pedas; Seremban. Selangor, Kwala Lumpur. Tringganu, Bundi (Rostados). *Native names*: Balik adap; Cha Pedi (Tringganu).

I doubt if the Indian species is the same as the Malay one. The cymes are wider spreading, and the corolla-tube is dilate at the tip, not in the middle, as in this plant and as Vahl describes, and the fruit oblong, not nearly globose.

(9) *M. polyneura* King, l.c. 185.

Sub-glabrous climber 30 to 40 ft. long, not lenticellate. Leaves thin, narrow elliptic-lanceolate acuminate, sub-caudate, base cuneate; nerves 9 to 10 pairs, pubescent beneath, midrib pubescent above; 4 in. long, 1.25 in. wide; petioles slender pubescent, .5 in. long. Stipules ovate bifid with a long point pubescent. Cymes terminal lax, wide, spreading, few-flowered at the tips; peduncle 1.5 to 2 in. long; branches 1.5 in. long, pubescent. Flowers .75 in. long. Calyx cylindrical short-toothed, large lobe ovate, sub-acute, base shortly cuneate; nerves hairy at base, 2 in. long, 1.25 in. wide; petioles .5 in. long. Corolla-tube cylindrical hardly dilate, slender, 1 in. long, lobes short acute, rich deep yellow. Fruit oblong, .5 in. long. *Hab.* Open hill jungle. Perak, Chanderiang (Kunstler). Tapah (Wray). *Distrib.* Mergui.

(10) *M. oblonga* King, l.c. 186.

Erect large shrub, glabrous. Leaves membranous elliptic to obovate lanceolate, long, narrowed to base, caudate acuminate; nerves 6 to 9 pairs; 5.5 to 9.5 in. long, 1.75 to 3.5 in. wide; petioles .4 to .8 in. long. Stipules triangular, linear, acuminate. Cymes terminal; peduncle .5 in. long; branched 1.5 in. long, usually few-flowered. Calyx-tube dilate upwards urn-shaped, lobes setaceous half as long, large lobe (sometimes wanting) ovate or lanceolate cuspidate, 1.5 in. long, 1 in. wide; petioles .5 in. long, slender. Corolla-tube cylindrical 1 in. long, lobes .2 in. long, lanceolate cuspidate, orange. Fruit globular-ovoid. *Hab.* Open places in hill jungles. Pahang, Kwala Lipis (Machado). Negri Sembilan, Tampin Hill (Good-enough). Selangor, Semangkok Pass. Perak, Larut (Kunstler); Temengoh; Gunong Keledang; Tambun near Ipoh. *Distrib.* Tavoy.

(11) *M. cordifolia* Wall. Cat. 6260; King, l.c. 184.

Stems slender, almost completely glabrous; young parts hairy. Leaves thin coriaceous oblong acute, base rounded slightly cordate; nerves 8 pairs often hairy, reticulations visible, 5 to 6 in. long, 1.75 to 2.25 in. wide; petioles .2 to .25 in. long, pilose. Stipules lanceolate-acuminate, hirsute at base. Cymes terminal and axillary, lax, many-flowered; peduncles 1.5 to 2 in. long. Calyx .2 in. long, cylindrical campanulate, lobes shorter linear lanceolate, large one 2 to 2.5 in. long, 1 in. wide, ovate-oblong, glabrous except nerves; petioles .5 to .75 in. long. Corolla 1 in. long, pubescent outside, yellow, limb .2 in. across, lobes ovate acute. Fruit sub-ovoid, glabrous, .35 in. long. *Hab.* Local. Hill forests. Selangor, Sempang Mines. Penang Hill. Common, Balik Pulau Road. *Distrib.* Mergui, India.

var. *pubescens* Ridl. Leaves broad lanceolate-acuminate, sparsely hairy above, thickly softly hairy beneath; stem hairy. Selangor, Sempang Mines (Ridley).



## 27. ADENOSACME, Wall.

Shrublets with white shiny bark. Leaves membranous. Stipules lanceolate. Flowers in terminal cymes crowded, numerous, yellow or white. Calyx-tube globose, lobes short. Corolla-tube very short (in our species), lobes 4, valvate. Stamens 4, insert in tube. Ovary 2-celled. Fruit a fleshy white berry. Species 6 or more, Indo-Malaya, China.

(1) *A. malayana* Wall. Cat. 6282. *A. longifolia* King, l.c. 196, not of Wallich.

Shrublet about 2 ft. tall, bark white. Leaves at the top only elliptic-lanceolate acuminate, base narrowed gradually to petiole, thin nerves 10 to 24 pairs, sprinkled thickly with hairs all over especially on the nerves beneath, 8 to 12 in. long, 2 to 4.5 in. wide; petioles 1 to 1.5 in. long, winged to base. Cymes terminal paniced 2 to 6 in. across, 2.5 in. long; branches slender. Flowers numerous, .15 in. long, yellow on longer pedicels. Calyx globular pubescent. Corolla very short hairy outside, lobes oblong blunt. Fruit subglobose white semi-translucent, pulpy, .2 in. through. *Hab.* In dense forests. Singapore, Bukit Timah. Johor, Pulau Tinggi (Burkill); Bukit Patani, Batu Pahat. Pahang, Kwala Tembeling; Gunong Tahan. Malacca, base of Ophir. Negri Sembilan, Tampin Hill. Selangor, Ginting Bidai; Ulu Selangor. Perak, Goping (Kunstler); Temengoh. Penang (Wallich). Kelantan, Kwala Lebir. *Native name*: Poko Nasi-Nasi bukit.

## 28. MYCETIA, Reinwdt.

Shrublets or small trees with white shiny bark. Leaves membranous. Stipules lanceolate. Flowers in axillary cymes with thin pedicels often produced before the leaves, yellow. Calyx-tube globose, lobes 4 to 5. Corolla-tube slender, lobes 4 to 5, valvate. Stamens 4 to 6 insert on tube. Ovary 2-celled; style slender. Fruit a berry. Seeds many, minute. Species 6, Malaya, Siam.

Leaves glabrous on both sides.

Leaves elliptic-lanceolate, 4 to 5 in. wide . . . . .	(1) <i>M. Scortechinii</i>
Leaves lanceolate, 2.5 in. across . . . . .	(2) <i>M. lanceolata</i>
Leaves red-hairy beneath . . . . .	(3) <i>M. flava</i>

(1) *M. Scortechinii* Ridl. Adenosacme Scortechinii King and Gamble, l.c. 197.

Shrub 6 to 8 ft. tall; stems white, .5 in. through. Leaves in upper part membranous elliptic-oblong lanceolate acuminate, glabrous except puberulous midrib and nerves, 16 to 18 pairs beneath, 9 to 13 in. long, 4 to 5 in. across; petioles .5 to 1.25 in. long, pubescent. Stipules triangular acute. Cymes from below the leaves under 1 in. long minutely tomentose with a few slender branches. Calyx campanulate, .15 in. long, teeth 5, lanceolate, longer. Corolla about .6 in. long, tube cylindrical inflate at base, contracted below

limb, lobes lanceolate 5, bright yellow. Anthers sessile at base of tube. Stigma of 5 linear arms. *Hab.* Dense forests in the mountains. Selangor, Bukit Hitam; Ginting Sempah (Ridley); Perak (Scortechini).

(2) ***M. lanceolata* Ridl.** *Adenosacme lanceolata* Ridl. *Journ. F.M.S. Mus.* iv. 29.

Slender shrublet 2 ft. tall; stem white, .15 in. through. Leaves lanceolate-acuminate, narrowed gradually to base, glabrous; nerves 16 pairs; 8 in. long, 2.5 in. wide; petioles 1 in. long. Cymes 2 to 3 from bare part of stem; peduncles slender, .5 in. long with 3 pedicels .25 in. long each with 1 or 2 flowers. Calyx cupular, .1 in. long, lobes linear acuminate. Corolla yellow, tube cylindrical, .25 in. long, lobes oblong-ovate. Stamens 5, in mouth of tube. Stigma bilobes, lobes broad elliptic. Fruit capsular, .25 in. long, sub-globose. *Hab.* By streams in mountain forests. Pahang, Telom (Ridley).

(3) ***M. flava* Ridl.** *Adenosacme flava* Ridl. *Journ. F.M.S. Mus.* iv. 29.

Shrub 2 to 3 ft. tall; stem hollow, .25 in. through. Leaves obovate abruptly acuminate, narrowed to base, 12 in. long, 5 in. wide or less, glabrous above, midrib and nerves rufous hairy beneath; nerves 15 pairs. Cymes 1 in. long, pubescent, crowded. Calyx urn-shaped, .1 in. long, pubescent, teeth lanceolate, cuspidate nearly as long. Corolla cylindrical dilate above, pubescent outside and in, lobes 4 oblong rounded nearly as long as tube, yellow. Stamens in mouth of tube. Style short, hairy at base. Stigmas 2, filiform. *Hab.* Forests by stream banks. Pahang, Telom (Ridley). Perak, Thaiping Hills (Curtis).

## 29. AULACODISCUS, Hook. fil.

Trees glabrous. Leaves coriaceous. Stipules triangular, long-acuminate. Flowers small in axillary peduncled paniculate umbellate cymes, unisexual. Calyx hemispheric, limb short truncate-sinuate. Corolla coriaceous, rotate, throat hairy, lobes lanceolate, valvate. Stamens 8 or 16; filaments flexuous; anthers dorsifixed. Disc large and prominent 8- to 16-lobed. Ovary 6- to 16-celled; style long. Stigma peltate. Berry small globose, 8- to 16-celled. Seeds numerous, minute. Species 1, Malay Peninsula and Tenasserim.

(1) ***A. premnoides* Hook. fil.** *Gen. Plant.* ii. 71; *King, l.c.* 189. *A. Maingayi* *King, l.c.* 189.

Tree 30 to 40 ft. tall. Branches 4-angled. Leaves narrow oblong, short acuminate, base slightly narrowed; nerves 14 to 16 pairs; 5.5 to .7 in. long, 1.25 to 1.65 in. wide; petioles .2 to .35 in. long. Panicles pubescent, 1.25 in. long, 1.5 in. wide; peduncles 1 in. long with usually a pair of leafy bracts below cyme. Flowers green and yellow, under .1 in. long. Calyx in male shallow, in female deeper. Calyx short tubular. Disc hairy. *Hab.* Common

in woods. Johor, Kwala Tebing Tinggi. Pahang, Labong Endau (Evans). Perak, Ulu Kerling; Goping (Kunstler); Thaiping, Waterfall (Wray). Penang, Penara Bukit (Curtis). *Native name*: Bebuloh.

*A. Maingayi* King, appears to me to be merely the female plant; the calyx is deeper than in the male.

### 30. UROPHYLLUM, Wall.

Usually shrubs with horizontal branches, occasionally treelets or fairly large trees. Leaves more or less coriaceous, elongate and acuminate or cuspidate. Stipules narrow elongate, rarely glabrous. Flowers small, green or yellow in small peduncled or sessile cymes. Calyx short, cupular, or obconic, usually 5-lobed (or 4 to 7). Corolla sometimes coriaceous, tube very short, white, villous in mouth with 5 (rarely 4 to 7) spreading, triangular valvate green lobes. Stamens as many as lobes, inserted by short filaments in throat; anthers linear. Disc sulcate. Ovary 5-(4- or 6- or 7-) celled; style short. Stigma ovoid or clubbed. Fruit a small globose orange or yellow berry. Seeds many, minute, pitted. Species about 40, tropical Asia, Africa, and 1 Japan.

Leaves beneath and shoots hairy.

Leaves elliptic-oblong, 6 to 10 in. long.

Cymes long bracteate . . . . . (1) *U. villosum*  
Cymes short or ebracteate . . . . . (2) *U. macrophyllum*

Leaves oblong-lanceolate, 2.5 to 5 in. long.

Fruit hairy.

Leaves with a long point . . . . . (3) *U. lasiocarpum*  
Leaves shortly acuminate . . . . . (4) *U. hirsutum*  
Fruit glabrous; leaves caudate acuminate . . . . . (5) *U. ferrugineum*

Leaves slightly puberulous or nearly glabrous beneath.

Leaves large, 8 in. long . . . . . (6) *U. corymbosum*

Leaves small, 2 to 7 in. long.

Cymes short dense . . . . . (7) *U. streptopodium*

Cymes very small, few-flowered . . . . . (8) *U. umbellulatum*

Leaves glabrous coriaceous, 3.5 to 6 in. long . . . . . (9) *U. coriaceum*

Leaves glabrous, 6 to 8 in. long . . . . . (10) *U. trifurcum*

Leaves chartaceous.

Cymes few-flowered, short . . . . . (11) *U. glabrum*

Cymes often many-flowered, 1 in. long . . . . . (12) *U. Griffithianum*

Flowers 3 sessile in each axil . . . . . (13) *U. sessiliflorum*

(1) *U. villosum* Jack and Wall., *Roxb. Fl. Ind.* (ed. Carey) ii. 185; King, *l.c.* 191.

Shrub about 3 ft. tall; branches stout hairy, as are petioles and nerves beneath. Leaves coriaceous oblong-elliptic caudate, base broad, light green (yellow when dry) above, smooth beneath; nerves and reticulations strongly elevate hairy, nerves 14 to 18 pairs; 7 to 10 in. long, 2 to 3.25 in. wide; petioles .3 in. long. Stipules narrow lanceolate. Flowers densely crowded in cymes,

·4 to ·8 in. long, pilose with numerous lanceolate-acuminate bracts; pedicels very short. Calyx campanulate, ·25 in. long. Corolla longer, cylindric-campanulate, lobes oblong, throat pilose. Fruit sub-globular, hairy, ·4 in. through, orange colour. *Hab.* Common in northern parts in forests. Dindings, Bruas (Burn-Murdoch). Perak, Gunong Keledang; Tapah; Sungei Rayah (Kunstler). Province Wellesley, Bukit Panchur (Fox). Penang, Bukit Laksamana (Curtis); Government Hill (Maingay).

(2) **U. macrophyllum** *Korth. Ned. Kruidk. Arch.* ii. 194; *King, l.c.* 191. *U. longifolium* *Hook. fil. F.B.I.* iii. 99.

Shrub or tree. Branches 4-angled, densely pubescent (at length glabrous). Leaves membranous, elliptic-oblong, base rounded or narrowed, tip acuminate, glabrous above except the depressed pubescent midrib; nerves 9 to 11 pairs, elevate beneath and pubescent, reticulations conspicuous; 6 to 10 in. long, 1·75 to 3 in. wide; petioles ·4 to ·6 in. long. Stipules lanceolate, pubescent, ·4 to ·6 in. long. Flowers in short dense many-flowered umbels, pubescent; peduncle very short; pedicels ·2 to ·4 in. long. Calyx short cup-shaped, shallow teeth short, triangular. Corolla ·1 in. long, cylindric. Fruit globose. *Hab.* Forests. Singapore, Kranji. Selangor, Ginting Bidai; Dusun Tua; Semangkok Pass. Perak, Temengoh. Dindings, Tanjong Hantu. Penang, Pulau Betong (Curtis). *Distrib.* Tenasserim.

(3) **U. lasiocarpum** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 19.

Shrub, densely appressed hairy. Leaves oblong or elliptic with a long point, base round, above glabrescent except the midrib, appressed hairy, beneath densely hairy especially midrib and veins, 4 to 6 in. long, 1 to 1·7 in. wide; petioles ·12 to ·25 in. long, hairy. Stipules linear acuminate, hairy. Cymes sessile, as long as the petiole. Corolla not seen. Calyx-tube entire, truncate, long, brown-hairy. Fruit very shortly pedicelled, ·25 in. long, turbinate, globose, densely hairy. Seed very numerous, ovoid, reticulate. *Hab.* Mountain forests, rare. Perak, Bujong Malacca (Ridley).

(4) **U. hirsutum** *Hook. fil. F.B.I.* iii. 98; *King, l.c.* 192.

Shrub about 6 ft. tall or small tree. Branches slender softly tomentose as are stipules, petioles and inflorescence. Leaves membranous, oblong-lanceolate or narrow-elliptic, base rounded or slightly narrowed, above glabrous, beneath softly hairy; nerves 8 to 10 pairs; 3 to 5 in. long, 1 to 2 in. wide; petioles ·15 in. long. Cymes small capitate, few-flowered. Calyx hairy, tube short, lobes broad, triangular. Corolla very small, hairy outside, white-hairy in mouth. Fruit globose, hairy, orange, ·2 in. through. *Hab.* Very common all over the lowland forest from Singapore, Garden Jungle; Johor, Malacca, Ayer Panas (Griffith). Pahang, Pulau Tawar. Selangor and Perak to Penang. *Native names:* - oko Panchan; Surupah.

A plant met with at Batu Pahat in Johor had remarkably narrow leaves with 14 pairs of nerves. This form might be called var. *longifolia*. The plant, however, varies a good deal in its foliage.

(5) **U. ferrugineum** King and Gamble, *l.c.* 193.

Shrub, 6 to 10 ft. tall; stems slender, red-tomentose as are midribs and nerves beneath and stipules. Leaves narrow oblong-lanceolate long caudate-acuminate, glabrous above; nerves very slender, 3 in. long; .5 to .75 in. wide, base very shortly narrowed; petioles .14 in. long. Stipules narrow linear acuminate, .75 in. long. Cymes .3 to .5 in. long (in fruit); peduncles very short; branches slender few-flowered. Flowers small, nearly glabrous. Corolla white or yellow. Fruit globular, .2 in. through. *Hab.* Mountain forests, not rare at 1500 to 3000 ft. altitude. Perak, Thaiping Hills (all collectors); Goping (Kunstler); Gunong Keledang. Kedah Peak (Ridley).

(6) **U. corymbosum** Korth. *Ned. Kruidk. Arch.* ii. 194. *U. macrophyllum* var. King, *l.c.*

Tree 20 ft. tall or big shrub, appressed pubescent. Leaves oblanceolate cuspidate, narrowed to base, glabrous except nerves, 18 pairs, slender puberulous, 8 in. long, 2.25 to 3 in. wide; petioles appressed, hairy, .5 in. long. Stipules lanceolate-acuminate, .5 in. long, hairy. Cymes compound, umbelled on a peduncle 2 in. long; branches as long; branchlets 1 in. long, all pubescent. Flowers nearly glabrous, .2 in. across. Calyx globose, puberulous, .1 in. long. Corolla-tube short, lobes triangular acute, longer, pale green. Fruit rather large globose orange. *Hab.* Forests, not rare in the south. Johor, Jaffaria (King); Pulau Tioman (Burkill). Pahang, Labong Endau (Evans). Perak, Chanderiang (Kunstler); Ulu Temengoh. *Distrib.* Sumatra, Java, Borneo.

(7) **U. streptopodium** Wall. *Cat.* 8317; King, *l.c.* 193. *U. parviflorum* Wall. *Cat.* 8320. *U. Blumeanum* Hook. *fl. F.B.I.* iii. 99.

Slender shrub about 6 ft. tall; young branches yellow, 4-angled, soft appressed hairy. Leaves thinly coriaceous, elliptic-oblong, acuminate or cuspidate often narrow, pale greenish when dry; glabrous above; nerves and midrib, beneath yellow appressed-hairy; 2.5 to 7 in. long, .8 to 2.5 in. wide; petioles .25 to .5 in. long. Stipules lanceolate-oblong, narrow silky. Cymes short dense, about .3 in. long. Flowers .15 in. long; pedicels pubescent (lengthening in fruit). Calyx cupular, lobes triangular, acute. Corolla tubular, lobes nearly as long, acute. Fruit as in *Blumeanum* but smaller. *Hab.* Common in woods. Singapore, Pulau Ubin (Hullett); Bukit Timah; Jurong. Johor, Gunong Pulai; Gunong Pantai. Pahang, Pulau Tioman (Burkill). Pahang, Pulau Tawar. Malacca, Ophir; Ayer Panas. Selangor, Bukit Kutu; Kwala Lumpur. Negri Sembilan, Tampin Hill (Goodenough). Perak, Goping (Kunstler); Hermitage Hill; Temengoh. Penang

(Wallich); Richmond Pool; West Hill (Curtis); Kedah Peak. *Distrib.* Borneo. *Native names* for this and similar species: Jinteh putih; Mata Keli; Para Chemperai Dadis.

(8) **U. umbellulatum** *Miq. Fl. Ind. Bat Suppl.* 542.

Bushy shrub a few feet tall. Branches slender appressed hairy as are stipules; petiole, midrib and nerves on back. Leaves rather thin lanceolate-acuminate, base rounded or shortly narrowed; nerves 7 pairs slender; 3 to 4 in. long, 1 to 1.5 in. wide; petioles .2 in. long. Stipules lanceolate-acuminate, .2 in. long. Cymes very small, hardly .2 in. long, few-flowered; pedicels slender. Calyx .05 in. long, cupular, teeth short triangular acute. Corolla short, .1 in. long. Fruit small globose, .15 in. through when dry. *Hab.* Not common. Mountains, Negri Sembilan, Gunong Angsi. Selangor, Dusun Tua (Ridley); Penang, Batu Hitam Pass (Curtis). *Distrib.* Sumatra.

(9) **U. coriaceum** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 18.

Large bush; stems below thick with white bark, entirely glabrous in all parts. Leaves coriaceous stiff, elliptic or oblong acuminate, cuspidate, base very shortly narrowed; nerves 12 pairs, conspicuous beneath as are reticulations on both sides, 3.5 to 6 in. long, 1.5 to 2 in. wide; petioles .5 in. long. Stipules short lanceolate, blunt. Cymes dense, few-flowered, .4 in. long. Calyx short, wide, cupular, .05 in. long, .1 in. wide, entire. Corolla .15 in. long, coriaceous, tube very short, lobes acute. *Hab.* Mountain forests 4000 ft. altitude. Malacca, Mt. Ophir. Pahang, Gunong Tahan at Wray's Camp (Ridley).

The Malacca plant has narrower lanceolate leaves and rather smaller flowers.

(10) **U. trifurcum** *Pearson, in King, l.c.* 194.

Big shrub or tree glabrous except inflorescence. Leaves coriaceous, oblong-elliptic shortly acuminate, base round or slightly narrow, midrib above depressed, puberulous; nerves 10 to 12 pairs elevate beneath; 6 to 8 in. long, 2.5 to 3.25 in. wide; petioles .5 to .75 in. long, stout. Flowers in trichotomous umbels on peduncle puberulous, 1 to 1.25 in. long. Umbels 1 in. long. Flowers puberulous, on short pedicels, .25 in. long. Calyx cupular, mouth truncate undulate. Corolla as long, lobes 4, broad, blunt. Fruit sub-globose, .5 in. through, orange. *Hab.* Forests. Singapore, Changi; Kranji. Johor, Castlewood; Kwala Sembrong (Kelsall). Pahang, Telom; Pekan. Selangor, Ginting Bidai; Semangkok Pass; Ulu Gombak. Perak (Scortechini). *Native names*: Suburus hitam; Sugao Petaling.

(11) **U. glabrum** *Wall. Roxb. Fl. Ind.* ii. 186; *Hook. fil. F.B.I.* iii. 98; *King, l.c.* 194 (*part*).

Slender shrub about 6 ft. tall. Branches obscurely 4-angled. Leaves thin coriaceous elliptic acuminate or abruptly cuspidate;

nerves 5 to 8 pairs, 4.5 to 5.5 in. long, 1.5 to 2 in. wide; petioles .2 in. long. Stipules lanceolate long, setaceous, .3 in. long. Umbels few-flowered, .3 in. or more long. Flowers .2 in. long. Calyx cupular truncate. Corolla glabrous except its white-bearded mouth, yellow green. Fruit globose, top flattened, .2 in. through, orange. *Hab.* Common all over the peninsula in low country woods and occasionally higher. From Singapore to Kedah and up to 4200 ft. altitude on Gunong Kerbau. *Distrib.* Java, Sumatra, Borneo.

var. (a) entirely glabrous except stipules and inflorescence.

var. (b) *Blumeanum*, petiole and base of midrib and upper part of stem and occasionally calyx pubescent. This passes into or very near to *U. streptopodium*, but is not yellow-branched and has larger flowers as in type. Very common.

(12) **U. Griffithianum** Hook. fil. *F.B.I.* iii. 98.

Stout shrub to a tree of 20 ft. tall. Leaves stiff coriaceous, elliptic or oblong cuspidate; nerves 8 pairs, reticulations conspicuous, 6 to 7 in. long, 2.25 to 2.75 in. wide; petioles .3 in. long. Stipules linear-oblong blunt, silky on the back, .4 in. long, .1 in. wide. Cymes stouter over 1 in. long many-flowered, puberulous. Calyx cupular, lobes very short sub-triangular. Fruit as in *glabrum* but larger. *Hab.* Common in lowland woods. Singapore, Garden Jungle; Changi. Malacca (Griffith); Bukit Sadanen (Derry). Pahang, Temerloh (Foxworthy). Selangor, Rawang (Kloss); Bukit Cheraka (Foxworthy). Dindings, Tanjong Hantu. Perak, Thaiping Hills (Wray). Penang Hill (Curtis); Lankawi (Robinson). *Distrib.* Java, Sumatra. *Native names*: Limputih Paya; Mata Perling.

King mixes this with *U. glabrum*, but though somewhat intermediate forms (probably hybrids) do occur where the two grow together, this when typical is quite distinct in its larger-sized and stiffer leaves and bigger cymes.

(13) **U. sessiliflorum** Ridl.

Tree. Branches slender, glabrous. Leaves chartaceous, elliptic-lanceolate, caudate-mucronulate, base shortly narrowed; nerves 8 pairs, ascending, hardly inarching, 4 in. long, 1.25 in. wide; petioles .15 in. long. Stipules linear acuminate from a broader base, .1 in. long. Flowers 1 to 3 in each leaf axil, sessile. Calyx very short, cup-shaped. Corolla .1 in. long, conoid in bud and whitish silky, lobes 4 to 6, .15 in. long, triangular-ovate acute, tube very short with thick mass of white hairs on base of lobes. Stamens linear apiculate. *Hab.* Forests, Negri Sembilan at Bukit Tangga (Ridley).

Very distinct in its sessile flowers.

### 31. BRACHYTOME, Hook. fil.

Nearly glabrous shrubs. Leaves membranous. Stipules triangular acuminate. Flowers small in slender cymose panicles

unisexual. Calyx ovoid or oblong, limb cupular 5-toothed, persistent. Corolla wide, funnel-shaped, lobes 5, twisted in bud. Anthers sub-sessile in throat of corolla, included linear-oblong. Disc annular, small in male, cupular and larger in female. Ovary 2-celled; style filiform. Stigmas 2, oblong, blunt. Berry globular 2-celled. Seeds cuneate reticulate. Species 3 to 4, Burma, China, Malay Peninsula.

(1) **B. Scortechinii** King, *l.c.* 198.

Shrub 6 to 12 ft. tall. Leaves narrow-elliptic or lanceolate tapering equally to both ends acuminate; nerves 10 to 14 pairs, slender, prominent beneath; 4 to 8 in. long, 1.5 to 2.5 in. wide; petioles .2 to .25 in. long, hairy. Stipules broad, triangular, keeled acuminate. Cymes 1 to 1.5 in. long, pubescent or glabrous; peduncles about as long as the lax, few-flowered branches. Calyx .1 in. long, ovoid constricted below limb. Berry globular, .3 in. through, crowned by calyx-limb. *Hab.* Forests in mountains, 3000 to 4000 ft. altitude. Pahang, Telom. Perak, Thaipung Hills, 3000 to 3500 ft. altitude (Scortechini, Kunstler). Kedah Peak (Ridley).

### 32. **RANDIA**, Linn.

Shrubs, lianes or trees unarmed or with straight or hooked spines. Leaves usually thinly coriaceous. Flowers in axillary cymes or solitary or in fascicles or corymbs or in terminal corymbs, white and fragrant. Calyx-tube ovoid to cylindrical, truncate or 5-toothed or lobed. Corolla-tube cylindrical or funnel-shaped, lobes usually 5, shorter or as long. Stamens 5; anthers narrow with short filaments or sessile. Ovary 2- (rarely 4-celled); style usually stout. Stigma fusiform or clubbed, entire or bifid. Fruit a berry, orange-coloured or black, globose or ovoid, small or large, pericarp pulpy or woody, 2-celled, many-seeded. Seeds usually in pulp numerous. Species upwards of 100, tropics generally.

i. **CERISCUS**. Stout usually spiny shrubs; flowers rather small; calyx-lobes broad-blunt; corolla short; berry large, woody.

Leaves thin membranous, glabrous; flowers .4 in.

long

Leaves thin coriaceous; flowers 1 in. long

Leaves stiff velvety; flowers 1 in. long

(1) **R. oocarpa**

(2) **R. perakensis**

(3) **R. tomentosa**

ii. **OXYCEROS**. Climbers armed with hooked spines; corolla salver-shaped; berry pulpy, small.

Flowers long-tubed, limb large, 2 to 3 in a cyme.

Flowers 2 in. long, tube thick; leaves coriaceous

Flowers 1.5 in. long, tube slender; leaves

elliptic, membranous, 3 in. long, glabrous

Flowers 1 in. wide; calyx-leaves lanceolate and branches densely hairy tomentose

Flowers 1 in. wide thin, tube slender; leaves

ovate acuminate, thin usually small hairy; nerves fine

(4) **R. Clarkei**

(5) **R. penangiana**

(6) **R. hirsuta**

(7) **R. fasciculata**



- Flowers 1.5 in. long, 5 to 6 in a corymb; leaves elliptic-lanceolate, coriaceous glabrous . . . (8) **R. longiflora**  
 Corolla tube .5 in. long.  
 Flowers 1 in. wide or less, numerous in corymbose cymes; leaves coriaceous ovate. . . (9) **R. Kunstleri**  
 Flowers .5 in. wide; leaves oblong-lanceolate rather thin . . . . . (10) **R. Curtisii**  
 Flowers .6 in. wide; leaves stiffly coriaceous ovate-elliptic . . . . . (11) **R. fragrantissima**

iii. GYNOPACHYS. Trees, shrubs or climbers with broad leaves and dense terminal or axillary corymbs of rather small flowers, unarmed; fruit a small berry.

- Corolla-tube shorter than lobes.  
 Climber; leaves large; corymbs 5 in. across. . . (12) **R. auriculata**  
 Shrub or tree, corymbs 1 in. long, all axillary. . . (13) **R. densiflora**  
 Corolla-tube longer than lobes.  
 Tube .25 in. long; corymbs 2 to 3 in. long.  
 Tree . . . . . (14) **R. incurva**  
 Tube .5 in. long; corymbs few-flowered, 2 to 3 in. long. Climber or bush . . . . . (15) **R. Forbesii**

iv. PARVIFLORÆ. Flowers very small in scanty axillary fascicles; epiphytic climbers, unarmed.

- Flowers .5 in. long; calyx 4-toothed; fruit not ridged . . . . . (16) **R. binata**  
 Flowers .35 in. long; calyx 5-toothed; fruit ridged . . . . . (17) **R. impressinervia**

v. ANISOPHYLLÆ. Trees, unarmed, with large obovate leaves; cymes condensed; flowers small salver-shaped; fruit woody, large green.

- Leaves tomentose beneath . . . . . (18) **R. anisophylla**  
 Leaves glabrous except nerves beneath . . . . . (19) **R. Scortechinii**

vi. GARDENIOIDES. Tree, very tall; flowers 2 in. or more long; tube funnel-shaped; fruit woody.

- Fruit globular; cymes axillary . . . . . (20) **R. exaltata**

vii. GRANDIFLORÆ. Shrubs; leaves large membranous, more or less hairy.

- Flowers 1 or few terminal usually very large; fruit large woody ellipsoid crowned with calyx.  
 Corolla trumpet-shaped, 6 in. long, lobes ovate. . . (21) **R. macrophylla**  
 Corolla-tube slender, 3 to 5 in. long, lobes very narrow . . . . . (22) **R. stenopetala**

(1) **R. oocarpa** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 79. *R. dumetorum* King, *l.c.* 205, *not of Lamarck.*

A thorny bush with horizontal spines an inch long. Leaves membranous oblong-acuminate or ovate, base narrowed, sparsely hairy on both sides (adult leaves often glabrous or dotted with hair-bases), midrib on both sides densely hairy; nerves 4 to 7 pairs, slender; 1 to 3.5 in. long, .6 to 1.25 in. wide; petioles .1 in. long or less. Flowers .4 in. long, 1 to 3 together; pedicels .2 in. long, hairy. Calyx cylindric-campanulate densely long hairy, lobes 4, broad ovate. Corolla-tube short thick, hairy not longer than calyx-lobes, lobes round blunt, white, turning orange-colour. Fruit obovoid, 2 in. long, 1.5 in. through, glabrous, yellowish green;

pericarp thick. Seeds numerous small, in pulp. *Hab.* Open usually sandy country. Pahang, Pekan. Perak, Relau Tujor (Wray); Thaiping (Scortechini). Lankawi, Burau; Kwah (Curtis). Perlis, Kanga.

(2) *R. perakensis* King and Gamble, l.c. 210.

A small armed glabrous tree, 12 to 18 ft. tall, spines 1 to 1.25 in. long, bearing flowers. Leaves thinly coriaceous, narrow elliptic tapering to both ends; nerves 6 to 7 pairs inarching some way from edge; 3 to 5 in. long, 1.4 to 2 in. wide; petioles .1 to .2 in. long. Flowers 1 in. long; pedicels very short, solitary or in pairs from short branches eventually becoming spines. Calyx tubular, .35 in. long, base narrowed, teeth triangular. Corolla-tube .45 in. long, .2 in. through, limb .75 in. across, lobes oblong blunt. Anthers sub-sessile at base of tube. Fruit globular surmounted by scar of calyx, 1.75 in. through. *Hab.* Perak (Kunstler).

I have not seen this.

(3) *R. tomentosa* Hook. fil. *F.B.I.* iii. 110. *R. dasycarpa* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 113.

Large spreading shrub, 6 to 18 ft. tall, strongly armed with horizontal spines 2 in. long; young parts red-scurfy. Leaves appearing after the flowers, spatulate, tip rounded, coriaceous dark green, velvety above, densely white felted beneath; nerves 10 pairs elevate beneath, 1.25 in. long, .75 in. wide. Flowers on short thick peduncles. Bracts ovate red-hairy, a cup-shaped circle of connate bracts below the flowers. Calyx cylindrical, teeth 8, woolly and gummy, .6 in. long. Corolla white, densely hairy, lobes 8, oblong obtuse, glabrous on inside, 1 in. long. Stamens 8. Fruit 3 in. through, globose, brown velvety, crowned by calyx-tube. *Hab.* Open sandy heaths. Setul. Kelantan, near Kota Bharu (Ridley). *Distrib.* Annam, Siam, Tenasserim, Java.

This sometimes forms bushes with the boughs lying on the ground and so densely armed that it is almost impossible to get at it without being wounded. The fruit exactly resembles a pomegranate.

(4) *R. Clarkei* King and Gamble, l.c. 213.

Glabrous climber with stout recurved hooks in pairs. Leaves coriaceous, thick oblong-elliptic sub-acute, base round; nerves 4 or 5 pairs prominent; 4 to 6.5 in. long, 1.75 to 2.5 in. wide; petioles .5 to .6 in. long. Flowers coriaceous, 3 in. long, white in cymes of 3, axillary, leaf-opposed; peduncles .15 in. long; pedicels .2 in. long thick. Calyx tubular, base narrowed, .3 in. long, teeth small. Corolla-tube thick, 1 in. long, lobes .75 in. long, oblong. *Hab.* Climbing on high trees in forest. Singapore, Bukit Timah. Malacca, Bukit Bruang (Derry, Maingay). Negri Sembilan, Gunong Angsi. *Native name*: Akar Suburus.

(5) *R. penangiana* King and Gamble, l.c. 213.

A woody climber, glabrous about 30 ft. long with stout axillary

curved spines about .3 in. long. Leaves thickly membranous elliptic, shortly blunt acuminate, base cuneate; nerves 5 to 7 pairs, elevate both sides; 3 to 4.5 in. long, 1.5 to 2.5 in. wide; petioles .2 to .3 in. long. Cymes axillary and terminal; peduncles under 1 in. long. Flowers 3 or 4 together; pedicels .2 in. long. Calyx cylindrical, teeth short, acute, .3 in. long. Corolla-tube 1.25 in. long, rather thick, lobes .3 in. long, oblong rounded, white withering yellow. Fruit oblong globose plum-coloured, 1.75 in. long. *Hab.* Forests. Singapore, Garden Jungle; Bukit Timah. Johor; Batu Pahat, Bukit Patani. Malacca (Maingay); Selangor (Cantley); Bukit Bruang (Derry). Selangor, Kwala Lumpur. Penang Hill (Curtis). Lankawi (Haniff).

(6) *R. hirsuta* Ridl. *Journ. F.M.S. Mus.* x. 140.

Unarmed straggling erect shrub, 10 ft. tall. Branches, back of leaf, petiole and calyx, densely tomentose. Leaves lanceolate rather thin, acute, base narrowed but blunt; nerves sunk above, elevate beneath; 4 in. long, 1.25 in. wide; petioles .25 in. long. Flowers 1 to 3 terminal, white, very shortly pedicelled. Calyx ovoid, very hairy, .12 in. long, lobes linear, acuminate, .25 in. long. Corolla-tube sparse-pubescent, 1.25 in. long, very slender cylindrical, lobes narrow oblanceolate, 1 in. long, .15 in. wide, glabrous. *Hab.* Kelantan, Chaning Woods (Ridley).

(7) *R. fasciculata* DC. *Prodr.* iv. 386; *King, l.c.* 211.

A spiny shrub; spines white, .5 in. long, pointing upwards; branches slender. Leaves membranous lanceolate, ovate or oblong, shortly acuminate, base round or cuneate, glabrous above; nerves pubescent, beneath elevate; .75 to 3 in. long, .5 to 1.5 in. wide; petioles pubescent, .05 to 2 in. long. Flowers 1.5 to 2 in. long, axillary, white, solitary or fascicled 2 or 3 together. Bracts lanceolate-acuminate, hairy. Calyx .35 in. long, villous, narrow funnel-shaped, teeth narrow subulate, as long as tube. Corolla-tube about 1 in. long, glabrous (inside pubescent) slender, lobes large, elliptic acute, .5 in. long, .25 in. across. Fruit pea-shaped, 2-celled, pubescent crowned by the long calyx-lobes, 4-seeded. *Hab.* Sandy places in north and on east coast. Pahang, Pulau Tawar. Perak, Kwala Dipang (form with leaves 5.3 in. long, 2 in. wide) (Scortechini). Province Wellesley, Bukit Juru; Permatang Bertam. Penang, Muka Head Beach (Curtis); Waterfall. Lankawi, Kwah (Haniff). Pulau Adang, Rawei Island. Perlis, Chupeng. Setul, Rajah Wang. *Distrib.* India. *Native names:* Akar Bedara Laut; Akar Duri; Akar Kukulang.

(8) *R. longiflora* Lam. *Dict.* ii. 227; *Ill. t.* 156, f. 3; *King, l.c.* 212.

A very thorny scrambling shrub with rather slender branches, thorns hooked, .3 in. long. Leaves coriaceous, dull light green, oblong or obovate sub-acute, base cuneate; nerves 5 to 6 pairs, faint; 1.75 to 3.75 in. long, .75 to 1.75 in. wide; petioles .1 to .15 in.

long. Cymes terminal, falsely axillary on short reduced lateral branches, umbellate; peduncle  $\cdot 1$  in. long; branches as short with numerous stout lanceolate-acuminate bracts; pedicels slender,  $\cdot 25$  in. long. Calyx glabrous campanulate with rather long triangular acuminate teeth,  $\cdot 2$  in. long. Corolla-tube  $1$  in. long, slender, lobes lanceolate acute,  $\cdot 5$  in. long, all white (withering yellow). Fruit globose ovoid, glabrous,  $\cdot 35$  in. long, green. Seeds wrinkled. *Hab.* Very common in tidal rivers. Singapore, Passir Panjang; Changi; Alexandra Road. Johor, Tanah Merah. Pahang, Pekan. Malacca, Malacca Pindah (Cantley). Selangor, Port Swettenham (Burkill). Dindings, Lumut. Perak, Matang (Wray). Kelantan, Kota Bharu. Lankawi, Kwah (Curtis). *Distrib.* Borneo, Java. *Native names* : As in *R. fasciculata*.

(9) **R. Kunstleri** King, *l.c.* 216. *R. Roxburghii* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 80. *R. longiflora* Clarke (in part) and DC., not of Lamarck.

A stout glabrous climber. Spines slender and slightly curved, much deflexed,  $5$  in. long. Leaves coriaceous, ovate or elliptic-round, bluntly cuspidate; nerves  $4$  or  $5$  pairs;  $4$  to  $5\cdot 5$  in. long,  $2\cdot 5$  to  $3\cdot 5$  in. wide; petioles  $\cdot 3$  to  $\cdot 5$  in. long. Flowers solitary or in scanty cymes; pedicels short. Calyx tubular obscurely toothed,  $\cdot 5$  in. long. Corolla-tube  $\cdot 5$  in. long, lobes as long, greenish yellow. Berry crowned by persistent calyx-tube. *Hab.* Singapore (Lobb); Fresh-water Island (Ridley). Perak (Kunstler and Scortechini). *Distrib.* Silhet (Wallich), common in India.

I have seen no type of King's but Wallich *Cat.* 8284c in Herb. Kew, which he quotes. This is *Posoqueria longiflora* of Roxburgh. He gives the fruit as  $1\cdot 25$  in. through, but though larger than in *longiflora* true, I have seen no specimens over  $\cdot 4$  in. through. It is easily distinguished from *R. longiflora* by its larger, stiffer leaves, blunt corolla-lobes and larger fruit with persistent calyx. It seems rare in the Malay Peninsula.

(10) **R. Curtisii** King and Gamble, *l.c.* 208.

Large climber. Spines in pairs recurved, short. Leaves coriaceous, glabrous, oblong-elliptic acute or acuminate, base cuneate; nerves  $6$  to  $11$  pairs, depressed above, much elevate beneath, inarching  $\cdot 1$  in. from edge;  $4\cdot 5$  to  $7$  in. long,  $1\cdot 5$  to  $2\cdot 25$  in. wide; petioles  $3$  to  $\cdot 5$  in. long. Cymes axillary and terminal, axillary, small,  $1$  to  $2$  in. long, many-flowered; peduncles short. Bracts numerous ovate. Flowers  $\cdot 72$  in. long; pedicels  $\cdot 1$  to  $\cdot 4$  in. long, pubescent. Calyx tubular pubescent, teeth  $5$ , acute. Corolla white, salver-shaped, tube  $\cdot 2$  in. long, hairy inside, lobes oblong nearly as long. Fruit globose,  $\cdot 5$  in. through, glabrous, greyish green. *Hab.* Hill forests. Perak, Thaiping Hills, at base (Kunstler, Curtis). Penang, Batu Feringhi (Curtis).

Near *R. Forbesii*, but the venation quite different and corolla-tube much shorter.

(11) **R. fragrantissima** *Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 115.

A liane 2 in. through. Spines in pairs strongly woody, .25 to .5 in. long, recurved. Leaves coriaceous glabrous, ovate or elliptic acute; nerves about 10 pairs; 5 to 7 in. long, 2.5 to 3.5 in. wide; petioles stout, .5 in. long. Cymes corymbose, terminal or axillary, 2 in. across, of 20 to 30 waxy-white fragrant flowers. Bracts ovate-pubescent, terminal one double. Calyx campanulate pubescent, .25 in. long, teeth short acute. Corolla-tube 1 in. long, cylindrical, glabrous, lobes oblong-obtuse, .3 in. long. Berry .24 in. long. *Hab.* Forests, climbing to tree-tops, not rare in the south. Singapore, Garden Jungle; Bukit Timah; Pulau Tekong. Johor, Sedenak. Malacca (Griffith); Selandor (Cantley); Ayer Panas and Bukit Bruang (Derry). Negri Sembilan, Gunong Angsi. *Native names*: Akar Seburus; Akar Kukulang.

(12) **R. auriculata** *Schum. Pflanzen-familien* iv. 75; *King, l.c.* 207. *Anomanthodia auriculata* *Hook. fil. F.B.I.* iii. 108.

Stout climber, glabrous. Leaves coriaceous elliptic or oblong sub-acute or obtuse, base oblique auricled; nerves 6 to 8 pairs, slender, prominent beneath; 4 to 6.5 in. long, 1.5 to 3.5 in. wide; petioles .05 to .1 in. long. Stipules triangular acuminate. Corymbs terminal and axillary hairy, 3 in. long and wide on peduncles 3 in. long. Flowers numerous, .5 in. long, sub-sessile. Bracts ovate cuspidate hairy. Calyx funnel-shaped truncate, edge hairy. Corolla glabrous, tube short thick, lobes oblong reflexed, throat pubescent. Anthers .2 in. long, linear exsert. Fruit as big as a pepper-corn, 2-celled, many-seeded. *Hab.* Forests. Singapore (Wallich, Maingay). Johor, Gunong Pulai. Negri Sembilan; Rantau; Bukit Sulu (Cantley). Perak, Goping (Kunstler); Tambun; Thaiping Hills. Penang Hill, top (Maingay); Moniot's Road (Curtis). *Distrib.* Malay isles. *Native name*: Akar Sumpang putih.

(13) **R. densiflora** *Benth. Fl. Hongkong*, 155; *King, l.c.* 209.

A tree about 40 ft. tall or a shrub. Leaves coriaceous elliptic-oblong to oblong-lanceolate, base cuneate; nerves 8 or 9 pairs, elevate beneath; 4 to 6 in. long, 1.75 to 2.75 in. wide; petioles .25 to .3 in. long. Cymes axillary only, sub-sessile puberulous, much-branched, many-flowered, 2.5 in. wide. Flowers .4 in. long, white, glabrous on pedicels .1 in. long. Calyx tubular campanulate, .1 in. long, teeth minute. Corolla-tube little longer, mouth hairy, lobes oblong much longer, reflexed oblong, edges pubescent outside, .15 in. long. Style long projecting. Fruit small, pea-shaped, orange. *Hab.* Woods and open forests, common and variable in habit. Singapore, Changi. Malacca, Durian Tunggul (Burkill); Bukit Kamuning (Derry); Selandor (Griffith and all collectors). Negri Sembilan. Bukit Tumayiang (Cantley). Selangor, Sempang; Bukit Kutu (3500 ft. altitude). Perak, Larut (Kunstler). Penang Hill (Maingay). Kedah (Kunstler). Lankawi (Curtis).

var. *parvifolia* King.

Leaves more lanceolate narrower, 3 to 5 in. long, 1.25 to 2.75 in. wide; petioles .15 to .2 in. long. Calyx very pubescent. Corolla-lobes white, silky outside. *Hab.* In the northern part of the peninsula. Penang, Moniot's Road (Curtis) and Penara Bukit. Lankawi, Kwah (Curtis). Pulau Adang, Rawei Island. *Distrib.* Tenasserim, Mergui. A shrubby form more compact with smaller leaves grows on the top of the Batu Caves in Selangor. *Distrib. of species:* The species occurs all over tropical Asia from India to Australia, and in China and Japan. *Native names:* Berumbong or Merombong jantan; Geruseh jantan or putih; Mata Ular; Musira Mata Kerbau; Gading Tulang; Bunga Kepinis; Bunga Mengkunyit; Tampoi Bhong.

(14) *R. incurva* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 79.

Tree. Leaves thinly coriaceous glabrous elliptic, shortly acuminate, base cuneate; nerves 9 pairs, widely inarching far from edge; 7.5 to 8 in. long, 2.75 to 3.25 in. wide; petioles .3 in. long. Cymes paniced terminal, 2.5 in. long and wide; peduncles .3 in. long, woody. Flowers numerous, fragrant; pedicels .1 to .2 in. long, pubescent. Bracts persistent, small, ovate. Calyx campanulate pubescent, .2 in. long, teeth short. Corolla cylindrical, .3 in. long, lobes broad oblong, rounded, .1 in. long. *Hab.* Penang, West Hill (Curtis 8181) at 1000 ft. altitude.

This resembles *R. Forbesii* King, and is quoted by him as that species, but the venation is totally different and the corolla-tube much shorter.

(15) *R. Forbesii* King and Gamble, *l.c.* 207 (*in part*).

Bush 6 ft. tall or big climber, glabrous, unarmed. Leaves coriaceous elliptic to ovate acute or acuminate, base narrowed; nerves 5 to 7 pairs, depressed above, elevate beneath, midrib stout; 4.5 to 7 in. long, 2 to 3 in. wide; petioles .5 to .6 in. long, slender. Stipules triangular subulate, .2 in. long. Corymbs axillary, lax many-flowered; peduncles .75 in. long; branches 1 to 2 in. long, faintly puberulous. Flowers 1 in. long; pedicels .1 in. long. Calyx tubular, .2 in. long, with minute teeth, pubescent. Corolla-tube cylindrical, .75 in. long, lobes oblong, .2 in. long, glabrous. Stamens just projecting at the tip. Style exsert. Stigmas broad rotund. Fruit like a pepper-corn, many-seeded. *Hab.* Limestone Hills. Perak, Kwala Dipang (Kunstler); Changkat Mentri (Kloss, Scortechini). *Distrib.* Andamans, Sumatra.

The Singapore plants quoted by King are *R. densiflora*, and the Penang one a distinct species from the Perak plant, *R. incurva* Ridl.

(16) *R. binata* King and Gamble, *l.c.* 205.

A small creeper, half parasite, 6 to 8 ft. long or a small tree 20 to 30 ft. tall. Stem 3 to 5 in. through, unarmed glabrous. Leaves coriaceous oblong-elliptic gradually acuminate, base round; nerves 9 to 10 pairs, depressed above, prominent beneath, midrib

broad, deeply depressed at base, 6 to 9 in. long, 2 to 2.75 in. wide; petioles very short, under .1 in. long. Stipules triangular, keeled acute sometimes forming a 4-toothed tube. Flowers .5 in. long, reddish yellow; pedicels fascicled in axils of fallen leaves. Calyx narrow campanulate, mouth 4-toothed. Corolla little longer salver-shaped, tube hairy within, 4 oblong lobes longer. Stigma exsert with 2 ovate-oblong lobes. Fruit as big as a pepper-corn, dark green. Seeds numerous, pitted. A very little-known plant. *Hab.* Perak, Chanderiang and Larut (Kunstler).

I give both Kunstler's descriptions of the habit of this plant from his tickets. This and the next are very unlike the rest of the genus, and I think should be generically separated, but the material is too scanty at present.

(17) *R. impressinervia* King, *l.c.* 206.

Half parasitic shrub, 6 to 30 ft. long, climbing, minutely pubescent. Leaves coriaceous elliptic oblong acuminate, base shortly narrowed or rounded; nerves 7 to 8 pairs, depressed above, elevate beneath, inarching some way from edge; 3.25 to 4.5 in. long, 1 to 1.75 in. wide; petioles under .1 in. long. Stipules .5 to .15 in. broad, triangular acuminate pubescent. Flowers .3 to .35 in. long on pubescent pedicels .15 in. long or less in short axillary cymes from below leaves. Calyx pubescent campanulate, limb as long as tube truncate with 5 or 6 teeth. Corolla .12 in. long, glabrous, green outside, white within, lobes 5 to 6, longer than the tube, oblong blunt. Anthers ovate exsert. Fruit like a pepper-corn, 10- to 12-ridged, glabrous. *Hab.* Dense jungle climbing on trees. Perak, Ulu Bera, Ulu Slim, and Ulu Bubong (Kunstler). *Distrib.* Borneo.

(18) *R. anisophylla* Jack, in Roxb. *Fl. Ind.* (ed. Carey) ii. 561; King, *l.c.* 209. now Partur. india genus

A tree about 30 ft. tall. Stem about 6 in. through, young parts tomentose. Leaves unequal, sub-coriaceous obovate, elliptic, short cuspidate, narrowed from middle to base, light green, glabrous except midrib above, pubescent and with nerves and midrib tomentose beneath; nerves 10 to 14 pairs; larger leaves 8 to 10 in. long, 3 to 5 in. wide; smaller ones 3 to 6 in. long, 1.5 to 3 in. wide; petioles .3 to 1 in. long, tomentose. Stipules lanceolate-acuminate tomentose. Cymes short, 1.5 to 2 in. long, terminal softly tomentose; peduncles short. Flowers .75 in. long, sessile. Calyx tubular, lobes acute, 5. Corolla .5 in. long, tubular, lobes acute, 5. Corolla .5 in. long, tubular white appressed silky, stiff, ~~woolly~~ <sup>glabrous</sup> inside, lobes half as long. Fruit green ellipsoid tomentose crowned by the tubular calyx 1 to 1.5 in. long. *Hab.* Lowland forests, very common. Singapore, Garden Jungle; Bukit Timah. Malacca, Kesang Batu (Hervey); Jus (Derry); Merlimau. Negri Sembilan, Senawang. Selangor, Kwala Lumpur. Penang Hill (Hullett, Curtis). *Distrib.* Borneo, Sumatra. *Native names:* Mempulu Rimbah; Bungkal; Chempaka Putih Hutan; Chimpol.

(19) *R. Scortechinii* King and Gamble, l.c. 210.

*P. terrandea* Tree 40 to 60 ft. tall, bushy. Leaves coriaceous obovate blunt, often rounded, long, narrowed to base, glabrous, dark shining green, 9 to 15 in. long, 4 to 8 in. across; petioles 1 to 1.5 in. long. Cymes axillary pubescent, 3 in. long and wide or less with small persistent ovate bracts. Calyx sub-sessile campanulate, .3 in. long, puberulous. Corolla white silky, 1 in. long, lobes broad, .2 in. long. Fruit oblong globose crowned with calyx-tube, minutely puberulous, on a thick peduncle .5 in. long. *Hab.* Common in forests of the main chain. Negri Sembilan, Johol. Selangor, Rantau Panjang (Kloss); Kwala Lumpur. Perak, Larut (Kunstler) Tapah rest-house. Penang, Balik Pulau (Curtis). *Distrib.* Borneo. *Native name*: Kamanang.

(20) *R. exaltata* Griff. *Notulæ*, iv. 262; King, l.c. 214.

A lofty tree 60 to 80 ft. or more tall. Branchlets pubescent. Leaves glabrous, coriaceous oblong-lanceolate acuminate both ends; nerves 8 to 10 pairs; 3.5 to 4.5 in. long, 1 to 1.35 in. wide; petioles .2 in. long. Cymes axillary pubescent; peduncles .2 in. long with few acute bracts; branches very short. Calyx small funnel-shaped, .15 in. long, pubescent, edge undulate, teeth minute. Corolla funnel-shaped, 1.75 in. long, pubescent outside, base cylindrical, narrow, .4 in. long, thin, rather abruptly dilate, lobes ovate, .25 in. long, white spotted purple-black inside, throat villous. Berry globular, woody, 5 in. through on a thick .5 in. long peduncle. Seeds nearly .5 in. long. *Hab.* In the north only, rather scarce in hilly forests. Penang, Waterfall Garden and Penara Bukit (Curtis). Pulau Adang, Rawei Island. *Distrib.* Burma, Java, Siam.

(21) *R. macrophylla* Hook. *fil. F.B.I.* iii. 14; King, l.c. 215 (Fig. 79, p. 79).

A slender-stemmed erect shrub 3 to 4 ft. tall. Young parts pubescent. Leaves membranous nearly sessile, narrow-elliptic oblong narrowed to the acute base, glabrous above and beneath except midrib and nerves 10 to 14 pairs pubescent; 8 to 12 in. long, 1.75 in. wide; petioles .1 in. long. Stipules triangular subulate. Flowers 1 or 2 axillary near the top sub-sessile, 6 in. long, pendulous with many hairy subulate bracts. Calyx funnel-shaped, .5 in. long, teeth linear longer. Corolla funnel-shaped, 4 in. across, lobes ovate, 1 in. long, recurved, white with purple spots inside. Fruit ellipsoid hairy green, 3 in. long, crowned by the calyx-lobes. *Hab.* Common and very conspicuous, a beautiful plant, in forests. Singapore, Garden Jungle. Johor, Gunong Pulai. Malacca, Selangor (Cantley). Selangor, Kwala Lumpur. Sungei Ujong, Gunong Berumbun (Cantley). Pahang, Kwala Jelai (Machado). Dindings, Gunong Tingul. Penang Hill. Kedah, base of Kedah Peak. Tringganu, Bundi (Rostados). *Distrib.* Sumatra. *Native names*: Kachubong hutan (lit. jungle Datura), "Tree Lily" of Europeans; Kumatan; Pecha Pingan.



(22) *R. stenopetala* Ridl. *Gardenia stenopetala* King, l.c. 218.

Shrub with slender stem about 5 ft. tall, hairy on branches, midrib and above and beneath, petioles and inflorescence. Leaves sparsely hairy above, more so beneath, oblanceolate apiculate acute, base long-narrowed, membranous; nerves 12 pairs inarching within the margin conspicuous; 12 in. or more long, 4.5 in. wide; petioles .5 in. long. Stipules large, triangular caudate. Cyme short-peduncled of 3 to 4 short branches densely hairy. Flowers sessile. Calyx-tube cylindrical, .3 in. long with subulate lobes as long. Corolla-tube cylindrical puberulous, .5 to .75 in. long, lobes narrow linear, 2.5 to 4.5 in. long, .15 to .2 in. wide, sparsely hairy. Anthers sessile



FIG. 79.—*Randia macrophylla*.

linear at base of tube. Fruit oblong, 2.5 in. long, 1.5 in. through, green hairy, crowned by the persistent calyx. *Hab.* In thick forests, not very rare in the main chain. Perak, Kamuning, Waterloo (Curtis); Bujung Malacca.

This is closely allied to *R. macrophylla*, so I put it in the affinity. It is sometimes called the tree *Crinum* by Europeans.

### 33. GARDENIA, Linn.

Shrubs, shrublets or trees. Stipules usually connate. Flowers in *Eu-gardenia* large terminal or axillary. Calyx-tube campanulate or tubular, lobes long linear acuminate (*Gardeniella*) or hardly marked or 0. Corolla-tube campanulate from a narrow base or cylindrical, lobes 4 to 9. Stamens as many as corolla-lobes; anthers

linear included, sessile or sub-sessile. Ovary 1-celled; ovules numerous 2 seriate on 2 to 6 placentas; style stout. Stigma fusiform or clubbed. Fruit ovoid globose, ellipsoid or cylindrical. Epicarp coriaceous, endocarp woody. Seeds numerous included in pulp. Species about 60, all tropics and sub-tropics.

*Gardenia florida* Linn. the cultivated *Gardenia* occurs in gardens and is known as Bunga Susu and Bunga China.

i. GARDENIELLA. Shrubs or shrublets; flowers axillary, tube cylindrical then dilate green or white spotted red; fruit sometimes capsular.

Bush; fruit oblong; stipules tubular . . . (1) *G. tentaculata*

Shrublets; flowers below the leaves.

Stipules lanceolate acute; leaves oblong

hairy . . . . .

(2) *G. didymocarpus*

Stipules ovate, fringed with long points.

Leaves puberulous beneath; corolla green,

pink-spotted . . . . .

(3) *G. virescens*

Leaves nearly glabrous; corolla white

pink-spotted . . . . .

(4) *G. pulchella*

ii. CAMPANULOIDEA. Bush; flowers campanulate from a narrow base.

Pure white . . . . .

(5) *G. Campanula*

iii. EU-GARDENIA. Shrubs or trees, resinous; calyx large tubular, lobes very short or 0; corolla large, tube cylindrical, long; petals 5 to 7 coriaceous, yellow or orange.

Calyx-tube campanulate, 5-keeled; fruit ribbed. . . . .

(6) *G. carinata*

Calyx-tube tubular, smooth-lobes oblong blunt; fruit smooth.

Bush, not very resinous; calyx slightly ribbed, .5 in. long . . . . .

(7) *G. tubifera*

Tree; leaves 4.5 in. long; stipules ciliate, very resinous; calyx .3 in. long . . . . .

(8) *G. resinifera*

Big tree; leaves 9 in. long; calyx bilobed, one lobe longer, .3 in. long . . . . .

(9) *G. elata*

Calyx-tube 1.25 in. long, tubular.

Corolla 3 in. long . . . . .

(10) *G. speciosa*

Calyx-tube 3.5 in. long; corolla 4 in. long . . . . .

(11) *G. Griffithii*

(1) *G. tentaculata* Hook. *fl. F.B.I.* iii. 119; *King, l.c.* 217.

A small bush about 2 to 4 ft. tall. Leaves membranous, oblanceolate, cuspidate, narrowed to base, minutely puberulous beneath, 4 to 8 in. long, 1.5 to 3 in. wide; petioles .25 in. long. Stipules tubular, bilobed. Flowers fascicled 4 to 6 axillary; pedicels .3 to .5 in. long, pubescent. Calyx narrow campanulate, lobes very narrow lanceolate linear setaceous. Corolla .75 to 1 in. long, tube narrow then suddenly dilate, .5 in. across, lobes oblong, rounded, light green with red spots inside. Fruit oblong, .5 in. long, glabrous, crowned by the long sepals. *Hab.* Common on river-banks on the stream edge. Johor, Sungei Tebrau; Ulu Kahang (Kelsall). Pulau Aor (Feilding). Pahang, Tahan River. Malacca, foot of Mt. Ophir (Lobb); Selandor (Cantley). Selangor, Puduk. Negri Sembilan, Johol. Perak, Simpang (Wray); Ulu Kerling (Kunstler); Kwala Kenering. Province Wellesley, Tasek

Gelugur. Penang (Kunstler). Tringganu, Bundi (Rostados). Kelantan, near Kota Bharu. *Distrib.* Borneo. *Native names:* Beluntas Paya; Kachubong Paya; Kapayung Ayer.

(2) *G. didymocarpus* Ridl. *Journ. F.M.S. Mus.* iv. 32.

Shrublet. Stem 2 to 3 in. long. Leaves oblong or oblong-ovate, acuminate, slightly narrowed at base, hairy all over; nerves 7 to 10 pairs, 6 to 7 in. long, 2 in. wide. Stipules lanceolate acute, hairy. Flowers from bare base of stem, 1 to 3 together with 4 or 5 linear bracts; hairy peduncle very short. Calyx-lobes 5 to 6, linear acuminate, 1 in. long, hairy. Corolla base shortly cylindric, above campanulate, hairy outside, 2 in. long, 1 in. wide at mouth, yellow with pink spots inside. Capsule 1 in. long, cylindric hairy, crowned with calyx-lobes. *Hab.* Forests on banks, local and rather rare. Selangor, Ginting Bidai; Bukit Kutu; Semangkok Pass (Ridley).

(3) *G. virescens* Ridl. *Journ. F.M.S. Mus.* iv. 32.

Stem woody over 1 ft. long, hairy. Leaves thin, broadly lanceolate or elliptic, 5 to 6 in. long, 2 in. wide, glabrous except for a few hairs; nerves 8 pairs with midrib hairy; petioles 1 in. long, glabrous. Stipules ovate fringed with long points. Flowers 1 or in pairs from axils or below leaves; peduncles .5 to .75 in. long, hairy. Calyx-lobes linear acuminate, hairy, .3 in. long. Corolla-tube 2 in. long, glabrous, cylindric, upper half dilate, mouth .5 in. across, lobes short, undulate, green with pink spots. *Hab.* Rare on banks in forest. Perak, Thaiping Hills at 5000 ft. altitude (Ridley).

(4) *G. pulchella* Ridl. *Journ. F.M.S. Mus.* iv. 31.

A shrublet. Stem creeping, woody, 2 ft. tall or less, hairy. Leaves membranous, oblanceolate sub-acute, glabrous above, pubescent beneath on the 7 to 9 pairs of nerves, 6 to 7 in. long, 2.5 to 3 in. wide; petioles 1.5 in. long. Stipules large ovate ending in a number of setaceous points, .5 in. long. Flowers 1 to 3 on a peduncle .25 in. long on the bare part of stem; pedicels slender, 1.5 to 2.5 in. long, pubescent. Calyx-tube slender, cylindric, 1 in. long, lobes linear acute, .5 to .75 in. long, pubescent. Corolla 2.5 in. long, base cylindric, slender, dilate upwards, limb .75 in. across, lobes round, cream-white outside, streaked and spotted red inside, lobes white with violet spot at tip. Capsule cylindric, glabrous, 1.5 in. long, .12 in. through. Seeds pustular. *Hab.* Banks of streams in forest at about 4000 ft. altitude, rare. Pahang, Telom (Ridley). Perak, Gunong Kerbau (Robinson).

(5) *G. Campanula* Ridl. *Trans. Linn. Soc.* iii. 310. *G. Godefroyana* Kuntze, *Rev. Gen. Pl.* i. 283; *King, l.c.* 219.

A shrub about 5 ft. tall. Leaves crowded on branch tips, narrow-elliptic or obovate sub-acute, membranous pubescent, edge ciliate, 2 to 6 in. long, 1 in. wide. Stipules connate in a tube obliquely acute, pubescent. Calyx tubular, .3 in. long, teeth linear,

subulate. Corolla nearly 2 in. long, base narrow cylindrical, above suddenly dilate bell-shaped, white, lobes 5 or 6 ovate blunt. Berry elliptic, over 1 in. long, shining inside crowned by the calyx-lobes. Seeds flat. *Hab.* Open sandy heaths, east coast and north. Pahang at Mahang on Pahang River. Perlis, Kanga (Ridley). *Distrib.* Annam and Cambodia.

(6) *G. carinata* Wall. *Roxb. Fl. Ind.* ii. 560; *King, l.c.* 218.

A small bushy tree 20 ft. tall. Leaves thinly coriaceous, obovate or oblanceolate cuspidate, narrowed to base, glabrous, except puberulous midrib; young parts and nerves beneath much elevate, 16 to 18 pairs; 4 to 18 in. long, 2 to 7 in. wide; petioles very short. Flowers solitary in upper axils; pedicels thick, .25 in. long, pubescent. Calyx 1 in. long, base narrow then abruptly dilate, keeled and lobed with 5 acute lobes, pubescent. Corolla-tube 1 in. long, rather thick, limb 3 in. across, lobes obovate, .5 in. across. Fruit ellipsoid, 1.5 in. long, longitudinally ribbed, crowned by the long keeled and lobed calyx-tube. *Hab.* Damp spots in forests. Malacca, Bukit Panchar (Derry) and Batang Malacca. Negri Sembilan, Tampin (Burkill); Dindings, Pangkor. Province Wellesley, Permatang Bertam. Penang Hill (Wallich); Ravenswood (Curtis). Kedah, base of Kedah Peak (Murton). *Native name:* Runda or Randa.

(7) *G. tubifera* Wall. *Cat.* 8266; *King, l.c.* 220 (*in part*) form 1.

A bush about 5 to 6 ft. tall. Leaves oblanceolate cuspidate, base much narrowed; nerves 18 pairs; 3.75 to 6 in. long, 1.5 to 2 in. wide; petioles .2 to .4 in. long. Stipules glabrous. Flowers sub-terminal or axillary at the branch ends, sub-sessile. Calyx tubular truncate, slightly dilate upwards, ribbed at base, .5 in. long. Corolla-tube cylindrical, 3 in. long, lobes oblong obtuse, 1 in. long, .3 in. wide. Fruit globose, saffron yellow inside with the calyx-tube long persistent. Stigma deeply 5-partite, sub-cylindrical. *Hab.* River-banks in mud. Singapore, Chan Chu Kang. Malacca, river-bank (Griffith); Merlimau (Derry); Sabukor in Melaleuca forest. Pahang, Pekan. Selangor, Kelombu Forest, Klang (Foxworthy). *Distrib.* Borneo, Sumatra. *Native names:* Sumpudu Paya; Kapayung Ipas; Delima hutan; Jambu Batu hutan; Koping Ayer; Chempaka Tanjong.

(8) *G. resinifera* Korth. *Ned. Kruidk. Arch.* ii. 191. *G. tubifera* form 2; *King, l.c.* 220.

Very resinous tree with a bushy top about 30 to 40 ft. tall. Leaves oblanceolate, coriaceous, acuminate blunt, much narrowed to petiole; nerves 12 pairs, midrib pubescent beneath; 4.5 in. long, .1 in. wide; petioles .75 in. long. Stipules tubular, edges ciliate. Flowers sessile, orange. Calyx-tube .35 in. long, urn-shaped, ribbed. Corolla-tube 1.5 to 2 in. long, lobes rounded oblong, narrowed at base, .75 to .3 in. wide, orange yellow turning darker,

fragrant. Fruit globose, 1 in. through, crowned with the short remains of the calyx-tube splitting irregularly and orange-coloured inside. *Hab.* Forests. Singapore, Garden Jungle; Changi. Malacca, Sungei Hudang (Goodenough); Jus (Cantley). Perak, Matang (Wray). Penang Hill (Curtis). Kedah, lower slopes of the Kedah Peak. *Distrib.* Borneo. *Native name*: Jambu-Jambu.

Rather difficult to separate from *G. tubifera* Wall, in dried specimens, but this species is very resinous, the bud and stem being covered with resin, the stipules are ciliate and the calyx smaller.

(9) *G. elata* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 81.

A very tall tree nearly 100 ft. high. Leaves thinly coriaceous, oblanceolate apiculate, glabrous, base cuneate; nerves 17 pairs, sub-horizontal, elevate beneath as are the fine transverse nervules; 9 in. long, 3.5 in. across; petioles 1 in. long or more. Stipules tubular within oblique limb. Flowers solitary, terminal, subsessile. Calyx-tube funnel-shaped, .3 in. long, limb spathaceous, bilobed with 1 long oblong blunt lobe, coriaceous, .5 in. long. Corolla-tube 3 in. long, lobes oblong spathulate, tip rounded, orange. Stigma thick, fusiform clavate. *Hab.* In forests. Rare. Singapore, Bukit Timah (Ridley). Selangor, Sungei Buluh (Foxworthy). Perak, Selama (Wray). *Distrib.* Borneo. *Native name*: Mentiong Bukit.

(10) *G. speciosa* Hook. *fil. F.B.I.* iii. 117 (*Randia*); *Ic. Pl. t.* 824; *King, l.c.* 221 *partly*.

Leaves coriaceous, oblong blunt or very short pointed, base very shortly narrowed; nerves strongly elevate beneath and depressed above, 12 pairs, midrib and petiole scurfy, transverse nervules fine and visible, 4 to 5.75 in. long, 3.5 to 3.75 in. wide. Stipules tubular with a papery lanceolate limb as long as tube, .2 in. long. Flower one, terminal, sessile. Calyx 1.25 in. long, base very short, cylindric, limb 1.1 in. long, tubular, gradually narrowed upwards, .75 in. wide at mouth. Corolla-tube 3 in. long, cylindric lobes 7 or 8, broad oblong, tip slightly narrowed, rounded, 1.5 in. long, .5 in. wide. Stigma clubbed, grooved. *Hab.* Singapore (Lobb).

I should not include this in our flora except that King states that it occurs in Perak. I have not seen his specimens, but his description does not at all agree with the type, and suggests *G. elata*. The locality of Lobb is, as usual, extremely doubtful, and I have never seen another specimen of the plant from anywhere.

(11) *G. Griffithii* Hook. *fil. F.B.I.* iii. 118; *King, l.c.* 221.

Small tree, slender with few branches, 20 ft. tall. Leaves thickly coriaceous, obovate cuspidate, much narrowed at base, glabrous above, slightly pubescent beneath; nerves about 13 pairs elevate beneath, 5 to 9 in. long, 2.5 to 4 in. wide; petioles .3 in. long. Flowers solitary, terminal. Calyx 3.5 in. long, coriaceous, tubular, mouth expanded, irregularly lobed. Corolla-tube 4 in. long,

cylindric, limb 4 in. across, lobes spathulate, round, 2 in. long, 1 in. across at end, orange. Fruit large, woody, globose, 2 in. through, crowned by calyx-tube. *Hab.* Wet spots in forest or on the edges of it. Singapore, Bukit Mandai; Sungei Buluh; Bukit Timah. Malacca, Alor Gajah (Griffith); Merlimau.

var. *Maingayi* Hook. fil. A form with the mouth of the tube distinctly cut into triangular lobes. Malacca (Maingay). *Native name*: Chempaka Hutan.

### 34. PETUNGA, DC.

Small or medium trees or bushes. Leaves sub-coriaceous, glabrous or nearly so. Stipules triangular or ovate-oblong. Flowers small, white with bracts in pairs in axillary spikes. Calyx-tube campanulate, lobes 4, short. Corolla funnel-shaped, mouth villous pubescent inside, lobes 4, short; anthers 4, sessile linear, in the tube. Ovary 2-celled; ovules 2 to 8 pendulous from apex of cell; style cylindric with 2 broad linear pubescent stigmas. Fruit small, 2-celled, pedicelled. Seeds imbricate. Species 4 or 5, Malay Peninsula and islands and India.

Midrib and nerves beneath pubescent . . . . .	(1) <i>P. longifolia</i>
Whole plant glabrous except bracts and calyx.	
Spikes long rather lax.	
Fruit ellipsoid, .25 in. long.	
Racemes 1.25 in. long . . . . .	(2) <i>P. Roxburghii</i>
Racemes 4 to 5 in. long . . . . .	(3) <i>P. floribunda</i>
Fruit clavate . . . . .	(4) <i>P. venulosa</i>
Spikes very short cone-like . . . . .	(5) <i>P. conifera</i>

(1) *P. longifolia* DC. *Prodr.* iv. 399; *King, l.c.* 222.

A small tree. Branches 4-angled. Leaves membranous oblong-elliptic abruptly acuminate acute, glabrous except the midrib beneath, finely hairy; nerves 8 pairs elevate beneath, transverse nervules fine and conspicuous beneath, numerous parallel, 4 to 5.6 in. long, 1.25 to 1.5 in. across; petioles .35 in. long. Stipules triangular ovate acute hairy. Racemes .5 in. long lengthening in fruit. Flowers densely crowded, .2 in. long, white pubescent. Calyx funnel-shaped, teeth broad acute. Corolla funnel-shaped twice as long as calyx. Fruit ellipsoid, .2 to .3 in. long, stalks slender, .3 to .5 in. long. Whole raceme 1.25 in. long, pubescent. *Hab.* Forests. Pahang, Kwala Tembeling. Selangor, Labu River. Perak, Goping (Kunstler); Tapah. Penang, Waterfall and the Hill (Wallich, Curtis, etc.). Kelantan, Chaning. *Distrib.* Sumatra.

(2) *P. Roxburghii* DC. *Prodr.* iv. 399; *King, l.c.* 222.

A bush 4 to 8 ft. to a tree 15 to 20 ft. tall. Branches angled. Leaves thinly coriaceous, dark shining green, oblong-lanceolate acuminate glabrous, base cuneate; nerves faint 8 to 10 pairs, 2.5 to 5 in. long, .75 to 1.5 in. wide; petioles .1 to .2 in. long. Stipules hairy at base, short. Racemes 1.25 in. long, lax glabrous.

Flowers .25 in. long with ovate-acute bracts at base. Corolla funnel-shaped with broad lobes. Fruit elliptic, .2 to .25 in. long; pedicels much shorter. *Hab.* Low marshy ground. Johor, Tebing Tinggi. Malacca, Merlimau (Derry). Selangor, Batu Tiga. Penang (Wallich); Waterfall (Curtis). Perlis, Besih Hangat, Kanga. *Distrib.* Borneo.

(3) **P. floribunda** Ridl. *B. Roxburghii* var. *floribunda* King, l.c. 223.

Tree 30 to 50 ft. tall or bush; stem 10 to 24 in. through. Leaves elliptic-oblong acuminate, base shortly narrowed, 5 in. long, 1.5 in. wide; nerves fine 10 pairs; petioles .2 in. long. Racemes 4 to 5 in. long, lax, many-flowered, bracts lanceolate acute. Flowers distant green. Calyx funnel-shaped, teeth acute. Corolla .1 in. long. *Hab.* Marshy ground. Johor, Batu Pahat. Pahang, Rumpin River (Evans). Selangor, Kwala Lumpur. Perak, Ulu Bubong (Kunstler).

(4) **P. venulosa** Hook. fil. *F.B.I.* iii. 121; King, l.c. 223.

Tree about 25 to 60 ft. tall. Leaves coriaceous elliptic-oblong, short abrupt, acuminate, base cuneate; nerves 6 or 7 pairs, depressed above, slender elevate beneath; nervules faint; 3 to 6 in. long, 1.5 to 3 in. wide; petioles .2 in. long. Stipules triangular acuminate, keeled. Racemes lengthening to 2 to 3 in., lax, rather stout. Flowers on short pedicels; bracts ovate acute rather distant. Calyx less than .1 in. long, campanulate, lobes blunt, hairy on edge. Corolla .3 in. long, funnel-shaped, white, glabrous except mouth, lobes ovate acute. Fruit clubbed, .5 in. long, narrowed at base to a slender pedicel .5 in. long. *Hab.* In woods, Malacca (Griffith); Brisu (Derry); Selandor (Holmberg). Dindings, Telok Sera; Pangkor (Curtis). Perak, Thaiping Hills (Wray); Batu Gajah (Scortechini). Penang, West Hill; Moniot's Road. Common. *Distrib.* Borneo. *Native names:* Lambai; Umpaong putih; Tulong Betina; Pulas or Peluk Hantu.

The fruits are often attacked by a gall insect and become .5 to 1.75 in. long, fusiform and crowned with long calyx-lobes.

(5) **P. conifera** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 81.

A slender tree about 30 ft. tall with few spreading horizontal 4-angled branched. Leaves coriaceous, dark green glabrous elliptic cuspidate, base shortly narrowed; nerves prominent beneath, 7 to 9 pairs; 6 to 9 in. long, 3.5 in. wide; petioles thick, .5 in. long. Racemes dense cone-like, 4-angled, .5 in. long; peduncles thick. Bracts ovate acute stiffly coriaceous, imbricating longer than calyx edge ciliate. Flowers sessile, white. Calyx obconic with 5 short broad triangular lobes, densely woolly at the top, .15 in. long. Corolla .15 in. long, tube short, thick glabrous outside, pubescent within, lobes oblong blunt as long, hairy at tips. Style as long as corolla, lobes linear blunt, all pubescent. *Hab.* Singapore, one tree in Garden Jungle (Ridley).

## 35. DIPLOSPORA, DC.

Shrubs or trees. Leaves coriaceous. Stipules triangular acuminate. Flowers small in axillary cymes or fascicles, pale green or white. Calyx-tube short, truncate 4- to 5-toothed. Corolla cylindrical-campanulate, lobes 4 to 5, twisted in bud. Stamens 4 or 5 insert in corolla-mouth. Ovary 2-(or 3-)celled; ovules 2 to 3 in a cell; style-branches linear or oblong. Berry ovoid or globose. Seeds few. Species about 15, tropical Asia.

Quite glabrous.

Leaves 6 to 7 in. long, coriaceous . . . . . (1) **D. Beccariana**

Leaves .25 to .45 in. long, coriaceous . . . . . (2) **D. malaccensis**

Leaves 4 to 6 by 2 in. wide, thin sub-membranous . . . . . (3) **D. minutiflora**

Nerves pubescent beneath.

Leaves 6 to 11 in. long.

Nerves 7 to 8 pairs . . . . . (4) **D. Wrayi**

Nerves 10 to 12 pairs . . . . . (5) **D. velutina**

Leaves 6 in. long or less.

Flowers glabrous.

Leaves oblanceolate . . . . . (6) **D. Kunstleri**

Leaves narrow elliptic . . . . . (7) **D. pubescens**

Flowers hairy . . . . . (8) **D. lasiantha**

(1) **D. Beccariana** King, *l.c.* 225.

A tree 30 to 40 ft. tall; stem 8 to 12 in. through. Leaves very coriaceous, broadly elliptic shortly blunt cuspidate, base broad round shortly cuneate, shining; nerves 7 pairs distinct on both surfaces (very conspicuous, deeply sunk above and prominent beneath as are nervules in Borneo specimens), 6.5 to 7.5 in. long, 3.25 to 3.75 in. wide; petioles stout, .5 in. long. Stipules triangular sub-acute, .15 in. long. Flowers (from Borneo specimen) about 10 in an axillary cyme .5 in. long, glabrous. Calyx cup-shaped, under .1 in. long. Corolla .25 in. long, tube very short, lobes linear much longer. Fruit globose mammillate at top, 1 in. through, green. *Hab.* Forests, not common. Johor, Sedenak. Perak, Larut (Kunstler). *Distrib.* Borneo.

The leaves are much larger and thicker in the Borneo plants, their bases are sometimes rounded and sometimes narrowed cuneate.

(2) **D. malaccensis** Hook. *fil.* *F.B.I.* iii. 124; King, *l.c.* 225.

A white-barked bushy tree about 20 ft. tall quite glabrous. Leaves elliptic, pale beneath, shortly abrupt-acuminate, base shortly narrowed; nerves 4 to 5 pairs, depressed above, elevate beneath; 2.5 to 4.5 in. long, 1 to 2 in. wide; petioles .15 to .2 in. long. Flowers .2 in. long, in small axillary clusters .1 in. long, about 5 together. Calyx tubular-campanulate with 4 broad acute teeth. Corolla tubular, mouth woolly with 4 blunt oblong lobes, very short, .1 in. long. Fruit globose orange, .4 in. through. *Hab.* Very common in woods. Singapore, Garden Jungle; Selitar; Reservoir Woods. Malacca (Griffith); Machap (Goodenough). Pahang, Kwala Tembeling; Bentong (Speldewind). Perak, Thaiping



Hills at 5500 ft. altitude (Low); Goping (Kunstler). Dindings. Penang, Penara Bukit (Curtis); Hill to 2000 ft. altitude. Lankawi, Sungei Batu Asap (Haniff). *Distrib.* Sumatra, Borneo. *Native name:* Uloh-Uloh. *Use:* Leaves used in place of coffee-leaves for coffee-leaf tea.

(3) *D. minutiflora* Ridl. *Journ. F.M.S. Mus.* x. 140.

Tree. Leaves rather thin elliptic sub-acute, base shortly cuneate quite glabrous; nerves 7 pairs slightly raised; 4 to 6 in. long, 2 in. wide; petioles .2 in. long. Stipules caducous. Cymes axillary on peduncles .1 in. long. Flowers 3, very small sub-umbelled with numerous persistent bracts at base; pedicels .1 in. long. Calyx campanulate with 4 short teeth. Corolla .1 in. long, tube shorter than calyx-lobes, lobes oblong blunt valvate, 4, mouth glabrous. Stamens 4. *Hab.* Kelantan, Chaning Woods (Ridley).

(4) *D. Wrayi* King and Gamble, *l.c.* 225.

Shrub 3 or 4 ft. to 14 ft. tall. Young branches puberulous, otherwise glabrous. Leaves elliptic or slightly obovate, caudate-acuminate blunt, base cuneate pale; nerves 7 to 8 pairs, elevate beneath; 6 to 11 in. long, 2.5 to 4.75 in. wide; petioles .25 to .4 in. long. Flowers .25 in. long in dense sub-sessile fascicles. Calyx cupular very short, teeth broad shallow. Corolla tubular slightly inflated above, villous inside, lobes shorter, oblong, sub-acute. Fruit globular-ovoid crowned by calyx scar, .4 in. long, orange. *Hab.* Local; mountain forests 2000 to 4000 ft. altitude. Selangor, Menuang Gasing (Kloss). Perak, Thaiping Hills 2000 to 3000 ft. altitude (Wray, Kunstler).

(5) *D. velutina* King and Gamble, *l.c.* 266.

Small tree 10 to 15 ft. tall. Branches densely velvety. Leaves coriaceous, oblong-elliptic, acute or abruptly long-cuspidate, cusp 1 in. long, base blunt, glabrous above, nerves and midrib depressed, beneath velvety pubescent; nerves 10 to 12 pairs; 8 to 10 in. long, 3 to 4.5 in. wide; petioles .2 in. long. Stipules triangular, long acuminate. Flowers .25 in. long, sessile in dense axillary heads about .25 in. long. Calyx short cupular obscurely lobed. Corolla funnel-shaped, glabrous, throat villous, lobes oblong, slightly emarginate. Fruit (unripe) flask-shaped, ovate narrowed into the calyx-tube, densely brown-velvety. *Hab.* Pahang, Kwantan, Bukit Galing (Burn-Murdoch). Perak, Selama (Kunstler).

The Pahang specimens which are in fruit differ from the single specimen of the type I have seen, in the leaves being narrower, acute not cuspidate, with smaller stipules and some pubescence on the upper side of the leaves. It is possibly distinct.

(6) *D. Kunstleri* King and Gamble, *l.c.* 266. *Urophyllum potatorum* King and Gamble, *l.c.* 195.

A small tree, 15 ft. tall, glabrous except for a slight puberulousness on the younger parts and underside of the leaves. Leaves

coriaceous oblanceolate or oblong shortly abruptly acuminate, base shortly cuneate; nerves 8 to 10 pairs, elevate beneath; 6 to 7 in. long, 1.75 to 2.5 in. wide; petioles .35 to .4 in. long. Stipules triangular-lanceolate keeled acuminate. Cymes short, peduncled, dense, about .5 in. long. Flowers sessile. Calyx saucer-shaped, glabrous. Corolla-tube cylindric, short, .15 in. long, lobes very short, oblong recurved, obtuse, whitish green. Fruit ovoid, crowned by the small calyx-scar, .4 in. long, 2-celled, 2-seeded, orange or yellow. *Hab.* Mountain forests. Malacca, Mt. Ophir (Hullett) 4000 ft. altitude. Perak, Thaipung Hills 2500 ft. altitude (Kunstler, Wray). *Use:* The leaves used to make coffee-leaf tea.

King described this twice over under the above names. The Mt. Ophir plant has smaller leaves and appears to be more stunted than the Perak ones.

(7) **D. pubescens** *Hook. fil. F.B.I. iii. 124.*

Shrub. Branches minutely pubescent. Leaves coriaceous, elliptic-oblong caudate-acuminate, base cuneate, glabrous above and nearly so beneath; nerves and midrib elevate beneath, 6 or 7 pairs, puberulous, nervules visible; fine, 3 to 6 in. long, 1.25 to 2.25 in. wide; petioles .15 to .2 in. long. Stipules lanceolate with long points. Flowers .2 in. long, in dense sub-sessile heads, .12 in. long. Calyx short, lobes very small, blunt pubescent. Corolla longer, tubular, lobes 4, short, throat villous. Fruit globular-ovoid, crowned with calyx-scar .4 in. through. Seeds 4. *Hab.* Perak, Gunong Chabang (Scortechini).

(8) **D. lasiantha** *Ridl. Journ. F.M.S. Mus. vi. 38.*

Shrub. Branches brown-velvety. Leaves lanceolate to elliptic-lanceolate shortly cuspidate, sub-glabrous above except midrib and edges, beneath sprinkled with hairs; nerves 8 pairs and midrib hairy; 5.5 in. long, 1.5 in. wide; petioles hairy, .2 in. long. Stipules lanceolate-acuminate, velvety. Flowers 3 or 4 together, sessile. Calyx velvety, lobes short, blunt. Corolla .2 in. long, tube short, lobes 4, ovate acute, hairy except inner side of lobes. Stamens exsert in a cone, hairy. *Hab.* Negri Sembilan, Gunong Tampin (Robinson).

### 36. SCYPHIPHORA, Gaertn.

A maritime bush, glabrous. Leaves small obovate blunt, coriaceous. Flowers white in dense, short-peduncled cymes. Calyx-tube elongate, obconic, limb cupular, truncate, 4- to 5-toothed. Corolla cylindric, villous in throat, lobes 4 to 5, oblong, twisted in bud. Stamens 4 to 5 on short filaments between corolla lobes; anthers linear sagittate. Ovary-cells 2; ovules 2 in each cell; style filiform. Stigmas 2, linear. Drupe sub-cylindric, 8 to 10 grooved separating into two ribbed pyrenes. Species 1, S. India, Ceylon, Malay Peninsula and islands, Australia.

(1) **S. hydrophyllacea** Gaertn. *Fruct.* iii. 91, t. 196; *King, l.c.* 288. *Epithinia malayana* Jack, *Mal. Misc.* i. 12.

Bush about 4 ft. tall. Leaves 2 in. long, 1.5 in. wide, narrowed to the petiole, .5 to 1 in. long; nerves invisible. Cymes dense, many-flowered, 1.5 in. across. Flowers about .4 in. long. Corolla-lobes about half as long as tube. Style long, projecting. Drupe .4 in. long, green. *Hab.* Muddy shores, very common. Singapore, Malacca, Negri Sembilan, Pahang. *Distrib.* All sea-coasts from India to Australia. The pyrenes carried about in the sea. *Native names*: Chingum; Sebasah or Sabasoh.

### 37. JACKIA, Wall.

A tree. Branches few, stout. Leaves large oblanceolate, sub-acute, coriaceous. Stipules sheathing, long-bristled. Flowers white in large bracteate scorpioid cymes arranged in a panicle of corymbs. Calyx obconic, lobes 5, unequal 2 small, 3 large, wing-like. Corolla funnel-shaped, tube narrow, limb campanulate, short, lobes 5, valvate, triangular. Anthers 5, linear, sub-sessile in throat. Disc hairy. Ovary 2-celled; ovules 2 in each cell; style slender, long, exsert hairy. Stigmas 2, short. Fruit obconic, hairy, crowned by the three enlarged calyx-lobes. Species 1, Malay Peninsula, Borneo and Bangka.

(1) **J. ornata** Wall. *Roxb. Fl. Ind. (ed. Carey)* ii. 321; *King, l.c.* 229; *Wall. Pl. As. Rar. t.* 293.

Usually a slender tree 30 ft. tall with few spreading branches. Leaves glabrous above, pubescent beneath; nerves 12 pairs, elevate beneath; 6 to 12 in. long, 2.5 to 5 in. wide; petioles .4 to .9 in. long, velvety. Stipules an inch long or more hairy red. Flowers .4 in. long, white; peduncles pendulous, 9 in. long; branches 4 in. long. Corymbs 2 in. (in flower) across, 4 in. in fruit. All pubescent. Fruit red, wings .5 in. long, lanceolate acute, pubescent. *Hab.* In wet open marshes. A beautiful tree. Singapore, Tanglin; Bukit Timah; Kranji. Malacca, Sungei Hudang; Machap (Goodenough); Nyalas (Foxworthy). Perak, Larut (Kunstler); Thaiping. *Distrib.* Borneo. *Native names*: Sintulang; Selumar; Terong.

### 38. IXORA, Linn.

Shrubs or small trees. Leaves usually coriaceous. Cymes terminal, compound trichotomous and usually corymbose. Calyx campanulate, small, 5-toothed. Corolla-tube narrow cylindric, long, lobes 4, spreading, shorter, red, yellow, pink or white, twisted in bud. Stamens 4 insert in the mouth of corolla-tube; anthers linear acuminate, projecting. Ovary 2-celled; ovule solitary in a cell; style exsert but not twice as long as tube. Stigmas 2 divergent. Fruit globose or didymous, pulpy, usually black with 2 plano-

convex pyrenes. Species about 110, tropics of Asia and Africa (*King and Gamble, Journ. As. Soc. Beng.*, lxxiii. 39).

The common native name for these plants is Pecha Priok, "the broken pot," and is said to refer to the 4 spreading petals resembling a pot broken in 4 pieces.

*Sepals as long as calyx-tube or longer.*

- Leaves hairy beneath, sessile . . . . . (1) **I. Brunonis**  
 Leaves pubescent beneath, petioled; sepals red ovate; corolla white . . . . . (2) **I. clerodendron**  
 Leaves glabrous, pubescent beneath, petioled.  
 Sepals linear; dwarf plant . . . . . (3) **I. pumila**  
 Sepals broad, blunt.  
 Big bush; flowers red . . . . . (4) **I. Kingstoni**  
 Bush; flowers white . . . . . (5) **I. multibracteata**  
 Shrubs; sepals lanceolate as long as tube; flowers white; leaves dry black.  
 Corymb lax, pendulous, hairy . . . . . (6) **I. plumea**  
 Corymb erect, short glabrous . . . . . (7) **I. arguta**

*Sepals shorter than calyx-tube.*

- Shrubs; corolla over 1 in. long, red.  
 Corolla-tube 2 in. long; leaves stiff coriaceous . . . . . (8) **I. Robinsonii**  
 Corolla tube 1.25 in. long; leaves broad, 4 in. across . . . . . (9) **I. congesta**  
 Leaves oblong-lanceolate, 2 in. across . . . . . (10) **I. Lobbii**  
 Leaves lanceolate or elliptic; flowers orange. . . . . (11) **I. stricta**  
 Leaves very narrow, .75 in. across; flowers red . . . . . (12) **I. stenophylla**  
 Dwarf shrub, leaves sessile; flowers red . . . . . (13) **I. humilis**  
 Tree up to 60 ft. tall; corymbs dense, tube .4 in. long, red . . . . . (14) **I. concinna**  
 Shrub 4 ft. tall; corymbs short, lax; leaves lanceolate; flowers white, .75 in. long. . . . . (15) **I. candida**  
 Little-branched shrubs; corymbs on long pendulous peduncles.  
 Leaves thin coriaceous; corolla-tube pink, lobes white, 1 in. long . . . . . (16) **I. pendula**  
 Leaves membranous; corolla-tube .4 in. long . . . . . (17) **I. diversifolia**  
 Leaves coriaceous, base round; cyme hairy; corolla .75 in. long, red . . . . . (18) **I. montana**  
 Trees; leaf-base round, broad elliptic, stiffly coriaceous; corolla-tube short, .2 to .3 in. long; flowers yellow, white or pink.  
 Leaf 8 to 10 in. long . . . . . (19) **I. grandifolia**  
 Leaf 4 to 6 in. long . . . . . (20) **I. fluminalis**  
 Leaves narrowed to base, lanceolate.  
 Leaves thick coriaceous, 13 in. long; flowers white . . . . . (21) **I. crassifolia**  
 Leaves thinly coriaceous, 7 to 9 in. long; flowers pink . . . . . (22) **I. elliptica**  
 Leaves lanceolate, 7 in. long, 2 in. wide; panicle wide . . . . . (23) **I. patens**  
 Shrub; leaves thin, coriaceous, 4 in. long; flowers small . . . . . (24) **I. micrantha**  
 Tree; leaves thin; corymb wide; flowers .25 in. long, yellow . . . . . (25) **I. undulata**

(1) **I. Brunonis** Wall. Cat. 6136; King, l.c. 72.

A shrub, tomentose 4 to 5 ft. tall. Leaves membranous, sessile, oblanceolate caudate-acuminate tapering to the cordate base, glabrous except nerves above, tomentose beneath, 5 to 10 in. long, 1.5 to 2.25 in. wide. Stipules ovate keeled and tailed. Cymes 1.5 in. long, 20-flowered; peduncles tomentose. Flowers sessile, white. Calyx .15 to .2 in. long, narrow-campanulate, teeth narrow lanceolate acuminate as long as tube. Corolla 1.5 in. long, more or less hairy, throat hairy, limb .5 in. across. Fruit ovoid puberulous, .35 in. long. *Hab.* Woods, chiefly in the north. Pahang, Gunong Senyum (Evans). Penang Hill (Wallich, Curtis, etc.). Waterfall; Penara Bukit. Pulau Adang. Lankawi (Curtis). *Distrib.* Tavoy, S. Siam.

(2) **I. clerodendron** Ridl. Trans. Linn. Soc. iii. 311.

A small, little-branched shrub; young parts pubescent. Leaves lanceolate or obovate narrowed to both ends, glabrous above, pubescent beneath, 9 in. long, 3.5 in. wide. Stipules triangular, subulate, .5 in. long. Cyme 1 in. through, dense, pubescent, many-flowered. Calyx-lobes ovate pubescent longer than the tube, red, nearly .25 in. long. Corolla white, tube 1 in. long, slender, lobes oblong ovate sub-acute, .12 in. long. Stamens exsert. Fruit grey with red streaks, .25 in. long, crowned with the red persistent sepals. *Hab.* Open woods, east coast. Pahang, Kwala Tembeling, and other places on the Pahang River (Ridley). *Distrib.* S. Siam.

(3) **I. pumila** Ridl. Journ. F.M.S. Mus. x. 142.

Dwarf plant 1 to 4 ft. tall; stem pubescent. Leaves obovate to oblanceolate, tip blunt or sub-acute base usually narrowed, glabrous above, pubescent beneath; nerves 15 pairs; 7 in. long, 3 in. wide. Stipules ovate with a long subulate process decurrent on the back .3 in. long. Corymb 3 in. wide, on a pubescent peduncle 3.5 in. long. Bracts narrow-linear acuminate. Calyx-lobes linear acuminate, .12 in. long, pubescent, much longer than the ovary. Corolla-tube slender, 1 in. long, lobes oblong, all white, glabrous, .15 in. across. Stamens exsert, brown. *Hab.* Pahang, Gunong Senyum (Evans); Kwala Tahan (Seimund).

(4) **I. Kingstoni** Hook. fil. F.B.I. iii. 140; King, l.c. 73.

Big bush. Leaves thin membranous or rather stiff glabrous, oblong or elliptic-oblong short acuminate, narrowed to cuneate base; nerves 15 to 18 pairs; 5 to 9 in. long, 2 to 3 in. wide; petioles .4 to .5 in. long. Stipules semi-linear with a short point. Corymbs 3 to 4 in. across; peduncles short; branches puberulous. Bracts ovate-lanceolate, sub-coriaceous. Flowers crowded, sessile. Calyx .2 to .3 in. long, tube short, lobes longer lanceolate, broad, nearly .1 in. long. Corolla-tube 1.25 in. long, lobes obovate, rounded, .5 to .6 in. across, red. Fruit ovoid crowned by the large sepals. *Hab.* Forests. Johor, Gunong Pulai. Muar (Curtis). Malacca, Nyalas (Goodenough). Pahang, Gunong Senyum (Evans). Selangor,

Kwala Lumpur; Sempang Mines; Ginting Peras; Menuang Gasing (Robinson); Perak, Changkat Serdang (Wray); Goping (Kunstler).

(5) ***I. multibracteata*** Pearson, in *King, l.c.* 74.

Shrub, glabrous except inflorescence. Leaves sub-coriaceous oblong oblanceolate reticulate; nerves 10 to 16 pairs; 5 to 9 in. long, 1.5 to 3 in. wide; petioles .3 to .6 in. long. Stipules cupular, short apiculate, .1 in. long. Corymbs terminal, 2.5 to 5 in. across, many-branched. Flowers membranous, white. Bracts numerous ovate triangular. Calyx sessile, .25 in. long, puberulous, lobes ovate blunt. Corolla-tube puberulous outside, 1.25 in. long, limb .5 in. across, lobes oblong, blunt. *Hab.* Open country in the north. Perak, Kampong Kota (Wray); Kedah, Alor Sta; Yan; Lankawi, Kwah (Curtis). Pulau Adang. Perlis, Chupeng, Kanga. *Distrib.* S. Siam.

(6) ***I. plumea*** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 117.

Shrub about 10 ft. tall. Leaves oblanceolate or elliptic acuminate, base cuneate, thinly coriaceous; nerves 8 pairs; 4 to 5 in. long, 2 in. wide; petioles .25 in. long. Stipules broad ovate, long cuspidate. Corymb lax, 3 in. long, 5 in. across, minutely hairy. Flowers shortly pedicelled, white. Calyx-tube short, round, lobes linear, subulate, longer. Corolla-tube slender, .5 in. long, lobes lanceolate acute. Fruit globose, .25 in. long, purplish. *Hab.* Borders of woods in the north. Perlis, woods at Kanga. Setul, Rajah Wang (Ridley). *Distrib.* S. Siam.

(7) ***I. arguta*** Br. *Wall. Cat.* 6157; *King, l.c.* 74. *I. nigricans* Wall. in part.

A bush glabrous, with thin branches. Leaves thin coriaceous (drying black) broad oblanceolate to obovate abruptly short acuminate, base much narrowed; nerves 6 to 7 pairs; 3.5 to 6 in. long, 1.5 to 2.25 in. wide; petioles .2 to .4 in. long. Stipules linear-lanceolate acuminate. Corymbs lax on peduncles short or up to 2 in. long, 2 to 3 in. across, often many-flowered. Calyx less than .1 in. long, campanulate narrow, teeth narrow lanceolate acuminate acute, as long as tube. Corolla white, tube slender, .3 to .5 in. long, lobes narrow, acute oblong. Style exsert. Fruit globose, pea-like. *Hab.* Common in woods. Johor, Pulau Dayong (Feilding). Pahang, Gunong Senyum (Evans). Selangor, Batu Caves; Semangkok. Perak, Goping; Ulu Bubong (Kunstler); Thaiping Hills 2000 ft. altitude (Curtis). Dindings, Gunong Tungul. Penang (Wallich), Waterfall; Pulau Betong (Curtis). Province Wellesley, Permatang Bertam. Lankawi, Kwah (Curtis). Perlis, Ginting Kabok.

var. with larger flowers, tube .5 in. long. Penang, Waterfall. *Distrib.* Burma; Malaya. *Native name:* Supati.

(8) ***I. Robinsonii*** Ridl. *Journ. F.M.S. Mus.* vi. 134.

Shrub about 6 ft. tall. Leaves stiffly coriaceous, oblanceolate

to ovate-lanceolate acuminate, blunt, base narrowed; nerves 10 pairs, 4 to 7 in. long, 2 in. wide; petioles winged to base. Stipules connate tubular, mucronate. Corymbs lax, many-flowered, 3 in. long, 4 in. across. Flowers salmon-red; pedicel .1 in. long. Calyx-lobes ovate, blunt, short. Corolla-tube slender, 2 in. long, lobes .5 in. long, lanceolate acute, narrowed at base. *Hab.* Mountains, rare. Pahang, Gunung Tahan, 4000 to 5000 ft. altitude (Robinson).

(9) ***I. congesta*** Roxb. *Fl. Ind.* i. 387; *King, l.c.* 76. *I. Griffithii*, *Hook. fil. Bot. Mag. t.* 4325.

Shrub about 2 to 4 ft. tall. Leaves coriaceous, dark green, elliptic or oblong, short, bluntly acuminate, base cuneate or rounded; nerves 12 to 20 pairs; 7 to 14 in. long, 2.5 to 4 in. across; petioles .3 to 5 in. long, thick. Corymbs very many-flowered, 4 to 6 in. through. Calyx less than .1 in. long, sessile or shortly pedicelled, teeth triangular, short. Corolla-tube 1.25 in. long, limb .5 in. across, lobes ovate-lanceolate round at tip, red orange. Fruit black. *Hab.* In forests, common, very showy. Singapore, Bukit Timah; Serangoon Road; Pulau Ubin. Malacca, Ayer Panas (Griffith). Negri Sembilan, Tampin. Selangor, Rantau Panjang (Kloss). Dindings, Lumut. Perak, Sayong (Murton); Goping (Kunstler); Kwala Kangsa; Changkat Mentri (Kloss). Penang. Kelantan, Chaning. *Distrib.* Tenasserim. *Native names:* Jarum Saluang; Bunga Penaga Riam.

(10) ***I. Lobbii*** Loud. *Encycl. Supp.* ii. 1543; *King, l.c.* 78. *I. fulgens* *Hook. fil. F.B.I.* iii. 146; *King, l.c. (in part)*.

Shrub about 6 to 8 ft. tall. Leaves rather coriaceous, oblong to lanceolate acute or acuminate, base cuneate; nerves 15 to 25 pairs; 6 to 8 in. long, 1.5 to 2 in. across; petioles .25 in. across. Stipules triangular acuminate. Corymb about 6 in. across, subsessile, many-flowered; pedicels red. Calyx cylindrical-campanulate, lobes broad, blunt. Corolla-tube cylindrical, 1.5 to 1.75 in. long, lobes oblong, ovate acute, bright orange-red. Fruit ellipsoid, black. *Hab.* Our commonest species, occurs in forests. Singapore, Sungei Morai; Garden Jungle. Johor, Gunung Pantai; Kwala Sembong (Kelsall). Malacca, Bukit Panchur (Derry); Ayer Panas (Griffith). Pahang, Sungei Jelai (Machado); Labong, Endau (Evans). Selangor, Rawang (Kloss). Negri Sembilan, Tampin. Perak, Sira Rimau (Yapp); Thaiping Hills (Derry); Ipoh; Changkat Mentri (Kloss). Province Wellesley, Tasek Gelugur. Penang Hill. *Distrib.* Siam. *Native names:* Kramat Hujan; Pechah Priok.

The real *I. fulgens* Roxb. is a native of the Moluccas and does not occur here (see note at end of genus). The var. *angustifolia* King and Gamble, *l.c.*, is a mixture. The leaves of typical *I. Lobbii* vary in width considerably all through the woods. Wray collected a very narrow-leaved form on the Thaiping Hills with lanceolate leaves 8 in. long, 1.25 in. wide, but the Pahang plant quoted by King and Gamble under variety *angustifolia* is quite a

different species, *I. stenophylla* Ridl. Excluding the plants quoted by King except Wray's 519, we may establish the var. *angustifolia* thus :

var. *angustifolia*, Small tree (Wray). Leaves narrow lanceolate acuminate, 7 in. long, 1 in. wide; nerves 12 pairs. Corymb large many-flowered. Flowers larger than ordinary *Lobbii* and petals usually more acute. *Hab.* Mountains, Selangor, Gunong Mengkuang Lebah (Robinson). Leaves long, sharply acuminate. Perak, Hill Gardens, Thaiping Hills (Wray).

(11) *I. stricta* Roxb. *Hort. Beng.* 10; *Fl. I.* i. 379; *Hook. fil. F.B.I.* iii. 145; *King, l.c.* 80.

A shrub about 5 ft. tall. Leaves coriaceous variable lanceolate or elliptic acute or acuminate, base cuneate; nerves 7 to 8 pairs; 2.5 to 5 in. long, 1.25 to 2 in. wide; petioles .15 to .2 in. long. Stipules broad, triangular with long points. Corymbs sub-sessile, dense or lax, 2 to 3 in. across. Calyx cylindrical, 4 broad lobes or none. Corolla orange (in cultivation yellow or pink), tube .8 in. long, limb .4 in. across, lobes oblong, rounded. Fruit globose, black. *Hab.* River-banks; common. Singapore, Chan Chu Kang, Johor, Kota Tinggi; Gunong Pantai. Pahang, Pekan; Tahan River. Malacca, Ayer Panas (Derry). Selangor, Rantau Panjang (Kloss); Klang Gates. Negri Sembilan, Gunong Angsi. Perak, Temengoh; Bujong Malacca. Dindings, Lumut. Tringganu, Pulau Redang (Yapp); Bundi (Rostados). Penang, Waterfall. Kelantan, Kwala Lebir; Kota Bharu. Kedah, Yan. Lankawi, Dayong Bunting (Robinson). Adang islands, Pulau Rawei. Setul.

var. *amœna* Wall. *Cat.* 6121. Corymbs very dense nearly sessile, 3 in. across, tube 1.5 in. long, lobes .15 in. long. Leaves more coriaceous. Not so common as typical *stricta*. *Hab.* Pahang, Tahan River. Perak, Gunong Kerbau (Robinson). Penang, Muka Head. Distribution of both forms, Tenasserim, Cochin-China, Borneo, Java. *Native names:* Siantan jantan; Siantan hutan; Jarum-jarum Merah.

A great variety of forms and hybrids of this species with other species are in cultivation in gardens, and of all colours, orange, yellow, red, pink and white.

(12) *I. stenophylla* Ridl. *Trans. Linn. Soc.* iii. 311.

Bushy shrub 6 ft. tall. Leaves lanceolate-acuminate acute tapering to both ends, coriaceous; nerves 8 pairs fine, ascending; 4 to 5 in. long, .75 in. wide; petioles .25 in. long. Corymbs small, 6- to 12-flowered; bracts ovate acute; pedicels short. Calyx-teeth ovate acute small. Corolla light orange, tube slender, 1.25 in. long, lobes lanceolate acute nearly .5 in. long. Fruit pea-shaped, black, pulp purple. Seeds grey, mottled purple. *Hab.* Rocky stream-banks in forests. Pahang, Tahan River (Ridley). *Distrib.* Borneo.

(13) *I. humilis* King and Gamble, *l.c.* 79.

Dwarf plant about a foot tall. Leaves large, coriaceous sessile, elliptic or sub-obovate, sub-acute generally more or less narrowed



to cordate base; nerves 15 to 18 pairs, reticulations conspicuous. Cymes 1 in. long on peduncles 1 to 2 in. long. Flowers crowded, salmon-red. Calyx under .1 in. long, lobes blunt. Corolla-tube 1.5 in. long, limb .7 in. across, lobes rounded. Fruit globose or 2-seeded, oblong, rose-pink turning grey, about .25 in. through. *Hab.* In forests and woods. Selangor, Ulu Gombak; Ginting Peras; Batu Caves. Perak, Ulu Selama (Wray). Kelantan, Kwala Aring (Yapp); Kwala Lebir (Gimlette). Tomoh (Machado). Penang (Curtis).

var. *Scortechinii* Ridl.; *I. Scortechinii* King and Gamble, l.c. 80.

A much more dwarfed plant. Leaves crowded, often sub-pandurate, obovate with fewer nerves and flowers more densely crowded. *Hab.* Dry sandy woods. Province Wellesley, Batu Kawan (Curtis); Tasek Gelugur. Dindings, Gunong Tungul. Perak, Selama (Kunstler).

(14) *I. concinna* Br. in Wall. Cat. 6149; King, l.c. 81.

A tree up to 60 ft. tall. Leaves thinly coriaceous, elliptic-oblong, short blunt acuminate, base cuneate; nerves 7 to 9 pairs, prominent beneath; 2.5 to 5 in. long, 1 to 1.75 in. wide; petioles .15 to .25 in. long. Stipules triangular, long, cuspidate. Corymbs dense; peduncles .75 in. long. Flowers crowded. Calyx campanulate, teeth broad, short. Corolla orange, tube .4 in. long, limb .3 in. across, lobes oblong blunt. Fruit as large as a pea. *Hab.* Forests, often quite a tall tree. Flowers scented. Singapore (Wallich); Bukit Timah. Johor, Bukit Tanah Abang (Kelsall). Pahang, Kota Tongkat (Evans). Malacca, Sungei Hudang; Chabau; Selangor (Cantley). Selangor, Semangkok Pass. Perak, Tapah (Wray); Goping (Kunstler). *Distrib.* St. Barbe Isle.

(15) *I. candida* Ridl. Journ. F.M.S. Mus. x. 141.

Small shrub, 4 ft. tall. Leaves lanceolate-acuminate at both ends, blunt or acute at tip coriaceous, drying brown, 3 to 4.5 in. long, .75 to 1 in. wide; petioles .1 to 2 in. long. Stipules coriaceous lanceolate subulate. Corymb lax puberulous with about 20 flowers, white; peduncle very short to .5 in. long. Bracts linear short. Calyx .05 in. long, lobes short acuminate. Corolla-tube slender, .75 in. long, lobes linear, .2 in. long, narrow. Style long, exsert. *Hab.* Lankawi islands, Dayong Bunting and Terutau (Robinson).

(16) *I. pendula* Jack Mal. Misc. i. 11; King, l.c. 77.

Shrub about 6 ft. tall. Leaves coriaceous, oblong to elliptic, sub-acute, base cuneate; nerves 12 to 16 pairs; 9 to 11 in. long, 2.5 to 3.5 in. wide; petioles .5 to .75 in. long. Stipules .2 in. long, ovate cuspidate. Corymbs 1 or 2 terminal of three branches, 2 in. long on a long slender pendulous peduncle, 5 in. long with 2 small leaves at the base. Cymes 3-branched with 5 or 6 flowers on each. Calyx small with sharp teeth. Corolla-tube 1 in. long, pink, lobes .2 in. long, narrow oblong, white. Style distinctly exsert. Fruit ellipsoid, deep purple, .2 in. long. *Hab.* Common

in woods. Singapore, Garden Jungle; Changi; Pulau Serapu. Johor, Mt. Austen; Gunong Pulau. Malacca, Sungei Hudang (Goodenough); base of Gunong Mering. Pahang, Tahan River; Telom. Selangor, Batu Caves; Ulu Selangor; Kwala Kubu. Perak, Goping and Batu Gajah (Kunstler). Penang (Curtis). Kelantan, Kwala Lebir (Gimlette); Chaning. Tomoh (Machado).  
*Distrib.* Sumatra.

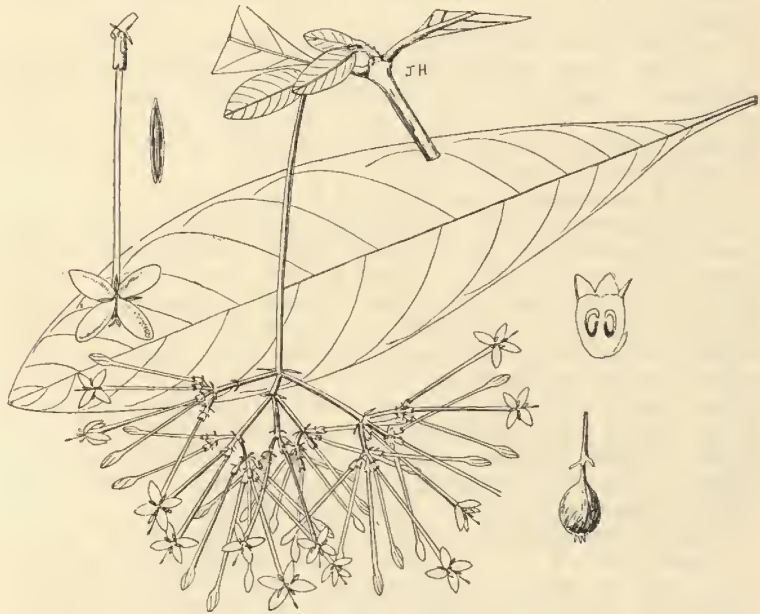


FIG. 80.—*Ixora pendula*.

var. *opaca*, *I. opaca* Br. Wall. Cat. 6141; King, l.c. 77.

A mountain form with more coriaceous often narrow lanceolate leaves, 6 in. long, 1.5 in. wide; peduncles short, 1 to 2.5 in. long. *Hab.* Mountain forests 2000 to 5000 ft. altitude. Johor, Gunong Pantai. Pahang, Tahan River. Negri Sembilan, Gunong Tampin. Dindings, Lumut. Perak, Gunong Inas (Yapp); Gunong Kerbau 5000 ft. altitude (Robinson); Penang, Muka Head (Curtis). Lankawi, Gunong Raya (Haniff). Perlis, Chupeng. *Native names:* Jambol Siol; Mumjilai Hutan; Saratong Padi; Tabong Bunga.

(17) *I. diversifolia* Wall. Cat. 6146; King, l.c. 83.

Shrub or small tree. Leaves membranous, oblong or broad elliptic, acute or sub-acute, base round or cuneate, 8 in. long, 2.75 in. wide or less. Corymbs 1 or more, pendulous; peduncles

4 to 6 in. long, slender with 2 ovate blunt sessile leaves at base; branches 1 in. long. Flowers comparatively few. Calyx campanulate, under 1 in. long, with very short teeth. Corolla-tube 4 in. long, lobes oblong acute, 2 in. long. Style slender, exsert. *Hab.* Selangor, Batu Caves. Pahang, Gunong Berumbun, Telom. *Distrib.* Burma.

This is perhaps a form of *I. pendula*.

(18) *I. montana* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 82.

Shrub. Bark pale. Leaves coriaceous, oblong-ovate, base round; nerves over 12 pairs, strongly elevate beneath, as are reticulations; over 6 in. long, 3.5 in. wide; petioles 2 in. long. Corymb many-flowered, dense, 4 in. across; peduncles 6 in. long, with a pair of sessile ovate acuminate leaves 2.5 by 1 in. wide at base. Bracts linear acuminate; branches hairy. Calyx glabrous, tube sub-globose small with shorter ovate acute teeth. Corolla light red, tube .75 in. long, lobes broad, oblong, rounded. *Hab.* Perak, Gunong Kerbau 6000 ft. altitude (Haniff); specimens very imperfect.

(19) *I. grandifolia* Zoll. and Mor. *Syst. Ver.* 65.

Big tree 40 to 60 ft. tall, 1.5 to 2 ft. through. Leaves coriaceous, elliptic-ovate, base round; nerves 8 pairs; 8 to 10 in. long, 4 to 5 in. wide; petioles stout, .5 to 1.5 in. long. Corymbs large, spreading; peduncles 2.5 in. long; branches 1.5 in. long. Flowers small white. Calyx 1 in. long, lobes very short. Corolla-tube slender, .3 in. long, lobes oblong, blunt, 1 in. long. Style rather long, exsert. Fruit ellipsoid, .3 in. long, red. *Hab.* Forests. Singapore, Chan Chu Kang. Malacca (Griffith). Perak, Larut (Kunstler). Blanda Mabok (Wray); Ulu Temengoh; Ulu Bubong (Kunstler). Penang, Telok Bahang; Waterfall (Curtis). Lankawi, Gunong Raya (Haniff). *Distrib.* Java.

var. *gigantea* King and Gamble is not worth keeping up. It is a typical form.

(20) *I. fluminalis* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 84. *I. arborescens* Hook. *fl. F.B.I.* iii. 143, not of Hasskarl.

A big tree 40 to 60 ft. tall. Leaves coriaceous elliptic blunt, base round; nerves 11 pairs; 4 to 6 in. long, 1.75 to 2 in. wide; petioles .5 in. long. Stipules broad, triangular keeled and mucronate. Corymbs usually 3; peduncles 2.5 to 3 in. long. Flowers numerous, yellow; branches 1 in. long, pubescent. Cymes 1 to 5 in. wide. Calyx campanulate with very short ovate lobes. Corolla-tube .3 in. long, lobes oblong, sub-acute, 1.2 in. long. Style long projecting, clubbed. Fruit globose or transversely oblong as big as a pea, black. *Hab.* River-banks, usually where they are tidal. Johor, Kota Tinggi; Tebrau River. Malacca (Griffith); Merlimau; Chabau (Cantley); Sungei Rumbai (Derry). Pahang, Kwantian (Foxworthy). Perak, Goping (Kunstler). *Native name:* Marauian.

Hasskarl's *I. arborescens*, a Javanese plant, has flowers about half the size of this, and the leaves are narrowed at the base.

(21) **I. crassifolia** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 83.  
*I. grandifolia* var. *coriacea* *King and Hooker, in part.*

Tree 20 to 30 ft. tall. Leaves lanceolate narrowed to both ends, thick, coriaceous; nerves prominent beneath, 8 pairs, depressed above, 13 in. long, 3 in. wide; petioles winged to base, thick, .75 in. long. Corymbs nearly sessile with numerous stout branches from base, puberulous 2.5 in. long, 3.5 in. wide. Calyx short broad campanulate, teeth broad, acute. Corolla white, tube .2 in. long, lobes oblong. Fruit globose or didymous, .25 in. long. *Hab.* Forests, local. Johor, Gunong Janeng (Kelsall). Pahang, Tahan River; Pekan. Malacca, Ayer Panas (Griffith); Selandor and Merlimau (Cantley); Brisu; Sungei Siput (Derry). Perak, Goping (Kunstler).

(22) **I. elliptica** *Wall. Cat.* 6153. *I. coriacea* *Wall. Cat.* 6151.

A tree. Leaves coriaceous, rather thin, elliptic-lanceolate to obovate-lanceolate, base cuneate, tip blunt or shortly apiculate; nerves eleviate beneath, 11 pairs; 7 to 9 in. long, 3 in. wide; petioles 1 in. long. Corymbs 3, puberulous, 3 to 5 in. long, including peduncle, 1 to 2.5 in. long, about 2 to 5 in. wide. Flowers rose-colour. Calyx short campanulate with very short ovate teeth. Corolla-tube slender, .3 in. long, lobes linear-oblong blunt, .2 in. long. Style long exsert. *Hab.* Penang (Wallich, Phillips).

For No. 6151 Wallich writes "Penang et Singapore"; it is probably from Penang only. This plant has not been seen of late years.

(23) **I. patens** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 83.

Leaves elliptic-lanceolate acuminate acute, base narrowed, coriaceous; nerves fine 18 pairs; 7 in. long, 2 in. wide; petioles .25 in. long. Corymbs, branches 5 spreading, about 3 in. long, 7 in. wide. Flowers apparently red, sessile, in crowded cymes 1 in. long. Calyx-teeth very short. Corolla-tube slender, .3 in. long, lobes half as long, tip round. *Hab.* Selangor, Gunong Mengkuang Lebah, 5000 ft. altitude (Robinson).

(24) **I. micrantha** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 21.

A large shrub. Leaves thinly coriaceous lanceolate, acuminate at both ends; nerves 9 pairs; 4 in. long, 1 in. wide; petioles .25 in. long, winged to base. Stipules subulate, base broad, .25 in. long. Corymbs 4 in. long; peduncles 1.5 to 2 in. long, minutely hairy; branches .1 in. long. Calyx campanulate, lobes very short, .1 in. long. Corolla-tube nearly .25 in. long, lobes oblong, tip rounded, .25 in. long. *Hab.* Mountain forests, scarce. Selangor, Sempang Mines. Semangkok, Pahang, Telom (Ridley).

(25) **I. undulata** *Roxb. Hort. Beng.* 10; *Fl. Ind.* i. 385.

A small tree. Leaves coriaceous, oblong-elliptic, sub-acute; nerves 12 pairs, 3.5 to 5 in. long, 1.25 to 2 in. wide; petioles .3

to .4 in. long. Stipules triangular acuminate, .2 in. long. Corymbs lax, spreading, 4 in. long, 9 in. wide; peduncles 3 in. long; branches puberulous, about 1 in. across. Calyx sessile, under .1 in. long, teeth ovate acute. Corolla yellow, tube .25 to .3 in. long, slender, limb .2 in. across, lobes narrow oblong, blunt, reflexed. Fruit globose, or when 2-seeded transversely oblong. *Hab.* Mountain forests, rare. Perak, Gunong Bubu at 4000 ft. altitude (Wray, Scortechini). *Distrib.* India, Burma.

King calls this *I. diversifolia*. I take it to be *I. undulata* Roxb. or near.

EXCLUDED SPECIES

I. FULGENS *Roxb. Hort. Beng.* 10. A native of the Moluccas. The plants referred to this species by King comprise one of unknown locality collected by Lobb, Wallich's No. 6152, which is *I. Lobbi*, and some Perak plants of which I have seen but one, and which does not fit with Roxburgh's description and is quite different from the Tenasserim plant called *fulgens* by Hooker, which has at least the acute petals described by Roxburgh, but it is very improbable that any of these species are the Moluccan plant.

In gardens we have a number of cultivated *Ixoras*, including :

- I. COCCINEA *Linn.* Bush with leaves sub-sessile. Cymes sessile, dense. Flowers orange red.
- I. BANDHUCA *Roxb.* Leaves quite sessile, small and round tipped. Flowers sessile, dark red, Indian.
- I. MACROTHYRSA *Teysm.*, with very large heads of red flowers and large leaves, and a variety of cultivated forms of *stricta* and hybrids of all colours.

39. PAVETTA, Linn.

Shrubs or shrublets resembling *Ixora* but often hairy. Flowers always white. Leaves thin membranous. Style very slender and much longer than the corolla-tube. Stigma not thicker and often entire. Species 70, Asia and Africa. The common name Jarum-Jarum or Jejarum (needles) refers to the conspicuous needle-like styles.

Corymbs large, spreading; peduncle terminal; bushes terminal.

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|--|----------------------------|
| Glabrous or sparsely pubescent . . . . .   | (1) <i>P. indica</i>       |
| Densely tomentose all over . . . . .   | (2) <i>P. tomentosa</i>    |
| Corymbs on lateral branches with one pair of leaves, glabrous; pedicels very slender . . . . . | (3) <i>P. graciliflora</i> |
| Corymb lax with few flowers, with stipuliform bracts . . . . .                                 | (4) <i>P. pauciflora</i>   |
| Corymbs lateral; branches sessile, very hairy; straggling shrub . . . . .                      | (5) <i>P. naucleiflora</i> |
| Corymb terminal, sessile, tomentose unbranched shrublet . . . . .                              | (6) <i>P. humilis</i>      |

(1) *P. indica* Linn. *Fl. Zeyl.* 56; *Hook. fil. F.B.I.* iii. 150, *in part.*

Bush glabrous. Leaves rather thin, oblong-lanceolate acute, base narrowed, 4 in. long, 1.25 in. wide; petioles .5 in. long. Stipules ovate-triangular cuspidate. Corymbs 1.5 in. long, dense; pedicels .1 to .2 in. long. Calyx campanulate, small, lobes very short, ovate. Corolla-tube .25 in. long, rather thick, lobes linear-oblong, blunt, .08 in. long. Style projecting .75 in. long. *Hab.* Open country, Perlis, Chupeng (Ridley).

var. *canescens*. *P. canescens* Wall. *Cat.* 6181.

Large bush. Branches softly hairy velvety. Leaves thin lanceolate, narrowed to the base; nerves and sometimes the whole leaf beneath sparsely softly hairy, 6 to 8 in. long, 1.75 to 3 in. wide; petioles 1 to 1.25 in. long. Stipules ovate with a long point. Corymbs terminal, 2 in. long, 3 in. wide on peduncles 2 in. long or less, pubescent; pedicels slender, .1 in. long, pubescent. Calyx very small, cup-shaped with 5 very short points, pubescent. Corolla-tube .5 in. long, slender, lobes oblong blunt, .1 in. long. Style .6 in. long. Fruit globose. *Hab.* Forests, Singapore (Wallich); Kranji. Malacca (Griffith). Negri Sembilan, Johol. Selangor, Ginting Sempah. Perak, Gunong Hijau (Burkill); Changkat Mentri (Kloss). *Distrib. of type:* India. *Native names:* Pecha Priok putih; Surungko.

(2) *P. tomentosa* Roxb. *Smith Cyclop.* xxvi. 2. *P. indica* var. *tomentosa* Hook. *fil. l.c.* 150, *in part.*

Shrub. Stem, underside of leaves and inflorescence densely softly tomentose. Leaves thickly membranous drying black, above sparsely hairy, midrib densely so, elliptic-lanceolate, 3 to 5 in. long, 1.5 to 1.75 in. wide; nerves 9 pairs; petioles 1 in. long. Stipules ovate cuspidate, tomentose. Inflorescence terminal or on short leafy side branches, 3 in. long. Corymb 3 in. wide; pedicels .25 in. long. Calyx limb with 5 short acute points. Corolla-tube .12 to .25 in. long, lobes oblong, sub-acute, .1 in. long, or less. Fruit globose, .15 in. through. *Hab.* Woods in the south. Singapore, Changi. Johor, Batu Pahat; Sedenak. Malacca (Maingay, Griffith and Cuming) near the town (Ridley). *Distrib.* India.

(3) *P. graciliflora* Wall. *Cat.* 6178. *P. petiolaris* Wall. *Cat.* 6186.

Glabrous shrub about 6 ft. tall. Leaves thin, dry olive brown, elliptic-lanceolate, cuspidate acuminate, base long-narrowed; nerves 8 pairs inarching; 7 in. long, 2 in. wide; petioles slender, .5 to 2 in. long. Stipules triangular, blunt. Inflorescence on lateral branches, 6 to 8 in. long, bare except for a pair of leaves at the top. Corymbs 3 to 4 in. wide, lax; pedicels very slender, .25 to .5 in. long. Calyx very small, limb cup-shaped with 5 minute points. Corolla pure white, tube slender, .75 in. long, lobes oblong, blunt narrow, .12 in. long. Style projecting, .5 in. long. Fruit pear-shaped, grey green

to black, .25 in. through. *Hab.* Common in forests. Malacca, Chabau (Griffith). Negri Sembilan, Bukit Tangga 2000 ft. altitude. Selangor, Menuang Gasing (Kloss); Sempang, Semangkok Pass (a form with lanceolate leaves 4 in. long, .75 in. wide); Ginting Sempah. Perak, Ulu Bubong (Kunstler); Temengoh; Tapah. Penang (Wallich, Maingay). Kelantan, Chaning. Kedah Peak (Robinson).

(4) *P. pauciflora* Ridl.

Small glabrous tree. Leaves thin elliptic-lanceolate, long acuminate, base long, narrowed; nerves 6 pairs; 4 to 6 in. long, .5 to 1.5 in. wide; petioles slender, .5 in. long. Stipules triangular cuspidate. Corymb very lax, 1.5 in. long; peduncle 1.5 in. long; branches 3, very slender, 1 in. long with rather large stipuliform bracts at base. Cymes of 3 or more flowers on very slender pedicels, .5 in. long. Calyx-tube sub-globose with 4 short lobes. Corolla white, tube very slender, .5 in. long, lobes 4, oblong blunt, .2 in. long. Stamens as long as lobes, spirally twisted. Style projecting for .5 in. Fruit globose with the tubular calyx at the top. *Hab.* Dense woods on limestone rocks. Selangor, Batu Caves (Ridley).

This differs from *P. graciliflora* in its lanceolate leaves and small cymes of fewer and smaller flowers, with the anthers as long as the corolla-lobes.

(5) *P. naucleiflora* Wall. *Cat.* 6171; *King, l.c.* 85.

Shrub 6 to 10 ft. tall, tomentose. Leaves oblanceolate, shortly acuminate, base cuneate, membranous pubescent on both sides, especially on nerves beneath 9 to 10 pairs; 4.5 to 5 in. long, 1.35 to 2 in. wide; petioles .3 to .5 in. long, pubescent. Corymbs on side shoots, bare except for 2 or 3 leaves at the tip, dense, 1.75 to 2.5 in. wide, densely pubescent, sessile. Calyx tubular pubescent, teeth small. Corolla white, .25 to .5 in. long, tube glabrous or hairy, limb hairy, lobes oblong blunt. Style projecting for .5 in. Fruit globular, hairy, .25 in. through. *Hab.* In the north only, in forests. Perak, Sira Rimau (Yapp). Penang, Waterfall; Penara Bukit (Wallich, Curtis, etc.). Kedah, Pulau Song Song. Lankawi, Gunong Raya; Dayong Bunting (Robinson). *Distrib.* India, Burma.

var. *longifolia* Ridl. Leaves lanceolate long-acuminate, 7 in. long, 2 in. wide. Flowers larger, hairy. Kelantan, Chaning.

(6) *P. humilis* Hook. *fl. F.B.I.* iii. 151; *King, l.c.* 85.

Dwarf shrub 6 to 12 in. tall, unbranched, at first pubescent. Leaves membranous, crowded, oblong-oblanceolate, base much narrowed; midrib above and under surface hispid; nerves 6 to 7 pairs; 3.5 to 6 in. long, 1.25 to 1.75 in. wide; petioles .3 to .5 in. long, hairy. Corymbs sessile, 1 to 1.5 in. across, dense, many-flowered. Flowers white, .75 in. long. Calyx with 5 short teeth, glabrous. Corolla-tube .6 in. long, lobes oblong blunt. Fruit

globular, black, .25 in. through. *Hab.* Mountains, rare. Malacca, Mt. Ophir (Griffith, Hullett). *Native name*: Jarum Batu.

#### 40. TARENNA, Gaertn.

Shrubs drying black, often hairy. Leaves thin coriaceous or membranous. Flowers white (in one green) in terminal corymbs or compact cymes. Calyx-tube campanulate, 5-toothed or lobed. Corolla cylindrical or funnel-shaped, throat hairy, 5-lobed, lobes narrow. Stamens 5, insert on throat; filaments short. Ovary 2-celled; ovules 1 or 2 in a cell; style short. Stigma long, fusiform. Fruits baccate, 2-celled, 2-seeded. Seed plano-convex, often cupped on the flat side. Species 25, tropics.

Leaves hairy beneath.

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|--|-------------------------|
| Leaves 9 in. long; peduncles 6 to 8 in. long with 2 leaves . . . . . | (1) <b>T. Napieri</b>   |
| Leaves 3.75 in. long; corymb sub-sessile . . . . .                   | (2) <b>T. papillosa</b> |
| Leaves 7 in. long; peduncles 3 in. long . . . . .                    | (3) <b>T. Evansii</b>   |
| Leaves 6 to 8 in. long; cymes dense; peduncles 1 in. long . . . . .  | (4) <b>T. rudis</b>     |

Whole plant glabrous except inflorescence.

Panicles lax spreading.

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|--|---------------------------|
| Leaves narrow lanceolate acuminate, cymes glabrous . . . . .                   | (5) <b>T. salicina</b>    |
| Leaves elliptic acuminate. . . . .   |                           |
| Panicles very lax; flowers large . . . . .                                     | (6) <b>T. pulchra</b>     |
| Leaves lanceolate; corymb on 3 in. long peduncle, hairy pendulous . . . . .    | (7) <b>T. longifolia</b>  |
| Leaves oblong-lanceolate; corymb on erect peduncle 2 in. long, hairy . . . . . | (8) <b>T. grandifolia</b> |

Cymes dense corymbose; leaves oblong lanceolate or elliptic.

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|--|--------------------------|
| Cymes velvety . . . . .  | (9) <b>T. odorata</b>    |
| Cymes pubescent, panicked . . . . .                                | (10) <b>T. Yappii</b>    |
| Cymes pubescent, umbelled . . . . .                                | (11) <b>T. Wrayi</b>     |
| Cymes glabrous or sub-glabrous, much-branched, 2 in. long. . . . . |                          |
| Calyx-lobes very short . . . . .                                   | (12) <b>T. Wallichii</b> |
| Calyx-lobes broad and long . . . . .                               | (13) <b>T. Ridleyi</b>   |

Cymes glabrous, small, 1 in. long.

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|--|---------------------------|
| Leaves thin; corolla glabrous, blunt in bud, white . . . . .               | (14) <b>T. glabra</b>     |
| Leaves thin; corolla-lobes ciliate, with spreading points, green . . . . . | (15) <b>T. stellulata</b> |
| Leaves thick; calyx-lobes long acute . . . . .                             | (16) <b>T. insularis</b>  |
| Leaves thick; calyx-lobes short, tooth-like. . . . .                       | (17) <b>T. Curtisii</b>   |
| Cymes lax spreading, 1 in. long; flowers large white . . . . .             | (18) <b>T. adangensis</b> |
| Leaves thin; cymes small; flowers small white . . . . .                    | (19) <b>T. calcarea</b>   |

(1) **T. Napieri** *Ridl.* *Webera Napieri* *Ridl. Journ. F.M.S. Mus.* iv. 34.

Low hairy shrub. Leaves lanceolate-acuminate, narrowed to



base, thin, coriaceous, glabrous above, hairy especially on nerves beneath; nerves 8 to 12 pairs elevate; 9 in. long, 2.5 in. wide; petioles 1.5 to 2 in. long. Stipules triangular acute, hairy. Peduncles 6 to 8 in. long, pendulous with 4 compact heads 1 in. long, hairy, sub-tended by 2 smaller leaves. Calyx dense hairy. Corolla white, tube very slender cylindric hairy, lobes 4, oblong blunt. Fruit globose narrowed at base, grey green. *Hab.* Woods in low country. Johor, Sedenak; Simpai, Ulu Batu Pahat (Kelsall). Pahang, Tahan River; Telom. Negri Sembilan, Bukit Tangga (Napier). *Native name*: Saguay.

(2) **T. papillosa** Ridl. *Stylocoryna adpressa*, var. *papillosa* King, l.c. 200.

Shrub. Branches 4-angled pubescent. Leaves coriaceous elliptic shortly acuminate long-narrowed at base, glabrous above, softly tomentose beneath becoming minutely papillose by the fall of the hairs; nerves 5 pairs, slender inconspicuous; 2.5 to 3.75 in. long, 1.25 to 1.5 in. wide; petioles .2 in. long. Stipules lanceolate acuminate pubescent. Corymbs dense, many-flowered 1 to 3 together, 1.5 in. long, about as wide, pubescent. Calyx cupular with minute obscure teeth puberulous. Corolla-tube .2 in. long, cylindric, puberulous, lobes 5 (or 4) half as long, broad oblong rounded. Ovary 2-celled, one seed in each cell. *Hab.* Damp forest in the south. Singapore, west of the island, Tampinis River; Sungei Brih; Bajau. Johor, Tana Runto. Pahang, Pekan (Ridley).

(3) **T. Evansii** Ridl.

Dwarf plant about 9 in. tall, pubescent. Leaves obovate-elliptic glabrous above, pubescent beneath, sub-acute, base narrowed, upper pair blunt at base, 7 in. long, 3 in. wide; petioles pubescent .25 in. long. Peduncles 2 to 3 in. long, pubescent. Cymes 3 in. wide, basal bracts lanceolate, .25 in. long. Calyx-lobes linear setaceous .15 in. longer than the ovary, pubescent. Corolla white, tube slender, 1 in. long, lobes oblong obtuse, .15 in. long. Stamens brown. *Hab.* Pahang, Gunong Senyum (Evans).

(4) **T. rudis** Ridl.

Shrub hairy. Leaves herbaceous, oblong or oblong-lanceolate to obovate, abruptly acute cuspidate, base slightly narrowed, sparsely rough hairy above; nerves depressed, beneath roughly short hairy on midrib and nerves, all elevated, nerves 13 pairs; 6 to 8 in. long, 3.5 to 4 in. wide; petioles .25 in. long, densely hairy. Peduncle 1 to 4 in. long, densely hairy with two short 1 in. lateral cymes and one 2 in. long, central, all densely hairy. Stipules and bracts lanceolate, long cuspidate, hairy. Flowers crowded in dense cymes shortly pedicelled. Sepals 5, lanceolate acuminate .1 in. long, hairy. Corolla not seen. Fruit ovoid hairy, .25 in. long, crowned with sepals. Seed one, semi-globose, black, minutely punctulate. *Hab.* Selangor, Kwala Lumpur, Weld's Hill (Foxworthy 2592, 2593).

This has the habit of *T. grandifolia* but is entirely roughly hairy.

(5) **T. salicina** *Ridl.* *Webera salicina Ridl. Journ. F.M.S. Mus.* iv. 34.

A large shrub. Leaves lanceolate narrow, acuminate to both ends glabrous; nerves 8 pairs inarching; 6 to 8 in. long, 1 to 1.5 in. wide; petioles winged nearly to base, .5 in. long. Stipules lanceolate obtuse. Cymes axillary; peduncles 3 in. long; branches few, slender, 1.5 in. long; pedicels filiform, 1.5 in. long. Calyx obconic minutely pubescent, limb cup-shaped, nearly entire. Corolla white, .5 in. long, base of tube dilate above abruptly narrowed, lobes linear-oblong 4, glabrous. Style pubescent. Stigma bilobed. Fruit globose ovoid, .5 in. through. Seeds 2. *Hab.* Rare. Forests in mountains by streams. Pahang, Telom Waterfall (Ridley).

(6) **T. pulchra** *Ridl.* *Webera pulchra Ridl. Journ. F.M.S. Mus.* iv. 33.

Large spreading shrub. Leaves broadly lanceolate to nearly obovate, abruptly acuminate, glabrous thin; nerves 12 to 14 pairs; 3 to 9 in. long, 1 to 3.5 in. wide; petioles .75 in. long. Stipules linear, .25 in. long. Panicles lax spreading of 4 or 5 branches 1.5 to 3 in. long on a peduncle 1 in. long or less. Flowers on pedicels .25 in. long. Calyx campanulate, teeth 4, short, .1 in. long. Corolla white, .5 in. long, tube dilate above, glabrous, lobes linear-oblong a little longer, a white ring of hairs in mouth. Fruit .5 in. long, dull grey green. Seed 1 sub-globose, base excavate. *Hab.* Local, by streams in forests at 4000 ft. altitude. A very pretty plant. Pahang, Telom (Ridley).

(7) **T. longifolia** *Ridl.* *Webera longifolia Hook. fil. F.B.I.* iii. 105; *King, l.c.* 69.

Shrublet about 2 ft. tall. Leaves thinly coriaceous lanceolate or oblong-lanceolate cuspidate, long-narrowed at base, above glabrous, sparsely hairy on midrib beneath; nerves 8 to 16 pairs prominent beneath; 6 to 12 in. long, 2 to 3 in. wide; petioles .4 to 1 in. long. Stipules ovate acuminate, hairy. Corymb of about 3 branches pendulous on a peduncle 3 in. long, hairy; branches .75 to 1.25 in. long (the terminal one) with linear bracts at base. Flowers crowded at top of branches about 12 on each, all pubescent hairy. Pedicels very short. Calyx .05 in. long, narrow; teeth acuminate as long as tube. Corolla .5 in. long, pubescent, pure white, tube cylindric, lobes oblong, blunt half as long. Fruit globular, black, .4 in. through. *Hab.* In forests. Selangor, Ulu Gombak (Burn-Murdoch). Negri Sembilan Burunang (Cantley). Perak, Thaiping Hills 2500 ft. altitude. Penang Waterfall (Curtis); Batu Feringhi. Lankawi, Burau. Adang islands, Rawei. *Native names*: Kulu Babi; Sigauri.

(8) **T. grandifolia** *Ridl.* *Webera grandifolia Hook. fil. F.B.I.* iii. 105; *King, l.c.* 68.

Shrub about 3 ft. tall. Leaves thinly coriaceous, shining dark green elliptic-oblong shortly acuminate, base narrowed, glabrous;

nerves 8 to 12 pairs, elevate beneath; 4 to 10 in. long, 2 to 4 in. wide; petioles .4 to .75 in. long. Stipules broad ovate. Corymbs erect; peduncle 2 in. long; branches 3.5 in. long; cymes 1 in. across, all pubescent. Calyx ovoid, limb cupular with short teeth, pubescent. Flowers as in *longifolia* but shorter. *Hab.* Woods; common. Singapore, Bukit Timah; Selitar; Pulau Damar. Johor, Serom; Sedenak. Pahang, Pulau Tawar. Malacca, Ayer Panas. Perak, Ulu Temengoh. Province Wellesley, Bukit Panchur. Kedah, Yan. *Native names*: Bua Karang hutan; Julong Julong Jantan.

(9) **T. odorata** *Ridl.* *Webera odorata* *Roxb. Hort. Beng.* 15; *King, l.c.* 68.

Shrub 6 to 10 ft. tall. Leaves membranous, oblong-elliptic, acuminate, base much narrowed, glabrous; nerves 8 to 9 pairs; 5 to 8 in. long, 1.5 to 3 in. wide; petioles .4 to .8 in. long. Stipules triangular acuminate. Corymbs large, paniculate, 2.5 in. long and wide (to 5 or 6 in.), pubescent; pedicels as long as flowers. Calyx urceolate campanulate, .1 in. long, teeth shorter lanceolate. Corolla-tube cylindrical, slender, .2 in. long, lobes as long, narrow oblong acute. Fruit as large as a pea, 2-seeded. *Hab.* Penang (Wallich). *Distrib.* India.

This plant has not been seen again in the Peninsula, possibly there is some error of locality, or it may have been a cultivated plant.

(10) **T. Yappii** *Ridl.* *Webera Yappii* *King, l.c.* 70.

Shrub? glabrous. Leaves membranous, oblong-elliptic acuminate, base cuneate, glabrous above, a few scattered hairs on the elevated midrib and 9 or 10 pairs of nerves, 5 to 7 in. long, 1.5 to 1.75 in. wide; petioles .3 to .5 in. long. Stipules lanceolate-oblong, blunt. Cymes paniced condensed, 2.5 in. through, pubescent. Calyx .1 in. long, narrow campanulate, pubescent, lobes less than half as long, triangular, sub-acute. Corolla-tube infundibuliform, narrow, .4 in. long, pubescent, lobes 5, oblong, blunt, glabrous. Fruit, size of a small pea, glabrous. Seeds 2, plano-convex. *Hab.* Perak (Yapp and Wray).

I have seen no specimens of this plant.

(12) **T. Wrayi** *Ridl.* *Webera Wrayi* *King, l.c.* 69.

Glabrous except inflorescence. Leaves thin coriaceous, oblong-elliptic, short acuminate, base cuneate; nerves 16 to 18 pairs, faint on both sides; 9 to 11 in. long, 2.5 to 3.5 in. wide; petioles .5 in. long. Cymes umbellate-paniced 1.25 in. long and as wide; branches few, pubescent, few-flowered; pedicels pubescent. Calyx .15 in. long, narrow campanulate, lobes linear-lanceolate pubescent, longer than tube. Corolla narrow, funnel-shaped, puberulous, .35 in. long, lobes linear-oblong, blunt, .1 in. long. Fruit globular, black, .4 in. wide, .25 in. through (when dry). Seeds 2. *Hab.* Perak (Wray).

I have seen no specimens of this plant.

(12) **T. Wallichii** *Ridl.* *Webera Wallichii* *Hook. fil. F.B.I.* iii. 105.

