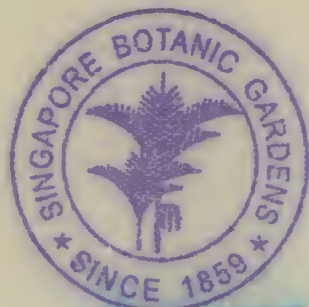


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THE FLORA OF
THE MALAY PENINSULA

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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. IV.—MONOCOTYLEDONES

PUBLISHED UNDER THE AUTHORITY OF THE GOVERNMENT OF
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CONTENTS

ORDER	PAGE
CXXXV. HYDROCHARIDEÆ	I
CXXXVI. ORCHIDEÆ	4
CXXXVII. ZINGIBERACEÆ	233
CXXXVIII. MARANTACEÆ	285
CXXXIX. CANNACEÆ	291
CXI. LOWIACEÆ	291
CXII. MUSACEÆ	293
CXLII. APOSTASIACEÆ	295
CXLIII. AMARYLLIDACEÆ	298
CXLIIIA. BURMANNIACEÆ	303
CXLIV. TACCACEÆ	309
CXLV. DIOSCOREACEÆ	311
CXLVI. ROXBURGHIACEÆ	320
CXLVII. LILIACEÆ	321
CXLVIII. PONTEDERIACEÆ	344
CXLIX. PHILYDRACEÆ	346
CL. XYRIDEÆ	347
CLI. COMMELINACEÆ	349
CLII. ALISMACEÆ	362
CLIII. TRIURIDEÆ	363
CLIV. NAIADACEÆ	365
CLIVA. POTAMOGETONACEÆ	367
CLV. FLAGELLARIACEÆ	367
INDEX	371
ERRATA	384

FLORA OF THE MALAY PENINSULA

VOLUME IV

ORDER CXXXV. HYDROCHARIDEÆ.

Aquatic herbs; stems short stoloniferous or elongate, leafy. Leaves linear-lanceolate or broadly ovate. Flowers regular usually unisexual enclosed in a spathe. Sepals free 3; petals white or yellow. Stamens 3 to 12; filaments short. Ovary inferior, 1-celled; placentas parietal 3 to 6; ovules numerous; style divided. Fruit usually baccate, rarely dehiscent. Seeds numerous. Species about 50, whole world. (Ridl., *Materials for a Flora of the Malay Peninsula*, vol. i.)

Fresh-water species.

Stems elongate leafy; leaves whorled	1. HYDRILLA
Stems elongate leafy; leaves alternate	2. ENHYDRIAS
Stem short; leaves radical.	
Leaves linear; flowers very small; petals linear	3. BLYXA
Leaves large ovate petioled; flowers large; petals ovate	4. OTTELLA
Marine, rhizome creeping.	
Leaves long linear; male flowers very numerous in a large spathe	5. ENHALUS
Leaves small ovate; males solitary	6. HALOPHILA

1. HYDRILLA, L.C. Rich.

Submerged elongate leafy plant. Leaves short in whorls of 3 or 4 or below opposite. Flowers in axillary spathes, solitary. Males short-pedicelled; sepals ovate; petals narrower; stamens 3; anthers ovate. Female sessile, spathe tubular. Ovary except long beak enclosed in spathe; styles 3 (rarely 2) linear. Fruit narrow. Seeds oblong. One or two species, all Old World tropics.

(1) *H. verticillata* Presl. *Bot. Bemerk.* 112; *Ridl., Mat.* i. 3. *Serpicula verticillata* Roxb. *Corom. Pl. t.* 164.

Stem 6 to 12 in. long, slender. Leaves .25 in. long, oblong acute, toothed. *Hab.* Rare. Kelantan in the river at Kamposa.

2. ENHYDRIAS, Ridl.

Stems long, leafy. Leaves alternate, narrow linear. Flowers solitary, in tubular spathes, bisexual. Perianth-tube long, slender.

Calyx-lobes lanceolate acute, 3. Corolla lobes much longer linear white. Stamens 3 adnate to mouth of tube; anthers linear; styles 3, shorter than stamens. Fruit narrow, flat, 1-celled. Seeds numerous, fusiform papillose. Species 1, Malay Peninsula, Borneo, Cochin-China, Siam.

(1) *E. angustipetala* Ridl., *Journ. Bot.* 1890, p. 99; *Mat.* i. 4.

Stem 6 to 24 in. long, submerged. Leaves olive-green or dull red, 2 in. long, .05 in. wide, minutely toothed. Spathe 1 in. long, tip bifid, flattened. Perianth-tube 1.5 in. long above; spathe pinkish white. Sepals .12 in. long. Petals over .25 in. long, white. Fruit 1 in. long, thin-walled. Seeds about 14, fusiform with 3 rows



FIG. 160.—*Enhydrias angustipetala*.

of blunt processes. *Hab.* Common in ponds and ditches, often in immense masses. Singapore: Garden Lake; Chua Chu Kang. Malacca (Griffith). Merlimau (Derry). Pahang, Pekan. Dindings. Perak, Kinta (Kunstler).

var. *latifolia*. Leaves 1.5 in. long, .12 in. wide. Perak, Chankat Serdang (Wray).

3. BLYXA, Du Petit Thouars.

Submerged stemless stoloniferous herbs. Leaves linear acute crowded, scapes long or short. Flowers uni- or bi-sexual, enclosed in a tubular flattened spathe. Male flowers several in a spathe, bisexual. Female solitary. Sepals 3, linear. Petals 3, longer linear. Stamens 3 to 9. Style short; stigmas 3, filiform. Fruit very slender, many-seeded. Seeds oblong, tubercled. Species about 4, Old World tropics.

(1) *B. malayana* Ridl. *Trans. Linn. Soc.* iii. 358; *Mat.* i. 4.

Rootstock short, stout. Leaves 14 in. long, 3 in. wide. Flower bisexual, 4 in. long. Petals white, 1 in. long, toothed. Stamens 3. Fruit 2.5 in. long, enclosed in spathe. Seeds elliptic-oblong blunt muricate, .05 in. long. *Hab.* Common in ponds and ditches. Singapore, Garden Lake; Chan Chu Kang. Johor, Kota Tinggi. Malacca, Tanjong Kling; Bukit Sabukor. Pahang, Kwala Pahang. Perak, Ulu Bubong (Kunstler). Penang, Telok Bahang.

4. OTTELIA, Pers.

Stemless aquatics. Leaves floating ovate-lanceolate or oblong cordate petioled. Flowers solitary in a tubular broad-winged

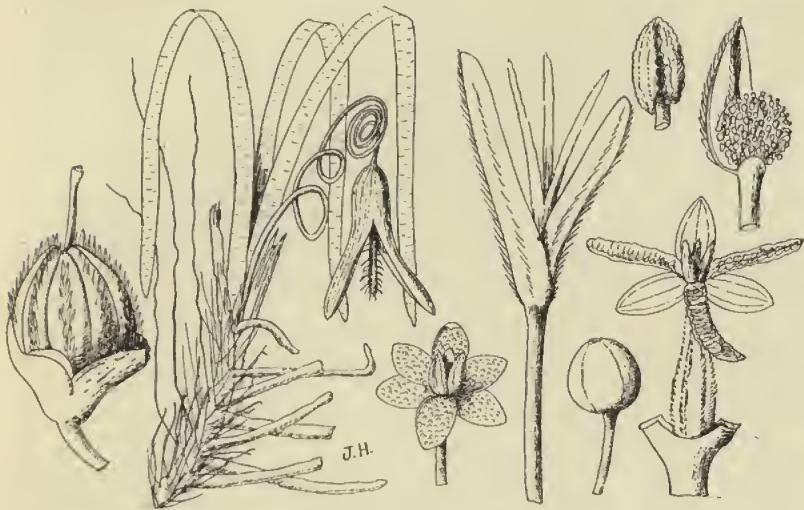


FIG. 161.—*Enhalus Koenigii*.

spathe, large showy, fugacious. Sepals 3 linear or oblong. Petals ovate or orbicular, white (or yellow). Stamens 6 to 15. Anthers linear. Ovary oblong beaked; style linear bifid. Fruit oblong, 6-valved dehiscent. Seeds numerous, testa pulpy. Species 6 or more, tropics.

(1) *O. alismoides* Pers., *Syn.* i. 400; *Ridl. Mat.* i. 5. *Dama-*
sonium indicum, *Roxb. Cor. Pl.* ii. 45, t. 185; *Bot. Mag.* t. 1201.

Leaves ovate often cordate acute, thin, 6 in. long, 4 in. wide; petioles 3-angled, 6 in. long. Scape 4 to 6 in. long. Spathe green, narrow or ovate, 1 in. long or more. Perianth-tube little longer. Sepals blunt, .25 in. long. Petals clawed ovate, 1 in. long, white tinted pink or violet. Stamens 6 to 10. Fruit linear-oblong

6-grooved. *Hab.* Local in ponds or ditches. Malacca, Chabong (Griffith). Selangor, Pudoh (Goodenough). Perak, Tambun; Larut (Kunstler). Province Wellesley, Krian. Penang, Telok Kumbang (Curtis). Lankawi, Kwah (Curtis). Kelantan near Kota Bharu. *Distrib.* India, Ceylon, Malay isles, Australia.

5. ENHALUS, Richard.

A submerged marine herb, rootstock stout covered with stiff black fibres. Leaves strap-shaped in twos and threes in basal sheaths. Flowers unisexual. Males very small, white, numerous in a 2-leaved spathe. Sepals and petals elliptic or ovate. Female flower much larger, solitary in a 2-leaved spathe. Sepals oblong. Petals linear. Ovary ovoid long-beaked, with 6 bristly ridges. Fruit similar, but nearly globose. Seeds few, cone-shaped, green soft. Species 1, Madagascar, Asia, Australia.

(1) *E. Koenigii* Rich. in *Mem. Institut. Fr.* 1811, ii. 64; *Ridl. Mat.* i. 6. *E. acroides* Zoll. *Verz. Ind. Arch.* ii. 69. *E. marinus* Griff. *Ic. Pl. As. t.* 249, 250. (Fig. 161, p. 3.)

Stem woody, .25 in. through. Leaves 2 to 3 ft. long, .5 in. wide, tip round. Male spathes 2 lanceolate acute, olive-green bristly, 1.5 in. long on a 2 in. long peduncle. Female spathes narrower; peduncle 1 to 2 ft. long. Fruit 1.5 in. long, 1 in. through, succulent with 6 broad bands of bristles. *Hab.* Common in shallow sandy bays all round the coast. *Native name*: Setul. *Use*: Fruit eaten by children. The leaves are the favourite food of the Duyong.

The male flowers become detached and float on the surface of the sea. The female flower when opened is raised to the surface; after fertilisation the peduncle contracts spirally, so that the flower sinks below the water.

6. HALOPHILA, Thouars.

Submarine plants; stems slender creeping. Leaves in pairs in axils of a scarious bract. Flowers unisexual solitary in a double spathe. Male pedicelled. Sepals 3. Petals 0; anthers 3 linear-oblong sessile. Female nearly sessile. Ovary beaked, 1-celled; styles 3. Fruit sub-globose. Seeds numerous, globular, minute. Species about 6, tropical seas.

(1) *H. ovata* Gaud. *Freycin. Voy. Bot.* 430, t. i.

Leaves elliptic or ovate, .25 to .5 in. long, .12 to .25 in. wide; petioles .5 in. long. Flowers very small; sepals ovate. Fruit small globose. *Hab.* Common in shallow sandy seas round the coast, Singapore, Harbour. Johor, Strait. Penang. Lankawi. *Distrib.* East Africa to the Pacific.

ORDER CXXXVI. ORCHIDÆ.

Herbs or half-shrubs, either terrestrial with a short stem, and herbaceous leaves, rarely climbing (*Vanilla*), often leafless

saprophytes; or epiphytes with short or long stems, the branches of which may be swollen and fleshy (pseudobulbs), the leaves usually coriaceous flat, distichous or terete or rarely (*Tæniophyllum*) absent. Inflorescence axillary or terminal racemose, spicate or paniced. Perianth superior, of three sepals petaloid, the two lateral ones sometimes connate into a spur or sac (*mentum*). Petals 3, two similar, the third opposite the column very different, often lobed and spurred and bearing calli, processes of various shapes (the lip, labellum). Stamens and style united into a *column* opposite the lip, long or short, erect on the top of the ovary, often prolonged into a *foot* to which the lip is adnate. Anther 1 terminal or 2 (*Cypripedium*) adnate to the top of the column or stalked. Pollen-grains cohering in 2, 4, 6, or 8 waxy or powdery masses (*pollinia*) attached to 1 or 2 thin, flat, or terete stalks (*caudicles*) with an adhesive disc below, or caudicles and disc absent. The other two stamens are represented by wings or arms of the column. Stigmas 3, one forming a flat, round or triangular, often bifid beak or plate below the anther, the *rostellum*, the other two forming a viscid mass sunk in a hollow of the column below the *rostellum* or rarely protruding. Ovary inferior usually twisted, 1-celled; ovules numerous. Fruit capsular, rarely baccate (*Vanilla*) elliptic, pear-shaped or cylindric, dehiscing often in 3 valves. Seed minute. Species over 5000, whole world, rare in desert regions, most abundant in the tropics.

TRIBES.

Fertile anther 1.

Pollinia waxy, 2 to 8 with no caudicles or disc, terrestrial or epiphytic with or without pseudobulbs	I. EPIDENDRÆÆ
Pollinia waxy, 2 to 4 with 1 or 2 caudicles and 1 to 2 discs; epiphytic or terrestrial	II. VANDEÆÆ
Pollinia mealy with 1 or 2 caudicles and 1 disc; herbs terrestrial, no pseudobulbs	III. NEOTTIÆÆ
Pollinia mealy 2 caudicles and 2 discs, terrestrial	IV. OPHRYDEÆÆ
Fertile anthers 2; lip saccate; terrestrial herbs	V. CYPRIPEDEÆÆ

Tribe I. EPIDENDRÆÆ.

I. MALAXEÆ. Terrestrial or epiphytic. Flowers small in a terminal raceme. Column footless. Pollinia 2 to 4, no disc.

Column short.

Terrestrial, pseudobulbous; leaves broad herbaceous	1. MICROSTYLIS
Epiphytic; leaves distichous, fleshy, no rhizome	2. OBERONIA

Column long.

Leaves and flowers as in <i>Oberonia</i> but a long rhizome	3. HIPPEOPHYLLUM
---	------------------

- Leaves broad and thin, terrestrial; column arms short 4. LIPARIS
- Column with long arms; epiphytic, pseudobulbous 5. PLATYCLINIS
- II. DENDROBIEÆ. Epiphytic rarely terrestrial, often pseudobulbous. Inflorescence lateral or terminal usually racemose. Column with a long foot.
- Pollinia 4.
- Leaf 1, coriaceous on a long slender pseudobulb; flower 1 6. DIPLOCAULOBIUM
- Leaves 2, coriaceous on a conic pseudobulb; flowers many terminal 7. SARCOPODIUM
- Leaf 1, on a pseudobulb; stem much branched with many pseudobulbs; flowers appearing singly, very fugacious 8. DESMOTRICHUM
- Rhizome short or 0; stems many, not branched; racemes axillary 9. DENDROBIUM
- Pseudobulbs conic or globose, 1-leaved; raceme 1, many-flowered from rhizome; arms of column short erect; column not hooded; fruit elliptic 10. BULBOPHYLLUM
- Arms of column long from side; column hooded; fruit 3-angled 11. DENDROCHILUM
- III. ERIEÆ. Pollinia 8. Column short (except No. 15). Lateral sepals forming a mentum.
- Stems usually swollen; flowers glabrous or woolly; racemes lateral; leaves sub-terminal 12. ERIA
- Stems tall leafy not swollen (rarely short), all red hairy; racemes lateral 13. TRICHOTOSIA
- Sepals connate in a tube, pseudobulbs small; leaf 1 14. PORPAX
- Sepals free spreading; column long, pseudobulbs large, 2-leaved 15. TYLOSTYLIS
- Small tufted epiphytes with racemes of minute flowers 16. PHREATIA
- Tall leafy plants; flowers very small in terminal heads 17. AGROSTOPHYLLUM
- Slender, tall leafy plants; flowers in lateral racemes 18. POÆPHYLLUM
- Leafy tufted or branched plants; flowers small in axillary tufts; column arms long 19. CERATOSTYLIS
- IV. BLETIEÆ. Terrestrial, rarely epiphytic. Leaves herbaceous. Inflorescence on tall rarely short lateral racemes. Column long. Pollinia 2, no disc.
- Column with side arms 20. CHRYSOGLOSSUM
- Column with no side arms.
- Lip 3-lobed, spurred 21. COLLABIUM
- Lip entire, not spurred 22. DIGLYPHOSA
- Column prolonged at base into a foot.
- Lip spurred; leaves elliptic or lanceolate on a long petiole; scape tall from rhizome.
- Stems of conic pseudobulbs 23. ASCOTAINIA
- Stems not pseudobulbous 24. TAINIA
- Lip spurred; scape short; leaves solitary, ovate cordate, no pseudobulbs 25. NEPHELAPHYLLUM

- Lip not spurred; sepals forming a mentum; leaves ovate-cordate, solitary, no pseudobulbs 26. MISCHOBULBUM
- Lip not spurred; leaves numerous in a large tuft; flowers large ventricose 27. ACANTHEPHIPIUM
- Column footless.
- Leaves appearing before the flower spike; rhizome subterranean 28. PACHYSTOMA
- Leaves with flowers; scape tall.
- Lip not spurred, clawed; scape from side of pseudobulb 29. SPATHOGLOTTIS
- Lip spurred, not clawed.
- Lip flat adnate to column.
- Scapes from among leaves, not pseudobulbous 30. CALANTHE
- Scapes from side of a leafless pseudobulb 31. PREPTANTHE
- Lip large convolute round column 32. PHAIUS
- Stems leafy not pseudobulbous; flowers large.
- Flowers axillary below leaves, few; lip flat 33. LIMATODIS
- Flowers terminal; lip convolute.
- Leaves broad herbaceous; lip spurred 34. THUNIA
- Leaves grassy; lip not spurred 35. ARUNDINA
- Leaves stiff ovate-lanceolate; lip not spurred 36. DILOCHIA
- V. COELOGYNEÆ. Epiphytes or rock plants, pseudobulbous, rhizome creeping. Leaves stiff, 2. Racemes many-flowered from the top of the pseudobulb. Lip sessile at column base not spurred. Column usually long. Pollinia 4.
- Lip not saccate, sides turned up; column footless 37. COELOGYNE
- Lip not saccate; column with a narrow foot.
- Lip nearly entire; column not hooded 38. CRINONIA
- Lip 3-lobed; column broadly winged and hooded 39. CHELONISTELE
- Lip saccate at base; column broadly winged and hooded.
- Base of lip abruptly bent 40. CHELONANTHERA
- Base of lip straight, boat-shaped 41. PHOLIDOTA
- VI. CLADERIÆ. Creeping, no pseudobulbs. Stems distant, 2-leaved. Flowers large. Lip spurred. Pollinia 2 42. CLADERIA

Tribe II. VANDEÆ.

Pollinia waxy 2 to 4 with 1 or 2 caudicles and discs.

I. EULOPHIÆ. Terrestrial. Leaves herbaceous, not articulated. Scapes tall, rarely leafless.

Pseudobulbs.

- Lip with upcurved side lobes, spurred 43. EULOPHIA
- Lip saccate, entire, no spur 44. GEODORUM
- No pseudobulbs; leaf solitary or several on a leafy stem; lip entire flat mobile on base of column 45. PLOCOGLOTTIS

II. CYMBIDIÆ. Mostly epiphytic. Leaves stiff or coriaceous articulate at base. Lip three-lobed, sides upcurved, column footless.

- Stems very short; leaves usually narrow; racemes from among leaves 46. CYMBIDIUM

- Stem elongate; leaves distichous; racemes long, axillary 47. *DIPODIUM*
- Leafy stems usually elongate; scapes from base very tall; flowers large 48. *GRAMMATOPHYLLUM*
- Stems leafy, flattened; flowers usually terminal 49. *BROMHEADIA*
- III. *POLYSTACHYÆ*. Stems erect leafy. Raceme or panicle terminal. Flowers small. Sepals forming a mentum. Column with a foot 50. *POLYSTACHYA*
- IV. *SARCANTHÆÆ*. Epiphytes, stems terete or flattened, often long. Leaves coriaceous distichous articulate with the sheaths. Racemes or panicles axillary. Pollinia 2 or 4 on a single caudicle.
- Lip spurless.
- No column foot. Lip entire.
- Leaves terete 51. *LUISIA*
- Leaves lanceolate flat 52. *ADENONCOS*
- Column with a short foot; lip lobed; flowers large.
- Lip obscurely 3-lobed, no callus 53. *ACAMPE*
- Lip distinctly 3-lobed, with callus.
- Stem long, callus not forked 54. *STAUROPSIS*
- Stem short, callus forked 55. *PHALÆNOPSIS*
- Lip 5-lobed 56. *STAUROCHILUS*
- Column foot long, lateral sepals adnate to it; lip 3-lobed, side lobes erect; flowers medium.
- Stem short; leaves broad, callus forked 57. *KINGIELLA*
- Stem tall; leaves narrower; callus not forked 58. *DORITIS*
- Lip spurred.
- Column footless.
- Flowers large, laxly racemed or panicled; column short.
- Midlobe of lip large 59. *VANDA*
- Midlobe small; sepals and petals curved, spatulate 60. *ARACHNIS*
- Midlobe small; sepals and petals lanceolate acute 61. *RENANTHERA*
- Column long slender; leaves terete 62. *RENANTHERELLA*
- Column short.
- Flowers small, solitary; lip 3- to 5-lobed often pubescent 63. *TRICHOGLOTTIS*
- Flowers in dense racemes showy; lip entire, stem short 64. *RHYNCHOSTYLIS*
- Flowers small, solitary, racemed or panicled; lip 3-lobed with callus in the spur mouth; caudicle narrow 65. *SACCOLABIUM*
- Flowers small solitary; leaves very close-set; lip entire, no callus 66. *MICROSACCUS*
- Leafless with numerous roots; stem very short 67. *TÆNIOPHYLLUM*
- Flowers few medium; caudicle as broad as the large disc 68. *PELATANTHERIA*
- Column foot long.
- Spur horizontal 69. *SARCOCHILUS*
- Spur small; stem short 70. *ASCOCHILUS*
- Flowers large; stem long 71. *AERIDES*
- Lip saccate not mobile.
- Stem elongate; bracts flat distichous 72. *THRIXSPERMUM*
- Stem short; bracts not distichous 73. *DENDROCOLLA*

V. NOTYLINEÆ. Epiphytes pseudobulbous. Leaves 1 or few. Racemes or panicles from base of pseudobulbs. Column long.

- Leaves several; lip adnate to column half-way;
 flowers small 74. ACRIOPSIS
 Leaf 1; lip forming a tube with column
 foot; flowers medium size 75. THECOSTELE

VI. PODOCHILINÆ. Stems slender, leafy, not pseudobulbous. Leaves distichous. Racemes lateral or sub-terminal. Flowers small. Pollinia 4 to 8 attached to 1 or 2 calyptriform caudicles. Rostellum long bifid.

- Pollinia 4; lip clawed, erect; small plants
 with very slender stems 76. PODOCHILUS
 Pollinia 8; lip saccate adnate to column;
 stiff rather tall plants, stout 77. APPENDICULA

VII. THELASINÆ. Stems pseudobulbous or not. Leaves few or many, distichous. Flowers very small in racemes. Lip sessile at column base. Rostellum long erect; pollinia globose 78. THELASIS

Tribe III. NEOTTIÆ.

Terrestrial herbs, often saphrophytic and leafless. Flowers in a terminal raceme, rarely lateral on a leafy stem. Pollinia 2, mealy with 2 caudicles and 2 discs. Column long or short. Rostellum long bifid.

I. VANILLEÆ. Climbing leafy plants. Flowers axillary. Fruit baccate. Column elongate; flowers large 79. VANILLA

II. GALEOLEÆ. Leafless scandent or erect plants. Flowers medium. Fruit capsular 80. GALEOLA

III. POGONIÆ. Erect herbs. Column usually long. Anther reclining. Flowers terminal.

Tuberous herbs with one leaf.

- Flowers racemose appearing after leaf is
 gone 81. APLOSTELLIS
 Flower solitary in leaf axil; plant small 82. CORYSANTHES

Leafless saprophytes hardly or not branched.

Sepals free, lip free from column.

- Lip 3-lobed, capsules on short pedicels 83. APHYLLORCHIS

- Lip entire; capsules on a long fleshy pedicel
 longer than stem 84. DIDYMOPLEXIS

- Lip adnate to column face, hairy; stems
 black wiry 85. LECANORCHIS

- Upper sepal adnate to petals, lower connate
 below lip; stem fleshy 86. LEUCOLENA

- Sepals all connate 87. GASTRODIA

IV. GOODYEREÆ. Anther vertical, long acute. Pollinia 2 to 4 granular attached to 2 caudicles and a disc. Column short.

Stems tall leafy, shrubby; inflorescence axillary or terminal.

- Panicles axillary; flowers long narrow 88. CORYMBIS

- Racemes short axillary or terminal; flowers
 short 89. TROPIDIA

Stem short ascending succulent; leaves membranous fleshy; racemes terminal peduncled; flowers small.

Lip spurred.

- Spur bifid 90. PHYSURUS

Spur not bifid.

- Lip entire, with 2 pendulous glands in
 spur 91. VRYDAGZYNEA

- Lip short 3-lobed, not clawed 92. CYSTORCHIS

- Lip with midlobe clawed wide expanded bilobed 93. ANÆCTOCHILUS
- Lip saccate not spurred, terminal lobe dilate. Stigma entire; column with a ventral boat-shaped process.
- Rostellum moderately long; lip large 94. DOSSINIA
- Rostellum very long curved; lip small 95. MACODES
- Column with no ventral process; flowers rather large 96. HÆMARIA
- Stigmas 2 lateral.
- Column 2-winged in front; midlobe entire 97. ZEUXINE
- Column with 2 processes in front; midlobe toothed 98. CHEIROSTYLIS
- Terminal lobe of lip not dilate.
- Leaves few ovate or lanceolate.
- Lip inferior, base boat-shaped 99. GOODYERA
- Lip superior, base saccate 100. HETÆRIA
- Lip a globose sac with very small linear midlobe 101. HYLOPHILA
- Leaves very long narrow, a big plant 102. LEPIDOGYNE
- Lip not saccate, flat.
- Leafless saprophyte; perianth connivent 103. STEREOSANDRA
- Leaves long-petioled from a rhizome; scape nearly leafless 104. CRYPTOSTYLIS

Tribe IV. OPHRYDEÆ.

Terrestrial herbs, with tubers or tuberous roots and a leafy stem terminated by a raceme usually of many flowers. Sepals and petals usually linear or oblong. Petals sometimes bifid. Lip adnate to column, 3-lobed or entire spurred. Anthers adnate to top of column erect 2-celled, cell bases often prolonged. Pollinia granular clubbed, with caudicle and disc to each. Capsule ellipsoid. Chiefly in sub-tropical and temperate regions. Whole world. Genus in our region one 105. HABENARIA

Tribe V. CYPRIPEDEÆ.

Terrestrial, rarely epiphytic herbs. Leaves herbaceous or subcoriaceous, in a rosette or stem leafy. Flowers large, few, terminal on leafy stem or on a peduncle from the rosette. Upper sepal erect, broad, lower pair connate below the lip. Petals narrower spreading. Lip large sac-shaped sessile, lateral lobes inflexed. Column short terete. Fertile anthers 2 on either side of a disc-like staminode. Stigma disc-shaped. Capsule elliptic narrow. Species about 50 of three genera or sub-genera. *Cypripedium* (true), Europe, Asia, North America. *Paphiopedilum*, Tropical Asia. *Selenipedium*, South America.

- Leaves in a rosette; flower on a peduncle 106. PAPHIOPEDILUM

TRIBE I. EPIDENDREÆ (GENERA 1-42).

1. MICROSTYLIS, Nutt.

Terrestrial herbs; stems erect cylindrical or swollen at base, rarely creeping. Leaves ovate or lanceolate petioled. Raceme terminal. Flowers small, green, yellow, white or purple. Sepals and petals narrow oblong or linear, spreading. Lip adnate to column base, flat, base prolonged into 2 auricles partly surrounding column. Column very short thick, with short blunt arms. Pollinia 4.

Capsule erect obconic. Species about 50, chiefly tropical, whole world.

Stem short erect swollen at base.

Lip with auricles.

Tip bifid not toothed (1) *M. calophylla*

Tip pectinate.

Lip crimson lanceolate acute, teeth 6 (2) *M. perakensis*

Lip white triangular pectinate all round (3) *M. acutangula*

Lip without auricles; flowers few and large, lip .25

in. long, toothed (4) *M. macrochila*

Flowers very small crowded, lip trilobed (5) *M. congesta*

Stems creeping ascending not swollen, leaves scattered.

Lip triangular narrowed to retuse tip (6) *M. flavoviridis*

Lip ovate with 5 short teeth at tip (7) *M. micrantha*

Lip obovate with 2 lobes at angles and 5 teeth (8) *M. nemoralis*

(1) *M. calophylla* *Rchb. fil. Gard. Chron.* 1879, ii. 718. *M. Scottii* *Hook. fil. F.B.I.* v. 678; *Bot. Mag. t.* 7268.

Stem short swollen. Leaves few, oblique ovate or lanceolate, edges crisp, brownish with darker spots 3 to 5 in. long, 1.5 in. wide. Raceme 6 in. long. Flowers numerous. Bracts lanceolate reflexed as long as ovary. Sepals oblong. Petals narrower pink. Lip green suborbicular with two long recurved auricles and two short teeth at tip. *Hab.* Rare, Penang, Rifle range (Curtis). *Distrib.* Pegu, Siam.

(2) *M. perakensis* *Ridl. Journ. Linn. Soc.* xxxii. 222; *Mat.* i. 13. *M. plantaginea* *Hook. fil. F.B.I.* v. 688 (not of *Steudel*).

Stem little swollen. Leaves 5 to 6 ovate to ovate-lanceolate acute, oblique, 6 in. long, 2 in. wide; petioles 1 to 2 in. long. Scape 1 ft. long, 4-angled. Flowers numerous. Bracts acuminate deflexed, .25 in. long; pedicels .5 in. long. Upper sepal oblong blunt, laterals ovate oblong, .12 in. long. Petals oblong all pink or purple. Lip large, auricles .4 in. long, acute; limb round with 6 long incurved teeth violet-pink, fovea deep elliptic. Column emerald, arms oblong truncate. *Hab.* Local. Perak, Batu Kurau (Curtis); Gunong Bubu (Scortechini); Ulu Bubong (Kunstler); Telok Pinang; Thaiping. Kelantan, Kwala Aring (Yapp).

(3) *M. acutangula* *Hook. fil. Ic. Pl. t.* 1835; *F.B.I.* v. 68.

Stem swollen short. Leaves ovate-lanceolate acuminate oblique, 4 to 6 in. long, 1.5 in. wide. Raceme 6 to 8 in. long. Bracts lanceolate deflexed. Flowers numerous, green or white, .5 in. across; pedicels .5 in. long. Sepals linear-oblong. Petals narrower longer. Lip auricled triangular, blade shorter pectinate all round. Column arms large round. *Hab.* Forests, Johor, Tebrau River. Pahang, Telom. Negri Sembilan, Labu reservoir; Seremban (Williams). Selangor, Bukit Hitam (Kelsall). Perak, Batang Padang (Wray); Thaiping Hills (Curtis).

(4) *M. macrochila* *Rolfe, Kew Bulletin* 1895, p. 6. var. *minor* *Ridl.*

Stem swollen cylindric, 1 in. tall. Leaves 3 ovate acute, 2.5 in.

long, 1.20 in. wide or less. Raceme 4 in. tall, nude below with about 6 flowers, distant at the top. Bracts lanceolate acuminate deflexed, .1 in. long. Pedicel and ovary slender, .3 in. long. Sepals and petals linear narrow, .25 in. long. Lip oblong-orbicular, base broad truncate, no auricles, edge toothed, teeth rather long acuminate, .25 in. across, green, strongly veined. Column short, arms short blunt emerald green. *Hab.* Lankawi, Kwala Kwah (Haniff).

The original *M. macrochila* Rolfe, is considerably larger than this, the lip being $\frac{1}{2}$ in. long and dark red. It is a native of Siam.

(5) *M. congesta* *Rchb. fil. Walp. Ann.* vi. 206; *King, Ann. Bot. Gard. Calc.* viii. 19, *pl.* 23; *Ridl. Mat.* i. 14.

Stem swollen at base, 2 in. tall. Leaves 4 to 5 unequal ovate to ovate-lanceolate acuminate, largest 6 to 7 in. long, 2 in. wide. Raceme 8 to 12 in. long, basal half nude. Flowers very small crowded yellow or crimson. Sepals oblong, laterals broader. Petals linear. Lip, auricles 0, 3-lobed, side lobes broad blunt, median longer narrower. Capsule .5 in. long, oblong obconic ribs crenulate. *Hab.* Common in dry woods, Singapore, Bukit Timah; Kranji. Malacca, Batu Tiga; Mount Ophir and Sungei Hudang (Derry). Pahang, Selinsing (Machado). Perak, Thaiping Hills at 2500 ft. altitude. Penang Hill and Pulau Betong (Curtis). Lankawi (Curtis). Setul. *Distrib.* India, Cochinchina. Borneo, China, Australia. *Native name:* Sigundol hutan.

(6) *M. flavoviridis* *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 37.

Stem weak ascending, whole plant 11 in. long. Leaves scattered lanceolate, 2 in. long, .75 in. wide, narrowed to petiole, .5 in. long. Raceme few-flowered; flowers distant small. Bracts .12 in. long, very narrow. Flowers .12 in. wide, greenish yellow turning light red; pedicels slender longer than bract. Upper sepal linear, laterals deflexed wider oblong blunt. Petal narrower oblong. Lip sub-triangular oblong; auricles long acute, limb triangular-lanceolate narrowed to retuse tip. *Hab.* Very rare, Perak, Gunong Kerbau on Gunong Bal, at 4500 ft. altitude (Haniff).

(7) *M. micrantha* *Hook. fil. F.B.I.* v. 688; *Ic. Pl. t.* 1834; *Ridl. Mat.* i. 14.

Stem not swollen, slender creeping, 6 in. long or more. Leaves sub-distichous, lanceolate or ovate-lanceolate, acute crisped copery, 2 to 4 in. long, .75 in. wide; petioles purple, .5 in. long. Scapes 1 to 2 slender, 6 to 8 in. long. Flowers very small, scattered. Sepals lorate blunt, purplish. Petals a little smaller. Lip ovate, auricles lorate blunt large, teeth at tip 4, short acute and median one blunt, bright yellow. Column green, arms rounded. Capsule oblong, .5 in. long. *Hab.* On rocks, and among dead leaves in damp forest, Singapore, Changi; Selitar. Johor, Batu Pahat; Tempayan River, Malacca (Derry). Perak, Thaiping Hills (Hervey, Scortechini). *Distrib.* Borneo.

(8) **M. nemoralis** *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 47.

Stem 6 in. long, purple creeping, ascending fleshy. Leaves ovate acuminate, 4 to 9, red, base round, 3 to 4 in. long, 2 in. wide. Raceme 5 in. tall; rachis angled. Flowers .25 in. wide, crowded. Sepals elliptic broad, tip round, lateral ones broader. Petals linear blunt, all red. Lip orange yellow, auricles broad round, limb obovate, quadrate with 2 round angle lobes and 5 acute teeth between. *Hab.* Very rare, in wet mud in dense forest, Johor, Sedenak (Ridley). Perak (Scortechini).

2. OBERONIA, Lindl.

Small epiphytes, stem usually short, covered with distichous fleshy equitant leaves. Spike terminal slender, covered with minute green yellow or red flowers; bracts short oblong; petals and sepals ovate deflexed. Lip entire or lobed, with a nectar depression (fovea) at base. Column very short, arms short. Pollinia 4 on a viscid disc. Capsule globose or elliptic. Species about 60, Old World tropics and Japan.

§ 1. *Acaules*. No distinct stem.

Lip entire flat ovate	(1)	O. lunata
Lip entire triangular oblong	(2)	O. Prainiana
Lip concave emarginate	(3)	O. subnavicularis
Lip bilobed toothed	(4)	O. iridifolia
Lip bifid oblong	(5)	O. gracillima
Lip 3-lobed, edges entire	(6)	O. rosea
Lip 3-lobed, side lobes toothed	(7)	O. stenophylla
Lip 4-lobed.		
Side-lobes entire short	(8)	O. aurantiaca
Side-lobes fimbriate	(9)	O. insectifera

§ 2. *Cauloscentes*. Stem distinct elongate entirely leafy.

Lip entire or bifid; petals entire.		
Lip oblong retuse ocre entire	(10)	O. anceps
Lip linear narrowly bifid; stems 7 in. long, narrow	(11)	O. sinuosa
Lip bilobed at tip, toothed; stem short, 1 in. long	(12)	O. miniata
Lip oblong bifid toothed; stem 12 in. long	(13)	O. grandis
Lip bifid with long curved crenulate auricles	(14)	O. porphyrochila
Petals toothed.		
Lip oblong or ovate serrate; stem 3 to 6 in. long	(15)	O. ciliolata
Lip ovate-elliptic with few teeth; stem very short	(16)	O. Bertoldi
Lip ovate laciniate; stem 1 in. long	(17)	O. brunnescens
Lip spatulate, tip ovate bilobed rounded	(18)	O. spatulata
Lip 3-lobed; petals entire.		
Stems short, 1 to 3 in. long.		
Midlobe obtuse broad erose	(19)	O. intermedia
Midlobe quadrate bifid	(20)	O. gracilis
Midlobe oblong with 2 short lobes	(21)	O. flava

Midlobe with 2 long narrow lobes	(22)	O. caudata
Midlobe narrow tip bilobed	(23)	O. Rolfeana
Stems 13 in. long; midlobe entire lanceolate	(24)	O. pendula
Stem bare at base from fall of leaves	(25)	O. condensata

(1) **O. lunata** Lindl. *Gen. and Sp. Orch. Pl.* 17; *Ridl. Mat.* i. 16. *O. biaurita* Hook. *fl. F.B.I.* vi. 180; *Ic. Pl. t.* 2317. *O. dissitiflora* *Ridl. Journ. Linn. Soc.* xxxii. 218.

Stemless. Leaves few ensiform or falcate, 3 to 5 in. long, .3 to .5 in. wide; spike 3 to 5 in. long. Bracts ovate dentate. Flowers .25 in. wide, white or yellow in dense whorls. Sepals ovate-lanceolate. Petals linear-lanceolate. Lip ovate entire or obscurely trilobed, tip round toothed. Capsule sessile, 3-angled. *Hab.* On trees, Singapore, Bukit Timah; Selitar; Kranji. *Distrib.* Java.

(2) **O. Prainiana** King, *Journ. As. Soc. Beng.* lxiv. 331; *Ann. Bot. Gard. Calc.* 8, pl. 1.

Leaves falcate, .5 to .75 in. long, .25 in. wide. Spike slender, 4 in. long. Flowers whorled bright brown minute. Bracts oblong entire as long as ovary. Sepals oblong blunt. Petals elliptic lanceolate serrate. Lip triangular or oblong; edges toothed. *Hab.* Negri Sembilan, Siliu (G. Williams). Perak (Scortechini). Penang, Penara Bukit (Curtis). *Distrib.* Sikkim, Siam.

(3) **O. subnavicularis** King, *Journ. As. Soc. Beng.* lxvi. ii. 579; *Ridl. Mat.* i. 16.

Leaves ensiform, oblique acuminate, .75 to 6 in. long, .25 to .5 in. wide. Spike hardly as long; peduncle terete. Flowers very densely crowded, .05 in. wide. Bracts lanceolate erose. Sepals ovate blunt. Petals narrow oblong truncate. Lip as long, as broad concave, edges coarsely retro-serrate, tip emarginate with central tooth. *Hab.* Very rare, Perak, no locality (Scortechini).

(4) **O. iridifolia** Lindl. *Gen. and Sp. Orch. Pl.* 15; *Ridl. Mat.* i. 16.

Leaves ensiform acute, 3 to 5 in. long, .5 to 1 in. wide. Spike 6 to 10 in. long, densely flowered. Flowers minute, green or yellow. Bracts broad toothed sheathing ovary. Sepals ovate toothed. Petals as large or less. Lip orbicular-ovate shortly bifid at tip, toothed all round. *Hab.* Local, Lankawi, Pulau Hujung Duri (Curtis). *Distrib.* India and Siam, Java.