Shrub 4 to 8 ft. tall, glabrous except inflorescence. Leaves membranous, oblong-elliptic to lanceolate-acuminate or cuspidate, base narrowed; nerves fine, 8 to 10 pairs; 5 to 8 in. long, 2 to 2.7 in. wide; petioles .4 to .6 in. long. Stipules broad, triangular, .25 in. long. Panicles 3 together; peduncles 1 in. long; branches .75 in. long, glabrous or pubescent. Calyx .15 in. long, campanulate; teeth broad, triangular, acute. Corolla .45 in. long, tube short, hairy within, lobes linear-lanceolate, longer than tube; anthers exsert. Fruit fusiform, glabrous, crowned by the small triangular blunt calyx-teeth. *Hab.* Woods, not common. Malacca, Ayer Panas and Bulau Besar (Griffith). Pahang, Kolam Ayer, Kwantan (Foxworthy). Perak, Larut (Kunstler). Penang (Wallich). Kedah, Pulau Songsong (Curtis). *Distrib.* Borneo. *Native name*: Gading Gading Rimbah.

(13) **T. Ridleyi** *Pearson MSS.* *Webera Ridleyi* *Pearson, in King, l.c.* 66.

A short glabrous shrub about 2 ft. tall. Leaves thinly coriaceous, broad elliptic acute or acuminate, base cuneate; nerves 10 to 14 pairs, slender, eleviate beneath; 5.5 to 7 in. long, 2 to 3 in. wide; petioles .4 to .7 in. long. Stipules broad triangular acute. Cymes several together, much-branched, 2 in. long, 2.5 in. wide, many-flowered; pedicels as long as calyx. Calyx .25 in. long, tube cupular, lobes as long, ovate-lanceolate acuminate. Corolla somewhat longer, pure white, tube short, lobes three times as long, edges ciliate. Fruit fusiform, glabrous. *Hab.* Damp open woods, chiefly in the south. Singapore, Chan Chu Kang. Johor, Gunong Banang; Tanjong Bunga. Perak, Goping (Kunstler).

(14) **T. glabra** *Ridl. Journ. F.M.S. Mus.* x. 141.

Shrub 3 to 4 ft. tall. Leaves thinly fleshy membranous, glabrous lanceolate, long acuminate, base cuneate; nerves 10 pairs, 7 in. long, 2 in. wide; petioles slender, .5 in. long. Stipules broad, triangular cuspidate, .25 in. long. Cymes .75 in. long, very shortly peduncled. Flowers sessile or nearly, greenish white. Calyx cup-shaped, lobes very short, ovate. Corolla .4 in. long, tube shorter than limb, lobes imbricate, not contort, linear-oblong, blunt, mouth of tube inside woolly. Anthers sessile linear with a short subulate process at the tip. Style stout, upper part dilate, hairy. Stigma clubbed. Ovary 2-celled; ovules 2 in a cell. *Hab.* Forests, Kelantan, Chaning (Ridley).

This has the general appearance of *T. stellulata*, but the corolla-lobes are blunt and glabrous.

(15) **T. stellulata** *Ridl.* *Webera stellulata* *Hook. fil. F.B.I.* iii. 104; *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 126; *King, l.c.* 65.

Shrub 2 to 3 ft. tall. Leaves dark green shining, elliptic cuspi-

date, thinly coriaceous, glabrous, base cuneate; nerves 7 to 10 pairs conspicuous elevate beneath; 4.5 to 9 in. long, 1.5 to 3 in. wide; petioles .25 to .4 in. long. Stipules ovate acuminate. Peduncles .4 in. long or less, corymbs 1 to 1.5 in. long, 1 to 2 in. across. Flowers light green, buds fusiform with the subulate tips turned out at right angles in bud. Calyx campanulate with lobes as long as tube, lanceolate. Corolla .4 in. long, tube .1 in. long; limb 3 in. long, lobes oblong acuminate with subulate tips, edges ciliate. Fruit broad, ovoid or globular, .4 in. long. Seeds 2. *Hab.* Woods and river-banks, dry spots. Singapore, Woodlands; Bukit Mandai. Johor, Panchur. Malacca, base of Ophir (Hullett); Sungai Hudang (Goodenough); Bukit Bruang (Curtis). Pahang, Tahan River. Negri Sembilan, Tampin (Burkill); Gunong Angsi. Selangor, Kwala Lumpur. Perak, Bukit Kapayung. Penang (Wallich). Kelantan, Kwala Lebir. Perlis, Kanga. Adang islands Pulau Tengah. *Native names:* Kahwa hutan; Kuruseh Putih; Poko Subiroh.

(16) **T. insularis** *Ridl. Journ. F.M.S. Mus.* lxi. 55.

A glabrous shrub. Branches grey. Leaves thickly membranous, elliptic acuminate; nerves 5 to 6 pairs; .3 in. long, 1.5 in. wide; petioles .25 in. long, slender. Stipules lanceolate subulate, .12 in. long. Cymes short, 1 in. long, compact; branches .5 in. long. Bracts ovate acute. Calyx .1 in. long, tube sub-globose, lobes longer, lanceolate-linear blunt. Corolla-tube cylindric, short, lobes lanceolate acuminate, .12 in. long, considerably longer than tube, mouth hairy. *Hab.* Sandy woods near the sea. Adang islands, Pulau Nipis.

(17) **T. Curtisii** *Ridl. Webera Curtisii King, l.c.* 67.

Small branching shrub, lower part of branches bare, glabrous except inflorescence. Leaves coriaceous elliptic acuminate, blunt, base cuneate; nerves 5 or 6 pairs, slender, not elevate; 2.5 to 3.5 in. long, .9 to 1.35 in. wide. Stipules ovate or ovate-lanceolate. Cymes 1 in. long, sub-sessile, puberulous branches and flowers few; pedicel longer than calyx. Calyx .1 in. long, campanulate, lobes acute triangular. Corolla-tube cylindric hardly longer than calyx, lobes oblong blunt, three times as long. Fruit globular, .2 in. through. Seeds 2. *Hab.* On limestone rocks. Lankawi, Terutau (Curtis).

var. with very small leaves and more compact habit. Selangor, Batu Caves (Ridley).

(18) **T. adangensis** *Ridl. Webera adangensis Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 54.

A shrub. Branches white. Leaves variable, ovate acuminate acute, base cuneate, membranous; nerves 6 pairs, prominent both sides, 4 to 6 in. long, 1.5 to 2 in. wide; petioles .25 in. long. Stipules ovate obtuse, connate. Cymes nearly sessile, 1 in. long and little wider, lax. Pedicels .12 in. long. Calyx .1 in. long, cup-shaped

with 5 short teeth. Corolla .25 in. long, tube narrow cylindrical twice as long as calyx, mouth white, hairy, lobes oblong 5, longer, blunt. *Hab.* Woods in the north. Pulau Adang. Perlis, Chupeng (Ridley).

(19) **T. calcarea** *Ridl.*

Shrub. Branches white, shining. Leaves membranous, ovate cuspidate with a long point, base cuneate; nerves 4 or 5 pairs; 4 or 5 in. long, 2 to 3 in. wide; petioles 1 in. long, slender. Stipules broad, short triangular with a short point. Cymes 1.5 in. long lax, few-flowered; peduncles .25 in. long. Bracts small, lanceolate acute. Calyx very small, under .05 in. long, cup-shaped with 5 short acute points. Corolla-tube cylindrical, .12 in. long, lobes oblong, blunt, nearly as long; anthers nearly as long as lobes. acute. *Hab.* Limestone rocks. Perak, Ipoh (Ridley).

#### 41. **STYLOCORYNA**, Cav.

Trees and shrubs often hairy. Leaves usually membranous. Stipules ovate triangular. Flowers in terminal corymbose cymes, white. Calyx-tube ovoid or campanulate, 5-lobed. Corolla funnel-shaped; throat glabrous 5-lobed, imbricate. Stamens 5. Ovary 2-celled; ovules numerous (rarely two in a cell); style stout. Stigma long, fusiform or clubbed. Fruit globose, baccate, 2-celled, 2- to many-seeded. Seeds angled. Species about 15, tropical Asiatic.

This genus is in habit and most other characters closely allied to *Tarenna*, but the flowers are usually pentamerous and there are often more than two ovules in the ovary. The corolla-lobes are imbricate and not twisted. It is usually put in the first series, the many-seeded *Rubiaceæ*, but has no relations to any other of that section.

Leaves broader than long.

Leaves elliptic-oblong or sub-lanceolate glabrous . . . (1) **S. fragrans**

Leaves elliptic oblong, hairy, pubescent beneath . . . (2) **S. mollis**

Leaves obovate glabrous . . . . . (3) **S. costata**

Leaves longer than broad.

Nerves not prominent beneath; leaves small glabrous . . . . . (4) **S. angustifolia**

Nerves not prominent beneath; leaves long, hairy beneath . . . . . (5) **S. adpressa**

Nerves prominent beneath; leaves hairy or pubescent on both sides . . . . . (6) **S. Maingayi**

(1) **S. fragrans** *Bl. Bijdr.* 982; *King, l.c.* 201.

A large bush about 8 ft. tall. Leaves coriaceous shining, elliptic or oblong, acute glabrous; nerves prominent beneath 6 to 12 pairs, dark shining green, 3 to 7 in. long, 1.25 to 2.5 in. wide; petioles .2 to .5 in. long. Stipules ovate lanceolate. Corymbs large, many-flowered, 2 to 3 in. long and as wide; peduncles short,

·5 in. long. Bracts linear acuminate. Calyx glabrous or puberulous, ·15 in. long. Corolla-tube ·75 in. long, cylindric, pubescent, lobes oblong, blunt ·2 in. long, all creamy white withering yellow. Style long exsert. Fruit pisiform black. *Hab.* Common bush in woods, open country. Singapore, Tanglin; Gelang; Tanjong Katong. Johor, Sungei Tebrau; Batu Pahat. Malacca (Griffith); Selandor (Cantley); Merlimau (Derry). Pahang, Sungei Chenei (Fox); Pekan. Selangor, Klang Gates. Perak, Tanjong Malim. Province Wellesley, Ara Kuda (Curtis); Tasek Gelugur. *Distrib.* Borneo, Sumatra, Java. *Native names:* Surungko; Surapoh Paya; Jarum-Jarum Payah.

(2) *S. mollis* Wall. *Cat.* 8454; *King, l.c.* 202. *Webera mollis* Hook. *fl. Fl. Br. Ind.* iii. 104.

Tree about 20 to 40 ft. tall. Branches, leaves, stipules, inflorescence pilose. Leaves sub-coriaceous oblong-lanceolate to ovate or narrow lanceolate acute or acuminate, base narrowed, above hispid, in old leaves often glabrous, beneath always hairy or pubescent; nerves prominent beneath 10 to 12 pairs depressed above; 4·5 to 6·5 in. long, 1·75 to 2·75 in. wide; petioles ·3 to ·5 in. long. Stipules ovate-lanceolate. Corymbs about 2 in. long and wide. Calyx campanulate, lobes broad oblong, as long as tube. Corolla white, tube slender, pubescent, ·3 in. long, lobes short, broad, all pubescent. Fruit pea-shaped, glabrous, black. *Hab.* In woods. There are two forms of this, the southern one (type) with broad ovate or oblong coriaceous leaves becoming glabrous above when old. Singapore (Wallich); Tanglin. Johor, Gunong Pulai; Gunong Pantai; Pulau Tinggi (Burkill). Negri Sembilan, Gunong Angsi. Dindings, Lumut. Selangor, Sungei Buloh (Foxworthy); the northern form, leaves oblong lanceolate narrower, thinner, always hairy. Perak, Larut (Kunstler). Penang Hill (Maingay, Curtis). *Distrib.* Sumatra. *Native names:* Injau Belukar; Kelabu; Pulu Buntal.

(3) *S. costata* Miq. *Fl. Ind. Bat. Suppl.* 218.

Large tree. Leaves sub-coriaceous, obovate blunt or short apiculate, base narrowed, glabrous except puberulous nerves beneath, 10 to 12 pairs, and tufts of hair in nerve axils, 6 to 8 in. long, 3·5 to 4·5 in. wide; petioles ·6 to ·8 in. long. Stipules broad apiculate. Corymbs dense, many-flowered, 1·75 in. long, 2·5 in. wide, pubescent. Flowers ·5 to ·6 in. long. Calyx campanulate, blunt lobed. Corolla-tube narrow with lobes oblong, greenish yellow, ·5 in. long. Fruit as big as a pea. *Hab.* Malacca, Ayer Panas (Griffith). Negri Sembilan, Serting (Foxworthy). Selangor, Kwala Lumpur (Curtis). *Distrib.* Sumatra. *Native name:* Tinjau Belukar.

(4) *S. angustifolia* King, *l.c.* 199.

Shrub 4 to 6 ft. tall, glabrous except inflorescence. Leaves coriaceous narrow-oblong, lanceolate, blunt acuminate, base long, narrowed; nerves 5 to 6 pairs, slender depressed above; 2·5 to

3.5 in. long, .75 to 1 in. wide; petioles .2 to .35 in. long. Stipules oblong abruptly acuminate, .25 in. long. Cymes less than 1 in. across; branches few-flowered. Flowers .35 in. long, puberulous outside, greenish white. Calyx campanulate, lobes narrow, linear-lanceolate. Corolla little longer, tube short, lobes oblong acute. *Hab.* Perak, Kwala Dipang, top of limestone cliffs (Kunstler).

(5) **S. adpressa** King, *l.c.* 200.

Shrub 5 to 6 ft. tall. Branches rather thick, 4-angled, deciduously tomentose. Leaves thick coriaceous, narrow-elliptic oblong or lanceolate-acuminate, cuspidate, glabrous above, shortly stiffly hairy beneath; nerves 6 to 10 pairs prominent beneath; 7 to 9 in. long, 2.5 in. wide; petioles .25 to .4 in. long. Stipules ovate acute. Corymbs dense, 2 in. long and wide, pubescent. Flowers numerous on short pedicels, white .6 in. long. Calyx urceolate, .1 in. long; teeth short, acute. Corolla-tube .35 in. long, pubescent, lobes oblong, blunt more than half as long; style short only projecting for .2 in. Fruit globose, .2 in. through, greenish white. *Hab.* Low wet forest, 3400 ft. altitude, rather rare. Malacca, Mt. Ophir. Perak, Larut (Kunstler); Gunong Batu Putih (Wray); Dindings, Lumut (Wolferstan); Bruas.

King's variety *papillosa* is a different species and is indeed a *Tarenna*.

(6) **S. Maingayi** King, *l.c.* 200. *Webera Maingayi* Hook. *fil. F.B.I.* iii. 103.

Shrub, densely tomentose all over. Leaves thickly membranous, elliptic-lanceolate caudate or ovate, base cuneate, above sparsely hispid, beneath densely pubescent; nerves 8 or 9 pairs elevate beneath, depressed above; 3 to 6.5 in. long, 1.5 to 3 in. wide; petioles .25 to .35 in. long. Stipules lanceolate, tips filiform, .5 in. long. Cymes condensed, densely hairy, .5 to 1.5 in. through; peduncles about as long. Calyx flask-shaped, .15 in. long, lobes long linear. Corolla-tube cylindrical, sparsely hairy, lobes .1 in. long, oblong obtuse, white. Style long. Fruit .2 in. through, globose, black glabrous. *Hab.* Mountains. Johor, Bukit Jitan; Serom; Bukit Soga; Batu Pahat. Malacca, Mt. Ophir (Griffith). Negeri Sembilan, Gunong Angsi. Perak, Larut (Kunstler).

#### 42. COFFEA, Linn.

Large glabrous shrubs. Leaves coriaceous. Stipules connate. Flowers white or green in axillary fascicles, sessile or very shortly pedicelled. Calyx-tube short, sub-cylindric, entire or toothed. Corolla salver-shaped, tube short or long, lobes 4 to 5 oblong blunt, contort. Stamens 4 to 5 in mouth. Disc swollen. Ovary 2-celled; ovules 1 in a cell; style filiform. Stigma arms 2 linear. Berry oblong. Pyrenes 2, coriaceous. Seed flat on one side, round on the other. Species about 20, Asia and Africa.



Cultivated at one time largely were *C. liberica*, *C. arabica*, *C. robusta*.

Corolla 1 in. long, white.

Leaves large coriaceous . . . . . (1) *C. malayana*

Corolla .2 in. long, green . . . . . (2) *C. viridiflora*

Leaves thin, small; flowers white . . . . . (3) *C. madurensis*

(1) *C. malayana* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 19.

Shrub 10 to 15 ft. tall. Branches 4-angled. Leaves elliptic-acuminate, base narrowed; nerves 13 pairs; 7 to 8 in. long, 2.5 to 3 in. wide. Stipules shining, tube cartilaginous with a long point .25 in. long. Flowers 14 sessile in a fascicle. Calyx-tube entire. Corolla 1 in. long, white, lobes 5, narrow-linear, .25 in. long. Fruit small, globose. Seed 1, globose. *Hab.* Forests. Johor, Gunong Pantai, Selangor and Bukit Hitam; Kwala Lumpur. Negri Sembilan, Gunong Berumban; Bukit Kandang (Cantley); Tampin Hill (Goodenough). *Native names*: Chiapet; Semangkok Jantan; Gading Jantan.

Coffee beans from this plant have been exhibited at one of the local exhibitions, and were mistaken by the judges for those of *C. arabica*. I have only seen a few fruits, and those all with one globose seed.

(2) *C. viridiflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 82.

Glabrous shrub 12 to 14 ft. tall. Leaves fleshy membranous, elliptic-oblong cuspidate, base cuneate, decurrent on the petiole; nerves 8 to 9 pairs; 8 in. long, 3 in. wide; petioles .75 in. long. Flowers green in axillary sessile or shortly peduncled heads. Calyces connate, sessile. Corolla .2 in. long, tube cylindrical, lobes linear acuminate 4, half as long; anthers shortly exsert. Fruit globose, .3 in. through, crowned with circular calyx scar. Seeds 2, semi-oblong, .2 in. long. *Hab.* Woods. Selangor, Batu Caves (Ridley). Perak, Waterloo (Curtis).

(3) *C. madurensis* Teysm. and Binn. *Hort. Bogor.* 1866, p. 112; *Koorders, Teysmannia*, 1900, p. 30, t. 8.

A shrub. Leaves thin, elliptic bluntly acuminate, base cuneate; nerves 4 pairs, 3 to 3.5 in. long, 1.5 in. wide; petioles .1 in. long. Stipules from a broad base with a setaceous tip. Flowers usually solitary on a very short peduncle with linear setaceous bracts. Calyx very short, .05 in. long. Corolla white, tube slender cylindrical, .5 in. long, lobes oblong acute, .25 in. long. Stamens exsert at tip. Fruit didymous, .3 in. long; pericarp crustaceous 2-celled, 2-seeded. *Hab.* Kelantan, village at Kota Bharu (Ridley). *Distrib.* Madura.

#### 43. GARDENIOPSIS, Miq.

A shrub, glabrous. Leaves very coriaceous, oblanceolate. Stipules lanceolate. Flowers few, sessile in axillary clusters, no bracts. Calyx small, cylindrical, lobes 5, spreading. Corolla 1 in. long, tube thick, cylindrical, short lobes large ovate, imbricate.

Stamens 5, near base of the corolla-tube; anthers linear included. Style short. Stigma fusiform, acute. Ovary 2-celled with one ovule in each cell. Fruit corky fleshy brown ovoid ellipsoid with 10 ridges (when dry), top sub-truncate with the enlarged incurved calyx-lobes. One species, Malay Peninsula, Borneo, Sumatra.

(1) *G. longifolia* Miq. *Ann. Mus. Bot. Lugd. Bat.* iv, 250 and 262; *King, l.c.* 63.

A shrub with few stout brown branches, about 8 ft. tall. Leaves acute, gradually narrowed to base, 12 in. long, 1.75 to 3 in. wide, rigid; nerves depressed above, conspicuously elevate, as are reticulations beneath; petioles winged, thick, .2 to .3 in. long. Calyx .1 in. long. Corolla dirty rosy white, tube .3 in. long, lobes .5 in. long, .3 in. wide. Fruit brown, sessile, nearly 1 in. long, .5 in. through. *Hab.* Common in dense forests. Flowers rare to find. Singapore, Bukit Timah. Pahang, Kwala Tembeling. Malacca, Machap (Derry); Selandor (Cantley). Selangor, Semangkok Pass. Negri Sembilan, Gunong Angsi. Perak, Thaiping Hills; Bujong Malacca. Lankawi, Burau (Robinson). Kelantan, Chaning. *Distrib.* Sumatra. *Native names:* Kayu Jolong; Jambu Kuao; Bebakan.

#### 44. GUETTARDA, Linn.

Trees (and shrubs). Leaves at ends of branches. Flowers secund on the branches of axillary forked peduncled cymes, white. Calyx campanulate. Corolla-tube cylindrical, lobes 4 to 9 imbricate; anthers 4 to 9, linear sub-sessile. Ovary 4- to 9-celled with one ovule in each cell; style filiform. Stigma sub-capitate. Drupe globular or flattened round; endocarp woody, 4- to 9-celled. About 45 species, mostly American.

(1) *G. speciosa* Linn. *Sp. Pl.* 991; *King, l.c.* 52.

A low but large much-branched tree. Leaves membranous rhomboid ovate, blunt or with a short point, base broad cordate, glabrous above, puberulous beneath; nerves 7 pairs, elevate; nervules horizontal, conspicuous, 5 in. long, 4 in. wide; petioles 1.25 in. long. Peduncles in terminal axils 2.5 in. long, puberulous. Flowers 1.5 to 2 in. long, white, sub-sessile and some on short pedicels. Calyx .2 in. long, velvety. Corolla pubescent outside, white, limb 1 in. or less across. Drupe depressed, ovoid, green about 1 or .75 in. through. *Hab.* Common on sandy sea-shores. Singapore (Wallich). Johor, Kota Tinggi; Pulau Tioman (Kloss). Dindings, Sembilan isles (Kloss). *Distrib.* Ceylon, Malay isles, Polynesia.

#### 45. TIMONIUS, DC.

Trees and shrubs. Leaves thinly coriaceous. Stipules ovate lanceolate. Flowers rather small, yellow or white unisexual in axillary cymes. Males with few or many secund flowers. Females 1 to 3 on longer peduncles. Calyx-tube short campanulate, limb

persistent. Corolla coriaceous silky, tube cylindric glabrous inside, lobes 4 to 5. Stamens as many insert by short filaments in tube. Disc small, hairy. Ovary many-celled; ovules one in each cell, pendulous; style short, thick, hairy. Stigmas several, linear. Fruit ovoid or globose; epicarp fleshy, thin, surrounding 12 to 30 small elongate pyrenes, 1-celled and 1-seeded, cohering by their sides and forming a stone. Seeds cylindric. Species about 30, tropical Asiatic.

Female flowers solitary on a long peduncle.

Flowers small.

Leaves elliptic glabrous, 4 by 2.5 in., thin; flowers yellow

(1) **T. peduncularis**

Leaves oblanceolate blunt, stiff, 3 to 6 in. long by 2.5 in.; flowers white

(2) **T. Finlaysonianus**

Leaves lanceolate acuminate, coriaceous 4 by 1.75 in.; midrib hairy beneath

(3) **T. malaccensis**

Leaves elliptic lanceolate coriaceous, pale beneath, quite glabrous

(4) **T. montanus**

Leaves not pale beneath; midrib hairy

(5) **T. oreophilus**

Leaves hairy beneath, thick

(6) **T. laxus**

Leaves and branches long-hairy

(7) **T. hirsutus**

Flowers large; corolla-tube short, thick.

Leaves glabrous sub-rhomboid, coriaceous 5 to 8 in. long

(8) **T. Wrayi**

Female flowers in peduncled cymes.

Cymes filiform with few branches; flowers small

(9) **T. diffusus**

Cymes dense; flowers many rather large

(10) **T. Wallichianus**

(1) **T. peduncularis** *Ridl.* *T. Jambosella* *King, l.c.* 53, *not of Thwaites.* *Guettarda?* *peduncularis* *Wall. Cat.* 6222.

Small tree. Young parts silky. Leaves coriaceous, quite glabrous except the midrib beneath covered with appressed hairs, elliptic acuminate at both ends; nerves slender, 5 or 6 pairs; 2.5 to 4 in. long, 1 to 2.5 in. wide; petioles .3 in. long. Stipules lanceolate silky. Male cymes 3- to 12-flowered; peduncles .75 to 1.5 in. long. Female flowers solitary on peduncles 2 in. long or less. Calyx cupular, narrowed to base, lobes ovate, .1 in. long. Corolla yellow covered with silky hairs, .5 in. long, lobes short. Drupe oblong, red, .25 in. long, when dry 4-angled. *Hab.* Open country, common. Singapore, Bajau; Bukit Mandai; Kranji; a compact small-leaved form. Johor, Castlewood; Kukub in swampy forest, a form with larger, more coriaceous leaves. Malacca, Bukit Bruang. Pahang, Kwala Pahang. Selangor, Kwala Lumpur. Penang Hill. *Distrib.* Andamans.

A variety with white bark and lax branches. Johor, Minyak Buku near Batu Pahat.

(2) **T. Finlaysonianus** *Hook. fil. F.B.I.* iii. 127. *T. Jambosella* *var. Finlaysonianus* *King, l.c.* 54.

Shrub. Leaves fleshy coriaceous glabrous, lanceolate or oblanceolate or elliptic blunt, narrowed to the base; nerves 5 pairs, inarching well within the margin; 3.75 to 6 in. long, 1.5 to 3.5 in. wide;

petioles .1 to .2 in. long. Male flowers in short cymes hardly 1 in. long, puberulous. Calyx shallow cup-shaped about as wide as long with 5 short teeth. Corolla silky-white, .2 in. long. Female flowers solitary on pedicels .3 to nearly 1 in. long. Calyx cupular, .2 in. long, nodulose nearly glabrous, teeth very small. Fruit globular, nodulose, glabrous, .3 in. through on a pedicel 1 in. long. *Hab.* Tidal mud and seashores. Not common. Singapore, Serangoon. Johor, Tana Runto; Pulau Boyan (Seimund); Dindings, Pulau Sembilan (Curtis); Pulau Rumpia (Seimund). Pulau Jara (Foxworthy). *Native name*: Mengkudu Laut.

King gives several other localities, but the only number quoted by him, "Penang (Curtis)," is typical *peduncularis*. This is an unmistakable shrub, with white, not yellow flowers.

(3) **T. malaccensis** King and Gamble, *l.c.* 56.

Shrub. Branches minutely tomentose. Leaves membranous oblanceolate or elliptic, blunt acuminate, base narrowed, glabrous above, midrib puberulous, beneath sparsely hairy; midrib and nerves 5 to 6 pairs, tomentose; 3.5 to 4.5 in. long, 1.5 to 1.75 in. wide; petioles .15 to .2 in. long. Stipules cupular with several filiform processes 2 in. long. Cymes 2 to 3 in upper axils, 6-flowered, about 1 in. long, tomentose; peduncles .35 to .6 in. long. Flowers densely pubescent. Calyx tomentose .1 in. long, campanulate, lobes broad, 4. Corolla twice as long, pubescent, throat villous, lobes ovate lanceolate. *Hab.* Malacca, Mt. Ophir (Ridley).

(4) **T. montanus** Ridl. *Journ. Linn. Soc.* xxxviii, 312.

Shrub 8 ft. tall or treelet. Leaves elliptic or elliptic-lanceolate acuminate, base cuneate, glabrous, 2.5 to 3 in. long, 1 to 1.5 in. wide; nerves 6 pairs conspicuous beneath; petioles short. Flowers 2 or 3 on a short peduncle .25 in. long, sessile, glabrous pale yellow, reddish externally. Calyx campanulate pubescent, lobes acute triangular. Corolla-tube cylindrical, glabrous, .5 in. long, lobes oblong blunt. Fruit narrow ovoid, narrowed to tip, .25 in. long, black. *Hab.* Mountains. Pahang, Gunong Tahan at 5000 ft. altitude (Robinson).

(5) **T. oreophilus** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 22.

Shrub. Leaves coriaceous, broad lanceolate-acuminate at both ends, glabrous above, beneath paler, midrib and nerves 7 pairs appressed hairy; 3 to 6 in. long, 1.5 to 2 in. wide; petioles .5 in. long, black hairy. Stipules lanceolate-triangular acuminate. Cymes, male short; peduncles .5 in. long, hairy; branches 2, shorter; bracts lanceolate-acuminate. Flowers .12 in. long. Calyx cupular, teeth 4, sub-acute hairy. Corolla .25 in. long, hairy; anthers linear, base bifid. Females in pairs on slender peduncles 2 in. long. Bracts broader, ovate acuminate. Drupe cylindrical-oblong, .25 in. long, hairy. *Hab.* Mountain forests. Pahang, Kluang Terbang (Barnes). Malacca, Mt. Ophir (Hullett). Selangor, Bukit Hitam. Kedah Peak, form with very narrow leaves (Ridley).

(6) **T. laxus** King and Gamble, l.c. 55.

Tree 20 to 30 ft. tall, 4 to 6 in. through. Branches coarsely hairy. Leaves thick membranous, narrow-elliptic, obovate short acuminate, base cuneate, glabrous above, hairy beneath; nerves 5 to 6 pairs elevate beneath; 3.5 to 5 in. long, 1.5 to 2.25 in. wide; petioles .1 to .15 in. long. Male cymes on slender pubescent peduncles 1 to 2 in. long, with 2 divergent 1- or 2-flowered branches and a sessile flower in the fork. Flowers .5 in. long; pedicels .3 in. long. Calyx cupular, under .1 in. long, silky tomentose. Corolla thickly coriaceous, densely silky velvety-brown outside, yellow inside, tube cylindric, lobes broad, blunt. *Hab.* Dense bamboo jungle. Perak, Ulu Bubong (Kunstler).

(7) **T. hirsutus** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 81.

Small shrub with slender purple-brown twigs. Young parts white-hairy. Leaves membranous, on the ends of bare shoots lanceolate-acuminate, base round; nerves 7 pairs; shortly hairy above, all hairy beneath, 3 to 4 in. long, .5 to 1.25 in. wide; petioles .12 in. long, dense hairy. Stipules triangular long acuminate, glabrous. Cymes hairy, .6 in. long, in 3-flowered pairs. Calyx campanulate, lobes as long as tube. Corolla .25 in. long, very slender, white silky, lobes oblong blunt short-bearded. *Hab.* Lankawi isles, Dayong Bunting (Curtis, Robinson).

(8) **T. Wrayi** King and Gamble, l.c. 54.

Tree 40 to 50 ft. tall. Branchlets thick. Leaves stiffly coriaceous elliptic or obovate-elliptic or rhomboidal acute, base much narrowed, glabrous except the appressed silky nerves beneath, 6 or 7 pairs; 5.5 to 8 in. long, 2.25 to 4.5 in. wide; petioles .6 to 1.5 in. long. Stipules lanceolate-acuminate, .5 in. long, silky. Male cymes, peduncles .5 in. long; branches dichotomous 6- to 8-flowered pubescent. Calyx .3 in. long, cylindric campanulate, lobes 4, blunt unequal. Corolla-tube short, wide, lobes blunt concave nearly as long. Fruit solitary ellipsoid or globose, crowned by calyx-lobes, with 1 oblong bract at base, pubescent. *Hab.* Singapore, Changi; Sungei Loyang. Perak, Larut 1800 to 2500 ft. altitude (Kunstler). Dindings, Lumut.

(9) **T. diffusus** Ridl. *Journ. F.M.S. Mus.* iv. 32.

A big tree with slender twigs. Leaves thin glabrous broad lanceolate-acuminate and equally narrowed to both ends; nerves 8 pairs, fine, 4 to 6 in. long, 2 in. wide; petioles .75 in. long. Stipules linear acuminate, very narrow, .5 in. long. Flowers sessile in the fork and at ends of cyme-branches. Males, calyx funnel-shaped, teeth 5, short, .1 in. long, glabrous. Corolla yellow, tube cylindric, .6 in. long, lobes 4, blunt lanceolate, all pubescent. Anthers 4 linear, sub-sessile. Females on solitary axillary pedicels, 1.5 in. long, .2 in. across. Calyx-lobes ovate. Corolla .1 in. long, silky lobes as long as tube, ovate. Style thick. Stigma bilobed. Fruit .25 in. long, ovoid-globose, 4-lobed. *Hab.* Pahang, Telom; Tahan (Ridley).

(10) **T. Wallichianus** *Valton, Bull. Dep. Agric. xxvi. 35; Ic. Bogor cccxlvii. T. Rumphii King, l.c. 55, not of DC. Bobea Wallichiana Korth. Ned. Kruidk. Arch. ii. 211.*

Small tree. Leaves lanceolate narrowed to both ends, glabrous above, grey drying golden silky beneath; nerves elevate beneath, 7 pairs; 3.5 in. long, 1.75 in. wide; petioles slender, .3 in. long, yellow silky. Cymes dense many-flowered. Males, .5 to 1.5 in. long, entirely silky except the inner face of calyx-lobes, sessile or sub-sessile. Calyx funnel-shaped, .05 in. long, with short blunt lobes. Corolla .3 in. long, yellow, lobes  $\frac{1}{2}$  as long as the thick tube, blunt. Females, cymes 1.5 in. long with 4 or 5 larger flowers. Calyx sub-globose; limb large with bigger teeth. Fruit ellipsoid, pubescent, .35 in. long. Seed linear-oblong. *Hab.* Common in open country. Singapore (Wallich); Bukit Timah; Changi. Johor, Tanjong Merawan; Malacca, Ayer Panas (Derry); Merlimau (Cantley). Selangor, Bukit Kutu; Sungei Buluh (Foxworthy). Negri Sembilan, Bukit Kupayang and Burunang (Cantley). Perak, Goping (Kunstler).

var. *penangianus*. Leaves smaller and hardly silky on the back. Penang, Balik Pulau; Government Hill (Curtis, Wallich). *Native name*: Menkong.

#### 46. PRISMATOMERIS, Thw.

Shrubs. Branches 4-angled. Leaves thin coriaceous. Flowers unisexual, usually on slender pedicels, axillary and terminal, white. Calyx in male small, turbinate, in female larger, obovoid. Corolla slender cylindrical, lobes 4 to 5, spreading. Stamens included 4 to 5. Ovary 2-celled, 2-ovuled; style filiform, bifid. Berry 1-celled, 1-seeded. Seed sub-globose, peltate concave below. Species 4 or 5, Indo-Malaya.

Flowers on long slender pedicels	. . . . .	(1) <b>P. malayana</b>
Flowers sub-sessile	. . . . .	(2) <b>P. subsessilis</b>

(1) **P. malayana** *Ridl. P. albidiflora King, l.c. 90, not of Thwaites.*

A bush or shrub 8 ft. tall or less, glabrous. Leaves rather variable, elliptic to lanceolate-acute acuminate, base cuneate, light green; nerves 5 to 7 pairs; 2.5 to 4.5 in. long, .75 to 1.5 in. wide; petioles .2 in. long. Flowers in sessile fascicles on very slender pedicels, .5 to .75 in. long. Calyx cup-shaped. Corolla-tube .5 to .75 in. long, slender, lobes narrow oblong nearly as long, white, fragrant. Fruit globose, .25 in. through. *Hab.* Widely spread all over the peninsula in dry open places. Singapore, Chan Chu Kang; Changi. Johor, Kota Tinggi at Kulat. Malacca, Bukit Bruang (Derry). Pahang, Rumpin River; Kwantan (Foxworthy). Dindings, Lumut. Perak, Thaiping Hills (Wray);

Gunong Keledang. Kedah, Alor Sta; the Peak. Kelantan, Kota Bharu. Penang coast (Curtis). Tringganu, Bundi (Rostados). Perlis, Chupeng. Setul, Pulau Adang. Lankawi, Kwah (Curtis). *Distrib.* Borneo, Sumatra, Cambodia. *Native names:* Mundess; Gading Gading; Langsit; Nasi Nasi.

(2) *P. subsessilis* King and Gamble, l.c. 91.

Shrub 4 to 6 ft. tall. Branches pale. Leaves fleshy coriaceous elliptic lanceolate-acuminate, narrowed to base; nerves 5 to 7 pairs, slender, nervules invisible; 2.25 in. long, .75 to 1.35 in. wide; petioles .15 to .4 in. long. Flowers very shortly pedicelled or sessile in a terminal fascicle. Calyx .2 in. long, funnel-shaped, limb as long as tube. Corolla 1.25 in. long, lobes 5, narrow lanceolate, coriaceous, white, scent of jasmine. Fruit .6 in. through, blue black. *Hab.* Rare. Mountains at 4500 ft. altitude. Perak; Gunong Batu Putih (Wray, Kunstler).

#### 47. MORINDA, Linn.

Small trees or shrubs, often climbing. Leaves membranous. Stipules connate, sheathing. Flowers in heads connate by the calyces, axillary or terminal. Calyx-tube short, fleshy, limb 0. Corolla white, salver-shaped, tube medium, throat hairy, lobes 5 (rarely 4 to 7) valvate. Stamens as many. Ovary 2 (or spuriously 4-celled); ovules solitary; style 2-branched. Fruit of the enlarged succulent calyces. Seeds obovoid or reniform. Species about 40, tropics.

Trees or large erect shrubs.

Leaves large, 6 in. across; fruit as big as an egg,  
white

(1) *M. citrifolia*

Leaves narrow, 1.25 in. across; fruit about .25 in.  
through

(2) *M. elliptica*

Climbers.

Leaves hairy; nerves 10 pairs, base narrowed

(3) *M. Scortechinii*

Leaves hairy; nerves 4 pairs, base round

(4) *M. Ridleyi*

Leaves tomentose beneath, coriaceous; nerves  
indistinct

(5) *M. rigida*

Leaves glabrous.

Leaves sub-coriaceous, cuspidate; fruit .1 in.  
through

(6) *M. lacunosa*

Leaves thin membranous, acute; fruit .4 in.  
through, orange

(7) *M. umbellata*

(1) *M. citrifolia* Linn. *Sp. Pl.* 176; King, l.c. 86.

Small erect tree about 15 to 20 ft. tall. Leaves broad elliptic, membranous, 8 in. long, 6 in. wide; peduncles .5 to 1 in. long, axillary. Head .5 to .75 in. through, green. Calyx hemispheric not lobed. Corolla-tube cylindrical stout, lobes oblong half as long recurved, tube hairy within, all white, .75 in. long. Stamens pale yellow. Style green. Fruit 3 in. long, 2 in. through, oblong, translucent white. *Hab.* In gardens and villages. *Distrib.* Indo-Malaya. *Native name:* Mengkudu. *Use:* The fruit is eaten,

though it has an unpleasant taste; roots used for dyeing orange-colour.

I have never seen this plant wild, and suspect it is an introduction from the Moluccas.

(2) *M. elliptica* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 86. *M. citrifolia* var. *elliptica*, King, *l.c.* 87.

A small tree usually about 15 ft. tall with white bark. Leaves narrow-elliptic or oblanceolate shortly acuminate and long narrowed to base; nerves about 7 pairs; 5 in. long, 1.25 in. wide; petioles .4 in. long. Peduncles slender, 1.25 in. long. Heads oblong, .25 in. long. Corolla-tube cylindric, lobes sub-acute, all white, .5 in. long. Fruit-head oblong, green, hardly pulpy, .5 in. long. *Hab.* One of the commonest trees in the open cleared ground, especially in lalang fields and on rocks by the sea. Whole peninsula. Singapore, Malacca. Pahang. Selangor. Penang. Tringganu. *Native name*: Mengkudu jantan.

This extremely common plant has been confused with the very different *M. citrifolia* owing to its bad drying, and I cannot find it has ever had a specific name.

(3) *M. Scortechinii* Ridl. *M. umbellata* var. *Scortechinii* King and Gamble, *l.c.* 88.

Climber, hairy all over. Leaves elliptic cuspidate or obovate cuspidate narrowed to a sub-obtuse base, 2.75 in. long, 1.25 in. wide, membranous; nerves elevate beneath 10 pairs; petioles slender, .3 in. long, hairy. Peduncles terminal, 8 together slender, pubescent, 1 to 1.5 in. long. Heads small few-flowered, .2 in. through in flower glabrescent. Calyx rounded, hemispheric, entire. Corolla .1 in. long, glabrous, white. Fruit yellow (Pierre). *Hab.* Perak, Goping (Scortechini). *Distrib.* Siam.

(4) *M. Ridleyi* sub *M. umbellata* var. *Ridleyi* King and Gamble, *l.c.* 88.

A lofty climber 2 in. through with corky bark. Leaves sub-coriaceous above, smooth shining beneath, densely red-hairy, especially on the elevated 4 pairs of nerves and midrib, oblanceolate oblong abruptly cuspidate narrowed to the rounded base, .3 in. long, 1 in. wide; petioles .2 in. long, hairy. Stipules thin, papery lanceolate-acuminate, .2 in. long. Peduncles terminal, umbelled 8 together slender hairy, 1.25 in. long. Heads .25 in. wide. Fruit black, .25 in. through. *Hab.* Forests in the south. Singapore, Garden Jungle; Bukit Timah (Ridley). Johor, Pengerang. Malacca, Bukit Kajang (Cantley).

(5) *M. rigida* Miq. *Fl. Ind. Bat.* ii. 246; King, *l.c.* 87.

Stout climber; young parts and underside of leaf tomentose. Leaves thick, coriaceous, dark green, elliptic blunt or short acuminate, base cuneate; nerves 18 to 20 pairs, indistinct; 2 to 4 in. long, 1 to 1.6 in. wide; petioles .4 in. long, pubescent. Stipules



oblong, blunt. Peduncles terminal, 3 or 4 pubescent, .2 to .3 in. long. Calyx short, cupular confluent in a head, .2 in. through. Corolla-tube 1 in. long, woolly in mouth, lobes oblong woolly inside. Fruit-heads sub-globose, green, .75 in. through, with only 3 or 4 fruits. *Hab.* Not rare, usually near the sea; flowers fragrant. Singapore, Pulau Tekong; Kranji; Changi. Johor, Gunong Pulai. Negri Sembilan, Berumbun (Cantley). Dindings, Bruas; Simpit. *Distrib.* Borneo. *Native name:* Lulong Akar.

(6) *M. lacunosa* King and Gamble, l.c. 87.

Climber 40 to 60 ft. long. Leaves sub-coriaceous, elliptic cuspidate, base shortly cuncate glabrous; nerves 8 pairs, strongly elevate beneath, reticulations prominent, midrib puberulous or glabrous; 4.5 to 6 in. long, 2 to 2.75 in. wide; petioles .5 to 1.25 in. long. Stipules apiculate, .15 in. long. Peduncles 1 to 3.75 in. long, terminal. Heads .5 in. through with 1 or 2 linear coriaceous bracts at base. Calyces connate irregularly cupular, with 1 large triangular lobe. Disc large. Fruit-head globular, 1.5 in. through, covered with the protruding 4-seeded conical calyces. *Hab.* Rare, open jungle 500 to 600 ft. altitude. Perak, Goping (Kunstler).

(7) *M. umbellata* Linn. *Sp. Pl.* 176; King, l.c. 88.

A scrambling sarmentose shrub. Leaves thin coriaceous dark green, narrow oblong or elliptic lanceolate, base narrowed, glabrous; nerves 5 to 6 pairs; 3.5 to 5 in. long, 1 to 1.35 in. wide; petioles .2 to .3 in. long. Heads sub-globular, .25 in. through; peduncles 5 to 8 umbellate, terminal, .35 to 1 in. long. Calyx truncate with short blunt lobes. Corolla pale green rotate, tube 1 in. long, throat villous, limb .2 in. across, lobes oblong obtuse woolly on inner faces and tips. Heads of fruit oblong, globose, .4 in. through, orange colour. *Hab.* Very common in open country and sandy heaths; often unisexual. Singapore, Kranji; Changi; Pulau Ubin. Johor, Pengerang; Pulau Tioman. Malacca, Bukit Bruang (Goodenough). Pahang at the Kwala. Selangor, Bukit Kutu. Dindings, Lumut. Penang Hill (Curtis). Tringganu. *Distrib.* India, Malay islands, China, Australia.

#### 48. RENNELIA, Korth.

Low shrubs resembling *Morinda* in structure, but heads few-flowered in terminal panicles. Flowers violet. Species 5 or 6, Malayan.

Inflorescence paniced . . . . . (1) *R. paniculata*  
 Inflorescence spicate or a simple head . . . . . (2) *R. speciosa*

(1) *R. paniculata* King and Gamble, l.c. 89.

Shrub 6 to 8 ft. or tree to 25 ft. tall. Leaves sub-coriaceous, elliptic acute, base much narrowed; nerves 10 to 12 pairs, prominent beneath; 6 to 9 in. long, 2.25 to 3.75 in. wide; petioles .8 to 1.25 in.

long. Inflorescence a terminal panicle, 4·5 in. long, of branches 1 in. long or less, bearing heads ·2 in. through of 3 or more sessile flowers. Corolla white, tipped violet, lobes nearly as long as tube. Fruit-head globular, ·5 in. through, yellowish green. *Hab.* Rare in mountains. Selangor, Bukit Hitam (Kelsall). Perak, Thaiping Hills 3000 to 3500 ft. altitude (Kunstler). Penang (Curtis). Kelantan, Chaning.

(2) *R. speciosa* Hook. fil. *F.B.I.* iii. 158; *King, l.c.* 89.

Small little-branched spreading shrub about 4 ft. tall, bark pale. Leaves thin coriaceous, oblanceolate sub-acute, base narrowed glabrous; nerves fine, 10 pairs inarching; 5 to 9 in. long, 1·5 to 3·5 in. wide; petioles ·5 to 1 in. long. Stipules oblong sub-acute bilobed. Heads 6 to 15 on a short terminal peduncle, ·5 in. long or less. Calyces cupular, truncate confluent, 3 together. Corolla coriaceous, ·75 in. long, violet, very fragrant, tube thick, lobes 5 oblong, blunt. Fruit-heads small. *Hab.* In forests, not rare. Johor, Gunong Pantai. Malacca, Selandor, Chabau and Merlimau (Cantley). Selangor, Ulu Gombak. Dindings, Gunong Tungul. Perak, Gunong Haram (Scortechini); Goping (Kunstler); Relau Tujur (Wray); Bujong Malacca (Curtis). *Distrib.* Burma.

var. *elongata*, *King and Gamble*. Inflorescence elongate, 3 to 6 in. long. Johor, Gunong Pantai. Pahang, Tahan River; Kwala Tenok. Selangor, Sungei Buloh. Perak, Larut (Kunstler). Province Wellesley, Ara Kudah.

var. *angustifolia*. Leaves narrow lanceolate-acuminate both ends, 4 in. long, 1 in. wide or less; stems slender. Head small few-flowered. Kedah, Gunong Bintang (Kloss).

Different in appearance as these two varieties are from typical *speciosa*, it seems impossible to separate them. The leaves in var. *elongata* are often larger, with prominent veins, and the flowers considerably larger, but intermediate forms occur.

#### 49. CÆLOSPERMUM, Bl.

Glabrous climbers. Leaves coriaceous elliptic to obovate; stipules connate below, acute or bifid. Flowers small, green or white in 3- to 6-flowered paniced umbels. Calyx-tube short, limb membranous, truncate or obscurely lobed. Corolla coriaceous, funnel-shaped, lobes 4 to 5, longer, valvate. Stamens 4 to 5, filaments slender; anthers versatile, exsert. Ovary 2-celled, with 2 ovules in each cell, or 4-celled with 1 ovule in each. Fruit depressed, globular, with 2 to 4 pyrenes. About 10 species, Malaya-Australia.

Calyx-limb membranous deciduous; ovary-cells 2.

Leaves coriaceous . . . . . (1) *C. truncatum*

Leaves membranous . . . . . (2) *C. biovulatum*

Calyx-limb coriaceous, persistent; ovary-cells 4 . . . . . (3) *C. scandens*

(1) **C. truncatum** King and Gamble, *l.c.* 50. *Trisciadia truncata* Hook. fil. *F.B.I.* iii. 94.

Shrubby climber. Leaves coriaceous, elliptic-oblong shortly acuminate, base cuneate shortly; nerves 4 to 6 pairs, distinct but not elevate beneath; 3 to 4 in. long, 1.25 to 2.5 in. wide, upper leaves much smaller; petioles .3 in. long. Stipules very small, 2-lobed. Panicle 1 in. long; branches 3, slightly puberulous. Flowers umbellate about 6 together. Calyx campanulate, truncate, .1 in. long. Corolla .35 in. long, clavate in bud, tube short, hairy inside. *Hab.* Rare, only once collected. Penang (Wallich).

(2) **C. biovulatum** Clarke MSS.; *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 87.

Leaves membranous not fleshy elliptic acute or abruptly cuspidate, base cuneate unequal, glabrous; nerves hardly visible above, conspicuously elevate inarching beneath; 6 in. long, 2.75 in. wide; petioles .7 in. long. Peduncles 1.5 in. long; branches 4 or 5, .25 in. long, bearing 5 umbellate flowers, puberulous. Calyx campanulate, puberulous, .12 in. long. Corolla-tube .3 in. long, slightly dilate upwards, lobes linear, recurved about as long, all yellow. Stamens, filaments long exsert; anthers long linear, curved. Ovary 2-celled with 1 ovule in each cell. *Hab.* Very rare. Malacca (Maingay).

Referred by Hooker to *C. scandens* Bl., and by King to *C. truncatum*, but totally distinct from either, especially in the foliage.

(3) **C. scandens** Bl. *Bijdr.* 994; King, *l.c.* 51.

A slender climber. Leaves elliptic or obovate-elliptic, base narrowed, tip rounded or shortly pointed; nerves 3 pairs, fine, depressed above, elevate beneath; 2.5 to 4 in. long, 2.5 to 3 in. across; petioles .35 in. long. Peduncles 1.5 in. long. Panicles 1.5 in. long and wide, puberulous; pedicels short. Calyx campanulate, under .1 in. long, puberulous truncate, teeth minute. Corolla white, tube .2 in. long (clavate in bud), lobes linear-oblong, .1 in. long, reflexed. Anthers much exsert. Fruit depressed, globular, .3 in. through. *Hab.* Climbing on trees on jungle edges, very fragrant. Singapore, Changi; Bukit Timah; Pulau Ubin. Malacca, Ayer Panas (Griffith). Perak, Larut (Kunstler). *Distrib.* Java, Borneo.

## 50. GYNOCETHODES, Bl.

Glabrous slender climbers. Leaves coriaceous. Flowers small white unisexual in axillary fascicles or peduncled heads. Calyx-tube short, limb truncate or 5-toothed. Corolla thick, throat woolly, lobes 4 to 5 valvate. Stamens as many exsert. Ovary 4-celled; ovules 1 in a cell; style of male simple, female bifid. Drupe globose, fleshy; pyrenes 2 to 4. Species 3 to 4, Malayan.

- Leaves round at tip . . . . . (1) *G. coriacea*  
 Leaves acuminate.  
 Fruit fusiform, grey, .25 in. through . . . . . (2) *G. sublanceolata*  
 Fruit .5 to .6 in. through, globose . . . . . (3) *G. macrophylla*

(1) *G. coriacea* *Bl. Bijdr.* 993; *King, l.c.* 93.

Tall woody climber. Stem .2 in. through. Leaves dark green coriaceous ovate blunt, base narrowed; nerves 4 to 6 pairs, faint; 2.25 to 4 in. long, 1.2 to 2.25 in. wide; petioles .4 to .5 in. long. Flowers few on very short axillary peduncles, green, .3 in. long. Corolla-tube narrow, lobes as long, villous above. Fruit globose, pulpy 4-celled, .5 in. through. *Hab.* Forests, climbing high on trees. Singapore, Garden Jungle; Changi. Malacca, Selandor (Cantley). Negri Sembilan, Gunong Berumbun (Cantley). *Distrib.* Malay islands. *Native names*: Akar Mali; Akar Lumpuas Tanah.

(2) *G. sublanceolata* *Miq. Fl. Ind. Bat. Suppl.* 548.

Slender woody climber. Leaves thin coriaceous elliptic-lanceolate acuminate, base much narrowed, dark green; nerves 5 or 6 pairs, indistinct; 2.25 to 3.25 in. long, .5 to 1.1 in. wide; petioles .3 in. long. Flowers few, sessile, on very short axillary branches. Calyx truncate. Corolla-tube short and thick, hairy inside, lobes 5, broad, lanceolate sub-acute longer, all white. Fruit globose, .25 in. through, lead-grey. *Hab.* Common in open country. Singapore Gardens; Changi; Freshwater Isle; Pulau Tekong. Malacca, Chabau (Griffith); Bukit Bruang (Cantley). Pahang, Pekan. *Distrib.* Borneo, Sumatra. *Native name*: Akar Lampai hitam.

(3) *G. macrophylla* *Kurz. Journ. As. Soc. Beng.* xli. (2), 314; *King, l.c.* 92.

Stout climber, 4-angled. Leaves coriaceous elliptic to oblong, shortly acuminate, base cuneate; nerves 6 to 7 pairs, spreading, slightly prominent beneath; 3.5 to 5.5 in. long, 1.35 to 2.5 in. wide. Flowers numerous, crowded on short peduncles. Calyx globose with short teeth. Corolla-tube short thick, lobes longer, acute hairy at base. Fruit globose bluish grey, .5 to .6 in. through. *Hab.* Forests to 3400 ft. altitude, not common. Malacca (Maingay). Dindings, Pulau Sembilan. Perak, Goping (Kunstler); Gunong Batu Putih (Wray). *Distrib.* Andamans. *Native names*: Sulong Akar; Akar Lampo Hutan.

### 51. CANTHIUM, Lam.

Shrubs or small trees, sometimes spiny. Flowers small axillary fascicled or in corymbose cymes, green or whitish. Calyx-tube short, limb cupular 4- to 5-toothed. Corolla-tube funnel-shaped or urceolate, throat hairy, lobes 4- to 5-valvate; anthers 4 to 5 in throat sessile or filaments short. Disc annular. Ovary 2-celled; ovules solitary; style stout. Stigma large. Drupe didymous or sub-globose with 1 to 2 pyrenes. Species 80, tropical Africa, Asia and Australasia.

- Flowers solitary or 2, 1 in. long . . . . . (1) **C. pauciflorum**  
 Flowers cymose less than .5 in. long.  
 Spiny shrubs.  
 Leaves 1.5 in. long, slender pubescent shrub . . . . . (2) **C. horridum**  
 Leaves 2 to 3 in. long velvety, climber; fruit  
 small . . . . . (3) **C. molle**  
 Leaves 2 to 3 in. long, glabrous with needle-  
 like spines . . . . . (4) **C. aciculatum**  
 Leaves 2 to 3 in. long, pubescent, coriaceous;  
 fruit large . . . . . (5) **C. depressinerve**  
 Unarmed.  
 Densely velvety; fruit velvety pear-shaped . . . . . (6) **C. velutinum**  
 Glabrous; fruit 2 in. long . . . . . (7) **C. glabrum**  
 Fruit 1.5 to 2 in. long.  
 Cymes few-flowered . . . . . (8) **C. confertum**  
 Cymes dense many-flowered . . . . . (9) **C. didymum**  
 Flowers umbellate dense short-peduncled . . . . . (10) **C. congestiflorum**

(1) **C. pauciflorum** *King and Gamble, l.c.* 58.

Shrub 15 to 20 ft. tall, spines few curved. Leaves membranous elliptic-ovate, shortly blunt acuminate, base cuneate, glabrous; nerves 4 or 5 pairs; 4.5 in. long, 1.5 to 2.25 in. wide; petioles .15 to .25 in. long. Stipules broad, triangular. Flowers 1 or 2 together on a short axillary branch. Calyx .2 in. long, cupular campanulate, teeth 5, acute. Corolla wide cylindrical, .5 in. long, glabrous except for a ring of hairs at base inside. Anthers exsert. Fruit nearly 1 in. long, pulpy, crowned by the calyx-tube. *Hab.* Perak (Scortechini).

(2) **C. horridum** *Bl. Bijdr.* 966; *Hook. fil. F.B.I.* iii. 135.  
**C. parvifolium** *King, l.c.* 59, *not of Roxburgh.*

Erect pubescent spiny shrub, spines curved, 2 in. long. Leaves sub-coriaceous ovate or elliptic, base cuneate, pubescent on midrib and 3 pairs of nerves beneath, .75 to 1.25 in. long, .5 to .75 in. wide; petioles .05 to .15 in. long. Flowers .2 in. long, clustered. Calyx cupular truncate. Corolla .1 in. long, pale green, tube globular when open, a dense ring of white hairs in mouth, lobes lanceolate. Fruit .5 in. through, pulpy, acid, yellow. *Hab.* Common in open country and forest edges. Singapore, Garden Jungle; Tanjong Katong. Malacca, Alor Gajah. Pahang, Pulau Tawar, etc. Selangor, Kwala Lumpur; Semangkok. Negri Sembilan, Seremban (Cantley). Perak, Blanda Mabok (Wray); Kwala Kangsa. Penang. Kelantan, Kwala Aring (Yapp). Lankawi (Curtis); Setul. *Distrib.* Chittagong, Java, Borneo. *Native names:* Bulang Gajah; Bulang Tikus; Bulang hitam; Bulang kechil.

(3) **C. molle** *King and Gamble, l.c.* 60.

A long, stout velvety climber with long decurved spines, .75 in. long. Leaves thickly membranous, ovate to lanceolate-acuminate, base narrowed, blunt, brown hairy all over, thickest on midrib and nerves 5 pairs, 2 to 3 in. long, .75 to 1.5 in. wide; petioles .2 in. long. Flowers .2 in. long; pedicels as long, in small axillary cymes. Peduncles thick, about .1 in. long. Calyx small cupular

with minute teeth. Corolla glabrous outside, a ring of white hairs in throat, lobes as long as tube. Fruit .5 in. long, oblong pulpy black. *Hab.* Very local in forests in the south. Singapore, Garden Jungle (Ridley). Malacca, Selandor (Cantley).

(4) **C. aciculatum** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 57.

A slender branched shrub finely appressed hairy with needle-like spines, brown with pale tips, .5 in. long. Leaves ovate to lanceolate with a long point, base round, glabrous; nerves 6 pairs, 2 in. long, 1 in. wide; petioles .12 in. long. Stipules lanceolate subulate. Flowers small in axillary cymes of 2 to 3 flowers, .5 in. long; pedicels hardly half as long, pubescent. Calyx cupular. Corolla-tube silky hairy inside, thick and short silky inside, lobes 5, broad lanceolate triangular sub-acute, fleshy. Berry .25 in. long. *Hab.* On limestone rocks. Perak, Lenggong. Kedah, Gunong Geriang (Ridley).

(5) **C. depressinerve** *Ridl. Journ. F.M.S. Mus.* x. 141.

Branches appressed pubescent, axillary, spines straight acute, .25 in. long. Leaves sub-coriaceous ovate acuminate, base round; nerves sunk above strongly elevate beneath, 4 pairs, above glabrous, minutely pustulate beneath, sparsely hairy; nerves thickly hairy; 2.5 in. long, 1 in. wide; petioles .05 in. long. Stipules broad triangular with a subulate spine, hairy. Flowers apparently solitary, pedicelled. Fruit large, fleshy, over .5 in. long when dry, pyrene 1, bony. Seed 1. *Hab.* Forests. Kelantan, Chaning (Ridley).

Near *C. macrocarpum* Thw. of Ceylon, but the flowers appear not to have a peduncled cyme. I only found it in fruit.

(6) **C. velutinum** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 19 (Fig. 81, p. 125).

Unarmed shrub, densely velvety hairy. Leaves sessile, lanceolate acuminate acute, base round; nerves 5 pairs prominent beneath; 4 in. long, 1.5 in. wide, densely hairy. Flowers in axillary tufts; pedicels .25 in. long, hairy. Calyx goblet-shape, truncate, .12 in. long. Corolla .5 in. long, lobes 4, narrow lanceolate, less than half as long as tube, densely hairy outside, glabrous inside, except for a tuft on each lobe at base. Stigma oblong bifid at lip. Fruit pear-shaped ribbed, .5 in. long, velvety. *Hab.* Rare on hills in thickets. Perak, Gunong Keledang (Ridley).

(7) **C. glabrum** *Bl. Bijdr.* 967; *King, l.c.* 61.

Unarmed tree medium or small. Leaves thickly membranous elliptic or ovate elliptic short, abrupt, acuminate, deep green, glabrous; nerves 6 to 8 pairs; 5 to 7 in. long, 2 to 3 in. wide; petioles .4 to .6 in. long. Cymes 1 in. across, dichotomously branched, many-flowered. Flowers .15 in. long, apple green. Calyx cupular, irregularly lobed or split. Corolla-tube short, lobes thick, fleshy, recurved; tube mouth villous with white hairs. Stigma large, mushroom-shaped filling up the tube-mouth. Fruit

ellipsoid about 2 in. long, plum-shaped, grey fleshy, pyrenes large triangular, inner face flat, outer one keeled. *Hab.* Woods, common. Singapore, Bukit Mandai; Toas. Johor, Bukit Soga, Batu Pahat. Malacca, Bukit Bruang (Derry). Sungei Ujong, Rantau (Cantley). Selangor, Weld's Hill, Kwala Lumpur (Foxworthy). Perak, Ulu Bubong and Chanderiang (Kunstler); Tapah (Wray). Penang, Penara Bukit (Curtis). *Distrib.* Siam. *Native names:* Munkai; Salang Rusa.



FIG. 81.—*Canthium velutinum*.

(8) *C. confertum* Korth. in *Ned. Kruidk. Arch.* ii, 235; *King*, l.c. 60.

A small unarmed glabrous tree about 25 to 30 ft. tall. Leaves fleshy-coriaceous, elliptic or lanceolate-acuminate shiny, dark green, perfectly glabrous; nerves 3 to 4 pairs very faint, nervules not visible; 2.5 to 4 in. long, 1.25 to 1.75 in. across; petioles .3 in. long, winged in upper part. Cymes sessile of 4 or 5 fascicled flowers on short pedicels. Flowers .25 in. long. Calyx short, cupular, teeth minute, blunt or 0. Corolla coriaceous, tube very short, mouth villous, lobes triangular blunt as long. Fruit .3 in. long, black sub-globose. *Hab.* By tidal rivers and by the sea. Singapore, Pulau Tekong; Blakan Mati; Bajau. Johor, Gunong Pulai. Malacca, Bukit Bruang (Griffith); Merlimau (Cantley). Pahang, Tahan River; Kwala Tembeling. Selangor, Kwala Lumpur, Weld's Hill (Foxworthy). *Distrib.* Borneo.

(9) *C. didymum* Gaertn. *fil. Fruct.* iii. 94; *King, l.c.* 91.

A tree about 20 to 25 ft. or a bush, unarmed. Leaves thin coriaceous, elliptic or ovate-lanceolate acuminate sub-acute, base shortly cuneate; nerves 3 to 5 pairs thin elevate beneath, nervules invisible; 2.5 to 4 in. long, 1.5 to 2.25 in. wide; petioles .2 to .3 in. long. Cymes sub-sessile or shortly peduncled; branches numerous, slender, .2 in. long. Flowers very numerous on slender pedicels .2 to .3 in. long. Calyx less than .1 in. long, narrow-campanulate. Corolla-tube cylindric, lobes more than half as long, white, .2 in. long. Fruit pulpy, black oblong, .25 to .6 in. long. *Hab.* Common in woods, and variable. Singapore, Serangoon Road; Chan Chu Kang. Pahang, Pekan. Negri Sembilan, Pasir Panjang (Foxworthy). Selangor, Kwala Lumpur (Curtis). Perak, Slim (Kunstler, tree, 60 to 80 ft. tall). Penang, Batu Feringhi (Curtis); Hill at 2000 ft. altitude. Flowers pubescent. Tree, 30 to 40 ft. tall. Lankawi, Kwah; Tanjong Sirih (Curtis). Pulau Adang. A form with leaves elliptic to round, cuspidate, 5 in. long, 3 in. wide, and larger flowers, occurs Perak, Ulu Bubong (Kunstler) and Pulau Adang, on Pulau Tengah and Butang. *Distrib.* Borneo.

The flowers are often monstrous.

(10) *C. congestiflorum* Ridl. *Journ. Roy. As. Soc. S. Br.* 82, p. 185.

Small glabrous tree. Leaves elliptic-lanceolate, rather long acuminate, base shortly cuneate; nerves 5 pairs, distinctly elevate beneath; 5 in. long, 2 in. wide; petioles .25 in. long. Flowers 15 to 20 in dense umbellate heads on a short peduncle; pedicels .1 in. long; bracts ovate-lanceolate. Calyx saucer-shaped, obscurely lobed. Corolla-tube short urceolate, dilate at base, lobes coriaceous, thick-edged, ovate-triangular, tube white hairy below stamens. Stamens 5 in the mouth, filaments short; anthers large, oblong. Style cylindric, rather stout. Stigma sub-globose, grooved, large. *Hab.* Forests, rare. Johor, Sedenah (Ridley).

## 52. VANGUERIA, Juss.

Spiny shrubs with whorled or opposite, rather thin leaves. Flowers small crowded in axillary branches. Calyx turbinate or rotate teeth 5 (rarely 4). Corolla-tube short or moderate, cylindric or urceolate, mouth hairy, lobes 5 (or 4). Stamens 4 (5 or 6). Ovary 3 to 6, usually 5-celled; style short or long. Stigma capitate or cylindric. Fruit drupaceous with 2 to 6 pyrenes. Species 30, chiefly African.

(1) *V. grisea* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 116. *Canthium griseum* King, *l.c.* 62.

Large shrub or medium-sized tree with long straight spines 1.5 in. long. Leaves elliptic blunt, base cuneate, caducous, glabrous, membranous, pale beneath, 2 in. long, 1 in. wide; petioles slender,



·2 in. long. Flowers bright green in dense fascicled axillary cymes, ·75 in. across; pedicels pubescent, ·2 in. long. Calyx rotate, 4 lobes, long, narrow, spreading. Corolla pointed in bud, puberulous outside, hairy inside, tube cylindrical stout, lobes 5, triangular acuminate. Fruit sub-globose on slender pedicels 1 in. long, 4-celled, crowned by the 4 ovate sepals. *Hab.* Open sandy country in the north and in pastures. Kedah, Alor Sta. Perlis, Kanga. Lankawi, Kwah (Curtis).

### 53. MESOPTERA, Hook. fil.

A tree. Leaves large coriaceous. Stipules large, coriaceous. Flowers minute in dense ebracteate cymes. Calyx-tube short, hemispheric, 5-toothed. Corolla-tube short, throat hairy, lobes short, acute, valvate. Stamens 5, insert on throat, filaments short, subulate; anthers oblong, apiculate. Ovary 2-celled; ovules 1 in each cell; style short, stout. Stigma capitate, 10-lobed. Fruit small, 2-celled and didymous or 1-celled, globose. Seeds cup-shaped. Species 1.

(1) *M. Maingayi* Hook. fil. *F.B.I.* iii. 137; *King, l.c.* 63.

Branches thick, rusty tomentose, as is under-side of leaves. Leaves elliptic or broadly ovate; nerves 5 to 7 pairs, depressed above, elevate beneath, as are reticulations, 7 to 9 in. long, 4·5 to 5·5 in. wide; petioles ·5 in. long, stout. Stipules very unequal, ribbed, 1 in. long. Cymes under ·5 in. long in flower, 2·25 in. in fruit, much-branched, pubescent. Fruit ·2 to ·25 in. (when didymous) across. *Hab.* Very rare, only known from Maingay's collection. Malacca (Maingay).

### 54. PSYCHOTRIA, Linn.

Herbs, shrubs, climbers or small trees. Flowers small, green or white in terminal, rarely axillary, cymes or heads. Calyx-tube short. Corolla-tube short, throat sometimes hairy, lobes 5 (rarely 4) valvate. Stamens as many on mouth. Ovary 2-celled; ovules solitary, erect from base; style bifid. Fruit baccate, ovoid or oblong, when dry smooth or ridged, red or white or black. Seeds 2, plano-convex, inner face smooth or grooved, back rounded, ridged. Species 550, all tropics. (*King, Journ. As. Soc. Beng.* lxxiv. ii, 1.)

#### (a) Climbers.

Seeds faintly ridged; leaves coriaceous.

Leaves obovate or ovate, 2 to 3 in. long . . . . .

Leaves very coriaceous; elliptic-ovate, 3 to 4 in. long . . . . .

Leaves lanceolate, 1 in. long, crowded, epiphyte . . . . .

Seeds with 3 ridges.

Flowers in cymose panicles . . . . .

Flowers in compact heads, glabrous . . . . .

Flowers in globular cymes on ends of branches of panicle . . . . .

Cymes dense, plant hairy . . . . .

(1) *P. obovata*

(2) *P. pachyphylla*

(3) *P. condensa*

(4) *P. Scortechinii*

(5) *P. Cantleyi*

(6) *P. pilulifera*

(7) *P. ovoidea*

- Seeds with 4 ridges.  
 Cymes compact in heads.  
 Leaves 3 to 4 in. long, 1.75 to 2.25 in. wide; branches glabrous . . . . . (8) **P. morindæflora**  
 Leaves about 2 in. long, 1.5 in. or less wide; branchlets pubescent . . . . . (9) **P. Maingayi**  
 Cymes wide, panicle, corymbose.  
 Cymes corymbose . . . . . (10) **P. sarmentosa**  
 Cymes umbellate . . . . . (11) **P. Kunstleri**  
 Cymes very lax; few-branched, very slender . . . . . (12) **P. polytricha**  
 Leaves fleshy coriaceous, 1.5 to 2 in. wide; cymes 4- to 5-umbelled . . . . . (13) **P. penangensis**
- Seeds with more than 4 ridges.  
 Leaves 5 in. long; cymes 3-branched; cymules dense, terminal . . . . . (14) **P. Ridleyi**  
 Leaves 1.5 to 4 in. long . . . . . (15) **P. brachybotrys**  
 Panicle very lax; branches slender . . . . . (16) **P. laxiflora**
- (b) *Erect shrubs or trees.*  
 Flowers 4-merous.  
 Leaves oblong-lanceolate; seed not ribbed . . . . . (17) **P. calocarpa**  
 Leaves elliptic-oblong; seed not ribbed; flowers very small few . . . . . (18) **P. rostrata**  
 Leaves narrow lanceolate; seed ribbed . . . . . (19) **P. lanceolaria**
- Flowers 5-merous.  
 Densely red-hairy plants, at least in inflorescence.  
 Seed 1-ridged; flowers in dense axillary heads . . . . . (20) **P. Helferiana**  
 Seed 4-ridged.  
 Cymes spreading, sessile; flowers in small terminal heads . . . . . (21) **P. rhinocerotis**  
 Cymes spreading peduncled; flowers in small heads . . . . . (22) **P. multicapitata**
- Seeds 5-ridged, inner face plain.  
 Leaves hairy beneath . . . . . (23) **P. Birchiana**  
 Leaves large, glabrous . . . . . (24) **P. fulva**  
 Leaves pubescent beneath; rigid, coriaceous . . . . . (25) **P. coriacea**  
 Leaves membranous, red hairy beneath . . . . . (26) **P. vulpina**  
 Seed 5-ridged, inner face 2-grooved . . . . . (27) **P. fulvoidea**
- Glabrous or nearly glabrous shrubs.  
 Seed with one very faint ridge; leaves membranous . . . . . (28) **P. montana**  
 Seed with 1 prominent ridge; leaves subcoriaceous, drying greenish grey.  
 Fruit large, black; leaves glabrous . . . . . (29) **P. Griffithii**  
 Fruit large, black; leaves hairy . . . . . (30) **P. rudis**  
 Fruit small, globose; leaves glabrous . . . . . (31) **P. siamensis**  
 Seed 1-ridged; leaves coriaceous, drying red.  
 Inflorescence glabrous; stipules broad triangular acute . . . . . (32) **P. angulata**  
 Inflorescence tomentose; stipules setaceous . . . . . (33) **P. setistipula**
- Seeds 4-ridged.  
 Big bush; flowers 1.5 in. long; leaves elliptic lanceolate . . . . . (34) **P. malayana**  
 Shrub; flowers small; leaves elliptic ovate . . . . . (35) **P. cuspidella**

- Seed 5-ridged.  
 Small tree; fruit .15 in. long . . . . . (36) **P. viridiflora**  
 Fruit .4 in. long . . . . . (37) **P. megacarpa**  
 Stout shrub; stipules large; fruit .2 in.  
 long; leaves 9 in. long . . . . . (38) **P. stipulacea**  
 Dwarf shrublet; leaves 7 in. long, cori-  
 aceous . . . . . (39) **P. atroviridis**  
 Fruit unknown. Shrubs.  
 Corymb umbelliform; flowers .25 in. long (40) **P. Wrayi**  
 Cyme pyramidal, rusty, puberulous;  
 leaves unequal . . . . . (41) **P. inæqualis**  
 Cymes paniced, sessile; flowers .05 in.  
 long . . . . . (42) **P. minutiflora**

(1) **P. obovata** Wall. *Cat.* 8380A. *P. polycarpa*, Hook. *fil. F.B.I.* iii. 165; *King, l.c.* 9.

Climbing shrubs, glabrous except inflorescence. Leaves coriaceous, ovate to obovate, shortly blunt apiculate or acuminate; nerves 5 to 6 pairs, rather faint; 2 to 3 in. long, .75 to 1.75 in. wide; petioles .3 to .6 in. long. Stipules cylindrical, caducous. Corymbs large, many-flowered; peduncles 2 to 3 in. long; branches 1 or more in. long. Flowers .15 in. long. Calyx minutely pubescent, campanulate; teeth lanceolate acute. Corolla greenish white, tube very short, limb longer, lobes lanceolate acute with tufts of hairs round stamens. Fruit ellipsoid, globose, white, pulpy, .15 in. long. Seeds faintly ridged. *Hab.* Common in hedges. Singapore, Gardens; Kranji; Gelang. Johor, Bukit Banang; Kwala Sembong (Kelsall). Malacca, Ayer Panas (Griffith); Bukit Bruang. Selangor, Langat; Labu River; Negri Sembilan, Bumban (Cantley). Perak (Kunstler). Penang, Penara Bukit (Curtis). *Distrib.* Borneo, Java.

(2) **P. pachyphylla** Ridl. *P. sarmentosa* var. *pachyphylla*, *King and Gamble, l.c.* 6.

Stout climbing shrubs, glabrous. Leaves very coriaceous, elliptic ovate rounded, shortly apiculate, base cuneate; nerves 6, prominent on both sides; 3 to 4 in. long, 1.75 to 2.75 in. wide; petioles stout, 1 in. long. Corymbs short, sessile, 1 in. long of three branches from the base on tips of lateral shoots bearing a cluster of flowers on the ends of short branchlets. Flowers sessile or nearly so. Calyx cup-shaped with short ovate-acute teeth. Corolla-tube short. Fruit globose, very obscurely ridged, .2 in. long; pedicels slender, .1 in. long. *Hab.* Rare; hill forests. Penang Hill (Curtis). *Distrib.* Borneo.

(3) **P. condensa** King and Gamble, *l.c.* 20.

Small compact dense shrub, epiphytic. Leaves lanceolate, crowded, glabrous, coriaceous, acuminate, base slightly narrowed, 1 in. long, .5 in. wide; nerves almost invisible; petioles .1 in. long. Cymes dense, .18 in. long. Calyx shallow, teeth very short. Corolla thick, tubular, white, lobes oblong, obtuse, not half as long as tube, woolly in mouth. Fruit oblong, .25 in. long, obscurely

ribbed. *Hab.* Mountains about 5000 ft. altitude and upwards. Pahang, Gunong Berumbun; Telom; Gunong Tahan to 7186 ft. altitude. Perak (Scortechini). Kedah, Gunong Bintang (Kloss).

(4) *P. Scortechinii* King and Gamble, l.c. 7.

Glabrous climber. Leaves membranous ovate-lanceolate or narrow elliptic, acuminate, base narrowed or rounded; nerves 5 or 6 pairs; 2.5 to 4 in. long, 1 to 1.5 in. wide; petioles .15 to .2 in. long. Stipules oblong acute, connate at base, .15 to .2 in. long. Cymes paniced as long as leaves, elongating in fruit; branches angled. Flowers .15 in. long, pedicelled in terminal threes. Calyx cupular, teeth short, acute. Corolla cylindric, lobes short, triangular with tufts of yellowish hair between the stamens. Fruit ellipsoid, both ends narrowed to clavate, 8-ridged, .35 in. long. Seed with 3 broad ridges. *Hab.* Perak (Scortechini).

I have not seen this.

(5) *P. Cantleyi* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 24.

Scandent, slender. Leaves ovate acuminate to lanceolate, base round or narrowed, glabrous or red-hairy beneath; nerves 6 pairs; 2 to 3 in. long, .5 to .75 in. wide. Cymes 1 or 2, compact on peduncles .25 in. long. Bracts linear; bracteoles ovate. Calyx obconic, lobes ovate acute. Corolla .12 in. long, glabrous outside with tufts of hairs between the stamens inside, lobes rounded at tip, half as long as tube. Fruit young, pyriform, adult sub-globose, white pulpy; pyrenes obovate, 3-ribbed. *Hab.* Singapore, Chua Chu Kang. Johor, Mt. Austin; Kwala Sembrong (Kelsall). Negri Sembilan, Burunang (Cantley). Selangor, Semangkok Pass. Malacca, Chenana putih (Cantley). Pahang, Kota Glanggi; Tahan River and Bukit Sulu. *Native name*: Akar Suburutih putih.

(6) *P. pilulifera* King and Gamble, l.c. 8.

A small tree or climber, glabrous except inflorescence. Leaves coriaceous, narrow-elliptic, tapered both ends; nerves 8 pairs, inconspicuous, midrib bold; 2.5 to 3.5 in. long, .75 to 1 in. wide; petioles .35 to 4 in. long, slender. Panicles few-branched, puberulous of 8- to 10-flowered globular cymes. Calyx campanulate, lobes acute. Corolla tubular, lobes oblong broad; anthers inflexed, surrounded by tufts of hairs. Fruit sub-globose, 10-ridged, .2 in. long, .15 in. through. Seed 3-ridged. *Hab.* Perak at 3000 to 5000 ft. altitude (Wray).

I have not seen this.

(7) *P. ovoidea* Wall. *Cat.* 8383; King, l.c. 8.

Slender climber; young parts and inflorescence hairy. Leaves coriaceous ovate, sometimes cordate, base round, glabrous above, hairy beneath; nerves 5 to 7 pairs, prominent; 1.5 to 2.5 in. long, .85 to 1.25 in. wide; petioles .15 to .25 in. long. Cymes dense, .75 in. across. Bracts linear-lanceolate acuminate, blunt. Calyx-lobes sub-acute, ovate hairy. Corolla white, hairy, lobes 4, longer

than the very short tube. Fruit oblong, white, .25 in. long, pulpy. Seed 3-ridged. *Hab.* Woods, climbing on trees and creeping on the ground. Singapore, Garden Jungle; Bajau; Selitar. Johor, Johor Bharu. Malacca, Bukit Bruang (Derry). Perak, Tea Gardens, Thaiping hills (a compact form).

(8) *P. morindæflora* Wall. *Cat.* 8438 *A.B.C. in part*; King, *l.c.* 8.

Woody climber, 15 to 20 ft. long, glabrous except puberulous inflorescence. Leaves coriaceous, ovate to elliptic or oblong-lanceolate blunt acuminate, base slightly cuneate or round, midrib channelled above; nerves 6 to 8 pairs, elevate beneath; 3 to 4.5 in. long, 1.75 to 2.5 in. wide; petioles .2 to .5 in. long. Cymes 2 to 3 in. long (including peduncle, 1.5 in. long), 3 from terminal point. Flowers crowded sessile in heads .2 in. through. Calyx cupular. Corolla very short, lobes oblong blunt, throat silky. Fruit ovoid-elliptic, .25 in. long, ridges 8. *Hab.* Local in forests. Perak (Kunstler). Penang (Curtis and Wallich).

(9) *P. Maingayi* Hook. *fil. F.B.I.* iii. 166; King, *l.c.* 5.

Slender climber; branchlets pubescent. Leaves thick membranous, elliptic caudate-acuminate, base much narrowed; nerves 6 pairs, indistinct; 2 to 3.5 in. long, .65 to 1.2 in. wide; petioles .1 to 2 in. long. Cymes axillary and terminal; peduncles .5 to 1.5 in. long; branches short, all pubescent. Bracts long, leafy. Flowers crowded. Calyx campanulate with longer obtuse recurved lobes, hairy. Corolla green, yellowish or white, thick tubular, .2 in. long, lobes short. Fruit ellipsoid, large white pulpy. Seed 4-ridged. *Hab.* Sandy woods near the sea, and also inland. Singapore, Kranji; Pasir Panjang (Maingay, Ridley). Johor, Gunong Pulau; Kampong Bharu. Negri Sembilan, Johol. Selangor, Ulu Gombak (Ridley).

(10) *P. sarmentosa* Bl. *Bijdr.* 964; King, *l.c.* 5. *P. sarmentosoides* Valet. *l.c. Bogor.* ccxcii.

Climbing plant, often creeping with air roots on tree trunks. Leaves thinly coriaceous elliptic, acute or shortly abruptly acuminate, glabrous or more or less hairy beneath; nerves 7 to 10 pairs; 2.5 to 4 in. long, 1 to 1.75 in. wide; petioles .4 in. long. Stipules in a cylindrical tube with a cusp on each side. Cymes puberulous (or hairy), corymbose, .2 in. long and wide. Flowers .15 in. long, shortly pedicelled. Calyx campanulate with 5 short teeth. Corolla villous in mouth. Fruit white, pulpy, ellipsoid. Seed with 4 ridges. *Hab.* Common all over the peninsula. Singapore, Kranji; Serangoon; Changi. Muar, Sungei Segal (Fox). Perak, Thaiping Hills. Dindings, Bruas. Penang (Curtis). Kelantan, Kamposa. *Distrib.* India, Burma, Ceylon, Siam, Malaya.

var. *montana*, Ridl. Leaves stiffly coriaceous, yellow green. Mountains at 4000 ft. altitude; Malacca, Mt. Ophir. Pahang, Gunong Tahan. Intermediate forms occur on the Selangor mountains at

Gunong Mengkuang Lebah (Robinson) and Perak on Gunong Kerbau (Robinson).

The plants vary a good deal in many small points in hairiness and in the presence of the extra little cusp on the stipule. I have found plants hairy all over the leaves, on the midrib only, on the inflorescence only and altogether glabrous growing together. The modern Dutch botanists consider that the plant named by Blume *sarmentosa* was what is now known as *polycarpa*, hence Valetton called this plant *sarmentosoides*, but Miquel and all the botanists till Valetton considered this to be the plant that Blume intended by his *sarmentosa*. His description would fit either plant.

(11) **P. Kunstleri** King and Gamble, l.c. 6.

A glabrous epiphyte. Leaves succulent, glossy elliptic-oblong to oblong-lanceolate, narrowed gradually to each end; nerves 5 to 6 pairs, very indistinct; 3 to 5.5 in. long, .8 to 1.4 in. wide; petioles .4 to .8 in. long. Stipules forming a cartilaginous entire cup. Cyme umbellate, 2 to 4 in. broad on a peduncle 2 to 3 in. long; branches spreading. Fruit ellipsoid, .35 in. long, ridges 10. Seed 4-ridged. *Hab.* Perak (Kunstler). *Distrib.* Sumatra.

I have not seen this plant.

(12) **P. polytricha** Miq. *Fl. Ind. Bat.* ii. 287. *P. ascendens* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 61.

Stem slender, climbing and rooting on tree trunks, above pubescent. Leaves ovate, sub-acute, base round, glabrous above, pubescent beneath, especially on the 7 pairs of nerves, 1 to 1.5 in. long, .5 to 1 in. wide; petioles .12 in. long, pubescent. Cymes lax, 1.5 to 2 in. long; branches spreading; peduncle 1 in. long or less, pubescent. Pedicels .12 in. long. Calyx campanulate, lobes acute. Corolla .12 in. long, lobes oblong, pubescent outside as long as tube, mouth woolly. Fruit .25 in. long, elliptic, base narrowed. Seed 4-ridged. *Hab.* Woods near the river. Rare. Perak, Temengoh (Ridley). *Distrib.* Sumatra.

(13) **P. penangensis** Hook. *fil. F.B.I.* iii. 175; King, l.c. 6.

Shrubby climber, glabrous except inflorescence. Leaves fleshy coriaceous elliptic-obovate acute, base long, narrowed; nerves 5 to 10 pairs distinct; 3 to 4.5 in. long, 1.5 to 2.5 in. wide; petioles .5 to 1.5 in. long, winged above. Cymes 4 or 5 in a terminal umbel; peduncles .5 to 1 in. long, heads .5 in. wide; flowers .25 in. long, pubescent, shortly pedicelled. Calyx obconic; teeth triangular. Corolla white, tubular, lobes broad, acute reflexed, throat with a ring of hairs. Fruit ellipsoid, .25 in. long on a pedicel .2 in. long. Seed 5-ridged. *Hab.* Common in forests. Singapore, Garden Jungle; Reservoir Woods; Sungei Buluh. Johor, Castlewood; Gunong Pulau. Pahang, Pekan. Selangor, Batang Berjuntai. Dindings, Pangkor (Curtis). Perak, Thaiping Waterfall. Penang Hill (Maingay).

It resembles *P. morindaeflora* except in its pedicelled flowers and fruit.

(14) **P. Ridleyi** King and Gamble, l.c. 9.

A low climber about 5 to 6 ft. tall, entirely bright green, glabrous. Leaves in distant pairs, membranous lanceolate to oblong-elliptic acuminate, base cuneate; nerves 9 pairs conspicuous; 5 to 5.5 in. long, 1.5 to 2.25 in. wide; petioles 1 in. long. Cyme 3-branched, 2 in. across; peduncles .5 in. long. Flowers crowded in dense terminal cymules .25 in. across. Calyx green puberulous, lobes sub-acute, lanceolate, larger than the conic tube. Corolla white, tube very short, lobes oblong obtuse, longer, mouth white, hairy. Fruit oblong, white pulpy, .25 in. long. Seed ellipsoid 6-ridged. *Hab.* Woods. Climbing on low shrubs and trees. Singapore, Garden Jungle; Bukit Timah. Johor, Tanjong Bunga; Gunong Pulai. Malacca, Sungei Hudang (Goodenough); Mt. Ophir (Hullett). Negri Sembilan, Bukit Tangga.

(15) **P. brachybotrys** Ridl. *Journ. F.M.S. Mus.* iv. 38, and vi. 155.

Scandent stems slender. Leaves lanceolate, coriaceous, cuspidate acuminate, blunt; nerves inconspicuous 7 pairs; 1.5 to 4 in. long, .75 to 1 in. wide; petioles .25 to .5 in. long. Cymes 1.25 to 4 in. long (longer in fruit) nearly glabrous; cymules small, dense; pedicels .1 in. long. Calyx cup-shaped, lobes very short, pubescent. Corolla very short, pubescent, .12 in. long, lobes nearly as long as the tube, hairy inside. Fruit on pedicels .12 in. long; branches of cyme .5 in. long; elliptic pyriform to globose, white, pulpy. Seed 5-ribbed. *Hab.* Mountains; climbing bushes with its petioles. Pahang, Gunong Berumbun at 6000 ft. altitude. Gunong Tahan. Selangor, Semangkok Pass (Ridley).

(16) **P. laxiflora** Bl. *Bijdr.* 964; King, l.c. 4 (*partly*).

Slender climber several feet long, internodes far apart. Leaves membranous, elliptic-lanceolate acuminate, base narrowed; nerves slender, 5 pairs, 3 to 3.5 in. long, .75 to 1 in. wide; petioles .2 in. long, slender. Stipules in a short tube, lobes lanceolate cuspidate. Panicle very lax, 1 in. long; branches slender on a peduncle 2 in. long, slender. Bracts small, linear. Flowers very small; peduncles slender, .15 in. long. Calyx short wide campanulate with short teeth. Corolla small white, about .1 in. long. Fruit of 2 pyrenes .25 in. long, flat on one side, rounded on back, 5-ridged. Rare. *Hab.* Perak, Ayer Larut (Wray). *Distrib.* Sumatra, Java.

The Singapore and Johor plants included by King are *Gærtnera viminea*.

(17) **P. calocarpa** Kurz. *Journ. As. Soc. Beng.* xli. (2), 315; King, l.c. 10.

Glabrous woody or almost herbaceous shrub, 2 to 4 ft. tall. Leaves membranous, attenuate at both ends, edges undulate (crenate in India) oblong-lanceolate, cuspidate; nerves fine conspicuous, 10 to 12 pairs inarching far from margin; 6 in. long, 2 in. wide; petioles 1 in. long. Stipules caducous, broadly

triangular acuminate, .2 in. long. Cymes terminal or axillary, sessile or short peduncled, 1 in. long with few branches, trichotomous. Flowers .2 in. long on short pedicels. Calyx-tube cylindrical, lobes oblong, blunt. Corolla narrow campanulate, densely silky in mouth 4-lobed. Fruit ovoid, sub-globose, fleshy, bright red, .3 in. long. Seeds 1-ridged on back, flat surface grooved. *Hab.* Rocky places. Not common. Pulau Tioman (Burkill); Malacca, Mt. Ophir (Hullett). Negri Sembilan, Tampin Hill (Burkill). Selangor, Ulu Gombak. Dindings, Gunong Tungul. Kelantan, Chaning. *Distrib.* India and Burma.

(18) **P. rostrata** *Bl. Bijdr.* 961. *Chasalia rostrata* *Miq. Ann. Mus. Bot. Lugd. Bat.* iv. 203; *King, Journ. As. Soc. Beng.* lxxiii. 134.

Glabrous shrub with slender branches about 6 ft. tall. Leaves thin membranous, elliptic-oblong acuminate, cuspidate, base narrowed; nerves 5 to 6 pairs, conspicuous, widely inarching, reticulations conspicuous, 3 to 6 in. long, 1.5 to .3 in. wide; petioles .2 in. long. Stipules in a short tube with bristles. Cymes small, usually under .5 in. long with short branches on slender peduncles 1.25 in. long. Calyx olive yellow, 4-toothed. Corolla white, tube as long as lobes, oblong, 4. Stamens 4. Fruit pulpy white, obovoid, .2 in. long. *Hab.* Common in lowland woods. Singapore, Selitar; Pulau Ubin; Garden Jungle. Johor, Sedenak; Simpai, Batu Pahat (Kelsall). Malacca, Ayer Keroh; base of Mt. Ophir. Negri Sembilan, Burunang and Gunong Bumban (Cantley). Selangor, Kwala Lumpur; Semangkok; Dusun Tua. Perak, Larut (Kunster). Dindings, Gunong Tungul. Kelantan, Chaning.

var. with very narrow leaves. Top of Mt. Ophir. *Distrib.* Sumatra.

(19) **P. lanceolaria** *Ridl.*

Slender, glabrous shrub. Leaves lanceolate-acuminate, long narrowed to base, membranous; nerves 10 pairs inarching, 6 in. long, 2 in. wide; petioles very slender, 1.5 in. long. Stipules ovate acuminate, .12 in. long. Cymes 1 in. long and wide; peduncles .25 in. long; branches and flowers few. Flowers small, white; pedicels short. Calyx small, cup-shaped, lobes 4, ovate, sub-acute. Corolla .1 in. long, white, tube longer than calyx, silky within, lobes 5, oblong, blunt. Fruit .2 in. long, globose, obscurely 4-ridged. *Hab.* Forests. Selangor, Batu Caves (Ridley).

(20) **P. Helferiana** *Hook. fil. F.B.I.* iii. 172; *King, l.c.* 13, *not of Kurz.*

Low unbranched shrublet 1 to 2 ft. tall or less, densely hairy all over. Leaves elliptic-lanceolate long acuminate, base long, narrowed or short cuneate, membranous; nerves 10 pairs, slender, prominent beneath; 7 to 9 in. long, 4 to 4.5 in. wide; petioles 1 to 1.75 in. long. Stipules .5 to 1 in. long, oblong-lanceolate, subulate, hairy. Heads .5 to .75 in. through, dense globose very hairy, in axillary cymes an inch or more long, generally below the leaves



with very numerous bracts intermixed with the small white flowers. Calyx-tube narrow, campanulate, lobes lanceolate nearly as long. Corolla small, white. Fruit oblong, bright orange, hairy, .3 in. long. Seed 4-ridged. *Hab.* Woods, only in the south. Singapore (Wallich); Chan Chu Kang; Garden Jungle. Johor, Pinerong; Simpai, Ulu Batu Pahat (Kelsall). Malacca, Mt. Ophir, Bukit Besar. Selangor, Semangkok Pass.

var. *diffusa*, King and Gamble. Shrub 6 ft. tall. Leaves narrower, lanceolate-acuminate, 10 in. long or less. Heads in spreading peduncled cymes; peduncle short; branches 1.5 in. long. Flowers flesh colour. *Hab.* Mountain forests. Johor, Gunong Pulai (Hullett, Ridley, etc.). A very distinct-looking plant and possibly specifically distinct. *Distrib.* Burma, Andamans.

(21) *P. rhinocerotis* Reinw. *Bl. Bijdr.* 961; King, *l.c.* 18; Valeton, *l.c.* Bogor. cclxxxviii. *P. Curtisii* King, *l.c.*

Shrublet densely red hairy, 1.5 to 6 ft. tall, base creeping, unbranched. Leaves obovate or elliptic short apiculate, narrowed to petiole, herbaceous green, glabrous above, silvery beneath and soft pubescent; nerves 10 to 14 pairs; 3 to 5 in. long, 1.35 to 2.5 in. wide; petioles .2 to .6 in. long. Stipules lanceolate, fimbriate. Panicle solitary terminal, densely red-hairy; branches slender, .5 to 1.5 in. long, spreading. Flowers white in small dense heads. Calyx tubular, teeth as long as corolla tube, lanceolate-acuminate hairy. Corolla pubescent outside, tube stout, lobes reflexed lanceolate, tufts of hairs at stamens. Fruit elliptic, 10-ridged "purple." Seed 4- or 5-ridged. *Hab.* Perak (Scortechini); Waterloo (Curtis). Lankawi, Kwah (Curtis). Perlis near Kanga. *Distrib.* Java.

(22) *P. multicapitata* King and Gamble, *l.c.* 10.

Much-branched shrub 3 to 7 ft. tall. Leaves thin membranous, obovate-lanceolate or oblong caudate, base narrowed, glabrous above, scurfy puberulous on midrib and 9 to 13 pairs of nerves, 5 to 10 in. long, 2.5 to 4 in. wide; petioles .7 to 1.15 in. long. Stipules free triangular, .15 in. long. Cymes 2 in. long (including peduncle) and as wide; branchlets numerous with numerous globular cymules .5 in. across, puberulous. Flowers pedicelled, .15 in. long. Calyx cupular, teeth lanceolate acute. Corolla longer, tube cylindrical, white-silky inside. Fruit ellipsoid-obovoid, 10-ridged, glabrous, .3 in. long. Seed 4-ridged, faintly. *Hab.* Perak (Scortechini, Kunstler).

I have not seen this.

(23) *P. Birchiana* King and Gamble, *l.c.* 15.

Shrublet, unbranched, entirely soft-pubescent, 6 to 18 in. tall. Leaves thick membranous, elliptic-lanceolate acuminate, base round; nerves 10 to 12 pairs; 3.5 to 5 in. long, 1.5 to 2.25 in. wide; petioles .5 to 1 in. long. Stipules ovate acuminate, .75 in. long. Cymes dense, on short branches .5 in. long with lanceolate bracts

·3 in. long or less on peduncles 2 in. long. Flowers sub-sessile ·1 in. long. Calyx campanulate, lobes triangular. Corolla wide tubular, lobes short, white. Fruit ellipsoid, glabrous except calyx limb, cherry-red, ·25 to ·3 in. long, 10-ridged. Seed 5-ridged. *Hab.* Mountain forests at 4000 to 5000 ft. altitude. Selangor, Bukit Kutu. Perak, Taiping Hills, Birch's Hill (Wray); Gunong Kerbau (Robinson).

(24) *P. fulva* Buch. *Ham. in Wall. Cat.* 8366; *King, l.c.* 16.

Shrub, sparsely hairy. Leaves thin membranous elliptic shortly apiculate, narrowed, decurrent at base, glabrous beneath, puberulous on midrib and nerves, 15 to 18 pairs, 5 to 8 in. long, 2 to 3 in. wide; petioles 2·5 in. long. Stipules oblong, bifid, ciliate, 1 in. long. Cyme dense, pubescent axillary (rarely terminal) trichotomous, or simple on a long peduncle 3 to 4 in. long. Flowers in dense heads with 2 to 3 large bracts (in bud). Calyx cupular, lobes long acuminate. Fruit narrow elliptic, base narrowed, glabrous 12-ridged, ·45 in. long. Seed 5-ridged. *Hab.* Mountains. Rare. Perak, Ulu Batang Padang and Telom (Wray, Ridley). *Distrib.* India.

(25) *P. coriacea* Korth, *Kruidk. Ned. Ind.* ii. 242.

Stout shrub. Branches pubescent. Leaves very coriaceous, glabrous shining above, dense velvety, pubescent beneath, broad elliptic acute apiculate, base very shortly cuneate; nerves 8 pairs, depressed above, eleviate beneath; 6 in. long, 3 in. wide; petioles thick, 1 in. long, pubescent. Cyme terminal; peduncle 1 in. long, velvety-pubescent. Cymes compact in a head ·5 in. wide, dense-hairy. Calyx sessile, campanulate with ovate lobes. Fruit ellipsoid hairy, 10-ridged, ridges low, ·25 in. long, sessile. *Hab.* Forests. Johor, Gunong Pulai (Ridley). *Distrib.* Sumatra.

My specimen is poor. The specimens of Beccari from Sumatra resemble it, but have thinner leaves and more nerves.

(26) *P. vulpina* Ridl. *Journ. F.M.S. Mus.* x. 142.

Shrubby, stems red-hairy. Leaves membranous elliptic-lanceolate acuminate, base narrowed; nerves 12 pairs ascending; glabrous above, densely red-hairy on the nerves beneath, less hairy on the rest of the surface, 5 in. long, 1·75 in. wide; petioles thickly hairy, ·25 in. long. Stipules broad oblong acuminate hairy, ·75 in. long, ·25 in. wide. Flowers not seen. In fruit, peduncle 3 in. long, slender hairy branches three 1 in. long with 2 to 3 secondary branches. Fruit red, shortly stalked, about ·12 in. long, elliptic, glabrous. Seed 5-ridged outside, flat inside. *Hab.* Woods. Kelantan, Kwala Lebir (Ridley).

This differs from *P. multicapitata*, King, in the very large stipules and much smaller fruit.

(27) *P. fulvoidea* King and Gamble, *l.c.* 17.

Small shrub. Leaves membranous elliptic acuminate, crenulate,

base cuneate, glabrous above; nerves 10 to 14 pairs and reticulations pubescent beneath; 6 to 7 in. long, 2 to 2.5 in. wide; petioles 1 in. long. Stipules ovate caudate, serrate ciliate, 1 in. long. Cymes axillary trichotomous, 1.25 in. across, in flower 2 in. wide, in fruit peduncle pubescent .3 in. long. Flowers in globular cymes, sessile. Calyx campanulate, teeth lanceolate. Fruit narrow-elliptic 12-ridged, glabrous, .4 in. long. Seed 5-ridged, 2-grooved ventrally. *Hab.* Perak (Scortechini). Very rare.

This is near *fulva*, but the leaves are crenulate, smaller and more glabrous.

(28) **P. montana** *Bl. Bijdr.* 960; *King, l.c.* 14.

Stout glabrous shrub. Branches angled. Leaves thinly membranous, elliptic acuminate, base cuneate; nerves 7 to 8 pairs, slender conspicuous inarching far from edge; 5 to 8 in. long, 1.75 to 3.5 in. wide; petioles .4 to 1.25 in. long. Stipules connate, tips caudate-acuminate. Cymes terminal panicked; peduncles .5 to 1.25 in. long. Flowers .25 in. long on ends of branches in cymules of 3. Calyx cupular, teeth broad spreading triangular. Corolla campanulate, lobes broad acute, mouth hairy, lobes 5. Fruit ellipsoid, narrowed to base, .25 to .3 in. long. Seed with one ridge, inner surface concave. *Hab.* Local; usually in hill districts, variable. Pulau Tioman (Burkill). Pahang, Tahan River. Malacca, Mt. Ophir (Hullett). Selangor, Bukit Bintang; Kwala Lumpur; Bukit Kutu. Perak, Telor Pinang; Ulu Temengoh; Hermitage Hill; Lenggong (leaves large ovate cuspidate). Kelantan, Chaning Woods. *Distrib.* Burma, Sumatra, Java.

Most of these belong to the short-petioled form *brevipetiolata*, King and Gamble.

(29) **P. Griffithii** *Hook. fil. F.B.I.* iii. 171; *King, l.c.* 12.

A low shrub about 2 ft. tall, glabrous except inflorescence. Leaves coriaceous, oblong, shortly abruptly acuminate, base cuneate, light green drying greenish grey; nerves 12 to 15 pairs elevate; 6 to 10 in. long, 1.75 to 3.5 in. wide; petioles .4 to .8 in. long. Stipules broad, triangular, sub-acute, .2 to .3 in. long. Cymes dense pyramidal, 1.5 in. long, 1 in. across on 1 to 1.5 in. long; peduncles puberulous. Flowers .2 in. long. Calyx campanulate. Corolla fleshy, tubular, lobes oblong hooded, tube silky inside. Fruit black, oblong-obovoid, .4 in. long, 4-ridged. Seeds 1-ridged. *Hab.* Forests. Common in the south. Singapore, Bukit Mandai; Bukit Timah; Pulau Ubin. Johor, Bukit Soga, Batu Pahat. Malacca, Chabau and Selandor (Cantley); Merlimau (Derry); Ayer Panas (Griffith).

var. *angustifolia*, *Ridley*. A narrow-leaved form. Stipules distinctly keeled. Inflorescence glabrous except for a tuft of red hairs at the base of the branches. Lankawi, Burau Woods (Ridley). *Native name*: Bunga Mempipit.

(30) **P. rudis** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 87.

Small unbranched shrub. Leaves elliptic-lanceolate, long acuminate and long narrowed to base, membranous, drying grey, sparsely hairy on nerves and nervules above, thickly sprinkled with hairs beneath, nerves 10 pairs elevate beneath; 6 to 8 in. long, 2 to 2.5 in. wide; petioles slender, hairy, .75 in. long. Panicle terminal hairy; peduncle and branches slender. Fruit oblong, 4-angled, black, .24 in. long; pyrenes inner face flat elliptic, back rounded with 1 keel. *Hab.* Kedah Peak 2800 to 4000 ft. altitude (Robinson).

Allied to *P. Griffithii*, but leaves hairy and thinner.

(31) **P. siamensis** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 120.

Glabrous erect branching shrub. Leaves coriaceous, lanceolate-acuminate or not, base narrowed drying light green; nerves 11 pairs elevate beneath; 4.5 in. long, 1.75 in. wide; petioles .25 in. long. Stipules connate with short triangular blunt points. Panicles dense, elongate, 2 in. long; branches very short. Flowers small, numerous. Calyx cup-shaped with 5 small points. Corolla twice as long, tube short, lobes ovate acute 5, mouth hairy. Stamens exsert. Fruit globose, .12 in. long, base narrowed 6-ribbed. *Hab.* Open places in the north. Setul heaths. Lankawi (Curtis).

(32) **P. angulata** Korth. *Ned. Kruidk. Arch.* ii. 243; King, *l.c.* 12.

Shrub 4 to 6 ft. tall. Branches angled, glabrous. Leaves coriaceous, oblanceolate cuspidate acute, base narrowed shining above (drying red), midrib prominent both sides; nerves 8 to 10 pairs, depressed above, fine elevate beneath; 4 to 6 in. long, 1 to 1.75 in. wide; petioles .2 to .5 in. long. Stipules broad, triangular acute, .25 in. long. Cymes pyramidal, many-flowered, 1 in. long and wide, branches 4-angled thick, on peduncles 1.5 in. long, 4-angled at top. Flowers sessile or nearly so, .1 in. long, crowded at branch-ends with ovate-acute bracts. Calyx short campanulate 4-toothed. Corolla little longer tubular, lobes hooded oblong, silky inside. Fruit elliptic, black, .25 in. long. Cyme much larger than in flower, 3 in. long and wide. Seed plano-convex. *Hab.* Woods. Common up to 2000 ft. altitude. Singapore Changi; Garden Jungle. Johor, Batu Pahat. Pahang, Pekan; Rumpin River. Malacca (Griffith). Negri Sembilan, Kwala Pedas. Selangor, top of Batu Caves. Dindings, Bruas. Perak, Thaiping Hills (Haniff). Province Wellesley, Tasek Gelugur. Penang Hill, Muka Head (Curtis). Lankawi, Burau. Kedah, Alor Sta. Perlis, Chupeng. *Distrib.* Burma.

The northern plants have much larger cymes, smaller flowers and thinner leaves.

(33) **P. setistipula** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 88.

Shrub; bark pale. Leaves coriaceous, lanceolate, glabrous,

narrowed to both ends; nerves fine, 12 pairs, faint; 4 to 5 in. long, 1.5 in. wide; petioles .5 in. long. Stipules broad, oblong, truncate with a long setiform cusp from the back. Cymes terminal, 3; peduncles 2 in. long, glabrous; branches .5 to 1 in. long, puberulous bearing 1 to 3 globose umbelled cymes at the tip, .3 in. through (in bud), puberulous. Bracts lanceolate-acuminate; bracteoles usually blunt. Buds only seen. *Hab.* Mountains, rare. Selangor, Gunung Mengkuang Lebah (Robinson).

This much resembles *P. angulata*, but the stipules are quite different, leaves more coriaceous and inflorescence puberulous.

(34) *P. malayana* Jack *Mal. Misc.* i. 3; *King, l.c.* 18. *P. aurantiaca* Wall. *Cat.* 8335.

A big bush about 6 ft. tall. Leaves coriaceous, bright green above, glabrous, elliptic or elliptic-lanceolate, shortly abrupt acuminate, long narrowed to base, beneath minutely pubescent; nerves prominent 12 to 18 pairs; 5 to 10 in. long, 2.5 to 4.5 in. wide; petioles .4 to 1.5 in. long. Stipules broad ovate, blunt .35 in. long. Corymbs large, 3 in. across, many-flowered; peduncles 1 to 2 in. long. Flowers .5 in. long. Calyx cup-shaped, truncate. Corolla tubular, lobes oblong, sub-acute, throat villous. Fruit ellipsoid, orange colour, turning black, .4 in. long, 10-ridged when dry. Seed faintly 4-ridged. *Hab.* Edges of woods, local, a very handsome bush. Singapore, Bukit Panjang; Bukit Timah. Pahang, Pulau Tawar. Penang (Wallich, Jack). *Distrib.* Borneo, Java.

(35) *P. cuspidella* Miq. *Ann. Mus. Bot. Lugd. Bat.* iv. 209.

Shrubby glabrous plant. Leaves elliptic cuspidate-acuminate, thinly coriaceous, base narrowed decurrent on the petiole; nerves 13 pairs ascending; 6 in. long, 3 in. wide; petioles 1 in. long. Stipules oblong truncate, free nearly to base, .6 in. long. Fruit ellipsoid .25 in. long, 8-ridged shortly pedicelled on a lax few-flowered cyme, 2 in. long. *Hab.* Selangor, Semangkok Pass (Ridley).

I am not certain of this species, as I only got very incomplete specimens, but if it is not Miquel's plant it is very closely allied to it. *P. cuspidella* is a native of Borneo and Sumatra.

(36) *P. viridiflora* Reinw. *in Bl. Bijdr.* 965; *King, l.c.* 15. *P. Jackiana* Hook. *fl. F.B.I.* iii. 167. *P. sulcata* Wall. *Cat.* 8370.

A small tree 15 to 20 ft. tall or large bush, glabrous. Leaves membranous, oblong-lanceolate acuminate-cuspidate, base cuneate, dark shining green; nerves 8 to 14 pairs, thin but prominent; 3.5 to 8 in. long, 1.25 to 2.5 in. wide; petioles .4 to .75 in. long. Stipules broad oblong-lanceolate, narrowed to top, .3 to .5 in. long. Cymes 3 terminal, 1 in. long on peduncles short to 1.25 in. long. Branches spreading, puberulous. Flowers shortly pedicelled on small cymules, greenish white, .1 in. long. Calyx cupular, teeth small. Corolla wide tubular, mouth silky, lobes broad.

Fruit panicle 3 in. long and wide. Fruit red, 10-grooved when dry, elliptic, sub-globose, .15 in. long. Seed 5-ridged. *Hab.* Common in open country. Pahang River; Telom. Malacca, Ayer Panas (Derry); Bukit Bruang. Negri Sembilan, Tampin Hill (Goodenough). Selangor, Kwala Lumpur. Dindings, Lumut. Perak, Thaiping Hills 1500 to 5000 ft. altitude. Tanjong Malim. Penang coast (Curtis). Kelantan, Kota Bharu. *Distrib.* Borneo, Java, Sumatra, Burma. *Native name:* Jarum Jarum. *Use:* Alexipharmic.

(37) ***P. megacarpa*** *Ridl. Journ. F.M.S. Mus.* vi. 48.

Glabrous shrub. Leaves stiffly thin coriaceous, lanceolate-acuminate at both ends; nerves fine conspicuous; 5 in. long, 1.5 in. wide; petioles .5 in. long. Cymes spreading, sessile branches in fruit slender, 1 in. long. Flowers not seen. Fruit ellipsoid, .4 in. long, .2 in. through, strongly ribbed. Seed flat on inner face, back rounded, 5-ribbed. *Hab.* Perak, Gunong Kerbau 3500 ft. altitude (Robinson).

Flowers not known, but a very distinct plant allied to *P. viridiflora*, with the fruit much bigger.

(38) ***P. stipulacea*** *Wall. Roxb. Fl. Ind. (ed. Carey)*, ii. 164; *King, l.c.* 17.

Stout glabrous shrub 2 ft. tall. Leaves stiffly membranous, oblanceolate or elliptic abruptly acuminate, base narrowed gradually, midrib stout; nerves 11 to 13 pairs, elevate beneath; 5 to 9 in. long, 2 to 4 in. wide; petioles .5 to 1.25 in. long, winged in upper part. Stipules large ovate, .75 to 1 in. long, .4 in. wide. Cyme usually 1, dense, many-flowered, .5 to .3 in. across; peduncle .25 to 1 in. long, stout; branches stout, pubescent. Flowers .15 in. long, white, on short pedicels, clustered in head-like cymules. Calyx campanulate, lobes broad pubescent. Corolla wide campanulate, lobes about half as long, mouth hairy, greenish white. Fruit ellipsoid, 10-ridged when dry, .3 in. long. Seed 5-ridged, concave with 1 ridge on inner face. *Hab.* Forests. Singapore, Bukit Timah. Johor, Gunong Pantai. Pahang, Kwala Tembeling. Malacca, Gunong Mering. Negri Sembilan, Bukit Sulu and Gunong Berumbun (Cantley). Selangor, Weld's Hill, Kwala Lumpur. Perak, Ulu Temengo; Hermitage, Maxwell's Hill. Dindings, Pangkor. Province Wellesley, Bukit Panchur. Penang (Wallich); Penara Bukit, the Hill (Curtis). Kedah Peak. *Distrib.* Sumatra.

(39) ***P. atroviridis*** *Ridl.*

Simple shrublet 12 in. tall; stem hairy. Leaves coriaceous, blackish green, oblanceolate-obovate, glabrous, midrib prominent on both sides as are the 11 pairs of nerves, 7 in. long, 4.25 in. wide; petioles short, stout, .25 in. long. Stipules oblong ovate. Cymes 3, terminal, 1 in. across; peduncle 2 in. long, all puberulous. Flowers many, white, very shortly pedicelled. Calyx cupular with 5 short

ovate blunt lobes. Corolla-tube as long as calyx, lobes oblong, blunt, 5. Fruit ellipsoid with 12 ribs, .25 in. long. *Hab.* Negri Sembilan, Bukit Tangga at 2500 ft. altitude in forest.

Dried specimens resemble *P. stipulacea*, but the plant is quite dwarf, with hairy short stem and broad coriaceous leaves.

(40) *P. Wrayi* King and Gamble, *l.c.* 19.

Shrub, glabrous. Leaves coriaceous, oblanceolate-elliptic gradually narrowed from about the middle; nerves 10 to 15 pairs nearly straight, indistinct above; 6 to 7 in. long, 2 to 2.5 in. wide; petioles .5 in. long, winged above. Stipules ovate sub-acute, edges ciliate, .5 in. long. Corymb umbelliform, 4 in. wide, 2 in. long; branches 4-angled puberulous. Flowers .25 in. long; pedicels thick. Calyx cupular, teeth broad, shallow. Corolla much longer, wide tubular, lobes broad, ovate, throat hairy; anthers exsert. *Hab.* Perak (Wray, Kunstler).

I have not seen this.

(41) *P. inæqualis* King and Gamble, *l.c.* 20.

Small unbranched shrub 1 ft. tall, puberulous. Leaves thick, membranous, unequal, larger one elongate-obovate, smaller one oblong, elliptic abrupt short acuminate, base cuneate, glabrous pitted above, hairy, especially on nerves, 10 to 13 pairs, beneath, 6 to 10 in. long, 2.5 to 5 in. wide; petioles .5 to .75 in. long, stout. Stipules narrow, ovate acuminate, pubescent, .65 in. long. Cymes pyramidal, 2 to 3.5 in. long (peduncles 1 to 2 in. long), rusty-puberulous. Bracts broad, abruptly acuminate, lowest over 1 in. long. Flowers .1 in. long; pedicel short, stout. Calyx tubular, lobes broad triangular. Corolla not much longer, lobes linear, tufts of hairs in throat. *Hab.* Perak (Scortechini).

I have not seen this.

(42) *P. minutiflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 88.

A small shrub, glabrous. Leaves membranous, elliptic-lanceolate acuminate, base long, narrowed, drying black; nerves 13 pairs elevate beneath; 6 to 7 in. long, 1.5 to 2 in. wide; petioles slender, 1.5 to 2 in. long. Stipules broad, oblong, abruptly acuminate, connate, ciliate. Cymes paniced, sessile, many-flowered, 1.5 in. long, 2 in. wide. Calyx short, cup-shaped, narrowed below the limb. Corolla .05 in. long, lobes as long as the very short tube 5, mouth tomentose. Style, lobes thick, 2. *Hab.* Selangor, Ginting Sempah (Ridley) in mountain forest.

Fruit not seen. Apparently nearest to *P. rostrata*.

## 55. CHASALIA, Comm.

Small shrubby plants. Leaves usually membranous and glabrous (rarely hairy). Cymes terminal, short-branched or crowded into a head. Flowers small, white or more or less pink. Calyx

small campanulate, teeth 5. Corolla long, tubular, curved at the top, lobes short, 5, usually hardly expanded. Stamens 5, sub-sessile. Style bifid. Disc conic truncate. Fruit drupaceous, 2-seeded. Species 4 or 5, Indo-Malayan. *King and Gamble, Journ. As. Soc. Beng.* lxxiii, 133.

Glabrous.

Flowers clustered on the branch-ends of a cyme.	
Flowers 1 in. long . . . . .	(1) <i>C. curviflora</i>
Flowers .25 in. long . . . . .	(2) <i>C. minor</i>
Flowers in a bracteate head . . . . .	(3) <i>C. bracteata</i>
Leaves tomentose beneath . . . . .	(4) <i>C. pubescens</i>

(1) *C. curviflora* *Thw. Enum. Pl. Ceyl.* 150, 421; *King and Gamble, l.c.* 133.

Shrub 2 to 5 ft. tall. Branches erect, glabrous. Leaves membranous, elliptic to oblanceolate, but very variable, shortly abruptly acuminate, base narrowed, shining dark green; nerves 5 to 6 pairs; 6 to 8 in. long, 1 to 2.75 in. wide; petioles .3 to .75 in. long. Stipules tubular, truncate entire or cleft. Cymes solitary terminal, 1 to 2 in. long; peduncles and branches purple or white tinted purple, fleshy divergent. Flowers sessile clustered on the branch-ends. Calyx small, black. Corolla 1 in. long, tube long, stout, curved at tip, white tipped madder pink, mouth yellow, lobes very short, lanceolate, not spreading. Fruit black pulpy globose borne on the thickened white or pink fleshy branches. Seeds 2, plano-convex. *Hab.* Very common and variable in size, shape of leaves, size of flowers, etc. In woods whole peninsula, a very pretty attractive plant. *Distrib.* India, Ceylon, Malay islands.

var. *longifolia* *Hook. fil. F.B.I.* iii. 177; var. *linearis* *King and Gamble, l.c.* 134.

Leaves linear acuminate, 6 to 7 in. long, 1.5 in. wide. This occurs sporadically in open places. Singapore, Malacca, fairly common, Ayer Panas; Mt. Ophir, 3000 ft. altitude. Selangor, Rawang (Kloss), leaves rather coriaceous. Penang Hill, a form with leaves only .12 in. wide. This form also occurs in India, Borneo, etc. Intermediate forms occur at Waterloo estate in Perak and Batu Feringhi in Penang with leaves linear-oblong, 7 in. long, 2.5 in. wide, and other forms occur in Province Wellesley at Ara Kudah and on Mt. Ophir. *Native names:* Berah; Buah Bras; Gading Galok; Jarum hitam; Gandarusa hitam; Metamak; Pecha Piring hitam; Kamiri; Pecha Priok putih; Piu-piu; var. *angustifolia* Tubang; Sumpuh Sumut. *Use:* The root used for Herpes zoster (Gimlette).

(2) *C. minor* *Ridl. Journ. F.M.S. Mus.* iv. 39.

Shrub or spreading bush. Stems woody. Leaves lanceolate-acuminate thin, glabrous, edges undulate; nerves 6 pairs; 3.5 in. long, .5 in. wide. Cymes with 3 slender spreading branches .5 in. long, 3 flowers at the end of each. Flowers white; pedicels



·1 in. long. Calyx funnel-shaped, lobes round. Corolla-tube ·25 in. long, curved, lobes lanceolate acute half as long. Stamens 4, exsert. Fruit black, ·25 in. long; peduncles not swollen. *Hab.* Mountain forest. Pahang, Gunong Berumbun, 5000 ft. altitude (Ridley); Selangor, Semangkok Pass. Kedah, Gunong Bintang (Kloss). (In this latter plant the stamens are included.)

(3) *C. bracteata* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 23.

A woody shrublet 15 to 17 in. tall, little or not branched. Leaves narrow lanceolate acuminate at both ends, coriaceous, glabrous; nerves 5 pairs (usually invisible); 4 in. long, 1 in. wide or less; petioles ·25 in. long. Stipules connate with two short ovate lobes. Cymes capitate, terminal, ·5 in. long, on peduncles 1 in. long with 2 ovate-lanceolate bracts ·5 in. long. Flowers 12 in a head, sessile. Calyx cup-shaped entire. Corolla white, ·5 in. long, tube nearly straight, dilate above, lobes ovate reflexed. *Hab.* Mountain forests. Selangor, Semangkok Pass at 4000 ft. altitude (Ridley).

(4) *C. pubescens* Ridl. *Journ. Roy. As. Soc. S. Br.* 54, p. 46.

Bush about 5 ft. tall, much-branched. Leaves herbaceous, lanceolate acuminate-caudate, narrowed to base, above glabrous, beneath pubescent, midrib and nerves (8 pairs) especially densely so; 6 to 7 in. long, 2 to 2·5 in. wide; petioles ·25 to ·5 in. long. Stipules ovate-oblong, ·1 in. long. Cymes compound, dense, 1 in. long, pubescent. Flowers sessile in small heads, rosy white. Calyx cup-shaped, ·15 in. long, teeth short, pubescent. Corolla ·3 in. long, pubescent, pinkish white, tubular, curved, lobes short-linear obtuse hooded. Stamens 5. *Hab.* Rare in lowland woods. Singapore, Bukit Timah. Johor, Sedenak. Selangor, Sungai Buloh (Ridley).

## 56. CEPHAELIS, Sw.

Fleshy-stemmed, little-branched herbs. Leaves membranous oblanceolate or oblong. Flowers several in involucrate heads peduncled. Calyx-tube funnel-shaped, limb entire. Corolla funnel-shaped, lobes 4 or 5 valvate, honey-yellow or white. Stamens 4 or 5. Ovary 2-celled (rarely 3- or 4-celled); ovules solitary. Fruit fleshy, light blue or black; pyrenes 2 plano-convex. Species 70, all tropics.

Little-branched fleshy herbs.

Heads dense solitary

Leaves oblanceolate, 4 to 5 in. wide . . . (1) *C. Griffithii*

Leaves elliptic, 3 in. wide . . . (2) *C. Ridleyi*

Leaves lanceolate, 2·5 in. wide; stipules ovate; fruit blue . . . (3) *C. singaporensis*

Leaves lanceolate, 2 in. wide; stipules narrow mucronate; fruit black . . . (4) *C. melanocarpa*

Leaves linear-lanceolate, 1 in. wide . . . (5) *C. angustifolia*

Heads 3, of few flowers, peduncled . . . (6) *C. triceps*

Stem woody, simple . . . (7) *C. elongata*

Stem woody, branched.

Heads sessile, few-flowered . . . . . (8) *C. subcoriacea*  
 Heads peduncled, 17-flowered . . . . . (9) *C. albiflora*

(1) *C. Griffithii* Hook. fil. *F.B.I.* iii. 178.

Robust, stout-stemmed shrublet. Leaves membranous oblanceolate or oblong-lanceolate, narrowed from above the middle to the base, shortly abrupt acuminate; nerves 12 to 20 pairs; 10 to 16 in. long, 4.5 to 5 in. wide; petioles 1.5 to 3 in. long. Stipules sub-orbicular sub-acute. Head 1 to 2 in. through, sessile or shortly peduncled (peduncle 1 in. long) with numerous orbicular bracts. Calyx .15 in. long, tubular, mouth campanulate truncate. Corolla funnel-shaped curved, honey-yellow, lobes ovate acute. Fruit .35 in. long, light blue, oblong. *Hab.* Forests in lowlands. Malacca, Rhim forest (Griffith). Selangor, Ulu Gombak (Ridley); Semangkok Pass. *Native names:* Chempaka Bukit; Sebiak Gajah; Pupulut Hutan. *Distrib.* Sumatra.

(2) *C. Ridleyi* King, *l.c.* 106.

A very stout plant about 2 ft. tall. Stem thick fleshy, all tinted with purple. Leaves elliptic, sharply acuminate, narrowed to the base from below the middle; nerves 8 to 10 pairs rather faint, midrib broad, flat; 8 in. long, 3 in. wide; petioles 2 in. long. Stipules large oblong lanceolate-acuminate, blunt, .6 in. long. Peduncle thick, 1 in. long. Head 1.5 in. wide. Involucral bracts 1 in. long, lanceolate-acuminate blunt. Flowers purple, shortly pedicelled. Calyx cup-shaped, truncate. Corolla-tube short, .1 in. long, lobes rounded nearly as long. *Hab.* Mountain forests, rare. Selangor, Bukit Kutu at 3000 ft. altitude (type). Perak, Gunong Inas, 3600 ft. altitude (Yapp).

The Singapore and Penang plants referred to this species by King are quite distinct.

(3) *C. singaporensis* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 89.

Plant about 2 ft. tall. Leaves elongate, acuminate, long narrowed to base; nerves 16 pairs; .9 in. long, 2.5 in. wide; petioles 1 in. long. Stipules tubular with 2 blunt points, .15 in. long. Peduncle 1 to 2.5 in. long. Head about 1 in. across. Bracts, outer pair broad ovate sub-acute or blunt, inner ones oblong. Calyx very short, truncate. Corolla 1.25 in. long, tube stout, lobes ovate obtuse, honey-yellow. Fruit light blue. *Hab.* Forests in the south. Singapore, Bajau. Johor, Gunong Pulau; Gunong Pantai (Ridley).

Near *C. angustifolia*, but the leaves broader.

(4) *C. melanocarpa* Ridl.

Shrubby plant 3 ft. tall. Leaves narrow oblanceolate acuminate, base long narrowed; nerves 20 pairs; 8 in. long, 2 in. wide; petioles slender, 1.5 in. long. Stipules broad, blunt oblong-ovate. Peduncle stout, white, fleshy, 2 to 3 in. long. Bracts lanceolate, keeled with

a long mucro 1 in. long. Flowers not seen. Fruit black pulpy, elliptic, narrowed at base, .25 in. long, 4-ribbed when dry. *Hab.* Forests at 2500 ft. altitude. Negri Sembilan, Bukit Tangga (Ridley).

(5) *C. angustifolia* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 88. *C. cuneata* Hook. *fl. F.B.I.* iii. 178; *King, l.c.* 105 (*in part*).

Stem about 18 in. tall, not branched or little. Leaves linear-lanceolate, fleshy membranous, equally acuminate from the middle to both ends, base long narrowed; nerves slender about 15 pairs; 6 to 9 in. long, 1 to 1.5 in. wide; petioles 1.5 in. long. Stipules connate with 2 acuminate points .2 in. long. Head .75 to 1 in. across; peduncle rather slender, 2 to 3 in. long. Bracts ovate orbicular, rounded at top, .4 in. long and wide. Corolla honey-yellow. Fruit oblong, .5 in. long, light blue. *Hab.* Mountain forests at 1500 to 2000 ft. altitude. Johor, Gunong Pantai. Malacca, Mt. Ophir (Maingay, Griffith). Negri Sembilan, Gunong Tampin.

(6) *C. triceps* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 89.

Woody, about 1 to 4 ft. tall. Leaves somewhat or very unequal, rather fleshy membranous elliptic, shortly blunt acuminate, base shortly cuneate; nerves about 12 pairs slightly prominent beneath; 5.5 to 6 in. long, 2.1 in. wide; petioles not winged, .5 in. long. Stipules coriaceous connate with short ovate points .25 in. long. Peduncle 1.75 in. long, bearing 3 pedunculate heads, peduncles .5 in. long, thick. Involucral bracts coriaceous connate, boat-shaped acuminate, 1 in. across the involucre. Bracts of heads broad, oblong, .5 in. long. Heads .5 in. across of few large flowers. Calyx .2 in. long, limb cup-shaped, entire. Buds sub-globose. Corolla-tube .25 in. long, cylindrical. *Hab.* Mountain forests about 3000 ft. altitude. Rare. Selangor, Sempang mines, Semangkok Pass; Damansara Hill, Kwala Lumpur (Ridley).

(7) *C. elongata* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 91.

Stem woody, rather slender, 14 in. tall, internodes 1.5 in. long. Leaves narrow lanceolate long acuminate, base narrowed, slightly fleshy membranous, nerves faint; 8 pairs, 4 to 5 in. long, 1 in. wide; petioles winged, .1 in. long. Stipules connate ovate-lanceolate, blunt, .1 in. long. Peduncle .4 in. long. Head .25 in. wide with 5 to 6 flowers and 2 lanceolate bracts .25 in. long. Floral bracts ovate boat-shaped blunt, .12 in. long. Flowers nearly sessile. Calyx cup-shaped, entire, .05 in. long. Corolla-tube cylindrical, dilate at mouth, .3 in. long, lobes ovate-lanceolate acute, .1 in. long. Fruit oblong, .2 in. long, crowned with calyx, 4-ridged. *Hab.* Mountain forests, 3000 ft. altitude. Selangor, Semangkok Pass (Ridley).

(8) *C. subcoriacea* Ridl. *Journ. F.M.S. Mus.* v. 36.

Stem slender woody branched. Leaves thinly coriaceous, broad lanceolate to obovate acuminate acute, base cuneate; nerves

6 to 8 pairs elevate beneath; 2.5 to 4 in. long, 1.25 to 1.5 in. wide; petioles .2 in. long. Stipules base tubular, lobes lanceolate-acuminate or ovate. Heads sessile, .5 in. across. Flowers few 5 or 6; pedicels and calyx 1 in. long, lobes lanceolate-acuminate. Corolla-tube .3 in. long, hairy in mouth, lobes short, lanceolate to blunt. *Hab.* Rare. Mountains at 5000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson).

(9) *C. albiflora* Ridl. *Journ. F.M.S. Mus.* vi. 155.

A tall branched shrub 6 ft. or more high. Leaves membranous, oblanceolate acuminate, long narrowed to base; nerves 10 to 11 pairs, slender; 6 in. long, 2 in. wide; petioles 1.5 in. long. Stipules lanceolate ovate mucronate. Peduncles 2 in. long. Flowers 17 in a head, sessile. Bracts ovate round, .25 to .5 in. long; bracteoles linear-lanceolate. Calyx-tube thick, lobes very small. Corolla white, tube cylindrical, .5 in. long, mouth hairy, lobes ovate acute, tips hairy. *Hab.* Pahang, Gunong Tahan in woods by streams on the Padang at 5000 ft. altitude (Ridley).

### 57. GEOPHILA, Don.

Small creeping herbs. Stems rooting. Leaves orbicular or reniform, long-petioled. Flowers small, white, solitary, subsessile or in peduncled umbels. Calyx-tube obovoid, lobes narrow. Corolla funnel-shaped, throat hairy, lobes 4 to 7. Stamens as many. Ovary 2-celled, 2-ovuled; style slender, bifid. Fruit pulpy red or black; pyrenes 2, plano-convex. Species 16, tropics.

Leaves with broad often cordate bases.

Flowers solitary axillary.

Leaves glabrous . . . . .	(1) <i>G. humifusa</i>
Leaves hairy . . . . .	(2) <i>G. pilosa</i>
Peduncles with 1 to 3 flowers; fruit red . . . . .	(3) <i>G. reniformis</i>
Peduncles with 6 to 9 flowers; fruit black . . . . .	(4) <i>G. melanocarpa</i>
Leaves with narrow bases, hairy . . . . .	(5) <i>G. Scortechinii</i>

(1) *G. humifusa* King and Gamble, *l.c.* 102.

Stems very slender, rooting at nodes, long. Leaves thickly membranous, glabrous in distant pairs ovate-cordate acute, .4 in. long, .25 in. wide; nerves 3 pairs; petioles .4 in. long. Stipules broad ovate, .1 in. long. Flowers solitary, axillary sub-sessile. Fruit red like a red currant. *Hab.* Perak (Scortechini) rare.

(2) *G. pilosa* Pearson, *Hook. Ic. Pl. t.* 2691; King, *l.c.* 103.

Long creeping stem, leaves, peduncles and calyx hairy. Leaves ovate cordate sub-acute; nerves 3 pairs; .6 to 1 in. long. Stipules ovate. Peduncles terminal 1- to 3-flowered, .5 to .8 in. long. Flowers white; bracts lanceolate. Calyx cylindrical, lobes linear. Corolla tubular, teeth ovate acute, pilose outside. Fruit globular, black. *Hab.* Rare in forests. Singapore, Bukit Timah in one spot; Reservoir woods (Ridley). *Distrib.* Borneo.

(3) *G. reniformis* Don, *Prod.* 136; *King, l.c.* 103.

Stem creeping with erect branches 3 in. tall. Leaves ovate-cordate or orbicular-cordate, sub-acute or blunt, glabrous; nerves 3 to 4 pairs; .5 to 1.5 in. long and about as wide; petioles 1 to 2 in. long. Stipules semi-lunar. Flowers .6 in. long, sessile, 1 to 3 on slender peduncles .5 to 2 in. long. Corolla-lobes lanceolate. Berry orange with calyx-lobes at top .35 in. through. *Hab.* Not rare in forests and on banks over the whole peninsula. Johor, Batu Pahat. Pahang, Kota Glanggi. Malacca, Batang Malacca (Good-enough); Panchur. Selangor, Ginting Bidai (Kloss); Batu Caves. Negeri Sembilan, Bukit Sulu (Cantley). Perak, Jor; Kwala



FIG. 82.—*Geophila melanocarpa*.

Temengoh; Bukit Kapayung. Dindings, Gunong Tungul. Penang, Balik Pulau; banks by the Chitty Temple; Pulau Betong (Curtis). Lankawi, Kwah (Curtis). *Distrib.* Indo-Malaya, China, Polynesia. *Native names:* Akar Pegaga Ular; Pegaga Tikus; Akar Pantat Beruk.

(4) *G. melanocarpa* Ridl. *Trans. Linn. Soc.* iii. 313, t. 62, *flowers too small.*

Creeping stems 6 to 18 in. long, ascending branches 3 in. tall. Leaves fleshy membranous, oblong-ovate slightly cordate, sub-acute; nerves 3 to 5 pairs; 1.75 to 3 in. long, .75 to 1.5 in. wide; petioles 1 to 2.5 in. long, puberulous. Stipules lanceolate. Peduncle terminal, .75 to 3 in. long, with 6 to 9 flowers in umbel. Flowers .6 in. long. Calyx-tube .25 in. long, lobes longer, blunt. Corolla .25 in. long, lobes oblong. Fruit .35 in. long, like a black

currant. *Hab.* Not rare in hill forests. Pahang, Tahan valley; Kota Glanggi. Selangor, Semangkok Pass; Bukit Kudah. Perak, Tapa (Ridley).

(5) *G. Scortechinii* King, *l.c.* 104.

Stem 1 to 2 ft. long, slender, branches erect, short. Leaves fleshy ovate or ovate-elliptic, base narrow or round, sparsely white hairy; nerves 3 to 4 pairs; 1 to 1.5 in. long, .6 to .9 in. wide; petioles .35 to .75 in. long. Peduncles terminal, as long as leaves, dichotomous at tip. Flowers few, .6 in. long. Calyx-tube narrow, long, lobes 5, long linear acuminate. Styles very long. *Hab.* Perak (Scortechini).

I have not seen this plant.

### 58. STREBLOSA, Korth.

Low hairy herbs with membranous leaves and dense axillary inflorescence of small flowers nearly sessile. Calyx campanulate, shortly 5-lobed. Corolla tubular, lobes 5, hairy in mouth of tube. Stamens 5, insert at base of mouth. Style shortly bilobed. Species about 6, Malay Peninsula and islands.

Leaves ovate, scurfy on nerves beneath, herb . . . . (1) *S. microcarpa*  
 Leaves ovate; nerves red hairy, woody . . . . (2) *S. pubescens*  
 Leaves lanceolate hairy on both sides, woody below . (3) *S. hirta*

(1) *S. microcarpa* Ridl. *S. tortilis* King, *l.c.* (not of Korthals).  
*Psychotria microcarpa* Wall. *Cat.*

Herbaceous 6 to 18 in. tall, unbranched sparsely scurfy. Leaves membranous ovate or ovate-elliptic acute, base narrowed, glaucous beneath; nerves 8 to 11 pairs, scurfy; 4 to 6 in. long, 1.75 to 3 in. wide; petioles .5 to 2 in. long. Stipules broad triangular bifid. Cymes dichotomous, .5 to 1 in. long and wide. Calyx hairy. Corolla longer, hairy. Fruit reniform, streaked brown, stiffly white-hairy, .05 in. or less long. *Hab.* In forests in hill districts. Perak, Temengoh; Goping (Kunstler); Penang (Wallich). Road to Pantai Acheh (Curtis).

The specimens labelled "Singapore, Lobb," were no doubt from Penang, as many others of Lobb's plants were. It is highly improbable it ever occurred in Singapore.

(2) *S. pubescens* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 63.

About 1 ft. tall, woody or more; young parts red-hairy. Leaves ovate acute, base cuneate, glabrous above, pustulate beneath; nerves 12 pairs, slender, red-hairy; 6 in. long, 3 in. across; petioles 1 in. long, pubescent. Stipules papery lanceolate-acuminate, glabrous, keels pubescent. Panicles dense from axils of fallen leaves 1 to 2 in. long, lengthening in fruit, red-hairy. Rachis flexuous; flowers in pairs sub-sessile, .1 in. long. Calyx short campanulate, lobes short acute tufted with red hair. Corolla white, tube cylindric, lobes oblong rounded, pubescent outside.

Fruit ovoid, hairy. Seed elliptic-ovoid, punctate. *Hab.* Forests. Johor, Gunong Pantai. Pulau Tiunan (Burkill); Dindings, Telok Sera. Perak, Temengoh (Ridley). Penang, Balik Pulau.

(3) *S. hirta* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 63.

A foot tall, unbranched, woody below, hairy above. Leaves lanceolate acuminate, base narrowed, 4 to 8 in. long, 1.5 to 2 in. wide; nerves 8 or 9 pairs; above thickly punctate and hairy, beneath hairy, the nerves densely so; petioles .5 in. long, hairy. Stipules a broad bifid cup with cuspidate tips glabrous. Panicles short, dense, .5 in. through, hairy. Bracts lanceolate. Calyx campanulate, lobes 5, as long as tube, hairy. Fruit hairy subglobose. *Hab.* Forests. Perak. Penang. Kelantan, Chaning (Ridley).

### 59. LASIANTHUS, Jack.

Shrubs, rarely small trees, usually hairy. Leaves distichous, membranous or thinly (rarely thickly) coriaceous; nerves generally elevate beneath with transverse parallel nervules (*Eu-Lasianthus*) or reticulate, whole plant foetid (*Mephitidia*). Stipules triangular or lanceolate acute. Flowers small, white (rarely white, rarely pink) in axillary sessile (or in section *Litosanthes*) peduncled fascicled cymes. Calyx-tube short with 4 to 5 (rarely 3) long acute lobes. Corolla funnel or salver-shaped, throat villous, lobes 4 to 5. Stamens 4 to 6, insert on short filaments in throat. Style with 3 to 9 stigmas; ovules 1 in a cell. Drupe pulpy blue, more rarely white or black, globular or obovoid, containing 3 to 9, 3-angled, 1-seeded pyrenes. Species over 100, tropical Asia, Africa.

In habit resembling *Urophyllum*, but more hairy; fruit blue (not orange); pyrenes 1-seeded, and calyx-lobes long. The fruit when dry is often lobed from the form of the pyrenes, when alive soft, pulpy and smooth.

i. EU-LASIANTHUS. Flower-heads sessile, not longer than petioles; plants usually hairy; nervules conspicuously parallel.

Heads partly covered by the broad persistent stipules.

Leaves elliptic-oblong, very hairy . . . . . (1) *L. scabridus*

Leaves oblanceolate glabrous above, pubescent beneath; pyrenes 4 acute . . . . . (2) *L. Griffithii*

Leaves oblong-lanceolate, glabrous . . . . . (3) *L. stipularis*

Heads not covered by stipules; bracts conspicuously longer than the flowers.

Outer bracts larger than inner, lanceolate, .25 in. long or more.

Heads .5 in. wide . . . . . (4) *L. cyanocarpus*

Bracts uniform, linear; leaves large, 6 to 7 in. long.

Tree, heads over 5 in. through; flowers pink; leaves coriaceous . . . . . (5) *L. rhinocerotis*

Shrub, heads smaller; flowers white; leaves thin, coriaceous . . . . . (6) *L. Ridleyi*

- Bracts conspicuous triangular, acuminate.  
 Leaves oblong cuspidate, very hairy . . . (7) *L. bractescens*  
 Leaves oblong-lanceolate, acute, glabrous  
 plant . . . . . (8) *L. glaber*
- Bracts ovate cuspidate.  
 Leaves small and close-set, oblanceolate;  
 petioles .25 in. long . . . . . (9) *L. inæqualis*  
 Leaves small and close-set, oblong;  
 petioles under .1 in. long . . . . . (10) *L. subinæqualis*
- Bracts small and inconspicuous.  
 Leaves close-set, small, usually low  
 shrubs.  
 Leaves densely hairy all over, 2 by  
 .4 in. . . . . (11) *L. densifolius*  
 Leaves densely hairy all over, 3 by  
 .1 in. . . . . (12) *L. hirtus*  
 Leaves glabrous above, except tomen-  
 tose midrib . . . . . (13) *L. attenuatus*  
 Leaves almost glabrous above; pyrenes 8 . . . . . (14) *L. appressus*  
 Leaves quite glabrous; pyrenes 5 . . . . . (15) *L. coronatus*
- Leaves distant oblong-lanceolate.  
 Leaves hairy above, at least on midrib.  
 Leaves lanceolate-acuminate, 4.5 by  
 1.25 in. . . . . (16) *L. pilosus*  
 Leaves narrow lanceolate, 6 by  
 1.25 in. . . . . (17) *L. ferrugineus*  
 Leaves lanceolate, 3.5 by 1.25 in.;  
 midrib above only hairy . . . . . (18) *L. mollis*
- Leaves glabrous above, densely hairy  
 beneath.  
 Leaves narrow-lanceolate, 3 in. long,  
 stiff . . . . . (19) *L. politus*  
 Leaves lanceolate, 5 in. long, thin  
 coriaceous . . . . . (20) *L. chryseus*  
 Leaves obovate-elliptic, 4 to 6 in.  
 long, thin . . . . . (21) *L. velutinus*  
 Leaves glabrous above, minutely  
 pubescent beneath . . . . . (22) *L. singaporensis*
- Leaves glabrous above; nerves  
 appressed, hairy beneath;  
 nervules and reticulations not  
 prominent beneath, thinly  
 coriaceous.  
 Leaves broad elliptic, 5 by 2.25 in.;  
 fruit small . . . . . (23) *L. ellipticus*  
 Leaves broad elliptic, 5 by 2.25 in.;  
 fruit large winged . . . . . (24) *L. pterospermus*  
 Leaves 6 to 9 in. long, 2 to 3 in.  
 wide.  
 Calyx short, campanulate . . . . . (25) *L. Maingayi*  
 Calyx broad, velvety . . . . . (26) *L. perakensis*  
 Leaves oblong, long acuminate, 3 by  
 1.25 in. . . . . (27) *L. Curtisii*  
 Leaves lanceolate acuminate, 1.5 by  
 .4 in. . . . . (28) *L. myrtifolius*
- Leaves coriaceous; nerves very pro-  
 ninent beneath.  
 Leaves 5 to 6 in. long, oblong-lan-  
 ceolate; fruit small . . . . . (29) *L. tomentosus*



- Leaves 5 to 6 in. long, oblong-lanceolate, caudate; fruit .2 in. long . (30) *L. angustifolius*  
 Leaves 5 to 6 in. long, elliptic-lanceolate; fruit large, .25 in. long . (31) *L. flavinervius*  
 Leaves 3 to 5 in. (rarely 7 in.) long, membranous ovate-elliptic . (32) *L. Harveyanus*  
 Leaves coriaceous lanceolate, base long-acuminate, 5 by 1 in. . (33) *L. Wrayi*  
 Leaves 3 by 1.5 in. . . . . (34) *L. Wightianus*  
 Leaves 1 by .4 in. . . . . (35) *L. nervosus*  
 Leaves lanceolate acuminate, base cuneate, 4 by 1.25 in. . . . . (36) *L. montanus*  
 Leaves quite glabrous, elliptic, 5 by 1.75 in. . . . . (37) *L. constrictus*

ii. MEPHITIDIA. Fœtid shrubs nearly all glabrous; leaves sub-coriaceous or membranous, nervules not distinctly parallel but broken up; usually drying black; corolla usually longer.

- Calyx, stipules and bracts bearded . . . . . (38) *L. barbellatus*  
 Cymes small glabrous.  
 Leaves elliptic-oblong, 1.4 in. long, thinly coriaceous . . . . . (39) *L. longifolius*  
 Leaves lanceolate acuminate, 1.2 in. long, coriaceous . . . . . (40) *L. pergamaceus*  
 Leaves elliptic-lanceolate.  
 Leaves thin coriaceous; nerves appressed hairy beneath . . . . . (41) *L. chinensis*  
 Leaves rigid coriaceous; nerves glabrous. . . . . (42) *L. crassifolius*  
 Leaves oblong-lanceolate, 4 to 5 in. by 1 in., glabrous . . . . . (43) *L. malaccensis*  
 Leaves oblanceolate, 1.1 by 3.25 in. . . . . (44) *L. robustus*  
 Leaves narrow lanceolate, base cuneate.  
 Leaves thin, 6 by 1.25 in.; nerves appressed hairy . . . . . (45) *L. stercorarius*  
 Leaves thin, long-acuminate, glabrous, 3 by 1 in. . . . . (46) *L. glaberrimus*  
 Leaves oblong-linear acuminate, 4 by 5 in., glabrous . . . . . (47) *L. oblongus*  
 Leaves similar but nerves appressed yellow hairy beneath . . . . . (48) *L. salicifolius*  
 Leaves ovate-lanceolate acuminate, base broad, midrib appressed, hairy coriaceous . . . . . (49) *L. caudiculatus*  
 Leaves quite glabrous.  
 Leaves elliptic, 6 by 2 in.; flowers .25 in. long . . . . . (50) *L. conspicuus*  
 Leaves ovate-lanceolate, 4 by 1.75 in.; flowers as long but more slender . . . . . (51) *L. Lowianus*

iii. LITOSANTHES. Cymes distinctly often long-peduncled, nervation as in *Eu-Lasianthus*; plants usually hairy.

Peduncles short and stout.

- Peduncles, .25 in. long; leaves glabrous coriaceous . . . . . (52) *L. scalariformis*  
 Peduncle very short, whole plant villous . . . . . (53) *L. villosus*  
 Peduncle very short, villous; leaves glabrous above . . . . . (54) *L. pseudo-lucidus*  
 Cymes spike-like, .25 in. long, hairy; leaves glabrous above . . . . . (55) *L. subspicatus*

Peduncles long, slender.

- |   |                           |
|---|---------------------------|
| Leaves ovate-lanceolate acuminate, 4 by<br>1·25 in.; peduncles over 1 in.<br>long . . . . . | (56) <b>L. pendulus</b>   |
| Leaves elliptic acute, 5 by 2·25 in.; peduncle<br>3 in. long . . . . .                      | (57) <b>L. Robinsonii</b> |
| Leaves oblong sub-sessile, 3 by 1 in.;<br>peduncle 5 in. long . . . . .                     | (58) <b>L. filiformis</b> |
| Leaves rhomboid; midrib only hairy, 5 by<br>25 in. . . . .                                  | (59) <b>L. gracilis</b>   |

(1) **L. scabridus** *King and Gamble, Journ. As. Soc. Beng.* lxx. III.

Shrub about 5 ft. tall. Stem glabrous. Leaves coriaceous, oblong to elliptic acuminate, base shortly narrowed unequal; nerves 12 pairs, deep sunk above and elevate beneath, reticulations depressed above, strongly elevate beneath, densely hairy on both sides, 4·5 to 8 in. long, 1·35 to 2·35 in. wide; petioles hairy, 7 in. long. Stipules broadly triangular, glabrous. Heads globose dense, 1 in. through, many-flowered. Bracts linear, very numerous hairy. Flowers few sessile concealed by bracts. Calyx-lobes pubescent, lanceolate. Fruit glabrous, purple blue, 2 in. long. Pyrenes wrinkled 5. *Hab.* Woods in the south. Singapore, Jurong Road (Burkill). Johor, Tanjong Bunga; Batu Pahat. *Distrib.* Carimon isles, Lingga, Borneo.

(2) **L. Griffithii** *Wight, Calc. Journ. Nat. Hist.* vi. 505; *King, l.c.* III.

Shrub about 3 ft. tall, rarely 8 ft., sparsely pubescent. Leaves coriaceous oblanceolate-elliptic acuminate, base acute, glabrous above; nerves 14 pairs and midrib prominent and reticulations hairy beneath; 8 to 12 in. long, 3 to 4 in. wide; petioles thick winged to base. Stipules broad triangular, blunt, half covering the heads, glabrous, 5 in. long. Heads 1 in. through. Flowers sessile, 3 in. long, mixed with numerous linear hairy bracts. Calyx campanulate, glabrous, lobes ovate to lanceolate hairy. Corolla white, tube glabrous, throat hairy, lobes narrow, lanceolate (many cleistogamic flowers). Fruit ovoid, 2 in. long; pyrenes 5. *Hab.* Forests, Singapore, Chan Chu Kang. Johor, Sedenah; Mt. Austin; Serom. Pahang, Gunong Tahan (Haniff). Malacca (Griffith). Selangor, Petaling. Negri Sembilan, Bukit Tumayiang (Cantley). Perak, Goping (Kunstler); Gunong Keledang (var.) Thaiping Hills.

var. *latibracteata*, *King and Gamble*, has shorter broader stipules. *Distrib.* Borneo. Lingga.

(3) **L. stipularis** *Bl. Bijdr.* 997; *King, l.c.* II2.

Slender shrub about 3 ft. tall, entirely glabrous (except bracts and corolla mouth). Leaves thinly membranous, oblong-lanceolate apiculate-caudate, base long-narrowed decurrent to petiole base; nerves slender, 9 to 10 pairs distinct; 5 to 7 in. long, 1·5 to 2 in. wide; petioles 25 in. long. Stipules broad, triangular-ovate acute, 5 in. long and wide at base, completely covering the head.

Flowers  $\cdot 3$  in. long, pedicelled with numerous lanceolate hairy bracts. Calyx campanulate, teeth broad triangular. Corolla three times as long. Fruit ovoid-globose with 8 to 10 ridges  $\cdot 25$  in. long. Seeds 4 to 5 elliptic acute. *Hab.* Woods, common. Singapore, Bukit Timah; Bukit Panjang. Johor, Mt. Austin. Selangor, Batu Caves. Perak, Temengoh; Telok Pinang (form with obovate cuspidate leaves). Kelantan, Chaning. *Distrib.* Andamans, Malay isles.

var. *hirtus* Ridl. Stem, back of leaves and stipules very hairy. Selangor, limestone rocks, Kanching (Ridley).



FIG. 83.—*Lasianthus rhinocerotis*.

(4) *L. cyanocarpus* Jack, *Trans. Linn. Soc.* xiv. 125; King, *l.c.* 113 (excl. var. *subsessilis*).

Shrub 2 to 4 ft. tall, entirely hairy. Leaves coriaceous, oblong to oblanceolate shortly acuminate, base unequal, narrowed; nerves 7 to 10 pairs, elevate beneath; 4.5 to 6.5 in. long, 1.65 to 2.25 in. wide; petioles  $\cdot 15$  to  $\cdot 25$  in. long. Stipules narrow triangular acuminate,  $\cdot 2$  in. long. Cymes sessile, 5 in. long with a number of bracts, the outer ones foliaceous ovate-lanceolate, strong-veined, inner ones smaller, linear. Flowers few, 3 to 4 sessile, concealed by bracts  $\cdot 25$  in. long. Calyx as long as corolla, lobes narrow, hairy. Corolla glabrous inside. Fruit ovoid-globular light blue,  $\cdot 25$  in. long. *Hab.* Common in dry sandy woods often near the sea up

to 3400 ft. altitude. Singapore, Pulau Ubin; Changi. Johor, Batu Pahat. Malacca, Sungei Hudang. Pahang, Rumpin River. Selangor, Langat. Perak, Gunong Batu Putih 3400 ft. altitude (Wray), a variety with leaves and stem claret-colour, flowers green tipped claret. Penang, West Hill. Province Wellesley, Ara Kudah. Kedah Peak 1500 ft. altitude (Robinson). *Distrib.* Indo-Malaya.

The whole plant is often covered with bright yellow hairs, giving it a very bright appearance.

(5) **L. rhinocerotis** *Bl. Bijdr.* 996; *King, l.c.* 114 (Fig. 83, p. 153).

Shrub or tree about 20 ft. tall. Branches, petioles, underside of leaves and inflorescence tomentose. Leaves coriaceous, oblong-lanceolate acute, base round, glabrous above; nerves 10 to 12 strongly elevate, as are transverse parallel nervules; 6 to 7 in. long, 2.25 in. wide; petioles .25 in. long. Stipules triangular acute, .2 in. long. Heads sessile or short-peduncled, .75 in. long. Bracts numerous linear, pilose. Flowers pale pink. Corolla-lobes concave, outside pilose. Fruit ovoid pointed, blue .15 in. long. Pyrenes 3-cornered, 5. *Hab.* Forests, at 2500 to 5000 ft. altitude. Johor, Gunong Pulai. Selangor, Bukit Hitam (Kelsall); Sempang, Semangkok. Pahang, Telom. Perak, Gunong Batu Putih (Wray); Gunong Kerbau (Robinson). *Distrib.* Java, Borneo.

(6) **L. Ridleyi** *King and Gamble, l.c.* 115.

Shrub about 3 ft. tall. Branches few, soft pubescent. Leaves thinly coriaceous oblong or elliptic acute or acuminate, base blunt, glabrous above, light green, beneath pale; nerves 5 to 7 pairs ascending, elevate nervules transverse, parallel, all hairy; 5 to 8 in. long, 1.75 to 2.5 in. wide; petioles very short. Stipules lanceolate, blunt, .2 in. long, hairy. Heads .5 in. through, bracts linear hairy. Calyx cup-shaped, greenish white with 4 triangular lobes, white-hairy. Corolla white, tube cylindrical hairy, lobes rounded 4 broad with long white hairs. Fruit globose, deep blue, .25 in. through. Pyrenes 2, semi-lunar, nodulose. *Hab.* Woods, Singapore, Garden Jungle; Woodlands; Bukit Timah. Johor, Gunong Pulai. Negeri Sembilan, Tampin Hill. Selangor, Kwala Lumpur (Ridley).

(7) **L. bractescens** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 85. *L. cyanocarpus* *var. subsessilis* *King, l.c.* 113.

Shrub. Branches hairy, as are midrib above and with nerves beneath and inflorescence. Leaves oblong long-acuminate often abruptly, base rounded, sometimes slightly unequal, thin membranous sparsely hairy above, more densely beneath; nerves 12 pairs, fine but elevate beneath; 6 in. long, 1.5 in. wide; petioles .05 in. long. Stipules lanceolate acuminate. Bracts hairy on both sides, .3 in. long. Calyx-lobes narrow lanceolate acuminate, hairy. Corolla white, much longer, glabrous except white hairy

mouth, tube slender, cylindrical, .25 in. long, lobes short oblong, blunt. *Hab.* Forests, rare. Selangor, Batu Caves; Ulu Gombak. Perak, Goping (Kunstler).

var. *rosulatus*. Leaves oblong sessile, broad, bases unequal. Bracts ovate acute, forming a rosette, each 1 in. or more long. Perak, Telok Pinang, Lenggong and Temengoh (Ridley).

Very like *L. pilosus*, but with large, broad bracts. Very distinct from *L. cyanocarpus* in the broad unequal base of leaves and quite different bracts.

(8) ***L. glaber*** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 59.

Shrub. Stem glabrous. Leaves thinly coriaceous elliptic lanceolate acuminate, acute, base cuneate; nerves elevate beneath; 6 in. long, 2 in. wide, glabrous occasionally with minute hairs; petioles .5 in. long or less. Stipules lanceolate acuminate edged with long yellow hairs, .3 in. long. Bracts lanceolate, hairy. Flowers several, short-pedicelled. Calyx ampliate urceolate with 5 long acuminate points, hairy. Corolla-tube twice as long, white, glabrous, except the mouth, lobes oblong acute, 5, .25 in. long. Fruit .3 in. long, obovoid, base narrowed, apex acute, glabrous. Pyrenes 4, rough. *Hab.* Perak, Temengoh woods (Ridley).

Allied to *L. ellipticus*, but glabrous.

(9) ***L. inæqualis*** *Bl. Bijdr.* 996; *King, l.c.* 114.

Shrub. Branches densely pilose, as are petioles. Leaves membranous, elliptic-oblancheolate, shortly acuminate, base round unequal, glabrous above except pilose midrib and puberulous nerves, beneath soft, pilose; 3 to 5.5 in. long, 1 to 2 in. wide; petioles .2 to .25 in. long. Stipules linear, pilose. Heads .1 in. long, few-flowered; bracts ovate abruptly acuminate, yellow-hairy, .7 in. long. Flowers .35 in. long. Calyx campanulate, lobes lanceolate, unequal. Corolla yellow-hairy outside, lobes oblong. Fruit narrow ovoid hairy, crowned with the enlarged calyx-lobes, .35 in. long, including lobes. Pyrenes 4, 3-sided rugose. *Hab.* Rare, mountain forests. Perak, Waterfall Hill, Thaiping (Wray). Penang, Moniot's Road (Curtis).

(10) ***L. subinæqualis*** *King and Gamble, l.c.* 120.

Shrub 3 to 5 ft. tall. Branches tomentose. Leaves membranous oblong-lanceolate acuminate, base round sub-cordate oblique, pilose on both sides, especially on midrib and 8 to 10 pairs of nerves; 2 to 3.5 in. long, .75 to 1 in. wide; petioles under .1 in. long. Stipules ovate to elliptic, pilose, .5 in. long. Head few-flowered, bracts like stipules but smaller ovate, abruptly acuminate. Flowers few, .3 in. long, sessile. Calyx with 4 lanceolate lobes. Corolla .15 in. long, 4-lobed, hairy outside. Fruit .35 in. long, including long sepals globular blue, sparsely hairy. Pyrenes 4, smooth. *Hab.* Hill forests, Johor, base of Gunong Pantai. Negri Sembilan, Gunong Angsi. Perak, Bujong Malacca (Ridley). Penang (Curtis). *Distrib.* Sumatra, Java.

(11) **L. densifolius** *Miq. Fl. Ind. Bat.* ii. 321; *King, l.c.* 122.

Shrub 3 ft. tall, more or less hairy all over. Leaves membranous sub-sessile, close set, narrow-oblong lanceolate, slightly oblique and emarginate and curved short-acuminate; nerves 8 pairs, fine, slightly elevate; 2 to 3 in. long, .5 in. wide. Stipules lanceolate. Flowers few with 5 or 6 lanceolate-acuminate white hairy bracts. Calyx-lobes linear acuminate, hairy, 4. Corolla-tube .25 in. long, hairy above, lobes 4, short ovate, very hairy all over. Fruit cobalt blue, sprinkled with white hairs .75 in. long, obovoid, a tuft of blue black hairs on top. Pyrenes 3 to 4, small, aciniform, smooth. *Hab.* Common in woods in the south. Singapore, Garden Jungle; Changi; Bajau. Johor, Gunong Pulai; Panchur. Selangor, Klang Gates; Ginting Bidai. Negri Sembilan, Perhentian Tinggi.

var. *calycina* King. Leaves glabrous above. Calyx-lobes as long as fruit, Singapore, Chan Chu Kang (Ridley).

var. *latifolia* King. Leaves broad oblong, point abrupt, base over 1 in. wide, Selangor, Ginting Peras (Ridley). *Distrib.* Borneo.

(12) **L. hirtus** *Ridl. Journ. F.M.S. Mus.* iv. 36.

Shrub, densely brown hairy. Leaves lanceolate acuminate with a long point, sub-sessile, hairy on both sides; nerves 10 pairs impressed above, elevate beneath; 4 to 4.5 in. long, .75 to 1 in. wide; petioles .1 to .25 in. long, hairy. Cymes densely hairy. Stipules lanceolate acute, hairy. Calyx-lobes 5, hairy. Fruit .1 in. long, hairy, eventually glabrous crowned by the hairy sepals, Pyrenes 4. *Hab.* Mountain forests, Pahang, Telom (Ridley).

(13) **L. attenuatus** *Jack, Trans. Linn. Soc.* xiv. 126; *King, l.c.* 121.

Shrub about 4 ft. tall. Branches, stipules, midrib both sides and nerves beneath covered with yellow tomentum. Leaves membranous, oblong-lanceolate short acuminate, base round, sub-sessile; nerves 7 to 8 pairs elevate, nervules conspicuous beneath; 2 to 3.5 in. long, .75 to 1 in. wide; petioles .05 in. long or less. Stipules lanceolate, as are bracts. Flowers sessile, 1 to 3. Calyx .2 in. long, lobes 4, lanceolate acuminate hairy. Corolla narrow campanulate, lobes 4, hairy outside, glabrous inside. Fruit ovoid, deep blue. Pyrenes 4. *Hab.* Woods. Common. Singapore, Bukit Timah; Chan Chu Kang. Johor, Batu Pahat. Malacca (Griffith). Negri Sembilan, Perhentian Tinggi; Gunong Angsi (Ridley). Perak, Thaiping Hills.

var. with leaves hairy above, Pulau Tiunan (Burkill) and Gunong Angsi. *Distrib.* Lingga.

(14) **L. appressus** *Hook. fil. F.B.I.* iii. 181; *King, l.c.* 121.

Shrub above 4 ft. tall. Branches, petioles, stipules, bracts softly densely yellow-hairy. Leaves coriaceous, oblong-lanceolate acute or acuminate, base round sub-oblique above, glabrous except midrib, beneath hairy; nerves 6 to 7 pairs, elevate beneath; 2 to

3 in. long, .5 to .75 in. wide; petioles .1 to .15 in. long. Stipules oblong blunt. Flowers .15 in. long, sessile, sub-solitary surrounded by linear-lanceolate hairy bracts, outer ones .25 in. long. Calyx campanulate. Fruit globular, .15 in. through, pilose. Pyrenes 8, 3-sided, smooth. *Hab.* In mountain forests, occasionally low down, common. Singapore, Chan Chu Kang. Johor, Batu Pahat, Bukit Soga. Malacca, Mt. Ophir. Selangor, Batu Tiga. Dindings, Lumut. Perak, Temengoh; Thaiping Hills. Penang (Wallich). Kedah Peak (Ridley). Lankawi, Gunong Raya (Haniff).

(15) **L. coronatus** King and Gamble, *l.c.* 120. *L. Wallichii?* var. *penangensis* Hook. *fil. F.B.I.* iii. 181.

Branches slender covered, as are petioles, stipules and nerves of lower side of leaves, with soft brown tomentum. Leaves coriaceous, oblong-lanceolate, much acuminate, base cuneate, quite glabrous above, edges hairy; nerves depressed beneath, glabrous except nerves and nervules elevate; nerves 5 to 6 pairs; 3 to 3.5 in. long, .75 to 1 in. wide; petioles .1 in. long. Stipules linear, .2 in. long. Cymes few-flowered with a few linear tomentose bracts rather long hairy. Fruit sub-globular, base narrowed deeply 5-grooved, pubescent and wrinkled, .25 in. long, lobes linear, erect pubescent. Pyrenes 5, bony. *Hab.* Forests. Very rare and little known. Perak (Scortechini). Penang (Wallich 8441, 1 sheet). Young leaves very hairy with long hairs, midrib above hairy.

(16) **L. pilosus** Wight, *Calc. Journ. Nat. Hist.* vi. 506; King, *l.c.* 115.

Shrub. Branches, petioles, under surface of leaves, stipules and inflorescence tomentose. Leaves thinly coriaceous, oblong or elliptic-lanceolate, tips sub-acute, base rounded unequal or cuneate, shortly above pilose or glabrous, midrib hairy; nerves elevate beneath, slender, 9 to 13 pairs; 4.5 to 6 in. long, 1.25 to 2.5 in. wide; petioles .1 in. long. Stipules triangular, lanceolate, acute hairy, 1 in. long. Heads sessile, .2 in. through. Bracts small, hairy. Calyx .2 in. long; teeth triangular. Corolla-lobes 5 to 7, "dirty purple" campanulate. Fruit glabrous blue black, sub-globular ribbed. Calyx-lobes long hairy. Pyrenes 5 to 7. *Hab.* Forests, Johor, Serom. Pahang, Kwala Tembeling. Malacca (Griffith); Brisu (Derry); Jasin Road (Burkill). Kelantan, Chaning Woods.

var. *angustifolius*, King and Gamble. Leaves narrow, 4 to 5 in. long, 1 to 1.15 in. wide, with the type form.

var. *setosus*. *L. setosus*, Wight, *Calc. Journ. Nat. Hist.* vi. 506; Hook. *fil. F.B.I.* iii. 181. *L. crassinervis* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 59. Leaves coriaceous, base not unequal; nerves depressed above, as are reticulations, otherwise similar. Malacca, Mount Ophir and Ayer Panas (Griffith). Perak, Ulu Temengoh (Ridley).

This appears to be a mountain form with very rigid coriaceous leaves.

(17) *L. ferrugineus* King and Gamble, l.c. 130.

Shrub. Branches rusty woolly as are stipules, petioles, and midrib both sides. Leaves thin coriaceous, dark brown when dry, oblong-lanceolate, long acuminate, base round, above glabrous, except midrib (young leaves sparse hairy), beneath more dense hairy; nerves and transverse nervules elevate, 10 to 18 pairs; 5 to 6 in. long, 1.25 to 1.5 in. wide; petioles .15 to 2 in. long. Stipules triangular. Cymes small ebracteate. Flowers short, pedicelled. Calyx .25 in. long, tubular campanulate hairy, lobes 5, lanceolate acuminate. Corolla shorter. *Hab.* Mountain forests, Negri Sembilan, Tampin (Burkill). Perak, Gunong Bubu at 4500 ft. altitude (Wray).

(18) *L. mollis* Ridl. *Journ. F.M.S. Mus.* x. 144.

Shrub. Branches slender appressed, yellow hairy. Leaves membranous lanceolate acuminate, base cuneate; nerves 6 to 7 pairs, above glabrous, shining except the midrib appressed hairy, beneath the main nerves and transverse nervules appressed hairy; 3.5 in. long, 1.25 in. wide; petioles slender, .25 in. long, hairy. Cymes sessile, few-flowered, shorter than the petiole. Bracts lanceolate acuminate hairy. Flowers sessile 2 to 3 in a cyme, white. Calyx-lobes short lanceolate, hairy. Corolla much longer, tube .15 in. long, glabrous, narrow, cylindric, dilate at the top, lobes 4, ovate blunt, much shorter. Stamens exsert 4. *Hab.* Woods, local. Malacca, Tebong (Ridley).

(19) *L. politus* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 85.

Shrub. Branches entirely covered with dense tomentose hair, as are petioles, midrib and nerves beneath and inflorescence. Leaves coriaceous, bright shining green above, hairy beneath, lanceolate acuminate, base shortly cuneate; nerves faintly depressed above, elevate beneath, 6 pairs, reticulations also elevate conspicuous; 3.5 in. long, .75 in. wide; petioles thick, .1 in. long. Stipules narrow lanceolate, densely hairy soon disappearing. Heads dense, .2 in. long. Bracts linear, long-hairy. Flowers sessile. Calyx-tube short, globose, lobes 5, lanceolate linear acuminate, densely long-hairy. Fruit globose, 5-lobed, white pulpy, .5 in. through, obscurely hairy especially at top terminated by the connivent hairy sepals, .2 in. long. *Hab.* Mountain forests. Selangor, Sempang Mines. Negri Sembilan, Bukit Tangga (Ridley).

(20) *L. chryseus* Ridl. *Journ. F.M.S. Mus.* x. 143. *L. Kurzii* King and Gamble, l.c. 119, not of Hook fil.

Shrub, 2 or 3 ft. tall. Stem appressed yellow-hairy. Leaves thin coriaceous, lanceolate acuminate, narrowed to base, glabrous above and shining, densely hairy on midrib and nerves beneath, nerves 9 pairs; 5 in. long, 1.5 in. wide; petioles tomentose, .2 in. long. Cymes 5- to 6-flowered, sessile hairy. Bracts minute or none. Flowers sessile. Sepals triangular, acute hairy. Fruit .2 in. long, hairy obovoid. *Hab.* Forests. Singapore, Garden jungle; Chan



Chu Kang; Pasir Panjang. Johor, Tanjong Bunga. Selangor, Semangkok Pass (Ridley).

The Penang? Wallich No. 8311, is, I think, clearly the Burmese plant described by Hooker as *Kurzii*, and must be wrongly localised.

(21) *L. velutinus* Ridl. *Journ. F.M.S. Mus.* x. 144.

Shrub 3 ft. tall, densely hairy. Leaves obovate to elliptic shortly acuminate, base narrowed cuneate; nerves 8 pairs, elevate beneath; 4 to 6.5 in. long, 2 to 2.75 in. wide; petioles .15 in. long. Stipules ovate acuminate, hairy. Cymes sessile, as long as petiole, few-flowered. Bracts lanceolate, linear, hairy persistent. Calyx-lobes lanceolate acuminate hairy. Corolla not seen. Fruit small, .2 in. long when dry, hairy. *Hab.* Kelantan, Chaning Woods (Ridley).

(22) *L. singaporensis* King and Gamble, *l.c.* 117.

Shrub. Branches, petiole and midrib on underside pilose. Leaves thinly coriaceous, narrow elliptic oblanceolate tapering to each end, above glabrous, shining, beneath soft pubescent; nerves 6 to 7 pairs and transverse nervules pubescent, elevate; 5 to 6 in. long, 1.75 in. wide; petioles .2 in. long. Stipules linear, hairy as long. Cymes 4- to 6-flowered. Bracts 2 to 3 to each flower, linear, hairy. Flower .4 in. long. Calyx campanulate, tube narrow, limb wide, teeth 5, deep triangular. Corolla funnel-shaped, glabrous outside, inside villous, lobes 5, narrow. *Hab.* Forests. Singapore, Bukit Timah; Selitar. Johor, Sedenak. Penang Hill (Ridley).

(23) *L. ellipticus* Wight, in *Calc. Journ. Nat. Hist.* vi. 507, King, *l.c.* 118? *L. venulosus* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 23. *L. sordidus* Ridl. *l.c.* 57, p. 60.

Shrub. Branches appressed pilose as are petioles and under nerves of leaves. Leaves thinly coriaceous, broad elliptic or nearly ovate acuminate, base shortly narrowed, glabrous above; nerves (and nervules) visible on both sides, 7 pairs, elevate beneath, nervules horizontal parallel, fine; 4.5 to 6.5 in. long, 1.5 to 2.5 in. wide; petioles .1 in. long. Stipules lanceolate caudate pilose. Heads small, few-flowered, very short. Bracts long, linear acuminate. Calyx sessile, lobes triangular acuminate hairy. Corolla hairy, 5-lobed, tube cylindric. Drupe .12 in. long (dry), obovoid hairy. *Hab.* Lowland forests. Singapore, Woodlands (leaves more coriaceous and hairy beneath); Pasir Panjang. Johor, Sedenak. Malacca (Griffith). Negri Sembilan Tampin (Burkill). Selangor, Sungei Buluh. Perak, Ulu Temengoh (Ridley).

King's description of the specimen labelled Penang, Curtis 1594, which he refers to this, does not agree with the type, and I have no specimen. I think it better to reduce my *L. venulosus* Ridl. to *ellipticus*, as also *sordidus*, allowing for local variation.

(24) **L. pterospermus** *Wight. Calc. Journ. Nat. Hist.* vi. 510; *King, l.c.* 125.

Shrub strigose puberulous becoming glabrous. Leaves thinly coriaceous, glabrous except the midrib and nerves beneath, broad elliptic or oblong-elliptic, abruptly acuminate; nerves slightly elevate above, more so beneath, 10 to 12 pairs, nervules transverse, fine; 5 to 7 in. long, 2 to 2.25 in. wide; petioles .2 in. long. Stipules lanceolate acuminate densely hairy. Cymes small, 3- to 4-flowered. Flowers sessile; bracts minute or none. Calyx .15 in. long strigose teeth short. Corolla tube short, glabrous except the woolly mouth. Fruit sub-globose, .5 in. long (fresh), glabrous, black. Pyrenes 4 to 5 trigonous with 3 vertical processes, middle one thick wrinkled, two laterals thin, wing-like. *Hab.* Lowland forests; not common. Johor, Kota Tinggi. Malacca, Ayer Panas (Griffith); Tebong.

(25) **L. Maingayi** *Hook. fil. F.B.I.* iii. 188. *L. flavicans* *King and Gamble, l.c.* 116.

Shrub 4 to 8 ft. tall. Branches slender covered with yellow tomentum eventually deciduous. Leaves thickly membranous pale, narrow-elliptic acuminate, base cuneate; nerves 5 pairs finely elevate beneath; nervules transverse elevate, soft hairy otherwise leaf glabrous; 5 to 7 in. long, 1.25 to 2 in. wide; petioles .3 to .35 in. long. Stipules oblong pubescent. Heads .2 in. long. Flowers few; bracts linear acuminate, hairy. Calyx campanulate, glabrous with 4 large triangular teeth hairy. Corolla twice as long, glabrous outside, villous inside, lobes triangular. Fruit blue, elliptic acute at each end, or blunt, .45 in. long; pyrenes rugulose. *Hab.* Common in woods. Singapore, Garden jungle; Bukit Timah. Johor, Genuang; Batu Pahat; Pulau Tioman (Burkill) (with leaves broad elliptic, 3 in. wide, cuspidate). Pahang, Pulau Tawar. Malacca, Tebong. Selangor, Dusun Tua; Langat. Perak, Ulu Temengoh; Thaiping. Kelantan, Chaning (Ridley).

var. *hirta*. Leaves very hairy beneath. *Hab.* Negri Sembilan, Bukit Tinggi.

var. *subglabra*. Hairs deciduous. *Hab.* Selangor, Langat; Dusun Tua. Penang (Curtis). *Distrib.* Borneo, Sumatra.

King and Gamble's description of *L. Maingayi* does not at all agree with Hooker's description or the type. They give the flowers as trimerous, whereas they are tetramerous. I cannot separate *flavicans* from *Maingayi*.

(26) **L. perakensis** *King and Gamble, l.c.* 126.

Shrub or small tree minutely puberulous, as are petioles, stipules and nerves beneath. Leaves thin coriaceous, narrow-elliptic or obovate-elliptic abruptly acuminate, base narrowed from lower third; nerves 7 to 8 pairs, depressed above, with the transverse nervules elevate and puberulous or yellow hairy beneath; 6 to 10 in. long, 1.75 to 3.25 in. wide; petioles .2 to .25 in. long. Heads .2 in. through, dense with a few linear

hairy bracts. Flowers sessile. Calyx campanulate, lobes indistinct, blunt, pubescent. Fruit hemispheric, sub-glabrous ribbed. Pyrenes 5. *Hab.* Hill forests. Pahang, Telom; Raub (Foxworthy). Negri Sembilan, Bukit Tangga. Perak, Goping (Kunstler); Gunong Inas (Wray). Dindings, Gunong Tungul. Penang, Chalet. Kelantan, Chaning (Ridley).

Perhaps only a mountain form of *L. Maingayi*.

(27) *L. Curtisii* King and Gamble, l.c. 128.

Shrub. Branches slender pubescent. Leaves thickly membranous, lanceolate or elliptic-lanceolate caudate pale, base very shortly narrowed, above glabrous, below pubescent on midrib; nerves 4 to 6 pairs, elevate, as are transverse nervules; 2.5 to 3.5 in. long, .35 to 1.25 in. wide; petioles .15 to .2 in. long, pubescent. Cymes short, sessile, 6- to 8-flowered ebracteate. Flowers sessile, .15 to .2 in. long. Calyx cleft nearly to base into 5 linear-lanceolate lobes, hairy. Corolla shorter, tube stout, mouth hairy, lobes 5, short. Fruit ovoid-globular, pilose, .1 in. long with the sepals as long; pyrenes 5, 3-angled. *Hab.* Penang, West Hill and Bukit Hitam (Curtis).

(28) *L. myrtifolius* Ridl. *Journ. F.M.S. Mus.* iv. 35.

A tall shrub; young parts pubescent. Leaves coriaceous, lanceolate acuminate, base cuneate; nerves and nervules elevate on both surfaces, glabrous above, pubescent beneath, .5 to 1 in. long, .25 to nearly .5 in. wide; petioles pubescent, .1 in. long. Stipules lanceolate pubescent. Flowers very small, 1 or 2 sessile in a leaf axil. Bracts minute ovate. Calyx pubescent campanulate, lobes 4, blunt. Corolla .2 in. long, white, tube cylindric, lobes linear, 4, pubescent outside, hairy within. *Hab.* Pahang, Telom ridge 5000 ft. altitude (Ridley).

(29) *L. tomentosus* Bl. *Bijdr.* 997; King, l.c. 130.

Shrub. Branches, petioles, stipules densely tomentose. Leaves sub-coriaceous, oblong-lanceolate acuminate, base round or cuneate glabrous or sparsely strigose above, paler sparsely pilose beneath; midrib and nerves slender, elevate, 7 to 10 pairs densely pilose, nervules transverse, faint; 2.5 to 3.5 in. long, .5 to 1 in. wide; petioles .1 to .2 in. long. Stipules triangular. Cymes condensed, ebracteate sessile. Calyx .1 in. long, campanulate, hairy, obscurely toothed. Corolla-tube wide, glabrous with a band of hairs in throat, lobes ovate. *Hab.* Lowland forest in the south. Singapore, Woodlands; Kranji. Johor, Batu Pahat on Bukit Banang; Bukit Soga; Mt. Austin; Gunong Janeng (Kelsall). *Distrib.* Java, Borneo.

(30) *L. angustifolius* King and Gamble, l.c. 126.

Small tree. Branches minutely tomentose. Leaves thick, membranous, narrow oblong-lanceolate caudate, base cuneate, glabrous above, except tomentose midrib, beneath glabrous, except

pubescent midrib and 12 to 14 pairs nerves, reticulations transverse strong beneath; 5 to 6 in. long, .6 to .75 in. wide; petioles .15 in. long. Stipules lanceolate, edges ciliate. Cymes 2- to 3-flowered ebracteate. Flowers sessile, .2 in. long. Calyx pubescent, teeth triangular acuminate, 5. Corolla-lobes 5, lanceolate pubescent, tube glabrous. Fruit ovoid globular, .2 in. long; pyrenes 4 to 5 rugulose. *Hab.* Perak, Gunong Batu Putih (Wray).

(31) **L. flavinervius** *Ridl. Journ. F.M.S. Mus.* vi. 154.

A shrub. Stem and young parts covered with yellow hairs, appressed. Leaves coriaceous elliptic-acuminate, base slightly narrowed above, glabrous shining beneath; nerves 7 pairs and transverse nervules strongly elevate and covered with yellow hairs; 6 in. long, 2 in. wide. Stipules very short, hairy. Cymes short few-flowered. Flowers small, shortly pedicelled. Calyx .12 in. long, campanulate, teeth short tipped blue. Corolla silky. Fruit .25 in. long, campanulate narrowed at base, with 5 large linear-lanceolate teeth, .1 in. long, hairy, blue. Pyrenes 4, backs round, smooth. *Hab.* Pahang, Woods, Gunong Tahan (Ridley).

(32) **L. Harveyanus** *King and Gamble, l.c.* 129.

Shrub. Branches minutely tomentose as are petioles and midribs on both sides. Leaves membranous, elliptic or ovate-elliptic, narrowed to blunt tip, base round, above scaberulous with a few hairs near the edges, lower scabrid-puberulous with a few appressed hairs on edges; nerves 4 to 6 pairs; 4 to 5 in. long, 1.65 to 2 in. wide; petioles .15 to .2 in. long. Stipules triangular acute. Cymes ebracteate of 3 to 5 sessile flowers, .3 in. long. Calyx narrow campanulate very pubescent, 4-toothed. Corolla funnel-shaped pubescent, lobes ovate, 4. *Hab.* Perak at 3400 ft. altitude (Wray).

var. *longifolia*. Leaves elliptic-oblong, shortly acuminate 7.5 in. long; nerves 8 to 10 pairs. *Hab.* Malacca (Hervey).

(33) **L. Wrayi** *King and Gamble, l.c.* 119.

Small tree. Branches pubescent. Leaves thinly coriaceous, oblong-lanceolate long-acuminate to each end, glabrous above, midrib appressed pubescent beneath, elevate, as are the 5 pairs of nerves, nervules conspicuous, elevate; 3.5 to 5 in. long, .75 to 1 in. wide; petioles .3 in. long. Stipules triangular acuminate. Flowers .15 in. long, 2 or 3 together with a few short, broad, pubescent bracts. Calyx .05 in. long, teeth 4, small, acute appressed hairy. Corolla hairy, lobes blunt, white. Fruit white. *Hab.* Mountain forests, rare, Perak, Gunong Batu Putih (Wray).

(34) **L. Wightianus** *Hook. fil. F.B.I.* iii. 188; *King, l.c.* 125.

A shrub. Branches, stipules, nerves beneath, and midrib on both sides pubescent. Leaves thin coriaceous, oblong-elliptic acuminate mucronulate, glabrous, dark above, paler beneath, hair often yellow, reticulations fine, conspicuous on both sides with the nerves 10 to 13 pairs strongly elevate beneath, base rounded or shortly

cuneate; 3.5 to 4.25 in. long, 1.25 to 1.5 in. wide. Cymes of 2 or 3 flowers sessile. Calyx with 5 hairy lanceolate acuminate lobes. Corolla longer, hairy. Fruit .2 in. long, terminated by the lobes of calyx, minutely hairy, when dry strongly 6-angled. *Hab.* Mountains 4000 to 5000 ft. altitude. Malacca, Mt. Ophir (Griffith). Pahang, Gunong Tahan. Selangor, Gunong Semangkok (Ridley).

Terminal leaves often very small, narrow-lanceolate.

(35) **L. nervosus** King and Gamble, *l.c.* 129.

Small bush 2 to 3 ft. tall. Branchlets and petioles brownish tomentose. Leaves coriaceous shining, oblong sub-acute mucronate, base shortly narrowed; nerves 6 to 8 pairs minutely pubescent, nervules transverse; 1 to 1.5 in. long, .4 to .6 in. wide; petioles .1 in. long, tomentose. Stipules triangular, pubescent. Cymes sessile 3-flowered. Flowers .15 in. long, sessile. Calyx cupular, teeth short, 4. Corolla .1 in. long, tube cylindrical, hairy, white, mouth hairy, lobes 4. Fruit blue, sparsely hairy globular, .15 in. long, pyrenes 4. *Hab.* Mountains, Selangor, Menuang Gasing (Robinson); Gunong Ulu Kali (Burn-Murdoch). Perak (Scortechini).

This is near *L. Wightianus*, but much smaller.

(36) **L. montanus** King and Gamble, *l.c.* 127.

Bush 4 to 8 ft. tall. Branches and stipules appressed pilose. Leaves thickly sub-coriaceous, ovate-lanceolate shortly acuminate, base cuneate, quite glabrous above, pubescent on midrib and on the prominent, inarching 5 to 6 pairs of nerves and transverse nervules; 3 to 4.5 in. long, 1 to 1.5 in. wide; petioles .1 to .15 in. long. Stipules triangular acuminate, pubescent. Flowers 1 or 2 ebracteate, .5 in. long. Calyx-tube short, lobes linear-lanceolate, pubescent. Corolla white, tube narrow, pubescent outside and in but especially inside near base, lobes broad, tips with tufts of hairs. Fruit depressed globose, .15 in. long (dry) with the long calyx-lobes. *Hab.* Mountain forests, Pahang, Gunong Tahan. Perak, Gunong Bubu 3000 to 4000 ft. altitude (Wray); Larut 3000 to 3500 ft. altitude (Kunstler).

(37) **L. constrictus** Wight, *Calc. Journ. Nat. Hist.* vi. 515; *King, l.c.* 117.

Shrub. Young parts, petioles and nerves beneath strigose. Leaves sub-coriaceous, thinly elliptic or oblong narrow tip acuminate, base very shortly cuneate; nerves 3 to 5 pairs, elevate beneath; 3.5 to 5.5 in. long, 1.25 to 2.5 in. wide; petioles .15 to .2 in. long. Stipules lanceolate strigose, deciduous. Cymes 4- to 6-flowered, .2 in. long. Flowers sessile. Calyx .1 to .15 in. long, constrict below the triangular toothed mouth, hairy. Corolla funnel-shaped, .25 in. long, glabrous outside, villous inside. Fruit oblique ellipsoid, narrowed both ends 4-ridged rugulose, .35 in. long. Pyrenes 4.

*Hab.* Forests, Singapore, Sungei Buluh; Changi; Kranji. Johor, Batu Pahat; Kwala Sembrong (Kelsall); Pahang, Tahan River and Pahang River. Malacca, Merlimau. Selangor, Sungei Buluh. Negri Sembilan, Gunong Angsi. Perak, Goping (Kunstler); Temengoh. Kelantan, Chaning. *Distrib.* Burma.

(38) ***L. barbellatus*** *Ridl. Journ. Roy. As. Soc. S. Br.* 77, p. 187.

Shrub 3 ft. tall. Branches glabrous. Leaves sub-coriaceous, short acuminate, base cuneate, above glabrous shining beneath with scattered stiff hairs on the midrib; nerves elevate beneath, 7 pairs, nervules faint transverse; 3.5 to 4.5 in. long, 1.5 in. wide; petioles .2 in. long, hairy. Stipules lanceolate acuminate, hairy. Cymes sessile, .25 in. long. Calyx long-hairy with lanceolate acuminate sepals. Corolla white, tube glabrous, lobes shorter oblong hairy broad nearly as long as the tube. *Hab.* Pulau Tiuman, Juara Bay (Burkill).

(39) ***L. longifolius*** *Wight, Calc. Journ. Nat. Hist.* vi. 514; *King, l.c.* 116.

Shrub quite glabrous. Leaves thinly coriaceous, broad or narrow elliptic or oblong, short acuminate, narrowed to petiole, scabrid beneath, nerves 10 to 13 pairs elevate, minutely hairy, transverse nervules elevate; 8 to 10 in. long, 2 to 3.5 in. wide; petioles .3 to .4 in. long. Stipules lanceolate, partly covering inflorescence but caducous. Cymes .2 in. long. Flowers 4 to 6, sessile with a few fimbriate bracts much shorter. Calyx .2 in. long tubular, coriaceous, teeth small. Fruit obovoid angled, purple. *Hab.* Hill forests. Johor, Gunong Pulai; Gunong Pantai. Malacca (Griffith); Ayer Panas (Hervey). Selangor, Kwala Lumpur. Negri Sembilan, Gunong Berumbun (Cantley). *Distrib.* Sumatra.

(40) ***L. pergamaceus*** *King and Gamble, l.c.* 123. *L. coriaceus* *King and Gamble, l.c.* 123.

Shrub or tree, very foetid. Young parts puberulous, bark pale. Leaves thin or thickly coriaceous, oblong-elliptic, shortly blunt acuminate, base cuneate; nerves slender 10 pairs, reticulations distinct, thin rhomboidal; 8 to 10 in. long, 2 to 2.75 in. wide; petioles .3 to .4 in. long. Stipules .15 in. long base broad, points abrupt. Cymes about .2 in. long ebracteate, peduncled. Flowers .5 in. long, sessile. Calyx .25 in. long, mouth tubular, truncate. Corolla much longer, 4-lobed, thick, fleshy, pubescent on one side outside, villous inside. Fruit purple. *Hab.* Mountains, Perak, Gunong Batu Putih (Wray) at 4500 ft. altitude (Scortechini).

The specimens of Wray and one of Scortechini's No. 332 have thin, the other of Scortechini's No. 332 has thick leaves; the latter is King's *L. coriaceus*.

(41) ***L. chinensis*** *Benth. Flor. Hongkong*, 160; *King, l.c.* 124. Shrub 8 to 12 ft. tall. Young branches puberulous. Leaves

thinly coriaceous, elliptic-oblong, short acuminate, narrowed to base, reticulate visibly on both sides, glabrous above, nerves and reticulations hairy beneath, 8 to 9 pairs; 5 to 6 in. long, 1.5 to 2 in. wide; petioles stout, pubescent, .15 in. long. Stipules triangular. Cymes few-flowered, sessile or peduncled, .2 in. long, hairy. Flowers .4 in. long, shortly pedicelled. Calyx appressed pubescent campanulate, lobes lanceolate. Corolla glabrous outside, pilose inside, lobes oblong. Fruit ovoid, pubescent at first. Pyrenes 4, small. *Hab.* Forests. Malacca, Pulau Besar (Griffith); Mt. Ophir. Pahang, Gunong Tahan (Haniff). Perak, Goping (Kunstler). Kedah Peak (Ridley). *Distrib.* S. China.

The typical Hongkong plant differs in having much larger flowers and the leaves do not become coriaceous in the same way as in the Malay plant. It would probably be better to keep the latter distinct.

(42) **L. crassifolius** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 85.

Woody stout shrub. Young branches puberulous. Leaves stiffly coriaceous above glabrous shining elliptic-lanceolate acuminate-caudate blunt, base short narrowed; nerves 9 to 12 pairs, thin, elevate puberulous when young; 7 in. long, 2 in. wide, reticulations conspicuous; petioles .4 in. long, pubescent. Stipules small triangular. Cymes few-flowered on woody peduncles .2 in. long; bracts small, ovate, hairy. Flowers sessile, .15 in. long. Calyx very short, shallow, lobes small spreading hairy. Corolla silky hairy, lobes short. Fruit ovoid narrowed at base and tip, hairy .1 in. long when dry. *Hab.* Forests in mountain districts. Malacca (Maingay). Selangor, Sempang, Semangkok Pass, 3000 ft. altitude.

(43) **L. malaccensis** *King and Gamble, l.c.* 124.

Shrub. Branches puberulous. Leaves coriaceous, oblong-lanceolate blunt acuminate, base round, edges wavy, glabrous except a few hairs on midrib and nerves 8 pairs reticulate; 4 to 5 in. long, 1 to 1.4 in. wide; petioles .3 in. long. Stipules base broad, triangular. Flowers 2 to 3 together, sessile. Calyx campanulate under .1 in. long, puberulous, 5-toothed. Fruit sub-globular with 5 or 6 sepals .2 in. through. Pyrenes 4, smooth. *Hab.* Malacca, Mt. Ophir. (Ridley).

(44) **L. robustus** *King and Gamble, l.c.* 123.

Branches glabrous. Leaves coriaceous, glabrous, oblanceolate, much narrowed, not acute at base, above nerves and nervules depressed, beneath reticulations, midrib and 16 to 20 pairs of nerves prominent; 8 to 11 in. long, 2.5 to 3.25 in. wide; petioles .4 in. long, stout. Stipules coriaceous, sagittate, .4 in. long. Cymes shorter than petioles condensed, no bracts, few-flowered. Calyx .1 in. long, teeth 5 or 6 obscure. Fruit sub-globular, 6-ridged, glabrous, .15 in. through. Pyrenes 5 or 6. *Hab.* Forests; rare. Malacca, Ayer Panas (Hervey); lower part of Mt. Ophir (Ridley).

(45) *L. stercorarius* Bl. *Bijdr.* 1000.

Shrub foetid. Branches, stipules, nerves and midrib of underside of leaf pubescent. Leaves membranous, oblong-lanceolate acuminate, base cuneate, drying brown; nerves slender 11 pairs, nervules fine, parallel and reticulate; 5 to 6 in. long, 1.25 to 1.5 in. wide; petioles .1 in. long. Stipules lanceolate acuminate. Cymes small of 3 or 4 sessile flowers. Calyx short, hairy, lobes very short. Corolla .2 in. long, glabrous. Fruit very small, .1 in. through, depressed obovoid 5-ridged obscurely when dry. *Hab.* Johor, Kota Tinggi (Ridley). *Distrib.* Java.

(46) *L. glaberrimus* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 86.

Foetid shrub with slender branches, quite glabrous. Leaves membranous, lanceolate acuminate-caudate, base cuneate; nerves very fine, faint, about 9 pairs inarching .1 in. from edge, secondaries as prominent, reticulations wide hardly conspicuous; 3.5 to 4 in. long, 1 to 1.25 in. wide; petioles .05 in. long. Stipules lanceolate caducous. Flowers very small 2 or 3 in axillary fascicles. Calyx campanulate with minute teeth. Corolla-lobes valvate, tube very slender, .05 in. long. Ovary 3-locular with 1 ovule in each cell. Fruit blue, obconic, .1 in. through. Pyrenes 2. *Hab.* Mountains, Selangor, Semangkok Pass. Malacca (Maingay). Penang, Moniot's Road; West Hill (Curtis). Kedah Peak.

This is nearest *L. Lowianus*; Clarke suggests it to be a *Saprosma*.

(47) *L. oblongus* King and Gamble, *l.c.* 127.

Shrub 6 to 20 ft. tall. Branchlets slender pubescent. Leaves membranous narrow lanceolate long-acuminate, base cuneate, drying dark, midrib puberulous; nerves inconspicuous above, 7 pairs, faint as are the transverse reticulations, all puberulous; 3 to 5 in. long, .5 to .6 in. wide; petioles .15 in. long. Stipules long, nearly glabrous. Flowers white, pedicelled. Calyx campanulate, mouth wide, truncate. Corolla .2 in. long, tube rather long, lobes oblong blunt, mouth woolly. Fruit globular, .2 in. long, 7 to 8-ridged, corrugated dark blue. Pyrenes 7 or 8. *Hab.* Hill forests, common, Johor, Hadji Senawi near Batu Pahat. Negri Sembilan, Bukit Burunang (Cantley). Selangor, Weld's Hill; Rawang. Pahang, Telom; K'luang Terbang (Barnes). Perak, Thaiping Hills; Goping (Kunstler); Telok Pinang; Tapa; Bujong Malacca. Kedah Peak. *Native name*: Sekuntut Jantan.

A very foetid plant.

(48) *L. salicifolius* Ridl. *Journ. F.M.S.* iv. 35.

A bush. Branches covered with felted hair. Leaves narrow-lanceolate, base shortly narrowed, sub-acuneate or round, thinly herbaceous, glabrous above, except the midrib and nerves covered with appressed yellow hairs beneath midrib, nerves 13 pairs and



nervules elevate densely yellow hairy; 4 in. long, .5 in. wide; petioles .25 in. long, hairy. Stipules hairy. Flowers 1 or 2, axillary sessile. Calyx campanulate, .08 in. long, lobes acute hairy. Corolla .1 in. long, hairy, base dilate, limb dilate, lobes ovate. Fruit globose, hairy .25 in. long. *Hab.* Pahang, Telom Ridge at 5000 ft. altitude (Ridley).

(49) *L. caudiculatus* Ridl. *Journ. F.M.S. Mus.* vi. 48.

Branches slender, covered with fine yellow hairs. Leaves coriaceous lanceolate, long caudate, base acute cuneate shining, glabrous except the ciliate edge and midrib and elevated nerves beneath, 5 pairs, hairy; 3.5 in. long, 1 in. wide; petioles .1 in. long, silky. Stipules triangular acute silky. Cymes sessile short, few-flowered. Bracts small. Calyx-lobes ovate acute, silky yellow. Corolla-tube stout, lobes ovate triangular acute, hairy. *Hab.* Perak, Gunong Kerbau at 4500 ft. altitude (Robinson).

(50) *L. conspicuus* Ridl. *Journ. F.M.S. Mus.* iv. 36.

Glabrous shrub 6 ft. tall. Leaves thin lanceolate or oblong-lanceolate, abruptly acuminate, base broad; nerves elevate beneath 8 to 9 pairs; 5 to 7 in. long. Stipules small, lanceate. Cymes shorter than petioles. Bracts linear, glabrous. Flowers several. Calyx campanulate, hardly toothed. Corolla .5 in. long, glabrous except the mouth, lobes 5, nearly half as long as tube. Fruit small, ovoid, .25 in. long, crowned by 5-toothed calyx. Pyrenes 5. *Hab.* Pahang, Telom Forests (Ridley).

(51) *L. Lowianus* King and Gamble, *l.c.* 132. *L. lucidus* King, not Blume, *l.c.*

Shrub glabrous, fœtid. Leaves thinly coriaceous, drying dark, oblong-elliptic or lanceolate caudate-acuminate, base much or little narrowed, shining, reticulate, nerves 7 to 10 pairs inarching .15 in. from edge, secondaries prominent; 4 to 6 in. long, 1.15 to 1.8 in. wide; petioles .15 to .2 in. long, slender. Stipules minute triangular. Cymes 4- to 8-flowered ebracteate. Flowers .25 in. long, white pedicelled. Calyx tubular, teeth 3. Corolla narrow, lobes narrow ovate 3. Fruit depressed, sub-trigonus or didymous blue, .3 in. through. Pyrenes 2 or 3, pyriform, smooth. *Hab.* Mountain woods, Pahang, Telom. Selangor, Semangkok Pass; Dusun Tua. Perak, Larut Hills, 2000 to 3000 ft. altitude (Kunstler); Kwala Kangsa. Kedah, Yan (Ridley).

(52) *L. scalariformis* King and Gamble, *l.c.* 131.

Stout shrub 5 to 6 ft. tall. Branches minutely rusty puberulous. Leaves coriaceous elliptic-oblong, shortly acuminate or acute, narrowed to base, glabrous; nerves 7 to 8 pairs conspicuous on both sides, nervules very numerous, transverse and close; 4 to 5 in. long, 1.25 to 1.5 in. wide; petioles .25 to .3 in. long. Stipules minute triangular. Peduncle .3 to .5 in. thick with a 3- or 4-flowered cyme at apex. Flowers sessile. Calyx .2 in. long, campanulate with 5 oblong acute lobes. Fruit obovoid, glabrous,

5-ridged; pyrenes 5. *Hab.* Mountain forests, Perak (Scortechini and Wray).

(53) *L. villosus* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 88.

Shrub with branches, petioles, stipules, midrib on both sides, nerves and nervules beneath and inflorescence villous. Leaves elliptic cuspidate or acuminate with a long point, base narrowed blunt, glabrous above except midrib; nerves 18 pairs elevate beneath, nervules transverse; 4 to 6 in. long, 1.5 to 2 in. wide; petioles .1 in. long. Stipules lanceolate acuminate narrow. Flowers few in a head on the stout hairy peduncle. Bracts .15 in. long lanceolate acuminate. Calyx-tube semi-globose, villous lobes short, triangular. Corolla glabrous, .15 in. long, tube short, lobes as long, 4, mouth dense hairy. Fruit globose, .2 in. long, hairy. *Hab.* Perak, Tapa Woods (Ridley).

(54) *L. pseudo-lucidus* King, *l.c.* 128.

Bush. Young branches tomentose. Leaves thin coriaceous, narrowly elliptic-lanceolate acuminate, base cuneate, glabrous above, dark beneath, reticulate, midrib and nerves 6 to 7 pairs puberulous; 2 to 2.5 in. long, .6 to .75 in. wide; petioles .1 in. long, pubescent. Stipules oblong-lanceolate tomentose, .4 in. long. Cymes .2 in. long on short tomentose peduncles 3- or 4-flowered. Flowers sessile. Calyx deeply divided into 5 linear-lanceolate lobes, hairy. *Hab.* Perak at 5000 ft. altitude (Wray).

(55) *L. subspicatus* King and Gamble, *l.c.* 118.

Small tree. Branches 2-grooved, underside of leaves and inflorescence covered with flocculent pubescence. Leaves membranous, ovate-elliptic much acuminate, base cuneate, glabrous except midrib and nerves beneath, reticulations faint; nerves 6 to 8 pairs, 3.5 to 5 in. long, 1.25 to 1.85 in. wide; petioles .25 in. long. Stipules elongate triangular acute keeled. Cymes spiciform about .25 in. long with a few lanceolate bracts acute, shorter than the 6 to 12 flowers, all hairy. Flowers sessile less than .1 in. long. Calyx-tube campanulate, teeth 5, small triangular. Corolla-tube much shorter than the 5-lobed limb. *Hab.* Mountain forests, Perak (Wray). Penang (Curtis).

(56) *L. pendulus* Ridl. *Journ. F.M.S. Mus.* iv. 67.

Shrub 6 to 8 ft. tall. Branches long pendulous, dense-hairy. Leaves lanceolate acuminate, sessile or nearly so, cuspidate, base round, coriaceous shining glabrous above, densely hairy beneath; nerves 8 pairs depressed above, elevate beneath; nervules transverse, 3 to 4 in. long, 1 to 1.5 in. wide. Stipules lanceolate-linear dense hairy. Peduncles 1.5 in. long with 3 to 4 flowers surrounded by many filiform hairy bracts, .5 in. long. Calyx with 5 long lanceolate subulate hairy sepals. Corolla glabrous, white, lobes nearly as long as tube. Fruit .25 in. long obovate, narrowed to base, 5-lobed and crowned with hairy calyx-lobes. *Hab.* Pahang, Gunong Berumbun near Telom at 6000 ft. altitude (Ridley).

(57) **L. Robinsonii** *Ridl. Journ. F.M.S. Mus. iv. 37.*

A tall pubescent shrub, internodes 3 in. long. Leaves thin elliptic-acuminate slightly narrowed to blunt base, sub-sessile, glabrous above, hairy on nerves depressed above, elevate beneath, 8 pairs, nervules raised hairy; 5 in. long, 2 in. wide; petioles .1 in. long or less. Peduncles filiform, 2 in. long, hairy. Flowers 1 to 3, sessile. Bracts 2, hairy, subulate. Calyx .1 in. long, teeth subulate 4, longer than the tube, hairy. Corolla .25 in. long, hairy outside and in, tube very short, lobes longer oblong, tips round. Fruit obovoid hairy, crowned with long linear sepals. *Hab.* Mountain forests 4000 to 5000 ft. altitude. Pahang, Telom and Gunong Tahan (Ridley).

(58) **L. filiformis** *King and Gamble, l.c. 131.*

Shrub. Branches slender, all hairy. Leaves membranous sub-sessile oblong-lanceolate, shortly acuminate, base round entirely hairy; nerves 7 to 9 pairs thin; 2 to 2.75 in. long, .65 to 1 in. wide. Stipules linear-lanceolate, .2 in. long. Peduncles filiform pubescent .75 to 1 in. long with 1 or 2 flowers with 1 or 2 bracts often ovate acuminate foliaceous, .5 in. long (var. *bracteata*). Calyx-tube .1 in. long, lobes 4, linear-lanceolate, long. Corolla longer, white hairy, lobes 4. Fruit blue, .25 in. wide. *Hab.* Hill and mountain forests, Pahang, Tahan, Wray's Camp at 3000 ft. altitude (Ridley). Perak, Tapa; Sungei Rayah (Kunstler).

(59) **L. gracilis** *King and Gamble, l.c. 132.* *Litosanthes biflora* *Bl. Bijdr. 994.*

Bush 2 to 3 ft. tall with slender branches appressed pubescent. Leaves stiffly membranous ovate or rhomboid acute mucronate, base cuneate, glabrous; nerves 7 to 9 pairs; .6 to .75 in. long, .35 to .5 in. wide; petioles .05 in. long. Peduncles filiform hairy, .4 in. long. Bracts minute. Flowers 2 to 3 in a head. Fruit globose, glabrous, .15 in. long. Pyrenes 4. *Hab.* Mountain forests. Perak, Ulu Batang Padang; Thaiping Hills by the Tea-gardens (Scortechini, Ridley). *Distrib.* Java.

## 60. SAPROSMA, Bl.

Shrubs foetid when broken, often bristly on the branch ends. Leaves membranous, sometimes in whorls. Stipules connate into a 1- to 3-pointed sheath. Flowers small, white or yellow axillary or terminal, solitary or fascicled or cymose. Calyx-tube funnel-shaped; limb dilate 4- to 6-lobed or toothed. Corolla funnel-shaped, throat villous, lobes 4 to 5, valvate edge inflexed. Stamens 4. Ovary 2-celled; ovule 1 in each cell; style filiform bifid. Fruit fleshy, oblong or globose, blue or black. Pyrenes 2 or 1. Species about 10.

- |  |                            |
|--|----------------------------|
| Flowers in dense heads . . . . .         | (1) <b>S. glomerulatum</b> |
| Flowers few fascicled terminal . . . . . | (2) <b>S. indicum</b>      |
| Flowers cymose pedicelled.               |                            |

Plants glabrous.

Cymes 1 in. long, 3-flowered . . . . . (3) *S. Scortechinii*

Cymes 1.5 to 3.5 in. long, lax several flowered (4) *S. ternatum*

Pubescent on branchlets and back of leaves.

Leaves blunt acuminate . . . . . (5) *S. Ridleyi*

Leaves sub-caudate . . . . . (6) *S. pubescens*

(1) *S. glomerulatum* King and Gamble, l.c. 98.

Fœtid low shrub 6 to 10 ft. tall. Branchlets brown obscurely angled above. Leaves thinly coriaceous, elliptic or ovate-elliptic, cuspidate-acuminate, base cuneate, glabrous; nerves 6 to 9 pairs prominent beneath; 4 to 7 in. long, 1.75 to 3 in. wide; petioles .25 to .4 in. long. Stipules cartilaginous with short bristles inside. Flowers 4 to 5 crowded into a sessile head between the 2 terminal leaves, male head shortly peduncled, female sessile, outer bracts forming an involucre. Flowers sessile, .25 in. long, white (or pale green). Calyx campanulate. Corolla salver-shaped, .2 in. long, tube short, lobes longer, broad blunt. Fruit sub-globular, blue. *Hab.* Forests. Singapore, Bukit Timah; Bukit Mandai. Johor, Gunong Pulai; Kwala Sembrong (Kelsall); Kota Tinggi. Malacca, Chabau (Cantley). Selangor, Kanching (Foxworthy). Perak, Gunong Mesah (Kunstler). Penang, Telok Bahang (Curtis).

var. *angustifolia* King, l.c. 99. Leaves more coriaceous ovate-lanceolate, 3 to 4 in. long, 1.4 in. wide. Negri Sembilan, Tampin Hill (Goodenough).

(2) *S. indicum* Dalz. *Kew Journ.* iii. 37.

Glabrous shrub. Leaves stiffly membranous, sessile oblong sub-acute, base round, nerves about 9 pairs elevate beneath; 3 to 4 in. long, .75 to 1.75 in. wide. Stipules connate 3, cuspidate. Flowers few, terminal, shortly peduncled. Calyx 4- to 5-toothed. Corolla .25 in. long, white. Fruit .3 in. long, light blue. *Hab.* Woods in the north, Kolantan, Chaning. Perlis, Ginting Kabok, Kanga. Lankawi, Sungei Machang (Haniff). *Distrib.* South India.

The leaves in both the last two specimens are much larger than in the type, especially in the Lankawi plant, where they are 6 by 3 in. and some of the lower leaves are petioled.

(3) *S. Scortechinii* King and Gamble, l.c. 99.

Shrub 4 to 6 ft. tall, glabrous except nerves beneath. Leaves thin coriaceous elliptic acuminate, base cuneate; nerves 6 to 7 pairs elevate inarching; 3.5 to 5.5 in. long, 1.5 to 2.5 in. wide; petioles .2 to .25 in. long. Stipules short, mouth bristly. Cymes 1 to 3 on branch-ends 1 in. long in flower, 3-flowered; peduncle puberulous. Flowers .5 in. long, bracts small lanceolate. Calyx funnel-shaped with long linear lanceolate lobes persistent in fruit. Corolla funnel-shaped twice as long, tube expanded at mouth, lobes 4, blunt, throat hairy. Fruit ellipsoid, blue, .65 in. long with long calyx-lobes. *Hab.* Forests in mountains, Pahang, Telom. Perak, Larut Hills 2500 to 3000 ft. altitude (Kunstler).

(4) *S. ternatum* Hook. *fil. F.B.I.* iii. 193; King, l.c. 100.

Shrub, glabrous 6 to 8 ft. tall. Branches yellowish 4-angled. Leaves thickly membranous often whorled, elliptic or elliptic-lanceolate acuminate, base cuneate; nerves 7 to 9 pairs prominent beneath; 4 to 8 in. long, 1.5 to 3.25 in. wide; petioles .4 to .6 in. long with bristles at base. Stipules setose toothed. Cymes axillary and terminal, solitary or fascicled, 1.5 to 3.5 in. long, often peduncled; branches lax, spreading, bracts few linear. Flowers .4 in. long, yellow; pedicels .2 to .6 in. long. Calyx .1 in. long, campanulate. Corolla .3 in. long, puberulous, tube broad, .35 in. across, broad. Fruit ovoid, blue. *Hab.* Forests. Malacca, Bukit Besar, Mt. Ophir. Pahang, Kwala Tembeling; Tahan River; Gunong Senyum (Evans). Selangor, Batu Caves. Perak, Thaiping Hills (Kunstler, Curtis). Kelantan, Chaning. *Distrib.* India.

(5) **S. Ridleyi** King and Gamble, l.c. 100.

Branches tomentose at tips. Leaves membranous oblanceolate to elliptic, shortly blunt-acuminate, base much narrowed, minutely pitted, glabrous above, pubescent on midrib beneath; nerves 7 to 10 pairs, prominent beneath; 3 to 3.75 in. long, 1 to 1.5 in. wide; petioles .1 to .15 in. long. Stipules pubescent at first irregularly toothed. Cymes axillary and terminal less than half as long as leaves, trichotomous, branches 3- to 4-flowered with 2 elliptic bracts at base. Flowers .25 in. long; pedicels .1 in. long. Calyx salver-shaped, .15 in. long, tube narrow tomentose, lobes 5, oblong, blunt. Disc large. *Hab.* Singapore (Ridley).

I do not know this plant. The number quoted from my collection for this by King belongs to a *Diplospora*.

(6) **S. pubescens** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 122.

Shrub. Young parts scabrid pubescent. Leaves elliptic to lanceolate acuminate almost caudate, glabrous above, pubescent or scabrid beneath on midrib and nerves 5 pairs elevate beneath; 4 to 5 in. long, 1.5 to 2 in. wide; petioles .12 in. long. Stipules of numerous subulate processes. Cymes terminal, .75 in. long of about 5 flowers, puberulous. Bracts of numerous setæ. Bracteoles linear. Peduncles and pedicels short to .25 in. in fruit, scurfy pubescent. Flowers yellow or white. Corolla .25 in. long, dilate upwards pubescent, lobes 4, oblong, blunt half as long. Fruit globose, .25 in. long, rough. *Hab.* Forests, rare, Pahang, Tahan River. Kedah, Gurun (Robinson).

var. *hirsuta*. Branchlets, leaves beneath and flowers hairy-tomentose. Leaves lanceolate acuminate caudate. Flowers yellow. Malacca, Relau at the base of Mt. Ophir (Ridley).

## 61. AMARACARPUS, Bl.

Low bushes with small leaves usually crowded, often fœtid. Flowers small axillary and terminal 1 to 2, sessile or shortly peduncled, white. Calyx-lobes 4. Corolla-tube sometimes long,

rarely very short, throat hairy, lobes 4. Stamens sub-sessile in throat. Ovary 2- to 3-celled; ovules 1 in a cell. Fruit drupaceous crowned by calyx-lobes, blue (or red). Seeds plano-convex 1 or 2. Stipules bifid. Species 4 or 5, Malay isles to New Guinea, Christmas Isle and Seychelles.

Leaves lanceolate short acuminate, blunt . . . . . (1) *A. saxicola*  
 Leaves ovate lanceolate caudate . . . . . (2) *A. caudatus*

(1) *A. saxicola* *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 22.

A small bush, glabrous. Leaves lanceolate, short acuminate blunt, base cuneate, coriaceous, 2 in. long, .5 in. wide; nerves 5 to 6 pairs elevate beneath; petioles .12 in. long winged nearly to base. Stipules scabrid with several long teeth. Fruit blue, .25 in. long, crowned with 4 short triangular teeth and a taller disc, very shortly pedicelled. *Hab.* Limestone rocks. Rare. Perak, Bukit Kamuning (Ridley).

(2) *A. caudatus* *Ridl. Journ. F.M.S. Mus.* x. 143.

Glabrous small fetid tree. Leaves ovate-lanceolate caudate, base shortly cuneate and obscurely unequal in rather distant pairs, tip mucronulate, 2 in. long, .5 to .75 in. wide; petioles .05 in. long. Flowers in pairs sessile axillary. Calyx short, teeth acute, 4. Corolla white, tube .25 in. long, cylindric, lobes 4. Stamens 4. Fruit .25 in. long, blue, 3-celled, 2- or 1-seeded. *Hab.* Perak, Birch's Hill, Thaiping Hills (Wray).

## 62. HYDNOPHYTUM, Jack.

Epiphytic glabrous unarmed shrubs with a large fleshy tuber tunnelled and perforated forming an ant's nest. Leaves coriaceous elliptic blunt. Flowers sessile axillary solitary or fascicled, white. Calyx ovoid cylindric; limb truncate. Corolla salver-shaped, tube hairy inside, lobes 4; anthers 4, sub-sessile. Ovary 2-celled; ovules 1 in each cell. Fruit orange-red pulpy containing 2 coriaceous pyrenes. Species 3 to 4, Australia, Polynesia, Malay isles.

(1) *H. formicarium* *Jack. Trans. Linn. Soc.* xiv. 124; *King, l.c.* 101.

Tuber 6 to 8 in. through, irregularly lobed brown fleshy; branches slender jointed terete brown. Leaves 2.5 to 2 in. long, 1 to 2.5 in. wide; petioles .1 to .2 in. long. Flowers .25 in. long, fascicled. Corolla with 4 tufts of hairs in throat, lobes half as long. Fruit narrow ellipsoid, .2 in. long. *Hab.* Common near the sea and on mountains. Singapore, Tanglin; Jurong; Bajau, Johor, Pulau Tinggi (Burkill); Castlewood; Tana Runto. Malacca, Pulau Besar (Griffith); Pulau Undan; Mt. Ophir (a small-leaved form). Pahang, Kwala Pahang; Telom. Perak, Tupai (Wray). Penang, Pulau Jerajah (Kunstler). Kedah Peak at 3000 ft. altitude (small-leaved form). Pulau Adang, Pulau Rawei; Pulau Butang. *Distrib.* Borneo. *Native names:* Kepala B'ruk; Sanalo Api Laut.

## 63. MYRMECODIA, Jack.

Epiphytic tuberous shrub strongly spiny. Branches thick spiny not jointed. Leaves coriaceous elliptic crowded towards the top, not clearly opposite. Flowers small white sessile in depressions in the stem. Calyx-tube short, limb truncate. Corolla-tube cylindric, lobes 4, lanceolate, short; anthers sub-sessile. Fruit pulpy. Pyrenes 4 to 8. Species about 16, Eastern Malay islands and Australia.

(1) *M. tuberosa* Jack, *Trans. Linn. Soc.* xiv. 123. *M. armata* Hook. *fil. F.B.I.* iii. 194.

Tuber about 8 in. through, spiny. Stems solitary, .5 in. through, covered with lobed thorn-edged discs the bases of fallen leaves. Leaves elliptic narrowed to base, 3 to 5 in. long, 1 in. broad; petioles 1 in. long. Flowers small, tube short; corolla-lobes acute. Fruit oblong, orange. *Hab.* Near the sea; not very common. Singapore, Sungei Jurong; Bukit Timah. Malacca, Gunong Mering, Ophir. Pahang, Kwala Pahang. *Distrib.* Java, Borneo, Sumatra. *Native name*: Samboko.

## 64. PÆDERIA, Linn.

Twining slender fœtid shrubs. Leaves sometimes in whorls of 3, membranous. Flowers numerous in axillary or terminal branched cymose panicles. Calyx campanulate, limb 4- to 5-toothed. Corolla funnel-shaped, lobes 4 to 5 with crenulate inflexed edges, violet. Stamens 4 to 5, linear-oblong insert in tube. Ovary 2-celled; ovule 1 in a cell. Stigmas 2, twisted. Fruit compressed, globose or orbicular. Pyrenes winged or globose fragile. Species 10 to 12, chiefly Asiatic.

Fruit flat, thin orbicular.

Leaves and branches opposite . . . . .	(1) <i>P. fœtida</i>
Leaves and branches whorled . . . . .	(2) <i>P. verticillata</i>
Fruit globular, fragile . . . . .	(3) <i>P. tomentosa</i>

(1) *P. fœtida* Linn. *Mant.* i. 52; *King, l.c.* 96.

Glabrous or puberulous. Leaves opposite ovate or lanceolate acute or cuspidate, base broad or narrowed, rather thin; nerves 4 to 5 pairs, fine; 2 to 3 in. long, 1 to 1.5 in. wide; petioles .5 to 1.5 in. long. Stipules ovate-lanceolate bifid. Panicle 6 in. long, peduncle 3 in. wide, spreading. Flowers violet, shortly pedicelled in slender trichotomous often scorpioid cymes. Calyx campanulate acutely-toothed. Corolla funnel-shaped, usually pubescent, lobes short. Fruit orbicular, wings pale .45 in. across. *Hab.* Not common in open country. Singapore, Serangoon. Johor, Hulu Sembrong (Kelsall). Malacca, Bukit Bruang. Pahang, Pekan; Tahan River. Perak, Goping and Durian Sabatang (Kunstler). Penang, Tanjung Bunga and Telok Bahang (Curtis); Kedah, Alor Sta. Lankawi. *Distrib.* India, Siam, Borneo. *Native names*: Dandangking; Akar Sekuntut.

(2) *P. verticillata* Bl. *Bijdr.* 968; *King, l.c.* 97.

A much stouter climber than *P. fœtida*. Leaves more coriaceous and larger, opposite or often whorled in threes; nerves 6 to 7 pairs; 2.5 to 4 in. long, 1 to 1.75 in. wide. Stipules broad triangular. Panicles elongate 18 in. long; branches about 1 in. long. Flowers in small cymes. Calyx .1 in. long, funnel-shaped. Corolla tubular, base narrowed, .6 in. long, lobes acute. Fruit as in *fœtida*. *Hab.* Commoner than *fœtida*, open edges of forests and river banks. Singapore, Sungei Morai; Chan Chu Kang; Serangoon, etc. Malacca (Maingay). Selangor, Rawang. Perak, Ulu Bubong (Kunstler); Kwala Dipang (Curtis); Tapa near Jor (the whole flower spray of a rich purple). Kedah, Yan. Tringganu, Bundi (Rostados). *Distrib.* Borneo.

(3) *P. tomentosa* Bl. *Bijdr.* 968; *Hook. fil. F.B.I.* iii. 197.

Very slender climber. Leaves membranous ovate to lanceolate, tip acute, base round or cuneate, 2.25 to 4 in. long, .85 to 1.5 in. wide; petioles .25 to 1 in. long. Stipules free triangular. Panicles like those of *fœtida*, but shorter and quite scorpioid. Flowers .5 in. long. Corolla .5 in. long, lobes short acute. Fruit globose brown brittle, not winged. *Hab.* Open places, borders of woods and on rocks. Malacca (Maingay). Perak, Lahat near Ipoh; Goping (Kunstler). Kelantan, Kota Bharu. Perlis, Limestone rocks, Bukit Lagi. *Distrib.* Burma and Malay isles, China, Japan.

### 65. DIODIA, Linn.

Rough herbs with leaves somewhat coriaceous in pairs. Stipules connate with numerous bristles. Flowers small, white in dense axillary heads. Calyx obconic ovoid, teeth 2 to 4 (rarely 5 or 6). Corolla funnel-shaped, tube short or long, lobes 4 (or 5 or 6), ovate triangular. Stamens 4 (or 5 or 6) in corolla-mouth. Ovary 2- (or 3- or 4-)celled; style filiform. Stigma bilobed. Fruit of 2 cocci, ovoid oblong. Cocci crustaceous, indehiscent on the inner face. Seed oblong, grooved on one face. Species numerous in Africa and America.

(1) *D. sarmentosa* Sw. *Prod. Veg. Ind. Occ.* 30. Spermaceo scaberrima Bl. *Bijdr.* 946.

A long sarmentose herb climbing over bushes; stems 4-angled, angles white-hairy. Leaves coriaceous, sessile, narrow elliptic, sparsely hairy; nerves 3 to 4 pairs, elevate beneath and pilose; .5 to 1 in. long, .2 to .4 in. wide. Stipules cupular with 3 or 4 bristles. Heads small, sessile, 4- to 8-flowered or more. Flowers .1 in. long, white. Calyx glabrous oblong, lobes short lanceolate 4. Corolla little longer, lobes narrow lanceolate. Capsule .1 in. long, obovoid crowned by the narrow hairy sepals, otherwise glabrous. Seed rather large, oblong, black, smooth. *Hab.* Common in damp low ground. Singapore, Lower Gardens; Chan Chu Kang.



Malacca, Alor Gajah (Griffith). Perak, Tapa; Ulu Temengoh (Ridley). *Distrib.* South America, Banca, Java, Sumatra, Borneo.

Our form has smaller fruit than the South American one usually has.

### 66. BORRERIA, Meyer.

Herbs with 4-angled branches. Leaves usually rather narrow. Stipules connate into a tube with bristles on the edge. Flowers small, white or pink in small axillary heads sometimes with bristles mixed with the flowers. Calyx ovoid with 2 or 4 teeth, usually persistent in fruit. Corolla salver-shaped with a short or long tube, lobes 4, valvate. Stamens 4 in the throat. Ovary 2-celled, with one ovule in each cell; style filiform. Stigma bifid. Fruit of 2 crustaceous cocci dehiscing on the inner face. Seeds oblong, grooved ventrally. Species about 150. Tropical weeds.

#### Calyx lobes 4.

- Large fleshy herb; fruit hairy, lobes deciduous; flowers white . . . . . (1) *B. latifolia*  
 Ascending herb; leaves coriaceous; corolla long-tubed, pink; fruit small hairy with 4 very short points . . . . . (2) *B. hispida*

#### Calyx lobes 2.

- Tall erect plants; capsule glabrous; flowers white.  
 Leaves sub-coriaceous; calyx-lobes short, caducous in fruit . . . . . (3) *B. lævicaulis*  
 Slender plants; leaves thin; nerves conspicuous; calyx teeth persistent.  
 Stems ciliate along edges; leaves glabrous . . . . . (4) *B. pilulifera*  
 Stems glabrous; leaves sprinkled with hairs . . . . . (5) *B. parviceps*  
 Short plant 3 to 6 in. tall; leaves fleshy; nerves invisible; flowers very small, white . . . . . (6) *B. setidens*

(1) *B. latifolia* Schum. in Mart. Fl. Braz. vi. 63. *Diodia sarmentosa* Ridl. Journ. Roy. As. Soc. S. Br. 73, p. 145, not of Swartz.

Fleshy herb branched, 2 ft. tall or less. Stems 4-angled, winged, edges crisped above. Leaves obovate acute, base narrow, 2 to 4 in. long, 1 to 1.25 in. wide, hairy on both sides; petioles .25 in. long (upper leaves smaller). Stipules with many bristles. Flowers in axillary heads .25 to .5 in. through and often one terminal one. Calyx lobes 4, short, lanceolate, hairy. Corolla .8 in. long, white, tipped with lilac. Fruit sub-globose, sepals usually caducous, hairy; cocci .1 in. long. Seeds solitary, oblong, brown smooth. *Hab.* Sandy open spots, Singapore, Tanglin; Tanjong Katong beneath coconuts. This plant first appeared in 1915. *Distrib.* West Indies and South America.

(2) *B. hispida* Schum. Pflanzenfamilien, iv. 144. Spermaceo *hispida* Linn. Sp. Pl. 102; King, l.c. 93.

A rough viscid diffuse, wiry herb about a foot long, hairy. Leaves sub-coriaceous, obovate or oblong, blunt and narrowed to the

base, above reticulate, strigose beneath with 3 pairs of hairy nerves, .35 to 1.75 in. long, .15 to .4 in. wide. Stipules short cupular, white, bristles few. Heads small. Calyx campanulate, hairy, lobes 4, rather long acute. Corolla glabrous except the lobes, silky at the tips, tube .25 in. long, white or pink, lobes pink. Capsule ovoid globose, small, hairy with the 4 persistent short triangular lobes. *Hab.* Waste ground and sandy spots, very common. Whole peninsula from Singapore to Kelantan and Setul. *Distrib.* Indo-Malaya.

(3) **B. lævicaulis** *Ridl.* *Bigelovia lævicaulis* *Miq. Fl. Ind. Bat.* ii. 335. *Spermacoe stricta* *King, l.c.* 90, *not of Linn. fl.*

Erect slender herb little branched, about 18 in. tall or less, glabrous often tinted purple. Leaves sessile sub-coriaceous oblong-lanceolate, acute, narrowed at the base, purplish; nerves 3 pairs; .75 to 1.25 in. long, .2 to .5 in. wide. Stipules cup-like with 6 to 8 long bristles. Flowers .1 in. long, white in dense axillary and terminal heads .25 to .4 in. through. Calyx campanulate hairy, teeth 4, short. Corolla-tube slender, short, lobes oblong as long, white tipped pink and ciliate all over. Capsule sub-globose ovoid, hairy, small with the very short remains of the sepals. Seed oblong transversely wrinkled. *Hab.* Roadsides and sandy, waste ground. Common. Singapore, Mount Zion; Tanglin in the Gardens; Tanjong Katong. Pahang, Sungei Meang near Pekan. Selangor, Kwala Lumpur (Ridley). *Distrib.* Bombay, Java.

(4) **B. pilulifera** *Ridl.*

Slender erect branched herb with few branches, 14 in. tall. Stems angled, ciliate along the angles. Leaves elliptic-lanceolate, narrowed to the base, rather fleshy, glabrous, pale beneath; nerves 5 pairs; 1 in. long, .4 in. wide; petioles .1 in. long. Heads .25 in. through, 2 shorter leaves usually at the base of the heads. Stipules very short with short bristles. Heads .25 in. through with numerous bristles between the flowers. Calyx glabrous, bifid. Corolla very short, white. Capsule obovoid. Seed rather large, ellipsoid, dark brown, very obscurely reticulate. *Hab.* Roadsides, Selangor, Klang Gates (Ridley).

(5) **B. parviceps** *Ridl.*

Very slender erect herb, simple or with one or two branches; stems angled with low wings, glabrous, 18 in. tall. Leaves in simple pairs, lanceolate acute and narrowed to the base, sprinkled with white hairs above, paler and scabrid beneath, .5 in. long, .25 in. wide; nerves 3 pairs sparsely hairy beneath; no petiole. Stipules very short with very numerous setae. Heads .12 in. through. Flowers small with fewer and shorter bristles than the last. Calyx glabrous, bifid. Corolla white, very short. Capsule smooth, glabrous. Seeds ellipsoid, dark brown, smaller than the preceding and deeply pitted. *Hab.* Roadsides, Negri Sembilan, Bukit Tangga Pass (Ridley).

(6) **B. setidens** *Ridl.* *Bigelovia setidens* *Miq. Fl. Ind. Bat.* ii. 336.

A low simple or diffuse often ascending herb. Branches winged, wings often undulate, glabrous altogether except the wings near the top which are sometimes ciliate. Whole plant 2 to 8 in. tall, sometimes nearly 12 in. wide when branched. Leaves membranous, ovate or lanceolate blunt or sub-acute, backs pale; nerves invisible; .3 to .5 in. long, .14 to .15 in. wide; petioles often .1 in. long. Heads .2 in. through or less. Flowers white. Calyx glabrous, lobes 2, narrow, long acuminate. Corolla very short, lobes small ovate, round. Capsule urn-shaped with 2 long recurved sepals, glabrous. Seed oblong, smooth. *Hab.* Common in waste ground. Singapore, Tanglin Gardens; Chan Chu Kang; Tanjong Katong. Johor, Scudai Road 4th mile. Malacca (Griffith); hill and town; Ayer Panas (Cantley). Perak, Temengoh. Kelantan, Chaning. *Distrib.* Java.

### 67. KNOXIA, Willd.

Erect herbs (or under-shrubs). Leaves usually narrow. Stipules connate into a bristly cup. Flowers white or pink, small in terminal corymbs. Calyx-tube ovoid, teeth 4, minute. Corolla-tube long, throat villous, lobes 4, valvate in bud. Stamens 4, insert on throat; anthers linear. Ovary 2-celled; ovules 1 in each cell; style filiform. Stigma bilobed. Fruit oblong of 2 small cocci indehiscent. Species 10, India to Australia.

(1) **K. corymbosa** *Willd. Sp. Pl.* i. 582; *King, l.c.* 57.

Stem terete or 4-angled, velvety. Leaves membranous linear or ovate-lanceolate acuminate both ends hairy; nerves 5 to 9 pairs, ascending; 1.5 to 5 in. long, .4 to 1 in. wide; petioles .2 to .4 in. long. Corymbs 1 in. long, 1.5 in. wide, many-flowered trichotomous, hairy. Flowers .05 in. long, pink or white on short pedicels. Calyx ovoid, lobes 4, blunt, triangular. Corolla hairy inside. Fruit ellipsoid, less than .1 in. long. *Hab.* Rare in pastures or open places. Malacca, at Relau, base of Mt. Ophir (Ridley). Penang (Wallich). *Distrib.* Indo-Malaya, Australia.

## ORDER LXXV. COMPOSITÆ.

Herbs, more rarely shrubs and trees, sometimes climbing. Leaves alternate, rarely opposite, simple, entire or more or less lobed. Flowers small in heads on the dilate top of the peduncle (receptacle). Heads surrounded by an involucre of 1 or more series of bracts. Flowers all tubular, or outer ones or all ligulate. All bisexual or outer ones female or neuter. Sepals connate, limb 0 or of scales or hairs. Corolla tubular, 5-lobed or lobes connate into a strap (ligulate). Stamens 4 to 5; anthers usually connate.

Ovary 1-celled, 1-seeded; style bifid. Achenes dry crowned by a pappus of scales or silky hairs, or none (calyx limb). Species 8000, whole world. But few of the species here are really indigenous. Most are weeds often of South American origin which are spreading gradually over the world. Many species are cultivated in gardens, but have not established themselves as weeds yet; among these are *Artemisia vulgaris* Linn. Wormwood, "Baru China," cultivated as a drug by Chinese.

*Cosmos bipinnatus* Linn. Ulan Rajah, a tall herb with finely cut leaves and pink ligulate flowers, tubular ones yellow, of South American origin. Cultivated as a pot-herb by Malays.

*Taraxacum Dens-leonis* Linn. The Dandelion was introduced and cultivated as a vegetable on Penang Hill and has run wild at the top near the Bungalows.

The genera in this order are arranged more for convenience of identification than in the usually adopted natural order.

(King and Gamble, *Journ. As. Soc. Beng.* lxxiv. ii. 22.)

*Flower-heads compound.*

Flower-heads glomerate and sessile in leaf axils . . . . . 1. SPARGANOPHORUS  
Flower-heads in terminal clusters.

Partial flower-heads 1-flowered, compound heads surrounded by leafy bracts. . . . . 2. ELEPHANTOPUS

Partial flower-heads several flowered, compound head not surrounded by bracts . . . . . 3. SPHERANTHUS

*Flower-heads not compound.*

Involucral bracts spiny and embracing the ripe achenes.

· Involucral bracts connate into a hard cup, flower-heads unisexual . . . . . 4. XANTHIUM

Involucral bracts free; flower-heads bisexual  
Involucral bracts not spiny; leaves opposite. . . . . 5. ACANTHOSPERMUM

Involucral bracts about 4 in a single row.  
Leaves cordate; climber . . . . . 6. MIKANIA

Involucral bracts more numerous, usually more than one row.

Receptacle nude without bracts among flowers; flower-heads discoid.

Pappus hair-like; flowers blue or white; style violet . . . . . 7. AGERATUM

Pappus of few club-shaped viscid bristles; flowers white . . . . . 8. ADENOSTEMMA

Receptacle with bracts among the flowers.

*Flower-heads radiate, rays sometimes minute.*

A sub-aquatic herb; leaves linear; heads axillary sessile; pappus 0 . . . . . 9. ENHYDRA

Terrestrial plants; leaves not linear.  
Pappus bristles 2, barbed at tip . . . . . 10. BIDENS

Pappus not as above.  
Involucral bracts densely covered with gland-tipped hairs; flower-heads small . . . . . 11. SIEGESBECKIA

- Involucral bracts not glandular.
- Heads axillary, sub-sessile; flowers bright yellow . . . . . 12. SYNEDRELLA
- Heads pedunculate, conspicuously ovoid conical . . . . . 13. SPILANTHES
- Heads depressed; pappus scaly cupular or short bristly.
- Flower-heads and rays white, very small; pappus o . . . . . 14. ECLIPTA
- Flower-heads and rays yellow, larger.
- Pappus small . . . . . 15. WEDELIA
- Pappus hair-like plumose, heads long-stalked . . . . . 16. TRIDAX
- Flower-heads discoid; flowers all tubular; leaves alternate.*
- Flowers all perfect bisexual; pappus of long hairs conspicuous.
- Style arms subulate, shortly hairy; flowers violet; involucral bracts in several rows; herbs or trees . . . . . 17. VERNONIA
- Style arms tapered hairy; flowers orange; involucral bracts in one row with a few very short ones at base . . . . . 18. GYNURA
- Style arms truncate tipped with hairs in a tuft; flowers pink, involucral bracts in one row . . . . . 19. EMILIA
- Outer flowers imperfect, female; involucral bracts in one row; flowers dark pink . . . . . 20. ERECHTHITES
- Leaves sessile; stem clasping . . . . . 21. LAGGERA
- Leaves not sessile nor stem clasping.
- Herbs shrubby at base; flowers yellow; bracts thin . . . . . 22. BLUMEA
- Bush much-branched; flowers violet; bracts rigid . . . . . 23. PLUCHEA
- Flowers imperfect; pappus none or of 2 to 3 short bristles; herbs.
- Flower-heads paniced, '15 in. wide; pappus o . . . . . 24. DICHROCEPHALA
- Flower-heads solitary, '25 in. across; pappus o . . . . . 25. EPALTES
- Heads '3 in. across; pappus very small . . . . . 26. GRANGEA
- Heads '1 in. wide; pappus o . . . . . 27. CENTIPEDA
- Flower-heads radiate.*
- Outer flowers only ligulate.
- Erect, heads lax-paniced or racemose . . . . . 28. ERIGERON
- Climber; heads densely clustered . . . . . 29. MICROGLOSSA
- All flowers ligulate, yellow . . . . . 30. CREPIS

### 1. SPARGANOPHORUS, Gaertn.

Herb. Leaves alternate, membranous. Heads small 1 or more in axils, sessile. Flowers small, white, all similar. Involucre hemispheric, bracts in many rows, edges scarios. Achenes glandular crowded with a cartilaginous cup. Pappus o. Species 1, tropical America, now a weed in Africa and Asia.

(1) *S. Vaillantii* DC. *Prodr.* v. 12.

Herb rather fleshy about 1 to 2 ft. tall. Stem hairy. Leaves lanceolate or ovate-lanceolate crenulate long, narrowed to base,

3 to 4 in. long, 0·5 in. wide with slender nerves; petioles 1 in. long. Heads ·25 to ·4 in. across. Flowers white; style violet. Achenes white. *Hab.* Edges of ponds, rice-fields and ditches. Singapore, Tanglin; Bukit Timah. Selangor, Batu Tiga. Kelantan, Kota Bharu.

## 2. ELEPHANTOPUS, Linn.

Stiff wiry herbs. Leaves sessile entire or toothed, mostly radical. Heads several collected into ovoid or globose clusters with a pair of leaf-like outer bracts, on long stiff peduncles. Bracts oblong acute about 8, stiff, dry acuminate. Flowers 4-lobed. Calyx bristles spiny. Corolla pink or white. Achene 10-ribbed. Pappus hairs few. Species about 10, chiefly American.

Plant under a foot tall, little-branched; leaves radical;  
flowers pink

(1) *E. scaber*

Plant 4 ft. tall, much-branched; leaves on branches;  
flowers white

(2) *E. tomentosus*

(1) *E. scaber* Linn. *Sp. Pl.* 814; *King, l.c.* 28.

Stem 3 to 4 in. to over 1 ft. tall, woolly-tomentose, branched. Leaves mostly radical, obovate or oblong obtuse, crenulate pustular scabrid above, hairy on the nerves beneath, 2 to 4 in. long, ·5 to 1·25 in. wide or more; petioles very short, densely white hairy. Heads ·5 to ·75 in. across. Bracts green, white-hairy, red-edged. Flowers greenish with pink lobes. Pappus of 5 spiny bristles. *Hab.* Very common in campongs and grass plots, whole peninsula. *Distrib.* Tropics generally. *Native name:* Tutup Bumi.

(2) *E. tomentosus* Linn. *Sp. Pl.* 814.

Shrubby, much-branched 4 ft. tall. Branches nearly glabrous. Leaves in tufts at the ends of short branches, lanceolate-acute, narrowed to base, hairy, 2 to 3 in. long, ·4 to ·5 in. wide; petioles winged to base. Heads ·5 to ·75 in. across numerous terminal on rather slender 3 in. peduncles. Outer bracts ovate acute reticulate, involucrel bracts narrow lanceolate acute, glabrous. Flowers white. *Hab.* Roadsides, Johor, Castlewood and Tebrau. Penang, Ginting Pass and Balik Pulau (Burkill). *Distrib.* Florida and Texas.

I cannot imagine how this plant got to the peninsula. It does not seem to occur in the Malay islands.

## 3. SPHÆRANTHUS, Linn.

Annual spreading herbs. Leaves alternate toothed decurrent on stem. Flower-heads very small in globular clusters terminal and peduncled with a few bracts at the base. Outer florets female, slender, 2- to 3-toothed, inner florets bisexual, thicker, 4- to 5-lobed. Achenes oblong. Pappus 0. Species 8, tropics of Old World.

(1) *S. africanus* Linn. *Sp. Pl.* (ed. ii), 1314; *King, l.c.* 38.

Branches winged, spreading from a woody root, about 8 in. or more long. Leaves glabrous, thin, 1 in. long, ·25 to ·5 in. wide,

oblanceolate, minutely toothed. Balls of heads .25 in. through. *Hab.* Common in damp waste ground, in mud. Singapore, Kalang; Mt. Zion and elsewhere round town. Pahang, Pekan. Malacca (Griffith). Perak (Scortechini). Province Wellesley, Telok Ayer Tawar. Penang, Pulau Betong (Curtis). Kedah, Gunong Geriang. Setul. *Distrib.* Asia and Africa. *Native name:* Gelumak Susu.

#### 4. XANTHIUM, Linn.

Annual herb. Leaves alternate, lobed and toothed. Heads bisexual in upper axils globose, females 2-flowered, apetalous. Involucre of bisexual heads of short bracts 1 to 2 rows, of female heads with the bracts united into an ovoid beaked utricule covered with hooked bristles. Species 4, American, 1 Indo-Malayan.

(1) *X. strumarium* Linn. *Sp. Pl.* 987; *Hook. fl. F.B.I.* iii. 303.

Stem 1 to 2 ft. tall. Leaves triangular-cordate or orbicular lobed, base cuneate, 2 to 4 in. long, 1 to 2 in. wide. Heads in terminal and axillary racemes, .25 in. through. Involucre female ovoid or oblong, green. *Hab.* Singapore town; a casual weed. *Distrib.* Indo-Malaya. *Native name:* Buah Anjang.

#### 5. ACANTHOSPERMUM, Schrank.

Prostrate herb, branched. Leaves opposite toothed. Heads very small axillary. Flowers white, outer ones rayed, one row. Involucre double, outer row herbaceous, inner ones enwrapping the flower. Achenes oblong enclosed in the enlarged bract armed with long hooked bristles, usually 4 or 5 radiating from centre. Species 2, South America, 1 established in Singapore.

(1) *A. brasilium* Schrank, *Pl. Rar. Hort. Monach.* ii. 53.

Branches 6 in. to 1 ft. long, hairy. Leaves fleshy membranous, ovate acute toothed, narrowed to base, nearly glabrous, .5 to 1 in. long and about half as wide. Bracts outer spreading .1 in. long. Fruit .25 in. long. *Hab.* Singapore in and about the town, first record Anderson 1861; Bidadari; Macpherson Road; Ang Mo Kio. Sporadic. *Distrib.* Otherwise only known from tropic America and Hawaii.

#### 6. MIKANIA, Willd.

A twining herb. Leaves opposite, ovate, petioled. Heads in corymbose cymes, 4-flowered. Involucre oblong, bracts 4, narrow. Corollas similar, tubular, 5-lobed. Achenes 5-angled, truncate. Pappus of 1 or more rows of scabrid hairs. Species 60, tropics of America and Africa, 1 Asiatic also.

(1) *M. scandens* Willd. *Sp. Pl.* 1743; *King, l.c.* 30.

Glabrous or obscurely puberulous. Leaves 1 to 2 in. long, .6 to .25 in. wide; nerves 1 pair from base. Heads small, in cymes 2 in. wide; peduncles 1 to 2 in. long. Pappus reddish. *Hab.*

Common in hedges and borders of woods to about 4000 ft. altitude. Singapore, Jurong, etc. Johor, Pulau Kukub. Pahang, Pekan; Telom. Malacca. Negri Sembilan. Selangor. *Distrib.* Assam, Malay Islands, Africa. *Native names*: Akar Lupang; Churoma; Akar Ulam Tikus.

### 7. *AGERATUM*, Linn.

Erect herbs. Leaves opposite below, alternate above, membranous. Heads in corymbs. Involucre campanulate; bracts in 2 to 3 series linear. Corollas similar tubular, blue or white. Achenes 5-angled. Pappus of 5 short spreading scales. About 20 species, American, 1 (or more) now cosmopolitan.

(1) *A. conyzoides* Linn. *Sp. Pl.* 839; *King, l.c.* 29.

Annual, 1 to 3 ft. tall, sparsely white hispid. Leaves ovate, base broad or cuneate, dentate; nerves 2 to 3 pairs; 1 to 3.5 in. long and nearly as wide; petioles .25 to 1 in. long. Heads .25 in. across. Flowers white; style violet. Calyx-lobes lanceolate acuminate, hairy. Achene black, hairy with persistent calyx-lobes. *Hab.* Common everywhere in waste ground. *Distrib.* All tropics. *Native names*: Tahi Ayam; Tombok jantan; Sianggit. White weed.

### 8. *ADENOSTEMMA*, Forst.

Herb with opposite membranous leaves. Heads in lax spreading corymbose cymes. Involucre campanulate; bracts green, 2-seriate oblong. Corollas similar, white, tube short, limb 5-toothed. Achenes 5-ribbed, glandular. Pappus of 3 to 5 clavate stiff hairs. Species 5 or 6, American, 1 cosmopolitan.

(1) *A. viscosum* Forst, *Char. Gen.* 20; *King, l.c.* 28. (Fig. 84, p. 183.)

Usually about 1 ft. tall, wide-branched more or less pubescent. Leaves ovate acuminate, long narrowed into petiole, serrate, 4 to 6 in. long, 2 to 3 in. wide; petioles .25 to 2.5 in. long. Cyme terminal, 6 in. long and wide; branches long, slender with a leaf-like bract at base. Heads about .25 in. across. *Hab.* Waste ground and in damp spots in forest up to 4000 ft. altitude. Not rare, variable in size, form of leaves, pubescence, etc., according to locality. Singapore, Bukit Panjang; Pulau Ubin (Hullett). Johor, Pulau Tiuman. Malacca (Griffith). Negri Sembilan, Bukit Tangga. Selangor, Batu Caves; Menuang Gasing (Kloss). Pahang, Telom 4000 ft. altitude. Tringgau, Bundi (Rostados). Kelantan, Kwala Aring (Yapp); Kota Bharu. Perlis, Chupeng. *Distrib.* Whole world. *Native names*: Rumput Babi; Sumbong Gajah; Rumput Pasir.

### 9. *ENHYDRA*, Lour.

Glabrous or pubescent marsh herbs. Leaves opposite, entire or nearly so, linear-oblong, fleshy. Heads axillary sub-sessile,



Ray-florets female, ligule minute, 3- to 4-toothed. Disc-florets tubular, 5-fid. Involucral bracts 4, foliaceous in opposite pairs. Achenes oblong; no pappus. Species 6, tropics.

(1) *E. fluctuans* Loureiro *Fl. Cochinchine* 511; *Hook. fil. F.B.I.* iii. 304.

Glabrous, 1 to 2 ft. long, rooting at nodes. Leaves 1 to 3 in. long, narrow. Heads sessile axillary, 3 to 6 in. across. *Hab.* In wet muddy spots, Singapore, Galang (Ridley). Penang, Dato Kramat (Curtis). *Distrib.* Indo-Malaya. *Native name:* Chinkro. *Use:* The Chinese use it as a drug, the Malays as a vegetable.

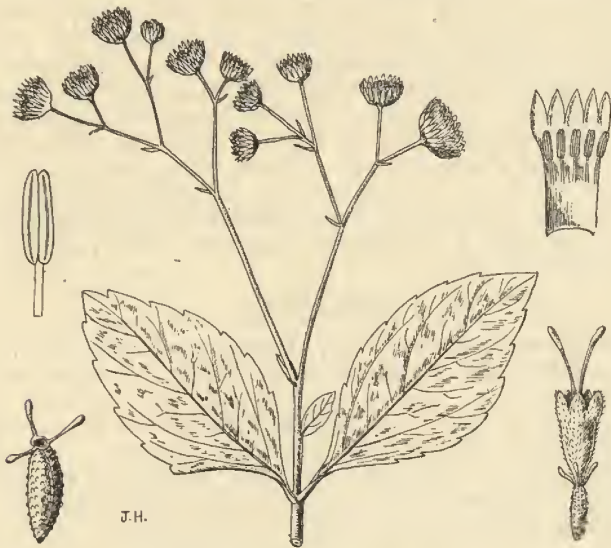


FIG. 84.—*Adenostemma viscosum*.

## 10. BIDENS, Linn.

Herbs. Leaves opposite, lobed, pinnatifid (or entire). Heads small or large, corymbose or sub-solitary. Ray-florets in 1 series, ligulate white (or yellow) neuter. Disc-flowers yellow bisexual; limb 5-fid, involucre campanulate. Bracts in two rows, outer herbaceous. Achenes linear or cuneate with a pappus of 2 to 4 long retrorsely-bearded spines. Species 120, whole world.

(1) *B. pilosa* Linn. *Sp. Pl.* 832; *King, l.c.* 45.

Erect branched glabrous (or hairy) herb about 2 ft. tall. Leaves trifid or tripartite (2- to 3-pinnatifid), about 3 in. long; segments ovate to lanceolate serrate. Heads 3 to 4 in. across; peduncles 5 to 3 in. long. Ray flowers white (but often absent). Bracts

oblong, edges scarious. Achenes black, long, narrow, ribbed, .25 in. long; spines about half as long. *Hab.* Open damp spots, not rare. Singapore. Johor, Batu Pahat. Muar, Sungei Pauh (Fox). Pahang, Sungei Chenei (Fox); Telom at 4000 ft. altitude. Negri Sembilan, Burunang (Cantley); Selangor, Batu Caves. Perak, Temengoh. Lankawi, Kwah (Curtis). Kelantan, Kwala Aring (Yapp). *Distrib.* All warm countries. *Native name:* Rumpit Juala.

### 11. SIEGESBECKIA, Linn.

Glandular pubescent herb. Leaves opposite, dentate. Heads in leafy panicles, yellow (or white). Ray-florets 1 row, limb 2- to 3-toothed female, disc-florets tubular bisexual; 3- to 5-toothed. Involucre campanulate or hemispheric. Bracts herbaceous, glandular as long as the flowers, outer ones spreading. Achenes ovoid blunt. Pappus 0. Species 2, 1 South American, 1 cosmopolitan.

(1) *S. orientalis* Linn. *Sp. Pl.* 900; *Hook. fil. F.B.I.* 304.

Hairy weed about 2 ft. tall. Leaves triangular-ovate 1 to 4 in. long and as wide; petioles long, winged nearly to base. Heads .25 in. across, yellow outer bracts often long and glandular hairy. *Hab.* Waste ground, occasional. Singapore, garden weed. Perak, Telom River (Ridley).

### 12. SYNEDRELLA, Gaertn.

Annual branched wiry herbs. Leaves opposite, dentate. Heads small, axillary and terminal rayed yellow. Involucre of few bracts, outer one or two foliaceous passing into the inner scarious bracts, about as long as the flowers. Ray-florets few, limb broad 2- to 3-toothed. Disc florets 4-toothed. Achenes compressed or trigonous, outer winged with long teeth. Pappus of a few bristles. Species 2, American. One an Asiatic and African weed also.

(1) *S. nodiflora* Gaertn. *Fruct.* ii, 456, t. 171, f. 7; *King, l.c.* 44.

Herb 1 to 2 ft. tall, glabrous and scaberulous. Leaves ovate acute, .75 to 3 in. long, .3 to 1.25 in. wide; petioles .1 to .4 in. long, edges ciliate. Heads .25 in. across, axillary, usually sessile. *Hab.* A common and pestilential weed everywhere, in waste ground from Singapore to Penang.

### 13. SPILANTHES, Linn.

Annual herb. Leaves opposite. Heads axillary or terminal on long peduncles, ovoid conical radiate or rayless yellow. Receptacle convex elongate. Involucral bracts in 2 rows, outer florets female, minute. Disc-florets tubular, 4- to 5-lobed. Achenes triquetrous or compressed. Pappus of 1 or 2 or no bristles. Species 40, chiefly American.

(1) *S. Acmella* Murr. *Syst.* (ed. xiii.), 610; *King, l.c.* 43.

Branched, 6 to 12 in. or taller, glabrous. Leaves ovate-lanceolate,

sub-acute, base cuneate, serrate or crenate; nerves 1 pair; '75 to 1'5 in. long; petioles '1 to '3 in. long. Peduncles 1 to 3 in. long, slender, head ovoid, conic, '35 in. long. *Hab.* Common weed in waste ground. Whole peninsula. A form with much bigger heads and altogether more robust is the variety *oleracea*. It is less common. *Use*: The "toothache plant." The heads rubbed on the gums, being pungent, are supposed to relieve toothache. *Native name*: Gutang.

#### 14. ECLIPTA, Linn.

Hairy annuals. Leaves opposite. Heads small, axillary on long peduncles rayed, white. Involucre campanulate, herbaceous; bracts outer broad, green, receptacle flat. Ray-flowers with a small entire or bifid ligule. Achenes sub-compressed, 2-awned or not. Pappus 0. Species 3 to 4, 1 American, 1 Australian, 1 cosmopolitan.

(1) *E. alba* Hassk. *Hook. fil. F.B.I.* iii. 304. *E. erecta* Lam. *Ill.* t. 687.

Weed, rather slender, 6 in. to 1 ft. long. Leaves linear or oblong-lanceolate, nearly entire, narrowed both ends, 1 to 3 in. long, '2 to '4 in. wide; petioles short. Peduncles 1 to 1'5 in. long. Heads about '25 in. across. Bracts longer than flowers. *Hab.* Common weed in waste ground. Singapore. Malacca, Bukit Sabukor (Derry); Ayer Panas (Cantley). Pahang, Pekan. Selangor, Kwala Selangor. Penang, Telok Bahang (Curtis). Kelantan, Kota Bharu (Yapp). *Native names*: Rumput Beu; Kurumak Jantan.

#### 15. WEDELIA, Jacq.

Hairy or scabrid-pubescent shrubs or herbs. Leaves opposite. Heads rayed yellow. Ray-florets conspicuous, female, ligulate. Disc-florets bisexual. Corolla tubular, 5-toothed. Involucre hemispheric, bracts 2 rows. Achenes cuneate oblong, thick. Pappus none or a cup. Species about 70, tropical.

Besides our seashore species a double form of *W. Wallichii* Less. (*W. scaberrima* Wall.) is often to be seen in gardens.

(1) *W. biflora* DC. in *Wight*, *Contrib.* 18; *King*, *l.c.* 43.

Scrambling, shrubby, young parts hispid, adults glabrous. Leaves ovate to lanceolate acuminate, serrate, base broad, slightly cuneate, 2 to 4 in. long, 1'25 to 2'75 in. wide. Heads '5 in. across, usually solitary, peduncled, orange yellow. Bracts in 2 rows, oblong-pubescent. Achenes triquetrous, hairy. *Hab.* Common in tidal mud. Whole peninsula from Singapore to Penang and Lankawi. *Distrib.* East Asia. *Native names*: Sarunei; Serenah; Sunai Laut.

An odd shrubby form, with lanceolate leaves cuneate at base, 1'5 in. long, '5 in. wide, and small flower-heads, was obtained by me in sea-sand at Pulau Nipis, Adang group. *Creeper*

## 16. TRIDAX, Linn.

Procumbent hairy herb. Leaves opposite, pinnatisect, segments few, narrow. Heads solitary on long peduncles rayed. Ray-florets ligulate, outer lip large. Disc-florets bisexual, tubular; limb bifid. Bracts in few series, outers herbaceous. Achenes silky. Pappus of feathery bristles. Species 7, American, 1 now all over Asia.

(1) *T. procumbens* Linn. *Sp. Pl.* 900.

Whole plant 6 to 12 in. long. Leaves few, ovate-lanceolate serrate, .5 to 2 in. long. Heads .4 to .6 in. across; peduncles erect 3 to 8 in. long. Ray-florets creamy white, about 4 in a head. Disc-florets lemon yellow, lobes hairy, recurved. Outer bracts green, inner ones purplish. *Hab.* Sandy places, usually near the sea. Singapore, Sepoy lines; Changi; Galang. Malacca. Perak, Ipoh (Ridley).

## 17. VERNONIA, Schreb.

Herbs, shrubs or trees. Leaves alternate. Heads homogamous in terminal panicles or axillary panicles or solitary axillary. Flowers violet or pink (never yellow). Involucre ovoid or hemispheric; bracts in many series, innermost longest. Corollas all equal, tubular, lobes 5, narrow. Fruit ribbed or angled, truncate at top. Pappus of many hairs in 2 rows. About 500 species.

Trees.

Leaves and branches glabrous . . . . . (1) *V. Wallichii*  
Leaves beneath and branches tomentose . . . . . (2) *V. javanica*

Shrub sarmentose.

Leaves white silky beneath; panicles lateral . . . . . (3) *V. eleagnifolia*

Herbs.

Heads in terminal panicles.

Heads .6 in. through . . . . . (4) *V. attenuata*

Heads .2 to .25 in. through.

Bracts narrow-lanceolate; heads numerous  
small, peduncled . . . . . (5) *V. cinerea*

Bracts broad lanceolate; heads few, larger,  
sessile . . . . . (6) *V. chinensis*

Heads solitary, long-peduncled axillary and ter-  
minal .5 in. through; leaves serrate acutely . . . . . (7) *V. Curtisii*

Heads axillary and terminal paniced, .5 in. long;  
leaves entire or obscurely serrate, 5 in. long . . . . . (8) *V. rupicola*

(1) *V. Wallichii* Ridl. *Journ. F.M.S. Mus.* x. 145. *Conyza acuminata* Wall. *Cat.* 3034.

Erect straight tree 60 ft. tall. Branches glabrous. Leaves thinly coriaceous elliptic acuminate, base narrowed often for some way, quite glabrous, reticulate, 3 to 6 in. long, 1.5 to 3 in. wide; nerves 15 pairs, distinct on both sides; petioles .5 in. long, slender. Panicles 7 in. long and as wide, tomentose. Bracts sub-tomentose or glabrous not ciliate. Flowers lilac. Fruit angled, smooth. *Hab.* Common in forests. Singapore, Tanglin; Pulau Ubin. Malacca, Bukit Bruang; Panchur. Pahang, Kwala Tembeling;

Bukit Goh, Kwantan (Foxworthy); Negri Sembilan, Kwala Pilah; Tumiang (Cantley); Selangor, Sempang mines; Kwala Lumpur. Penang, West Ayer Hitam (Curtis). *Distrib.* South Siam (Trang); Sylhet, Borneo. *Native name*: Pelong.

Both this and the next have been confused under the Indian *V. arborea* by Hooker, King and others.

(2) *V. javanica* DC. *Prodr.* v, 21. *V. arborea* King, *l.c.* 26.

A low-branched tree. Branches tomentose. Leaves coriaceous, elliptic, shortly blunt-acuminate, base round, glabrous except nerves, tomentose beneath; nerves elevate, 9 pairs; 3 to 4 in. long, 1.75 to 2 in. wide; petioles .25 in. long. Panicles tomentose, 6 in. long and wide. Heads 1 in. across, few-flowered. Bracts short, oblong rounded at tip, edge ciliate. Flowers pale lilac. *Hab.* Open country, common. A low-spreading stout tree. Singapore, Bukit Mandai; Jurong. Malacca, Merlimau (Derry); Sungei Hudang (Goodenough). Pahang, Pekan; Bentong (Foxworthy). Selangor. Negri Sembilan, Pelasih (Foxworthy). Dindings, Bruas River (Curtis). Penang, Chalet (Curtis). *Distrib.* Java and Borneo. *Native names*: Jankang Paya; Mengabong; Medang Gambong; Merombong Bukit; Temengau.

var. *mollissima* Ridl. Tree 60 ft. tall. Branches tomentose. Leaves thickly tomentose beneath and on midrib and nerves above. Flower-heads smaller. *Hab.* Forests. Negri Sembilan, Bukit Tangga (Ridley).

(3) *V. eleagnifolia* DC. *Prodr.* v. 22; *Hook. fil. F.B.I.* iii. 237. (Fig. 85, p. 188.)

Sarmentose shrub. Branches whitish. Leaves oblong, mucronulate or blunt, base rounded, sub-coriaceous, glabrous above, whitish silky beneath; nerves fine, forked at tip, about 9 pairs; 2 to 3 in. long, 1 to 1.5 in. wide; petioles .2 in. long (young leaves narrow small, silky on both sides). Panicles lateral, 6 in. long; branches 1 to 1.25 in. long. Flowers in small terminal heads, violet. Heads .1 in. wide; bracts oblong, lower ones ovate blunt. *Hab.* Open country hedges and river-banks. Rare in the south, rarely flowering. Singapore, Pongol. Pahang, Pekan River bank (Ridley). Kedah, Alor Sta. Perlis. *Distrib.* Siam, Burma.

(4) *V. attenuata* DC. *Prodr.* v. 33.

Herb over 2 ft. tall, slightly woody at base, puberulous. Leaves rather stiff obovate blunt, upper ones lanceolate, base narrowed, edge undulate-crenate, puberulous on midrib and nerves, 6 pairs, prominent beneath (young leaves silky hairy on back); 4 to 5 in. long, 1 to 3 in. wide; petioles winged to base, .25 in. long, hairy. Heads .6 in. through in a little and short-branched terminal panicle. Peduncles .2 to 1 in. long, hairy. Lowest involucrel bracts very narrow linear-acuminate, green, hairy. Upper ones lanceolate mucronate, white, bright green at tip. Corolla pink

·2 in. long. Achenes linear acutely 4-angled, hairy. Pappus white, ·25 in. long, scabrid. *Hab.* Lankawi, coast at Tukang Rajah (Robinson). *Distrib.* Burma.

(5) *V. cinerea* Less, in *Linnaea*, iv. 291; *King, l.c.* 27.

An erect herb 6 to 36 in. tall pubescent. Leaves membranous ovate or lanceolate toothed, 1·5 to 3 in. long, ·3 to ·5 in. wide; petioles in lower leaves ·1 to ·5 in. long. Heads ·2 to ·25 in. long, ·1 in. across in a loose terminal corymb. Bracts green, tipped red hairy, linear-lanceolate acuminate. Flower violet mauve, tube

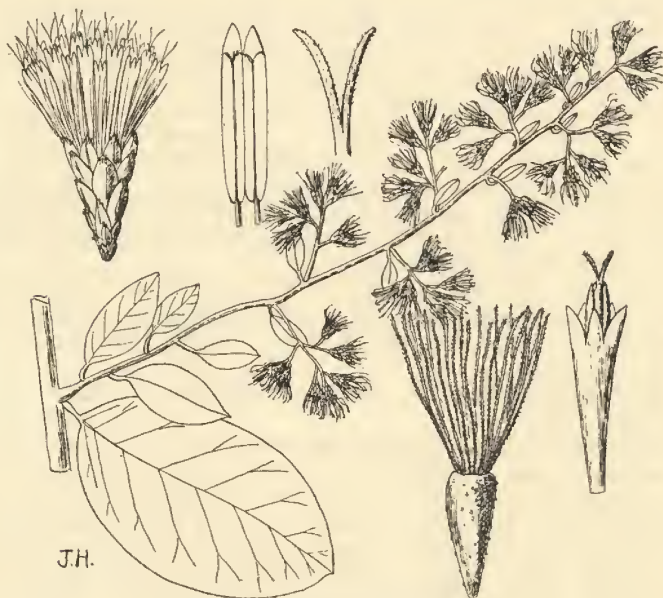


FIG. 85.—*Vernonia elegnifolia*.

pale. Pappus white spiny as are the achenes. *Hab.* A common weed everywhere in waste ground. *Distrib.* Whole tropics. *Native names:* Ekor Kudah; Rumpit Sabagi; Rumpit Susor Daun; Tahi Babi; Tambak bukit; Tambak Tambak; Sembong hutan.

(6) *V. chinensis* Less, in *Linnaea* vi. 674; *King, l.c.* 26.

A wiry spreading annual, pubescent, about 2 ft. tall. Leaves membranous, glabrous above, silky beneath, ovate-elliptic or oblanceolate, sub-serrate or entire, 1 to 1·5 in. long, up to ·5 in. across, decurrent on petiole ·25 in. long. Heads sessile or stalked, ·25 in. long. Bracts green woolly, keeled and mucronate, edge scariosus. Flowers bright violet. Pappus scanty, white. *Hab.*

Common in Campongs and waste places. Singapore, Bukit Mandai. Malacca, Bukit Sabukor (Derry). Pahang, Pekan. Sungei Ujong, Bukit Tumiang (Cantley). Penang, Ayer hitam; Sepoy Lines (Curtis). Kelantan, Kamposa. *Distrib.* Malay isles. *Native names* : Ruku Gajah; Praasi putih.

(7) *V. Curtisii* Craib and Hutchinson, *Kew Bulletin*, 1910, p. 22.

Herb 1 to 3 ft. tall, branched above glabrous. Leaves elliptic-lanceolate acute, narrowed to petiole, serrate-membranous, sparsely setulose above, 1.5 to 3 in. long, .25 to 1 in. wide; nerves 7 to 12 pairs. Heads solitary axillary, peduncled .5 in. wide; peduncle 2.5 in. long. Bracts oblong-lanceolate, long, subulate glabrous. Flowers white and blue. Achenes 10-ribbed. Pappus stiff. *Hab.* Lankawi and Terutau islands (Curtis).

(8) *V. rupicola* Ridl. *Journ. F.M.S. Mus.* x. 144.

Base of stem woody, glabrous except the young shoots which are mealy tomentose. Leaves membranous lanceolate, obscurely blunt serrate or nearly entire, mostly at the base of the stem, sub-acute long narrowed to the winged petioles, 5 in. long, 2 in. wide or less. Cymes of heads axillary 2 to 3 heads or terminal. Peduncles 1.25 in. long. Heads in fruit, .25 in. across, .5 in. long. Bracts lanceolate mucronate chaffy, at the base numerous much smaller ones. Pappus white, .2 in. long. Achenes narrow oblong, ribbed hairy. *Hab.* On rocks at Pulau Butong, Adang group (Ridley).

The plants were quite over and nearly dry when I found them.

### 18. GYNURA, Cass.

Herbs sometimes climbing. Leaves alternate, toothed or lobed. Heads in corymbs or solitary, disc-shaped, flowers all bisexual, yellow. Bracts in one series 10 or 12, narrow, receptacle flat. Style arms slender, hairy. Achenes narrow, many-ribbed. Pappus white copious, hairs in many rows. Species about 20, Asia, Africa, Australia.

Scandent; leaves slightly dentate petioled; bracts purple . . . . . (1) *G. sarmentosa*  
Erect herb; leaves strong-toothed and lobed; stem claspings; bracts green . . . . . (2) *G. malasica*

(1) *G. sarmentosa* DC. *Prodr.* vi. 298. *King, l.c.* 39; *Bot. Mag.* t. 7244. (Fig. 86, p. 190.)

Scandent or erect, glabrous, stem purple. Leaves succulent elliptic to lanceolate acute, base cuneate, dentate, 1 to 3 in. long, .4 to 1 in. wide; petioles .15 to .4 in. long. Heads few, .65 to .75 in. long; pedicels puberulous, in long lax hanging cymes. Involucre purple, bracts narrow. Flowers orange. Achenes 10-ribbed, puberulous. Pappus white silky. *Hab.* In forests. Whole peninsula from Singapore to Tomoh and Lankawi from sea

level to 4000 ft. altitude. In open spots it is occasionally short and erect, Penang Hill, Kelantan, Kedah peak and Lankawi. *Distrib.* Borneo, Java, Philippines. *Native name*: Akar Sabiak.

(2) *G. malasica* Ridl. *G. zeylanica* var. *malasica*, Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 24. *G. bicolor*, King, *l.c.* (in part) not of DeCandolle.

Weed about 3 ft. tall. Stem stout, nearly glabrous. Leaves linear-oblong, strongly toothed and lobed semi-amplexicaul, 4 to 5 in. long, .25 to .75 in. wide. Heads numerous .3 in. long in a



FIG. 86.—*Gynura sarmentosa*.

single head or acyme with 4 in. peduncles. Involucral bracts purplish linear-acuminate, nearly as long as the yellow corollas. Achene ribbed, hairy. Pappus silky white. *Hab.* Common in waste ground. Singapore, Tanglin. Johor, Tanah Merah; Pulau Dayong (Kelsall). Muar, Sungei Pauh (Foxworthy). Negri Sembilan, Bukit Tangga Pass. Selangor, Kwala Lumpur. Pahang, near Pekan. Malacca (Griffith): Pahang, Tanjong Bunga (Curtis). Tringganu, Bundi (Rostados). *Distrib.* Borneo.

#### 19. EMILIA, Cass.

Herb, glabrous (or hairy), glaucous. Leaves alternate, radical crowded entire toothed or runcinate, cauline few, amplexicaul.



Heads on long peduncles, solitary or few corymbose, pink (red or yellow). Flowers all bisexual; limb elongate, 5-toothed. Involucre cylindrical; bracts in 1 row, receptacle flat. Achenes minutely hairy. Pappus white, silky. Species 14 to 15, Indo-Malaya, Africa.

(1) *E. sonchifolia* DC. *Prodr.* vi. 302; *King, l.c.* 38.

Annual 6 in. to 1 ft. or more tall. Leaves lower ones usually lyrate pinnatifid below, 1.5 to 4 in. long; cauline ones hastate or linear toothed or pinnate, sessile auricled. Flower-heads .4 in. long; peduncles 1 in. long or more. Involucre apple green nearly as long as the flowers, lobes very unequal, linear-oblong. Flowers, tube white, limb rose pink. Stamens and style pink tipped crimson. Achene buff with lines of spines between the ribs. *Hab.* Weed in waste ground, paths, etc., variable. Whole peninsula.

var. *minor* King and Gamble. Lower leaves ovate with narrow-winged petioles. A common form or state. *Distrib.* Indo-Malaya. *Native names:* Katumbit Jantan; Satumbak Merah.

## 20. ERECHTHITES, Raf.

Erect more or less puberulous herbs. Leaves alternate, lobed or pinnate dissect. Heads corymbose on the ends of branches, narrow. Corolla pink (white or yellow). Outer florets female in 2 or many rows, filiform. Disc-florets bisexual, 5-fid. Achenes oblong-linear. Pappus white, tinted pink, abundant silky. Species 12, American, 1 spread all over Asia.

(1) *E. valerianifolia*, DC. *Prodr.* vi. 295. *Gynura bicolor* King, *l.c.* 40 in part, not of DeCandolle. *G. rosea* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 25.

Herb about 2 ft. tall, generally tinted with pink. Leaves finely dissected, 1 to 3 in. long or lobed toothed; petiole in lower leaves 1 in. long, glabrous or nearly so. Heads .25 in. long. Involucral bracts green, very narrow-acuminate. Flowers rose pink, tube white. Achenes cylindrical, hairy. Pappus in bud mauve, at length white tinted pink. *Hab.* Weed in waste ground of South American origin, now spreading over Java, Borneo, Sumatra and Malay Peninsula. Common in Singapore. Negri Sembilan, etc.

## 21. LAGGERA, Schultz.

Herb. Leaves alternate. Heads paniced or axillary, outer florets bisexual filiform, teeth minute. Disc-florets several rows 5-lobed. Involucre campanulate. Bracts rigid, narrow. Species 9 or 10, India and Africa.

(1) *L. flava* Benth. *Gen. Plan.* ii. 290; *King, l.c.* 36.

Glabrous or puberulous herb, 6 to 30 in. tall. Leaves membranous, glabrous oblong acute, cordate amplexicaul (radical leaves

sometimes petioled), toothed; nerves 8 pairs, conspicuous. Heads few, .25 in. across; peduncles slender. Corolla yellow. *Hab.* Penang "in the mountains of the island, Dec. 1822" (Wallich). Never seen since. *Distrib.* North India.

## 22. BLUMEA, DC.

Herbs; sometimes shrubby at base, often tomentose. Leaves alternate, lobed. Heads paniced, rarely racemed. Flowers yellow. Ray-florets in several rows, female, filiform 2- to 3-toothed. Disc-florets few bisexual. Involucre ovoid, bracts in several rows, outer smaller. Pappus hairs in a single row. Species 60, Asia, Africa, Australia.

- |  |                            |
|--|----------------------------|
| Scandent. Pappus white . . . . .   | (1) <b>B. chinensis</b>    |
| Erect, heads in large terminal panicles.   |                            |
| Tall shrub, camphoraceous; pappus often reddish; leaves thick . . . . .            | (2) <b>B. balsamifera</b>  |
| Tall herb, base shrubby; leaves membranous; pappus hardly reddish . . . . .        | (3) <b>B. aromatica</b>    |
| Tall herb; leaves stiff, shining, quite glabrous . . . . .                         | (4) <b>B. myriocephala</b> |
| Herb 2 to 3 ft. tall; heads axillary and terminal, clustered; pappus white.        |                            |
| Leaves thick, tomentose beneath . . . . .  | (5) <b>B. lacera</b>       |
| Leaves thin, membranous, glabrous . . . . .  | (6) <b>B. membranacea</b>  |
| Heads in sessile clusters of 2 or 3 in axils of bracts in a pseudo-spike . . . . . | (7) <b>B. glomerata</b>    |

(1) **B. chinensis** DC. *Prodr.* v. 444; *King, l.c.* 32.

Scandent. Leaves membranous, elliptic acuminate, narrowed to rounded base, with distant teeth; nerves 4 to 5 pairs; 2.25 to 3.25 in. long, .85 to 1.4 in. wide; petioles 2 to 3 in. long. Cymes 3 in. long or less axillary, peduncled. Heads sessile .35 in. across. Bracts outer 2 rows short, ovate-lanceolate blunt, pubescent, inner two rows much longer, linear acuminate, longer than the copious white pappus. *Hab.* Woods. Not rare. Singapore, Bukit Timah; Tanglin; Pulau Ubin. Johor, Bukit Murdom (Kelsall). Malacca, Ayer Panas (Derry). Selangor, Rawang (Goodenough). Perak, Thaiping Hills. Tringganu, Bundi (Rostados). Penang (Wallich, Curtis). *Distrib.* Indo-Malaya. *Native name:* Tombak-Tombak.

var. *riparia* King, *l.c.* *B. riparia* Blume. Somewhat hairy; nerves 3 or 4 pairs. *Hab.* Perak (Kunstler, Scortechini).

(2) **B. balsamifera** DC. *Prodr.* v. 466; *King, l.c.* 33.

Shrub, 6 to 12 ft. tall, tomentose, smelling strongly of camphor when bruised. Leaves membranous elliptic-lanceolate, serrate-dentate acute, base narrow, densely tomentose beneath, 3 to 6 in. long, 1 to 2 in. wide or larger; petioles 1 in. long. Heads .25 in. across, numerous in large terminal panicles. Flowers yellow; involucre bracts linear acuminate tomentose. Pappus red (when dry). Achenes 10, ribbed. *Hab.* Very common in open places, whole peninsula, easily recognised by its scent. The Ngai camphor

is obtained from it. King gives a variety *angustifolia* with narrow leaves less than .5 in. broad, an odd form from Singapore. *Distrib.* Indo-Malaya. *Native names*: Chapa; Chapu; Sembong.

(3) **B. aromatica** DC. *Prodr.* v. 88; *Hook. fl. F.B.I.* iii. 270.

A tall shrubby plant tomentose more or less. Leaves membranous, white arachnoid tomentose beneath, glabrous above, elliptic acuminate, long narrowed down the petiole, glandular denticulate, 12 in. long, 5 in. wide; petioles 3 in. long. Panicle of heads large, 6 to 12 in. long, tomentose. Heads over .5 in. across. Bracts green, tomentose, lanceolate acuminate, very narrow, as long as the white or reddish pappus, basal ones half as long. *Hab.* Roadsides in mountain forest, rare. Negri Sembilan, Bukit Tangga Pass. Selangor, Sempang Mines (Ridley). *Distrib.* Indo-Malaya.

This somewhat resembles *B. balsamifera*, but has no camphor-scent.

(4) **B. myriocephala** DC. *Prodr.* v. 445; *Hook. fl. F.B.I.* iii. 269.

Shrubby plant about 8 ft. tall. Leaves coriaceous shining above, quite glabrous, 4 to 10 in. long, 3 in. or more wide, oblanceolate-acuminate sub-serrate, narrowed to the winged petioles. Heads .5 in. across in a large pyramidal panicle. Pappus red, silky. *Hab.* Mountain forests. Selangor, Ginting Bidai; Kwala Lumpur (Curtis). Sungei Ujong (Cantley). Negri Sembilan, Bukit Tangga. Perak, Hulu Batang Padang (Ridley). *Distrib.* Indo-Malaya.

(5) **B. lacera** DC. *in Wight, Contrib.* 14; *King, l.c.* 35.

Herb 1 to 3 ft. tall with a turpentine odour, hairy or villous, simple or branched. Leaves obovate toothed, tomentose beneath, or runcinate, 3 in. long, .9 in. wide, winged to base of petiole. Heads .3 in. across, in dense terminal spikes. Involucre hairy, woolly. Bracts narrow, green tipped pink. Corollas yellow with red lobes. Achenes hairy. Pappus white. *Hab.* Common roadside weed. Singapore, Tanglin; Jurong. Johor, Tana Runto. Malacca, Bukit Bruang (Derry). Muar (Feilding). Pahang, Pekan; Kwala Tembeling. Penang Hill (Curtis). Perlis. *Distrib.* Tropical Asia and Africa. *Native name*: Lumai hitam.

(6) **B. membranacea** DC. *Prodr.* v. 440; *King, l.c.* 35.

A weed about 2 ft. or more tall nearly glabrous. Leaves thin membranous oblanceolate, toothed or runcinate, winged to base of petiole, 2 to 7 in. long, .5 to 2 in. across. Panicle often large, many-branched with numerous heads .25 in. across. Bracts linear acuminate. Corolla yellow. Pappus white. *Hab.* Sporadic in open places in the south, common in the north, Singapore, Alexandra Road, Malacca (Hullett, Griffith). Negri Sembilan, Tampin Hill. Selangor. Kwala Lumpur. Perak, Larut Hills; Temengoh. Penang, Ayer Hitam; Hill (Curtis). Lankawi. Perlis, Kanga. *Distrib.* Indo-Malaya.

(7) **B. glomerata** DC. in *Wight*, Contrib. 15.

Erect herb 1.5 to 2 ft. tall, glandular pubescent. Leaves membranous, sparsely strigose on both sides, lower leaves lyrate lobed, lobes dentate, uppers lanceolate, toothed. Heads .2 to .25 in. across in sessile clusters of 2 or 3 in axils of leaf-like bracts along the slender branches. Corolla very slender. Involucre often pink; bracts very narrow. Pappus white. *Hab.* Penang (Deschamps). Not seen. *Distrib.* Indo-Malaya, China.

## EXCLUDED SPECIES

**B. WIGHTIANA** DC. in *Wight*, Contrib. 14. "Penang and Singapore by roadsides, not common"; *King*, l.c. 35.

I have seen no specimen of this anywhere in the peninsula.

**23. PLUCHEA**, Cass.

Shrubs, glabrous (or tomentose). Leaves alternate dentate. Heads small in terminal corymbose cymes (or large and solitary) lilac (white or yellow), outer florets filiform, female. Disc-flowers bisexual, few, sterile, 5-lobed. Involucre ovoid or campanulate; bracts dry, stiff, ovate or lanceolate. Achenes small. Pappus scanty. Species 30, tropics.

(1) **P. indica** Less. *Linnaea* vi. 150; DC. *Prodr.* v. 451; *King*, l.c. 37.

Shrub about 4 ft. tall or less, glabrous. Leaves membranous, obovate acuminate, narrowed to base, dentate, .2 in. long, 1 in. wide. Panicles in flower 2 in. across. Flowers very slender, white or violet; lobes very short. Pappus .1 in. long, white. *Hab.* Extremely common in tidal swamps and often persisting long after the land has ceased to be tidal. Whole peninsula from Singapore to Perlis. *Distrib.* Indo-Malaya to Australia. *Native name:* Poko Beluntas.

**24. DICHROCEPHALA**, DC.

Annuals with alternate lyrate leaves. Heads small, globose in panicles; outer florets female, 2- to 3-toothed. Disc-florets bisexual 4- to 5-toothed. Pappus none or of 2 to 3 bristles. Species 5, Asia and Africa.

(1) **D. latifolia** DC. in *Guill. Arch. Bot.* ii. 518; *King*, l.c. 30.

Annual weed 1 to 2 ft. tall. Leaves ovate-lanceolate to lyrate or pinnatifid, terminal lobes ovate, toothed, 1 to 4 in. long; petioles .25 to 1.25 in. long. Heads .15 in. through, yellow or purplish; pedicels slender, .5 in. long in lax panicles. *Hab.* Rare, in damp spots. Perak, Thaiping (Ridley). *Distrib.* Africa, India, Malaya.

**25. EPALTES**, Cass.

Herbs. Leaves alternate toothed (or entire). Heads rather small, disc-like. Flowers purplish or white, in many series.

Involucre campanulate or hemispheric. Bracts in many series imbricate dry stiff. Receptacle flat (or elevate). Bisexual flowers regular, tubular; limb campanulate shortly 3- to 5-fid. Anthers sagittate; style subulate papillose at tip. Female flowers filiform minutely 2- to 3-toothed. Achenes sub-terete, 5- to 10-ribbed. Pappus 0. Species 9 or 10. *Hab.* South America, Africa, Asia and Australia.

(1) **E. australis** Merrill and Rolfe, *Philipp. Journ. Sc.* iii. 126.

Low tufted herb, glabrous. Branches from the base 4 to 6 in. long. Leaves rather fleshy, spatulate, irregularly toothed at the tip, .3 to .4 in. long, .12 to .3 in. wide. Heads .25 in. across on peduncles .1 in. long. Involucre as long or longer than the flowers, pale, lowest bracts small ovate, upper ones numerous, oblong blunt or minutely sub-acute. *Hab.* Kelantan, Kota Bharu (Yapp). *Distrib.* Siam, Philippines.

## 26. GRANGEA, Forsk.

Prostrate (or sub-erect) villous herbs. Leaves alternate pinnatifid. Heads sub-globose, yellow, terminal or leaf-opposed, outer flowers female, 2- to 4-lobed. Disc-flowers bisexual, 4- to 5-lobed. Involucre broad, campanulate; bracts few, herbaceous. Pappus a cylindrical fimbriate tube. Species 3 to 4, Asia and Africa.

(1) **G. maderaspatana** DC. *Prodr.* v. 373; *Hook. fl. F.B.I.* iii. 247.

Growing flat on the ground forming a patch 6 to 12 in. across. Heads solitary, .4 in. across. *Hab.* Rare. In rice-fields in the north, Setul and Perlis. *Distrib.* India.

## 27. CENTIPEDA, Lour.

Small prostrate herb. Leaves alternate, toothed. Heads very small axillary, sessile (or racemose), yellow or purplish, outer florets female, in many rows minute; disc-florets bisexual, few. Corollas 4-lobed. Involucre hemispheric. Achenes 4-angled, hairy. Pappus 0. Species 40, Asia, Australia, America.

(1) **C. orbicularis** Loureiro *Fl. Cochinchine*, 493; *King, l.c.* 46.

A very small herb, 1 in. tall to about 6 in. across, glabrous or tomentose sparsely. Leaves obovate or obcuneate sparsely toothed, .2 to .5 in. long. Heads .1 to .15 in. across. Flowers minute. *Hab.* Waste ground and open spots, Singapore, Johor. Malacca. Perlis in rice-fields. Kelantan, rice-fields, Kota Bharu. *Distrib.* Asia generally.

## 28. ERIGERON, Linn.

Tall or short herbs. Leaves alternate, entire or toothed or dissect. Heads racemose or paniced. Ray-florets 2 or many

rows, female of the disc bisexual. Involucre campanulate; bracts 2 or more rows. Receptacle flat, nude or with small paleas, outer female flowers ligulate, very narrow. Achenes flattened. Pappus of many slender bristles. Species about 100, whole world.

Much-branched weed 3 to 6 ft. tall; leaves toothed . (1) **E. sumatrense**  
 Dwarf unbranched herb; heads racemose; leaves  
 entire . . . . . (2) **E. oreophilum**

(1) **E. sumatrense** *Retz Obs.* v. 28; *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 90. *Conyza semipinnatifida*, *Ridl. Journ. Roy. As. Soc. S. Br.* 49, p. 18, *not of Wallich*.

Hairy weed 3 to 6 ft. tall. Lower leaves membranous, lanceolate, strongly sparingly toothed, sub-acute gradually narrowed to the base of the petioles 3·5 in. long, including petiole ·5 in. across. Uppermost leaves in inflorescence linear, 1 in. long, ·05 in. wide, entire. All coarsely white-hairy. Panicle very large, strict, many-branched, hairy. Heads ·1 in. long on pedicels slender, ·25 in. long, ·4 in. across in fruit. Involucral bracts linear-acuminate very narrow. Receptacle pustulate. Pappus white. *Hab.* Common weed in clearings and waste ground. Singapore, Pulau Ubin; Bukit Mandai. Johor, Batu Pahat. Malacca, Bukit Asahan. Pahang River. Sungei Ujong, Burunang (Cantley). Selangor, Batu Caves. Perak. Dindings, Lumut (Curtis). Penang, Tanjung Bunga (Curtis). *Distrib.* Siam, Java, Sumatra, Philippines. *Native names:* Sumbong Jantan; Sari Bulan.

(2) **E. oreophilum** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 91.

Simple unbranched herb, 6 to 8 in. tall, soft-pubescent. Leaves oblong-lanceolate entire, obtuse (upper ones smaller, narrower, acute) narrowed to base of petiole; ·4 in. long, ·12 in. wide or less, white hairy. Heads racemose or with one or two short branches ·1 in. long, shortly peduncled in fruit ·25 in. across. Peduncle slender, white-hairy ·12 in. long. Involucral bracts very narrow, linear-acuminate, pubescent or glabrous, not imbricating, outer flowers with a minute oblong ligule. Achenes (not ripe) glabrous. Pappus white. *Hab.* Perak, Gunong Kerbau at 6600 ft. altitude (Robinson).

## 29. MICROGLOSSA, DC.

Scandent shrub. Leaves alternate, entire. Heads small in large corymbose panicles. Ray-florets female, ligule white; disc-florets bisexual, limb 3- to 4-lobed. Involucre campanulate of several rows of narrow bracts. Achenes angled. Pappus of many silky hairs. Species 6, Asia and Africa.

(1) **M. volubilis** *DC. Prodr.* v. 320; *King, l.c.* 31.

Glabrous, shrubby. Leaves ovate-lanceolate acuminate, base

round entire or toothed; nerves 4 or 5 pairs, 1.5 to 2 in. long, .65 to 1.25 in. wide; petioles .25 to .4 in. long. Heads .35 in. across. Peduncles short in dense cymes, 2 in. across. Pappus dense, reddish. *Hab.* Hill forests; not very common. Malacca, Chabau (Cantley). Pahang, Telom. Perak, Hermitage Hill; Gunong Kerbau. Penang (Wallich, Phillips). *Distrib.* India, China. *Native name:* Poko Ragin. *Use:* A decoction of the roots used for colic.

### 30. CREPIS, Linn.

Glabrous (or hairy) herbs. Leaves alternate, radical, lobed, runcinate (or entire). Heads peduncled corymbose yellow. Involucre cylindrical; bracts multiseriate imbricate. Corollas ligulate with broad 5-toothed tips. Achenes fusiform or oblong, 10 or more ribbed. Pappus copious, silvery. Species about 10, northern parts of Old World.

(1) *C. japonica* Benth. *Fl. Hongk.* 194; *King, l.c.* 48.

Leaves thin runcinate, more or less toothed, mostly radical, 1.5 to 5 in. long; petioles 1.5 to 1.5 in. long, nearly or quite glabrous. Stems 4 to 14 in. tall, slender 1 or more from root with a few small sessile cauline leaves. Heads usually numerous about .24 in. long on slender peduncles and pedicels. Flowers bright yellow. *Hab.* Dry banks and clay soils in clearings, etc. Johor, Bukit Soga; Gunong Pulai. Malacca Hill. Perak, Thaiping Hills; Kamuning. Penang Hill, common, at 2500 ft. altitude. Perlis. *Distrib.* East Asia.

## ORDER LXXVI. STYLIDIEÆ.

Herbs. Leaves radical or scattered entire. Flowers in terminal racemes or panicles, irregular. Calyx-tube adnate to ovary, 2-lipped, upper lip 3- lower 2-lobed. Corolla gamopetalous, 5-lobed, 1 lobe smaller. Stamens 2, on a disc. Filaments connate with style; ovary inferior 2-celled; capsule 2-celled. Seeds minute. Species 100, few Asiatic, most Australian.

### 1. STYLIDIUM, Sw.

Herbs annual. Corolla irregular, lip narrow.

(1) *S. tenellum* Sw. *Gesellsch. Nat. Berl. Mag.*, 1807, 51, t. 2, Fig. 3; *King, l.c.* 49. (Fig. 87, p. 198.)

Very small slender herb, 1 to 8 in. tall, dichotomous. Leaves alternate oblong, .2 to .3 in. long. Flowers 2 to 5, sessile, mauve, very small. Capsule .5 to .7 in. long, slender 2-valved. *Hab.* In wet grassy

spots and rice-fields. Not very scarce but difficult to find. Malacca, Merlimau. Province Wellesley, Butterworth (King). Penang, Waterfall Gardens. Setul. *Distrib.* India.



FIG. 87.—*Stylidium tenellum*.

## ORDER LXXVII. GOODENOVIÆ.

Shrubs (or herbs). Leaves alternate entire or toothed. Flowers in axillary (or terminal racemes or panicles irregular) or regular. Corolla gamopetalous, white (yellow or blue), lobes 5. Stamens 5 on the disc. Ovary 1- or 2-celled. Fruit drupe (or capsule). Species over 200, chiefly Australasian.

### 1. *SCÆVOLA*, Linn.

Shrub. Leaves simple, entire or nearly. Flowers axillary in dichotomous cymes, white. Calyx-tube turbinate. Corolla oblique, split to base behind, lobes spreading digitately. Fruit fleshy white; endocarp woody. About 60 species, chiefly Australian.



(1) *S. Koenigii* Vahl. *Symb.* iii. 36; *King, l.c.* 50.

Big spreading shrub with light green succulent leaves, obovate-oblong sessile, 3 to 6 in. long, '2 in. wide, pubescent beneath. Flowers about 1 in. long. Calyx and corolla inside villous. Corolla white, turning brown. Fruit globose, '25 in. through. *Hab.* Sandy seashores, whole peninsula, common from Singapore to Penang, Kelantan, etc. *Distrib.* India to Polynesia. *Native name:* Ambong-Ambong.



FIG. 88.—*Scævola Koenigii*.

## ORDER LXXVIII. LOBELIACEÆ.

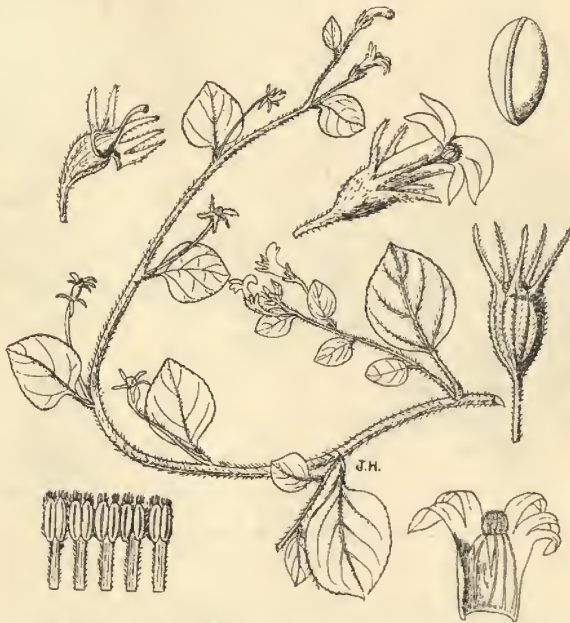
Herbs. Leaves entire or toothed, alternate (rarely opposite). Peduncles axillary, one or more flowered (rarely terminal racemed). Calyx-tube adnate to ovary, lobes persistent in fruit. Corolla superior, irregular, 2-lipped. Stamens as many as corolla-lobes; anthers connate round the style. Ovary inferior, 2- to 5-celled; ovules many; style simple. Stigmas as many as ovary-cells. Fruit baccate or 2-valved at top. Seeds very small. Species about 400, whole world, chiefly South American.

- |  |            |
|--|------------|
| Fruit 2-valved at top; plants small, ascending . . . . . | 1. LOBELIA |
| Fruit baccate, indehiscent; plant creeping . . . . .     | 2. PRATIA  |

1. **LOBELIA**, Linn.

Herbs, small (or shrubby and sometimes very tall). Leaves alternate. Inflorescence 1-flowered, axillary (or racemose) terminal. Calyx-teeth turbinate or obovoid, 5-lobed. Corolla, upper lip 2-, lower 3-lobed, usually blue. Ovary 2-celled. Stigma bifid. Capsule 2-valved. Seeds many, minute. Species 200, whole world.

- Creeping ascending herb; leaves ovate, petioled . . . (1) **L. affinis**  
 Erect; leaves oblong, sessile . . . . . (2) **L. Griffithii**

FIG. 89.—*Lobelia affinis*.

(1) **L. affinis** Wall. Cat. 1311; King, l.c. 52.

Creeping ascending pubescent (or glabrate) herb about 6 in. long. Leaves ovate round, base truncate or cordate, tip acute, hairy beneath, .5 to 2 in. long, .5 to 1.5 in. wide; petioles .3 to 6 in. long. Flowers solitary, axillary on pedicels nearly 1 in. long. Calyx obconic, lobes linear, hairy. Corolla .25 in. long, pale blue or white or violet. Capsule ribbed. *Hab.* Common in damp spots, variable in height and size of leaves. Singapore, Bukit Timah; Kranji. Johor, Gunong Pantai. Malacca, Bukit Tungul. Pahang River; Telom. Selangor, Batu Caves; Dusun Tua.

Perak, Temengoh; Tapa (Ridley). Penang Hill. *Distrib.* Indo-Malaya, China.