(5) **O. gracillima** *Ridl. Journ. Roy. As. Soc. S. Br.* 43, p. 93; *Mat.* i. 17.

Leaves 4 or 5 ensiform acute, 1.5 in. long, .12 in. wide. Spike very slender, 3 to 4 in. long, base nude. Bracts lanceolate acute longer than ovary. Flowers minute whorled, 5 to 6 in a whorl. Sepals oblong blunt entire. Petals broader ovate toothed all whitish. Lip orange oblong, tip acute bifid with a wide sinus between lobes, and short round auricles at base. *Hab.* Very rare, Tringganu, Bundi (Rostados).

(6) *O. rosea* Hook. *fil. Ic. Pl. t.* 2005; *Ridl. Mat. i.* 17.

Leaves ensiform, 2 to 3·5 in. long, ·25 to ·3 in. wide. Spike as long as leaves. Bracts lanceolate. Flowers ·03 in. across, pink. Sepals round ovate. Petals elliptic erose. Lip hardly longer, side-lobes quadrate, midlobe reniform retuse. Capsules sub-sessile. *Hab.* Mountains at 3000 to 4000 ft. altitude. Perak, Gunong Batu Putih (Wray); Thaiping Hills (Kunstler). Penang (Norris).

(7) *O. stenophylla* *Ridl. Journ. Linn. Soc.* xxxii. 218; *Mat. i.* 17.

Leaves ensiform falcate acute, 2·5 in. long, ·12 to ·25 in. wide. Spike 3·5 in. long, slender curved, almost entirely covered with minute flowers in scattered fascicles. Sepals and petals equal ovate-oblong blunt. Lip side-lobes wide oblong, lacinate, midlobe longer triangular emarginate, angles acute. *Hab.* Johor, Hulu Sembrong (Kelsall); on coffee bushes, Sungei Tebrau. Perak, Temengoh (Ridley).

(8) *O. aurantiaca* *Ridl. Journ. Bot.* vol. 36, p. 210; *Mat. i.* 18.

Leaves about 6 falcate acuminate, 2 in. long, ·12 in. wide. Spike 4 in. long, nodding, base covered with lanceolate acuminate bracts. Flower bracts linear acuminate. Flowers minute whorled. Sepals ovate spreading. Petals oblong blunt, toothed at tip much narrower, all orange. Lip narrow oblong, red, much longer, side-lobes short oblong blunt narrow, midlobe narrow oblong, tip bifid. *Hab.* Rare, Selangor, Kajang (Goodenough).

(9) *O. insectifera* Hook. *fil. Ic. Pl. t.* 2004; *Ridl. Mat. i.* 18.

Leaves ensiform straight narrowed to tip, 2 to 4 in. long, ·3 in. wide. Spike as long. Flowers sub-whorled, ·05 in. wide. Sepals ovate acute. Petals linear. Lip much longer, side-lobes 2- to 3-partite, lobes linear, midlobe much longer with 2 lobes linear. Capsule shortly pedicelled. *Hab.* Pahang, Tahan River. Perak, Thaiping Hills at 3500 ft. altitude (Kunstler).

(10) *O. anceps* *Lindl., Sert. Orch. sub. t.* 8; *Ridl. Mat. i.* 18. *O. Griffithii* *Wight, Ic. v.* 4.

Stems 4 to 10 in. long. Leaves short cultrate very numerous and close, ·25 to ·5 in. long. Spike cylindric, 1 to 3 in. long, dense. Bracts ovate. Sepals ovate. Petals smaller linear all reflexed behind lip. Lip ovate to oblong emarginate ochre. Column arms green. Capsule globose sessile. *Hab.* Common. Singapore, Galang; Kranji. Malacca, Tanjong Kling. Pahang, Pekan. Selangor, Ginting Bidai. Dindings. Perak. Penang Hill (Curtis). *Distrib.* Tenasserim. Java. *Native name:* Sakat Lidah Buaya. *Use:* Leaves for poulticing.

(11) *O. sinuosa* *Ridl. Journ. Linn. Soc.* xxxi. 263.

Stems several sinuate, 7 in. long, flat, ·25 in. wide. Leaves about 19 ensiform acute falcate, ·5 in. long. Raceme 4 in. long. Flowers very small whorled red. Bracts oblong acute toothed.

Sepals short oblong blunt. Petals linear. Lip narrow elongate linear bifid at tip, lobes acute. Capsule elliptic, .12 in. long. *Hab.* Rare, Negri Sembilan at Siliau (Williams). *Distrib.* Borneo.

(12) *O. miniata* Lindl. *Bot. Reg.* 1843, *Misc.* 8; *Ridl. Mat.* i. l.c. 18.

Stem 1 to 1.5 in. long. Leaves ensiform acute about 8, 1 in. long, .25 in. wide. Spike slender, 1.5 to 8 in. long, base nude puberulous. Flowers .05 in. wide, lax pedicelled red or yellow.

Bracts lanceolate shorter than pedicels. Sepals ovate ciliate. Petals narrower. Lip, base broad, sides dilate upcurved, limb narrow oblong dilate towards tip, toothed, bilobed. *Hab.* Rare, Singapore, Kranji (Ridley).

(13) *O. grandis* Ridl. *Journ. Linn. Soc.* xii. 297.

Stems 1 ft. long. Leaves ensiform acuminate curved, 6 in. long, .5 in. wide. Spike as long. Flowers .06 in. wide, dense at base, whorled above, yellow. Bracts lanceolate cuspidate. Sepals ovate acute. Petals oblong lanceolate narrower. Lip oblong-ovate, tip bifid, edges shortly toothed, fovea ovate. Capsule oblong-globose, .12 in. long. *Hab.* Selangor, Ulu Langat (Kloss).

(14) *O. porphyrochila* Ridl. *Journ. Linn. Soc.* xxxii. 220; *Mat.* i. 19.

Stem short. Leaves lorate acuminate falcate flaccid, 6 in. long, .5 in. wide. Spike over 4 in. long, slender. Flowers .05 in. across, crowded at base, fascicled towards tip. Bracts linear acute. Sepals ovate obtuse yellow. Petals linear narrower. Lip, midlobe bilobed toothed, purple. *Hab.* Rare in mountain forests, Pahang, Telom, Selangor, Bukit Hitam (Kelsall).

(15) *O. ciliolata* Hook. *fil. F.B.I.* vi. 181; *Ic. Pl.* 2318; *Mat.* i. 19.

Stems 3 to 6 in. long. Leaves 9 to 14, ensiform acute, .75 to 2 in. long, .25 in. wide. Spike 4 to 6 in. long, flowered to base. Flowers .05 in. long, white whorled. Bracts oblong toothed apiculate. Sepals ovate ciliate. Petals lanceolate, toothed, ciliate.



FIG. 162.—*Oberonia ciliolata*.

Lip oblong-quadrate, or ovate retuse, serrate. Capsule pedicelled puberulous. *Hab.* On mangroves and orchard trees, not rare. Singapore, Kranji; Changi; Bukit Timah Road. Malacca, Sungei Kesang; Sungei Rambei (Derry). Tringganu, Bundi (Rostados).

(16) *O. Bertoldi* King, *Journ. As. Soc. Beng.* lvi, 2, p. 581; *Ridl. Mat.* i. 19.

Stem very short. Leaves coriaceous narrow lanceolate acuminate, .5 to 1.5 in. long, .25 in. wide. Spike longer, base nude slender. Flowers .05 in. wide in whorls of 6. Bracts lanceolate serrate. Sepals elliptic-oblong. Petals lanceolate serrate. Lip larger oblong-ovate with one to two teeth on each side, tip bifid toothed. *Hab.* Very rare, Perak. No locality (Scortechini).

(17) *O. brunnescens* Ridl. *Journ. Linn. Soc.* xxxvii. 220.

Stem 1 in. long. Leaves cultrate falcate, .75 in. long, .12 in. wide. Spike 4 in. long, slender, base nude. Flowers scattered, .05 in. across, reddish brown. Bracts ovate acute. Sepals ovate-oblong. Petals broad ovate toothed. Lip ovate laciniate not lobed, Capsule ellipsoid pear-shaped, .12 in. long. *Hab.* Rare. Perak, Thaiping Hills (Ridley).

(18) *O. spathulata* Lindl. *Gen. and Sp. Orch. Pl.*

Caulescent, stem 7 in. tall. Leaves distichous lanceolate acuminate, 2 in. long, .25 in. wide at base. Spike floriferous to base, 4 in. long. Flowers minute fawn-coloured in tufts of 3. Bracts lanceolate fimbriate as long as ovary. Sepals broad ovate, edges shortly fimbriate. Lip oblong spathulate, base broad, limb abruptly dilate rounded bilobed. *Hab.* Pahang, Fraser Hill (Burkill and Holttum) *Distrib.* Java, Borneo, Celebes.

(19) *O. intermedia* King, *Journ. As. Soc. Beng.* lvi. 2, p. 579.

Stem 1 to 3.5 in. long. Leaves sub-falcate acute, 1 to 2.5 in. long, .5 in. wide. Spike slender, decurved, 4.5 in. long. Flowers .05 in. wide. Bract lanceolate, shorter than ovary. Sepals ovate acute. Petals linear-oblong acute. Lip 3-lobed longer, broad oblong, side-lobes round, tip broad obscurely notched. *Hab.* Very rare. Perak, no locality (Scortechini).

(20) *O. gracilis* Hook. fil. *F.B.I.* v. 685; *Ridl. Mat.* i. 20.

Stems 6 to 8 in. long, flexuous. Leaves straight lanceolate acute, 1 in. long. Spike 4 to 6 in. long, few flowered. Flowers subsessile, .05 in. wide, reddish. Bracts ovate-triangular very short. Upper sepal orbicular, laterals ovate. Petals linear. Lip with two oblong cylindrical blunt side-lobes, midlobe quadrate bluntly 2-lobed. *Hab.* Perak, Kinta River (Kunstler).

(21) *O. flava* Ridl. *Journ. F.M.S. Mus.* iv. 64.

Stem 1 in. long, flexuous. Leaves narrow linear falcate acuminate, 2 in. long, .1 in. through. Scape slender 6 in. long, base one-third nude. Flowers minute yellow dense. Bracts narrow lanceolate. Sepals ovate, blunt. Petals narrower lanceolate. Lip 3-lobed

side-lobes broad ovate blunt, midlobe much larger oblong with 2 short acute lobes. *Hab.* Forests, Pahang, Telom (Ridley).

(22) *O. caudata* King *Journ. As. Soc. Beng.* lxvi. 2, p. 581; *Ridl. Mat.* i. 20.

Stems 1.5 in. long. Leaves 4 to 5 distant linear ensiform falcate, .75 to 2 in. long, .15 in. wide. Spike lax decurved, 2 in. long. Flowers .05 in. wide. Bracts ovate entire. Sepals ovate-oblong acute pale red. Petals linear acuminate. Lip longer, side-lobes ovate acuminate, midlobe narrow deeply bilobed, lobes caudate acuminate. *Hab.* Rare, Perak. No locality (Scortechini).

(23) *O. Rolfeana* King, *Journ. As. Soc. Beng.* lxvi. 2, p. 581; *Ridl. Mat.* i. 20.

Stem 1 in. long. Leaves ensiform acute falcate, .6 to 1 in. long, .25 in. wide. Spike 1.8 to 3 in. long, slender puberulous. Flowers sparse, .05 in. across, orange. Bracts oblong erose. Sepals ovate blunt. Petals linear entire. Lip larger, base broad concave, side-lobes round erect, midlobe narrow, tip bilobed. *Hab.* Very rare. Perak, no locality (Scortechini).

(24) *O. pendula* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 38.

Stems 4 to 13 in. long, slender pendulous. Leaves remote linear ensiform acute, 1 in. long, .1 in. wide. Spike 4 in. long, slender. Flowers yellow in close whorls. Bracts lanceolate as long as flowers. Sepals ovate-triangular. Petals narrower linear. Lip 3-lobed, side-lobes short triangular acute, midlobe lanceolate sub-acute. *Hab.* Rare. On trees in forests, at 3000 ft. altitude. Selangor, Sempang Mines (Ridley).

(25) *O. condensata* Ridl. *Journ. Linn. Soc.* xxxviii. 322.

Stems several, 1 to 2 in. long, bare below with numerous roots. Leaves fleshy linear acute, .75 in. long, .12 in. wide. Raceme floriferous to base. Bracts lanceolate long-acuminate. Flowers yellow, .08 in. wide. Sepals ovate blunt. Petals lanceolate much narrower. Lip as long quite entire elongate triangular. *Hab.* On trees by streams, very local, Pahang, Gunong Tahan at 5500 ft. altitude (Robinson, Ridley).

3. HIPPEOPHYLLUM, Schlechter.

Epiphytes with the appearance of *Oberonia*, but rhizome long-creeping with distant tufts of leaves, ensiform falcate, articulate at base. Racemes long slender with numerous very small flowers and persistent bracts. Sepals lanceolate. Petals narrower. Lip 3-lobed not auricled, base broad. Column rather long slender with broad wings. Species about 6, Malay islands.

(1) *H. Scortechinii* Schlechter *Engl. Jahrb.* xlv. *Beibl.* 104, p. 13. *Oberonia Scortechinii* Hook. *fil. F.B.I.* v. 683; *Ridl. Mat.* i. 17.

Rhizome long-creeping with leaf tufts 1.5 in. apart. Leaf 9 to 10 in. long, .25 to .3 in. wide, ensiform narrowed to tip. Scape 12 to 18 in. long, rather slender, entirely covered with very small

yellow flowers in whorls to base. Bracts ovate-lanceolate, .1 in. long. Sepals oblong blunt. Petals linear. Lip 3-lobed, side-lobes lanceolate acute, midlobe shorter orbicular-rhomboid, with 3 raised veins from base. *Hab.* Rare, Perak, Kinta valley near Bujong Malacca (Kunstler, Scortechini). *Distrib.* Java.

4. LIPARIS, Richard.

Terrestrial plants with herbaceous or epiphytic with coriaceous leaves. Stem usually swollen at base. Raceme erect; flowers numerous medium to small. Sepals and petals narrow linear or oblong. Lip clawed, blade oblong, ovate or reniform deflexed with a single or double callus at base. Column long graceful with short arms or wings; anther terminal ovate. Pollinia 4. Species over 100, all temperate or tropical regions.

§ 1. MOLLIFOLIÆ. Terrestrial herbaceous. Leaves 1 or more on a swollen stem, not articulate.

Leaves several.

- Lip large oblong toothed; flowers deep red . . . (1) *L. atosanguinea*
- Lip large ovate; flowers pale, veins red . . . (2) *L. tricallosa*
- Lip small oblong entire, calli 2 . . . (3) *L. ferruginea*
- Lip small obovate crenulate, callus a transverse bar . . . (4) *L. transtillata*
- Lip small oblong, bilobed toothed, callus 0 . . . (5) *L. Wrayi*

Leaf 1, ovate.

- Lip elliptic-lanceolate fimbriate . . . (6) *L. purpureo-viridis*
- Lip oblong bifid toothed . . . (7) *L. Maingayi*
- Lip pandurate bifid with 2 long tails . . . (8) *L. parvula*
- Lip pandurate bifid, lobes fimbriate . . . (9) *L. furcata*

§ 2. CORNIFOLIÆ. Epiphytic plants. Leaves coriaceous articulate with the pseudobulb. Raceme lax. Bracts thin pale deflexed.

- Flowers large, lip bilobed toothed; leaves large (10) *L. latifolia*
- Flowers small, lip pectinate at tip . . . (11) *L. lacerata*
- Flowers very small.
- Lip oblong retuse; raceme long erect . . . (12) *L. elegans*
- Lip oblong bilobed; raceme long decurved . . . (13) *L. parviflora*
- Lip entire ovate; raceme usually long . . . (14) *L. longipes*
- Lip entire oblong; raceme very short . . . (15) *L. comosa*

§ 3. DISTICHÆ. Epiphytic. Leaves coriaceous articulate. Raceme short compact, with persistent spreading distichous bracts. Peduncle long nude.

- Lip .5 in. long, flabellate crenulate; leaf 1 in. wide . . . (16) *L. compressa*
- Lip .25 in. long, obovate retuse; leaf .25 in. wide . . . (17) *L. disticha*

(1) *L. atosanguinea* Ridl. *Journ. As. Soc. S. Br.* 39, p. 71; *Mat.* 1. 21. *L. tabularis* Rolfe, *Kew Bulletin* 1908, p. 68; *Bot. Mag.* t. 8195.

Stem stout, 4 in. tall. Leaves ovate-lanceolate acute, 8 in. long, 3 in. wide. Raceme over 1 ft. long, lax, many-flowered. Ovary and pedicel 1 in. long. Bracts ovate-lanceolate very small. Flowers large,

red-purple. Sepals linear blunt. Petals narrower. Lip orbicular-oblong sub-acute toothed, with 2 short semi-orbicular lamellæ at base, .5 in. long. *Hab.* Rare. Perak, Thaiping Hills, Gap (Derry).

(2) *L. tricallosa* *Rchb. fil. Gard. Chron.* 1897 i. 684; *Bot. Mag.* t. 7804. *L. venosa* *Ridl. Journ. Linn. Soc.* xxiv. 350; *Mat.* i. 21.

Stem 2 in. long, old pseudobulb 6 in. long, green or purple. Leaves ovate-lanceolate acute, 6 in. long, 2 in. wide. Raceme over 1 ft. long, purple-red, many-flowered. Bracts lanceolate, .12 in.

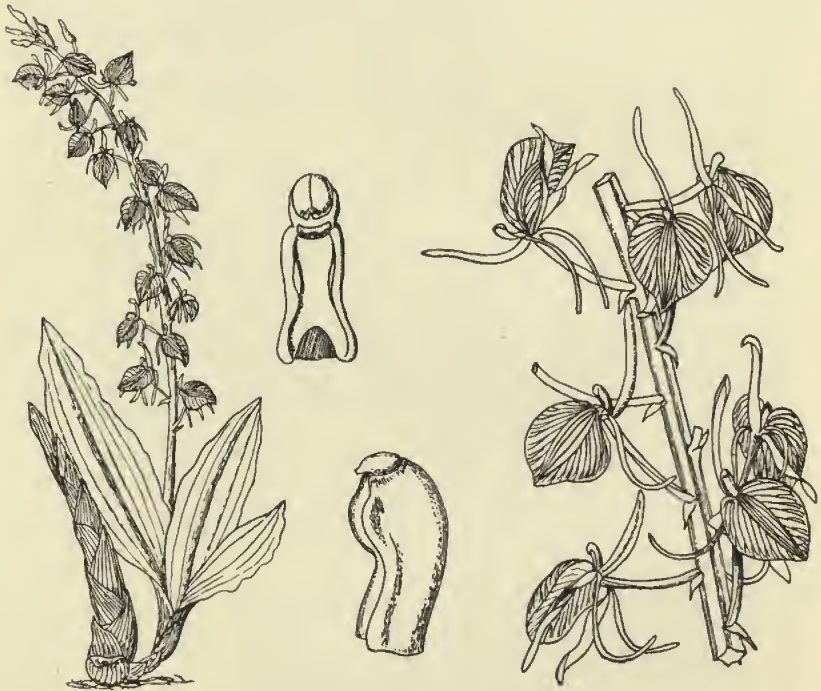


FIG. 163.—*Liparis tricallosa*.

long. Pedicels 1 in. long, purple. Sepals oblong, .75 in. long, pink or green. Petals linear pink. Lip ovate blunt crenulate, over .5 in. long and wide, pale, purple veins; calli small round. Column purple nearly straight. *Hab.* Scarce and rather sporadic. Singapore, Chan Chu Kang. Johor (Little). Malacca (Maingay). Negri Sembilan, Gunong Angsi (Williams). Perak, Bujong Malacca (Curtis). *Distrib.* Borneo.

(3) *L. ferruginea* *Lindl. Gard. Chron.* 1848, p. 55; *Ridl. Mat.* i. 22.

Stem short. Leaves linear-lanceolate acuminate, 8 to 9 in. long,

·5 to 1 in. wide. Raceme 12 to 16 in. long. Flowers small, ·25 in. wide, scattered at top, base nude. Sepals oblong-ovate, lateral ones falcate blunt. Petals linear, all green or purple. Lip hardly clawed, oblong retuse, green or purple, 2 small bosses at base. Column curved, greenish. Capsule pear-shaped, 1 in. long on a pedicel ·25 in. long. *Hab.* Damp grassy spots, ricefields, not rare. Singapore, Tanglin; Changi. Malacca (Griffith); Chabau. Perak, Larut (Kunstler); Kampar (Curtis). *Distrib.* Cambodia.

(4) **L. transtillata** *Ridl. Journ. Linn. Soc.* xxxii. 225; *Mat.* i. 22.

Stem 1·5 in. long. Leaves ovate to ovate-lanceolate acute oblique, 6 in. long, 2 in. wide; petioles 2 in. long. Raceme 6 in. long, rachis winged. Flowers ·5 in. wide; pedicels ·36 in. long, purple. Sepals lorate purplish. Petals linear narrower. Lip oblong-obovate sub-retuse crenulate dark purple, a median olive green channel, a transverse raised bar at base, green with purplish spots. Column yellowish white nearly straight. *Hab.* Forests. Perak, Thaiping Hills.

(5) **L. Wrayi** *Hook. fil. F.B.I.* vi. 181; *Ridl. Mat.* i. 22. *L. pectinifera* *Ridl. Journ. Bot.* 1898, p. 210.

Stem 3 to 4·5 in. long, purple. Leaves lower ovate, upper lanceolate acute, 6 in. long, 3 in. wide or less. Raceme 6 in. long, angled. Bracts ovate-lanceolate acute, ·12 in. long. Pedicel and ovary ·5 in. long. Sepals linear blunt, ·36 in. long. Petals shorter narrower green. Lip oblong, tip square bilobed, lobes toothed green, 2 purple lines on disc, no calli. Column curved green. Capsule elliptic, nearly 1 in. long. *Hab.* Local. Dindings, Gunong Tungul, Perak (Wray). Temengoh (Ridley).

(6) **L. purpureo-viridis** *Burkill MSS.*

Rhizome stout, creeping, 3 in. long; pseudobulbs crowded, elongate conic pale whitish pustular-rugose, 1 in. long, ·25 in. through at base with 2 pale papery bracts, the largest 2 in. long, the smaller ·5 in. long, both lanceolate acute. Leaf solitary herbaceous ovate cordate acute when young suffused with violet along the nerves about 20 in number, slender, 3 in. long and as wide; petioles 1 in. long. Scape 6 in. long, slender. Flowers about 8; pedicels ·3 in. long. Bracts very narrow lanceolate acute, ·2 in. long. Sepals linear pale, ·2 in. long. Petals much narrower filiform purple. Lip claw short broad, limb elliptic-lanceolate acute green fringed with linear purple processes, nerves 7 purple, ·25 in. long. Column base broad with a short process on the front then abruptly narrowed curved, ·1 in. long. *Hab.* Mountains, Pahang, Fraser Hill at 4000 to 4370 ft. altitude (Burkill and Holtum).

(7) **L. Maingayi** *Ridl. Journ. Linn. Soc.* xxxii. 226; *Mat.* i. 23. *Microstylis Maingayi* *Hook. fil. Ic. Pl.* t. 1826.

Stem short sub-globose. Leaf 1, orbicular-ovate, 3 in. long, 2 in. wide. Raceme 4 in. long. Bracts lanceolate acuminate,

·25 in. long. Pedicels ·5 in. long. Flowers ·25 in. long, deep crimson. Sepals narrow lanceolate acute. Petals narrower. Lip cuneate-oblong truncate with 3 or 4 long teeth at the angles. Column arched, arms incurved. *Hab.* On dripping rocks in forest, Malacca, Mt. Ophir. Selangor, Semangkok Pass. Perak, Thaiping Hills (Wray); Gunong Batu Putih (Wray). Penang, Waterfall Hill (Maingay); Bukit Laksamana (Curtis). Kedah Peak.

(8) *L. parvula* *Ridl. Journ. Linn. Soc.* xxxii. 226; *Mat.* i. 23. *Microstylis parvula* *Hook. fil. Ic. Pl.* t. 1827.

Stem short globose. Leaf 1, ovate acute, 2 in. long, 1 in. long. Raceme 3 in. long. Bracts lanceolate acuminate. Flowers rather crowded, ·12 in. wide, deep crimson. Sepals oblong blunt. Petals narrow. Lip narrow pandurate with 2 narrow tails and a sinus between. *Hab.* Local on dripping rocks, Perak, Thaiping Hills (Kunstler).

(9) *L. furcata* *Ridl. Journ. Linn. Soc. l.c.*; *Mat.* i. 23. *Microstylis furcata* *Hook. fil. Ic. Pl.* 1827A.

Stem very small sub-globose. Leaf 1 ovate acute, 2 in. long, 1 in. wide. Raceme slender, 4 to 6 in. long, base nude. Flowers numerous, ·12 in. wide. Bracts lanceolate acute short. Pedicels ·12 in. long. Sepals oblong blunt. Petals linear-lorate. Lip not clawed narrow oblong bifid, lobes diverging toothed with a median tooth. Capsule elliptic, ·25 in. long. *Hab.* Perak, Thaiping Hills at 4000 ft. altitude.

(10) *L. latifolia* *Lindl. Gen. and Sp. Orch. Pl.* 30; *Ridl. Mat.* i. 23. *L. robusta* *Hook. fil. Ic. Pl.* 2012. *L. Scortechini* *Hook. fil. Ic. Pl.* 2009.

Stem about 3 in. long. Leaf 1, elliptic-lanceolate very coriaceous with 14 strong ribs, 12 in. long, 3 in. wide. Raceme 10 to 14 in. long. Flowers numerous, ·5 in. across. Bracts lanceolate acuminate, ·25 in. long. Pedicels ·5 in. long. Sepals narrow linear. Petals narrower, all yellowish. Lip, base narrow, limb obovate bilobed toothed orange, 2 short erect calli. Column slender arched. Capsule obconic, 1 in. long. *Hab.* Epiphytic at 4000 ft. altitude. Mountain forests, not rare, Selangor, Bukit Hitam (Kelsall). Perak, Thaiping Hills, Gunong Hijau. *Distrib.* Java, Borneo.

(11) *L. lacerata* *Ridl. Journ. Linn. Soc.* xxii. 284; *Mat.* i. 24.

Pseudobulb conic, 2 in. long, ·5 in. through. Leaf lanceolate to elliptic-lanceolate, 6 to 9 in. long, ·75 to 1·5 in. wide. Raceme slender, 6 to 12 in. long. Flowers numerous, ·25 in. wide. Bracts narrow lanceolate, ·13 in. long. Pedicel and ovary ·5 in. wide. Sepals oblong blunt. Petals smaller white. Lip oblong broad, bilobed many-toothed, orange. Column curved. Capsule elliptic, ·5 in. long. *Hab.* Perak, Thaiping Hills. Dindings, Pulau Rumpia, Sembilan isles (Kloss). Lankawi, Gunong Raya (Curtis). *Distrib.* Tenasserim, Borneo.

(12) **L. elegans** Lindl. *Gen. and Sp. Orch. Pl.* 30; *Ridl. Mat.* i. 24. *L. crenulata* Lindl. *Gen. and Sp. Orch. Pl. l.c.* *L. gracilis* Hook. *fil. Ic. Pl. t.* 2011.

Pseudobulbs conic-cylindric, 1 in. long. Leaves 2, elliptic-oblanccolate, 6 to 9 in. long, 1 to 1.25 in. wide. Raceme 12 to 18 in. long, stiff, base nude. Flowers .1 in. across, very numerous. Bracts lanceolate acute, .12 in. long. Sepals oblong, laterals curved blunt. Petals narrower, all green. Lip oblong retuse orange, calli 2. Column curved green. Capsule elliptic, .25 in. long. *Hab.* Epiphyte on trees and on rocks, common, Singapore, Kranji; Sungei Buluh. Johor, Gunong Banang. Pahang, Pekan. Malacca, Nyalas; Mt. Ophir. Perak, Thaiping Hills, Waterfall (Wray). Penang, Moniot's Road (Curtis). Kedah Peak. Lankawi, Kwala Malacca (Curtis). *Distrib.* Borneo.

(13) **L. parviflora** Lindl. *Gen. and Sp. Orch. Pl.* 31. *L. flaccida* Rehb. *fil. Linnæa*, xii. 45; *Ridl. Mat.* i. 24.

Pseudobulb cylindric, 1.5 to 3 in. long. Leaves narrow long-lanceolate acute, 6 to 12 in. long, .25 to .75 in. wide. Raceme slender decurved, 6 to 12 in. long. Flowers very small copious. Bracts .12 in. long, lanceolate acute. Pedicel and ovary .25 in. long. Sepals oblong, laterals falcate blunt greenish white. Petals smaller. Lip oblong abruptly decurved in the middle, bifid, edges ciliate, orange, calli 2 small. Column curved. Capsule elliptic, .5 in. long. *Hab.* Not rare, on lofty trees, Malacca, Machap (Derry). Selangor, Batu Caves. Perak, Ulu Bubong (Kunstler). *Distrib.* Siam, Java, Borneo.

(14) **L. longipes** Lindl. *Wall. Pl. As. Rar.* i. 31, t. 35; *Ridl. Mat.* i. 25.

Pseudobulbs short ovoid, 1 to 2 in. long, or elongate to 6 in. long. Leaves linear-obovate, oblong blunt or acute, 4 to 8 in. long, 1 in. wide. Raceme erect, 6 in. long. Flowers copious crowded above very small. Bracts linear acuminate, .12 in. long. Sepals oblong. Petals linear greenish white. Lip ovate acute, decurved in middle, orange or green, calli 0. Column curved. *Hab.* Rare. Perak, Thaiping Hills (Derry); Batang Padang (Wray); Sungkai River (Curtis). Penang (Porter). *Distrib.* India, Malay isles, Polynesia, China.

(15) **L. comosa** Ridl. *Journ. Linn. Soc.* xxxii. 229; *Mat.* i. 25.

A dwarf plant; pseudobulbs crowded conic, .6 in. long. Leaves narrow lanceolate acute, 4.5 in. long, .25 in. wide. Raceme erect, 6 in. long. Flowers small numerous green. Sepals lanceolate lorate, laterals broader. Petals linear. Lip sub-quadrate oblong tip round, no calli. Column slightly arched above. Capsule ellipsoid-subglobose, .12 in. long. *Hab.* Not rare, in mountains at 1500 to 4000 ft. altitude, Pahang, Telom (at 4000 ft. altitude). Selangor, Menuang Gasing (Kloss). Perak, Thaiping Hills; Temengoh (Ridley).

(16) *L. compressa* Lindl. *Gen. and Sp. Orch. Pl.* 32; *Ridl. Mat.* i. 25.

Rhizome creeping; pseudobulbs sub-globose. Leaf 1, coriaceous, base sheathing the pseudobulbs, linear-lanceolate acute, 9 to 15 in. long, 1 in. wide. Scape slender, 6 to 8 in. long. Bracts at top distichous imbricating. Flowers opening singly, red brown; pedicel .5 in. long. Sepals lanceolate. Petals narrow linear. Lip .5 in. long, obcuneate fan-shaped, claw narrow, limb tip broad truncate crenulate, calli 2. Column slender curved. *Hab.* Not common, Perak, Thaiping Hills at 4000 to 5000 ft. altitude (Curtis, Scortechini); Gunong Batu Putih (Wray). *Distrib.* Sumatra, Borneo, Java, Celebes.

(17) *L. disticha* Lindl. *Bot. Reg. sub. t.* 882; *Ridl. Mat.* 26.

Rhizome long slender branching, pseudobulbs pear-shaped, .25 in. long. Leaf 1, linear acute, 5 to 10 in. long, .25 in. wide or less. Scape slender winged, 4 to 6 in. long. Raceme .5 to .75 in. long. Bracts .12 to .25 in. long, distichous. Flowers .5 in. wide. Sepals oblong narrow. Petals linear yellowish. Lip .25 in long, ocre, obovate retuse with 2 tubercles at base. Column broadly winged slightly curved. *Hab.* Common on mangroves, and on forest trees up to 5000 ft. altitude. Singapore, Kranji; Sungei Buluh. Johor, Kwala Kahang (Kelsall). Pahang, Kota Glanggi. Selangor, Menuang Gasing (Kloss); Gunong Mengkuang Lebah (Robinson). Perak, Thaiping Hills; Bujong Malacca (Kunstler, etc.). Penang (Maingay). Lankawi (Curtis). *Distrib.* Mascarene isles, Ceylon, Tenasserim, Malay isles.

5. PLATYCLINIS, Benth.

Tufted epiphytes with numerous obconic pseudobulbs crowded on a rhizome. Leaves single, lanceolate or linear, petioled. Raceme terminal on a long peduncle slender. Bracts stiff broad convolute. Flowers small green, white or brown. Sepals and petals narrow. Lip sessile or nearly flat, oblong or pandurate with two keels or calli at base. Column slender or short and broad, arms long, tip of column hooded. Anther 2-celled. Pollinia 4, waxy ovoid. Species about 20, Malay Peninsula and islands.

- | | |
|--|----------------------------|
| Bracts broad oblong | (1) <i>P. longifolia</i> |
| Bracts narrow lanceolate acute. | |
| Column and arms long. | |
| Column arms long from middle | (2) <i>P. gracilis</i> |
| Column arms from near the base | |
| Arms much shorter than column | (3) <i>P. linearifolia</i> |
| Arms as long acuminate; leaves 12 in. long | (4) <i>P. linearis</i> |
| Arms as long acuminate; leaves 3 in. long | (5) <i>P. pulchella</i> |
| Arms as long toothed | (6) <i>P. odorata</i> |
| Column and arms short. | |
| Arms from near stigma acute. | |
| Leaves thin grassy | (7) <i>P. graminea</i> |

Arms oblong toothed from near stigma.

Pseudobulbs distant on long rhizome . . . (8) *P. carnosa*

Pseudobulbs crowded; rhizome short.

Lip side-lobes round, 2 curved calli at base (9) *P. Kingii*

Lip side-lobes toothed, a double keel at base (10) *P. sarawakensis*

(1) *P. longifolia* Hemsl. *Gard. Chron.* 1881, ii. 656; *Ridl. Mat.* i. 26. *Dendrochilum bracteosum* Rehb. *fil. Walp. Ann.* vi. 241.

Pseudobulbs numerous elongate-conic, 3 to 4 in. long. Leaf lanceolate acuminate, 6 to 13 in. long, 1 to 2.5 in. wide; petioles 2 to 4 in. long. Racemes 12 to 15 in. long, lower half nude. Bracts oblong convolute, .12 in. long. Flowers 40, .25 in. wide. Sepals and petals lanceolate acute ochreous. Lip pandurate, lobes short acute, midlobe much larger obovate-oblong, dark brown, edges lighter, 2 low keels. Column pale, arms long linear from middle erect, hood toothed. Capsule globose-oblong, 1 in. long. *Hab.* In mangrove swamps and forests, Singapore, Kranji; Sungei Jurong. Johor, Batu Pahat. Pahang, Selinsing (Machado). Perak, Hermitage Hill. *Distrib.* Borneo, Java, Papua.

(2) *P. gracilis* Hook. *fil. F.B.I.* v. 708; *Ic. Pl. t.* 2016; *Ridl. Mat.* i. 27.

Pseudobulbs 1 in. long, conic. Leaf elliptic-lanceolate blunt, .4 to 6 in. long, 1 in. wide; petioles .5 to 1 in. long. Raceme 4 to 6 in. long, lower third nude. Flowers numerous. Bracts lanceolate acute, .12 in. long. Sepals and petals lanceolate acuminate acute pale green. Lip pandurate, side-lobes narrow linear pale greenish white, midlobe obovate or cuneate acuminate, white with red centre bar and median green line, or yellowish with brown centre, keels 3 thick from base to centre green. Column slender, arms long from middle of column. Capsule elliptic, .5 in. long. *Hab.* Mountains at 4000 to 5500 ft. altitude. Pahang, Gunong Tahan (Robinson). Selangor, Mengkuang Lebah (Robinson and Kloss). Perak, Thaping Hills (Kunstler).

var. *angustifolia* Ridl. *l.c.* Leaves linear blunt, 5 in. long, .36 in. wide. Perak, Bujong Malacca (Ridley). *Distrib.* Java.

(3) *P. linearifolia* Ridl. *Journ. Linn. Soc.* xxxii.; *Mat.* i. 27. *Dendrochilum linearifolium* Hook. *fil. F.B.I.* v. 782; *Ic. Pl. t.* 1859.

Pseudobulbs fusiform conic, .2 in. long. Leaf linear-lanceolate, 2 in. long, .25 in. wide; petioles .5 in. long. Raceme nodding, 3 in. long, lower half nude. Flowers .3 in. wide, about 20, yellowish. Bracts lanceolate acute. Sepals and petals lanceolate acuminate. Lip oblong or obovate, side-lobes short triangular acute, midlobe ovate-oblong or quadrate sub-acute, keels 3. Column arms from near the base shorter, hood round entire. *Hab.* Mountains on trees and rocks at 4000 to 5500 ft. altitude. Not rare. Pahang, Telom; Gunong Berumbun; Gunong Tahan. Malacca, Mt. Ophir

(all collectors). Perak, Batang Padang (Wray); Chosang (Scortechini); Gunong Bubu (Wray); Kedah, Gunong Bintang (Kloss).

On Gunong Tahan, on exposed rocks, the pseudobulbs were bright orange and flowers bright yellow.

(4) *P. linearis* *Ridl. Journ. Linn. Soc.* xxxii. 230; *Mat.* i. 28.

Rhizome thick woody, pseudobulbs elongate-conic, 1.5 in. long. Leaf over 12 in. long, .5 in. wide, linear-lanceolate blunt; petioles 3 in. long. Raceme 12 in. long, lower two-thirds nude. Flowers .25 in. wide, white. Bracts lanceolate. Sepals linear acute. Lip linear blunt, side lobes obscure acute, keels 3. Column long curved, arms lanceolate acuminate acute from near base and taller than the hood. *Hab.* Local, terrestrial, Kedah Peak, at 3000 to 4000 ft. altitude (Ridley).

(5) *P. pulchella* *Ridl. Journ. F.M.S. Mus.* vi. 56.

Pseudobulbs ovoid-conic, .4 in. long. Leaf coriaceous lanceolate blunt, 1.5 in. long, .3 in. wide. Scape 4.5 in. long. Flowers numerous apparently green or yellow. Bracts narrow lanceolate longer than pedicel and ovary. Sepals lanceolate acute, .25 in. long. Petals shorter. Lip apparently brown, pandurate, side-lobes round toothed, midlobe ovate acute, keels 2 from base ending on base of midrib. Column slender curved, arms linear acuminate from near base, nearly as long as column, hood round entire. *Hab.* Perak, Gunong Kerbau at 5500 to 6600 ft. altitude (Robinson).

(6) *P. odorata* *Ridl. Journ. As. Soc. S. Br.* 39, p. 72; *Mat.* 28.

Pseudobulbs cylindrical tapering, 2.5 to 3 in. long. Leaf lanceolate subacute, 9 in. long, .75 in. wide; petioles 2 in. long. Racemes 12 in. long, lower half nude. Flowers greenish white fragrant, .25 in. wide. Bracts lanceolate acuminate longer than ovary. Sepals and petals lanceolate acuminate acute. Lip entire tongue-shaped, blunt pubescent, keels 2. Column short, wings broad, arms from just below stigma as long as hood, linear toothed, hood toothed. *Hab.* Rare. Perak (Curtis), probably on Hermitage Hill. Pahang, Fraser Hill (Sempang) at 4000 to 4370 ft. altitude (Burkill and Holttum).

(7) *P. graminea* *Ridl. Journ. F.M.S. Mus.* vi. 57.

Pseudobulbs crowded elongate conic, 1.25 in. long, .1 in. through. Leaf lanceolate sub-acute thin grassy, 5 in. long, .5 in. wide; petioles 2 in. long. Scape slender, 8 in. long, lower half nude. Flowers .15 in. across. Bracts lanceolate acuminate longer than pedicel and ovary. Sepals lanceolate acuminate. Petals shorter. Lip very narrow nearly entire lanceolate acute, keels 2, thin, side-lobes indistinct. Column straight, arms from near stigma, bases broad, tips acute, shorter than column, hood ovate, 2- to 3-toothed. *Hab.* Local. Perak, Gunong Kerbau at 5500 to 6000 ft. altitude (Robinson).

(8) *P. carnosa* *Ridl. Journ. F.M.S. Mus.* vi. 56.