(2) *L. Griffithii* Hook. *fil. Journ. Linn. Soc.* ii. 28; *F.B.I.* iii. 424.

Slender weak erect annual 3 to 12 in. tall, glabrous. Leaves few, sessile, oblong, '5 in. long, '12 in. wide, entire or few toothed. Pedicel slender, '25 in. long. Flowers as long; corolla bright blue. Capsule nearly orbicular, '12 in. long. *Hab.* Rare in wet grass. Perlis, Chupeng (Ridley). *Distrib.* Burma, Siam.

## 2. PRATIA, Gaud.

Herbs. Leaves alternate, toothed. Peduncles axillary, 1-flowered. Calyx 5-partite. Corolla oblique, 2-lipped, upper lip bifid, lower trifid. Ovary inferior, 2-celled. Berry ellipsoid crowned with calyx teeth. Seeds many, minute. Species 15, South-east Asia, Australasia, South America.

(1) *P. begonifolia* Lindl. *Bot. Reg. t.* 1373; *Hook. fil. F.B.I.* iii. 422.

Small, long creeping, rooting plant, pubescent. Leaves cordate, ovate, toothed, '25 to '5 in. long. Peduncles '5 to 1'5 in. long. Corolla green with pink marks. Berry '3 in. long ellipsoid, purple. *Hab.* High mountains at 4000 to 7000 ft. altitude. Selangor, Menuang Gasing (Kloss); Perak, Gunong Kerbau (Robinson). *Distrib.* Indo-Malaya, China.

*Isotoma longiflora* Presl. An erect herb about a foot tall, poisonous and very hot tasting, with lanceolate dentate leaves and long-tubed white flowers, the limb nearly regular, a native of the West Indies, has escaped from gardens in many places in Singapore and Penang, but has not established itself completely.

## ORDER LXXIX. CAMPANULACEÆ.

Herbs. Leaves opposite or alternate. Flowers solitary, or in cymes, sometimes scorpioid or racemed, regular. Calyx inferior. Corolla-tube short (or long), lobes equal and similar. Stamens as many; anthers free from style. Ovary inferior, 2- to 5-celled; ovules many. Fruit capsular or baccate indehiscent. Species about 600, whole world.

Flowers solitary, peduncled; roots tuberous; berry white

1. CAMPANUMÆA

Flowers in dense axillary scorpioid cymes; berry small

2. PENTAPHRAGMA

Flowers in dense terminal spikes; capsule circumsciss

3. SPHENOCLEA

### 1. CAMPANUMÆA, Bl.

Erect (or climbing) herbs; roots tuberous. Leaves opposite, round at base (or cordate). Flowers solitary or few in a forked

cyme on short lateral branches. Calyx-lobes 4 to 6. Corolla campanulate, 4- to 6-lobed, regular, white or purple. Stamens 4 to 6. Ovary 4- to 6-celled. Fruit a sub-globose berry. Species 5 to 6, East Asia.

(1) *C. celebica* *Bl. Bijdr.* 727; *King, l.c.* 53.

Erect herb, 2 to 5 ft. long. Branches spreading. Leaves ovate-lanceolate, base rounded (or cuneate), 3 in. long, .75 to 1 in. wide, serrate mucronulate, glabrous above, pubescent beneath; petioles .15 in. long. Calyx-teeth linear-lanceolate, often serrate. Corolla white, .3 to .5 in. long. Berry .3 to .4 in. long, white, succulent. *Hab.* Rare. Mountains on banks. Selangor, Semangkok Pass (Ridley). Perak, Thaiping Hills (Curtis). *Distrib.* Indo-Malaya, China.

## 2. PENTAPHRAGMA, Wall.

Succulent herbs, little or not branched. Leaves alternate, broad, round, often inæquilateral at base. Cymes axillary, scorpioid with sessile flowers in two rows, bracteate and bracteolate. Calyx-tube adnate to ovary, lobes 4 to 5. Corolla campanulate, white (to orange), lobes 4 to 5. Stamens 5, epigynous or on corolla-tube. Ovary 3- to 5-celled. Fruit a berry. Seeds ellipsoid reticulate. [NOTE.—Plants with double flowers occur in most, if not all the species.] Species about 10, Malayan.

Leaves very unequal-sided at base.

Leaves equal-sided at base . . . . . (1) *P. begoniaefolium*

Cymes scorpioid elongating.

Leaves elliptic, narrowed to base, glabrous . . . . . (2) *P. Ridleyi*

Leaves ovate, base round shortly cuneate,  
tomentose beneath; petioles tomentose . . . . . (3) *P. Scortechinii*

Cymes short, few-flowered; flowers large . . . . . (4) *P. grandis*

(1) *P. begoniaefolium* *Wall. Cat.* 1313; *King, l.c.* 55.

About 8 in. tall, woolly. Leaves ovate, very unequal-sided, serrate, 4 to 6 in. long, 3.5 in. wide; petioles .75 to 1 in. long. Cymes 1 to 4 in. long. Flowers white. Bracts ovate, .25 in. long. Bracteoles oblong or spatulate, villous, .2 in. long. Calyx villous outside. Corolla glabrous. *Hab.* Banks in woods; northern part of peninsula, Pahang, Telom. Penang (all collectors). Perak (Scortechini). *Distrib.* Mergui.

(2) *P. Ridleyi* *King, l.c.* 57.

Succulent herb about 6 to 12 in. tall, ascending. Leaves ovate equal, sub-acute, edge minutely toothed, base cuneate, 6 to 8 in. long, 3.5 to 4.5 in. wide, glabrous; petioles 1 in. long. Cymes 1 or more in an axil .3 in. long; peduncle .25 in. long; flowers in two rows. Bracts ovate-spathulate, glabrous; bracteoles linear-spathulate, .15 in. long. Flowers .25 in. long, white with yellow spots turning purple at base inside. Stamens adnate at base to corolla-tube inside. *Hab.* Very local in forests in the south;

Singapore, Bukit Timah in ravines in the forest; Changi; Chan Chu Kang. Johor, Sungei Tebrau (Ridley).

(3) *P. Scortechinii* King and Gamble, l.c. 55.

Herb about 8 to 10 in. tall, woolly-tomentose. Leaves entire, ovate, base equal-sided, broad or narrowed, 6 to 12 in. long, 5 to 6 in. across, glabrous above, tomentose on nerves beneath and sprinkled with short hairs; petioles 2 to 3 in. long, woolly-tomentose. Cymes from upper axils 1 to 2 in. long. Flowers in 2 rows, white, centre yellow. No bracteoles. Calyx-lobes 5. Corolla campanulate, lobes 5, glabrous. *Hab.* Woods up to about 4000 ft. altitude.



FIG. 90.—*Pentaphragma begonifolium*.

The commonest species, Singapore, Pulau Damar. Johor, Panchur; Gunong Pulai. Negri Sembilan, Bukit Sulu (Cantley). Selangor, Kwala Lumpur; Ginting Bidai; Sempang Mines (very large here). Pahang, Telom. Perak, Thaiping Hills; Gunong Keledang; Temengoh; Tapa (Wray); Gunong Kerbau (Robinson). Dinding. Lumut.

var. *parvifolia* King and Gamble, l.c. is a small form.

(4) *P. grandis* Ridl. Journ. Linn. Soc. xxxviii. 312.

Herb 1 to 2 ft. tall. Stem .25 in. thick, fistular. Leaves elliptic-obovate obtuse, denticulate, base inæquilateral, glabrous above, pilose on the nerves beneath, 5 in. long, 2.75 in. wide; petioles 1 in. long. Flowers 6 to 7 in cyme, .75 in. long, yellowish white becoming purplish within. Calyx woolly. Corolla-lobes

oblong-pubescent. *Hab.* Wet spots on mountains in forests, Pahang, Gunong Tahan, 4000 to 5000 ft. altitude (Robinson and Ridley).

### 3. SPHENOCLEA, Gaertn.

Annual fleshy herb. Leaves alternate, lanceolate, entire. Flowers yellowish in dense cylindric spikes, small. Calyx-tube turbinate, lobes 5. Corolla campanulate, 5-lobed. Stamens 5, on corolla base. Capsule semi-inferior, depressed, globose, circumsciss at edge of calyx-tube. Seeds very numerous, minute. Species 1, all tropics.

(1) *S. zeylanica* Gaertn. *Fruct* i. 113, t. 24, Fig. 5; *King, l.c.* 57.

One to 2 ft. tall, branched. Leaves narrowed at both ends, 1 to 3 in. long, .2 to 1 in. wide; petioles .1 to .5 in. long. Spike 1 to 2 in. long, pointed; peduncle 1.5 to 3 in. long. Corolla greenish white, .1 in. long. *Hab.* In muddy spots, rice-fields, etc. Not common. Malacca (Griffith). Province Wellesley, Golden Grove (Ridley). Kedah, Alor Sta (Ridley). *Distrib.* All tropics.

## ORDER LXXX. VACCINIACEÆ.

Shrubs or small trees often epiphytic. Leaves alternate, entire or serrate. Flowers in axillary or terminal racemes or solitary axillary bracteate. Calyx campanulate or cupular, adherent to ovary, limb persistent, 5-toothed. Corolla tubular or inflate, campanulate or globose, 5-toothed. Stamens 10, epigynous inserted at base of tube; anthers opening by apical pores or prolonged into tubes. Ovary inferior with an epigynous disc, 5- or falsely 10-celled. Style and stigma simple. Fruit baccate. Seeds numerous. Species about 350, chiefly temperate regions.

Corolla long, tubular or campanulate; lobes long.

Calyx-tube terete . . . . . 1. AGAPETES

Calyx-tube 5-winged . . . . . 2. PENTAPTERYGIIUM

Corolla small, ovoid or campanulate; lobes short;

toothlike . . . . . 3. VACCINIUM

### 1. AGAPETES, Don.

Epiphytic shrubs. Leaves coriaceous, alternate linear to elliptic or ovate. Flowers axillary, solitary (or corymbose). Calyx globose, 5-lobed or toothed. Corolla tubular or campanulate, lobes long green, white or more or less red. Stamens 10; anthers oblong with two long apical processes spurred behind; disc pulvinate. Ovary 5-celled (or pseudo-10-celled). Berry globose, 5- to 10-celled. Seeds numerous. Species 30, chiefly Himalayan.

- Leaves ovate-lanceolate, 3·5 to 6 in. long; raceme 2 in. long; flowers ·25 in. long . . . . . (1) *A. perakensis*  
 Leaves deltoid-ovate cuspidate, 3 in. long; raceme very short; flowers ·1 in. long . . . . . (2) *A. micrantha*  
 Leaves ovate acuminate; tip coriaceous . . . . . (3) *A. Wrayi*

(1) *A. perakensis* *Ridl.* *A. Griffithii* *King, l.c.* 59, *not of Clarke.*

Epiphyte 3 to 15 ft. long, glabrous. Leaves lanceolate caudate, base round, thinly coriaceous; nerves fine, very inconspicuous; 5 in. long, 1·5 in. wide; petioles ·1 in. long. Racemes 2 in. long of 5 or 6 flowers on slender peduncles 1 in. long. Bracts minute lanceolate-linear. Calyx short cupular with ovate acuminate lobes as long as the tube. Corolla ·25 in. long, white, claret colour inside. Fruit green, tinted pink. *Hab.* Perak, Thaiping Hills about 2500 to 4000 ft. altitude (*Wray, Scortechini, Ridley.*)

The type of *Clarke's Griffithii* from Assam is in very poor condition, but it is certainly distinct in the lanceolate leaves being cuneate at base.

(2) *A. micrantha* *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 26.

Epiphyte. Leaves deltoid-ovate, long-caudate, base truncate, fine reticulate, 3 in. long, 1·25 in. wide; petioles ·1 in. long. Racemes 3-flowered, very short; pedicels ·5 in. long, pubescent. Calyx campanulate, hairy, lobes ovate. Corolla ·1 in. long, tubular, cylindric, pink. Berry globose, red hairy, ·25 in. through. *Hab.* Rare. Mountain forests. Selangor, Sempang Mines, Semangkok (*Ridley.*)

(3) *A. Wrayi* *Ridl.*

Branches rather stout. Leaves ovate acuminate, base round, thickly coriaceous; nerves fine, 4·5 in. long, 1·75 in. wide; petioles ·15 in. long. Racemes ·4 in. long. Flowers up to 6, on raceme. Pedicels 1 in. long. Calyx-tube campanulate, lobes 5, triangular acuminate, longer. Fruit ·4 in. long. Flowers not seen. *Hab.* Perak (*Wray.*)

Quite distinct from *A. perakensis* in the stiff coriaceous leaves and shorter peduncle. The only specimen I have seen bears almost ripe fruit.

## 2. PENTAPTERYGIUM, Klotsch.

Shrub. Leaves alternate, ovate or lanceolate, coriaceous. Flowers in axillary and terminal corymbs. Calyx large, tubular, 5-winged, 5-lobed. Corolla tubular, red (or yellow). Stamens 10. Ovary 5 (or pseudo-10-celled). Berry 5-winged or ribbed, 5-celled. Species 6, Himalayan.

(1) *P. Scortechinii* *King and Gamble, l.c.* 60.

Sarmentose 4 to 10 ft. tall, glabrous. Leaves thickly coriaceous, ovate or round, tip blunt, base broad, round; nerves 4 pairs prominent, 1·75 to 3 in. long, ·8 to 2 in. wide; petioles ·25 to ·4 in. long. Flowers few, 1 in. long, red; pedicels ·6 in. long. Corolla pubescent outside. Calyx as long, glabrous, 5-winged, lobes broad,

acute. *Hab.* Rare. Local on rocks and trees at 5000 ft. altitude. Perak, Gunong Batu Putih (Kunstler). Pahang, Gunong Berumbun (Wray).

### 3. VACCINIUM, Linn.

Shrubs or trees. Leaves coriaceous, alternate, lanceolate or ovate. Flowers in racemes or fascicles. Calyx-tube globose, small, teeth 4 to 5. Corolla urceolate, tubular or ovoid, pink or white. Stamens 8 to 10, free from corolla base; anthers oblong with 2 cylindrical tubes, dehiscing at top by slits. Disc cushion-shaped. Ovary 4- to 5-celled (or falsely 8- to 10-celled); ovules few or several in a cell. Berry crowned by persistent sepals, 5-celled. Seeds several in a cell. Species 140, chiefly north temperate zone.

Leaves broad elliptic or obovate, round at tip, very coriaceous, usually epiphytes.

Leaves under .75 in. long.

Flowers solitary axillary in leaves at tips of branches, pubescent . . . . .

(1) **V. Scortechinii**

Leaves 2 to 3 in. long, broad; flowers in long axillary and terminal racemes.

Racemes long many-flowered; flowers long-pedicelled; leaves glabrous.

Calyx-lobes very small; corolla unknown . . . . .

(2) **V. viscifolium**

Calyx-lobes triangular-ovate as long as tube in flower.

Corolla cylindric-ovoid . . . . .

(3) **V. decorum**

Corolla narrow, cylindric . . . . .

(4) **V. perakense**

Pedicels very short and thick; flowers crowded; corolla ovoid . . . . .

(5) **V. loranthifolium**

Pubescent plant; leaves pubescent, cordate at base, one terminal raceme bracts large . . . . .

(6) **V. glabrescens**

Leaves narrowed to the tip, stiff coriaceous, entire. Bushes.

Flowers in pairs axillary in axils of reduced terminal leaves . . . . .

(7) **V. longibracteatum**

Flowers in axillary racemes.

Bracts papery oblanceolate, .2 in. long . . . . .

(8) **V. brevifolus**

Bracts minute.

Leaves elliptic, 2 by 1 in., very shortly pointed; racemes 3.5 in. long . . . . .

(9) **V. Wrayi**

Leaves elliptic 1 in. long, distinctly pointed; racemes 1.5 in. long . . . . .

(10) **V. ardisiflorum**

Leaves lanceolate, 2.5 by 1 in., acuminate; racemes lax, 2.5 in. long . . . . .

(11) **V. eburneum**

Leaves lanceolate acuminate both ends; nerves hardly visible; racemes lax, 2.5 in. long . . . . .

(12) **V. bancanum**

Leaves elliptic caudate; nerves conspicuous; racemes 3 in. long . . . . .

(13) **V. Hasseltii**

Leaves lanceolate long caudate; nerves sunk above . . . . .

(14) **V. acuminatissimum**



- Leaves thin, serrate, lanceolate caudate,  
 4 in. long; pedicels .3 in. long . (15) **V. pubicarpum**  
 Leaves elliptic acute, 2 in. long; pedicels  
 .08 in. long . . . . . (16) **V. malaccense**

(1) **V. Scortechinii** *King and Gamble, l.c. 62.*

Shrub or small tree puberulous. Leaves coriaceous, gland-dotted elliptic round or obovate, base slightly cuneate; nerves faint, .3 to .45 in. long, .25 to .35 in. wide. Flowers solitary axillary, .35 in. long, rosy, pubescent as are pedicels. Calyx campanulate, teeth triangular acute. Corolla cylindric, dilate below tapering upwards. Stamens 10; anther processes shorter than anther. Fruit globular tomentose. *Hab.* Mountains at 6000 to 7000 ft. altitude. Pahang, Gunong Tahan; Gunong Berumbun, Telom (Ridley). Perak (Scortechinii); Gunong Kerbau (Haniff).

(2) **V. viscifolium** *King and Gamble, l.c. 63.*

Small shrub. Branches thick black. Leaves obovate or oblanceolate, round at top, narrowed to base, very coriaceous; nerves 4 pairs, conspicuous when dry, usually on both sides; 2 to 4 in. long, 1 to 2.7 in. wide; petioles thick, .2 in. long. Racemes axillary and terminal, .3 in. long; rachis rather slender, red. Flowers crimson. Fruit on decurved pedicels, .5 in. long or less, globular, .2 in. through or less, crowned by a large sub-conic disc and very small calyx-lobes, 5-celled. *Hab.* Mountains at 5000 ft. altitude. Pahang, Gunong Tahan (Ridley). Perak (Scortechinii); Gunong Batu Putih (Kunstler).

(3) **V. decorum** *Ridl. Journ. F.M.S. Mus. v. 36.*

Shrub. Leaves very coriaceous, obovate, tip round, narrowed to petiole, gland-dotted beneath, 1.5 to 2.5 in. long, .75 to 1.5 in. wide. Racemes axillary, lax, 2 in. long; pedicels .1 in. long. Calyx-lobes triangular ciliate. Corolla broadly cylindric, dilate in middle. Stamens 8, silky; anther processes as long as anther, no basal appendage. Fruit semi-globose crowned with disc and conspicuous calyx-lobes, on pedicel .2 in. long. *Hab.* Selangor, Gunong Mengkuang Lebah at 5000 ft. altitude (Robinson).

Near *V. viscifolium*, but the calyx-lobes larger in fruit.

(4) **V. perakense** *Ridl. Journ. Roy. As. Soc. S. Br. 79, p. 92.*  
*V. Teysmanni* *King, l.c. 64, not of Miquel.*

Stunted tree or shrub. Leaves thick coriaceous, obovate rounded, base narrowed into petiole; nerves faintly visible or more or less conspicuous; 2.5 to 3.5 in. long, 1.25 to 2.25 in. wide; petioles .2 to 4 in. long. Racemes slender, 3 to 4 in. long, puberulous. Flowers on slender pedicels .2 in. long. Calyx hemispheric, short with broad acute lobes. Corolla .25 in. long, cylindric with short lobes, white, glabrous. Stamens 8 or 10, sub-exserted apical, spurs long, no basal appendage. Fruit globular with a conspicuous disc at top. *Hab.* Perak, Gunong Bubu (Scortechinii); Thaiping Hills at 4000 ft. altitude (Curtis).

(5) *V. loranthifolium* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 91.

Small shrub or tree. Branches stout. Leaves very coriaceous, obovate, tip round, base cuneate; nerves rather prominent when dry; 2 to 2.75 in. long, 1 to 1.25 in. wide; petioles thick, .2 in. long. Racemes thick, terminal, 2.5 in. long, rachis red. Flowers crowded on very short thick pedicels. Bracts oblong, blunt, as long as calyx. Calyx cupular, lobes broad ovate pubescent. Corolla globose-ovoid, glabrous, fleshy, hairy within. Stamens 10; anther-processes cylindrical nearly as long as the anther, no basal process. Fruit pulpy, .15 in. long, glabrous, crowded with calyx-lobes. *Hab.* Perak, Gunong Kerbau (Robinson and Haniff).

(6) *V. glabrescens* King and Gamble, *l.c.* 63.

Epiphyte, pubescent. Leaves coriaceous elliptic blunt, base minutely cordate, pubescent beneath when young, 1 to 1.35 in. long, 6 to 1 in. wide; petioles under .14 in. long. Raceme solitary, terminal, 3 to 4 in. long with a large lanceolate pubescent bract, .4 in. long at the base of each flower. Flowers unknown. Fruit round or ellipsoid, pubescent, .2 in. long, .15 in. wide. *Hab.* Perak (Scortechini).

I have not seen this plant; perhaps it is *V. longibracteatum* Ridl., but the description does not quite accord.

(7) *V. longibracteatum* Ridl. *Journ. Linn. Soc.* xxxviii. 313; *Journ. F.M.S. Mus.* vi. 157.

A large bush with white-hairy branches. Leaves coriaceous ovate blunt sub-cordate, pubescent beneath, 1 to 1.5 in. long, .75 to 1.25 in. wide, terminal ones lanceolate-acute pubescent, .5 to 1 in. long. Flowers in pairs; in axils of terminal leaves pedicels pubescent, .4 in. long. Calyx short, broad campanulate, .1 in. long. Corolla rose pink, .4 in. long, cylindrical, hairy outside and in. Stamens 10, included; anther-processes as long as anther with a flat lanceolate process from the back. Berry pink globose, .2 in. long, pubescent. *Hab.* Mountains at 4000 to 5500 ft. altitude. Selangor, Gunong Ulu Kali. Pahang, Gunong Tahan; Perak, Gunong Kerbau.

(8) *V. breviflos* Ridl. *Journ. Linn. Soc.* xli. 293.

Shrub. Leaves coriaceous oblong-lanceolate, abruptly acuminate, base narrowed, glabrous, .2 in. long, .5 in. wide. Racemes axillary and sub-terminal, pubescent, 1.5 in. long. Bracts oblong cuspidate, papery. Calyx cup-shaped, entire. Corolla cylindrical, lobes rounded, .15 in. long. Stamens 10, appendages nearly as long as anthers, no basal processes. *Hab.* Selangor, Menuang Gasing (Kloss).

The bracts are papery and much longer than the buds, .1 in. long and fall off as the flower develops.

(9) *V. Wrayi* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 92. *V. bancanum* King, *l.c.* in part.

Tree. Leaves elliptic, slightly narrowed at both ends, stiffly

coriaceous, 1.25 to 2 in. long, .75 to 1 in. wide; petioles thick, .1 in. long. Racemes 3 in. long, pubescent as are flowers. Calyx flat saucer-like with large spreading acute lobes. Corolla .15 in. long, conoid-cylindric, reddish pink, hairy inside. Stamens very short, filaments hairy; anthers ellipsoid with 2 recurved tubes on the apex, trumpet-shaped, and a dorsal process on the back. Disc hairy. Fruit globose, puberulous with a rather prominent hairy disc and sepals acute as long. *Hab.* Perak, Ulu Batang Padang, 4900 ft. altitude (Wray).

(10) **V. ardisiflorum** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 91.  
*V. ardisioides* *Ridl. Journ. F.M.S. Mus.* v. 37.

Shrub. Leaves coriaceous, glabrous elliptic-lanceolate acuminate, base narrow, 1.25 in. long, .5 in. wide; nerves very fine, inconspicuous. Racemes 1 in. long, lax. Flowers small on pedicels .1 in. long, pubescent. Calyx pubescent, cup-shaped, lobes as long as tube. Corolla glabrous, .12 in. long, ovoid, lobes small acute. Stamens 10, short, anther-processes small, globose yellow, no basal process. *Hab.* Selangor, Gunung Mengkuang Lebah (Robinson).

(11) **V. eburneum** *Ridl. Journ. F.M.S. Mus.* vii. 45.

Tree up to 20 ft. tall. Leaves thick coriaceous, elliptic-ovate narrowed equally to both ends, acute, 1.5 to 2 in. long, .5 to .8 in. wide; petioles .1 in. long. Racemes 1 to 5 in. long. Flowers waxy-white, .2 in. long. Calyx-lobes ovate, ciliate. Corolla cylindric, glabrous. Stamens 10, anther-processes subulate connective spur oblong, crenulate. *Hab.* Kedah Peak at 3000 ft. altitude (Robinson). Selangor, Klang Gates 1400 ft. altitude, on the quartzite ridge (Ridley).

(12) **V. bancanum** *Miq. Fl. Ind. Bat. Supp.* 587; *King, l.c.* 64.  
*V. Kunstleri* *King and Gamble, l.c.* 65.

Shrub, terrestrial or epiphytic. Leaves coriaceous elliptic acuminate, sub-acute, base shortly narrowed, 2.5 in. long, .75 to 1 in. wide; petioles .1 in. long. Racemes 2 in. long, pubescent; pedicels .2 in. long. Calyx campanulate, tomentose with 5 very short teeth. Corolla .15 in. long, glabrous, lobes very short, blunt, tube narrowed towards tip. Stamens shorter; anthers with short slightly curved erect terminal processes and 2 subulate spurs behind; filaments pubescent. Style longer than corolla. Fruit globose, pea-shaped. *Hab.* Mountain forests. Malacca, Mt. Ophir (Maingay). Pahang, Gunung Tahan. Selangor, Klang Gates (Brooks). *Distrib.* Bangka, Borneo.

The type in Herb. Kew has the calyx nearly glabrous, but some of the Borneo ones are pubescent. I cannot separate *V. Kunstleri* King.

(13) **V. Hasseltii** *Miq. Ann. Mus. Bot. Lugd. Bat.* i. 40; *King, l.c.* 66. (Fig. 91, p. 210.)

Large epiphyte, glabrous. Leaves coriaceous, often red, elliptic acuminate caudate blunt, base shortly cuneate, entire; nerves

and reticulations conspicuous; 1.5 to 2.5 in. long, .6 to 1 in. wide; petioles .2 in. long. Racemes 3 to 4 in. long, glabrous. Flowers .35 in. long. Calyx short, cupular. Corolla cylindric, mouth narrowed, lobes very short, white. Stamens as long as corolla; anther-beaks twice as long as anthers; filaments hairy. Fruit globular, smooth, black. *Hab.* From sea level to 4000 ft. altitude. Very fragrant. Fruit eatable. Singapore, Toas; Changi; Kranji. Johor, Scudai River; Tanjong Bunga. Pahang, K'luang Terbang (Barnes). Perak, Larut (leaves narrow lanceolate; flowers pink, Kunstler). Kedah Peak. *Distrib.* Bangka.

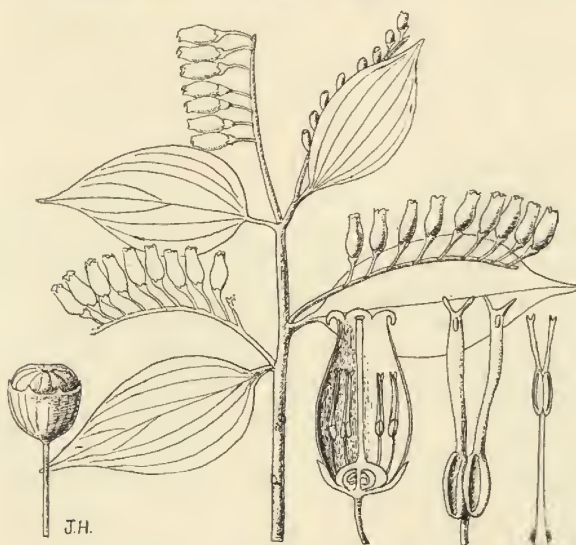


FIG. 91.—*Vaccinium Hasseltii*.

var. *sabulctorum*, *Ridl.* (species in *Trans. Linn. Soc.* iii. 315). Big terrestrial shrub. Flowers rosy red. *Hab.* Pahang, sandy country. Pekan (Ridley).

(14) *V. acuminatissimum* *Miq.* *Ann. Mus. Bot. Lugd. Bat.* i. 36; *King, l.c.* 66.

Epiphytic shrub 3 to 4 ft. tall more or less pubescent. Leaves oblong-lanceolate long-caudate, base round, shortly cuneate; stiffly coriaceous; nerves 2 pairs much raised beneath, depressed above and reticulations conspicuous, hairy beneath, 4 in. long, 1.5 in. wide; petioles .1 in. long, hairy. Racemes 1 to 1.5 in. long, hairy. Flowers distant. Bracts lanceolate, setaceous. Calyx-lobes 5 short, lanceolate, tube hairy. Corolla not seen. Fruit sub-globose, yellow, .12 in. through. Seeds linear black, pitted.

Ovary 10-celled. *Hab.* Forests; not common. Singapore, Bukit Mandai. Perak, Batang Padang District, and Larut Hills 300 to 1500 ft. altitude (Kunstler). *Distrib.* Java and Borneo.

(15) *V. pubicarpum* Ridl. *Journ. Linn. Soc.* xxxviii. 313.

A shrub 4 ft. tall. Leaves thinly coriaceous, lanceolate acuminate acute, glabrous serrulate, 2 in. long, .75 in. wide; petioles .2 in. long. Racemes 2 in. long. Flowers on pedicels .25 in. long, pubescent. Calyx cupulate, pubescent. Corolla pubescent, cylindrical, .2 in. long. Stamens 10; anther-processes as long as anther; filaments silky as long as anther. Berry globose pubescent. *Hab.* Shady ravines on mountains, local. Pahang, Gunong Tahan; K'luang Terbang (Barnes).

(16) *V. malaccense* Wight, *Calc. Journ. Nat. Hist.* viii. 172; *lc.* 1186; *King, l.c.* 67.

Large terrestrial shrub 15 to 20 ft. tall, glabrous. Leaves thinly coriaceous, lanceolate-elliptic acuminate, base narrowed, serrate, 1 to 2.25 in. long, .6 to .9 in. wide; petioles .15 in. long. Racemes pubescent, 3 in. long. Calyx campanulate. Corolla pale rose to white, cylindrical, .25 in. long. Stamens short; anther-beaks longer than anther, blunt. Fruit globose, glabrous, .35 in. long, plum-coloured, eatable. *Hab.* Seashores and mountains. Singapore, Changi. Pahang, Pekan; Sungei Chenei (Fox); Kuantan (Foxworthy). Malacca, Tanjong Kling; Tanjong Kundur (Griffith); Merlimau (Cantley). Dindings, Lumut. Kedah Peak (Lobb). Lankawi, Tasek Enak (Haniff). *Distrib.* Cochin-China, Bangka, Java. *Native names:* Kalampadang; Enai Batu.

#### EXCLUDED SPECIES

*V. ERYTHRINUM* Hook. *Bot. Mag. t.* 4688. *Diplycosia erythrina* King and Gamble, *l.c.* 72. Almost certainly a form of *V. waringiaefolium* common in the Sumatra and Java mountains. The only specimen quoted for this by King and Gamble which I have seen is Wray's plant from Gunong Bubu 3816, but that which is only in fruit has solitary axillary flowers, and cannot possibly be *V. erythrinum*. A fruiting *Vaccinium* collected by Robinson on Gunong Mengkuang Lebah more closely resembles it, but the fruit is glaucous and the sepals are larger.

#### ORDER LXXXI. ERICACEÆ.

Shrubs or trees. Leaves alternate or whorled. Flowers racemed, fascicled or solitary. Calyx free or slightly adnate to ovary, 4(5- or 6)-lobed. Corolla hypogynous, imbricate or contort rarely valvate, 4 to 5 lobes (rarely more). Stamens hypogynous 10 (5, 8, or 20); anthers dehiscent by terminal pores or with apical tubes. Disc usually present. Ovary 5-celled; style slender. Stigma sometimes lobed. Fruit capsular, 5-celled, seeds many, rarely

(*Pernettyopsis*) baccate. Species over 1000, temperate regions and tropical mountains.

Corolla gamopetalous.

Fruit capsular.

Capsule 5-valved, loculicidal; flowers small.

Calyx round, capsule succulent.

Anthers with 2 horns; flowers racemose . . . . . 1. GAULTHERIA

Anthers not horned; flowers solitary or  
few . . . . . 2. DIPLYCOSIA

Calyx not succulent in fruit . . . . . 3. PIERIS

Capsule 5- to 20-valved, septical.

Flowers large, fasciated . . . . . 4. RHODODENDRON

Fruit baccate . . . . . 5. PERNETTYOPSIS

Petals separate . . . . . 6. CLETHRA

### 1. GAULTHERIA, Linn.

Erect (or creeping) shrubs. Leaves coriaceous, serrulate. Flowers white in axillary and terminal racemes. Calyx 5-toothed, enlarged and succulent in fruit enclosing the capsule. Calyx ovoid or tubular, lobes 5, recurved. Stamens 10 attached to corolla-base; anthers prolonged at top into 2 tubes, often with a to 2 dorsal spurs. Ovary 5-celled; ovules many in a cell; style and stigma simple. Capsule 5-celled dehiscent from tip. Seeds many, minute. Species 80, American; a few Asiatic and Australian.

Glabrous. Racemes lax, many-flowered.

Leaves elliptic, blunt . . . . . (1) *G. fragrantissima*

Leaves ovate caudate acuminate . . . . . (2) *G. leucocarpa*

Whole plant hairy; racemes short few-flowered . . . . . (3) *G. hirta*

(1) *G. fragrantissima* Wall. *As. Res.* xiii. 397

Shrub. Leaves thick coriaceous, elliptic-ovate sub-acute, base cuneate, crenate serrate, gland-dotted; nerves 4 pairs with reticulations visible; 1.5 to 2.25 in. long, .75 to 1.2 in. wide; petioles .2 in. long. Racemes axillary and paniced, terminal, 1 to 2 in. long. Flowers numerous, pedicelled. Calyx campanulate, lobes deep, triangular. Corolla .15 in. long, ovoid, tubular. Anther-tubes long. Fruit depressed globular, 5-grooved, .15 in. through. *Hab.* Rare at 6000 ft. altitude in mountains. Perak, Gunong Kerbau (Robinson); Gunong Batu Putih (Wray). *Distrib.* India. Sumatra, Java.

(2) *G. leucocarpa* Bl. *Bijdr.* 586; *King, l.c.* 70.

Scandent branches slender. Leaves coriaceous, ovate caudate serrulate, base round, glabrous, 2 to 4 in. long, 1 to 2 in. wide; petioles 2 in. long. Racemes slender, axillary, 3 in. long. Flowers remote; pedicels .25 in. long. Calyx saucer-shaped, lobes small. Corolla sub-cylindrical tapering at mouth. Fruit adnate to calyx-tube, 5-celled. *Hab.* Rare, mountains at 5500 to 6000 ft. altitude. Perak (Wray, Scortechini). Pahang, Gunong Berumbun; Telom. Kedah, Gunong Bintang (Kloss). *Distrib.* Java, Sumatra.

(3) *G. hirta* Ridl. *Journ. F.M.S.* vi. 49.

Flexuous hairy shrub. Leaves coriaceous, ovate acuminate, base round, hairy beneath, 1.5 to 3 in. long, 1 to 1.25 in. wide; petioles .1 in. long, hairy. Racemes axillary, 1.5 in. long, hairy. Flowers 5 or 6; pedicels .25 in. long, hairy. Calyx campanulate large, lobes ovate hairy. Corolla urceolate, .25 in. long, hairy outside, lobes 5 short, lanceolate blunt. Stamens 10, glabrous; anthers elliptic-oblong with 2 forked appendages, orange colour. *Hab.* Very rare, mountains at 5000 ft. altitude. Perak, Gunong Kerbau (Robinson).

## 2. DIPLYCOSIA, Bl.

Usually epiphytic shrubs, often bristly. Leaves coriaceous, entire or ciliate-serrate. Flowers small, axillary, solitary, fascicled or very shortly racemose. A whorl of bracts just below the flowers. Calyx 5-toothed, free or half superior accrescent in fruit. Corolla campanulate, 5-lobed. Stamens 10, as long as corolla, insert at base; anthers with terminal tubes. Disc 10-lobed. Ovary 5-celled; ovules numerous. Fruit half superior, 5-valved. Seeds minute. Species about 15, Malayan.

Flowers solitary.

Leaves .4 in. long, ovate serrate setose on edge; stem bristly (1) *D. microphylla*

Leaves sparsely or not setose; leaf-edge entire; stem pubescent.

Leaves elliptic, .5 to .75 in. long (2) *D. elliptica*

Leaves ovate cordate, .5 in. long; branches red tomentose (3) *D. cordifolia*

Leaves lanceolate acuminate, base narrow, 1.5 by .5 in.; pedicels .5 in. long (4) *D. lancifolia*

Flowers fascicled.

Leaves lanceolate 2 by 1 in. (5) *D. heterophylla*

Leaves ovate, very coriaceous, 4 by 2 in. (6) *D. latifolia*

(1) *D. microphylla* Becc. *Males*; i. 212. *Vaccinium microphyllum* King, *l.c.* 62, not of Blume.

Epiphyte, slender branches, hairy and bristly. Leaves coriaceous, ovate-elliptic, round at both ends, edge crenulate with a bristle in each notch, underside sprinkled with bristles; nerves invisible beneath, one pair from base sunk above; .4 in. long, .3 in. wide; petioles very short. Flowers solitary, axillary. Peduncles .1 in. long or less, thick, with small whorl of bracts at top. Calyx broad, campanulate with 5 round lobes. Corolla greenish flesh-colour, .2 in. long. *Hab.* On trees in mountains at 3000 to 4000 ft. altitude. Malacca, Mt. Ophir (all collectors). Kedah Peak (Lobb, Low). *Distrib.* Borneo.

(2) *D. elliptica* Ridl. *Journ. F.M.S. Mus.* x. 145.

Stem and branches pubescent not setose. Leaves entire, elliptic, rounded at both ends, .5 to .75 in. long, .2 to .5 in. wide; petioles very short. Pedicels .05 in. long. Calyx-lobes ovate, sub-acute.

Corolla pale green (Wray), white (Kunstler). *Hab.* Mountains at 3000 to 4000 ft. altitude. Perak, Larut (Kunstler. "Parasite 5 to 8 ft. long. Leaves dark green, glossy. Flowers white, bell-shaped, yellow inside, at 3000 to 4000 ft. altitude"); Gunong Batu Putih (Wray) at 3400 ft. altitude on top of a tall tree.

This differs from *D. microphyllum* in the complete absence of bristles on the stouter stem, entire leaves, larger with no bristles on edge (a trace of them on Wray's specimen) and more deeply cut calyx-lobes. The flowers are all in bud.

(3) *D. cordifolia* Ridl. *Journ. F.M.S. Mus.* x. 145.

Branches 4-angled, red-tomentose. Leaves entire, ovate cordate base broad round, edge sparsely setose, nerves sunk above; .5 in. long, .4 in. wide; petioles very short. Peduncle decurved, .1 in. long. *Hab.* Pahang, Wray's camp, Gunong Tahan (Ridley).

This is another species allied to *D. microphyllum* differing in the absence of bristles on the red-tomentose branches and the cordate leaves. Unfortunately I could get no flowers or fruits.

(4) *D. lancifolia* Ridl. *Journ. Roy. As. Soc. S. Br.* 39, p. 15.

Shrub, slender setulose above. Leaves coriaceous, lanceolate or ovate-lanceolate acuminate, base narrowed; nerves 2 pairs and midrib depressed above; 1.5 in. long, .25 to .5 in. wide. Flowers solitary, axillary; pedicels nearly .5 in. long, setulose. Bracts 2, ovate. Calyx campanulate, narrowed at base, lobes ovate acute red hairy, .25 in. long. Corolla longer, glabrous. *Hab.* Very rare on mountains. Pahang, Kluang Terbang (Barnes).

(5) *D. heterophylla* Bl. *Bijdr.* 858; *King, l.c.* 71.

Shrub. Branches slender, pilose when young. Leaves coriaceous, elliptic to lanceolate acuminate acute, base narrowed, glabrous, 2 to 4 in. long, 1 to 2 in. wide; petioles .2 in. long. Flowers axillary, fascicled, .15 in. long, with 2 reniform bracts below calyx. Calyx campanulate, lobes broad, erect. Corolla campanulate, .2 in. long, teeth short, reflexed. Fruit round, smooth, superior. *Hab.* Perak (Scortechini). Very rare. *Distrib.* Java.

(6) *D. latifolia* Bl. *Bijdr.* 858; *King, l.c.* 71.

Glabrous shrub, 6 to 10 ft. tall. Leaves coriaceous thick elliptic-lanceolate, acuminate, base narrowed; nerves 2 pairs from near base of midrib, depressed above, slightly raised beneath, 3 to 5 in. long, 1.35 to 3 in. wide; petioles .2 in. long. Flowers in fascicles of 2 or 3; pedicels slender, .15 in. long. Calyx small, lobes blunt, ciliolate. Corolla .1 in. long, campanulate with short erect acute teeth and a short tube at base. Style exsert. Fruit black, enclosed in the corolla. *Hab.* Forests at 3000 to 5000 ft. altitude. Pahang, Gunong Tahan; Kluang Terbang (Barnes). Selangor, Bukit Kutu. Perak, Gunong Batu Putih (Wray, Scortechini, Kunstler). *Distrib.* Java.



## 3. PIERIS, D. Don.

Trees or shrubs. Racemes axillary solitary or terminal, paniced. Calyx free, 5-lobed. Corolla ovoid white, lobes short, recurved. Stamens 10; anther-cells ovoid truncate; filaments 2-horned or muticous. Ovary globose. Disc lobed. Capsule globose 5-valved. Seeds linear-oblong, falcate. Species 10, Indian.

(1) *P. ovalifolia* Don, *Edinb. Phil. Journ.* xvii. 159; *King, l.c.* 73.

A tree about 20 ft. tall. Leaves thinly coriaceous, ovate, shortly acuminate, base round; nerves 12 to 15 pairs prominent beneath; 4 to 5.25 in. long, 2 to 2.75 in. wide; petioles .3 in. long. Racemes simple, axillary, pubescent, 4 to 8 in. long. Flowers numerous, white; pedicels .1 in. long. Calyx small, teeth acute. Corolla .25 in. long, ovoid cylindric. Capsule .2 in. through. *Hab.* Mountains in rocky places by streams. Pahang, Gunung Tahan at 5000 ft. altitude (Ridley). Perak, Gunung Kerbau at 6000 ft. altitude (Robinson); at 5000 ft. altitude (Wray). *Distrib.* India, Japan.

## 4. RHODODENDRON, Linn.

Shrubs, epiphytic or terrestrial or trees. Leaves coriaceous, often whorled. Flowers in terminal umbels, showy, white, red or yellow. Calyx small, saucer-shaped, lobed or entire. Corolla campanulate or tubular. Stamens 10 (or fewer); filaments slender; anthers muticous, oblong opening by 2 terminal pores. Ovary cylindric; style long, filiform. Capsule 5-valved, cylindric, long or short. Seeds winged, thin, flat. Species about 160, mountains of Europe, Asia and North America.

*Flowers campanulate in simple umbels.*

Flowers large, red; ovary glabrous . . . . . (1) *R. javanicum*

Flowers large, yellow; ovary silky . . . . . (2) *R. Teysmanni*

Flowers small, yellow.

Stamens not exsert, 1 in. long . . . . . (3) *R. Robinsonii*

Stamens not exsert, .3 to .4 in. long . . . . . (4) *R. perakense*

Stamens exsert . . . . . (5) *R. orion*

Flowers white; capsules short and broad.

Umbels simple, many-flowered.

Leaves very coriaceous, white beneath;  
bracts round, glabrous . . . . . (6) *R. Wrayi*

Leaves coriaceous not white beneath;  
bracts long, silky . . . . . (7) *R. coruscum*

Umbels 2 to 4, each with 2 to 4 flowers.

Leaves coriaceous, lanceolate acute, bracts  
ovate . . . . . (8) *R. leucobotrys*

*Flowers tubular, dilate above.*

Big tree; flowers white; corolla cylindric . . . . . (9) *R. Klossii*

Shrub; flowers red; corolla tubular at base,  
campanulate above . . . . . (10) *R. moulemeinense*

*Flowers tubular, salver-shaped, umbelled.*

Tube very narrow; limb wide, white . . . . . (11) *R. jasminiflorum*

Tube cylindric; limb not very wide, red.

- Leaves oblong, flowers 2 in. long; capsule not twisted . . . . . (12) **R. longiflorum**
- Leaves lanceolate, acute; flowers 1 in. long; capsule twisted . . . . . (13) **R. malayanum**
- Leaves elliptic, blunt, strong nerved; capsule not twisted; flowers yellow . . . . . (14) **R. Scortechinii**
- Leaves obovate small whorled; flowers solitary or 2, red . . . . . (15) **R. pauciflorum**
- Corolla tubular hardly dilate at mouth.*  
Stamens not exsert.
- Leaves obovate; corolla hairy very broad; bracts ovate, blunt . . . . . (16) **R. calocodon**
- Leaves elliptic-lanceolate, corolla, pubescent, narrow; bracts lanceolate acute . . . . . (17) **R. elegans**
- Stamens exsert.
- Leaves spatulate glandular; corolla glabrous, glandular . . . . . (18) **R. spathulatum**
- Doubtful species* . . . . . (19) **R. dubium**

(1) **R. javanicum** *Benn. Pl. Jav. Rar.* 85, t. 19; *Bot. Mag. t.* 4366; *King, l.c.* 74.

Epiphytic shrub. Leaves thinly coriaceous, elliptic acute, tapering to each end, 3·5 to 5·5 in. long, 1·25 to 2 in. wide; petioles 75 in long. Umbels 5- to 7-flowered. Corolla wide campanulate, 1·5 in. long, and as wide, red. Ovary glabrous. Capsule 1·5 in. long, glabrous, narrow. *Hab.* Mountains, 2000 to 4000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Thaiping Hills (Wray, Derry). *Distrib.* Java, Sumatra.

(2) **R. Teysmanni** *Miq. Fl. Ind. Bat. Supp.* 585. *R. javanicum* var. *King and Gamble, l.c.*

Resembles *R. javanicum* but has leaves thinner, 6 in. long, 2 in. wide; petioles 1 in. long, thick. Flowers yellow and pistil silky. *Hab.* Mountains; not very common. Pahang, Tahan River; Telom Ridge (Ridley). Perak, Thaiping Hills. Penang, Moniot's Road and top of hill (Maingay, Curtis). Kedah Peak (Robinson). A variety with thick leaves and fewer nerves occurs on Gunong Kerbau (Robinson). *Distrib.* Sumatra, Java.

(3) **R. Robinsonii** *Ridl. Journ. F.M.S. Soc. Mus.* iv. 44.

Epiphyte about 2 ft. tall. Leaves in whorls of 3, coriaceous, elliptic to lanceolate obtuse to sub-acute; nerves 8 pairs, 3·5 to 5 in. long, 2 in. wide; petioles 5 in. long. Umbels of 5 flowers on short peduncle; pedicels 1·5 in. long. Corolla campanulate, 1 in. long, 1·25 in. wide, bright yellow, sometimes flushed red. Stamens and ovary glabrous. *Hab.* Mountain forests about 3000 ft. altitude. Pahang, Telom from 3400 to 5000 ft. altitude (Ridley). Selangor, Gunong Mengkuang Lebah at 5000 ft. altitude (Robinson).

(4) **R. perakense** *King and Gamble, l.c.* 76.

Small very scaly epiphyte. Leaves very coriaceous, obovate or oblanceolate blunt, base narrowed; nerves 2 (or 3) pairs; with persistent large scales beneath 6 to 8 in. long, 3 to 4 in. wide; petioles 1 in. long. Umbels 3- to 5-flowered with large round bud-

bracts ciliate on edge. Flowers bright yellow, .35 to .4 in. long. Corolla narrow, campanulate, lobes broad, slightly spreading. Capsule .3 in. long not twisted. *Hab.* Perak at 7000 ft. altitude (Wray).

I have seen no specimen.

(5) **R. orion** *Ridl. Journ. F.M.S. Mus. v. 39.*

Small shrub. Leaves coriaceous in whorls of 6 or 7, obovate retuse, base narrowed; nerves 4 pairs indistinct; 1.5 to 1.75 in. long, .75 to 1 in. wide; petioles .25 in. long. Umbels of 6 or more flowers on a short peduncle covered with lanceolate acute bracts; pedicels slender, 1 in. long. Corolla funnel-shaped, scaly, lobes oblong-ovate, 1 in. long and nearly as wide, pale yellow tinged apricot. Stamens exsert, glabrous. Ovary scurfy; style glabrous. Capsule fusiform not twisted, .5 in. long, scaly. *Hab.* Mountains in shady gullies at 2000 to 3000 ft. altitude. Selangor, Menuang Gasing (Kloss).

var. *aurantiacum* *Ridl.* Leaves short blunt, acuminate; nerves quite invisible. Pistil silky-pubescent all over. Flowers orange. *Hab.* Selangor, Klang Gates, Quartzite ridge 1500 ft. altitude (F. T. Brooks).

(6) **R. Wrayi** *King and Gamble, l.c. 75.*

Terrestrial bush 4 to 5 ft. tall. Leaves very coriaceous, elliptic sub-acute, base round, underside glaucous; nerves 6 to 12 pairs; 3 to 6 in. long, 1 to 2 in. across; petioles .25 to .5 in. long. Umbels 8- to 12-flowered; pedicels .5 in. long, pubescent. Bracts coriaceous, sub-orbicular, 5 in. long, inner ones pubescent. Corolla wide campanulate, 1.25 in. long, 1.5 in. wide, lobes broad, ovate, white, tinged and spotted red in throat. Ovary tomentose. Capsule .5 in. long, .25 in. wide, tomentose. *Hab.* Mountains at 4000 to 6000 ft. altitude. Selangor, Semangkok Mountain (Ridley). Pahang, Gunong Tahan. Perak, Gunong Kerbau (Robinson).

var. *elliptica* *Ridl. Journ. F.M.S. Mus. iv. 42.* Large shrub or small tree 15 ft. tall. Leaves elliptic coriaceous longer and narrower, pale beneath. Flowers pure white, Selangor, Ulu Semangkok (Burn-Murdoch). Pahang, Telom and Gunong Tahan (Ridley).

(7) **R. coruscum** *Ridl. Journ. F.M.S. Mus. v. 37.*

A small lanky tree 25 ft. tall. Leaves stiff coriaceous oblanceolate or oblong, blunt or shortly acute, base blunt narrowed, minutely reticulate; nerves 12 pairs; 6 to 7 in. long, 2 to 2.25 in. wide; petioles 1.5 in. long. Umbel of 10 to 12 flowers; pedicels 1.5 in. long, pubescent. Bracts coriaceous, basal ones lanceolate, upper obovate round silvery silky hairy. Calyx hairy. Corolla campanulate, 1.75 in. long, nearly 2 in. across, white, tube speckled dark purple. Stamens hairy at base. Pistil red-tomentose. Capsule broad .75 in. long. *Hab.* Selangor, Gunong Mengkuang Lebah (Robinson). A very fine species near *R. Wrayi*.

(8) **R. leucobotrys** *Ridl. Journ. F.M.S. iv. 43.*

An erect shrub 12 to 14 ft. tall. Leaves lanceolate, narrowed at base, coriaceous, 2.5 to 3 in. long, 1 in. wide; nerves raised beneath, 10 pairs; petioles .25 in. long. Umbels 2 to 4, each of 2 to 4 flowers on peduncles .2 in. long; pedicels 1 in. long. Bracts ovate obtuse, broad, .25 in. long, ciliate. Corolla 1.5 in. long, campanulate, tube under .5 in. long, lobes 1 in. long, .25 in. across, white with a yellow spot in throat. Stamens pubescent at base. Ovary glabrous. Capsule fusiform, not twisted, 1 in. long. *Hab.* Kedah Peak, at 3000 to 4000 ft. altitude in open woods (Ridley).

(9) **R. Klossii** *Ridl. Journ. F.M.S. Mus. iv. 43.*

Tree 50 ft. tall. Leaves in pairs, whorled at branch-tips, thinly coriaceous, lanceolate acute, base narrowed, 4 to 4.5 in. long, 1 to 1.5 in. wide; petioles .5 in. long. Flowers in 3 to 6 umbels of 2 flowers each. Bracts numerous, lower ones small, ovate blunt, upper ones lanceolate, .5 in. long, acute, ciliate. Pedicels .5 to 1 in. long. Corolla-tube cylindric as long as lobes, white, 1.5 in. long, 1 in. across. Ovary glabrous. *Hab.* Rare in mountain forests. The biggest species in the peninsula, Pahang, Telom (Ridley).

(10) **R. mouleminense** *Hook. Bot. Mag. t. 4904.*

Branches rather slender, .12 in. through. Leaves coriaceous, not scaly, elliptic blunt, base narrowed; nerves fine about 8 pairs, inconspicuous, inarching .1 in. from the edge; midrib strongly elevate, 3.5 in. long, 1.75 in. wide; petioles thick, .4 in. long. Bracts very narrow, linear papery. Flowers few; pedicels .5 in. long, glabrous. Calyx obscurely lobed. Corolla "reddish" tubular at base, campanulate above, 1 in. long and about as wide, lobes oblong-lanceolate. Stamen-filaments glabrous, shorter than the corolla. Ovary cylindric; style .75 in. long, glabrous. *Hab.* Kedah Peak at 3500 ft. altitude (Haniff). *Distrib.* Moulmein, Siam.

The only specimen seen is very poor; the one flower is smaller than the typical form and the leaves are rather broader.

(11) **R. jasminiflorum** *Hook. Bot. Mag. t. 4524; King, l.c. 77.*

Epiphytic or on rocks, about 4 to 5 ft. tall. Leaves thickly coriaceous, whorled, elliptic round (sometimes sub-acute) base round, 1.25 to 3 in. long, 1 to 1.5 in. wide; petioles .1 in. long. Umbel 8- to 20-flowered; pedicels 1 in. long. Corolla white, tube narrow cylindric, 1.6 in. long, limb 1.5 in. across, lobes round, obovate. Ovary pubescent. Capsule 1 in. long, narrow, apiculate, ridged. *Hab.* Mountains at 3000 to 5000 ft. altitude. Malacca, Mt. Ophir, flowers pure white (Griffith and all collectors). Kedah Peak (Robinson, Haniff) at 4000 ft. altitude, flowers flushed rose.

var. *maculata*. Mouth of tube pink-spotted, a more straggling shrub; leaves ovate sub-sessile. Pahang, Telom; Gunong Tahan. Perak, Thaiping Hills. *Distrib.* Java, Sumatra.

The type form appears to be quite peculiar to Mt. Ophir.

(12) **R. longiflorum** Lindl. *Journ. Hort. Soc.* iii. 88; King, *l.c.* 77.

Epiphyte or rock plant about 2 to 3 ft. tall. Branches and petioles scaly. Leaves coriaceous, whorled, elliptic-oblong acute, base narrowed, 2·25 to 3·5 in. long, 8 to 1·5 in. wide; petioles ·5 in. long. Umbels 5- to 7-flowered; pedicels ·5 to ·8 in. long, scaly. Flowers 2 in. long, crimson red, tubular with a limb of short round lobes 1 in. across. *Hab.* Forests up to about 4000 from 500 ft. altitude. Singapore; formerly on lofty trees on Bukit Timah. Pahang, Gunong Tahan (Robinson); Telom. Negri Sembilan, Kwala Pilah. Selangor. Klang Gates top of ridge. Perak, Thaiping Hills; Haram Parah (Scortechini). Kedah Peak from 3800 ft. altitude upwards (Robinson). *Distrib.* Sumatra, Borneo.

(13) **R. malayanum** Jack, *Mal. Misc.* ii. n. 7, p. 17. *Bot. Mag.* 6045.

Usually epiphytic, often on rocks, about 3 ft. tall. Branches slender. Leaves narrow elliptic or lanceolate, both ends acute, coriaceous, 1·75 to 3·25 in. long, ·75 to 1·25 in. wide; petioles ·4 in. long. Umbel 3- to 5-flowered. Pedicels ·25 to ·35 in. long. Corolla tubular, 1 in. long, ·5 in. across, lobes broad cuneate, deep crimson red. Capsule 1 in. long, slender, twisted. *Hab.* Common on high mountains, Malacca, Mt. Ophir. Pahang, Gunong Tahan; Guron Berumbun, Telom. Selangor, Gunong Ulu Kali (Burn-Murdoch); Gunong Mengkuang Lebah (Robinson); Perak, Gunong Inas (Yapp); Gunong Kerbau (Robinson); Gunong Batu Putih (Kunstler); Thaiping Hills. *Distrib.* Borneo, Sumatra.

(14) **R. Scortechinii** King and Gamble, *l.c.* 76.

Epiphytic or terrestrial shrub. Leaves very coriaceous, elliptic to obovate blunt, base cuneate; nerves 4 to 6 pairs depressed above, raised beneath, 1·25 to 2 in. long, ·75 to 1·25 in. wide; petioles ·15 in. long. Umbel 4- to 7-flowered. Corolla yellow, ·75 in. long, wide, funnel-shaped, about ·6 in. across. Stamens 8. Ovary scaly. Capsule ·5 in. long; valves not twisted. *Hab.* Mountains at 5000 to 7000 ft. altitude. Perak, Gunong Bubu (Cantley, Scortechini).

(15) **R. pauciflorum** King and Gamble, *l.c.* 75.

Small shrub. Leaves coriaceous obovate or round, base narrowed; nerves 3 to 4 pairs indistinct, ·6 to 1 in. long, ·4 to ·65 in. wide; petioles under ·1 in. long. Flowers 1 or 2, terminal. Pedicels ·25 to ·6 in. long, pubescent. Corolla bright red, infundibuliform-campanulate, ·5 to ·85 in. long, ·5 to ·75 in. across the limb. *Hab.* Perak, Gunong Batu Putih (Wray).

I have seen no specimen.

(16) **R. calocodon** Ridl. *Journ. F.M.S. Mus.* v. 38. (Fig. 92, p. 220.)

Epiphytic shrub, slender. Leaves in whorls of 6, obovate, rounded, base blunt, shortly narrowed, coriaceous; nerves 3 pairs

hardly visible; 1 in. long, .5 in. wide; petioles .05 to .1 in. long. Flowers solitary, terminal; pedicels .4 in. long, pubescent. Bracts ovate, blunt, glabrous. Calyx pubescent. Corolla cylindric, campanulate, very broad, .6 in. long, nearly as wide, deep red, white-hairy inside and out. Stamens and ovary silky, not exsert. *Hab.* Mountains at 4800 to 5000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Gunong Kerbau (Robinson).

This latter plant differs slightly in having flowers in pairs, glabrous and slightly smaller.



FIG. 92.—*Rhododendron calocodon*.

(17) *R. elegans* Ridl. *Journ. Linn. Soc.* ii. 3, p. 4.

Slender epiphyte. Leaves opposite or whorled, coriaceous, elliptic-lanceolate blunt, base cuneate; nerves invisible; .75 to 1 in. long, .5 in. wide; petioles .1 in. long. Flowers solitary, terminal, .5 in. long, .4 in. across, bright red; pedicels as long, pubescent. Bracts numerous, acuminate. Corolla pubescent, cylindric .3 in. long, lobes short, round. Stamens 8; filaments pubescent. Ovary hairy. Capsule .25 in. long, valves lanceolate acute, .1 in. wide. *Hab.* Mountains 5000 ft. altitude. Local. Pahang, on trees in dense woods, Gunong Tahan (Ridley).

(18) *R. spathulatum* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 25.

Slender shrub. Leaves coriaceous, 4 to 8 in a whorl, obovate to spathulate, tip round, base cuneate, nerves invisible, closely gland-dotted, .5 in. long, .25 in. wide, petioles .12 in. long.

Flowers terminal with 2 or 3 ovate ciliate, coriaceous bracts; pedicels .12 in. long. Corolla .75 in. long, tubular, lobes short glabrous, glandular .5 in. across, dark red. Stamens exsert. Capsule conic, glandular, .12 in. long. *Hab.* Mountains, Perak, Gunong Kerbau at 7000 ft. altitude (Haniff, Robinson).

(19) **R. dubium** King and Gamble, *l.c.* 78.

Shrub or small tree. Leaves coriaceous, oblong-elliptic, sub-acute, narrowed to acute or round base; nerves 15 to 18 pairs; 3.5 to 6 in. long, 1 to 2 in. wide; petioles .75 to 1 in. long, stout. Umbels 3- to 8-flowered; pedicels 1.35 in. long, glabrous. Flowers unknown. Ovary red-pubescent. Capsule .4 to .7 in. long, red-pubescent, not twisted. *Hab.* Perak at 3400 ft. altitude (Wray).

I have not seen any specimen.

### 5. **PERNETTYOPSIS**, King and Gamble.

Stiff epiphytes. Leaves coriaceous on hispid petioles, sub-crenulate. Flowers solitary or in pairs, or more numerous, axillary. Bracts 2 or 3 forming an involucre. Calyx larger than corolla, deeply 5-lobed, persistent. Corolla urceolate or ovoid, glabrous; teeth short, reflexed. Stamens 10; filaments attached to base of corolla; anthers with 2 long tubes. Ovary 5-celled, very globose, 5-celled. Seeds minute. Species 3, Malay Peninsula.

Leaves 2 in. long; peduncles .5 in. long, red-tomentose (1) **P. malayana**

Leaves 1.5 in. long or less; peduncle .1 in. long.

Calyx tip and edges hairy, .3 in. long . . . . . (2) **P. sub-glabra**

Calyx all hairy, .1 in. long . . . . . (3) **P. breviflora**

(1) **P. malayana** King and Gamble, *l.c.* 79.

Bush 1 ft. tall. Branches bristly at tip. Leaves round to elliptic, base narrow, apiculate, edge crenulate with small appressed bristles, sub-terminal; nerves and midrib deep, depressed above, pitted with short bristles beneath, 1.25 to 2 in. long, .75 to 1.35 in. wide; petioles .2 in. long, bristly. Flowers .5 in. long. Peduncles .5 in. long. Bracts red, woolly. Calyx red, woolly outside (eventually sub-glabrous). Corolla glabrous ovoid. Fruit blue. Seeds red. *Hab.* Mountains Selangor, Mengkuang Lebah (Robinson); Perak, Gunong Kerbau at 6000 ft. altitude (Robinson); Gunong Batu Putih (Wray). Kedah, Gunong Bintang (Kloss).

(2) **P. sub-glabra** King and Gamble, *l.c.* 80.

A small, rigid epiphyte. Stems slender, glabrous except a few bristles near the tips. Leaves sub-rotund to elliptic-rotund, glabrous above, a few small hairs beneath, edges serrate ciliate; nerves 3 to 4 pairs, depressed above; .8 to 1.5 in. long, .75 to 1.25 in. wide; petioles .15 to .25 in. long, bristly. Bracts below flower 2 or 3, broad, rusty-pubescent as is pedicel. Calyx rotate, lobes 5, long, lanceolate, tips rusty-pubescent. Corolla, stamens and pistil as in *P. malayana*. *Hab.* Mountains at 5000 ft. altitude. Perak (Scortechini and Kunstler).

(3) *P. breviflora* Ridl. *Diplycosia breviflora* Ridl. *Journ. F.M.S. Mus.* vi. 158.

Epiphyte; young parts red-hairy. Leaves obovate, edges crenulate with red hairs, rugose above, dotted with hairs beneath; nerves 2 pairs very indistinct, 1 in. long and wide; petioles 12 in. long, hairy. Flowers in axillary pairs. Pedicels rufous-hairy, 12 in. long. Calyx dark green, lobes ovate acuminate, hairy, 12 in. long. Corolla sub-globose, green. Pistil glabrous. *Hab.* Mountains on tree-branches at 4500 ft. altitude. Pahang, Gunong Tahan (Ridley).

## 6. CLETHRA, Linn.

Pubescent shrubs or trees. Leaves serrate (or entire). Flowers small white, in paniced terminal racemes. Calyx 5-lobed. Petals 5 obovate cuneate, round, usually toothed, deciduous. Stamens 10; anthers dorsifixed obovate, no processes, dehiscing by elongate pores at tip. Pollen globose simple. Disc none. Ovary globose 3-angled, 3-locular, hairy; style cylindric or simple, 3-trifid. Capsule sub-globose, 3-valved, loculicidal. Seeds 3-angled winged. Species 25, North America, Madeira, Japan and Malaya.

(1) *C. canescens* Bl. *Bijdr.* 863.

Tree or large shrub. Leaves lanceolate acute, base narrow, serrate or entire, 11-nerved, adult glabrous, young pubescent or hairy beneath and midrib above, 4 in. long, 1.25 in. across; petioles 2 in. long, pubescent. Racemes numerous, paniced, 4 in. long, tomentose. Flowers numerous, short-pedicelled, tomentose, 1 in. long. *Hab.* Open places on mountains at 5500 ft. altitude, very rare. Pahang, Gunong Tahan (one plant) (Ridley). *Distrib.* Borneo, Java, Celebes.

## ORDER LXXXII. MONOTROPEÆ.

Leafless, fleshy, white parasites, herbaceous, simple or branched. Flowers solitary on stems or branches. Sepals scale-like, 2 to 6. Stamens 6 to 12. Ovary superior, globose or fusiform, 1- to 6-celled; style cylindric. Fruit capsular or baccate. Genera 9, forests of northern hemisphere.

### 1. CHEILOTHECA, Hook. fil.

White or coloured, branched. Sepals 3 to 5, narrow oblong. Petals 3, blunt. Stamens 6; anthers linear, opening by marginal slits or pores. Ovary fusiform, 1-celled. Stigma globose, conic; placentas 6. Fruit baccate. Species 2, Indo-Malaya.

(1) *C. malayana* Scort. *Hook. fil. Ic. Pl.* xvi. t. 1564; Prain in King, *Journ. As. Soc. Beng.* lxxiv. 2, p. 81. (Fig. 93, p. 223.)

Simple or 2- to 3-forked, 6 to 9 in. tall; scales ovate-oblong increasing, upwards, purple or white. Flowers terminal, 1 in.



long, yellow or white. Sepals 5, linear-oblong like the scales; Petals 3, pilose inside. Stamens puberulous or pilose. Fruit white, .75 in. across. *Hab.* In dense forests at 3500 ft. altitude. Perak (Scortechini and Kunstler).

### ORDER LXXXIII. EPACRIDEÆ.

Shrubs or small trees. Leaves alternate coriaceous entire; nerves parallel. Flowers solitary axillary (or terminal or spicate) white (or red). Calyx 4- to 5-lobed, coriaceous. Corolla 4- to

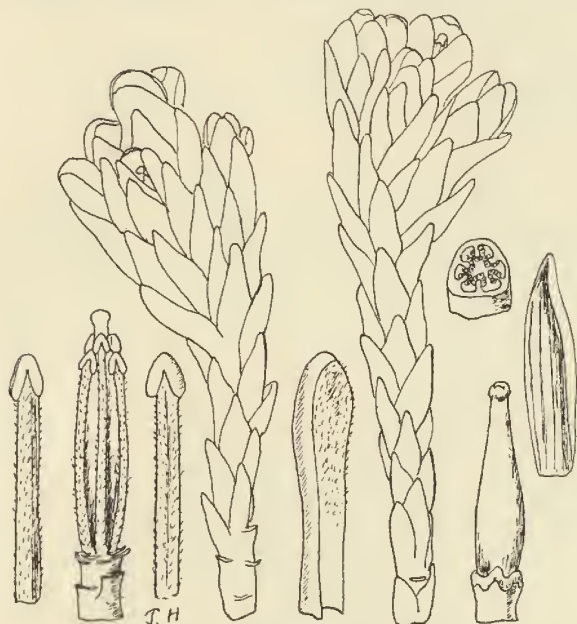


FIG. 93.—*Cheilotheca malayana*.

5-fid. Stamens 5; anthers dehiscent for whole length. Disc cupular. Ovary globose or ovoid, 1- to 10-celled. Fruit drupaceous; pyrenes 2 to 5 (or capsular). About 320 species, Australasian and Malayan.

#### 1. LEUCOPOGON, Br.

Shrubs with narrow leaves and very small white flowers in short axillary spikes. Fruit a small orange drupe.

(1) *L. malayanus* Jack. *Mal. Misc.* iv. 20; *King, l.c.* 83. (Fig. 94, p. 224.)

Bush, 6 ft. tall. Leaves narrow lanceolate acute mucronate,

1.5 to 2.5 in. long, .3 to .5 in. wide, glaucous beneath, sessile, no midrib. Flowers very small, 3 to 7 in a spike; rachis villous. Calyx-lobes ciliate, elliptic-oblong. Corolla white, villous inside, .1 in. long. Fruit orange-red, globose, .1 in. through, 5-celled, 5-seeded. *Hab.* Sandy heaths near the sea and on mountains. Singapore, Changi; Malacca, Mt. Ophir, and Tanjong Kundur (Griffith). Pahang, Gunong Tahan; Karang, Kwantan (Watson). Selangor, Gunong Ulu Kali (Burn-Murdoch). Perak, Gunong



FIG. 94.—*Leucopogon malayanus*.

Kerbau (Haniff). Tringganu, Pulau Redang (Yapp). *Distrib.* Bangka, Borneo. *Native names* : Tasek Timbol; Churing Atap.

var. *moluccana* Kurz. Leaves very much smaller, not glaucous beneath, subulate, densely crowded at the tips of the branches. Kedah Peak (Low). This is not *L. moluccanum* Scheff., nor like any of the Malay island species.

#### ORDER LXXXIV. PLUMBAGINÆ.

Herbs or shrubs. Flowers in terminal heads, spikes or racemes or panicles. Calyx inferior, gamopetalous, tubular, 5-lobed. Corolla hypogynous, tubular, 5-lobed (or petals free). Stamens 5,

free or adnate to corolla. Anthers dorsifixed, dehiscing longitudinally. Ovary superior; ovule 1; style 5, free or connate below. Fruit included in calyx, capsular, 1-seeded. Species about 200, whole world.

*Aegialitis rotundifolia* Roxb. Malacca (Griffith), King, l.c. 85 is certainly an error of locality. Griffith collected the plant in Mergui, and the label of the one specimen labelled Malacca does not appear to me to be in his handwriting. It has never since been seen in any part of the Malay Peninsula.

### 1. PLUMBAGO, Linn.

Herbs (or under-shrubs) straggling. Leaves alternate, entire. Flowers in terminal spikes or racemes, simple or forming a panicle. Calyx tubular, glandular, 5-toothed. Corolla-tube slender, lobes spreading. Stamens free; filaments insert on glands. Style with stigmatic branches; ovary 1-ovuled. Fruit capsular in persistent adhesive perianth. Seed 1. Species 10, whole world.

(1) *P. zeylanica*, Linn. *Sp. Pl.* 151; King, l.c. 86.

About 2 ft. tall. Leaves ovate sub-acute, narrowed into petiole, base broad, 2 to 5 in. long, 1 to 2.5 in. wide. Racemes spike-like, 6 to 8 in. long, sticky, spreading, many-flowered. Calyx narrow, tubular, .5 in. long, glandular, hairy. Corolla white, 1 in. long, .5 in. across. *Hab.* A roadside weed. Singapore, Thompson Road; Changi. Malacca, Tanjong Kling. Negri Sembilan, Seremban. Bukit Tangga. Selangor, Kwala Kubu (Ridley). Penang (Porter, Curtis). *Distrib.* Tropics of Old World.

*P. rosea* Linn. A plant with larger rose-pink or red flowers of unknown origin is commonly cultivated and occurs occasionally as a garden escape, e.g. in Kelantan. It is used as a blistering agent for leprosy. *Native name*: Cheraka merah.

## ORDER LXXXV. PLANTAGINEÆ.

Herbs with radical leaves in a rosette. Scapes axillary, slender. Flowers small, greenish, spicate. Sepals 4, imbricate persistent. Corolla scarious, salver-shaped, lobes 4. Stamens 4, capillary; anthers versatile. Ovary free, 3- to 4-celled; style filiform. Capsule 1- to 4-celled, circumsciss membranous, 1- or more-seeded. Seed peltate. About 50 species, temperate regions.

### 1. PLANTAGO, Linn.

Characters as above.

(1) *P. asiatica* Linn. *Sp. Pl.* 113. *P. major*, Prain, *Journ. As. Soc. Beng.* lxxiv. 727. (Fig. 95, p. 226.)

Leaves ovate obtuse, entire or rounded, 2 to 8 in. long, 1 to 4 in. wide, edge entire or toothed bluntly; petioles 1 to 3 in. long, strongly 5- or 3- to 7-nerved. Spikes 3 to 6 in. long on peduncles as long or longer. Flowers usually crowded, but sometimes somewhat dispersed. Calyx .12 in. long. Corolla .8 in. long. Capsules

ovoid. Seeds 4 to 8. *Hab.* Weed in waste ground and gardens, sporadic. Singapore, Tanglin; Chan Chu Kang. Malacca (Griffith). Negri Sembilan, Bukit Tumiang (Cantley); Selangor, Petaling. Penang Hill. *Distrib.* Europe and Asia, spreading as a weed all over the world. *Use:* A decoction of the plant used for cough.



FIG. 95.—*Plantago asiatica*.

### ORDER LXXXVI. MYRSINEÆ.

Trees, shrubs, sometimes climbers or under-shrubs. Leaves usually alternate, usually gland-dotted or streaked. Stipules 0. Flowers regular, pink or white, bisexual, small. Calyx inferior (in *Maesa* adnate to ovary) 4- to 5-lobed, often glandular. Corolla 4- to 5-lobed, tube very short or none, lobes twisted to the left or right, often gland-dotted. Stamens opposite corolla-lobes and as many. Ovary globose ovoid or oblong free (except *Maesa*); ovules inserted on or immersed in a free central placenta; style cylindric.

Stigma simple. Fruit small, a globose, fleshy 1-seeded drupe except *Maesa*, several seeded, and *Aegiceras* linear curved, dehiscent. 1-seeded. Species about 900, tropics and sub-tropics. *King and Gamble, Journ. As. Soc. Beng.*, lxxiv. ii. 93.

Calyx-tube adnate to ovary; seeds many . . . . . 1. *MÆSA*

Calyx-tube free; seed 1.

Fruit round, pulpy.

Corolla-lobes imbricate in bud, white.

Flowers below leaves on short lateral branches . . . . . 2. *MYRSINE*

Flowers in racemes or panicles; climbers . . . . . 3. *EMBELIA*

Corolla-lobes imbricate, pink; shrublets . . . . . 4. *LABISIA*

Corolla-lobes contort overlapping to right; pink . . . . . 5. *ARDISIA*

Corolla-lobes contort, overlapping to left; pink . . . . . 6. *ANTISTROPHE*

Fruit elongate, cylindric curved, dehiscent, flowers

pale pink . . . . . 7. *AEGICERAS*

### 1. *MAESA*, Forsk.

Shrubs scrambling or erect or small trees. Leaves entire or usually crenate, undulate or dentate. Flowers uni- or bi-sexual, white, very small in axillary or terminal racemes. Calyx-tube adnate to ovary, lobes 4 to 5. Corolla short campanulate, lobes 4 to 5 round. Stamens 4 to 5 on the corolla-tube; filaments short; anthers oblong cordate; style short. Drupe small, globular thinly fleshy. Seeds many angular. Species 100, chiefly Old World tropics.

Leaves quite entire.

Panicles terminal, pubescent . . . . . (1) *M. macrothyrsa*

Panicles axillary, glabrous . . . . . (2) *M. ramentacea*

Leaves faintly undulate or crenate.

Sub-coriaceous; nerves prominent . . . . . (3) *M. impressinervis*

Coriaceous; nerves not prominent; panicles  
thyrsoid . . . . . (4) *M. arborea*

Membranous under 3 in. wide.

Racemes slender, solitary or fascicled . . . . . (5) *M. striata*

Racemes paniced; pedicels very short . . . . . (6) *M. lancifolia*

Leaves 4 in. wide; racemes hardly longer . . . . . (7) *M. pahangiana*

Leaves conspicuously toothed; fruit small, 1 in.

long . . . . . (8) *M. indica*

Leaves toothed; fruit ovoid, 2 in. long . . . . . (9) *M. oocarpa*

(1) *M. macrothyrsa* *Miq. Fl. Ind. Bat. Supp.* 573; *King, l.c.* 95.

Slender climber 30 to 40 ft. long. Leaves entire, thickly membranous, elliptic short blunt acuminate, base round, 3 to 4 in. long, 1.5 to 2 in. wide; petioles .5 to .7 in. long. Inflorescence a large leafy pubescent panicle. Calyx-lobes 4-(or 5)-toothed. Corolla white or pink, lobes 4 or 5. Fruit very small, .05 in. through, globose. *Hab.* Perak (Wray, Scortechini, Kunstler) *Distrib.* Sumatra, Borneo.

I have seen no specimens.

(2) *M. ramentacea* *Wall. Roxb. Fl. Ind. (ed. Carey)*, ii. 231; *King, l.c.* 96.

Usually a sarmentose shrub, occasionally tree-like, glabrous. Leaves thickly membranous, ovate-lanceolate or elliptic acuminate,

base round or cordate, entire, 3 to 8 in. long, 1·5 to 3 in. wide; petioles 3 in. long. Inflorescence axillary or falsely terminal of simple or paniced slender racemes, 3 to 6 in. long, glabrous. Flowers very small. Calyx-tube 0·25 in. long, lobes as long. Corolla white, 0·75 in. long. Fruit globose, 1 in. long. *Hab.* Very common in woods all over the whole peninsula from Singapore to Penang and Lankawi islands and Kelantan. A form with inflorescence modified into a light green mossy mass is very common. *Distrib.* Indo-Malaya. *Native names:* Gamber-Gamber; Kayu Pesat.

(3) *M. impressinervis* King and Gamble, *l.c.* 97.

Bush or small tree. Leaves thinly coriaceous, elliptic, shortly acuminate, base cuneate, entire or faintly toothed near tip; nerves 7 to 8 pairs deep impressed above, elevate beneath; 3 to 3·5 in. long, 1·25 to 1·75 in. wide. Racemes simple axillary or with one short branch at base; pedicels slender, 1 in. long. Bracts subulate. *Hab.* Perak Gunong Bubu at 5000 ft. altitude (Wray).

I have not seen this.

(4) *M. arborea* Ridl. *Journ. F.M.S. Mus.* x. 147.

Small tree. Leaves coriaceous, smooth, ovate acuminate, base round, edge obscurely undulate; nerves 10 pairs slightly elevate; 4 to 7 in. long, 2 to 3 in. wide; petioles 5 in. long. Panicles thyrsoid, 3 to 4 in. long; branches 5 in. long, densely flowered. Flowers white, very shortly pedicelled; pedicels much shorter than the calyx. Sepals toothed, striate, ovate. Petals 5, round. Stamens adnate to corolla base. *Hab.* Forests, Kelantan, Pehi river near Chaning (Ridley).

(5) *M. striata* Mez. *Pflanzenreich Myrs.* 42; King, *l.c.* 98.

Shrub, scandent 4 to 6 ft. tall or more. Leaves membranous, elliptic-oblong acuminate or round, base rounded or shortly cuneate, undulate or dentate, striate, glabrous, 4 to 7 in. long, 2·5 to 3 in. wide; petioles 4 to 1 in. long. Racemes axillary, slender, simple or paniced, about 1 to 2 in. long; pedicels very slender, 0·5 to 1 in. long. Calyx-lobes ovate. Corolla rotate, lobes rounded crenate. Fruit 1 to 1·5 in. through, faintly ribbed. *Hab.* Perak, Hills (Kunstler). Penang, Paya Trobong (Curtis). *Distrib.* Sumatra.

var. *dissitiflora* Ridl. *l.c.* Racemes elongate, 2 in. long; pedicels 1 in. long. *Hab.* Kelantan, Kwala Lebir (Ridley).

(6) *M. lancifolia* Ridl.

Shrub. Leaves thin, lanceolate to ovate-lanceolate acuminate, obscurely crenate, base usually rounded; nerves elevate, 10 pairs; 4 in. long, 2 in. wide; petioles slender, 5 in. long. Inflorescence of a few slender racemes on a short peduncle. Flowers rather distant; pedicels as long as calyx. Sepals ovate, thin, not striate or toothed 5. Petals oblong, blunt. Stamens adnate to corolla base. Style short. *Hab.* Kelantan, Kota Bharu (Ridley).

(7) *M. pahangiana* King and Gamble, l.c. 98.

Large shrub. Leaves membranous rhomboid-ovate acuminate, base round, cuneate, faintly crenate, 7 to 8 in. long, 4 to 4.5 in. wide; nerves 8 or 9 pairs; petioles .8 to 1 in. long. Racemes simple, as long as the petiole. Calyx-tube very short, lobes .6 in. long hyaline at edge. Corolla-lobes crenate. Fruit globose, tip conic ribbed, .125 in. through, cream colour or orange. *Hab.* Local river-banks. Pahang River, Tanjong Antan; Kwala Tembeling (Ridley).

(8) *M. indica* Wall. *Roxb. Fl. Ind. (ed. Carey)*, ii. 230; King, l.c. 99.

Erect shrub or small tree. Leaves thick membranous, elliptic-acuminate, base round or acute, repand-dentate, 3 to 7 in. long, 2 to 3 in. wide; nerves 8 to 12 pairs; petioles .5 to 1 in. long. Racemes axillary simple or compound, .1 to 3 in. long. Calyx-lobes ovate, ciliate. Corolla as long, lobes denticulate. Fruit .15 in. long. *Hab.* Local in mountain forests, 2500 to 4000 ft. altitude. Selangor, Semangkok Pass. Perak, Thaiping Hills; Kwala Kangsa (Wray, Scortechini). *Distrib.* Java, Burma.

(9) *M. oocarpa* Ridl. (*misp rinted ovocarpa*) *Journ. F.M.S. Mus.* x. 147.

A large glabrous shrub. Leaves thin-textured, ovate, blunt or sharply acuminate, edge dentate; nerves 8 pairs; 6 in. long, 4 in. wide; petioles .1 in. long. Inflorescence of several slender racemes, 1.5 in. long on a very short peduncle. Flowers rather distant; pedicels short. Sepals 4, ovate, denticulate, not striate. Fruit ovoid, base narrowed .2 in. long, crowned by the much-enlarged sepals. *Hab.* Kelantan, Chaning forests on Kelantan River (Ridley).

## 2. MYRSINE, Linn.

Trees or shrubs. Branches thick. Leaves stiff, punctate. Flowers fascicled or on very short branches below the leaves. Calyx very small, lobes 4 or 5, persistent. Corolla small, 4- or 5-lobed, imbricate. Stamens 4 or 5, short. Ovary free, globose or ovoid; style short. Drupe 1-seeded, fleshy, small. Seed globose. Species 80, tropics generally.

Branchlets bearing flowers very short.

- |   |   |
|---|---|
| Nerves obscure; leaves under 2.5 in. long . . . . .                               | (1) <i>M. avenis</i>                                |
| Nerves visible; leaves over 2.5 in. long, chartaceous . . . . .                   | (2) <i>M. Porteriana</i>                            |
| Nerves and reticulations visible; leaves coriaceous over 4 in. long . . . . .     | (3) <i>M. perakensis</i>                            |
| Nerves and reticulations visible; leaves lanceolate, blunt 3.5 in. long . . . . . | (4) <i>M. capitellata</i><br>var. <i>lanceolata</i> |

Branchlets longer, .3 in. long or more.

- |   |                           |
|---|---------------------------|
| Leaves round at tip . . . . .             | (5) <i>M. Wrayi</i>       |
| Leaves emarginate; fruit larger . . . . . | (6) <i>M. umbellulata</i> |

(1) **M. avenis** DC. in *Trans. Linn. Soc.* xvii. 107; *King, l.c.* 100.

Small tree. Leaves chartaceous, oblong-lanceolate, blunt acuminate; nerves very obscure; 1 to 2.5 in. long, .5 to .75 in. wide; petioles .2 in. long. Flowers in compact sessile 2- to 5-flowered umbels on very short arrested branches. Pedicels .1 in. long. Calyx-lobes triangular, acute. Corolla-lobes elliptic. Drupe globose, .1 in. long. *Hab.* Singapore, Bajau (Ridley). Rare. *Distrib.* Malay isles.

(2) **M. Porteriana** Wall. *Cat.* 6525; *King, l.c.* 101.

Large shrub or treelet. Leaves chartaceous, oblong-lanceolate acuminate blunt emarginate, base cuneate; nerves 8 to 12 pairs and reticulations visible; 1.5 to 3.5 in. long, .75 to 1.35 in. wide; petioles .2 to .4 in. long. Umbels sessile on thick axillary cone-like branches .1 to .3 in. long. Calyx-lobes ovate, ciliate. Corolla-lobes oblong, obtuse. Drupe .1 in. through, dark blue. *Hab.* Mountain woods, not rare, occasionally near seashore. Johor, Gunong Pantai. Malacca, Mt. Ophir. Pahang, Kwala Pahang. Selangor, top of the Batu Caves. Perak, Thaiping Hills. Penang Hill (Wallich, Curtis). *Distrib.* Sumatra.

(3) **M. perakensis** King and Gamble, *l.c.* 102.

Tree. Leaves coriaceous, oblong bluntly acuminate, base narrowed, 4 to 5 in. long, 1.5 to 2 in. wide; midrib thick, prominent; nerves 20 to 26 pairs; petioles .3 in. long, thick winged. Umbels on cone-like bracteate branches axillary or just below the leaves, 5- to 8-flowered; pedicels .15 to .2 in. long, thick. Calyx-lobes ovate acute. Drupe globose, .1 to .15 in. through. *Hab.* Perak, Gunong Bubu (Scortechini, Wray).

I have not seen this, but found a tree very similar to the description in Pahang on Gunong Tahan with leaves 7 in. long and 3 in. wide.

(4) **M. capitellata** var. *lanceolata* Clarke in *Hook fil. F.B.I.* iii. 512.

Leaves lanceolate, narrowed to a blunt point, base long, narrowed; nerves very numerous, visible, 3 to 4 in. long, .75 to 1.25 in. wide; petioles .25 in. long, winged. Branchlets .1 in. long or less axillary; pedicels slender, .25 in. long. Calyx-lobes small, ovate. Drupe small globular. *Hab.* Selangor, Gunong Mengkuang Lebah (Robinson). *Distrib.* Moulmein, Java. *Native name*: Kicher-Kicher.

(5) **M. Wrayi** King and Gamble, *l.c.* 102.

Tree. Leaves coriaceous, elliptic-oblong, round at tip, base cuneate; nerves 12 pairs, very obscure; 3 to 5 in. long, 1 to 1.75 in. wide; petioles .15 to .7 in. long. Umbels few-flowered, axillary on peduncles .3 to .5 in. long. Pedicels .35 in. long, thickened above. Fruit .2 in. through. *Hab.* Perak at 4500 ft. altitude (Wray).

I have not seen this.



(6) *M. umbellulata* A. DC. in *Trans. Linn. Soc.* xvii. 135; *King, l.c.* 103.

Shrub or tree. Leaves oblanceolate blunt or retuse, base narrowed, 1·4 to 2·5 in. long, ·75 to 1·25 in. wide; petioles ·2 in. long. Umbels of three or more flowers on arrested branches ·1 in. long; pedicels slender, ·3 to ·4 in. long. Drupe globose, ·3 in. through. *Hab.* Rare, near the sea. Singapore (Wallich). Changi; Chan Chu Kang; Beting Kura (Burkill). Setul (Ridley). *Distrib.* Sumatra, Borneo.

### 3. EMBELIA, Burm.

Climbing (rarely erect) shrubs. Leaves entire; petiole often winged. Flowers very small, white, in terminal or axillary racemes or panicles of racemes or fascicled. Calyx of 4 or 5 rounded lobes, small. Corolla-lobes 4 or 5, free or shortly connate. Stamens 4 or 5 inserted on the corolla; anthers ovate; style short. Drupe globose, small, black-seeded. Seed ovoid, base hollow, albumen pitted. Species 60, Old World tropics.

#### i. EU-EMBELIA. Petals free.

Panicles lax spreading, terminal.

Leaves membranous or chartaceous; glabrous except the puberulous inflorescence.

Leaves narrowed to base; petioles slender . . . (1) *E. garciniæfolia*

Leaves broad, base round; petioles flat winged, toothed . . . (3) *E. canescens*  
var. *glabrescens*

Branches pubescent or hairy.

Leaves 1 in. wide; petioles short, not toothed . . . (2) *E. dasythyrsa*

Leaves broad, round at base; petioles flat winged, toothed . . . (3) *E. canescens*

Leaves 5 by 2 in., white scaly beneath; inflorescence villous . . . (4) *E. Scortechinii*

Leaves 4 by 1 in. elliptic-lanceolate; inflorescence glabrous . . . (5) *E. penangiana*

Leaves coriaceous.

Panicle small; fruit ovoid acute . . . (6) *E. rugosa*

Panicle large; fruit globose, small . . . (7) *E. coriacea*

Panicle large; fruit large . . . (8) *E. macrocarpa*

Panicle short; leaves very thick . . . (9) *E. angulosa*

Panicles lax axillary . . . (10) *E. Ridleyi*

#### ii. GRENACHERIA. Petals connate in a tube.

Leaves villous beneath; bracts inconspicuous . . . (11) *E. Lampani*

Leaves pubescent or nearly glabrous; bracts squarrose . . . (12) *E. amentacea*

#### iii. MICREMBELIA. Petals free; flowers in short axillary racemes or fascicles.

Sepals and petals 4 each.

Leaves stiff coriaceous elliptic ovate . . . (13) *E. rotundifolia*

Leaves ·5 by ·25 in. elliptic to orbicular . . . (14) *E. myrtilus*

Sepals and petals 5 each.

Leaves ovate-lanceolate subacute . . . (15) *E. parviflora*

Leaves oblong-lanceolate, blunt sub-cordate . . . (16) *E. subcordata*

(1) *E. garciniaefolia* Wall. Cat. 2304.

Slender woody climber glabrous except puberulous inflorescence. Leaves rather thin, lanceolate to nearly ovate, bluntly acuminate, base narrowed; nerves very faint, pustulate beneath; 2.75 to 3 in. long, .6 to 1.2 in. wide; petioles slender not winged, .3 in. long. Panicles 4 in. long, 3 to 4 in. wide, puberulous to glabrous. Flowers white, small; pedicels .1 in. long. Calyx-lobes short, round. Petals free, oblong-ovate, glabrous or nearly so. Stamens shorter. Fruit globose, black with short persistent style, .1 in. through. *Hab.* Common in edges of forests. Singapore, Changi; Garden Jungle. Johor, Genuang. Selangor, Kwala Lumpur. Malacca (Maingay); Alor Gajah (Goodenough). Negri Sembilan, Tampin. Penang (Wallich); Kelantan, Kota Bharu (Ridley). *Native name*: Akar Sulang Kerang. *Use*: Fruits as an anthelemintic.

This is mainly the plant called *E. ribes* Burm., by King, Mez and others. *E. ribes* is a totally different species from Ceylon with much larger and stiffer leaves.

(2) *E. dasythyrsa* Miq. Fl. Ind. Bat. Supp. 573; King, l.c. 106.

Climber 40 to 60 ft. long. Leaves thinly coriaceous, oblong-elliptic, base round, tip blunt acuminate; nerves fairly conspicuous, about 10 pairs; midrib red-hairy beneath, channelled above, 1.75 in. long, .5 in. wide; petioles thick, channelled above hairy. Panicles slender in upper axils and terminal, 4 to 6 in. long; branches 2.5 to 3 in. long, red-hairy to puberulous. Flowers distant, pale green, smaller than in *E. garciniaefolia*, more hairy on slender pedicels .08 in. long. Sepals rounded. Petals little longer. *Hab.* Perak Goping (Kunstler). *Distrib.* Bangka.

Specimens of Miquel's plants are unknown, but this plant fits in with his description very well, it differs from *E. garciniaefolia* in its hairiness, smaller round-based leaves and smaller flowers.

(3) *E. canescens* Jack, in Wall. Roxb. Fl. Ind. (ed. Carey), ii. 292; King, l.c. 105.

Slender woody climber, hairy in type on branches, petiole and midrib. Leaves elliptic, base round almost subcordate, thinly coriaceous; nerves numerous obscure, not distinctly pustulate; 3.25 in. long, 1.75 in. wide; petioles .2 in. long, thick, flattened above with short blunt teeth on each side. Inflorescence terminal, red hairy or softly velvety, 4 to 6 in. long and nearly as wide. Flowers as in *E. garciniaefolia*, but hairy all over. Fruit obovoid .15 in. long, on a pedicel .2 in. long, black. *Hab.* Penang Hill 2000 ft. altitude (Jack, Maingay, etc.).

var. *glabrescens* Ridl. Leaves and branches quite glabrous. *Hab.* Singapore. Pearl's Hill (Murton). Malacca (Griffith, Cuming).

This variety passes towards *E. garciniaefolia*, and seems in some specimens to be really intermediate between the two.

(4) *E. Scortechinii* King and Gamble, l.c. 107.

Branchlets villous. Leaves chartaceous elliptic-lanceolate long acuminate, base narrow, glabrous above, grey-pubescent on nerves 8 pairs, beneath with white scales, 4 to 5 in. long, 1.5 to 2 in. wide. Panicles villous, 7 to 10 in. long, of racemes 3 to 6 in. long. Calyx-lobes ovate, ciliate with long moniliform hairs. Corolla villous. *Hab.* Perak (Scortechini); rare.

(5) *E. penangiana* Mez. *Monogr. Myrs.* 311; King, l.c. 107. *E. Ribes* var. *penangiana* Oliv. *l.c. Pl.* 1597.

Big woody liane 1 in. through. Leaves chartaceous, elliptic acuminate, base cuneate, glabrous, 3.5 to 4.5 in. long, 1.5 to 2 in. wide; nerves 10 to 12 pairs; petioles .5 in. long, edges crisped. Panicles 6 to 9 in. long, rather stout, pubescent, somewhat dense, many-flowered. Racemes about 1 to 2 in. long; pedicels short. Calyx-lobes orbicular. Corolla-lobes free, ovate, rounded, pubescent. Fruit red, tubercled and corrugate, 1 in. long; pedicels shorter. *Hab.* Perak (Wray, Scortechini, Kunstler). Penang, Penara Bukit; Sungei Penang (Curtis).

(6) *E. rugosa* Ridl. *Embelia ribes* var. *rugosa* King and Gamble, l.c. 105.

A woody climber entirely glabrous, bark of branches rough, wrinkled, lenticelled dark brown. Leaves thinly stiffly coriaceous elliptic, blunt acuminate, base narrowed; midrib prominent beneath, nerves and nervules very fine, elevate as are the numerous nervules; 4.5 in. long, 2 in. wide; petioles .5 in. long, rather stout, not toothed. Flowers unknown. Fruiting panicles 6 in. long, very wrinkled. Drupes ovoid, conic at the top, .2 in. long; pedicels .05 in. long. Sepals ovate, very small. *Hab.* Perak, Sungei Larut (Wray).

This to some extent resembles *E. tortuosa* of Kinabalu, but the leaves are very much larger and not of the same shape, otherwise I know no other species resembling it, but the only specimen seen is very incomplete.

(7) *E. coriacea* Wall. *Cat.* 2314; King, l.c. 109. *E. pergamacea* DC. *Prodr.* viii. 85; King, l.c. 108.

A big liane up to 100 ft. long and 1 in. through or more. Leaves stiff coriaceous, oblong or oblong-lanceolate shortly acuminate, base round, glabrous; nerves very fine and numerous; 6 to 10 in. long, 1.5 to 4 in. wide; petioles thick, .3 to .7 in. long, edges crisped. Panicles very large pendent, scurfy-pubescent. Flowers very numerous white; rachis thick. Calyx-lobes triangular, minute with large glands. Corolla-lobes free, 4 to 5, ovate, gland-dotted. Fruit globose, .075 in. through, black. *Hab.* Climbing on big trees in forest, common up to 5000 ft. altitude. Singapore, Selitar; Johor, Pengarang. Pahang, Tahan River; Telom, Malacca, Base of Mt. Ophir. Selangor, Labu River; Sempang. Negri Sembilan, Gunong Berumbun (Cantley). Perak, Thaping Hills; Tapa; Hermitage Hill (Curtis). Province Wellesley,

Tasek Gelugur. Penang (Wallich, Curtis). *Distrib.* Sumatra, Borneo, Java. *Native names*: Akar Sakarito; Akar Kadish.

I am quite unable to separate specifically *pergamacea* from *coriacea*, and consider them merely states of the same thing.

(8) ***E. macrocarpa*** King and Gamble, *l.c.* 114.

A stout climber. Branches thick. Leaves coriaceous, elliptic acuminate, base shortly narrowed, glabrous; nerves fine, 8 pairs; 6 in. long, 3 in. wide; petioles .7 to 1 in. long. Flowers in thick racemes below the branches. Calyx-lobes 4, triangular, acute. Fruit .5 to .7 in. long, globose. Seed deep pitted. *Hab.* Penang, Moniot's Road (Curtis); very rare and little known.

(9) ***E. angulosa*** King and Gamble, *l.c.* 110.

A thick-branched climber. Leaves stiffly coriaceous, obovate blunt emarginate 2 to 3.5 in. long, 1 to 2 in. wide, midrib very thick; nerves fine, numerous; petioles very thick .2 in. long. Panicles large, 12 in. long or more, pubescent, rachises angled thick. Bracts spatulate; bracteoles subulate persistent. Calyx-lobes ovate. Corolla-lobes ovate acute, nearly glabrous. Fruit ovoid-pyriform, red. *Hab.* Rare, mountains from 5000 to 8800 ft. altitude in Borneo. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Ulu Batang Padang (Wray). *Distrib.* Borneo, Kinabalu.

(10) ***E. Ridleyi*** King and Gamble, *l.c.* 112.

Large climber, glabrous. Leaves thinly chartaceous, oblong-acute, base round, 4 to 7 in. long, 1.5 to 3 in. across; nerves prominent below, 12 pairs, midrib stout; petioles .5 in. long, thick. Panicles of racemes axillary; branches few, distant, about 3 in. long, glabrous, few-flowered. Calyx-lobes 4 to 5, ovate. *Hab.* Very rare; edges of woods; Singapore, Chua Chu Kang and Bukit Mandai (Ridley).

Not seen again for many years, and probably extinct.

(11) ***E. Lampani*** Scheff. *Myrs.* 37; King, *l.c.* 110.

A slender woody climber. Leaves chartaceous oblong blunt, base rounded or cordate, glabrous above, villous below, 1.5 to 3 in. long, 1 to 1.5 in. wide; petioles .1 to .2 in. long, villous; pedicel .05 in. long. Bracts few. Flowers small white, tube red. Calyx-lobes 5 to 6, ovate acute, villous. Corolla gamopetalous, lobes oblong. Fruit globose, black or purple. *Hab.* Forests. Singapore, Garden Jungle; Reservoir Woods; Changi. Malacca, Bukit Sabukor. Selangor, Kwala Lumpur; Batang Berjuntai. Sungei Ujong (Cantley). Perak, Thaiping (Kunstler); Asam Kumbang (Wray). Penang Hill (Curtis). *Distrib.* Sumatra. *Native names*: Akar Dundulang; Dulang-Dulang.

(12) ***E. amentacea*** Clarke, in *Hook. fil. F.B.I.* iii. 514; King, *l.c.* iii.

Slender climber, branches velvety-brown. Leaves chartaceous, oblong blunt, base round sparsely pilose above, whitish-pubescent

beneath, 2 to 3 in. long, .75 to 1 in. wide; petioles .15 in. long, villous. Panicle of long slender villous racemes (sometimes only one raceme), each 6 in. long. Flowers numerous with much longer subulate bracts. Calyx-lobes 5, acute. Corolla shortly gamopetalous, lobes 5, ovate. Drupe globose, black, .1 in. through. *Hab.* Not rare, hedges and woods. Singapore, Bukit Timah road; Cluny. Malacca, Bukit Bruang (Cantley). Selangor, Kwala Lumpur; Sungei Buluh; Semangkok. Perak, Larut (Kunstler). Dindings, Lumut. *Distrib.* Borneo. *Native name:* Akar Malukut.

(13) *E. rotundifolia* Ridl. *Journ. F.M.S. Mus.* vi. 50.

Shrub probably climbing, quite glabrous. Leaves very stiff coriaceous elliptic-ovate blunt or rounded, base round; midrib



FIG. 96.—*Embelia myrtillus*.

sunk above, raised beneath; nerves and reticulations fine, conspicuous, densely black dotted on both sides, 1.75 in. long, 1.1 in. wide; petioles .25 in. long. Racemes fascicled or shortly paniced under .5 in. long; peduncles covered with ovate bracts, .1 in. long; pedicels .2 in. long. Sepals 4, connate at the base, ovate blunt, gland-dotted. Petals free elliptic pubescent, glandular at tip .1 in. long. Stamens longer. *Hab.* Mountains at 5000 ft. altitude. Perak, Gunong Kerbau (Robinson).

(14) *E. myrtillus* Kurz. *Journ. As. Soc. Beng.* xl. (2), 67; King, *l.c.* 112. *Myrsine myrtillus* Hook. *fl. Ic. Pl.* 825.

Pubescent erect or climbing shrub. Leaves coriaceous bifarious elliptic to nearly orbicular with 3 terminal teeth; base round, .5 in. long, .25 in. wide; petioles .1 in. long, villous. Flowers few in axillary umbels or short racemes, .25 in. long; pedicels .1 in. long. Calyx-lobes 4, ovate glandular pubescent. Petals 4, oblong glandular pubescent, white. Berry globose .2 in. through

red or black with persistent style. *Hab.* Mountains. Malacca, Mt. Ophir (Griffith and all collectors). Pahang, Telom. Selangor, Bukit Hitam (Kelsall); Gunong Ulu Kali (Burn-Murdoch); Gunong Mengkuang Lebah (Robinson). Perak, Gunong Inas (Yapp); Gunong Bubu (Wray). Kedah, Gunong Bintang (Kloss). *Distrib.* Burma.

(15) *E. parviflora* Wall. *Cat.* 2307; *King, l.c.* 113.

Slender climber, villous. Leaves chartaceous, distichous ovate-lanceolate, sub-acute, base truncate, glabrous except midrib beneath, .7 to 1.5 in. long, .5 to .75 in. wide; petioles very short, .05 in. long, villous. Racemes or umbels few-flowered, axillary. Male 4- to 6-flowered, female 1- to 3-flowered. Calyx-lobes ciliate 5. Corolla-lobes 5, ovate round ciliate. Fruit globose red or black, .15 to .2 in. through. *Hab.* Mountains, local. Perak, Thaiping Hills 3000 to 5000 ft. altitude (Wray, Curtis, Kunstler). *Distrib.* Khasiya, Burma, Sumatra.

(16) *E. subcordata* Ridl.

Slender climbing, branches covered with red brown glandular hairs. Leaves distichous oblong-lanceolate, blunt, base broad sub-cordate, chartaceous densely gland-dotted beneath, glabrous except the hairy midrib; nerves very faint about 10 pairs; 1.5 in. long, .6 in. wide; petioles hairy, very short under 1 in. long. Flowers minute in axillary fascicles of 2 to 5; pedicels puberulous, .05 in. long. Calyx-lobes 5, ovate blunt glabrous with 8 red glands outside. Corolla twice as long, lobes ovate blunt, glabrous except the ciliate tip. Anthers oblong-ovoid with 4 warts on the back. Pistil glabrous. *Hab.* Selangor, Semangkok Pass on the Track to Bukit Fraser (Ridley).

This species has the appearance of *E. pulchella* of Siam, but the flowers are much smaller and almost completely glabrous.

#### DUBIOUS SPECIES

*EMBELIA LUCIDA* Wall. *Cat.* 2315. *Hab.* Singapore. Altogether doubtful. The specimen looks like an *Ilex*; certainly not an *Embelia*.

#### 4. LABISIA, Lindl.

Small shrublets, rhizome creeping. Leaves few, coriaceous to herbaceous nearly entire or toothed, many-nerved. Flowers pink in erect spike-like panicles, very small. Calyx 5-lobed. Corolla 5-lobed, tube short. Stamens 5 wrapped in corolla lobes; filaments short; anthers ovoid. Ovary globose; ovules few immersed in placenta. Drupe globose, red or blue, 1-seeded. Seed globose, hollowed at base. Species 4, Malay Peninsula and isles.

Leaves chartaceous, elliptic-lanceolate; drupe red	(1) <i>L. pothoina</i>
Leaves herbaceous, lanceolate; petals acute	(2) <i>L. acuta</i>
Leaves chartaceous, ovate or orbicular	(3) <i>L. paucifolia</i>
Leaves coriaceous oblong; drupe blue.	(4) <i>L. longistyla</i>

(1) **L. pothoina** Lindl. *Bot. Reg.* 31, t. 48. *L. pumila* Benth. and Hook. *Gen. Pl.* ii. 645; *King, l.c.* 115.

Herbaceous undershrub; stem rooting. Leaves four erect elliptic-lanceolate acuminate, base narrowed, dark green entire; when young blackish green edged pink, crenate 5 to 8 in. long, 1 to 2.5 in. wide; nerves extremely numerous; petioles 1 to 3 in. long. Flowers pink or white in a spike-like panicle of small clusters. Fruit globose, bright red, .15 in. through. *Hab.* Common in forests over the whole peninsula. There are three forms which grow together.

var. (a) *pothoina*. Leaves lanceolate narrowed to a narrow-winged petiole.

var. (b) *alata*. Leaves larger; petioles broadly winged, often deep blackish green.

var. (c) *lanceolata*. Leaves smaller, lanceolate, shortly cuneate, petioles not winged, slender. *Hab.* Singapore, Bukit Timah; Garden Jungle (all vars.). Johor, Gunong Muntahar (Kloss); Pengarang; Gunong Janeng (Kelsall) (var. b). Malacca, Jus; Merlimau (Derry) (var. b); Pahang, Telom (var. a); Tahan woods (var. b). Selangor, Kwala Lumpur (var. a). Perak, Thaiping Hills; Gunong Bubu (Wray) both forms. Province Wellesley, Tasek Gelugur (var. b). Penang Hill (Curtis) (var. c). Kelantan, Kwala Lebir (Gimlette). *Distrib.* Java, Sumatra, Borneo.

(2) **L. acuta** Ridl. *Journ. Roy. As. Soc. S. Br.* 50, p. 116.

Undershrub, flexuous, 1 ft. tall. Leaves 12 lanceolate narrowed to both ends, herbaceous, 4 to 6 in. long, 1.5 in. wide; petioles .25 in. long, winged to base. Panicles in upper axils, 2 in. long, dense, red-scaly. Calyx campanulate. Corolla-lobes lanceolate acute, all eglandular. *Hab.* Local in woods. Johor, Sungei Tebrau (Ridley).

(3) **L. paucifolia** King and Gamble, *l.c.* 117.

Shrubby plant 10 to 15 in. tall, pubescent. Leaves 3 to 4 in. long, petioled, ovate or orbicular, tip rounded, base round, shortly decurrent, entire or minutely crenate, 2.5 to 4 in. long, 1.5 to 3 in. wide; petioles 1 to 2 in. long. Inflorescence, 1.5 to 2.5 in. long of axillary pubescent racemes. Flowers single or in few-flowered clusters. Calyx-lobes ovate acuminate. Corolla-lobes oblong acuminate. Stamens anthers hastate, long-apiculate. Fruit dark red, .1 in. wide. *Hab.* Open forest at 3000 to 5000 ft. altitude. Perak (Scortechini, Wray).

I have not seen this plant.

(4) **L. longistyla** King and Gamble, *l.c.* 117.

Under shrub, 1 to 2 ft. tall. Leaves coriaceous, oblong or oblanceolate, entire, rounded at tip, narrowed and decurrent to base of petiole; nerves and reticulations conspicuous; 7 to 12 in. long, 3 to 4 in. wide. Inflorescence a raceme-like pubescent panicle of small deep pink flowers in short corymbs. Calyx-lobes

acute, glandular pubescent. Corolla 1 in. long; lobes acute, glandular, pubescent. Style 2 in. long. Fruit globose-conic, azure blue. *Hab.* Mountains at 3000 to 4000 ft. altitude. Selangor, Gunong Semangkok (Curtis, Ridley). Perak (Wray). Pahang, Telom.

### 5. *ARDISIA*, Swartz.

Small trees or shrubs, rarely undershrubs, glandular. Leaves membranous or coriaceous often crenate or serrate. Flowers waxy-pink, often showy, rarely white, usually umbellate. Calyx free, 4- to 5-lobed; tube as short or shorter. Corolla 4- or 5-lobed; tube short, lobes spreading, often twisted to the right. Stamens usually sagittate, lanceolate; filaments short. Ovary globose; style often long, filiform. Fruit globose, red or black, fleshy. Seed 1, hollowed at base, large. Species 250, all tropics.

#### A. Leaves entire, not crenate or undulate.

i. *PIMELANDRA*. Flowers in short racemes or fascicled on the old wood.

Leaves sub-glabrous beneath; flowers fascicled . . . . . (1) *A. pachysandra*

Leaves tomentose beneath; flowers on a short-branched raceme . . . . . (2) *A. Teysmanniana*

ii. *TINUS*. Inflorescence axillary.

Flowers solitary or 2 axillary.

Leaves stiff coriaceous; peduncles very short . . . . . (3) *A. retinervia*

Leaves thin coriaceous; peduncles 1 in. long slender . . . . . (4) *A. monticola*

Leaves stiff coriaceous; peduncles slender 2 or 3 fld. . . . . (5) *A. biniflora*

Cymes axillary; flowers large.

Peduncles short, several branches.

Leaves coriaceous obovate; nerves very faint . . . . . (6) *A. littoralis*

Leaves thin elliptic, 5 to 10 in. long . . . . . (7) *A. solanacea*

Leaves broad elliptic acuminate both ends 5 in. long or more . . . . . (8) *A. oxyphylla*

Leaves chartaceous, linear-lanceolate; young parts pubescent . . . . . (9) *A. tahananica*

Leaves coriaceous, lanceolate; raceme pubescent . . . . . (10) *A. lurida*

Leaves coriaceous obovate acute . . . . . (11) *A. Scortechinii*

Leaves coriaceous-chartaceous, lanceolate . . . . . (12) *A. glanduligera*

Leaves oblanceolate, undershrub; flowers rather small . . . . . (13) *A. suffruticosa*

Peduncles long, 2 to 3 in. long.

Cymes with many sub-umbellate flowers . . . . . (14) *A. Kunstleri*

Cymes corymbose; flowers 8; peduncle flat . . . . . (15) *A. oblongifolia*

Cymes 3-flowered . . . . . (16) *A. Hullettii*

Cymes short, 2-flowered.

Leaves chartaceous, oblong-lanceolate, acuminate . . . . . (17) *A. biflora*



- Leaves coriaceous, elliptic-acuminate . . . . . (18) **A. Barnesii**  
 Flowers racemose distant, raceme long. . . . . (19) **A. pendula**  
 Flowers in a pseudo-terminal sub-umbellate raceme, 2 in. long . . . . . (20) **A. tetrasepala**
- iii. **STYLARDISIA.** Panicles terminal, longer than leaves. Style exsert in bud; flowers very small.  
 Branches terete.  
 Leaves membranous; cymes on branch ends . . . . . (21) **A. andamanica**  
 Leaves coriaceous not scaly, lanceolate-ovate; corolla little longer than calyx . . . . . (22) **A. pallidiflora**  
 Leaves coriaceous, smooth; nerves inconspicuous . . . . . (23) **A. tuberculata**  
 Leaves stiffly coriaceous, strongly nerved . . . . . (24) **A. ophirensis**  
 Leaves coriaceous, scaly beneath.  
 Leaves broad; nerves conspicuous . . . . . (25) **A. labisiæfolia**  
 Leaves narrow; nerves inconspicuous . . . . . (26) **A. montana**  
 Leaves chartaceous; panicles wide.  
 Panicles slender, elongate . . . . . (27) **A. sinuata**  
 Panicles rather dense, many-flowered . . . . . (28) **A. colorata**  
 Panicles dense shorter than leaves.  
 Leaves finely many-nerved, stiffly coriaceous . . . . . (29) **A. petricola**  
 Branches with a raised rib running from petiole . . . . . (30) **A. platyclada**
- iv. **ACRARDISIA.** Style not exsert in bud; flowers small.  
 Flowers small in dense panicles . . . . . (31) **A. divergens**  
 Flowers rather large; buds acuminate. . . . . (32) **A. porosa**
- v. **TINOPSIS.** Panicles terminal. Calyx-lobes rather large; corolla large waxy pink.  
 Leaves 8 by 3 in.; panicle of very short branches . . . . . (33) **A. Vaughani**  
 Leaves large linear-oblong; calyx pubescent . . . . . (34) **A. crassa**  
 Leaves large lanceolate; flowers large . . . . . (35) **A. lanceolata**  
 Leaves under 6 in. long; panicle compact; flowers smaller . . . . . (36) **A. sumatrana**
- B. Leaves crenate.**  
 vi. **CRISPARDISIA.** Leaves crenate with glands in crenations. Leaves slightly crenulate or undulate; inflorescence red-tomentose.  
 Inflorescence axillary.  
 Leaves entire; edge undulate.  
 Leaves oblong-lanceolate, bluntly acute, glabrous . . . . . (37) **A. chrysophyllifolia**  
 Leaves elliptic caudate-acuminate, hairy beneath . . . . . (38) **A. solanoides**  
 Leaves elliptic, shortly acuminate, villous beneath . . . . . (39) **A. fulva**  
 Leaves linear or oblong-lanceolate, red-pubescent beneath . . . . . (40) **A. ferruginea**  
 Leaves lanceolate scaly beneath, 6 in. long or more; panicle wide . . . . . (41) **A. singaporensis**

- Leaves coriaceous, elliptic-lanceolate, glabrous; flowers racemed . . . . . (42) **A. lankawiensis**
- Leaves crenate; flowers rather large, not ferruginous tomentose.
- Calyx-lobes gland-dotted.
- Leaves lanceolate, villous . . . . . (43) **A. villosa**
- Leaves oblong, glabrous . . . . . (44) **A. virens**
- Calyx-lobes ovate acute.
- Inflorescence axillary in upper axils; calyx-lobes gland-dotted.
- Leaves membranous, large, lanceolate, 6 in. long . . . . . (45) **A. Wrayi**
- Leaves coriaceous, 6 in. long . . . . . (46) **A. minor**
- Leaves under 4 in. long . . . . . (47) **A. perakensis**
- Racemes in axils of all the leaves . . . . . (48) **A. Meziana**
- Inflorescence terminal.
- Calyx-lobes gland-dotted.
- Leaves 4 to 8 in. long, 1 terminal umbel . . . . . (49) **A. Ridleyi**
- Leaves 2 to 4 in. long, several umbels . . . . . (50) **A. crenata**
- Calyx-lobes not gland-dotted.
- Branches of inflorescence short . . . . . (51) **A. rosea**
- Branches long; peduncle 2 to 3 in. long . . . . . (52) **A. longepedunculata**
- vii. **BLADHIA.** Leaves rather or very thin, serrate.
- Leaves large, sub-sessile, whorled, glabrous . . . . . (53) **A. Maingayi**
- Inflorescence short, under 2.5 in. long.
- Leaves under 3 in. long, glabrous, lanceolate, alternate . . . . . (54) **A. theæefolia**
- Leaves over 4 in. long, villous elliptic . . . . . (55) **A. odontophylla**
- Leaves glabrous over 4 in. long, oblong-lanceolate . . . . . (56) **A. bambusetorum**
- Leaves linear, very narrow; dwarf shrublets . . . . . (57) **A. linearifolia**

(1) **A. pachysandra** Mez. *Pflanzenreich* Myrs. 97, Fig. 14; *King, l.c.* 121. *Pimelandra Wallichii* DC. *Prodr.* viii. 106.

Tall shrub or small tree 20 to 40 ft. tall. Leaves thinly coriaceous, glabrous, or nearly so, oblong or oblanceolate acute, base cuneate; nerves prominent beneath 14 to 20 pairs; 6 to 10 in. long, 1.5 to 3 in. wide; petioles .4 to .6 in. long, pubescent. Flowers in small axillary umbels of 6 to 8. Corolla-lobes broadly ovate, short acuminate, .3 in. long, white. Drupe white, globose, .2 to .4 in. through. *Hab.* Forests. Johor, Gunong Pulau and Gunong Pantai (Ridley). Perak, Tapa. Penang Hill, near Waterfall (Wallich, Porter, Curtis). Kedah Peak.

(2) **A. Teysmanniana** Scheff. *Nat. Tijdschr. Ned. Ind.* xxxi. 368. *Pimelandra Wallichii* var. *Clarke* in *Hook. fl. F.B.I.* iii. 531.

Large erect shrub or small tree about 20 ft. tall. Branches tomentose. Leaves chartaceous oblong to oblanceolate-acuminate,

narrowed to base, blunt, glabrous above, red-tomentose beneath; nerves prominent, 25 to 30 pairs; petioles thick, .2 in. long. Umbels axillary, 4- to 5-flowered, red-tomentose about .2 in. long. Calyx-lobes ovate-pubescent. Corolla white, .2 in. long, pubescent. Drupe globose, .3 in. through, white with black spots. *Hab.* Common in the south. Singapore, Garden Jungle; Bukit Timah; Changi. Malacca, Mt. Ophir; Bukit Bruang (Derry); Selangor (Cantley). *Distrib.* Bangka. *Native names:* Loyau; Medang Ketanak; Medang Merah; Medang Pasir; Tambang Sisir.

(3) *A. retinervia* Ridl. *Journ. Linn. Soc.* ii. 3, p. 5.

Bush 10 to 12 ft. tall. Branches thick, glabrous. Leaves stiffly coriaceous, elliptic rounded, base cuneate, 4 to 4.5 in. long, 2 in. wide, glandular on both surfaces; midrib depressed above; nerves numerous, fine as are reticulations; petioles .5 to 1 in. long. Cymes few-flowered, axillary short. Calyx-lobes ovate blunt, eglandular. Drupe globose, .25 in. long, grooved black. *Hab.* Mountains. Rare. Pahang, Gunong Tahan at 5000 to 6000 ft. altitude (Ridley).

(4) *A. monticola* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 26.

Shrub. Leaves narrow lanceolate acuminate to both ends, blunt, glabrous, coriaceous, 2.5 in. long, .5 in. wide; nerves and reticulations conspicuous, fine; petioles slender winged halfway, .15 in. long. Peduncles axillary, slender, 1 in. long with 2 to 3 flowers; pedicels .5 in. long. Calyx-lobes ovate-ciliate. Corolla .5 in. across, lobes lanceolate acuminate, pink. Drupe globose, .12 in. through. *Hab.* Mountains. Selangor, Ulu Semangkok (Ridley).

(5) *A. biniflora* Ridl. *Journ. Linn. Soc.* ii. 314.

Glabrous bush 10 to 15 ft. tall. Leaves coriaceous, lanceolate blunt, base cuneate; nerves numerous, fine; 2.5 in. long, 1 in. wide; petioles .25 in. long. Flowers in twos or threes axillary on slender 1 in. long peduncles. Bracts ovate foliaceous. Sepals round. Petals lanceolate acute, .25 in. long, reddish pink. *Hab.* Mountains. Pahang, Gunong Tahan, 5000 to 6000 ft. altitude (Ridley).

(6) *A. littoralis* Andr. *Rep.* x. t. 630; *King, l.c.* 135.

Large bush to about 10 ft. tall. Leaves fleshy coriaceous, obovate round or short acute, base narrowed; nerves nearly invisible; 2 to 5 in. long, 1 to 2.5 in. wide; petioles .3 in. long, thick. Racemes umbellate, 2 in. long, axillary of about 8 rose pink flowers. Peduncles 1 in. long; pedicels .3 in. long. Buds conic. Calyx-lobes orbicular, .25 in. long. Corolla-lobes acute, thickly gland-dotted. Drupe globose flattened, at first red then black, pulpy, .5 in. through. *Hab.* Tidal swamps and muddy river banks; common on all the coasts from Singapore to Kelantan and Lankawi. *Distrib.* Ceylon, South India, China and Malay isles. *Native name:* Lutus.

A form with white flowers was collected by Burn-Murdoch at Bruas in the Dindings.

(7) *A. solanacea* Roxb. *Cor. Pl.* 27, t. 27; *King, l.c.* 137.

Shrub, 6 to 8 ft. or tree 30 to 35 ft. tall, 6 to 8 in. through. Leaves coriaceous, oblong-oblancoelate blunt acuminate, base narrowed glabrous; nerves 12 to 20 pairs, eleviate beneath; 6 to 10 in. long, 2 to 3·5 in. wide; petioles ·5 to ·8 in. long. Peduncles 2 to 3 in. long, ending in corymbiform racemes of 10 to 16 flowers; pedicels ·7 to 1 in. long; buds conic obtuse, ·4 in. long. Calyx-lobes orbicular. Corolla-lobes ovate round, ·3 to ·35 in. wide, rose pink. Drupe globose, ·3 in. through, black. *Hab.* Not very common, in woods. Selangor, Damansara (Burn-Murdoch). Perak, Goping (Kunstler); Relau Tujor (Wray); Thaiping Hills. A tall robust form, var. *elata* King and Gamble, at Goping (Kunstler). *Distrib.* India.

(8) *A. oxyphylla* Wall. *Cat.* 2291; *King, l.c.* 139.

Shrub or small tree, glabrous. Leaves stiffly chartaceous, elliptic acute or broadly lanceolate, base narrowed; nerves and reticulations fine, conspicuous; 3 to 7 in. long, 1 to 2·5 in. wide; petioles ·4 to ·7 in. long. Racemes axillary, 5- to 8-flowered on peduncle 1 to 2 in. long; pedicels ·4 in. long, buds round, ·3 in. long. Calyx-lobes ovate round. Corolla-lobes ovate, ·25 in. long, pink. Drupe globose, fleshy, ·3 in. through. *Hab.* Hill forests. Malacca, Mt. Ophir. Negri Sembilan, Bukit Tumiang and Gunong Berumbun (Cantley). Dindings, Gunong Tungul. Pahang, Telom. Perak, Gunong Kerbau (Haniff). Province Wellesley, Bukit Juru. Penang Hill (Wallich, Curtis). Setul. *Distrib.* Tenasserim, Borneo. *Native names:* Bujong Samalam Bukit; Chato; Tumurus.

(9) *A. tahanica* King and Gamble, *l.c.* 143.

Shrub; young parts pubescent. Leaves chartaceous, linear-lanceolate acuminate both ends; nerves about 12 pairs, obscure; 4 to 6 in. long, ·7 to ·9 in. wide; petioles slender, ·4 to ·6 in. long. Racemes umbellate, on a peduncle ·7 to ·12 in. long in upper axils; flowers 5 to 8 in raceme; pedicels slender, ·5 in. long. Calyx-lobes semi-orbicular, scarious and ciliate on edge, rusty-pubescent, densely glandular, ·05 in. wide; tube as long. Corolla in bud conic-acute, ·15 in. long. Drupe globose depressed, ·2 in. long, pink. *Hab.* On river-banks. Pahang, woods on the Tahan River. Malacca, Mt. Ophir. Negri Sembilan, Johol. Selangor. Ulu Selangor (Goodenough) leaves broader, 1·5 in. wide. Kelantan river by the Jeram Panjang (Ridley).

(10) *A. lurida* Bl. *Bijdr.* 687; *King, l.c.* 138.

A very handsome tall tree 20 ft. high or more, glabrous. Leaves coriaceous, lanceolate or oblanceolate, reddish brown beneath (when dry); nerves 16 to 20 pairs; 5 to 10 in. long, 1·5 to 2·5 in. wide; petioles ·4 to ·7 in. long. Racemes axillary; peduncles 1 to 1·5 in. long, flattened pubescent; pedicels ·4 to ·6 in. long. Buds round. Flowers waxy pink, ·8 in. across. Calyx-lobes

orbicular, puberulous. Corolla-lobes ovate blunt. Drupe globose, apiculate, red. *Hab.* Woods. Johor, Mt. Austin. Pahang, Telom. Dindings, Lumut (Ridley). *Distrib.* Java.

(11) **A. Scortechinii** *King and Gamble, l.c.* 140.

Tree 40 to 50 ft. tall, 8 to 12 in. through. Leaves coriaceous, obovate acute; base cuneate; nerves 14 to 16 pairs; 5 to 7 in. long, 1.5 to 2 in. wide; petioles .4 in. long, broad winged. Racemes axillary, umbellate, 8- to 12-flowered; peduncles thick, flat, 1 in. long; pedicels .5 in. long. Bracteoles ovate boat-shaped, persistent. Calyx-lobes orbicular round emarginate, .25 in. long. Corolla-lobes ovate acute, .35 in. long. Drupe globose, bluish black, .3 in. long. *Hab.* Perak (Scortechini, Kunstler).

I have not seen this plant.

(12) **A. glanduligera** *Ridl. Journ. F.M.S. Mus.* iv. 46.

Stout glabrous shrub. Leaves lanceolate to elliptic-lanceolate long acuminate; base narrowed, coriaceous-chartaceous; nerves inconspicuous, 10 pairs; 6 to 7 in. long, 2 to 3 in. wide; petioles .5 in. long. Peduncles axillary, .25 in. long, bearing umbels of 3 pink flowers on pedicels .5 in. long. Calyx-lobes ovate sub-acute, glabrous, densely gland-dotted. Drupe globular with prominent glands, .2 in. long. *Hab.* Mountain forests. Pahang, Telom (Ridley).

(13) **A. suffruticosa** *Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 116.

An undershrub 1 ft. tall, flexuous. Leaves oblanceolate, blunt acuminate, narrowed to base, glabrous; nerves 20 pairs slightly elevate beneath, 4 to 5 in. long, 1 in. across; petioles .5 in. long. Peduncles slender, 1 in. long, pubescent; pedicels 7, .5 in. long. Flowers small, pink. Calyx lobes lanceolate, acute, ciliate. Corolla-lobes .1 in. long. Fruit globose, .25 in. through. *Hab.* Sandy woods, local. Johor, Sungei Tebrau (Ridley).

(14) **A. Kunstleri** *King and Gamble, l.c.* 136.

Shrub 6 to 20 ft. tall. Leaves coriaceous-chartaceous, glabrous when adult; elliptic shortly acuminate, base long narrowed, nerves 20 to 24 pairs, prominent; 8 to 15 in. long, 2.5 to 5 in. wide; petioles 1 to 2.5 in. long or shorter. Peduncles axillary, 2.4 in. long, bearing a crowded corymboid raceme of 18 to 22 flowers on pedicels 1 in. long or less. Buds conoid, .25 in. long. Calyx-lobes orbicular, .1 in. long. Corolla "pinkish blue" outside, red within, lobes ovate acute. Drupe globose, bluish black. *Hab.* Mountain forests. Perak, Thaiping Hills 1800 ft. altitude (Kunstler); Gunong Keledang (Ridley).

(15) **A. oblongifolia** *King and Gamble, l.c.* 141.

Shrub, glabrous. Leaves chartaceous, oblong acute; base cuneate; nerves 22 to 26 pairs; secondary nerves and reticulations conspicuous, 7 to 10 in. long, 2 to 2.5 in. wide; petioles slender, .5 to 1 in. long. Racemes of 8 flowers, .5 in. long on 1.5 to 2 in. long flattened peduncles; pedicels .75 in. long. Calyx-lobes

orbicular, 1 in. long. Drupe globose, 2 in. long, gland-dotted. *Hab.* Perak at 1000 ft. altitude (Wray).

(16) **A. Hullettii** Mez. *Pflanzenreich*. *Myrs.* 130.

Shrub, glabrous. Leaves membranous oblong-lanceolate, acuminate at both ends; nerves and reticulations very fine and close; 4 to 7 in. long, 1.5 to 2 in. wide; petioles slender, .4 in. long. Umbels 3- to 5-flowered, glabrous on peduncles 1 to 1.5 in. long, glabrous; pedicels rather stout, .5 in. long. Calyx-lobes oblong, blunt, .15 in. long. Corolla .25 in. long, lobes oblong acute. Drupe globose, .2 in. through. *Hab.* Malacca, Mt. Ophir (Hullett); rare.

(17) **A. biflora** King and Gamble, *l.c.* 142.

Shrub 4 to 8 ft. tall. Leaves chartaceous, oblong-lanceolate acuminate at both ends entire or faintly crenulate; glands many large; nerves 12 to 15 pairs; 3 to 5 in. long, .75 to 1.5 in. wide; petioles .2 to .5 in. long. Umbels of 2 flowers, on lateral peduncles .75 in. long; pedicels as long. Calyx-lobes ovate, scarious and ciliate on edge, .05 in. long. Drupe black, globose, .25 in. long, ribbed and glandular. *Hab.* Dense jungle on limestone hills, 300 to 800 ft. altitude. Perak (Kunstler, Wray).

I have not seen this plant.

(18) **A. Barnesii** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 26.

Glabrous shrub. Leaves coriaceous, elliptic acuminate, base narrowed; nerves and reticulations conspicuous; 3 in. long, 1 in. wide, gland-dotted; petioles .12 in. long. Peduncles terminal and in upper axils, .5 to 1 in. long, with 2 flowers on pedicels .5 in. long. Calyx-lobes orbicular ciliate, half as long as petals. Corolla-tube short, lobes short, oblong-ovate, .5 in. across. *Hab.* Mountains; rare. Pahang, Kluang Terbang (Barnes).

(19) **A. pendula** Mez. *Pflanzenreich*. *Myrs.* 125; *King, l.c.* 140.

Shrub; branchlets pubescent. Leaves chartaceous, elliptic-lanceolate acute, base cuneate, faintly crenate at tip, glabrous above, puberulous beneath, glands numerous along the edge; nerves 10 to 12 pairs, prominent beneath; 4 to 7 in. long, 1.5 to 2 in. wide; petioles .3 to .5 in. long. Racemes axillary, 6 to 8 in. long, pendulous. Flowers scattered, 10 or more on .5 in. long pedicels, pubescent. Calyx-lobes ovate round, pubescent, ciliate. Corolla lobes ovate-elliptic, light pink. Drupe globose, .25 in. through, black. *Hab.* Rare and sporadic in open heathy country. Malacca, Panchur (Goodenough). Pahang, Temerloh. Perlis, Kanga. *Distrib.* Java and Sumatra.

(20) **A. tetrasepala** King and Gamble, *l.c.* 142.

Shrub; branchlets slender. Leaves chartaceous, elliptic or elliptic-ovate acuminate, base round, glabrous above, minutely pubescent beneath; nerves 16 to 20 pairs, elevate beneath; 4.5 to 6.5 in. long, 1.5 to 2.5 in. wide; petioles .2 to .3 in. long. Racemes .2 in. long of 8 to 12 flowers on peduncles .5 in. long; pedicels as long, pseudo-terminal, sub-umbellate. Calyx-lobes 4, ovate-

orbicular, ciliate, .1 in. long, reflexed in fruit. Drupe globose, .25 in. through, dotted with glands. *Hab.* Johor, Jaffaria and Gunong Pulai (King).

(21) *A. andamanica* Kurz. *Flor. For.* ii. 108; *King, l.c.* 126.

Shrub about 15 ft. tall, 2 in. through; branches slender, glabrous. Leaves membranous, oblong-lanceolate long-acuminate, base cuneate, glabrous, glands scattered; nerves fine, 20 pairs; 3 to 6 in. long, .75 to 1.75 in. wide; petioles .3 to .5 in. long. Panicles terminal, 2 to 6 in. long, with 4 or 5 racemes on .25 in. long peduncles. Flowers flesh-colour, .15 in. long; pedicels .2 in. long. Calyx-lobes acute triangular, white. Corolla-lobes ovate acute. Bud ovoid. Drupe pyriform or round, .3 in. through. *Hab.* Hilly districts to 5000 ft. altitude. Johor, Gunong Pulai; Kudunak (Feilding). Malacca, Mt. Ophir (Griffith). Selangor, Bukit Kutu; Menuang Gasing (Kloss); Gunong Mengkuang Lebah (Robinson). Perak, Chanderiang and Gunong Batu Putih (Kunstler); Keledang; Kamuning. *Distrib.* Mergui and Andamans.

var. *latifolia* Ridl. Leaves 5 in. long, 2 in. wide, broad lanceolate; base sub-rhomboid. Panicle 4 in. long; branches thicker than in type. Flowers white. A small tree. *Hab.* Kelantan, top of Gunong, near Kota Bharu.

(22) *A. pallidiflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 27.

Glabrous shrub. Leaves coriaceous, lanceolate to ovate-elliptic short acuminate, base narrowed; nerves 9 to 10 pairs, conspicuous as are reticulations; 3 to 4 in. long, 1 to 1.75 in. wide; petioles .25 in. long. Panicles on the end of lateral branches. Umbels of 6 or more flowers on pedicels .1 in. long. Bracts linear-lanceolate. Calyx-lobes .1 in. long, lanceolate with black and red glands. Corolla pale pink; lobes oblong, truncate, .1 in. long. *Hab.* Johor Tempayan River forests (Ridley).

(23) *A. tuberculata* Wall. *Cat.* 2274; *King, l.c.* 126.

Shrub about 12 ft. tall, glabrous. Leaves coriaceous smooth, elliptic blunt acuminate, base narrowed or round, coppery scaly beneath; midrib prominent; nerves very inconspicuous; 3 to 6 in. long, 1 to 2 in. wide; petioles .3 to .5 in. long. Panicles terminal lax, 3 to 4 in. long, sometimes leafy, rachis flattened; branches 1.5 in. long. Flowers light pink, .1 in. across, buds ovoid, blunt. Calyx-lobes short blunt ovate. Petals ovate, sub-acute. Drupe obovoid, black, .15 in. through. *Hab.* Lowland forests, common in south. Singapore (Wallich); Selitar; Jurong; Garden Jungle. Johor, Tempayan River; Pantai. Malacca, Bukit Bruang (Derry). Pahang, Pekan. *Distrib.* Bangka.

(24) *A. ophirensis* Mez. *Pflanzenreich. Myrs.* 113; *King, l.c.* 127.

A low stout shrub. Leaves rigid coriaceous, elliptic shortly acuminate, base rounded or sub-acute, minutely scaly and densely glandular beneath, midrib stout; nerves 12 to 16 pairs, prominent

beneath as are secondaries and reticulations; 3 to 6 in. long, 1.75 to 2.25 in. wide; petioles .4 to .5 in. long. Panicles stout, about 3 in. long; branches .5 to 1 in. long. Calyx-lobes ovate-oblong, small. Corolla-lobes ovate, .1 in. long; bud ovoid, blunt. Drupe black, .15 in. through. *Hab.* Very local on mountains. Malacca, Mt. Ophir (Hullett, etc.). Chohong (Feilding).

(25) *A. labisiæfolia* King and Gamble, l.c. 127.

Small tree. Leaves coriaceous elliptic or elliptic-oblong, shortly abrupt acuminate, base round or often unequally cuneate, minutely scaly on both sides when young, beneath only when adult, dark green above, beneath brownish, midrib stout; nerves prominent beneath, as are reticulations; 6 to 8 in. long, 2 to 4 in. wide; petioles .5 to .8 in. long. Panicles lax, 6 in. long, flexuous, scurfy, tripinnate. Calyx-lobes ovate, scaly. Corolla deep pink, .2 in. across, ovate acute. Style long, exsert. Drupe black, globose, .2 in. through. *Hab.* Mountains in forest at 5500 to 6700 ft. altitude. Pahang, Gunong Tahan. Perak, Gunong Batu Putih (Wray).

(26) *A. montana* King and Gamble, l.c. 128.

Shrub 4 to 6 ft. tall; branches brown-scurfy tomentose, as are underside of leaves and panicle. Leaves coriaceous elliptic-oblong or narrow lanceolate blunt, narrowed or round at base, densely red-scurfy, tomentose beneath; nerves obscure, 20 pairs; 4 to 6 in. long, .75 to 1.25 in. wide; petioles .5 in. long. Panicles 3 in. long and wide to 6 in. in fruit. Flowers small, clustered on the ends of short branches. Calyx-lobes ovate acute under .05 in. long. Corolla little longer, lobes ovate. Drupe red globose, .15 in. through. *Hab.* Mountain forests at 5000 to 6700 ft. altitude. Pahang, Gunong Tahan. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Gunong Batu Putih (Wray).

var. with smaller leaves 3 in. long, 1.5 in. wide and elliptic blunt. *Hab.* Selangor, Semangkok Pass (Ridley), Perak, Gunong Kerbau (Robinson).

(27) *A. sinuata* King and Gamble, l.c. 129.

Shrub or tree 10 to 15 ft. tall; branches sinuate flattened ridged. Leaves chartaceous, elliptic-oblong acute, base round or narrowed, glabrous; nerves 10 to 12 pairs, slender but distinct; 3 to 6 in. long, 1 to 2 in. wide; petioles .3 to .4 in. long. Panicles lax, terminal 5 to 7 in. long; rachis flat sinuate. Calyx-lobes triangular ovate ciliate. Corolla pale green or pink, lobes ovate acute. Drupe globose .15 in. through. *Hab.* Perak, Goping (Kunstler).

This is possibly another form of *A. colorata* Roxb.

(28) *A. colorata* Roxb. *Hort. Beng.* 16; King, l.c. 129.

Large shrub, glabrous, rarely a small tree. Leaves chartaceous, oblong-lanceolate acute or short acuminate, base cuneate; nerves 10 to 15 pairs sometimes prominent; 5 to 10 in. long, 1.5 to 3 in. wide; petioles .5 to .8 in. long. Panicles terminal, 4 to 12 in.



long, tripinnate, red scaly with numerous racemes of pale pink flowers about .2 in. across. Calyx-lobes ovate, sub-acute. Corolla-lobes ovate acute not glandular. Drupe black, .2 in. through, globose, ribbed when dry. *Hab.* Common in forests throughout the peninsula from Singapore to Kedah and Tringganu. A number of varieties are recorded.

var. *polyneura* Clarke, in *Hook. fil. F.B.I.* iii. 520 has leaves up to 15 in. long and 4.5 in. wide, elliptic, nerves very prominent. Singapore to Perak.

var. *complanata* Clarke, *l.c.* Leaves lanceolate, smaller as are the panicles. *Hab.* Singapore, Malacca, Penang, etc.

var. *elliptica* King and Gamble, *l.c.* More robust, leaves stiffer, 7 in. long by 8 in. wide. Panicle robust. *Hab.* Perak, Relau Tujur (Wray).

var. *salicifolia* King and Gamble, *l.c.* Leaves lanceolate, 5 to 7 in. long, 1 to 1.5 in. wide; nerves inconspicuous. *Hab.* Perak, Malacca. *Distrib.* Indo-Malaya. *Native names:* Mantua Pelandok; Mantulong; Maranting; Marabuloh; Mumbuloh; Munsial; Nauli-nauli; Jerok putih.

(29) **A. petricola** Ridl. *Journ. F.M.S. Mus.* vi. 159.

Shrub; young parts red-scurfy. Leaves elliptic obtuse, slightly narrowed to each end, coriaceous; nerves fine, numerous, gland-dotted beneath, 3 in. long, 1.5 in. wide; petioles .25 in. long, winged to base, red scurfy. Panicles terminal dense, 2 in. long, red scurfy; branches 7 to 8, short, .5 in. long with cymes of 3 to 4 flowers. Corolla pink, .25 in. across, lobes ovate blunt. Buds acute. Stamens eglandular. *Hab.* Pahang, Gunong Tahan to 7186 ft. altitude. On rocks (Ridley).

(30) **A. platyclada** King and Gamble, *l.c.* 132.

Small tree or shrub, 10 to 15 ft. tall, glabrous; branchlets with zigzag rib from petiole to petiole, above flattened. Leaves chartaceous oblong abruptly acuminate, base narrowed, rounded, red-scaly when young; nerves 14 to 18 pairs, strongly elevate inarching beneath; 4 to 6 in. long, 1.5 to 2 in. wide; petioles very short or 0. Panicles pyramidal scaly, 2- to 3-pinnate, 4 to 5 in. long, rachis flat. Flowers very small in dense umbellate clusters. Bracts foliaceous spatulate-lanceolate. Calyx-lobes lanceolate, pink. Corolla white, .07 in. wide, lobes ovate-acuminate. Drupe globose, dark blue, .2 in. through. *Hab.* Dense forest. Rare. Perak, Ulu Bubong and Goping (Kunstler).

(31) **A. divergens** Roxb. *Hort. Beng.* 85; King, *l.c.* 133.

Small tree 20 ft. tall. Branches terete, glabrous. Leaves chartaceous elliptic to lanceolate, shortly acuminate, base blunt, gland-dots very conspicuous on edge; nerves fine, distinct, 8 to 12 pairs, 3 to 5 in. long, 1 to 2 in. wide; petioles .15 to .3 in. long. Panicles lax terminal; rachis flattened, rusty pubescent, 2 to 3 in. long. Flowers umbelled red; pedicels short, thick. Buds

ovoid, blunt. Calyx-lobes short, ovate pubescent. Corolla .2 in. long, lobes ovate acute. Drupe globose, depressed, .15 in. through. *Hab.* Very local at 2500 ft. altitude. Penang Hill (Jack, Wallich, Curtis).

(32) *A. porosa* Clarke, *l.c.* iii. 522; King, *l.c.* 132.

Shrub, 8 ft. tall. Branches flexuous, flattened, ridged. Leaves chartaceous oblong acute or sub-acute, base cuneate; nerves very fine and numerous, obscure; 5 to 9 in. long, 1.5 to 2.5 in. wide;



FIG. 97.—*Ardisia porosa*.

petioles .4 in. long. Panicles terminal, lax, few-flowered, few-branched, 6 to 8 in. long; pedicels slender, .75 in. long, spreading. Calyx ovate, .04 in. long. Corolla-lobes narrow acuminate (bud, long acuminate, narrow), .3 in. across, rose pink. Stamens long, slender. Drupe globose, .25 in. through, ribbed, dark purple. *Hab.* Hill woods, Malacca, Panchur (Goodenough). Negri Sembilan, Perhentian Tinggi. Perak, Batu Togoh and Ayer Larut (Wray); Thaiping Hills. Penang, Moniot's Road (Curtis).

(33) *A. Vaughani* Ridl.

Shrub. Leaves chartaceous elliptic blunt, base narrowed; nerves 18 pairs, elevate beneath inarching, midrib prominent;

8 in. long, 3 in. wide; petioles .25 in. long. Panicles terminal, 4 in. long; branches under .2 in. long, pubescent, umbellate. Flowers about 6 to 8 in an umbel. Inflorescence maroon; petals white, buds conoid; pedicels .25 in. long. Sepals triangular acute. Corolla-lobes lanceolate acute, .12 in. long. Style hardly as long. Fruit globose. *Hab.* Jungle, Rahman, Kota Bharu, Bukit Sembilan (Gwynne-Vaughan, 617).

(34) *A. crassa* Clarke, *l.c.* iii. 518; *King, l.c.* 131.

A small tree with stout branches. Leaves coriaceous, narrow, oblong acute, base cuneate, glabrous, shining above, midrib prominent; nerves fine, inconspicuous 20 to 25 pairs; 4 to 9 in. long, 1.5 to 2.5 in. wide; petioles thick, .5 in. long. Panicles rusty-pubescent, 5 to 6 in. long, dark pink, branches thick flattened remote with terminal umbels of close packed umbels of few pinkish white or pink flowers on short very thick pubescent peduncles. Calyx-lobes pubescent, ovate-orbicular .2 in. long. Corolla in bud globose, lobes broad ovate, shorter. Drupe globose, .25 in. through. *Hab.* Not common, lowland forest. Singapore, Selitar; Chan Chu Kang. Malacca, Selandor (Goodenough, Maingay). Negri Sembilan. Bukit Tangga. *Distrib.* Borneo.

(35) *A. lanceolata* Roxb. *Hort. Beng.* 85; *King, l.c.* 134.

A handsome tree about 40 ft. tall. Leaves coriaceous elliptic-oblong or obovate short acuminate, base long cuneate, glabrous; nerves 12 to 15 pairs with the secondaries nearly as conspicuous; 6 to 11 in. long, 2 to 3.5 in. wide; petioles .5 to .7 in. long, winged. Panicles terminal, 4 to 6 in. long and as wide; rachis angled; pedicels stout, thickened upwards, .75 in. long. Calyx-lobes orbicular, .1 in. long. Corolla .35 in. wide, lobes ovate acuminate, deep rose pink, twisted in bud. Drupe black, globose, .3 in. through. *Hab.* Not rare in forests. Singapore, Bukit Timah; Selitar. Johor, Bekok River; Ulu Sembrong (Kelsall); Gunong Pulau. Malacca, Brisu (Derry); Ayer Panas. Pahang, Pulau Tawar; Selangor, Kwala Lumpur; Batu Caves. Negri Sembilan, Bukit Dusun Paya (Cantley). Perak, Goping; Larut (Kunstler); Kwala Dipang (Scortechini). Penang (Roxburgh, Curtis). Rahman, Bukit Besar (Yapp). *Distrib.* Malay isles. *Native names:* Sembarang; Murambong.

(36) *A. sumatrana* Miq. *Pl. Jungh.* i. 195; *King, l.c.* 134.

Large shrub or small tree 20 ft. tall. Stem 3 to 4 in. through, glabrous. Leaves thin coriaceous, elliptic-oblong to ovate acute; base cuneate; nerves 12 to 15 pairs, elevate beneath; 3 to 6 in. long, 1.5 to 2.5 in. wide; petioles .3 in. long. Panicles much-branched, compact pyramidal, 3 to 4 in. long; peduncles none or short. Pedicels moderately thick, .2 in. long. Buds globose. Calyx-lobes orbicular, over-lapping. Corolla-lobes ovate acute, white. Drupe red, then black, .2 in. long, striate. *Hab.* Perak, Chanderiang (Kunstler). *Distrib.* Java, Sumatra.

This resembles *A. lanceolata*, but the flowers are much smaller.

(37) *A. chrysophyllifolia* King and Gamble, l.c. 123.

Shrub or tree. Young parts red-pubescent. Leaves coriaceous, oblong-lanceolate, sub-acute, base narrowed, glabrous; nerves many, inconspicuous; 4 to 6 in. long, .75 to 1.25 in. wide; petioles .5 in. long, edged with decurrent blade. Umbels axillary, sessile or short peduncled, 12-flowered; pedicels slender, .2 in. long, ferrugineo-pubescent. Calyx-lobes ovate ciliate pubescent with many conspicuous golden glands. Corolla-lobes ovate concave, glabrous, tube none or very short. Drupe globose, glandular. *Hab.* Perak, Gunong Batu Putih, 3400 ft. altitude (Wray).

I have not seen this species.

(38) *A. solanoides* King and Gamble, l.c. 123.

Small shrub 3 to 4 ft. tall, glandular hirsute. Leaves membranous, elliptic long caudate-acuminate, base attenuate, glandular-hirsute beneath glands many; nerves 8 to 9 pairs raised; 2.5 to 3.5 in. long, .75 to 1.25 in. wide; petioles .15 in. long, blade decurrent. Inflorescence umbellate, sessile, axillary. Racemes hardly .1 in. long of 4 to 6 flowers, white bluish-tinged on slender pedicels, .3 to .4 in. long. Calyx-lobes 4 or 5, edges scarious, ciliate. Corolla-lobes ovate caudate, twisted and reflexed, .3 in. long, glandular punctate. Drupe red, .25 in. through. *Hab.* Dense jungle. Perak, 500 to 800 ft. altitude (Kunstler).

I have not seen this plant. It is said to resemble *Antistrophe caudata*, but the petals overlap to right.

(39) *A. fulva* King and Gamble, l.c. 124.

Woody shrub, 6 to 12 ft. tall, young parts villous. Leaves coriaceous, elliptic-lanceolate acuminate acute, base shortly narrowed, crenate, glabrous above, tawny villous beneath, glands few; nerves 20 to 24 pairs; 5.4 to 7 in. long, 1 to 2 in. broad; petioles winged, .4 to .6 in. long. Corymbs 1 to 1.5 in. long, dense-pubescent in axils of uppermost leaves or lower; pedicels .5 in. long or less, hairy. Calyx-lobes ovate, densely hairy. Corolla glabrous, lobes obovate, blunt, .25 in. long, dotted pale rose. Drupe .2 in. through. *Hab.* Not common. In woods in the northern part of the peninsula. Dindings. Penang Hill. Lankawi, Kwah (Curtis). Kelantan, Chaning; Kota Bharu (common here).

This varies somewhat in form of leaves, sometimes quite narrow lanceolate, and in amount of pubescence in flowers.

(40) *A. ferruginea* Mez. *Pflanzenreich*. l.c. 108; King, l.c. 125.

Shrub. Branches slender, densely ferruginous-tomentose. Leaves membranous, oblong-lanceolate, blunt acuminate, base rounded, rusty-pubescent beneath, 3 to 4 in. long, .75 to 1 in. wide; petioles .1 to .2 in. long. Panicles in uppermost axils red tomentose, slender, 2 in. long, 1 in. wide. Flowers small. Calyx-lobes ovate blunt, pubescent. Corolla-lobes .1 in. long, ovate acute, glabrous. *Hab.* Johor, Kampong Simpai, Ulu Batu Pahat (Kelsall).

(41) **A. singaporensis** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 92.

Small tree, young parts densely red-scurfy. Leaves thin coriaceous, elliptic-lanceolate acuminate acute, base narrowed, edge slightly wavy, closely gland-dotted, glabrous above, scurfy beneath, chiefly on midrib in young leaves; nerves about 18 pairs fine inconspicuous, secondaries nearly as conspicuous; 4.5 to 7 in. long, 1.75 to 2 in. wide; petioles .5 in. long. Panicles in terminal axils scurfy, of several umbels on peduncles 1 in. long; secondary peduncles .5 in. long; pedicels .2 in. long, dilate upwards. Flowers pink, .1 in. long; buds ovoid. Calyx-lobes small, oblong-ovate, scurfy. Corolla-lobes ovate acute, glabrous. Drupe globose, .2 in. through, black. *Hab.* Singapore, Pulau Ubin and Changi Road (Ridley).

A rare species.

(42) **A. lankawiensis** *King and Gamble, l.c.* 125.

Tree glabrous. Leaves coriaceous, glabrous, elliptic to elliptic-lanceolate acuminate, base acute, glands frequent at edges; nerves 12 to 14 pairs, obscure; 3.5 to 5 in. long, 1.25 to 1.5 in. wide; petioles .5 to .6 in. long, winged. Racemes closely congested in uppermost axils; peduncles 3 to 3.5 in. long; pedicels .5 to .7 in. long. Calyx-lobes ovate acute, ciliate, glands many. Corolla-lobes ovate acuminate, gland-dotted, .25 to .3 in. long. Drupe obscurely 5-angled, .2 in. through. *Hab.* Lankawi. Woods opposite Kwah (Ridley).

(43) **A. villosa** *Roxb. Hort. Beng.* 85; *King, l.c.* 143. *A. vestita* *Wall. Roxb. Fl. Ind.* ii. 274.

Shrublet 2 to 4 ft. tall, little-branched, pilose. Leaves thin membranous chartaceous, oblong-lanceolate acuminate, base cuneate, crenate, sparsely hirsute to glabrous above, villous beneath; nerves 8 to 12 pairs; 4 to 8 in. long, 1 to 2.5 in. wide; petioles .4 to .8 in. long, villous. Racemes umbellate villous, on the long side-branches 3 in. long with 1 or 2 leaves at the top. Flowers 5 or 6 on villous pedicels .5 in. long. Calyx-lobes linear-oblong nearly as long as corolla, white. Corolla .25 in. long, pale pink or white, ovate acuminate. Anthers rose pink. Drupe pubescent, red, .25 in. long. *Hab.* Common in forest all over the main forest range. Singapore, Pulau Ubin. Johor, Mt. Austin; Tebing Tinggi. Malacca, Mt. Ophir (Griffith). Pahang, Telom; Kota Glanggi. Selangor, Kwala Lumpur; Semangkok; Dusun Tua. Negri Sembilan, Gunong Berumbun (Cantley). Perak, Temengoh; Tapa; Gunong Kerbau (Haniff). *Distrib.* Siam, Burma, Malay isles, Cambodia. *Native names:* Mata Pelandok Gajah; Poko Sigoreh.

var. *glabrata* *Kurz.* Leaves and calyx glabrous. Leaves narrow lanceolate, 4 by 1 in. *Hab.* Pahang, Pulau Tawar. Perak

Goping; Thaiping Hills; Kampar (Kunstler and Wray). Penang Hill (Maingay, Curtis, etc.). Kedah Peak (leaves very narrow, linear). *Distrib.* Borneo, Java, Sumatra. *Native names:* Mata Pelandok Gajah; Salunta orang tinggi; Segareh.

(44) **A. virens** *Kurz. For. Flor. C., ii. 575; King, l.c. 144.*

A big shrub, glabrous. Leaves membranous, oblong or oblong-lanceolate acuminate, faintly crenulate, base cuneate; nerves fine; 12 to 14 pairs, 4 to 6 in. long. Corymbs nearly sessile, terminal or on long bare branches with 2 leaves at the top, main peduncles very short, secondary when present up to 1.5 in. long; pedicels .5 to 1 in. long. Calyx-lobes small, oblong blunt. Corolla-lobes ovate acuminate, .3 in. long. Stamens shorter, with longitudinal slits. Drupe red, globose dotted with glands (when dry, pale spotted black), .4 in. through. *Hab.* Local at 5000 ft. altitude in mountain forests. Perak, Thaiping Hills; and upper part of Ulu Batang Padang valley (Wray). *Distrib.* India, Yunnan, China, Borneo.

The large pale, dotted fruits are very characteristic.

(45) **A. Wrayi** *King and Gamble, l.c. 145.*

Unbranched shrublet up to 5 ft. tall. Leaves membranous, oblong-lanceolate long-acuminate, base long narrowed, broad, crenate, red beneath, deep green above, glabrous but midrib beneath scurfy; nerves 12 to 20 pairs; 6 to 10 in. long, 1.5 to 3 in. wide; petioles .7 to 1.3 in. long. Racemes glabrous, subumbellate in uppermost axils crowded; peduncles .5 to 2 in. long, rachis marked by bract scars. Flowers 8 to 12; pedicels slender, .3 to .4 in. long. Calyx-lobes ovate acute, .1 in. long. Corolla-lobes waxy reddish or purple, ovate, .2 in. long. Drupe globose, glandular red, .3 in. through. *Hab.* Perak, Thaiping Waterfall (Wray).

(46) **A. minor** *King and Gamble, l.c. 146.*

Undershrub 12 to 18 in. tall, pubescent. Leaves coriaceous, elliptic caudate, base acuminate cuneate often unequal, shallow, crenate with prominent glands, glabrous; nerves 15 pairs; 5 to 7 in. long, 2 to 2.5 in. wide; petioles pubescent, .7 to 1 in. long. Racemes umbellate, short, 5 to 6 flowers from upper axils, .2 in. long; pedicels thick, .3 to .4 in. long. Calyx-lobes ovate acute, .14 to .15 in. long, glabrous. Corolla-lobes ovate acute, .2 in. long. *Hab.* Perak without locality (Scortechini).

I have not seen this plant. Said to be near *A. Wrayi* Br., but with leaves coriaceous and pedicels shorter and thicker.

(47) **A. perakensis** *King and Gamble, l.c. 146.*

Bush, young parts pubescent. Leaves membranous, elliptic long-acute both ends, scaly but otherwise glabrous, crenate or dentate in middle; glands few or none; nerves 16 pairs, raised beneath, 2.5 to 4 in. long, .75 to 1.25 in. wide; petioles slender,

·2 to ·4 in. long. Umbels pubescent, 2- or 3-flowered in upper axils; peduncles ·3 in. long; pedicels ·1 to ·2 in. long. Buds ovoid, pale pink. Calyx-lobes triangular ovate, pubescent, ·05 in. long. Corolla-lobes ovate acute, ·1 to ·15 in. long, black-dotted. *Hab.* Perak at 300 ft. altitude (Wray).

I have not seen this plant.

(48) **A. Meziana** King and Gamble, *l.c.* 147.

Herbaceous undershrub 1 to 2 ft. tall, 2 in. through, young parts pubescent. Leaves chartaceous, elliptic-obovate, abruptly short acuminate, base cuneate, crenate-dentate in middle; nerves 10 to 14 pairs, elevate; 3·5 to 5·5 in. long, 1·5 to 2 in. wide; petioles ·3 to ·5 in. long, pubescent. Racemes sessile, pubescent, very short, of 6 flowers, in all the axils, ·1 to ·15 in. long. Bracts ovate, gland-dotted, ciliate. Pedicels ·1 to ·15 in. long. Calyx-lobes ovate acute, ciliate hyaline, black-dotted, ·05 in. long, tube as long. Corolla-lobes ovate, blunt, ·1 in. long, waxy-white, dotted. *Hab.* Limestone rocks in open jungle. Perak (Kunstler).

I have not seen this plant.

(49) **A. Ridleyi** King and Gamble, *l.c.* 148.

Slender spreading shrub 10 to 12 ft. tall; branchlets pubescent. Leaves membranous, oblong-lanceolate, long-acuminate, base broad shortly narrowed, strongly crenate, glabrous, sparsely glandular, 4 to 8 in. long, 1·25 to 1·75 in. wide; petioles ·7 to 1·4 in. long. Raceme 3- to 6-flowered, sessile, umbellate in uppermost axils. Calyx-lobes 5, triangular acute pubescent. Corolla-lobes ovate acute, ·15 in. long, rose pink. Drupe ovoid, scarlet. *Hab.* In woods, local; not common, from sea level to 4000 ft. altitude. Singapore, Angmo Kio. Johor, Gunong Pantai; Tanjong Bunga. Pahang, Tahan River. Malacca, Mt. Ophir. Selangor, Semangkok (Ridley). Perak, Thaiping Hills, 2500 to 4000 ft. altitude. Lankawi, Dayong Bunting (Robinson), leaves strongly gland-dotted. *Distrib.* Sumatra.

(50) **A. crenata** Roxb. *Hort. Beng.* 85; King, *l.c.* 149; *Bot. Mag. t.* 1950. *A. crispa* DC. in *Trans. Linn. Soc.* xvii. 124.

A bush 2 to 5 ft. tall, glabrous. Leaves chartaceo-coriaceous, lanceolate acuminate, base narrowed, more or less crenate, 2 to 4 in. long, ·75 to 1 in. wide. Racemes short terminal, short-peduncled or sessile. Flowers 4- or 5-merous, ·4 in. across, pink. Corolla-lobes ovate-oblong acuminate, blunt. Drupe ·25 in. through, scarlet succulent, edible. *Hab.* Common in orchards and open country over the whole peninsula from Singapore to Setul and Tringganu. *Distrib.* Assam, Burma, Malay isles, China, Japan. *Native names:* Mata Pelandok; Lingguni.

var. *angusta* Clarke is a narrow-leaved form from Malacca.

(51) **A. rosea** King and Gamble, *l.c.* 150.

Shrub or small tree 4 to 6 ft. tall or more. Branches slender, spreading. Leaves thinly coriaceous, elliptic cuspidate, base

gradually narrowed, edges crenulate; nerves very fine; 2 to 4 in. long, 1 to 1.5 in. wide; petioles slender, .5 in. long. Racemes umbellate, terminal; peduncles .5 in. long, puberulous; secondary peduncle .5 to 1 in. long, slender. Flowers nearly white, sometimes tinted rose, 3 to 4 together; pedicels .5 in. long, slender. Calyx-lobes small, triangular, ovate. Corolla-lobes narrow acuminate, .2 in. long, twisted. Drupe black, globose, .25 in. through. *Hab.* Mountains. Pahang, Gunong Tahan; Gunong Berumbun; Telom. Perak, Thaiping Hills (2500 ft. altitude); Bujong Malacca.

The Perak hills plant has thinner, softer leaves; those of the Tahan mountain plant, which is much more exposed, are stiffer and coriaceous.

(52) ***A. longepedunculata*** King and Gamble, l.c. 150.

Shrub; branchlets slender, rusty-pubescent. Leaves membranous, oblong-lanceolate caudate acuminate, base shortly cuneate, minutely crenulate; nerves distinct, 12 to 16 pairs; 4 to 6 in. long, 1.25 in. wide; petioles slender, .5 in. long or less. Panicles 6 in. long and wide, pubescent; peduncles 1 in. long; secondary peduncles about 6, slender, 3 in. long. Flowers about 6 in an umbellate raceme; pedicels 1 in. long. Buds acuminate. Calyx-lobes triangular blunt. Corolla-lobes ovate long-acuminate. Drupe purplish black, globose, .2 in. long. *Hab.* Perak, Gunong Batu Putih (Wray), rare.

Like *A. rosea*, but enlarged in every part.

(53) ***A. Maingayi*** King and Gamble, l.c. 151.

An erect hardly or not branched shrublet, 12 to 18 in. tall. Leaves herbaceous in distant whorls, elliptic-obovate or oblanceolate acuminate, base long narrowed, finely toothed, 6 to 11 in. long, 2 to 3.5 in. wide; petioles none or very short. Panicles sub-terminal; peduncles slender, 2.5 in. long; branches distant, spreading, slender, 6 or more, 1 in. long with linear bracts. Flowers pink in nodding umbels of 6 or more, small about .2 in. across. Corolla-lobes ovate oblong, blunt. Fruit scarlet, .3 in. in diameter. *Hab.* Mountains in damp forests. Malacca (Maingay). Selangor, Gunong Semangkok. Pahang, Gunong Tahan (3300 ft. altitude); Telom. Perak, Bujong Malacca (Ridley, Wray and Scortechini).

(54) ***A. theæfolia*** King and Gamble, l.c. 152.

Slender shrub 3 ft. tall glandular pubescent above. Leaves chartaceous, elliptic long acuminate, base narrowed, denticulate, opposite, alternate and falsely whorled, 2 to 3 in. long, .7 to 1.2 in. wide; petioles slender, .3 in. long. Panicles axillary; peduncles slender, 1.5 in. long; branches few, 1 in. long, bearing racemes of 2 to 3 flowers about 1 in. long. Calyx-lobes round. Corolla white, lobes ovate acute, or blunt. Drupe pyriform, .2 in. through. *Hab.* Mountain forests about 4000 to 5000 ft. altitude. Perak, Ulu Batang Padang (Wray); Gunong Berumbun, Telom (Ridley).



(55) **A. odontophylla** Wall. *Cat.* 2279; *King, l.c.* 152.

Soft under-shrub, 1 to 2 ft. tall, villous. Leaves membranous sub-opposite, elliptic or obovate-lanceolate acute, base cuneate, serrate, glabrous above except hairy midrib, hairy beneath, 4 to 8 in. long, 1.5 to 3.5 in. wide; petioles .4 to 1 in. long. Racemes umbellate, lateral, lax, few-flowered, under 1 in. long, pubescent; peduncles .5 to 2 in. long; pedicels .3 to .7 in. long. Calyx-lobes ovate pubescent, .1 in. long. Corolla-lobes pink, ovate, .15 to .2 in. long. Drupe globose, red, .25 in. through. *Hab.* In damp forests. Malacca, Bukit Sadanen (Derry); Merlimau (Cantley), Pahang, Tahan river and Pulau Tawar. Selangor, Ginting Bidai; Petaling (Ridley). Perak, Sungei Larut and Sapetang (Wray). *Distrib.* Borneo. *Native names:* Sumpah Lumpo; Pasal.

(56) **A. bambusetorum** King and Gamble, *l.c.* 153.

Semi-herbaceous shrub, 1 to 2 ft. tall, pithy. Leaves membranous oblong to ovate-oblong acute, narrowed and rounded at base, glabrous, irregularly toothed; nerves 8 to 10 pairs; 4 to 6 in. long, 1 to 1.5 in. wide; petioles .4 to .6 in. long. Racemes lateral, 1 to 1.5 in. long with a linear leaf .5 in. long; peduncles .7 in. long. Pedicels slender, .4 to .15 in. long. Calyx-lobes linear-oblong, acute, .05 to .07 in. long. Corolla-lobes obovate-oblong, .15 in. long, white. *Hab.* Bamboo forests, Perak (Kunstler).

I have not seen this plant. It is probably a variety of *A. odontophylla*, but with the flowers white and whole plant glabrous.

(57) **A. linearifolia** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 27.

Shrublet 6 to 8 in. tall, hairy above. Leaves lanceolate-linear acuminate, edges setose undulate, glabrous above, midrib pubescent beneath; nerves 16 pairs inarching, 5 in. long, .5 in. wide; petioles .25 in. long, pubescent; pseudo-stipules linear acuminate, .5 in. long. Racemes from upper axils, .5 in. long with 3 or 4 flowers; pedicels .25 in. long. Flowers hardly .25 in. across. Sepals triangular acute. Corolla-lobes imbricate white, with red keel and tip, .12 in. long. *Hab.* Province Wellesley, Gunong Bongsu (Haniff).

Very rare, one of our smallest species.

## 6. ANTISTROPHE, DC.

Slender shrubs resembling some species of *Ardisia*, but flowers axillary solitary or umbellate. Calyx-lobes acute. Corolla-lobes lanceolate acuminate over-lapping to the left in bud. Stamens dehiscing longitudinally. Species 4, Indo-Malayan.

Inflorescence 1- to 2-flowered, glabrous; leaves caudate . (1) **A. caudata**  
 Inflorescence 4- to 6-flowered, hirsute; leaves short  
 acuminate . . . . . (2) **A. Curtisii**

(1) **A. caudata** King and Gamble, *l.c.* 154.

Shrub or treelet, nearly glabrous. Leaves membranous elliptic-lanceolate caudate, base round, 3 to 4 in. long, 1 to 2 in. wide;

petioles .1 to .2 in. long. Umbels 1- or 2-flowered, glabrous sessile. Calyx-lobes dotted, edge ciliate, with 2 lines of glands. Corolla-lobes .3 in. long, glabrous. Drupe .25 in. long, red. *Hab.* Not common, in hill woods. Negri Sembilan, Perhentian Tinggi; Ayer Kuning (Cantley). Selangor, Bukit Hitam (Kelsall); Klang Gates. Perak, Gunong Batu Putih (Wray); Bujong Malacca; Thaiping Hills. *Native name*: Lilimah Hutan.

(2) *A. Curtisii* King and Gamble, *l.c.* 155.

Shrub. Branches zigzag, young parts pubescent. Leaves membranous elliptic, acuminate, base round hirsute beneath and on upper midrib, 3.5 to 5 in. long, 1.5 to 2 in. wide; petioles .2 in. long. Umbels 4- to 6-flowered, hairy. Calyx-lobes linear subulate hairy. Corolla .3 in. long, hairy outside. *Hab.* Local in woods, Perak, Batu Kurau (Curtis). Ipoh.

### 7. AEGICERAS, Gaertn.

Glabrous bushes in tidal mud. Leaves fleshy entire obovate round. Flowers pale, rosy white in terminal and axillary umbels, numerous. Calyx-lobes coriaceous, twisted to left, no tube. Corolla-lobes overlapping to right, acute. Stamens connate below. Fruit cylindrical, curved acute, coriaceous, testa splitting. Seed elongate. Species 2, Asiatic seashores.

(1) *A. majus* Gaertn. *Fruct.* i. 216, t. 46, Fig. 1; *King, l.c.* 156.

Usually 4 ft. tall, but rising to 20 ft. Leaves 1.5 to 3.5 in. long, 1 to 1.5 in. wide. Umbels 15- to 20-flowered, sessile; pedicels .3 to .5 in. long. Corolla-lobes .25 in. long. Stamens exsert. Fruit 3 in. long. *Hab.* In tidal mud (not a mangrove plant). Singapore, Pulau Ubin; Gelang; Jurong. Johor, Batu Pahat River. Pahang, Sungei Meang; Rumpin River (Kloss). Malacca, Tanjong Kling (Hervey). Perak (Kunstler). Penang (Curtis and Wallich). Setul. *Distrib.* India to Australia. *Native names*: Teruntum; Kukulang Laut.

## ORDER LXXXVII. SAPOTACEÆ.

Trees, often vast, rarely small or shrubby, laticiferous, young parts usually red-tomentose. Leaves coriaceous, rarely membranous, entire. Flowers small or medium-sized, creamy white, fragrant, fascicled in the axils of leaves or on tubercles on the branches of the last year's wood below the leaves (rarely paniculate *Sarcosperma*). Calyx inferior, lobes coriaceous, 4 to 8, usually biseriate, outer pair valvate, inner often imbricate. Corolla gamopetalous, tube short, lobes as many or 2 or 4 times as many as calyx-lobes. Stamens on corolla-tube in 1 or 2 series, 5 to 16 or more; staminodes occasionally present; anthers ovate or linear-sagittate often with the connective produced (appendage). Ovary

superior; ovules solitary in 2 to 5 or more cells; style elongate-subulate (or conic). Berry fleshy. Seeds 1 to 8, brown or black, shining often flattened, ellipsoid with a large smooth hilum on one side, testa crustaceous, albuminous or exalbuminous. Species about 320, tropics.

*Achras sapota* Linn. The Chiku is a commonly cultivated large bush or small tree from South America. It is also known to Malays as Sau-Manilla (Sau is *Mimusops Kauki*); the name is a Malay modification of the Spanish name Sapodilla, from the Brazilian Sapoti. It was introduced from South America through Manilla.

- Sepals uniseriate, imbricate; stamens 5 to 6.  
 No staminodes; flowers axillary, fascicled . . . 1. CHRYSOPHYLLUM  
 Stamines present; flowers axillary fascicled . . . 2. SIDEROXYLON  
 Stamines present; flowers in paniced racemes. 3. SARCOSPERMA
- Sepals 2-seriate, outer series valvate.  
 Sepals 4; seeds albuminous.  
 Stamens 8 . . . . . 4. ISONANDRA  
 Stamens 12 or more . . . . . 5. PAYENA  
 Seeds exalbuminous . . . . . 6. BASSIA
- Sepals 6 to 8.  
 No staminodes; seed exalbuminous . . . . . 7. PALAQUIUM  
 Stamines present; seed albuminous (cult. only) 8. MIMUSOPS

### 1. CHRYSOPHYLLUM, Linn.

Trees. Leaves coriaceous. Flowers small, axillary fascicled. Sepals 5 to 7, imbricate. Corolla 5- to 7-lobed, imbricate. Stamens 5 to 7, opposite corolla-lobes. Ovary villous. Fruit fleshy, globose, 5-seeded. Species about 60, nearly all American.

- Leaves deep green, coriaceous, caudate-acuminate . . . (1) **C. Roxburghii**  
 Leaves paler, chartaceous, acuminate . . . . . (2) **C. Curtisii**

(1) **C. Roxburghii** Don. *Syst.* iv. 33; *King, l.c.* 158.

A medium-sized bushy tree 40 to 60 ft. tall; branchlets red-pubescent. Leaves oblong-lanceolate, abruptly blunt, caudate-acuminate, coriaceous, dark shining green, base cuneate; nerves very fine and numerous, parallel; 4.5 to 6 in. long, 1.25 to 1.5 in. wide; petioles .1 in. long or less, pubescent. Flowers small white in axillary fascicles; pedicels .1 in. long, pubescent. Sepals 5, ovate. Corolla tubular campanulate, .1 in. long; lobes 5, edges ciliate. Stamens 5, opposite corolla-lobes, insert on tube base. Ovary round, 5-lobed, surrounded by red hairs. Fruit yellow, 5-lobed, tomentose when young pulpy laticiferous, 1 to 1.5 in. long. Seeds .6 in. long, flattened, outer edge curved; inner flat, bright brown. *Hab.* Forests. Singapore, Garden Jungle. Bukit Timah. Malacca, Pringit (Griffith). *Distrib.* Indo-Malaya. *Native names*: Kayu Malukut; Poko Pulut-Pulut.

(2) **C. Curtisii** King and Gamble, *l.c.* 159.

Small tree. Leaves chartaceous lanceolate-acuminate both ends, glabrous shining; nerves indistinct about 6 pairs; 2 to 3 in.

long, 1 in. wide; petioles .1 in. long. Flowers in axillary fascicles of 3 to 5; pedicels .2 in. long, like the sepals coppery-hairy. Sepals 2, outer ovate blunt, inner 3 oblong, much smaller. Corolla very small, white, tube very short, lobes 5 rounded, veined brown inside. Stamens minute, filaments shorter than anther. Ovary red-hairy; style stout, cylindrical. Fruit on axillary pedicels 2 to 5 in. long, obscurely angled, globose, .4 in. through, terminate by the remains of the style and with sepals 5, rounded, silky-pubescent, .1 in. long. Seed .4 in. long, semi-ovate, pyriform, slightly flattened, dark shining brown, back round, inner edge sub-acute. *Hab.* Penang, Batu Feringhi Hill just above Grace-Dieu at 2000 ft. altitude (Curtis and Wallich).

## 2. **SIDEROXYLON**, Linn.

Trees medium or small. Leaves coriaceous or thinner. Flowers small, in axillary fascicles sub-sessile or short pedicelled. Sepals 5 to 6 imbricate orbicular. Corolla-lobes 5 to 6 imbricate. Stamens 5 or 6, opposite corolla-lobes. Berry 1- to 5-seeded. Species about 60, tropics both worlds, few tropical.

- |   |                            |
|---|----------------------------|
| Leaves over 3 in. across; nerves prominent . . . . .                            | (1) <b>S. malaccense</b>   |
| Leaves under 3 in. across, glabrous obovate acuminate membranous . . . . .      | (2) <b>S. Maingayi</b>     |
| Leaves glabrous coriaceous lanceolate . . . . .                                 | (3) <b>S. glabrum</b>      |
| Leaves glabrous chartaceous lanceolate . . . . .                                | (4) <b>S. littorale</b>    |
| Leaves under 3 in. across, pubescent beneath.                                   |                            |
| Corolla-tube longer than lobes; leaves grey silky beneath . . . . .             | (5) <b>S. Derryanum</b>    |
| Corolla-tube shorter than lobes; leaves obovate; nerves inconspicuous . . . . . | (6) <b>S. ferrugineum</b>  |
| Leaves oblong-lanceolate; nerves strongly elevate . . . . .                     | (7) <b>S. firmum</b>       |
| Doubtful . . . . .  | (8) <b>S. Wallichianum</b> |

(1) **S. malaccense** Clarke, in *Hook. fil. F.B.I.* iii. King, l.c. 161.

A big tree 40 to 60 ft. tall. Young parts pubescent. Leaves stiff coriaceous, obovate, tip round, base narrow; nerves strong elevate 8 to 14 pairs with midrib pubescent beneath; 6 to 8 in. long, 3 to 4.5 in. wide; petioles 1 to 1.5 in. long, pubescent. Flowers in fascicles of 5 to 10 on branches below leaves; pedicels thick, .25 in. long, red-tomentose. Sepals 5, red-tomentose, .15 in. long. Corolla white, .15 in. long (absent in females). Stamens on base of corolla-tube; staminodes linear-lanceolate. Ovary pubescent. Berry round oblong, orange red-tomentose, .5 in. through. *Hab.* Forests, Singapore, Garden jungle; Selitar, Malacca, Panchur (Goodenough). Selangor, Weld's Hill (Burn-Murdoch). Perak, Thaiping Hills. Penang Hill, Batu Feringhi (Curtis). *Native names:* Ekor Batu (Penang); Daru-Daru; Dedaru (according to Cantley, but not the tree usually so called).

(2) **S. Maingayi** Clarke, l.c. iii. 536; King, l.c. 162.

Tree; branchlets pubescent. Leaves membranous obovate or oblanceolate-acute or blunt, base narrowed, glabrous when adult;

nerves 8 to 10 pairs, slender, little elevate; 4 to 8 in. long, 1.5 to 3 in. wide; petioles 1 to 1.5 in. long. Flowers fascicled sessile or sub-sessile on bare parts of branches below leaves under .1 in. long. Sepals round, red-pubescent. Corolla as long or shorter, lobes very short. Berry 1.5 in. long, ovoid. Seeds 4, compressed, .7 in. long. *Hab.* Not common, in woods. Singapore, Garden Jungle. Malacca, Sungei Hudang (Goodenough, Maingay). Negri Sembilan, Gunong Angsi (Ridley). *Native name*: Buah Gumei.

(3) **S. glabrum** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 28.

Glabrous tree. Leaves broad lanceolate or elliptic blunt, base acuminate, coriaceous; nerves slender, 6 pairs rather faint; 5 in. long, 2 in. wide; petioles .5 in. long. Flowers in axillary fascicles of 3 to 5 below the leaves; pedicels .25 in. long. Sepals orbicular, .2 in. long, glabrous, edges ciliate. Corolla unknown. Ovary densely hairy; style conic thick. *Hab.* Selangor, Sempang Mines (Ridley).

(4) **S. littorale** *Ridl.*

Bush. Leaves thin chartaceous glabrous, elliptic-lanceolate acuminate, base acute; nerves and nervules numerous similar distinct; 3 in. long, 1.25 in. wide; petioles .15 in. long. Flowers fascicled in uppermost axils, small; pedicels .1 in. long. Sepals 5, oblong round appressed hairy outside, brown-streaked within, Corolla as short white glabrous, lobes oblong round, tube very short. Stamens 6, filaments adnate to corolla, anthers elliptic. Staminodes obcuneate with numerous reddish hairs at the tips. Ovary sub-conic; style short, stout; all hairy. *Hab.* Seashores. Johor, Pulau Tinggi (Burkill).

(5) **S. Derryanum** *King and Gamble, l.c.* 163.

Tree. Leaves chartaceous, elliptic very shortly acuminate and narrowed at base, coppery silvery pubescent beneath; nerves 12 to 18 pairs, parallel, slender, elevate; 3 to 5.5 in. long, 1.5 to 3 in. wide; petioles .3 to .5 in. long, black pubescent. Flowers in fascicles of 5, axillary; pedicels .25 in. long, tawny-pubescent. Sepals, 2 outer thick pubescent, 3 inner scarious pubescent in centre. Corolla .2 in. long, lobes 5 ovate. Ovary villous. Berry oblong, dark blue, glabrous, .6 to .7 in. long, 1-seeded. Seed oblong. *Hab.* Very rare, forests. Perak (Derry, Curtis). Penang, Ayer hitam (Haniff). *Native name*: Buah Susu.

(6) **S. ferrugineum** *Hook. fil. and Arn. Beech. Voy.* 266, t. 55; *King, l.c.* 163.

A small tree; branchlets red-pubescent. Leaves coriaceous obovate round at tip or oblong-lanceolate blunt, base narrow, dark shining green, coppery-silky beneath when young and pale when old; nerves 10 to 12 pairs, slender but prominent; 2.5 to 6 in. long, 1 to 3 in. wide; petioles .5 to .7 in. long. Flowers in numerous fascicles of 2 to 5 axillary; pedicels .1 in. long, red-tomentose. Sepals very small, round-pubescent. Corolla .1 in. long, campanulate, lobes round, crenulate. Staminodes subulate. Berry ovoid, .35 in. long. Seeds 1 or 2, .25 in. long. *Hab.* Sea-

side shores, rarely inland, common. Singapore to Lankawi and Setul; Pulau Tiunan and Kwala Pahang. *Distrib.* Burma, Malay isles, South China. *Native name*: Tuak-Tuak.

(7) **S. firmum** *Pierre, Burck. Ann. Jard. Builenz. v. 17, t. iii.*

Small tree. Young parts red-pubescent. Leaves coriaceous, oblong-lanceolate, short-acuminate, base acute, midrib impressed above and nerves 12 to 16 pairs, elevate beneath, rusty-pubescent, reticulations transverse; 4 to 5 in. long, 1 to 1.5 in. wide; petioles 1 to 1.5 in. long, pubescent. Flowers 4 to 6 in a fascicle, axillary; pedicels .3 to .6 in. long, pubescent. Sepals .15 in. long, pubescent. Corolla .15 in. long, hairy outside, lobes oblong. Ovary villous. Berry oblong or obovoid, glabrous. Seed one, .6 in. long. *Hab.* Rare, Mountain forests. Penang, West Hill at 2500 ft. altitude (Curtis). *Distrib.* Bangka, Philippines.

#### DOUBTFUL SPECIES

(8) **S. Wallichianum** *Don. Gen. Syst. iv. 28; King, l.c. 165.*

Branches red-villous. Leaves chartaceous, elliptic-obovate oblique acuminate, base cuneate; nerves 6 to 7 pairs, prominent as are reticulations, 6 to 8 in. long, 3 to 4 in. wide; petioles densely tawny-pubescent. Flowers very small. Sepals 5, short, round, rusty-pubescent. *Hab.* Penang (Porter, *S. ? rugosum* *Wall. Cat. 4158*).

I doubt that this is a *Sideroxylon* at all, but have never seen anything quite like it.

### 3. SARCOSPERMA, Hook. fil.

Glabrous trees. Leaves coriaceous, oblong. Flowers small, sessile on paniced racemes. Sepals 5, round, imbricate. Corolla broad, campanulate, tube short, lobes 5, round. Stamens 5 on the tube and opposite lobes; staminodes 5, round (or subulate). Ovary glabrous, 1- to 2-celled; style short. Fruit ellipsoid 1- or 2-seeded. Species 3, Indo-Malaya, China.

(1) **S. paniculatum** *Stapf and King, Ic. Pl. t. 2690; King, l.c. 160.*

Tree 50 to 60 ft. tall, 18 to 20 in. through. Leaves chartaceous sub-opposite, elliptic-oblong bluntly acuminate, base acute; nerves 5 to 7 pairs; 4 to 8.5 in. long, 1.5 to 3 in. wide; petioles .5 to .7 in. long. Panicles 1 to 3 in. long, racemes up to 1 or more in. long. Flowers .1 in. wide or less, waxy pale yellow. Sepals 3, larger than the others. Corolla fleshy, lobes as long as tube. Staminodes minute, orbicular. Fruit ellipsoid, over 1 in. long. Seeds 1 or 2. *Hab.* Mountain forests. Negri Sembilan, Gunong Angsi (Ridley). Perak, Batang Padang and Ulu Bubong (Kunstler).

### 4. ISONANDRA, Wight.

Trees. Leaves usually coriaceous. Flowers small, short-pedicelled. Sepals 4, outer valvate, inner imbricate. Corolla tubular, lobes 4, imbricate, twisted. Stamens 8. Ovary 4-celled,

villous. Berry small. Seed usually 1. Species 7, chiefly South India and Ceylon.

Leaves round at tip . . . . . (1) *I. perakensis*  
 Leaves acuminate . . . . . (2) *I. rufa*

(1) *I. perakensis* King and Gamble, l.c. 166.

Tree 30 to 40 ft. tall, 6 to 10 in. through. Young parts pubescent. Leaves coriaceous, obovate-oblong, rounded, base cuneate, brown-pubescent beneath; nerves 8 to 10 pairs, elevate beneath; 2 to 3.5 in. long, 1 to 1.5 in. wide; petioles .2 to .3 in. long, stout. Flowers fascicled, about .15 in. wide on angled pedicels, .1 in. long in upper axils. Sepals 4, in 2 pairs, brown. Corolla white, as long; lobes round. Stamens 8. Ovary hairy, conic, cells 4. Berry oblong, acute, .4 to .5 in. long. Seeds ellipsoid, acute, hardly flattened, dark brown. *Hab.* Top of limestone mountains at 1000 to 1500 ft. altitude, rare. Perak, Gunong Mesak, Kinta (Kunstler).

(2) *I. rufa* King and Gamble, l.c. 166.

Tree 20 to 30 ft. tall, 4 to 6 in. through. Young parts red-pubescent. Leaves membranous, obovate, long-acuminate, cuneate round at base; rough pubescent beneath; nerves 8 to 10 pairs; 5 to 7 in. long, 1.5 to 2.5 in. wide; petioles .3 in. long, slender. Flowers solitary or paired in upper axils, very small; pedicels slender, .25 in. long. Sepals 4, red-pubescent ovate, 2 outer valvate, .2 in. long, 2 inner imbricate. Corolla tubular campanulate, .25 in. wide, hairy outside and in mouth, lobes 6, linear oblong. Stamens 6, filaments villous. Ovary glabrous. Berry oblong, .1 in. long, .5 in. through. Seed 1. *Hab.* Perak (Scortechini and Kunstler).

I have not seen this plant, which appears to be very rare and is but little known, and its position is doubtful.

### 5. PAYENA, DC.

Medium to vast trees. Leaves membranous or chartaceous, sometimes coriaceous. Flowers fascicled in leaf axils, or below leaves. Sepals 4, outer valvate, inner often imbricate. Corolla-tube usually short, lobes 8, imbricate. Stamens 16; filaments usually short. Ovary 8-celled, villous. Fruit 1- to 2-seeded. Seeds with albumen, cotyledons thin. Species 12, Malayan.

Leaves large 6 to 9 in. long, silky beneath; flowers large.

- |  |                                |
|--|--------------------------------|
| Leaves thin coriaceous; sepals .25 in. long . . . . .  | (1) <i>P. Maingayi</i>         |
| Leaves thick coriaceous; sepals .4 to .5 in. long . . . . .  | (2) <i>P. grandiflora</i>      |
| Leaves 5 to 6 in. long, not silky beneath.<br>Flowers large; pedicels very long . . . . .                  | (3) <i>P. longipedicellata</i> |
| Flowers under .75 in. wide; leaves chartaceous<br>or thin coriaceous.<br>Leaves elliptic, 2 to 3 in. long. |                                |
| Fruit obpyriform, 1.5 in. long . . . . .   | (4) <i>P. Havilandii</i>       |
| Fruit conic, 1.75 in. long . . . . .   | (5) <i>P. Leerii</i>           |
| Leaves elliptic, 4 to 6 in. long; fruit oblong,<br>.1 in. long . . . . .                                   | (6) <i>P. lucida</i>           |
| Leaves narrow lanceolate, thin coriaceous . . . . .  | (7) <i>P. lanceolata</i>       |

- Leaves oblong-lanceolate acuminate . . . (8) **P. selangorica**  
 Leaves pubescent beneath.  
 Leaves obovate, blunt, 2 to 3 in. long . . . (9) **P. obtusifolia**  
 Leaves oblong obovate acuminate, very hairy  
 beneath, 4 to 8 in. long . . . (10) **P. dasyphylla**  
 Leaves sessile, coriaceous, oblanceolate; fruit  
 globose, .5 in. long . . . (11) **P. sessilis**  
 Fruit over 1 in. long . . . (12) **P. utilis**

(1) **P. Maingayi** *Clarke, l.c.* iii. 547; *King, l.c.* 168.

Large tree, 80 ft. tall, 1.5 to 2 ft. through. Leaves thin coriaceous, oblong acuminate or caudate, base cuneate, golden-silky beneath; nerves 20 to 25 pairs, fine conspicuous parallel, inarching, midrib prominent; 6 to 9 in. long, 2 to 3 in. wide; petioles 1 in. long, rather thick. Flowers axillary, fascicled in fives; pedicel thick, .75 in. long. Sepals ovate sub-acute, golden-silky, .25 in. long, inner ones shorter. Corolla .5 in. long, glabrous; lobes 8, lanceolate in 2 rows. Stamens 16. Berry oblong, brown pubescent, 1.5 in. long, tipped with the style base. Seeds 1 or 2, oblong, light brown. *Hab.* Forests; not rare. Singapore, Pulau Damar; Sungei Morai; Bukit Timah. Malacca, Ayer Panas (Curtis); Sungei Hudang (Cantley). Pahang, Temerloh; Kuantan (Foxworthy). Negri Sembilan, Durian Tawar (Foxworthy). Perak, Gunong Mesak (Kunstler). Penang, West Hill (Curtis). *Native names*: Mentua Taban; Taban Pertja; Getah Pertja.

Pertja or Percha, signifies a rag, and a name for Sumatra is given as Pulau Pertja. Perhaps the native name Taban Pertja means Taban from Sumatra. The tree somewhat resembles the true Taban popularly known as Gutta percha, though never called so by the Malays and by a misidentification the name Getah Pertja has been transferred from *P. Maingayi* to *Palaquium gutta*. The gutta obtained from it resembles at first that of the *Palaquium*, but soon turns black and does not set properly and is quite worthless. Wallich's specimen, No. 4161, referred to this species by King is *Palaquium gutta* var. *oblongifolium*.

(2) **P. grandiflora** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 28.

Tree about 30 ft. tall. Leaves stiffly coriaceous, glabrous shining beneath, golden-silky (ferruginous hairy when quite young, glabrous and sub-glaucous when old) oblong, shortly acuminate, base cuneate; nerves 20 pairs, conspicuous but fine, distinct, with conspicuous reticulations above; 7 in. long, 3 in. wide; petioles 1.25 in. long. Flowers clustered below the leaves; pedicels stout, 1 in. long. Sepals ovate acuminate, .3 to .4 in. long, blunt, thinly pubescent as is pedicel. Corolla over .5 in. long, lobes narrow acuminate, silky inside. Stamens 20. Berry cylindrical, red, 1 in. long. *Hab.* Forests in the south; rare. Singapore, Sungei Morai. Malacca. Panthur (Goodenough). *Distrib.* Sumatra.

This differs from *P. Maingayi* in its stiff coriaceous leaves, stouter longer pedicels and bigger flowers.

(3) **P. longipedicellata** *Brace in King, l.c.* 169.

Tree 100 to 130 ft. tall. Leaves chartaceo-coriaceous, oblong or elliptic abruptly short-acuminate, base round or shortly narrowed;



nerves faint, 18 pairs, midrib depressed above, elevate beneath; 4 to 5 in. long, 1.5 to 2 in. wide; petioles .7 in. long. Flowers 2 to 3 in. long, fascicled below leaves; pedicels 1 to 1.5 in. long, slender. Sepals, outer ovate acute, .5 in. long, inner lanceolate acuminate, .6 in. long, pubescent. Corolla .8 in. long, tube .3 in. long, lobes 8, ovate-acuminate. Stamens 16 in 1 row. Easily known by the long-pedicelled large flowers. *Hab.* Perak (Kunstler).

(4) **P. Havilandii** King and Gamble, *l.c.* 169. *P. croixiana* Pierre, *Bull. Soc. Linn. Par. i.* 524 (probably).

Big tree up to 80 ft. tall. Leaves chartaceo-coriaceous shining green, elliptic abruptly acuminate, base narrowed, glabrous; nerves 10 to 12 pairs very fine and inconspicuous, nervules nearly as conspicuous; 2.5 to 3 in. long, 1.25 to 1.75 in. broad; petioles slender, .4 to .5 in. long. Flowers in fascicles of 3 or 4 on slender pedicels .75 in. long, rusty-pubescent. Sepals oblong-rounded, pubescent, .3 in. long. Corolla .3 to .4 in. wide, lobes 8, oblong, base cordate, edges crenate, as long as tube. Stamens 16 in 2 rows. Berry obpyriform, 1.5 in. long. Seed 1, oblong. *Hab.* Dense forests, not rare. Singapore, Bukit Timah; Bajau. Dindings (Burn-Murdoch). Penang, Moniot's Road; Hill (Curtis). Lankawi. *Distrib.* Borneo. *Native name:* Getah Sundik. *Use:* A good white gutta.

(5) **P. Leerii** Kurz. *Journ. As. Soc. Beng.* xl. (2), 69. *King, l.c.* 170.

Tree 80 to 100 ft. tall. Leaves chartaceous, elliptic abruptly acuminate, base round or short acute; nerves 14 to 18 pairs, slender, inconspicuous with many nervules, 2 to 4 in. long, 1 to 2 in. wide; petioles slender, .75 in. long. Flowers in fascicles of 3 and 4 in axils or on leafless ends. Sepals .15 in. long, ovate, blunt pubescent. Corolla as long, lobes 8, ovate obtuse. Stamens 16 in 1 row. Fruit conic, reddish green, 1.5 to 1.75 in. long. Seed 1, broad oblong. *Hab.* Forests. Perak, Sapetang (Low). Batang Padang (Kunstler). *Distrib.* Sumatra, Bangka. *Native names:* Surian; Balam Sundik (Sumatra). *Use:* A good white gutta.

This is rarer than *P. Havilandii*, which it resembles in leaf, but the flowers are much smaller and the fruit is conic and large.

(6) **P. lucida** DC. *Prodr.* viii. 197; *King, l.c.* 171. *Isonandra polyandra* Wight, *l.c.* 1589; *P. Lowiana* Pierre, *Bull. Soc. Linn. Par. i.* 524.

Small tree about 30 ft. tall. Leaves chartaceous, elliptic to nearly lanceolate, rather abruptly acuminate, obtuse, base acute; nerves 10 to 12 pairs slightly prominent; 4 to 6 in. long, 1.5 to 2 in. wide; petioles .4 in. long. Flowers in fascicles of 1 to 4 in the axils, pendent; pedicels .7 to .8 in. long, silky. Sepals yellowish-buff, ovate obtuse, .2 in. long. Corolla white, .2 to .3 in. wide, lobes 8, oblong, in two rows. Stamens 16. Berry oblong, red-pubescent, 1 to 1.5 in. long. Seed 1. *Hab.* Woods and forests,

common. Rather variable as to size of leaf, hence a number of varieties have been given, the commonest being the broad-leaved form known as *Wightii* Clarke, *l.c.* iii. 548. Var. *nigra* King and Gamble, is a Perak form with leaves as much as 8 in. long, and probably *P. Lowiana*, Pierre, is the same thing. Singapore, Botanic Gardens; Reservoir (common). Malacca, Brisu and Merlimau (Derry). Selangor, Ulu Selangor (Goodenough). Negri Sembilan, Tampin; Gunong Talan (Cantley). Pahang, Klau (Foxworthy). Perak, Ulu Bubong; Ulu Kerling (Kunstler). Penang (Wallich). Waterfall (Curtis). *Native name*: Nyatoh Bunga.

(7) *P. lanceolata* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 93.

Tree; branchlets, petiole, midrib in young leaves, red-woolly. Leaves thinly coriaceous, lanceolate caudate-acuminate, base narrow; nerves very fine, 11 to 12 pairs, horizontal with reticulations, conspicuous below, midrib prominent; 3 in. long, 1 in. wide; petioles slender, 1 in. long. Flowers in fascicles of 2 to 4 in axils; pedicels stout, .5 in. long, minutely pubescent. Sepals, outer .2 in. long, thick, ovate blunt, inner ones valvate, edge ciliate. Corolla .5 in. long, lobes 8, tube as long as calyx-lobes, oblong obtuse; filaments very short, 18; anther-appendages very short, hairy. Style and ovary glabrous. *Hab.* Lankawi, Gunong Raya (Haniff).

(8) *P. selangorica* King and Gamble, *l.c.* 175.

Medium-sized tree. Leaves chartaceo-coriaceous, oblong-lanceolate acuminate, base narrowed; nerves 16 pairs, indistinct, parallel; 4 to 6 in. long, 1 to 1.7 in. wide; petioles .5 to .7 in. long. Flowers in fascicles of 2 or 3 axillary pedicels, rather thick, .6 to .8 in. long, rusty-pubescent. Sepals ovate acute, outer .3 in. long; inner .25 in. long, rusty-pubescent. Ovary pubescent. *Hab.* Selangor, Woods half-way up Bukit Kutu, rare (Ridley).

(9) *P. obtusifolia* King and Gamble, *l.c.* 175.

Tree. Leaves coriaceous, obovate or elliptic-obovate blunt emarginate, cuneate attenuate at base, glabrous above, rusty or pubescent beneath; nerves 10 to 12 pairs, inconspicuous above; 2.5 to 3 in. long, 1 to 1.5 in. wide; petioles .5 to .75 in. long. Flowers in fascicles of 5 to 8; pedicels .5 in. long, pubescent. Sepals, outer ovate acute, golden-pubescent, .3 in. long. Ovary glabrous. *Hab.* Perak (Scortechini).

I have not seen this rare and little-known species.

(10) *P. dasyphylla* Pierre, *Bull. Soc. Linn. Par.* i. 527; King, *l.c.* 173.

Big tree 100 ft. tall. Leaves chartaceous, oblong or obovate-oblong acuminate, acute, base rounded or shortly narrowed, densely red-pubescent beneath; nerves 12 to 16 pairs elevate, inarching some way from edge, midrib thick, red-pubescent on both sides; 4 to 8 in. long, 1.5 to 3 in. wide; petioles .5 in. long. Flowers axillary 1 to 3; pedicels and sepals red-pubescent, .4 to

.6 in. long. Sepals .3 in. long, triangular round, inner .35 in. long, strongly keeled. Corolla .3 in. wide, lobes oblong obtuse. Stamens 16. Berry ovoid pubescent, .75 in. long. Seeds elliptic acute. *Hab.* Rather rare in forests. Perak, top of Thaiping Hills 3500 ft. altitude (Kunstler).

var. *glabrata* King and Gamble, l.c. Leaves nearly glabrous, tip abrupt long acuminate; pedicels 1 in. long. Berry nearly spherical. *Hab.* Singapore, Selitar. Perak (Scortechini). *Distrib.* Java, Sumatra. *Use*: Gutta said to be fairly good.

(11) *P. sessilis* King and Gamble, l.c. 174.

Big tree. Leaves coriaceous, oblanceolate rounded, base narrowed, glabrous; nerves and reticulations slightly raised beneath; 2 to 4 in. long, 1 to 1.5 in. wide. Flowers in fascicles of 2 or 3 in axils; pedicels slender, .5 in. long. Sepals .2 in. long, acute (in fruit) glabrous, inner ones keeled. Berry globose, black, about .5 in. long, crowned with style. *Hab.* Singapore, Toas (Ridley), very rare.

(12) *P. utilis* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 94.

A very large tree. Leaves oblanceolate, tip round or bluntly pointed, base long, narrowed, thinly coriaceous, shining above, pale beneath; nerves 8 pairs, faintly visible above, midrib elevate beneath, broad flat above; 3 in. long, 1 to 1.5 in. wide; petioles slender, 1 in. long with some red hairs or glabrous. Flowers numerous in terminal axils forming a sub-terminal tuft; pedicels slender, glabrous or sparsely pubescent. Sepals lanceolate blunt, narrow, .25 in. long, pubescent inner ones oblong, narrower. Corolla cylindrical, .25 in. long, lobes linear narrow, shorter than tube. Stamens filaments long, slender, 16; anther appendage very short. Seed very large, 1.5 in. long, 1 in. wide, .5 in. through, elliptic, base round, tip sub-acute, yellow brown, hilum half the width of seed. *Hab.* Selangor, Ulu Selangor (Stephens, Burn-Murdoch). *Native name*: Betis or Bilian (not the Bilian of Borneo). *Use*: A very valuable timber. See *Agric. Bull.* vol. 5, p. 39.

## 6. BASSIA, Linn.

Trees, often very large. Leaves usually coriaceous. Flowers fascicled, axillary or below the leaves. Sepals 4. Corolla campanulate, tube broad, lobes 6 to 12, contort in bud. Stamens twice as many or more. Ovary 4- to 12-(usually 6- to 8)-celled; style elongate. Berry globose or oblong. Seeds few, ellipsoid. No albumen. Cotyledons fleshy. Species 40, Indo-Malayan.

Some of these species may belong to *Payena*, as their fruit is not known and practically the only difference is in the presence or absence of albumen.

Flowers large, .75 in. long.

Leaves coriaceous glabrous. Inflorescence hairy	(1) <i>B. hirtiflora</i>
Leaves coriaceous, glabrous; flowers pubescent	(2) <i>B. aristulata</i>
Leaves thin, red-tomentose	(3) <i>B. caudata</i>

Flowers about .4 in. long; buds globose.

- Leaves 10 to 14 in. long . . . . . (4) **B. Kingiana**  
 Leaves 4 to 6 in. long . . . . . (5) **B. Kunstleri**  
 Leaves lanceolate, tomentose beneath . . . . . (6) **B. Watsoni**
- Flowers  $\frac{1}{4}$  in. wide, buds conic.  
 Leaves large, over 6 in. long, conspicuous.  
 Leaves silky beneath, coriaceous . . . . . (7) **B. penicillata**  
 Leaves glabrous; nerves elevate . . . . . (8) **B. malaccensis**  
 Leaves glabrous; nerves faint . . . . . (9) **B. Curtisii**
- Flowers small, under  $\frac{1}{3}$  in. wide.  
 Pedicels under  $\frac{1}{5}$  in. long; leaves more or less lanceolate.  
 Pedicels and buds tawny-pubescent; anther long-acuminate . . . . . (10) **B. laurifolia**  
 Pedicel and buds thinly pubescent; anthers short-acuminate . . . . . (11) **B. rupicola**  
 Pedicel and buds thinly pubescent; anther long acuminate, ciliate . . . . . (12) **B. penangiana**
- Pedicels  $\frac{1}{5}$  in. long or more.  
 Flowers in upper axils, rarely on old wood.  
 Leaves glabrous, coriaceous . . . . . (13) **B. perakensis**  
 Leaves grey-silky beneath; nerves distinct . . . . . (14) **B. argentea**  
 Leaves slightly pubescent, chartaceous; nerves prominent . . . . . (15) **B. Braceana**
- Flowers on the old wood of branches.  
 Leaves chartaceous, elliptic; nerves elevate . . . . . (16) **B. longistyla**  
 Leaves coriaceous, oblong; nerves not elevate.  
 Anther-connective long apiculate . . . . . (17) **B. cuprea**  
 Anther-connective short apiculate . . . . . (18) **B. Motleyana**
- Little known and dubious.*
- Leaves coriaceous, obovate . . . . . (19) **B. cuneata**  
 Leaves coriaceous, large, red; fruit golden-tomentose . . . . . (20) **B. erythrophylla**  
 Leaves coriaceous, 13 in. long, oblanceolate . . . . . (21) **B. elongata**

(1) **B. hirtiflora** Ridl.

Branches somewhat hairy. Leaves oblong-lanceolate, coriaceous, glabrous, shortly acuminate, base long narrowed; nerves elevate about 24 pairs; 11 in. long, 4 in. wide; petioles slender, 2 in. long, thickened at base. Flowers about 6 in a fascicle, large; pedicels 1 in. long, thick covered with brown hairs. Sepals in fruit 4, coriaceous, lanceolate ovate acute,  $\frac{1}{3}$  in. long, brown hairy. Corolla and stamens not seen. Fruit ellipsoid thickly brown hairy, 1 in. long, terminated by the glabrous style (not quite ripe). *Hab.* Perak, Sungei Siput (Haniff).

This resembles *B. aristulata* in size of flowers and foliage, but instead of being slightly pubescent the inflorescence is thickly covered with soft brown hairs.

(2) **B. aristulata** King and Gamble, l.c. 177.

Tree. Leaves coriaceous, oblong, shortly abruptly acute, base unequally rounded, decurrent, midrib deep, channelled above, very prominent as are 24 to 28 pairs of nerves, parallel; 6 to 10 in. long, 3 to 4 in. wide; petioles 1.5 to 2 in. long, thick. Flowers in fascicles of 2 to 6, axillary on tubercles; pedicels 1 to 2 in. long, thick, golden-pubescent. Buds  $\frac{1}{75}$  in. long. Sepals  $\frac{1}{5}$  to  $\frac{1}{7}$  in.

long, pubescent, triangular-ovate. Corolla-tube .2 to .3 in. long, funnel-shaped, pubescent inside, lobes 8 or 9, oblong-lanceolate, pubescent. Ovary silky. *Hab.* Perak, Goping (Scortechini) rare.

(3) **B. caudata** *Ridl.*

Young parts densely red-tomentose. Leaves thinly coriaceous above, glabrous beneath, red-hairy on midrib and nerves 15 pairs, sub-horizontal, inarching within the edge, elliptic, long cuspidate, base shortly cuneate, 10 in. long (cusp 1 in. long), 4 in. wide; petioles red-tomentose, .75 in. long. Flowers in fascicles of 2 to 8 in the uppermost axils; pedicels rather slender, 1 in. long, tomentose. Sepals, 2 outer oblong-ovate, sub-acute or blunt, .25 in. long; inner ones oblong blunt, coriaceous, .26 in. long, all tomentose outside. Corolla-tube as long as sepals, lobes 5 lanceolate, .25 in. long, acute, tube inside hairy. Stamens 15; filaments very short; anthers lanceolate acuminate much shorter than the petals. Ovary conic, densely pubescent; style .75 in. long, glabrous. *Hab.* Pahang, Kwantan, Baloh Reserve (Foxworthy). *Native name:* Nyatoh Ekor.

(4) **B. Kingiana** *Brace, in King, l.c. 178.*

Tree 40 to 60 ft. tall, 10 to 15 in. through. Leaves stiffly coriaceous, oblong-oblongate, rounded or shortly acute, base cuneate; nerves 20 pairs, inconspicuous above with the reticulations strongly elevated beneath, inarching; 10 to 14 in. long, 3.5 to 4.5 in. wide; petioles 2 in. long, base thickened. Flowers in fascicles of 3 or 4, below leaves, on tubercles; pedicels thick, .4 in. long, tawny-pubescent; buds globose. Sepals .4 in. long, imbricate round, emarginate. Corolla-tube .15 in. long, hairy outside, pubescent inside, lobes 12 to 16, white, imbricate, spatulate hairy, .25 in. long. Fruit globose, dense pubescent, .75 in. through with the long persistent style, deep brown. Seeds 1 or 2. *Hab.* Forests, low down. Singapore, Bukit Timah (Ridley). Perak, Larut (Kunstler).

(5) **B. Kunstleri** *King, l.c. 178.*

Tree 30 to 60 ft. tall, 10 to 15 in. through. Leaves thin coriaceous, lanceolate-oblong acute or acuminate both ends; nerves 15 to 20 pairs with the reticulations raised beneath, inarching; 4 to 6 in. long, 1.5 to 2 in. wide; petioles slender, 1 to 1.5 in. long, base thicker. Flowers 1 to 3 in axils and below leaves; pedicel thick, .3 to .4 in. long, like calyx and fruit golden brown pubescent. Calyx .4 in. long, outer sepals valvate orbicular, inner ones imbricate. Corolla tubular campanulate, lobes 16, imbricate, spatulate. Stamens 32 mixed with brown hairs. Berry ovoid, pubescent, brown, .8 to 1 in. long. Style persistent. *Hab.* Local in forests. Perak, Thaping Hills from Waterfall to 2500 ft. altitude (Kunstler).

(6) **B. Watsoni** *Ridl.*

Tree; young parts red-tomentose. Leaves lanceolate, sub-acute long narrowed to base, thinly coriaceous, drying green,

glabrous, shining above except the red-tomentose midrib, beneath with the 8 pairs of nerves elevate and with the midrib red-hairy, 4.5 in. long, 1.5 in. wide; petioles densely red-tomentose, .5 in. long. Flowers in fascicles of 4 or fewer crowded at the apex of the branch about 30; pedicels .75 in. long, densely red-tomentose. Sepals outer 3 broad, blunt ovate, inner narrower, hairy, .25 in. long. Petals .3 in. long, tip broad, round, tube shorter than calyx. Stamens 15, filaments long, stout; anthers large, lanceolate, dorsifixed. Style stout, longer, all glabrous. *Hab.* Pahang, Baloh Reserve, Kuantan (Foxworthy and Watson). *Native names:* Nyatoh Bukit; Putat Bukit (Watson).

(7) **B. penicillata** *King and Gamble, l.c.* 179.

Tree 60 ft. tall, girth 4 ft. Leaves coriaceous, oblong or obovate-oblong short abrupt, acute, base unequally round, golden silky pubescent beneath when young; nerves 24 to 28 pairs, parallel conspicuous; 6 to 10 in. long, 2.5 to 3.5 in. wide; petioles 1.2 to 1.5 in. long, thick. Flowers axillary, 1 to 4 on a tubercle; pedicels slender, 1 to 1.2 in. long, pubescent. Sepals 4 or 5, .4 in. long, ovate-acuminate, pubescent. Corolla .4 in. wide, densely red-hairy within in upper half, lobes 10, lanceolate acuminate. Stamens 20 in 1 row; filaments hairy, appendage penicillate. Ovary and style, base hairy. *Hab.* Province Wellesley, Tasek Gelugur (Curtis), rare. *Native name:* Minyato.

(8) **B. malaccensis** *King and Gamble, l.c.* 180. *Payena malaccensis* *Clarke, F.B.I.* iii. 547.

Tree about 40 to 60 ft. tall. Leaves chartaceous, obovate or obovate-oblong blunt or shortly acute, glabrous when adult; nerves elevate beneath, parallel, 14 to 16 pairs; 6 to 12 in. long, 4 to 6.5 in. wide; petioles 1 to 2 in. long, base swollen. Flowers fascicled, 4 to 8 on thick pubescent tubercles; pedicels .4 to .6 in. long, pubescent. Sepals ovate acute, .25 in. long, pubescent. Corolla campanulate, tube .1 in. long, lobes 10 to 12, lanceolate, blunt, .25 to .3 in. long. Stamens 20 to 24 in 2 rows. Berry obovate-oblong, nearly 1 in. long. Seed 1, oblong, tip acute. *Hab.* Lowland woods. Singapore Gardens; Changi; Bukit Timah (Ridley). Malacca (Maingay). Perak, Gunong Batu Putih (Wray).

(9) **B. Curtisii** *King and Gamble, l.c.* 181.

Tree 40 to 80 ft. tall. Leaves stiffly coriaceous, obovate-blunt emarginate, glabrous, 4 to 6 in. long, 1.25 to 2.5 in. wide; nerves 14 to 15 pairs, slender conspicuous little elevate, midrib prominent; petioles 7 to 1 in. long, rather thick. Flowers in numerous fascicles of 10 to 12 on tubercles below leaves. Pedicels .5 in. long, pubescent. Sepals rounded pubescent, .2 in. long, outer thick, inner keeled. Corolla campanulate, rather longer, lobes 8, oblong spatulate, hairy at tip. Stamens 16. Berry oblong, golden-pubescent, .5 to .7 in. long. Seed oblong, pointed at both ends. *Hab.* Hill woods, Penang Hill at 1500 to 1800 ft. altitude and Waterfall (Curtis). Perak, Thaiping Waterfall (Wray), leaves sometimes lanceolate acuminate.

(10) *B. laurifolia* King and Gamble, l.c. 192.

Tree 50 to 60 ft. tall and 12 to 18 in. through; shoots densely yellowish tomentose. Leaves chartaceous, obovate-lanceolate (or lanceolate narrowed at both ends), glabrous except slightly pubescent midrib beneath; nerves 14 to 15 pairs; 5 to 10 in. long, 1.5 to 3.5 in. wide; petioles .75 to 1 in. long, slender, hairy, keeled above. Flowers in fascicles of 6, on hairy axillary tubercles; pedicels .4 to .5 in. long, densely pubescent. Sepals .2 in. long, narrow ovate, outer blunt, inner acute, densely pubescent. Corolla-tube .05 in. long with a ring of hair in mouth, lobes 8, oblong-spathulate, .1 in. long, glabrous. Stamens 14 to 16. Berry black, oblong, .6 to .7 in. long. Seed 1, ovoid. *Hab.* Hill forests, variable.

var. *typica*. Perak, Forest Hills and Salama (Kunstler). Selangor, Ulu Gombak (Burn-Murdoch).

var. *obtusa*. Leaves blunt acumen abrupt. Calyx-lobes blunt; anthers very hairy. Penang, Batu Feringhi (Curtis):

var. *parvifolia*. Leaves smaller, shoots not pubescent. Sepals more rounded. Kedah Peak (Ridley).

(11) *B. rupicola* King and Gamble, l.c. 183.

Tree 40 to 60 ft. tall, 15 to 20 in. through. Leaves coriaceous obovate-oblong, shortly acuminate blunt, base attenuate; nerves 8 to 10 pairs, elevate beneath; 3.5 to 5.5 in. long, 1.5 to 2 in. wide; petioles .5 to 1 in. long. Flowers in fascicles of 5; pedicels thick, ferruginous, .15 in. long. Sepals 4, ovate red-pubescent, .25 in. long. Corolla tubular campanulate, mouth hairy, lobes oblong, tips ciliate, hairy outside. Stamens 6. *Hab.* Rare. Rocky creeks in open jungle at 1500 to 2000 ft. altitude. Perak, Gunung Batu (Kunstler).

(12) *B. penangiana* King and Gamble, l.c. 188.

Small tree. Leaves chartaceous oblong-lanceolate acutely narrowed to both ends or blunt at top; nerves 10 to 12 pairs, slender, slightly elevate beneath; 5 to 7 in. long, 1.5 to 2.5 in. wide; petioles 1 to 1.2 in. long. Flowers numerous in fascicles of 5 or 6 in leaf axils; pedicels slender, .4 to .5 in. long, pubescent. Sepals ovate, blunt acuminate, .2 in. long, recurved pubescent. Corolla .25 in. long, lobes 8 (?) oblong-spathulate, golden pubescent without. Stamens 16 (?) hairy. Ovary glabrous. *Hab.* Rare. Penang, Waterfall (Haniff). Penara Bukit and Moniot's Road (Curtis).

(13) *B. perakensis* King and Gamble, l.c. 183.

Tree 60 to 80 ft. tall, 12 to 18 in. through. Leaves stiffly coriaceous, oblong or obovate, blunt or short blunt acuminate, base attenuate; nerves slender, indistinct, 14 to 18 pairs; 4 to 6 in. long, 1.5 to 2.5 in. wide; petioles thick at base, .75 to 1 in. long. Flowers in fascicles of 10 to 12; pedicels .5 to .6 in. long, pubescent when young. Sepals .2 in. long, ovate acute, densely pubescent. Corolla funnel-shaped, lobes 8, villous. Stamens 16. Berry ovoid, brown, pubescent, .7 to .9 in. long, crowned with short

style. Seeds one or two, ovoid-oblong, base acute. *Hab.* Forests at 500 to 2500 ft. altitude. Perak, Thaiping Hills (Kunstler and Curtis).

(14) *B. argentea* Clarke, in *Hook. fl. F.B.I.* iii. 545; *King, l.c.* 184 (not of *De Vriese*).

A big tree 100 ft. tall. Leaves thickly chartaceous, elliptic to elliptic-oblong, quite blunt or shortly acuminate, base shortly narrowed, unequal, grey-silky beneath (drying yellowish); nerves 13 to 15 pairs elevate, midrib thick; 4 to 7 in. long, 2.5 to 3 in. wide; petioles 1 in. long. Flowers in fascicles of 6; pedicels slender, .5 in. long, pubescent. Sepals all valvate ovate acute, .25 in. long, pubescent. Corolla .1 in. long, lobes 8 or 9, linear-oblong, .15 in. long. Stamens 24 in 3 rows; filaments short or 0; anthers hairy. *Hab.* Singapore, Chan Chu Kang. Malacca (Maingay); Merlimau (Cantley); Sungei Hudang (Derry). Penang (Maingay).

(15) *B. Braceana* King and Gamble, *l.c.* 184.

Small tree 10 to 18 ft., or up to 70 ft. tall. Leaves chartaceous, oblong or elliptic-oblong, shortly or fairly long acuminate, base short, acuminate; nerves 14 to 18 pairs elevate, reticulations transverse fine parallel, shortly pubescent; 4 to 8 in. long, 2 to 3 in. wide; petioles .8 to 1.4 in. long, slender. Flowers in fascicles of 4 to 7; pedicels .4 to .6 in. long, pubescent. Sepals .15 to .2 in. long, ovate rounded, golden-pubescent. Corolla-tube .1 in. long, lobes 8 to 9 linear-oblong, .2 in. long. Stamens 16 to 18 in two rows. Ovary glabrous. Fruit oblong, green, .8 to 1 in. long. Seed 1, ovoid, flattened. *Hab.* Forests. Perak, Larut hills (Kunstler); Relau Tujur (Wray). Penang, Penara Bukit (Curtis).

var. *lanceolata* King and Gamble, *l.c.* Leaves slightly narrower, lanceolate-acuminate. Flowers very numerous. Corolla-lobes acute. *Hab.* Perak, Gunong Batu Putih (Wray); Tapah.

(16) *B. longistyla* King and Gamble, *l.c.* 185.

Big tree, 80 to 100 ft. tall. Leaves chartaceous elliptic, shortly abrupt acuminate both ends; nerves 12 to 15 pairs, prominent as are secondaries and reticulations; 3.5 to 5 in. long, 1.5 to 2 in. wide; petioles slender, .6 to .8 in. long. Flowers in fascicles of 10; pedicels slender, glabrous, .5 to .7 in. long. Sepals .15 to .2 in. long, ovate acute, somewhat pubescent. Corolla .05 in. long, lobes 8 or 9, oblong lanceolate obtuse, glabrous. Stamens 16 to 18; anthers ovate, 0.75 in. long, apiculate; style .5 in. long. *Hab.* Perak, Larut Hills (Kunstler).

(17) *B. cuprea* King and Gamble, *l.c.* 186.

Tree 60 to 70 ft. tall. Leaves coriaceous, oblong obtuse emarginate, base attenuate, coppery beneath when dry; nerves 10 to 12 pairs, sparsely hairy beneath; 4 to 6 in. long, 2.5 to 3 in. wide; petioles thick, .75 to 1 in. long. Flowers in fascicles of 2 to 5; pedicels .5 in. long, pubescent. Sepals .25 in. long, ovate



pubescent. Corolla  $\cdot 4$  in. long, mouth densely brown-hairy, lobes 8 to 9, oblong, tip round, brown, hairy both sides. Stamens 18 to 22, hairy. *Hab.* Perak (Scortechini).

I have not seen this species, but it appears to be near *Motleyana* with larger flowers, ovary glabrous, and stamens more numerous.

(18) **B. Motleyana** Clarke, *F.B.I.* iii. 546; *King, l.c.* 187.

A tree about 80 ft. tall. Leaves coriaceous, elliptic rounded or shortly abrupt-acuminate, base cuneate; nerves fine, 12 to



FIG. 98.—*Bassia Motleyana*.

18 pairs not elevate, secondaries and reticulations nearly as conspicuous; 4 to 5 in. long, 1.5 to 2.5 in. wide, midrib elevate on both sides; petioles  $\cdot 8$  to 1.2 in. long, rather thick. Flowers very numerous crowded in fascicles of 10 to 12; pedicels slender,  $\cdot 4$  in. long. Calyx-lobes  $\cdot 15$  to  $\cdot 2$  in. long, ovate blunt or sub-acute, sparsely pubescent. Corolla as long, lobes 8, 4 outer enclosing 4 inner, oblong spatulate, red-pubescent. Stamens 16. Ovary villous. Fruit obovoid, green, glabrous or oblong, narrowed at base with the remains of the style. *Hab.* Damp forests. Singapore, Bukit Mandai; Changi. Johor, Tebrau River, Sungei Bau. Malacca (Griffith). Negri Sembilan. Port Dickson (Foxworthy); Pasoh (Foxworthy).

var. *Scortechinii*. Leaves 6 to 8 in. long, 2.5 to 3.5 in. wide. *Hab.* Perak, Port Weld (Scortechini). *Distrib.* Borneo. *Native names:* Maiang; Bengku.

(19) *B. cuneata* Bl. *Bijdr.* 675; *King, l.c.* 187.

Big tree. Leaves coriaceous obovate rounded or abrupt short acuminate, base long, narrowed; nerves not prominent, 20 pairs, very fine, midrib prominent, nervules and reticulations very fine but visible, parallel; 4 to 5 in. long, 2 to 3 in. wide; petioles .6 to 1 in. long. Flowers in axillary fascicles. Fruit globose or oblong, .75 to 1 in. long. Seeds 1 to 3. Seed ovoid not compressed, pointed at both ends. *Hab.* Forests. Rare and very little known. Singapore, Bukit Timah (Ridley). Malacca (Maingay). *Distrib.* Sumatra.

(20) *B. erythrophylla* King and Gamble, *l.c.* 188.

Tree 40 to 50 ft. tall, 1 ft. through. Leaves stiffly coriaceous, obovate-oblong short blunt acuminate, base unequal narrowed, drying orange red; nerves 10 to 12 pairs, somewhat elevate beneath, reticulations prominent on both sides; 6 to 8 in. long, 1.5 to 2.5 in. wide; petioles 1.5 to 2 in. long. Flowers in fascicles of 5 to 6 below leaves; pedicels in fruit, thick, .5 to .6 in. long, golden-pubescent. Sepals ovate acute or round, golden-pubescent all over. Fruit globose, golden brown hairy, .5 to .6 in. through. *Hab.* Penang, Highlands (Curtis). Rare.

(21) *B. elongata* Miq. *Fl. Ind. Bat. Supp.* 582.

Tree. Leaves coriaceous oblanceolate, narrowed gradually to the petiole, dark brown above, red beneath when dry; nerves 20 pairs, depressed above, strongly elevate beneath; 13 in. long, 2.5 in. wide; petioles thick, 1.5 in. long, base thickened rugose. Flowers fascicled below the leaves; pedicels .5 in. long, rather slender. Sepals ovate glabrous, outer two coriaceous, inner three thinner, .18 in. long. Ovary wrinkled; style slender, .12 in. long. *Hab.* Malacca, Panchur (Goodenough). Very rare.

The specimen is imperfect, and Miquel's description only consists of that of the leaves, but I suppose this to be what he meant. The type came from Palembang in Sumatra.

## 7. PALAQUIUM, Blanco.

Trees, big to vast, usually very laticiferous. Leaves usually coriaceous, obovate or oblong. Flowers fascicled usually below the leaves in the axils of the fallen ones, white, fragrant. Calyx 6-lobed, outer 3 valvate, inner 3 imbricate. Corolla campanulate, tube short, lobes 6. Stamens 12 to 18; anthers ovate, connective produced, no staminodes. Ovary villous, 6-celled; style subulate. Fruit 1- to 2-seeded, a fleshy berry. Seeds large exalbuminous. Species 50 to 60, Indo-Malaya and Samoa.

Pedicels .75 in. long or less on lower bare parts of branches, numerous.

Leaves large obovate blunt; branchlets thick.

Leaves nearly glabrous, glaucescent beneath

(1) *P. obovatum*

- Leaves appressed-pubescent beneath . . . (2) **P. Maingayi**  
 Leaves red-tomentose beneath and on upper  
 midrib . . . (3) **P. Clarkeanum**  
 Leaves up to 6 in. long elliptic; branchlets,  
 slender.  
 Leaves golden-silky beneath.  
 Nerves very fine and close, numerous . . . (4) **P. Gutta**  
 Nerves conspicuous, 14 to 18 pairs . . . (5) **P. Oxleyanum**  
 Leaves almost or quite glabrous.  
 Leaves oblanceolate drying orange red . . . (6) **P. xanthochyimum**  
 Leaves obovate drying fuscous.  
 Nerves very fine and almost invisible.  
 Leaves round at tips.  
 Pedicels very short, .05 in. long . . . (7) **P. bancanum**  
 Pedicels .1 in. long . . . (8) **P. calophylloides**  
 Leaves tips narrowed blunt acuminate . . . (9) **P. microphyllum**  
 Nerves conspicuous depressed above . . . (10) **P. Ridleyi**  
 Nerves prominent beneath . . . (11) **P. Herveyi**  
 Leaves thin elliptic acuminate . . . (12) **P. hexandrum**  
 Pedicels 1 in. long, clustered at the branch-tips.  
 Leaves oblong lanceolate . . . (13) **P. stellatum**

(1) **P. obovatum** *King and Gamble, l.c.* 190. *Dichopsis obovata* Clarke, *F.B.I.* iii. 542.

A big tree with stout stem 40 to 80 ft. tall. Leaves coriaceous stiff, obovate blunt or sub-acute, cuneate at base, glaucescent beneath; nerves prominent beneath, sometimes scurfy-pubescent, about 12 pairs; 5 to 8 in. long, 2 to 4 in. wide; petioles .7 to 1 in. long. Flowers clustered on the bare parts of branches below leaves, numerous; pedicels .3 to .5 in. long. Sepals outer triangular ovate pubescent, .15 in. long. Corolla greenish white, lobes twisted. Stamens 12; filaments long, glabrous. Style 15 in. long, subulate. Fruit oblong-globose, glabrous, green. Seed ovoid, base pointed. *Hab.* Forests in the south, Singapore, Garden Jungle; Kranji; Changi. Malacca, Pulau Undan (Cantley); Rim; Sungei Hudang (Holmberg). *Distrib.* Tenasserim, Sumatra. *Native names:* Niato Bunga; Niato Tembaga; Niato Balam; Taban Balau putih; Taban balam Kuning. *Use:* This gives a good second-rate white gutta-percha.

(2) **P. Maingayi** *King and Gamble, 191.* *Dichopsis Maingayi* Clarke in Hook. *fil. F.B.I.* iii. 543.

Big tree 60 ft. tall, 10 to 15 ft. through. Leaves stiffly coriaceous obovate blunt, base long cuneate, thickly red-pubescent beneath; nerves strong elevate, 12 to 20 pairs distant; 5 to 13 in. long, 3 to 7 in. wide; petioles 1 to 1.5 in. long. Flowers fascicled in tens below leaves, numerous; pedicels .5 to .7 in. long, red-pubescent. Sepals ovate pubescent, inner orbicular, .15 in. long. Corolla-lobes ovate-oblong. Stamens 12, .25 in. long. Style .4 in. long. Berry green, .5 in. long. Seeds 2, oblong. *Hab.* Forests. Malacca (Maingay). Negri Sembilan, Bukit Sulu (Cantley); Jelebu (J. N. Gunn); Tampin (Burkill). Selangor (Arden). Perak, Changkat Serdang (Wray); Larut (Kunstler).

*Native names*: Getah Simpor; Getah Ketapang; Jelutong Batu; Getah Percha Burong.

(3) **P. Clarkeanum** *King and Gamble, l.c.* 191.

Tree about 40 to 100 ft. tall, 2 to 4 ft. through. Leaves coriaceous, rather stiff, ovate, blunt or oblanceolate, narrowed towards tip, glabrous above except midrib, densely red-hairy beneath; nerves elevate, 18 to 20 pairs; 8 to 10 in. long, 4 to 5 in. wide; petioles .7 to 1 in. long. Flowers as in *Maingayi*, but pedicels shorter and thicker, .2 in. long. Corolla-lobes shorter and blunter with a hairy line on the back. Fruit globose, green, smooth, .2 in. long or less. Seed 1, oblong-acute at both ends. *Hab.* Not common in dense forest. Malacca, Sengeh reserve (Foxworthy); Sungei Hudang (Kinsey). Selangor, a tree in Lake Club gardens. Negri Sembilan, Tampin Hill. Perak, Waterfall, Thaiping (Wray, Kunstler). Lankawi, Gunong Raya, 2000 ft. altitude (Haniff). *Native names*: Getah Menjatoh; Nyato Tembaga.

(4) **P. Gutta** *Burck, Ann. Jard. Buitenz, v.* 24; *King, l.c.* 192. *Dichopsis Gutta Benth. Gen. Pl. ii.* 658. *Isonandra Gutta Hook. Lond. Journ. Bot.* 463, *t.* 16. *P. oblongifolium Burck, l.c.* 25, *t. v.* *P. malaccense* and *P. formosum Pierre, Bull. Linn. Par.* i. 498.

A tree rising to 100 ft. tall. Leaves coriaceous, dark green above, golden-coppery beneath, obovate obtuse (in old trees) to oblanceolate acuminate, base slightly or rather long-narrowed, midrib prominent; nerves 20 or more, very fine and inconspicuous; 3 to 5 in. long, 1.5 to 2.5 in. wide. Flowers in fascicles of 4 or 5, axillary on bare part of branches. Sepals 6, brown-pubescent, 3 outer triangular ovate, inner longer. Corolla white with 6 ovate imbricate lobes, .25 in. long. Stamens 12; filaments slender. Ovary slightly pubescent, 6-celled; style long, filiform. Berry .6 to .7 in. long, oblong, red-pubescent. Seed 1 (rarely 2), oblong round at both ends; hilum elliptic covering half the seed, testa brown. *Hab.* Forests; over the whole peninsula as far north as Penang, on both coasts. *Native names*: Getah Taban; Ekor Daun Durian (Penang). *Use*: The Gutta Percha tree. The product largely used for deep-sea cables, surgical instruments, etc. The tree is now protected all over the peninsula.

This plant is apparently endemic in the Malay Peninsula except the variety *Curtisii* described below. It was first discovered by Dr. Montgomerie in Singapore in 1845 (*Magazine of Science*). He mentions three varieties of gutta-percha, *viz.* Gutta Girek (Getah Grit) *Willughbeia*; Gutta Taban; and Gutta Percha (*Payena Maingayi*); by some accident it appears that the name Gutta Percha (Getah percha) was transferred from the *Payena* to the *Palaquium* (see under *Payena Maingayi*).

*King, l.c.* 193 keeps up the var. *oblongifolia*, *P. oblongifolium* of Burck, but seems doubtful that it can be kept up even as a variety. It only differs in its longer acuminate leaves, and there are plenty of intermediate states. It appears to me to be merely a young state of the foliage, and is certainly the commonest form.

var. *Curtisii* Ridl. Leaves obovate round at tip and cuneate at base (young leaves short acuminate) 6 in. long, 2·75 in. wide; nerves quite distinct beneath, about 18 pairs and more distant than in *D. gutta*. Flowers distinctly larger, and sepals blunter. Fruit round, 1·25 in. through. Seed larger. *Hab.* Forests in the north. Perak, Plus River and Ulu Kenering (Wray). Penang, Highlands; Telok Bahang and Waterfall (Curtis).

A very distinct-looking form occurring in Sumatra also. It may be specifically distinct.

(5) **P. Oxleyanum** Pierre, *Bull. Soc. Linn. Par.* i. 498; King, *l.c.* 194 (not Burck).

A big tree. Leaves coriaceous, oblong-ovate blunt or shortly acuminate, base narrowed, golden-pubescent beneath; nerves 14 to 18 pairs distant, distinctly elevate; 5 to 8 in. long, 2·5 to 3 in. wide; petioles 1 to 1·5 in. long. Sepals, outer red-pubescent, 2·5 in. long. Berry sub-globose, 1 in. long, 75 in. through. Seed oblong. *Hab.* Forests. Singapore, Little's Hill (Maingay). Pahang, Ulu Tembeling, Sungei Senap (Craddock). Selangor, Kwala Lumpur (Burn-Murdoch), Perak, Thaiping Hills, by Waterfall, and Kwala Kangsa (Curtis). Common at 2000 to 2500 ft. altitude.

var. *glabrata* King and Gamble, *l.c.* Leaves smaller, 1·5 in. wide, glabrate, Perak (Wray). Also South Siam, Kopah (Haniff). *Native names:* Taban Sutra; Taban Putih; Taban Chaier. *Use:* Gutta inferior and less in quantity than in *P. gutta*.

(6) **P. xanthochymum** Pierre, *Burck, Ann. Jard. Buit.* v. 30; King, *l.c.* 195. *Dichopsis rubens* Clarke, *F.B.I.* iii. 543.

Large tree 80 to 120 ft. tall, 2·5 to 3 ft. through. Leaves coriaceous, obovate or oblanceolate blunt or emarginate, base cuneate, glabrous; nerves obscure, 12 to 14 pairs; 2·5 to 4 in. long, 1·5 in. wide; petioles 5 in. long. Flowers in axillary fascicles of 8; pedicels slender, 2 in. long. Calyx-lobes ovate acute, red-pubescent. Corolla 3 in. long, lobes oblong blunt, white. Berry ovoid glabrous. *Hab.* Not common in forests. Singapore, Changi; Chan Chu Kang. Malacca (Maingay). Perak, Larut (Kunstler). *Distrib.* Borneo.

The leaves have a tendency to dry bright red, whence Clarke's name.

(7) **P. bancanum** Burck, *Ann. Jard. Buit.* v. 43; King, *l.c.* 195.

A high tree 150 ft. tall, 3 to 4 ft. through. Leaves coriaceous, dark green, glabrous obovate or oblong-obovate, abruptly acute or round; nerves 14 to 16 pairs, very obscure; 3 to 4 in. long, 1·5 to 2·5 in. wide; petioles 7 to 1 in. long. Flowers in fascicles of 2 to 4 below the leaves numerous; pedicels 1 in. long or less, red-pubescent, as is calyx. Sepals, outer round, inner acute, 1 in. long. Corolla campanulate, lobes ovate. *Hab.* Forests. Probably

common, but too lofty to see or collect from. It contains very little latex. Singapore Gardens; Bukit Timah; Kranji. Perak, Larut (Kunstler). Penang, Waterfall and Batu Feringhi (Curtis). *Native name*: Ekor Limpong (Penang).

(8) ***P. calophylloides*** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 93.

Big tree 50 to 60 ft. tall. Leaves stiffly coriaceous obovate, short-acuminate blunt, base cuneate; nerves very conspicuous, about 10 pairs, faint; 4 in. long, 2.5 in. wide; petioles 1 in. long. Flowers in fascicles below the leaves; pedicels thick, .25 in. long, pubescent. Calyx-lobes .1 in. long, outer 3 ovate rounded, finely hairy, inner narrower, shorter lanceolate, sub-acute. Corolla .2 in. wide, lobes oblong lanceolate sub-acute, tube much shorter, glabrous. Style little longer. *Hab.* Mountains at 1000 ft. altitude, rare. Kedah Peak (Bell and Haniff).

This is near *P. Ridleyi*, but the nerves of leaf are finer and nearly invisible, the calyx-lobes very dissimilar and corolla-tube very short.

(9) ***P. microphyllum*** *King and Gamble, l.c.* 196.

Big tree. Leaves coriaceous obovate-lanceolate, shortly sub-acute, base long narrowed, glabrous, reddish beneath when dry; nerves very indistinct, 8 to 10 pairs; 1 to 2 in. long, .7 to 1 in. wide; petioles .4 to .5 in. long, winged above. Flowers in fascicles of 1 to 3 below leaves; pedicels .2 in. long, pubescent. Sepals, outer densely tawny-pubescent, ovate acute, .15 to .2 in. long, inner ones blunt, pubescent outside. Corolla tubular rotate, .15 in. wide, lobes oblong, spatulate, hairy, tube very short. Ovary conic, villous. *Hab.* Rare and difficult to get at. Singapore, Bukit Timah; Kranji (Ridley). Selangor (Stevens). *Distrib.* Sumatra.

(10) ***P. Ridleyi*** *King and Gamble, l.c.* 196.

A big tree. Leaves coriaceous, obovate rounded or emarginate, base long cuneate; nerves 8 to 10 pairs, depressed above, hardly elevate beneath, nervules transverse; 2 to 3 in. long, 1 to 2 in. wide; petioles winged nearly to base, .5 to .7 in. long. Flowers small in fascicles of 6 or 7 in upper axils; pedicels pubescent, .25 in. long, rather thick. Sepals .1 in. long, outer apiculate, glabrous, inner thin pubescent. Corolla .15 in. long, lobes erose at tip as long as tube. Ovary villous above; style thick, conic. *Hab.* Lowland forests in the south. Singapore, Sungei Jurong; Kranji; Tanjong Gol. Malacca, Selandor (Cantley); Merlimau (Derry). *Native names*: Niato hitam; Maiang.

(11) ***P. Herveyi*** *King and Gamble, l.c.* 197.

A big tree. Leaves coriaceous, obovate rounded or elliptic, shortly acute, glabrous, slightly pubescent on midrib and nerves beneath; nerves 5 to 7 pairs distinct, elevate beneath; 2 to 3.5 in. long, 1.25 to 1.75 in. wide; petioles .5 in. long, thickened at base. Flowers in axillary fascicles of 4 or 5; pedicels .3 in. long, rather

slender. Sepals ovate acute, red-pubescent, .1 in. long. Corolla campanulate, hairy inside and out, lobes oblong-linear, .15 in. long. Ovary pubescent; style .3 in. long. *Hab.* Forests. Rare. Malacca (Hervey, Maingay). Perak (Wray). *Native names:* Jongek; Niatoh putih.

The Gutta is sticky and worthless (Wray). The plant is somewhat like *P. Ridleyi*, but the nerves are prominent beneath, the flowers rather smaller and much more pubescent.

(12) *P. hexandrum* King and Gamble, *l.c.* 197. *Dichopsis hexandra Clarke, l.c.* iii. 543. *Isonandra hexandra Griff. Notulæ* iv. 292.

A tree 120 ft. tall or more. Leaves chartaceous, glabrous, elliptic-oblong acute, base shortly narrowed; nerves 10 to 13 pairs elevate beneath; 4 to 5 in. long, 2 to 2.5 in. wide; petioles .5 to .75 in. long, base thickened. Flowers in fascicles of 3 or 4 generally below the leaves; pedicels .4 in. long, pubescent. Sepals pubescent, sub-acute, .05 in. long. Corolla green, campanulate, tube 1 in. long with a ring of hairs in mouth, lobes .15 in. long. Ovary pubescent; style .25 in. long. Berry fleshy, .75 in. through, green. Seed 1, ovoid, slightly flattened; hilum very large, half the length of the seed. *Hab.* Forests. Singapore, top of Bukit Timah. Malacca, Nhingull (Griffith); (Maingay); Sungei Baru (Burkill).

(13) *P. stellatum* King and Gamble, *l.c.* 198.

Tree over 100 ft. tall. Leaves membrano-chartaceous, oblong-lanceolate, short-acuminate, base cuneate, glabrous above, rusty-stellate tomentose beneath on nerves 10 pairs, reticulations prominent on both sides, 3 to 6 in. long, 1 to 1.5 in. wide; petioles .75 to 1 in. long, densely pubescent. Flowers in axils of upper leaves in fascicles of 3 to 5, forming a leafy terminal corymb of 20 to 25 flowers; pedicels slender, 1 in. long, pubescent. Sepals densely pubescent, ovate, .25 to .3 in. long. Corolla .3 to .4 in. wide, lobes rounded at top, glabrous, tube nearly as long. *Hab.* Perak (Scortechini).

Very rare, I have seen no specimen.

### 8. MIMUSOPS, Linn.

Trees. Leaves chartaceous or coriaceous; nerves many, parallel, inconspicuous. Flowers solitary or fascicled in the axils of the upper leaves. Calyx-lobes 6 or 8 in 2 rows, outer row valvate, inner row imbricate. Corolla-tube very short, lobes 18 to 24 in 2 rows. Stamens 6 to 8, attached to the corolla opposite the inner lobes. Staminodes alternate with stamens sub-petaloid, fimbriate. Ovary hairy, 6- to 8-celled. Fruit oblong, 1- to 4-seeded pulpy. Species about 30, tropics generally.

Sepals and stamens 8; staminodes acuminate, hairy; fruit

small . . . . . (1) *M. elengi*

Sepals and stamens 6; staminodes fimbriate, glabrous;

fruit large . . . . . (2) *M. Kauki*

(1) *M. elengi* Linn. *Sp. Pl.* 349; *King, l.c.* 199.

A bushy tree 30 ft. tall. Leaves dark green, rather thin chartaceous, elliptic, shortly acuminate, 3 to 5 in. long, 2 in. wide; petioles .6 to 1 in. long. Flowers white, fragrant, about .5 in. wide. Corolla-lobes 24 acute, tube very short. Stamens 8. Fruit ovoid, yellow, about 1 in. long. Seed oblong, .75 in. long, .5 in. broad, brown shining. *Hab.* A roadside tree, commonly planted. *Distrib.* Probably of Indian and Burmese origin. *Native name*: Bunga Tanjung. Children string the star-like fragrant corollas together to make necklaces of them.

I have never seen it anything like wild, but Evans sends it from the Rumpin River, Pahang, where it is perhaps wild.

(2) *M. Kauki* Linn. *Sp. Pl.* 349.

Large spreading tree with coriaceous leaves, obovate or elliptic blunt, white silky beneath, 4 in. long, 2.5 in. wide; petioles 1.5 in. long. Flowers on thick pedicels. Sepals .25 in. long, ovate acute, silky. Corolla-lobes 18 in 2 rows. Stamens usually 6; staminodes fimbriate. Fruit ovoid-oblong, over 1 in. long, 2- to 4-seeded, orange red. *Hab.* In gardens in Malacca and possibly elsewhere, but rarely cultivated. Johor, Pulau Tinggi (Burkill). A poor fruit. *Native name*: Sau.

## ORDER LXXXVIII. EBENACEÆ.

Trees, never vast, very rarely shrubs; bark usually black. Leaves alternate, entire, usually coriaceous. Flowers unisexual in axillary or extra-axillary cymes sometimes on the trunk. Calyx inferior, gamosepalous with 3 to 7 lobes accrescent. Corolla gamopetalous, white or yellow, small lobes 3 to 7. Stamens in 1 row as many as corolla-lobes or 2 or more times as many; filaments shorter than anthers, free or not; anthers linear; in female flowers; as staminodes or absent. Ovary superior (abortive or 0 in males); styles 2- to 8-cells as many or twice; ovules twice as many. Fruit a coriaceous or fleshy berry, often large. Calyx as base enlarged and often woody. Seeds oblong, albuminous. Species 320, tropics generally.

Some species produce the ornamental black heart-wood, ebony, Kayu Arang. *D. discolor* Linn. the Mabola or butter fruit, Bua manteiga of the Philippines is cultivated for its large peach-like pink fruit covered with brown fur. The species are comparatively little known, as it is often difficult to get both sexes of flowers and fruit. Several of King's species I have not seen.

Flowers often 3-merous; ovary 3- to 6-celled . . . . .	1. MABA
Flowers mostly 4- to 5-merous; ovary 4- to 5- or 8- to 10-celled . . . . .	2. DIOSPYROS



## 1. MABA, Forst.

Trees or shrubs, never large. Flowers shortly pedicelled or in small cymes, usually 3-merous (rarely 4- or 5-merous). Calyx 3- to 5-fid, rarely sub-truncate. Corolla-tube usually longer; lobes 3, twisted to right. Males, stamens 3 to 21; anthers oblong. Females, staminodes 0 to 12. Ovary 3- or 6-celled; ovules 6. Fruit globose or ellipsoid baccate, 1- to 6-celled and seeded. Species 70, tropics. This genus is hardly separable from *Diospyros*.

- |  |                          |
|--|--------------------------|
| Leaves opposite or nearly so . . . . .                       | (1) <b>M. Hierniana</b>  |
| Leaves alternate.  |                          |
| Leaves pubescent beneath; nerves prominent . . . . .         | (2) <b>M. venosa</b>     |
| Leaves velvety-tomentose beneath; nerves invisible . . . . . | (3) <b>M. olivacea</b>   |
| Leaves glabrous, large.                                      |                          |
| Leaves ovate or elliptic . . . . .                           | (4) <b>M. merguensis</b> |
| Leaves oblong; nerves 6 to 7 pairs . . . . .                 | (5) <b>M. Clarkeana</b>  |
| Leaves oblong; nerves invisible . . . . .                    | (6) <b>M. perakensis</b> |
| Leaves small obovate, under 1 in. across . . . . .           | (7) <b>M. buxifolia</b>  |
| Leaves small elliptic lanceolate, 12 in. across . . . . .    | (8) <b>M. elegans</b>    |

(1) **M. Hierniana** King and Gamble, l.c. 203.

Small glabrous shrub 2 to 3 ft. tall. Leaves opposite, thin coriaceous, oblong, shortly acute acuminate, base short cuneate; nerves 8 to 10 pairs, prominent beneath and widely inarching; 6 to 10 in. long, 2 to 3.5 in. wide; petioles .3 to .6 in. long. Male flowers unknown. Female flowers rotate, sub-sessile in axillary or extra-axillary fascicles of 2 or 3. Calyx-lobes free nearly to base, round crenate. Corolla twice as long, deeply 5-lobed, lobes oblong blunt. Stamines 3 to 4. Ovary hemispheric; style short, thick. *Hab.* Rare and little known. Forests 300 to 500 ft. altitude. Perak, Batang Padang district (Kunstler).

(2) **M. venosa** King and Gamble, l.c. 203.

Medium-sized tree 15 to 20 ft. tall, thinly ashy-pubescent. Leaves coriaceous elliptic shortly acuminate, base very shortly narrowed; nerves 6 to 9 pairs with midrib depressed above, elevate beneath, strongly inter-arching, midrib pubescent; 4.5 in. long, 2 to 3 in. wide; petioles pubescent, .5 in. long. Male and female flowers alike in dense cymes of 5 or 6, about .3 in. long, flowers sessile or on hairy pedicels .3 to .4 in. across. Calyx very coriaceous with 3 ovate deep lobes, blunt, partly pilose. Corolla smaller, tubular, glabrous. Stamens 6 in 2 rows; anthers cordate. Rudimentary ovary ovoid in a dense ring of hair. Females with a few flat staminodes. Ovary ovoid, base hairy; styles 3. Fruit ovoid-globular, glabrous, .75 in. long, .6 in. through, blunt at both ends, with the 3- or 4-lobed calyx woody accrescent. *Hab.* Singapore, Tampinis River and Changi. *Native name:* Timah-Timah.

(3) **M. olivacea** King and Gamble, l.c. 204.

Trees 50 to 70 ft. tall, 15 to 20 in. through. Leaves coriaceous, elliptic, short apiculate velvety-tomentose beneath and on midrib

above; nerves 5 to 8 pairs like midrib depressed above, elevate strongly and inarching beneath; 3 to 5.5 in. long, 1.5 to 2.25 in. wide; petioles .4 in. long, tomentose. Male flowers sessile, .15 in. long in dense-branched cymes under 1 in. long. Calyx .1 in. long, tubular-campanulate tomentose outside, deeply lobed, lobes 4, ovate blunt. Corolla cylindric-campanulate; lobes 4, oblong, edges hairy. Stamens 8 large, 4 small. Fruit ellipsoid blunt, glabrous, .5 in. long, .4 in. through; calyx .6 in. across, lobes 4 ovate blunt. Fruit ellipsoid blunt. *Hab.* Forests, rare. Perak, Batang Padang district (Kunstler); Tapah (Wray). Lankawi (Curtis).

(4) *M. merguensis* Hiern. *Trans. Camb. Phil. Soc.* xii. 134.

Small tree nearly glabrous. Leaves thin coriaceous, ovate or elliptic, base broad, rounded or very shortly cuneate, tip acuminate; nerves 3 to 5 pairs, slender but elevate beneath; 3 to 5.5 in. long, 1.65 to 2.65 in. wide; petioles .25 in. long. Male flowers in dense pubescent cymes, 1 to 1.5 in. across. Calyx less than .25 in. long, lobes 3 or 4, triangular, blunt. Corolla little larger, short, 3- or 4-lobed. Stamens 14 to 16. Female 3- or 4-merous. Staminodes 3 or 4. Ovary 6-celled; ovules solitary; styles 3. Fruit subglobular to cylindric, .5 in. long; calyx .5 in. across, lobes ovate acute, 3. *Hab.* Woods and open country in the north. Penang, Batu Feringhi and Muka Head (Curtis). Lankawi; Kwah. Perlis, Chupeng. *Distrib.* Burma.

(5) *M. Clarkeana* King and Gamble, *l.c.* 205.

Tree 20 to 30 ft. tall. Leaves coriaceous, oblong blunt, base cuneate, adpressed pubescent beneath; nerves 6 to 7 pairs, faint, midrib depressed above, bold beneath; 1.5 to 3 in. long, .65 to 1.25 in. wide; petioles .1 in. long. Male flowers .1 to .15 in. long, crowded in sessile cymes .25 in. long, sessile. Calyx pubescent outside of 3 ovate-acute lobes. Corolla smaller densely silky, of 3 ovate-lanceolate outer and 3 or 6 narrower inner lobes. Stamens 6. Fruit globular, .35 in. through, glabrous; calyx thick with 3 blunt angles. Seeds 3, 3-sided. *Hab.* Perak (Kunstler).

I have not seen this plant.

(6) *M. perakensis* King and Gamble, *l.c.* 205.

Tree 50 to 60 ft. tall. Leaves coriaceous, oblong to oblong-lanceolate acute, base broad rounded; nerves obsolete, midrib pubescent, depressed above, elevate beneath; 2.5 to 3 in. long, .75 to 1.35 in. wide; petioles .15 in. long. Male flowers .15 in. long, 8 to 10 in dense sessile clusters. Calyx sessile, campanulate, pubescent outside, deeply 3-lobed, lobes ovate acute. Corolla silky, lobes 3, ovate acute. Stamens 12. Fruit oblique ellipsoid, glabrous; calyx woody, flat, deeply 3-lobed, lobes ovate round, edges reflexed. Seeds 2. *Hab.* Perak (Wray, Kunstler).

I have not seen this plant.

(7) *M. buxifolia* Pers. Syn. ii. 606; King, l.c. 206.

Large bush or small tree. Leaves coriaceous, elliptic to obovate, base narrowed, tip round to sub-acute; nerves faint, 4 to 6 pairs, midrib bold; .35 to 1 in. long, .3 to .6 in. wide; petioles under .5 in. long. Flowers solitary or 2 or 3 in a cyme, trimerous. Calyx .1 in. long, lobes short. Corolla campanulate, lobes short triangular. Male flowers, stamens 6 to 12. Females no stamens. Ovary 3-celled; style 3-lobed. Fruit ellipsoid or globose, .35 in. long. Seed 1. *Hab.* Not rare, usually by the sea. Singapore, Tampinis; Kranji. Malacca, Mt. Ophir (Griffith). Pahang, Pekan; Pulau Tiunan (Burkill); Baloh, Kwantan (Foxworthy). Tringganu, by the sea. Penang, Telok Bahang (Curtis). Lankawi, Kwah (Curtis). Pulau Adang, Pulau Tengah. Perlis, Kanga. *Distrib.* Tropical Africa, Indo-Malaya, Australia.

var. *rhomboidea* Ridl. Leaves 2.5 in. long, 1 in. wide, rhomboid lanceolate. Province Wellesley, Kubang Ulu (Curtis). *Native names*: Kaya Arang; Sachirit Laut.

(8) *M. elegans* Ridl. Journ. F.M.S. Mus. vi. 161.

Slender tree-like shrub 10 ft. tall. Branches drooping, stiff hairy. Leaves elliptic lanceolate, blunt, base narrowed, midrib hairy beneath, nerves invisible; .5 in. long, .12 in. wide. Flowers male, unknown. Females solitary, sessile or nearly silky all over, .25 in. long. Calyx-lobes 4, ovate round. Corolla flask-shaped, lobes 3 lanceolate blunt, hairy; staminodes filiform, 3. Ovary hairy. *Hab.* Pahang, Kwala Teku woods (Ridley).

## 2. DIOSPYROS, Linn.

Trees, rarely shrubs. Leaves alternate. Calyx-lobes 4 to 5 (rarely 3), deep enlarged in fruit. Corolla tubular or campanulate, lobes 4 to 5, short. Stamens 4 to 64, usually 16, in males; staminodes 0 to 16 in females. Ovary 4- to 5-celled or imperfectly 8- to 10-celled; ovules 1, rarely 2 in each cell; styles and stigmas 1 to 4. Fruit globose, ellipsoid or conic-ovoid subtended by enlarged, sometimes woody calyx; flesh pulpy. Seed oblong, compressed. Species 220, tropics, rarely sub-temperate regions.

Trees, rarely shrubs, unarmed.

*Flowers male in small cymes or fascicles axillary on branches.*

Leaves membranous, under 3 in. long.

Leaves elliptic cuspidate, 2.5 in. long, globular; stamens 16 . . . . .

(1) *D. Wrayi*

Leaves broad lanceolate, 1.4 in. long; fruit cylindrical; stamens 16 . . . . .

(2) *D. microphylla*

Leaves elliptic blunt acuminate or lanceolate, 2.25 in. long; stamens 8; fruit ellipsoid, puberulous . . . . .

(3) *D. subrhomboidea*

Leaves over 3 in. long.

Leaves lanceolate, 3.5 in. long . . . . .

(4) *D. Scortechinii*

- Leaves puberulous beneath, elliptic apiculate,  
3.5 in. long . . . . . (5) **D. glomerulata**
- Leaves elliptic cuspidate; fruit glabrous . . . . . (6) **D. graciliflora**
- Leaves 3 to 5 in. long; calyx tubular, small  
silky hairy . . . . . (7) **D. tubicalyx**
- Leaves 3 in. long, lanceolate acuminate  
glabrous . . . . . (8) **D. dumosa**
- Leaves 4 to 5 in. long by 1.5 to 2 in., oblong  
acuminate glabrous . . . . . (9) **D. flavicans**
- Leaves over 5 in. long, whole plant hairy . . . . . (10) **D. apiculata**
- Males unknown; leaves sub-coriaceous  
lanceolate acuminate, 4 by 1.25 in. . . . . (11) **D. Kurzii**
- Flowers unknown; leaves thin,  
elliptic 3 by 1.5 in.; fruit hairy . . . . . (12) **D. pubicarpa**
- Leaves coriaceous; calyx 4-lobed.  
Leaves under 5 in. long, 1.5 in. wide, thin  
coriaceous.  
Leaves elliptic, thin coriaceous; calyx  
in fruit a woody cup . . . . . (13) **D. lucida**
- Leaves elliptic; calyx in fruit a 4-angled  
cup . . . . . (14) **D. polyalthioides**
- Leaves elliptic; calyx deep, cupular in  
fruit . . . . . (15) **D. styraciformis**
- Leaves stiff coriaceous.  
Leaves obovate; fruit small oblong . . . . . (16) **D. bilocularis**
- Leaves elliptic, fruit small oblong . . . . . (17) **D. clavigera**
- Leaves oblong; fruit large, apple-like . . . . . (18) **D. siamensis**
- Leaves usually over 6 in. and under 12 in.  
long.  
Leaves densely silky hairy beneath; fruit  
large hairy . . . . . (19) **D. argentea**
- Leaves with midrib hairy beneath, not  
cordate . . . . . (20) **D. tristis**
- Leaves oblong cordate at base, midrib and  
nerves hairy . . . . . (21) **D. penangiana**
- Leaves glabrous; fruit red-tomentose,  
.4 in. through . . . . . (22) **D. rufa**
- Leaves glabrous.  
Base cuneate; branches glabrous . . . . . (23) **D. pauciflora**
- Base round; leaves broad; nerves not  
sunk above; branches glabrous . . . . . (24) **D. toposioides**
- Base round; leaves rather thin, narrow  
oblong; branches hairy . . . . . (25) **D. ellipsoidea**
- Leaves up to 14 in. long.  
Fruit 1 in. through on a thick woody calyx . . . . . (26) **D. Wallichii**
- Fruit 2 in. through; calyx cupular . . . . . (27) **D. rigida**
- Calyx 5-lobed.  
Leaves oblong acuminate; base cuneate . . . . . (28) **D. oblonga**
- Leaves oblong rounded both ends . . . . . (29) **D. Helferi**
- Flowers in racemed cymes on bare branch ends.*  
Leaves stiff coriaceous, minutely areolate . . . . . (30) **D. areolata**
- Leaves stiff coriaceous; branches red-pubescent . . . . . (31) **D. reflexa**
- Cymes peduncled distinctly.  
Cymes .5 in. long . . . . . (32) **D. oleifolia**
- Cymes 1 in. long; leaves elliptic oblong . . . . . (33) **D. brachiata**
- Cymes 1 in. long; leaves membranous-  
elliptic . . . . . (34) **D. Kunstleri**
- Cymes much-branched; leaves thin, black;  
flowers small . . . . . (35) **D. cymosa**

- Cymes much-branched, 3 in. long; flowers large . . . . . (36) *D. Horsfieldii*  
 Cymes over 1 in. long; fruit large with papery sepals 1.5 in. long . . . . . (37) *D. latisejala*  
 Cymes small .5 in. long on a long slender peduncle 12 in. long . . . . . (38) *D. nutans*  
*Flowers borne on trunk or old wood on branches.*  
 Fruit large pear-shaped . . . . . (39) *D. pyriferia*  
 Fruit 1 in. long, oblong or globose.  
 Leaves pubescent on midrib and petiole; cymes black hairy; fruit globose . . . . . (40) *D. caliginosa*  
 Leaves quite glabrous; cymes yellow hairy; fruit oblong . . . . . (41) *D. trunciflora*  
 Leaves membranous cordate; fruit large; thorny shrub . . . . . (42) *D. cordifolia*

(1) *D. Wrayi* King and Gamble, l.c. 209.

Shrub 12 ft. tall. Branchlets puberulous. Leaves membranous, ovate-lanceolate to narrow elliptic acuminate blunt, base cuneate or round; nerves very obscure, 5 to 6 pairs, midrib hairy on both sides; 2 to 4 in. long, .75 in. wide; petioles .1 in. long or less. Male flowers .25 in. long, 2 to 4 in axillary cymes, puberulous; pedicels very short. Calyx less than .1 in. long, narrow campanulate, lobes 4. Corolla 3 times as long, salver-shaped, lobes oblong, 4. Stamens 16. Females like males but longer; staminodes 8. Stigmas 4. Fruit globular, glabrous, shining black; calyx .75 in. wide, coriaceous, 4-lobed. *Hab.* Dense forests. Selangor, Pondok Tanjong (Burn-Murdoch). Perak, Blanda Mabok; Trong; Kota (Wray).

(2) *D. microphylla* Bedd. *l.c. Pl. Ind. Or.* 27, t. cxxxiii; King, l.c. 210.

Tree 60 to 80 ft. tall and 2 ft. through. Branchlets pubescent. Leaves thinly coriaceous, ovate lanceolate, sub-rhomboid, acute or blunt; nerves obsolete; young leaves sparsely hairy on both sides, adult appressed hairy on midrib and edges, 1 to 1.4 in. long, .45 to .65 in. wide; petioles .05 in. long. Male flowers solitary or 3 in a cyme. Calyx .05 in. long, deeply 4-lobed. Corolla little longer, lobes 4. Stamens 16. Females .2 in. long, solitary, pedicelled or paired. Calyx campanulate, lobes 4, round, blunt, imbricate, silky on edge and centre. Corolla longer, deep, 4-lobed. Fruit cylindrical or oblong conic, glabrous, 1-celled, 1-seeded. *Hab.* Common in forests. Singapore, Bukit Timah; Garden Road. Pahang, Kwala Pahang. Malacca, Sungei Hudang (Goodenough); Ayer Panas (Cantley); Bukit Bruang (Griffith). Dindings, Lumut. Penang Hill (Curtis). *Distrib.* India, Malay isles. *Native name:* Delai Putih. *Use:* Said to supply the best Malacca ebony.

(3) *D. subrhomboidea* King and Gamble, l.c. 209.

Shrub 4 to 6 ft. tall. Branchlets pubescent. Leaves lanceolate, ovate or sub-rhomboidal, caudate-acuminate blunt, base

cuneate; nerves faint, 4 to 5 pairs, midrib pubescent on both sides; 1.5 to 2.25 in. long, .6 to .8 in. wide; petioles .1 in. long. Male flowers solitary, .6 in. long; pedicels tomentose. Calyx under .1 in. long, deeply 4-lobed, lobes broad, sub-quadrate, imbricate. Corolla-tube cylindric, lobes 4, all hairy outside. Stamens 8. Fruit ellipsoid red, .75 to 1 in. long, .5 in. through, puberulous; calyx .25 in. across, lobes 4, spreading. *Hab.* Dense forest, usually in mountain regions. Selangor, Batu caves; Semangkok Pass (Ridley). Perak, Larut Hills 1000 to 1500 ft. altitude (Kunstler).

(4) *D. Scortechinii* King and Gamble, *l.c.* 212.

Tree 15 to 50 ft. tall. Leaves membranous, narrow elliptic oblong acuminate, base narrowed sometimes puberulous beneath; nerves 8 to 12 pairs, 2 to 4 in. long, .6 to 1.25 in. wide; petioles .1 to .15 in. long. Male flowers .5 in. long in fascicles of 2 to 3 or solitary. Calyx campanulate, tomentose, .1 in. long, lobes 4, broad, sub-truncate. Corolla glabrous, .3 in. long, lobes oblong, sub-acute. Stamens 8. Females solitary. Fruit ellipsoid, puberulous; calyx cupular, tomentose, .75 in. long. *Hab.* Mountains to 4000 ft. altitude. Selangor, Ginting Bidai; Rawang. Perak, Thaiping Hills (Wray, Curtis); Bujong Malacca. Penang, Penara Bukit (Curtis).

(5) *D. glomerulata* King and Gamble, *l.c.* 229.

Tree 40 to 60 ft. tall. Branchlets red-pubescent. Leaves membranous, elliptic, shortly blunt apiculate, base round or slightly cuneate, puberulous beneath; midrib bold, nerves 5 to 6 pairs; 2.25 to 3.5 in. long, 1.25 to 1.75 in. wide; petioles .1 in. long. Male flowers .2 in. long, crowded in globular heads .4 in. across. Calyx sessile, tomentose; lobes triangular, 4. Corolla tubular, 4-angled; tube glabrous; lobes pubescent outside. Stamens 8. *Hab.* Perak (Kunstler).

I have not seen this species.

(6) *D. graciliflora* Hiern, *Trans. Camb. Phil. Soc.* xii. 191; King, *l.c.* 111. *D. decipiens* Clarke in Hook. *fil. F.B.I.* iii. 563.

Small tree 20 to 50 ft. tall. Leaves thick membranous, narrow-elliptic caudate acuminate, base narrowed; nerves 5 pairs usually prominent and wide, inarching beneath; 2.5 to 4.5 in. long, .75 to 1.35 in. wide; petioles .1 to .2 in. long. Male flowers .5 in. long, few in sessile cymes puberulous. Calyx of 4 large ovate round lobes. Corolla narrow tubular, pale yellow, one-third longer; tube with 4 lines of pubescence; lobes 4, deep oblong blunt. Stamens 8. Females like males and sometimes mixed with them. Fruit ellipsoid, 1 in. long, .75 in. wide, glabrous. *Hab.* Mountain forests in the north, Perak, Thaiping Hills; Ulu Bubong (Kunstler); Relau Tujur and Tapah (Wray). Penang Waterfall; Penara Bukit (Curtis). Kedah Peak (Haniff). *Distrib.* Java.

(7) *D. tubicalyx* Ridl.

Branches slender. Young parts pubescent. Leaves alternate, elliptic, bluntly short acuminate, glabrous except midrib beneath; base cuneate; nerves 6 pairs, slender inarching some way from the edge, slightly raised beneath; whole leaf papery, thin, drying brownish, 3·5 in. long, 1·5 in. wide; petioles ·1 in. long, pubescent. Male flowers small in axillary clusters of 5, sessile or nearly so. Bracts oblong hairy. Calyx tubular, ·12 in. long; lobes 4, thick short ovate, outside brown-silky; lobes silky inside. Corolla small, silky, lobes acute. Stamens 8, glabrous, filaments shorter than anther; anther-cells oblong, connective between them, distinct and prolonged into a subulate point. *Hab.* Pahang, Lubok Paku (Foxworthy).

This somewhat resembles *D. eriantha* Benth. of Hongkong. The flowers of the specimen are very young. From description it resembles *D. Carthei* Hiern, of the Philippines.

(8) *D. dumosa* King and Gamble, l.c. 211.

Small tree. Leaves membranous, lanceolate short-acuminate, base cuneate slightly puberulous on the midrib and nerves 4 to 5 pairs; 1·5 to 2 in. long, ·5 to ·75 in. wide; petioles ·05 in. long. Male flowers in short axillary fascicles of 3 or 4. Calyx ·25 in. long; lobes ovate-lanceolate acuminate, deep, edges undulate, pubescent. Corolla ·5 in. long, narrow tubular; lobes 4, oblong-narrow, pubescent within and without. Stamens 12. Females solitary, ·4 in. long. Calyx cleft to base in 4 large ovate reniform undulate blunt acuminate lobes. Corolla longer; staminodes 8. *Hab.* Perak (Wray). Rare. *Distrib.* Lower Siam.

(9) *D. flavicans* Hiern, *Trans. Camb. Phil. Soc.* xii. 205; *King, l.c.* 212.

Shrub or tree up to 70 ft. tall. Leaves thinly coriaceous, elliptic, short acuminate; base cuneate, glabrous; nerves 5 to 7 pairs; 3·25 to 5 in. long, 1·35 in. wide; petioles ·1 to ·15 in. long. Male flowers ·45 in. long, 2 to 6 in. wide in sessile, tomentose fascicles. Calyx campanulate, pubescent; lobes 5, broad, ovate blunt acuminate. Corolla salver-shaped cylindrical, pubescent above, glabrous inflated below, lobes 4, broad oblong, blunt. Stamens 12 in 3 rows. Females conspicuously bi-bracteate in peduncled cymes. Fruit ellipsoid, glabrous, ·75 in. long. Seeds 4. *Hab.* Woodlands in low country, Malacca, Ayer Panas (Griffith). Selangor, Ulu Selangor (Goodenough). Perak (Kunstler). Penang, Batu Feringhi. Adang islands, Pulau Rawei.

(10) *D. apiculata* Hiern, l.c. 186.

Shrub 4 to 8 ft. tall; branches hirsute. Leaves membranous oblong caudate-acuminate, base round, above often hairy, beneath rough hairy on the nerves 8 to 10 pairs; 5·5 to 7·7 in. long, 1·5 to 2·5 in. wide; petioles ·1 in. long, hairy. Male flowers about 3, sessile, ·35 in. long. Calyx-lobes narrow lanceolate 4 or 5, pubescent.

Corolla tubular, .4 in. long, lobes blunt. Stamens 6 to 12. Females 1 to 3 in small hairy cymes. Fruit ovoid-conic, rusty hairy, 1 in. long. Seeds 4. *Hab.* Forests in north. Perak, Larut (Kunstler). Penang Hill (Maingay); Moniot's Road (Curtis).

(11) *D. Kurzii* Hiern, l.c. 162.

Tree. Branchlets hairy. Leaves lanceolate caudate-acuminate, narrowed to base, edges undulate, thin coriaceous drying black, glabrous except midrib, hairy; nerves very fine with nervules conspicuous beneath; 4 in. long, 1.25 in. wide; petioles .2 in. long. Male flowers not seen. Female flowers in short hairy cymes; young fruit densely hairy sub-globose. Calyx lobed nearly to base; lobes 4, rounded, glabrescent, golden hairy at the base. *Hab.* Selangor, Batu Caves (Ridley).

This differs from *D. Kurzii* of the Andamans chiefly in its hairy midribs and the hairy ovary. I refer it to Kurz's species with some doubt.

(12) *D. pubicarpa* Ridl.

Tree. Branches slender pubescent. Leaves elliptic acuminate, thin papery, elliptic blunt acuminate; midrib beneath appressed hairy, base narrowed shortly; nerves about 13 pairs, very irregular, secondary nerves nearly as conspicuous; 3 in. long, 1.5 in. wide, drying black; petioles .1 in. long, hairy. Female flowers in axillary pairs; pedicels hairy little longer than the petiole. Male flowers not seen. Fruit globose drying black, hairy with a short beak .5 in. through; pericarp thin; sepals 4 (in one fruit 5) oblong blunt leathery, free nearly to base, glabrous, .25 in. long; pedicel hairy, .2 in. long. *Hab.* Pahang, Bentong, Jemampang (Foxworthy). *Native name*: Hidang Kelawar.

Allied to *D. nitida* Merrill, of the Philippines, but hairy.

(13) *D. lucida* Wall. *Cat.* 4127; *King*, l.c. 217. (Fig. 99, p. 287.)

A small tree or large shrub. Leaves coriaceous shining, lanceolate or oblong sub-acute or blunt, base round or narrow, glabrous; nerves 5 to 9 pairs, quite obscure; 1.25 to 4.5 in. long, .5 to 1.5 in. wide; petioles .2 to .4 in. long. Male flowers sessile in small fascicles. Calyx .15 in. long, lobes broad, triangular, tomentose all over. Corolla narrow tubular, silky tomentose, yellow, .4 in. long; lobes oblong. Stamens 12 to 16 pairs. Females 1 to 2 together, sub-sessile. Calyx larger than in male. Fruit globose depressed, about .5 in. long, nearly glabrous; calyx broad, woody, flat, cup-shaped, .5 in. wide, angled, hardly lobed. *Hab.* Common in woods and rocky places by the sea. The whole peninsula, Singapore, Garden Jungle; Pulau Brani; Bukit Timah; (Wallich). Johor, Kota Tinggi. Pahang, Rumpin River (Evans). Malacca, Batu Tiga; Mt. Ophir; Ching (Griffith). Negri Sembilan, Gunong Angsi. Selangor, Weld's Hill, Kwala Lumpur (Foxworthy). Perak, Sungei Larut and Sempang (Wray). Penang, Batu



Feringhi; Telok Bahang (Curtis). *Distrib.* St. Barbe Isle. *Native names*: Koguel; Kayu Arang.

The specimens referred by King to the Indian *D. lanceafolia* are all of this species. *D. lanceafolia* seems distinct in the much larger fruit and leaves.

(14) *D. polyalthioides* Hiern, *l.c.* 199, *t.* vii.

Small tree; branchlets glabrous or nearly so. Leaves elliptic or lanceolate elliptic, short, blunt acuminate, thinly coriaceous, 4.5 to 6 in. long, 2 to 3 in. wide; nerves fine, distinct beneath, 3 to 5 pairs; petioles .25 in. long. Male flowers in cymes silky



FIG. 99.—*Diospyros lucida*.

ferruginous. Flowers silky, .5 in. long. Calyx campanulate, lobes 4 or 5 deltoid. Corolla tubular, shortly 4-lobed, lobes ovate. Stamens 8. Ovary 0 (*vide* Hiern). Female flowers solitary axillary on a short hairy peduncle .1 in. long. Calyx cupular of 4 broad foliaceous sub-ovate truncate lobes, hairy on outside, densely yellow-hairy at base and centre, .15 in. long. Corolla .25 in. long, cylindrical, tube yellow, hairy, lobes short, broad, glabrous. Fruit (ripe?) ovoid densely red-hairy, shorter than the broad 4-angled, 4-lobed, golden hairy calyx .3 in. long, lobes short, rounded, nearly .4 in. wide. *Hab.* Open country in the north. Lankawi (Curtis); Gunong Raya (Haniff). Perlis, Tebing Tinggi (Ridley). *Distrib.* Borneo.

This bears a close resemblance to Hiern's figure, including the "dark depressed glands" on the lower part of the leaf which appear to me to be some species of fungus. I have no male specimen, and the female flowers are solitary, with the corolla longer than the calyx.

(15) *D. styraciformis* King and Gamble, l.c. 216.

Tree; branchlets pubescent. Leaves thinly coriaceous elliptic to elliptic-lanceolate, sub-acute, base cuneate, beneath red-pubescent (deciduously); nerves 5 pairs; 2.5 to 4 in. long, 1 to 2 in. wide; petioles .2 to .35 in. long. Male flowers few in short cymes, clustered. Calyx .2 in. long, campanulate tomentose, teeth narrow, triangular. Corolla .5 in. long, narrow tubular, lobes half the length, 4, oblong, blunt. Stamens 16. Female flowers solitary. Calyx-lobes broad, reniform. Fruit globose, truncate and depressed at top, densely minutely tomentose, .5 in. long, .65 in. through; calyx cup-shaped, teeth triangular, 4. *Hab.* Very local and scarce. Singapore (Maingay), Garden Jungle; Bukit Timah; Chua Chu Kang.

(16) *D. bilocularis* Oliv.  *Ic. Pl. t.* 2336; King, l.c. 215. Maba Maingayi Hiern, l.c. 107; Clarke, l.c. iii. 552.

A big tree about 80 ft. tall, glabrous with obovate thickly coriaceous leaves or elliptic sub-acute or blunt, base narrowed; nerves obscure on both surfaces about 12 pairs; 3 to 5 in. long, 1.5 to 2 in. wide; petioles .5 in. long. Male flowers .65 in. long on pedicels .3 in. long in fascicles of 3 or 4 white. Calyx coriaceous, .25 in. long, lobes 4, short and broad. Corolla narrow, tubular, yellow, .4 in. long, very thick, lobes long, oblong. Stamens 16. Female flowers similar. Fruit ellipsoid yellow, 1.5 to 2 in. long on a stout pedicel; calyx flat, lobes blunt. Seed 1, ruminant. *Hab.* Lowland woods. Singapore, Garden Jungle; Selitar; Changi. Malacca (Maingay); Sungei Hudang (Derry). Perak (Kunstler).

(17) *D. clavigera* Clarke, l.c. iii. 558.

Tree; glabrous entirely except calyx. Leaves coriaceous elliptic, narrowed or broad, rounded at base, apex sub-acute; nerves 6 to 7 pairs, slightly prominent beneath; 3.25 to 6 in. long, 1.5 to 4 in. wide; petioles .15 to .4 in. long. Male flowers 3 to 16 in small cymes. Calyx .15 in. long. Corolla .35 in. long, clubbed, glabrous. Stamens 16. Fruit oblong, .5 in. long, shining; calyx cup-shaped with 3 to 5 short excurved lobes, .2 in. long. *Hab.* Forests, widely distributed but not common; very variable in the size of the leaves. The type-specimens have quite small leaves with an occasional big one. Singapore, Sungei Morai. Malacca, Ayer Chantie (Maingay); Ching (Griffith). Lankawi, Kwah (Curtis). Kedah, Alor Sta. Perlis, Kanga; Chupeng (leaves pubescent on the back). *Native name*: Komoi.

var. *pachyphylla*, *D. pachyphylla* Clarke, l.c. iii. 568. Leaves rather smaller, base round. Flowers and fruit smaller. *Hab.* Singapore, Tampinis Road (Ridley). Malacca (Maingay).

(18) *D. siamensis* Hochreut.  *Pl. Bogor. exsicc.* 36.

Tree about 40 ft. tall with large head. Leaves stiffly coriaceous, oblong dark green, base rounded, tip blunt or shortly acute;

nerves inconspicuous above, elevate, irregularly incurved beneath as are reticulations; 4 in. long, 2 in. wide; petioles .2 in. long. Flowers, males in short sub-terminal cymes. Calyx 5-lobed, silky pubescent; females larger, solitary. Calyx-lobes broad ovate, .25 in. long. Corolla cylindric, stiffly coriaceous, .3 in. long, lobes short, ovate, erect, 4. Fruit large globose over an inch through, smooth, orange colour; pulp red; calyx-lobes triangular, .3 in. long. *Hab.* Orchards and open country in the north, Lankawi, Kesap (Curtis). *Distrib.* Siam.

(19) *D. argentea* Griff. *Notulæ*, iv. 288; *King*, l.c. 221.

A shrub 4 to 6 ft. tall, covered except the upper surface of leaves with golden silky hair. Leaves coriaceous oblong acute, base blunt or rounded, densely golden-red silky beneath; nerves invisible on both surfaces; 6 to 10 in. long, 1.65 to 3.5 in. wide; petioles .1 to .25 in. long. Male flowers in short peduncled spikes 1 to 1.25 in. long. Calyx .25 in. long, deeply 4-lobed, villous. Corolla .35 in. long, villous, cream flushed with rose. Stamens 20 to 24. Female flowers solitary on a .2 in. long peduncle. Calyx .5 in. long. Corolla .65 in. long. Fruit oblong truncate, 2 to 3 in. long and nearly 2 in. through, densely red-tomentose; calyx-lobes oblong blunt, thin coriaceous, golden-red hairy, 1.5 in. long. *Hab.* Not at all rare in woods, and unmistakable from its beautiful leaves. Singapore, Bukit Timah; Chan Chu Kang; Changi (Hullett). Pahang, Tahan River. Malacca, Ching (Griffith); Bukit Bruang (Derry); Selandor (Cantley). Selangor, Petaling. Dindings, Lumut (Curtis). Perak, Goping (Kunstler); Maxwell's Hill. *Native name*: Bedil Lalat. The leaves when burnt make a crackling sound supposed to keep away mosquitoes.

(20) *D. tristis* King and Gamble, l.c. 219.

Tree 40 to 50 ft. tall; branchlets black, hairy. Leaves thinly coriaceous, oblong-elliptic, short-acuminate, base round or cuneate, minutely conspicuously reticulate on both sides, midrib beneath hairy as are 7 to 8 pairs prominent nerves; 6 to 9 in. long, 2 to 2.75 in. wide; petioles .4 in. long. Male flowers .3 in. long, short red tomentose, in cymes .75 in. long. Calyx hairy, teeth 5, short, broad, blunt. Corolla glabrous resembling and as long as calyx. Stamens 24. Fruit depressed-globose, glabrous, nearly 2 in. through; calyx thick woody, flat, 1.5 in. across, lobes spreading triangular. *Hab.* Perak, Larut (Kunstler). Rare and little known.

(21) *D. penangiana* King and Gamble, l.c. 227.

Tree 20 to 30 ft. tall; branchlets yellow tomentose, with long bristly hairs. Leaves thinly coriaceous, oblong, shortly blunt acuminate, base broad, deep cordate, glabrous above except midrib; nerves beneath elevate 10 to 14 pairs; 5.5 to 7.5 in. long, 1.25 to 2.25 in. wide; petioles .15 to .2 in. long. Flowers unknown. Fruit sessile globular, .75 to 1 in. through, minutely red-tomentose;

calyx small with 5 reflexed lobes. *Hab.* Penang, Waterfall (Curtis). *Native name*: Tumuruang.

This may be a *Maba*. It somewhat resembles *M. cordata* Hiern, of Borneo.

(22) ***D. rufa*** King and Gamble, *l.c.* 228.

Tree 60 to 80 ft. tall, glabrous; shoots red-tomentose. Leaves thickly coriaceous, oblong-elliptic or oblanceolate, shortly blunt-acuminate, base narrowed; nerves 7 to 10 pairs slightly elevate, inarching far from the edge; 5.5 to 7.5 in. long, 1.75 to 2.25 in. wide; petioles .4 to .6 in. long. Fruit globular-ovoid, blunt, 1.25 in. long and 1.15 in. through, red-tomentose; calyx flat, 4-angled, .4 in. wide, red-tomentose. *Hab.* Lowland forest. Malacca, Selangor (Cantley). Perak, Larut (Kunstler). *Native name*: Mentuba. *Use*: Timber dark coloured, used in house building, but not durable if exposed. Fruit used for poisoning fish. Specimens very poor.

(23) ***D. pauciflora*** King and Gamble, *l.c.* 219.

Shrub or small tree, glabrous. Leaves very coriaceous, oblong-lanceolate or oblanceolate caudate acuminate, base slightly cuneate; nerves 8 to 10 pairs inarching; 5 to 10 in. long, 1.75 to 3 in. wide; petioles corrugated, .25 to .3 in. long. Male flowers sessile in fascicles .3 in. long. Calyx .25 in. long, narrow tubular, narrowed both ends, tomentose and black hairy, lobes 4 triangular, short, base inside thick hairy. Corolla little longer, half split into 4 broad blunt lobes, a line of black hair all along each midrib, rest silky. Stamens 12; 8 in pairs, 4 free, hairy. *Hab.* Perak (Kunstler).

Very rare. I have not seen it.

(24) ***D. toposioides*** King and Gamble, *l.c.* 223.

Tree 15 to 40 ft. tall or shrubby. Leaves coriaceous, oblong-elliptic, shortly acute, base round or short narrowed; nerves 16 to 20 pairs depressed above, elevate strongly beneath, minutely distinctly reticulate on both sides; 7 to 11 in. long, 2 to 4 in. wide; petioles .3 to .4 in. long, wrinkled, stout. Male flowers .25 in. long in cymose panicles 1 in. long. Calyx campanulate, mouth entire or nearly. Corolla little larger, ovoid inflate below mouth, 4-toothed. Female flowers conical in bud. Calyx acutely 4-angled, lobes deltoid, very coriaceous, puberulous outside, tomentose inside. Corolla tubular. Fruit depressed, globular, 1 to 1.25 in. through; calyx-lobes .4 in. long, stiff recurved. *Hab.* Forests; commonest on limestone. Selangor, Batu Caves; Sungei Siput. Perak, Goping (Kunstler). Dindings, Lumut. *Native name*: Tuba Bua. Fruits used for poisoning fish.

(25) ***D. ellipsoidea*** King and Gamble, *l.c.* 220.

Shrub 4 to 6 ft. tall, or tree; branchlets puberulous. Leaves thin coriaceous oblong acute, base rounded cordate, glabrous or

minutely puberulous beneath, midrib and nerves 10 to 12 pairs, depressed above, elevata beneath; 6 to 10 in. long, 2.25 to 3.5 in. wide; petioles .25 to 3 in. long, stout. Male flowers in dense axillary cymes, 6 to 12. Calyx sub-sessile, tomentose, lobes round, blunt, 4. Corolla glabrous, lobes 4, broad, deep. Female flowers 3 to 4 in a cluster. Fruit ellipsoid, black glabrous, 1 to 1.25 in. long, .8 in. through; calyx reflexed, broad-lobed, .35 in. across. *Hab.* Perak, Larut (Kunstler).

(26) **D. Wallichii** King and Gamble, *l.c.* 220. *D. undulata* Wall. *Clarke, l.c.* iii. 568.

Tree 30 to 60 ft. tall; branchlets hairy. Leaves coriaceous, oblong or elliptic-oblong acute, base cuneate or round, pubescent beneath at first, midrib depressed above, strong elevata beneath; nerves 18 pairs, slender, elevata beneath; 8 to 14 in. long, 2.5 to 5 in. wide; petioles .5 in. long. Male flowers in cymes .5 to .75 in. long, clustered, 7- to 10-flowered. Calyx .1 in. long, tubular, teeth 4, blunt triangular tomentose all over. Corolla .3 in. long, narrow tubular, tomentose without. Stamens 16 in 2 rows. Female flowers larger, cymes smaller. Calyx 4-angled, deep grooved. Fruit 1 in. through, sub-globose, deeply immersed in the woody 4-angled calyx. *Hab.* Common in forests. Malacca (Griffith). Selangor, Weld's Hill; Damansara Road; Batu Caves. Perak, Batu Togoh (Wray); Larut (Kunstler). Penang, Penara Bukit; Telok Bahang (Curtis). Lankawi, Kwah (Curtis). *Native names:* Taring Pelandok; Sengkawas; Hitam Mati. *Use:* Fruit used in fish poisoning.

(27) **D. rigida** Hiern, *l.c.* 257; King, *l.c.* 222.

Tree up to 40 ft. tall, glabrous except cymes. Leaves very stiff coriaceous, oblong sub-acute, base round; nerves very faint, reticulations very small and conspicuous on both sides; 10 to 18 in. long, 2 to 4 in. wide; petioles .4 to .6 in. long, stout. Male flowers few in small black-tomentose cymes; pedicels stout, .75 in. long. Flowers in bud .4 in. long, and nearly .3 in. wide. Calyx tomentose, teeth 4, broad shallow blunt. Corolla glabrous, tube ovoid, lobes short, blunt. Stamens 20. Fruit depressed, globose, woody rind, 1.75 in. through, green with warm brown fur; calyx leathery, lobes ovate, 1.5 in. across. *Hab.* Perak, Larut; Thaiping (Wray and Kunstler).

(28) **D. oblonga** Wall. *Cat.* 4124; King, *l.c.* 217.

Tree about 30 to 70 ft. tall. Leaves large, coriaceous glabrous, oblong elliptic, shortly apiculate, base round or slightly narrowed; nerves 16 to 18 pairs, inarching, prominent beneath; 7 to 9 in. long, 3 to 3.75 in. across; petioles .4 in. long. Male flowers .5 in. long in short cymes. Calyx with 5 long narrow lobes. Corolla silky-tomentose, tube cylindrical. Stamens 10, in pairs. Female flowers 1 to 5 together, .3 in. long. Calyx-lobes 5, deep, ovate, auricled. Corolla hairy outside. Fruit sub-globose or ovoid

truncate both ends, glabrous when ripe; calyx .75 in. across, lobes oblong, auricled. *Hab.* Common in forests. Singapore, Tanjong Gol; Garden Jungle; Kranji. Malacca, Ayer Panas (Hervey). Dindings, Gunong Tungul. Perak, Larut (Kunstler). Penang (Wallich); Telok Bahang (Curtis).

(29) *D. Helferi* Clarke, *l.c.* iii. 569; *King, l.c.* 218.

A tree about 30 ft. tall; young parts red-pubescent. Leaves coriaceous, elliptic or oblong sub-acute or blunt, above glabrous except the sunk pubescent midrib, beneath sparsely pubescent; nerves 10 to 12 pairs rather slender but elevate beneath; 5.5 to 7.5 in. long, 2.5 to 3.25 in. wide; petioles .4 to .5 in. long, pubescent. Male flowers in dense cymes on a .2 in. long peduncle, all tomentose. Calyx .2 in. long, lobes deep cut, narrow linear. Corolla cylindric, lobes nearly as long as tube, oblong, blunt .25 in. long. Female flowers 1 to 2 sessile, .4 in. long. Calyx dense silky pubescent all over, lobes broad, oblong blunt. Corolla little longer, silky. Fruit ovoid ellipsoid, 1 in. long, glabrous, with the deep 5-lobed plicate calyx at base. *Hab.* Abundant in open country north of Kedah. Lankawi, Kwah (Curtis). Perlis, Kanga; Tebing Tinggi (Ridley). *Distrib.* Mergui, Tenasserim.

(30) *D. areolata* King and Gamble, *l.c.* 228.

Tree 50 to 60 ft. tall. Leaves very coriaceous, oblong sub-acute, base rounded; nerves 7 pairs, faint below, invisible above, reticulations minute conspicuous on both sides and puberulous, as is the prominent midrib; 4.5 to 6 in. long, 1.5 to 1.75 in. wide; petioles .5 to .6 in. long. Male flowers under .5 in. long on the ends of branches in tomentose cymes .5 to 1 in. long. Calyx coriaceous, teeth short. Stamens 21. Female flowers solitary. Calyx velvety, divided to near base in 4 ovate very acute lobes. Corolla glabrous, .6 in. long. Fruit 3 in. through; calyx .5 in. across, lobes 5, short, tooth-like acute. Seed 1.5 in. long. *Hab.* Forests and lowland open country, Johor town. Perak, Goping (Kunstler); Gunong Haram Parah (Scortechini, probably Gunong Arang Parah).

(31) *D. reflexa* King and Gamble, *l.c.* 227.

Tree 50 to 70 ft. tall; branchlets pubescent. Leaves thick coriaceous, oblong to elliptic short-acuminate, base cuneate, glabrous; nerves 8 to 10 pairs elevate beneath, inarching .15 in. from edge, finely reticulate; 5 to 7.7 in. long, 1.75 to 3 in. wide; petioles .4 in. long, stout. Flowers unknown. Fruit hemispheric, velvety yellowish green, .5 in. long; calyx of 4 fleshy tomentose strongly reflexed triangular lobes, .25 in. long. *Hab.* Rare, 300 to 2000 ft. altitude. Perak near Gunong Bubu and Gunong Pondok (Kunstler).

(32) *D. oleifolia* Wall. *Cat.* 4128; *King, l.c.* 224.

Medium tree. Leaves coriaceous, narrow oblong, blunt or sub-acute, base short cuneate, black-hairy densely on shoots,

sparsely on midrib, elevate beneath; nerves invisible, pale beneath, 6.5 in. long, 2 in. wide; petioles .25 in. long. Male flowers in cymes on axillary peduncles .3 in. long. Flowers pedicelled, .5 in. long, black-hairy. Calyx tubular-campanulate, lobes 4, triangular. Corolla tubular tomentose, lobes 4, oblong; anthers 16, sessile. Female flowers on longer peduncles. Fruit depressed-globose, 1.35 in. through, rind woody, tawny-tomentose; calyx thick woody, nearly 1 in. wide, dark tomentose. *Hab.* Local in hill forests. Perak (Kunstler). Penang Hill at 1200 ft. altitude (Curtis). *Distrib.* Burma, Java.

(33) **D. brachiata** King and Gamble, *l.c.* 224.

Small tree 30 to 40 ft. tall. Leaves coriaceous, elliptic-oblong, blunt or sub-acute, base narrowed; nerves 10 to 12 pairs, slender, elevate beneath, midrib prominent; 5 to 9 in. long, 1.5 to 2.5 in. wide; petioles .3 in. long, thick. Cymes peduncled tomentose, .75 in. long. Male flowers .5 in. long. Calyx-lobes 5, ovate acute, tomentose. Corolla twice as long, tube 5-angled, lobes twice as long as tube, 5, linear oblong. Stamens 14. Female flowers .4 in. long in compound umbellate cymes 1.75 in. long. Calyx tomentose of ovate acuminate lobes. Corolla tubular, lobes oblong, 4. Fruit depressed globose, puberulous, .75 in. through; calyx woody thick, 1 in. across. *Hab.* Penang, Waterfall (Curtis), very local.

(34) **D. Kunstleri** King and Gamble, *l.c.* 226.

Glabrous tree 20 to 40 ft. tall. Leaves thickly membranous, elliptic acute, base round; nerves 8 to 12 pairs, slightly elevate beneath, inarching .25 in. from edge; 8 to 12 in. long, 3.5 to 4.5 in. wide; petioles thick, .25 in. long. Female flowers in short cymes, puberulous, 1 in. long. Fruit depressed globular, densely red-tomentose with 4 or 5 vertical ridges, .75 in. long; calyx nearly woody, lobes 4, reniform, cordate, apiculate. *Hab.* Perak, Goping (Kunstler). Rare and little known.

(35) **D. cymosa** Ridl.

Tree. Quite glabrous except inflorescence. Leaves alternate, membranous, black when dry, shining elliptic, narrowed to base; nerves elevate, 8 pairs, sunk above and midrib channelled, reticulations lax, 5 in. long, 2.5 in. wide; petioles .25 in. long. Cymes peduncled below the leaves, much-branched, pale pubescent, 1 in. long. Male flowers 1 in. long, glabrous. Sepals ovate, 4. Corolla-lobes lanceolate acute, 4. Stamens 4; filaments as long as anthers, lanceolate acuminate. Female flowers, ovary globose, glabrous. *Hab.* Pahang, Telok Sisih, Kuantan (Foxworthy). *Native name:* Merangat.

Allied to *D. brachiata* and *oleifolia*, but leaves thin and flowers smaller.

(36) **D. Horsfieldii** Hiern, *l.c.* 193; King, *l.c.* 222.