Rhizome long woody; pseudobulbs conic, .75 in. long, .5 in.

distant. Leaf coriaceous elliptic-lanceolate blunt, base narrowed, 4.5 in. long, 1.5 in. wide or smaller; petioles .5 in. long. Scape nodding, 4 to 6 in. long, basal half nude. Bracts lanceolate blunt. Flowers numerous fleshy. Sepals broad lanceolate blunt. Petals shorter. Lip fleshy, side-lobes minutely toothed, tips free lanceolate acuminate, ridges 2, short from base to near middle of lip, midlobe ovate acuminate toothed. Column short straight, hood oblong tall toothed, arms short from near stigma, broad acuminate. *Hab.* Perak, Gunong Kerbau at 6500 ft. altitude (Robinson).

(9) **P. Kingii** *Hook. fil. F.B.I. v. 708; Ic. Pl. t. 2015.*

Pseudobulbs elliptic-oblong, 1 in. long. Leaf lanceolate-linear acuminate, 6 to 10 in. long, .25 in. wide. Racemes 9 in. long, lower half nude. Flowers about 24, pale green, lip darker, .25 in. wide. Bracts lanceolate twice as long as ovary. Sepals lanceolate acute. Petals wider. Lip side-lobes broad round, midlobe ovate or lanceolate with 2-curved calli at base. Column very short, broad arms short toothed from upper part, hood long entire. *Hab.* Mountains, Pahang, Gunong Tahan. Perak, Thaiping Hills (all collectors); Gunong Kerbau (Robinson). *Distrib.* Borneo.

(10) **P. sarawakensis** *Ridl. Journ. Linn. Soc. xxxi. 267.*

Pseudobulbs oblong, .75 in. long. Leaf lanceolate, 7 in. long, .75 in. wide; petioles 1 in. long. Racemes 8 in. long. Bracts lanceolate acute. Sepals lanceolate acute. Petals blunt, all greenish yellow. Lip side-lobes sub-quadrate toothed, midlobe oblong ovate cuspidate, green, a double keel at base. Column short, hood large, arms very short oblong toothed. *Hab.* Rare. Perak, Thaiping Hills (Curtis). *Distrib.* Borneo.

6. DIPLOCAULOBIMUM, Rchb. fil.

Epiphytes pseudobulbs slender crowded. Leaf 1, coriaceous. Flower solitary terminal from an ovate or lanceolate bract on a long slender peduncle. Sepals and petals lanceolate caudate, mentum short blunt. Lip 3-lobed, side-lobes erect falcate, midlobe longer, base narrowed, tip abruptly dilate with 2 keels. Column very short. Species about 30, Amboina, Papua, Polynesia, 1 in Singapore and Borneo.

(1) **D. longicolle** *Kranzl. Pflanzenreich. iv. 50, p. 340. Dendrobium longicolle Lindl. Bot. Reg. 1840; Misc. 127; Ridl. Mat. i. 34.*

Rhizome short; pseudobulb in large clumps flattened, club-shaped, 4 to 8 in. long, .12 in. through at base. Leaf lanceolate unequally bilobed, 5 in. long, 1 in. wide. Bracts brown lanceolate acute, 1 in. long. Pedicel 3 in. long. Sepals 1.5 in. long, .25 in. wide at base, yellow, tipped red, mentum .25 in. long. Petals similar smaller. Lip yellow, side-lobes .25 in. long, midlobe cordate, edge crisped, base narrowed. Column yellow. *Hab.* Rare. On tree-stumps and on the ground, woods near the sea, Singapore (Cuming); Sungei Morai (Ridley). *Distrib.* Borneo.

7. SARCOPODIUM, Lindl.

Epiphytic and rock plants; rhizome long; pseudobulbs conic distant. Leaves 2 coriaceous, oblong or elliptic. Racemes terminal of few 3 to 10 flowers. Sepals lanceolate, laterals falcate. Petals usually narrower. Mentum short. Lip 3-lobed. Column short. Species about 20, Indo-Malaya to Fiji.

Tip with 2 rows of tubercles on midlobe	(1)	S. longipes
Lip with 3 keels and 2 calli at base	(2)	S. macropodium
Lip with thickened ridges, no calli.		
Midlobe narrow acuminate	(3)	S. geminatum
Midlobe tongue-shaped	(4)	S. citrino-castaneum

(1) **S. longipes** *Kranzl., Pflanzenreich, l.c. 324.* *Dendrobium longipes* *Hook. fil. F.B.I. v. 713; Ic. Pl. 2017; Ridl. Mat. i. 34.*

Rhizome stout; pseudobulbs pyramidal, 1 to 1.25 in. long, covered with brown sheaths. Leaves elliptic-lanceolate, 1.5 to 3 in. long, sessile or short petioled. Raceme 6 to 8 in. long, 3- to 5-flowered. Bracts lanceolate. Pedicels stout with ovary 1.5 in. long. Sepals linear or oblong-lanceolate, 1 in. long, laterals falcate, white tinted rose, mentum short blunt. Lip ovate-oblong, side-lobes round, midlobe ovate or lanceolate mealy with 3 rows of tubercles, white streaked brown, orange-yellow blotch on midlobe, tip white. *Hab.* Mountains, at 3000 to 7100 ft. altitude, Pahang, Gunong Tahan; Telom on Gunong Berumbun. Selangor, Sempang Mines, Semangkok; Gunong Mengkuang Lebah (Robinson). Perak, Gunong Batu Putih (Wray); Gunong Kerbau.

(2) **S. macropodium** *Kranzl. l.c. 324.* *Dendrobium macropodium* *Hook. fil. F.B.I. v. 713; Ic. Pl. 2020; Ridl. Mat. i. 34.*

Pseudobulbs conic, deeply grooved, 2 in. long. Leaves elliptic blunt, thick, 2 to 3 in. long. Racemes 6 to 8 in. tall. Flowers 6 to 12. Bracts ovate-lanceolate; ovary with short pedicel 2 in. long. Flowers 1.5 in. wide. Sepals lanceolate acuminate; mentum very short. Petals linear-lanceolate acute. Lip side-lobes round blunt, midlobe orbicular, keels 3 on disc and 2 ear-shaped calli at base. Column rather long. Capsule fusiform. *Hab.* Mountains, Pahang, Gunong Tahan; Kluang Terbang (Barnes). Perak, Thai-ping Hills. *Distrib.* Sumatra.

(3) **S. geminatum** *Kranzl. l.c. 26.* *Dendrobium geminatum* *Hook. fil. F.B.I. v. 713; Ridl. Mat. i. 35; Lindl. Gen. and Sp. Orch. 77.*

Rhizome very long, over 2 ft.; pseudobulbs remote, conic, 5-angled, 1 to 1.5 in. tall, .5 in. through, red or reddish yellow. Leaves stiff lanceolate or elliptic, 1.5 to 3 in. long, .25 to .75 in. wide. Panicles few branched, 3 to 4 in. long, red. Bracts lanceolate acute, .25 in. long. Pedicel and ovary .75 in. long, pink. Sepals lanceolate acute, reddish yellow, .75 in. long. Petals narrower pale yellow. Lip .5 in. long, side-lobes broad round yellow, midlobe narrow acuminate with orange red blotch at base, 2 thick

blunt ridges ending in veins. Column short, white. *Hab.* Mountains at 5000 ft. altitude. Pahang, Gunong Tahan. Perak, Thaiping Hills (Curtis). Kedah Peak. *Distrib.* Java.

(4) **S. citrino-castaneum** *Ridl.* *Dendrobium citrino-castaneum* *Burkill, Gardens Bulletin, Straits Settlements*, iii. 12.

Rhizome creeping, covered with pale tubular sheaths turning dark brown; pseudobulbs conoid green, 2.3 in. long, 2 in. apart. Leaves 2, obovate-elliptic, 4.5 in. long, 1.25 in. wide, rounded at tip. Corymb 6- to 10-flowered. Pedicels with ovary .75 to 1.5 in. long. Bracts ovate-linear. Sepals lemon-yellow, upper one lanceolate acute, .75 in. long, laterals triangular-lanceolate, mentum .25 in. long. Petals little shorter and narrower, yellow. Lip chestnut trilobed, .5 in. long, limb nearly flat fleshy, middle tongue-shaped grooved above, side lobes oblique oblong, tip round, minutely toothed. *Hab.* Johor, near Johor Bharu (Feddersen).

8. DESMOTRICHUM, Blume.

Shrubby epiphytes; stems erect branched, the terminal internodes of each branch developed into an ovoid or conic often flattened pseudobulb with 1 coriaceous leaf. Flowers 1 or 2 at a time from a tuft of bracts below the leaf, very fugacious. Sepals and petals lanceolate; mentum short blunt. Lip 3-lobed, base narrow; mid-lobe longer dilate or flabellate. Species about 30, Indo-China, Malay isles.

Terminal lobe of lip not broader than side lobes.

Lip glabrous.

- | | | |
|---|-----|-------------------------|
| Midlobe oblong, base broad | (1) | D. lonchophyllum |
| Midlobe clawed, horseshoc-shaped | (2) | D. Kelsalli |
| Midlobe clawed, 2 fleshy cushions on disc | (3) | D. Ardeni |
| Midlobe entire bearded | (4) | D. criniferum |

Terminal lobe much broader than side lobes.

- | | | |
|--|-----|---------------------------|
| Midlobe oblong, margins waved | (5) | D. fimbriatum |
| Midlobe triangular, tip broad retuse | (6) | D. roseo-punctatum |
| Midlobe triangular bilobed yellow | (7) | D. pallidiflorum |
| Midlobe of 2 long undulate lobes | (8) | D. bifidum |
| Midlobe lacerate-fimbriate | (9) | D. lacinosum |

(1) **D. lonchophyllum** *Kranzl. Pflanzenreich l.c.* 350. *Dendrobium lonchophyllum* *Hook. fl. F.B.I. v. 714; Ic. Pl. t. 2018; Ridl. Mat. i. 35.*

Stems much branched, 6 to 12 in. long; pseudobulbs fusiform, cylindrical, 2 in. long. Leaf lanceolate, 2 to 3 in. long, .5 to .75 in. wide. Flowers paired, .5 in. long. Sepal upper, ovate-lanceolate, laterals triangular yellowish with pink stripes; mentum rather long. Petals lanceolate. Lip spatulate, tip bilobed, lobes blunt, base and disc deep crimson, tip yellow, 3-keeled on disc. *Hab.* On mangrove and orchard trees, common, Singapore, Sungei Buluh; Kranji. Johor, Tanah Runto. Pahang, Tahan River, Negri Sembilan, Siliau (Williams). Perak (Scortechini). Kedah Peak. *Distrib.* Rhio.

(2) **D. Kelsalli** *Ridl.* *Dendrobium Kelsalli* *Ridl. Journ. Linn. Soc.* xxxii. 237.

Stems much branched, 15 in. long; pseudobulbs fusiform, 1 in. long, .12 in. through. Leaf lanceolate sub-obtuse, 1.5 in. long, .25 in. wide. Flowers .5 in. wide. Upper sepals ovate blunt, laterals much larger; mentum large blunt. Petals smaller lorate, pale green. Lip side-lobes broad blunt greenish, disc crimson purple with 3 keels, midlobe horseshoe-shaped orange. *Hab.* On trees in mountains, Johor, Pulau Aor (Feilding). Pahang, Gunong Tahan at 3000 to 6000 ft. altitude; Kluang Terbang (Barnes). Malacca, Mt. Ophir. Perak, Thaiping Hills. Kedah Peak.

(3) **D. Ardeni** *Ridl.* *Dendrobium Ardeni* *Ridl. Journ. As. Soc.* 50, p. 132.

Stems slender branched; pseudobulbs cylindric, slightly flattened olive-green, 1.5 in. long, .26 in. through. Leaves lanceolate-linear, 3 to 4 in. long, .25 to .5 in. wide. Flowers nearly .5 in. wide. Sepals oblong, laterals recurved blunt cream faintly purple-veined. Mentum short broad conic. Petals linear acute. Lip as in *Kelsalli* but side-lobes short round pink; midlobe clawed with a round bilobed limb, disc and claw violet pink, limb creamy yellow, 2 large fleshy semi-elliptic deep purple cushions on disc. Column lemon yellow. *Hab.* Rare, Johor, Kukub; Tempayan River (Ridley).

(4) **D. criniferum** *Lindl. Bot. Reg. Misc.* 41.

Large plant, 2 ft. tall, much branched; pseudobulbs linear oblong flattened, 2 in. long, .25 in. through. Leaf elliptic or ovate-elliptic blunt, 3 in. long and wide. Flowers in pairs; pedicel and ovary .75 in. long. Sepals .36 in. long, lanceolate acute, pale yellow; mentum short and broad. Lip as long, side-lobes falcate acute yellow with crimson lines, midlobe spotted purple, keels 2, crimson running to midlobe and there sinuous, midlobe linear waved, tip covered with yellow filaments. Column short, white spotted purple. *Hab.* Mangrove trees, common, Singapore, Kranji; Changi. Johor, Batu Pahat. Negri Sembilan, Siliau (Williams). *Distrib.* Rhio, Java. Borneo, Papua.

This may be the plant intended by Blume under *Dendrobium comatum*, which would be its earliest name, but I am not sure of this.

(5) **D. fimbriatum** *Bl. Bijdr.* 320. *Dendrobium flabellum* *Rchb. fil. Xenia Orch.* ii. 75, t. 118; *Ridl. Mat.* i. 36. *D. Kunstleri* *Hook. fil. F.B.I.* v. 714.

Large much-branched plant; pseudobulbs ovate flat, olive or purplish, 4 in. long, 1 in. wide, .5 in. thick. Leaf ovate to lanceolate blunt, 5 to 6 in. long, 2 in. wide. Flowers 1 in. wide; pedicels .5 in. long. Bracts 2 ovate-lanceolate soon broken into fibres. Sepals lanceolate acute, mentum conic sub-acute as long. Petals linear, all cream, spotted pink. Lip base linear, side-lobes narrow acute, straw colour, tips rosy, midlobe pandurate oblong, sides

plicate pale yellow, keels 3, 2 thick wavy on midlobe, median one shorter, straight. *Hab.* On trees, mangroves, orchards, etc. Singapore, Kranji; Changi. Johor, Batu Pahat (Kelsall). Negri Sembilan, Siliau (Williams). Perak, Thaiping (Kunstler). Jalor, Biserat, Bukit Goa (Gwynne Vaughan). *Distrib.* Siam, Borneo.

(6) **D. roseo-punctatum** *Ridl.* *Dendrobium roseo-punctatum* *Ridl. Journ. Linn. Soc.* xxxii. 240.

Stems 6 to 8 in. long; pseudobulbs fusiform, slightly flattened, 2 in. long, .5 in. wide, .25 in. thick. Leaf lanceolate-lorate, blunt, 6 in. long, .75 in. wide. Flowers 1 in. across, pedicel .25 in. long. Sepals lanceolate acute, .5 in. long, .12 in. wide; mentum short broad. Petals linear, all white. Lip .75 in. long, side-lobes curved acute, white spotted crimson, midlobe fan-shaped, emarginate, cream colour, keels 2 running to midlobe plicate sinuate crimson. *Hab.* Malay Peninsula, exact locality lost. (Cult. in Hort. Singapore.)

(7) **D. pallidiflorum** *Ridl.* *Dendrobium pallidiflorum* *Ridl. Journ. Linn. Soc.* xxxii. 240; *Mat. i.* 37.

Stems slender branched; pseudobulbs elongate-ovoid flat thin, 1.5 in. long, .5 in. wide. Leaves ovate acute thin coriaceous, 3 in. long, 1 in. wide. Flowers small, .5 in. across. Upper sepal ovate-lanceolate, laterals much larger ovate; mentum little longer obtuse. Petals as long lanceolate, all pale yellow. Lip side-lobes triangular acute, midlobe triangular bilobed, yellow, edges wavy, keels 2 wavy on midlobe, median one shorter straight. Anther emerald green. *Hab.* On trees near the sea in the south, Singapore, Kranji; Pulau Tekong. Johor, Hulu Kubong (Kelsall); Batu Pahat. *Distrib.* Siam, Sumatra.

(8) **D. bifidum** *Kranzl, l.c.* 357. *Dendrobium bifidum* *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 73; *Mat. i.* 37.

Plant with habit of *D. fimbriatum*. Stems 12 in. long or more; pseudobulbs 2 in. apart, oblanceolate flattened, 1.5 in. long. Leaf broad lanceolate ovate blunt, 5 in. long, 2 in. wide. Bracts lanceolate acute, red. Ovary and pedicel .5 in. long. Sepals and petals linear-oblong acute yellow spotted red, mentum shorter acute. Lip longer, claw narrow linear, edges and keels crenate, limb of 2 narrow cuneate truncate lobes white yellowish at tips. *Hab.* Rare. Lankawi (Curtis).

(9) **D. lacinosum** *Kranzl, l.c.* 346. *Dendrobium lacinosum* *Ridl. Journ. Linn. Soc.* xxxii. 242; *Mat. i.* 38.

Stems about 12 in. long; pseudobulbs ovate-elliptic flat, 1.75 to 2 in. long, .75 in. wide, .12 in. thick. Leaf lanceolate blunt, 4 in. long, 1.5 in. wide. Raceme over 1 in. long, covered with ovate lanceolate bracts. Flowers pale yellow, .5 in. across. Sepals broad lanceolate obtuse. Petals narrower. Lip, side-lobes falcate, midlobe base linear, tip oblong truncate much broader lacinate, keels 2 straight to base of midlobe then sinuate. Anther

sub-quadrate, edges truncate fimbriate. Capsule elliptic, .75 in. long. *Hab.* Rare. Singapore, Pulau Selitar (Ridley).

9. DENDROBIUM, Sw.

Epiphytic, rarely terrestrial plants with short rhizome and several erect many-jointed stems not branched, sometimes with some of the lowest internodes swollen. Leaves fleshy, coriaceous or thin. Flowers in short or large racemes, axillary. Lateral sepals forming a mentum being attached to the prolonged foot of the column. Petals generally smaller. Lip varied, without or with a callus at base, usually clawed, entire or 3-lobed. Column short, broad with short arms, with a long foot at base. Anther ovate or helmet-shaped 2-celled attached by a short process. Pollinia 4, ovoid or oblong in pairs. Capsule elliptic or pear-shaped. Species about 500, tropical Asia to Japan, Australia.

§ 1. *Bulbodium*. Stems short clubbed angled. Leaves 2 terminal. Flowers 1 or 2 from between the leaves.

Stem not strongly 4-angled (1) *D. pumilum*

§ 2. *Aporum*. Stems flattened with distichous ensiform or triangular short leaves. Flowers very small or medium, white, yellow or pink in short tufts of brown bracts.

Terminal part of stem covered with sheaths only;
leaves triangular. Flowers very small.

Lip narrow, tip bilobed, white (2) *D. serra*

Lip narrow, tip reniform white, column pink (3) *D. rhodostele*

Lip tip obovate; flowers pink (4) *D. rosellum*

Stem leafy to top; flowers small.

Leaves oblong or lanceolate broad not imbricating.

Lip cordate, side-lobes short blunt, midlobe
broad, callus transverse (5) *D. eulophotum*

Lip side-lobes long curved, midlobe shorter (6) *D. lobatum*

Lip obcuneate bilobed; flowers much larger;
leaves .5 in. wide (7) *D. grande*

Lip oblong-obcuneate; sepals .75 in. long;
leaves .25 in. wide (8) *D. terminale*

Leaves narrow ensiform imbricating.

Lip entire oblong spatulate.
Bracts numerous; leaves 2 in. long (9) *D. atropurpureum*

Bracts few; leaves .75 in. long (10) *D. sinuatum*

Lip side-lobes distinct; flowers deep red (11) *D. atrorubens*

Leaves broad short; stem leafy to top; flowers
large.

Stems erect; flowers 1.5 in. across (12) *D. leonis*

Stems prostrate creeping; flowers smaller (13) *D. prostratum*

§ 3. *Strongyle*. Stems slender not swollen at base. Leaves distant terete or slightly flattened. Flowers 2 to 3 from axils of leafless tip of stem white often veined pink.

Stems over 1 ft. tall; flowers .75 in. long (14) *D. teres*

Stems 12 to 18 in. long. Leaves recurved flattened laterally, pungent (15) *D. acerosum*

Stems 4 to 8 in. long; leaves .5 to 1 in. long, sub-
terete straight (16) *D. kentrophyllum*

Leaves .5 in. long, flattened recurved; small plant (17) *D. subulatum*

Leaves terete acuminate erect appressed to stem (18) *D. flexile*

§ 4. *Virgata*. Often terrestrial. Stems slender erect. Flowers in pairs from upper parts of sheaths.

Terrestrial.

Sheaths glabrous when adult (19) *D. calcaratum*

Sheaths black pubescent (20) *D. villosulum*

Epiphytic, sheaths glabrous; leaves narrow linear (21) *D. pachyglossum*

§ 5. *Bambusaefolia*. Epiphytes with tall erect or pendulous stems. Leaves linear to ovate-lanceolate. Flowers from an internode with one or more pairs of ovate yellow stiff bracts, yellow not expanding.

Stems erect; leaves thin linear-lanceolate. (22) *D. gemellum*

Stems pendulous; leaves ovate-lanceolate fleshy (23) *D. pensile*

§ 6. *Clavata*. Stems with 1 to 3 of the internodes at base swollen into an ovoid or fusiform pseudobulb. Leaves lanceolate, linear or terete. Flowers borne singly from tufts of bracts on terminal nude part of stem, medium to small, white or pink. Mentum curved.

Leaves terete.

Stem leafy to top, long; flowers lateral; leaves setaceous (24) *D. gracile*

Stem nude at top; leaves very narrow (25) *D. clavator*

Leaves flat narrow linear (26) *D. truncatum*

Leaves elliptic broad.

Pseudobulb oval flattened of 2 internodes red (27) *D. planibulbe*

Pseudobulb fusiform thick of 4 internodes, yellow; flowers white, yellow on lip (28) *D. crumenatum*

§ 7. *Distichophylla*. Stems tufted leafy. Leaves ovate to lanceolate bifid. Flowers medium size on axillary racemes. Petals and sepals reflexed. Mentum straight horizontal.

Stems tufted; lip broad entire fleshy; flowers small Leaves .5 in. long or more; flowers .5 in. across (29) *D. bifarium*

Leaves up to .5 in. long; flowers .25 in. wide (30) *D. rupicolium*

Leaves lanceolate; lip 3-lobed reniform (31) *D. Hosei*

Leaves broad lanceolate; lip 3-lobed oblong retuse (32) *D. revolutum*

Leaves thick short, lip 3-lobed oblong, side-lobes broad (33) *D. uniflorum*

Lip narrow long-clawed side-lobes small; leaves rather long; flowers burnt sienna (34) *D. metachilinum*

Stems on a creeping rhizome; leaves thin narrow; sepals white, lip orange (35) *D. pandaneti*

§ 8. *Breviflores*. Stems not swollen. Leaves 1 or 2 sub-terminal. Flowers in short racemes or solitary from below leaves. Lip short with small obscure lobes. Mentum short.

Stem club-shaped 4-angled above; flower solitary (36) *D. euphlebium*

Stem sub-terete stout; flowers white and yellow in a compact head-like raceme (37) *D. callibotrys*

Stem slender; flowers few white and violet (38) *D. metrium*

Stem slender; lip narrow 3-lobed, pale yellow (39) *D. flavidulum*

Stem slender; lip entire; flowers green cleistogamous (40) *D. tetradon*

Stem slender; lip boat-shaped; flowers white and pink (41) *D. hercoglossum*

§ 9. *Pedilonum*. Stems terete (rarely flattened). Leaves lanceolate. Flowers solitary or racemed on leafless stems large or small white, pink or orange. Mentum much longer than sepals. Lip with a long linear claw and ovate or oblong limb.

Stem flattened thin ovoid (42) *D. lamellatum*

Stems terete long.

- Flowers very small pink; raceme secund dense (43) *D. secundum*
 Flowers medium to large.
 Lip entire spatulate; flowers medium, pink (44) *D. cornutum*
 Lip spatulate toothed; flowers small, pink (45) *D. ægle*
 Lip short rounded toothed; flowers green;
 mentum long (46) *D. virescens*
 Lip short, tip pandurate entire, striped red;
 mentum long (47) *D. serpens*
 Lip entire obovate large.
 Flowers orange large, tip rounded (48) *D. crocatum*
 Flowers white, lip truncate, buff and white (49) *D. Derryi*
 Flowers white, tip entire, 1 in. wide (50) *D. lepidum*
 Flowers white, tip of lip bilobed, 1 in. wide (51) *D. calicopsis*
 Flowers white smaller, .5 in. wide, leaf
 broad (52) *D. hymenopterum*
 Lip blade quadrate crenulate, rosy (53) *D. roseatum*
 Lip blade abruptly pandurate bilobed,
 white (54) *D. Foxii*
 Lip blade quadrate fimbriate, white (55) *D. clarissimum*
 Lip blade oblong undulate, yellow (56) *D. chloroleucum*
 Lip blade lanceolate, deep yellow spotted
 red (57) *D. subflavidum*
 Lip 3-lobed.
 Flowers small, mentum long (58) *D. tropæoliflorum*
 Flowers large.
 Leaves broad (59) *D. megaceras*
 Leaves narrow. Callus o, side-lobes up-
 curved (60) *D. exilicaule*
 Callus a retrorse spine on claw of lip.
 Leaves broad elliptic, 1 in. wide (61) *D. kentrochilum*
 Leaves lanceolate, .75 in. wide (62) *D. sanguinolentum*
- § 10. *Stachyobium*. Dwarf plants. Stems cylindrical tufted. Leaves nar-
 row thin. Flowers solitary or racemose, small or medium, usually white.
 Mentum rather long or short. Lip with a flat keel.
 Flower 1; leaves lanceolate (63) *D. trinervium*
 Raceme many-flowered; leaves linear-lanceolate (64) *D. eriæflorum*
- § 11. *Speciosa*. Stems stout cylindrical or clavate. Flowers in racemes
 from old stems showy large. Lip broad convolute. Mentum short.
 Stems terete.
 Lip ovate lanceolate, yellow (65) *D. aureum*
 Lip convolute saccate.
 Petals and sepals rose-pink; lip pale yellow
 convolute (66) *D. Pierardi*
 Flowers purplish white, tips darker (67) *D. Haniffii*
 Flowers purple; lip pubescent, centre dark. (68) *D. superbum*
 Flowers yellow, lip purple orbicular villous,
 two purple spots at base (69) *D. Dalhousieanum*
 Lip 3-lobed, side-lobes erect, midlobe ovate,
 green and scarlet (70) *D. cruentum*
 Stems fusiform.
 Raceme 9 in. long; flowers yellow (71) *D. aggregatum*
 Raceme shorter, sepals and petals rose twisted,
 lip cream yellow (72) *D. tortile*
- (1) *D. pumilum* Roxb. *Fl. Ind.* iii. 479. *D. quadrangulare*
Ridl. Mat. i. 35 (not of *Parish*).
 Pseudobulbs tufted cylindrical or dilate upwards, 2 in. long,
 yellow. Leaves 2 at top lanceolate blunt or elliptic bilobed, 1.25 in.

long, .5 in. wide. Flowers 1 or 2 from terminal tuft of bracts; pedicels .5 in. long. Upper sepal ovate-lanceolate, laterals ovate; mentum blunt curved, .25 in. long. Petals narrower linear all pale straw colour or veined with red. Lip oblong entire yellow with red edges or red veined, tip dilate toothed with round orange callus in centre. *Hab.* Common on orchard trees. Singapore; Kranji; Selitar. Johor, Kwala Sembrong (Kelsall); Batu Pahat. Pahang, Pekan. Selangor, Kajang. Negri Sembilan, Bukit Kupa- yang (Cantley). Perak, Thaiping (Curtis); Temengoh. Penang Pulau Tikus (Curtis); Tringganu (Rostados). Kelantan, Kwala Aring (Yapp), stems 3 in. long. *Distrib.* Burma, Borneo. *Native name*: Sakat Kalumbai. *Use*: As a drug in dropsy.

(2) **D. serra** Lindl. *Journ. Linn. Soc.* iii. 3; *Ridl. Mat.* i. 38. *Aporum micranthum* Griff. *Calc. Journ. Nat. Hist.* iv. 376.

Stems tufted, flattened occasionally branched, 6 to 24 in. long, base covered with leaves, tip with sheaths only. Leaves distichous ovate acute laterally flattened articulate at base, .75 in. long, .25 in. wide, green or red. Racemes from the leafless part, rarely below, covered with copious brown bracts. Flowers .12 in. wide, pure white. Sepals ovate-lanceolate recurved; mentum long, narrow blunt. Petals linear. Lip linear-oblong tip of 2 parallel blunt linear lobes with a small forked callus at their base. Column rather long. Capsule pear-shaped, .25 in. long. *Hab.* Common in woods on trees, Singapore (Wallich). Changi, etc. Johor, Batu Pahat. Pahang, Pekan. Perak, Ulu Temengoh. *Distrib.* Borneo, Java.

(3) **D. rhodostele** Ridl. *Trans. Linn. Soc. Ser.* ii. vol. iii. 360; *Mat.* i. 38.

Stem 12 to 15 in. long, like that of *D. serra*. Leaves lanceolate or ovate-lanceolate acute, .75 to 1 in. long, .25 in. wide. Flowers very small, white. Sepals ovate blunt; mentum short broad blunt. Petals linear acute. Lip linear-oblong, midlobe bilobed rounded broader. Column rather larger than in *D. serra*, pink. Pollinia narrow linear. Capsule pear-shaped, .25 in. long. *Hab.* Rare. Pahang, Tahan valley (Ridley).

(4) **D. rosellum** Ridl. *Journ. Linn. Soc.* xxxi. 168; *Mat.* i. 39.

Habit of the two preceding. Stems branched, over 1 ft. long. Leaves ovate acute rather distant, .5 to .75 in. long, .75 in. wide. Flowers pink, .75 in. wide. Upper sepals ovate, laterals wider, mentum long straight, tip thicker. Petals small ovate-lanceolate. Lip long narrow, side-lobes very short, midlobe obovate with oblong grooved callus at base yellow, tip bilobed, lobes broad round. Column rather long. *Hab.* Rare, Johor, Gunong Pantai (Ridley). *Distrib.* Borneo, common.

(5) **D. eulophotum** Lindl. *Journ. Linn. Soc.* iii. 5; *Ridl. Mat.* i. 39.

Stems 4 to 16 in. tall, leafy to top. Leaves lanceolate acute, .5 to 1 in. long, .12 in. wide; sheaths .5 in. long. Racemes axillary,

·12 in. long. Bracts numerous. Flowers ·12 in. across. Upper sepal lanceolate-oblong, laterals larger triangular-ovate, mentum very short and broad. Petals narrower lanceolate, all yellow with red streaks. Lip cordate, 3-lobed, yellowish, side-lobes short blunt spreading, midlobe broad round; calli 2 conic or one truncate retuse in the middle of the lip base. *Hab.* Common on trees. Singapore, Bajau; Kranji. Johor, Batu Pahat. Pahang, Pekan. Perak (Scortechini). Lankawi, Kwah; Terutau. Setul a variety with greenish yellow flowers with a few faint red streaks on the sides of the lip. *Distrib.* Tenasserim, Borneo, Java.

(6) *D. lobatum* Miq. *Fl. Ind. Bat.* iii. 631. *D. rhizophoreti* *Ridl. Journ. Soc.* xxxii. 246; *Mat.* i. 39.

Stems 1 to 2 ft. tall, often branched. Leaves lanceolate acuminate, ·75 to 1 in. long, ·25 in. wide. Racemes ·25 in. long; bracts few. Flowers ·36 in. long, lip uppermost. Upper sepal oblong sub-acute, laterals wider ovate falcate; mentum shorter oblong blunt. Petals smaller linear, all yellow with a median red line. Lip, claw linear pink, side-lobes curved sub-acute, midlobe indistinct, round shorter yellowish, edge wavy, calli 2, bases thickened connate pink, tips subulate curved. *Hab.* In mangroves, Singapore, Kranji. Johor, Batu Pahat; Hulu Sembrong (Kelsall). Perak, Matang (Wray); Telok Anson (Williams). *Distrib.* Java.

(7) *D. grande* Hook. *F.B.I.* v. 724; *Ic. Pl. t.* 2024; *Ridl. Mat.* i. 40.

Stems 9 to 12 in. long, broad flattened. Leaves lanceolate acute, light green, 2 in. long, nearly ·5 in. wide, covering stem to top. Racemes in axils of upper leaves, ·25 in. long. Bracts lanceolate acute. Flowers ·3 to ·5 in. wide, yellow tinted red; pedicels ·25 in. long. Upper sepal ovate, laterals broader triangular; mentum as long blunt. Petals lanceolate acute. Lip cuneate fan-shaped bilobed, side-lobes short, midlobe truncate; a toothed lamella at base. Column short, arms erect tooth-like. Anther conic with tuft of hair on top. *Hab.* Not rare, on very lofty trees, Singapore, Selitar. Johor, Kwala Sembrong. Pahang, Tahan River. Selangor, Kwala Lumpur; Rawang. Perak (Scortechini). Penang. Kelantan, Kwala Aring (Yapp).

The largest of the *Aporum* section.

(8) *D. terminale* Par. and Rehb. *fil. Trans. Linn. Soc.* xxx. 149; *Ridl. Mat.* i. 42. *D. Mannii* *Ridl. Journ. Linn. Soc.* xxx. 246.

Stems 5 to 6 in. long. Leaves lanceolate acute, ·75 in. long, ·25 in. wide. Racemes separate not tufted on old leafless stems. Flowers paired thin, primrose yellow. Bracts few. Upper sepal ovate-oblong, laterals much larger ovate-triangular falcate, ·75 in. long, mentum thick curved blunt. Petals linear-lorate much smaller. Lip oblong-obcuneate, side-lobes deflexed truncate, mid-

lobe little longer bilobed, lobes rounded crisped, an orange spot in centre. Column narrow, an orange spot at base. *Hab.* Very rare. Malacca, Mt. Ophir district (Derry). *Distrib.* Assam, Burma.

(9) *D. atropurpureum* *Miq. Fl. Ind. Bot.* iii. 644; *Ridl. Mat.* i. 40. *D. concinnum* *Miq. l.c.* *Oxystophyllum carnosum* *Bl. Rumphia* iv. 41; *Pl.* 193, f. 4 and 198 c.

Small tufted plant, 2 to 9 in. tall. Leaves lanceolate or linear-lanceolate acute imbricating, 1 in. long, .25 in. wide. Racemes .25 in. long. Bracts numerous. Flowers yellow dotted pink or deep red. Upper sepals lanceolate acute, laterals triangular larger, mentum short broad blunt. Petals linear. Lip entire oblong spatulate tip round, pubescent, a horseshoe-shaped callus on tip and a conical tubercle beneath. *Hab.* Common in mangroves, orchards, woods, etc. Singapore (Wallich); Kranji. Johor, Kwala Kahang (Kelsall). Pahang, Rumpin River; Pekan. Malacca, Sungei Rambei. Selangor, Kwala Lumpur. Perak, Ulu Temengoh. Penang Hill. Lankawi, Dayong Bunting (Robinson). *Distrib.* Tenasserim, Siam. Malay isles.

(10) *D. sinuatum* *Lindl. Walp. Ann.* vi. 280; *Ridl. Mat.* i. 40.

Stems pendulous, 8 in. long or more. Leaves lanceolate acuminate, pungent, imbricating fleshy, 1 in. long, .25 in. wide. Racemes .36 in. long. Bracts fewer than in *D. atropurpureum*. Flowers larger, orange. Upper sepals lanceolate, laterals larger triangular; mentum short thick. Petals much smaller lanceolate blunt. Lip fleshy cuneate, side-lobes small tooth-like, tip round, with a horseshoe-shaped callus above dark red, a conical tubercle beneath. *Hab.* Common on mangroves, orchard trees, etc. At 5500 ft. altitude, Singapore, Kranji; Selitar. Johor, Batu Pahat; Tebrau River. Malacca (Griffith). Pahang, Gunong Tahan; Kluang Terbang (Barnes). Perak, Thaiping (Curtis). Penang (Maingay). *Distrib.* Borneo.

(11) *D. atrorubens* *Ridl. Journ. Linn. Soc.* xxxii. 147; *Mat.* i. 41.

Stems stout, sometimes branched, 1 to 2 ft. long. Leaves imbricating lanceolate acute, 1 in. long, .75 in. wide. Racemes sub-terminal and lateral. Bracts very numerous lanceolate acute forming a tuft .5 to .75 in. wide. Flowers .25 in. wide, deep red. Upper sepal lanceolate acute, laterals larger triangular. Lip linear, obcuneate, side-lobes tooth-like acute, tip thickened fleshy, a tubercle beneath. *Hab.* Mountains at 3000 to 5000 ft. altitude, on stumps and low trees, Pahang, Kluang Terbang (Barnes). Perak, Thaiping Hills. Kedah Peak (Ridley).

(12) *D. leonis* *Rchb. fil. Walp. Ann.* vi. 280; *Ridl. Mat.* i. 41. *King. Ann. Bot. Gard. Calc.* v. pl. 10.

Stems tufted, 4 to 8 in. tall. Leaves thick cultrate or ovate

sub-acute, .5 in. long and nearly as wide. Racemes terminal short broad. Bracts many. Flowers fleshy, yellowish spotted pink, vanilla-scented. Upper sepal short blunt, .25 in. long, laterals widely ovate larger, mentum short and broad. Petals lorate-spathulate. Lip oblong shorter than sepals, nearly entire, tip bilobed rounded ciliate, an orange yellow centre bar ending in a small callus. Column short yellow, an orange spot at base. *Hab.* Common on trees in woods, Singapore, Changi, etc., Johor, Batu Pahat (Kelsall). Pahang, Kwala Pahang; Kota Glanggi. Malacca, Jasin; Sungei Baru Ulu; Tanjong Kling and Ayer Panas (Griffith). Negri Sembilan, Seremban (Williams). Selangor, Rawang (Kloss). Perak, Gunong Hijau (Scortechini); Ulu Leding (Wray). *Distrib.* Cochinchina, Borneo.

(13) *D. prostratum* *Ridl. Journ. Linn. Soc.* xxxiii. 248; *Mat.* ii. 41.

Stem creeping and rooting, branched flat. Leaves .25 in. long and nearly as wide, oblong triangular sub-acute or blunt fleshy deep green or red. Flowers as in *D. leonis* but smaller, pale yellow or dotted red. Upper sepal ovate blunt, laterals much larger ovate sub-falcate, mentum short broad curved. Petals much smaller spathulate. Lip oblong, tip dilate retuse; keel on disc orange with small erect quadrate callus. *Hab.* On branches of trees, mangroves and woods, Singapore, Kranji. Selangor, Sepang. Negri Sembilan, Perhentian Tinggi; Siliau and Port Dickson (Williams). *Distrib.* Borneo.

(14) *D. teres* *Lindl. Bot. Reg.* 1840; *Misc.* 51; *Hook. Ann. Bot. Calc.* v. pl. 112; *Ridl. Mat.* i. 42.

Stems few stiff, 10 to 15 in. tall. Leaves distant terete blunt, 2 to 4 in. long, .12 in. through, sheaths 1.25 in. long. Flowers .75 in. long, opening singly from tufts of bracts on the bare tip of stem, white; pedicel and ovary .5 in. long. Sepals lanceolate acute sub-equal, .5 in. long; mentum over .26 in. long, blunt conic. Petals narrower. Lip shorter, 3-lobed, side-lobes ovate-oblong acute, veined orange, midlobe narrower lanceolate acuminate, keels 3, flame-colour. *Hab.* Not common, Singapore, Toas; Selitar. Johor, Kota Tinggi. Negri Sembilan, Gunong Angsi (Williams). Perak, Thaiping Hills (Curtis). Penang (Curtis). *Distrib.* Borneo.

(15) *D. atherosum* *Lindl. Bot. Reg.* 1841; *Misc.* 86; *Ridl. Mat.* i. 43.

Stems slender flexuous, 12 to 15 in. long. Leaves recurved, laterally flattened pungent, 1 to 1.5 in. long, sheaths .5 in. long, mouth black. Flowers .25 in. long, solitary from the bare top axillary cream-colour with or without pink veins. Bracts ovate-lanceolate, small. Upper sepal lanceolate very small, laterals triangular blunt; mentum stout blunt, twice as long as upper sepal. Petals narrower linear. Lip spreading obtusely-ovate,

tip crisped bilobed, white, centre bar thickened, tip yellow. *Hab.* Not rare, on trees. Singapore, Kranji; Changi. Johor, Kwala Kahang (Kelsall); Tana Runto. Pahang, Pekan. Malacca (Griffith). Negri Sembilan, Port Dickson (Williams). Penang. *Distrib.* Tenasserim, Siam, Sumatra, Borneo.

(16) **D. kentrophyllum** Hook. *fil. F.B.I.* vi. 725; *lc. Pl. t.* 2021; *Ridl. Mat.* i. 42.

Stems tufted stout, 4 to 8 in. long. Leaves sub-terete straight thick acute, .5 to 1 in. long, sheaths .25 in. long. Flowers lateral on the terminal leafless portion, .5 in. long. Upper sepal ovate-oblong, laterals blunt; mentum more than twice as long as the upper sepal stout incurved narrowed to tip. Lip spatulate long-clawed bilobed. Capsule pear-shaped on slender pedicel, .12 in. long. *Hab.* Rare and little known. Pahang, Tahan River. Perak, Gunong Hijau (Scortechini).

(17) **D. subulatum** Hook. *fil. F.B.I.* v. 726; *Ridl. Mat.* i. 43. *Podochilus bicolor* Miq. *Choix t.* 22, f. 3.

Stems tufted numerous, 2 to 6 in. tall, slender. Leaves narrow pungent slightly flattened recurved, .5 in. long, sheaths .25 in. long. Flowers solitary from the axils of the leafless part, nearly .5 in. long. Upper sepals small lanceolate blunt, laterals triangular acute; mentum twice as long, all white veined pink. Petals linear. Lip oblong truncate, tip broad shortly 3-lobed white, a yellow spot at tip. *Hab.* Singapore, Bukit Timah; Kranji. Johor. Selangor, Batu Caves; Kwala Lumpur. Perak (Scortechini). Penang, Western Road (Curtis). *Distrib.* Java, Borneo.

(18) **D. flexile** Ridl. *Journ. Linn. Soc.* xxxii. 251; *Mat.* i. 42.

Stems numerous, 3 in. long, slender, flexuous, pendulous. Leaves terete acuminate acute appressed to stem, .75 in. long. Flowers sub-terminal, .5 in. long, white. Upper sepals small lanceolate acute, laterals ovate triangular acute; mentum much larger, curved blunt. Petals small linear. Lip, claw linear entire, limb obovate round, tip obscurely 3-lobed, edge toothed, a central orange spot. *Hab.* Not common, on trees low down. Singapore, Bukit Timah. Johor, Pulau Aor (Feilding).

(19) **D. calcaratum** Lindl. *Bot. Reg.* 1840, *Misc.* 219. *D. conostalix* Rchb. *fil. Walp. Ann.* vi. 292; *Ridl. Mat.* i. 43. *D. Teysmanni* Miq. *Fl. Ind. Bat.* iii. 540. *D. Lobbii* Teysm. and *Binn. Nat. Tijdr. Ned. Ind.* iii. 339.

Terrestrial herb with erect slender wiry stems, 1 to 2 ft. tall. Leaves narrow linear, tip unequally bilobed, stiff, 3 in. long, .25 in. wide, sheaths 1.5 in. long, hairy. Flowers .5 in. long in axillary pairs. Bracts small ovate. Upper sepal ovate with 3 olive streaks, laterals larger acute; mentum very long straight blunt. Lip base narrow, yellowish white, side-lobes tooth-like acute, midlobe round retuse. Column short, base dilate, arms erect tooth-like. Capsule

1 in. long, elliptic; pedicel .25 in. long. *Hab.* In shallow water, ditches and swamps, Singapore, Changi. Malacca, Bukit Bruang (Curtis). *Distrib.* Labuan. *Native names*: Rumput; Rajah Sari.

(20) *D. villosulum* Wall. *Cat.* 2006; *Hook. fil. F.B.I.* v. 728; *Ridl. Mat.* i. 44.

Terrestrial stems, graceful terete, sometimes branched, 2 to 3 ft. tall. Leaves linear-lanceolate unequally bilobed, 2 in. long, nearly .25 in. wide, sheaths 1 in. long, black pubescent. Flowers solitary pendulous from sheaths .5 in. long. Sepals lanceolate acute, yellowish with pale red network, mentum .5 in. long, narrow blunt straight. Petals narrow linear recurved. Lip shorter, 3-lobed, side-lobes narrow erect, blunt, midlobe orbicular, primrose yellow. Column short, base thicker. *Hab.* Terrestrial on dead leaves, up to 4000 ft. altitude. Singapore, Bajau; Sungei Buluh. Malacca, Mt. Ophir. Negri Sembilan, in old rubber ground Siliau (Williams). Penang Hill at 3000 ft. altitude (Porter, etc.), Kedah Peak.

(21) *D. pachyglossum* Par. and Rehb. *fil. Trans. Linn. Soc.* xxx. 149; *Hook. fil. Ann. Bot. Gard. Calc.* v. 8, pl. 12; *Ridl. Mat.* i. 44. *D. abietinum* *Ridl. Journ. Linn. Soc.* xxxii. 252.

Epiphytic stems slender, 1 ft. long. Leaves linear acute, 4 in. long, .12 in. wide, sheaths .25 in. long. Flowers .5 in. wide in pairs on short lateral racemes. Sepals oblong blunt, laterals wider greenish with red streaks, mentum .25 in. long, white. Petals narrow linear acute. Lip fleshy spatulate, side lobes hardly distinct, midlobe emarginate pale green, keels 2. Column narrow. *Hab.* Mountain forests on trees, at 2000 to 4000 ft. altitude, Pahang, Gunong Tahan. Perak, Thaiping Hills at 2000 ft. altitude. Kedah Peak. Lankawi, Gunong Raya. *Distrib.* Tenasserim.

§ 5. *Bambusæfoliæ*.

(22) *D. gemellum* Lindl. *Gen. and Sp. Orch. Pl.* 81; *Ridl. Mat.* i. 44.

Epiphyte 2 to 3 ft. tall, flattened above. Leaves lanceolate lorate unequally bilobed thin light green, 4 in. long, .3 to .5 in. wide, sheaths .75 in. long, wrinkled. Raceme from centre of an internode very short enclosed in oblong blunt bracts. Flowers 2, yellowish unexpanded, .5 in. long; pedicel .5 in. long; ovary .12 in. long. Upper sepal lanceolate blunt, laterals larger triangular-lanceolate; mentum as long, thick curved. Petals linear-lanceolate acute. Lip shorter narrow spatulate entire thin. Capsule ovoid, .5 in. long. *Hab.* On trees. Singapore, Serangoon. Malacca, Bukit Bruang (Griffith). Perak, Thaiping. Jalor, Biserat (Gwynne Vaughan). Lankawi (Curtis). *Distrib.* Siam, Java, Sumatra, Borneo.

(23) *D. pensile* *Ridl. Journ. Linn. Soc.* xxiii. 253; *Mat.* i. 5.

Stems numerous pendulous, 2 to 3 ft. long, terete. Leaves numerous ovate-lanceolate fleshy distichous, 3 in. long, .75 in. wide.

Racemes very short from middle of internode. Flowers 2, sessile unexpanded, yellow. Bract ovate-triangular broad dry. Ovary thick, .5 in. long. Sepals lanceolate twisted, laterals sub-triangular blunt; mentum short blunt. Petals narrow lanceolate. Lip much shorter, 3-lobed, side-lobes short falcate, midlobe longer lanceolate acute pubescent, with red mid-line. Column sub-globose narrowed above, arms 0. Capsule elliptic, 1 in. long' *Hab.* Local, on trees near sea coast, Singapore, Changi; Selitar. Johor. *Distrib.* Rhio.

(24) **D. gracile** Lindl. *Gen. and Sp. Orch. Pl.* 92. *D. setifolium* Ridl. *Journ. Linn. Soc.* xxxi. 270.

Stems tufted slender pendulous, over 1 ft. long, with one internode at base swollen fusiform, 1 in. long, .5 in. thick. Leaves setaceous, very slender, channelled 3 in. long, sheaths 1 in. long. Raceme lateral very short. Flowers .75 in. wide on pedicels .86 in. long. Sepals lanceolate white. Petals linear white. Lip 3-lobed, side-lobes rather large round, white, red veined inside, midlobe ovate clawed, white. Column straight narrow, arms tooth-like longer than anthers. *Hab.* Rare, Singapore, Chan Chu Kang. *Distrib.* Rhio, Borneo, Java, Sumatra, Siam.

(25) **D. clavator** Ridl. *Journ. Linn. Soc.* xxxii. 255; *Mat.* i. 47. *D. mellitum* Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 32.

Stems over 1 ft. long, slender, one internode near base thickened fusiform, .75 in. long. Leaves terete channelled, 3 in. long, .06 in. through. Racemes from nude tip of stem. Bracts many. Flowers .75 in. wide. Upper sepal lanceolate acute, laterals wide ovate falcate; mentum broad curved. Petals lanceolate shorter broader than upper sepals, yellowish, tinted red. Lip, side-lobes oblong round pale red nerved, midlobe ovate blunt minutely toothed, disc elevate, yellowish red. *Hab.* Scarce. Johor, Sungei Tebrau. Perak, Thaiping.

My *D. mellitum* is, I think, only a very dwarf form.

(26) **D. truncatum** Lindl. *Journ. Linn. Soc.* iii. 15. *D. clavipes* Hook. *fil. F.B.I.* v. 728; *Ic. Pl.* 2027; *Ridl. Mat.* i. 47.

Stems 6 to 12 in. long, slender, one internode at base ovoid globose, .5 in. long, tip often nude. Leaves narrow linear, 1 to 1.25 in. long, .12 in. wide, tip bifid. Flowers often on bare tip, .36 in. long, white. Bracts ovate acute, small. Sepals lanceolate acute, veined pink; mentum as long curved, thick. Petals lanceolate, narrower. Lip hastate, side-lobes hardly distinct round, midlobe lanceolate acute, callus on disc yellow, oblong. *Hab.* Pahang, Pulau Chengai. Selangor, Batu Caves. Perak (Scortechini); Baling. (Williams). *Distrib.* Sumatra, Java.

(27) **D. planibulbe** Lindl. *Bot. Reg.* 1843, *Misc.* 54. *D. tuberiferum* Hook. *F.B.I.* v. 728; *Ic. Pl.* 2025; *Ridl. Mat.* i. 48.

Stems 12 to 18 in. long, red, 2 internodes dilate into an ovate

flattened pseudobulb, 1·5 in. long, 1 in. wide, ·25 in. thick, tip of stem leafless. Leaves few elliptic-ovate unequally bifid blunt, 1 in. long, ·25 to ·75 in. wide, sheaths 1 in. long. Flowers solitary from bare tip, ·5 in. long. Upper sepal lanceolate acute, laterals triangular acute; mentum little longer curved blunt. Petals lanceolate acute, all white with violet crimson central line. Lip side-lobes round white veined violet, midlobe lanceolate acute, tip ciliate white with violet crimson bar, callus retuse, yellowish between side-lobes. *Hab.* On trees, Singapore, Kranji; Bajau. Johor, Batu Pahat. Pahang, Kwala Pahang. Negri Sembilan, Siliau (Williams). Perak, Thaiping Hills on Gunong Hijau (Murton); Temengoh common. *Distrib.* Borneo, Java.

(28) *D. crumenatum* Swartz, *Schrad. Journ.* ii. 237; *Lindl. Bot. Reg.* 1839 t. 22; *Bot. Mag. t.* 4013.

Stems often branched, 3 to 4 ft. long, 4 internodes at base swollen into a fusiform pseudobulb 3 in. long, ·75 in. through, upper part of stem leafless. Leaves broad elliptic stiff coriaceous blunt retuse, 3 in. long, 1 in. wide, sheaths 1·5 in. long. Flower white produced singly from tufts of dry bracts on nude part of stem. Upper sepal ·75 in. long, lanceolate acute, mentum conic curved dilate towards tip, ·75 in. long. Petals wider and shorter. Lip base oblong, side-lobes elongate round, midlobe oblong-ovate cuspidate, keels 3 on disc between side lobe, pale yellow papillose patch on midlobe. Capsule 1 in. long, elliptic. *Hab.* Common on orchard and roadside trees all over the peninsula. *Distrib.* Burma, S. China, Siam, Malay isles. *Native names:* Poko Merpati; Bunga Angin; Pigeon orchid.

The peculiar habit of all the plants in a district flowering simultaneously, the flowers lasting but a day, has attracted the notice of most residents.

(29) *D. bifarium* *Lindl. Wall. Cat.* 2002; *Hook. fil. F.B.I.* v. 732; *Ridl. Mat.* i. 45.

Stems tufted, 6 to 12 in. long, channelled. Leaves elliptic-oblong unequally bilobed, ·5 to 2 in. long, ·25 to ·36 in. wide. Flowers solitary axillary, ·5 in. wide expanded, white. Bracts minute; pedicel and ovary ·5 in. long. Upper sepal lanceolate acute, laterals little larger, mentum short blunt, straight. Lip entire obovate retuse papillose in centre light yellow. Column short thick, arms tooth-like. Capsule 1 in. long, ·5 in. through, unequally pear-shaped. *Hab.* On trees in woods, common, Singapore, Selitar; Kranji. Johor, Tana Runto. Pahang, Tahan River. Penang (Wallich, Curtis). *Distrib.* Borneo.

(30) *D. rupicolum* *Ridl. Journ. F.M.S. Mus.* vi. 174.

Stems 6 to 12 in. tall, ·12 in. through, internodes ·12 in. long. Leaves ·25 to ·5 in. long, oblong blunt unequally bifid. Flowers solitary, ·25 in. wide. Sepals oblong-lanceolate pale ochre brown; mentum short blunt. Petals smaller. Lip white or light yellow, a

darker central mealy blotch, claw linear-oblong, limb sub-orbicular, deeply retuse. *Hab.* On rocks and trees at high altitudes, Pahang, Gunong Tahan; Kluang Terbang (Barnes), Selangor, Bukit Hitam (Kelsall). Perak, Gunong Kerbau (Robinson).

(31) **D. Hosei** *Ridl. Trans. Linn. Sec. iii.* 363; *Mat. i.* 46.

Stems over 2 ft. long, flexuous. Leaves lanceolate acuminate, very unequally bifid, 3 in. long, .36 in. wide; sheaths .75 in. long. Racemes from base of internodes .75 in. long. Flowers 3 or 4, 1 in. wide. Bract ovate acute. Sepals white oblong-ovate acute, .5 in. long; mentum as long, straight. Petals linear, white. Lip ochreous, .36 in. long, side-lobes acute curved, white with brown veins, midlobe oblong-reniform retuse, edge waved ciliate with 3 brown parallel nerves. Column broad, narrowed above. *Hab.* Rare. Pahang, Tahan River. Kedah Peak (Williams). *Distrib.* Borneo.

(32) **D. revolutum** *Lindl. Bot. Reg.* 1840; *Misc.* 51; *not Bot. Mag. t.* 6706; *Ridl. Mat. i.* 46.

Stems pendulous, 2 ft. long, .25 in. through, grooved. Leaves broad lanceolate thinly coriaceous unequally bilobed, 3 to 3.5 in. long, .75 in. wide; internodes .5 to 1 in. long. Flowers solitary, .75 in. wide on very short peduncle from base of internode. Bracts minute ovate acute; pedicel and ovary .75 in. long. Upper sepal ovate acuminate, laterals larger, broad ovate; mentum short blunt, .36 in. long. Petals lanceolate shorter, all white recurved. Lip horizontal fleshy, side-lobes short blunt deflexed, midlobe oblong-ovate truncate retuse, dull orange with three brown streaks. Column white thick narrowed upwards with two broad keels in front. *Hab.* Sporadic, not common. Singapore, Wayang Satu. Johor, Batu Pahat. Pahang, Labong Endau (Evans), Malacca, Ayer Panas (Hervey). Negri Sembilan, Siliau (Williams). Kedah Peak. *Distrib.* Rhio.

The type was mixed by Lindley with Griffith's *uniflorum*. The narrow thin leaves distinguish it from any of the other species.

(33) **D. uniflorum** *Griff. Notulæ, iii.* 305; *Ic. Pl. As. t.* 203; *Ridl. Mat. i.* 46.

Stems about 1 ft. tall, grooved. Leaves oblong-lanceolate unequally lobed, 1 to 1.24 in. long, 1 in. wide or less; sheaths .25 in. long. Flower 1, white, .5 in. across. Peduncle .12 in. long, pedicel and ovary over 1 in. long. Sepals oblong acuminate; mentum shorter straight. Petals obovate acute. Lip .75 in. long, obtusate, 3-lobed, side-lobes large oblong blunt, midlobe obovate bilobed, 2 raised violet ridges on the disc. Column broad flat in front with a raised line, arms green. *Hab.* On trees at 3000 to 5000 ft. altitude. Pahang, Gunong Tahan. Malacca, Mt. Ophir (Griffith and all collectors). Perak, Thaiping Hills.

The Tahan form has the front of the column elevate green with a depressed central line.

(34) *D. metachilinum* *Rchb. fl. Bonplandia* iii. 1855, p. 222; *Ridl. Mat.* i. 46.

Stems stout, over 1 ft. long, deeply grooved. Leaves broad lanceolate, tips very unequally bilobed, 3 in. long, .36 in. wide; sheaths 1 in. long. Racemes from upper axils very short, 3- to 4-flowered. Bracts ovate acute, very small. Ovary and pedicel .5 in. long. Sepals oblong-lanceolate acute, .5 in. long; mentum .5 in. long, straight, slender acuminate. Petals linear-spathulate, burnt sienna colour with darker veining. Lip narrow with a long claw and small tooth-like side-lobes, midlobe small ovate fleshy caruncled, brown with 2 keels on disc. *Hab.* very rare, Malacca (Cuming); Bukit Jelutong (Derry). Negri Sembilan, Siliu (Williams).

The long mentum and narrow, long-clawed lip cause the flower to resemble a *Pedilonum*.

(35) *D. pandaneti* *Ridl. Journ. Linn. Soc.* xxxii. 257; *Mat.* i. 47.

Rhizome long creeping vertically on trunks of palms and pandans, branched. Stems 8 to 12 in. long, weak. Leaves thin lanceolate acuminate unequally bifid, 3 in. long, .75 in. wide, sheaths .5 in. long. Racemes in upper axils .25 in. long. Flowers few, 1 in. across. Pedicel and ovary 1 in. long. Sepals lanceolate acute; mentum slender blunt, shorter. Petals linear acute, all white. Lip base narrow linear, side-lobes short blunt incurved, midlobe fleshy, orange red with three orange keels on disc. Column straight, olive brown; arms large incurved and often bearing a half-anther on each. Capsule on pedicel .5 in. long, elliptic, pear-shaped fawn-colour. *Hab.* Climbing on trunks of palms and pandans. Singapore, Jurong; Bukit Mandai. Johor, Pulau Kukub; Batu Pahat. *Distrib.* Sumatra.

(36) *D. euphlebium* *Lindl. Journ. Linn. Soc.* iii. 7; *Rchb. fl. Xenia Orch.* ii. 26 t. 110; *Ridl. Mat.* i. 49.

Stems 6 to 9 in. tall, thickened upwards from a slender base, waved. Leaves terminal 2 lanceolate acuminate, 3 in. long, .75 in. wide, shortly petioled. Flowers solitary pendulous below the leaves, with a small yellow ovate bract. Upper sepal ovate-oblong blunt, laterals broad triangular ovate; mentum short. Petals lanceolate-spathulate, all white. Lip base narrow, side-lobes erect short, midlobe broad orbicular, depressed, yellow with pink veins and streaks, a small callus on claw-base. Capsule obconic, 1 in. long. *Hab.* On mangrove trees and hill woods, Singapore, Kranji; Selitar. Johor, Gunong Pantai; Batu Pahat. Negri Sembilan, base of Gunong Angsi (Williams). *Distrib.* Borneo, Java.

(37) *D. callibotrys* *Ridl. Journ. Linn. Soc.* xxxii. 258.

Stems sub-terete, 6 in. long or more, .25 in. thick. Leaves few at top lanceolate, 4 in. long, 1 in. wide; nerves 6. Racemes 1 in.

long from near top of stem, 6-flowered. Flowers crowded fragrant; pedicels .25 in. long. Bracts ovate acute. Upper sepal widely ovate, .5 in. long, laterals longer, ovate acute falcate; mentum shorter, thick. Petals lanceolate falcate, all white. Lip ovate cuneate spoon-shaped, fleshy, yellow with red streaks. Capsule 1.5 in. long, oblong; pedicel and peduncle thickened. *Hab.* Mangrove trees. Singapore, Kranji; Sungei Bulu. *Distrib.* Borneo.

(38) **D. metrium** *Kranzl. Pflanzenreich l.c. 221.* *D. modestum* *Ridl. Journ. Bot.* 1898, p. 211 (*not of Rehb. fil.*).

Stems slender, 7 in. long, flexuous purple. Leaf 1, rarely 2, terminal lanceolate-linear, 1 in. long, .25 in. wide, petiolate. Flowers in pairs on a short peduncle. Pedicel .5 in. long. Sepals lanceolate, .36 in. long, laterals base broader; mentum as long, acuminate acute, white tinted rose. Lip ovate acuminate, side-lobes indistinct, white with violet stripes. Column short; anther violet. *Hab.* Very rare, Penang Hill at 2500 ft. altitude (Ridley).

(39) **D. flavidulum** *Hook. fil. F.B.I. vi. 185; Ridl. Mat. i. 55.*

Stems slender, 12 to 18 in. tall, internodes 1 in. long. Leaves lanceolate, 3 in. long, .5 in. wide. Racemes several, 1 in. long. Flowers 3 to 6, pale yellow or nearly white, .5 in. long. Sepals ovate acute; mentum very short, thick. Petals lanceolate acute as big. Lip oblong 3-lobed, side-lobes lanceolate acute, midlobe longer ovate-lanceolate blunt ciliate, a red spot on tip, 2 low ridges on disc. Capsule long elliptic, pear-shaped, .5 in. long. *Hab.* On mangrove trees, Singapore, Kranji, etc. Kelantan Kamposa, Parit (Haniff). *Distrib.* Rhio.

Smith says this is *D. exsculptum* Teysm., the description of which is insufficient to identify it by, and the specimen so named at Kew by Smith seems quite different.

(40) **D. tetradon** *Rehb. fil. Journ. Linn. Soc. iii. 10.* *D. viridicatum* *Ridl. Journ. Roy. As. Soc. S. Br. 39, p. 72; Mat. i. 55.*

Stems slender, over 1 ft. long. Leaves lanceolate acute, 2.5 in. long, .5 in. wide, internodes .5 in. long. Flowers numerous on leafless stems, .5 in. wide, light green. Racemes of 2 to 3 flowers. Peduncles .25 in. long. Pedicels .75 in. long. Sepals lanceolate acute, laterals broader; mentum very short, blunt. Petals broader oblong lanceolate. Lip entire, lanceolate acute, .5 in. long. Column short with two thick yellow round arms. *Hab.* On tree in orchards. Perak, Ipoh (Goldham); Thaiping (Hobson); Ulu Temengoh. *Distrib.* Java.

This appears to be always self-fertilised; the rostellum is absent in all my specimens.

(41) **D. hercoglossum** *Rehb. fil. Hamb. Gartenz. xlii. 558; Gard. Chron. 1886, ii. 487; Ridl. Mat. i. 56.* *D. aduncum* *Hook. fil. Bot. Mag. t. 6784.*

Stems very slender pendulous, 1 to 3.5 ft. long, internodes 1 in. long. Leaves narrow linear acuminate thin, 3 in. long, .5 in. wide.

Racemes .5 in. long. Flowers 2 to 8, rosy pink, .75 in. wide; pedicel and ovary .5 in. long. Sepals ovate sub-acute; mentum short broad, round. Petals lanceolate, much smaller. Lip .25 in. long, claw very short, sub-hemispheric, sides enclosing column, tip beak-shaped, a large bearded callus at base. Column short pubescent. Anther purple papillose. *Hab.* On trees usually by streams, local, Johor, Pulau Tiunan (Nanson); Batu Pahat. Perak, Batang Padang (Curtis); Ulu Temengoh; Teluk Anson (Williams). *Distrib.* China.

(42) **D. lamellatum** Lindl. *Gen. and Sp. Orch. Pl.* 89. *D. compressum* Lindl. *Bot. Reg.* 1844, t. 53.

Stems 2 to 4 in. tall of 4 or 5 flexuous internodes fusiform with a narrow base, thin and flat, 1 to 1.5 in. wide, green. Leaves 2 to 3, ovate sub-acute on the tip of young stems 2 to 3 in. long, 1 in. wide. Flowers few in short racemes from upper nodes of leafless stems. Ovary and pedicel .5 in. long. Flowers 1 in. long, cream colour turning ochre. Sepals ovate broad; mentum long flattened blunt. Petals obovate blunt. Lip shorter obtusely, tip broad round fimbriate, white, a central orange bar of 5 low keels. *Hab.* Widely scattered but never common, Singapore, Changi; Jurong. Johor, Batu Pahat. Pahang, Kwantan (Durnford). Selangor, Kwala Lumpur (Curtis). Negri Sembilan, Siliu (Williams). Perak (Scortechini). *Distrib.* Tenasserim, Borneo, Java.

(43) **D. secundum** Lindl. *Gen. and Sp. Orch. Pl.* 81; *Bot. Mag.* i. 4352; *Exot. Fl.* t. 269; *Bot. Reg.* t. 1291.

Stems stout terete, 3 ft. long, .25 in. through. Leaves elliptic oblong or linear-oblong blunt, 4 in. long, 1.25 in. wide. Racemes 4 to 6 in. long on old stems; peduncles .5 in. long. Bracts ovate acute persistent. Flowers very numerous, crowded second, .5 in. long, rose-pink rarely white. Sepals small ovate acute; mentum twice as long, curved, tip dilate. Petals smaller, blunt. Lip linear-spathulate, entire, tip orange. *Hab.* Singapore, Long Island (Nanson). Johor. Pahang, Pekan. Negri Sembilan, Seremban (Dr. Braddon). Penang (Wallich). Perlis, Ginting Kabok. Lankawi, Dayong Bunting and Burau (Robinson). *Distrib.* Burma, Cochin China, Malay isles to Philippines.

(44) **D. cornutum** Hook. *fil. F.B.I.* v. 720; *Ic. Pl.* 2029; *Ridl. Mat.* i. 51.

Stems slender, 12 to 18 in. long. Leaves narrow linear-lanceolate acuminate, 3 to 4 in. long, .25 to .5 in. wide. Racemes short, few-flowered. Flowers 1 in. long, bright mauve pink. Sepals oblong blunt; mentum curved blunt, twice as long as sepals. Petals smaller, elliptic-oblongeolate blunt. Lip spathulate, claw long, callus small at base. *Hab.* On trees on high mountains, Pahang, Gunong Tahan (plentiful); Kluang Terbang (Barnes). Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Gunong

Batu Putih (Wray); Gunong Inas (Yapp). Kedah, Gunong Bintang (Kloss).

(45) *D. ægle* *Ridl. Journ. Linn. Soc.* xxxii. 260; *Mat.* i. 51.

Stems slender, 2 ft. long. Leaves lanceolate sub-acute, 3 in. long, .75 in. wide. Racemes .25 in. long. Flowers many, .5 in. long, dark pink; pedicels .2 in. long. Bracts lanceolate acute. Upper sepal oblong blunt, .25 in. long, laterals lanceolate-ovate, blunt; mentum terete curved, blunt, .25 in. long. Petals shorter, broader. Lip spathulate, limb round toothed. Anther conic dark crimson. *Hab.* On trees, Johor, Batu Pahat. Perak, Thaiping Hills at about 2500 ft. altitude (Ridley).

(46) *D. virescens* *Ridl. Journ. Linn. Soc.* xxxii. 259; *Mat.* 51.

Stems weak, over 1 ft. long, internodes .75 in. long. Leaves thin lanceolate acuminate, 4 in. long, 1 in. wide. Racemes lax, 2.5 in. long. Flowers 12, 1 in. long, greenish yellow, pedicels 1 in. long. Upper sepal ovate acute, .25 in. long, laterals wider; mentum .75 in. long, cylindrical, blunt. Petals shorter. Lip spathulate, claw narrow, blade round toothed, margins of claw thickened with a transverse bar. *Hab.* Perak, Thaiping (Curtis). Legeh, at Tomoh (Machado).

(47) *D. serpens* *Hook. fil. Ann. Bot. Gard. Calc.* v. 10, pl. 16; *Ridl. Mat.* i. 51. *D. panduriferum* *var. serpens* *Hook. fil. F.B.I.* vi. 186.

Stems 2 to 3 ft. long, flexuous weak, internodes 1 to 1.5 in. long. Leaves elliptic, tip very unequally lobed, 3 in. long, 1 in. wide. Racemes 1.5 in. long. Flowers 6 to 8, about 1 in. long. Sepals broad ovate, yellow streaked red; mentum twice as long, terete blunt, straight green. Petals wide obovate. Lip, claw long linear, blade pandurate with a callus across base. *Hab.* Rare. Perak (Kunstler); Ulu Temengoh on an island in the Kertai River (Ridley).

(48) *D. crocatum* *Hook. fil. F.B.I.* vi. 185; *Ann. Bot. Gard. Calc.* v. 9, pl. 14. *D. pyropum* *Ridl. Trans. Linn. Soc.* iii. 362.

Stems 1 to 3 ft. through. Leaves lanceolate acute, unequally bilobed, 3 to 4 in. long, 1 in. wide. Racemes .5 in. long, 2- to 3-flowered. Flowers 2 in. long, orange. Sepals lanceolate acute, .5 in. long; mentum straight cylindrical acuminate. Petals as large as sepals. Lip spathulate, claw linear, blade ovate denticulate crisped, a double keel on the claw. *Hab.* On trees often high up, sporadic. Singapore, Chan Chu Kang. Pahang, Tahan River. Negri Sembilan, Seremban (Braddon). Selangor, Ulu Gombak. Perak, Larut (Kunstler).

(49) *D. Derryi* *Ridl. Mat.* i. 52.

Stem stout enlarged upwards red, 8 to 10 in. long, internodes 1.5 in. long. Leaves oblong blunt, 3 in. long. Flowers on old stems 1 in. across; pedicel and ovary .75 in. long. Sepals oblong-lanceolate blunt, ochreous; mentum straight blunt horizontal,

thick, .5 in. long. Petals narrower. Lip white, claw narrow with an elevated double ridge meeting at base, blade oblong truncate, broad retuse. Column short, broad, arms erect longer than the flat orange anther. *Hab.* Rare, Perak, Taiping Hills (Derry). *Distrib.* Borneo.

(50) **D. lepidum** *Ridl.* *D. hymenopterum* *Ridl. Mat. i. 52* (not of *Hooker*).

Stems slender terete or thickened upwards, 1 ft. long, purple, internodes short. Leaves linear acuminate, 3 in. long, .25 in. wide. Flowers solitary, thin, 1.5 in. wide, 1 in. long. Sepals elliptic blunt, white tinted violet; mentum slender acuminate. Petals little larger, white. Lip entire spathulate, limb broad round truncate, white base and nerves pale yellow, keels 2 connate on claw diverging on blade, 2 parallel raised nerves on disc. Column greenish white, tip orange. *Hab.* On trees low down, on mountains at 4000 to 5500 ft. altitude. Pahang, Gunong Tahan; K'luang Terbang (Barnes); Bukit Fraser (Burkill). Perak, Bujong Malacca. Kedah Peak. Lankawi, Gunong Rayah (Curtis).

(51) **D. calicopsis** *Ridl. Journ. Roy. As. Soc. xxxix. 72.*

Stems slender, 1 ft. long, internodes .5 to 1 in. long. Leaves lanceolate acuminate, 3 in. long, .5 in. wide. Flowers 1 in. across, 3 to 4 on pedicels .5 in. long; peduncles as long. Sepals ovate blunt, laterals narrower, sub-acute; mentum as long, cylindric sub-acute. Petals broader elliptic blunt, all white, tinted rose. Lip entire broadly oblong truncate, tip bilobed, lobes short round, with 4 raised veins in centre and 2 thinner outside, white, tip rose. Column short, arms crimson tooth-like. Anther large ovate pink. *Hab.* Rare. Lankawi islands (Curtis).

(52) **D. hymenopterum** *Hook. fil. Ic. Pl. 2032.*

Stems 9 in. long, moderately stout, flexuous. Leaves broad lanceolate sub-acute, base shortly narrowed, 3.5 in. long, .75 in. wide. Flowers few, white, tinted rose and green, .5 in. across. Upper sepal broad lanceolate blunt, laterals broader triangular blunt; mentum .25 in. long, clubbed. Lip, claw long narrow, limb rounded-obovate denticulate with 2 short raised semi-ovate rings at the base of limb. Column-arms broad oblong truncate rounded. *Hab.* Mountains at 3400 ft. altitude, very rare. Perak Gunong Batu Putih (Wray).

(53) **D. roseatum** *Ridl. Journ. Linn. Soc. xxxii. 261; Mat. i. 53.*

Stems slender, over 2 ft. long, internodes 1 in. long. Leaves lanceolate acute, 3 in. long, .5 in. wide. Raceme 1 in. long. Flowers 6, rosy white, 1.5 in. long. Sepals .5 in. long, ovate; mentum as long, thick tip curved and clubbed. Petals broader blunt. Lip with a narrow linear base, blade abruptly quadrate crenulate. *Hab.* Selangor, Gunong Mengkuang Lebah (Robinson), Perak, Taiping Hills (Curtis).

(54) **D. Foxii** *Ridl. Journ. Bot.* 1900, 70; *Mat.* i. 53.

Stems slender, 3 ft. long, red. Leaves lanceolate acuminate, 4 in. long, 1 in. wide. Racemes .5 in. long. Flowers 7 to 10, rosy white, 1 in. across; pedicels 1 in. long. Sepals ovate acute, laterals more blunt curved, .6 in. long; mentum thick curved dilate towards the acuminate tip. Petals oblong obovate fimbriate, nearly .75 in. long. Lip, claw narrow, linear, limb abruptly pandurate bilobed, rounded fimbriate, white. Column arms short blunt, orange. *Hab.* Perak, Thaiping Hills (Fox).

(55) **D. clarissimum** *Ridl. Journ. F.M.S. Mus.* iv. 65.

Stem about 1 ft. long, flexuous, .26 in. through. Leaves thin lanceolate acute, 2 to 4 in. long, base round, .5 in. wide. Raceme sub-terminal of 4 or 5 flowers on a raceme 2 in. long, white, 1 in. wide. Pedicel 1.5 in. long. Sepals ovate acute, broad; mentum 1 in. long, cylindric then dilate, tip acute. Petals obovate blunt, larger, tip slightly rosy. Lip, claw linear, limb quadrate, edge fimbriate. Column arms orange. *Hab.* Mountain forests, rare, Pahang, Telom near the cascade, only a few plants seen (Ridley).

(56) **D. chloroleucum** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 38.

Stem slender, 2 ft. long, .12 in. through, internodes 2 in. long. Leaves thin lanceolate acute, 4 in. long, .36 in. wide. Flower 1 on pedicels .75 in. long; peduncles 1 in. long. Sepals lanceolate, .5 in. long; mentum long, curved acuminate blunt, 1 in. long. Petals narrower, all cream colour, greenish at back, tip of sepals and mentum. Lip entire spathulate, 1.25 in. long, claw linear with a V-shaped keel at base, limb oblong narrowed into claw, edges undulate, .5 in. wide, canary yellow. Column base green, arms orange. *Hab.* Perak, Gunong Kerbau (Haniff).

(57) **D. subflavidum** *Ridl. Journ. Linn. Soc.* xxxviii. 130.

Stem slender, 18 in. long, .12 in. thick, internodes 2 in. long. Leaves lanceolate acuminate acute, 3 in. long, 1 in. wide, 5-nerved. Racemes from old stems, .75 in. long. Flowers 2, cream-colour spotted crimson, 1.5 in. long, .5 in. wide. Sepals, upper lanceolate, laterals triangular much wider; mentum horn-shaped, tip curved. Lip lanceolate, claw narrow, limb entire blunt, .5 in. wide, deeper yellow spotted red-brown. *Hab.* Local. Pahang, Gunong Tahan at 3000 to 6000 ft. altitude (Robinson, Ridley).

(58) **D. tropæoliflorum** *Hook. fil. Ann. Bot. Gard. Calc.* v. pl. 17; *Ridl. Mat.* i. 62.

Stem elongate flexuous thickened above, 1 ft. long. Leaves linear-oblong acute, 2.5 in. long, 1 in. wide. Raceme 1 to 2 in. long. Flowers 6 or more, 1 in. long. Sepals triangular-ovate acute, .25 to .5 in. long, deep purple; mentum 4 times as long, yellow. Petals obovate round acute, deep purple. Lip as long as sepals, claw linear gradually dilate to the lateral lobes, between

which is a semi-lunar callus, limb obovate apiculate. *Hab.* Perak, no locality given (Kunstler).

(59) *D. megaceras* Hook. *fil. F.B.I.* v. 731; *Ic. Pl.* 2031; *Ridl. Mat.* i. 54.

Stems slender, 2 ft. long, internodes 1 to 1.25 in. long. Leaves oblong-lanceolate acuminate, 3 to 4 in. long, .75 to 1 in. wide. Racemes short. Flowers few, 1.5 in. long, yellowish. Sepals elliptic-oblong blunt; mentum 2 or 3 times as long, cylindrical nearly straight, pinkish. Petals obovate. Lip cuneate, 3-lobed, claw gradually dilate to limb, an elongate keel at base, side-lobes sub-truncate crenulate, midlobe sub-orbicular retuse crenate. *Hab.* Malacca, no locality (Maingay).

Near *D. subflavidum* Ridl., but the flowers are rather smaller and lip crenulate; mentum somewhat clubbed blunt.

(60) *D. exilicaule* Ridl. *D. tenuicaule* Ridl. *Journ. Roy. As. Soc. S. Br.* 39, p. 73 (not of Hooker).

Stems very slender, weak, 1 ft. long. Leaves linear-lanceolate, 3 in. long, .25 in. wide. Flower one, .75 in. wide. Pedicel and ovary .5 in. long. Sepals ovate acute; mentum .75 in. long, cylindrical, tip recurved acute. Petals broad ovate. All pink, tips darker. Lip clawed, long and narrow, side-lobes broad upcurved, midlobe ovate shortly bifid, edge crisped, white with pink central lines. *Hab.* Lankawi, Ayer Hangat (Curtis).

(61) *D. kentrochilum* Hook. *fil. F.B.I.* vi. 731; *Ic. Pl.* 2030.

Stems rather stout flexuous. Leaves broad elliptic coriaceous blunt, base very shortly narrowed, 3 in. long, 1 in. wide. Flowers .34 in. wide, cream colour. Upper sepal ovate blunt, laterals oblong blunt larger; mentum .36 in. long. Lip obovate slightly trilobed, claw medium with a retrorse spur. Column arms erect curved acute. *Hab.* Very rare. Perak, Batang Padang valley at 2000 ft. altitude (Wray).

Near *D. sanguinolentum*, but the leaves are quite different, the flower smaller, and the mentum short.

(62) *D. sanguinolentum* Lindl. *Bot. Reg.* 1842; *Misc.* 73, 1843, t. 6; *Ridl. Mat.* i. 55.

Stems fairly stout, 1 to 2 ft. long, flexuous. Leaves lanceolate sub-acute, 2 in. long, .75 in. wide. Racemes 1 to 1.5 in. long. Flowers 4 to 6, showy, 1 in. across. Sepals ovate blunt, .2 in. long; mentum .75 in. long, terete, tip dilate curved. Petals broad ovate blunt, .5 in. long, all cream colour, tipped violet crimson. Lip shorter, base narrow with a reflexed spine-like callus, limb suddenly dilate, quadrate-round, edge waved, cream colour tipped violet-crimson with a central yellow patch.

var. *D. cerinum*. *D. cerinum* Rehb. *fil. Gard. Chron.* xii. 554.

Flowers entirely yellowish ochre. Both forms grow together on trees at about 2500 to 3000 ft. altitude. *Hab.* Selangor, Semangkok Pass. Penang Hill (Curtis). Kedah Peak. *Distrib.* Borneo.

(63) **D. trinervium** *Ridl. Journ. Linn. Soc. xxxiii. 242.*

Dwarf; stems 3 in. tall, .25 in. thick, crowded flexuous. Leaves lanceolate fleshy unequally acutely bilobed, 2.5 in. long, .5 in. wide. Flower solitary; peduncle .25 in. long. Bract minute ovate-lanceolate acute. Upper sepal ovate-oblong acute, laterals much larger; mentum blunt as long. Petals smaller lanceolate, all white. Lip oblong-pandurate retuse, yellow spotted, red at base, keels 3, bright green thickened at the tip on midlobe, .75 in. long and half as wide. *Hab.* Setul (Haniff *vide* Burkill). *Distrib.* Southern Siam.