Tree 30 to 40 ft. tall, glabrous except cymes. Leaves coriaceous, oblong-elliptic or ovate-oblong, sub-acute, base round or

slightly cuneate; midrib, nerves and nervules depressed above, much elevate beneath, nerves 8 to 14 pairs; 6 to 10 in. long, 2·5 to 4 in. wide; petioles ·35 in. long. Cymes 2 or 3 in. long, black, pubescent, sometimes paniced, mostly of male with a few female flowers. Male flowers, calyx ·15 in. long of 4 broad ovate undulate lobes. Corolla cylindric, 4-angled at base, tomentose, ·4 in. long, lobes narrow, elliptic, blunt. Stamens 16 in 2 rows. Female flowers, corolla longer. Fruit ovoid-globular, glabrous, 1 to 1·25 in. through; calyx-lobes large, undulate. *Hab.* Apparently rare. Malacca (Griffith). Perak (Scortechini, Kunstler). *Distrib.* Java.

(37) *D. latisejala* Ridl. *D. paniculata* King, l.c. 226 (not of Dalziel).

Tree 50 to 70 ft. tall, 10 to 15 in. through; branchlets softly hairy. Leaves thinly coriaceous, elliptic-oblong acuminate, base cuneate; midrib slightly depressed above, prominent and angled beneath, hairy on both sides; nerves 5 to 8 pairs strongly elevate beneath, reticulations small, conspicuous on both sides, nerves and reticulations hairy beneath, and in young leaves above also; 4 to 7·5 in. long, 1·65 to 2·5 in. wide; petioles ·25 in. long, stout, wrinkled and grooved softly hairy. Cymes elongate axillary sometimes several together softly hairy, 1·5 in. long, few-flowered with peduncles ·5 in. long. Bracts lanceolate acuminate, ·05 in. long. Pedicels ·1 in. long. Sepals 4 or 5, lanceolate acuminate, ·2 in. long, hairy, membranous. Corolla (male) ·25 in. long, base tubular, globose short; lobes 6, oblong lanceolate, blunt all pubescent silky. Stamens 6 in the tube short; filaments very short attached to tube; anthers longer lanceolate. Fruit ellipsoid, 1·25 in. long, red hairy, when young becoming glabrous; calyx-lobes 5, ovate membranous, reticulate, 1·25 in. long and as wide. *Hab.* Dense jungle, Selangor, Kopsis and Sungei Buloh (Foxworthy). Perak, Gunong Pondok (Kunstler). *Native names:* Singus or Siangus; Berumbang Darat.

(38) *D. nutans* King and Gamble, l.c. 226.

A low shrub 4 to 15 ft. tall. Stem corky, deep grooved; branchlets villous. Leaves thin coriaceous, oblong, shortly caudate-acuminate, base round, glabrous or puberulous beneath or villous on the nerves, 7 to 10 pairs, prominent beneath; 5 to 7 in. long, 1·5 to 2·5 in. wide; petioles ·15 in. long. Cymes umbellate, few-flowered on slender peduncles 4 to 12 in. long, pendent. Male flowers ·5 in. long; pedicels ·1 in. long, brown. Calyx with 5 long lanceolate lobes. Corolla 4 times as long, tubular, lobes 5, deep oblong. Stamens 10. Female flowers on different cymes, shorter. Fruit narrow ellipsoid, hairy, ·6 to 1 in. long. *Hab.* Forests, Johor, Kota Tinggi. Perak, Larut and Kinta hills (Kunstler).

(39) *D. pyrifera* Ridl. *Journ. Roy. As. Soc. S. Br.* 50, p. 117.

Tree about 30 ft. tall, bark black. Leaves coriaceous, glabrous, elliptic blunt or sub-acute, base round, 11 to 13 in. long, 4 in. wide,



midrib depressed above, elevate beneath as are 13 pairs of nerves, reticulations conspicuous; petioles thick, .25 in. long. Cymes on trunk and branches, .75 in. long, hairy, much-branched. Calyx-lobes 5, ovate, hairy, .1 in. long. Corolla in male flask-shaped, .5 in. long, lobes round, cream colour, glabrous. Stamens 30, in pairs. Fruit pear-shaped, green, white inside, 3.5 in. long, 2 in. through; calyx .5 in. long, green, lobes ovate acute, glabrescent. Seeds 10. *Hab.* Local in dense forests. Singapore, Bukit Timah (Ridley).

(40) **D. caliginosa** *Ridl. Trans. Linn. Soc.* iii. 318.

Tall tree; bark black; branchlets pubescent. Leaves elliptic-oblong, acute; nerves 13 pairs with midrib pubescent beneath; 8 in. long, 3 in. wide; petioles .25 in. long, pubescent. Flowers crowded in tufts of cymes on trunk densely black-hairy. Male flowers, calyx saucer-shaped, lobes 4, ovate blunt outside and edge black-hairy. Corolla urceolate, silky-white, .25 in. long, lobes recurved, 4, ovate. Stamens 16 in pairs. Fruit small, globose. Female flowers unknown. *Hab.* Rare in forests. Pahang, Tahan River (Ridley).

(41) **D. trunciflora** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 67.

A small tree. Leaves thinly coriaceous, elliptic-lanceolate acuminate, base slightly narrowed, glabrous; nerves 11 pairs, reticulations distinct; 9 in. long, 3 in. wide; petioles .12 to .25 in. long. Cymes very short in large tufts on the trunk; peduncles .12 in. long red-hairy. Male flowers unknown. Females, calyx-lobes 4 ovate, sub-acute, nearly .12 in. long, hairy. Corolla very small, hairy. Fruit ovoid-oblong, glabrous, black, 1 in. through, tip only hairy; calyx-lobes .25 in. long, triangular, reflexed, densely yellow-hairy. *Hab.* Forests. Pahang, Tahan River; Pulau Tioman (Burkill). Negri Sembilan, Tampin Hill (Goodenough). Dindings, Gunong Tungul. Perak, Lenggong.

(42) **D. cordifolia** *Roxb. Corom. Pl.* i. 50. *D. montana* *Roxb. l.c.* 48.

Shrub or small tree, thorny. Leaves membranous, oblong shortly acuminate blunt, base broad, cordate or truncate, 2 in. long, .75 in. wide; petioles slender, .2 in. long. Male flowers in small cymes, .25 to .75 in. long, pubescent. Calyx .1 in. deep, lobed. Corolla urceolate. Stamens 16. Female flowers solitary on peduncles .25 in. long. Calyx deeply 4-fid. Fruit 1.5 in. through, orange, globose, smooth. Calyx .5 in. across, lobes short ovate, triangular, reflexed. *Hab.* Lankawi, Kwala Kwah (Haniff). *Distrib.* India, Siam, Malay islands, Australia.

## ORDER LXXXIX. STYRACEÆ.

Trees or shrubs. Leaves alternate, simple. Flowers in simple or branched axillary racemes or spikes, or solitary, white, rarely yellow. Calyx gamosepalous, tube more or less adnate to ovary, 4- to 5-toothed or truncate. Petals 4 or 5, tube short or 0. Stamens adnate to petals, equal, or double or very many, 1 or many rows; filaments free or connate. Ovary inferior or superior, 2- to 5- or 1-celled; style filiform. Stigma capitate. Fruit drupe with 1, rarely 2 to 3 seeds. Seed albuminous. Species about 450, Asia, Australia, America.

Stamens 10 in 1 row . . . . .	1. STYRAX
Stamens many in several rows.	
Stamens free; corolla-tube very short . . . . .	2. SYMPLOCOS
Stamens in a tube; corolla-tube elongate . . . . .	3. CORDYLOBLASTE

## 1. STYRAX, Linn.

Tree (or shrubs) usually stellate tomentose all over except the upper side of the leaves. Leaves serrulate or entire. Flowers white, fragrant in lax axillary racemes or panicles. Calyx campanulate, truncate or with 5 minute teeth. Corolla-tube short, lobes long, oblong, 5. Stamens 10, in 1 row from the base of the corolla-tube; filaments flat; anthers linear long. Ovary at first nearly free, 3-celled, later 1-celled; ovules few; styles subulate; stigma capitate. Fruit globose or ellipsoid; pericarp firm, fleshy within woody. Seed 1, rarely 2. Species about 60, warm regions in Asia and America, a few in temperate regions, Europe and Asia.

Leaves green beneath, serrulate; fruit ellipsoid . . . . . (1) *S. serrulatum*

Leaves white beneath; base round, entire; fruit globose, flattened at both ends . . . . . (2) *S. benzoin*

Leaves white beneath; base cuneate with orange stellate tomentum.

Leaves and branches covered with red stellate tomentum . . . . . (3) *S. Ridleyanum*

Leaves large; fruit globose or ovoid, top not flat . . . . . (4) *S. crotonoides*

(1) *S. serrulatum* Roxb. *Fl. Ind.* ii. 415; *King, l.c.* 251. *S. Porteriana* Wall. *Cat.* 4401.

Trees 25 to 35 ft. tall or more, stellate grey pubescent. Leaves membranous, ovate or ovate-lanceolate acuminate, base round, edges serrate, glabrous except a few stellate hairs by the nerves, 6 to 8 pairs with nervules and reticulations prominent, 1.5 to 3 in. long, 1.25 to 1.75 in. wide; petioles .2 in. long, pubescent. Racemes terminal on short branches, 6- to 8-flowered or fewer, rachis white, pubescent. Calyx campanulate .15 in. long, white pubescent. Corolla .15 in. long, cylindric pubescent, lobes oblong sub-acute. Fruit ellipsoid, .4 to .5 in. long, grey-pubescent. *Hab.* Woods, local in northern parts. Perak (Kunstler). Penang (Wallich); Waterfall (Curtis). *Distrib.* India, Burma.

(2) **S. benzoin** Dryand. *Phil. Trans.* lxxvii. 308, t. 12; *King, l.c.* 252.

High tree about 60 to 80 ft. tall and 2 ft. through; bark smooth, grey; branchlets pubescent. Leaves chartaceous, elliptic acuminate, light green above, white-pubescent beneath, entire, base rounded; nerves 6 to 8 pairs, conspicuous beneath, nervules transverse; 4 to 5 in. long, 1.5 to 2.5 in. wide; petioles .3 to .5 in. long. Racemes paniced, terminal and axillary, pubescent. Calyx cupular, .15 in. long. Corolla .4 in. long, white, fragrant pubescent, lobes oblong-linear, acute. Fruit depressed globose,



FIG. 100.—*Styrax benzoin*.

flattened at both ends, hard, pale green glaucous pubescent, .7 to .8 in. through. Seeds 1 or 2, brown. *Hab.* In forests; common. Singapore, Selitar; Bukit Timah; Sungei Buluh. Malacca, Ayer Panas (Griffith); Merlimau; Sungei Hudang (Cantley). Negri Sembilan. Bukit Kupayiang (Cantley); Kopis (Kinsey). Selangor, Kwala Lumpur, Sungei Buluh (Foxworthy). Perak, Batang Padang district; Batu Putih and Gapis (Wray); Trolah (Colomb). *Distrib.* Sumatra, Java. *Native name:* Kemeniyan. *Use:* This tree supplies the Sumatra Benzoin or Gum benjamin used in incense and medicine.

(3) **S. Ridleyanum** Perkins, *Pflanzenreich, Styraceæ*, p. 61.

Tree; branches, racemes, midrib of leaves, and nerves, grey, covered with orange stellate hair tufts. Leaves thin, elliptic-oblongate narrowed to base and often unequal, tip shortly

cuspidate, acute above, glabrous beneath, white; nerves 8 to 10 pairs elevate beneath, nervules and reticulations prominent; 6 in. long, 2.5 to 3 in. wide; petioles .25 in. long. Racemes in upper axils 3 in. long. Flowers shortly pedicelled with 2 bracts, 1 often leaf-like, the upper one linear acute, .08 in. long. Calyx campanulate, edge undulate, .12 in. long. Petals lanceolate obtuse, .25 in. long, white puberulous silky outside. Stamens 10, pilose. Ovary conic, grey-tomentose; style glabrous. *Hab.* Pahang, Bukit Goh, Kuantan (Foxworthy). *Distrib.* East Sumatra. *Native name:* Kemeniyan Burong.

(4) *S. crotonoides* Clarke, in *Hook fil. F.B.I.* iii. 589; King, *l.c.* 253.

Tree 60 to 80 ft. tall, about 20 in. through; branchlets and underside of leaves grey-pubescent with rusty hairs. Leaves chartaceous oblong-acuminate, base cuneate, glabrous above; nerves depressed reddish, beneath elevate 10 pairs; 5 to 7 in. long, 2.5 to 4 in. wide; petioles .2 in. long. Racemes axillary and terminal, paniced, 4 to 8 in. long, rusty pilose and white tomentose. Calyx cupular, .2 to .25 in. long, brown. Corolla .4 in. long, white, lobes broader and blunter than in *S. benzoin*. Fruit ovoid mucronate grey-pubescent. *Hab.* Not common in forests. Singapore (Wallich, Cantley). Pahang, Bukit Gelugur, Chenei; near Kwantan (Foxworthy). Perak, Ulu Kal; and Batang Padang district (Kunstler); Sungkai, Bikam Reserve (Foxworthy). *Distrib.* Sumatra. *Native names:* Kemeniyan Kara; Kemeniyan Bukit.

## 2. SYMPLOCOS, Linn.

Trees or shrubs, rarely big. Leaves alternate, drying bright yellow or green, usually toothed or crenate. Flowers white, rarely yellow, small, in axillary racemes usually paniced. Bracts sometimes large and in bud forming a cone. Calyx-tube adnate to ovary, small, campanulate, lobes 5 (rarely 4). Corolla with a very short tube, lobes rounded, 5, free nearly to base. Stamens very numerous 30 to 100 adnate to the base of the corolla, filiform, sometimes in connate bundles. Ovary inferior 2- to 5-celled; style filiform; stigma capitate. Drupe oblong or ampulliform, base sub-globose narrowed upwards, 1- to 3-seeded. Seed 1. Embryo straight or curved in albumen. Species about 300, tropical and sub-tropical, Asia, Australia and America.

i. PALURA. Fruit flask-shaped; embryo curved.

Inflorescence compound.

- |  |                            |
|--|----------------------------|
| Branches paniced, racemose . . . .     | (1) <i>S. odoratissima</i> |
| Branches simple, racemose . . . .      |                            |
| Racemes dense, red-tomentose; pedicels |                            |
| very short, thick . . . .              | (2) <i>S. fulvosa</i>      |
| Racemes red villous; pedicels slender, |                            |
| .2 in. long . . . .                    | (3) <i>S. nivea</i>        |
| Racemes scurfy; leaves obovate . . .   | (4) <i>S. pulverulenta</i> |

- Racemes hairy; leaves lanceolate, caudate, narrow . . . . . (5) *S. caudata*
- Racemes glabrous or slightly pubescent.
- Leaves over 4 in. long; calyx-lobes glabrous . . . . . (6) *S. monticola*
- Leaves under 4 in. long; calyx-lobes pubescent; racemes very short condensed . . . . . (7) *S. fasciculata*
- Branches of inflorescence spicate.
- Leaves nearly glabrous all over; endocarp thin . . . . . (8) *S. spicata*
- Leaves beneath and inflorescence red-villous; endocarp bony . . . . . (9) *S. ferruginea*
- Racemes simple, very short head-like; branches angled . . . . . (10) *S. Ridleyi*
- ii. LODHRA. Fruit oblong; embryo straight.
- Racemes paniced, long-pubescent; leaves glabrous or nearly so. . . . . (11) *S. celastrifolia*
- Leaves prominently crenate . . . . .
- Racemes lax, solitary or few in a panicle, glabrous.
- Leaves nearly or quite entire; coriaceous, narrow . . . . . (12) *S. adenophylla*
- Leaves entire chartaceous, broad, 3 in. long . . . . . (13) *S. perakensis*
- Leaves entire, chartaceous broad, 6 in. long. . . . . (14) *S. pruniflora*
- Racemes short paniced pubescent.
- Leaves entire oblong glabrous; fruit glabrous. . . . . (15) *S. concolor*
- Leaves and stem hairy; fruit villous . . . . . (16) *S. Brandiana*
- Inflorescence unbranched racemose.
- Racemes slender 2 to 3 in. long, few-flowered; calyx-lobes very large . . . . . (17) *S. calycodactylos*
- Racemes very short.
- Leaves densely coriaceous . . . . . (18) *S. ophirensis*
- Leaves chartaceous, long acuminate, base cuneate . . . . . (19) *S. Curtisii*
- Leaves chartaceous, large ovate, subcordate, glabrous . . . . . (20) *S. crassipes*
- Leaves long-acuminate, serrate, base round, red pilose beneath . . . . . (21) *S. penangiana*
- Inflorescence spicate with large ovate, silky bracts.
- Drupe large over 1 in. long; endocarp 8-ridged.
- Leaves sub-glabrous denticulate under 2 in. across . . . . . (22) *S. cerasifolia*
- Leaves sub-glabrous entire, 3 in. across . . . . . (23) *S. rigida*
- Leaves red-hairy beneath; fruit 4 in. long . . . . . (24) *S. rubiginosa*
- Drupe 5 in. long, not ridged; bracts smaller.
- Leaves glabrous, crenate . . . . . (25) *S. pyriforma*
- (1) *S. odoratissima* Choisy, *Zoll. Syst. Verz.* 136; *King, l.c.*

233.

Tree 60 to 70 ft. tall, 18 to 24 in. through. Leaves thinly coriaceous, elliptic or elliptic-obovate, short-acuminate, base cuneate, glabrous entire or serrate; nerves 8 to 10 pairs, slender elevate; 3 to 6 in. long, 2 to 2.5 in. wide; petioles .4 to .6 in. long. Panicles of racemes axillary in upper leaves, grey-pubescent, 1.5 to 2 in. long. Calyx pubescent, tube .05 in. long, lobes as long,

round. Corolla-tube very short, lobes ovate obtuse, .15 in. long, pubescent on back, white. Stamens in 5 bundles 80 to 100. Ovary villous. Fruit ampulliform, .5 in. long, corky, rusty-pubescent. Seeds 1 to 3; embryo curved. *Hab.* In woods. Rare. Singapore, Bukit Timah (Ridley). Perak, Ulu Bubong and Ulu Kal (Kunstler). *Distrib.* Java. Sumatra, Borneo.

(2) *S. fulvosa* King and Gamble, *l.c.* 233.

Tree 150 ft. tall; young branches densely red-tomentose. Leaves chartaceo-coriaceous elliptic, abruptly long blunt acuminate, base cuneate glabrous, edges crenate-serrate; nerves 6 to 8 pairs; reticulations many, conspicuous; 3 to 4.5 in. long, 1.25 to 2 in. wide; petioles .75 in. long. Racemes 1 to 2 in. long in tripartite sessile panicles densely red-tomentose. Calyx dense-tomentose; lobes rounded. Corolla-tube short, lobes ovate-oblong, .15 in. long, glabrous. Stamens in bundles. Ovary and style glabrous. *Hab.* Perak (Scortechini).

Very rare. I have not seen it.

(3) *S. nivea* Brand, *Pflanzenreich* iv. *Symplocaceæ*, 36; King, *l.c.* 234.

Tree 40 to 50 ft. tall. Leaves chartaceo-coriaceous, glabrous, entire, slightly undulate; nerves fine, conspicuous 5 or 6 pairs inarching far from edge; 3 to 4 in. long, 1 to 1.75 in. wide; petioles .3 to .4 in. long. Racemes 2 in. long, paniced, axillary and terminal, rusty-tomentose. Calyx-lobes oblong blunt, .1 in. long, glabrous. Corolla pure white, .25 in. across. Stamens 60, as long as lobes. *Hab.* Local in hill forests, Penang, Muka Head; Pulau Betong and the Hill (Curtis).

(4) *S. pulverulenta* King and Gamble, *l.c.* 234.

Big tree; branchlets and inflorescence golden-mealy-scaly. Leaves membranous, obovate, abruptly short-acuminate, base cuneate, entire, glabrous except nerves 8 to 9 pairs running to margin, reticulations transverse; 5 to 7 in. long, 2 to 3 in. wide; petioles .7 to .8 in. long. Racemes lax, 1.5 in. long, 3 to 5 in an axillary panicle 2 in. long. Calyx .06 in. long, funnel-shaped, lobes short round. Corolla pulverulent-pubescent, yellow. Stamens 200 or more in 5 bundles. *Hab.* Singapore, in swampy forests, Chan Chu Kang (Ridley). *Native name:* Domun.

(5) *S. caudata* Wall. *Cat.* 4413; Brand, *Pflanzenreich*, *l.c.* 42 (*in part*).

Tree. Leaves coriaceous narrow-lanceolate, long caudate, base narrowed, edge undulate obscurely denticulate; nerves 4 pairs very faint, midrib elevate; 2 to 3 in. long, .4 to .75 in. wide; petioles .12 in. long. Flowers unknown. Drupes on axillary raceme; rachis hairy, 1 in. long about 4, flask-shaped, .3 in. long, green or bluish, base round, .15 in. through, narrowed above. Calyx-lobes very short tooth-like. *Hab.* Selangor, Semangkok Pass at 4000 ft. altitude (Ridley).

I only got a fruiting specimen of this. It resembles Wallich's *caudata* from Mt. Sylhet, but the leaves are more coriaceous and nerves almost invisible. The Chinese and some Indian plants referred to this by Brand appear to me utterly different.

(6) **S. monticola** King and Gamble, *l.c.* 235.

Shrub or treelet 20 ft. tall, 3 in. through. Leaves chartaceous, elliptic-acuminate, base cuneate or rounded, serrate, glabrous; nerves 6 to 8 pairs meeting in a curved intramarginal, reticulations transverse; 4 to 6 in. long, 2 to 2.5 in. wide; petioles .25 in. long. Racemes .5 to 1.5 in. long, 6- to 8-flowered, glabrous, fascicled in axils of lower leaves. Calyx-lobes .1 in. long, as long as tube, glabrous, round. Corolla-lobes oblong obtuse, .2 in. long. Stamens more than 80 in 5 bundles. Ovary glabrous or slightly pubescent. *Hab.* Mountains 4000 to 4600 ft. altitude. Perak (Kunstler).

Very rare. I have not seen it.

(7) **S. fasciculata** Zoll. *Syst. Verz.* 136; King and Gamble, *l.c.* 235.

A slender tree about 20 to 50 ft. tall, 6 to 15 in. through. Leaves thinly membranous, oblong-lanceolate, long-acuminate mucronate, base round or rhomboid, glabrous except midrib beneath, minutely pilose, serrate; nerves 5 to 7 pairs, thin inarching; 2 to 4 in. long, .7 to 1.5 in. wide; petioles .2 in. long, pilose. Cymes or short pubescent racemes fascicled in axils about .25 in. long, many-flowered. Calyx-lobes .05 in. long, pubescent. Corolla very small, glabrous, tube hardly any, lobes hardly .1 in. long, white. Stamens 20 to 25 in 5 bundles. Fruit ampulliform .25 in. long, .15 in. through, deep blue. *Hab.* Open woods, secondary growth, common in the lowlands, Singapore, Tanglin; Bukit Timah. Malacca, Sungei Hudang and Brisu (Holmberg). Negri Sembilan, Johol. Selangor, Kwala Lumpur; Batu Caves. Perak, Thaiping; Chankat Jerin (Wray); Ipoh (Curtis). *Distrib.* Java, Sumatra, Borneo. *Native names:* Merpadi Payah; Jehuh; Lukot; Medang Melukok.

(8) **S. spicata** Roxb. *Hort. Beng.* 40; King, *l.c.* 236. var. *malasica* Clarke, in *Hook fil. F.B.I.* iii. 573. var. *attenuata* Clarke.

Tree, 15 to 20 ft. tall. Leaves coriaceous-chartaceous elliptic or oblong lanceolate acuminate, base cuneate serrate, glabrous; nerves 4 to 6 pairs, slender branched near margin; 3 to 3.5 in. long, 1.5 in. wide; petioles .2 in. long, thick. Spikes in axillary panicles 1.5 in. long, closely pubescent. Calyx-lobes round pubescent or sub-glabrous. Corolla white with a small yellow spot at base, lobes ovate-orbicular. Stamens brown about 40, outer ones longer than corolla. Drupe globose, olive-coloured, with a short calyx rim, .15 in. long. *Hab.* Open country and hills. Variable in form of leaf according to locality, Pahang, Pekan (common). Malacca, Bukit Sabukor and Jus (Derry). Selangor,

Menuang Gasing (Kloss). Perak, Thaiping Hills 2500 to 3000 ft. altitude (Kunstler). Leaves larger, 6 in. long, 2.5 in. wide entire; spikes glabrous.

var. *acuminata*. Leaves long acuminate or caudate, coriaceous, spikes shorter red-hairy. Selangor, Gunong Mengkuang Lebah. (Robinson). Kedah (Kunstler); Kedah Peak (Robinson); Pahang, Wray's Camp, Tahan, a mountain form. *Distrib.* India, Java.

There is a great variation in the plants included under this species. The Indian forms have often large, thin, strongly toothed leaves.

(9) *S. ferruginea* Roxb. *Hort. Beng.* 40; *King, l.c.* 238.

Tree, 50 to 60 ft. tall, 1 ft. through; branchlets densely red-villous. Leaves coriaceous elliptic-lanceolate acuminate, base cuneate, glabrous shining above, yellow and red villous especially on nerves beneath, minutely denticulate; nerves 12 to 14 pairs, prominent beneath; 5 to 8 in. long, 1.75 to 3 in. wide; petioles .3 in. long, red-villous. Spikes paniced, 1.5 to 3 in. long, red-villous. Calyx-lobes round ovate, .1 in. long, pubescent. Corolla white, lobes .1 in. long, oblong blunt. Stamens 40 to 70 in 5 fascicles. Fruit ampulliform or sub-globose, .2 in. long; endocarp 12- to 14-ribbed. *Hab.* In woods. Pahang, Pekan. Malacca (Maingay). Negri Sembilan, Seriting (Foxworthy). Perak, Goping; Larut Hills (Kunstler); Kwala Kangsa (Wray). Penang (Wallich); Ayer Hitam (Curtis); Waterfall; Batu Feringhi. *Distrib.* Assam. *Native names*: Ganchil Kechil; Medang hitam.

(10) *S. Ridleyi* King and Gamble, *l.c.* 239.

A fair-sized tree quite glabrous; branchlets angled. Leaves coriaceous, oblong to ovate acute or short acuminate, base shortly narrowed, obscurely toothed at tip; nerves 8 to 9 pairs, with reticulations slightly elevate on both sides; 3 to 4 in. long, 1 to 1.5 in. wide; petioles .3 in. long. Racemes sessile axillary, very short and head-like, .25 in. long; bracts ciliate orbicular. Calyx-lobes orbicular, ciliate. Corolla-lobes ovate, white, .15 in. long. Stamens 50 in bundles. Ovary villous. *Hab.* Very rare, near the sea, in woods, Singapore, Kranji (Ridley).

(11) *S. celastriifolia* Griff. Clarke, in *Hook fil. F.B.I.* iii. 575; *King, l.c.* 239.

Tree glabrous. Leaves chartaceous, elliptic-ovate acuminate blunt, base cuneate, edge prominently crenate; nerves irregular 6 to 8 pairs forming a network at the tip, fine conspicuous on both sides; 2.5 to 3 in. long, 1.5 to 1.75 in. wide; petioles .2 in. long. Racemes lax in a pubescent panicle 2 in. long. Flowers distant, 12 to 16 in a raceme, white, fragrant. Calyx-lobes oblong blunt. Corolla .3 in. across, lobes rounded ovate. Stamens 40 to 50 in bundles of 5. Drupe ovoid-ellipsoid, .25 in. long. Seeds 1 to 3, embryo straight. *Hab.* Woods. Singapore, Bukit Mandai and Jurong. Malacca (Griffith). Penang, Batu Feringhi (Curtis). *Distrib.* Sumatra, Bangka, Borneo.



(12) *S. adenophylla* Wall. *Cat.* 4427; *King, l.c.* 240.

Shrub or a small tree about 20 ft. tall, 3 in. through; young parts glandular, pubescent. Leaves coriaceous, lanceolate caudate, tip blunt, edge minutely crenulate, base long, narrowed; nerves 4 to 5 pairs, faint, widely inarching some way from edge, glabrous; 3 to 3.5 in. long, .5 to .75 in. wide; petioles .4 in. long. Racemes solitary or 2 or 3 in a panicle, axillary, 1.5 to 2 in. long, red-pubescent. Flowers small, scattered. Calyx nearly glabrous, .05 in. long; teeth short. Corolla yellow, .15 in. across, lobes broad,



FIG. 101.—*Symplocos adenophylla*.

ovate, round. Stamens about 40 in 5 bundles. Fruit oblong, yellow, .25 in. long. *Hab.* Common in sandy spots near the sea and up to 2500 ft. altitude. Singapore, by the sea. Changi; Pasir Panjang, very common. Malacca. Selangor, Perak, Penang Hill at 2500 ft. altitude (Wallich, Maingay, Curtis); Kedah Peak.

var. *virgata* Wallich, has leaves up to 5 in. long, .2 in. wide, elliptic caudate, Singapore and Malacca. *Distrib.* Borneo, Sumatra, Nanka. *Native name:* Semugum. B

var. *montana* Ridl. Shrub 3 to 4 ft. tall. Leaves coriaceous lanceolate caudate, base shortly narrowed; midrib depressed above, elevate beneath, nerves very fine and inconspicuous; 7 or 8 pairs inarching within margin, edge entire or minutely crenulate; 4 to 4.5 in. long, 1.25 to 1.5 in. wide; petioles thick, .25 in. long. Racemes in fruit about 1 in. long, red-scurfy in uppermost axils. Flowers unknown. Drupe oblong, .2 in. long, .1 in. through.

*Hab.* Mountains, Selangor, Semangkok Pass; Bukit Kutu. Pahang, Gunung Tahan 3000 to 6000 ft. altitude (Robinson).

This differs from typical *S. adenophylla* in the nerves being much more numerous and leaves larger and more coriaceous and fruit larger. I have seen no flowers, so it may prove specifically distinct.

(13) ***S. perakensis*** King and Gamble, *l.c.* 241.

Glabrous tree, 50 to 60 ft. tall, 15 to 20 in. through. Leaves chartaceous elliptic-ovate, caudate acute, base cuneate, entire; nerves 6 to 7 pairs, slender with reticulations faint but visible both sides; 2 to 3.5 in. long, 1 to 1.5 in. wide; petioles .2 in. long. Racemes slender, solitary or in short panicles about 1 in. long, puberulous. Flowers scattered, pedicelled. Calyx-lobes round, pubescent, as long as tube, .05 in. long. Corolla .1 in. across, white, lobes oblong rounded. Stamens 40 in 5 bundles. Drupe cylindrical, .4 to .5 in. long, hairy on top and calyx-lobes. *Hab.* Mountain forests and lowland jungle, Pahang, Temerloh (Foxworthy). Selangor, Kwala Lumpur. Perak, Goping and Ulu Bubong (Kunstler); Thaiping Hills, Waterfall to Maxwell's Hill (Wray). *Native name*: Meruas.

(14) ***S. pruniflora*** Ridl. *Journ. F.M.S. Mus.* iv. 46.

A tree about 25 ft. tall. Leaves thinly coriaceous, lanceolate acuminate, glabrous, base slightly narrowed, entire; nerves 4 to 6 pairs inarching; 4 in. long, 1 to 1.5 in. wide; petioles .25 in. long. Racemes 2 or 3 in a cluster or shortly peduncled, 1 in. long, brown-scurfy; pedicels very short. Calyx scurfy, .12 in. long, lobes round, very small. Corolla white, .25 in. across, lobes round. Stamens 40. Fruit ovoid. *Hab.* Rare in mountain forests, Pahang, Telom (Ridley).

(15) ***S. concolor*** Brand, *Pflanzenreich*, *l.c.* 65; King, *l.c.* 242.

Tree 30 to 40 ft. tall. Leaves thinly coriaceous oblong acuminate or short cuspidate, base shortly narrowed, glabrous, entire or obscurely toothed; nerves 6 to 7 pairs, faint; 3 to 4 in. long, 1 to 1.5 in. wide; petioles .1 in. long. Racemes short, paniced, .5 to 2 in. long, golden-pubescent, 10- to 20-flowered. Calyx funnel-shaped, .05 in. long, lobes short, round. Corolla .15 in. across, lobes oblong. Stamens 60, little longer. Ovary pubescent. Drupe oblong, glabrous, .3 in. long, .15 in. through. *Hab.* Penang, Penara Bukit at 2000 ft. altitude (Curtis). Rare. *Distrib.* Kopah (South Siam).

(16) ***S. Brandiana*** King and Gamble, *l.c.* 242.

Tree 15 to 20 ft. tall; stem 4 to 6 in. through; branchlets red-tomentose with long stiff hairs. Leaves membranous lanceolate, ovate-oblong, caudate-acuminate, base round or cordate, entire, glabrous above, pilose beneath; nerves about 8 pairs elevate beneath; 3 to 6 in. long, 1 to 2 in. wide; petioles minute or none. Racemes .2 to .3 in. long, 2-flowered, dense red-hairy up to panicles, 1.5 in. long. Calyx hairy, lobes linear-lanceolate. Corolla yellowish

green (Wray), white (King); lobes elliptic blunt, .15 in. long. Stamens 60 to 70 in 5 bundles. Fruit oblong-cylindric constricted about the middle, light blue, hairy, .8 in. long, .3 in. through. *Hab.* Mountain forests up to 5000 ft. altitude. Perak, Thaiping Hills from Waterfall (Wray) to Cottage (Curtis).

(17) **S. calycodactylos** Brand, *Pflanzenreich*, l.c. 63; King, l.c. 243.

Branches red-villous. Leaves membranous, oblong-lanceolate, caudate acuminate, base round, denticulate bristly all over, densely so on nerves beneath, 6 to 8 pairs, and on midrib and petiole; 4 to 5.5 in. long, 1.5 to 2 in. wide; petioles .2 in. long. Racemes few, solitary, 3 in. long, densely villous of 4 to 5 flowers; pedicels .5 in. long. Calyx-tube short, densely red-bristly, lobes linear, longer .25 in. long. Corolla .5 in. across, lobes obovate. Stamens 80. *Hab.* Perak, Waterloo (Curtis). Very rare, in forest.

(18) **S. ophirensis** Clarke, l.c. iii. 479; King, l.c. 243.

A bush. Leaves coriaceous elliptic or elliptic-lanceolate, narrowed slightly to both ends, blunt, base often rounded, glabrous entire; nerves 8 to 10 pairs raised on both sides as are reticulations; 2 to 4 in. long, 1 to 1.5 in. wide; petioles .1 to .2 in. long. Racemes .3 to .4 in. long, pubescent in upper axils. Flowers 3 to 7, crowded. Calyx-lobes pubescent, ovate, .05 in. long, tube as long. Corolla .25 in. across, white, lobes oblong blunt. Stamens 30 to 60 in bundles of 6 to 12. Fruit ovoid cylindric, blue purple, .3 to .4 in. long. *Hab.* Mountain tops 3000 to 5500 ft. altitude. Malacca, Mt. Ophir (all collectors). Selangor; Gunong Mengkuang Lebah (Robinson); Hulu Semangkok. Perak, Gunong Bubu (Wray).

(19) **S. Curtisii** Oliv. Hook.  *Ic. t.* 1757; King, l.c. 244.

Straggling tree about 15 ft. tall or shrub, glabrous. Leaves membranous, elliptic cuspidate acuminate, base narrowed, entire or very obscurely denticulate; nerves 5 to 7 pairs strongly elevate beneath; 4 to 9 in. long, 1.5 to 3 in. wide; petioles .2 to .4 in. long. Racemes short, crowded headlike about .25 in. long of 5 flowers. Calyx-tube funnel-shaped, .1 in. long, lobes ovate, blunt, as long. Corolla .25 in. across, lobes oblong, white. Stamens 60 or more, longer than corolla. Drupe cylindric-oblong, bright blue, .5 to .8 in. long. *Hab.* Mountain forests to 5500 ft. altitude. Pahang, Telom. Negri Sembilan, Senawan (Dennys). Selangor. Semangkok Pass. Perak, Thaiping Hills 2500 ft. altitude (Wray) to Gunong Hijau (5500 ft. altitude). Penang, Penara Bukit (Curtis).

(20) **S. crassipes** Clarke, l.c. iii. 580; King, l.c. 245.

Leaves thickly chartaceous, broad elliptic or elliptic-lanceolate, abrupt acuminate, base round, sub-acute; nerves 9 to 10 pairs, elevate beneath; 6 in. long, 3 in. wide; petioles .15 in. long, very thick. Racemes axillary, 4-flowered; pedicels very short, densely

red-tomentose. Calyx-lobes ovate, .075 in. long. Corolla-lobes .1 to .15 in. long, obtuse. Stamens about 30. *Hab.* Malacca, Mt. Ophir (Maingay). Very rare and local.

(21) *S. penangiana* King and Gamble, *l.c.* 245.

Small tree; branches thickly red-woolly. Leaves chartaceous, lanceolate caudate serrate; base shortly narrowed, glabrous above; nerves and midrib depressed above, raised beneath, densely hairy, 4 to 7 in. long, 1 to 1.25 in. wide; petioles .15 in. long, hairy. Raceme short, dense head-like, .25 in. long. Bracts and calyx densely red-hairy. Calyx-lobes oblong, blunt, .12 in. long. Corolla .25 in. wide, lobes oblong. Stamens 30. *Hab.* Penang, West Hill 2500 ft. altitude (Curtis). Very rare.

(22) *S. cerasifolia* Wall. *Cat.* 4434; King, *l.c.* 245.

Tree 60 to 80 ft. tall; stem 20 in. through, sub-glabrous. Leaves coriaceous-chartaceous, elliptic-lanceolate, acuminate, base narrowed, crenate-serrate, glabrous except midrib and nerves 6 to 8 pairs, elevate beneath, pilose, inarching .1 in. from edge; 5 to 7 in. long, 1 to 2 in. wide; petioles .5 to .7 in. long. Spikes numerous, axillary and sub-terminal, stout-pubescent. Bracts broad round, villous. Flowers 12 in a spike. Calyx-lobes lanceolate acute, pilose. Corolla .25 in. across, white; lobes oblong-acute. Stamens 30 or more. Drupe oblong, 1.5 to 2 in. long, 1 in. through, yellow corky. *Hab.* Forests to 4000 ft. altitude, Malacca (Maingay). Perak, Thaiping Hills at 2500 ft. altitude (Wray). Penang (Wallich); Moniot's Road; Penara Bukit (Curtis).

(23) *S. rigida* Clarke, *l.c.* iii. 581; King, *l.c.* 246.

Big tree 60 to 80 ft. tall, 18 to 24 in. through, glabrous except inflorescence. Leaves coriaceous, oblong-lanceolate, acute or short acuminate, entire or minutely serrulate; base cuneate; nerves 10 to 13 pairs, elevate beneath, reticulations transverse, midrib stout; 6 to 12 in. long, 2.5 to 5 in. wide; petioles .7 to 1.3 in. long. Spikes in terminal axils 1.5 to 2 in. long, dense; rachis pubescent. Bracts broad, ovate, silky grey, deciduous. Calyx-lobes 4, ovate acute. Corolla white, about .25 in. across. Stamens 60 in 5 bundles. Drupe ovoid-oblong, dull yellow, "dark blue when ripe" (King); 1 to 1.5 in. long, .75 to 1 in. through. *Hab.* Woods, not rare. Singapore, Changi. Malacca, Merlimau (Cantley). Selangor, Semangkok Pass; Bintang (Goodenough). Perak, Thaiping Hills to 2500 ft. altitude (Wray, Curtis); Goping (Kunstler). Tapah. *Native names:* Kelat Jambu Putih; Laga Egan.

(24) *S. rubiginosa* Wall. *Cat.* 4432; King, *l.c.* 249.

Large shrub or small tree up to 30 ft. tall. Leaves coriaceous, bright green, elliptic-lanceolate acuminate; base narrow, entire or dentate in upper part, glabrous above midrib and nerves, elevate beneath, 10 to 13 pairs, appressed, hairy; 5 to 11 in. long, 2 to 4 in. wide; petioles thick, .5 to 1 in. long, when young pubescent.

Spikes simple in upper axils, dense, 10- to 12-flowered, pubescent. Bracts ovate round, caducous, forming a cone in bud as in *S. rigida*. Calyx-lobes ovate-lanceolate acute, as long as tube. Corolla white, .3 in. across. Stamens about 30 in 5 bundles. Drupe oblong, .4 in. long, yellow, faintly ridged. Seeds 3. *Hab.* Woods. Singapore, Bukit Mandai; Bukit Timah; Changi (Hullett). Johor, Batu Pahat. Negri Sembilan, Bukit Tinggi. Perak, Gopong and Ulu Bubong (Kunstler). Penang (Wallich); Hill up to 2500 ft. altitude (Curtis). *Distrib.* Borneo. Sumatra. *Native name:* Bantun. A beautiful tree when in flower.

(25) *S. pyriflora* Ridl. *Journ. F.M.S.* vi. 159.

Medium-sized tree. Leaves coriaceous, elliptic-ovate to lanceolate acuminate blunt; base shortly narrowed, crenate, 5 in. long, 2 in. wide; nerves 6 pairs; petioles .25 in. long, sessile. Racemes in terminal sessile panicles 2 in. long, pubescent. Calyx-tube sessile, obconic; lobes large ovate blunt, glabrous. Corolla .5 in. across, white, fragrant. Stamens 50, free to base. Drupe elliptic, .75 in. long, sessile. Seed not ribbed. *Hab.* Mountains at 5500 ft. altitude, open woods and stream banks. Pahang, Gunong Tahan (Ridley).

### 3. CORDYLOBLASTE, Moritzi.

Mountain shrubs. Flowers few, white, pendulous, axillary. Calyx campanulate, with short round lobes. Corolla long, tubular; lobes 5. Stamens connate in a tube attached to the corolla-tube and projecting beyond it, lobed, with 40 to 60 anthers. Ovary villous; style slender or stout, villous or glabrous. Fruit oblong, crowned by calyx-rim. Seed 1. Species about 10, Indo-Malayan.

Flowers short, under 1 in. long.

Leaves elliptic-lanceolate.

Corolla-tube slender, rather long silky . . . (1) *C. confusa*

Corolla-tube short, broad, sub-glabrous; lobes large, broad . . . (2) *C. pulcherrima*

Leaves obovate.

Leaves thick coriaceous; nerves invisible; corolla-lobes half as long as tube . . . (3) *C. obovata*

Leaves thin coriaceous; nerves conspicuous; corolla split to near base . . . (4) *C. crenulata*

Flowers 1 in. or more long.

Branches and leaves beneath red-velvety . . . (5) *C. Maingayi*

Branches and leaves nearly glabrous grey pubescent (6) *C. Scortechinii*

(1) *C. confusa* Ridl. *Symplocos confusa* Brand, *Pflanzenreich*. iv, 88; King, *l.c.* 248; *S. Henscheli* and var. *hirtistylis* Clarke, not of *Bentham*.

Shrub 5 to 8 ft. tall. Leaves stiffly coriaceous, glabrous, elliptic-oblong, bluntly acuminate, base cuneate or very shortly narrowed; nerves irregular, breaking up and inarching far from edge; 3 to 4 in. long, 1.5 to 2 in. wide; petioles .2 to .3 in. long,

pubescent. Racemes very short, axillary 3- or 4-flowered. Calyx campanulate, .1 in. long; teeth short. Corolla funnel-shaped, .2 to .3 in. long. Stamen-tube longer. Stamens 40 to 60 inside the tube. *Hab.* Malacca, Mt. Ophir at 3000 ft. altitude (Griffith, Maingay, etc.).

(2) *C. pulcherrima* Ridl. *Symplocos pulcherrima* Ridl. *Journ. Linn. Soc.* xxxviii. 9, 315; *Journ. F.M.S. Mus.* vi. 160.

Glabrous shrub or small tree. Leaves coriaceous elliptic blunt, crenulate, base long narrowed; nerves 9 pairs, faint with reticulations visible both sides; 4 in. long, 1.75 in. wide; petioles .25 in. long. Flowers 1 to 4 in a short raceme, glabrous. Calyx



FIG. 102.—*Cordyloblaste crenulata*.

campanulate, lobes rounded, .12 in. long, tips only pubescent. Corolla .35 in. long, tube short, funnel-shaped, lobes oblong, reflexed, slightly silky inside, white, veined red, edges pubescent. Stamens 60, tube silky. Fruit oblong, narrowed at base, tip projecting beyond. Calyx-rim white silky, .5 in. long, .25 in. thick. *Hab.* Stream banks and woods at high altitudes, Pahang, Gunong Tahan, 4000 to 5000 ft. altitude (Ridley).

(3) *C. obovata* (sub. *Symplocos*) Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 51.

Shrub, glabrous except inflorescence. Leaves obovate, faintly crenulate, tip round, base long, narrowed, stiffly coriaceous; nerves very faint hardly visible, 2 in. long, 1 in. wide; midrib prominent beneath; petioles thick, .25 in. long. Racemes .5 in. long, pubescent silky. Calyx .25 in. long, cup-shaped, lobes rounded. Corolla

·35 in. long, pubescent, lobes oblong, half as long as tube. Stamen-tube adnate to corolla-tube, free above. Style hairy. *Hab.* Mountains. Perak, Gunong Kerbau at 7000 ft. altitude (Haniiff).

(4) *C. crenulata* (sub. *Symplocos*) *Ridl. Journ. F.M.S. Mus.* vi. 52. (Fig. 102, p. 308.)

Shrub. Leaves coriaceous oblanceolate or obovate, distinctly crenulate, tip round, base long narrowed; nerves and reticulations fine, conspicuous; 2·5 to 3 in. long, 1·5 to 2 in. wide; petioles ·25 in. long. Flowers numerous, usually solitary, rarely 2- to 3-racemed; pedicels ·1 in. long. Calyx ·15 in. long, campanulate, lobes rounded, short, silky. Corolla ·35 in. long, tube short, thick-lobed nearly to base, adnate to stamen-tube except by tips and margins, lobes broad, all silky. Stamen-tube hairy inside, lobes 15, anthers 40. Style stout, glabrous. *Hab.* Perak, Gunong Kerbau (Robinson) at 5500 to 6000 ft. altitude.

Differs from *C. obovata* in the thinner, more crenulate leaves, with conspicuous nerves, the flowers solitary, the corolla-tube split nearly to the base, and the very broad and glabrous style.

(5) *C. Maingayi* *Ridl. Symplocos Maingayi Clarke, in Hook. fil. F.B.I. iii. 588; King, l.c. 249.*

Tree 40 to 60 ft. tall, 10 to 15 in. through; branches red-velvety. Leaves stiffly chartaceous, elliptic-oblong acuminate, base round or narrowed, glabrous above, pubescent beneath; nerves 8 pairs elevate beneath and with stout midrib, densely velvety, 4·5 in. long, 2 in. wide. Racemes in upper axils 8- to 10-flowered, dense red-tomentose, 1 to 1·5 in. long. Calyx funnel-shaped, teeth round, ·25 in. long. Corolla 1 to 1·5 in. long, narrow cylindrical, lobes ·5 in. long oblong, white silky. Stamen-tube adnate to corolla-tube, then free, 15- to 20-lobed. Stamens 40 to 60. Fruit obovoid, blunt, glabrous, 1·75 in. long, 1·25 in. through, yellow. *Hab.* Malacca (Maingay). Perak, Larut at 300 to 800 ft. altitude (Kunstler).

(6) *C. Scortechinii* *Ridl. Symplocos Scortechinii King and Gamble, l.c. 250.*

Tree? branches sparsely grey-pubescent. Leaves chartaceous, oblong-lanceolate, blunt acuminate, base cuneate, quite glabrous; nerves 8 to 10 pairs, fairly prominent; 4 to 5 in. long, 1·5 to 2 in. wide; petioles ·5 in. long. Racemes ·7 to 1 in. long, axillary and pseudo-terminal, grey pubescent. Calyx campanulate grey; teeth round. Corolla 1 to 1·5 in. long, white tomentose. Fruit obovoid oblong, glabrous, 1·75 in. long. *Hab.* Perak (Scortechini). Very rare.

Very near *C. Maingayi*, but without the red tomentum.

## ORDER XC. OLEACEÆ.

Climbers, shrubs or trees. Leaves opposite (rarely alternate). Stipules 0. Inflorescence cymose or paniced. Flowers regular, usually white, sometimes uni-sexual. Calyx free, campanulate, 4-lobed or toothed. Corolla gamopetalous, tube short or long, lobes 4 to 12, imbricate or induplicate, valvate. Stamens 2 (rarely 4) insert on corolla; filaments short; anthers large ovate or oblong. Style 1; ovary free, 2-celled; ovules 1 to 2 in a cell, attached to inner angle; stigma often bilobed. Fruit a drupe sometimes 2, twin (or a capsule). Seeds 1 to 2 in a cell. Tropics and temperate regions about 300 species. (King, *Journ. As. Soc. Beng.* lxxiv, extra number, p. 254.)

Corolla-lobes imbricate.

Climbing shrubs; flowers large, tube cylindric long . . .	1. JASMINUM
Small trees; flowers small, tube very short . . .	2. OSMANTHUS
Corolla-lobes valvate, tube short; trees or shrubs.	
Petals nearly free, connected by the stamens . . .	3. LINOCIERA
Corolla-tube distinct, short . . .	4. OLEA
Corolla-lobes valvate; tube urceolate; climber . . .	5. MYXOPYRUM

## 1. JASMINUM, Linn.

Climbing shrubs. Leaves opposite (rarely alternate) simple, trifoliolate (or impari-pinnate). Flowers white (or pink or yellow), fragrant in 2- to 3-chotomous cymes, terminal or axillary. Calyx funnel- or bell-shaped, lobes linear, 4 to 9. Corolla-tube narrow cylindric long, lobes 4 to 9 imbricate. Stamens 2, usually included. Ovary 2-celled; ovules 2 in a cell; style filiform; stigma usually bifid. Drupes twin (didymous) or solitary. Carpels globose or ellipsoid, pulpy. Seeds usually 1 in a carpel, rarely 2. Species about 90, Asia, Africa and Australia, 1 in Europe in temperate and tropical regions.

A few species are cultivated in the Malay Peninsula, the commonest being *J. Sambac* Ait., and chiefly the double-flowered bush form common in Chinese gardens. It is known as Melati, or Melor, a common name for all Jasmynes.

Leaves simple, penninerved.

Leaves thick chartaceous, pilose . . . . .	(1) <i>J. Griffithii</i>
Leaves thick chartaceous, glabrous . . . . .	(2) <i>J. Maingayi</i>
Leaves thick coriaceous, hairy beneath . . . . .	(3) <i>J. kedahense</i>
Leaves membranous.	
Calyx-lobes .25 in. long, spreading; bracts small . . . . .	(4) <i>J. Wrayi</i>
Calyx-lobes .5 in. long; bracts large leafy . . . . .	(5) <i>J. Curtisii</i>
Calyx-lobes under .2 in. long.	
Leaves always hairy beneath; corolla-tube shorter than lobes . . . . .	(6) <i>J. decussatum</i>



- Corolla-tube longer than ovate oblong lobes.
- Leaves ovate sub-glabrous; corolla-tube long slender . . . . . (7) **J. bifarium**
- Leaves lanceolate, hairy on both sides. . . . . (8) **J. Evansii**
- Leaves lanceolate, glabrous when adult . . . . . (9) **J. arenarium**
- Calyx-lobes long subulate, corolla-lobes ligulate . . . . . (10) **J. adenophyllum**
- Leaves triplinerved, 2 outer nerves from base slender.
- Slender climber; corolla-lobes long, narrow . . . . . (11) **J. longipetalum**
- Climber stout, terete; corolla-lobes broad . . . . . (12) **J. smilacifolium**
- Stem very stout; branches 4-angled; corolla-lobes ovate oblong . . . . . (13) **J. insigne**
- Leaves trifoliolate, thick . . . . . (14) **J. Scortechinii**

(1) **J. Griffithii** Clarke, in *Hook. fil. F.B.I.* iii. 593; *King, l.c.* 257.

Slender villous climber. Leaves chartaceous ovate or elliptic acuminate, base round, hairy on both sides but little above; nerves 10 to 12 pairs, elevate beneath; 4 to 6 in. long, 1.5 to 3.5 in. wide; petioles .2 to .4 in. long. Cymes dense hairy, 1 to 1.5 in. long, terminal. Calyx slender, lobes linear hairy. Corolla-tube .75 in. long, lobes .25 in. long, apiculate. Drupe twin or single fleshy, white, oblong, .3 in. long. *Hab.* In dense forest; never common. Singapore, Garden Jungle; Chan Chu Kang. Johor, Gunong Pulau; Mt. Austin. Selangor, Batu Caves (Curtis). Malacca (Griffith, Maingay). Perak, Ulu Bubong (Kunstler); leaves thicker and ovate. *Native names:* Akar Kum-Kuma hutan; Akar Melor Hutan.

The var. *cuspidata* King and Gamble is the typical form with narrower elliptic leaves.

(2) **J. Maingayi** Clarke, *l.c.* 594; *King, l.c.* 258; *Bot. Mag. t.* 7823. (Fig. 103, p. 312.)

A fairly stout climber. Leaves thickly chartaceous, ovate or ovate-oblong acuminate, base round; nerves 6 to 8 pairs, elevate beneath, midrib prominent, glabrous; 4 to 6 in. long, 2 to 2.5 in. wide; petioles .5 to .7 in. long, purplish. Cymes paniced, trichotomous, terminal in a head about 2 in. across, pubescent. Calyx .1 in. long, campanulate, lobes 6, linear subulate, hairy, .32 in. long. Corolla-tube 1 in. long, lobes 8 to 10, oblong acuminate, limb 1.5 in. across. Drupe solitary, black oblong, .5 in. long. *Hab.* Widely scattered, usually in hill forests, Johor, Kwala Sembong; Kwala Kahang (Kelsall). Pahang, Telom. Selangor, Klang Gates. Perak, Thaiping Hills to 1500 ft. altitude. Penang Hill (Maingay, Curtis) at 1500 ft. altitude. Perlis (Ridley).

(3) **J. kedahense** Ridl. *Journ. F.M.S. Mus.* vii. 46. **J. Maingayi** var. *kedahensis* King and Gamble, *l.c.* 258.

Stout woody climber. Leaves stiffly coriaceous, ovate blunt acuminate, glabrous above, pubescent on midrib and nerves

beneath; nerves strongly elevate, 2 to 3 pairs (1 or 2 radiating from base), transverse nerves from midrib, 2 to 3 pairs; 2 to 3 in. long, 1 to 2 in. wide; petioles .12 in. long, stout. Cymes terminal, pubescent, many-flowered. Calyx-tube funnel-shaped, lobes linear acuminate, as long, pubescent. Corolla-tube 1.5 in. long, lobes 7 to 9, lanceolate acute, .6 in. long, .1 in. across. Drupe large, black, sub-globose. *Hab.* Kedah Peak (Robinson, Ridley).



FIG. 103.—*Jasminum Maingayi*.

(4) **J. Wrayi** King and Gamble, *l.c.* 258.

Slender, hairy in young parts. Leaves membranous, oblong or obovate-oblong, base bluntly narrowed, tip acuminate, glabrous except edge and midrib hairy; nerves fine, 7 pairs; 3 to 7 in. long, 1.5 to 2.5 in. wide; petioles .3 to .5 in. long. Cymes lax, 2 to 3 in. long, on a peduncle 1 in. long, hairy. Flowers 15 to 20. Calyx-tube short, lobes 5, linear-subulate, pilose or glabrous. Corolla-tube .75 in. long, lobes 8 to 9, narrow, .3 to .4 in. long. Fruit twin "greenish white." *Hab.* Woods and thickets. Selangor, Batu Caves (Curtis), hairy form (var. *hispida*). Perak, Thaiping Waterfall (Wray); Relau Tujur and Sungei Larut (Wray).

This varies in its hairiness, being occasionally nearly glabrous.

var. *axillaris* King and Gamble, has small leaves, sparsely pubescent and axillary cymes of 5 to 7 flowers, fruit .5 in. long. *Hab.* Perak, Maxwell's Hill (Scortechini).

(5) **J. Curtisii** King and Gamble, *l.c.* 259.

Climber. Branchlets pubescent. Leaves membranous ovate or ovate-oblong acuminate, base round, glabrous except for nerves above

pubescent; nerves 5 to 6 pairs; 3 to 5 in. long, 1 to 2 in. wide; petioles .4 in. long, pubescent. Cymes trichotomous, terminal, pubescent with leafy ovate-lanceolate bracts, 1 in. long and similar, smaller bracteoles. Flowers 15 to 20. Calyx-tube .15 in. long, lobes 6, linear, subulate, .5 in. long. Corolla-tube 1 in. long, limb 1 in. across, lobes 8 to 9, oblong-lanceolate acute. *Hab.* Rare. Perak, Ipoh (Curtis).

(6) **J. decussatum** Wall. *Cat.* 2860; *King, l.c.* 260.

Bushy climber, densely pubescent. Leaves chartaceous ovate acuminate, base round, pubescent all over; nerves 4 to 5 pairs, elevate beneath; 2 to 4 in. long, 1 to 1.5 in. wide; petioles .3 to .4 in. long. Cymes axillary and terminal, corymbose dense pubescent. Calyx-tube short, lobes 6, subulate. Corolla-tube .25 in. long; lobes oblong-lanceolate apiculate, glabrous, longer. Drupe 1, ellipsoid, .2 to .3 in. long. *Hab.* Open country in the north; abundant. Kedah, Alor Sta. Perlis and Setul (Ridley). *Distrib.* Burma and Siam.

(7) **J. bifarium** Wall. *Cat.* 2866; *King, l.c.* 260.

Climbing bush glabrous or more or less pubescent. Leaves chartaceous, ovate to ovate-oblong, acuminate, round or truncate, base cordate or not; nerves 2 to 3 in. long, 1 to 1.5 in. wide, glabrous or midrib pubescent; petioles .2 to .3 in. long. Cymes sub-capitate of 12 to 14 flowers, sub-sessile. Calyx-tube campanulate, teeth 5 to 7, linear subulate. Corolla-tube .6 to .8 in. long, lobes 6 to 9, ovate-oblong, apiculate, .2 to .3 in. long. Drupes twin, black. *Hab.* Very common all over the open country from Singapore to Kedah. The variety *glabra* Clarke, with large and more glabrous leaves, is not worth keeping up. *Distrib.* Java, Sumatra. *Native names:* Akar Pakan hutan; Akar Pakan betina.

(8) **J. Evansii** Ridl. *Journ. F.M.S. Mus.* x. 148.

Climber with slender tomentose branches. Leaves lanceolate acuminate, base rounded, sparsely hairy beneath with midrib sunk, pubescent beneath more thickly hairy, midrib tomentose, 2.25 in. long, 1 in. wide; nerves 4 pairs; petioles .2 in. long, tomentose. Cymes on short axillary branches .5 in. long; bracts very small, linear; pedicels .1 in. long. Calyx cup-shaped with subulate points as long as tube, .12 in. long, pubescent. Corolla glabrous, tube slender, .8 in. long, lobes 8, rather narrow, linear-oblong acute, .35 in. long. Fruit .4 in. long, didymous, ellipsoid. *Hab.* Pahang, Gunong Senyum (Evans).

This species is most nearly allied to *J. Horsfieldii* Miq., of Bangka.

(9) **J. arenarium** Ridl. *Journ. F.M.S. Mus.* x. 147.

Slender climber; branches pubescent. Leaves lanceolate-acuminate, base round, velvety when young becoming quite glabrous membranous; nerves 4 to 5 pairs, slender; 3 in. long, 1.25 in. wide. Cymes on ends of lateral or terminal branches,

of 5 flowers, subtended by 2 small leaves. Calyx cup-shaped, hairy, the lobes subulate, longer than the tube, appressed, hairy, .25 in. long. Corolla glabrous, tube 1 in. long, lobes .4 in. long, ovate-oblong broad, 8. *Hab.* Open sandy country, Kelantan, Kota Bharu (Ridley).

This is allied to *J. syringæfolium* Wall., of Assam.

(10) **J. adenophyllum** Wall. *Cat.* 2876; *King, l.c.* 261.

Very slender climber, glabrous. Leaves membranous, ovate-lanceolate to elliptic-oblong acuminate, base cuneate, glabrous; nerves slender, 6 pairs; 1.5 to 5 in. long, .75 to 1.5 in. wide; petioles 2 to 3 in. long, slender twisted, hairy or glabrous. Flowers 2 to 4 on slender axillary peduncles .75 to 2 in. long, pubescent with 2 or 3 pairs of lanceolate bracts; pedicels .25 to 1 in. long. Calyx-tube campanulate, ribbed, .1 in. long, lobes subulate, .4 to .5 in. long. Corolla-tube funnel-shaped, .75 in. long, lobes 8 or 9, oblong ligulate, limb .75 in. across. Drupe globose. *Hab.* Very scarce in mountain districts. Selangor, Menuang Gasing (Kloss). Penang (Kunstler). *Distrib.* Khasiya.

(11) **J. longipetalum** King and Gamble, *l.c.* 262.

Slender climber, glabrous. Leaves chartaceous to sub-coriaceous, 3-nerved from base, elliptic to lanceolate acute or acuminate, narrowed or cuneate at base; nerves from midrib 7 to 8 pairs; 2 to 6 in. long, 1.5 to 3 in. wide; petioles .2 to .4 in. long. Flowers 2 to 6 in short cymes, terminal or axillary. Calyx-tube short, lobes 6, linear-subulate. Corolla-tube .75 in. long, lobes 9, linear-oblong acute, .75 to 1 in. long. Fruit twin or solitary, black globose. *Hab.* Scarce, in woods. Singapore, Mandai (Ridley). Perak (Kunstler). *Distrib.* South Siam.

(12) **J. smilacifolium** Griff. ex Clarke in Hook. *fil. F.B.I.* iii, 600.

Branches stout. Leaves coriaceous, 3-nerved, elliptic-ovate, caudate acuminate, base rounded; nerves from midrib to lateral nerves 3 to 4 pairs inconspicuous; 5 to 7 in. long, 3 to 4 in. wide; petioles .75 in. long or less, twisted. Cymes axillary, 1 to 2 in. long. Flowers 5 to 20, white, tinted pink. Calyx campanulate, .1 in. long, with very short teeth. Corolla-tube 1 in. long, lobes oblong-linear, narrow, .75 in. long, .2 in. wide. Drupe twin, obconic, black, 1 in. long, .4 in. through. *Hab.* In woods; not common. Malacca (Griffith, Maingay). Negri Sembilan, Ayer Bemban and Bukit Berunang (Cantley). *Native names:* Kenching Kambing; Akar Lumut; A. Sial Munahon.

(13) **J. insigne** Bl. *Ann. Mus. Bot. Lugd. Bat.* i. 278; *King, l.c.* 263.

A very stout woody climber; branches corky, .4 in. through, young ones 4-angled, glabrous. Leaves chartaceous, opposite or whorled, elliptic acute, base cuneate; nerves slender, 6 or 7 pairs;

3 to 8 in. long, 1.25 to 2.25 in. wide; petioles .4 to 1.2 in. long, twisted. Flowers in compact glabrous cymes, axillary or on stem, numerous. Calyx campanulate, .2 in. long, lobes 4 or 5, linear-subulate about as long. Corolla-tube .75 in. long, lobes 4 or 5 ovate-oblong, apiculate, .5 in. long, .3 to .4 in. wide. Drupe twin, oblong, white. *Hab.* Forests. Not common. Pahang, Tahan River. Perak, Thaiping (Cantley, Kunstler); Tupai (Wray). *Distrib.* Sumatra.

(14) **J. Scortechinii** King and Gamble, *l.c.* 264.

Glabrous, rather stout. Leaves coriaceous, tri- or uni-foliolate, leaflets ovate or lanceolate acuminate, base round; nerves very indistinct, 2.5 to 4 in. long, 1 to 1.5 in. wide; petiolule of central leaflet 1 in. long, of laterals .5 in. long; petioles .75 to 2 in. long. Cymes lax, terminal and axillary, paniced, spreading, 3 in. long and as wide. Calyx campanulate, teeth 5, very short. Corolla-tube .4 to .6 in. long, lobes 5, ovate-cordate blunt, .3 to .4 in. long. Drupes twin, ellipsoid, 1 in. long, .5 in. through. *Hab.* Hill forests. Perak, Thaiping Hills 1500 to 5000 ft. altitude (Kunstler, Scortechini, etc.). Penang Hill 1200 ft. altitude (Curtis).

## 2. OSMANTHUS, Lour.

Trees or shrubs. Leaves entire (or toothed). Flowers fascicled or in very short racemes. Calyx short, 4-toothed. Corolla-tube short (or long), lobes 4, blunt, imbricate. Stamens 2 or rarely 4, insert on tube. Ovary 2-celled; ovules 2 in a cell, pendulous from apex; style short, 2-lobed or sub-entire. Drupe ovoid or globose; exocarp fleshy, endocarp bony. Seed 1, pendulous. Special 8 to 10, Himalayas, China, Japan, North America.

(1) **O. Scortechinii** King and Gamble, *l.c.* 265.

Glabrous tree, 40 to 50 ft. tall, 10 to 15 in. through; bark pale-corky. Leaves coriaceous lanceolate, shortly acuminate, entire, base narrow; nerves depressed above, nearly or quite invisible beneath (or raised), 5 to 6 pairs; 2 to 4 in. long, .75 to 1.25 in. wide; petioles .3 to .6 in. long. Racemes short, dense, axillary, .5 in. long in fruit. Calyx membranous, lobes serrate. Corolla campanulate, lobes .1 in. long, oblong obtuse, tube .05 in. long. Stamens 4 from top of tube between lobes; style slender. Drupe ellipsoid (globose, King), .2 to .3 in. long, greenish blue. Albumen ruminant. *Hab.* Mountains, Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Thaiping (Wray); Thaiping Hills, Gunong Hijau (Kunstler).

var. *oblonga* King, *l.c.* 266. Drupe bright red, .5 in. long, embryo spatulate; radicle nearly as long as cotyledons. Perak (Kunstler). I have not seen this variety.

Wray's plant has much broader leaves with nerves prominent beneath, probably a lowland form. In the high mountain forms the leaves are narrow and smooth beneath, the nerves often quite invisible.

## 3. LINOCIERA, Swartz.

Trees or shrubs. Leaves entire. Flowers small, white in axillary (rarely terminal) panicles or cymes. Calyx small, 5-lobed. Corolla petals nearly free or very shortly connate, valvate in bud, narrow. Stamens 2 (rarely 4) insert at base of petals; filaments short. Ovary 2-celled; ovules 2 in a cell, pendulous from apex; style short. Drupe globose or ellipsoid; endocarp bony. Albumen fleshy or o. About 40 species, tropics generally.

Petals tailed, *i.e.* very narrow with incurved edges.

Leaves obovate, 6 to 10 in. long; fruit 1·7 in. long . . . (1) **L. insignis**

Leaves oblong, 6 to 12 in. long . . . (2) **L. paludosa**

Leaves elliptic, 4 in. long; flowers in small spikes . . . (3) **L. spicifera**

Panicles oblong, flat.

Leaves large, 4 to 9 in. long; panicles many-flowered (4) **L. pauciflora**

Leaves under 4 in. long, chartaceous caudate . . . (5) **L. caudifolia**

Leaves under 4 in. long, coriaceous, lanceolate, 2 to 3 in. long.

Panicles 1 to 2 in. long . . . . . (6) **L. lancifolia**

Panicles ·5 in. long . . . . . (7) **L. parvifolia**

(1) **L. insignis** Clarke in Hook. fil. *F.B.I.* iii. t. 10; *L. macrocarpa* King and Gamble, *l.c.* 267.

Big tree. Leaves coriaceous obovate oblong or oblanceolate, blunt or shortly blunt acuminate, base long cuneate; nerves 14 to 17 pairs, prominent beneath; 6 to 10 in. long, 2 to 3·5 in. wide; petioles 1 to 1·5 in. long. Panicles pubescent, 2 to 4 in. long. Calyx pubescent, lobes ovate acute. Corolla-lobes oblong-linear, ·15 in. long, narrow. Stamens with a conic point. Ovary pubescent. Drupe oblong, 1·7 in. long, 1 to 1·2 in. wide; endocarp obscurely ridged; branches of panicle much thickened and elongated, woody. *Hab.* Rare. In forests. Singapore, Bukit Mandai. Malacca, Ayer Panas (Ridley). *Distrib.* Tenasserim, Sumatra, Borneo.

(2) **L. paludosa** King and Gamble, *l.c.* 268.

Tree, small (Wray) to 80 ft. tall, 15 to 20 in. through (King). Leaves thickly coriaceous, oblong, blunt acuminate and narrowed to base, glabrous; midrib and nerves above very minutely scurfy; nerves sunk above, much raised beneath, 11 to 15 pairs; 6 to 12 in. long, 2 to 4 in. wide; petioles stout, short, wrinkled, ·5 in. long. Panicles pubescent, 1 to 2 in. long, axillary. Bracteoles ovate acute. Calyx-lobes ovate acute or triangular, ciliate. Corolla-lobes narrow linear, ·2 in. long, yellow, centre brown. Ovary glabrous. *Hab.* Rare in low wet forests. Perak, Sungei Larut (Wray, Kunstler).

(3) **L. spicifera** Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 94.

Tree. Leaves coriaceous elliptic, abruptly acuminate acute, base cuneate; nerves 7 to 8 pairs faintly sunk above, slightly elevate beneath, midrib prominent on both sides; 4 to 4·5 in. long, 1·5 in. wide; petioles ·15 in. long, papillose, thick. Flowers sessile

in short spikes .25 in. long, with persistent thickly coriaceous ovate bracts. Calyx campanulate, lobes 4, rounded ovate. Corolla-lobes tailed linear, base dilate, .25 in. long. Ovary oblong. Stigma sessile. *Hab.* Selangor, Rawang Forest Reserve (Kloss).

(4) **L. pauciflora** *Clarke, l.c.* iii. 609; *King, l.c.* 266.

Tree 30 to 40 ft. tall or taller, 1.5 to 2 ft. through. Leaves coriaceous elliptic-oblong, shortly blunt acuminate, base cuneate, minutely papillose; nerves 11 to 13 pairs prominent; 4 to 9 in. long, 2 to 4 in. wide; petioles .7 to 1.3 in. long. Flowers in compound axillary peduncled panicles 2 to 6 in. long, numerous, white, turning orange. Calyx-lobes ovate acute. Corolla-lobes 2 pairs oblong, .1 to .15 in. long. Drupe ellipsoid, .75 in. long, .3 in. through, blue black. *Hab.* Common in wet forests. Singapore, Jurong; Bukit Timah; Selitar. Malacca, Sungei Hudang (Goodenough). Perak, Ulu Temengoh. Dindings, Lumut. Penang (Wallich); Telok Bahang; Tanjong Bunga (Curtis). Kedah, Pulau Song-Song (Curtis).

(5) **L. caudifolia** *Ridl. L. caudata King and Gamble, l.c.* 268, *not of Beddome.*

Tree 30 to 40 ft. tall; stem 5 to 7 in. through; branches slender. Leaves chartaceous, lanceolate caudate-acuminate, glabrous; nerves very obscure 4 to 5 pairs; 3 to 4 in. long, 1 to 1.25 in. wide; petioles .1 to .2 in. long. Panicles few-flowered, trichotomous, 1 in. long, glabrous. Calyx-lobes 4, blunt. Corolla-lobes oblong blunt, .05 in. long (.1 in. long, King) cream-colour. Ovary glabrous. Drupe obovoid, .3 to .4 in. long. *Hab.* Dense forests at 3500 to 4000 ft. altitude. Rare. Perak. No locality (Kunstler).

(6) **L. lancifolia** *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 14. *Olea ardisioides King and Gamble, l.c.* 271.

Small tree with slender branches. Leaves coriaceous, lanceolate long acuminate, base cuneate, glabrous; nerves very faint; 2 to 3 in. long, .6 to 1 in. wide; petioles .1 to .2 in. long. Panicles lax, slender, 1 to 2 in. long, with slender spreading branches .5 in. long. Calyx-lobes 4, ovate acute. Corolla-lobes linear, .1 in. long. Stamens 2 from base of corolla. Ovary conic; no style. *Hab.* High mountains 4500 to 5000 ft. altitude. Pahang, K'luang Terbang (Barnes). Perak, Gunong Bubu (Wray).

(7) **L. parvifolia** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 94.

A shrub?, glabrous. Leaves coriaceous, lanceolate-sub-rhomboid or oblanceolate blunt, midrib elevate beneath; nerves 6 pairs, very fine, hardly visible, 1 to 1.75 in. long, .5 to .75 in. wide; petioles slender, .12 in. long. Cymes paniced, lax, spreading, .5 in. long. Flowers in threes, pedicelled. Calyx cup-shaped, short, teeth small, ovate. Corolla-lobes ovate triangular, flat blunt, .1 in. long. Ovary conic; style short. *Hab.* Mountains, rare. Selangor, Gunong Mengkuang Lebah at 5000 ft. altitude (Robinson).

## 4. OLEA, Linn.

Shrubs or trees. Leaves often toothed. Flowers small, sometimes unisexual, in axillary trichotomous panicles. Calyx small, 4-toothed. Corolla-tube short, lobes flat, oblong induplicate-valvate (occasionally absent in females). Stamens 2 on the corolla-tube; filaments short. Ovary 2-celled; ovules 2 in a cell; style short. Drupe globose or ellipsoid, 1-seeded. Species about 40, Europe, Asia, South Africa, New Zealand.

Leaves coriaceous, 3 to 4 in. long.	
Panicles lateral, long; leaves lanceolate over 4 in. long	(1) <i>O. penangiana</i>
Panicles lateral, short; leaves 3 in. long	(2) <i>O. maritima</i>
Panicles terminal, pubescent	(3) <i>O. puberula</i>
Leaves stiffly coriaceous.	
Flowers in very small heads	(4) <i>O. capitellata</i>
Leaves very large, 8 to 14 in. long; panicles tufted on old wood	(5) <i>O. platycarpa</i>

(1) *O. penangiana* Ridl. *O. dentata* King, l.c. 269, not of Wallich.

Small tree; young branches pubescent. Leaves entire, coriaceous, lanceolate or oblong-lanceolate acuminate, base cuncate; nerves obscure, 8 to 10 pairs; 3.5 to 4.5 in. long, 1 to 2 in. wide. Cymes in spreading pubescent panicles 6 in. long, umbellate. Bracts leaf-like or narrow linear-oblong .2 to 1.5 in. long. Calyx pubescent, lobes 4, round. Corolla campanulate, .15 in. long. *Hab.* Penang, Penara Bukit and Telok Bahang (Curtis).

This has much smaller, more coriaceous leaves than typical *dentata* Wall. and I have seen no toothed leaves. The plant has differently shaped leaves and larger flowers, otherwise it resembles *O. maritima*.

(2) *O. maritima* Wall. *Cat.* 2813; King, l.c. 270. (Fig. 104, p. 319.)

Shrub; young parts pubescent. Leaves coriaceous, elliptic or ovate-lanceolate acuminate, often spiny on edge; midrib elevate; nerves rather faint, 7 to 10 pairs; 3 to 4 in. long, 1 to 2 in. wide; petioles .2 in. long. Flowers white in short paniced lax cymes, 1 to 2 in. long or terminal ones longer. Calyx pubescent, lobes lanceolate acute. Corolla campanulate, .1 in. long, lobes ovate or oblong-blunt as long as tube. Ovary conic; no style. Drupe pea-shaped, .2 in. through, black. *Hab.* Common in open country and near the sea. Singapore, Changi; Pulau Ubin. Johor, Kwala Batu Pahat. Pahang, Pekan Heaths; Rumpin River. Leban Chondong (Evans). Malacca, near town; Bukit Sabukor (Derry); Bukit Bruang. Kelantan, Kota Bharu. Perlis, Chupeng (Ridley).

(3) *O. puberula* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 128.

Tree, white-barked. Leaves lanceolate acute or elliptic-lanceolate, thin coriaceous; nerves 6 or 7 pairs; 4 in. long, 1.5 in.



wide or less. Panicles terminal, dense, 2 in. long, pubescent. Bracts oblong, persistent. Flowers in cymose tufts, sub-sessile, .12 in. long. Calyx cup-shaped, lobes ovate pubescent. Corolla pubescent, lobes 5, thick, oblong. Stamens 2, pubescent. Drupes oblong, black, .25 in. long in an enlarged panicle. *Hab.* Open country. Perlis at Chupeng (Ridley).

(4) *O. capitellata* Ridl. *Journ. Linn. Soc.* xxxviii. 317

A shrub 3 to 4 ft. tall. Leaves stiffly coriaceous, elliptic-blunt, base narrowed, 2 in. long, 1 in. wide; nerves 8 pairs. Flowers in



FIG. 104.—*Olea maritima*.

small axillary tufts, yellowish white. Bracts ovate-round, edges ciliate. Pedicels short, pubescent. Calyx-lobes ovate pubescent. Corolla-lobes round pubescent. Stamens much longer than corolla; filaments linear. *Hab.* Pahang, Gunung Tahan, 5000 to 6000 ft. altitude on rocky slopes (Ridley).

#### DUBIOUS SPECIES

(5) *O. platycarpa* King and Gamble, *l.c.* 271.

Small tree 30 ft. tall. Leaves coriaceous, obovate-oblong, abruptly acuminate, base cuneate, glabrous; nerves prominent, 14 to 16 pairs; 8 to 14 in. long, 3 to 5 in. wide; petioles 1 in. long, base wrinkled. Flowers unisexual in paniced cymes about 1 in. long on old wood. Bracts ovate. Male flowers unknown. Female flowers, calyx-lobes ovate, ciliate. Corolla none. Ovary conic;

style 0; stigma mitriform, 2-lobed. Drupe ovate-oblong, flattened, .7 in. long. *Hab.* On low levels on the hills. Malacca (Hervey). Perak, Gunong Bubu 500 to 800 ft. altitude (Kunstler).

A very doubtful plant, unlike any other *Olea*. If it belongs to this Order at all, I should rather suggest it to be a *Linociera*.

### 5. MYXOPYRUM, Bl.

Large climbing shrubs; branches 4-angled. Leaves large, tripli-nerved. Flowers very numerous, small, yellow, in axillary and terminal trichotomous panicles. Calyx-tube short, lobes 4. Corolla fleshy, tube urceolate, lobes 4, concave, valvate. Stamens 2 on base of tube; filaments very short. Ovary 2-celled; ovules 1 or 2 in each cell; style very short or 0. Fruit 1- or 2-seeded, globose. Species 10, Indo-Malayan.

(1) *M. nervosum* Bl. *Bijdr.* 683; *King, l.c.* 272.

Leaves coriaceous, elliptic acuminate, base narrowed, glabrous, often denticulate; nerves 4 to 6 pairs very prominent; 4 to 7 in. long, 1.5 to 3.5 in. wide. Flowers sessile; panicles pubescent, 1.5 to 3 in. long. Calyx-lobes triangular acuminate. Corolla .15 in. long, yellowish or greenish white. Berry .5 to .7 in. long, blue black, ovoid or globose. *Hab.* Woods. Pahang, Kota Glanggi. Malacca (Griffith). Selangor, Bukit Kutu (Goodenough). Negri Sembilan, Bukit Burunang (Cantley). Perak, Batu Togoh (Wray); Thaiping (Scortechini); Goping (Kunstler). Penang, Telok Bahang (Curtis). *Distrib.* Java, Sumatra. *Native names:* Akar Kulawai; Akar Dudaro.

## ORDER XCI. APOCYNACEÆ.

Climbing or erect shrubs or trees (rarely herbs) very laticiferous. Leaves simple, entire, opposite or whorled. Stipules 0. Inflorescence terminal or axillary; cymes solitary or corymbose. Flowers small or large, regular, bisexual, white, yellow or pink. Calyx inferior, tube short, lobes 5, imbricate often with glands inside. Corolla gamopetalous usually salver-shaped, lobes 5 (rarely 4), contort in bud. Stamens 5 (or 4) insert in tube or mouth; filaments short; anthers linear-oblong, free or connivent. Ovary superior, 1-celled, placentas 2 parietal; when 2-celled placentas axile. Fruit a berry, drupe or of 2 follicles, containing seed with aril (*Ervatamia*) or more commonly plumed or winged (*Dyera*), rarely a bivalved capsule of arillate seed (*Chilocarpus*). Species about 1000, whole world, chiefly tropical. Many are cultivated in gardens, including the *Allamandas*, of which one, *A. Schottii*, has occasionally escaped, but is hardly established, and *Plumieria*, the Frangipanni, "Chempaka Biru" *P. acutifolia* Poir., planted largely in graveyards, natives of South America, and the Oleander, *Nerium oleander*, native of West Asia.

(a) *Anthers included, free from stigma ; cells round at base.*

- Carpels combined into a large fleshy fruit;  
seeds not winged or plumed;  
climbers.
- Ovary 1-celled; ovules parietal.  
Fruit indehiscent; no albumen . . . 1. WILLUGHBEIA  
Fruit bivalved; seeds albuminous . . . 2. CHILOCARPUS
- Ovary 2-celled; ovules axile.  
Flowers 4-merous, no scales in throat . . . 3. LEUCONOTIS  
Flowers 5-merous, with lobed scales in  
throat . . . 4. MELODINUS
- Ovary of 2 distinct carpels; fruit of 2 1-seeded  
drupes or follicles often reduced  
to 1.
- Climbers; albumen ruminant; leaves cori-  
aceous, whorled. Drupes . . . 5. ALYXIA
- Shrubs or trees; albumen plain; seed one.  
Fruit ellipsoid small drupes; leaves cori-  
aceous opposite . . . 6. HUNTERIA  
Fruit flattened drupes; leaves fleshy or  
membranous opposite . . . 7. RAUWOLFIA  
Leaves opposite, fruit flat, capsular, one-  
seeded . . . 8. KOPSIA  
Leaves alternate; drupe 2 in. long,  
oblong with 1 large fibrous seed;  
seashores . . . 9. CERBERA  
Leaves opposite or whorled; drupe  
large, 2 in. long; seashores . . . 10. OCHROSIA  
Fruit of 2 follicles, wide spreading many-  
seeded.  
Follicles dry; seeds very small not  
arillate or winged; dwarf shrub. 11. LOCHNERA  
Follicles fleshy with arillate seed; shrubs  
or small trees . . . 12. ERVATAMIA  
Follicles woody; seeds winged; trees . . . 13. DYERA  
Follicles dry; seeds plumed.
- Trees; leaves whorled; flowers small . . . 14. ALSTONIA  
Shrubs; leaves opposite; flowers large,  
white . . . 15. HOLARRHENA

(b) *Anthers often exsert connivent in a cone round the stigma and adherent to it, cells spurred below ; fruit of 2 many-seeded follicles ; seeds plumed at one or both ends.*

- Anthers partly at least exsert.  
Corolla throat naked.
- Corolla tubular, climbers . . . 16. PARSONIA  
Corolla rotate; trees or shrubs . . . 17. VALLARIS  
Corolla salver-shaped; climber . . . 18. POTTSIA  
Corolla, throat with scales; erect shrubs . . . 19. WRIGHTIA
- Anthers included in tube.  
Corolla-tube with 5 to 10 scales.  
Shrubs erect or stout short climbers . . . 20 STROPHANTHUS  
Corolla-tube naked; woody climbers.
- Lobes valvate; flowers small . . . 21. URCEOLA  
Lobes overlapping to left; flowers small . . . 22. PARAMERIA  
Lobes overlapping to right.  
Corolla minute, urceolate . . . 23. ECDYSANTHERA  
Corolla salver-shaped; seeds beaked.  
Flowers, leaves and fruit large . . . 24. CHONEMORPHA  
Flowers, leaves and fruit medium . . . 25. RHYNCHODIA

- Flowers small or very small;  
 corolla-lobes short . . . . . 26. ANODENDRON
- Seeds not beaked, narrowed at end;  
 flowers rather or very small.
- Corolla-lobes round, entire . . . . . 27. CLEGHORNIA
- Corolla-lobes laciniate . . . . . 28. ICHNOCARPUS
- Seeds not beaked, end broad.
- Cymes corymbose; flowers medium  
 size.
- Follicles terete . . . . . 29. AGANOSMA
- Follicles flattened . . . . . 30. TRACHELOSPERMUM
- Cymes shortly paniced; flowers  
 medium, tube long . . . . . 31. EPIGYNUM
- Cymes corymbose; flowers minute,  
 petals obliquely lobed . . . . . 32. MICRECHITES

### 1. WILLUGHBEIA, Roxb.

Large woody climbers with tendrils (modified peduncles). Leaves coriaceous or nearly so; nerves few, not parallel. Flowers in dense cymes, white or yellow, axillary. Calyx 5-lobed. Corolla tubular with flat limb of 5 lobes. Stamens near base of tube; anthers lanceolate. Ovary 1-celled; ovules parietal; style short; stigma capitate or ovoid. Fruit a large fleshy berry, oblong, pear-shaped or rarely globose. Seeds numerous, testa thin, embedded in a fleshy mass. Species about 12, Malay Peninsula and islands; a few Indian.

Cymes short and dense; peduncles and pedicels stout.

- Leaves elliptic or orbicular, thick; nerves 6 to 8  
 pairs; flowers 2 in. wide . . . . . (1) *W. grandiflora*
- Leaves oblong, thick; nerves 8 pairs; base cuncate,  
 flowers .25 in. wide . . . . . (2) *W. coriacea*
- Leaves oblong, base round, thick, nerves 10 pairs;  
 flowers .25 in. wide . . . . . (3) *W. oblonga*
- Leaves thinly coriaceous, elliptic 6 by 2.5 in. long;  
 nerves numerous . . . . . (4) *W. edulis*
- Leaves lanceolate-elliptic; nerves 13 or more pairs,  
 3 by 1.5 in. long . . . . . (5) *W. firma*
- Leaves obovate to oblanceolate; nerves 28 to  
 30 pairs . . . . . (6) *W. dulcis*
- Leaves oblong cuspidate; nerves 30 pairs . . . . . (7) *W. tenuiflora*
- Flowers in slender peduncled lax cymes . . . . . (8) *W. flavescens*

(1) *W. grandiflora* Dyer, in *Hook. fil. F.B.I.* iii. 625; *King, Journ. As. Soc. Beng.* lxxiv. ii. 392.

Stout liane. Leaves very coriaceous, orbicular or elliptic blunt, base round; midrib and nerves sunk above, nerves 6 to 8 pairs, glaucescent beneath, reticulations fine and visible above; 3 to 5 in. long, 3 to 3.5 in. wide; petioles thick, corky, .5 to 1 in. long. Cymes dense, about 1 in. long, puberulous. Calyx broad, .1 in. long. Corolla white, base reddish, tube .5 in. long, dilate around stamens, lobes 1 in. long, oblong spatulate, edges ciliate. *Hab.* Malacca (Maingay). Very rare. *Distrib.* Borneo. *Native name:* Akar Jitan.

(2) **W. coriacea** Wall. *Cat.* 1620; *Pl. As. Rar.* iii. 45; *King, l.c.* 393.

Stout lofty liane about 4 in. through, bark black, warty. Tendrils long, branched. Leaves coriaceous, elliptic, very shortly acuminate, base cuneate, dark shining green; nerves 10 to 12 pairs flat and raised on the lower surface, midrib thick; 3.5 to 6 in. long, 1.5 to 2.5 in. wide; petioles .3 to .4 in. long. Cymes sessile, crowded, under 1 in. long. Calyx hemispheric, lobes round ciliate. Corolla white, tube inflate in middle, narrowed both ends, lobes oblong. Berry pear-shaped or elongate oblong, dull red, green or orange, 4 in. long. Seeds brown, inside violet. *Hab.* Common in forests. Singapore, Garden Jungle; Pulau Ubin; Bukit Timah. Malacca, Ayer Panas and Bukit Bruang and Bukit Sadanen (Derry). Perak, Larut (Kunstler). Penang Hill (Curtis). *Native names:* Getah Gaharu; Getah Ujol; Getah Menjawa; Puchong Kapor; Jela. *Use:* The rubber is sticky and only used as an adulterant of *W. firma* and as bird-lime.

(3) **W. oblonga** Dyer, *l.c.* iii. 625.

Big climber, bark pale. Leaves chartaceous-coriaceous, elliptic blunt or shortly blunt apiculate, base round; nerves 10 to 15 pairs elevate beneath; 3 to 6 in. long, 1.5 to 3 in. wide; petioles .25 in. long. Cymes small, sessile, pubescent. Calyx-lobes ovate-oblong, pubescent. Corolla cylindrical, .2 in. long, dilate above, lobes .3 to .4 in. long, linear-oblong. Berry oblong. *Hab.* Malacca (Maingay); Ayer Panas (Goodenough). Rare.

(4) **W. edulis** Roxb. *Cor. Pl.* iii, t. 280; *Hook. fl. F.B.I.* iii. 623. *W. martabanica* Wall. *Cat.* 1618; *Pl. As. Rar.* iii. 45, t. 272.

Large climber. Leaves thinly chartaceous, elliptic acuminate or oblong, base acute; nerves many pairs, sub-parallel; 4 to 7 in. long, 1.5 to 2.5 in. wide; petioles .5 in. long. Cymes shortly peduncled, few-flowered. Bracts round, deciduous. Calyx subglobose, lobes round, ciliate. Corolla-tube .13 in. long, lobes 3 times as long. Berry as big as a lemon, ovoid, 2 in. long when dry. *Hab.* Forests. Dindings, Gunong Tungul (Curtis). Perak, Thaping Hills (Haniff). *Distrib.* Assam, Burma.

I have only seen fruiting specimens from the Malay Peninsula, but they are quite similar to Wallich's *W. martabanica*, No. 1618; the large, thin closely-nerved leaves distinguish it among our species.

(5) **W. firma** Bl. *Ann. Mus. Bot. Lugd. Bat.* i. 154; *King, l.c.* 394; *Hook. Ic. Pl.* t. 2344. (Fig. 105, p. 324.)

Stout black liane about 3 to 4 in. through, warty, in section red; tendrils long, slender. Leaves coriaceous elliptic acuminate, base cuneate; nerves slender, 12 to 14 pairs, elevate beneath (drying yellow above); 3 to 4 in. long, 1.25 to 2 in. across; petioles .4 to .5 in. long. Cymes sub-sessile, .3 to .5 in. long. Calyx campanulate, .15 in. long, lobes ovate ciliate. Corolla white, fragrant,

tube cylindric dilate in middle, .25 in. long, lobes as long or longer, linear-oblong. Fruit globose or oblong, light green or orange. Seed, testa violet, inside white, tinted violet. *Hab.* Common in thick forests. Singapore, Garden Jungle; Changi; woodlands. Johor, Panchur. Malacca, Ayer Panas (Curtis); Bukit Sadanen (Derry). Negri Sembilan, Rantau (Cantley); Perak, Waterfall; Thaiping and Selama (Wray); Ulu Bubong (Kunstler). Penang, Balik Pulau; Waterfall. Kelantan, Kwala Lebir (Gimlette).



FIG. 105.—*Willughbeia firma*.

Lankawi (Curtis). *Distrib.* Sumatra, Borneo. *Native names:* Getah Singarip; Grip; Gegrip; Grit; Gegrit; Gegrip hitam; Gegrip Besih; Gegrip putih; Gegrip merah; Akar Sampat; Akar Gam or Gehan. *Use:* The best of all jungle rubbers, formerly collected extensively all over the peninsula (see *Agric. Bull.* ser. i. 241), and the latex of fruit or stem used in Kelantan for Puru (Yaws). (Gimlette, *Journ. Trop. Med. Puru of Malay Peninsula*.)

Easily distinguished from *W. coriacea* by the smaller, closer-nerved and thinner leaves, the nerves thinner, not flattened. The latex if rubbed between

the finger and the thumb coagulates in a firm lump, leaving no viscosity. That of *W. coriacea* and all other of our Willughbeias leaves an unpleasant stickiness on rubbing.

(6) *W. dulcis* Ridl. *Trans. Linn. Soc.* iii. 319. *W. martabanica* King and Gamble, *l.c.* 395, not of Wallich.

Slender liane. Leaves deep green, thinly coriaceous, obovate or oblanceolate, quite obtuse or rarely acuminate, base acute; nerves 28 to 30 pairs; 3 in. long, 1 in. wide; petioles .25 in. long. Cymes glabrous. Flowers yellow, .5 in. long. Calyx-lobes ovate, blunt ciliate. Corolla-tube dilate at top, lobes much longer, no scales in throat. Berry elliptic, apricot colour, 3 in. long, 1.25 in. through. *Hab.* Local; climbing over bushes on the heaths. Pahang, Pekan; Ulu Rumpin (Foxworthy). Malacca (Griffith). *Use*: Fruit sweet and eatable.

(7) *W. tenuiflora* Dyer, *l.c.* iii. 625; King, *l.c.* 396.

Big liane. Leaves thinly coriaceous, elliptic to oblanceolate acute, shortly acuminate, base cuneate; nerves 20 to 30 pairs; 4 to 5 in. long, 1.25 to 2 in. wide; petioles slender, .5 to .6 in. long. Cymes 1 in. or more long, pubescent. Calyx campanulate, lobes ovate pubescent. Corolla narrow cylindric, dilate above base, villous inside, .4 in. long, lobes .4 to .7 in. long, oblong falcate, blunt, white. Fruit pear-shaped, very large, 6 in. long, 4 in. through, apiculate, light green, pulp creamy white. Seed red outside, pink inside. *Hab.* Common in the south, in forests. Singapore, Bukit Timah; Reservoir Woods. Malacca, Ayer Panas (Curtis). Negri Sembilan, Tampin (Burkill). Selangor, Sungei Buloh (Foxworthy). Dindings, Lumut. *Distrib.* Sumatra. *Native names*: Akar Jitan; Akar Relang putih; Akar Segerang; Getah Puchong Kapor. *Use*: Latex mixed with that of *W. firma*.

(8) *W. flavescens* Dyer, *l.c.* iii. 625; King, *l.c.* 397.

Stem about 2 to 4 in. through or less, black. Leaves coriaceous elliptic, shortly blunt acuminate, base round or shortly cuneate; nerves slender, 16 to 20 pairs with many secondary ones, midrib prominent beneath, 2.5 to 4.5 in. long, 1.25 to 2.25 in. wide. Cymes axillary dichotomous with slender branches, 1 in. long. Calyx very small, lobes ovate acute. Corolla-tube .15 in. long, urn-shaped, lobes broad, rounded, as long, pale yellow. Fruit globose, yellow, 1 to 2 in. through. Seeds few. *Hab.* Dense forests, Singapore, Garden Jungle; Pulau Ubin; Mandai. Malacca, Bukit Sadanen (Derry). Perak (no locality) (Kunstler). *Distrib.* Sumatra. *Native names*: Akar Tenggang merah and putih; Akar Sagan. *Use*: The rubber is inferior and rather slimy, but was reported on in 1880 as fair and would be useful, valued in 1879 at 1s. 3d. per pound.

var. *rufescens*, *W. rufescens* Dyer, *l.c.* iii. 626.

Leaves narrower; nerves more numerous. Singapore, Malacca (Maingay). Negri Sembilan, Tampin (Burkill). Province Welles-

ley at Krian. Penang, Balik Pulau. This species was based by Dyer on a plant collected by Maingay in Malacca, which seems to be a slightly narrow-leaved state of *flavescens*. It bears the same galls as are common in that species. I have also, however, a plant from the roadside at Changi, Singapore, which has stiffer coriaceous lanceolate leaves, shortly acuminate at both ends, nerves and reticulations very fine and close, visible on both sides, 4 in. long, 1.4 in. wide; petioles .3 in. long. Cymes lax spreading, over  $\frac{1}{2}$  in. long. This may be a further exaggerated form. The flowers are identical in all.

## 2. CHILOCARPUS, Bl.

Climbing shrubs. Leaves usually thick; nerves numerous, parallel, sometimes obscure. Flowers usually yellow in axillary (or terminal) cymes small. Calyx 5-lobed. Corolla-tube cylindrical, dilate round stamens, limb round flat of 5 lobes, twisted to right. Stamens at or below middle of tube; anthers lanceolate acute. Ovary 1-celled; ovules many parietal; style short; stigma conic. Fruit at first fleshy, at length 2-valved dehiscent; pericarp woody. Seeds arillate albuminous. Species 16 to 18, Indo-Malaya, Australia.

- |  |                            |
|--|----------------------------|
| Flowers 1 in. long; leaves large; nerves prominent .                                   | (1) <i>C. costatus</i>     |
| Flowers about .3 in. long; leaves small or medium;<br>nerves very fine, not prominent. |                            |
| Cymes terminal and axillary, longer than leaves.                                       |                            |
| No bracts to flowers; peduncles under 1 in. long;<br>fruit ovoid . . . . .             | (2) <i>C. atroviridis</i>  |
| No bracts to flowers; peduncle over 1.5 in. long;<br>fruit globular . . . . .          | (3) <i>C. embelioides</i>  |
| Bracts many imbricate; fruit sausage-shaped .  | (4) <i>C. decipiens</i>    |
| Cymes very short, bracts many imbricate.   |                            |
| Cymes sub-sessile; leaves coriaceous obovate .   | (5) <i>C. enervis</i>      |
| Cymes peduncled .5 in. long; leaves apiculate<br>oblong.                               |                            |
| Petals rhomboid falcate . . . . .  | (6) <i>C. Cantleyi</i>     |
| Petals linear falcate . . . . .  | (7) <i>C. nigrescens</i>   |
| Petals ovate falcate . . . . .   | (8) <i>C. minutiflorus</i> |

(1) *C. costatus* Miq. *Fl. Ind. Bat.* ii. 393; King, *l.c.* 406.  
C. Maingayi Dyer, *l.c.* iii. 627.

Stout woody climber. Leaves fleshy chartaceous, sometimes rather thin, elliptic to oblong blunt, acuminate, base narrowed or rounded; nerves 12 to 20 pairs strongly elevate beneath, joining a prominent marginal nerve; petioles thick, .2 to .5 in. long. Cymes 1.5 to 3 in. long on peduncles .5 to 1.5 in. long, puberulous. Calyx-lobes ovate, round. Corolla-tube slender, .7 to 1 in. long, lobes ovate-lanceolate acuminate, .5 in. long. Berry large, ovoid to elliptic, base flat, 3 in. long, nearly 2 in. through, orange yellow, smooth. Seeds with yellow aril. *Hab.* Forests from sea level to 3000 ft. altitude. Malacca, Ayer Panas (Curtis); Selangor and



Bukit Panchur (Cantley). Pahang, Temerloh. Selangor, Kwala Lumpur; Ginting Bidai (Kloss). Perak, Hermitage Hill (Curtis); Chankat Serdang (Wray); Gunung Kerbau at 2000 ft. altitude (Robinson). Province Wellesley, Krian. Penang, Penara Bukit; Ayer hitam (Curtis). *Distrib.* Sumatra. *Native names:* Getah Grip putih; Singut Nasi (Wray); Gunum.

(2) **C. atroviridis** *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 153; *King, l.c.* 400.

Slender climber. Leaves thinly coriaceous, elliptic-oblong or lanceolate, tip caudate-acuminate, base cuneate; nerves very numerous, parallel joining an intramarginal nerve, midrib elevate; 2.25 to 5 in. long, .5 to 1.75 in. wide; petioles .3 to .4 in. long. Cymes very slender, axillary and terminal, 1 to 4 in. long; peduncle .5 to 1 in. long. Calyx under .1 in. long, lobes ovate blunt. Corolla yellow, tube .15 in. long, dilate in middle, lobes .1 in. long, falcate acute. Berry ovoid-oblong, 1.75 in. long, 1 in. through. Seed black, aril yellow. *Hab.* Forests to 3000 ft. altitude. Malacca, Ayer Panas (Griffith). Selangor, Batang Berjuntai; Batu Caves. Perak, Thaiping Hills at 2500 to 3000 ft. altitude (Scortechini, Kunstler). *Distrib.* Tavoy, Mergui.

(3) **C. embelioides** *King and Gamble, l.c.* 401.

Slender shrub. Leaves chartaceous, elliptic-oblong, shortly acuminate, base narrowed; nerves 24 to 26 pairs, very slender; 3 to 5 in. long, 1.25 to 2 in. wide; petioles .2 to .4 in. long. Cymes lax, many-flowered, nearly as long as leaves; peduncles 1.5 to 1.75 in. long; branches 1 in. long. Calyx .05 in. long, lobes very small. Corolla-tube .1 in. long, cylindric, lobes ovate falcate, .05 to .1 in. long. Berry globular. *Hab.* Perak, "Haram" (Scortechini, probably Bukit Arang Payah); very rare.

I have seen no specimen.

(4) **C. decipiens** *Hook. fil. F.B.I.* iii. 627; *King, l.c.* 402.

Slender woody liane. Leaves thinly coriaceous, elliptic-oblong or lanceolate cuspidate, base round or short, narrowed; nerves 20 to 25 pairs, horizontal, slender, not conspicuous; 3 to 3.5 in. long, 1 to 1.5 in. wide; petioles .12 to .25 in. long. Cymes terminal in a panicle 1 to 9 in. long and as much as 6 in. wide; peduncles very short, covered with lanceolate bracts. Sepals lanceolate acute. Corolla .1 in. long, lobes short, rounded. Berry sausage-shaped, 2 to 2.5 in. long, 1 in. through, green. Seed about .5 in. long with a lobed aril. *Hab.* Climbing on high trees in forests. Malacca (Maingay). Selangor, Batu Caves; Batang Berjuntai (Ridley).

I have not been able to examine good flowers of this very abnormal plant.

(5) **C. enervis** *Hook. fil. F.B.I.* iii. 626; *King and Gamble, l.c.* 402.

Stout climber. Leaves fleshy coriaceous, obovate to oblanceo-

late, blunt or shortly apiculate, base long cuneate; nerves 25 to 30 pairs, horizontal, very faint and often quite invisible; 3 to 4 in. long, 1·25 to 2 in. wide; petioles ·5 to ·75 in. long. Cymes small, dense. Flowers small, white. Calyx-lobes 5, ovate puberulous. Corolla-tube cylindrical, ·3 in. long, lobes oblique, falcate, ·1 to ·15 in. long. Berry ellipsoid or obovoid, orange, 1·5 to 2 in. long; pericarp woody, more or less ribbed, 2-valved. Seeds ·4 in. long, oblong with a lobed orange-coloured aril on one side. *Hab.* Edges of woods, forests. Johor, Kota Tinggi. Malacca (Maingay). Negri Sembilan, Bukit Tangga Pass. Perak, Relau Tujur (Wray); Thaiping (Cantley); Bujong Malacca.

(6) **C. Cantleyi** *King and Gamble, l.c.* 403.

Glabrous climber. Leaves coriaceous, elliptic or oblong, blunt or shortly blunt apiculate, base long, narrowed; nerves about 30 pairs, invisible beneath; 3·5 to 4 in. long, 1·25 to 1·5 in. wide; petioles rather slender, ·5 in. long. Cymes ·4 to ·5 in. long, many-flowered on stout peduncles; branches few, short. Calyx ·1 in. long, lobes elliptic, round. Corolla yellow, tube ·2 in. long, lobes rhomboid-falcate, ·15 to ·2 in. long. *Hab.* Rare in damp lowland forest. Selangor, Kwala Lumpur (Curtis, Ridley). Perak, Ulu Kerling (Kunstler); common in swamps; Lower Perak (Cantley). *Native name:* Getah Cherit Morei.

(7) **C. nigrescens** *King and Gamble, l.c.* 404.

Rather stout, drying black. Leaves chartaceous-coriaceous, elliptic-oblong, shortly cuspidate, base narrowed; nerves 12 to 16 pairs, joining an intramarginal nerve; 3 to 5 in. long, 1·5 to 2 in. wide; petioles ·5 to ·6 in. long. Cymes large, many-flowered, 1·5 in. long on stout peduncles, ·5 in. long; branches about ·5 in. long; pedicels with numerous imbricate bracts. Calyx small, lobes broad, ovate. Corolla cylindrical, dilate near base, lobes linear-falcate acuminate, ·2 in. long. *Hab.* Penang Hill and Penara Bukit up to 3000 ft. altitude (Curtis). Very local in hill-forest.

(8) **C. minutiflorus** *King and Gamble, l.c.* 405.

Climber 10 to 15 ft. long. Leaves thinly coriaceous, waxy-white beneath elliptic or oblong-lanceolate; nerves 9 to 12 pairs, faint or invisible; 2 to 2·5 in. long, ·75 to 1·25 in. wide; petioles slender, ·15 to ·2 in. long. Cymes small, ·12 in. long; peduncles and branches very short. Calyx-lobes minute. Corolla white or reddish yellow, tube short, inflate in middle, ·1 in. long; lobes ovate falcate. Berry pear-shaped, bivalved with low ridges, 2 to 2·5 in. long, ·75 to 1·25 in. through, green with grey spots. Seeds oblong angular, ·25 in. long, aril papery. *Hab.* Forests, local and scarce, sometimes epiphytic. Perak, Larut (Kunstler).

### 3. LEUCONOTIS, Jack.

Climbing shrubs. Leaves sub-coriaceous; nerves few, not parallel. Flowers in axillary cymes, 4-merous, yellow. Calyx

4-lobed. Corolla tubular with flat limb of 4 short lobes. Stamens 4, included; anthers linear-lanceolate. Ovary 2-celled; ovules 2 or 3 in a cell axile; style short; stigma bifid. Berry ovoid or globose, fleshy-pulpy. Seeds 1 to 6, testa membranous, albumen none. Species 6, Malayan.

- Calyx-lobes linear long; nerves very prominent;  
seeds up to 6 . . . . . (1) **L. eugenifolius**  
Calyx-lobes round, short; nervules less prominent;  
seeds 2.  
Corolla-tube .25 in. long; calyx fleshy; fruit pear-  
shaped . . . . . (2) **L. Maingayi**  
Corolla-tube .4 in. long; calyx thinner; fruit  
ellipsoid . . . . . (3) **L. Griffithii**

(1) **L. eugenifolius** DC. *Prodr.* viii. 331; *King, l.c.* 407.

Climber. Leaves fleshy chartaceous, oblong to elliptic acute, base rounded or shortly narrowed; nerves 8 to 10 pairs, very prominent beneath, inarching in a marginal nerve; 2.5 to 5 in. long, 1 to 1.5 in. wide; petioles .25 to .5 in. long. Cymes 1 to 1.5 in. long, 6- to 12-flowered, pubescent; peduncles .5 in. long; branches 3. Calyx-lobes linear, pubescent, .1 in. long. Corolla-tube .3 to .4 in. long, lobes ovate-cordate, pubescent, recurved, yellow buff. Berry ovoid, light yellow, 1.5 in. long. Seeds about 6. *Hab.* Edges of forest. Perak, Kurau, Waterfall Hill and Relau Tujur (Wray); Padang Rengas; Ipoh (Curtis). Province Wellesley (Cantley). Penang (Wallich); road to Sungei Penang. *Distrib.* Sumatra, Borneo. *Native names:* Akar Getah Gaharu; Akar Cheri Morei; Akar Garah; Akar Gegrip Sundek.

(2) **L. Maingayi** Dyer, in *Hook. fil. F.B.I.* iii. 628.

Climber. Leaves coriaceous, often whorled in threes, elliptic-oblong, short acuminate, base round; nerves 5 or 6 pairs, faint, not elevate; 3 to 4 in. long, 1.5 to 2 in. wide; petioles slender, 1.25 in. long. Cymes dense, many-flowered, 1 in. long; peduncles stout angled, .5 in. long. Calyx-lobes oblong-ovate, .15 in. long, puberulous. Corolla-tube .25 in. long, lobes broad ovate pubescent, yellow. Berry pear-shaped, 1.75 in. long, yellow, on a thickened peduncle with enlarged calyx-lobes and bracts. Seeds about 3. *Hab.* Edges of woods. Singapore, Garden Road; Bukit Timah; Changi. Selangor, Sungei Buluh (Foxworthy). *Native names:* Getah Sundi; Grit Putih.

(3) **L. Griffithii** Hook. *fil. F.B.I.* iii. 628; *King, l.c.* 409.

Climber. Leaves coriaceous, elliptic-oblong sub-acute, base round or short cuneate; nerves 4 to 7 pairs, slightly elevate below, meeting in intramarginal arches; 3.5 to 4.1 in. long, 1.5 to 2 in. wide; petioles slender, .5 in. long. Cymes .75 in. long, on angled rather stout peduncles as long, puberulous, dense many-flowered. Calyx-lobes short, ovate acute, puberulous. Corolla .3 to .4 in. long, glabrous outside, lobes short, oblong rounded, yellow. Fruit

ellipsoid, pale yellow, .2 in. long, 1.5 in. through. Seeds usually 2 flat rugose, olive green, in thick pulp. *Hab.* Woods. Singapore, Selitar; Bukit Mandai; Jurong. Malacca, Merlimau; Bukit Bruang (Griffith, Derry). Negri Sembilan, Kwala Pedas; Tampin. Selangor, Kwala Lumpur. Perak, Asam Kumbong and Thaiping Railway (Wray). *Native name*: Akar Getah Sundi. *Use*: The rubber considered by Malays of good quality.

#### 4. MELODINUS, Forst.

Climbers. Leaves with numerous slender parallel nerves. Flowers white (or pale pink) terminal paniced cymes, or denser axillary cymes, 5 (rarely 4-merous). Corolla-lobes often fimbriate, with thick lobed scales in mouth. Stamens 5 (or 4) below the middle of the tube. Ovary 2-celled; ovules many axile; style short; stigma bifid. Berry globose, pericarp often woody. Seeds in pulp many, albumen fleshy. Species 20, Indo-Malaya, China, Australasia.

Flowers large in terminal panicles . . . . . (1) *M. monogynus*  
Flowers small in axillary cymes; leaves thin chart-  
aceous.

Cymes .25 to .5 in. long.

Corolla-tube thick, hardly dilate; lobes bifid;  
1 lobule bicuspidate . . . . . (2) *M. orientalis*

Corolla-tube slender, dilate in middle; lobule  
dentate.

Nerves 10 to 15 pairs; scales bifid . . . . . (3) *M. micranthus*

Nerves 18 to 22 pairs; scales 5-lobed . . . . . (4) *M. citriformis*

Cyme .75 to 1 in. long.

Nerves 10 to 15 pairs; lobes oblong spatulate . . . . . (5) *M. perakensis*

Nerves 40 pairs; lobes ovate entire . . . . . (6) *M. cymosus*

Leaves stiff coriaceous; cymes .5 in. long; lobes  
fimbriate . . . . . (7) *M. coriaceus*

(1) *M. monogynus* Roxb. *Fl. Ind.* 56; *King, l.c.* 411; *Bot. Mag.* t. 2527.

Large climber. Leaves chartaceous-coriaceous, oblong or oblong-lanceolate acuminate, base rounded; nerves about 20 pairs, fine horizontal; 4.5 to 6 in. long, 1.5 to 2 in. wide; petioles .2 to .3 in. long. Panicles terminal, puberulous up to 3 in. long and as wide. Calyx-lobes 5, oblong orbicular, .2 in. long. Corolla-tube cylindrical, .5 to .75 in. long, villous inside, lobes oblong falcate, round, .5 in. long, white, fragrant, with a 2- or 3-lobed scale at base. Berry globose, 3 in. through, orange. Seeds flattened. *Hab.* Rare; a beautiful fragrant plant. Perak, Hermitage Hill (Curtis). Penang Hill (Maingay, etc.). *Distrib.* India, Timor.

(2) *M. orientalis* Bl. *Bijdr.* 1026; *King, l.c.* 412.

Large climber. Leaves chartaceous, nerves very fine and close, oblong cuspidate, base acute, 3 to 5.5 in. long, 1 to 2.25 in. wide; petioles .5 in. long. Cymes axillary, few-flowered (8 to 10), .24 in. long. Calyx campanulate, .1 in. long, lobes .05 in. long.

Corolla thick, cylindric, .2 in. long, puberulous, lobes oblique, ovate, tip bifid. Berry 2.5 in. through, yellow. *Hab.* Hill Forests to 3000 ft. altitude. Perak, Maxwell's Hill 3000 ft. altitude (Scortechini); Goping (Kunstler). Penang, Waterfall and Moniot's Road (Curtis). *Distrib.* Java, Sumatra. *Native name:* Getah Ujol.

(3) **M. micranthus** *Hook. fil. F.B.I. iii. 629; King, l.c. 413.*

Climber. Leaves chartaceous, oblong-lanceolate acuminate, acute, base slightly narrowed blunt; nerves 10 to 15 pairs fine, slightly elevate; 3 to 6 in. long, 1 to 2.25 in. wide; petioles .15 to .25 in. long. Cymes paniced, axillary, .3 to .5 in. long, many-flowered. Calyx .075 in. long, lobes ovate, round. Corolla cylindric, dilate above middle, .125 in. long, lobes short, 2-lobed, scales in mouth bifid. *Hab.* Rather scarce in woods. Singapore, Jalan Bray (Ridley). Malacca (Maingay). Penang, road to Sungei Penang (Curtis).

(4) **M. citriformis** *King and Gamble, l.c. 413.*

Slender climbing shrub. Leaves chartaceous, oblong-lanceolate, caudate-acuminate, base cuneate; nerves 18 to 22 pairs, secondaries many; 3 to 4 in. long, 1 to 1.25 in. wide. Cymes axillary, short, few-flowered. Calyx campanulate, lobes blunt, .05 in. long. Corolla light yellow, tube cylindric, dilate in middle, .125 in. long, scales in mouth 5-lobed, lobes falcate fimbriate and inflexed at tip. Berry ovoid, orange, 3.5 in. long, 2.5 in. wide. Seed numerous, pitted, .6 in. long. *Hab.* Perak, Larut, dense jungle (Kunstler). Rare.

(5) **M. perakensis** *King and Gamble, l.c. 414.*

Climber. Leaves elliptic-oblong, shortly acuminate, base narrowed; nerves 10 to 15 pairs; 3.5 to 5 in. long, 1.5 to 2 in. wide; petioles .15 to .2 in. long. Cymes axillary, .75 to 1 in. long, sessile, lax. Calyx .05 in. long, campanulate, lobes ovate. Corolla-tube cylindric, inflate in middle, lobes oblong-spathulate, lobed at tip, one lobule toothed, a large gland at base of each lobe. Fruit pear-shaped, 2 in. long, 1.5 in. wide, pericarp woody. Seeds many, triangular, .75 in. long. *Hab.* Perak, Limestone Hills 300 to 800 ft. altitude (Kunstler). Rare.

(6) **M. cymosus** *Ridl. Journ. F.M.S. Mus. x. 146.*

Leaves coriaceous-chartaceous, elliptic, abruptly blunt cuspidate, base shortly cuneate; nerves very fine, 40 pairs, horizontal; 4.25 in. long, 2 in. wide; petioles .6 in. long. Cymes lax, spreading, .75 in. long on a .5 in. peduncle; pedicels .12 in. long. Flower .25 in. long, dull yellow. Calyx-lobes round. Corolla base dilate, narrowed upwards, lobes ovate, 5, entire, scales narrow oblong, bilobed. *Hab.* Malacca, Selendor Forest (Burkill). Rare.

(7) **M. coriaceus** *Oliv. Hook. Ic. Pl. 1758; King, l.c. 414.*

Big climber. Leaves coriaceous, elliptic or obovate, blunt or slightly acute, base cuneate; nerves 13 to 17 pairs, very incon-

spicuous especially below; 3 to 5 in. long, 1·5 to 2 in. wide; petioles ·3 to ·5 in. long. Cymes axillary, sessile, ·5 in. long, many-flowered. Calyx ·05 to ·07 in. long, lobes half as long. Corolla cylindric, dilate in middle, scales in mouth 2-lobed, lobes ovate falcate, toothed. Berry ovoid or globose; pericarp woody, 1·5 to 2·5 in. through, deep green or yellow. Seeds many, irregular, brown. *Hab.* Hill forests. Perak Waterfall, Thaiping (Wray). Penang (Wallich); Chalet and West Hill (Curtis).

### 5. ALYXIA, Br.

Slender woody twiners, with fragrant bark. Leaves coriaceous, whorled. Flowers small in small axillary (rarely terminal) cymes. Calyx eglandular. Corolla-tube cylindric, throat naked, lobes overlapping to left. Stamens above the middle of the tube; anthers lanceolate, base rounded, disc 0. Carpels distinct. Style filiform; ovules 2 to 6 in 2 rows in a carpel; stigmas oblong or capitate. Drupes black, 1-seeded or in 2 to 4 1-seeded joints. Seed ovoid or oblong. About 35 species, tropical Asia and Australasia.

Drupe under ·5 in. long.

- |   |                            |
|---|----------------------------|
| Corolla outside and leaves beneath, pubescent   | (1) <i>A. pilosa</i>       |
| Corolla and leaves glabrous.                    |                            |
| Leaves coriaceous over 2 in. long               | (2) <i>A. lucida</i>       |
| Leaves coriaceous under 2 in. long.             |                            |
| Leaves obovate, ·35 to ·75 in. wide             | (3) <i>A. pumila</i>       |
| Leaves elliptic, ·75 to 1·25 in. wide           | (4) <i>A. oleifolia</i>    |
| Leaves narrow elliptic lanceolate, ·25 in. wide | (5) <i>A. angustifolia</i> |
|   | (6) <i>A. Forbesii</i>     |

Drupes over ·5 in. long.

- |  |                            |
|--|----------------------------|
| Leaves pubescent beneath, 3 to 4 in. long; drupe |                            |
| ·75 in. long                                     | (7) <i>A. selangorica</i>  |
| Leaves glabrous, 4 to 6 in. long                 | (8) <i>A. Scortechinii</i> |

(1) *A. pilosa* *Miq. Fl. Ind. Bat.* ii. 408; *King, l.c.* 416.

Climber rather stout for the genus, 4-angled, stem pubescent at top. Leaves very coriaceous, in whorls of three, lanceolate, dense-pubescent beneath, acuminate; nerves 15 to 20 pairs, midrib prominent; 3 to 5 in. long, 1 to 1·5 in. wide; petioles ·25 in. long. Cymes ·5 in. long, grey pilose; peduncles stout. Calyx ·15 in. long, lobes ovate-lanceolate, pubescent. Corolla white, tube cylindric, lobes ovate-cordate, pubescent. Drupes 1 to 2, ellipsoid, ·5 in. long. *Hab.* Mountains, Malacca; Mt. Ophir. Selangor, Hulu Semangkok; Bukit Kutu. Perak, Bujong Malacca (Kunstler); variety with narrow leaves, nerves invisible. Kedah Peak (Robinson). *Distrib.* Sumatra, Borneo.

(2) *A. lucida* *Wall. Roxb. Fl. Ind. (ed. Carey)*, ii. 540; *King, l.c.* 417.

Stout, woody glabrous. Leaves thinly coriaceous in whorls of 3 or 4, elliptic or obovate, blunt or sub-acute, base narrowed; nerves 16 to 20 pairs, very faint, hardly visible; 1·75 to 3 in. long,

1 to 1.25 in. wide, midrib slender; petioles .3 in. long or less. Cymes .75 to 1 in. long, many-flowered, umbellate, puberulous, lengthening to 1.5 in. long in fruit. Calyx-lobes linear pubescent. Corolla-tube .25 in. long, oblong, limb .2 in. across, white, throat orange. Drupes ellipsoid, .5 in. long, pulpy, purple black. *Hab.* Sea coasts; often cultivated for its fragrant flowers and bark. Singapore, Kranji; Sungei Morai. Johor, Minyak Buku, Batu Pahat. Malacca; Cape Râchado (Finlayson in Herb Wallich). Dindings, Bruas; Pangkor, Rajah Hitam (Curtis); Pulau Rumpia (Seimund). Lankawi, Gunong Rayah (Curtis). *Distrib.* St. Barbe Isle, Borneo, Sumatra. *Native names:* Pulasari; Mempelas Hari. *Use:* The bark fragrant of Coumarin is put among clothes to perfume them.

(3) **A. pumila** Hook. *fl. F.B.I.* iii. 635; *King, l.c.* 420.

Slender climber. Leaves in whorls of 3, narrow elliptic or obovate blunt acuminate, base cuneate; nerves 15 to 20 pairs, very inconspicuous; .75 to 2 in. long, .35 to .75 in. wide; petioles .1 in. long. Cymes very small, 5- to 6-flowered; peduncles very short, .15 to .25 in. long. Calyx-lobes linear, ciliate. Corolla-tube cylindrical, dilate at top, nearly .2 in. long, white. Drupe ellipsoid, .4 in. long, .3 in. through. *Hab.* Mountains 3000 to 4000 ft. altitude in thickets. Malacca; Mt. Ophir (Maingay, etc.). Selangor, Hulu Semangkok. Perak, Batu Kusan (Scortechini); Bujong Malacca. Kedah Peak.

(4) **A. oleifolia** King and Gamble, *l.c.* 419.

Small climber or epiphyte, stem angled. Leaves thick coriaceous, 3-whorled or opposite, elliptic acuminate, ovate or lanceolate, base narrowed or round; nerves 10 to 12 pairs sunk, inconspicuous above, invisible beneath; 1.5 to 2.5 in. long, .75 to 1.25 in. wide; petioles stout, .15 to .25 in. long, thick. Cymes sub-terminal and axillary, 1 in. long. Flowers 3 or 4, large; pedicels .2 in. long. Calyx-lobes subulate. Corolla white, .5 in. long, glabrous outside, tube stout, cylindrical contracted at mouth, lobes ovate, blunt. Drupes ellipsoid, .5 in. long, glossy black. *Hab.* Mountains at 5000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Gunong Bubu (Cantley, Kunstler).

var. *tenuifolia* Ridl. Leaves lanceolate-acuminate, much thinner; nerves visible above when dry. Calyx-lobes half as long, lanceolate acuminate. Corolla pubescent outside, lobes shorter. Possibly a distinct species. *Hab.* Selangor, Gunong Mengkuang Lebah (Robinson).

(5) **A. angustifolia** Ridl. *Journ. F.M.S.* vi. 161.

Slender climber or in open spots sub-erect. Leaves coriaceous, elliptic-lanceolate blunt or sub-acute, edge thickened, midrib very thick beneath, sunk above, nerves altogether invisible; 1 to 2 in. long, .25 in. wide; petioles .12 in. long. Cymes terminal and axillary, .5 in. long, 12-flowered; peduncles short, pubescent.

Calyx-lobes linear pubescent. Corolla .25 in. long, white, glabrous, lobes blunt ovate. Drupe elliptic-obovoid, black, .25 in. long. *Hab.* Rare among bushes on rocky slopes on mountains. Pahang, Gunong Tahan at 5000 ft. altitude and upwards (Ridley).

(6) **A. Forbesii** King and Gamble, *l.c.* 490. A stellata Wall. *Cat.* (not of Roem. and Schult.).

Straggling-branched climber; branches 3-angled, slender. Leaves chartaceous in whorls of 3 or 4, lanceolate cuspidate acuminate, base shortly cuneate; nerves very fine and inconspicuous, 30 pairs, midrib prominent; 2.5 to 5 in. long, .75 to 1.5 in. wide; petioles .1 in. long. Cymes lax, 3- to 5-flowered, 1 in. long; peduncles .25 in. long; pedicels slender. Calyx-lobes ovate acuminate. Corolla .4 to .6 in. long, cylindric, lobes blunt, ovate cordate, white and yellow. Drupes ellipsoid, .4 to .5 in. long. *Hab.* Mountains. Pahang, Kluang Terbang (Barnes). Perak, Gunong Inas (Wray); Thaiping Hills 3200 to 3800 ft. altitude (Kunstler). Penang (Wallich). *Distrib.* Java, Sumatra.

(7) **A. selangorica** King and Gamble, *l.c.* 422.

Woody climber, slender. Leaves coriaceous, pubescent beneath, 3- to 4-whorled, obovate or oblanceolate, abrupt acuminate, base long-cuneate; nerves very fine, 30 pairs or more, midrib sunk above and pubescent on both sides; 3 to 4 in. long, 1 to 1.25 in. wide; petioles .25 in. long, pubescent. Cymes very short. Flowers unknown. Drupe ellipsoid acute both ends, .75 in. long, .45 in. through, on a pedicel .4 in. long, black. *Hab.* Selangor, top of the Batu Caves, limestone rocks. Very rare (Ridley). *Distrib.* Sumatra.

(8) **A. Scortechinii** King and Gamble, *l.c.* 421.

A stout species, upper part of stem angled and pubescent. Leaves thin coriaceous in whorls of 3, oblong-lanceolate, shortly cuspidate, narrowed gradually to base; nerves extremely numerous and close, faint, generally invisible beneath, midrib stout beneath; 4 to 6 in. long, 1.5 to 2 in. wide; petioles .3 to .5 in. long. Cymes sessile, axillary, dense pubescent, .4 in. long. Calyx-lobes linear, pubescent. Corolla-tube narrowed at mouth, pubescent above, lobes ovate. Drupes ellipsoid, 1 in. long, .5 in. wide. *Hab.* Mountain forests. Perak, Kwala Kangsa; Gunong Batu Putih (Wray). Gunong Berumbun, Telom (Ridley).

#### EXCLUDED SPECIES

A. ODORATA Wall. *Cat.* 1606, from Tenasserim, is distinct in its very conspicuous intra-marginal nerves and large elliptic leaves. The Singapore plant referred to this (and also to *A. lucida*) by King, appears to me to be the latter species, and a specimen labelled Malacca, Griffith, in *Herb. Kew* may be the same with exceptionally large narrow-oblong leaves, but it does not at all resemble *A. odorata* Wall.



## 6. HUNTERIA, Roxb.

Glabrous tree. Leaves opposite, coriaceous, many-nerved. Flowers in terminal and axillary corymbose cymes, small white. Calyx 5-lobed. Corolla salver-shaped, tube dilate at mouth. Stamens in dilate portion; anthers oblong-lanceolate. Disc o. Carpels 2, distinct; style filiform; stigma bifid. Berries twin, ovoid, 2-seeded. Seeds ovoid plano-convex. Species 3, 1 Indo-Malayan, 1 Javan, 1 African.

(1) *H. corymbosa* Roxb. *Fl. Ind.* i. 695; *King, l.c.* 426.

Tree 30 to 40 ft. tall, 15 to 20 in. through. Leaves lanceolate-oblong, caudate-acuminate, base cuneate; nerves fine, 22 to 26 pairs; 3 to 7 in. long, 1 to 2 in. wide; petioles .5 in. long. Corymbs 1 to 2 in. long; peduncles .2 to 1 in. long. Calyx-lobes ovate acute. Corolla pure white, tube .3 to .35 in. long, throat annulate, lobes ovate-oblong, .2 to .25 in. long. Berries globose, beaked, yellow, .75 in. long on a thickened stalk. Seeds 2. *Hab.* Not rare; in woods and forests. Negri Sembilan, Petasih (Foxworthy). Selangor, Batu Caves; Gombak (Burn-Murdoch); Sungei Buloh (Foxworthy). Perak, Larut (Kunstler). Penang (Wallich); Batu Feringhi and Telok Bahang (Curtis). Langkawi, Kwah (Curtis). *Distrib.* India, Ceylon, Sumatra. *Native names:* Kamuning Hutan; Kayu Gading.

## 7. RAUWOLFIA, Linn.

Shrubs or trees. Leaves whorled or opposite. Flowers in corymbose or umbellate cymes, axillary and pseudo-terminal. Calyx short, eglandular. Corolla-tube cylindrical, throat hairy, lobes broad, overlapped to left. Stamens above middle of tube; anthers rounded at base. Disc cup-shaped or annular. Carpels connate or free; style filiform; stigma calyptriform or peltate. Fruit of 2 drupes each with 1 pyrene. Seed 1, ovate. About 50 species, chiefly American, about 10 Asiatic.

Shrub 4 to 7 ft. tall; corolla-tube cylindrical . . . (1) *R. perakensis*  
 Tree 40 to 50 ft. tall; corolla campanulate . . . (2) *R. sumatrana*

(1) *R. perakensis* King and Gamble, *l.c.* 434.

A shrub about 4 to 7 ft. tall. Leaves on ends of branches, membranous fleshy, lanceolate acuminate, base narrowed; nerves fine, 12 to 15 pairs; 4 to 8 in. long, 1 to 3 in. wide; petioles .75 in. long. Cymes corymbose in upper axils, lax, 1 in. long; peduncles .5 to 2 in. long; pedicels 1.25 in. long. Calyx .05 in. long, lobes linear. Corolla .5 in. long, pink, tube cylindrical, inflate above, lobes short, ovate blunt. Drupes pink, obovoid, .3 in. long, flattened, pyrenes rugose. *Hab.* Common in orchards and river banks in open spots. Pahang, Pekan. Selangor, Batu Caves; Menuang Gasing (Kloss); Gunong Mengkuang Lebah (Robinson). Perak, Kwala Dipang; Thaiping Hills to 5000 ft. altitude; Leng-

gong. Tringganu, isles of river mouth. Kelantan, Banks of Lebir River. Kedah, Gunong Geriang (Ridley). *Distrib.* South Siam. *Native name*: Batu Pelir Kambing (Dr. Gimlette). *Use*: As a poison (Gimlette, "Malay Poisons," p. 52).

(2) *R. sumatrana* Jack. *Mal. Misc.* 22; *King, l.c.* 424.

Tree 40 to 50 ft. tall, 6 to 10 in. through. Leaves thin subcoriaceous, whorled 3 to 4 or opposite, oblong to obovate-spathulate blunt or very shortly acuminate; nerves parallel, over 30 pairs; 6 to 8 in. long, 2 to 3 in. wide. Flowers in compound umbels, 3 to 6 terminal on peduncles 3 in. long; umbels 2 in. long and 3 in. across on peduncles 1.5 in. long. Calyx-lobes orbicular, small. Corolla campanulate, .2 in. long, .1 in. wide, pubescent in mouth, white. Drupe oblong-globose, .61 to .7 in. long, .5 to .6 in. through, beaked, furrowed, containing 2 pyrenes. *Hab.* Not common. Limestone rocks, Perak (Scortechini); Goping (Kunstler); Tambun (Burkill). *Distrib.* Sumatra.

Jack, who described it from Sumatra, gives Tampil Badak and Sembu Badak as native names and says the light wood is used for sheaths of swords and krises.

## 8. KOPSIA, Bl.

Small or large shrubs or big trees. Leaves opposite, rather thin. Flowers white (or pink) in short terminal cymes. Bracts ovate, persistent. Calyx 5-lobed. Corolla salver-shaped, tube very slender, slightly dilate round stamens, lobes overlapping to right. Stamens near top of tube. Disc of 2 glands. Carpels 2, distinct; ovules 2 in each; style filiform; stigma thick. Fruit an obovoid or oblique quadrate dry 1-(or 2)seeded, flattened capsule; pericarp coriaceous, not dehiscent. Seed oblong, ex-albuminous. About 12 species, Indo-Malaya.

Corolla-tube dilate at top; branches of cyme not closely bracteate.

Fruit glabrous.

Shrub; many-flowered; petals broad oblong . . . (1) *K. singapurensis*

Big tree; few-flowered; petals narrow linear oblong . . . (2) *K. pauciflora*

Tree; flowers many; petals narrow linear oblong . . . (3) *K. Scortechinii*

Fruit densely hairy . . . (4) *K. Griffithii*

Corolla-tube dilate at top, bracts numerous . . . (5) *K. larutensis*

Corolla-tube dilate in middle; bracts numerous.

Small shrub; cyme .5 in. long . . . (6) *K. Ridleyana*

Big shrub; cyme 1 to 3 in. long, lengthening, dense-bracted . . . (7) *K. macrophylla*

(1) *K. singapurensis* Ridl. *K. fruticosa* var. *albiflora*, *King and Gamble, l.c.* 431.

A shrub or treelet 6 to 12 ft. tall. Leaves coriaceous, elliptic-oblong acuminate, base shortly narrowed; nerves about 14 pairs, rather prominent; 6 in. long, 2.5 in. wide; petioles .25 in. long.

Cymes terminal, .5 in. long on peduncles .5 in. long. Bracts persistent, oblong, .1 in. long. Calyx campanulate with broad truncate, ciliate lobes. Corolla white with crimson eye, tube 1.5 in. long, limb 1.25 in. across, lobes broad, oblong. Fruit rhomboid, 1.12 in. long, .5 in. wide, .1 in. thick, dull red. *Hab.* Woods in the south. Singapore, Chan Chu Kang. Johor, Kwala Kahang (Kelsall); Kota Tinggi. Pahang, Rumpin River (Watson).

Teysmann's Javanese *Calpicarpum albiflorum* has bigger flowers, less coriaceous, sub-sessile leaves, lengthening racemes with persistent bracts, smaller calyx and totally different fruit.

(2) **K. pauciflora** *Hook. fl. F.B.I. iii. 639; King, l.c. 431.*

A very big tree. Leaves chartaceous elliptic bluntly caudate-acuminate, base narrowed; nerves 6 to 10 pairs elevate; 4 to 6 in. long, 1.5 to 2.5 in. wide; petioles .25 in. long. Cyme terminal, 2- to 3-flowered, rachis .25 to .5 in. long. Bracts ovate. Calyx .15 in. long, lobes ovate, blunt. Corolla cylindric, 1.5 to 2 in. long, dilate at top, villous inside, lobes linear-oblong 1 in. long, white with pink ring in mouth. *Hab.* Malacca, Mt. Ophir in the forest of Bukit Besar (Maingay, Ridley). A rare and very local tree in the forest about 2000 ft. altitude.

(3) **K. Scortechinii** *King and Gamble, l.c. 431.*

Tree 40 to 50 ft. tall. Leaves chartaceous, elliptic-oblong, tip acuminate, base narrow; nerves 8 to 16 pairs; 2 to 5 in. long, 1 to 2 in. wide; petioles .1 in. long, glandular at base inside. Cymes terminal or lateral; peduncles .25 to 2 in. long. Bracts ovate-triangular acute, .15 in. long, glabrous. Calyx-lobes ovate acuminate with a gland at point, .1 in. long. Corolla-tube slender, dilate at top, then constrict, .75 to 1 in. long, lobes linear-oblong, .5 to .75 in. long, white. *Hab.* Perak (Scortechini).

I have not seen this species.

(4) **K. Griffithii** *King and Gamble, l.c. 432.*

Small tree. Leaves thinly coriaceous, ovate-elliptic caudate, tip glandular, emarginate, base rather long-narrowed; nerves fine, 22 to 30 pairs, close parallel; 3.5 to 5 in. long, 1.5 to 2 in. wide; petioles .25 in. long, winged nearly to base. Cymes terminal corymbose; peduncle .25 in. long; flowers numerous. Bracts acute. Calyx very small, lobes blunt. Corolla-tube very slender, 1.25 in. long, dilated at top, lobes linear blunt, .75 in. long, .1 in. wide. Carpels densely hairy. *Hab.* Malacca (Griffith). Apparently very rare, not seen again.

var. *paucinervia* *King and Gamble.* Shrub 4 to 6 ft. tall. Flowers white; nerves 12 to 15 pairs. Perak, Limestone hills (Kunstler).

I have not seen this variety.

(5) **K. larutensis** *King and Gamble, l.c. 432.*

Shrub 10 ft. tall to tree 25 ft. tall, bark pale and corky. Leaves

coriaceous, oblong-lanceolate, narrow caudate acuminate, base cuneate; nerves parallel 15 to 22 pairs elevate beneath; a gland on the tip of the leaf; 4 to 10 in. long, 1·5 to 2·5 in. wide; petioles ·1 in. long or less. Cymes sessile about 10, branched, lengthening to ·5 in. long, covered with imbricating bracts. Flowers small, cream-colour. Calyx-lobes ovate blunt ciliate. Corolla cylindrical, ·3 to ·4 in. long, slightly dilate at top, pubescent inside, lobes oblong spatulate twisted, ·3 in. long. Carpels glabrous. Capsule urn-shaped triangular, ·7 in. long, ·6 in. wide, ·25 in. thick. *Hab.* Perak, Goping (Kunstler); Ipoh (Curtis); Sungei Larut (Wray). Local in woods.

(6) *K. Ridleyana* King and Gamble, *l.c.* 433.

A shrublet about 2 ft. tall or less. Leaves thinly chartaceous, lanceolate acuminate, base narrowed; nerves 12 to 14 pairs ascending, slender but conspicuous; 4 to 4·5 in. long, 1 to 1·5 in. wide; petioles ·15 in. long. Cyme terminal, sessile with few short branches about ·25 in. long, glabrous. Calyx-lobes ovate blunt, ·1 in. long. Corolla white, tube 1 in. long, dilate in middle, mouth pubescent, lobes oblong, obovate, ·75 in. long, ·25 in. across. *Hab.* Local in woods, but not rare in Negri Sembilan. Negri Sembilan, Perhentian Tinggi; Bukit Tangga, Seremban (Napier); Bukit Putus; Tampin; Johol. Selangor, Rawang; Sungei Buluh (Goodenough).

(7) *K. macrophylla* Hook. *fil. F.B.I.* iii. 639; King, *l.c.* 434.

Shrub 6 to 10 ft. tall. Leaves thinly coriaceous elliptic-oblong abruptly narrow caudate acuminate, base cuneate; nerves 18 to 22 pairs elevate beneath; 5 to 9 in. long, 2 to 2·5 in. wide; petioles very short or none. Cymes terminal with short thick peduncles up to ·5 in. long and 2 or more thick, branches lengthening to 3 in. long, densely covered with persistent pubescent bracts. Calyx-lobes oblong blunt pubescent. Corolla white, tube 1 in. long, slender, lobes obovate, ·5 to ·75 in. long, 4 to ·5 in. wide. *Hab.* Penang, Pulau Jerajah (Kunstler); Singapore (Lobb).

Lobb's locality no doubt should be Penang.

#### CULTIVATED IN GARDENS

*K. fruticosa* A.DC. *Prodr.* viii. 352.

Native of Burma. This bush with rose-pink flowers is often cultivated in gardens, but has no claim to be considered as belonging to our flora. King and Gamble's var. *albiflora* is a totally distinct species, *K. singaporensis* Ridley.

#### 9. CERBERA, Linn.

Short trees or shrubs. Leaves alternate, fleshy; nerves slender, parallel. Cymes terminal, many-flowered. Flowers large, white with a red or yellow eye. Calyx-lobes long, narrow. Corolla-tube long or short, lobes 5, overlapping to right; anthers lanceolate. Disc 0. Carpels 2, distinct; ovules 4 in each; style filiform;

stigma large discoid. Fruit of 1 (rarely 2) globose, flattened or oblong drupes large; pericarp outside fleshy, inside very thick, woody-fibrous. Seeds 1 (rarely 2), albumen 0. Species 5. Sea-coasts from Madagascar and Indo-Malaya to Polynesia. The large oblong fruit, covered with its strong fibrous network, can be often seen in abundance floating in the sea or cast up on the coasts.

Corolla-tube shorter than lobes, thick; limb larger, white, eye yellow (1) *C. odollam*

Corolla-tube longer than lobes, slender; limb white, eye pink (2) *C. lactaria*

(1) *C. odollam* Gaertn. *Fruct.* ii. 192; *Valeton, Ann. Jard. Buitenz.* 12, 244.

A low tree about 20 ft. tall. Leaves obovate-oblong, base long, narrowed tip shortly acuminate acute; nerves 25 to 50 pairs parallel; 4 to 6 in. long, 1.5 to 2 in. wide; petioles 1 in. long. Corymbs 2 in. long on peduncles 3 in. long. Calyx-lobes linear-lanceolate, 3 in. long. Corolla white, mouth yellow, tube 2 in. long dilate in middle, lobes as long or nearly, oblong acute, ribs in mouth of tube glabrous above, villous below. Anthers below the mouth. Fruit sub-globose green flushed red ovoid, 4 in. long, 2 to 3 in. through. Seeds sometimes 2. *Hab.* Sea-coasts. Not very common. Singapore, Selitar; Kranji. Pahang, Rumpin River, Malacca. *Distrib.* Bengal, Assam, Malay isles.

King and Gamble have confused this species and the next, as other botanists working from dried material have done; *Valeton, l.c.*, shows the differences very well.

(2) *C. lactaria* Ham. in *A.D.C. Prodr.* viii. 353; *Valeton, l.c.* 245.

Large shrub or tree. Leaves as in *odollam*, but shorter and more oblanceolate-spathulate; nerves fewer, 20 pairs. Corymb similar. Calyx-lobes obovate oblong, 5 in. long, broader. Corolla-tube cylindric, 1 in. long, inflate at mouth, with densely bearded red ribs in mouth, lobes 5 in. long obovate blunt; anthers in mouth of tube. Fruit often twin ovate-oblong, 4 in. long. Seed cavity flattened. *Hab.* Common on seashores in tidal mud and sand; Singapore, Kranji. Johor, Batu Pahat. Pahang, Rumpin River. Dindings, Pangkor. Perak, Matang (Wray). Lankawi, Kesap (Curtis). Setul. *Distrib.* Malay islands. *Native names:* Buta-Buta; Babuta. *Use:* The whole plant very poisonous, and the milk dropping in the eye is said to produce permanent blindness, hence the name (Buta, *i.e.* blind). The fruit is rubbed on a limb to cure rheumatism.

## 10. OCHROSIA, Juss.

Maritime tree. Leaves whorled or scattered; nerves very numerous, parallel. Cymes peduncled on the branch ends, lateral.

Calyx 5-lobed. Corolla salver-shaped, tube cylindric, throat naked, lobes 5, overlapping to right. Stamens included at or above middle. Carpels 2; style filiform; stigma oblong, bifid. Drupes twin, spreading; endocarp hard. About 12 species, Mascarenes to the Pacific eastwards.

(1) *O. borbonica* *Gmel. Syst. Veg.* i. 439; *King, l.c.* 428.

Tree 20 ft. tall; branches stout. Leaves fleshy 3 or 4 in a whorl, obovate blunt and apiculate, base cuneate; nerves 20 to 26 pairs; 4 to 10 in. long, 2 to 5 in. wide; petioles .5 to 1.5 in. long, stout. Cymes short; peduncles 1 to 4 in. long; secondary peduncle 1 in. long. Corolla .3 in. long, white; tube cylindric, lobes oblong. Drupe 2.5 in. long, curved, ovoid oblique, 1.75 in. wide, yellow. *Hab.* Rare on seashores at tidal creeks, Singapore (Wallich), not seen here again. Pulau Adang (Ridley). *Distrib.* Indo-Malaya.

### 11. LOCHNERA, DC.

Shrublets. Leaves opposite. Flowers solitary axillary. Calyx-lobes narrow, 5. Corolla salver-shaped, tube cylindric with hair below stamens, throat constrict. Stamens above the middle. Disc of 2 large glands. Carpels 2, distinct; ovules many, 2-seriate in each carpel; style filiform; stigma annulate. Follicles 2, slender. Seeds sub-cylindric truncate. Species 3, 1 American and now in all tropics, 1 Indian, 1 Madagascar.

(1) *L. rosea* *Reichb. Consp. Reg. Veg.* 134. *Vinca rosea* *Linn. Sp. Pl. ed. ii.* 305.

Plant about 1 ft. tall. Leaves membranous obovate, dark green, 1 to 1.5 in. long, .5 to .75 in. wide, narrowed to a short petiole. Flowers in terminal axils, 1 or 2 usually open, sessile. Corolla-tube cylindric, 1 in. long, limb of broad blunt lobes, 1 in. across, rose pink, white or white with crimson eye. Follicles slender, cylindric, 1 in. long. Thoroughly established in sandy places near the sea over the whole peninsula. Native of America. Commonly known as the "West Indian periwinkle."

### 12. ERVATAMIA, Stapf.

Small or large shrubs usually quite glabrous. Leaves membranous or fleshy coriaceous. Flowers small to fair-sized, showy, white, in terminal or axillary corymbose cymes; branches dichotomous. Calyx small, lobes 5, free or connate at base. Corolla salver-shaped, tube cylindric slightly dilate at mouth, lobes overlapping to left (rarely to right). Stamens erect included; filaments short; anthers linear, base bilobed. Disc 0. Carpels 2, distinct; ovules numerous pluri-seriate. Follicles oblique, curved ovoid or lanceolate, keeled; orange colour, dehiscing along upper edge. Seeds few, ellipsoid, in a scarlet aril. Species 35, tropical Asia and Australia, 1 in Madagascar.

- Leaves very thick; nerves horizontal; stamens in middle of tube . . . . . (1) *E. polyneura*  
 Leaves thick; nerves curving upwards; stamens near top of tube.  
     Cymes nearly or quite glabrous . . . . . (2) *E. corymbosa*  
     Cymes very hairy . . . . . (3) *E. hirta*  
 Leaves thin membranous, slender shrubs.  
     Calyx-lobes under 1 in. long.  
         Flowers few in a short cyme, large, lobes rounded . . . . . (4) *E. coronaria*  
         Flowers few in short-peduncled cymes, medium, lobes linear.  
         Corolla 2 in. across . . . . . (5) *E. jasminiflora*  
         Corolla 1 in. across . . . . . (6) *E. pauciflora*  
         Flowers in a spreading slender panicle, small . . . . . (7) *E. peduncularis*  
     Calyx-lobes 1 in. long.  
         Follicles oblong curved about 1 in. long . . . . . (8) *E. malaccensis*  
         Follicles ovoid, long-beaked . . . . . (9) *E. Curtisii*  
         Follicles cylindric, 3 in. long . . . . . (10) *E. cylindrocarpa*

(1) *E. polyneura* King and Gamble, l.c. 454. *E. coriacea* Ridl. Journ. Roy. As. Soc. S. Br. 61, p. 29.