(64) **D. eriaeflorum** *Griff. Notulæ, iii. 316; Ic. Pl. As. t. 307.*

Stem 3 to 8 in. long, with large basal sheaths below. Leaves rather thin, linear-lanceolate, 2 in. long, .25 in. wide. Racemes axillary lax, 6- or more-flowered, 2 in. long. Flowers .5 in. long, white or yellowish. Sepals lanceolate; mentum incurved. Petals narrow lanceolate, whitish, three purple lines. Lip nearly as long, broad ovate, lobes fimbriate serrate, midlobe broad undulate, disc crested, yellowish veined purple. *Hab.* Kedah Peak (Burkill). *Distrib.* Himalaya.

(65) **D. aureum** *Lindl. Gen. and Sp. Orch. Pl. 77; Bot. Reg. 1839, t. 20. D. heterocarpum Wall. Pl. As. Rar. ii. 84, t. 196; Bot. Mag. t. 4708 and 4970.*

Stems sub-terete thickened upwards, 9 to 36 in. tall. Leaves oblong-lanceolate, 4 to 5 in. long, .5 in. wide. Flowers 1 to 3 on a short peduncle from leafless stems, 2 to 2.5 in. across, pale yellow, fragrant. Sepals linear-oblong acute; mentum large conic truncate. Petals ovate-lanceolate. Lip ovate-lanceolate acute, tip recurved, sides incurved, disc pubescent, orange, streaked yellow. Column orange red. *Hab.* Very rare; once found in hill forests. Perak, Thaiping Hills (Stephens). *Distrib.* India, Java, Philippines.

(66) **D. Pierardi** *Roxb. Hook. Exot. Flora, t. 9; F.B.I. v. 738; Lindl. Bot. Reg. t. 1756; Bot. Mag. t. 2584.*

Stems slender, 2 to 3 ft. long. Leaves lanceolate acuminate, 2 to 4 in. long, thin. Flowers 2 to 3 on short peduncle from leafless stems 1 to 2 in. across. Sepals oblong-lanceolate; mentum short. Petals broader oblong, all rose pink. Lip orbicular cucullate pubescent ciliate, base tubular, primrose yellow. *Hab.* Selangor. Between Kwala Kubu and Tanjong Malim (Williams). *Distrib.* Himalayas to Tenasserim.

(67) **D. Haniffii** *Ridl.*

Stems slender, 18 in. tall, yellow with tubular leaf sheaths 1.5 in. long. Leaves linear-oblong unequally bilobed at tip, thin, 4.5 in. long, .3 in. wide, lower ones shorter and broader, sheaths 1.25 in. long. Flowers 2 on an axillary raceme from the bare stem; peduncle 1.5 in. long with 4 papery sheaths at base; pedicels 1.5 in. long. Sepals lanceolate, 1 in. long, .15 in. wide, twisted.

Petals broader, 1.25 in. long, conic. Lip obovate convolute, tip round, 1.25 in. long, 1 in. wide entire, nearly white except the veins, with a touch of purple at the tip and a patch of deep purple on both sides close to the base. Column short, broad and thick. Anther deep purple. *Hab.* Kelantan river-bank (Haniff).

(68) **D. superbum** *Rehb. fil. Walp. Ann.* vi. 282; *Lindl. Sert. Orch. t.* 35. *D. macranthum* *Hook. fil. Bot. Mag. t.* 3970. *D. Scortechinii* *Hook. fil. F.B.I.* v. 741.

Stems terete, 2 to 4 ft. long, pendent, internodes 1 in. long. Leaves oblanceolate acute, 5 to 6 in. long, .6 in. wide. Flowers in pairs on old stems 3 to 4 in. across, pink, lip with dark purple centre. Sepals lanceolate acute, mentum short broad conic. Petals ovate-oblong, broader. Lip ovate convolute pubescent acute, a 3-lobed callus at base. *Hab.* Rare. In mountain forest, Perak, Thaiping Hills (Stephens and Scortechini). Lankawi (Robinson). *Distrib.* Borneo, Philippines.

(69) **D. Dalhousieanum** *Wall. Paxt. Mag. Bot. t.* 145; *Lindl. Bot. Reg. t.* 10; *Ridl. Mat. i.* 57.

Stems stout terete, 3 to 4 ft. long, internodes 1 to 1.5 in. long. Leaves linear-oblong, 4 to 6 in. long, base cordate. Flowers 4 to 5 in. wide, rosy or yellow, with 2 deep purple blotches on the lip. Sepals oblong acute; mentum short. Petals much broader. Lip short clawed orbicular, tip and sides densely villous, disc with 2 fringed lamellæ. *Hab.* Very rare, Singapore, one large plant on a forest tree at Chan Chu Kang. *Distrib.* India, Burma.

(70) **D. cruentum** *Rehb. fil. Gard. Chron.* 1884, i. 604; *Hook. fil. F.B.I.* v. 736; *Warner, Orch. Alb. iv. t.* 174.

Stem 1 ft. long, terete base swollen. Leaf oblique oblong emarginate. Flowers 1 or 2, axillary, 1.5 to 2 in. wide, light green. Bracts lanceolate. Sepals triangular-ovate acuminate, keeled; mentum round short. Petals linear acute. Lip side-lobes erect oblong crimson, midlobe ovate apiculate green with a red crest and 3 red ridges. Column green edged crimson. *Hab.* Setul. Bukit Rajah Wang (Haniff). *Distrib.* Tongkah.

(71) **D. aggregatum** *Roxb. Fl. Ind. iii.* 477; *Lindl. Bot. Reg.* 1695; *Bot. Mag. t.* 3643.

Stem crowded fusiform, thick, 2 to 3 in. long. Leaf one, oblong, 2 to 4 in. long, 1 to 2 in. wide. Flowers 10 to 12 in a loose raceme 9 in. long, yellow, 1.6 in. long. Sepals oblong. Petals broad round. Lip transversely oblong concave, claw short, limb pubescent, edges ciliate. Column yellow. *Hab.* Perak. A drawing by Scortechini, in his collection; no locality given, possibly a cultivated plant. *Distrib.* Assam, Burma, Siam and China.

(72) **D. tortile** *Lindl. Gard. Chron.* 1847, p. 797, fig.; *Bot. Mag. t.* 4477; *Hook. fil. F.B.I.* v. 744.

Stems fusiform compressed, 6 to 12 in. long, .75 in. broad, grooved and ribbed. Leaves narrow retuse, 3 to 4 in. long. Raceme

on leafless stems 3- to 6-flowered, 3 to 3·5 in. wide. Sepals and petals oblong, undulate and twisted, rose lilac; mentum conic. Lip sub-saccate, limb orbicular erose pubescent and ciliate, light yellow. *Hab.* Rare. Penang. A large clump at Balik Pulau (Haniff). *Distrib.* Burma, S. Siam.

Often cultivated, possibly a garden escape.

10. BULBOPHYLLUM, Thouars.

Epiphytes with creeping rhizome and one jointed pseudobulb. Leaf one, sub-terminal on the pseudobulb coriaceous, oblanceolate, ovate or lineate. Flowers one to many in a raceme, peduncled from the rhizome close to the pseudobulb. Sepals lanceolate, similar, or laterals larger. Petals smaller. Lip fleshy curved or flat, tongue-shaped movable on the end of the column foot. Column short, thick, with a long curved foot to which the lateral sepals are usually adnate, arms short or long erect, entire or bifid. Anther conic or flat. Pollinia 2 to 4 ovoid or elliptic in unequal pairs. Species about 400, all tropics.

§ 1. *Sestochilus*. Flowers large, solitary (rarely 2 or more) on a long peduncle, spreading. Sepals sub-equal; petals nearly as large.

- | | |
|--|------------------------------|
| Lip flat narrow linear-oblong | (1) <i>B. patens</i> |
| Lip flat long narrow acuminate; flowers 2·5 in.
long | (2) <i>B. megalanthum</i> |
| Lip flat hastate blunt; flowers rather small,
yellow | (3) <i>B. pileatum</i> |
| Lip ovate acute curved.
Flower large pink spotted, lip small | (4) <i>B. macranthum</i> |
| Lip large; pseudobulbs cylindric distant
peduncle tall; flowers often 2.
Sepals caudate, yellow | (5) <i>B. galbinum</i> |
| Sepals lanceolate acuminate, yellow, thickly
red-spotted | (6) <i>B. polystictum</i> |
| Sepals acute, yellow red-spotted or pink | (7) <i>B. variable</i> |
| Sepals long caudate, striped pink | (8) <i>B. longiflorum</i> |
| Sepals ovate-oblong blunt, green spotted pink | (9) <i>B. membranifolium</i> |
| Pseudobulbs ovoid crowded; flowers large
yellow | (10) <i>B. siamense</i> |
| Flowers 1 in. or less across.
Pseudobulb crowded cylindric; flowers 1·5 in.
wide, yellow | (11) <i>B. rugosum</i> |
| Pseudobulbs oblong conic crowded; flowers
1 in. wide, yellow striped red | (12) <i>B. pustulatum</i> |
| Pseudobulbs conic; flowers 1 in. wide, lip
very small | (13) <i>B. microglossum</i> |
| Flowers rather large, 4 to 8 in a head.
Pseudobulbs crowded; flowers 2 in. wide,
2 to 3 in a head glabrous | (14) <i>B. subumbellatum</i> |
| Pseudobulbs distant; flowers 8 in a head,
1 in. wide, hairy purple | (15) <i>B. hispidum</i> |
| § 2. <i>Monanthea</i> . Small, often very small plants with a single small flower.
Pseudobulbs adnate to rhizome approximate.
Flowers orange.
Sepals sub-equal linear acuminate | (16) <i>B. araniferum</i> |

- Lower sepals larger than upper one.
- Leaf .25 in. long, elliptic (17) **B. catenarium**
- Leaf .5 in. long, lanceolate (18) **B. titania**
- Leaf 1 in. long, oblanceolate (19) **B. tineæ**
- Minute plant; leaf .1 in. long; flowers straw-colour (20) **B. minutulum**
- Pseudobulb 0; sepals sub-equal; leaves .5 in. apart (21) **B. dryas**
- Pseudobulbs erect conic distant.
- Sepals sub-equal caudate.
- Pseudobulbs and leaf over 1 in. long; lip short tongue-shaped (22) **B. striatellum**
- Pseudobulbs and leaf very small; lip long linear (23) **B. oreas**
- Sepals sub-equal.
- Sepals oblong blunt (24) **B. pan**
- Sepals lanceolate acute (25) **B. ceneum**
- Leaf linear (26) **B. nematocaulon**
- Sepals narrow lanceolate caudate long; leaf elliptic-lanceolate. (27) **B. longistelidium**
- Sepals unequal, lower ones longest.
- Lower sepals obovate, yellow (28) **B. vitellinum**
- Lower sepals oblong connivent, deep purple (29) **B. membranaceum**
- § 3. *Epicriantes*. Rhizome long; pseudobulbs remote. Flowers single.
- Petals of 6 or 7 clubbed threads (30) **B. epicriantes**
- § 4. *Hirtula*. Usually small plants with a few purple flowers usually pubescent in a short raceme.
- Flowers glabrous, small, 3 (31) **B. tenerum**
- Flowers hairy, few small, 2.
- Sepals sub-equal lanceolate (32) **B. hirtulum**
- Sepals unequal ovate-lanceolate (33) **B. cincinnatum**
- Flowers numerous small; pseudobulbs large ampulliform flattened (34) **B. limbatum**
- Flowers numerous large hairy, about 15 at top (35) **B. lasianthum**
- § 5. *Racemosæ*. Flowers numerous in a dense or open, raceme purple or spotted pink glabrous.
- Raceme lax; flowers rather large; lip 3-lobed (36) **B. Wrayi**
- Raceme deflexed; flowers small appressed to rachis.
- Flowers .25 in. long; lip clawed oblong ciliate (37) **B. alcicorne**
- Flowers .12 in. long; lip lanceolate cordate (38) **B. musciferum**
- § 6. *Densifloræ*. Raceme dense many-flowered; flowers pink or spotted pink.
- Peduncle 18 in. long; leaf 12 in. long (39) **B. gigas**
- Peduncle and leaf short.
- Pseudobulbs crowded.
- Flowers crowded in a small head; peduncle slender.
- Peduncle 6 in. long, spike cone-shaped (40) **B. coniferum**
- Peduncle 2.5 in. long; flowers sub-capitate, 6 (41) **B. trichoglottis**
- Flowers in a large head, .5 in. long, pubescent (42) **B. trifolium**
- Flowers in a distinct dense raceme.
- Upper sepal shorter than lower ones; flowers pink (43) **B. lilacinum**
- Upper sepal shorter than lower ones; flowers green spotted pink (44) **B. densiflorum**
- Sepals sub-equal, gibbous at base, orange (45) **B. xanthum**

Pseudobulb o.

Flowers small crowded in a small head
 deep crimson (46) **B. botryophorum**

§ 7. *Intervallatæ*. Peduncle long; raceme elongating with the opening of 1 flower at a time. Bracts stiff persistent. Flowers large.

Flowers opening wide (47) **B. stella**
 Flowers cleistogamous not opening (48) **B. cleistogamum**

§ 8. *Oxysepalum*. Stems long pendent branched or not with pseudobulbs appressed to stem. Flowers in short racemes or solitary on short peduncle, but resembling those of *Diphyes*.

Stems slender much branched; pseudobulbs very
 small (49) **B. clandestinum**

Stems stout; pseudobulbs rather large; flowers
 showy orange (50) **B. capitatum**

§ 9. *Diphyes*. Rhizome creeping horizontal. Pseudobulbs usually distant large small or o. Racemes peduncled long or short lax. Flowers thin small pale yellow or tipped orange.

Sepals equal or nearly, acuminate caudate.

Racemes short; flowers few at the end of short
 scape.

Scape very short hidden in sheaths (51) **B. brevipes**

Scape short.

Sepals equal acute, tipped orange (52) **B. concinnum**

Sepals unequal blunt (53) **B. paullum**

Base of laterals not gibbous (54) **B. modestum**

Base gibbous (55) **B. vermiculare**

Sepals acuminate, white, lower ones slightly
 the longer, '25 in. long (56) **B. ochranthum**

Pseudobulbs flattened very short on a sub-
 erect stem; raceme obconic, very
 short (57) **B. sarcanthoides**

Raceme elongate many-flowered.

Pseudobulb o or very small.

Sepals acuminate caudate, laterals not
 gibbous (58) **B. adenopetalum**

Pseudobulbs small globose.

Lateral sepals gibbous.

Leaf linear, 4 by '5 in.; flowers 15 (59) **B. leptosepalum**

Leaf oblanceolate, 6 to 8 in. by '75 in.;
 flowers very numerous (60) **B. montigenum**

Sepals not acuminate-caudate laterals not
 gibbous.

Pseudobulbs very small globose; raceme
 very long (61) **B. odoratum**

Lateral sepals gibbous.

Leaf linear (62) **B. linearifolium**

Leaf oblanceolate.

Scape shorter than leaf (63) **B. apodum**

Scape longer than leaf, tall, 7 in. long
 with a sheath half-way (64) **B. selangorense**

Scape 2 in. tall; leaves 1 in. long,
 fleshy elliptic (65) **B. viridescens**

Pseudobulbs large conspicuous crowded.

Pseudobulbs globose or ovoid; raceme 1 to
 2 in. long (66) **B. globulus**

Pseudobulbs cylindric small; raceme 8 in.
 long; sepals gibbous (67) **B. arachnites**

- Pseudobulbs oblong conic distant; raceme
6 in. long; flowers tipped orange . (68) **B. flammuliferum**
- § 10. *Cirrhopetalum*. Lower sepals much longer usually differing in
shape from upper one.
- Flower 1 large.
- Lower sepals long-caudate (69) **B. fascinator**
Lower sepals not caudate.
- Lower sepals broad shortly subulate, pink . (70) **B. Blumei**
Lower sepals oblong blunt or sub-acute.
- Lip large hairy; petals as long as upper sepal (71) **B. breviscapum**
Lip small; petals very small (72) **B. restrepia**
- Flowers few in a short terminal raceme sub-whorled.
- Pseudobulbs elliptic lying flat on the rhizome
and adnate to it (73) **B. planibulbe**
- Flowers capitate very numerous.
- Head large, 1½ in. through; flowers 6 in. long,
white spotted pink (74) **B. medusæ**
Head small, flowers 1½ in. long, yellow (75) **B. vaginatum**
- Flowers in a distinct whorl.
- Lateral sepals long caudate filiform at tip . (76) **B. psittacoides**
Lateral sepals flat to the end.
- Sepals and petals glabrous.
- Flowers 5 in a whorl, lateral sepals ¾ in.
long, free (77) **B. rhizophoreti**
- Flowers 10 in a whorl, upper sepal and
petals connate half-way (78) **B. punctatissimum**
- Lateral sepals connate half-way, ¾ in.
long (79) **B. perakense**
- Lateral sepals connate at tip only.
- Leaf 6 in. long; flowers white spotted
pink (80) **B. rupicolum**
- Leaf 1 to 2 in. long; sepals orange-
red; petals purple (81) **B. Skeatianum**
Lateral sepals quite free, yellow (82) **B. purpurascens**
- Upper sepal and petals hairy.
- Lower sepals free.
- Lower sepals base broad then narrow,
then dilate, tip acute (83) **B. Annandalei**
Lower sepals linear-oblong acute, pink . (84) **B. campanulatum**
Lower sepals narrow long-acuminate,
reddish-yellow (85) **B. acuminatum**
Lower sepals very narrow linear, pink . (86) **B. microbulbon**
Lateral sepals connate half-way, tips
free acuminate (87) **B. semibifidum**
- Lateral sepals connate altogether.
- Lateral sepals very narrow linear,
yellow, tips not free (88) **B. Makoyanum**
Lateral sepals linear acuminate pale
red, tips free setaceous (89) **B. stenophyllum**
- Lateral sepals oblong blunt, ¾ in. long.
- Scape 2 to 4 in. long, flesh pink
spotted or crimson purple (90) **B. pulchellum**
Scape 8 in. long, flesh pink spotted . (91) **B. Griffithianum**
Lateral sepals oblong-lanceolate, 1 in.
long, orange ochre (92) **B. ochraceum**
- § 11. *Pahudia*. Flowers very large in a large whorl. Sepals equal or
nearly so, long acuminate or caudate.
- Sepals long acuminate, 6 in. long (93) **B. maximum**

(1) **B. patens** Hook. fil. *F.B.I.* vi. 187; *Ridl. Mat.* i. 62.

Rhizome stout with numerous dense roots at the pseudobulbs; pseudobulbs conic, 1 in. long, 1 in. apart. Leaf elliptic, 3 to 7 in. long, .5 to 1 in. wide; petiole .5 to 1 in. long. Flower 1; peduncle slender, 1.5 in. long, yellowish closely red-spotted, 1 in. wide, clove-scented. Sepals lanceolate acute, laterals falcate. Petals as long narrower. Lip stipitate on free part of column foot, linear-oblong flat, half as long as sepal, crimson. *Hab.* On trees, not rare. Singapore, Changi; Bukit Timah. Johor, Tana Runto. Negri Sembilan, Port Dickson (Williams). Dindings (Curtis). Perak (Kunstler). Penang, Spout (Curtis). *Distrib.* Java.

(2) **B. megalanthum** Griff. *Notulæ*, iii. 286; *l.c. Pl. As. t.* 292.

Rhizome stout; pseudobulbs small distant. Leaf oblong emarginate petioled, 3 in. long, 1 in. wide. Flower 1, dusky with purple spots. Sepals linear acuminate, upper one 2.5 in. long; laterals scythe-like crossed over the lip. Petals lanceolate long acuminate, rather shorter. Lip long narrow slender, 3-lobed, lobes short acute; midlobe long acuminate. Fruit club-shaped, 2 in. long. *Hab.* Malacca, on Pulau Besar (Griffith).

This plant has not been seen again since Griffith published the description and figure. I failed to find it on Pulau Besar, and no specimen exists.

(3) **B. pileatum** Lindl. *Bot. Reg.* 1844; *Misc.* 73; *Ridl. Mat.* i. 63.

Rhizome rather slender; pseudobulbs 1.5 in. apart, cylindrical narrow, .5 to 1.5 in. long. Leaf thinly coriaceous lanceolate blunt, 4 to 6 in. long, 1 to 2 in. wide; petiole .25 to .5 in. long. Peduncle very short; pedicel slender, 2 in. long. Flower 1 to 1.25 in. wide, yellow. Sepals lanceolate-oblong blunt similar. Petals narrower oblong blunt. Lip half as long as sepals, flat, base round broad tapering to a blunt point, base grooved, yellow with red spots on each side. Column unusually long green, arms 0; anther conic. *Hab.* Climbing on small trees in forests, Singapore, Selitar. Johor, Panchur. Perak, Waterfall Hill (Wray). Penang Hill, Penara Bukit. *Distrib.* Sumatra.

(4) **B. macranthum** Lindl. *Bot. Reg.* 1844, t. 13; *Ridl. Ann. Bot.* iv. 328, pl. xxii.; *Mat.* i. 63; *Bot. Mag. t.* 7208.

Rhizome stout crinite with many roots, .25 in. thick, woody; pseudobulbs 1 in. apart, oblong wrinkled, 1 in. long. Leaf elliptic blunt, 5 to 8 in. long, 1.75 to 3 in. wide; petiole stout, 1 in. long. Flower 2 in. wide, clove-scented; peduncle short; pedicel 2 in. long. Upper sepal lanceolate acute, white spotted purple, laterals larger semi-ovate acuminate connivent, base yellow spotted crimson, tip dark brown. Petals like upper sepal but narrower. Lip .25 in. long, base quadrate with 2 truncate ears; tip acute decurved yellow tinted red. Column yellow, arms porrect tooth-like; anther conic, deep red. *Hab.* Common on tree-trunks climbing upwards.

Singapore, Jurong. Pahang, Pekan. Malacca, Pulau Besar. Sungei Ujong, Port Dickson (Williams). Perak, Sonkai (Snow). Pulau Adang. Lankawi, Burau Bay. *Distrib.* Tenasserim, Sumatra, Borneo.



FIG. 164.—*Bulbophyllum longiflorum*.

(5) *B. galbinum* Ridl. *Journ. Linn. Soc.* xxxii. 267; *Mat.* i. 64; *Bot. Mag.* t. 8216.

Rhizome long creeping; pseudobulbs 1 to 3 in. apart, cylindrical, 3 in. long, .25 in. thick. Leaf elliptic acute, thinly coriaceous, 6 in. long, 1.5 in. wide; petiole 1 in. long. Flowers 1 or 2 on slender 3 in. peduncles. Bracts ovate acute, .25 in. long. Pedicel and ovary 3 in. long. Upper sepal lanceolate acuminate acute,

1.5 in. long, laterals as long, ovate acuminate. Petals nearly 1 in. long, ovate, acuminate, all olive yellow. Lip stipitate cordate acuminate, fleshy, tip recurved, crimson, beneath whitish. Column broad; arms short blunt. *Hab.* Hill forests on trees, Pahang, Gunong Tahan, Selangor, Sempang Mines, Semangkok; Gunong Mengkuang Lebah (Robinson); Bukit Hitam (Kelsall). Perak Thaiping Hills (Kunstler).

(6) **B. polystictum** *Ridl. Journ. F.M.S. Mus. iv. 65.*

Rhizome long rather stout; pseudobulbs distant cylindrical, 3 in. long. Leaf elliptic-oblong petiolate, base narrowed, 8 to 12 in. long, 2.5 in. wide. Peduncle 4 to 6 in. long, 3 or 4 oblong cuspidate sheaths at base. Flowers solitary. Upper sepal 3 in. long, .5 in. wide, lanceolate acuminate, back yellow thickly spotted, red, edges maroon red, front pale ochre yellow, laterals 2.25 in. long, 1 in. wide at base, lanceolate acuminate, greenish on back spotted black, red at tip, in front reddish dotted black. Lip ovate-cordate, lobes round, tip acuminate fleshy curved pinkish, orange spot at base, beneath pinkish spotted purple, black at tip. Column 1 ft. long, orange red spots, arms obscure orange. *Hab.* Rare, in forests on tree-trunks. Pahang, Telom near Gunong Berumbun (Ridley).

(7) **B. variabile** *Ridl. Journ. Roy. As. Soc. S. Br. 39, p. 74.*

Rhizome stout woody; pseudobulbs cylindrical curved, 3 in. long. Leaf elliptic-ovate acute, 6 in. long, 2 to 3 in. wide; petiole 1 in. long. Peduncle red, .4 in. long, sheaths spotted red. Bracts large, lanceolate acute spotted red. Flowers 1 or 2 showy, 3 in. wide. Upper sepal lanceolate acute, laterals falcate. Petals lanceolate yellow with lines of red dots. Lip tongue-shaped recurved base broader, tip blunt yellow spotted red. Column short foot free twice as long, arms short round. *Hab.* Hill forests. Perak, Thaiping Hills (Curtis); Gunong Batu Putih (Wray).

var. *rubrum*. Sepals and petals crimson spotted red at base. Lip dark crimson. Column yellow spotted red. Both forms grow together.

(8) **B. longiflorum** *Ridl. Journ. Linn. Soc. xxxii. 368; Mat. i. 66. (Fig. 164, p. 58.)*

Rhizome woody long; pseudobulbs cylindrical thick, 2 in. apart, 1.25 to 1.5 in. long. Leaf lanceolate, obovate or elliptic acute, 6 to 7 in. long, 2 to 2.5 in. wide; petiole 1 in. long. Peduncle 1 in. long; pedicel 1.5 in. long. Bract long. Flower pink with darker veins. Sepals lanceolate acuminate, 2 in. long, laterals wider. Petals longer, 2.5 in. long, linear-lanceolate. Lip .25 in. long, thick, curved, shortly stipitate, tip papillose, pale orange. Column greenish, foot long, crimson, arms long porrect sub-terete. *Hab.* Perak, Hermitage Hill (Cock). Penang Hill (Curtis). Kedah Peak.

(9) **B. membranifolium** *Hook. fil. F.B.I. v. 706; Ridl. Mat. i. 65.* *B. sanguineo-maculatum* *Ridl. Journ. Linn. Soc. xxxii. 265.*

Rhizome slender; pseudobulbs sub-cylindric narrow, 1 to 1.5 in. long, distant. Leaf 6 to 10 in. long, elliptic-lanceolate membranous. Peduncle stout, 2 in. long. Flower 1.5 in. across. Sepals ovate-oblong or lanceolate blunt, laterals deflexed. Petals smaller ovate-lanceolate, all green spotted red. Lip small stipitate tongue-shaped, tip decurved verrucose. Column arms bifid, the lower lobes longer, deflexed. Capsule 1.5 in. long, green spotted purple. *Hab.* On trees. Selangor, Kwala Lumpur (Curtis). Perak, Gunong Batu Putih (Wray).

(10) **B. siamense** *Rchb. fil. Gard. Chron. 1867, p. 372.* *B. Lobbii* *Lindl. Ridl. Mat. i. 64; Saunders Refug. Bot. t. 116.*

Rhizome stout; pseudobulbs crowded ovoid. Leaf linear-oblong acute, 4 to 8 in. long, 1 in. wide; petiole .5 in. long or less. Flower wide open, ochre-yellow veined red. Upper sepal lanceolate acute, laterals deflexed falcate broader, 2 in. long. Petals lanceolate. Lip broad ovate recurved often speckled red. Column broad, arms obscure. *Hab.* Rare. Perak, Thaiping Hills (Stephens). *Distrib.* Tenasserim, Siam.

(11) **B. rugosum** *Ridl. Journ. Linn. Soc. xxxi. 266; Mat. i. 65.*

Rhizome slender branched; pseudobulbs numerous crowded cylindric, 2 in. long, .5 in. through. Leaf oblanceolate acute, 6 in. long, 1.5 in. wide. Peduncle .5 in. long; pedicel and ovary 1 in. long. Flower .5 in. across, hardly expanding. Sepals lanceolate acute, pale yellow with many longitudinal grooves 1 in. long. Petals shorter, yellowish white. Lip fleshy oblong, tip decurved, base excavate, reddish pink, .25 in. long. Column arms long decurved blunt. *Hab.* On trees in woods, Singapore, Chan Chu Kang (Ridley).

(12) **B. pustulatum** *Ridl. Journ. Roy. As. Soc. S. Br. 39, p. 74; Mat. i. 65.*

Stem stout; pseudobulbs crowded oblong conic, .5 in. long. Lip elliptic-lanceolate acute, 4 in. long, 1 in. wide; petiole .5 in. long. Flower 1 in. wide; pedicel slender, .5 in. long. Upper sepal lanceolate acute, laterals much wider ovate blunt. Petals lanceolate acute, nearly as large as upper sepal, yellow with red stripes. Lip fleshy ovate-cordate, .25 in. long, dark maroon, 2 raised rounded lobes at base and mass of papillæ on disc. Column foot long, tip free, arms triangular blunt. *Hab.* Very rare. Climbing on trees in forest, Malacca, base of Mt. Ophir (Ridley).

(13) **B. microglossum** *Ridl. Journ. Linn. Soc. xxxviii. 325.*

Stem slender, long creeping; pseudobulbs conic, .5 in. long, .25 in. thick. Leaf elliptic blunt, 1.75 in. long, .5 in. wide. Peduncle 1.75 in. long. Upper sepal elliptic hooded, laterals ovate-

lanceolate falcate blunt, .5 in. long. Petals broad oblong-lanceolate blunt nearly as large, all dull yellow lined and spotted red. Lip very small, pink fleshy, base broadly emarginate, sides compressed, tip decurved, hardly .25 in. long. Column foot long, free, sides winged, arms obscure. *Hab.* Pahang, Gunong Tahan at 4000 to 5000 ft. altitude (Robinson).

(14) **B. subumbellatum** *Ridl. Journ. Linn. Soc.* xxxi. 274; *Mat.* i. 66.

Rhizome slender; pseudobulbs crowded or up to 5 in. apart cylindrical, 2 in. long. Leaf lanceolate acute, 5 to 6 in. long, 1.25 in. wide. Peduncle 4 in. long, with 4 or 5 ovate cuspidate sheaths. Flowers 2 or 3, 2 in. long in a very short raceme; pedicels .75 in. long. Bracts .25 in. long. Upper sepal ovate acute, 1 in. long, .36 in. wide, laterals twisted. Petals much smaller, broad ovate. All greenish yellow spotted red. Lip stipitate tongue-shaped acute curved, .5 in. long. Column foot long, slender, arms very short. *Hab.* Johor, Hulu Batu Pahat (Kelsall); Tanjong Kupang (Ridley). *Distrib.* Borneo.

(15) **B. hispidum** *Ridl. Journ. Linn. Soc.* xxxii. 268; *Mat.* i. 67.

Rhizome stout long; pseudobulbs 3 in. apart, conic 1 in. long. Leaf lanceolate blunt, 3 to 6 in. long, 2 in. wide; petiole 1 in. long. Peduncle .5 in. long. Flowers 8, in a dense raceme .5 in. long; with rachis thickened; 1 in. across, deep red fœtid. Sepals ovate sub-acute hairy on edge, laterals connate. Petals lanceolate falcate, edge hairy. Lip thick not stipitate, with a short, thick claw, blade deflexed, broad blunt tongue-shaped, warty with 2 hooked processes near base and 2 keels red. Column rather long, foot short, arms short erect, pale red-spotted. Anther conic yellow. *Hab.* Rare. Kedah Peak at 4000 ft. altitude (Ridley). —

(16) **B. araniferum** *Ridl. Journ. F.M.S. Mus.* v. 47.

Rhizome long creeping, almost covered with adnate pseudobulbs, oblong horizontally appressed, tips only upcurved, .5 in. long. Leaf elliptic-lanceolate acute petioled, 1.5 in. long, .25 in. wide. Scape slender, 2.5 in. long, with a lanceolate acuminate sheathing bract. Pedicel and ovary .75 in. long. Sepals subequal very narrow linear acuminate caudate, 1.25 in. long. Petals linear blunt, shorter. Lip tongue-shaped acuminate blunt, orange colour, base cordate, lip curved, a groove in centre. Column arms subulate. *Hab.* Very rare, Selangor, Gunong Mengkuang Lebah (Robinson).

(17) **B. catenarium** *Ridl. Trans. Linn. Soc.* ii. 235.

Rhizome filiform; pseudobulbs appressed tips upcurved. Leaf .25 in. long, elliptic blunt. Scape filiform, 1 in. long. Pedicel 1 in. long. Flower .25 in. wide, orange. Upper sepal lanceolate blunt, laterals longer and broader streaked red. Petals one-third of their length, one red streak, lanceolate. Lip ovate acute, papil-

lose dark red. Column arms erect acute. Capsule elliptic. *Hab.* Singapore, on mangroves, Kranji; Chan Chu Kang. Selangor, Bukit Hitam (Kelsall). Pahang, Kluang Terbang (Barnes); Perak, Thaiping Hills (Curtis). *Distrib.* Borneo.

(18) **B. titania** *Ridl. Journ. Linn. Soc.* xxxviii. 325.

Rhizome long; pseudobulbs closely appressed to it, oblong, tips curved up, nearly .5 in. long. Leaf lanceolate, .5 in. long, .12 in. wide, base narrowed. Peduncle capillary 1.5 in. long. Bract funnel-shaped, .12 in. long. Sepals lanceolate, .18 in. long, laterals wider. Petals minute one-quarter length of sepal lanceolate, all orange. Lip tongue-shaped, deep orange, bent in middle, three-quarters length of sepal. Column thick, arms setaceous long. *Hab.* Pahang, Gunong Tahan, in moss (Robinson).

(19) **B. tineia** *Ridl. Journ. F.M.S. Mus.* iv. 66.

Rhizome filiform; pseudobulbs prostrate, tips ascending .12 in. long and as distant. Leaf oblanceolate spatulate, blunt, 1 in. long, .12 in. wide. Peduncle filiform, 3 in. long. Flower .5 in. wide, orange-yellow streaked darker. Upper sepal lanceolate, laterals semi-ovate blunt broader. Petals very small, yellow, midrib green. Lip fleshy blunt oblong flat, reddish purple. Arms of column subulate. *Hab.* Rare. Pahang, Gunong Berumbun, Telom at 6000 ft. altitude (Ridley).

(20) **B. minutulum** *Ridl.*

Rhizome short, slender, covered with the prostrate elliptic-oblong pseudobulbs, .05 in. long. Leaves elliptic acute, .1 in. long, coriaceous. Scape filiform, .3 in. long. Bract cupular truncate minute. Flower .1 in. long, very pale-straw colour almost white. Sepals broad lanceolate-ovate acute equal. Petal obovate, much shorter. Lip ovate tongue-shaped blunt straw colour with a touch of pink beneath. Column short, arms slender horn-shaped longer than the anther. *Hab.* Mountains, rare, Pahang, Fraser Hill on a bank (Burkill and Holtum).

The most minute species I have seen.

(21) **B. dryas** *Ridl. Journ. F.M.S. Mus.* vi. 175.

Rhizome very long and slender, no pseudobulbs. Leaves .5 in. apart, ovate fleshy reddish covered with short black hairs, .25 in. long, .18 in. wide. Peduncle filiform, 1 in. long. Bract cup-shaped amplexicaul. Pedicel .12 in. long. Sepals elliptic-ovate blunt, .25 in. long, primrose yellow. Petals half as long, paler. Lip oblong-ovate, blunt flat dull red, edges paler, 2 low keels in centre. Column arms broad round, short. *Hab.* Rare, Pahang, Gunong Tahan (Ridley).

(22) **B. striatellum** *Ridl. Ann. Bot.* iv. 335; *Mat.* i. 67.

Rhizome filiform; pseudobulbs conic curved, .5 in. long and as distant. Leaf lanceolate acute, 2 in. long, .5 in. wide. Scape filiform, little more than .5 in. long. Flower nodding yellow;

pedicel 1 in. long. Sepals oblong or oblong-lanceolate caudate with 3 red veins .5 in. long. Petals ovate-oblong round, tip spotted red, 2 red spots at base. Column arms short, blunt. *Hab.* Local. Singapore, on mangroves, Kranji; Chan Chu Kang (Ridley).

(23) **B. oreas** *Ridl.*

Rhizomes filiform forming a mat; pseudobulbs .25 in. apart, conic, base flattened, .1 in. long. Leaf lanceolate sub-acute, .2 in. long, .08 in. wide. Peduncles filiform, .5 in. long. Bract funnel-shaped with setaceous point at one side. Flower solitary. Pedicel and ovary .1 in. long. Sepals lanceolate caudate, bases broad, .1 in. long. Petals oblong-ovate, little longer than the column. Lip lanceolate, base broad, sides involute, tip elongate linear, .06 in. long. Column short and thick, arms ovate oblique, broad with 2 points. Anther semi-globose. *Hab.* Mountains. Pahang, Gunong Tahan at 5500 to 7000 ft. altitude (Haniff).

(24) **B. pan** *Ridl. Journ. F.M.S. Mus.* vi. 176.

Rhizome short white corky; pseudobulbs conic purplish, .5 in. long. Leaf 1.5 to 2 in. long, .25 in. wide, oblanceolate acute, petioled. Peduncle filiform, 3 in. long, red. Sepals oblong obtuse, .5 in. long, red with darker stripes. Petals one-quarter of the length oblong, edges toothed, tipped black. Lip short broad, flat blunt tongue-shaped grooved down centre, deep purple, base greenish. Column whitish stout, arms long, slender, curved. *Hab.* On trees in dense woods, mountains, Pahang, Gunong Tahan at 5500 ft. altitude (Ridley).

(25) **B. cœneum** *Burkill MSS.*

Rhizome very slender; pseudobulbs .25 in. apart, conic curved, .25 in. long. Leaf linear narrowed at base, .75 in. long, .08 in. wide. Scape filiform, 2 in. long. Bract funnel-shaped with an acute point. Pedicel .1 in. long. Flower solitary, purple. Sepals lanceolate acute, .15 in. long. Lip oblong blunt dark purple, three-quarters the length of the sepals. *Hab.* Mountains at 4000 to 4370 ft. altitude, rare. Pahang, Fraser Hill (Sempang) (Burkill and Holttum).

Closely allied to *B. pan* *Ridl.*, but leaves and flower very much smaller. I have only seen one flower, which was too much crushed to see the column and petals.

(26) **B. nematocaulon** *Ridl.*

Rhizomes filiform long; pseudobulbs .25 in. apart, oblong curved, .15 in. long. Leaf elliptic-lanceolate, .24 in. long, .08 in. wide. Peduncle slender, .5 in. long, with a funnel-shaped bract below the pedicel. Flower .25 in. wide. Sepals lanceolate acute sub-equal. Petals white, half as long lanceolate, tip rounded, base narrowed, acute. Lip shorter than sepals entire lanceolate with a very short claw. Column broad, arms short broad bifid erect blunt. *Hab.* Perak (Scortechini). Pahang, Fraser Hill (Burkill and Holttum).

(27) **B. longistelidium** *Ridl.*

Rhizome woody, 0.25 in. thick, covered with roots; pseudobulbs .25 in. apart, conic curved, .25 in. long. Leaf linear-oblong blunt narrowed to base, 1.25 in. long, .25 in. wide. Scapes slender 1 to 1.1 in. long. Flower solitary. Sepals linear acuminate elongate, tips setaceous, 1.3 in. long, .1 in. wide at base, base gibbous equal orange. Petals small rounded truncate orange with claret spots at tips. Lip claw long curved, limb .1 in. long, fleshy ovate tongue-shaped dark claret pink. Columns short, arms long filiform, from a broad base. Anther broad. Pollinia large flat sub-oblong orbicular. *Hab.* Pahang, Fraser Hill at 4000 to 4370 ft. altitude (Burkill and Holttum).

(28) **B. vitellinum** *Ridl. Journ. Linn. Soc. xxxii. 271. B. truncicola Schlechter in Fedde, Repert. Bot. Beih. i. 745.*

Rhizome slender; pseudobulbs 1 in. long, conic 4-angled, .75 in. apart. Leaf 1.5 in. long, .5 in. wide, lanceolate blunt. Peduncle filiform, .5 in. long. Flower hardly .25 in. wide. Upper sepals oblong-ovate rounded yellow with 3 crimson lines with or without black dots on the upper edge, laterals lanceolate-ovate, yellow, outer half with red lines or not. Petals half as long as sepals, obovate-oblong blunt, orange with 4 glandular black spots on edge, minutely ciliate. Lip as long as sepal oblong blunt, base excavate, channelled. Column arms linear blunt erect. Capsule fusiform, .5 in. long. *Hab.* Penang on tree trunks, West Hill. *Distrib.* Borneo.