Shrub 20 ft. tall with thick branches. Leaves very coriaceous elliptic-oblong blunt, base cuneate, pustular beneath, midrib prominent beneath, broad; nerves 20 to 30 pairs usually conspicuous beneath horizontal; 4.5 to 8 in. long, 1.5 to 3 in. wide; petioles 1 in. long. Cymes 1 or 2, terminal; peduncles 2 in. long; branches erect, as long, 1- or many-flowered; pedicels thick, 1 in. long. Calyx 1 in. long, lobes truncate or sub-acute. Corolla-tube thick, 5 in. long, lobes .25 in. long, linear-oblong, blunt. Follicles ovoid, long-beaked orange, 1 to 1.5 in. long, .5 in. broad, curved. Seeds 4 to 6; aril scarlet. *Hab.* Mountain forests up to 4000 ft. altitude. Malacca (Millar). Pahang, Wray's Camp, Gunong Tahan (Ridley). Selangor, Gunong Mengkuang Lebah (Robinson); Sempang, Semangkok. Perak, Bujong Malacca (Scortechini).

(2) *E. corymbosa* King and Gamble, l.c. 448.

Shrub or tree up to 40 ft. tall. Leaves thinly coriaceous, elliptic or ovate lanceolate, blunt acuminate, base cuneate; nerves elevate 12 to 16 pairs; 6 to 16 in. long, 2 to 6 in. wide; petioles stout, 2 to 8 in. long, base enlarged, clasping stem. Cymes in uppermost axils much-branched, usually about 4 in. long; peduncles and branches thick; pedicels .5 to 1 in. long. Flowers corymbose. Calyx campanulate, lobes ovate round. Corolla-tube slender, dilate at top, .75 in. long, lobes oblong, falcate, .5 in. long, pubescent. Follicles orange, ovoid curved beaked, 1.5 in. long, 1 in. through. Seed oblong blunt, .5 in. long. *Hab.* Not rare in forests, Singapore, Garden Jungle; Changi; Reservoir woods. Johor, Kota Tinggi; Jaffaria (King). Malacca (Griffith). Negri Sembilan, Senawang (Foxworthy). Perak, Gunong Bubu (Kunstler); Goping and Chanderiang (Kunstler). Province Wellesley, Ara Kudah.

Penang (Wallich); Pulau Betong (Curtis). Kedah, Yan. Kelantan, Kwala Lebir (Dr. Gimlette).

var. *kelsalli* King and Gamble, *l.c.* 449. Leaves thinner, oblong lanceolate; nerves 10 pairs. Cymes sub-sessile, few-flowered. *Hab.* Selangor, Bukit Hitam (Kelsall).

var. *pubescens* King and Gamble, *l.c.* Inflorescence pubescent. Malacca, Sungei Hudang (Goodenough); Perak (Kunstler). *Native names*: Saratong; Restong; Restong Badak; Istong Parah. *Use*: The latex is supposed to be a cure for syphilis.

(3) *E. hirta* King and Gamble, *l.c.* 449.

A large shrub resembling the last. Leaves lanceolate or ovate long-acuminate, acute shortly narrowed at base; nerves finer, 10 to 15 pairs, elevate beneath, 4 to 9 in. long, 2 to 2.4 in. across; petioles .2 to .5 in. long. Cymes 3 to 4 in. long as in *corymbosa*, but rather denser and pubescent. Calyx cup-shaped sometimes 7-lobed, pubescent. Corolla .5 in. long, lobes in bud small, ovate. Follicles ovoid, curved, 1 to 1.5 in. long, .5 to .75 in. wide. *Hab.* Local in lowland forests. Malacca, Selandor (Cantley); Bukit Bruang; Bukit Sabukor and Sungei Hudang (Derry). Negri Sembilan, Gunong Berumbang (Cantley). *Native names*: Jantong Badak; Jelutong Badak; Sembu Badak.

(4) *E. coronaria* Stapf. *Fl. Trop. Afr.* iv. 127; King, *l.c.* 450. *Tabernaemontana coronaria* Willd. *Enum. Hort. Berol.* 275.

A low shrub usually 2 ft. tall, branching. Leaves membranous lanceolate acuminate, base narrowed, light shining green, 3 to 6 in. long, .75 to 1.5 in. wide; petioles slender, .3 to .4 in. long. Cymes 2- or 3-flowered. Calyx-lobes ovate acute or round. Corolla white, tube .7 to .9 in. long, lobes as long, ovate oblong, blunt. Follicles 1 to 2 in. long oblong, tip recurved acuminate. Seeds 3 to 6, oblong, .25 in. long with a red aril. *Hab.* A garden escape now common in Kampongs; a common cultivated form is double. Probably native of North India. *Native names*: Bunga China; Bunga Susu; Susun Kelapa; Manda Kaki.

(5) *E. jasminiflora* Ridl.

Branches slender. Leaves thin membranous, lanceolate cuspidate acuminate, base long, narrowed; nerves 10 pairs, curved, slender; 7 in. long, 2.2 in. wide; petioles slender, .8 in. long. Cymes axillary, lax, few-flowered of 2 divaricating branches, each bearing 2 flowers on pedicels over .5 in. long. Calyx under .1 in. long, lobes short, oblong, blunt. Corolla-tube .75 in. long, limb 1.25 in. wide, lobes linear-oblong, puberulous above, tube dilate just below. Stamens linear, rather large, not apiculate. *Hab.* Pahang, Kwantan, Baloh Reserve (Foxworthy).

Nearest to *E. pedunculata*, but the cyme-peduncle much shorter, the flowers fewer and very much larger.

(6) *E. pauciflora* Ridl.

Shrub about 8 ft. tall; bark pale whitish. Leaves thin mem-



branous elliptic blunt cuspidate, base narrowed, 7 in. long, 3 in. wide; nerves 10 pairs, nervules invisible; petioles .75 in. long. Cymes in upper axils; peduncle .25 in. long; pedicels .5 in. long. Flowers white, 2 to 3 in a cyme. Calyx-lobes separate half-way down oblong blunt edge ciliate. Whole calyx .1 in. long. Corolla-tube cylindric, .5 in. long; lobes linear blunt. Stamens small; anthers oblong not apiculate. Style very slender. Follicles oblong thick narrowed and acute at both ends falcate, 1.25 in. long, .5 in. thick. *Hab.* Mountain forests, Selangor, Ginting Sempah (Ridley).

var. *minor*. Leaves 4 in. long, 1.6 in. wide, with about 8 pairs of nerves; petioles .2 in. long. Peduncle .1 in. long; pedicels .2 in. long. Calyx .08 in. long. Corolla-tube .6 in. long, lobes linear blunt, .25 in. long. *Hab.* Negri Sembilan, Bukit Tinggi at 2400 ft. altitude (Ridley).

Allied to *E. jasminiflora* Ridl., but the flowers are smaller with a shorter corolla-tube and small stamens.

(7) ***E. peduncularis*** King and Gamble, l.c. 451.

Shrub 3 to 8 ft. tall; branches slender. Leaves membranous, elliptic to lanceolate, long narrowly blunt caudate, base shortly acute; nerves 12 to 20 pairs; 4 to 9 in. long, 1.5 to 3 in. wide; petioles slender, base enlarged, stem-clasping, .25 to .4 in. long. Cymes 1 or 2, axillary; peduncles slender, 2 to 5 in. long; branches wide spreading, few, 1 to 2 in. long, with few flowers 1 to 3 on slender pedicels on few branchlets. Calyx very small, lobes ovate, round. Corolla-tube .35 in. long, very slender, inflate at top, lobes .15 in. long, linear-oblong, narrow. Follicles oblong curved, beaked shortly stalked, orange, .35 in. long. *Hab.* Woods, common to 2500 ft. altitude. Malacca, Mt. Ophir Woods; Nyalas (Derry). Selangor, Batu Caves. Negri Sembilan, Bukit Sulu (Cantley). Bukit Tinggi. Perak, Temengoh; Bukit Kamuning; Thaiping Hills, Waterfall (Wray); Gapis (Curtis). Penang, Balik Pulau (Curtis). Lankawi (Curtis). *Native names*: Bunga Sujarong; Sejarang.

(8) ***E. malaccensis*** King and Gamble, l.c. 452.

Slender branched shrub, 4 to 6 ft. tall. Leaves membranous, lanceolate to elliptic-obovate caudate-acuminate; nerves 6 to 9 pairs; 1.5 to 4 in. long, .5 to 1.5 in. wide; petioles .5 to .25 in. long, stem-clasping. Cymes axillary or terminal, sessile or short, .5 in. long, peduncled, little-branched, few-flowered, about 1 in. long. Calyx-lobes lanceolate, .12 in. long. Corolla-tube slender, .5 to .7 in. long, glabrous, lobes .4 to .5 in. long, narrow oblong, white mouth yellow. Follicles oblong falcate, beaked, sessile, orange, 1.25 in. long. Seeds ovoid with a red aril. *Hab.* Common. Singapore, Garden Junglè; Changi. Johor, Panchur; Batu Pahat (Kelsall); Pulau Tioman. Malacca, Bukit Bruang (Cantley); Selangor; Merlimau. Negri Sembilan, Ayer Bemban (Cantley).

Selangor, Kwala Lumpur (Curtis). Perak, Goping (Kunstler). Penang, West Hill (Curtis). *Native names*: Lada-Lada Hutan, and L. jantan; Puding hutan; Gurang; Lagundi Bulan; Lelada padi; Perachit; Penyoi; Perachek. *Use*: In syphilis, and leaves and sap for poulticing boils. Roots said to be poisonous.

(9) *E. Curtisii* King and Gamble, l.c. 453.

Shrub. Leaves membranous, lanceolate caudate, base narrow; nerves 9 to 12 pairs; 3 to 6 in. long, 1 to 1.5 in. wide; petioles .2 to .3 in. long, base stem-clasping. Cymes terminal or axillary, lax, 6- to 10-flowered; peduncles slender, .5 to 1 in. long; pedicels .5 to .6 in. long. Calyx-lobes linear acute, .15 in. long, unequal. Corolla-tube .6 to .7 in. long, lobes crisped, narrow oblong, .5 in. long. Follicles ovoid beaked, orange colour, 1 to 1.5 in. long. Seeds 6 to 8, angular, aril crimson, .25 in. through. *Hab.* Pahang, Kwala Lipis (Machado). Perak, Kwala Wok (Wray). Penang, Waterfall (Curtis) to Highlands.

(10) *E. cylindrocarpa* King and Gamble, 452.

Shrub 4 to 6 ft. tall. Leaves membranous, lanceolate to oblong, caudate-acuminate, base narrowed, 4 to 7 in. long, 1 to 2.5 in. wide; petioles .25 in. long. Cymes axillary and terminal; branches spreading; peduncles .5 to 1 in. long. Flowers few in a cyme, white with a yellow eye. Calyx-lobes lanceolate acute. Corolla .4 to .5 in. long, glabrous, lobes oblong, spreading, .5 in. long. Follicles cylindrical, nearly straight, acute at both ends, up to 3 in. long. Seeds up to 10, ovoid, .3 in. long. *Hab.* Woods and forests up to 4000 ft. altitude. Malacca, Sungei Buluh (Good-enough). Selangor, Jalan Liang (Burn-Murdoch). Semangkok Pass. Dindings. Perak, Temengoh; Bujong Malacca; Sungkei and Ulu Bubong (Kunstler). Province Wellesley, Permatang Bertam. (Ridley).

### 13. DYERA, Hook. fil.

Very large trees; branches whorled. Leaves large coriaceous, whorled oblong-ovate; nerves prominent. Cymes paniced terminal umbellate branched. Flowers small, white. Calyx small 5-lobed. Corolla salver-shaped, tube short, throat naked, lobes 5. Stamens 5, included; anthers oblong, connective prolonged. Ovary 2-celled, entire, tip pubescent; ovules many; style 0 or minute; stigma obpyriform. Follicles 2, divaricate, woody, very large, opening flat. Seed elliptic, thin, flat, surrounded by a papery wing, oblong. Species 3, Malaya.

Commonly known as "Jelutong," and valued for the latex. This is very abundant and watery, and is set into a white mass plaster when treated with hot water, and used for adulterating rubber, as a substitute for plaster of paris for picture moulding and other purposes. The wood, soft and white, used for Chinese clogs, models, boxes and inner partitions for houses.

Corolla-tube nearly as long as lobes; cymes peduncles short (1) *D. costulata*  
 Corolla-tube much shorter than lobes; cymes peduncled (2) *D. laxiflora*

(1) *D. costulata* Hook. *fil. Journ. Linn. Soc.* xix. 293; *King, l.c.* 443; Burn-Murdoch, *Trees and Timbers of Malay Peninsula*, i, p. 19, with plates.

Tree attaining a height of 250 ft. and nearly 7 ft. through; stem cylindrical, no buttresses, bark grey, very laticiferous. Leaves 6 to 8 in a whorl, oblong-ovate glaucous beneath; 3 to 7 in. long, 1.5 to 3 in. wide; nerves 16 to 20 pairs, petioles 1 to 1.5 in. long. Cymes with peduncle, dense, 3 in. long. Corolla-tube 1 in. long, lobes 1.5 in. long. Follicles 9 to 15 in. long, 1 in. or more across. Seeds 2 in. long, 1 in. wide. *Hab.* Common. Whole peninsula in forests in low country, Singapore, Rogie. Malacca, Bukit Panchur; Bukit Sadanen (Derry). Selangor, Sungei Buluh (Foxworthy). Perak, Goping (Scortechini). Penang (Curtis). *Distrib.* Sumatra.

These trees flower immediately after shedding their leaves, when the young leaves come on, so that herbarium specimens of flowers usually have only small leaves.

(2) *D. laxiflora* Hook. *fil. F.B.I.* iii. 644; *King, l.c.* 444. *Dyera costulata* *Ridl. Agric. Bull.* ii. 95, Pls. iii and iv.

A tree similar to the last except that the leaves are shortly acute at tip, rather larger; nerves 13 to 17 pairs. Cymes long and lax; peduncles over 3 in. long; branches over 1 in. long in pedicels .25 in. long. Corolla-tube .075 in. long, lobes oblong, .2 in. long, .1 in. wide. Fruit rather larger than in *D. costulata*. *Hab.* As common as the last or commoner, in thick lowland forest. Singapore, Gardens, the big tree on the bandstand; Cluny Road. Malacca, Selandor (Cantley). Selangor, Kwala Lumpur (Foxworthy). Perak, Batang Padang (Kunstler). *Use:* The wood is lighter, 19.5 lb. per cubic ft., and the yield of latex less than in *D. costulata* (Burn-Murdoch, *Trees and Timbers of Malay Peninsula*, i, p. 19, plates).

#### 14. ALSTONIA, Br.

Trees, often vast (or shrubs); branches often whorled. Leaves usually whorled. Cymes corymbose or umbelliform, terminal often verticillate. Calyx-tube very small, lobes short. Corolla green or white, small, salver-shaped, tube cylindrical, short, dilate round the stamens near top, lobes small. Stamens included; anthers lanceolate. Carpels 2; ovules many, pluri-seriate; style filiform; stigma cylindrical usually bifid. Follicles long, cylindrical, slender. Seed oblong ciliate with tufts of hair at each end. Species 30, 1 Africa, the rest Indo-Malaya, Australia.

Very big trees; nerves very close, parallel; corolla-lobes overlap to left; seed round at both ends.

Ovary villous; corolla pubescent . . . (1) *A. scholaris*

- Ovary and corolla glabrous.
- Corolla-tube thick; leaves spathulate obovate; fruit glabrous . . . . . (2) *A. spathulata*
- Corolla-tube slender; leaves oblong; fruit pubescent . . . . . (3) *A. angustiloba*
- Flowers very small; leaves opposite . . . . . (4) *A. micrantha*
- Small or medium trees; nerves fewer; corolla-lobes overlap to right; seed acute at one end.
- Leaves 5 to 12 in. long; corolla glabrous; nerves 20 to 24 pairs . . . . . (5) *A. macrophylla*
- Leaves 4 to 6 in. long; corolla pubescent.
- Calyx-lobes short acute; leaves 3 in. across . . . . . (6) *A. latifolia*
- Calyx-lobes ovate; leaves 1.75 in. across . . . . . (7) *A. angustifolia*
- Dubious plant . . . . . (8) *A. pangkorensis*

(1) *A. scholaris* Br. Mem. Wern. Soc. Edinb. i. 76; King, l.c. 436.

Big tree 80 to 100 ft. tall, 3 ft. or more through, buttressed, bark grey; branches whorled. Leaves coriaceous 4 to 7 in a whorl, oblong-oblancoate blunt, base cuneate, bright green above, glaucous beneath; nerves 30 to 40 pairs; 3 to 7 in. long, 1.5 to 2.5 in. wide; petioles .25 to .75 in. long. Cymes umbelled in a panicle; peduncles 1 in. long; branches 2 in. long; umbels 1.5 in. long, 5 to 7 together. Flowers pale green. Calyx-lobes ovate. Corolla-tube cylindric, dilate at tip, hairy all over, .25 to .35 in. long, lobes blunt, ovate, base cordate. Ovary villous. Follicles 1 to 2 ft. long, .15 in. through, terete. Seed oblong, .3 in. long, with tufts of hair at each end. *Hab.* Forests in damp spots. Malacca, Bukit Sabukor; Batang Malacca (Derry). Selangor, Klang Gates; Kwala Lumpur (Curtis); Batu caves. Dindings, Bruas (Burn-Murdoch). Perak, Batang Padang (Kunstler). Penang (Wallich). *Distrib.* India, Africa, Malaya, Australia. *Native name:* Pulai.

(2) *A. spathulata* Bl. Bijdr. 1037; King, l.c. 437.

Tree 80 to 90 ft. tall, or more; branches whorled. Leaves 3 to 5 in a whorl, coriaceous, obovate or spathulate tip round; nerves 20 to 30 pairs, glaucous beneath; 2 to 4 in. long, 1 to 1.5 in. wide; petioles very short. Cymes terminal axillary; peduncles several, 1 in. long; branches few, short, few-flowered, about 1 in. long, umbellate. Calyx .1 to 5 in. long, lobes orbicular, ciliate. Corolla dilate above, glabrous outside white, .25 in. long, lobes .2 in. long, oblong, villous at base. Ovary glabrous. Follicles 5 to 9 in. long, .15 in. wide. Seed oblong peltate, .25 in. long, .1 in. across with tufts of hair at each end. *Hab.* In very wet marshy forest and swamps. Singapore, Tanglin. Malacca, Tualang (Derry); Merlimau (Cantley); Ayer Panas (Maingay). Selangor, very abundant in the wet low-lying districts. Perak, Tapah (Wray). Batang Padang (Kunstler); Batu Gajah (Scortechini). *Distrib.* Borneo. *Native name:* Poko Rajana. *Use:* Wood very soft; used for coffins.

(3) *A. angustiloba* *Miq. Fl. Ind. Bat.* ii. 438; *King, l.c.* 438.

Gigantic tree 100 ft. tall, 3 to 4 ft. through; bark grey; branches whorled. Leaves 4 to 7 in a whorl, coriaceous, elliptic-oblong sub-acute, base narrowed, white beneath; nerves parallel, 30 to 40 pairs; 2.5 to 7 in. long, 1.5 to 3 in. wide; petioles 1 to 2 in. long. Cymes terminal, 4 or more in a whorl; peduncles 1.5 to 2.5 in. long; branches few, spreading about 1 in. long. Calyx-lobes ovate acute, pubescent. Corolla pale green, tube cylindrical, glabrous outside, .25 in. long, lobes linear-oblong, .2 in. long. Ovary glabrous. Follicles grey-pubescent, 6 to 8 in. long, under .1 in. through. Seeds oblong, .2 in. long, .05 in. wide, with a tuft of hairs .5 in. long at each end. *Hab.* Forests. The tree flowers after the fall of the leaves, when the young leaves are just coming out. Singapore, Gardens; Blakang Mati. Perak, Larut (Kunstler); Waterfall (Wray). Penang, Waterfall and Batu Feringhi (Curtis). *Distrib.* Borneo. *Native name:* Pulai. *Use:* Latex used with copper sulphate in yaws (Gimlette).

(4) *A. micrantha* *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 95.

Leaves opposite not whorled, coriaceous oblong, abruptly shortly caudate, base short cuneate; nerves very fine, parallel, very numerous, secondary ones as conspicuous joining in a fine intramarginal nerve; 4 to 4.5 in. long, 1.5 to 1.75 in. wide; petioles .25 in. long. Panicles axillary slender, 3 in. long; branches distant, few, re-branched or not, terminal cymes of numerous very small sessile flowers. Calyx-tube campanulate, lobes round ciliate. Corolla 0.5 in. long, tube cylindrical, dilate in middle, lobes oblong-lanceolate, pink, with small scales in mouth. Ovary simple, conic, glabrous. *Hab.* Selangor, Rantau Panjang (Kloss). Rare.

(5) *A. macrophylla* *Wall. Cat.* 1648; *King, l.c.* 439.

A medium-sized tree. Leaves chartaceous, three in a whorl, oblong-lanceolate, shortly abruptly cuspidate, long-attenuate to base; nerves 20 to 24 pairs parallel, slightly ascending; 5 to 12 in. long, 1.5 to 3 in. wide; petioles .5 to 1 in. long. Panicles sessile terminal, 3 to 4 in. long and as wide; many-flowered, grey-pubescent. Calyx small, lobes 5, ovate acute, pubescent. Corolla cylindrical, dilate above, glabrous outside, yellowish white, lobes broad, as long. Follicles 1.8 in. long, .2 in. through. Seeds oblong peltate, plumed at both ends, .3 in. long. *Hab.* Local in mountain forests at 1200 to 3000 ft. altitude. Malacca, Mt. Ophir at 3000 ft. altitude (Ridley). Penang, Moniot's Road (Curtis, Wallich, Main-gay). *Distrib.* Malay islands.

(6) *A. latifolia* *Ridl. A. angustifolia* var. *latifolia* *King and Gamble, l.c.* 441 and var. *elliptica*.

A tall tree. Leaves chartaceous, obovate, bluntly short cuspidate, base cuneate; nerves 12 to 13 pairs, elevate beneath; 6 in. long, 3 in. wide; petioles 1 in. long. Panicles sessile, terminal of 4 peduncles 2 to 2.5 in. long; branches 6 umbellate, .5 in. long.

Flowers numerous, white. All puberulous. Calyx campanulate, lobes short, triangular acute. Corolla puberulous, 14 in. long, tube thicker and lobes larger than in *angustifolia*. Follicles slender, 13 in. long. Seed acuminate at one end often to a long point, edge and both ends covered with long red hair. *Hab.* Penang Hill (Maingay and all collectors) in woods at about 2000 ft. altitude.

The whole habit and size of leaves of this tree, and the larger, more crowded flowers, distinguish this from *angustifolia*. Maingay calls it a tall tree, I know it as about 20 to 30 ft. tall and 4 or 5 in. through.

(7) **A. angustifolia** *Wall. Cat.* 1650; *King, l.c.* 440.

Usually a small slender tree about 20 to 50 ft. tall. Leaves sub-coriaceous, 3 in a whorl or opposite, oblanceolate or lanceolate cuspidate, base long, narrowed; nerves 12 to 16 pairs; 4 to 6 in. long, 1 to 1.75 in. wide; petioles .5 in. long. Panicle terminal, sessile of 8 or 9 slender peduncles 2 in. long; branches umbelled, 1 in. long, 4 or 5 with short, few-flowered branchlets. Calyx urceolate pubescent, lobes ovate. Corolla white pubescent inside and out, 12 in. long, lobes round, .07 in. long. Follicles 18 in. long, 15 in. through. Seed oblong, 4 in. long, plumes 3 in. long. *Hab.* Woods. Common in the south. Singapore (Wallich); Garden Jungle; Jurong; Bukit Timah; Pasir Panjang. Johor, Panchur. Malacca, Merlimau (Derry).

(8) **A. pangkorensis** *King and Gamble, l.c.* 442.

Branches very stout. Leaves membranous, ovate or oblanceolate, short blunt acuminate, base cuneate, pubescent beneath; nerves 18 pairs, elevate beneath; 12 to 14 in. long, 4 in. wide. Follicles slender, 10 to 12 in. long. *Hab.* Dindings, Pangkor (Scortechini).

A very little known and altogether dubious species.

#### EXCLUDED SPECIES

- A. CURTISII *King and Gamble, l.c.* 439. Kasum (Curtis) out of our area.  
 A. GRANDIFOLIA *Miq., King and Gamble, l.c.* 442. A couple of leaves picked up in Singapore by Anderson, apparently leaves of *Dyera costulata*.

#### 15. HOLARRHENA, Br.

Shrubs or trees. Leaves opposite. Flowers white often showy, fragrant in terminal or axillary corymbose or simple cymes. Calyx-lobes 5, narrow. Corolla salver-shaped, tube cylindrical, slightly dilate round the stamens, lobes 5, oblong, overlapping to the right. Stamens near the base; anthers lanceolate. Disc o. Carpels distinct; ovules many; style filiform; stigma oblong-fusiform. Follicles long, terete. Seeds oblong or linear with a

terminal plume. Species 12, 5 African, the others Indian, and Siamese to North of the Peninsula.

Tree, cymes many-flowered; flowers .5 in. long . (1) *H. antidysenterica*  
Low shrubs or bushes; corolla-lobes deep cut.

Cymes lax, many-flowered, terminal; leaves  
glabrous . . . . . (2) *H. pulcherrima*

Cymes dense, many-flowered, terminal; leaves  
hairy . . . . . (3) *H. densiflora*

Flowers solitary, axillary, limb cut half-way  
into lobes . . . . . (4) *H. pauciflora*

(1) *H. antidysenterica* Wall Cat. 1672; King, l.c. 445. *H. malaccensis* Wight, Ic. 1298.

Small tree, glabrous (or pubescent). Leaves membranous, ovate to elliptic-lanceolate acuminate, base round (or narrowed), 4 to 8 in. long, 2 to 4 in. wide; petioles .1 in. long or absent. Cymes many-flowered, 3 to 6 in. across. Calyx-lobes linear-lanceolate, .1 to .2 in. long. Corolla white, tube slender, .3 to .4 in. long, base inflate, lobes oblong, .4 in. long. Follicles broad terete, 10 to 15 in. long, .2 in. wide. Seeds linear-oblong, .5 to .6 in. long, plume .75 to 1 in. long. *Hab.* Malacca (Capt. Wight).

This is only admitted to the flora on specimens said to have been collected by a Captain Wight, in Malacca. It has never been seen even cultivated in the peninsula since. It is a native of Siam and India.

(2) *H. pulcherrima* Ridl. Journ. Roy. As. Soc. S. Br. 59, p. 130.

Shrub 3 to 4 ft. tall, branched, glabrous. Leaves coriaceous, lanceolate acuminate acute, base slightly narrowed; nerves fine, 7 to 8 pairs; 4 in. long, .75 in. wide. Cymes terminal, lax, 14-flowered, 2 in. long, .3 in. wide. Calyx-lobes linear ciliate, .25 in. long. Corolla-tube .75 in. long, pubescent in and out, lobes as long, .25 in. wide, pubescent outside. Follicles .75 in. long, linear, .3 in. through. Seed linear-oblong, .5 in. long, plume pale buff, 1.5 in. long. *Hab.* Open heaths. A very fragrant, beautiful bush. Perlis, Kanga; Chupeng. Setul Heath (Ridley).

(3) *H. densiflora* Ridl. Journ. Roy. As. Soc. S. Br. 59, p. 131.

Shrub 1.5 to 2 ft. tall. Leaves coriaceous, obovate to sub-spathulate, sub-sessile, tip round, base narrowed, minutely hairy above, densely so beneath; nerves 12 to 13 pairs; 2 to 3 in. long, 1 to 1.25 in. wide. Flowers numerous, crowded in compact cymes 1 to 2 in. long. Calyx-lobes hairy, .12 in. long, linear. Corolla-tube .5 in. long, hairy, green, lobes white oblong, .25 in. long, pubescent outside. Follicles 2 to 3 in. long. *Hab.* Open country, in dry spots. Pulau Rawei (Ridley). Between Singgora and Nongchik (Down). *Distrib.* Siam.

(4) *H. pauciflora* Ridl. l.c. 132.

Glabrous shrub 3 ft. tall. Leaves lanceolate, sub-sessile coriaceous, 1 to 3 in. long, .15 in. wide; nerves 5 pairs. Flowers solitary in upper axils; pedicels .12 in. long, pubescent. Calyx-

lobes lanceolate acuminate, '12 in. long. Corolla-tube '75 in. long, glabrous, dilate in middle, limb over 1 in. across, white lobed about half-way, lobes ovate. Follicles 6 in. long, '25 in. through. Seed '25 in. long, plume buff, 1 in. long. *Hab.* Open heaths, Perlis, Ginting Kabok (Ridley). Ban Aor to Nongchik (Down). Lankawi, Tasek Enak (Haniff). *Distrib.* South Siam.

### 16. PARSONIA, Br.

Twiners. Flowers small, yellow or white in terminal and axillary corymbose or thyrsoid cymes. Calyx 5-lobed. Corolla-tube short, cylindrical or sub-globose, throat naked, lobes overlapping to right. Stamens often twisted; anthers half exsert, acute connivent round stigma; cells at base produced. Disc 5-lobed. Ovary 2-celled; ovules many; style filiform; stigma columnar or conic. Follicles cylindrical. Seed linear or oblong, narrowed to top, plumed. About 12 species, tropical Asia, Australia, New Zealand.

Filaments spirally twisted round style; corolla '4 in. across.

Leaves oblong; nerves 6 to 8 pairs; corolla glabrous (1) *P. spiralis*

Leaves ovate; nerves 10 to 12 pairs; corolla pubescent (2) *P. Kunstleri*

Filaments not twisted.

Corolla '3 in. across, urceolate . . . . . (3) *P. stenocarpa*

Corolla '6 in. across, campanulate . . . . . (4) *P. penangiana*

(1) *P. spiralis* Wall. *Cat.* 1631; *King, l.c.* 456.

Slender twiner, glabrous. Leaves fleshy membranous, ovate-oblong or oblong-lanceolate, abruptly acuminate, base rounded; nerves 6 to 8 pairs; 3 to 7 in. long, 1.5 to 3.5 in. wide; petioles slender, '5 to 1 in. long. Cymes axillary, corymbose, 1.5 to 3 in. across; peduncles 1 to 4 in. long. Flowers pinkish yellow with pink centre. Calyx-lobes ovate acute, pubescent. Corolla-tube cylindrical, '125 in. long, glabrous, throat villous, lobes '2 in. long, oblong acute. Stamens twisted spirally round the style, pubescent. Fruit linear-lanceolate acuminate, 4 to 7 in. long, '75 in. wide. Seed '5 to '75 in. long, enlarged below, narrowed above, plume golden brown. *Hab.* Climbing on bushes usually near the sea. Singapore, Selitar; Pulau Brani; Toas. Johor, Hulu Sembrong (Kelsall); Kota Tinggi river bank. Pahang, Rumpin river mouth (Evans). Malacca, between Relau and Chabau. Perak (Wray). Penang, road to Batu Feringhi; Penara Bukit (Curtis); Lankawi (Curtis). *Distrib.* Indo-Malaya, Siam, China.

(2) *P. Kunstleri* King and Gamble, *l.c.* 457.

Twiner, slender. Leaves membranous, ovate acute, base round, glabrous; nerves 10 to 12 pairs, reddish; 3 to 6 in. long, 1.5 to 3 in. wide; petioles slender, '25 to 1.25 in. long. Cymes axillary, corymbose up to 3 in. across; peduncles 3 to 5 in. long; branches 1 to 2 in. long. Calyx-lobes ovate pubescent, '1 in. long.



Corolla-tube .15 in. long, pubescent outside, villous inside, lobes .2 in. long, pubescent outside only, dark yellow, dark red inside. Stamens, filaments twisted, villous. Fruit linear-lanceolate acuminate, 2.5 to 3 in. long, .2 to .3 in. wide. Seeds .4 to .5 in. long, narrow-linear, plume 1 in. long, pale. *Hab.* Perak, Chandiang (Kunstler). Rare.

(3) *P. stenocarpa* King and Gamble, *l.c.* 458.

Long twiner, 40 to 50 ft. long. Leaves membranous, broad lanceolate acuminate, base narrowed cuneate; nerves 6 to 8 pairs; 2 to 4 in. long, 1 to 2 in. wide; petioles .25 to 1 in. long. Cymes axillary, 8- to 10-flowered pubescent; peduncle 1 in. long; pedicels .2 in. long. Flowers light yellow. Calyx-lobes ovate acuminate, .125 in. long. Corolla urceolate, .15 in. long, lobes ovate acuminate, .075 in. long. Stamens not twisted. Fruit slender terete acuminate, 5 to 7 in. long, .2 in. through. Seeds .5 in. long, narrowed upwards, plume 1 in. long, golden. *Hab.* Rare; dense forests, Perak, Goping (Kunstler).

(4) *P. penangiana* King and Gamble, *l.c.* 458.

Twiner. Leaves membranous, ovate acuminate, base round; nerves 8 to 10 pairs; 5 to 7.5 in. long, 3 to 4 in. wide; petioles 1 to 1.25 in. long. Cymes corymbose puberulous; peduncles 1.5 in. long, flattened; branches few. Flowers yellowish white. Calyx-lobes triangular-ovate acuminate. Corolla campanulate, .3 in. long, lobes as long ovate acute, pubescent outside. Stamens exert from top of tube, not twisted. *Hab.* Penang, Waterfall (Curtis). Very rare.

## 17. VALLARIS, Burn.

Trees, shrubs or climbers. Flowers white in axillary fascicles or cymes, pendulous. Calyx-lobes narrow. Corolla-tube short, limb rotate, lobes broad, contort overlapping to right. Stamens partly exert; anthers sagittate connivent adhering to stigma, connective with a dorsal gland, cells with stiff spurs. Disc 5-lobed. Carpels separate; ovules many; style filiform, stigma thick. Follicles oblong. Seeds ovate acuminate, plumed. Species 5 or 6. Indo-Malaya.

*V. pergulana* Burm. A climber with membranous leaves and flowers in cymes smelling of mice, is cultivated in gardens.

Big tree. Leaves elliptic-lanceolate . . . . . (1) *V. Maingayi*  
Epiphytic shrub. Leaves ovate or lanceolate caudate . . . . . (2) *V. lancifolia*

(1) *V. Maingayi* Hook. *fl. F.B.I.* iii. 651; King, *l.c.* 461.

A very handsome tree 40 to 60 ft. tall. Leaves deep shining green, coriaceous elliptic-lanceolate acuminate, base narrowed, 3 to 4.5 in. long, .75 to 2 in. wide; petioles .2 to .4 in. long. Flowers in axillary fascicles of 4 to 12, white, fragrant; pedicels .5 in. long. Calyx-lobes ovate acute, .06 in. long. Corolla urceo-

late, .25 in. long, limb 1 in. across, lobes broad, ovate-oblong, pubescent inside; anthers half exsert. Fruit cylindric, 12 in. long, .25 in. through, slender. Seed linear red brown, 1 in. long, plume 4 in. long. *Hab.* Lowland woods; Singapore, Tanglin, Garden Jungle, Malacca (Maingay). Selangor, Kwala Lumpur (Foxworthy). Penang, Batu Feringhi and the hill (Curtis).

(2) *V. lancifolia* *Hook. fil. F.B.I. iii. 651; King, l.c. 461.*

A stiff epiphytic shrub; stem warty. Leaves chartaceous, ovate or lanceolate, caudate-acuminate, base rhomboid or cuneate 1 to 2 in. long, .5 to .75 in. wide; nerves fine, 8 to 10 pairs; petioles .1 to .25 in. long. Cymes axillary; peduncles very slender, .1 to .2 in. long; pedicels .25 in. long. Flowers white. Calyx-lobes ovate acute. Corolla-tube cylindric, .15 in. long, lobes linear-oblong, .2 in. long, throat villous. Fruit long, slender. *Hab.* Woods; Malacca (Maingay). Perak, Goping (Kunstler). Penang Hill and Batu Feringhi (Curtis).

### 18. POTTSIA, Hook. and Arn.

A climber. Leaves opposite; nerves distant. Flowers small, pink in large lax terminal and axillary panicles. Calyx small, 5-lobed. Corolla salver-shaped, lobes overlapping to right slightly twisted. Stamens in corolla-mouth; anthers exsert, connivent sagittate. Disc 5-lobed. Carpels 2, distinct; ovules many; style thickened in middle; stigma conic. Follicles slender, terete. Seeds linear, plumed. Species 1, Indo-Malaya.

(1) *P. cantoniensis* *Hook. and Arn. Beech Voy. 199, t. 43.*

Large climber. Leaves ovate-acuminate, glabrous except midrib; nerves 5 to 6 pairs; base round, 2 to 4 in. long, 1 to 2.5 in. wide; petioles .75 to 1 in. long. Panicles 4 to 6 in. long, 6 to 10 in. across. Corolla pink, tube .15 to .2 in. long, limb .3 in. wide, lobes ovate. Follicles 1 ft. long, flexuous. Seed 1 in. long enlarged at top, plume white, 1 to 1.5 in. long. *Hab.* Malacca (Maingay). Perak, Kampar (Curtis); Ulu Selama (Scortechini). Penang, Waterfall; Pass to Batu Feringhi (Curtis).

### 19. WRIGHTIA, Br.

Shrubs or small trees. Flowers white or yellowish (or red) in corymbs of cymes, terminal. Calyx 5-lobed, with scales inside, lobes blunt. Corolla salver-shaped, tube cylindric, lobes overlapping to left, the throat with a corona of 5 to 10 scales often lobed or fimbriate (absent in *W. religiosa*). Stamens in mouth of tube; anthers exsert, sagittate, base spurred, conniving and adhering to stigma. Disc 0. Carpels 2, free or connate; style filiform; stigma ovoid. Follicles slender, terete. Seed linear narrowed to top, plumed. Species 10, tropical Asia and Australia.

Throat of corolla with a corona of scales.

Scales lobed, 10; leaves tomentose . . . . . (1) *W. javanica*

Scales many, fimbriate; leaves glabrous . . . . . (2) *W. lævis*

No corona of scales.

Flowers small . . . . . (3) *W. religiosa*

(1) *W. javanica* A. DC. *Prodr.* viii. 405; *King, l.c.* 464.

Shrub or small tree up to 40 ft. tall; stem 12 to 14 in. through. Leaves membranous, elliptic or ovate-elliptic, abruptly blunt acuminate, pubescent above when young, tomentose beneath; nerves 10 to 12 pairs; 3 to 5 in. long, 1 to 2½ in. wide; petioles .25 in. long. Cymes terminal, tomentose sub-sessile, 1 to 1½ in. long, 2 to 3 in. wide; many-flowered. Flowers white. Calyx-lobes ovate acute. Corolla-tube .15 in. long, lobes oblong, .5 in. long, pubescent all over, corolla-scales 10. Anthers stiff pubescent penicellate. Follicles 10 to 12 in. long, rough beaked. *Hab.* North of peninsula in open country. Province Wellesley, Tasek Gelugur (Curtis). Kedah, Alor Sta. Perlis, Chupeng. Kelantan River, Chaning (Ridley). *Distrib.* Java, South Siam.

(2) *W. lævis* Hook. *fil. F.B.I.* iii. 654; *King, l.c.* 465.

Glabrous shrub or small tree up to 20 ft. tall; branchlets yellow. Leaves membranous elliptic or elliptic-oblong caudate, base cuneate; nerves 4 to 7 pairs, far apart; 3 to 6 in. long, 1 to 3 in. wide. Cymes terminal, 1 to 2 in. long and a little wider; peduncles 1 in. long or less. Flowers .5 in. across, white (blood-red, *vide* Maingay). Calyx-lobes ovate. Corolla-tube .05 in. long, lobes ovate, round, .25 in. long. Corona scales fimbriate from base. Stamens exsert. Follicles 7 to 8 in. long, slender. Seeds 1.5 in. long, slender. *Hab.* Not common. Forests. Pahang, Sungei Lenget, Rumpin (Foxworthy). Malacca, Mt. Ophir (Maingay). Negri Sembilan, Johol. Selangor, Dusun Tua; Ginting Bidai. Perak, Ulu Temengoh. *Distrib.* Punga and Sumatra.

(3) *W. religiosa* Benth. *Gen. Pl.* ii. 713; *King, l.c.* 467.

A straggling shrub about 6 ft. tall, with grey branches. Leaves membranous, rather thickly ovate to elliptic-lanceolate acuminate, base narrowed; nerves very obscure; .5 to 1.5 in. long, .3 to .7 in. wide; petioles .1 in. long. Cymes axillary and terminal, pendulous few to 12-flowered; peduncles short, stout; pedicels capillary. Corolla-tube .15 in. long, cylindrical, lobes ovate-orbicular, .25 to .3 in. long; no corona-scales, white, fragrant. Stamens long, exsert, brown. Follicles slender, terete, 6 in. long. Seed linear, .3 to .4 in. long, plume 1 to 1.5 in. long. *Hab.* Setul and Perlis, hedges and open places (Ridley). Cultivated by Chinese in Singapore and Malacca. *Distrib.* South Siam.

## 20. STROPHANTHUS, DC.

Shrubs often sarmentose (or small trees). Flowers usually large in terminal corymbose cymes. Calyx 5-lobed; scales 5 to

many within at the lobe bases. Corolla short, funnel-shaped with 5 or 10 corôna scales in mouth, lobes twisted often produced into long tails, more rarely ovate acute. Stamens in top of tube included; anthers sagittate, tips produced into a long bristle, connivent and adhering to stigma, base spurred. Disc o. Carpels distinct; style slender; stigma thick, columnar with a reflexed frill. Follicles large, oblong or terete. Seed flattened, fusiform with a long plumose point. Species 40, chiefly African and Asiatic.

Lobes of corolla long-tailed.

Flowers large, white, tails purple, 4 in. long . . . (1) *S. dichotomus*

Flowers smaller, yellow, pink in tube, tails 3 in. long . . . (2) *S. Wallichii*

Lobes not tailed, ovate acuminate, yellow green, .5 to .7 in. long . . . (3) *S. perakensis*

Lobes lanceolate acuminate, red, .5 in. long . . . (4) *S. Jackianus*

Lobes ovate acuminate, .12 in. long, dark purple . . . (5) *S. brevicaudatus*



FIG. 106.—*Strophanthus dichotomus*.

(1) *S. dichotomus* DC. *Bull. Soc. Philom. Paris*, iii. 123; *King, l.c.* 468.

A stout sarmentose shrub; stem 3 to 4 in. through, glabrous. Leaves thickly chartaceous, elliptic-oblong or obovate abrupt acuminate; nerves 8 to 9 pairs, sunk above, slightly elevate beneath; 3 to 5 in. long, 2 to 3 in. wide; petioles .25 in. long. Cymes terminal; peduncles .2 in. long; branches about .5 in. long. Flowers several.

Calyx-lobes ovate-acuminate, red purple, .25 in. long. Corolla-tube broad funnel-shaped, white, .5 in. long, lobes ovate with long slender tails, 3 to 4 in. long, purple. Follicles twin widely divaricate, about 8 in. long, 2 in. through, green, lanceolate in outline, tapering to a blunt tip. Seed flat, fusiform, .7 in. long with a long beak bearing an inch long plume, white. *Hab.* Open country, edges of woods. Singapore, Changi Road; Selitar. Johor, Sungei Sembrong (Kelsall); Serom. Malacca, Sungei Hudang (Derry); Alor Gajah; Chenana putih (Cantley). Perak, Ulu Kerling (Kunstler). *Native names:* Akar Dudok Kijang; Akar Tandok.

(2) **S. Wallichii** *A. DC. Prodr.* 418; *King, l.c.* 469.

Climbing shrub. Leaves membranous, elliptic-oblong, abruptly cuspidate acute; nerves 7 to 8 pairs; 1.5 to 3 in. long, .75 to 1.25 in. wide; petioles .25 in. long. Cymes corymbose, terminal, lax; peduncles slender, 1.5 in. long; branches 1 in. long. Bracts at base of branches, peduncles and flowers linear-acuminate, .25 to .5 in. long. Flowers yellow. Calyx-lobes linear acuminate, .5 in. long. Corolla-tube funnel-shaped, .5 in. long, lobes long-tailed, very slender, 2 in. long, yellow stained and streaked red in throat. *Hab.* Open country in the north. Perlis at Chupeng (Ridley). *Distrib.* India, Tenasserim, South Siam.

(3) **S. perakensis** *Scort. in King and Gamble, l.c.* 470.

Climber, slender. Leaves thinly coriaceous, elliptic-oblong acuminate, base acute; nerves very obscure; 2 to 3.5 in. long, .75 to 1 in. wide; petioles .25 in. long. Cymes 1 in. long, terminal, few-flowered; peduncle .25 in. long. Flowers yellowish green; bracts very small. Calyx-lobes linear acute, .2 in. long. Corolla-tube urceolate, constrict at mouth, .2 in. long, lobes ovate-cordate at base, long-acuminate, blunt, .5 to .7 in. long. *Hab.* Rare. Perak, Dipang (Scortechini).

(4) **S. Jackianus** *Wall. Cat.* 1643; *Hook. Ic. Pl. t.* 1521. *Cameraria dubia* *Sims, Bot. Mag. t.* 1646. *Wrightia dubia* *Spr. Syst. Veg.* i. 638; *King, l.c.* 465.

A slender branched shrub about 5 to 8 ft. tall. Leaves membranous oblong or ovate-lanceolate acuminate, base narrowed or round, glabrous; nerves 8 to 12 pairs, elevate beneath; 3 to 6 in. long, 1 to 2 in. wide; petioles .1 in. long. Cymes terminal, few-flowered, 1 to 6. Calyx-tube short, lobes ovate acute. Corolla-tube campanulate, .25 to .35 in. long, lobes lanceolate-acuminate, cherry pink withering scarlet above, back of lobes and tube greenish white, whole limb over 1 in. across with 5 ligulate, entire coronal processes. Stamens included in tube. Follicles 8 to 12 in. long, terete. *Hab.* Open country in the north. Province Wellesley, Ara Kudah by Sungei Krai bridge. Penang, Telok Bahang (Curtis). Kedah, Yan (Ridley). *Distrib.* South Siam, Sumatra. *Native name:* Bunga Hantu.

(5) *S. brevicaudatus* Wight,  *Ic. p.* 1302;  *Hook. F.B.I.* iii. 656. *S. singaporianus* Gilg.  *Engl. Monogr.* II;  *King, l.c.* 471.

An erect bush about 4 or 5 ft. tall. Leaves fleshy membranous, elliptic-oblong cuspidate, base rounded or shortly acute; nerves 6 to 8 pairs; 2 to 4 in. long, 1.5 to 2 in. wide. Cymes many-flowered, terminal, much-branched, 1.5 in. long on peduncle. Flowers small, purple. Calyx campanulate, maroon with short acute lobes. Corolla-tube dilate in middle, .12 in. long, lobes ovate acuminate as long, dark madder pink, tube light pink, streaked darker. Coronal scales linear falcate, white. Follicles 8 in. long, .5 in. through, lanceolate-acuminate. Seed oblong, lanceolate, .75 to 1 in. long with a long plumed point.  *Hab.* Open country in the south, in damp open spots. Singapore, Holland Road; Sungei Jurong; Balestier plain. Malacca, Bukit Bruang (Derry).  *Distrib.* Borneo.

## 21. URCEOLA, Roxb.

Stout lianes. Leaves coriaceous or nearly. Flowers small, white in dense corymbose cymes on the branch-ends. Calyx-lobes oblong or linear, no glands within. Corolla urceolate or globose, lobes short, valvate. Stamens in corolla-base; anthers sagittate, connivent and adhering to stigma; cells spurred at base. Disc cupular or annular. Carpels distinct. Style short; stigma conic. Follicles terete, dagger-shaped or torulose (*i.e.* contracted between seeds). Seed oblong or linear, compressed, villous, tip with stiff brown hairs and a long white plume. Species about 10, Malay Peninsula and islands.

Follicles terete acuminate.

Leaves coriaceous, thickly pubescent beneath . (1)  *U. elastica*

Leaves thinner, glabrous.

Corolla urceolate; calyx-lobes broad obtuse . (2)  *U. Maingayi*

Corolla globose; calyx-lobes ovate, very small. (3)  *U. brachysepala*

Follicles terete recurved; calyx-lobes longer than corolla . (4)  *U. malaccensis*

Follicles dagger-shaped at base, recurved; panicles large; branches slender . (5)  *U. lucida*

Follicles torulose . (6)  *U. torulosa*

(1)  *U. elastica* Roxb.  *As. Res.* v. 167,  *fig. of plant (not of fruit).*  *King, l.c.* 472.

A large stout climber. Leaves coriaceous glabrous except nerves above, pubescent beneath, ovate to elliptic ovate, 4 to 7 in. long, 2 to 3.5 in. wide; nerves elevate 10 to 11 pairs; petioles .5 to 1 in. long, pubescent. Panicles terminal and in upper axils pubescent, 6 in. long, 3 in. wide; peduncles 2 in. long; branches as long; branchlets 1 in. long, bearing dense cymules about 4 in a head, 1 in. across. Flowers very small, numerous. Calyx-lobes linear. Corolla urceolate, .1 in. long, lobes oblong. Follicles

(brown velvety when young), glabrous, cylindric acuminate, 8 in. long,  $\frac{1}{4}$  in. through. Seed linear-oblong,  $\frac{1}{5}$  in. long, plume 2 in. long. *Hab.* Forests, not very common now. Malacca, Ayer Panas (Curtis); Bukit Sadanen; Bukit Bruang and Selandor (Derry); Ching (Griffith). Selangor, Ulu Kerling (Goodenough). Perak, Thaiping Waterfall (Wray). Penang Hill (Howison and Campbell, Roxburgh). *Distrib.* Sumatra. *Native names:* Akar Gegrip Merah; Gegrip tembaga. *Use:* A good rubber.

The fruit in Roxburgh's picture is not that of this plant.

(2) **U. Maingayi** Hook. *fl. F.B.I.* iii. 658; *King, l.c.* 473.

Big climber. Leaves coriaceous elliptic, abrupt acuminate, base round, glabrous; nerves 8 to 10 pairs and midrib prominent beneath;  $2\frac{1}{2}$  to 3 in. long, 2 in. wide; petioles  $\frac{1}{4}$  in. long. Panicles terminal and axillary, about 2 to 3 in. long; peduncles 1 to 3 in. long, pubescent. Cymules about  $\frac{1}{25}$  in. across. Flowers small, pubescent. Calyx-lobes ovate blunt,  $\frac{1}{125}$  in. long. Corolla nearly  $\frac{1}{2}$  in. long, lobes oblong. Follicles terete acuminate, 6 in. long,  $\frac{1}{25}$  in. through, tip hooked. Seeds linear-oblong,  $\frac{1}{6}$  in. long, plume  $\frac{1}{2}$  in. long. *Hab.* Forests, not common. Singapore (Maingay); Kranji. Malacca (Hullett). Perak, Goping (Kunstler).

(3) **U. brachysepala** Hook. *fl. F.B.I.* iii. 659; *King, l.c.* 474.

Big climber. Leaves chartaceous, glabrous, elliptic blunt acuminate, base round; nerves 6 to 8 pairs elevate but slender; 4 to  $5\frac{1}{2}$  in. long,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  in. wide; petioles  $\frac{1}{2}$  to 1 in. long. Panicles terminal and axillary; peduncles about 2 in. long, puberulous. Calyx-lobes very short, lanceolate-ovate slightly puberulous. Corolla globose, villous outside, white,  $\frac{1}{2}$  in. long. Follicles 6 in. or more long, terete acuminate, slender,  $\frac{1}{2}$  in. through. Seed  $\frac{1}{4}$  to  $\frac{1}{5}$  in. long, villous, plume  $1\frac{1}{2}$  in. long. *Hab.* Forests, common. Singapore, Jurong; Bukit Timah; Bukit Mandai. Malacca, Selandor (Cantley). Ayer Panas. Penang, Pantai Acheh (Curtis). *Native names:* Getah Grip Hitam; Gegrip putih.

(4) **U. malaccensis** Hook. *fl. F.B.I.* iii. 658; *King, l.c.* 475.

Climbing shrub. Leaves coriaceous ovate or oblong-ovate acuminate, base round, glabrous; nerves 6 to 8 pairs, sunk above, elevate beneath; 2 to  $4\frac{1}{2}$  in. long, 1 to 2 in. wide; petioles  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long. Cymes axillary and terminal about 1 in. long including peduncle, dense flowered,  $\frac{1}{5}$  in. across. Calyx-lobes linear-oblong,  $\frac{1}{2}$  in. long. Corolla-tube very short, lobes oblong. Follicles terete acuminate, slender, 8 to 9 in. long,  $\frac{1}{2}$  in. wide. Seed oblong, fusiform acuminate at base, golden-silky, plume 2 in. long, white. *Hab.* Forests and hedges. Singapore, Tyershall Road; Changi; Bukit Timah (Hullett). Johor, Castlewood. Malacca, Sungei Hudang; Jasin; Merlimau (Cantley). Selangor, Kwala Lumpur (Curtis). Perak, Gunong Keledang. *Native names:* Akar Sankang Buaya; Akar Serapat Jantan.

(5) *U. lucida* Benth. *Gen. Pl.* ii. 716; *King, l.c.* 475. *U. reticulata* King and Gamble, *l.c.* 477.

Stout liane 3 to 4 in. through. Leaves chartaceous, elliptic abruptly short cuspidate, base round; nerves 8 to 12 pairs prominent beneath; 3 to 5 in. long, 1.25 to 2 in. wide; petioles .5 in. long. Panicles terminal, large, 7 to 10 in. long, 6 to 8 in. wide; branches slender, numerous. Calyx-lobes broad oblong, pubescent. Corolla urceolate, .1 in. long, lobes oblong. Follicles broad lanceolate acuminate, woody, 3 in. long, .5 in. through at base. *Hab.* Common in forests. Singapore, Jurong; Pulau Ubin; Changi. Malacca, Bukit Bruang; Batu Tiga; Bukit Sadanen (Derry). Perak (Scortechini, Kunstler). Penang, Waterfall; Moniot's Road (Curtis, Wallich). *Native names*: Getah Grit putih; Akar Gegrip Merah, or Nasi. *Use*: Gives a good quality rubber.

*U. reticulata* King seems to be only a young state of *U. lucida*. King and Gamble quote the same numbers for both species.

(6) *U. torulosa* Hook. *fl. F.B.I.* iii. 659; *King, l.c.* 476.

Climber. Leaves thin coriaceous, oblong-lanceolate acuminate, rounded or shortly acute; nerves slender, 6 to 10 pairs; 4 to 7 in. long, 1.5 to 2 in. wide (smaller on branch ends); petioles .5 in. long. Cymes terminal, 2 to 2.5 in. long, 2 in. wide, densely pubescent; peduncles 1 to 2 in. long. Calyx-lobes ovate-oblong, .05 in. long. Corolla urceolate, lobes oblong acute. Follicles very slender, torulose, 2 ft. long. Seed elliptic-lanceolate, .5 in. long, villous, plume 1 to 1.8 in. long. *Hab.* Woods; common in south. Singapore, Garden Jungle; Tampinis; Selitar. Johor, Batu Pahat (Hullett); Mt. Austin. Malacca, Machap (Derry); Jasin. *Native names*: Akar Montek; Akar Suapah.

## 22. PARAMERIA, Benth.

Usually stout lianes. Flowers small in broad lax panicles, white or pink. Calyx bifid with many glands inside. Corolla salver-shaped or sub-campanulate, tube short, broad above, lobes oblique overlapping to left. Stamens at base of corolla; anthers lanceolate sagittate, base spurred, connivent and adhering to stigma. Disc of 5 scales. Carpels distinct. Style short obconical; stigma conic. Follicles long, slender torulose. Seed linear or oblong, crowded with short bristles and a long plume. Species 4 or 5, Indo-Malaya.

Leaves under 6 in. long; panicles lax.

Panicle glabrous; flowers white; follicles 6 to 12 in. long

Panicle pubescent; flowers pink; follicles 20 to 24 in. long

Leaves over 6 in. long; panicles dense

(1) *P. glandulifera*

(2) *P. polyneura*

(3) *P. densiflora*

(1) *P. glandulifera* Benth. *Gen. Pl.* ii. 715; *King, l.c.* 478.

Large climber. Leaves chartaceous-sub-coriaceous, opposite



or 3 in a whorl, elliptic to obovate, base cuneate; nerves 5 to 7 pairs; 3 to 5 in. long, 1.5 to 2 in. wide; petioles 1 to 2 in. long. Panicles terminal and axillary, 1 to 3 in. long, glabrous, lax spreading, terminal cymules corymbose, many-flowered, .25 in. long. Flowers white, fragrant. Calyx-lobes ovate, puberulous, .05 in. long. Corolla campanulate, tube .125 in. long, puberulous, lobes longer, rotate. Follicles flexuous, 10 to 12 in. long, slender torulose. Seed oblong, .4 to .5 in. long, with a tuft of brown bristles and a plume 1 in. long. *Hab.* Forests, Singapore (Wallich). Pahang, Kwala Tembeling. Malacca, Panchur (Goodenough); Kwala Linggi; Batang Malaka and Merlimau (Derry). Penang (Curtis). *Distrib.* Burma, Cambodia, Malay Archipelago. *Native names*: Akar Singarip putih; Akar Serau.

(2) **P. polyneura** Hook. *fl. F.B.I.* iii. 660; *King, l.c.* 479.

A big climber about 3 in. through. Leaves chartaceous, elliptic-oblong to obovate abruptly short acuminate, light green; nerves 8 to 10 pairs; 3 to 6 in. long, 1.25 to 2.5 in. wide; petioles .2 in. long. Panicle large, lax, terminal, 3 to 4 in. long, 4 in. wide or more, sessile; branches slender. Calyx rose pink, lobes ovate. Corolla 1 in. long, tube rose, campanulate, limb white, lobes ovate, oblique. Follicles 2 ft. long, slender, slightly torulose, swellings 1 in. long. Seed fusiform, 1 to 1.25 in. long, tip cup-shaped, plume 2 in. long. *Hab.* In forests; common and very beautiful in flower. Singapore, Garden Jungle; Changi (Hullett). Malacca, Ayer Panas; near Jasin; Selandor and Panchur (Derry). Selangor, Kwala Lumpur. Perak, Chandering Simpang (Wray). Penang, Waterfall and Penara Bukit (Curtis). *Distrib.* Borneo, Sumatra. *Native names*: Akar Sedang; Akar Serapit or Serapat.

(3) **P. densiflora** Oliv. Hook. *l.c. Pl. t.* 1520; *King, l.c.* 480.

Climber. Leaves chartaceous, oblong abruptly acuminate, base round, hairy beneath, especially on midrib, and 6 pairs of nerves; 5 to 8 in. long, 1.75 to 2.25 in. wide; petioles .2 in. long. Panicles sessile, terminal, thickly pubescent, dense, 6 in. long; branches stout, very many-flowered. Calyx small, lobes ovate acute. Corolla .2 in. long, tube short pubescent, lobes ovate oblique, glabrous white. Follicles 11 to 14 in. long, distant, torulose swellings thick, .5 in. long. Seed .4 in. long, oblong blunt, plume 1 in. long. *Hab.* Penang Hill at 1200 ft. altitude (Curtis), not common.

### 23. ECDYSANTHERA, Hook and Arn.

Glabrous climbers. Leaves acuminate. Flowers small, white, yellow or pink in terminal or axillary lax panicles. Calyx deeply 5-fid. Corolla urceolate, lobes very short hardly twisted, blunt, overlapping to the left. Stamens at base of tube, included; anthers sagittate connivent and adhering to stigma, spurs at base empty. Disc annular. Carpels distinct. Style short; stigma obpyriform.

Follicles terete acuminate. Seeds few, elliptic, little contracted at tip with a ring of stiff hairs and a plume. Species 4 or 5, Indo-Malaya, China.

Cymes terminal; branches rather stout . . . . (1) *E. micrantha*  
 Cymes lateral; branches very slender . . . . (2) *E. multiflora*

(1) *E. micrantha* DC. *Prodr.* viii. 442; *King, l.c.* 482.

Large climbing shrub. Leaves ovate to oblong-lanceolate, blunt acuminate, 2 to 7 in. long, 1 to 2 in. wide; petioles .3 to .5 in. long. Cymes puberulous, 5 in. long and wide, many-flowered, terminal. Calyx-lobes very small, ovate acute, pubescent. Corolla .05 in. long, lobes falcate; anthers blunt. Follicles 3 to 4 in. long, .75 in. wide, narrowed to tip. Seed elliptic lanceolate, .75 in. long, .25 in. wide, with a ring of tawny bristles and a white plume 1.5 to 2.5 in. long. *Hab.* Perak (Scortechini). Very rare. *Distrib.* India, China.

(2) *E. multiflora* *King and Gamble, l.c.* 482.

Large climber. Leaves ovate abruptly acuminate, base narrowed, rounded, 2 to 3 in. long, 1 to 1.5 in. wide; petioles .4 to .6 in. long. Cymes paniced lateral very lax puberulous; peduncles 1 to 2.5 in. long; branches 2 in. long or less, slender branchlets numerous. Flowers very numerous, pale yellow. Calyx-lobes ovate acute. Corolla .06 in. long, lobes short. Anthers acuminate. *Hab.* Perak, Larut (Kunstler). Very rare.

#### 24. CHONEMORPHA, G. Don.

Large climbing shrubs with broad leaves. Flowers large white in lax terminal paniced cymes. Calyx tubular, 5-lobed with a ring of glands inside. Corolla salver-shaped, tube cylindric, lobes broad, twisted to left, overlapping to right. Stamens on throat of corolla, included; filaments villous; anthers sagittate, base short, spurred, connivent and adhering to stigma. Disc thick, 5-lobed. Carpels distinct. Style filiform; stigma conoid. Follicles woody, triquetrous, large. Seeds ovoid or oblong beaked plumed. Species 6 or 7, Indo-Malaya.

(1) *C. penangensis* *Ridl. Agric. Bull.* x. 147. *C. macrophylla* *King, l.c.* 483 in part, *not of Don*.

Stems hairy. Leaves obovate, base round, tip short acuminate, hairy on both sides; nerves 10 pairs; 8 to 9 in. long, 6 to 7 in. wide; petioles .25 to .5 in. long. Peduncle 3 in. long, hairy. Cyme-branches 3 or more; flowers numerous. Calyx .25 in. long, tubular with 5 acute points, hairy. Corolla-tube 1 in. long, base narrow then abruptly dilate, hairy as are backs of lobes, lobes spathulate, 1 in. long. *Hab.* Edges of forests. Pahang, Kota Tongkat (Evans). Malacca, Brisu (Derry). Perak, Goping (Kunstler). Temengoh. Penang, Balik Pulau (Curtis). *Native name:* Akar Gegrip Merah. A very handsome climber,

## 25. RHYNCHODIA, Benth.

Large climbing shrubs. Leaves membranous, broad. Flowers medium size in lax axillary or sub-terminal paniced cymes. Calyx 5-lobed, lobes as long as tube, glandular, scales many. Corolla salver-shaped, tube enlarged round stamens, narrow at throat, villous, lobes large, twisted obliquely, obovate falcate overlapping to right. Stamens insert on middle of tube; filaments broad, short; anthers sagittate, connivent, cell-spurs narrow, incurved. Disc 5-lobed. Carpels 2 distinct; style slender; stigma columnar. Follicles narrow, compressed. Seed ovate-oblong, compressed, beaked, plumed. Species 1, India to China.

(1) *R. Wallichii* Benth. *Gen. Pl.* ii. 720; *King, l.c.* 485.

Large climber. Leaves elliptic-ovate caudate-acuminate or cuspidate, base cuneate; nerves 7 to 10 pairs; 5 to 9 in. long, 2 to 4 in. wide; petioles 1 in. long. Panicles 4 to 5 in. long and about as wide, corymbose, puberulous. Corolla-tube 5-angled, .25 in. long, lobes .5 in. long, white tinged pink. Follicles 12 to 18 in. long. Seed .5 in. long. *Hab.* Pahang, Ulu Rumpin (Foxworthy). Perak, Kwala Dipang (Scortechini); Chanderiang (Kunstler). Lankawi, Kwah (Curtis). *Native name*: Kedomba.

## 26. ANODENDRON, DC.

Large glabrous climbers. Flowers in axillary or terminal leafy panicles. Calyx small 5-partite. Corolla salver-shaped, tube cylindrical, little dilate round stamens, lobes narrow overlapping to right, twisted to left. Stamens below the middle of the tube; anthers sagittate, connivent and adhering to stigma, cells short spurred. Disc annular or cupular. Carpels distinct sunk in disc and adhering to it; style very short; stigma thick, conic, bilobed. Follicles acuminate. Seeds few, ovoid or oblong beaked, plume attached to beak and running down it. Species about 7, Indo-Malaya.

Cymes many-branched, terminal; leaves coriaceous.

- |   |                             |
|---|-----------------------------|
| Leaves ovate, base round; corolla-lobes over .1 in. long, villous in throat . . . . . | (1) <i>A. paniculatum</i>   |
| Leaves elliptic, base cuneate round; corolla-lobes .05 in. long, glabrous . . . . .   | (2) <i>A. Candolleianum</i> |
| Leaves obovate, base cuneate; corolla-lobes .2 to .25 in. long, tomentose . . . . .   | (3) <i>A. Wrayi</i>         |
| Cymes axillary, 2.5 in. long; leaves coriaceous, oblong-lanceolate . . . . .          | (4) <i>A. lanceolatum</i>   |
| Cymes axillary, 1 in. long, few-flowered; leaves chartaceous oblong . . . . .         | (5) <i>A. pauciflorum</i>   |

(1) *A. paniculatum* A. DC. *Prodr.* viii. 444; *King, l.c.* 486.

A robust climber. Leaves thin coriaceous, ovate or elliptic shortly abrupt blunt cuspidate, base round, glabrous; nerves 12 to 15 pairs, distinct on both sides; 4 to 8 in. long, 1.5 to 3 in. wide; petioles .5 in. long. Panicles axillary and terminal, 10 in. long,

6 in. wide or less, lax, repeatedly branched, branches slender; cymules 3-flowered; pedicels .05 to .1 in. long. Flowers small, white or pale yellow. Calyx-lobes ovate round ciliate. Corolla cylindrical dilate round stamens, narrow at throat, .06 in. long, lobes oblong falcate, villous inside, .1 to .125 in. long. Follicles woody, 3 to 6 in. long, .5 to .75 in. through at base, narrowed to tip. Seed few, obovoid, flat, .5 to 1 in. long, beak .25 in. long, plume 2 in. long. *Hab.* Northern parts in open places, in thickets. Penang, Waterfall (Curtis). Perlis, Kanga (Ridley). *Distrib.* India, Siam, Malay isles.

(2) **A. Candolleianum** *Wight, Ic. t. 1309; King, l.c. 487.*

Big climber 60 to 80 ft. long, 1 to 1.5 in. through. Leaves coriaceous, elliptic or ovate, base round or shortly cuneate, shortly cuspidate; nerves 8 to 10 pairs, conspicuous elevate; 5 to 9 in. long, 2 to 5 in. wide; petioles 1.5 to 2 in. long, stout. Panicles axillary and terminal, repeatedly branched; branches rather slender, 9 in. long, 4 to 5 in. wide; peduncles 1 to 1.5 in. long. Calyx-lobes ovate. Corolla cylindrical, .05 in. long, lobes oblong, falcate, glabrous, .05 in. long, all yellowish. Follicles 6 to 7 in. long, dagger-shaped, .4 in. through base and gradually narrowing to tip, papery. Seed oblong flat, 1 in. long, beak as long, plume 2 to 2.5 in. long. *Hab.* Forests. Malacca (Maingay); Selandor (Cantley). Perak, Larut and Batang Padang (Kunstler). Penang, West Hill (Curtis). *Distrib.* Borneo.

(3) **A. Wrayi** *King and Gamble, l.c. 489.*

Climber; branches sinuous. Leaves coriaceous, obovate or parallel, 2 to 3.5 in. long, 1 to 1.75 in. wide; petioles .1 to .2 in. long. Cymes paniced corymbose, axillary; peduncles .2 to .4 in. long. Panicle 1 to 1.5 in. long, 2 in. wide; branches slender. Flowers greenish yellow. Calyx-lobes ovate acute, .06 in. long. Corolla cylindrical, .25 in. long, glabrous outside, pubescent inside, lobes ovate, .2 to .25 in. long, dense tomentose. *Hab.* Perak, Gunung Bubu at 5000 ft. altitude (Wray). Very rare.

(4) **A. lanceolatum** *King and Gamble, l.c. 490.*

Glabrous climber. Leaves coriaceous, oblong-lanceolate bluntly acuminate, base narrow cuneate, edges crisped; nerves 15 to 16 pairs; 3.5 to 5.5 in. long, 1 to 1.5 in. wide; petioles .4 to .5 in. long. Cymes axillary, paniced, 2.5 in. long, 1.25 in. across; peduncles .1 to 1.5 in. long, branches short; cymules close. Flowers pale buff. Calyx campanulate, lobes ovate acute. Corolla sub-cylindrical, dilate below, .15 in. long, lobes oblong linear, as long. *Hab.* Perak, Tapah (Wray). Rare.

(5) **A. pauciflorum** *Hook. fil. F.B.I. iii. 669; King, l.c. 488.*

Climber 10 to 15 ft. long. Leaves chartaceous oblong, with a short blunt point, base rounded; nerves fine, 8 to 10 pairs; 3 to 4 in. long, 1.25 to 1.5 in. wide; petioles .2 to .3 in. long. Cymes axillary, numerous; peduncles .5 in. long; branches very short,

corymbose, whole cyme 1 in. long. Flowers rather numerous, greenish yellow. Calyx-lobes ovate, 1 in. long. Corolla cylindrical dilate below, 3 in. long, lobes linear-lanceolate, falcate as long. Follicles dagger-shaped, 4 in. long, narrowed to point from base, 5 to 6 in. through, cartilaginous. Seed obovoid, 6 in. long, 3 in. wide, beak 1 to 1.25 in. long, plume 3 to 3.5 in. long. *Hab.* Hill forests, scarce. Perak, Larut (Kunstler). Penang Hill at 1000 to 2000 ft. altitude (Curtis).

## 27. CLEGHORNIA, Wight.

Slender climbers. Leaves membranous; nerves horizontal. Flowers small in terminal axillary paniced or corymbose cymes. Calyx 5-lobed, with 5 twin glands alternate with lobes. Corolla salver-shaped, lobes overlapping to right. Stamens below the middle, connivent and adhering to stigma; anthers sagittate, cells short, spurred. Disc of 5 scales cleft at tip. Carpels distinct sunk in disc. Style short, obconic; stigma conic. Follicles long acuminate. Seed oblong, tips narrowed, plumed. Species 3, Ceylon and Malaya.

Leaves elliptic; cymes paniced; corolla-lobes linear-oblong, over 1 in. long

Leaves lanceolate; cymes corymbose; corolla-lobes round, under .05 in. long

(1) *C. malaccensis*

(2) *C. gracilis*

(1) *C. malaccensis* King and Gamble, *l.c.* 491. *Baissea malaccensis* Hook. *fl. F.B.I.* iii. 663.

A slender climber 60 to 80 ft. long. Leaves membranous, elliptic-oblong shortly caudate-acuminate, pale beneath, base round or little attenuate; nerves 12 to 14 pairs, sub-parallel; 2 to 4 in. long, 1 to 1.5 in. wide; petioles .5 to 1 in. long. Panicles terminal, 4 in. long or less; peduncles .75 to 2 in. long, ultimate cymules sub-umbellate. Flowers white with yellow centre. Calyx-lobes lanceolate, .075 in. long. Corolla tubular-campanulate, .2 to .25 in. long, glabrous, lobes as long, linear oblong. Follicles narrowed from base to tip, 2.5 to 5 in. long, .25 in. through at base. Seeds fusiform, .4 to .5 in. long, ending in a flat point with a short plume. *Hab.* Not common; dense jungle. Malacca (Maingay). Perak, Goping and Bera (Kunstler).

(2) *C. gracilis* King and Gamble, *l.c.* 91.

Slender climber 60 to 80 ft. long, 1 to 2 in. through. Leaves membranous, lanceolate caudate-acuminate blunt, base cuneate; nerves 12 to 16 pairs; 2 to 3 in. long, .5 to .7 in. wide; petioles slender, .25 in. long. Panicles terminal and axillary, 2 in. long and wide; peduncles .5 to .75 in. long, like the branches and pedicels very slender, capillary. Flowers light yellow. Calyx-lobes orbicular round, .04 in. long. Corolla urceolate, 1 in. long, lobes rounded not twisted. *Hab.* Perak, Thaiping Hills at 4000 ft. altitude (Scortechini and Kunstler).

## 28. ICHNOCARPUS, Br.

Climbing shrubs. Paniced cymes, lax, many-flowered, terminal and axillary. Flowers small, white. Calyx-lobes ovate acute, no glands. Corolla salver-shaped, throat villous, lobes overlapping to right narrowed to a blunt point. Stamens from the middle of the tube or below; anthers sagittate, connivent and adherent to the stigma, cells spurred. Disc 5-lobed. Carpels distinct, hairy. Style short, top obconic; stigma columnar. Follicles 2, slender. Seeds oblong, tip narrowed, plumed. Species 5 or 6, Indo-Malaya, Australia.

Leaves elliptic, under 1·5 in. wide; panicle narrow

tomentose

(1) *I. frutescens*

Leaves ovate, over 1·5 in. wide; panicle wide, glabrous (2) *I. ovalifolius*

(1) *I. frutescens* Ait. Hort. Kew (ed. 2) ii. 69; King, l.c. 493.

Slender woody tomentose climber about 20 ft. long. Leaves elliptic lanceolate or oblong acuminate, base round, glabrous above, tomentose especially on elevate midrib beneath, or glabrous; nerves 5 to 7 pairs, slender elevate, reticulations fine conspicuous in young leaves; 2 to 4·5 in. long, .75 to 1·5 in. wide; petioles tomentose, .1 to .3 in. long. Cymes paniced, axillary and terminal, tomentose; panicles 2 to 2·5 in. long with distant short .5 in. long branches each bearing a cymule of a number of small white flowers. Calyx-lobes tomentose, ovate-lanceolate, .05 in. long. Corolla-tube .1 in. long, base cylindrical above globose tomentose, lobes glabrous, .2 in. long, linear falcate, hairy inside. Follicles slender, cylindrical, 3 to 6 in. long, .1 to .15 in. through. Seed linear, cylindrical, .4 to .75 in. long, plume scanty, 1 in. long. *Hab.* Perak, Bujong Malacca; and Goping (Kunstler); Changkat Mentri (Kloss). Not common. *Distrib.* Indo-Malaya, Australia.

(2) *I. ovalifolius* A. DC. Prodr. viii. 435; King, l.c. 494.

A straggling climber. Leaves chartaceous, ovate to elliptic acute, glabrous except the villous midrib beneath; nerves 5 to 6 pairs, reticulations netted, conspicuous in young leaves; 3 to 6 in. long, 1·5 to 3 in. wide; petioles .4 to .6 in. long, pubescent. Panicles 3 in. long, axillary and terminal as in *frutescens*, but cymules larger very pubescent. Calyx campanulate, lobes ovate acute, .06 in. long. Corolla .1 in. long cylindrical then dilate, lobes .15 in. long, linear falcate. Follicles cylindrical, dilate at base and gradually narrowed, 7 in. long, .15 in. through, plume 1 in. long, white. *Hab.* River banks and woods, not rare, fragrant. Johor, Kota Tinggi; Pahang River, Pulau Manis; Gunong Senyum and Tongkat (Evans). Selangor, Kwala Lumpur. Perak, Ulu Bubong (Kunstler); Ulu Temengoh. Province Wellesley, Krian. Penang, Batu Feringhi; Tanjong Bunga (Curtis). *Distrib.* India, Malay Archipelago.

## 29. AGANOSMA, G. Don.

Woody climbers. Cymes many-flowered, axillary and terminal. Flowers large or medium-sized, white, fragrant. Calyx 5-lobed to base or nearly, lobes lanceolate glandular within. Corolla salver-shaped, base of tube cylindric, above campanulate broader with longitudinal villous bands inside behind the anthers, lobes overlapping to right, twisted to left, rather narrow. Stamens insert at base of upper part of tube; anthers sagittate, conniving and adhering to stigma, cells spurred, spurs empty. Disc 5-lobed. Carpels 2, usually hairy; style short, top urn-shaped; stigma columnar, tip conic. Follicles terete. Seeds oblong or linear obovate not beaked, plumed. Species about 6, Indo-Malaya.

Corolla-lobes narrow linear, .25 in. long . . . . (1) *A. marginata*  
 Corolla-lobes broad, rhomboid, 1 in. long . . . . (2) *A. calycina*

(1) *A. marginata* G. Don., *Gen. Hist. Dict. Pl.* 77; King, *l.c.*

495.

Climbing shrub. Leaves chartaceo-membranous, oblong-lanceolate acuminate, base round, glabrous; nerves 12 to 16 pairs, conspicuous, inarching in a conspicuous marginal nerve elevate beneath; 2 to 5 in. long, .75 to 1.25 in. wide; petioles .15 to .25 in. long. Cymes terminal and axillary, puberulous, 2 to 4 in. long; branches slender; peduncles 1 to 2 in. long. Calyx-lobes lanceolate-acuminate, .25 in. long. Corolla-tube cylindric, enlarged at base, .25 in. long, lobes narrow linear, acute, .5 to .7 in. long, white. Follicles 6 to 17 in. long, .3 to .4 in. through. Seed linear-oblong, .3 in. long, plume 1.5 in. long. *Hab.* Not rare in open country. Pahang River, Tanjong Antan; Gunong Senyum (Evans). Singapore, Garden Jungle (Murton). Malacca, Alor Gajah (Derry). Perak, Kwala Kangsa. Penang, Chalet (Curtis). Lankawi, Kwah (Curtis). *Distrib.* India, Siam, Malay islands. *Native name:* Sakat Lima.

(2) *A. calycina* DC. *Prodr.* viii. 432; King, *l.c.* 497.

An immense climber. Leaves coriaceous-chartaceous, elliptic or elliptic-ovate, abruptly short-acuminate, base rounded but narrowed; nerves 7 to 10 pairs conspicuous, as are the small netted reticulations; 3.5 to 6 in. long, 1.5 to 3.5 in. wide; petioles .5 in. long. Cyme terminal, sessile, rusty-tomentose, 3 to 5 in. long, 8 in. wide; branches rather thick. Bracts lanceolate, large. Calyx-lobes lanceolate-acuminate, .75 to 1 in. long, tomentose. Corolla cylindric, stout, dilate in middle, pubescent outside, .4 to .5 in. long with villous bands behind stamens, inside, lobes rhomboid, half tomentose as long as tube. *Hab.* Perak, Gunong Chabang (Scortechini). Rare. *Distrib.* Tavoy.

### 30. TRACHELOSPERMUM, Lemaire.

Climbing shrub. Flowers rather large, white or purplish in lax terminal or axillary cymes. Calyx small with 5 or 10 scales or glands within. Corolla salver-shaped, tube cylindric, dilate round the stamens, constrict at mouth, lobes oblique, twisted to left, overlapping to right. Stamens from above the middle of tube; filaments broad; anthers sagittate, connivent and adhering to stigma, cells produced to spurs below. Disc various. Carpels longer than disc; stigma columnar, base ringed, tip conic. Follicles incurved, elongate. Seed linear, not beaked, plumose. Species about 8, Indo-Malaya to Japan.

(1) **T. Curtisii** *King and Gamble, l.c.* 498.

Climber; branches soft but moderately thick. Leaves membranous, elliptic or ovate abruptly acuminate, base cordate, strigose-hairy both sides, especially on nerves beneath; nerves thin, 8 to 10 pairs, reticulations conspicuous; 3 to 5 in. long, 2 to 3 in. wide; petioles  $\frac{3}{4}$  to  $\frac{5}{8}$  in. long, villous. Cymes corymbose, terminal, sessile, 2 in. long, 3 in. wide, puberulous. Flowers white, fragrant. Calyx-lobes narrow linear-lanceolate, pubescent. Corolla-tube  $\frac{5}{8}$  to  $\frac{6}{8}$  in. long, gradually narrowed from the dilate base, lobes oblique, triangular, dentate,  $\frac{2}{8}$  in. long. Follicles 8 to 9 in. long,  $\frac{25}{100}$  in. through, falcate, flattened not enlarged at base. Seed oblong,  $\frac{7}{8}$  to  $\frac{8}{8}$  in. long,  $\frac{2}{8}$  in. wide, base acute, plume 1 to 1.5 in. long. *Hab.* Perak, Larut (Kunstler). Penang, Balik Pulau (Curtis). Local, not common.

### 31. EPIGYNUM, Wight.

Slender climbing shrub. Flowers white, fragrant, medium size, white-tomentose in dense heads at the ends of branches. Calyx-lobes narrow. Corolla-tube long flask-shaped, dilate at base, throat villous, lobes rounded. Stamens below the middle of tube; anthers linear sagittate, connivent, cells spurred. Disc 5-lobed lining the calyx-tube. Follicles linear terete. Seed long, tip broad, plumed. Species 4 to 5, Malaya.

Leaves elliptic, glabrous beneath . . . . .	(1) <b>E. perakense</b>
Leaves elliptic tomentose . . . . .	(2) <b>E. Maingayi</b>
Leaves lanceolate; corolla-tube $\frac{6}{8}$ in. long . . . . .	(3) <b>E. Curtisii</b>
Leaves lanceolate; corolla-tube 1 in. long . . . . .	(4) <b>E. Ridleyi</b>

(1) **E. perakense** *King and Gamble, l.c.* 500.

Climber 10 to 20 ft. long. Leaves membranous, elliptic acute, base shortly cuneate; nerves 6 to 7 pairs, elevate beneath; glabrous when adult, 2 to 4 in. long, 1.5 to 2.5 in. wide. Cymes terminal and axillary grey tomentose, 1.5 to 2 in. long and wide. Calyx small, lobes ovate acute. Corolla-tube cylindric, dilate below,  $\frac{6}{8}$  to  $\frac{7}{8}$  in. long, grey-tomentose, lobes  $\frac{25}{100}$  in. long, oblong crenulate. Follicles 10 to 12 long, tomentose, torulose slender acuminate.



Seeds fusiform 1 in. long, flattened, plume 1 in. long. *Hab.* Perak, Ayer Kuning and Kota (Wray). Kedah, Yan (Ridley). Jalor, Biserat (Gwynne Vaughan). *Native name*: Lemak Ketam.

(2) **E. Maingayi** *Hook. fl. F.B.I.* iii. 666; *King, l.c.* 501.

Branches tomentose. Leaves membranous, elliptic acute at both ends, tomentose beneath; nerves 6 to 7 pairs strong elevate beneath; 3.5 to 4.5 in. long, 1.5 to 2.5 in. wide; petioles .25 in. long. Cymes terminal and axillary tomentose, 3 in. long, 2 in. wide; peduncles 1 to 1.5 in. long. Flowers crowded. Calyx-lobes .1 in. long. Corolla cylindric, tomentose with 5 villous lines inside, .6 in. long, lobes oblong, crenulate, twisted to left, .25 in. long. Follicles 6 to 8 in. long, .15 to .25 in. through, slender cylindric, tomentose. Seed fusiform pubescent, .6 to .7 in. long. *Hab.* Open bamboo forests and woods. Malacca (Maingay). Pahang, Kota Tongkat, Bentong to Kwantan Road (Evans). Selangor, Kwala Lumpur. Negri Sembilan, Linsum. Perak, Ulu Kerling (Kunstler).

(3) **E. Curtisii** *King and Gamble, l.c.* 501.

Branches slender. Leaves membranous, lanceolate acuminate, base shortly acute, glabrous except for hair tufts in nerve axils beneath; nerves 7 to 8 pairs, slender, raised; 3.5 to 4.5 in. long, 1 to 1.5 in. wide; petioles .25 in. long. Cymes axillary and terminal, pubescent, 1.5 in. long, branches .5 in. long. Calyx-lobes ovate-acuminate. Corolla cylindric, .6 in. long, tomentose, throat villous, lobes obovate, .3 in. long. *Hab.* Penang, Road to Penara Bukit at 2000 ft. altitude (Curtis). Rare.

(4) **E. Ridleyi** *King and Gamble, l.c.* 502.

Slender climber. Leaves chartaceous, lanceolate or elliptic-lanceolate acuminate, base attenuate, glabrous above, strigose beneath; nerves 8 to 10 pairs, slender; 2 to 4 in. long, 1 to 1.5 in. wide; petioles .25 to .5 in. long. Cymes simple, terminal or in upper axil, villous. Flowers 5 or 6, white. Calyx short, lobes ovate-acuminate. Corolla-tube slender narrowing upwards from dilate base, 1.5 in. long, lobes rhomboid crenate, .25 to .3 in. long. *Hab.* Rare. Flowers very fragrant; on banks in woods. Selangor, Rawang and Ginting Bidai (Ridley).

### 32. MICRECHITES, Miq.

Large climbers. Flowers very small in axillary and terminal paniced pubescent cymes. Calyx small, lobes blunt, many glands within. Corolla-tube small ovoid cylindric, or campanulate, lobes falcate, very oblique sometimes forked, overlapping to right. Stamens on base of tube; anthers sagittate, conniving and adhering to stigma, cells spurred. Disc annular or cupular. Carpels distinct; style short; stigma ovoid. Follicles thick, sub-terete. Seeds few; linear-oblong not beaked, plumed. About 6 species, Indo-Malaya.

Lobes of corolla bifid . . . . .	(1) <b>M. furcata</b>
Lobes entire.	
Leaves chartaceous, lanceolate . . . . .	(2) <b>M. Scortechinii</b>
Leaves thinly coriaceous; lobes of corolla tooth-like . . . . .	(3) <b>M. brachypetala</b>
Leaves sub-membranous, lobes of corolla oblong-linear . . . . .	(4) <b>M. tenuifolia</b>

(1) **M. furcata** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 95.  
*M. polyantha* *King, l.c.* 504 (not of *Miquel*).

A rather stout climber. Leaves chartaceo-coriaceous, elliptic or lanceolate, blunt or blunt acuminate, base cuneate; nerves 10 to 15 pairs; 2 to 4.5 in. long, 1 to 2.25 in. wide; petioles .5 to 1 in. long. Cymes axillary and terminal, pubescent dense, branches rather thick, variable. Calyx campanulate, lobes ovate-round, densely tomentose, .05 in. long. Corolla campanulate or urceolate, .15 to .2 in. long, glabrous outside, white or yellow, lobes falcate lanceolate, bilobed unequally, .05 to .125 in. long. Follicles terete cylindric, 6 to 12 in. long. Seeds linear oblong, 1 to 1.5 in. long, plume tawny, .2 in. long. *Hab.* Forests. Perak, Relau Tujur (*Wray*); Larut and Bernam River (*Kunstler*). I have seen no fruit.

This is distinct from *M. polyantha* *Miq.* of Java in its larger very tomentose calyx and bilobed corolla-lobes, and larger more coriaceous not long-acuminate leaves.

(2) **M. Scortechinii** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 96.  
*M. elliptica* var. *Scortechinii* *King and Gamble, l.c.* 505.

Leaves chartaceous lanceolate blunt, long acuminate, base cuneate, glabrous, 3 to 3.5 in. long, 1 to 1.5 in. wide; nerves 10 to 12 pairs, very slender, inconspicuous; petioles .25 in. long. Cymes terminal and axillary, few-flowered, 1 in. long, puberulous. Calyx-lobes round ovate, .075 in. long. Corolla-tube cylindric, .1 in. long, lobes linear-oblong, .15 in. long, twisted to left. *Hab.* Perak (*Scortechini*).

This seems to me quite different from the much larger-flowered *M. elliptica* of India, but the specimens are poor.

(3) **M. brachypetala** *Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 96.

Woody climber. Leaves thinly coriaceous, obovate blunt, short acuminate, base narrowed; nerves 7 to 8 pairs very fine, reticulations faint, visible when dry; 2.5 in. long, 1.5 in. wide; petioles .25 in. long. Panicles terminal, 2.5 in. long, sub-glabrous, branches in pairs, 1 in. long; branchlets .5 in. long, branched again. Bracts ovate persistent. Calyx cup-shaped with very short teeth, slightly pubescent. Corolla urceolate cylindric, lobes very short, tooth-like. Ovary hairy. *Hab.* Penang, Penara Bukit (*Curtis*). Rare.

(4) *M. tenuifolia* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 96.  
*M. polyantha* Hook. *fl. F.B.I.* iii. 671 (not of Miquel).

Slender climber. Leaves nearly membranous, broad elliptic lanceolate, narrowed to both ends, blunt, base sub-acute; nerves very fine, parallel; 2 in. long, 1.5 in. wide; petioles slender, .3 in. long. Cymes small, 1 in. long or under, axillary or by fall or suppression of leaves in short-branched panicles, 4 to 6 in. long, terminal, puberulous. Bracts ovate acute, persistent. Calyx-lobes rounded ovate, puberulous. Corolla glabrous, .05 in. long, tube cylindric, lobes short, oblong linear bent to one side, entire. *Hab.* In forests. Malacca (Maingay). Selangor, Ginting Bidai; Kwala Lumpur.

This is distinguished from *M. polyantha* Miq. by the flowers smaller, corolla-lobes entire, calyx-lobes much less hairy, leaves smaller and thinner.

## ORDER XCII. ASCLEPIADACEÆ.

Slender climbing or twining shrubs, rarely herbs or erect shrubs, usually laticiferous. Leaves opposite, rarely whorled, thin or fleshy. Flowers regular, bisexual, medium or small, yellow or pink or purple, seldom white, in cymes umbellate or paniced or racemes, axillary, or from between petioles, or terminal. Calyx inferior, 5-lobed, usually with glandular scales inside. Corolla gamopetalous, 5-lobed, tube short (except *Ceropegia*), with 5 coronal-processes. Stamens 5, inserted at corolla base, free or usually connate into a column, enclosing the ovary. Anthers 2-celled, free or united to the style-tip, with membranous or fleshy terminal appendages, sometimes connate, edges of anther or basal prolongations spreading outwards (anther-wings). Pollen granular, loose in a spathulate appendicle (*Periplotœæ*) or in waxy masses (*pollinia*), attached to horny pollen-carriers either directly or by club-shaped caudicles, 2 to each anther, rarely 4. Ovary superior, of 2 carpels free below; styles dilate above into a 5-angled disk, top flat or with a conic process. Follicles 2 or 1 by suppression, divaricate. Seeds flat, usually winged with a silky plume at the top (except the tidal river *Finlaysonia* and *Sarcolobus*). Species nearly 2000. Tropics and sub-tropics, few in temperate regions. (King and Gamble, *Journ. As. Soc. Beng.* lxxiv. 505.)

i. PERIPLŒCÆ. Pollen granular, loosely contained in a spathulate appendicle.

No corona processes; climbers.

Anther appendages erect, incurved at tip . . . . . 1. PHYLLANTHERA

Anther appendages erect, bearded not incurved . . . . . 2. PENTANURA

Anther appendages short, incurved over style;  
 shrublets erect . . . . . 3. GONGYLOSPERMA

Corona processes 5, short, thick . . . . . 4. HEMIDESMUS

Corona processes filiform.

- Stamens without alternating glands between the filaments.
- Corolla-lobes round.
- Corolla large; follicles short, broad, ribbed. 5. FINLAYSONIA
- Corolla small; follicles cylindric, narrow . 6. GYMNANTHERA
- Stamens with glands between filaments.
- Corolla-lobes linear-lanceolate . . . . . 7. ATHERANDRA
- Corolla-lobes short, oblong . . . . . 8. STREPTOCAULON
- ii. SECAMONEÆ. Pollen combined into waxy masses (sometimes into one) sessile on pollen-carriers, minute quadrate, pale. Filaments of stamens connate in a tube and adnate to dilate parts of the style; appendages more or less fimbriate.
- Corolla-lobes imbricate, glabrous or puberulous.
- Tube not lined with a toothed membrane; corona thin.
- Corolla small; style-tip short blunt; pollinia in fours . . . . . 9. SECAMONE
- Corolla rather large; style-tip long; pollinia in pairs . . . . . 10. TOXOCARPUS
- Tube lined with membrane, toothed; corona thick . . . . . 11. GONIOSTEMMA
- Corolla-lobes valvate, villous inside . . . . . 12. GENIANTHUS
- iii. CYNANCHEÆ. Pollen masses waxy, opaque, pendulous in pairs, pollen-carriers dark red.
- Corona of 5 processes adnate to column.
- Erect plants.
- Large bushes; flowers large pale lilac . . . . . 13. CALOTROPIS
- Herb; little-branched; corolla scarlet . . . . . 14. ASCLEPIAS
- Climbers; flowers large, fleshy; corona processes adnate to column. . . . . 15. RAPHISTEMMA
- Flowers small; corona processes attached to base of column . . . . . 16. ISCHNOSTEMMA
- Corona annular, adnate to surrounding column base; flowers small . . . . . 17. CYNANCHUM
- iv. MARSDENIÆ. Pollen masses erect or horizontal, waxy, pollen-carriers dark red attached to pollen by caudicles; stamens connate in a tube; anthers erect or incumbent on style-tip with flat or inflat membranous appendages.
- Corolla-lobes imbricate; scandent.
- No corona; fruit fleshy; seeds with no plume, large . . . . . 18. SARCOLOBUS
- Corona present, corolline.
- Erect herb with narrow leaves; petals long. 19. PENTASACME
- Climbers; petals short . . . . . 20. GYMNEMA
- Corona staminal or absent. Climbers; corolla urceolate or campanulate.
- Corona processes fleshy, round . . . . . 21. GONGRONEMA
- Corona processes fleshy, spreading in a star; flowers large, few; corolla rotate . . . . . 22. DREGEA
- Corona processes subulate often bilobed; flowers small in a panicle, raceme or corymb . . . . . 23. MARSDENIA
- Corona processes beaked; corolla salver-shaped; flowers medium . . . . . 24. PERGULARIA
- Corona processes none or flat; flowers large or small . . . . . 25. STEPHANOTIS
- Corona processes small; corolla small, rotate 26. TYLOPHORA

- Corolla-lobes valvate.  
 Corolla rotate.  
 Twiner; leaves thin . . . . . 27. HETEROSTEMMA  
 Epiphytes climbing or erect; corona stellate,  
 lower lobes spreading or erect . . . . . 28. HOYA  
 Corolla very small urceolate or cylindrical;  
 corona-lobes membranous anchor-shaped  
 or o. Epiphytes fleshy . . . . . 29. DISCHIDIA  
 Corolla campanulate, terrestrial twiner . . . . . 30. PHYSOSTELMA  
 Corolla-tube short, lobes long subulate, hairy  
 twining shrub . . . . . 31. PYCNORRHACHIS  
 Corolla long-tubed, 2 in. long, lobes con-  
 nivent at tips; pollen-masses edge  
 pellucid . . . . . 32. CEROPEGIA

### 1. PHYLLANTHERA, Bl.

Glabrous climber. Leaves rather fleshy. Flowers subracemose, pedicelled, racemes axillary lengthening. Calyx-lobes ovate, 5, scales alternate with lobes, 5. Corolla campanulate-rotate, fleshy, papillose inside, lobes sub-oblique, concave, overlapping to right. Corona o. Stamens near base of corolla; anthers cohering with style apex, not bearded. Pollen-carriers globose; caudicles short, appendices containing 3 or 4 pollen masses. Follicles slender, divaricate. Seed oblong with long plume. Species 2, 1 Javanese.

(1) *P. perakensis* King and Gamble, l.c. 508.

Climber 15 to 20 ft. long. Leaves oblong or oblong-lanceolate acuminate, base round; nerves 8 to 10 pairs horizontal, faint; 2·5 to 4 in. long, .75 to 1·25 in. wide; petioles .25 to .5 in. long. Racemes 2, lengthening to .25 in. as the flowers fall, with persistent bracts on a peduncle .1 to .2 in. long; flowers mottled dark red and yellow. Corolla .5 in. across, lobes orbicular. Follicles 6 to 7 in. long, .25 in. through. Seeds .3 in. long, .06 in. wide; plume 1·5 to 2 in. long. *Hab.* Dense forest in low ground. Perak, Kota (Wray); Larut (Kunstler).

### 2. PENTANURA, Bl.

Glabrous climbers. Flowers on peduncled axillary racemes. Calyx small, scales 5, alternate with lobes. Corolla campanulate rotate, fleshy, papillose; lobes oblong or obovate-oblong, deep, overlapping to right. Corona o. Stamens near base of corolla, bases geniculate; anthers agglutinate to style; appendages bearded, lanceolate. Pollen-carriers with slender caudicles, spatulate appendices, pollen of 3 or 4 granules. Follicles slender. Seed oblong, plume long. Species 2, 1 Indian.

(1) *P. sumatrana* Bl. *Ann. Mus. Bot. Lugd. Bat.* i. 125, t. xxi.

Leaves chartaceous, bright green with purple marks, elliptic, abruptly acuminate, base round or short, cuneate; nerves 7 to 8 pairs, horizontal; 3 to 4 in. long, 1·25 to 1·75 in. wide; petioles .25 in. long. Racemes lengthening to 2 in. Flowers claret-colour.

Corolla-lobes .5 in. long, .3 in. wide. Follicles slender, 5 to 6 in. long, .2 in. through, dark brown. Seed .275 in. long, .075 in. wide, plume 1.5 in. long. *Hab.* Perak, Relau Tujur (Wray). *Distrib.* Sumatra.

### 3. GONGYLOSPERMA, King and Gamble.

Dwarf shrubs with stout stems. Leaves coriaceous, strongly nerved. Flowers in terminal or axillary peduncled cymes, few-branched, small. Calyx short, scales forming a ring. Corolla rotate, campanulate, tube short, lobes oblong, overlapping to right. Corona 0. Stamens on corolla-tube; filaments broad; anthers short, appendages short, triangular. Pollen-carriers spatulate; pollen grains 3 or 4. Carpels 2; styles distinct below. Follicles oblong, short pubescent or woolly. Seed very small, oblong cylindrical, plume white. Species 2, 1 Siam, at Pungah, 1 Lankawi.

(1) *G. lanuginosum* *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 135.

Stems stout, twisted. Leaves few, elliptic, sub-sessile blunt pubescent above, woolly beneath; nerves 15 to 18 pairs horizontal, 5 to 10 in. long, 1.5 to 3 in. wide; petioles .5 in. long. Cymes 2 to 3 in. long. Flowers .16 in. long, dull red. Calyx woolly. Follicles thick, oblong, 1 in. long, .25 in. through, woolly. Seed lanceolate, black, areolate, .12 in. long; plumes scanty, little longer. *Hab.* On limestone cliffs in the north. Lankawi, Dayong Bunting (Curtis).

### 4. HEMIDESMUS, Br.

Slender, twining shrubs. Leaves opposite or whorled in fours. Flowers small, greenish purple in crowded sessile cymes. Calyx-lobes acuminate, scales minute, 5. Corolla rotate, deep 5-lobed lobes fleshy, tube very short. Corona-processes 5, short thick on corolla throat, alternate with lobes. Stamens at base; anthers small, cohering at tip with inflexed appendages. Pollen carriers thick, narrowed upwards with cucullate appendices. Pollen masses granular. Style flat-topped. Follicles terete. Seed oblong, flat, tip broad, plume long. Species 1 or 2, Indian.

(1) *H. indicus* *Br. Mem. Wern. Soc. Edinb.* i. 57; *King, l.c.* 512.

Leaves chartaceous, very variable, elliptic-oblong to linear-lanceolate acute or mucronate, base round; nerves 4 to 5 pairs; 2 to 4 in. long, .5 to .75 in. wide; petioles .25 in. long. Cymes opposite, very short, not .25 in. long. Flowers crowded. Corolla .25 in. across, lobes oblong, purple red. Follicles cylindrical, 4 to 7 in. long. *Hab.* Dindings, Bruas Road (Curtis). Very rare. *Distrib.* India and Ceylon.

## 5. FINLAYSONIA, Wall.

Glabrous climber. Leaves fleshy. Flowers in di- or trichotomous axillary branched cymes, fairly large, yellow spotted purple. Calyx short. Corolla rotate, lobes deep, broad, orbicular, overlapping to right. Corona-processes 5, filiform behind stamens. Stamens in throat, filaments slender; anthers adnate to style; tip with broad inflexed, acute appendages. Pollen-carriers attached to angles of style-tip; appendicles slender, dilate above. Pollen granular, pollen-masses cohering in pairs in each cell. Style slender, tip large, truncate, 5-angled, conic. Follicles 2, fleshy ventricose, 3- to 4-ribbed. Seeds ovate with a few hairs along the edge and a short tuft at top. Species 1, Bengal and Malay peninsula, Siam.

(1) *F. obovata* Wall. *Pl. As. Rar.* ii. 48, t. 162; *King, l.c.* 513.

Bark pale papery. Leaves obovate blunt, base cuneate, 3 to 5 in. long, 1.5 to 2.5 in. wide; petioles .5 to 1 in. long. Cymes 2 to 3 in. long. Corolla .25 in. across, dull yellow, inner half of lobes purplish and hairy. Fruit green, fleshy ovoid hooked, 3 in. long, 2 in. through. Seeds flat, brown, very numerous, .7 to .8 in. long. *Hab.* Tidal rivers. Singapore, Gelang; Kranji. Johor, Batu Pahat. Malacca (Maingay). Selangor, Kwala Selangor. Perak (Scortechini). Province Wellesley, Butterworth. Lankawi, Kwah (Curtis).

## 6. GYMNANTHERA, Br.

Climbing shrub, woody. Leaves chartaceous. Flowers small in short racemes lengthening, 2 to 3 on a short axillary peduncle; bracts persistent. Calyx with 10 (or 5) minute scales between the lobes. Corolla rotate. Corona-processes unequally bifid subulate behind the stamens. Stamens insert in tube; anthers adherent to style-tip produced into acuminate connivent appendages. Pollen-carriers large, spatulate; pollen granular. Style-apex convex. Follicles cylindric. Species about 5, Malaya, Australia.

(1) *G. insularum* King and Gamble, *l.c.* 514.

Leaves elliptic to oblong short-pointed, base shortly narrowed; nerves faint, 14 pairs; 2.5 to 3.5 in. long, 1 to 1.5 in. wide, pale beneath; petioles .5 to .75 in. long. Racemes .4 in. long. Calyx scales 10. Corolla-lobes ovate acute, .2 in. long. *Hab.* Lankawi, small islands (Curtis). Rare.

## 7. ATHERANDRA, Dcne.

Slender twiner. Flowers small in lax peduncled cymes. Calyx-tube turbinate; scales 4, quadrate, crenulate. Corolla rotate; lobes long linear-lanceolate; tube narrowed at base. Corona-processes filiform. Stamens insert at base; filaments free with glands between; anthers ovate, connate with style-tip, with long

acuminate appendages. Pollen-carriers spathulate; pollen granules of 4 grains. Ovary conic sunk in tube; style-apex long, conic. One species.

(1) *A. acutifolia* Dcne. DC. *Prodr.* viii. 497.

Leaves chartaceous oblong-lanceolate acute, base round; nerves 5 to 8 pairs, very slender; 2 to 6 in. long, .75 to 1.75 in. wide; petioles .2 to .4 in. long; peduncles slender, 1.25 in. long; branches and pedicels 1.75 in. long, capillary. Flowers brownish yellow. Corolla .3 to .4 in. long. *Hab.* Rather rare in thickets in the north. Lankawi, Kwah (Curtis). Setul (Ridley). *Distrib.* Java.

### 8. STREPTOCAULON, Wight and Arn.

Twining herbs and shrubs, very laticiferous and usually tomentose. Flowers very small, in paniced cymes sessile or peduncled in one axil of a leaf-pair. Calyx with 5 scales within. Corolla rotate, lobes ovate, overlapping to the right, usually purple. Corona-processes filiform, adnate to back of stamen. Filaments from base of tube alternating with minute glands; anthers oblong adhering to style-tip. Pollinia 2 in a cell, of pollen-granules in a spathulate funnel-shaped caudicle. Carpels distinct. Follicles pubescent. Seed oblong with a long plume. Species 6 or 7, Indo-Malaya.

Leaves elliptic; nerves 6 to 8 pairs; corolla .15 in. across (1) *S. Wallichii*  
 Leaves obovate; nerves 14 to 18 pairs; corolla .3 in.  
 across . . . . . (2) *S. Griffithii*

(1) *S. Wallichii* Wight, *Contrib.* 65; *King, l.c.* 516.

A woody climber with tomentose branchlets. Leaves subcoriaceous, glabrous above, densely tomentose (brown when dry) beneath, elliptic-lanceolate, acute with a short cusp, base cuneate; nerves 6 to 8 pairs ascending; 2 to 5 in. long, 1 to 2 in. wide; petioles .25 to .5 in. long. Panicles spreading, lax, 1.5 in. long or more, hispid pubescent; peduncles short, .25 in. long or less. Flowers minute, glabrous, purple, very many. Calyx turbinate. Corolla rotate, lobes oblong, .13 in. across. Follicles slender, 3 in. long, .3 in. through, tomentose. Seed oblong, base round, .25 in. long; plume 1.5 in. long. *Hab.* Open places and edges of forest. Dindings, Lumut. Perak, Larut Hills 1500 ft. altitude. Province Wellesley, Ara Kudah. Penang (Wallich); Balik Pulau; Ayer Hitam and Telok Bahang (Curtis). Kelantan, Kamposa. Lankawi (Curtis). Perlis, Chupeng. *Native names*: Akar Sarapahat; Akar Timah Ketam.

(2) *S. Griffithii* Hook. *fl. F.B.I.* iv. 10; *King, l.c.* 517.

Woody climber. Leaves coriaceous, obovate-oblong, acuminate, base round or cordate above glabrous with reticulations and nerves sunk, beneath thin tomentose, reticulations and 14 to 18 pairs of nerves elevate; 3 to 4 in. long, 1 to 2 in. wide. Cymes



widely dichotomous, hairy, 1 to 2 in. long and broad. Calyx turbinate. Corolla rotate, lobes ovate acute, 3 in. across. Corona-scales filiform. Follicles 3 to 4 in. long, pubescent. Seeds oblong truncate at both ends 3 in. long; plume 1 in. long. *Hab.* Johor, Batu Pahat (Ridley). Rare. *Distrib.* Burma, Siam, Cambodia.

### 9. SECAMONE, Br.

Scrambling or twining shrubs. Flowers minute in lax axillary cymes. Calyx 5-lobed; no scales. Corolla small, rotate. Corona-processes 5, adnate to stamen-column. Stamens from corolla base; anthers with a small inflexed appendage connivent to stigma. Pollen-masses minute, waxy globose or oblong in pairs in each cell, attached in fours to pollen-carriers, no caudicles. Carpels 2; style columnar, ending in a flat ring and beaked above, apex round. Follicles terete or angular acuminate. Seed flat oblong, plumed. Species 30, mostly African.

(1) *S. micrantha* Dcne. DC. *Prodr.* viii. 501; *King l.c.* 519.

Wiry-branched climber. Leaves membranous, lanceolate acuminate; base narrowed; nerves 8 to 10 pairs obscure; 1.5 to 3 in. long, .35 to 1 in. wide; petioles .1 to .25 in. long. Cymes dichotomous, spreading, .5 to 2 in. across and long; branches zig-zag. Flowers pale yellow. Calyx-lobes ovate, black gland-dotted. Corolla .13 in. across. Follicles 3 in. long, .3 in. wide, glabrous. Seed ovate-spathulate; plume .5 in. long. *Hab.* Open places or rocks by the sea, Johor, Minyak Buku, Batu Pahat. Penang, Batu Feringhi; Pulau Jerajah; Tanjong Bunga (Curtis). Terutau (Curtis); Perlis, Bukit Lagi (Ridley). *Distrib.* South Siam, Java, Timor.

### 10. TOXOCARPUS, Wight and Arn.

Twining, generally hairy plants. Flowers usually small in axillary dichotomous racemose paniced cymes. Calyx very small. Corolla campanulate or sub-rotate, lobes linear-oblong. Coronal-processes attached to staminal tube, dorsally flattened with a tooth curving upwards. Stamens from base of corolla; filaments connate; anthers connivent round style top. Pollen-masses very minute, pendulous attached to carriers. No caudicles. Carpels 2; style slender, apex columnar produced beyond stamens. Follicles cylindrical acute. Seed oblong, plumed. Species 20, Africa, Indo-Malaya.

Corolla-tube much shorter than lobes.

Lobes linear; flowers small.

Leaves elliptic; follicles 12 in. long . . . . . (1) *T. Griffithii*

Leaves obovate; follicles 4 in. long . . . . . (2) *T. Curtisii*

Lobes oblong; flowers large, 1 in. across or nearly . (3) *T. Scortechinii*

Corolla campanulate; tube longer than lobes.

Cymes 2 in. long; leaves lanceolate . . . . . (4) *T. penangianus*

Cymes under 1 in. long; leaves elliptic . . . . . (5) *T. lankawiensis*

(1) **T. Griffithii** *Dcne. DC. Prodr.* viii. 505; *King, l.c.* 520.

Slender climber, hispid. Leaves chartaceous, elliptic-oblong or lanceolate cuspidate, base cuneate or round, shining; nerves 6 to 7 pairs slender elevate beneath, midrib prominent; 2 to 4 in. long, 1 to 2 in. wide; petioles .3 to .5 in. long. Cymes of few lax, often flexuous dark red hairy branches up to 2 in. long. Flowers in small clusters, creamy white. Calyx pubescent, lobes ovate-oblong. Corolla-lobes linear-oblong, twisted, .075 in. long. Corona-processes adherent to staminal tube. Style-apex ovate-clavate, acuminate, bifid. Follicles 12 in. long, .15 in. thick, flexuous, slightly torulose puberulous. Seed 1 in. long, linear; plume 1 to 1.25 in. long. *Hab.* Dense low-lying forest. Not common. Johor, Batu Pahat. Malacca (Maingay). Selangor, Batu Caves. Perak, Sungei Larut (Wray). *Distrib.* Mergui.

(2) **T. Curtisii** *King and Gamble, l.c.* 521.

Slender climber; branchlets pubescent. Leaves broad elliptic or elliptic-obovate, short blunt acuminate, base narrowed glabrous or rusty-pubescent along elevated midrib beneath; nerves fine 4 to 8 pairs; 2 to 3.5 in. long, 1.25 to 2 in. wide; petioles .2 to .5 in. long. Cymes axillary, rusty-pubescent, sessile or very short-peduncled; branches 2 or 3. Flowers clustered. Calyx pubescent; lobes ovate acuminate. Corolla-lobes linear-ligulate twisted, .2 in. long. Corona-processes acute, longer than stamen-column. Follicles linear-acuminate, curved, 4 in. long, .3 in. wide. Seed oblong, .5 to .6 in. long, .15 in. wide; plume 1.5 in. long. *Hab.* Not common. Mountains and dry spots. Perak, Gunung Batu Putih (Kunstler) at 2000 to 3000 ft. altitude. Lankawi (Curtis).

(3) **T. Scortechinii** *King and Gamble, l.c.* 521.

A climber purplish brown hairy. Leaves thinly coriaceous ovate-oblong to ovate-acuminate, base round or shortly acute, glabrous except midrib beneath; nerves 7 to 8 pairs; 3 to 4 in. long, 1 to 1.75 in. wide; petioles .3 to .5 in. long. Cymes sessile densely red-hairy 1 in. long of large flowers. Calyx-lobes ovate-oblong. Corolla-lobes ovate-oblong, .35 to .5 in. long. Corona-processes flat, truncate. Follicles .3 in. long, .4 to .5 in. wide, cylindrical, acute. Seed ovate, .6 in. long, .25 in. wide. *Hab.* Perak, Thaiping Hills at 3000 ft. altitude (Derry, Curtis); Gunung Haram Parah (Scortechini).

(4) **T. penangianus** *King and Gamble, l.c.* 522.

Slender twiner hispid with red hairs. Leaves chartaceous, lanceolate acuminate, base narrowed acute; nerves 6 to 8 pairs not elevate, reticulations visible beneath; 3.5 to 4.5 in. long, 1 to 1.25 in. wide. Cymes rusty-puberulous, 2 in. long, 4 in. wide; branches dichotomous with distant clusters. Flowers small, reddish brown. Calyx hispid; lobes ovate. Corolla campanulate; lobes ovate, .1 in. long, villous inside. Corona-processes bifid at tip. *Hab.* Penang, Moniot's Road (Curtis). Rare.

(5) **T. lankawiensis** King and Gamble, *l.c.* 523.

Slender twiner. Leaves chartaceous elliptic short, cuspidate-acuminate, base glabrous except midrib beneath; nerves 5 to 6 pairs; 3 to 3.5 in. long, 1.75 to 2 in. wide; petioles hairy, .25 to .3 in. long. Cymes sessile pubescent, .5 to 1 in. long, corymbose; flowers racemose, yellow, dotted with purple at the base. Calyx-lobes ovate-oblong acute, .1 in. long. Corolla campanulate, .1 to .15 in. long, lobes ovate-oblong, .1 in. long, pubescent inside. Corona-processes longer than anthers and adherent to them incurved over style-top. *Hab.* Lankawi (Curtis). Rare.

**11. GONIOSTEMMA**, Wight.

Slender climber. Flowers medium in lax terminal and interpetiolar panicles of cymes. Calyx-lobes round with glandular scales within. Calyx campanulate-rotate, tube lined with a toothed membrane, lobes linear-oblong, acute. Corona short, thick, 5 lobes forming a 5-lobed tube adherent to column base. Stamen-column attached to base of tube; appendages erect. Pollen-masses attached to minute carriers without caudicles. Carpels 2. Style longer than stamens tip fusiform. Follicles 2, thick, lanceolate. Seed ovate, winged broad beaked, plumed. Species 1.

(1) **G. acuminatum** Wight, *Contrib.* 62; King, *l.c.* 524. *Toxocarpus acuminatus* Hook. *fil.* *F.B.I.* iv. 15.

Slender climber, 15 to 20 ft. long. Leaves fleshy, ovate-oblong acuminate, base cuneate; nerves 10 to 14 pairs, obscure; 3 to 5 in. long, 1 to 1.75 in. wide; petioles .75 to 1.75 in. long. Panicles 6 to 7 in. long, 5 to 6 in. wide. Seeds .75 in. long, .25 in. wide, plume 2 in. long. *Hab.* Dense lowland forest. Perak, Thaiping Hills and Sungei Larut; Kal (Wray and Kunstler). Penang Hill (Curtis). *Distrib.* Sylhet.

**12. GENIANTHUS**, Hook. fil.

Climbers usually brown velvety, sometimes very large. Flowers small, white, in distant sessile clusters on paniced or simple branches axillary red-tomentose. Calyx with 5 scales between the lobes. Corolla-tube short, lobes narrow, valvate, villous above. Corona of 5 processes adnate to back of staminal column; appendages of stamen-column shorter than style-apex. Pollen-masses 2 in each cell, granular, no caudicles. Carpels 2. Style thick. Follicles thick blunt, often woolly. Seed flat winged and plumed. Species 6 or more, Indo-Malayan.

Slender climbers; leaves lanceolate nearly glabrous.

Leaves narrowed at base, spikes 3 in. long . . . (1) **G. Maingayi**

Leaves round at base, spikes slender, 6 in. long . . . (2) **G. Ridleyi**

Stout woody climbers; leaves coriaceous ovate, very woolly.

Follicles densely woolly . . . . . (3) **G. rufo-velutinus**

Follicles glabrous . . . . . (4) **G. Blumei**

(1) **G. Maingayi** *Hook. fil. F.B.I.* iv. 16; *King, l.c.* 525.

Slender climber, purple pubescent above. Leaves coriaceous, obovate to oblanceolate shortly acuminate, base cuneate blunt; nerves 6 to 7 pairs sunk above, elevate beneath; 2.5 to 3.5 in. long, 1.25 to 1.5 in. wide; petioles .25 to .5 in. long. Spikes 3 to 4 in. long with distant, sessile flowers solitary or in pairs; rachis and calyx purple-pubescent. Calyx-lobes oblong, blunt. Corolla reddish white, .12 in. long, lobes linear recurved, villous inside. *Hab.* Singapore, Bukit Timah (Murton, Maingay). Perak, Larut (Kunstler). Local and scarce.

(2) **G. Ridleyi** *King and Gamble, l.c.* 526.

Long hairy twiner. Leaves fleshy, oblong-lanceolate acuminate, base round; nerves 6 to 8 pairs slightly elevate below; 3 to 5 in. long, 1 to 2 in. wide; petioles hairy-pubescent, .75 in. long. Panicles of 3 or 4 long, slender branches 6 in. long or more, axillary and terminal red-hairy. Flowers small, white in distant clusters .25 in. apart. Calyx-lobes ovate-oblong, red-villous. Corolla-lobes free nearly to base, oblong, recurved, .15 in. long, villous above. Corona-processes acuminate. *Hab.* In mountain forest, local. Perak, Thaping Hills 3000 to 3500 ft. altitude (Kunstler, etc.).

(3) **G. rufo-velutinus** *King and Gamble, l.c.* 526.

A stout climber 100 to 150 ft. long; stem 3 to 4 in. through, upper branches .15 in. through, densely brown tomentose. Leaves coriaceous, elliptic-ovate to obovate acuminate, base cuneate, above glabrous shining dark green, beneath brown-velvety; midrib and nerves 7 to 9 pairs, sunk above, elevate (midrib thick) beneath; 4 to 6 in. long, 2 to 3 in. wide; petioles thick, 1 in. long. Spikes 4 to 5 in axillary panicles on short peduncles, densely brown woolly, 3 in. long. Flowers 4 or 5 together in distant clusters, cream-colour. Calyx campanulate, brown-woolly, lobes ovate. Corolla-lobes linear-oblong, .1 in. long, acute, white-villous. Follicles oblong hardly narrowed to the blunt tip densely brown-velvety, 4 in. long, .75 in. through. Seed oblong, .75 in. long; beak broad; plume 2 in. long. *Hab.* Local in dense jungle, on trees. Perak, Larut (Kunstler).

(4) **G. Blumei** *King and Gamble, l.c.* 527.

Stout climber; branches red-tomentose. Leaves elliptic-ovate or obovate short-acuminate, base attenuate or round, glabrous above, densely red-tomentose at first beneath; nerves 7 to 10 pairs sunk above, elevate beneath; 3 to 6 in. long, 2 to 4 in. wide; petioles .5 in. long, tomentose. Panicle of spikes lateral, 3 in. long. Flowers in sessile clusters small, tomentose. Calyx-lobes ovate, red-pubescent. Corolla-lobes very short, white, villous inside. Corona-processes ending in a linear ligule. Follicles cylindrical blunt, 3 to 4 in. long, .75 in. through. Seeds ovate, .6 in. long, .3 in. wide; plume brown, 2 in. long. *Hab.* Perak, Sungei Larut (Wray). Rare. *Distrib.* Java.

## 13. CALOTROPIS, Br.

Erect branched shrubs. Leaves broad, sub-sessile. Flowers in umbelled cymes from the stem between the petioles. Calyx 5-lobed. Corolla campanulate or sub-rotate, lobes 5, broad, valvate as long as tube. Corona of 5 fleshy processes adnate to column with an upcurved spur and auricles at base. Stamens, anthers short, horny; appendage inflexed over style-apex. Pollen-masses solitary spathulate, caudicles slender. Ovary-cells 2; style slender, apex pentagonal. Follicles large, inflated, fleshy. Seed ovate plano-convex, plumed. Species 4, tropical Asia.

(1) *C. gigantea* Br. *Ait. Hort. Kew* (ed. 2), ii. 78.

Shrub about 5 or 6 ft. tall; branchlets woolly. Leaves leathery, elliptic-oblong cordate, woolly when young but becoming more or less glabrous, 4 to 8 in. long, 2 to 4 in. wide; petioles none or very short. Cymes erect, many-flowered, woolly, on peduncles 1 to 4 in. long; cymes 2 to 3 in. long and wide. Flowers large, white and lilac about 1 in. across. Follicles 3.5 in. long or more, 2 in. wide. Seeds .25 in. long; plume 1.25 in. long. *Hab.* In villages by the sea or in dry spots, cultivated. A native of India.

## 14. ASCLEPIAS, Linn.

Herbs or shrublets. Leaves membranous. Flowers in peduncled umbels red or yellow, terminal. Calyx deeply 5-lobed, with 5 or 10 scales between. Corolla rotate, deeply lobed, lobes valvate, reflexed. Corona of 5 processes adnate to staminal column; lobes concave with a horn from within. Filaments connate in a tube. Pollen-masses pendulous, solitary in anther-cell with caudicles. Follicles lanceolate. Species numerous in Africa and America, one naturalised in our region.

(1) *A. curassavica* Linn. *Sp. Pl.* 215; *King, l.c.* 530; *Bot. Reg. I. t.* 81.

Herb about 2 ft. tall with narrow lanceolate leaves acuminate, long-narrowed to base, thin, 2.5 to 5.5 in. long, .5 to 1 in. wide. Umbels axillary and terminal; peduncles 2 in. long; pedicels .5 in. long; flowers about 12. Corolla-lobes reflexed, scarlet, .25 in. long. Staminal-column orange. Follicles 3 to 3.5 in. long. *Hab.* An alien from America in village ground and roadsides. All over the peninsula here and there.

## 15. RAPHISTEMMA, Wall.

Glabrous, slender bushy climbers. Leaves membranous, ovate cordate. Flowers in peduncled umbels, white and pink, large. Calyx 5-lobed glandular within. Corolla campanulate, lobes spreading. Coronal processes membranous subulate acuminate, twice as long as staminal-column. Stamens filaments connate in a tube. Pollen-masses 1 in a cell, waxy with short clavate caudicles.

Follicle 1, fleshy ventricose. Seed margined, plumed. Species 2, 1 Indo-Burmese, 1 Javanese.

(1) **R. pulchellum** *Wall. Pl. As. Rar.* ii. 50, *t.* 163; *King, l.c.* 531.

Stem rather herbaceous. Leaves 3 in. long, 2·5 in. wide; petioles 1·5 in. long; peduncle 2 in. long; pedicels ·4 to ·5 in. long, about 6 together. Flowers ·5 to 1 in. across. Corolla-lobes white, with a pink stripe. Follicle thinly fleshy, 4 to 6 in. long, 2·5 in. through. *Hab.* Formerly cultivated in gardens about Singapore and probably wild in Perak, mixed bamboo jungle, Ulu Bubong (Kunstler) and Lankawi, Kwah (Curtis), also Negri Sembilan, Bukit Kayu Arang, Tampin (Burkill). Native of Burma, Yunnan and Assam.

### 16. ISCHNOSTEMMA, King and Gamble.

Twining, slender, shrubby. Flowers small in peduncled umbels; pedicels filiform. Calyx-lobes acuminate. Corolla rotate, lobes long, slender. Corona of 5 membranous lanceolate processes attached to base of column. Anthers slender; appendages membranous. Pollen-masses 1 in a cell, ellipsoid; caudicles slender clavate. Follicles slender, long-acuminate. Seed orbicular, winged plumed. Species 1, Selangor and Philippines.

(1) **I. selangorica** *King and Gamble, l.c.* 532. *Cynanchum carnosum* *Schlechter Fragm. Phil.* 120.

Slender twiner. Leaves membranous, ovate-lanceolate to oblanceolate, tip mucronate, base narrow, 1 to 1·75 in. long, ·5 to ·75 in. wide. Umbels 3- to 5-flowered; peduncle ·75 in. long; pedicels filiform, ·5 in. long. Flower ·4 in. across, yellow. Follicle lanceolate, 2·5 in. long, ·25 in. wide. Seed 1·75 in. long. *Hab.* Very rare in open country. Selangor, Kwala Selangor (Ridley). *Distrib.* Philippines.

### 17. CYNANCHUM, Linn.

Twining (or erect) herbs (or shrubs). Flowers small in sessile or peduncled cymes or racemes from between the petioles. Corolla rotate or campanulate; lobes deep, overlapping to right, twisted in bud. Corona from the mouth of the corolla-tube, membranous tubular with 5 points or cut down almost to base in 5 lobes, as long as stamens. Stamens quadrate with a round often toothed appendages. Pollinia 1 in a cell, with a short caudicle and ellipsoid carrier. Style stout; stigma large discoid. Follicle broad, thick, ovoid lanceolate. Seed flat plumed. Species 100, whole world.

Leaves not cordate; peduncles short; follicle smooth (1) **C. ovalifolium**

Leaves cordate; peduncles long.

Leaves glaucous beneath; corona as long as corolla;

follicle with soft spines . . . . .

Leaves not glaucous beneath; corona much shorter

than column . . . . .

(2) **C. corymbosum**

(3) **C. Seimundii**

(1) **C. ovalifolium** Wight, *Contrib.* 57; *King, l.c.* 533.

A slender herbaceous climber. Leaves membranous or slightly fleshy ovate to oblong-lanceolate, shortly acuminate, base round or narrowed; nerves 7 to 8 pairs; 3 to 4.5 in. long, 1.25 to 2 in. wide; petioles .5 to .75 in. long. Cymes racemose, 4- to 15 flowered, .5 in. long; peduncles .5 to 1 in. long, from between the petioles and subtended by little round leaves .25 in. wide. Calyx-lobes ovate blunt, much shorter than the corolla. Corolla .25 in. wide, yellowish green, tube very short; lobes oblong-blunt, fleshy. Corona tubular, 5-lobed or cut down nearly to base. Stamens sub-coriaceous. Follicles smooth, green, ovoid-lanceolate, 4 in. long, 1.25 in. wide when dehisced. Seed orbicular, .3 in. long, .25 in. wide, plume 1.25 in. long. *Hab.* In hedges and woods. Not rare. Singapore, Cluny road, bamboo hedges; Bukit Timah, Johor, Gunong Pulai. Malacca, Bukit Bruang (Cantley). Negri Sembilan Tampin. Perak, Thaiping (Kunstler); Haram Parah (Scortechini). Province Wellesley, Ara Kudah. Penang, Telok Bahang (Curtis); Rifle Range. Penara Bukit 1000 ft. altitude. Lankawi (Curtis); Terutau, Telok Wan (Robinson). Setul. Tringganu, Bundi (Rostados). *Distrib.* Java. *Native name:* Akar Bano.

This varies much in the form of the leaf as well as the depth to which the corona is cut down. A form with oblong-lanceolate leaves almost acute at base may be called var. *angustifolia*. It occurs in Penang and Terutau.

(2) **C. corymbosum** Wight, *Contrib.* 56; *King, l.c.* 534.

Slender twiner. Leaves thinly membranous, glaucous beneath, ovate cordate cuspidate, with a tuft of glands in the sinus; nerves 6, radiating from the sinus; 2 to 6 in. long, 1 to 3 in. wide; petioles 1.5 to 3 in. long. Cymes corymbose, 2 or 3 in an axil, branched or simple. Flowers distant, not distinctly umbellate; pedicels .12 in. long; peduncles 1.5 in. long. Calyx-lobes ovate acute. Corolla campanulate, .3 in. wide, lobes oblong, rather long blunt. Buds conic, blunt. Corona as long as the corolla, irregularly crenately 10-lobed. Pollinia ellipsoid with short clavate caudicles. Follicles 1 or 2, reddish, lanceolate long-acuminate, thickly covered with soft hooked spines, 3 to 5 in. long, 1 to 1.5 in. wide. Seeds orbicular-ovoid .5 in. long and nearly as broad; plume 1.5 in. long. *Hab.* Rare in forests. Perak, Larut; open jungle 300 to 500 ft. altitude (Kunstler). Penang (Wallich). *Distrib.* India.

(3) **C. Seimundii** Ridl. *Journ. R. As. Soc. S. Br.* 86, p. 300.

Herbaceous climber, glabrous except the inflorescence. Leaves thinly membranous, not glaucous beneath ovate acute, base cordate, upper leaves round, entire; nerves 6 pairs; 6 in. long, 5 in. wide; petioles 3 in. long; upper leaves smaller. Corymbs solitary axillary umbelliform; peduncles 1.5 in. long. Flowers about 20; pedicels .5 in. long, puberulous. Buds sub-globose. Calyx-lobes very short, rounded ovate. Corolla .25 in. across; tube very

short, lobes sub-acute lanceolate valvate, spotted at the tips. Corona much shorter than corolla-lobes with lanceolate retuse lobes. Anthers oblong truncate with 3 inflexed points. Pollinia pendulous oblong with long, slender caudicles. *Hab.* Pahang, Kwala Tahan (Seimund).

Allied to *C. corymbosum*, but with plain green leaves, smaller and very much shorter staminal column.



FIG. 107.—*Sarcolobus globosus*.

### 18. SARCOLOBUS, Br.

Herbs, climbing and trailing. Leaves fleshy. Flowers small in umbellate peduncles; cymes axillary. Calyx with 5 minute scales at base. Corolla rotate or campanulate. Corona o. Filaments connate in a short tube; anthers broad with a spatulate appendage. Pollinia solitary obovate with long filiform twisted caudicles. Carpels distinct; style ending in a 5-angled tip. Follicle 1, thick, globose, fleshy ovate. Seeds large obovate flat, margined with no plume. Species 3, Indo-Malayan.

(1) *S. globosus* Wall. *Asiat. Res.* xii. 577, t. 4; *King, l.c.* 36. Gimlette, "Malay Poisons," p. 58.

Twiner. Leaves fleshy coriaceous, ovate or ovate-oblong



acuminate, base round; nerves 5 to 7 pairs meeting in arches far from edge; 3 to 4.5 in. long, 1 to 1.75 in. wide; petioles .5 in. long. Peduncles thick, .25 to .5 in. long; pedicels .25 in. long. Flowers numerous, .4 in. across, light purple. Corolla-lobes orbicular, pubescent inside. Follicle brown and rough, 4 in. long and nearly as much through; pericarp .5 in. thick, pithy. *Hab.* Tidal mud; common but not often flowering. Singapore, Chan Chu Kang; Changi; Serangoon. Johor, Tebrau river. Pahang river, Kwala Bruas. Malacca (Griffith). Perak River (Kunstler). Penang (Foxworthy). Kelantan (Gimlette). *Distrib.* Calcutta, Burma, Borneo. *Native name:* Akar batu pelir Kambing (Gimlette). *Use:* Seeds (pitis buah) used to poison dogs. The pericarp eaten as a vegetable cooked and washed in salt and water, or, after soaking in brine for three days, put into boiling syrup for a sweetmeat.

### 19. PENTASACME, Wall.

Slender, erect herbs; stems simple. Leaves narrow-lanceolate acuminate, membranous. Flowers small, white, in short axillary umbellate or racemose cymes. Calyx with 5 glandular scales inside. Corolla-tube short, campanulate, lobes narrow caudate, twisted. Corona processes on corolla-tube. Stamen column very short; anther-appendages membranous. Pollen-masses 1 in a cell, caudicles slender. Style short. Follicle 1, slender terete. Seed oblong spatulate convex on both sides. Species 3 or 4, Indo-Malaya, China.

(1) *P. caudatum* Wall. *Cat.* 8234; *King, l.c.* 537. *Spiladocorys angustifolia* Ridl. *Trans. Linn. Soc. ser. 2, iii.* 322, t. 63.

Stems several, wiry, up to 12 in. tall. Leaves linear-lanceolate, long caudate, 2 to 4 in. long, .2 to .4 in. wide, sessile. Cymes 1- to 6-flowered, .25 in. long. Corolla-lobes .25 in. long. Follicle 1.75 to 3 in. long, very slender. Seed .15 in. long, plume .75 in. long. *Hab.* In rocks in forest streams, common. Pahang, Tahan River up to 1000 ft. altitude. Selangor, Semangkok Pass; Ulu Gombak. Perak, Sira Rimau (Yapp); Gunong Kerbau 3500 ft. altitude (Robinson); Thaiping Waterfall; Ulu Slim (Kunstler); Temengoh. *Distrib.* India, Burma.

### 20. GYMNEMA, Br.

Twining. Flowers small yellow, in axillary cymes. Calyx with 5 to 10 or no glandular scales. Corolla sub-rotate or campanulate or urceolate. Corona-processes adnate to tube of 5 fleshy lobes more or less free at the tips or 5 fleshy ridges on the tube, alternating with the lobes. Staminal column from base of the tube; anthers short, erect with short appendages. Pollinia erect with short caudicles. Carpels free; styles free near the top; style-top large conic or clubbed, longer than the anthers. Follicles

2 (or 1). Seed plumed. Species about 20, Asiatic, 2 African, others Australian.

Corona of round processes.

Leaves 3 to 6 in. long, coriaceous, pubescent beneath	(1) <i>G. acuminatum</i>
Leaves 2 in. long, membranous; midrib hairy only	(2) <i>G. dissitiflorum</i>
Corona of fleshy scales with a hairy ridge below.	
Leaves thin, pubescent all over	(3) <i>G. Maingayi</i>
Corona of linear hairy processes; leaves hairy.	(4) <i>G. hirtum</i>
Corona of bearded ridges.	
Corolla-tube short	(5) <i>G. lactiferum</i>
Corolla-tube elongate	(6) <i>G. tingens</i>
Corona none visible	(7) <i>G. flavum</i>

(1) *G. acuminatum* Wall. *Tent. Fl. Nap.* 50; *King, l.c.* 539.

A large twining shrub; bark corky; branches pubescent. Leaves coriaceous ovate to elliptic pubescent beneath, 3 to 6 in. long, 1·75 to 2·25 in. wide; nerves 4 to 6 pairs, elevate beneath inarching; reticulations conspicuous; midrib prominent; petioles ·5 in. long. Cymes in axillary pairs; peduncle ·5 in. long. Flowers numerous, densely crowded in a head ·5 in. across, all hairy-pubescent; pedicels very short. Calyx-lobes ovate acute, pubescent. Corolla ·1 to ·2 in. across, glabrous. Corona of round curved processes alternating with lobes, with bearded ridges below; anthers short, appendages round. Pollinia oblong. Follicles ovoid, ·3 in. long, turgid, base cordate. Seeds ·7 in. long, winged. *Hab.* Not common, in open country. Malacca, Chenana putih (Cantley, Griffith, and Maingay). Lankawi, Kwah (Curtis). *Distrib.* India, Burma, Java. *Native names:* Akar Sibueh Api; Serapat Kuning.

Cantley says the latex is yellowish.

(2) *G. dissitiflorum* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 30.

Long slender pubescent twiner. Leaves membranous, ovate or elliptic-ovate cuspidate acuminate, base cuneate, glabrous except the midrib beneath, hairy, 2 in. long, ·75 in. wide; petioles hairy, ·12 to ·25 in. long. Cymes distant, many-flowered on a hairy axillary rachis, 3 to 4 in. long. Pedicels ·12 in. long, hairy. Calyx-lobes ovate hairy. Corolla-lobes ovate blunt, broad. Corona scales small, semi-ovate. *Hab.* Perak, Tapah (Ridley) in woods, rare.

(3) *G. Maingayi* Hook. *fl. F.B.I.* iv. 31; *King, l.c.* 540.

Slender twiner finely pubescent. Leaves thinly membranous ovate acuminate cordate pubescent all over; nerves 4 to 5 pairs inarching; 1 to 2 in. long, ·75 to 1 in. wide; petioles ·12 to ·25 in. long. Cymes sub-sessile; pedicels ·1 to 2 in. long. Calyx pubescent; lobes oblong blunt. Corolla campanulate, lobes ovate, ·05 in. across. Corona of fleshy scales between the lobes and hairy ridge below. *Hab.* Malacca (Maingay). Very rare. *Distrib.* Burma.

(4) *G. hirtum* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 29.

Rather slender; stem, leaves, and petioles, especially nerves, dense reddish yellow hairy. Leaves elliptic or ovate, abruptly acuminate, thick membranous; nerves 5 pairs with reticulations prominent beneath; 3 to 4 in. long, 1.5 to 2.25 in. wide; petioles 1 in. long. Flowers small, about 6 fasciated on a short axillary tubercle, yellow; pedicels .15 in. long, slender, hairy. Calyx-lobes oblong-ovate, small, hairy. Corolla tubular, .1 in. long, glabrous with short linear-oblong lobes. Coronal processes linear hairy with a black mass of hairs at base. *Hab.* Mountain forest, 3000 ft. altitude. Selangor, Semangkok Pass (Ridley).

(5) *G. lactiferum* Br. *Mem. Vern. Soc. Edinb.* i. 33. var. *nitens* Hook. *fil. F.B.I.* iv. 30; *King, l.c.* 539. *G. malayanum* Griff. *Notulæ* iv. 56; *l.c. Pl. As.* 394.

Slender nearly glabrous twiner with membranous ovate-lanceolate acuminate leaves, base acute; nerves 6 pairs inarching; 2 to 4 in. long, .75 to 1.5 in. wide; petioles .3 in. long. Cymes in pairs; pedicel .25 to .5 in. long, slender. Flowers about 10; pedicels slender, .1 in. long. Calyx-lobes ovate. Corolla nearly .1 in. across. Corona of 5 pairs of bearded ridges. Pollinia spathulate. *Hab.* Malacca (Griffith, Maingay). Perak (Scortechini). Penang, Penara Bukit (Curtis). *Distrib.* Sumatra and Borneo.

(6) *G. tingens* Wight. *Contrib.* 45; *King, l.c.* 540.

Slender climbing shrub, glabrous, 60 to 80 ft. long. Leaves membranous ovate acuminate, base narrowed when young, rounded cordate when adult; nerves 5 to 8 pairs; 2.5 to 6 in. long, 1 to 3 in. wide; petioles 1.5 in. long or less. Cymes axillary between leaves, many-flowered, over 1 in. across; peduncles .5 in. long; pedicels slender, as long. Calyx-lobes oblong, .15 in. long, ciliate. Corolla light yellow, .4 in. across; lobes narrow oblong blunt. Corona of thick bearded ridges. Follicles 6 to 8 in. long, .75 in. through narrowed to the tip. Seeds elliptic, .5 in. long, .3 in. wide, broad winged. *Hab.* Perak, Ulu Bubong (Kunstler); Chanderiang (Wray). *Distrib.* India, Burma.

(7) *G. flavum* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 68.

Slender hairy twiner. Leaves membranous, ovate acuminate, base round; nerves 3 pairs; 1 to 2.5 in. long, 1 in. wide; petioles .5 in. long. Peduncles slender, .5 to 1 in. long, pubescent with 1 or 2 branches; pedicels slender pubescent, .12 in. long. Flowers about 5, umbelled, yellow. Sepals nearly free to base, ovate round pubescent. Corolla-tube very short, lobes narrow linear twisted pubescent, .25 in. long. Corona none visible. *Hab.* River banks in forest; local. Perak, Temengoh, river bank (Ridley).

## 21. GONGRONEMA, Decne.

Twining shrubs. Flowers small, in sessile or peduncled or branched cymes, or racemose with thickened rachis. Corolla

urceolate rotate or campanulate; lobes overlapping to right, valvate in *G. Wrayi*. Corona processes adnate to stamen-column near base, small rounded or large erect. Stamens from base of corolla; anther appendages inflexed over style. Pollinia solitary ovoid with short caudicles and large carriers. Carpels distinct; style short, tip conic or convex. Follicles 1 or 2, acuminate. Seeds plumed. Species 10, Africa, Asia, Australia.

Corolla urceolate; flowers racemose.

- |                                |     |                     |
|--------------------------------|-----|---------------------|
| Leaves round at base . . . . . | (1) | <b>G. Wallichii</b> |
| Leaves cordate . . . . .       | (2) | <b>G. Curtisii</b>  |

Corolla campanulate.

- |   |     |                        |
|---|-----|------------------------|
| Flowers racemose, raceme and peduncle 1 in. long<br>or more . . . . . | (3) | <b>G. bracteolatum</b> |
| Cymes umbellate, few-flowered, short . . . . .                        | (4) | <b>G. Wrayi</b>        |

(1) **G. Wallichii** *Dcne. DC. Prodr.* viii. 624; *King, l.c.* 542.

Shrubby glabrous climber. Leaves membranous, elliptic-lanceolate acuminate, base round; nerves 5 to 6 pairs elevate beneath, conspicuously inarching; 3 to 6 in. long, 1 to 2 in. wide; petioles .5 in. long. Flowers about 12 or fewer; pedicels slender .1 in. long on a very short rachis covered with bracts. Calyx-lobes ovate acute with 5 scales. Corolla urceolate, tube sub-globose hairy inside, .1 in. long, teeth very short. Corona processes broad incurved. Staminal processes acuminate. Pollinia oblong-ovoid, caudicles slender, curved. Follicles linear-lanceolate acuminate, 6 in. long, .3 to .4 in. through. Seed ovate-spathulate, .3 in. long, winged. *Hab.* Malacca (Griffith). Negri Sembilan, Tampin (Burkill). Province Wellesley (Ridley). *Distrib.* Borneo.

(2) **G. Curtisii** *King and Gamble, l.c.* 542.

A slender twiner, pubescent. Leaves thickly membranous, elliptic-lanceolate to obovate, base cordate pubescent below, scabrid or pubescent above; nerves very obscure, midrib prominent; 2.5 to 3 in. long, .75 to 1.5 in. wide; petioles .5 in. long or less. Flowers green, shortly pedicelled in a sessile or short peduncled cyme. Calyx-lobes ovate pubescent. Corolla-tube .15 in. long, lobes oblong-acute, .1 in. long. Corona curved downwards. Pollinia oblong, caudicles short clubbed. *Hab.* Mountain forests. Perak, Gunong Batu Putih, 3400 ft. altitude (Wray). Penang, West hill, 2000 ft. altitude (Curtis).

Curtis' plant, the type, has very narrow leaves and a sessile cyme, and is more hairy than the Perak plant.

(3) **G. bracteolatum** *King and Gamble, l.c.* 543.

A stout woody climber, sub-glabrous. Leaves coriaceous, oblong-lanceolate acuminate, base cordate; nerves conspicuous, 6 pairs; 3 to 6 in. long, 1.25 to 1.75 in. wide; petioles .75 to 1 in. long; peduncles thick bent, .5 in. long. Raceme thick, gradually lengthening, densely covered with bracts, .5 in. long. Flowers yellow. Calyx-lobes ovate acute, scales 10. Corolla campanulate

broad, tube .1 in. long, pubescent inside, lobes triangular, .25 in. across. *Hab.* Perak, Goping (Kunstler). Rare.

(4) **G. Wrayi** King and Gamble, *l.c.* 543.

Slender twiner, flexuous. Leaves coriaceous, bright green, ovate-acuminate, base minutely cordate round; nerves 5 to 7 pairs very faint; 2.5 to 4 in. long, 1 to 1.75 in. wide; petioles .5 in. long. Flowers 5 to 6, yellow, umbelled on a peduncle .1 in. long; pedicels as long, puberulous. Calyx cup-shaped pubescent, lobes orbicular. Corolla thick, campanulate, tube cylindrical, .15 to .2 in. long, glabrous, lobes valvate triangular. Pollinia caudicles slender, long. *Hab.* Perak, Relau Tujur (Wray). Rare.

## 22. DREGEA, E. Meyer.

Twining. Flowers moderately large, few. Calyx-lobes ovate glandular or not. Corolla rotate, deeply lobed. Coronal scales thick fleshy, adnate to the staminal column, spreading in a star, inner angle forming a short tooth lying on the anther; filaments connate in a tube, very short. Pollinia solitary, obovoid-oblong, erect. Stigma-top conic. Follicles thick, often with wings or ridges. Species 6 or 7, Africa, Indo-Malaya.

Corolla-lobes round; leaves glabrous . . . . . (1) **D. volubilis**  
 Corolla-lobes lanceolate acute; leaves pubescent . . . . . (2) **D. stellaris**

(1) **D. volubilis** Hook. *fl. F.B.I.* iv. 46. *Marsdenia volubilis* Cooke *Fl. Bomb.* ii. 166; King, *l.c.* 547.

Half-woody climber with pale brown bark. Leaves membranous, fleshy, ovate-acuminate truncate or cordate at base; nerves 2 to 3 pairs from base, 2 pairs from midrib; 2.5 to 6 in. long, 1.75 to 4.5 in. wide; petioles .5 to 1.5 in. long. Cymes many-flowered, umbellate on pedicels .25 to .5 in. long; peduncles 1 to 2 in. long. Flowers light green. Calyx-lobes ovate-oblong, .1 in. long, scales 5, minute. Corolla rotate, tube .1 to .15 in. long, lobes round, longer. Corona-lobes large, fleshy, round-beaked. Follicles 2 (or 1) lanceolate tapering to a blunt point, 3 to 4 in. long, 1 in. thick, yellow. Seed ovate, .5 in. long, broad-winged, tip truncate, plume 2 in. long. *Hab.* Adang group, Pulau Tengah. *Distrib.* Indo-Malaya.