Originally found by me on a tree in Dr. Rauch's garden, Singapore, with *B. epicriantes* and *Dendrocolla fulgens*, but probably planted there.

(29) **B. membranaceum** *T. and B. Nat. Tijdsch. Ned. Ind. iii. 397; J. J. Smith Orch. v. Java 465, pl. cclvi. B. avicella Ridl. Journ. Linn. Soc. xxxii. 270; Mat. i. 67.*

Rhizome long slender; pseudobulbs 1 in. apart, obpyriform, .5 in. long. Leaf .75 in. long, .4 in. wide, ovate sub-acute, coriaceous. Peduncle .25 in. long, Flower reversed. Bract very small, cup-shaped. Upper sepal lanceolate acute, .25 in. long, green, laterals much longer connivent into a boat-shape deep crimson. Petals minute cuneate, mucronate pale. Lip stipitate, claw erect, blade lanceolate blunt, flat narrow orange with crimson groove, purple beneath, papillose. Column pink, arms long linear, truncate bilobed, upper lobe short, lower long, curved. Capsule ovoid, .5 in. long. *Hab.* On mangrove and other trees, Singapore, Kranji; Bajau (Ridley). Negri Sembilan, Port Dickson (Williams). Penang Hill at 2000 ft. altitude. *Distrib.* Java.

(30) **B. epicriantes** *Hook. fil. F.B.I. v. 753; Ridl. Mat. i. 68.*

Rhizome moderately thick; pseudobulbs 1 in. apart, .5 in. long, fusiform. Leaf elliptic-oblong blunt or acute, 1 in. long, .5 in.

wide or more. Peduncle very short. Flower 1. Sepals ovate-lanceolate acute pink, .5 in. long. Petals reduced to 6 or 7 clubbed terete threads, base white, tip grey, less than .25 in. long. Lip elliptic-lanceolate sub-acute warded deep purple. Column stout, foot shorter pinkish, above deep purple, arms erect long acute. Anther with long upcurved beak. *Hab.* Rare. Negri Sembilan, Siliu (Williams). Perak, Tapah (Curtis); Teluk Anson (Williams). *Distrib.* Java.

(31) **B. tenerum** Ridl. *Journ. Roy. As. Soc. S. Br.* 39, p. 75; *Mat.* i. 68.

Rhizome filiform; pseudobulbs ovoid, .25 in. long, .25 in. apart. Leaf oval, .5 in. long, sessile. Peduncle red, 2 in. tall. Flowers terminal 3; pedicel .25 in. long. Upper sepal lanceolate acuminate, laterals much longer, slightly gibbous at base purple, bases green. Petals ovate-elliptic much smaller, green. Lip small recurved, acute purple. Column thick purple, foot as long, green; arms long linear acute curved. *Hab.* Rare. Lankawi (Curtis).

(32) **B. hirtulum** Ridl. *Journ. Bot.* 1900, p. 71; *Mat.* i. 68.

Rhizome slender; pseudobulbs globular crowded, hardly .25 in. long. Leaf oblong-lanceolate blunt, 1.5 in. long, .5 in. wide. Scape slender, 2 in. long. Flowers two, .25 in. long; pedicels with ovary short, red. Upper sepal ovate-lanceolate acute, laterals wider falcate pubescent white tinted purple. Petals narrow linear shorter, white with brown veins and cilia on edges. Lip tongue-shaped straight, deep red, hairy. Column short broad, green, base red, arms very short, rounded; anther hat-shaped orange. *Hab.* Rare. Penang Hill at 2000 ft. altitude (Ridley).

(33) **B. cincinnatum** Ridl. *Journ. Roy. As. Soc. S. Br.* 39, p. 75; *Mat.* i. 69.

Pseudobulb very small. Leaf elliptic blunt, 4 in. long, 2 in. wide. Peduncle very slender, 2 in. long. Flowers 2, terminal, .12 in. long. Bracts ovate. Ovary and pedicel .25 in. long. Sepals lanceolate sub-acute, sub-equal, brown hairy. Petals brown linear-oblong, falcate blunt hairy. Lip oblong blunt with long white hairs. Column short, foot as long, arms short. *Hab.* Rare. Perak, Batu Tujoh (Curtis).

(34) **B. limbatum** Lindl. *Bot. Reg.* 1840; *Misc.* 74; *Ridl. Mat.* i. 69.

Rhizome stout; pseudobulb flattened, about 1 in. long. Leaf large ovate. Peduncle stout, 4 in. long. Flowers many, distant, 25 in. long; pedicel and ovary short and thick. Sepals ovate blunt, edges ciliate dark purple. Petals spathulate villous, purple. Lip fleshy ovate blunt concave, edges scabrid, dull green tinted purple. *Hab.* Singapore (Hort. Loddiges).

Only known from a cultivated plant in Lindley's Herbarium.

(35) **B. lasianthum** Lindl. *Gard. Chron.* 1855, p. 53; *De Vriese, Ill. Orch. Nederl. Ind.* i. pl. 12, fig. 1; *Ridl. Mat.* i. 70.

Rhizome very stout woody, .25 in. thick; pseudobulbs cylindrical, 2.5 to 3 in. long, 3 in. or more apart. Leaf lanceolate acute, 9 in. long, 3 in. wide; petiole 1 in. long. Peduncle 4 to 10 in. long, base covered with red sheaths. Flowers about 15, purple, hairy, 1 in. long, foetid. Bracts lanceolate acute, .5 in. long. Ovary and pedicel .5 in. long. Upper sepal linear-oblong, laterals as long ovate concave at base. Petals lanceolate acuminate. Lip glabrous half as long lanceolate acute. Capsule cylindrical, 1.5 in. long. *Hab.* On trees and rocks. Johor, Kukub on trees (Ridley). Negri Sembilan, Silliau (Williams). Perak (Scortechini). Penang Hill and Bukit Laksamana (Curtis). *Distrib.* Sumatra.

(36) **B. Wrayi** *Hook. fil. F.B.I. v. 766; Ic. Pl. 2044; Ridl. Mat. i. 69.*

Rhizome woody, stout; pseudobulbs conic, 1 in. long, 1 in. apart. Leaf elliptic thinly coriaceous blunt, 8 in. long, 2.5 in. wide; petiole 4 in. long. Peduncle stout, 12 to 18 in. long; racemes 6 in. long. Flowers many, sub-whorled, green with pink spots, .5 to .6 in. across, or half as big. Bracts short ovate. Pedicels .25 in. long. Sepals lanceolate, laterals falcate. Petals broad oblong blunt, half as long. Lip 3-lobed, claw short narrow, side lobes round with 2 bosses between, midlobe lanceolate, base narrow. Column broad-winged, arms acute. Anther large elliptic with a long fleshy pustular conic process on top. *Hab.* Mountains at 2500 to 8000 ft. altitude, Pahang, Gunong Berumbun (Wray). Perak, Thaipung Hills (Derry).

(37) **B. alicorne** *Par. and Rchb. fil. Trans. Linn. Soc. xxx. 151; Ridl. Mat. i. 70.*

Rhizome long woody, .12 in. thick; pseudobulbs globose small, .12 in. apart. Leaf oblanceolate, blunt, fleshy, coriaceous, 3 to 4 in. long, .5 in. wide; petiole 1 in. long. Peduncle graceful, 5 in. long, pink; raceme decurved, 1 in. long. Flowers 20 crowded appressed to rachis. Bracts very small. Ovary and pedicel very short. Upper sepal nearly .25 in. long, lanceolate acute, white tipped and veined purple, laterals little longer linear oblong pink. Petals half as long ovate cuspidate toothed, white, teeth and nerves purple. Lip short-clawed, blade straight oblong blunt, edge ciliate yellowish, claw pink. Column white, foot shorter, arms bifid, lobes linear-oblong 2-toothed. Capsule elliptic, .36 in. long. *Hab.* Penang Hill at 2400 to 3000 ft. altitude (Fox and Curtis). *Distrib.* Tenasserim.

(38) **B. musciferum** *Ridl. Journ. F.M.S. Mus. vi. 176.*

Rhizome 2 in. long; pseudobulbs oblong-conic, .5 in. long, approximate. Leaf oblanceolate to linear-lanceolate, sub-acute or blunt, 2 to 5 in. long, .25 to .5 in. wide; petiole .25 to .5 in. long; peduncle slender, 1 ft. long; raceme deflexed, 1 in. long, densely flowered. Bracts triangular-lanceolate or ovate acuminate, longer

than the very short ovary. Flowers $\cdot 12$ in. long. Upper sepal lanceolate cuspidate, hairy, purple with darker stripes and specks, lower sepals deflexed, slightly oblique, inner edge whitish, outer red purple. Petals half as long, lanceolate white, edge denticulate, a tuft of black hairs on tip. Lip lanceolate cordate with central groove, fleshy yellow, claw and column-foot purple. Column arms oblong bifid. *Hab.* Rare. Pahang, Gunong Tahan, in forest up to 7000 ft. altitude (Ridley).

(39) **B. gigas** *Ridl. Journ. Linn. Soc.* xxxii. 277; *Mat.* i. 70.

Rhizome long, woody, thick; pseudobulbs cylindric, $\cdot 5$ to $\cdot 75$ in. long, $\cdot 6$ in. apart. Leaf obovate-oblanccolate, 1 ft. long, 6 in. wide; petiole 6 in. long. Peduncle stout, 18 in. tall; sheaths 4 in. long, raceme nodding, many flowered, 5 in. long. Flowers $\cdot 5$ in. long, white spotted pink. Bracts ovate, $\cdot 5$ to $\cdot 75$ in. long. Sepals lanceolate acute, laterals gibbous at base, petals linear narrower. Lip sessile shorter than column hastate blunt curved with two parallel keels, orange. Column thick white, three purple spots, foot short orange, arms bifid. Capsule 1.5 in. long, pear-shaped. *Hab.* Mountain forest on rocks and trees, Pahang Telom. Perak, Thaping Hills (Ridley).

(40) **B. coniferum** *Ridl. Journ. F.M.S. Mus.* iv. 67.

Rhizome short, thick; pseudobulbs $\cdot 5$ in. long, cylindric crowded. Leaf very coriaceous spatulate, blunt petioled, 6 in. long, 1.25 to 1.5 in. wide. Peduncle purple, 6 in. long. Flowers in a dense cone-shaped spike. Bracts ovate acute much longer than ovary, cuspidate purple. Ovary sunk in thickened rachis. Upper sepal lanceolate green striped and tipped purple, $\cdot 05$ in. long, lower sepals connate in an ovate organ, blunt, as long, green edged purple, all pubescent. Petals linear-lanceolate, green pubescent half the length of the sepals. Lip shorter, ovate flat, base truncate retuse, tip round, green. Column very small; arms ovate blunt. Anther transversely oblong, edge in front emarginate nearly as big as lip. *Hab.* Rare, Pahang, Telom (Ridley).

(41) **B. trichoglottis** *Ridl. Journ. F.M.S. Mus.* iv. 66.

Rhizome short; pseudobulbs crowded, $\cdot 5$ in. long, cylindric. Leaf elliptic, blunt, base narrowed, 6 in. long, 2.5 in. wide, subsessile. Peduncle very slender, 2.5 in. long. Flowers 6, subcapitate, $\cdot 33$ in. wide. Bracts ovate acute. Pedicel and ovary $\cdot 06$ in. long, pink. Sepals sub-equal, lanceolate acute, upper one gibbous on back, edges ciliate yellowish reticulate purple, laterals more ovate connate at base. Petals more than half as long linear-oblong, yellowish, edges and lines purple, long ciliate. Lip shorter than sepals, flat, tongue-shaped blunt pustular, base retuse with two long points, deep crimson, edge ciliate, claw thick channelled. Column-arms green of 2 short acute lobes. *Hab.* Rare, Pahang, Telom (Ridley).

(42) **B. trifolium** *Ridl. Journ. Linn. Soc.* xxxii. 278; *Mat.* i. 71.

Rhizome thick; pseudobulbs conoid-ovoid, .25 in. long. Leaf lanceolate acute, 6 in. long, 1 in. wide. Peduncle 1 in. long. Raceme .5 in. long, sub-capitate; flowers numerous, .25 in. long, pink, pubescent. Bracts lanceolate acute, pubescent. Upper sepal lanceolate acute, white striped pink, laterals longer oblique acuminate. Petals shorter linear blunt. Lip claw short, limb tongue-shaped, blunt warty, white pink spotted, central groove crimson. Column green, short, a large white tooth on inner face, foot long straight, arms long truncate oblong. *Hab.* Local, Singapore, Sungei Morai. Johor, Tana Runto. Pahang, Pekan (Ridley).

(43) **B. lilacinum** *Ridl. Journ. Linn. Soc.* xxxii. 276; *Mat.* i. 71; *Bot. Mag. t.* 8723.

Rhizome stout, woody; pseudobulbs thick conic, 1.5 in. long, 1 in. through at base; petiole .25 in. long. Leaf oblong-lanceolate, blunt, 6 in. long, 1 in. wide. Petiole .25 in. long. Peduncle 4 in. long, including the dense raceme 3 in. long. Upper sepal lanceolate acute, laterals longer, lilac spotted pink. Petals much shorter. Lip claw stout, limb lanceolate blunt flat. Column as long as foot; arms lanceolate acute. *Hab.* Kedah Peak (Ridley). Lankawi, Niur Stali (Curtis). *Distrib.* South Siam.

(44) **B. densiflorum** *Ridl. Journ. Linn. Soc.* xxxii. 277; *Mat.* i. 71.

Rhizome very long woody; pseudobulbs narrow oblong cylindrical, 1 to 2 in. long, .25 in. through, 6 in. apart. Leaf lanceolate acuminate acute, 1 ft. long, 1.25 in. wide; petiole 1 in. long. Raceme dense pendulous, 2 in. long. Peduncle 1.5 in. long. Flowers .5 in. long; bracts nearly as long lanceolate. Upper sepal ovate-lanceolate mucronate, laterals longer acuminate acute, purplish green with darker spots. Petals lanceolate mucronate shorter. Lip tongue-shaped decurved purple. Column nearly globose, white purple spotted, foot free at tip; arms triangular acute. Capsule pear-shaped, 1.5 in. long. *Hab.* On trees in forests, Singapore, Chan Chu Kang; Kranji; Bukit Timah (Ridley).

(45) **B. xanthum** *Ridl.*

Rhizome long; pseudobulbs distant conic, .75 in. long, with thick tufts of roots below each. Leaf stiffly coriaceous lanceolate-oblong, 7 in. long, 1 in. wide. Raceme 4 in. long, many-flowered. Bracts .1 in. long, lanceolate. Flowers .25 in. across, orange and yellow. Upper sepal lanceolate acuminate, laterals broad and gibbous at base, sub-equal. Petals half as long. Lip as long as sepals entire, base shortly narrowed, sides at base elevate, limb curved, fleshy linear. Column foot long, arms simple erect. *Hab.* On rocks at 800 ft. altitude. Lankawi islands, Dayong Bunting (Robinson).

Habit of *B. lilacinum*, but flowers orange, no distinct lobes to lip and sepals sub-equal.

(46) **B. botryophorum** *Ridl. Journ. Linn. Soc.* xxxii. 275; *Mat.* i. 71.

Rhizome long slender; pseudobulbs 0. Leaves .5 in. apart lying flat on rhizome, elliptic fleshy, 1 in. long, .5 in. wide. Racemes pendulous, 1 in. long; flowers densely crowded, .12 in. across, deep purple. Bracts ovate minute. Upper sepal lanceolate acuminate pale with three pink streaks, laterals semi-ovate falcate crimson. Petals quadrate truncate, white, edge crimson. Lip fleshy, claw oblong, limb ovate-elliptic blunt, decurved papillose, a semi-circular ridge at base. Column large, arms round truncate crimson. Anther helmet-shaped pustular. Capsule sessile elliptic-oblong, .5 in. long. *Hab.* On mangrove and other trees, Singapore, Kranji; Toas. Pahang, Pekan (Ridley).

(47) **B. stella** *Ridl. Journ. Linn. Soc.* xxxi. 297; *Mat.* i. 72. *B. vanessa* *King, Journ. As. Soc. Beng.* lxvi. ii. 587.

Pseudobulbs crowded ovoid, .75 in. long. Leaves lanceolate blunt thick, 6 in. long, 1.5 in. wide. Peduncle 18 in. long. Raceme short gradually lengthening, about 80-flowered; rachis thickened. Bracts ovate persistent, .12 in. long. Ovary and pedicel .5 in. long. Flowers opening widely, singly, 2.5 in. across. Sepals lanceolate acuminate, yellow streaked red. Petals .12 in. long. Lip oblong-lanceolate acuminate, 1.5 in. long, dark pink, 2 keels from base. Column green short, foot as long, arms round short. *Hab.* On trees, not rare. Singapore, Bukit Mandai; Jurong. Perak (Scortechini); Batang Padang (Ayre), Kedah Peak (Ridley).

(48) **B. cleistogamum** *Ridl. l.c.*

Pseudobulbs densely crowded, conic, .75 in. long. Leaf oblong or oblanceolate, 4 to 6 in. long, .75 to 1 in. wide; petiole .5 in. long. Peduncle 1 ft. long. Raceme short, flat. Bracts ovate acute, .25 in. long. Flowers not or rarely opening. Sepals lanceolate acuminate pale yellow, laterals gibbous at base, red inside. Petals minute quadrate, toothed with a long cusp, green. Lip long curved acute, side-lobes short falcate, midlobe long narrow acuminate, keels 2 approximate, base crimson, tip straw-colour. Column with erect subulate arms, foot very short, no rostellum. *Hab.* Rare, Perak, Waterloo (Curtis). *Distrib.* Rhio, Borneo.

(49) **B. clandestinum** *Lindl. Bot. Reg.* xxvii. 1841; *Misc.* 166; *Ridl. Mat.* i. 72. *B. trisetosum* *Griff. Notulæ*, iii. 23; *l.c. Pl. As. t.* 293. *Oxysepala ovalifolia* *Wight Ic.* 1734.

Stems many-tufted branched, slender, 6 to 12 in. long, pendulous; pseudobulbs .25 in. apart, on stems oval, .12 in. long. Leaf elliptic-oblong, .5 in. long, .25 in. wide, blunt. Flowers 1 or 2 in axils of sheaths on very short pedicels, yellowish-white, .12 in. long. Sepals lanceolate caudate. Petals much shorter, ovate blunt. Lip as long as petals ovate entire. Column short, arms very short blunt. *Hab.* Common on orchard and wayside trees, Singapore, Kranji, etc., Johor, Kota Tinggi. Pahang, Tahan River. Malacca

(Griffith); Batu Berendam (Derry). Perak (Scortechini). Penang, Telok Tikus (Curtis). *Distrib.* Borneo, Java, Tenasserim. Andamans.

(50) **B. capitatum** Lindl. *Gen. and Sp. Orch. Pl.* 56; *Ridl. Mat.* i. 73.

Stems stout woody in a tuft 6 to 9 in. long, branched; pseudobulbs conic, .5 to 1 in. long, crowded or .5 in. apart. Leaf lanceolate or elliptic-lanceolate acute or blunt, 2 to 4 in. long, .5 to 1 in. wide. Flowers in a short raceme .5 in. long or less, orange scarlet, about 6 or 8 together. Sepals lanceolate acuminate, .18 in. long. Petals shorter narrower linear half as long. Lip small tongue-shaped yellow. Column arms erect acuminate. *Hab.* Hill forests at 2000 to 6000 ft. altitude. Johor, Batu Pahat. Pahang, K'luang Terbang (Barnes); Gunong Tahan; Gunong Berumbun, Telom. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Bujong Malacca; Gunong Batu Putih (Wray); Thaiping Hills (Curtis); Gunong Inas (Yapp). Penang Hill (Curtis). *Distrib.* Borneo, Java.

(51) **B. brevipes** Ridl. *Journ. Roy. As. Soc. S. Br.* 39, p. 75; *Mat.* i. 73.

Rhizome woody; pseudobulbs .5 to .75 in. apart, cylindrical-conic, curved, .5 in. long. Leaf elliptic sub-acute, 1 in. long, .25 to .5 in. wide. Raceme 6-flowered, .25 in. long. Flowers .75 in. across, pale yellow. Sepals lanceolate acuminate. Petals .12 in. long, elliptic blunt. Lip short curved, deep grooved, clawed with 2 strong ridges from base. Column short thick, arms acuminate. *Hab.* Perak, Bujong Malacca (Ridley).

(52) **B. concinnum** Hook. *fil. F.B.I.* vi. 189; *Ic. Pl.* 2038; *Ridl. Mat.* i. 74.

Rhizome long, slender; pseudobulbs 1 to 2 in. apart, conic curved, .5 in. long. Leaf ovate to elliptic, 1 to 1.5 in. long, .5 to 1 in. wide. Peduncle slender, 1 to 1.25 in. long. Flowers 4 to 5 at tip. Sepals narrow lanceolate-linear acute, .13 in. long, connivent yellowish tipped orange. Petals half as long, elliptic blunt pale. Lip as long as petals lanceolate curved orange red. Column stout, foot shorter, arms slender acuminate. *Hab.* On mangrove branches, Singapore, Sungei Buluh; Kranji. Johor, Kwala Kahang, Negri Sembilan, Port Dickson (Williams). *Distrib.* Borneo.

(53) **B. paullum** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 38.

Rhizome slender; pseudobulbs conic curved, .25 in. long, .5 in. apart. Leaf oblong-linear blunt, .75 to 1.5 in. long, .1 in. wide, petioled. Peduncle filiform, 1.25 in. long. Flowers 4 or 5 in a short crowded raceme. Bracts lanceolate acute. Sepals linear acuminate narrow. Petals linear-oblong, blunt, one-third as long, pale whitish. Lip short fleshy curved, base broad claw narrow orange. Column foot long free, arms lanceolate acuminate. *Hab.* Very rare. On a tree at 3000 ft. altitude. Selangor, Sempang Mines, Semangkok Pass (Ridley).

(54) **B. modestum** Hook. *fil. F.B.I.* v. 759; *Ic. Pl.* 2038; *Ridl. Mat.* i. 74.

Rhizome slender long; pseudobulbs .5 in. apart, narrow ovoid, .5 in. long. Leaf linear blunt, base narrowed, .5 to 2 in. long, .12 in. wide. Scape slender, 1 to 1.5 in. long. Bracts minute. Flowers 3 to 5 sub-terminal, .12 in. long. Upper sepal ovate-lanceolate, sub-acute, laterals broader blunt. Petals two-thirds length of sepals linear-oblong. Lip tongue-shaped blunt recurved, 2-keeled. *Hab.* Johor, Tempayan River. Perak, Bujong Malacca (Ridley). Kedah Peak (Robinson and Kloss).

(55) **B. vermiculare** Hook. *fil. F.B.I.* vi. 188; *Ridl. Mat.* i. 74.

Rhizome long, slender; pseudobulbs 1 in. apart, globose, .12 in. long, concealed in sheaths. Leaf elliptic-oblong to linear blunt, narrowed into a petiole. Peduncles 1.5 in. long. Flowers very small scattered pale green. Bracts lanceolate acute. Upper sepal lanceolate, laterals falcate-lanceolate acute, base gibbous. Petals small sub-spathulate lanceolate. Lip entire lanceolate, blunt fleshy yellow, edge ciliate. Column short, arms blunt. *Hab.* On mangroves and other trees. Singapore, Selitar; Kranji. Johor, Kwala Kahang (Kelsall). Perak, Bujong Malacca (form with narrow leaves).

(56) **B. ochranthum** *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 76.

Pseudobulbs .25 in. long, oblong-conic densely crowded. Leaf linear-lanceolate, acute, base narrow, 1.25 in. long, .12 in. wide. Peduncle nearly as long. Flowers 5 or 6 in a head .25 in. long. Bract lanceolate, shorter than ovary. Upper sepal narrow linear-lanceolate acuminate, laterals a quarter longer, white, tips yellowish. Petals less than half as long as upper sepal, blunt white. Lip tongue-shaped acute, recurved yellow. Column thick, foot shorter, arms linear acute curved. *Hab.* Perak, Thaiping Hills at 3000 to 4000 ft. altitude (Curtis).

(57) **B. sarcanthoides** *Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 131.

Rhizome very short; pseudobulbs very small. Leaf succulent lorate falcate acute, 1.5 in. long, .25 in. wide. Racemes dense, 2 in. long. Bracts lanceolate acuminate comose. Flowers yellow, .25 in. long. Sepals lanceolate caudate. Petals wider at base and a little shorter, similar. Lip half as long, side-lobes ovate curved blunt, midlobe very narrow acuminate caudate, centre elevate thickened. Column short, broad winged. *Hab.* Rare. Johor, Sungei Tebrau on trees over the river (Ridley).

(58) **B. adenopetalum** *Lindl. Bot. Reg.* 1842; *Misc.* 95; *Ridl. Mat.* i. 75.

Rhizome stout; pseudobulbs very small globose. Leaf thick oblanceolate blunt, 8 in. long, 1 in. across; petiole stout. Raceme 6 in. long, all floriferous. Flowers numerous, pale yellow, .5 in. long. Pedicel .12 in. long. Bracts longer lanceolate acuminate.

Sepals lanceolate acuminate. Petals short, oblong ciliate blunt. Lip tongue-shaped, blunt channelled, ciliate. Column arms short, blunt. *Hab.* Singapore (cult Loddiges' Garden). Perak, Kamuning (Machado).

(59) **B. leptosepalum** *Hook. fil. F.B.I. v. 767; Ic. Pl. 2045; Ridl. Mat. 76.*

Tufted plant; pseudobulbs very small crowded. Leaf linear acute, base narrowed, 4 in. long, .5 in. wide. Raceme slender, 3 in. long. Flowers 15 scattered, white, .25 in. long. Sepals lanceolate caudate, laterals gibbous at base. Petals linear-lanceolate much shorter. Lip lanceolate, side-lobes erect obscure, midlobe narrow fleshy pustular. Column short, foot long, arms narrow acuminate. *Hab.* Perak (Scortechini). Penang Hill (Curtis).

(60) **B. montigenum** *Ridl. Trans. Linn. Soc. iv. 235; Mat. i. 76.*
B. oblanceolatum *King. Journ. As. Soc. Beng. lxvi. 586.*

Rhizome nearly .25 in. through; pseudobulbs 0. Leaf oblanceolate or oblong-oblanceolate sub-acute, 6 to 8 in. long, .75 in. wide; petiole 1 to 3 in. long. Raceme 5 in. long, basal inch nude. Flowers numerous scattered, .25 in. long. Bract lanceolate as long as ovary. Sepals lanceolate acuminate, laterals gibbous at base. Petals less than one-third length, fleshy papillose, lanceolate blunt. Lip as long oblong-lanceolate entire blunt pubescent. Column very small, foot longer, arms erect acute. *Hab.* Mountains. Pahang, K'luang Terbang (Barnes). Selangor, Bukit Fraser (Burkill). Perak, Gunong Batu Putih (Wray); Thaiping Hills at 4000 ft. altitude.

(61) **B. odoratum** *Lindl. Gen. and Sp. Orch. 54; Ridl. Mat. i. 77.*

Rhizome long; pseudobulbs very small globose. Leaf 7 to 8 in. long, 1 in. wide, oblanceolate blunt; petiole 3 in. long. Raceme 16 in. long, stout. Flowers very numerous to base, orange turning white, fragrant. Bracts lanceolate acuminate, .12 in. long. Sepals lanceolate sub-acute. Petals very small ovate-lanceolate. Lip very small curved obscurely 3-lobed, ovate, sides upcurved, midlobe tongue-shaped, flat blunt. Column thick, foot oblong, arms entire or 2-toothed, erect acute. *Hab.* Pahang, Tahan River. Perak, Temengoh (Ridley). Kelantan Kwala Endong (Haniff). *Distrib.* Java, Borneo.

(62) **B. linearifolium** *King, Journ. As. Soc. Beng. lxvi. ii. 3, 586.*

Rhizome stout; pseudobulbs obsolete, .5 in. apart. Leaf linear acute, 4 to 6 in. long, .36 to .5 in. wide; petiole 1 to 2 in. long. Peduncle 1 to 1.5 in. long. Raceme very lax, 3 to 4 in. long. Flowers .12 in. long, yellow. Bracts lanceolate acuminate. Sepals lanceolate blunt, laterals broader falcate, gibbous at base. Petals linear half as long. Lip oblong fleshy acute or blunt. Column arms broad lanceolate blunt. *Hab.* Perak (Scortechini); Bujong Malacca. Kedah Peak (Burkill).

(63) **B. apodum** Hook. fil. *F.B.I.* v. 766; *Ic. Pl.* 2043; *Ridl. Mat.* i. 76.

Rhizome stout woody, branched; pseudobulbs globose, very small hidden in sheaths. Leaf stiffly coriaceous oblanceolate or linear-oblong, 3 to 9 in. long, .75 to 1.5 in. wide; petiole stout, 3 in. long (leaf dries red). Raceme 4 in. long; peduncle 1 in. long. Flowers numerous white tinted yellow, tips orange, .12 in. long. Bracts lanceolate as long as ovary. Sepals lanceolate sub-acute, laterals gibbous at base. Petals linear-lorate blunt, half as long. Lip pale orange lanceolate recurved acute entire. Column arms erect acuminate. Capsule elliptic, .5 in. long, sub-sessile. *Hab.* Common. Singapore, Kranji; Chan Chu Kang. Malacca, Ayer Panas; Merlimau (Derry). Negri Sembilan, Perhentian Tinggi; Port Dickson (Williams). Perak, top of Batu Kurau (Scortechini). *Distrib.* Borneo.

(64) **B. selangorense** *Ridl. Journ. F.M.S. Mus.* v. 47.

Rhizome long branched, woody, no pseudobulbs. Leaf oblanceolate blunt, long narrowed at base, 7 in. long, 1.75 in. wide; petiole 3 in. long, stout. Scape 18 in. tall, basal half nude with a large foliaceous bract at top. Flowers rather scattered. Sepals .12 in. long, lanceolate-ovate acute, laterals connate in a gibbous sac at base. Petals nearly as long, linear-oblong blunt. Lip thin, side-lobes elevate round, tip acuminate, 3 raised veins on disc from a horseshoe-shaped callus at base. Column foot adnate to sepals, tip free, arms subulate. *Hab.* Rare. Mountains, at 5000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Thaiping Hills (Long). Kedah Peak (Robinson and Kloss).

(65) **B. viridescens** *Ridl. Journ. Linn. Soc.* xxxviii. 132.

Rhizome long, no pseudobulbs. Leaf 1 in. long, .36 in. wide, elliptic, fleshy thick; petiole thick. Raceme filiform, 2 in. long, few-flowered. Bracts lanceolate acuminate, .12 in. long. Flowers pale green, .13 in. long. Upper sepal lanceolate blunt, laterals gibbous at base, sub-lanceolate blunt. Petals linear falcate. Lip as long as sepals, tongue-shaped, blunt channelled papillose, brown. Column very small, arms obscure. *Hab.* Rare. On rocks and trees. Pahang, Gunong Tahan at 3300 ft. altitude (Robinson).

(66) **B. globulus** Hook. fil. *F.B.I.* v. 767; *Ic. Pl.* 2047.

Rhizome stout; pseudobulbs globose or ovoid crowded, .33 in. through. Leaf 1 to 2 in. long, linear-oblong blunt, .5 to .7 in. wide. Raceme as long. Flowers scattered. Bracts ovate acute. Upper sepal linear subulate, laterals lanceolate, sub-acute. Petals ovate-oblong, half as long. Lip lanceolate much recurved. *Hab.* Perak (Scortechini).

(67) **B. arachnites** *Ridl. Journ. F.M.S. Mus.* iv. 67.

Rhizome woody; pseudobulbs close set cylindric, .12 in. long. Leaf lanceolate acuminate, 6 in. long, 1 in. wide; petiole 2 in. long.

Raceme 8 in. long. Flowers about 12. Bracts ovate white as long as ovary. Sepals ovate-lanceolate white filiform caudate, base gibbous, nearly 2 in. long (tail 1.75 in. long). Petals truncate oblong, orange, less than .25 in. long. Lip oblong blunt, flat, yellow. Column arms erect setiform. *Hab.* Rare. Pahang, Telom on a fallen tree (Ridley).

(68) **B. flammuliferum** *Ridl. Journ. Bot.* 36, p. 211; *Mat.* i. 77.

Rhizome stout woody; pseudobulbs distant oblong conic, curved flattened, 2 in. long, .5 in. wide, .12 in. thick. Leaf oblong-lanceolate blunt, petioled, 4 to 8 in. long, 1 in. wide. Raceme 6 in. long, base covered with dilate sheaths. Flowers about 25, $\frac{1}{2}$ in. long. Bracts .25 in. long, longer than ovary. Sepals lanceolate acuminate, yellowish tipped orange, laterals twice as long as upper. Petals very small oblong blunt, yellowish white. Lip fleshy tongue-shaped, blunt pustulate, yellowish, tip red. Column arms bifid; upper lobe lanceolate erect, lower one shorter rounded. *Hab.* Limestone rocks and mangroves, Negri Sembilan, Port Dickson (Williams). Selangor, Batu Caves (Ridley).

(69) **B. fascinator** *Rolfe, Bot. Mag. t.* 8199. *Cirrhopetalum fascinator Rolfe, Kew Bulletin* 1908, p. 69.

Pseudobulbs crowded ovoid oblong, 1 in. long, .75 in. through. Leaf coriaceous elliptic-oblong 2 in. long, 1 in. wide. Scape 4 in. long. Flower 1. Upper sepal ovate acuminate, 1.25 in. long, .5 in. wide, green blotched purple, edge violet hairy, laterals connate, tips free, long caudate, base broad green with large pustular purple blotch each side, tail green, 7 in. long. Petals falcate-oblong purple hairy on edge green spotted red. Lip recurved ovate-oblong 2-keeled puberulous purple. Column green and purple broad, arms porrect acute. *Hab.* Setul (Curtis). *Distrib.* Annam.

(70) **B. Blumei** *J. J. Smith Orchid, van Java*, i. 459, pl. ccclix. *B. ephippium Ridl. Mat.* i. 78. *Ephippium ciliatum Bl. Bijdr.* 309, t. 35. *Cirrhopetalum Blumei Lindl. Gen. and Sp. Orch.* 59.

Rhizome .25 in. thick, branched; pseudobulbs conic, 1 to 1.5 in. long, .5 in. thick. Leaf lanceolate acute, 4 in. long, .75 in. wide. Peduncle slender, 3 in. long. Flower 1; pedicel and ovary .5 in. long. Upper sepal linear-lanceolate subulate, base ciliate on edge, 1 in. long, .12 in. wide, laterals 1.5 in. long, .2 in. wide, lanceolate falcate subulate, pink edged white. Petals small obliquely lanceolate acute, bases toothed, pink with purple warts. Lip .5 in. long, ovate acuminate, long pointed crimson. Column arms tooth-like, erect. *Hab.* Rare. Singapore, Kranji (Ridley). *Distrib.* Java, Borneo.

(71) **B. breviscapum** *Ridl. Mat.* i. 78. *Cirrhopetalum breviscapum Rolfe, Bot. Mag. t.* 8033.

Pseudobulbs oblong, 4-angled, .6 to .83 in. long, 1 in. apart.

Leaf sub-sessile, elliptic-oblong blunt, 1.25 to 2 in. long. Flower 1. Bracts ovate-lanceolate, .13 in. long. Upper sepal lanceolate-oblong acute incurved, .6 to .75 in. long, laterals connate at base, oblong blunt deflexed, base twisted, 1 in. long, yellow spotted red. Petals lanceolate acute, as long as upper sepal, purple. Lip fleshy, .25 in. long, base wide cordate covered with long hairs. Column arms curved porrect, a short erect boss at top. *Hab.* Perak (cult. at Glasnevin and Kew).

(72) **B. restrepia** *Ridl. Trans. Linn. Soc. iii. 365; Mat. i. 78.*

Rhizome short; pseudobulbs crowded cylindrical, .75 in. long. Leaf obovate petioled, 2 in. long, 1 in. wide. Peduncle filiform, 4 in. long. Flower 1. Upper sepal linear tapering clubbed, .5 in. long, laterals lanceolate acuminate, sub-falcate, edges at base and tip connate, 1 in. long, .25 in. wide at base, pale green, edges brown speckled pink at base. Petals very small edged brown. Lip small ovate, decurved white spotted pink above. Column short, foot very short, green, arms bifid. *Hab.* Rare. Pahang, Pekan, on bushes (Ridley). *Distrib.* Borneo.

(73) **B. planibulbe** *Ridl. Mat. i. 79. Cirrhopetalum planibulbe Ridl. Trans. Linn. Soc. iii. 364, pl. lxiv.*

Rhizome long, slender; pseudobulbs elliptic-oblong lying flat on rhizome 3 in. apart, purple, 1 in. long, .25 in. wide. Leaf elliptic-oblong blunt, 1 in. long, .25 in. wide. Peduncle 4 in. long, slender purple. Flowers at end 4 or 5. Pedicels 1 in. long. Bract lanceolate, .25 in. long. Upper sepal lanceolate caudate, 1 in. long, laterals deflexed, 2 in. long, yellow spotted red on back and edges. Petals short obovate-sub-spathulate yellow. Lip recurved fleshy tongue-shaped acute, channelled orange. Column yellow, foot very short purple, arms subulate as long as petals. *Hab.* On tree trunks. Pahang, Pekan. Kedah, Yan (Ridley).

(74) **B. medusæ** *Rchb. fil. Walp. Ann. vi. 262; Ridl. Mat. i. 79. Cirrhopetalum medusæ Lindl. Bot. Reg. 1842, t. 12; Bot. Mag. t. 4977.*

Rhizome very stout; pseudobulbs angled conic, 1 in. long, very thick. Leaf 6 in. long, 1 in. wide, oblanceolate, petiole short; peduncle 4 to 5 in. long; sheaths large loose. Flowers very many in a globose head 1.5 in. through. Bracts at base lanceolate pale, .5 in. long, those of flowers longer than ovary. Sepals caudate-lanceolate, upper 1 in. long, lower ones 6 in. long, white with pink spots or all white. Petals lanceolate acuminate, pinkish or white much shorter. Lip shorter lanceolate acute, yellowish. Column thick, arms long lanceolate acuminate porrect. *Hab.* On rocks and trees, not rare. Singapore, Bukit Timah; Bukit Mandai. Johor, Tengarah (Kelsall); Tebrau River. Pahang, Tahan River. Malacca, Jasin. Negri Sembilan, Siliau (Williams). Dindings, Lumut. Perak, Waterfall Hill (Wray). Penang (Curtis). Kelantan, Kwala Lebir (Gimlette), flowers white. *Distrib.* Siam, Borneo.

(75) **B. vaginatum** *Rehb. fil. Walp. Ann. vi. 261; Ridl. Mat. i. 80.* *Cirrhopetalum vaginatum Lindl. Gen. and Sp. Orch., pl. 59.* *C. caudatum Wight, Ic. t. 1658.*

Rhizome long, stout; pseudobulbs 1 in. apart, 1 in. long, conic-ovoid. Leaf very fleshy, thick elliptic or oblanceolate blunt, 1 to 4 in. long, .5 to .75 in. wide. Peduncle 3 to 4 in. long, with loose sheaths. Flowers numerous in a head, pale yellow. Bracts lanceolate acuminate, twice as long as the short ovary. Upper sepal ovate blunt, edge ciliate, .1 in. long, laterals lanceolate caudate, 1 in. long. Petals very small ovate blunt ciliate. Lip little longer lanceolate acute curved orange. Column short, thick,



FIG. 165.—*Bulbophyllum psittacoides*.

arms acute erect. *Hab.* On trees. Common. Singapore (Wallich); Kranji Road. Johor, Tana Runto. Pahang, Pekan. Malacca, Mount Ophir; Cling (Derry). Selangor, Bukit Hitam (Kelsall); Sepan. Negri Sembilan, Siliau (Williams). Dindings, Sembilan isles, Pulau Rumpia (Kloss). Penang (Curtis). Lankawi (Curtis). *Distrib.* Borneo.

(76) **B. psittacoides** *Ridl. Mat. i. 80.* *Cirrhopetalum gracilimum Rolfe, Kew Bulletin 1895, p. 34.* *C. psittacoides Ridl. Journ. Linn. Soc. xxxii. 280.*

Rhizome branched; pseudobulbs crowded or distant, .5 in. long. Leaf elliptic or lanceolate blunt, 4 in. long. Leaf elliptic or lanceolate blunt, 4 in. long, .75 to 1.25 in. wide. Peduncle very slender, 8 to 12 in. long, red. Flowers small, 8 or 9 in a whorl. Bracts minute. Ovary and pedicel .25 in. long. Upper sepal

ovate hooded, with a long point, edges ciliate, base yellow, tip red, laterals 1·5 in. long, connate at base in a tube, tips free setaceous, dark red, 2 yellow spots at mouth of tube. Petals lanceolate acuminate-caudate, edges ciliate. Lip fleshy recurved, acute violet. Column conic, foot as long yellow dotted red, arms round very short. Capsule elliptic, fusiform, ·5 in. long. *Hab.* Johor, Batu Pahat (Kelsall). Malacca, Sungei Hudang. Negri Sembilan, Gunang Angsi; Port Dickson (Williams). Dindings, Telok Sera. Perak, Thaiping (Curtis). Lankawi (Curtis). *Distrib.* Siam.