(2) **D. stellaris** Ridl. *Marsdenia stellaris* Ridl. *Journ. F.M.S. Mus.* v. 40.

Pubescent climber. Leaves in distant pairs ovate-lanceolate acuminate acute, base sub-cordate round, pale beneath sprinkled with hairs all over midrib and petioles, red-hairy; nerves almost invisible, 5 pairs; 2 to 3.5 in. long, .75 to 1 in. wide; petioles .75 in. long. Peduncles axillary, 1 in. long, pubescent; pedicels nearly as long. Flowers 3, apparently violet. Calyx-lobes ovate pubescent. Corolla glabrous, lobes lanceolate acute, .75 in. across. Corona-lobes sub-coriaceous, yellow shining spreading, tips acute; anther appendages oblong. Pollinia sessile on carriers. *Hab.* Mountains; rare. Selangor, Gunong Mengkuang Lebah (Robinson).

## 23. MARSDENIA, Br.

Half shrubby climbers with large thin membranous leaves. Flowers small in clusters in a panicle raceme or corymb. Calyx with glandular scales. Corolla campanulate or urceolate, lobes narrow. Corona processes subulate, bilobed or o. Staminal column with appendages incumbent on style top. Pollinia solitary, erect; caudicles stout. Style apex large, 5-rayed or lobed. Follicles lanceolate. Seed plumed. Species about 70, all tropics.

- Flowers clustered on branches of a panicle . . . (1) *M. tinctoria*  
 Flowers clustered in a long raceme . . . . . (2) *M. thyrsiflora*  
 Flowers in corymbose cymes . . . . . (3) *M. Scortechinii*

(1) *M. tinctoria* Br. *Mem. Wern. Soc. Edinb.* i. 30; King, *l.c.* 545.

Half-herbaceous shrub, climbing, slightly pubescent at tips. Leaves membranous, ovate to oblong broad acuminate, base cordate, glabrous when adult, 4 to 5 in. long, .3 in. wide (leaves at ends of sprays much smaller); petioles 1.25 in. long. Panicle 5 in. long with distant sessile heads .3 in. through, of small, green, short-pedicelled flowers or a continuous raceme of flowers. Calyx-lobes ovate. Corolla cylindric-campanulate, about .1 in. long, including the rounded lobes, tufted with hair at mouth. Follicles linear-lanceolate, 3 in. long, .5 in. through, gibbous at base pubescent. Seed ovate, short beaked, .5 in. long. *Hab.* Open ground, among thickets. Selangor, Batu Caves. Perak, Temengoh; Kamuning; Ulu Selama (Scortechini). Kedah (Kunstler). *Distrib.* India, Malay Archipelago, and China. *Native name*: Tarum Akar.

In 1888 and onwards there were a number of plants in waste ground in Singapore said to have been introduced as an indigo plant, but, as no one knew how to extract the dye, it dropped out of cultivation and gradually disappeared. It is possible that all the above-quoted localities are remains of cultivation.

(2) *M. thyrsiflora* Hook. *fil. F.B.I.* iv. 37; King, *l.c.* 546.

Climber. Leaves membranous, ovate acuminate, deeply cordate; nerves 3 pairs from the sinus and 2 or 3 pairs from the broad midrib; 4 to 8 in. long, 2 to 6 in. wide; petioles 3.5 in. long. Racemes from between petioles 6 in. long. Flowers small in fascicles of 2 or 3, distant; pedicels slender 1 in. long on a tubercle. Calyx deep cleft, lobes ovate-lanceolate, scales subulate. Corolla urceolate, lobes lanceolate. Corona none. Follicles lanceolate, 2 in. long, .25 in. through, acuminate. Seed ovate, .2 in. long, winged, plume short. *Hab.* On river banks in lowland forest. Pahang, Tahan river banks. *Distrib.* India, Assam.

(3) *M. Scortechinii* King and Gamble, *l.c.* 546.

Twiner. Leaves membranous, ovate-cordate acuminate; nerves 5 to 7 pairs; 2 to 3 in. long, 1 to 1.5 in. wide; petioles .5 to 1 in. long. Cymes corymbose, 1 in. long. Flowers numerous; pedicels

·15 in. long. Calyx-lobes oblong acute, ·1 in. long; scales 5, minute. Corolla tubular, campanulate, tube ·1 in. long, lobes linear-oblong, ·15 in. long. Corona processes bifid. *Hab.* Perak, Tjuk (? Gunung Hijau) (Scortechini).

I have not seen this plant.

#### 24. PERGULARIA, Linn.

Twining shrubs. Flowers medium-sized in peduncled, umbellate cymes between the petioles. Corolla-tube inflated at base, lobes overlapping to right. Corona of 5 erect processes from base of column, free above with a narrow process on inner face. Anthers oblong with long appendages connivent over the style top. Pollinia solitary in the cells, caudicles very short. Follicles lanceolate, turgid. Seeds ovate, plumed. Species about 10, Indo-Malaya, Africa.

(1) *P. puberula* *Miq. Fl. Ind. Bat.* ii. 495; *King, l.c.* 549.

Leaves membranous ovate long acuminate, base round, 3 in. long, 1·5 in. wide; petioles ·5 in. long, slender. Peduncles ·5 in. long, puberulous. Umbel of 15 or more flowers in pedicels ·25 in. long. Calyx-lobes ovate. Corolla pubescent, tube broad inflated below, ·25 in. long, lobes linear-oblong, hispid. *Hab.* Penang (Phillips). Penara Bukit at 800 ft. altitude (Curtis).

*P. minor* *Andr. Bot. Rep. t.* 184, the "Bunga Tonkin," is often cultivated for its fragrant flowers.

#### 25. STEPHANOTIS, Thouars.

Twining shrubs. Leaves coriaceous. Flowers large, white or yellow, fragrant in axillary cymes. Calyx-lobes large, 5. Corolla-tube cylindric, inflated at base, fleshy, lobes twisted, overlapping to right. Corona processes adnate to back of stamens or 0. Staminal column from base of tube; anthers with erect or inflexed membranous appendages. Pollen masses solitary, erect, caudicles very short. Carpels 2. Style apex conic, hardly exsert. Follicles blunt or acuminate, thick. Species 16, Madagascar, Malaya, China.

Flowers over 2 in. across, pale yellow . . . . (1) *S. Maingayi*  
Flowers ·75 in. across, white . . . . . (2) *S. parviflora*

(1) *S. Maingayi* *Hook. fil. F.B.I.* iv. 39; *King, l.c.* 550.

An extensive climber, hairy. Leaves coriaceous ovate to oblong acuminate cordate; nerves 8 to 10 pairs; 4 to 6 in. long, 2 to 3 in. wide; petioles pubescent, ·5 to 1 in. long. Peduncles 1 to 3 in. long with 3 or 4 flowers umbelled; pedicels stout, 1 in. long. Calyx glabrous, lobes oblong-lanceolate acute free nearly to base, ·75 in. long. Corolla pale sulphur yellow, 1 in. long, bristly inside, lobes ovate-lanceolate acuminate, ·75 in. long. Corona none. *Hab.* Edges of forest, very rare, only twice seen. A splendid plant

with flowers as big as a wine-glass (Hullett). Singapore, Changi, covering trees on the wood edge (Hullett). Malacca (Maingay).

Not seen for many years, and perhaps extinct here.

(2) *S. parviflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 69.

Stems creeping and rooting at nodes; bark corky, pale-pubescent hairy. Leaves coriaceous, ovate acute, base round, glabrous above, hairy beneath; nerves 1 pair from base, 2 pairs from midrib; 2 to 3 in. long, 1.25 to 1 in. wide; petioles thick hairy, .5 in. long. Calyx-lobes lanceolate, glabrous, shorter than corolla-tube. Corolla waxy-white, tube .3 in. long, urceolate, limb .75 in. across, lobes lanceolate acute, hairy. Corona of five processes oblong, with a bifid, linear process on the inner face. *Hab.* On trees on the edges of woods. Perak, Temengoh and Tapah (Ridley).

## 26. TYLOPHORA, Br.

Twiners. Flowers small in single or branched cymes or racemes or sessile clusters, yellow or purple. Calyx 5-glandular within. Corolla rotate or campanulate, deeply lobed, lobes overlapping to right. Corona of small fleshy tubercles adnate to and radiating from stamen base. Staminal column from base of corolla; anthers erect, small. Pollinia minute attached by middle to slender caudicles. Carpels 2. Style top 5-lobed, flat or convexed, rarely longer than anthers. Follicles 2 or 1, acute, sometimes winged. About 40 species, tropics and sub-tropics of Old World.

Inflorescence corymbose; plant glabrous.

Leaves lanceolate, base round . . . . . (1) *T. longifolia*

Leaves elliptic-lanceolate small; panicles very lax . . . . . (2) *T. tenuis*

Inflorescence corymbose; plant hairy . . . . . (3) *T. hirsuta*

Inflorescence paniculate of lengthening racemes; follicles ventricose.

Leaves not cordate . . . . . (4) *T. Wallichii*

Leaves cordate . . . . . (5) *T. perakensis*

Inflorescence racemose with distant lengthening racemes, pubescent; bracts minute . . . . . (6) *T. exilis*

Racemes 1 to 2 elongating with persistent conspicuous bracts . . . . . (7) *T. squarrosa*

Inflorescence umbellate, cymose; flowers rather large.

Leaves ovate acuminate . . . . . (8) *T. globifera*

Leaves ovate blunt . . . . . (9) *T. asthmatica*

(1) *T. longifolia* Wight, *Contrib.* 50; *King, l.c.* 551.

A slender glabrous twiner. Leaves membranous, oblong-lanceolate acuminate, base broad, rounded; nerves 6 to 8 pairs, conspicuous beneath raised, first pair from base; 2.5 to 6 in. long, .75 to 1.75 in. wide; petioles .5 in. long or more. Panicles of distant cymes very slender, 3 to 4 in. long from between petioles. Flowers yellow, .4 in. across about 4 in umbels .5 to 1 in. apart. Calyx-lobes lanceolate. Corolla rotate, lobes oblong blunt. Follicles 2, dagger-shaped, long acuminate, 3.5 to 4.5 in. long, .25 in. across. Seed oblong broad-winged, .4 in. long, plume 1.5 in.



long. *Hab.* In forests in mountains in open spots, very local. Perak, Thaiping Hills from the Tea-gardens to the top; common here (all collectors). *Distrib.* India, Borneo.

(2) **T. tenuis** *Bl. Bijdr.* 1062; *King, l.c.* 552.

A slender much-branched glabrous twiner. Leaves fleshy membranous, lanceolate or ovate-lanceolate, base round, .75 to 2 in. long, .25 to 1 in. wide; nerves indistinct; petioles .5 in. long or less. Panicles from between petioles, very slender spreading, 3.5 in. long, 4 in. wide, much-branched. Flowers small, purple, in cymes on the branch-ends; pedicels filiform, about .2 in. long. Calyx-lobes lanceolate. Corolla rotate, .05 in. across. Follicles lanceolate, dagger-shaped, 2 to 3 in. long, acuminate. Seed ovate, .25 in. long, winged, toothed below, plume .75 to 1 in. long. *Hab.* Common along tidal rivers, forming considerable masses, but also occurring inland. Singapore, Alexandra Road; Blakang Mati; Pasir Panjang. Johor town; Hulu Sembrong (Kelsall). Malacca. Pahang, Rumpin River (Evans). Perak, Ulu Bubong and Goping (Kunstler). Province Wellesley, Prai dock and Pengkalan (Curtis). Penang, Penara Bukit. Perlis, Kanga. *Distrib.* India to Java and Borneo.

(3) **T. hirsuta** *Wight, Contrib.* 49. *T. hirsuta* var. *penangensis* *Hook. fil. F.B.I.* iv. 13; *King, l.c.* 554.

Hairy twiner; stems tolerably stout. Leaves membranous, ovate acuminate (thicker and narrower when young), base rounded, 2 to 6 in. long, 1 to 3 in. wide; petioles very hairy, 1 in. long or less. Cyme-panicles 3 in. across on peduncles 1 in. long, densely yellowish hairy, widely spreading, many-flowered. Calyx-lobes lanceolate acute, hairy. Corolla .12 in. across, lobes hairy outside, lanceolate, purple-pink. *Hab.* Open spots. Penang, Waterfall quarry (Curtis, Phillips, Ridley). Perak, Tambun (Ridley). *Distrib.* India.

I believe this is the same as Wallich's 201, the type, and is very close to several other specimens, but the plant appears to be variable.

(4) **T. Wallichii** *Hook. fil. F.B.I.* iv. 45; *King, l.c.* 555.

Slender puberulous twiner. Leaves thick coriaceous, ovate-lanceolate or ovate-oblong, acuminate, base round or cordate; nerves 6 to 8 pairs; 3 to 6 in. long, 1 to 2 in. wide; petioles .75 in. long, puberulous. Panicle interpetiolar, lax, 3 to 4 in. long and as wide, puberulous. Flowers in lengthening racemes on the branch ends, eventually to .25 in. or more, covered with persistent bracts; pedicels .25 in. long, capillary. Calyx-lobes ovate-oblong acute. Corolla rotate-campanulate, yellow, .2 in. across, lobes ovate-oblong, acute. Follicle oblong swollen blunt, slightly narrowed both ends, 3.5 in. long, 1.5 in. wide. Seed ovate broad winged, tip truncate, plume 1 in. long. *Hab.* Not common in lowland woods. Singapore (Wallich). Malacca (Griffith). Negri Sembilan, Rantau (Cantley). Perak, Larut (Kunstler). Penang, Pulau Betong (Curtis, Maingay). *Distrib.* Borneo.

(5) **T. perakensis** *King and Gamble, l.c. 555.*

Fleshy climbers. Leaves oblong-ovate, deeply cordate fleshy membranous acuminate; nerves 9 to 10 pairs; 5 to 7 in. long, 2 to 3 in. wide; petioles 1 to 3 in. long, nearly glabrous. Panicles inter-petiolar, wide branched, 3 in. long, puberulous. Flowers green in umbelled cymes, not racemose. Corona less beaked and anther appendages longer, otherwise resembling *Wallichii*, and perhaps a variety of it. *Hab.* Perak, Gunong Batu Putih (Wray); Gunong Pondok and Chanderiang (Kunstler). Ipoh (Curtis). *Distrib.* Borneo.

(6) **T. exilis** *Colebr. Trans. Linn. Soc. ii. 358, t. 16; King, l.c. 553.*

Much-branched slender twiner, puberulous. Leaves chartaceous, ovate-oblong or lanceolate mucronulate, 2 to 3 in. long, 1 to 1.5 in. wide; nerves faint 4 pairs puberulous; petioles slender, .5 to 1 in. long. Racemes from between petioles, 2 to 3 in. long, puberulous; rachis slender flexuous with short, .2 in. long, bracteate racemes. Flowers very small, light brown, under .1 in. across, in clusters. Bracts minute. Calyx pubescent, lobes ovate acute. Corolla rotate. Follicle one narrow lanceolate acuminate, .3 in. long, .2 in. wide. Seed ovate-oblong, .25 in. long, tip broad truncate, plume .75 to 1 in. long. *Hab.* Malacca (Griffith). Selangor, Rantau Panjang (Kloss). Perak, Larut (Kunstler); Kota (Wray). Dindings, Pangkor (Scortechini). *Distrib.* Assam, Chittagong.

(7) **T. squarrosa** *Ridl. Journ. Roy. As. Soc. S. Br. 61, p. 30.*

Long slender twiner. Leaves membranous, ovate cuspidate, base round; nerves 4 pairs; 2 to 3 in. long, 1 in. wide. Peduncles 1 in. long with 1 or 2 elongating racemes 6.5 in. long, covered with persistent lanceolate-acuminate bracts; pedicels .12 in. long. Flowers very small. Calyx-lobes narrow lanceolate, blunt. Corolla-lobes ovate-obtuse. Coronal scales oblong blunt. *Hab.* In Mangroves. Singapore, Woodlands (Ridley). Johor, Tana Merah Road (Ridley).

(8) **T. globifera** *Hook. fil. F.B.I. iv. 4; King, l.c. 552.*

Glabrous twiner. Leaves membranous, ovate-lanceolate acute, base round; nerves 4 to 7 pairs inconspicuous; 1 to 3 in. long, .5 to 1.5 in. wide; petioles .25 to .5 in. long. Cymes very slender; peduncles usually 1 in. long; pedicels filiform, .5 to .75 in. long. Flowers umbellate, blue (Kunstler). Calyx-lobes ovate-lanceolate. Corolla .3 in. across, lobes ovate, .15 in. long. Corona processes globose. *Hab.* Rare; Kunstler says the flowers are blue, probably meaning purple. Malacca (Griffith). Perak, Bernam River (Kunstler).

(9) **T. asthmatica** *Wight and Arn. Contrib. 51; Hook. fil. F.B.I. iv. 44.*

Slender twiner. Leaves oblong or ovate-lanceolate, cuspidate, base slightly cordate round, glabrous (or in some forms more or less tomentose), 1.5 to 4 in. long, .5 to 1.75 in. wide; petioles

·3 to ·6 in. long. Peduncles short with 2 or 3 umbels of flowers on capillary pedicels. Bracts lanceolate. Sepals long narrow lanceolate hispid. Corolla-lobes ovate, yellow or dull pink. Corona-scales flat orbicular with free tips. Follicles dagger-shaped, 3 in. long, ·25 in. through. Seeds ovate truncate. *Hab.* Sandy places by river or sea. Singapore, Changi. Pahang, Pekan and Sungei Meang; Leban Chondong, Rumpin River (Evans). Tringganu on an island in the river mouth. *Distrib.* India, Siam, Borneo.

### 27. HETEROSTEMMA, W. and A.

Slender twiner. Leaves fleshy membranous. Flowers small in sessile or peduncled inter-petiolar umbellate cymes. Calyx 5-lobed. Corolla campanulate or urceolate, lobes triangular valvate. Corona processes often laciniate spreading horizontally from the column. Staminal column short depressed; anthers minute, appendage small. Pollinia 1 in a cell, erect sessile or with short caudicles. Style-apex 5-sided, not longer than anthers. Follicles 2, slender, straight. Seeds thin winged. Species 10, Indo-Malayan.

Corolla campanulate rotate; cyme umbellate . . . (1) **H. piperifolium**  
 Corolla urceolate; flowers racemed . . . . . (2) **H. fimbriatum**

(1) **H. piperifolium** *King and Gamble, l.c. 557.*

Glabrous twiner. Leaves membranous ovate-acuminate, truncate or cordate (var. *cordatum*) minutely puberulous on both sides; nerves 2 or 3 pairs from the base, fine; 2·5 to 3·5 in. long, 1·5 to 2·5 in. wide; petioles slender, ·75 to 2 in. long. Peduncles ·5 to ·75 in. long. Flowers about 6, yellow; pedicels ·25 in. long. Calyx-lobes ovate. Corolla ·3 in. across. Corona processes lying flat, linear-lanceolate, entire or laciniate. Follicles slender linear acuminate, 4 in. long, ·15 to 2 in. wide. *Hab.* Open woods up to 5000 ft. altitude. Selangor, Batu Caves (Burkill). Perak, Batang Padang River and Larut (Kunstler); Gunong Hijau (Scortechini); Kwala Dipang; Thaiping.

(2) **H. fimbriatum** *King and Gamble, l.c. 558.*

Twiner, stem with 2 longitudinal lines of hairs. Leaves fleshy, oblong or oblong-lanceolate acuminate; nerves 5 pairs prominent when dry; 3·5 to 4·5 in. long, 1·5 to 2 in. wide; petioles ·5 to ·75 in. long. Flowers racemose; peduncles thick, ·15 in. long; rachis of raceme ·3 in. thick with cushion-like bracts; pedicels slender, ·5 in. long. Calyx-lobes minute. Corolla ovoid urceolate, pubescent, ·3 to ·4 in. wide, lobes  $\frac{1}{3}$  of its length. Corona processes sub-erect, thick, fimbriate. Very rare. *Hab.* Perak G. Ijuk (Gunong Hijau) (Scortechini).

I have not seen this species.

### 28. HOYA, Br.

Twining epiphytes rarely (*H. multiflora*) erect shrubby, usually rooting at nodes. Leaves thick and fleshy. Flowers showy, large

or small, pink or white or purple, rarely yellow, on lateral racemes, which gradually lengthen, the rachis thick tubercled where the flowers have fallen; pedicels slender, sub-equal so as to form an umbel of flowers. Calyx small, scales 5. Corolla rotate or star-like, fleshy, often wax-like, lobes flat convex or sometimes reflexed, valvate. Corona processes large, becoming horny when dry, adnate to column; lower lobes spreading star-like or ascending turgid or concave above, upper lobe a tooth or horn resting on the anther. Stamen-column short from corolla base; anthers connivent over style-tip. Pollinia single, waxy with short thick caudicles. Carpels distinct. Follicles 1 to 2, slender or thick. Seeds oblong or ovate plumed. Species 70 to 80, Asia and Australia.

*Lower corona-lobes thin vertically.*

- Upper lobe and stamen appendages very long acuminate . . . . . (1) *H. caudata*
- Upper lobe and stamen appendages short.
- Leaves large fleshy, conspicuously nerved ovate . . . . . (2) *H. latifolia*
- Leaves small ovate and lanceolate; flowers white . . . . . (3) *H. lacunosa*
- Leaves oblong, moderate size; flowers pink . . . . . (4) *H. diversifolia*
- Leaves big, lanceolate; stem woody nodose . . . . . (5) *H. Maingayi*
- Corona processes acute; corolla spreading.*
- Leaf-nerves 3 to 5 from base, conspicuous.
- Leaves oblong, base narrowed; flowers white . . . . . (6) *H. parasitica*
- Leaves ovate, base broad sub-cordate; flowers yellow . . . . . (7) *H. citrina*
- Leaf-nerves pinnate.
- Flowers  $\frac{1}{2}$  in. across, yellowish white . . . . . (8) *H. coriacea*
- Flowers small,  $\frac{1}{25}$  in. across.
- Leaves large over 1.5 in. wide; nerves prominent; flowers  $\frac{1}{4}$  in. across; lower corona-lobes horizontal, narrow oblong . . . . . (9) *H. Forbesii*
- Lower corona-lobes ovate acute . . . . . (10) *H. Finlaysonii*
- Lower corona-lobes lanceolate . . . . . (11) *H. perakensis*
- Lower corona-process shorter than upper; stem angled; leaves ovate . . . . . (12) *H. oclusa*
- Corona-lobes inflated; corolla-lobes reflexed.*
- Epiphytic erect shrub; flowers glabrous . . . . . (13) *H. multiflora*
- Twiner; corolla-tube villous . . . . . (14) *H. lasiantha*
- Creeper; flowers small, annular ring on corolla-tube; corona-lobes ovoid, swollen . . . . . (15) *H. Curtisii*
- Corona processes lower spreading, blunt inflated; corolla-lobes spreading, star-like.*
- Flowers over 1 in. across, deep purple . . . . . (16) *H. imperialis*
- Flowers under 1 in. across; leaves oblong . . . . . (17) *H. obtusifolia*
- Flowers small; corona-lobes beaked; leaves elliptic with horizontal nerves meeting an intramarginal . . . . . (18) *H. elliptica*
- Corona-lobes flattened, above horizontal.*
- Flowers 1.5 in. across, white turning pink; leaves velvety beneath . . . . . (19) *H. coronaria*
- Flowers small hardly  $\frac{1}{5}$  in. wide; leaves glabrous . . . . . (20) *H. Scortechinii*
- Lower corona-lobe thick and blunt.*
- Leaves under 1.75 in. across; nerves inconspicuous when dry . . . . . (21) *H. Ridleyi*

- Leaves lanceolate; flowers very small. . . . . (22) **H. parviflora**  
 Leaves ovate or lanceolate; flowers rather small,  
 edge of leaf thickened . . . . . (23) **H. revoluta**  
 Leaves ovate lanceolate, edge not thickened;  
 flowers  $\frac{1}{4}$  in. across . . . . . (24) **H. plicata**  
 Leaves large ovate, stem back of leaves and petioles  
 densely red woolly . . . . . (25) **H. rufo-lanata**

(1) **H. caudata** Hook. *fil. F.B.I.* iv. 60; *King, l.c.* 568.

Long climbing epiphyte. Leaves fleshy coriaceous, ovate acuminate, base rounded or cordate, edges strongly undulate, recurved, 3 to 7 in. long, 2 to 3 in. wide; petioles very thick,  $\frac{1}{25}$  in. long. Peduncles 1 in. long, stout, rachis thick,  $\frac{1}{5}$  to 1 in. long; pedicels filiform,  $\frac{1}{5}$  in. long, all glabrous. Calyx-lobes linear lanceolate glabrous. Corolla  $\frac{1}{5}$  to  $\frac{1}{75}$  in. wide, lobes oblong long caudate acuminate silvery-pilose within white suffused with pink. Corona fleshy, lower lobes horizontal, elliptic-ovate, upper with a long subulate spur. Stamen-appendages white, thin, long, caudate acuminate. *Hab.* Hill forests. Malacca (Maingay); Mt. Ophir. Penang, Richmond pool (leaves smaller, edge entire, dull pink).

var. *crassifolia* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 30. Leaves very coriaceous denticulate on the edge. Peduncles and petioles bristly-hairy. Corolla-lobes triangular cuspidate, pink, villous edged with long hairs. Perak, Tapah on the Temoh Road (Ridley).

(2) **H. latifolia** Don. *Hist. Dichl. Pl.* iv. 127; *King, l.c.* 568.

A long climbing and creeping epiphyte. Leaves very thick coriaceous, ovate or oblong-ovate acute, base round or cordate, reddish green; nerves 3 to 5 from base; 5 to 10 in. long, 3 to 7 in. wide; petioles stout,  $\frac{1}{25}$  to  $\frac{1}{5}$  in. long. Peduncles 6 or 7, stout 2 in. long on short axillary tubercles,  $\frac{1}{25}$  in. long and very thick; rachis thick, 1 in. long; pedicels slender,  $\frac{1}{25}$  in. long. Flowers small,  $\frac{1}{35}$  in. across, pink. Calyx minute, lobes ovate acute. Corolla rotate pubescent inside, lobes ovate. Corona-lobes membranous, lower lobe ovate, horizontal, upper shorter, erect acute. Staminal column very short. Follicle 3 in. long,  $\frac{1}{2}$  in. through, puberulous. *Hab.* Common in forests epiphytic on high trees or on river banks, but not often flowering. Singapore, Garden Jungle; Cluny Road; Changi, etc. (Ridley). Johor, Sungei Tebrau. Pahang, Kota Glanggi; Kota Tongkat (Evans).

In flowering branches often the leaves either fall or are not produced, making a long floriferous panicle.

(3) **H. lacunosa** Bl. *Bijdr.* 1063; *King, l.c.* 569; *Hook. Bot. Mag.* 4826, 5272.

Creeping slender epiphyte. Leaves thick fleshy, ovate to lanceolate acute or acuminate, base round or narrowed,  $\frac{1}{75}$  to  $1\frac{1}{75}$  in. long,  $\frac{1}{5}$  to  $\frac{1}{75}$  in. wide; petioles  $\frac{1}{15}$  in. long. Peduncles thick,  $\frac{1}{75}$  to  $1\frac{1}{5}$  in. long, rachis lengthening to  $\frac{1}{25}$  in. long; pedicels  $\frac{1}{25}$  to  $\frac{1}{35}$  in. long. Calyx-lobes as long as tube. Corolla  $\frac{1}{25}$  in.

across, white pubescent inside, lobes triangular. Corona thin, lower lobes upcurved, ovate blunt, upper ovate acute, longer than anther. *Hab.* Lowlands on trees. Singapore, Chan Chu Kang; Bukit Mandai, Malacca between Jasin and Ayer Bombo (Maingay). Perak (Scortechini); Larut (Kunstler). *Distrib.* Sumatra, Java, Borneo.

(4) *H. diversifolia* *Bl. Bijdr.* 1064; *King, l.c.* 570.

Long climber. Leaves fleshy very thick, broad elliptic or blunt ovate, base round; nerves 4 to 6 pairs (visible only when dry); 2 to 4 in. long, 1.5 to 2.5 in. wide; petioles .25 to .75 in. long. Peduncles thick, 1 to 2.5 in. long, rachis lengthening to over 1 in. long, thick; pedicels .5 in. long. Flowers greenish white, with corona pink or all pink, .25 to .35 in. wide. Corolla velvety inside, lobes ovate blunt. Corona, lower lobes oval blunt. Follicles sub-linear, .6 in. long, .75 in. through. *Hab.* Common, often draping trees, especially near the sea. Singapore, Jurong; Serangoon; Kranji. Johor, Scudai River; Kukub. Malacca, Tanjong Kling. Pahang, Pekan; Sungei Jelai (Machado). Negri Sembilan, Bukit Sulu (Cantley). Perak, Kwala Kangsa. Province Wellesley, Batu Kawan. Penang, Pulau Betong; Waterfall (Curtis). Kedah, Alor Sta; Gunong Geriang river bank. *Distrib.* Burma, Java. *Native names:* Akar Sesudu Bukit; Akar Chapang Kra.

(5) *H. Maingayi* *Hook. fil. F.B.I.* iv. 62.

A stout species. Leaves fleshy very thick elliptic-lanceolate acuminate, narrowed to both ends; nerves slender 5 pairs visible when dry; 7 to 9 in. long, 2.5 to 3.5 in. wide; petioles .3 to 1 in. long, thick. Rachis short; pedicels .5 to 1 in. long, very slender. Flowers .5 to .75 in. across, pale pinkish white. Corolla-lobes triangular, villous. Corona lower lobes ovate acute, white. *Hab.* Malacca (Maingay). Perak (Scortechini). Rare, and little known.

The stems appear to be quite smooth and polished and the nodes swollen.

(6) *H. parasitica* *Wall. Wight, Contrib.* 37; *King, l.c.* 572. *H. pallida* *Lindl. Bot. Reg. t.* 951.

Stem rather slender climbing widely over trees. Leaves fleshy drying rigid, coriaceous but thin, oblong elliptic sub-acute or blunt base shortly narrowed, occasionally rounded at the base, 3 to 4 in. long, 1 to 2 in. wide; petioles .2 in. long, thick. Peduncles stout, 1 to 3 in. long, rachis thick elongating to 4 in. long; pedicels slender, .5 in. long. Flowers 30 to 40 open at once. Calyx-lobes small oblong blunt. Corolla .3 in. across, pearly white or pinkish white, lobes inflexed, glabrous ovate cordate acute. Corona white or pink, lower lobes long lanceolate acute. *Hab.* Common on trees on river banks and near the sea. Singapore, Jurong; Pulau Serapu; Pulau Tekong. Johor, Pulau Tinggi (Feilding). Pahang, Pekan. Malacca (Maingay, Griffith). Dindings, Pangkor. Perak, Sungei Larut (Wray). Kedah (Kunstler). Adang group on Pulau Tengah. *Distrib.* India.

(7) *H. citrina* Ridl. *Journ. Roy. As. Soc. S. Br.* 86, p. 300.

Stems stout, very long. Leaves thick fleshy drying stiffly coriaceous, ovate acute, base broad, round cordate; nerves 3, conspicuous when dry with about 4 pairs of nervules from the central one broken up into large lax reticulations, 4 to 4.5 in. long, 3 in. wide; petioles stout, .75 in. long. Peduncles stout, 2.24 in. long, raceme thickened lengthening to over 1 in.; pedicels .6 in. long, slender. Calyx-lobes ovate blunt. Corolla .3 in. wide, lobes triangular-ovate acute not cordate, light yellow. Corona as in *H. parasitica*, but pinkish red, lower lobe long lanceolate acute. *Hab.* Limestone precipices. Selangor, Batu Caves. Perak, Ulu Bubong on a tree in jungle (Kunstler); Batu Kurau (Scortechini).

(8) *H. coriacea* Bl. *Bijdr.* 1063; *Rumphia*, iv. t. 187; *King*, l.c. 573; *Bot. Mag. t.* 4518.

Leaves thinner than most species, ovate-lanceolate acute, base round; nerves 4 to 6 pairs with reticulations prominent; 6 in. long, 2.5 in. wide; petioles .75 in. long. Peduncles 2 to 5 in. long, rachis thick lengthening to .75 in. long. Flowers numerous, creamy white or creamy yellow, .75 in. across. Corolla-lobes triangular ovate, velvety acute. Corona-lobes white edged purplish, ovoid inflated acute. Follicle 4.5 to 5 in. long, .5 to .75 in. wide, lanceolate woody. Seed oblanceolate, .25 in. long. *Hab.* Not common. Lowlands near the sea, also mountains to 3000 ft. altitude. Singapore, Tampinis (D'Almeida). Pahang, Pekan; Rumpin River (Evans). Malacca (Maingay). Selangor, Semangkok Pass (Machado). Perak (Scortechini). *Distrib.* Java, Borneo.

(9) *H. Forbesii* King and Gamble, l.c. 574.

Branches thick, slightly angled. Leaves coriaceous, elliptic-oblong or obovate acuminate blunt, base narrowed rounded, stout, midrib and nerves 7 pairs elevate when dry, 4 to 7 in. long, 2.5 to 4 in. wide; petioles thick. Peduncle .75 in. long, rachis short; pedicels .5 in. long. Flowers .4 in. across, greyish white. Corolla purple-tipped, lobes triangular acute incurved, puberulous outside. Corona lower lobes narrow-oblong. *Hab.* Perak (Scortechini). Rare. *Distrib.* Sumatra.

(10) *H. Finlaysonii* Wight, *Contrib.* 38; *King*, l.c. 574.

Stem fairly stout. Leaves coriaceous, ovate or oblong lanceolate, blunt acuminate, base rounded or narrow blunt, greenish red above, dark red beneath; nerves 5 to 7 pairs joining an intramarginal, elevate as are reticulations when dry; 5 to 7 in. long, 1.5 to 2.5 in. wide; petioles thick, .25 to .5 in. long, a gland just above it. Peduncles 1.75 in. long, rachis very short; pedicels .75 in. long. Flowers numerous, cream-colour and pink, and corona white; .4 in. across. Corolla pubescent inside, lobes triangular-ovate acute. Corona-lobes ovate acute. Follicle 1, very slender, 7.5 in. long, .25 in. wide. Seeds cylindrical, .3 in. long,

base acute, tip truncate, plume 1.5 in. long. *Hab.* Singapore (Wallich 2724). Perak, Goping (Kunstler). Rare.

(11) *H. perakensis* *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 70.

Stems slender. Leaves coriaceous ovate acute, base broad truncate; nerves from base 5; 4.5 in. long, 3 in. wide; petioles .25 in. long. Peduncles .75 in. long; racemes 1.25 in. long, thick; pedicels .5 in. long. Calyx-lobes ovate-lanceolate, pubescent. Corolla .36 in. across, lobes triangular, pubescent outside only. Corona-lobes, lower horizontal lanceolate, upper tooth-like. *Hab.* Perak, Temengoh and Kwala Kenering (Ridley). Rare and local.

(12) *H. oclusa* *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 31.

Stem stout 4-angled. Leaves coriaceous ovate acuminate, base blunt; nerves 5 pairs elevate beneath; 4 in. long, 2 in. wide; petioles 1 in. long. Peduncles stout angled, 2 in. long; pedicels .25 in. long, hairy. Calyx-lobes linear-lanceolate. Corolla-lobes ovate blunt, .12 in. long, glabrous. Corona-lobes, lower shorter than upper, fleshy not horny, broad lanceolate, upper one lanceolate, edges scarious. Pollinia pyriform, caudicle slender. *Hab.* Selangor, Batu Caves; top of the limestone rocks (Ridley). Rare, the flowers appear never to open.

(13) *H. multiflora* *Bl. Bijdr.* 1064; *King, l.c.* 561. *H. coriacea* *Lindl. Bot. Reg.* 1839, t. 18 (not of Blume). *Cyrtoceras reflexum* *Benn. Horsf. Pl. Jav.* 90, t. 21.

An epiphytic erect shrub about 1 ft. tall, not branched. Leaves fleshy coriaceous, oblong acuminate, base acute; nerves 7 to 10 pairs, inarching; 3 to 8 in. long, 1 to 2 in. wide; petioles .75 in. long. Umbels many-flowered, rachis thick; peduncles 1 to 2 in. long. Calyx-lobes oblong, small. Corolla white lobes tipped yellow, tube .2 in. long, lobes triangular, .25 in. long, completely deflexed. Corona processes horny, lobes erect, conic with a horn-like lobe at base. Stamen-column .3 in. long, stipitate. Follicle slender, 7 to 8 in. long, .3 in. through. Seed oblong narrow-winged, plume 2 in. long. *Hab.* On trees in forest up to 3000 ft. altitude. Johor, Gunong Pulai; Pulau Tiunan. Malacca, Mt. Ophir (Maingay). Selangor, Semangkok Pass and Ulu Gombak (Ridley). Perak, Gunong Keledang; Thaiping Hills; Hermitage Hill; Bujong Malacca (Scortechini). Penang. *Distrib.* Burma, Malay islands.

(14) *H. lasiantha* *Korth. in Miq. Fl. Ind. Bat.* ii. 526; *Bot. Mag. t.* 5081; *King, l.c.* 562.

Erect or climbing epiphyte. Leaves fleshy elliptic or lanceolate acuminate, base acute; nerves conspicuous 8 to 10 pairs; 4 to 6 in. long, 1.25 in. wide; petioles .5 in. long. Umbels 2- to 8-flowered on short thick rachises on peduncles 3 in. long. Calyx-lobes ovate to orbicular. Corolla-tube very short, lobes stiffly deflexed, lanceolate acuminate, orange yellow, densely white villous. Corona ochre yellow, lower lobe ovoid, 2-winged below, upper tongue-



shaped. Follicle slender, 7 in. long, .25 in. wide. Seed .2 in. long, elliptic; plume 1.5 in. long. *Hab.* Not common, a very beautiful plant, in mountain forest. Selangor, Semeniyeh. Perak, Gunong Kerbau (Haniff); Bujong Malacca (Curtis). *Distrib.* South Siam, Kopah, Java and Borneo.

(15) **H. Curtisii** King and Gamble, *l.c.* 563.

Slender epiphyte creeping and rooting at nodes. Leaves orbicular, abruptly acute, base round, sessile, .4 to .7 in. long, about as wide. Umbels terminal and axillary, 10- to 16-flowered on a sessile rachis, .25 in. long, pubescent. Calyx-lobes oblong, villous. Corolla .5 in. across, lobes deflexed, spatulate, acute. An annular corona, surrounding a staminal corona of 5 hooded processes of 3 lobes, 2 side ones round, upper ovate, enclosing a cavity and overtopping the staminal column. *Hab.* Perak, Waterloo at 2000 ft. altitude (Curtis). Very rare.

(16) **H. imperialis** Lindl. *Bot. Reg.* under *t.* 68; *Bot. Mag.* *t.* 3397; *King, l.c.* 564.

A shrubby climber. Leaves fleshy, elliptic or oblong, short acuminate, base round; nerves horizontal, numerous; 6 to 9 in. long, 1.25 to 2.5 in. wide; petioles .25 to .5 in. long. Umbels of about 10 flowers on a short rachis; pedicels 3 in. long; peduncles 3 to 10 in. long. Calyx-lobes .2 in. long. Corolla spreading, brown purple, 3 in. across, whitish outside, tube shorter, lobes ovate-triangular acute. Corona white, lower lobes erect, obtuse, 2-cleft; upper lobes subulate acuminate. Follicle 1 lanceolate acuminate, 8 to 9 in. long, 1 in. through. *Hab.* Very rare, growing in the mangroves in Borneo; easily known by its very large purple flowers. Malacca (Maingay). *Distrib.* Borneo.

(17) **H. obtusifolia** Wight, *Contrib.* 38; *King, l.c.* 563.

A stout climber. Leaves thick fleshy, oblong blunt or rounded both ends; nerves rather horizontal, 10 to 12 pairs (invisible in life), 4 to 6 in. long, 1 to 3 in. wide; petioles very thick, .5 in. long. Umbels many-flowered, rachis up to 1 in. long, and very thick; peduncles as long, all puberulous; pedicels 1 to 1.5 in. long, thick. Calyx fleshy, lobes linear-oblong, .15 in. long, pubescent. Corolla about 1 in. across, pubescent outside, white, lobes ovate acuminate. Corona pink, lower lobes erect, inflate; upper longer acuminate. *Hab.* Not common and rarely flowering, climbing on trees in mangrove swamps. Singapore, Serangoon River; Changi. Pahang, Pekan. Perak (Scortechini). *Distrib.* Sumatra, Java.

(18) **H. elliptica** Hook. *fil. F.B.I.* iv. 58; *King, l.c.* 565.

Slender twiner. Leaves chartaceous when dry, elliptic blunt both ends; nerves 8 to 10 pairs, horizontal joining an intramarginal nerve; 1.5 to 2.5 in. long, 1 to 1.5 in. wide; petioles .15 to 1.25 in. long. Peduncles pink, thick, 1 in. long, rachis short; pedicels slender, 1 to 1.5 in. long. Calyx puberulous, pink, lobes ovate-oblong, blunt. Corolla .5 in. across, pilose inside white, lobes

obcordate apiculate. Corona, lower lobes sub-erect, bladder-like ovate; upper lobes short, covering anthers. *Hab.* Malacca (Maingay). Perak (Scortechini). A rare and very little known plant.

(19) *H. coronaria* *Bl. Bijdr.* 1063; *Rumph.* iv. 31, t. 182, f. 2, and t. 184.

A long twiner, velvety pubescent. Leaves thick coriaceous, light green, elliptic to ovate-oblong, short acuminate, base round, velvety beneath, 3 to 4 in. long, 1 to 2 in. wide; petioles .75 in. long. Peduncles .75 in. long, velvety; rachis thick with large tubercles, .5 to 1.5 in. long; pedicels 1 in. long. Flowers few in



FIG. 108.—*Hoya coronaria*.

an umbel. Calyx thick velvety, lobes orbicular. Corolla fleshy, star-shaped, villous outside, lobes triangular acute, waxy white then becoming spotted with pink, finally all pink, 1.5 in. across. Corona flat spreading. Follicle oblong blunt; pericarp very thick, 6 to 10 in. long. *Hab.* Very common in mangrove swamps, river banks, etc. Singapore, Kranji; Jurong; Serangoon; Pulau Tekong. Johor, Scudai River; Kwala Batu Pahat (Kelsall). Pahang, Kwantan, Kwala Pahang. Selangor, Sepang. Dindings, Lumut (Curtis). Perak, Matang (Wray); Goping (Scortechini). Penang, Telok Bahang (Curtis). Tringganu, Bundi (Rostados). *Distrib.* Malay isles, Sumatra to Papua. *Native name*: Akar Setebal.

(20) *H. Scortechinii* *King and Gamble, l.c.* 567.

Climbing and rooting. Leaves fleshy ovate or ovate-lanceolate acuminate, round or cordate, 2 to 3.5 in. long, .75 to 1.25 in.

wide; petioles .2 in. long. Peduncles 1.5 to 4 in. long; rachis stout, .25 in. long; pedicels .5 to .75 in. long. Calyx-lobes ovate. Corolla .5 to .6 in. across, puberulous inside, lobes ovate acuminate. Corona-lobes, lower very blunt with a raised ovate ring above and deep cleft valves below; upper short tooth-like, shorter than stamens. Follicles very narrow, 1 or 2. *Hab.* Perak (Scortechini). Penang (John Scott). Rare.

(21) **H. Ridleyi** *King and Gamble, l.c.* 575.

A long climber. Leaves fleshy coriaceous ovate to lanceolate or oblong acute, rounded or cuneate at base; nerves (when dry) 5 to 6 pairs faint; 3 to 5 in. long, 1.25 to 1.75 in. wide; petioles very thick, .25 to .75 in. long. Peduncles 1 to 4 in. long, rachis lengthening to 1 in. long; pedicels .5 to .75 in. long. Corolla puberulous inside, .3 in. across, pearly pinkish white, lobes cordate, acute, short. Corona-lobes, lower sharply acute. *Hab.* Common on trees in orchards and open country. Singapore, Tanglin; Kranji; Blakang Mati. Johor, Pulau Tinggi (Feilding); Kota Tinggi. Malacca, Tanjong Kling. Dindings, Pangkor. Perak, Thaiping Hills 2400 ft. altitude. Penang, Pulau Tikus. Kedah, Pulau Song-Song (Curtis). Lankawi. Perlis, Kanga (Ridley). *Distrib.* South Siam.

(22) **H. parviflora** *Wight, Contrib.* 37; *King and Gamble, l.c.* 576.

A slender rather wiry twiner. Leaves coriaceous lanceolate, narrowed to both ends often falsely whorled; nerves 5 to 6 pairs faint when dry; 2 to 4 in. long, .35 to .75 in. wide; petioles .15 in. long. Peduncles 1.75 in. long, rather slender; rachis lengthening to 1 in. long; pedicels .25 in. long. Flowers many, pinkish white, .25 in. across. Corolla-lobes triangular villous inside. Corona-lobes forming a cone. Follicles very slender, 4 to 5.5 in. long, .2 in. wide. Seed oblong truncate, plume 1 in. long. *Hab.* In forests and woods twining, low down on small trees, not rare, but not often flowering. Malacca, Mt. Ophir. Penang, Balik Pulau; Waterfall (Curtis). Setul (Ridley).

(23) **H. revoluta** *Wight in Hook. fil. F.B.I.* iv. 55; *King, l.c.* 577.

Slender twiner. Leaves very thick fleshy, ovate or ovate-lanceolate acuminate, base acute, edges strongly recurved, 1.5 to 3 in. long, .75 to 1 in. wide; petioles very thick, .15 in. long. Peduncles 2 to 4 in. long; rachis lengthening to .5 in. long. Flowers small pink or white tipped pink, on filiform pedicels. Corolla .125 in. across; lobes triangular. Corona-processes forming a conic column, 5-lobed. *Hab.* In forests, Singapore (Wallich, *H. ovalifolia*, 8160 b); Woodlands. Pahang, Tahan River. Malacca (Main-gay). Selangor, Kwala Lumpur; Gunong Semangkok at 4000 ft. altitude (Ridley). Perak, Kwala Kenering; Maxwell's Hill; Relau Tujur (Wray). Perlis, Bukit Lagi. Kelantan, Kwala Lebir.

King mentions a fruiting plant from Blanda Mabok (Wray) with lanceolate leaves as doubtful, but the upper leaves are often lanceolate, and he is probably correct in his identification. The leaves in some forms are very thick, with a recurved edge, and in Maingay's specimen the corolla appears to be pubescent, but it is generally glabrous.

(24) *H. plicata* King and Gamble, *l.c.* 578.

Rather stout climber. Leaves fleshy coriaceous ovate-lanceolate acuminate, base acute; nerves and midrib invisible; .3 in. long, 1 in. wide; petioles stout, .25 in. long. Peduncles .75 to 1 in. long; pedicels flattened, 1 in. long. Corolla .4 in. broad with an elevated 5-angled villous ridge in the tube, puberulous outside and in, lobes triangular. Corona attached to back of anthers, lower lobe ovate blunt or bifid at tip. *Hab.* Perak, Maxwell's Hill (Scortechini). Very rare.

I have not seen this species.

(25) *H. rufo-lanata* Ridl.

Stem .2 in. through, with petioles, back of leaves and fruits densely thick red-woolly. Leaves ovate acute, base round; nerves 5 or 6 pairs sunk above, glabrous above coriaceous; 4.5 to 4.75 in. long, 3 in. wide; petioles thick, 1 to 1.25 in. long. Flowers unknown. Capsule lanceolate blunt, rather abruptly narrowed from a broad base, 4.5 in. long, 2 in. wide at base. Plume of seed white copious, 1 in. long. *Hab.* Perak, Sungei Siput (Burkill).

I know nothing at all like this; the very dense red brown wool on the stem and back of leaves is unlike anything I know. Unfortunately, no flowers or seed have been procured. It seems to be nearest to *H. coronaria*.

## 29. DISCHIDIA, Br.

Herbs or under-shrubs epiphytic twiners climbing and rooting on trees. Leaves fleshy sometimes converted into pitchers or convex and sessile. Flowers very small, white or red. Racemes short, thick gradually lengthening as the flowers fall, dense with tubercles and small bracts usually peduncled. Calyx small lobes oblong-ovate. Corolla urceolate tubular or campanulate, lobes very short, thick; mouth usually villous. Corona-processes adnate to back of stamen column, anchor-shaped or hastate rarely entire, or replaced by a corona attached to the corolla-tube; annular lobed or toothed above. Staminal column short, filaments connate; anthers erect with membranous processes. Pollinia 1 in a cell, waxy attached by a long or short caudicle to an oblong carrier. Carpels free. Follicles 1 to 2, acuminate. Seed very small, plumed. Species 50 or more. *Distrib.* Indo-Malaya to Australia.

i. CONCHOPHYLLUM. No coronal scales, but a corolline ring of processes; leaves fleshy convex and orbicular flattened.

Corolla 5-angled scarlet, corolline corona-lobes forked . . . . . (1) *D. astephana*

Corolla round, corolline corona shortly lobed not forked . . . . . (2) *D. depressa*

Corolla campanulate not narrowed above, no corolline-ring; flowers white, tipped pink . . . . . (3) *D. longepedunculata*

ii. COLLYRIS. Coronal scales anchor-shaped; leaves fleshy, convex sessile. Leaves convex.

Leaves yellow; flowers white . . . . . (4) *D. collyris*

Leaves purple grey pustular; flowers red tipped blue . . . . . (5) *D. coccinea*

iii. ASCIDIFERA. Some leaves converted into pitchers.

Pitchers oblong, 2 to 5 in. tall . . . . . (6) *D. Rafflesiana*

Pitchers sub-reniform, 2 in. through . . . . . (7) *D. complex*

iv. NORMALIA. Coronal scales anchor-shaped; leaves flat.

Leaves few, spatulate or linear-oblong on long bare twining stems . . . . . (8) *D. benghalensis*

Leaves ovate lentil-shaped, small very thick . . . . . (9) *D. Gaudichaudii*

Leaves ovate flat, base round hairy; flowers red . . . . . (10) *D. hirsuta*

Leaves ovate acute flat glabrous; flowers white pink tips . . . . . (11) *D. albida*

Leaves ovate blunt; corolla urceolate; flowers rose pink . . . . . (12) *D. rhodantha*

Leaves orbicular ovate or lanceolate, base round . . . . . (13) *D. singaporensis*

Leaves over 1 in. long, 1 in. or more broad, ovate-lanceolate or ovate.

Leaves ovate 1.75 in. wide; corolla campanulate . . . . . (14) *D. cordifolia*

Leaves ovate-lanceolate 1 in. wide; corolla campanulate; flowers pale green . . . . . (15) *D. monticola*

Leaves elliptic, plant shrubby . . . . . (16) *D. fruticulosa*

Leaves lanceolate, 1.25 in. across; corolla-tube urceolate . . . . . (17) *D. acutifolia*

Leaves lanceolate, 1 in. wide; corolla conic . . . . . (18) *D. ericæflora*

Leaves narrow lanceolate, not more than .5 in. across.

Leaves glabrous; corolla over .1 in. long, lobes elongate . . . . . (19) *D. Scortechinii*

Hairy, leaves 1.25 in. wide; flowers under .1 in. long . . . . . (20) *D. pubescens*

White hairy, leaves .5 in. long, .16 in. wide; flowers under .1 in. long . . . . . (21) *D. tomentella*

Flowers .3 to .4 in. long, lobes linear long . . . . . (22) *D. tubuliflora*

No corona scales or corolline ring.

Leaves small ovate . . . . . (23) *D. parvifolia*

Leaves .75 in. long, lanceolate acuminate . . . . . (24) *D. viridiflora*

(1) *D. astephana* *Scort. in King and Gamble, l.c. 582.* Conchophyllum angulatum *Schlechter Engl. Jahrb. xl. Beibl. xcii, 6.*

Slender creeper. Leaves orbicular convex, dull purplish bullate, 1 in. long and wide crowded together with flatter round

ones on the longer branches. Racemes shortly peduncled, short, about .5 in. long. Sepals lanceolate blunt, pink pubescent. Corolla .24 in. long, bluntly prominently 5-angled, as long as broad with small erect blunt teeth, deep blue black, the ridges and lobes scarlet, mouth inside hairy. Corona 0. A ring of membrane below the mouth with deflexed bifid lobes. Staminal column conic; filaments red; anther-wings red, edged white; appendages acuminate. Follicle 1 to 1.75 in. long. *Hab.* Common on trees in the mountains. Easily recognised by its angled scarlet and blue-black flowers. Pahang, Gunong Tahan (Robinson); Kluang Terbang (Barnes). Selangor, Bukit Hitam (Kelsall); Menuang Gasing (Kloss). Perak, Maxwell's Hill (Schlechter); Gunong Kerbau (Robinson); Bujong Malacca (Scortechini).

(2) *D. depressa* Clarke, in *King and Gamble, l.c.* 582.

Slender, wiry creeper. Leaves fleshy, sessile orbicular, flattened or convex slightly bullate, 1 to 1.25 in. long and rather wider. Calyx-lobes glabrous, round. Corolla urceolate, white, .075 in. long with a 5-lobed corolline corona, throat closed with white hairs, lobes hairy inside. No staminal corona. *Hab.* Malacca (Maingay). Rare. Only known from Maingay's poor specimen.

(3) *D. longepedunculata* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 32.

Leaves oblong convex, hairy, light brown, purple beneath, 1.5 in. long, .5 in. wide. Peduncles .1 in. through, 3.5 to 4 in. long, hairy. Raceme .1 in. long. Bracts hairy. Pedicels short and thick. Calyx-lobes ovate, hairy pink. Corolla campanulate not narrowed above, cream yellow, glabrous, lobes short, ovate triangular pink, half as long as the tube; tube glabrous inside with 5 strong ribs. No corona. Pollinia pyriform; caudicles broad, flat. Follicles one, 2.5 in. long, coriaceous, .25 in. wide when open. Seeds flat, lanceolate pustular. *Hab.* On a low tree at 3000 ft. altitude. Rare. Selangor, Sempang Mines, Semangkok Pass (Ridley).

(4) *D. collyris* Wall. *Cat.* 4207; *King, l.c.* 583. *D. albiflora* Griff. *Notulæ*, iv. 47.

Creeping on trees, slender. Leaves convex orbicular, buff yellow, fleshy coriaceous above, purple beneath, edges appressed to trunk covering the roots and generally containing an ants'-nest, 1.5 in. or more long. Peduncles short, stout; rachis short. Calyx-lobes ovate. Corolla urceolate, tube globose, mouth contracted, white, lobes lilac, glabrous. Corona-processes thin, linear. *Hab.* On roadside and seashore trees on the trunk and branches fully exposed to sun, Singapore, Chan Chu Kang; Bukit Timah. Johor. Lama; Panchur; Sedenak. Malacca, Tebong (Griffith). Kelantan, Chaning (Ridley).

(5) *D. coccinea* Griff. *Notulæ*, iv. 45; *King, l.c.* 584.

Slender creeper on trees. Leaves oblong-orbicular, crowded,

coriaceous convex, pustulate and bullate, olive-grey above, purple beneath, .5 in. or more long. Peduncles short with the short rachis about .5 in. long or less; pedicels .2 in. long. Calyx-lobes obtuse, very small. Corolla red obovoid, gradually narrowed to the mouth, lobes blue, .1 in. long, glabrous. Corona-lobes anchor-shaped; anthers rather short, appendages blunt. Follicle 1 in. long, .15 in. wide. Seeds obovoid. *Hab.* On lofty trees in forest. Singapore, Selitar; Bukit Timah; Jurong; Bukit Mandai (Ridley). Malacca (Griffith). Pahang, Ulu Kwantan (Craddock). *Distrib.* Borneo.

(6) *D. Rafflesiana* Wall. *Pl. As. Rar.* 35, t. 142; *King, l.c.* 585.

Creeping and rooting on trees. Leaves coriaceous, yellow with the underside purple when exposed, light green in damp shady spots, of 2 kinds: (1) pitcher-shaped, 2.4 in. long, oblong blunt, mouth downwards with roots from nodes inside, usually clustered; (2) flat orbicular, yellow on both sides, 1 in. long and wide. Raceme 6- to 8-flowered; peduncle about .5 to 1 in. long; rachis short, thick. Calyx hairy, lobes lanceolate. Corolla yellow, urceolate pubescent, lobes villous. Corona-lobes spatulate. Follicle 1, narrow, curved acuminate, 3 to 4 in. long. *Hab.* On trees, usually dying ones by the sea, more rarely on mountains. Common. Singapore, Tanglin. Johor, Sungei Bau. Malacca, Mt. Ophir; Water island (Maingay); Pahang, Kwala Pahang. Perak, Larut (Kunstler). Kedah Peak. Setul. Perlis, Kanga. *Distrib.* Tenasserim, Java, Borneo. *Native names:* Akar Kul; Akar Bano.

(7) *D. complex* Griff. *Notulæ*, iv. 50.

Stem very slender. Leaves pitcher-shaped, sub-reniform, compressed, 2 in. through, edge inflexed forming a second pitcher inside much smaller, inside purple. Flowers white on a thickened rachis. Peduncle 1 to 3 in. long. Corolla-tube sub-globose, scarcely narrowed at throat, lobes broad, ovate, a ring of hair in throat. Corona-processes long narrow, arms dilate at tips. *Hab.* Very rare on high trees; very little known. Malacca (Griffith). Selangor, Batu Caves (a bit fallen from a lofty tree).

(8) *D. benghalensis* Colebr. *Trans. Linn. Soc.* xii. 357, t. 15; *King, l.c.* 586.

Stems long, fleshy glaucous green, .1 in. through, creeping all over tree branches. Leaves few, oblong, narrowed at base, very thick and fleshy, glaucous, .5 to 2 in. long, .25 in. through. Umbels very short, peduncled, few-flowered. Calyx red. Corolla globose, .5 in. long, greenish white, mouth sparsely hairy, lobes acute. Follicles slender, acuminate, 1.5 in. long. *Hab.* Common chiefly near the sea and in open country, on roadside trees, occasionally on high mountains. Singapore, Dalvey Road; Selitar; Kranji. Johor, Gunong Banang, Batu Pahat; Pulau Aor (Feilding). Pahang, Kota Glanggi; Pahang River; Gunong Tahan, 3500 ft. altitude. Perak, Chanderiang (Kunstler). Penang Hill, to 3000 ft.

altitude (Curtis). Kedah Peak, Yan. Pulau Adang. Lankawi on rocks, Pulau Ujong Duri (Curtis). *Distrib.* India, Java, Borneo.

(9) *D. Gaudichaudii* Dcne. DC. *Prodr.* viii. 632. *D. nummularia* King, l.c. 587 (not of R. Brown).

Stems very slender closely leafy. Leaves glaucous green, ellipsoid, very fleshy and thick (in exposed spots, stem and leaves yellow), .25 in. long, nearly as wide and as thick, narrowed at base. Umbels very small sub-sessile, 2- or 3-flowered. Calyx white or pink. Corolla urceolate, tube yellowish white, .075 in. long; throat villous inside, lobes narrow linear, pure white. Corona-scales anchor-shaped, translucent. Stamens ochreous. Follicle

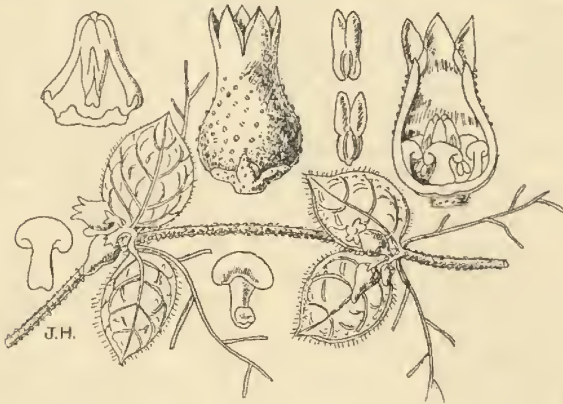


FIG. 109.—*Dischidia hirsuta*.

linear-lanceolate, 1.25 in. long, base .25 in. across when expanded. *Hab.* A very abundant plant on trees in open country and very injurious to trees, Singapore to Penang, and Pulau Adang. *Distrib.* Malay islands, Tenasserim.

In damp spots the leaves become thin and green, in exposed spots thick glaucous and lenticular. This plant has been confused by all authors with the totally distinct flat-leaved *D. nummularia* Br., of Australia.

(10) *D. hirsuta* Dcne. DC. *Prodr.* viii. 632; *Hook. fil. Bot. Mag. t.* 7853; *King, l.c.* 589.

Slender creeper on trees, pubescent. Leaves coriaceous fleshy ovate acute, base round hairy, .5 to .75 in. long and about as wide; petioles short. Flowers 2 or 3 on short rachises at end of peduncles, .15 in. long. Corolla urceolate, .3 in. long, narrowed at mouth, deep red, lobes light pinkish red, hairy inside. Corona-scales rather large, top recurved, reniform. Follicles 3 in. long, linear-lanceolate. *Hab.* Common on orchard trees and in woods. Singa-



pore, Tanglin; Selitar; Kranji. Johor, Mt. Austin. Kwala Kahang (Kelsall); Gunong Pulai. Pahang, Pekan; Telom. Malacca, Mt. Ophir; Kesang Batu. Selangor, Batu Caves at top (Kelsall). Perak, Bujong Malacca; Waterfall, Thaiping (Wray). Dindings, Pangkor (Scortechini). Penang, Batu Feringhi (Curtis).  
*Distrib.* Tenasserim, Java, Borneo.

(11) *D. albida* Griff. *Notulæ*, iv. 46; *King, l.c.* 588.

Slender creeper. Leaves flat fleshy, ovate acute, base round, slightly peltate, .5 to .75 in. long, .4 in. wide; petioles .1 to .15 in. long. Umbels few-flowered; rachis short; peduncle .5 in. long. Calyx-lobes ovate acute. Corolla urceolate, .15 in. long, throat villous, white with pink lobes, triangular. Corona-lobes hammer-shaped, the two arms deflexed. *Hab.* Mountains, more rarely on lofty trees in low country. Singapore, forest at Bajau. Johor, Gunong Pulai (King). Malacca, Gunong Tunduk, Mt. Ophir (Griffith). Pahang, Gunong Tahan. Selangor, Sempang Mines, Semangkok. Perak, Thaiping Hills (Scortechini); Bujong Malacca (Curtis); Ulu Batang Padang, Batu Putih (Wray).

The description of Griffith's *D. albida* is suspiciously like that of *Gaudichaudii*, and he says "in arboribus Malacca vulgatum," which *D. albidum* is not, but the leaves of *Gaudichaudii* are not cordate ovate, as he describes his species.

(12) *D. rhodantha* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 97. *D. rosea* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 31 (not of Schlechter).

Stem slender. Leaf-pairs 1.5 in. apart. Leaves ovate blunt sub-cordate, fleshy, .75 in. long, .5 in. wide; petioles .1 in. long. Peduncles stout, .75 in. long; pedicels .1 in. long. Flowers rose pink, .25 in. long. Calyx-lobes lanceolate blunt. Corolla urceolate, gradually narrowed from a swollen base to a tube with acute ovate short lobes, mouth villous. Corona-scales large, claw linear, limb reniform three-lobed, central lobe small, sub-ovate, laterals incurved ovate. Anther-appendages short. Pollinia subsessile on carrier. Follicle linear acuminate, 2.25 in. long. Seed oblong, papillose. *Hab.* Selangor on a tree, Sempang Mines, Semangkok Pass (Ridley).

(13) *D. singaporensis* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 31.

Slender creeper. Leaves orbicular-ovate, more rarely lanceolate acute, base round, .75 in. long, .5 in. wide, lanceolate ones 2 in. long, 1 in. wide; nerves invisible; petioles .12 in. long; peduncle short; pedicels short hairy; calyx-lobes ovate hairy. Corolla dilate at base, narrowed upwards, .25 in. long, pubescent; lobes linear blunt, hairy at tip. Coronal scales retuse at top with recurved linear arms. *Hab.* Singapore, Changi; Bukit Mandai (Ridley).

(14) *D. cordifolia* King and Gamble, *l.c.* 590.

Leaves fleshy coriaceous, ovate acuminate blunt, rounded or slightly cordate at base, 5- to 7-nerved from base, 1.5 to 2.5 in.

long, 1 to 1.75 in. wide; petioles .5 in. long. Peduncle stout, .5 in. long; umbels in pairs; rachises lengthening to .15 in. long. Calyx campanulate. Corolla-tube .1 in. long, glabrous inside and out, lobes .075 in. long. Corona-scales linear with a round top and decurved linear lobes. Stamen-appendages very short. *Hab.* High mountains. Pahang, K'luang Terbang (Barnes). Perak, Maxwell's Hill (Scortechini); Tea Gardens (corolla pubescent outside).

Barnes' plant has obtuse lanceolate leaves 3 in. long, 1 in. across, and longer pedicels.

(15) *D. monticola* King and Gamble, *l.c.* 591.

Trailing under shrub. Leaves fleshy, ovate to ovate-lanceolate acuminate, base round or narrowed, 1.5 to 3.5 in. long, .75 to 1 in. wide; petioles .25 in. long. Peduncles 1.75 in. long or less with a pair of short rachises at the end, .2 to .3 in. long; pedicels slender. Flowers pale green. Calyx puberulous outside. Corolla campanulate, .125 in. long, glabrous, lobes very short. Corona-scales linear with a sagittate head. Stamen-appendages very long acuminate. *Hab.* High mountains 3000 to 4900 ft. altitude. Selangor, Menguang Gasing (Kloss); Gunong Mengkuang Lebah (Robinson). Perak, Ulu Batang Padang 4900 ft. altitude (Wray); Gunong Berumbun.

(16) *D. fruticulosa* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 96.

Epiphytic woody shrub; stem over .12 in. through; branches slender. Leaves rather thin-textured when dry, elliptic blunt, narrowed at base; nerves invisible; 2 to 3 in. long, .75 to 1.10 in. wide; petioles .1 in. long. Racemes sessile, thick solitary or paired, .5 in. long. Pedicels very short. Calyx-lobes oblong blunt. Corolla-tube at base globose, abruptly narrowed to a cylindrical portion, lobes fleshy short acute with a deflexed tuft of hairs inside below each. Coronal scales with linear claw, limb broad, rounded, hastate. Stamen-column short; appendages blunt. *Hab.* Mountains; rare. Perak at Gunong Kerbau 4200 ft. altitude (Robinson).

(17) *D. acutifolia* Maingay in Hook. *F.B.I.* iv. 51; King, *l.c.* 590.

Slender twiner. Leaves coriaceous, lanceolate acuminate, base blunt; nerves and reticulations conspicuous when dry, 2.5 to 4 in. long, .75 to 1.25 in. wide; petioles .25 in. long. Peduncle 1.5 in. long; rachis short, thick. Corolla pale yellow, lobes pink, urceolate, mouth hairy, lobes villous. Corona-scales very thin, subulate from a broad base with 2 short spatulate, recurved arms. *Hab.* Hill forests 2000 ft. altitude. Malacca (Maingay). Perak (Scortechini). Penang, near Crag Hotel (Burkill).

(18) *D. ericæflora* Ridl. *Journ. F.M.S. Mus.* x. 146.

Long climber. Leaves fleshy lanceolate acuminate blunt, base round; nerves faint, 2 pairs radiating from base; 2.25 in. long,

1 in. wide; petioles .4 in. long. Racemes 2, thick, .5 in. long, divaricating from top of a peduncle .25 in. long. Bracts very numerous rounded, papery. Flower (apparently white) campanulate, .15 in. long; pedicels shorter. Calyx-lobes ovate blunt. Corolla conic, swollen at base, globose, narrowed upwards, lobes ovate acute, deep cleft, glabrous within. Corona-scales with a tall slender pedicel, top wider, sub-ovate with 2 long curved arms nearly as long as the pedicel. Staminal column short, broad, blunt, conic. Anther wings fleshy, rather narrow. Pollinia oblong ellipsoid; carrier minute. *Hab.* Mountains. Rare. Kedah, Gunung Bintang (Kloss).

(19) **D. Scortechinii** *King and Gamble, l.c. 592.*

Very slender with distant leaves, pendulous and sparsely rooting internodes, 2 to 4 in. long. Leaves fleshy, ovate-lanceolate (very narrow lanceolate in type), acuminate, base rounded, 2 to 2.5 in. long, .5 in. (.3 to .4 in.) wide; petioles .15 to .1 in. long; peduncle 3 in. long; rachis short; pedicels .05 in. long. Calyx-lobes ovate acute. Corolla urceolate, pubescent inside, .125 in. long, white lobes .1 in. long, villous inside, scarlet. Corona-scales short, anchor-shaped. *Hab.* Perak (Scortechini). Rare.

(20) **D. pubescens** *Ridl. Roy. As. Soc. S. Br. 57, p. 71.*

Stem pubescent. Leaves lanceolate, thin coriaceous acute, base round, hairy beneath and on edge with white hairs, 1.25 in. long, .5 in. wide; petioles .12 in. long. Peduncles .12 in. long, stout; pedicels .1 in. long. Calyx-lobes ovate hairy. Corolla gradually narrowed from a dilate base, lobes linear, glabrous, tube villous inside. Corona-scales spatulate with 2 long arms deflexed. *Hab.* Perak, Temengoh woods (Ridley).

(21) **D. tomentella** *Ridl. Journ. Roy. As. Soc. S. Br. 59, p. 137.*

Long slender climber, softly tomentose. Leaves fleshy lanceolate acute, base round, sparsely white hairy, .5 in. long, .16 in. wide; petioles .05 in. long. Peduncles .25 in. long; pedicels slender, .1 in. long. Calyx-lobes ovate, blunt, green. Corolla .1 in. long, pink and white, tube ovoid, lobes acute; mouth hairy. Corona-scales lanceolate elongate. *Hab.* Woods in open country on limestone rocks. Perlis, Bukit Lagi (Ridley).

(22) **D. tubuliflora** *King and Gamble, l.c. 592.*

Slender creeper wiry. Leaves fleshy drying thin, lanceolate or ovate acuminate, base round, .75 to 1.25 in. to 2 in. long, .3 to .6 in. wide; petioles pubescent, .1 to .25 in. long. Peduncles .15 in. long or none; rachis up to .25 in. long. Calyx-lobes ovate pubescent. Corolla tubular flask-shaped, narrowed gradually upwards to the linear hairy lobes, tube .3 to .4 in. long, lobes .1 to .15 in. long. Corona scales narrow, stalked with a broad horse-shoe-shaped top. Staminal column long. Follicle slender, 2 in. long, .1 in. through. Seed minute linear. *Hab.* Mountains.

Pahang, Telom Ridge (Ridley). Perak (Scortechini); Gunong Kerbau (Robinson).

(23) *D. parvifolia* *Ridl. Journ. F.M.S. Mus.* v. 41.

Stem very slender. Leaves ovate acute, base round; nerves visible (dry), .5 in. long, .3 in. wide; petioles .1 in. long. Peduncles .1 in. long or 0; racemes very short, many-flowered; pedicels slender, .2 in. long. Calyx-lobes ovate. Corolla campanulate, .1 in. long, white, lobes acute, triangular deep pink. Corona none. Follicle narrow lanceolate acuminate, 1.75 in. long. Seed oblong. *Hab.* Mountains. Rare. Selangor, Gunong Mengkuang Lebah (Robinson).

(24) *D. viridiflora* *Ridl. Journ. F.M.S. Mus.* x. 146.

Long slender creeping glabrous plant rooting at distant points. Leaves fleshy, lanceolate acuminate blunt, base narrow; nerves invisible, .75 in. long, .25 in. wide; petioles .1 in. long. Peduncles .15 in. long; racemes .1 in. long. Flowers .15 in. long; pedicels very short. Sepals very short, lanceolate linear blunt. Corolla flask-shaped, base wide, gradually narrowed to tip, green turning pinkish, glabrous within, lobes short sub-acute. Corona 0. Staminal-column stout, wings rather large, yellowish coriaceous. *Hab.* Woods in lowland country, rare. Kelantan, Chaning (Ridley).

#### DOUBTFUL AND EXCLUDED SPECIES

*D. DESCHAMPSI* *King and Gamble, l.c.* 593. Slender twiner. Leaves coriaceous elliptic-ovate acute, base round; nerves 5 pairs with reticulations prominent when dry; 1.5 to 3 in. long, .75 to 1 in. wide; petioles thick, .15 to .25 in. long. Peduncles 1 in. long, rachis lengthening to .75 in. long. Singapore (Deschamps).

I have not seen this and the flowers are unknown.

*D. WALLICHII* *Wight, Contrib. Singapore Wall. Cat.* 8183 is a young stage of a *Ficus*.

*LEPTADENIA RETICULATA* *Wight, Contrib.* 47; *King, l.c.* 595. Singapore (Lobb) is certainly erroneously localised.

#### 30. *PHYSOSTELMA*, Wight.

Twining; leaves rather thin. Flowers thin-textured. Corolla campanulate not fleshy, shortly toothed. Corona lower lobes up-curved, upper ones erect. Pollinia oblong truncate with a thin transparent outer edge; caudicle short thick, carrier brown, rather large. Species about 6, Malay islands and Polynesia.

Distinguished from *Hoya* by the thin leaves and thin campanulate corolla and horn-like up-curved corona processes.

Flowers 1.5 in. across	.	.	.	.	.	(1) <i>P. Wallichii</i>
Flowers .3 in. across	.	.	.	.	.	(2) <i>P. Wrayi</i>

(1) **P. Wallichii** *Wight, Contrib.* 40. *Hoya campanulata* *Bl. Bijdr.* 1064; *King, l.c.* 578; *Bot. Reg.* 54; *Bot. Mag. t.* 4545.

A slender wiry terrestrial twiner. Leaves thinly fleshy, elliptic-oblong acuminate, base cuneate; nerves 6 to 7 pairs, inarching in an intra-marginal nerve far from the edge, 2.5 to 6.5 in. long, 1 to 2.5 in. wide; petioles .25 in. long. Peduncles 1 to 2 in. long; pedicels very slender, 1 to 1.25 in. long. Calyx-lobes subulate. Corolla campanulate thin, about 1 in. across, creamy white, lobes boat-shaped. Corona, lower lobes spreading, up-curved, upper ones erect. Follicle straight, cylindric, 6 to 8 in. long, .2 in. wide, green striped white. *Hab.* Sandy spots near the sea, and thickets in mountain forests. Singapore, Serimbun; Tampinis road; Kranji. Pahang, Tahan River. Perak, Thaiping Hills; Bujong Malacca; near Tapah; Relau Tujur (Wray). Dindings, road to Sungei Rotan (Curtis); Lumut. *Distrib.* Java, Sumatra, Borneo.

(2) **P. Wrayi** *Ridl.* *Hoya Wrayi* *King and Gamble, l.c.* 579.

Leaves thin fleshy, lanceolate blunt, base long attenuate; nerves very inconspicuous, 4 pairs; 3.5 to 4 in. long, 1 to 1.25 in. wide; petioles thick rugose. Inflorescence not seen; pedicels 1 in. long. Calyx-lobes linear-oblong. Corolla campanulate-rotate, .3 in. across, edges fimbriate crisp, villous inside. Corona processes lower lobe an up-curved spur, upper similar erect; filament tube free from corona. Pollinia with inflated cup-like caudicles. *Hab.* Perak, Batang Padang (Wray). Very rare.

### 38. PYCNORHACHIS, Benth.

A rough hairy twiner. Flowers in reflexed pairs spirally arranged round the long fleshy raceme, solitary or 2 or 3 on a peduncle. Calyx 5-lobed with 5 to 10 scales. Corolla turbinate, tube short, lobes valvate, purple. Corona-scales 5, spreading at base of column; anthers erect with hyaline appendages. Pollinia 1 in each cell, cylindric waxy erect, caudicle short. Carpels 2, sunk in tube; style apex conical. Fruit curved, smooth cylindric. Seed plumed. Species 1.

(1) **P. Maingayi** *Hook. fil. F.B.I.* iv. 63; *King, l.c.* 594.

Leaves rather thin, oblong-ovate abruptly cuspidate acuminate, base shortly cordate hairy all over, 4 to 6 in. long, 1.5 to 2 in. wide; petioles .25 in. long. Racemes 3 to 6 in. long; peduncle 1 to 2 in. long. Calyx minutely red-hairy outside. lobes linear-lanceolate, .1 in. long. Corolla deep purple, tube very short with a fringed annulus, lobes .25 in. long, subulate lanceolate, base broad. Follicle 5 in. long, .7 in. wide, curved, glabrous. *Hab.* Malacca (once collected by Maingay). Extremely rare.

### 32. CEROPEGIA, Linn.

Twining herbs, root-stock tuberous or with fleshy roots. Flowers moderate-sized or large, racemose or umbellate. Calyx

5-lobed. Corolla tubular, base inflated, lobes free or connate at tips. Corona double, outer cup-shaped, entire or 5- to 10-toothed, inner of processes adnate to outer corona at base. Stamen column from above base of swollen part of tube; anthers erect, appendages 0. Pollinia solitary in cell. Follicles 1 or 2 lanceolate or fusiform acuminate. Species over 80, Africa, Indo-Malaya, Australia.

(1) *C. lucida* Wall. *Pl. As. Rar.* ii. 33, t. 139; *King, l.c.* 597.

Roots glabrous, slender climber. Leaves fleshy membranous, ovate or oblong lanceolate acuminate, base acute, 4 to 7 in. long, 1.5 to 3 in. wide; petioles .5 to 1.5 in. long. Cymes 1 to 3 together, 3 in. long; peduncles 1 to 2 in. long, racemes .25 to .5 in. long. Corolla 1.5 to 2 in. long, curved broad, funnel-shaped below the lobes green spotted purple in the tube, lobes lanceolate inflexed at the long ciliate brown tips. *Hab.* Penang, at Penara Bukit (Curtis) at 1000 ft. altitude. Rare and local.

### ORDER XCIII. LOGANIACEÆ.

Shrubs, trees or climbers, or herbs. Leaves opposite, simple; stipules present or absent. Flowers bisexual, regular in terminal or axillary, simple or paniced cymes. Calyx inferior, imbricately 4- to 5-lobed or toothed. Corolla tubular, funnel-shaped or campanulate 4- or 5-insert on tube; anthers longitudinally dehiscing. Carpels 2, connate; ovules 1 or more in a cell, placentas on septum or based on inner angle; style simple; stigma capitate or bifid. Fruit capsule or berry, 1- to many-seeded. Species 450, tropical or sub-tropical.

Ovules many in a cell.

Herbs; capsule didymous.

Flowers 5-merous . . . . . 1. MITREOLA  
Flowers 4-merous . . . . . 2. MITRASACME

Shrubs or trees.

Fruit capsular, 2-celled. Shrubs . . . . . 3. BUDDLEIA  
Fruit capsular, 2-celled. Trees . . . . . 4. NORRISIA

Fruit baccate.

Shrubs epiphytic or trees; flowers large, fleshy;  
leaves thick fleshy . . . . . 5. FAGRÆA

Trees; leaves thinly coriaceous; flowers membranous . . . . . 6. CYRTOPHYLLUM

Woody climbers; very bitter, with tendrils . . . . . 7. STRYCHNOS

Ovule 1 in a cell. Shrubs . . . . . 8. GAERTNERA

#### 1. MITREOLA, Linn.

Herb with opposite, membranous leaves and small stipules. Cymes di- or tri-chotomous, terminal and axillary. Flowers small, white, second. Sepals lanceolate. Corolla urn-shaped, lobes valvate, 5. Stamens 5, included. Ovary 2-celled; style 2, short, at first connate then divergent. Capsule ovoid laterally compressed,

2-horned or truncate, dehiscent from above downwards. Seeds numerous, small. Species 4, 2 American, 2 Asiatic.

(1) *M. oldenlandioides* Wall. *Cat.* 4350; *Hook. Ic. Pl.* 827; *King, l.c.* 598.

Annual 6 to 18 in. tall. Leaves ovate or ovate-lanceolate, narrowed at both ends, 1 to 2 in. long, .5 to 1 in. wide; petioles .25 in. long. Cymes peduncles slender, 1 in. long; branches .5 in. long or more, dichotomous. Flowers sub-sessile, under .1 in. long. Capsule .1 in. or more long, 2-horned. *Hab.* Lankawi, Kwah (Curtis). *Distrib.* Indo-Malaya, Australia.

The flowers are usually described as white, Curtis records them as blue.

## 2. MITRASACME, Labill.

Small herbs. Leaves opposite; stipules forming a sheath. Flowers solitary in terminal cymes or umbels. Calyx 4-fid. Corolla tubular, lobes 4. Stamens 4, included; filaments adnate to tube; anthers ovate cordate. Ovary 2-celled; styles 2, connate, separating from the base upwards; stigma capitate or 2-lobed. Capsule sub-globose, truncate or 2-horned. Seeds numerous, minute.

Leaves in a rosette at base . . . . . (1) *M. nudicaulis*  
 Leaves in distinct pairs; cymes lax, terminal . . . . . (2) *M. polymorpha*  
 Leaves in pairs; flowers solitary axillary . . . . . (3) *M. alsinoides*

(1) *M. nudicaulis* Reinw. *Bl. Bijdr.* 849; *Hook. fil. F.B.I.* iv. 80.

Whole plant 3 to 5 in. tall, slender. Leaves at base of stem few, sub-sessile elliptic, hairy, .3 in. long; stem slender with a terminal, lax cyme of few white flowers; pedicels .5 to 1.5 in. long, glabrous. Calyx-lobes acute. Corolla .13 in. long. Capsule .1 in. long. *Hab.* Rare. Inalang grass fields. Malacca, Bukit Sialang, near Sempang Ampat (Burkill). *Distrib.* India, China, Malaya.

(2) *M. polymorpha* Br. *Prodr.* 452; *King, l.c.* 599. *M. malaccensis* Wight, *Ic.* 1601.

Whole plant 3 to 9 in. tall, base (about one-third) leafy. Leaves in pairs, sessile, oblong, blunt, hairy, 2 to 3 in. long and .05 in. wide. Cymes lax, terminal and on the ends of a few branches; pedicels slender, .25 in. long. Flowers .25 in. long, nodding, white and buff. Calyx-lobes triangular acute. Corolla bell-shaped, hairy in throat. Capsule globular, .1 in. across. *Hab.* Grassy spots. Malacca (Griffith); Sungei Baru Ulu; Bukit Sabukor (Goodenough). Pahang, Pekan (Ridley). *Distrib.* Indo-Malaya, China and Australia.

(3) *M. alsinoides* Br. *Prodr.* 453; *Hook. fil. F.B.I.* iv. 80.

Branched annual about 6 in. tall or less, glabrous. Leaves .15 to .25 in. long, sessile, oblong. Pedicels slender, solitary or 2 to 3 together in upper axils, .2 in. long. Calyx acutely lobed. Corolla white, .1 in. long or more. Capsule .1 in. long; style persistent. *Hab.* Rice-fields, Kelantan at Kota Bharu (Ridley).

A very small plant resembling an *Oldenlandia*. Our form about 3 in. tall. *Distrib.* India, China, Malaya, Australia.

### 3. BUDDLEIA, Linn.

Herbs, shrubs or trees. Leaves opposite. Cymes in a terminal thyrsoid panicle (or globose or corymbiform cymes). Calyx campanulate, 4-lobed. Corolla tubular, lobes 4 imbricate. Stamens 4, adnate to tube. Ovary 2-celled; style linear clavate. Fruit a 2-valved capsule. Seeds many, oblong or fusiform. Species about 100, Old World tropics. *B. madagascariensis* Lam. a shrub, sarmentose with orange flowers in dense spikes, was formerly planted largely on the top of Penang Hill. Native of Madagascar.

(1) *B. asiatica* Loureiro *Fl. Cochinchine*, 72; *King, l.c.* 600.

Shrublet 1 to 6 ft. or more tall, white-pubescent on stem and underside of leaves. Leaves membranous lanceolate, long acuminate, base narrowed, glabrous except midrib above, minutely pubescent beneath, 2.5 to 6 in. long, .6 to 1.5 in. wide; petioles .1 to .35 in. long. Inflorescence terminal of numerous 3-flowered cymules arranged in a panicle of 4 or 5 spikes, 5 to 9 in. long. Flowers .15 in. long, white. Calyx pubescent, half as long as corolla-lobes, acuminate. Corolla glabrous. Capsule .2 in. long. *Hab.* Not common, in rice fields. Perak, Larut (Kunstler). Temengoh. Penang (Wallich). *Distrib.* Indo-Malaya.

In other countries this forms a bush up to 15 ft. tall.

### 4. NORRISIA, Gardn.

Trees. Leaves opposite; petioles dilate at base and subconnate. Flowers small, white in dense terminal corymbs. Calyx small, 5-lobed. Corolla-tube narrow, lobes 5, oblong valvate. Stamens 5 on corolla throat; filaments slender, exsert; anthers ovate. Ovary 2-celled; style filiform; stigma capitate. Capsule oblong septically 2-valved, carpophore free. Seeds numerous with an elongate wing at each end. Species 1.

(1) *N. malaccensis* Gardn. *Hook. Kew. Journ.* i. 327; *King, l.c.* 602.

Tree about 60 to 80 ft. tall. Leaves thin coriaceous, ovate or elliptic, acute, base acute, glabrous above, midrib and nerves 4 to 6 pairs, puberulous beneath or all pubescent, 1.5 to 2.5 in. long, .85 to 1.25 in. wide; petioles .25 in. long. Corymbs 1 to 1.5 in. across; peduncles and branches densely tomentose, 1 in. long. Flowers sub-sessile. Calyx cupular. Corolla .25 in. long, tomentose. Capsule .25 in. long. *Hab.* Forests.

var. (a) *malaccensis*. Flowers smaller and fruit smaller.

var. (b) *major*, *N. major* Solereder, *Pflanzenfamilien* iv. 2, p. 37; *King, l.c.* 602. The commonest form. Flowers and fruits rather



larger. Singapore, Garden Jungle; Changi (*b*). Malacca (Griffith); Sungei Hudang [Derry (*a*)]; (Goodenough) (*b*). Negri Sembilan, Bukit Kupayiang (Cantley), Selangor, Sungei Buloh (Burn-Murdoch). Perak (Kunstler). *Distrib.* Borneo. *Native name:* Kayu Karkaras.

### 5. FAGRÆA, Thunb.

Epiphytic shrubs eventually becoming trees by killing the host, or erect shrubs or trees. Leaves stiffly coriaceous, usually large and rather fleshy; petioles dilate at base. Cymes terminal, simple or corymbose, or racemose. Flowers white, medium to very large, fleshy. Calyx deeply 5-lobed, lobes broad, coriaceous imbricate. Corolla tubular, salver-shaped or funnel-shaped, lobes broad, round. Stamens 5, filaments long from anthers versatile, not exsert. Ovary 2-celled; ovules numerous; style filiform. Stigma peltate. Berry large, grey, occasionally dehiscent irregularly. Seeds very numerous, very small immersed in pulp. About 50 species, Indo-Malaya, China, Australia.

i. EU-FAGRÆA. Epiphytic shrubs with large coriaceous leaves and fleshy white flowers.

- |   |                            |
|---|----------------------------|
| Tube of corolla cylindrical, limb salver-shaped.                                  |                            |
| Leaves elliptic, thin cuspidate . . . . .   | (1) <i>F. tubulosa</i>     |
| Leaves stiff coriaceous obovate, tube 2 in. long,<br>limb as wide . . . . .       | (2) <i>F. gardenioides</i> |
| Leaves stiff elliptic, tube 4 in. long . . . . .                                  | (3) <i>F. carnosa</i>      |
| Leaves stiff orbicular, tube 6 in. long . . . . .                                 | (4) <i>F. rotundifolia</i> |
| Tube of corolla funnel-shaped.  |                            |
| Limb 8 to 12 in. across; petioles auricled . . . . .                              | (5) <i>F. auriculata</i>   |
| Limb 4 in. across; petioles not auricled . . . . .                                | (6) <i>F. Curtisii</i>     |
| Limb 2 in. across; leaves obovate large . . . . .                                 | (7) <i>F. Ridleyi</i>      |
| Limb 1.5 in. across; leaves oblong, rather<br>flaccid . . . . .                   | (8) <i>F. oblonga</i>      |
| Limb under 1 in. across; leaves obovate to<br>4 in. wide . . . . .                | (9) <i>F. vaginata</i>     |
| Limb under 1 in. across; leaves oblanceolate<br>acuminate, 2.5 in. wide . . . . . | (10) <i>F. obovata</i>     |

ii. RACEMOSÆ. Terrestrial trees or shrubs; flowers rather small, in racemes of cymes.

- |   |                           |
|---|---------------------------|
| Inflorescence dense; flowers .75 in. across, flesh-<br>colour . . . . .       | (11) <i>F. racemosa</i>   |
| Inflorescence lax; cymes distant.   |                           |
| Flowers 1.5 in. across; leaf broad . . . . .                                  | (12) <i>F. Maingayi</i>   |
| Flowers .75 in. across; leaf narrow; flowers<br>white . . . . .               | (13) <i>F. pauciflora</i> |
| Flowers .3 in. across; leaf rather thin, elliptic<br>to 5 in. long . . . . .  | (14) <i>F. ligustrina</i> |
| Corymbs large; big thorny tree; leaves very<br>large, 12 in. across . . . . . | (15) <i>F. crenulata</i>  |

(1) *F. tubulosa* *Bl. Ann. Mus. Bot. Lugd. Bat.* i. 167; *King, l.c.* 604.

Straggling climber. Leaves thinly coriaceous elliptic abruptly cuspidate, base cuneate; nerves almost or quite invisible; 4 to

8 in. long, 1.75 to 2.5 in. wide; petioles .8 in. to 1 in. long. Flowers in a crowded head of 3 or 4, sessile. Calyx .4 in. long, tubular, teeth short. Corolla 3 in. long, tube slender, cylindrical, lobes oblong-lanceolate, .45 in. long. *Hab.* Rare. Hill forests, Perak, Bujong Malacca (Ridley, Scortechini and Kunstler). *Distrib.* Bangka, Sumatra.

(2) **F. gardenioides** *Ridl. Journ. F.M.S. Mus.* v. 42.

Shrub with stout branches. Leaves oblong obovate, tip round, base narrowed, decurrent on petiole, very fleshy, coriaceous; nerves invisible; 3 to 5.5 in. long, 1.5 to 3 in. wide; petioles very thick, 1 in. long, sheathing at base. Cymes of 3 flowers sessile; pedicels very thick, 1 in. long. Calyx 1 in. long, lobes broad truncate rounded. Corolla-tube cylindrical, 2 in. long, lobes rounded obovate 1 in. long, over .5 in. wide. Stamens short exsert. Fruit ellipsoid, 1.75 in. long. *Hab.* Mountains. Rare. Selangor, Gunung Mengkuang Lebah (Robinson).

(3) **F. carnosa** *Jack. Mal. Misc.* ii. 7, p. 81; *King, l.c.* 604.

Shrub. Leaves very coriaceous elliptic or sub-ovate, tip round; nerves invisible, midrib prominent; 3 to 4 in. long, 2 to 2.5 in. wide; petioles thick, .4 to .5 in. long. Flowers solitary or in pairs, terminal sub-sessile. Calyx nearly 1 in. long, lobes blunt oblong. Corolla-tube 4 in. long, .35 in. through, limb 1.25 in. across. Stamens sub-sessile in mouth of tube, included. Fruit as big as a small hen's egg. *Hab.* Thaiping, Waterfall (Wray). Dindings, Lumut. *Distrib.* Burma.

(4) **F. rotundifolia** *Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 117.

Shrub. Leaves very coriaceous nearly orbicular, truncate rounded or retuse with a short point, midrib elevate on both sides; nerves 3 pairs faint on upper side, invisible below; base slightly narrowed 3 in. long and wide; petioles .5 in. long. Flowers solitary, white. Calyx-lobes broad oblong, tip rounded. Corolla-tube coriaceous, 6 in. long, .25 in. through, lobes obovate 1 in. long; limb over 2 in. across. Stamens protruded from mouth of tube. *Hab.* Tringganu, Bundi (Rostados).

This may be only a very large form of the last species with round leaves.

(5) **F. auriculata** *Jack, Mal. Misc.* ii. No. 7, 82; *Wall. Pl. As. Rar.* iii. 15, t. 229. *Bl. Rumphia t.* 72; *King, l.c.* 605; *Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 119. *F. imperialis* *Miq. Ann. Mus. Bot. Lugd. Bat.* ii. 226, t. 5.

At first an epiphytic shrub, then, by killing its host, a tree 30 ft. or more tall, wide spreading. Leaves coriaceous, oblanceolate or obovate sub-acute narrowed to base; nerves 6 to 8 pairs conspicuous beneath; 12 to 14 in. long, 4 in. wide or less; petioles 1.25 in. long, with thick large auricles at base. Calyx ellipsoid, 3 in. long, 2 in. across. Corolla-tube funnel-shaped, 6 in. long,

3 in. across the mouth, limb 8 to 12 in. across, lobes 3 in. wide, .25 in. thick, all leathery, white. Stamens 3 in. long. Style 4 in. with a peltate stigma .5 in. across or more, emerald green. Fruit 6 in. long, blunt conic, surrounded by enlarged sepals at base, lead-colour, dehiscing into 5 lobes, lobes inside with orange pulp and minute seeds. *Hab.* Open country. Singapore, Pulau Ubin. Johor Lama; Sungei Tebrau; Batu Pahat. Pahang, Pekan. Malacca, Alor Gajah Road (Bland); Merlimau (Derry). Dindings, Bruas. *Distrib.* Java to Philippines, Cambodia.

There is another form, common as a small tree, in which the flowers and leaves are considerably smaller than the dimensions given above.

(6) **F. Curtisii** King and Gamble, *l.c.* 605.

Low spreading tree. Leaves coriaceous, elliptic-ovate or oblanceolate blunt short acuminate, base narrow; nerves invisible, midrib prominent; 4 to 8.5 in. long, 2.25 to 3 in. wide; petioles .5 to .75 in. long, base sheathing shortly. Flowers in terminal pairs, 3.5 in. long; pedicels .5 in. long. Calyx .7 to .9 in. long, campanulate, lobes round. Corolla thick coriaceous, 3.25 in. long, tube funnel-shaped, 1.75 in. long, limb 4 in. across, lobes broad elliptic, 1 in. wide. Fruit globose, 1.5 in. through. *Hab.* Woods, Kelantan, Chaning near the river. Lankawi, Telok Woh (Curtis); Pulau Segai (Haniff).

(7) **F. Ridleyi** King and Gamble, *l.c.* 612; *Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 118.

Large spreading epiphytic shrub 12 to 14 ft. tall. Leaves coriaceous, glaucous beneath, obovate narrowed to base, apex rounded with yellow scattered glands beneath, visible above, 9 in. long, 5.5 in. wide; petioles very stout, 1.5 in. long. Buds covered with a yellow resin. Flowers in terminal cymes of 4; peduncles short. Calyx-lobes ovate blunt, nearly 1 in. long. Corolla-tube funnel-shaped, 2 in. long, orange green, lobes oblong blunt, emarginate, white shaded green, 1 in. long, .5 in. wide. Stamens long, white; anthers violet. Berry ovoid, grey green, .2 in. long. *Hab.* Rare in forest. Singapore, Bukit Timah (Ridley). Malacca, Mt. Ophir (Ridley).

(8) **F. oblonga** King and Gamble, *l.c.* 612; *Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 121.

Epiphytic shrub. Leaves thinly coriaceous, flaccid, elliptic-oblong abruptly acuminate, base cuneate, midrib prominent; nerves invisible; 5 to 11 in. long, 1.75 to 2.75 in. wide; petioles .75 to 1.5 in. long. Flowers in axillary pairs on branch-ends; peduncles stout, 1 in. long; pedicels .25 in. long. Calyx-lobes ovate blunt, .25 in. long. Corolla white, tube straight, 1 in. long, lobes .75 in. long, .5 in. wide, oblong obovate round. Stamens included. Style 1 in. long. *Hab.* Mountains about 3500 to 5000 ft. altitude. Selangor, Semangkok Pass; Pahang, Telom (Ridley).

Perak, Thaiping Hills from Tea Gardens to the Cottage (all collectors).

(9) **F. vaginata** *King and Gamble, l.c.* 610.

Medium tree or large shrub. Leaves thick coriaceous elliptic or obovate, round at tip; nerves 6 to 7 pairs prominent beneath; 5 to 9 in. long, 2.75 to 4 in. wide; petioles 1 in. long, expanding to a sheath below. Corymbs 4 in. long and wide; branches 1.75 in. long or less with 3-flowered cymes; pedicels .5 in. long. Calyx .8 to .9 in. long, tubular below, dilate above. Corolla 1.5 in. long, tube .5 in. wide, funnel-shaped. Fruit ovoid conic, 1.75 in. long. *Hab.* Forests. Selangor, Rawang. Negri Sembilan, Tampin Hill. Perak, Ulu Bubong (Kunstler); Jenah (Wray). *Distrib.* Java.

(10) **F. obovata** *Wall. in Roxb. Fl. Ind. (ed. Carey), ii.* 33; *King, l.c.* 606.

Shrub, epiphytic or eventually terrestrial. Leaves coriaceous, oblong-oblancheolate to elliptic acuminate base, narrowed; nerves nearly invisible, midrib prominent, 3.5 to 5 in. long, 1.5 to 2.25 in. wide; petioles .6 to 1 in. long. Flowers in cymes of 4 to 5, sessile or peduncled. Calyx .5 to .75 in. long, tubular lobes oblong blunt. Corolla base tubular then funnel-shaped, .75 in. long, limb .5 in. wide, lobes oblong blunt. Stamens included. Fruit elliptic-ovoid. *Hab.* Common in forest, often on rocks. Singapore (Wallich); Kranji; Johor, Castlewood; Tanjong Bunga. Malacca, below Gunong Mering, Mt. Ophir; Machap-Tebong Road (Derry). Selangor, Kwala Lumpur (Curtis); Gombak (Burn-Murdoch). Perak, Ulu Bubong; Goping (Kunstler); Kamunting and Asam Kumbang and Batu Togoh (Wray). Penang Hill. Kedah, Pulau Song-Song (Curtis). *Distrib.* Indo-Malaya. *Native name:* Akar Tunku Biawak.

(11) **F. racemosa** *Jack, Roxb. Fl. Ind. ii.* 35; *King, l.c.* 608.

A large bush with stout pale stems or tree 12 to 30 ft. tall. Leaves coriaceous, elliptic shortly abruptly blunt-acuminate, base shortly narrowed or oblanceolate; nerves prominent, 5 to 7 pairs, midrib stout; 6 to 10 in. long, 2.25 to 4 in. wide. Peduncles 2 to 3 in. long. Flowers in dense racemes of very shortly peduncled or sessile cymes of 3, numerous, whole raceme 1.5 in. long, sometimes lengthening to 3 in. Calyx obovoid, lobes rounded at tip, .25 in. long. Corolla flesh-colour, tube .75 in. long, base narrow cylindrical, above broad funnel-shaped, lobes rounded, .5 in. long, .2 in. wide. Stamens included. Fruit .5 in. long, globose. *Hab.* Common in open marshy country. Singapore, Pulau Ubin; Johor, Kwala Sembrong (Kelsall); Kota Tinggi. Pahang, Tahan River, and along Pahang River. Malacca, Selandor (Cantley); Alor Gajah (Griffith). Machap and Batang Malacca (Derry). Selangor, Kwala Lumpur; Dusun Tua; Ulu Selangor. Negri Sembilan. Bukit Sulu; Bukit Kapayung (Cantley). Perak, Thaiping Waterfall (Wray); Goping (Kunstler). Kedah, Yan. Tringganu, Bundi

(Rostados). Penang (Wallich). *Distrib.* Borneo. *Native names:* K'lu Payam; Mumpulih.

(12) **F. Maingayi** Clarke in *Hook. fil. F.B.I.* iv. 84; *King, l.c.* 608.

Tree 40 to 50 ft. tall. Leaves very coriaceous, oblong blunt, short apiculate, base round; nerves 5 to 8 pairs, conspicuous beneath; 7 to 10 in. long, 2.75 to 4 in. wide; petioles .5 to .9 in. long, very thick. Inflorescence a raceme of cymes in opposite pairs, rachis stout, 4 in. long; branches thick, .1 or .2 in. long; pedicels .3 in. long. Calyx globose, lobes round ovate, .5 in. long. Corolla funnel-shaped, 1.75 in. long, limb 1.5 in. across, lobes broad



FIG. 110.—*Fagraea pauciflora*.

blunt. Stamens included. *Hab.* Not common, in open country or forests. Malacca (Maingay); Bukit Sadanen (Derry). Negri Sembilan, Seremban; Senawang (Foxworthy). Selangor, Ulu Selangor (Kunstler). *Native name:* Lembusu.

(13) **F. pauciflora** Ridl. *F. racemosa* var. *pauciflora* King and Gamble, *l.c.* 609.

Slender little-branched shrub about 8 ft. tall. Leaves thin coriaceous, elliptic-oblong abruptly cuspidate, base round; nerves 6 to 7 pairs, prominent beneath, 4 to 6 in. long, 2.5 to 3.5 in. wide; petioles thick, .2 in. long. Inflorescence of a slender raceme of distant sessile cymes of 3 flowers in opposite pairs, 6 in. long on a 3 in. peduncle; pedicels .2 in. long. Calyx-lobes .15 in. long, round ovate. Corolla white, tube cylindric at base and dilate

funnel-shaped above, .75 in. long, limb 1.25 in. across, lobes .2 in. long and as wide, round. Stamens included. *Hab.* In wet dense forests. Singapore, Bukit Panjang; Bukit Timah; Kranji; Bukit Mandai. Johor, Tanjong Kupang. Pahang, Tahan River; Labong, Endau (Evans). Perak, Larut (Kunstler); Thaiping hills at base. *Distrib.* Sumatra, Borneo. *Native name*: Membera Gading.

(14) *F. ligustrina* Bl. *Rumph.* ii. 33; *King, l.c.* 609.

A tree about 30 ft. tall. Leaves coriaceous sometimes rather thin, elliptic abruptly short cuspidate, base shortly cuneate; nerves 4 pairs inarching far from edge; 3 to 3.75 in. long, 1 to 2 in. wide; petioles .25 to 3 in. long. Peduncles 1.5 to 2 in. long; lower pair of cymes .5 in. from the upper ones which are crowded together, all sessile, 3-flowered. Calyx .15 in. long, campanulate lobes very short. Corolla 1 in. long, tube very slender at base, funnel-shaped at top, lobes .05 in. long, limb .3 in. across, white. Stamens exsert. Fruit ovoid pointed, .3 in. long. *Hab.* Very local, in low country, open spots near woods. Singapore (Lobb); Changi; Bidadari (Ridley). *Distrib.* Bangka.

Blume described this from a New Guinea plant, and it is improbable that his *F. ligustrina* was the Singapore plant, but his description suits this plant very well; no type of his is to be seen.

(15) *F. crenulata* Maing. in *Hook. fil. F.B.I.* iv. 83; *King, l.c.* 610.

A tall tree with distant horizontal spreading branches, base of stem thorny, about 30 to 40 ft. tall and 12 in. or more through. Leaves coriaceous, round obovate, narrowed to broad base, sessile, 15 in. long, 12 in. or more across; nerves 4 to 5 pairs very prominent. Corymbs about 6 in. across, very many-flowered; peduncle 3 in. long. Flowers 1 in. across, flesh-colour, sessile or short-pedicelled. Calyx .35 in. long, campanulate, lobes blunt. Corolla 1.25 in. long, funnel-shaped. Fruit 1 in. long, greenish. *Hab.* Along tidal rivers, in swampy ground. Malacca, Ujong Pasir (Derry). Selangor, Klang; Ulu Selangor; Jugra (Foxworthy). Perak (Scortechini). Penang in town. Kedah, Alor Sta. *Native names*: Malebera; Malbeira. *Use*: The timber valued for piles, if used with the bark on, as it resists teredo.

#### DOUBTFUL SPECIES

*F. lanceolata* King and Gamble, *l.c.* 607 (not of Blume). Epiphytic creeper 40 ft. long. Leaves coriaceous thick and fleshy, oblanceolate blunt, narrowed to base, sub-sessile, very dark when dry, 2.5 to 4 in. long, 1.25 to 1.5 in. wide. Flowers apparently solitary, not seen. Calyx in fruit obconic, lobes rounded. Fruit ovoid-oblong, 1.5 in. through, glossy bluish green. *Hab.* Perak (Wray); Larut (Kunstler).

This is certainly not the thin acuminate-leaved *F. lanceolata* of Bl., but until flowers are collected I am unwilling to give it a new name.

## 6. CYRTOPHYLLUM, Reinwdt.

Big or medium trees. Leaves thin sub-coriaceous, small lanceolate. Flowers white or pale yellow medium size in corymbs axillary and terminal. Corolla thin membranous, salver-shaped. Stamens long exsert, from top of the tube. Style exsert. Berry small bilocular, many-seeded. Species 4 or 5, Malayan.

Leaves coriaceous, lanceolate; flowers in peduncled cymes of 3 . . . . . (1) **C. lanceolatum**

Leaves rather thin lanceolate cuspidate.

Medium tree; flowers yellowish white; corolla-tube slender; berries red . . . . . (2) **C. peregrinum**

Gigantic tree; flowers yellow; berries yellow; corolla-tube short . . . . . (3) **C. giganteum**

(1) **C. lanceolatum** DC. *Prodr.* ix. 31. *Fagræa Wallichiana Benth. Journ. Linn. Soc.* i. 98; *King, l.c.* 607.

A tall tree. Leaves thin coriaceous, elliptic-lanceolate acuminate, base narrowed decurrent on petiole; nerves 4 to 5 pairs elevate beneath, inarching, midrib elevate below; 2.25 to 3 in. long, .6 to 1.1 in. wide; petioles .3 to .5 in. long. Flowers in terminal cymes of 3; peduncles 1 in. long; pedicels .25 in. long. Calyx .25 in. long, teeth very small. Corolla-tube cylindrical below, funnel-shaped above, .75 in. long, lobes oblong, .2 in. long, blunt. Stamens filiform, long exsert. Fruit ellipsoid, .5 in. long. *Hab.* Penang (Wallich), Moniot's Road and the hill (Curtis and all collectors). *Native name*: Temusu.

(2) **C. peregrinum** Bl. *Bijdr.* 1022. *Fagræa fragrans Roxb. Fl. Ind.* ii. 32; *King, l.c.* 611 (*partly*); *Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 121.

Tree about 60 ft. tall, 1 to 2 ft. through, bark rough irregularly grooved. Leaves elliptic acuminate, base narrow, edges straight; nerves 8 pairs; 2.25 to 4 in. long, 1.4 in. wide; petioles .3 to .6 in. long. Cymes corymbose, pendent 20- to 30-flowered. Calyx-lobes short ovate. Corolla-tube .25 in. long, funnel-shaped, creamy white, lobes oblong, reflexed, blunt as long. Stamens long, exsert. Berry .2 in. through, globose, scarlet. Seed very small, quadrate. *Hab.* Open country, secondary scrub. Singapore, Tanglin district. Pahang, Pekan. Malacca, Merlimau. Selangor, Sungei Buloh (Foxworthy). Dindings, Lumut; Pangkor. Province Wellesley. Penang, Telok Bahang (Curtis). Perlis, Kanga. *Distrib.* Cambodia, Borneo. *Native name*: Tembusu.

Timber very hard and durable, highly valued. The tree has been much planted by the Forest Department in Selangor.

(3) **C. giganteum** Ridl. *Fagræa gigantea Ridl. Journ. Roy. As. Soc. S. Br.* 79, p. 98. *F. speciosa Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 122 (*not of Blume*). *F. fragrans King, l.c. in part.*

A big tree 100 to 150 ft. tall, 4 to 6 ft. through, bark channelled in long straight grooves. Leaves lanceolate long-acuminate,

conspicuously undulate along edge; nerves 5 pairs; 3 in. long, 1.25 in. wide; petioles .5 in. long. Corymbs laxer than in *peregrinum*, 2 in. across. Calyx small rounded, .06 in. long. Corolla orange yellow, tube cylindric, .25 in. long, lobes lanceolate, blunt, .1 in. long. Stamens twice as long as tube. Style very long. Berry oblong, yellow. *Hab.* Dense forests. Singapore, Tanglin; Garden Jungle. Malacca, Bukit Sabukor (Derry); Merlimau (Cantley). Negri Sembilan, Seremban. Selangor, Rantau Panjang. Perak, Goping (Kunstler). *Distrib.* Sumatra. *Native names*: Tembusu Bukit or T. tembaga or T. paya.

Timber highly valued, very hard and indestructible.

### 7. STRYCHNOS, Linn.

Big lianes (or trees), all parts intensely bitter in most, if not all, our species, climbing to great heights in forests, by axillary clubbed tendrils. Leaves coriaceous, opposite, with 3 to 5 or more conspicuous ribs from the base. No stipules. Flowers small yellowish green or white, in axillary or terminal small corymbose paniced cymes. Calyx 4- to 5-lobed. Corolla-tube short, lobes 5- or 4-lobed. Corolla-tube short, lobes 5- or 4-valvate, hairy in the mouth below the lobes or glabrous. Anthers 5 or 4, with very short filaments inserted at the throat of the tube or below, often hairy or in a tuft of hairs. Ovary 2-celled; ovules many; style short or long. Stigma capitate or bifid. Berry globose, pulpy rarely with a hard pericarp. Seed 1 to many, oblong or orbicular flattened, or globose, immersed in pulp. Species about 100 in all tropics.

#### *Corolla-tube shorter than lobes.*

Leaves triplinerved; corolla glabrous outside;  
ovary and anthers hairy . . . . . (1) *S. Maingayi*

Leaves 5-nerved; corolla pubescent outside;  
ovary and anthers glabrous . . . . . (2) *S. hirsutiflora*

#### *Corolla-tube and lobes equilong.*

Leaves 3-nerved; panicle terminal . . . . . (3) *S. flavescens*

Leaves triplinerved; cymes axillary.  
Filaments very short bearded . . . . . (4) *S. septemnervis*

Filaments long glabrous . . . . . (5) *S. Curtisii*

Lobes of corolla with a line of erect hair;  
anthers in corolla-tube.

#### *Leaves quintuplinerved.*

Small hairy . . . . . (6) *S. pubescens*

#### *Large 3.5 by 2 in.*

Corolla-tube villous inside . . . . . (7) *S. Ridleyi*

Corolla with a line of hairs at base of lobes . . . . . (8) *S. quintuplinervis*

Leaves triplinerved, hairy, larger . . . . . (9) *S. Scortechinii*

#### *Anthers in notches of lobes.*

Inflorescence terminal; leaves pustular . . . . . (10) *S. penicillata*

Inflorescence axillary; nerves hairy  
beneath . . . . . (11) *S. malaccensis*

#### *Corolla-tube longer than lobes.*

Fruit woody, many silvery seeds . . . . . (12) *S. ovalifolia*



## INSUFFICIENTLY KNOWN SPECIES

Leaves pustular; fruit many-seeded . . . . . (13) *S. rufa*  
 Stems 4-angled; leaves large . . . . . (14) *S. quadrangularis*

(1) *S. Maingayi* Clarke in Hook. fil. F.B.I. iv. 88; Hill, Kew Bulletin, 1917, p. 141.

Climbing shrub 10 to 15 ft. long. Leaves elliptic abruptly cuspidate, base shortly narrowed, thinly coriaceous, deep shining green, 3-nerved, 3.5 to 5.5 in. long, 2.5 in. wide or less; petioles .15 in. long. Panicles axillary, dense many-flowered, axillary, 1.5 in. long to 4 in. wide, corymbose or thyrsoid. Flowers small. Calyx-lobes ovate acute. Corolla-tube very short, .025 in. long, lobes elliptic-ovate, hairy inside. Fruit .5 to 1 in. through. Seeds orbicular 2, flattened. *Hab.* Dense forest. Malacca (Maingay). Perak, Selama and the Ulu Leding (Wray).

(2) *S. hirsutiflora* A. W. Hill, Kew Bulletin, 1917, p. 144.

Big liane 100 ft. long, 2 to 4 in. through; branchlets tomentose. Leaves ovate-elliptic, 3 in. long, 1.5 in. wide, polished above sparsely hairy, especially on nerves, beneath, 5-nerved; petioles .4 to .5 in. long. Panicles axillary and terminal, many-flowered, lax, 4 in. long, 2 in. wide, dense hairy. Calyx-lobes narrow ovate acute, pubescent. Corolla greenish yellow, very small, tube very short, lobes triangular-ovate, hairy, tube and throat inside glabrous. Fruit (unripe) pear-shaped. *Hab.* Rare in forests. Perak, Ulu Bubong (Kunstler).

(3) *S. flavescens* King and Gamble, l.c. 617.

Big liane. Leaves chartaceous, elliptic or elliptic-lanceolate, acute or acuminate, narrowed or blunt at base; nerves 3 to 5, 3 to 5 in. long, 1.5 to 2.75 in. wide; petioles .3 in. long. Corymbs terminal, yellow puberulous, 4 in. long or less; peduncles 1 in. long. Flowers minute, pale green. Calyx campanulate, tube short, lobes round. Corolla-tube cylindric, lobes 4 or 5 as long as tube, .05 in. long, minutely hairy outside, densely woolly inside. Stamens glabrous. Fruit ovoid, 1 in. long, .5 in. through, green. Seeds 2, .6 in. long. *Hab.* Forests. Malacca, Ayer Panas (Curtis). Perak, Larut (Kunstler). Penang, Waterfall (Curtis).

(4) *S. septemnervis* Clarke, l.c. iv. 88; Hill, l.c. 149.

Big liane 100 ft. long, 4 to 6 in. through. Leaves elliptic to elliptic-ovate, base narrowed, tip acute, coriaceous, polished, 5- to 7-nerved, 2.5 to 4.5 in. long, 1.5 to 2.5 in. wide. Panicles 5 in. long or less, pubescent, rachis angled. Flowers pale yellow, white inside. Calyx-lobes ovate, small. Corolla .15 in. long, glabrous outside, lobes inside and short filaments white woolly. Berry .5 in. long, ovoid. Seed 1 flat and round. *Hab.* Forests, rare. Malacca (Maingay). Perak, Ulu Bubong (Kunstler).

var. *imberbis* Hill, l.c. Leaves acuminate, panicles smaller, 2 in. long, more glabrous. Corolla-tube hairy; filaments glabrous. Penang, Penara Bukit (Curtis).

(5) *S. Curtisii* King and Gamble, l.c. 614.

Big liane; stems 6 in. through, 80 to 100 ft. long. Leaves coriaceous, ovate or ovate-oblong, rounded at base, tip acute, 3- to 5-ribbed, 2.5 to 4 in. long, 1.5 to 2 in. wide; petioles .3 to .5 in. long, puberulous. Cymes axillary, sessile corymbose, many-flowered, pubescent, 2.5 in. long or less. Flowers pale green, centre yellowish. Calyx pubescent. Corolla-tube .06 in. long, lobes .18 in. long, glabrous outside, dense woolly on the lobes inside. Stamens long, glabrous. Fruit globose, .5 to 1 in. through. Seed round-ovoid. *Hab.* Hill forests. Perak, Gunong Bubu, and Goping district (Kunstler). Penang, Hill (Curtis).

(6) *S. pubescens* Clarke, l.c. iv. 89; King, l.c. 620; Hill, l.c. 166.

Climber 200 ft. long, 9 in. through, entirely pubescent. Leaves ovate acute or acuminate, base round, 1 to 2.5 in. long, .75 to 1 in. wide, pubescent, 3- to 5-ribbed; petioles .1 to .2 in. long. Cymes dense pubescent axillary, .5 in. long. Flowers white. Corolla cylindrical puberulous outside, lobes lanceolate, hooded, thick with a line of hairs inside. Berry globose, .3 to .6 in. long, yellow. Seeds 1 or 2, flat on one side, convex on the other. *Hab.* Forests, common. Singapore, Bukit Timah; Garden Jungle. Malacca, Merlimau and Chabau (Cantley); Bukit Bruang (Curtis). Negri Sembilan, Perhentian Tinggi. Perak, Thaiping Hills; Relau Tujur (Wray); Bujong Malacca (Scortechini). *Native names:* Akar Ipoh Batang; B'lay Besar (Sakai *vide* Vaughan Stevens). *Distrib.* Borneo. *Use:* As a poison for darts by Sakais in the same way as *S. ovalifolia*.

(7) *S. Ridleyi* King and Gamble, l.c. 621.

Climbing shrub. Leaves sub-coriaceous drying black, ovate to ovate-lanceolate acute, narrowed or round at base, 3- to 5-ribbed, 1.5 to 3.25 in. long, 1 to 1.75 in. wide; petioles .3 to .4 in. long. Cymes axillary, few-flowered, .75 in. long and wide; peduncles .25 in. long. Calyx-lobes broad, blunt. Corolla-tube campanulate, .075 in. long, glabrous, lobes as long as tube, glabrous outside, densely villous inside with tufts of bristles below. *Hab.* Very rare in forests, only once seen. Singapore, Toas (Ridley).

(8) *S. quintuplinervis* A. W. Hill, *Kew Bulletin*, 1917, p. 106.

Liane with stems, petioles and peduncles pubescent. Leaves widely ovate to lanceolate, base round or shortly cuneate, 3.5 in. long, 1.5 to 2 in. wide, 5-nerved (dry black). Corymbs axillary, many-flowered, 1 in. long. Calyx-lobes triangular ovate acute. Corolla .06 in. long, greyish white, lobes long ovate with a transverse line of hairs at base. Anthers bearded at base. Fruit ovoid, 1.25 in. long, 1-seeded. Seed oblong, ends rounded flat, ridged from centre to edges. *Hab.* Penang, Waterfall and Muka Head (Curtis).

(9) **S. Scortechinii** *A. W. Hill, Kew Bulletin*, 1917, p. 168. *S. rufa King and Gamble, partly*, and *S. pubescens var. Scortechinii King and Gamble*.

Climber 20 to 50 ft. long, all pubescent. Leaves ovate to ovate-elliptic acuminate, base cuneate or round; nerves 3; 1.5 to 2.5 in. long, 1 in. wide; petioles very short, densely tomentose beneath. Cymes about .4 in. long, axillary. Calyx-lobes rounded, glabrous except ciliate edges. Corolla greenish yellow, paler inside, .12 in. long, glabrous, lobes shorter than tube with a line of hair at base. Stamens hairy. Berry obovoid-elongate, .75 in. long and as thick, green. Seeds 1 or 2, ovoid-elliptic. *Hab.* Lowland forest. Malacca, Selandor Forest (Burkill). Selangor, Kwala Lumpur (Curtis). Perak, Larut (Kunstler); Dabung Batak (Scortechini); Kampar; Relau Tujur (Wray).

(10) **S. penicillata** *A. W. Hill, Kew Bulletin*, 1917, p. 178.

Climbing shrub altogether pubescent. Leaves ovate or broadly ovate lanceolate acute, base round shining, 3 in. long, 1.75 to 2 in. wide, coriaceous, 5-nerved, nerves strongly pubescent beneath, minutely pustular; petioles .2 in. long. Corymbs dense terminal, .5 in. across. Calyx-lobes pubescent, ovate-orbicular acute. Corolla white, .1 in. long, pubescent outside, lobes elliptic-lanceolate acute with a tuft of hairs at the base of each. Anthers hairy, in the notches between the lobes. Berry ovoid, 1- or 2-seeded. *Hab.* Forests, not common. Negri Sembilan; Perhentian Tinggi. Perak, Thaiping Waterfall (Wray). Selama and Relau Tujur (Wray). Penang Hill (Curtis).

(11) **S. malaccensis** *Benth. Journ. Linn. Soc. i. 101; King, l.c. 618; Hill, l.c. 171.*

A pubescent climbing shrub. Leaves ovate to elliptic-ovate acute, base round; nerves 5; glabrous except nerves, 3.5 in. long, 1.75 in. wide; petioles .1 in. long. Inflorescence axillary an interrupted panicle, corymbs .5 in. long and wide, dense; peduncles and pedicels pubescent. Calyx-lobes triangular-ovate, glabrous. Corolla-tube campanulate, lobes as long, ovate acute, with a horizontal line of hair at base. Anthers bearded at base. Berry ovoid, 1-seeded, 1 in. long. Seed 1, ovoid flat. *Hab.* Lowland forests, rather rare. Singapore, Garden Jungle (Ridley). Malacca (Griffith).

(12) **S. ovalifolia** *Wall. Cat. 1592; Hill, Kew Bulletin*, 1917, p. 201. *S. pseudo-tieute Hill, Kew Bulletin*, 1911, p. 287. *S. tieute King, l.c.*

Very big liane, 3 to 4 in. through, with black bark. Leaves chartaceous elliptic to elliptic-lanceolate caudate-acuminate, base round or acute, glabrous dark shining green; nerves 3 to 5; 2.5 to 3.5 in. long, 1 to 1.5 in. wide; petioles .3 in. long. Corymbs axillary, 1 in. long, 1.25 in. wide. Flowers white. Calyx-lobes ovate-lanceolate acute. Corolla funnel-shaped, tube .25 in. long,

puberulous outside, glabrous inside, a few hairs at base. Fruit globose, grey, with a woody rind beneath. Seeds numerous oblong, silvery, about .75 in. long, flat, immersed in bitter black green pulp. *Hab.* Common in forests. Singapore, Garden Jungle; Changi. Malacca, Batang Malacca (Derry); Sungei Hudang (Holmberg). Perak, Larut (Kunstler). Penang Hill (Curtis). Kemaman (Vaughan Stevens). *Distrib.* Borneo. *Native names:* Ipoh Akar; B'lay hitam (Sakai, *vide* Vaughan Stephens) and probably Legop (Cerruti, "My Friends the Savages," p. 212). *Use:* One of the most important ingredients in the Sakai dart poison. Every part of the plant is intensely bitter and the alkaloid contained in it has been shown to be *Brucine*. The Sakais make a decoction of the scraped bark, and add it to the latex of *Antiaris*, and I knew of one case where an attempt at criminal poisoning was made with the pulp of the fruit. See *Agric. Bull.* ser. I. vol. i. 211.

#### INSUFFICIENTLY KNOWN SPECIES

(12) **S. rufa** C. B. Clarke in Hook. *fil.* *F.B.I.* iv. 89 (not of King).

Branches and leaves red-hairy, especially on nerves beneath, base round, 3 in. long, 2 in. wide. Berry apple-shaped, 1.5 in. through, with numerous flattened seeds. *Distrib.* Malacca (Maingay).

(13) **S. quadrangularis** Hill, *Kew Bulletin*, 1917, p. 205.

Branches 4-angled. Leaves elliptic, base rounded or cuneate, cuspidate, reddish beneath when dry, 3- or 4-nerved, 7 in. long, 3 in. wide or less; petioles .1 in. long. Inflorescence axillary; peduncles 4-angled minutely pubescent. Calyx-segments ovate-triangular. Fruit globose, bluish green, .5 to 1 in. through. *Hab.* Perak, Cheroh (Wray). *Native name:* Ipoh Akar. *Use:* Root used for arrow-poisoning.

### 8. GAERTNERA, Lam.

Shrubs. Leaves thinly coriaceous or fleshy. Stipules connate into a sheath. Cymes terminal or axillary. Calyx small, funnel-shaped or campanulate. Corolla-tube rather long, lobes valvate, small, 4 to 5. Stamens adnate to tube by short filaments. Ovary 2-celled; ovules solitary, erect; style various. Stigmas linear or clavate. Berry twin, oblong or globose. Species about 40, Asia and Africa.

These plants may easily be taken at first sight for *Psychotrias*.

*Slender shrubs with cymes on the ends of main branches.*

Flowers 4-merous, very small . . . . . (1) **G. viminea**

Flowers 5-merous, larger.

Flowers sessile; calyx truncate entire . . . . . (2) **G. sessiliflora**

Flowers shortly pedicelled, white, .25 in. long, calyx toothed.

Panicle large many-flowered; leaves membranous elliptic . . . . .

(3) *G. acuminata*

Flowers shortly pedicelled, larger, .3 in. long.

Leaves elliptic lanceolate, thin coriaceous; flowers puberulous . . . . .

(4) *G. ramosa*

Leaves lanceolate caudate reticulate coriaceous, glabrous . . . . .

(5) *G. caudata*

Leaves lanceolate acuminate both ends; nerves nearly invisible; corolla-tube very short; violet . . . . .

(6) *G. violascens*

Flower pedicels long slender; corolla .5 in. long; calyx truncate . . . . .

(7) *G. pedicellata*

Leaves oblanceolate rather thin; flowers in an elongate panicle of short cymes; inflorescence terminal short; flowers small .

(8) *G. oblanceolata*

*Inflorescence on lateral shoots; panicle of short distant pairs of cymes.*

Leaves oblanceolate.

Flowering shoots with 1 to 2 pairs leaves and 1 to 2 lax-panicked cymes . . . . .

(9) *G. diversifolia*

Flowering shoots with 4 pairs distant leaves; panicle of many short cymes . . . . .

(10) *G. intermedia*

Leaves lanceolate, narrow coriaceous . . . . .

(11) *G. lanceolata*

*Thick-stemmed shrubs with large leaves . . . . .*

(12) *G. rigida*

Leaves ovate glabrous; peduncle slender; cymes small; flowers few . . . . .

(13) *G. ovata*

Leaves glabrous, fleshy; head dense large . . . . .

(14) *G. obesa*

Leaves hairy beneath; corymb spreading . . . . .

(15) *G. grisea*

(1) *G. viminea* Clarke in Hook. fil. F.B.I. iv. 91; King, l.c.

623.

Slender erect little-branched shrub. Leaves membranous, narrow lanceolate caudate acuminate narrowed to base; nerves 7 pairs; 2.5 to 3.5 in. long, .6 to .8 in. wide; petioles .1 in. long. Cyme 2 in. long, lowest branch 1 in. long, trichotomous. Flowers white, .25 in. long. Calyx cupular with 4 spreading teeth. Corolla-tube short cylindrical, lobes 4, broad blunt ovate as long, throat villous. Fruit white obovoid, .25 in. long. *Hab.* Woods in the south, common. Singapore (Wallich); Garden Jungle; Bukit Mandai; Changi; Pulau Ubin. Johor, Johor Lama; Gunong Pantai; Tanjung Bunga. Negri Sembilan, Tampin (Ridley).

(2) *G. sessiliflora* Ridl. Journ. Roy. As. Soc. S. Br. 79, p. 98.

Leaves elliptic cuspidate acuminate, 5.5 in. long, 1.5 in. wide, chartaceous. Stipules short. Cyme short, under an inch including peduncle; branches 3, very short. Flowers crowded, sessile. Calyx truncate, entire, no teeth. Corolla .24 in. long, tube narrow cylindrical. Fruit globose, 2-seeded, .3 in. through. *Hab.* Forests, local. Malacca, Tebong Forests. Negri Sembilan, Tampin Hill (Robinson).

(3) *G. acuminata* Benth. Journ. Linn. Soc. i. 112. *G. Koenigii* Clarke, l.c. iv. 91 (not of Wight).

Shrub. Leaves membranous, elliptic abrupt acuminate, base

cuneate, 3.5 in. long, 1.5 in. wide; petioles .25 in. long. Stipules forming a cylindrical tube, .5 in. long with 2 points. Panicle terminal, spreading, many-flowered, 3 to 5 in. long, 2 to 4 in. across. Basal bracts ovate-acuminate, .15 in. long. Branch-bracts leaf-like, 1.25 in. long. Bracteoles lanceolate blunt. Calyx .1 in. across, saucer-shaped, teeth 5. Corolla .25 in. long, white, lobes sub-acute as long as tube, mouth villous. Fruit globular, .3 in. through. *Hab.* Singapore (Wallich 8342). This has never been collected again.



FIG. 111.—*Gaertnera ramosa*.

var. *oxyphylla*, *G. oxyphylla* Benth. *Journ. Linn. Soc.* i. 112. Leaves narrow lanceolate acuminate caudate, 3 by 1 in. Branches long spreading, slender. Cymes lax and slender. Singapore (Wallich 8374).

Intermediate forms with typical *acuminata* occur.

var. *montana* Ridl. Leaves usually more coriaceous, lanceolate acuminate. Cymes shorter more dense, 1 to 2 in. long; peduncles short, thick. Malacca, Mt. Ophir (Hullett). Pahang, Telom Ridge (Ridley). Perak (Scortechini); Gunong Kerbau (Robinson). Kedah Peak (Robinson).

(4) *G. ramosa* Ridl. *Journ. Linn. Soc.* xxxviii. 317. (Fig. III, p. 428.)

Shrub. Leaves elliptic-lanceolate cuspidate-acuminate, subcoriaceous, 4 in. long, 1 in. wide, narrowed to the petiole, .1 in. long. Panicle terminal, 1.5 in. long, 2 in. wide, lax few-branched, puberulous; pedicels .1 in. long. Calyx campanulate, puberulous, obscurely toothed. Corolla .3 in. long, white, puberulous, lobes broad elliptic obtuse, longer than tube. *Hab.* Mountains 4000 to 5000 ft. altitude. Pahang, Gunong Tahan (Robinson).

(5) *G. caudata* Ridl. *Journ. F.M.S. Mus.* vi. 51.

Stem slender. Leaves in distant pairs, lanceolate caudate acute, base long-acuminate, thinly coriaceous; nerves 7 pairs elevate, reticulations minute, conspicuous; 4 in. long, 1 in. wide; petioles .5 in. long. Stipules tubular with a few setaceous points, .15 in. long. Cyme panicle terminal, lax, 1 in. long and as wide at base; branches few; peduncles .75 in. long. Bracts very small; pedicels .1 to .2 in. long. Calyx broad cup-shaped, 5 teeth. Corolla-tube cylindric, .3 in. long, lobes lanceolate, mouth white, hairy. *Hab.* Mountains, rare. Perak, Gunong Kerbau 4500 ft. altitude (Robinson); Gunong Inas (Yapp).

(6) *G. violascens* Ridl. *Journ. F.M.S. Mus.* vi. 164.

Shrublet; stems .12 in. through, young parts purplish. Leaves lanceolate acuminate acute, narrowed and decurrent on petiole, membranous; nerves thin, 8 pairs; 6 in. long, 1 in. wide; petioles slender, 1 in. long. Stipules very short connate, lobes free, rounded ovate; peduncles 1 to 2 terminal, 2 to 3 in. long; branches 3 or 4, lowest ones .75 in. long. Cymes 2 or 3 on the branch. Flowers few, sessile. Calyx campanulate, obscurely toothed. Corolla violet, tube cylindric, .5 in. long, lobes ovate, .12 in. long, mouth hairy. Fruit ellipsoid, sessile of 2 pyrenes. *Hab.* Forests in mountains. Pahang, Wray's Camp, Gunong Tahan 3500 ft. altitude (Ridley).

(7) *G. pedicellata* Ridl. *Journ. Roy. As. Soc. S. Br.* 79, p. 99.

Slender shrub. Leaves lanceolate cuspidate-acuminate, base long narrowed, 3 to 3.5 in. long, .5 in. wide; petioles slender, .6 in. long. Stipules tubular, .25 in. long. Cyme sessile, terminal lax spreading of few branches, 1.5 in. long; pedicels .25 in. long. Flowers 1 or 3 on the branch ends. Calyx campanulate truncate. Corolla .4 in. long, tube rather stout, lobes elliptic. *Hab.* Selangor, Gunong Mengkuang Lebah (Robinson).

(8) *G. oblanceolata* King and Gamble, *l.c.* 624.

Shrub 4 to 8 ft. tall; branches sub-4-angled. Leaves subcoriaceous, oblong-oblanceolate, short abruptly acuminate or lanceolate acuminate; nerves 10 to 12 pairs, prominent beneath; 7 to 9 in. long, 1.75 to 3.5 in. wide; petioles .6 to 1 in. long. Stipules spathaceous, 1.25 in. long, opening on one side embracing petiole by a rounded basal wing. Cymes paniced lax supra-axillary about 3 in. long (peduncle 1 in. long); branches few.

Flowers in threes crowded on thick pedicels. Calyx cylindrical, under  $\cdot 1$  in. across, shortly 5-toothed. Corolla twice as long, lobes triangular, throat very hairy. Fruit obliquely obovoid or glandular,  $\cdot 3$  in. long. *Hab.* Perak (Scortechini); Thaiping Hills, Birch's Hill at 4000 ft. altitude (Wray).

I have not seen the type, Scortechini's plant, but take Wray's plant to be the plant intended by King.

(9) *G. diversifolia* Ridl. *Journ. F.M.S. Mus.* vi. 163.

Stem woody stout,  $\cdot 25$  in. through. Leaves thinly coriaceous, elliptic-oblancoate acuminate cuspidate; nerves 6 to 10 pairs; 11 in. long, 3 in. wide; petioles 1 in. long. Stipules tubular, teeth setaceous,  $\cdot 5$  in. long. Flowering branches 10 in. long, base bare, 3 in. then 1 or 2 pairs of leaves, lanceolate acuminate with 1 to 2 lax paniced cymes, 1.5 in. long; branches short and stout. Calyx cup-shaped, 5-toothed. Corolla white,  $\cdot 12$  in. long, tube thick cylindrical, lobes as long oblong obtuse. Fruit globose,  $\cdot 25$  in. long. *Hab.* Rare, Mountain forests. Selangor, Bukit Hitam (Kelsall).

(10) *G. intermedia* Ridl. *Journ. Fed. Mus.* vi. 163.

Stem woody, stout. Leaves oblanceolate, abruptly cuspidate, gradually narrowed to base, sub-coriaceous, dotted; nerves 8 pairs elevate beneath; 8 in. long, 2.5 in. wide; petioles  $\cdot 25$  in. long, winged nearly to base. Stipules tubular, with 4 to 5 setae. Flowering branches nearly 12 in. long with 4 distant pairs of narrow lanceolate leaves 1.5 in. long. Panicles 3 in. long or less of distant paired cymes, the lowest under 1 in. long, peduncled, upper ones smaller. Calyx cup-shaped obscurely 5-toothed. Corolla cylindrical, small,  $\cdot 2$  in. long. Fruit pea-shaped, small. *Hab.* Mountain forests at 4000 ft. altitude. Selangor, Hulu Semangkok (Ridley).

(11) *G. lanceolata* Ridl. *Journ. F.M.S. Mus.* vi. 162.

Shrub. Leaves elongate-lanceolate acuminate to both ends, coriaceous punctate; nerves 7 pairs; 7 in. long, 1 in. wide; petioles  $\cdot 5$  in. long. Stipules tubular,  $\cdot 25$  in. long with 5 or 6 ribs and points. Inflorescence on slender long side branches; peduncle 3 in. long with 2 narrow leaves. Panicle 4 to 5 in. long of about 12 short few-flowered paired cymes,  $\cdot 25$  in. long or less, lowest pair with a peduncle of  $\cdot 3$  in. long all minutely pubescent. Calyx cup-shaped entire. Corolla  $\cdot 12$  in. long, white, cylindrical, lobes ovate. Fruit globular, small, black. *Hab.* Mountains 3300 ft. altitude. Pahang, Gunong Tahan (Robinson).

(12) *G. rigida* Ridl. *Journ. As. Soc. S. Br.* 86, p. 301.

Low shrub, 3 ft. tall, quite glabrous. Leaves coriaceous, drying grey, lanceolate-acuminate long, narrowed to the base, smooth shining above, beneath minutely papillose; nerves 8 or 9 pairs with nervules and reticulations elevate; 9 in. long, 3 in. wide; petioles 1.25 in. long. Stipules tubular split on one side with a bifid lanceolate limb on the other,  $\cdot 75$  in. long. Cyme borne on



the end of a horizontal branch, 9 in. long with a pair of leaves 4 in. long, .75 in. wide, subtending it. Cyme 1 in. long of 3 short branches. Flowers not seen. Fruit globose or sub-globose, .25 in. through with one or two seeds. *Hab.* Dense hill forests, Negri Sembilan, Bukit Tangga, base of hill (Ridley).

This is most closely allied to *G. lanceolata* Ridl., having the same style of inflorescence, small cymes borne on long side branches, bare except for a pair of reduced leaves below the cymes.

(13) *G. ovata* Ridl. *Journ. Roy. As. Soc. S. Br.* 86, p. 301.

Glabrous woody shrublet. Leaves obovate cuspidate, base narrowed and decurrent on petiole nearly to the base; nerves prominent beneath, 9 pairs; 9 in. long, 4 in. wide; petioles .25 in. long. Peduncles below the leaves, slender, 3 in. long with 2 branches. Stipules forming a tube with 2 long mucros of the elevated prolonged midribs. Cyme small, 1 in. long of 6 short branches, lowest under .5 in. long. Flowers sessile about 4 in a head at the end of each branch. Calyx short, cup-shaped with very short points. Corolla .1 in. long, tube thick shorter than the oblong blunt lobes, mouth inside white hairy. *Hab.* Mountain forests. Selangor, Semangkok Pass at 2000 ft. altitude (Ridley).

(14) *G. obesa* Hook. *fil. F.B.I.* iv. 92.

A stout fleshy shrub about 4 ft. tall little or not branched. Leaves fleshy coriaceous, oblong-lanceolate short-acuminate, base narrowed to the thick petiole; nerves conspicuous beneath, 9 to 12 pairs; 12 in. long, 3.5 in. wide; petioles 1.5 in. long, broad. Stipules 1.5 in. long, coriaceous, broad oblong, bifid, auricled at base, connate in middle. Cyme dense about 2 in. across, many-flowered, umbellate; peduncles 1.5 in. long. Flowers .3 in. long, white, sessile or shortly pedicelled. Calyx campanulate, obscurely toothed. Corolla .3 in. long, lobes 5 dense hairy in mouth. Fruit baccate, bright light blue. *Hab.* Forests lowland. Singapore, Toas; Garden Jungle; Chan Chu Kang. Johor, Tanjong Bunga; Gunong Pulai (Ridley). Malacca (Maingay). Perak (Scortechini).

var. *angustifolia* King and Gamble, *l.c.* 624. Leaves not exceeding 2.75 in. wide. Cymes axillary, 1.5 in. long. Perak (Scortechini) only a single specimen, which I have not seen.

(15) *G. grisea* Hook. *fil. F.B.I.* iv. 92; *King, l.c.* 625.

A bush about 4 ft. tall of few thick stems. Leaves sub-coriaceous, oblong-oblancoate abruptly acuminate, above glabrous, beneath densely pubescent, 9 to 14 in. long, 3 to 5 in. across; nerves 7 or 8 pairs very prominent beneath; petioles thick, .25 in. long. Stipules forming a velvety tube 1 in. long with 2 setaceous points. Cyme spreading pubescent, 3 in. long, lowest branches 2 in. long. Cymules dense on branch-ends, 1 in. through. Flowers white, .25 in. long, puberulous. *Hab.* Lowland forests in the south. Singapore, Changi; Bukit Timah; Bukit Panjang. Johor, Batu Pahat (Ridley).

## ORDER XCIV. GENTIANACEÆ.

Herbs, erect, twining, or floating, generally glabrous. Leaves opposite except in floating plants. Inflorescence in 2- or 3-divided cymes or 1-flowered. Flowers regular (except *Canscora*). Corolla tubular or campanulate; lobes 4 to 6, oblong or linear. Corolla-tube various lobes 4 or 5. Stamens 4 to 6, perfect (except *Canscora*) rising from tube. Ovary 1-celled of 2 carpels superior or slightly inferior; placentas parietal; ovules many; style linear; stigma capitate or slightly bilobed. Capsule sometimes more or less succulent; many-seeded. Species 700, whole world. (Clarke, *Journ. As. Soc. Beng.* lxxiv. extra number, p. 86.)

Erect herbs. Fruit capsular.

Glabrous; flowers rather large, blue or bluish white . . . . .	1. EXACUM
Glabrous; flowers small, white or pink . . . . .	2. CANSCORA
Glabrous; flowers small, blue . . . . .	3. GENTIANA
Pubescent much-branched; flowers small . . . . .	4. MICRORPHIUM
Twiner; corolla over 1 in. long, yellow with purple marks; fruit pulpy violet . . . . .	5. CRAWFURDIA
Floating or creeping on mud; leaves round ovate. Peduncles solitary from axil of floating leaf; flowers yellow . . . . .	6. VILLARSIA
Peduncles clustered; leaf sessile; flowers white . . . . .	7. LIMNANTHEMUM

## 1. EXACUM, Linn.

Glabrous erect herbs. Leaves opposite, 3- or 5-nerved. Flowers paniced, 4- to 5-merous. Calyx deep-lobed. Corolla rotate; blue or white, lobes ovate. Stamens attached to corolla-throat; anthers opening by terminal slits. Ovary 2-celled; style linear; stigma sub-capitate. Capsule globose, 2-valved; seed minute, cup-shaped. Species about 30, India, China, Malaya, Africa.

(1) *E. tetragonum* Roxb. *Fl. Ind.* i. 398.

Stem 1 to 2 ft. tall or more, 4-angled. Leaves 2 in. long, .75 to 1 in. wide, sessile lanceolate, 3- to 5-nerved. Panicle many-flowered. Bracts linear. Corolla-lobes lanceolate acute, white tipped blue, .5 in. long. Capsule globose, .25 in. long. *Hab.* Grassy pastures in the north. Perlis, Kanga (Ridley). *Distrib.* Malaya.

The specimens of this and *E. pedunculatum* Linn, given by Clarke, *l.c.* p. 87, as from Singapore (Lobb), were obviously erroneously localised.

## 2. CANSCORA, Lam.

Herbs branched, glabrous. Leaves opposite. Flowers cymose. Calyx large membranous tubular, often winged. Corolla-tube cylindrical, lobes 4, equal or unequal, white or rose. Style linear. Capsule breaking irregularly (or 2-valved). Species 25, Africa, Asia and Australia.

- Corolla regular; stamens all perfect, 5 . . . . . (1) *C. pentanthera*  
 Corolla irregular, 1 petal larger than the others;  
 stamens 3 perfect, 1 sterile.  
 Leaves ovate-lanceolate, fleshy . . . . . (2) *C. trinervia*  
 Leaves narrow lanceolate sub-coriaceous  
 distant . . . . . (3) *C. andrographioides*

(1) *C. pentanthera* Clarke, l.c. 89.

A glabrous, much-branched herb, 12 to 18 in. tall. Leaves ovate-lanceolate, acuminate, base attenuate, 1.5 to 2.5 in. long, 1 to 1.5 in. wide; petioles .2 in. long or less. Cymes loose, dichotomous of as many as 10 flowers; upper bracts in amplexicaul pairs. Flowers white on pedicels .12 to .5 in. long. Calyx .35 in. long, tube 3-winged ovoid, lobes .1 in. long, ovate, imbricate. Corolla-tube as long as calyx, lobes 5 or 6, regular, oblong, whole limb .5 in. wide. Stamens 5 or 6, equal, perfect. Capsule ellipsoid included in calyx, .25 in. long; style linear persistent. Seeds ovoid, brown. *Hab.* On limestone rocks up to 4000 ft. altitude. Selangor, Batu Caves. Perak, Waterloo (Robertson-Glasgow). Kedah Peak on top. Lankawi, small islands (Curtis). *Distrib.* South Siam, Singora.

(2) *C. trinervia* Ridl. *Journ. Linn. Soc.* xxxviii. 316.

Herb, 3 to 5 in. tall, branched. Leaves ovate-lanceolate acuminate both ends, 3-nerved, .5 to 1 in. long, .5 to .75 in. wide. Flowers nearly sessile, 1 to 3 in the axils, and terminal. Calyx tubular narrowed upwards, 5 in. long, 8-ribbed; lobes acuminate. Corolla irregular, tube little longer than sepals, lobes 4, round oblong crisped, one much longer than the others, white. Stamens fertile 3, sterile 1. Style long; stigmas linear elongate. Capsule oblong apiculate, black, .24 in. long, shorter than the filiform calyx-ribs surrounding it. *Hab.* Stream banks on mountains; very local. Pahang, Gunong Tahan at 5000 to 6000 ft. altitude (Ridley).

(3) *C. andrographioides* Clarke in Hook. *fil. F.B.I.* iv. 105.

A tall herb over 1 ft. high with slender stems simple or branched from a short woody rootstock. Leaves lanceolate, narrowed to both ends, trinerved, 2 in. long, .3 in. wide, sub-sessile. Flowers terminal on short axillary branches, .5 to 1 in. long. Calyx cylindrical, striate, not winged, .3 in. long. Corolla-tube as long; lobes obovate as long, white, purple or rose-veined, .25 in. long, 2 broader than the others. Stamens 1 with a filament, 3 subsessile. *Hab.* Kedah Peak (Robinson). *Distrib.* Khasiya, Moulmein.

### 3. GENTIANA, Linn.

Herbs with opposite leaves. Flowers axillary or terminal. Calyx tubular, terete, lobes 5 or 4. Corolla tubular, bell-shaped; lobes 5 or 4, often with folds between the lobes, blue (white, purple or yellow). Stamens 5 to 4, attached in middle or lower half; filaments linear. Ovary 1-celled; style short or 0. Capsule