(77) **B. rhizophoreti** *Ridl.* *B. Curtisii* *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 76. *Cirrhopetalum Curtisii* *Hook. fil. Bot. Mag.* t. 7554.

Rhizome slender; pseudobulbs ovoid-conic, ·36 in. long, half an inch apart. Leaf elliptic-oblong blunt, 1 to 1·5 in. long, ·5 in. wide; petiole short. Scape slender, 2 to 3 in. long. Flowers at top 5. Bracts lanceolate acuminate. Upper sepal triangular-lanceolate, laterals quite free, linear flat, ·36 in. long, yellow. Petals falcate lanceolate glabrous, brown. Lip fleshy curved tongue-shaped. Column broad, arms triangular. *Hab.* Rare, Mangroves, Dindings (Curtis).

(78) **B. punctatissimum** *Ridl.* *Cirrhopetalum punctatissimum* *Rolfe MSS.*

Rhizome fairly stout; pseudobulbs ovoid covered with sheaths, ·6 to ·8 in. long. Leaves oblong blunt, coriaceous, 3 to 4 in. long, ·8 to 1 in. wide. Scape 2 to 2·5 in. long, slender. Flowers umbelled, small. Bracts oblong blunt, ·2 in. long. Pedicels slender, ·4 in. long. Upper sepal ovate apiculate not ciliate, ·3 in. long, lateral sepals ·4 in. long at base ovate-elliptic, free, then connate attenuate and sub-acute. Petals elliptic-oblong blunt, minutely toothed, ·12 in. long. All densely dotted pink on a straw-coloured ground. Upper sepal and petals tipped purple. Lip fleshy oblong recurved blunt. Column broad with subulate teeth. *Hab.* Malay Peninsula, locality unknown.

Sent alive to Kew by Mr. E. Seimund in 1914 and flowered shortly after.

(79) **B. perakense** *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 76; *Mat.* 1. 82.

Pseudobulbs ·5 in. long, conic. Leaf elliptic, 2 to 3 in. long, ·5 in. wide. Scape 3 to 4 in. long, stout. Flowers numerous crowded, glabrous. Upper sepal ovate acute, laterals ·75 in. long, connate for half their length, tips acuminate. Petals nearly as long as upper sepal, ovate-lanceolate acute. Lip tongue-shaped, channelled. Column arms triangular obtuse broad. *Hab.* Rare. Perak, Waterloo (Elphinstone).

(80) **B. rupicolum** *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 194.

Rhizome long; pseudobulbs 2 in. apart, conic, 1 in. long. Leaf 6 in. long, 1·5 in. wide, elliptic blunt; petiole 1 in. long. Peduncle

3 in. long. Flowers 10 in a whorl. Bracts .25 in. long. Pedicels filiform, .5 in. long. Upper sepal ovate acute, minutely mucronate, lower ones .36 in. long, connate near tip only, tip shortly bifid. Petals glabrous half as long as upper sepal, ovate toothed. All white closely pink-spotted. Lip tongue-shaped linear blunt. Column white, foot pink spotted. *Hab.* On rocks. Setul, Bukit Rajah Wang (Ridley).

(81) **B. Skeatianum** *Ridl. Journ. F.M.S. Mus.* vi. 177.

Pseudobulbs crowded obpyriform, 1 in. long, purple. Leaf linear-lanceolate blunt, 1 to 2 in. long, .25 to .36 in. wide. Scape 5 in. long or less, slender purple. Bracts linear acuminate. Flowers 9 to 12 in a half whorl. Pedicels 1 in. long. Upper sepal ovate blunt, purplish red with red streaks, lower sepals bright red to orange red, linear acuminate, connate towards tip, 1 in. long. Petals ovate blunt deep red, purple as long as upper sepal. Lip tongue-shaped orange. *Hab.* Local on tree boughs. Pahang, Gunung Tahan, at 3000 to 5500 ft. altitude (Ridley).

(82) **B. purpurascens** *Leysm. and Binn. Natur. Tidschr.* xxiv. 308. *B. citrinum* *Ridl. Mat.* i. 75. *Cirrhopetalum citrinum* *Ridl. Journ. Linn. Soc.* xxxi. 279.

Rhizome rather slender; pseudobulbs crowded to 1 in. apart, conic, hardly 1 in. long. Leaf obovate blunt, fleshy dark green or purple, 1.5 in. long, .75 in. wide. Peduncle filiform shorter or longer. Flowers 10 crowded in a head, whorled, lemon yellow, nearly .5 in. long. Bracts linear acute as long as pedicels. Upper sepal ovate-lanceolate acute, laterals lanceolate-linear twice as long. Petals ovate acuminate or lanceolate acute, shorter than upper sepal. Lip curved sub-acute, 2-keeled. Column foot short, arms short broad blunt. Capsule elliptic, .5 in. long. *Hab.* Common. Singapore, Tanjong Gol; Sungei Buluh, Johor, Sungei Bau. Malacca, Mt. Ophir; Cape Rachado (Williams). Perak, Thaiping. *Distrib.* S. Siam, Borneo. Java. Sumatra.

(83) **B. Annandalei** *Ridl.*

Rhizome moderately thick; pseudobulbs approximate truncate conic, .5 in. long. Leaf coriaceous lanceolate blunt, narrowed to petiole, 4 in. long, .6 in. wide; petiole .25 in. long. Scape 3 in. tall. Flowers 2, deep crimson colour, faintly striped brown. Upper sepal ovate, .5 in. long, .24 in. wide, sub-acute, edge ciliate, lower sepals free except at base, 1 in. long, base dilate then narrowed, blade lanceolate acuminate, .25 in. long. Petals ovate, .25 in. long, edges fimbriate. Lip tongue-shaped curved fleshy large. *Hab.* Naung Chik, Bukit Besar. On a log across a stream at 2000 ft. altitude (Annandale and Robinson).

(84) **B. campanulatum** *Rolfe, Kew Bulletin* 1909, p. 62; *Bot. Mag.* t. 8281; *Orch. Review* 1910, 73, t. 6. *B. auratum* *Ridl. Mat.* i. 82. *Cirrhopetalum auratum* *Ridl.* not *Lindl.*

Rhizome short; pseudobulbs crowded ovoid grooved and

wrinkled, .75 in. long, .5 in. through. Leaf oblanceolate petiolate, blunt, purple beneath, 6 in. long, 1 in. wide. Peduncle 6 in. tall, nodding, pink-flowered, 8 in a whorl. Upper sepal ovate aristate, yellow with 5 crimson stripes, edges hairy, laterals nearly 1 in. long, free, .5 in. across, pink linear oblong. Petals lanceolate aristate, yellow, 3 crimson stripes as long as upper sepal. Lip oblong acute, recurved. Column arms obscure. *Hab.* Rare. On trees overhanging the river, Selangor, Sepan (Ridley). *Distrib.* Sumatra.

The figure in *Bot. Mag.* is not very good. In our specimen the petals and sepals were much more yellow than in the Kew plant.

(85) **B. acuminatum** *Ridl. Mat. i. 81.* Cirrhopetalum acuminatum *Ridl. Journ. Linn. Soc. xxxii. 282.*

Pseudobulbs fusiform conic, 1 in. apart, .5 in. long. Leaf lanceolate acuminate 3 in. long, 1 in. wide. Scape 6 in. long, slender. Flowers 5 in a half circle. Upper sepals aristate, ovate, ciliate orange with red stripes, laterals 1 in. long, narrow elongate acuminate free, reddish, tipped yellow. Petals ovate ciliate long-pointed orange, red striped. Lip short blunt slightly curved, greenish spotted purple. Column rather long, arms short. *Hab.* Rare. Singapore, Chan Chu Kang (Ridley).

(86) **B. microbulbon** *Ridl. Mat. i. 82.* Cirrhopetalum microbulbon *Ridl. Journ. Linn. Soc. xxxii. 283.*

Rhizome slender; pseudobulbs .12 in. long, globose, 1 in. apart. Leaf elliptic or obovate blunt, 1.5 to 1.75 in. long, .75 in. wide. Scape filiform, 5 in. long. Flowers small, 8 in a whorl. Bracts very small lanceolate acuminate. Upper sepal ovate cuspidate, edge ciliate, laterals very narrow linear free, .5 in. long, pink. Petals as long as upper sepal lanceolate cuspidate ciliate. Lip minute ovate. *Hab.* Singapore, Sungei Buru (Ridley).

(87) **B. semibifidum** *Ridl. Mat. i. 82.* Cirrhopetalum semibifidum *Ridl. Journ. Linn. Soc. xxxii. 284.*

Rhizome slender; pseudobulbs conic, angled, .5 to .75 in. apart, .25 in. long. Leaf lanceolate, 1.5 in. long, .5 in. wide. Scape very slender, 4 in. long, crimson. Flowers 5 in a whorl. Bracts linear acuminate, red; pedicel and ovary .12 in. long. Upper sepal ovate acuminate, edge hairy, rosy with darker streaks, laterals 1.5 in. long, connate for half their length, tips lorate acuminate widely separate deep crimson. Petals ovate-lanceolate falcate acuminate, edge hairy. Lip tongue-shaped, curved rosy. Column rather long, yellow, arms short rounded. *Hab.* On trees near the sea. Singapore, Kranji (Ridley).

(88) **B. Makoyanum** *Ridl. Mat. i. 81.* Cirrhopetalum Makoyanum *Rchb. fil. Gard. Chron. 1879, p. 243; Hook. fil. Bot. Mag. t. 7259.*

Rhizome slender; pseudobulbs 1 in. apart, ovoid, nearly 1 in. long. Leaf elliptic blunt or lanceolate, 3 to 6 in. long, .5 to 1 in. wide; petiole short. Peduncle slender, red, 7 to 8 in. tall. Flowers

11 in a whorl. Bracts lanceolate acuminate, .12 in. long. Ovary and pedicel .25 in. long. Upper sepal ovate acuminate red, edges yellow hairy, laterals connate, long narrow linear, 2 in. long, yellow spotted red. Petals ovate acuminate, yellow red spotted or all red hairy. Lip fleshy curved, blunt grooved yellow edged, red or all red. *Hab.* Singapore, Chan Chu Kang (Ridley).

var. *Brienianum* Ridl. *Cirrhopetalum Brienianum Rolfe, Kew Bulletin*, 1893, p. 62. Upper sepal and petals brown, lower sepals yellow. Johor, Gunong Pantai. Perak, Thaiping; Teluk Anson (Williams). *Distrib.* Borneo.

(89) **B. stenophyllum** Ridl. *Mat.* i. 83. *Cirrhopetalum linearifolium Ridl. Journ. Linn. Soc.* xxxiii. 283.

Rhizome long slender; pseudobulbs conic-cylindric, 2 in. apart, .3 in. long. Leaf narrow linear-lanceolate blunt, 4 in. long, .5 in. wide. Scape 6 in. long, reddish. Flowers few, small. Bracts linear acute, .25 in. long. Upper sepal lanceolate acute, greenish dark purple streaks, edge hairy, laterals almost entirely connate, linear acuminate, tips setaceous pale red, .5 in. long. Petals triangular lanceolate acuminate, green purple streaked. Lip tongue-shaped curved, sub-acute purple. *Hab.* Singapore, Changi; Chan Chu Kang (Ridley).

(90) **B. pulchellum** Ridl. *Mat.* i. 83. *Cirrhopetalum concinnum Hook. fil. F.B.I.* v. 190; *Ic. Pl. t.* 2060 B.

Rhizome slender; pseudobulbs crowded conical, 3-angled, 1 in. long. Leaf narrow oblanceolate, blunt petioled, 3 to 6 in. long, .5 in. wide. Scape slender, 2 to 4 in. long. Flowers about 12 in a whorl. Bracts narrow linear, setaceous, half as long as ovary. Upper sepal ovate aristate, edge ciliate, yellowish densely spotted red, laterals almost quite connate, oblong-oblanceolate blunt. Petals lanceolate aristate hairy on edge, all same colour. Lip thick curved, deep purple, yellow tip. Column thick, foot as long, arms short broad, rounded. *Hab.* Common on trees. Singapore, Chan Chu Kang. Johor, Tana Runto. Negri Sembilan, Siliu (Williams). Selangor, Sepan. Kelantan Kelumpang (Haniff). *Distrib.* Islands south of Singapore.

var. *purpureum* Ridl. Whole flower crimson purple, sepals shorter, broader. *Hab.* Perak, Thaiping. Penang Hill (Curtis), also Siam.

var. *brachysepalum* Ridl. Flowers very small, lateral sepals connate above only, tips round, .25 in. long, crimson purple. *Hab.* Lankawi, Kwah (Curtis).

(91) **B. Griffithianum** Par. and Rehb. *fil. Trans. Linn. Soc.* xxx. 153; *Ridl. Mat.* i. 83. *Cirrhopetalum gamosepalum Griff. Notulæ* iii. 296; *Hook. fil. Ann. Bot. Gard. Calc.* v. 17, pl. 26.

Rhizome moderately stout; pseudobulbs 1 in. apart, conic grooved, .5 to .75 in. tall. Leaf oblong-lanceolate blunt or oblanceolate, 4 in. long, 1.12 in. wide. Scape 8 in. tall, slender. Flowers

8 to 10 in a whorl. Bracts linear-lanceolate setaceous red. Upper sepal ovate aristate, hairy, yellowish brown or pink spotted darker, laterals connate oblong blunt, .75 in. long, .13 in. wide, reddish or pink with darker spots or suffused rosy. Petals as long as upper sepal, lanceolate aristate hairy. Lip very small recurved channelled with 3 ribs yellow tip purple or brown. Column foot hardly as long, yellowish or pink spotted, arms short rounded. *Hab.* Trees in low country. Singapore, Bajau. Johor, Kwala Kahang (Kellsall). Malacca, Sungei Rambei. Negri Sembilan, Siliau (Williams). *Distrib.* Tenasserim, Borneo.

(92) **B. ochraceum** *Ridl. Mat. i. 84.* *Cirrhopetalum ochraceum* *Ridl. Journ. Bot. 1898, p. 212.*

Rhizome long; pseudobulbs crowded, conic, 4-angled, 1.5 in. long, .5 in. thick. Leaf oblanceolate blunt, 7 in. long, 1 in. wide. Scape stout, 10 in. long, red. Flowers about 10. Bracts lanceolate long-acuminate. Upper sepal ovate acuminate reddish, edge hairy, laterals connate for whole length oblong-lanceolate, 1 in. long, .25 in. wide, orange-ochre red spotted. Petals lanceolate, edges hairy red. Lip tongue-shaped, recurved olive. Column long, foot slender, arms large thin, triangular. *Hab.* Very rare. Selangor, Semangkok Pass (Ridley).

(93) **B. maximum** *Ridl. Mat. i. 79.* *Cirrhopetalum maximum* *Ridl. Journ. Bot. March 1900, p. 70.*

Rhizome long stout; pseudobulbs distant, narrow oblong, 5 in. long. Leaf lanceolate, 1 ft. long, 4 in. wide; petiole 1.5 in. long. Peduncle 1 ft. long. Flowers in a terminal whorl 1 ft. across, each over 6 in. long; pedicel 1 in. long, stout. Bracts lanceolate acuminate, 1 in. long. Sepals lanceolate cordate. Petals similar, all apple green. Lip tongue-shaped fleshy acute, cream colour with violet centre. Column oblong, broad cream marked mauve, arms 4, 2 erect, 2 broad, thick horizontal violet. *Hab.* Local. Perak, Bujong Malacca on trees (Ridley, Curtis).

11. DENDROCHILUM, Blume.

Rhizome woody creeping branched; pseudobulbs usually distant. Leaf solitary coriaceous. Raceme slender from the rhizome near the pseudobulb with dry sheaths at base. Flowers numerous very small, white. Sepals narrow equal, laterals adnate to column-foot. Column rather tall with lateral arms, top hooded. Anther 2-celled, pollinia 4, ovoid united by a viscid mass. Capsule subglobose or 3-angled. Species about 15, Malay Peninsula and islands.

Lip lanceolate.

Leaf lanceolate (1) **D. album**
 Leaf narrow linear very coriaceous (2) **D. angustifolium**
 Lip oblong sub-spathulate (3) **D. spathulatum**

Lip pandurate.

Leaf obovate coriaceous thick (4) **D. crassum**
 Leaf elliptic thin coriaceous (5) **D. ellipticum**

Fl.M.P., 4

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(1) **D. album** *Ridl. Journ. Linn. Soc.* xxxii. 287; *Mat.* i. 85. *Bulbophyllum pteriphilum Rolfe, Kew Bulletin* 1894, p. 391. *D. pallidiflorum (flavens) Hook. fl. F.B.I.* vi. 782, *not pallidiflavens Bl.*

Pseudobulbs conic, 1 in. apart, 1 in. long. Leaf elliptic-lanceolate blunt, 3 to 4 in. long, .75 to 1 in. wide; petiole .5 in. long. Racemes slender, 1 in. long, with membranous bracts at base. Flowers numerous white. Sepals sometimes tipped orange, .25 in. across. Bracts very small. Sepals linear blunt, tips thickened. Petals similar smaller. Lip shorter lanceolate sub-acute, keels 2. Column arched, upper edge prolonged lanceolate retuse, arms linear acuminate. *Hab.* Mountains, common. Selangor, Gunong Semangkok. Perak, Thaiping Hills, Gunong Hijau (Kunstler, etc.); Ulu Bera (Kunstler); Gunong Kerbau at 6000 ft. altitude (Robinson). *Distrib.* Tenasserim, S. Siam.

(2) **D. angustifolium** *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 77; *Mat.* i. 85.

Rhizome stout; pseudobulbs 1 to 1.5 in. apart, sub-cylindric, .5 to .75 in. long. Leaf narrow linear-lanceolate, 2 in. long, .25 in. wide, blunt. Raceme solitary or several on a stout short peduncle 3 to 4 in. long. Flowers greenish white, .12 in. long. Bracts ovate sub-acute, half as long as ovary. Sepals linear-lanceolate. Petals narrower. Lip narrow lanceolate blunt, 2 thick ridges at base and a lower one between. Column short, upper edge hooded minutely toothed, arms linear from near base. Capsule sub-globose ovoid, 3-angled, .5 in. long. *Hab.* Mountains, Pahang, K'luang Terbang (Barnes); Gunong Tahan. Selangor, Bukit Hitam (Kelsall); Gunong Mengkuang Lebah (Robinson). Perak, Gunong Kerbau (Robinson).

(3) **D. spathulatum** *Ridl. Journ. Roy. As. Soc. S. Br.* 50, p. 134.

Rhizome much branched, slender; pseudobulbs cylindric, 1 in. long, .1 in. through. Leaf elliptic-lanceolate blunt, abruptly narrowed at base, 2 in. long, .5 in. wide. Raceme 2 in. long, floriferous to base. Bracts minute ovate. Flowers .1 in. across. Sepals linear blunt fleshy. Petals shorter. Lip less than half as long oblong at base with 2 keels, tip sub-spathulate round. Column very short, hood oblong as long as the rest of the column, arms from near anther lanceolate subulate, as long as hood. Capsule .5 in. long and nearly as wide, turbinate triquetrous. *Hab.* Pahang, Tahan River (Ridley). *Distrib.* Sumatra.

(4) **D. crassum** *Ridl. Journ. Linn. Soc.* xxxii. 288; *Mat.* i. 85.

Rhizome .25 in. thick; pseudobulbs cylindric, .5 in. long. Leaf elliptic blunt, thick, 4 in. long, 1.5 in. wide; petiole .25 in. long. Raceme 3 to 4 in. long, entirely floriferous. Bract ovate-lanceolate, two-thirds the length of pedicel. Sepals oblong blunt fleshy, .12 in. long and as wide, green. Petals obovate blunt, green. Lip white pandurate, tip broad obovate, 2-keeled. Column-foot very short,

upper edge broad round entire, arms lanceolate acute, falcate.
Hab. Rare. Perak, Hermitage Hill (Ridley).

(5) *D. ellipticum* *Ridl. Journ. As. Soc. S. Br.* 39, p. 78; *Mat.* i. 85.

Rhizome long woody branched; pseudobulbs slender, conic cylindrical curved, .75 in. long. Leaf thin coriaceous elliptic-oblongate blunt, 3 in. long, 1 in. wide. Raceme 3 in. long, sheaths at base large. Flowers .12 in. long, fleshy. Bracts ovate acute nearly as long as ovary. Sepals lanceolate acute, tip thickened terete. Petals narrower. Lip pandurate blunt pustular, a pustular mass at base. Column hood large, 3-toothed, arms from the middle linear, longer than the hood. *Hab.* Rare. Singapore, Sembawang (Ridley).

12. ERIA, Lindl.

Epiphytes or rock plants, rarely terrestrial. Stems slender or stout, or with the lower or all internodes swollen into a pseudobulb. Leaves lanceolate usually coriaceous, numerous, or 2 or 3 only at the top of the stem. Inflorescence racemose axillary or sub-terminal, rarely paniced. Flowers 1 to very many, small or medium white, red or yellow, glabrous or white-tomentose. Sepals unequal, laterals forming a mentum by attachment to the column foot. Petals narrower. Lip sessile on the end of the foot, usually 3-lobed. Column short, broad, rarely long, foot usually long, arms round incurved. Pollinia 8, pyriform or ovoid attached to a disc in fours, often unequal. Capsule usually narrow cylindrical. Species about 200, tropical Asiatic.

§ 1. *Eriura*. Stems leafy usually tall with distichous long narrow leaves. Flowers very woolly, small and numerous in sub-terminal woolly racemes.

Stems short; leaves lanceolate.

Flower spike lateral (1) *E. pudica*

Flower spike terminal (2) *E. lancifolia*

Stem 2 to 4 in. tall; raceme 1 to 3 in. long;
 leaves linear (3) *E. obliqua*

Stems 1 to 3 ft. tall, broad; leaves long;
 racemes long.

Flowers .5 in. long, sparsely pubescent (4) *E. larutensis*

Flowers .2 in. long or less, very woolly,
 whitish, purple spotted.

Lip midlobe of 2 linear lobes (5) *E. bidens*

Lip midlobe of broad toothed lobes (6) *E. iridifolia*

Lip midlobe entire reniform clawed (7) *E. Ridleyi*

Lip midlobe entire oblong (8) *E. tahananensis*

Lip midlobe oblong retuse, flowers yellow (9) *E. citrina*

§ 2. *Mycaranthes*. Stems leafless below. Leaves 2 or 3 at top. Racemes sub-terminal woolly. Flowers small, white.

Flowers in whorls; lip entire saccate (10) *E. longifolia*

Flowers not whorled; lip spathulate 3-lobed (11) *E. Earine*

§ 3. *Dilochiopsis*. Stems tall leafy glabrous.

Flowers in a large panicle terminal with
 white bracts (12) *E. Scortechinii*

§ 4. *Cylindrolobus*. Stems tall leafy. Leaves usually thin. Racemes usually short, lateral, few-flowered. Flowers glabrous.

Racemes 4- to 6-flowered. Leaves broad (13) *E. leptocarpa*

- Racemes 1- to 2-flowered; leaves narrow linear.
 Flowers 1 in. across (14) *E. pendula*
 Flowers several, .5 in. wide, lip yellow-hairy (15) *E. pilifera*
- § 5. *Hymeneria*. Stems short or medium swollen or terete fleshy. Leaves few terminal. Racemes many flowered from below the leaves. Flowers not woolly usually glabrous small. Mentum short; bracts small.
 Racemes dense horizontal; flowers white or pinkish.
 Stem .5 in. thick terete; lip truncate (16) *E. floribunda*
 Stem 1 in. thick; lip refuse (17) *E. densa*
 Stem sausage-shaped, 1 in. thick; lip apex orbicular (18) *E. saccata*
 Raceme lax; flowers thin yellow; rhizome long woody (19) *E. tenuiflora*
 Stem swollen upwards; leaves terete; flowers white (20) *E. cepifolia*
- § 6. *Bractescentes*. Racemes many-flowered with large white or green bracts; flowers showy.
 Stems short and thick, sausage-shaped.
 Bracts oblong white; flowers few white; mentum short (21) *E. bractescens*
 Bracts oblong white; flowers very many pink; mentum long (22) *E. suaveolens*
 Stems short conic-cylindric; bracts lanceolate; flowers many white (23) *E. Endymion*
 Stems large fusiform; bracts ovate; lip yellow (24) *E. xanthocheila*
 Stems fusiform, 1 in. long; bracts oblong; flowers .5 in. wide (25) *E. Maingayi*
 Rhizome short; stems cylindric.
 Stems 3 in. long; mentum long; flowers pink and yellow (26) *E. saccifera*
 Stems 6 in. long; mentum large short; flowers yellow striped purple (27) *E. recurvata*
 Stem 1 ft. long; leaves large; bracts green, large (28) *E. Braddonii*
 Stem 8 in. long; leaves 1 in. wide; bracts .3 in. long, lanceolate (29) *E. carnea*
 Stem 2 in. long; leaves 1 in. wide; bracts ovate (30) *E. carunculata*
 Rhizome long creeping; stems distant cylindric.
 Stem 6 in. long; bracts white; mentum short (31) *E. ramulosa*
- § 7. *Nutantes*. Flowers few sub-terminal above the leaves.
 Stems tufted; rhizome short; flowers 1, white (32) *E. nutans*
 Stems distant. Rhizome long branched.
 Flowers pinkish; stem dilate upwards (33) *E. neglecta*
 Flowers greenish-yellow; stems cylindric (34) *E. ochracea*
 Flowers yellowish-white, stems cylindric (35) *E. diluta*
 Rhizome long creeping; flowers from below leaves (36) *E. longerepens*
- § 8. *Stellatæ*. Glabrous, stems short swollen; raceme tall erect. Flowers large spreading.
 Bracts lanceolate acuminate.
 Midlobe of lip lanceolate; flowers white (37) *E. stellata*
 Midlobe of lip linear; flowers striped (38) *E. striolata*
 Bracts ovate acuminate; midlobe shorter than side-lobes (39) *E. elata*

§ 9. *Aeridostachya*. Stems very short swollen covered with large sheaths; leaves long, coriaceous. Racemes erect, lower half nude. Flowers small in a dense raceme, covered with brown fur. Mentum long.

Rhizome short; pseudobulbs approximate.

Lip entire spatulate.

Leaves 18 in. long, broad lanceolate . . . (40) *E. aeridostachya*

Leaf narrowed at base, 9 in. long, narrow lanceolate . . . (41) *E. brunea*

Leaf stiff linear narrow . . . (42) *E. linearifolia*

Lip oblong, fan-shaped; leaf linear-lanceolate broad . . . (43) *E. crassipes*

Rhizome long creeping; pseudobulbs 1 in. apart.

Lip oblong round entire . . . (44) *E. reptans*

Lip 3-lobed; leaves oblanceolate, 8 in. long . . . (45) *E. dasystachys*

Lip 3-lobed; leaves lorate, 15 in. long . . . (46) *E. lorifolia*

Lip 3-lobed; leaves lanceolate, 7 in. long . . . (47) *E. crassifolia*

§ 10. *Dendrolirion*. Rhizome long; stems distant short, or large, pseudobulbous or not.

Stem pseudobulbous; flowers few, woolly.

Scape 6 in. long; flowers large, several . . . (48) *E. albido-tomentosa*

Scape short, 1 to 3 in. long; flowers 1 to 3.

Pseudobulbs small conic crowded; leaf terete . . . (49) *E. teretifolia*

Pseudobulbs obovoid narrowed upwards; leaf flat lanceolate . . . (50) *E. leiophylla*

Stems not pseudobulbous.

Leaves 3 linear long; rhizome stout . . . (51) *E. pannea*

(1) *E. pudica* Ridl. *Journ. Linn. Soc.* xxxii. 394; *Mat.* i. 104.

Stems crowded cylindric, with 5 internodes, 1.5 in. tall, .5 in. through, covered with brown papery sheaths. Leaves 2, oblanceolate sub-acute, 6 in. long, 1.5 in. wide. Racemes from lower nodes, 2 in. long. Flowers numerous, small. Bracts ovate. Ovary and pedicel woolly. Upper sepal elliptic blunt, woolly on back, laterals much larger ovate blunt. Petals as large as upper sepal, elliptic blunt curved. All white. Lip side-lobes falcate sub-acute edged violet, midlobe longer, oblong truncate white, 2 large oblong pink-edged calli between the lobes. Column rather large, foot short. *Hab.* On trees by rivers. Singapore, Changi; Pasir Panjang, Johor, Kwala Kahang (Kelsall). Negri Sembilan, Siliu, Seremban (Williams).

(2) *E. lancifolia* Hook. *fl. F.B.I.* v. 894; *l.c. Pl.* 2075; *Ridl. Mat.* i. 104. *E. dissitiflora* Ridl. *Journ. Linn. Soc.* xxxii. 292.

Stems 4 in. long, thick, covered with large sheaths. Leaves 2, oblanceolate sub-acute, 6 in. long, 1 in. wide; petioles more than 1 in. long. Racemes 2 or 3, pubescent short. Flowers about 6, small sessile. Bracts ovate, very small. Upper sepal elliptic or ovate blunt, laterals much broader, ovate falcate blunt; mentum very short pubescent. Petals as long as upper sepal elliptic. Lip side-lobes falcate blunt, papillose, with 2 large oblong calli, midlobe ovate. Column large, foot slender. Capsule oblong

3-angled pubescent, .5 in. long. *Hab.* Trees over rivers. Johor, Batu Pahat. Pahang, Tahan River. Perak, Batang Padang (Kunstler).

(3) *E. obliqua* Lindl. *Journ. Linn. Soc.* iii. 1839, p. 55; *Ridl., Mat.* i. p. 89.

Little tufted plant, 2 to 4 in. tall. Leaves linear-lanceolate bilobed, 2 in. long, .25 in. wide. Racemes 1 to 3 sub-terminal erect, 3 in. long, woolly, base nude. Flowers 20 or more crowded, very small. Sepals ovate white woolly. Petals narrower than lip, as long, 3-lobed, side-lobes falcate, ovate acute, midlobe cordate acute, a conic yellow callus in middle, white with a row of violet spots on the side lobes. Column short, abruptly dilate above, white. Anther pink. Capsule terete, .5 in. long. *Hab.* Mangroves and other trees. Singapore (Cuming), Kranji (Ridley). Johor, Batu Pahat; Tempayan River (Ridley). *Distrib.* Borneo.

(4) *E. larutensis* Ridl.

Stem tall stout compressed. Leaves oblong-lanceolate acuminate, thinly coriaceous; nerves elevate; 6 in. long, 1.25 in. wide. Racemes sub-terminal 4, over 1 ft. long, covered with small tufts of white hairs. Flowers very numerous. Bracts lanceolate reflexed, .05 in. long. Pedicel and ovary hairy, .25 in. long. Upper sepal small oblong blunt, laterals large, nearly .5 in. long, oblong lanceolate broad at base; mentum as long as sepal; all sprinkled with tufts of white hairs. Petals small linear-oblong. Lip .5 in. long, side-lobes long oblong blunt, midlobe fan-shaped small with a large blunt hairy callus on the lip and a conic woolly callus at the base of the lip. Column very small, foot long. *Hab.* Rare. Perak, Thaiping Hills (Curtis and Derry).

(5) *E. bidens* Ridl. *Journ. Linn. Soc.* xxxii. 289.

Stems tufted, 12 in. tall, stout leafy. Leaves 9 to 18 in. long, 1.5 in. wide, lorate distichous bilobed. Racemes 3 solitary in upper axils, over 12 in. long, woolly. Flowers numerous, .25 in. wide. Bracts ovate acuminate, .12 in. long. Upper sepal ovate blunt, laterals broad ovate, mentum short; all woolly outside, greenish spotted and tipped purple. Petals linear pink. Lip greenish yellow, side-lobes round blunt; midlobe of 2 linear processes, disc white raised with 2 red keels. Capsule terete, 1 in. long. *Hab.* Mountain forests on rocks and trees. Pahang, Telom; Bukit Fraser (Burkill). Perak, Thaiping Hills at 3000 to 4000 ft. altitude (Ridley).

(6) *E. iridifolia* Hook. *fil. F.B.I.* v. 790; *Ic. Pl.* 2067; *Ridl. Mat.* i. 90.

Stems leafy, 12 in. long or less, tufted. Leaves 9 to 18 in. long, .75 in. wide. Scapes 18 in. long, pubescent. Flowers numerous, .5 in. long. Bracts ovate reflexed. Upper sepal oblong-ovate blunt, laterals much broader, ovate blunt oblique, backs chestnut-red pubescent, front yellow blotched red. Lip side-

lobes oblong-ovate blunt yellow red-spotted, midlobe bifid, lobes lacinate, callus at base 3-lobed white, broad white band on disc with 2 yellow ridges, centre of midlobe thick white. *Hab.* Mountain forests. Perak, Gunong Batu Putih (Wray); Bujong Malacca (Ridley).

(7) **E. Ridleyi** Rolfe, *Journ. Linn. Soc.* xlii. 150. E. major *Ridl. Mat.* i. 90 (not of *Trans. Linn. Soc.* iv. 237). E. Kingii *Hook. fil. F.B.I.* vi. 790; *Ic. Pl.* 2066.

Stems tufted, over 1 ft. long, flattened, nearly .5 in. through. Leaves lanceolate acuminate unequally bilobed, 7 in. long, .75 in. wide, thin. Racemes 4, woolly, 1 ft. long. Flowers very numerous, .12 in. long; pedicel and ovary .25 in. long. Bracts ovate acuminate, .12 in. long. Upper sepal elliptic, laterals broader blunt, backs woolly greenish yellow inside, mentum broad, round short. Petals oblong blunt. Lip side-lobes sub-falcate, oblong white with pink spots, midlobe clawed reniform, deep purple with a white powdery callus and a lobed one at the base of lip. Column short, foot long, white edged purple. Capsule elliptic, .25 in. long. *Hab.* On trees in mountain forests, at 3000 ft. altitude and upwards, Pahang, Kluang Terbang (Barnes); Telom. Selangor, Semangkok Pass. Perak, Thaiping Hills at 3800 to 5000 ft. altitude (all collectors). Jalor, Bukit Besar (Gwynne-Vaughan).

(8) **E. tahanensis** *Ridl. Journ. F.M.S. Mus.* vi. 177.

Stems 1 ft. tall, .25 in. through, leafy. Leaves coriaceous, linear-acuminate, 4 in. long, .25 in. wide, sheaths 1 in. long, flattened. Racemes 2 to 3, lax many-flowered, 8 in. long; rachis white woolly. Bracts lanceolate caudate, .1 in. long. Pedicel and ovary slender woolly, .25 in. long. Upper sepal ovate-lanceolate, laterals broader triangular-ovate, woolly outside; mentum short, half as long as sepal, broad. Petals oblong blunt. Lip side-lobes oblong blunt, midlobe transversely oblong, one erect round callus at base of lip between 2 smaller, the narrow linear fleshy disc on the midlobe ending in a fleshy oblong callus. Column arms round. *Hab.* Local. Pahang, Gunong Tahan, on trees in woods at 3600 to 6000 ft. altitude (Ridley).

(9) **E. citrina** *Ridl. Kew Bull.* 1894.

Stems numerous, stout flattened flexuous, 2 ft. tall. Leaves coriaceous elliptic-lanceolate, bluntly bilobed, 6 in. long, 1.5 in. wide; petiole stout, .5 in. long; sheath 3 in. long, flattened. Racemes 2 or more terminal, 6 in. long, rachis woolly; flowers numerous yellow woolly. Bracts lanceolate acuminate deflexed, .25 in. long. Pedicel and ovary longer woolly. Sepals ovate blunt, upper one hooded, laterals broader, mentum short broad, lemon yellow. Petals elliptic-obovate blunt, shorter. Lip base clawed with a mass of flocculent yellow matter, lateral lobes broad thin sub-acute falcate pale yellow with obscure purple spots; midlobe shorter oblong retuse, callus spoon-shaped, on the disc

between side-lobes two keels thin waved ending in 2 points. All bright lemon yellow. Column short, thick foot long, deeply grooved. Anther ovate yellow. *Hab.* Gunong Kerbau (Haniff). *Distrib.* Borneo.

(10) ***E. longifolia*** *Hook. fil. F.B.I. v. 790; Ridl. Mat. i. 91.*

Stems tufted, 2 to 8 in. tall, covered with white sheaths. Leaves 2 to 3, terminal linear acuminate unequally bifid, 4 to 8 in. long, .25 in. wide. Racemes solitary, 3 to 6 in. long, woolly. Flowers very small white, whorled. Upper sepal oblong blunt, laterals woolly triangular-ovate larger, mentum broad round. Petals narrow lanceolate. Lip saccate lanceolate-ovate acute, entire. Column short, foot very short. Capsule elliptic sessile, .12 in. long. *Hab.* Mountains, Pahang, Kluang Terbang (Barnes); Gunong Tahan (Robinson); Bukit Fraser (Burkill). Perak, Thaiping Hills; Ulu Batang Padang (Wray). *Distrib.* Sumatra, Borneo.

(11) ***E. Earine*** *Ridl. Journ. F.M.S. Mus. vi. 178.*

Stems terete, 2 in. tall. Leaves 3 to 4 at tip, oblong-linear fleshy, 2 in. long, .25 in. wide, acute. Raceme 1 or 2 from upper axils, 5 in. long, red woolly. Flowers very numerous, small, white. Bracts ovate truncate red woolly, .1 in. long. Sepals upper ovate oblong, laterals blunt triangular; mentum nearly as long as ovary, pubescent white. Petals linear-oblong. Lip spatulate, tip rounded triangular, 2 short oblong erect lobes at base. Column broad, foot long; stigma very large ovate-triangular. Capsule oblong, .1 in. long. *Hab.* Rare, Pahang, Gunong Tahan at 5000 ft. altitude (Ridley).

(12) ***E. Scortechinii*** *Hook. fil. F.B.I. v. 809; Ic. Pl. 2082; Ridl. Mat. i. 91.*

Stems woody, 3 to 6 ft. tall, terete. Leaves linear acuminate unequally bilobed, 6 in. long, .24 in. wide. Panicle 4 to 5 in. long and as wide, tomentose. Bracts broad papery, .25 in. long. Floral bracts smaller lanceolate. Flowers sessile, white or pink. Sepal upper orbicular-ovate, laterals ovate pubescent. Petals oblong blunt broad. Lip side-lobes oblong blunt, midlobe shorter round or obcordate, disc and centre tomentose. Column foot long. Capsule elliptic sessile, .5 in. long. *Hab.* On rocks and trees, mountains, Pahang, Gunong Tahan; Kluang Terbang (Barnes). Selangor, Gunong Mengkuang Lebah (Robinson), Gunong Menuang Gasing (Kloss); Hulu Semangkok. Perak, Gunong Batu Putih (Wray); Gunong Bubu (Kunstler); Gunong Kerbau (Robinson).

(13) ***E. leptocarpa*** *Hook. fil. F.B.I. v. 805; Ic. Pl. 2077; Ridl. Mat. i. 92.*

Stems robust, 2 to 3 ft. tall, thick, internodes 1.5 in. long. Leaves linear-lanceolate or lorate blunt, 6 to 8 in. long, .5 to 1.5 in. wide, thin, coriaceous. Raceme lateral, 1.5 in. long, 4- to 6-flowered.

Bracts ovate-lanceolate, .25 to .5 in. long. Pedicels and ovary .5 to 1 in. long. Upper sepal lanceolate, laterals ovate-lanceolate falcate acuminate, .3 in. long, yellow mottled brown outside, straw-colour inside. Petals linear oblong blunt. Lip spathulate, clawed, side-lobes short, midlobe round with 3 mealy keels on disc between side lobes. Capsule cylindrical blunt angled, 3 to 4 in. long, very slender. *Hab.* On trees at 800 ft. altitude. Perak, Kal (Kunstler); Tanjong Malim (Williams). *Distrib.* Borneo.

(14) **E. pendula** *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 78; *Mat.* i. 92.

Stems terete, 2 to 3 ft. long, .25 in. through. Leaves narrow linear-lanceolate acuminate, 4 in. long, .25 in. wide; sheaths dilate upwards, .75 to 1 in. long. Racemes hardly .5 in. long, with several acute lanceolate red-brown bracts .5 in. long. Flower solitary, white, nearly 1 in. wide; pedicel and ovary .5 in. long. Upper sepal oblong blunt, laterals broad ovate reflexed; mentum short very broad blunt. Petals oblong rounded as broad as upper sepal. Lip short-clawed broad, obovate round, side-lobes obscure, midlobe broad, 2 curved laminae on disc. Column foot long. *Hab.* Selangor, Batu Caves (Kelsall). Perak (Scortechini). *Distrib.* Borneo.

(15) **E. pilifera** *Ridl. Journ. Linn. Soc.* xxxii. 299.

Stems weak sub-terete, 18 in. long. Leaves thin, lanceolate acuminate unequally bilobed, 3 in. long, .25 in. wide, sheaths nearly 1 in. long. Racemes very short, few-flowered, with 4 empty yellow pubescent bracts .12 in. long at base. Ovary and pedicel .36 in. long, pubescent. Flowers nearly .5 in. long, white. Upper sepal lanceolate blunt, laterals straight or falcate acute; mentum short blunt. Petals lanceolate, all white. Lip shorter, narrow obtusely, side-lobes round, midlobe hardly longer oblong, obscurely 3-lobed covered with yellow papillose hairs, a yellow line towards base. Column curved with an orange spot on base. Pollinia 4 large and 4 very small. Capsule terete, 2 in. long. *Hab.* Perak, Thaiping Hills (Ridley). *Distrib.* Sumatra.

(16) **E. floribunda** *Lindl. Bot. Reg.* 1843; *Misc.* 43. t. 23; *Ridl. Mat.* i. 96.

Stems tufted, 5 to 9 in. tall, .25 in. through, grooved. Leaves at top linear-lanceolate, 5 to 8 in. long, .75 to 1 in. wide. Racemes from below leaves 3 in. long, densely floriferous, axillary. Axillary bract ovate brown. Floral bracts ovate acute, reflexed. Flowers .25 in. long, white. Upper sepal ovate acute, laterals oblique triangular; mentum twice as long. Petals lanceolate acute. Lip, side-lobes acute, midlobe spathulate, apex broad truncate. Column short, foot long. Capsule terete, .5 in. long. *Hab.* Common on trees, Singapore (Wallich); Sungei Buluh; Selitar. Johor, Tana Runto. Pahang, Tahan River. Selangor, Sepan (Ridley). Negeri Sembilan, Port Dickson (Williams). Perak (Scortechini); Larut

(Kunstler). Kedah Peak at 3000 ft. altitude. Pulau Terutau (Curtis). *Distrib.* Borneo.

(17) ***E. densa*** *Ridl. Journ. Linn. Soc.* xxxi. 281; *Mat.* i. 96.

Stems tufted, cylindric, 8 in. long, 1 in. thick. Leaves 4 at top lanceolate lorate, 11 in. long, 2 in. wide. Racemes dense, 9 in. long; rachis pubescent. Flowers small, white or pink. Upper sepal ovate, laterals ovate-triangular. Petals ovate narrower. Lip side-lobes falcate acute, midlobe spathulate, tip obscurely retuse, 3-lobed. Column foot long, white edged red. Anther red. *Hab.* Selangor, Sempang Mines. Perak, Thaiping Hills (Ridley); Hermitage Hill (Curtis), Kedah Peak. *Distrib.* Borneo.

The low-land form has white, the high-hill form dull pink flowers.

(18) ***E. saccata*** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 39.

Stems sausage-shaped cylindric, 4 in. long, 1 in. through. Leaf lanceolate acute narrowed to petiole, 8 in. long, 1.5 in. wide. Spike 4 in. long, rachis black hairy. Bracts ovate reflexed. Flowers numerous dense yellowish white. Ovary and pedicel .5 in. long, purple hairy. Upper sepal ovate blunt white, .2 in. long, laterals broad ovate; mentum nearly .5 in. long. Petals shorter ovate-triangular, pink. Lip as long as sepals, claw broad oblong, white centre pink, channelled, limb orbicular, edge undulate, fleshy pustular, reddish, centre yellow. Column pink, foot straight tipped orange, arms acute subulate; anther purple black. *Hab.* Rare, Perak, Gunong Kerbau (Mohammed Haniff).

(19) ***E. tenuiflora*** *Ridl. Journ. Linn. Soc.* xxxii. 291; *Mat.* i. 97.

Rhizome long, woody. Stems terete, 6 to 8 in. long, .25 in. thick. Leaves at top lanceolate acute, 3 to 4 in. long, .75 in. wide. Racemes 3 to 4, slender lax. Flowers thin, numerous glabrous yellow, .25 in. long; pedicels as long. Bracts .12 in. long. Sepals lanceolate acute, no mentum. Petals similar shorter. Lip shorter entire lanceolate acute, yellow with red central blotch. *Hab.* On trees, sea level to 4000 ft. altitude, Singapore, Galang; Sungei Morai, Toas, Johor, Batu Pahat. Pahang, Pekan; Telom (Ridley), Perak, Hermitage Hill (Curtis). Penang Hill. Kedah Peak (Robinson). *Distrib.* Borneo.

(20) ***E. cepifolia*** *Ridl. Journ. Linn. Soc.* xxxi. 382; *Mat.* i. 97.

Stems tufted, 3 in. tall, suddenly thickened upwards from a narrow base, green. Leaves 4 from the thickened part terete acute, 6 in. long. Racemes axillary slender, 6 in. long, pubescent. Flowers numerous small white. Bracts lanceolate minute. Sepals ovate pubescent, laterals triangular-ovate blunt; mentum short. Petals lanceolate narrower. Lip side-lobes small acute erect, midlobe obtuse spathulate. Column short thick violet. *Hab.* Perak (Scortechini). *Distrib.* Borneo.

(21) **E. bractescens** Lindl. *Bot. Reg.* 1841, 18, 1844, t. 29; *Ridl. Mat.* i. 101.

Stems sausage-shaped of 2 internodes, 2 in. long, .5 to .75 in. through. Leaves 2 at top oblong-lanceolate, 4 to 9 in. long, .5 in. wide. Raceme from upper part of stem 6 in. long, lax. Flowers 15. Bracts at base of raceme oblong blunt, floral ones lanceolate blunt. .5 in. long, white. Rachis pubescent. Upper sepal lanceolate-acute, laterals falcate lanceolate, .5 in. long, mentum conic. Petals narrow lanceolate acute, all white. Lip oblong, side-lobes long falcate acute, lanceolate, rosy, midlobe obovate white, ridges on disc 2, short, thickened in front. Column long, foot short, white with a rosy spot. *Hab.* Not rare, usually near the sea, Singapore, Pulau Tekong; Chan Chu Kang. Johor, Batu Pahat. Pahang, Pekan (Ridley), Negri Sembilan, Siliu (Williams). Kedah, Pulau Song Song (Ridley); Lankawi (Curtis). *Distrib.* Tenasserim, Borneo.

(22) **E. suaveolens** Ridl. *Journ. Linn. Soc.* xxxii. 292; *Ridl. Mat.* i. 101.

Stems sausage-shaped of 6 internodes 4 in. long, 1.25 in. through. Leaves 3 to 4, lanceolate blunt, 6 in. long, 1.25 in. wide, narrowed to a petiole 1 in. long. Raceme below leaves stout, recurved. Bracts .25 in. long, oblong acute, black pubescent. Flowers large, fragrant. Sepals ovate blunt, .74 in. long; mentum long, oblong compressed. Petals ovate acute, all rose pink. Lip spathulate, claw long, side-lobes round pink, midlobe short broad ovate fleshy, a central warty yellow callus. *Hab.* Rare, Johor, Sedili River (E. D'Almeida). Perak, Bujong Malacca (Ridley).

(23) **E. Endymion** Ridl. *Journ. Linn. Soc.* xxxii. 295; *Mat.* i. 101.

Stems conic-cylindric of 2 to 8 internodes, 3 in. long. Leaves 8 in. long, 1.5 in. wide, lanceolate sub-acute, base narrowed. Raceme stout erect, 6 in. long. Flowers many, .5 in. wide; pedicels pubescent. Bracts lanceolate. Sepals upper wide lanceolate blunt, laterals ovate falcate acute; mentum broad blunt short, all white, backs pubescent. Petals ovate white. Lip side-lobes falcate red, erect approximate with a fleshy callus on the ovate blunt whitish yellow midlobe. *Hab.* Singapore, Selitar. Selangor, Sempang Mines (Ridley). *Distrib.* Borneo.

(24) **E. xanthocheila** Ridl. *Mat.* i. 102.

Stems cylindric fusiform, 5 in. long, .5 in. apart on a rather thick rhizome. Leaves 3 to 4, lanceolate, 5 to 6 in. long, 1.5 in. wide. Racemes several below leaves, 3 in. long. Flowers many fragrant, .5 in. long; pedicels pubescent, .5 in. long. Bracts .12 to .36 in. long, white. Upper sepal ovate, laterals falcate ovate; mentum twice as long, oblong blunt. Petals lanceolate acute, all white. Lip claw long, side-lobes oblong blunt or acute, curved dull red,

midlobe ovate yellow truncate, three red keels on disc, mid-one prolonged to midlobe. Column straight, foot long. *Hab.* Selangor, near Klang. Kedah Peak (Robinson).

(25) **E. Maingayi** *Hook. fil. F.B.I. v. 798; Ic. Pl. 2072.*

Pseudobulbs tufted fusiform, 1 in. long. Leaves 2, linear acuminate, 3 to 4 in. long, .5 in. wide; base narrow. Racemes 2 to 3 in. long. Flowers .5 in. across. Bracts oblong, greenish white. Upper sepal oblong, laterals triangular-ovate falcate acute; mentum short round. Petals linear-oblong as long, all white. Lip obovate, side-lobes crenulate, midlobe small, round bilobed, a woolly callus in centre, 3 keels between side-lobes green with purple spot at base. *Hab.* Local on high trees, Penang (Maingay). On a tree between the Crag Hotel and Government Bungalow. Fl. March (Ridley).

(26) **E. saccifera** *Hook. fil. F.B.I. v. 797; Ic. Pl. t. 2071.*

Stems cylindrical crowded, 3 in. long. Leaves 2 to 8 oblanceolate acuminate, 12 in. or more long, 1 to 1.5 in. wide, petioled. Raceme sub-terminal slender, 6 in. long. Flowers .5 in. long. glabrous, dull pink claret and yellow. Bracts oblong-lanceolate. Upper sepal ovate-oblong, laterals very broad round; mentum 3 times as long as upper sepal, saccate. Petals elliptic acute. Lip entire clawed spatulate tomentose. Column very short, foot long. *Hab.* Rare, Perak, Gunong Batu Putih (Wray).

(27) **E. recurvata** *Hook. fil. F.B.I. v. 797; Ic. Pl. 2070; Ridl. Mat. i. 102.*

Stems thick cylindrical, 2 to 5 internodes, 4 to 6 in. tall, .6 in. through. Leaves 3 to 5, elliptic lanceolate, narrowed to petiole, .6 to 8 in. long, 1.5 to 2 in. wide. Raceme lateral, 6 in. long, pubescent. Bracts ovate yellow, 5 in. long. Flowers .6 in. wide. Sepals recurved falcate lanceolate acuminate, yellow striped purple; mentum large rounded. Petals lanceolate acuminate yellow striped purple. Lip side-lobes short round, pale purple, midlobe obcordate yellowish, 2 keels on disc, retuse with a short point. *Hab.* Perak (Kunstler).

Drawing known only.

(28) **E. Braddoni** *Rolfe, Orch. Rev. xv. 248. E. latibracteata Ridl. Journ. Linn. Soc. xxxii. 293. (Fig. 166, p. 93.)*

Stems terete, 1 ft. long, .25 in. thick. Leaves 4, lanceolate acute plicate thin, 7 in. long, 1.75 in. wide. Racemes 2 to 3 compact sessile, 2 in. long. Bracts ovate acute, nearly .5 in. long, green. Flowers 12, nearly glabrous, .5 in. long. Upper sepal lanceolate acute, laterals falcate keeled; mentum short broad, white, bases red. Petals shorter broader ovate blunt, white. Lip shorter, side-lobes curved blunt, madder pink, midlobe broad round ovate retuse, white, 2 raised keels and 2 raised nerves between on disc ending in a madder patch on midlobe. Column rather

long, foot short. *Hab.* Rare. Negri Sembilan, Seremban (Dr. Braddon).

Kranzlin refers this to Reichenbach's *E. hemimelana* by guess, without having seen a specimen of either species.

(29) *E. carnea* Ridl. *Journ. F.M.S. Mus.* iv. 68.

Stems tufted, 8 in. tall, .25 in. through, cylindrical. Leaves



FIG. 166.—*Eria Braddoni*.

elliptic-lanceolate acuminate acute, narrowed at base, 6 in. long, 1 in. wide. Racemes 2 in uppermost axils, 3 in. long, 12-flowered, with an acuminate papery bract 1.5 in. long at base. Bracts lanceolate, .3 in. long. Pedicels .5 in. long, pubescent. Upper sepal narrow lanceolate-linear acute, .5 in. long, laterals broad falcate acuminate; mentum round. Petals narrower linear curved,

all flesh-colour. Lip side-lobes broad ovate falcate papillose, midlobe ovate-orbicular acute, 2 ridges on base of side-lobes, 3 undulate to midlobe, centre yellow. *Hab.* On trees over river. Pahang, Telom (Ridley).

(30) **E. carunculata** *Ridl. Journ. Linn. Soc.* xxxviii. 326.

Stems sub-terete, 2 in. long. Leaves lanceolate, base narrowed, tip acute, 5 in. long, .1 in. wide. Raceme 5 in. long. Flowers small crowded, .12 in. long. Bracts ovate reflexed; rachis tomentose. Upper sepal ovate, laterals triangular-ovate blunt mentum short round, all pubescent, brownish white. Petals ovate rounded. Lip longer, side-lobes ovate-lanceolate, edges appressed fleshy, midlobe clawed obovate 3-lobed, lobes rounded, edged flesh colour. Column sub-quadrate. *Hab.* Mountains on rocks. Pahang, Gunong Tahan at 5000 to 6000 ft. altitude (Robinson).

(31) **E. ramulosa** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 39.

Rhizome creeping branched cylindrical; stems 6 in. long, .25 in. through, covered with silvery grey epidermis. Leaves 2, lanceolate acute, base narrowed, 3 in. long, .75 in. wide, thin. Raceme 2 in. from below leaves. Flowers 6. Bracts .25 in. long, oblong cream white. Pedicels with ovaries .25 in. long, red scurfy. Upper sepal lanceolate acute, .25 in. long, laterals falcate; mentum short, flesh colour; nerves pink. Petals lanceolate-linear, falcate narrow. Lip side-lobes falcate pubescent, pink, midlobe reniform bilobed, a tooth in the notch, a whitish purple raised line between lobes, ending on base of midlobe in a purple short keel on each side, base brown purple, tip pink. Column foot short white. *Hab.* Perak, Thaping Hills (Long).

(32) **E. nutans** *Lindl. Bot. Reg.* 1840; *Misc.* 83; *Ridl. Mat.* i. 103.

Rhizome short; stems 1 ft. tall, .5 in. through, cylindrical tufted covered with brown sheaths. Leaves 2 or 3, lanceolate acuminate acute, 6 in. long, 1 in. wide. Flower 1, nodding from above, leaves with a large brown bract .5 in. long. Peduncle .5 in. long; pedicel .5 in. long. Upper sepal oblong blunt, laterals ovate falcate, mentum thick curved blunt. Petals lanceolate, blunt, all white. Lip side-lobes falcate acute, midlobe obovate obscurely 3-lobed at tip, white tinted pink, keels 3, median running on to the midlobe, laterals 3 crisped to base of midlobe. Column long curved, foot short, white, an orange cushion at base of foot. Capsule cylindrical, 3 in. long, .25 in. thick. *Hab.* Common on mangroves and other trees up to 6000 ft. altitude. Singapore, Toas; Kranji. Johor, Tanah Runto (Ridley); Ulu Batu Pahat (Kelsall). Malacca, Mt. Ophir. Pahang, Gunong Tahan (Robinson). Negri Sembilan, Port Dickson (Williams). Perak, Bujong Malacca. Penang (Maingay). Kedah Peak. *Distrib.* Linga.

(33) **E. neglecta** *Ridl. Journ. Linn. Soc.* xxxi. 283; *Mat.* i. 103.

Rhizome much branched forming a dense mat; stems thickened upwards, 5 in. tall. Leaves lanceolate flaccid acute 1 or 2, 3.5 in. long, .75 in. wide. Flower 1; pedicel short in a large brown bract, terminal. Sepals lanceolate, laterals nearly ovate-lanceolate, .25 in. long; mentum short broad. Petals lanceolate shorter, all rose-tinted. Lip side-lobes falcate acute pink, midlobe oblong quadrate to obovate, tip round, retuse yellow, keels 2, running to base of midlobe, median to end of midlobe waved. Column rather long pink, a square callus on foot. *Hab.* Mangrove swamps. Singapore, Selitar. Johor, Tana Runto (Ridley). Perak (Scortechini). *Distrib.* Lingga, Borneo.

(34) **E. ochracea** *Rolfe, Kew Bulletin* 1909, p. 366.

Rhizome stout woody; pseudobulbs cylindrical, 3.9 to 6.8 in. long. Leaves 3, oblong or lanceolate-oblong sub-coriaceous, 3.6 to 6 in. wide. Scapes terminal pubescent, 3.9 in. long. Bracts ovate-oblong, .4 in. long. Flowers greenish yellow slightly brownish; pedicels pubescent, .8 in. long. Upper sepal ovate oblong-blunt, laterals oblique ovate recurved, .6 in. long. Petals elliptic-oblong. Lip recurved, side-lobes truncate narrow, midlobe sub-orbicular disc fleshy. Column broad. *Hab.* Setul, Bukit Bunga Batu (Haniff).

(35) **E. diluta** *Ridl. Journ. F.M.S. Mus.* vii. 52.

Rhizome long creeping; stems remote, 4 in. long, slender. Leaves narrow linear acuminate acute, 3.75 in. long, .4 in. wide. Raceme sub-terminal, .5 in. long; bracts brown lanceolate acuminate, 2-flowered. Pedicels .4 in. long, pubescent. Sepals .3 in. long, lanceolate acute, yellowish white, laterals nearly .2 in. long; mentum short and broad. Petals linear acute. Lip brownish pink, side-lobes falcate broad, midlobe oblong sub-acute dilate near tip, 2 short ridges meeting in a V, fleshy at base, 2 short undulate ridges near side-lobes and 1 running to tip elevate into a keel. Column long curved, back margin elevate, brownish pink. *Hab.* Kedah Peak at 3000 ft. altitude (Robinson).

(36) **E. longerepens** *Ridl. Journ. Linn. Soc.* xxxi. 282; *Mat.* i. 103.

Rhizome long creeping; stems 6 to 7 in. apart terete, 4 in. long, .25 in. thick. Leaves 3 or 4, lanceolate to ovate lanceolate acute, 6 in. long, 2 in. wide; petioles .5 in. long. Raceme from below leaves 3-flowered. Bracts .25 in. long, flesh colour. Sepals ovate-lanceolate, .5 in. long, laterals longer; mentum oblong; all pinkish yellow, a darker median line. Petals much smaller lanceolate acute, yellowish. Lip oblong truncate entire white. Column club-shaped, white with a red spot at base. Capsule cylindrical, 2 in. long. *Hab.* On mangroves. Singapore, Kranji; Sungei Morai (Ridley). *Distrib.* Borneo.

(37) **E. stellata** Lindl. *Bot. Reg. t.* 904; *Bot. Mag. t.* 3605; *Ridl. Mat. i.* 98. *Dendrobium perakensense* Hook. *fil. F.B.I. v.* 712, *Ic. Pl.* 2019.

Stems short, 2 in. long. Leaves lanceolate acute or oblanceolate jointed to a prolongation of sheath petioled, 1 ft. long, 1·75 to 2 in. wide. Raceme lateral erect, 18 to 30 in. long. Flowers scattered, ·75 in. wide. Bracts lanceolate acuminate, ·75 to 1 in. long. Sepals lanceolate acuminate, white, backs pubescent, mentum short. Petals smaller. Lip side-lobes erect round, white edges crimson with 3 raised veins yellow, on disc, midlobe linear-oblong or lanceolate acute, yellowish white. Column broad white, edges crimson. *Hab.* On orchard trees. Singapore, Chan Chu Kang. Pahang, Kota Glanggi. Negri Sembilan, Seremban (Williams). Perak (Scortechini); Temengoh (Ridley). *Distrib.* Tenasserim to New Guinea.

(38) **E. striolata** Rchb. *fil. Ill. Hort.* 1888, 35, t. 48; *Ridl. Mat. i.* 99.

Pseudobulbs globose crowded, 1·5 in. long, ·75 in. thick. Leaves 2 lanceolate acute, base narrowed, 9 in. long, 1·75 in. wide. Scape erect, 15 in. tall. Flowers scattered, 1 in. wide. Bracts ovate to lanceolate acute, ·5 in. long. Sepals lanceolate acute white, striped pink. Petals linear-lanceolate, greenish white. Lip side-lobes blunt round, white, edge and veins pink, midlobe narrow linear acute greenish tipped pink. Capsule elliptic, ·5 in. long. *Hab.* Singapore, Kranji. Johor, Batu Pahat (Ridley). Negri Sembilan, Seremban (Williams). *Distrib.* Borneo, Sumatra, New Guinea.

(39) **E. elata** Hook. *fil. Ic. Pl.* 1848; *F.B.I. v.* 794; *Ridl. Mat. i.* 99.

Pseudobulbs elongate thick, 4 in. long. Leaves 2, oblanceolate, 1 ft. long, coriaceous. Scape stout, 9 in. long. Bracts longer than ovary ovate acuminate, ·75 in. long, ·25 in. wide. Flowers large distant; pedicel and ovary ·25 in. long with base of sepals pubescent. Upper sepal lanceolate, laterals falcate lanceolate acute, mentum blunt. Petals linear-oblong blunt falcate. Lip side-lobes incurved blunt, midlobe shorter, hairy, disc with 3 raised ridges. Column slender, foot pubescent. Capsule cylindrical angled, 1 in. long, erect. *Hab.* Rare. Selangor, Gunong Mengkuang Lebah (Robinson) at 5000 ft. altitude. Perak (Scortechini).

(40) **E. aeridostachya** Rchb. *fil. Lindl. Journ. Linn. Soc.* iii. 48; *Ridl. Mat. i.* 97.

Rhizome stout; stems 2 in. long, crowded thick covered with coriaceous sheaths. Leaves 3 or 4, stiff coriaceous broad lanceolate, 18 in. long, 2 in. wide. Scapes from upper axils 1 ft. long, base nude pubescent, raceme dense. Flowers brown small, pubescent outside. Upper sepal ovate-oblong, laterals triangular-ovate,

mentum twice as long. Petals linear-lorate blunt falcate. Lip oblong blunt, tip round crisped pubescent. Capsule elliptic, .25 in. long. *Hab.* Singapore, Bukit Mandai. Johor, Tanah Runto. Malacca. Perak, Thaiping at 3000 to 4000 ft. altitude (Ridley). Kedah, Gunong Bintang (Kloss).

(41) **E. brunea** *Ridl. Journ. Linn. Soc.* xxxii. 297; *Mat. i.* 98.

Leaves narrow lanceolate acute, base narrow, 9 in. long, .75 in. wide. Scapes 8 to 10 in. long, lower half nude red woolly, raceme very dense. Flowers brown woolly outside, yellowish within. Bracts ovate acute, very small. Sepals sparsely red-tomentose outside. Upper one elliptic blunt, laterals much larger ovate oblique; mentum long. Petals linear blunt curved. Lip thin, claw long, limb ovate-spathulate undulate. *Hab.* Selangor, Bukit Hitam. Perak, Thaiping Hills (Ridley); Hermitage Hill (Curtis).

(42) **E. linearifolia** *Ridl.*

Pseudobulbs crowded, 1 in. long. Leaves stiff coriaceous lanceolate-linear, 1 ft. long, .35 in. wide, keel stout. Scape 7 in. long, rather slender, racemose part, 3.5 in. long. Flowers barely .2 in. long, red-woolly; pedicels .1 in. long, brown hairy pale greenish straw colour. Sepal upper elliptic-lanceolate blunt, laterals broad ovate blunt, mentum clubbed. Petals thin smaller elliptic blunt. Lip obovate-oblancoate, base rather thin, tip fleshy broad undulate. Column short. Anther apparently purple. *Hab.* Perak, Gunong Batu Putih (Wray).

(43) **E. crassipes** *Ridl. Journ. Linn. Soc.* xxxviii. 327.

Rhizome woody; pseudobulbs crowded conic, covered with dark brown sheaths, 1 in. long. Leaves 2, linear-lanceolate acute, 5 in. long, .5 in. wide. Scape 1 ft. long, lower half nude, silvery tomentose. Raceme densely red silvery tomentose. Bracts minute lanceolate acuminate. Sepals upper ovate blunt, laterals semi-orbicular pubescent; mentum short, straight clubbed. Petals small narrow lanceolate curved. Lip short oblong fan-shaped, tip round undulate. Capsule oblanceolate. *Hab.* On low bushes or on the ground. Pahang, Gunong Tahan at 5000 ft. altitude.

(44) **E. reptans** *Ridl. Journ. Linn. Soc.* xxxviii. 327.

Rhizome long creeping stout woody; pseudobulbs 1 in. apart, cylindrical, 1 in. long, covered with silvery sheaths. Leaf 1, narrow lanceolate linear sub-acute very coriaceous, 6 in. long, .5 in. wide. Scape 1 ft. long, basal 7 in. nude. Raceme dense, 4 in. long, all red tomentose. Upper sepal oblong hooded, laterals ovate-triangular falcate, tomentose outside, pale yellow inside; mentum .25 in. long, straight cylindrical clubbed. Petals broad ovate-lanceolate. Lip oblong rounded, edges undulate, central bar fleshy papillose. *Hab.* On rocks at 5000 to 6000 ft. altitude. Pahang, Gunong Tahan (Robinson).

(45) **E. dasystachys** *Ridl. Journ. Linn. Soc.* xxxiii. 296; *Mat.* i. 98.

Rhizome thick woody; pseudobulbs 3 in. long, conic-cylindric. Leaves 4, oblanceolate narrowed to petioles, 8 in. long, .5 in. wide. Scapes two, 7 to 8 in. tall, base nude with 2 or 3 ovate bracts. Raceme dense, 3 in. long. Flowers rusty pubescent, .25 in. long. Bracts .25 in. long, ovate-lanceolate acute. Sepals ovate acute, mentum as long, conic blunt. Petals linear acuminate. Lip claw linear, side-lobes short round crisp, midlobe larger ovate blunt crisp. *Hab.* Rare, on low trees. Pahang, Kwala Pahang (Ridley).

(46) **E. lorifolia** *Ridl. Journ. Linn. Soc.* xxxii. 296; *Mat.* i. 98.

Rhizome nearly 1 in. thick; pseudobulbs 1 in. long. Leaves lorate acute, 15 in. long, 1 to 1.25 in. wide. Scapes 18 to 24 in. long, lower half nude glabrous; raceme pubescent lax. Flowers very many, .25 in. long. Bracts minute ovate. Sepals red pubescent outside. Upper one short ovate, laterals broader, mentum long clubbed, yellowish white inside. Petals wider ovate purple at base. Lip shorter oblong, side-lobes very short, midlobe longer blunt undulate. *Hab.* Mountains. Pahang, Gunong Tahan. Selangor, Bukit Kutu. Kedah Peak (Ridley).

(47) **E. crassifolia** *Ridl. Journ. F.M.S. Mus.* vi. 55.

Rhizome stout woody; pseudobulbs crowded cylindric, 3 in. long, .4 in. through, covered with brown coriaceous truncate sheaths. Leaves very coriaceous lanceolate blunt narrowed to base, 7 in. long, .5 in. wide or less. Scapes with a large pale papery sheathing bract at base. Scape 6 to 18 in. long, lower half nude; raceme long dense brown tomentose. Bracts minute. Upper sepal oblong blunt, laterals broad triangular yellow inside; mentum cylindric conic blunt. Petals linear-oblong blunt. Lip base very shortly narrowed, limb oblong faintly 3-lobed, round truncate. *Hab.* Mountains. Perak, Gunong Kerbau at 4000 to 6000 ft. altitude (Robinson); Gunong Inas (Yapp).

(48) **E. albido-tomentosa** *Lindl. Gen. and Sp. Orch. Pl.* 66; *Rehb. fil Xenia Orchid* ii. t. 136; *Ridl. Mat.* i. 99.

Rhizome long; pseudobulbs ovoid compressed, 2 in. long, 1 in. apart or more. Leaves 3, lanceolate acute, 5 in. long, 1.5 in. wide. Scapes from lowest node of pseudobulb 6 to 8 in. long; rachis woolly. Flowers scattered woolly outside. Bracts lanceolate, .5 in. long. Sepals .5 in. long, outside woolly, inside sea-green; upper lanceolate acute, laterals wide triangular acute spotted red at base, mentum short blunt. Petals .25 in. long, linear-lanceolate acute. Lip pandurate-lanceolate, lobes oblong blunt, midlobe oblong blunt densely spotted purple, a yellow V-shaped callus with dark purple spot in fork on midrib. Column white a pink spot at base. *Hab.* Kedah Peak. Lankawi (Curtis). *Distrib.* Siam, Java.

(49) **E. teretifolia** Griff. *Notulæ*, iii, 298; *Ic. Pl. As. t.* 3000; *Ridl. Mat.* i. 101. *E. pelliipes* Hook. *fil. F.B.I.* v. 802.

Pseudobulbs conic crowded on slender rhizome. Leaf 1, terete, 4 to 5 in. long. Scape in basal sheath woolly, 2 in. long. Flowers 1 or 2, pale lemon. Bracts ovate, .12 in. long. Pedicel .75 in. long. Upper sepal lanceolate, .5 in. long, laterals broad triangular; mentum large round, all woolly outside, rather large round. Petals linear woolly. Lip dull red. *Hab.* Mountains, on trees at 2000 to 6000 ft. altitude, more rarely in mangroves. Singapore, Kranji. Pahang, Telom; Gunong Tahan. Malacca, Mt. Ophir (Griffith). Perak, Thaiping Hills (Curtis); Gunong Batu Putih (Wray). Kedah Peak. *Distrib.* Borneo.

(50) **E. leiophylla** Lindl. *Journ. Linn. Soc.* iii. 57; *Ridl. Mat.* i. 100.

Rhizome branching; pseudobulbs obovate narrowed above into a stalk covered with a reticulate sheath below, 3 in. long, 1 in. through, 2 in. apart. Leaves 2, lanceolate or lorate coriaceous, 4 in. long, .75 to 1 in. wide. Flower 1, scape 2 in. long in a long sheath. Upper sepal lanceolate, laterals broad triangular acute, .5 in. long; mentum thick long, inside ochre, outside red pubescent. Petals narrower, light yellow lorate-lanceolate blunt pubescent. Lip lanceolate, side-lobes obscure, central ridge and disc of midlobe papillose deep purple. Column tall yellow, foot short, arms incurved. *Hab.* Local. Penang, rocks on the hill at 2500 ft. altitude (Maingay, Curtis). *Distrib.* Java, Borneo.

(51) **E. pannea** Lindl. *Bot. Reg.* xxviii. 1842; *Misc.* 79; *Ridl. Mat.* i. 100; *King, Ann. Bot. Gard. Calc.* viii. 175.

Rhizome long wiry; stems hardly swollen, .5 in. long, 2 in. apart. Leaves 3, narrow linear curved acuminate fleshy subterete, 3 to 7 in. long. Scape from axil of an upper leaf 1 in. long, woolly. Flowers 3; bract large ovate. Upper sepal lanceolate acute, laterals triangular, .5 in. long, ochre, woolly outside; mentum short blunt. Petals shorter lanceolate yellow. Lip entire, oblong acute fleshy, purple, centre nearly yellow. Column slender, green. Capsule fusiform, 1 in. long. *Hab.* On trees. Singapore, Kranji; Serangoon. Johor, Batu Pahat. Malacca, Bukit Bruang (Derry). Pahang, Tahan River. Negri Sembilan, Siliau and Port Dickson (Williams). Perak (Scortechini). Penang Hill (Curtis). *Distrib.* Borneo, Himalayas, Tenasserim. *Native name:* Kura Kubong.

13. TRICHOTOSIA, Blume.

Tall or short, sometimes woody plants, densely hairy leafy, no pseudobulbs. Leaves fleshy sessile alternate. Flowers hairy sessile in small or long axillary racemes, 1 to many, covered with red hairs outside. Sepals as in *Eria* but usually sub-equal; mentum moderately long. Petals narrower. Lip usually sub-entire, base narrow, limb quite entire or obscurely 3-lobed; midlobe sometimes

obscurely bilobed. Column short, foot long, arms erect incurved; stigma usually broad. Capsule elliptic. Species about 80, Indo-Malaya. The genus has been long made a section of *Eria*, but Kranzlin has restored it in his Monograph in the Pflanzenreich, unfortunately adding the *Cylindrolobus* section of *Eria*. The tall not swollen stems persistently leafy, short lateral racemes, oblong capsule and peculiar red hair covering even the connivent sepals, make this a convenient genus.

Racemes long pendulous; flowers numerous, all very hairy.

Flowers 1 in. long, about 20 (1) *T. vestita*

Flowers .4 in. long; raceme 3 to 4 in. long; lip obcuneate toothed (2) *T. pyrrhotricha*

Flowers .4 in. long; raceme 1 to 3 in. long; lip obovate (3) *T. ferox*

Racemes very short few-flowered hairy.

Stems 1 ft. long or more, hairy.

Sepals lanceolate acute (4) *T. cristata*

Sepals oblong blunt (5) *T. velutina*

Stems very short villous.

Leaves obovate (6) *T. rotundifolia*

Leaves lanceolate (7) *T. aporina*

Leaves linear (8) *T. hispidissima*

Leaves elliptic (9) *T. microphylla*

Stems and leaves glabrescent.

Stems tall; flowers very short numerous in a short raceme (10) *T. poculata*

Stems 12 in. long or less; flowers 2 or 3.

Leaves ovate-lanceolate; lip trilobed; flowers .25 in. long (11) *T. oligantha*

Leaves lanceolate; lip entire; flowers .5 in. long (12) *T. biflora*

Leaves linear-lanceolate, fleshy glabrous; lip sub-trilobed (13) *T. tuberosa*

Leaves thin lanceolate; lip spatulate, round entire (14) *T. gracilis*

(1) *T. vestita* Kranzlin. *Pflanzenreich*, 151. *Eria vestita* Lindl. *Bot. Reg.* 1844; *Misc.* 76, 1845, t. 2; *Ridl. Mat.* i. 92.

Stems 2 to 3 ft. long. Leaves lanceolate unequally bilobed, densely red-hairy especially beneath, 4 to 8 in. long, 1 to 1.5 in. wide; sheaths 1.5 in. long. Racemes flexuous, 1 ft. long, red-hairy. Flowers 1 in. long, sessile about 20. Bracts orbicular mucronate, .25 in. long. Sepals lanceolate; mentum half as long, curved, all red. Petals narrow lanceolate-linear blunt, pinkish. Lip 3-lobed, base narrow, side-lobes blunt; midlobe cordate longer, crimson, edges white. Column straight; stigma very large, foot as long as column, crimson. *Hab.* Common. Singapore, Sungei Brih. Johor. Pahang, Kluang Terbang (Barnes); Gunong Tahan (Robinson); Gunong Irau near Telom (Robinson); Pekan; Telang River (Machado). Malacca, Merlimau (Derry); Mt. Ophir. Selangor, Sepan. Perak, Batang Padang (Kunstler). Penang, Telok Bahang (Curtis). Kelantan, Bator (Haniff). *Distrib.* Borneo.

(2) **T. pyrrhotricha** *Ridl. Journ. F.M.S. Mus.* v. 48.

Stems tall, 3 ft. 6 in. long, stout densely red-hairy. Leaves 3.5 to 7 in. long, .75 to 1.25 in. wide, lanceolate sharp acuminate hairy all over. Raceme flexuous, 3 to 4 in. long, basal bract ovate amplexicaul, .5 in. long. Floral bracts remote lanceolate acuminate, .5 in. long. Sepals upper lanceolate, lower triangular-ovate falcate hairy, base gibbous, .4 in. long. Petals linear-oblong blunt. Lip obcuneate, edges denticulate, side-lobes broad round with raised nerves papillose on disc, midlobe round with lines of papillæ. *Hab.* Mountains. Pahang, Gunong Tahan. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Thaiping Hills to 5000 ft. altitude (Curtis, Kunstler, etc.); Gunong Kerbau (Robinson).

(3) **T. ferox** *Bl. Bijdr.* 342; *De Vriese, Ill. t.* 9 and t. 11.

Stems 2 to 6 ft. tall, hairy. Leaves oblong acuminate pustular sparsely hairy both sides, 5 in. long, 1 in. wide, semi-amplexicaul. Racemes 1.5 to 3 in. long, slender flexuous. Flowers distant, .4 in. long, sparsely long hairy green. Bracts ovate acuminate, .2 in. long, sparse hairy. Ovary densely hairy. Sepals lanceolate, laterals curved. Petals spathulate-lanceolate, lip claw long slender, limb obovate, 3- to 6-lobed, with 3 sinuous keels on disc and pustular patches on midlobe. Column and foot long. Capsule elliptic hairy, .5 in. long. *Hab.* Mountains at 3000 to 3400 ft. altitude. Perak, Gunong Batu Putih (Wray). Penang (Lobb and Maingay) on a big rock near Convalescent Bungalow. Kedah Peak (Ridley). *Distrib.* Java, Borneo, Sumatra.

(4) **T. cristata** *Kranzl. Pflanzenreich*, 140. *Eria cristata* *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 78; *Mat.* i. 93.

A foot tall. Leaves lanceolate acuminate oblique nearly glabrous above, hairy beneath, 3 in. long, .5 in. wide; sheaths nearly glabrous when adult. Racemes .25 in. long, hairy, lower bracts cup-shaped, upper ovate-lanceolate acute, .5 in. long. Ovary much shorter. Flowers 2 to 3, .5 in. long. Sepals lanceolate acute red-hairy, mentum as long. Petals linear blunt. Lip with a long claw pubescent at base spathulate, tip round retuse glabrous except ends of 3 raised veins hairy. Column base pubescent. *Hab.* Penang (Curtis). Lankawi, Terutau (Curtis).

(5) **T. velutina** *Kranzl. l.c.* 140. *Eria velutina* *Lindl. Bot. Reg.* 1840; *Misc.* 86; *Ridl. Mat.* i. 94. *E. monticola* *var. hirsuta* *Hook. fil. F.B.I.* v. 806.

Stems 9 to 18 in. tall. Leaves lanceolate nearly glabrous above, hairy beneath, 2 to 3 in. long, .5 to 1 in. wide; sheaths hairy, .5 in. long. Racemes very short. Flowers few, .5 in. long, pale yellow red-haired. Bracts lanceolate, .25 in. long. Upper sepal oblong blunt, laterals lanceolate yellow white; mentum short blunt. Petals narrower lanceolate blunt. Lip pink spathulate, 2 keels on disc, side-lobes short incurved round tip yellow round bilobed. Column long, slender, pink in front. *Hab.* Common.

Singapore, Kranji; Jurong. Johor, Batu Pahat. Malacca, Mt. Ophir; Nyalas (Goodenough). Perak (Scortechini). Lankawi, Telaya Tujoh (Haniff). *Distrib.* Lingga, Karimata.

Hooker's *E. monticola* var. *hirsuta* is merely this plant with thinner rather long lanceolate leaves; perhaps a jungle form.

(6) **T. rotundifolia** *Kranzl. l.c.* 145. *Eria rotundifolia* *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 78.

Rhizomes very slender matted, white-hairy. Stems .12 in. tall. Leaves thick, fleshy obovate blunt white-hairy, .25 in. long, .12 in. wide. Flowers .25 in. long, solitary on short pedicel with 2 cupular bracts, upper one longer than the white-hairy ovary. Upper sepal oblong-ovate, laterals broader; mentum very short, large rounded. Petals oblong blunt. Lip side-lobes small, midlobe round toothed, greenish yellow, a central ochre bar and purple spots on each side. Column short, foot long, olive green. Anther orange. *Hab.* Penang, above Waterfall (Curtis). Lankawi, Burau Bay on a tree.

Allied to *E. dasyphylla* Par.

(7) **T. aporina** *Kranzl. l.c.* 150. *Eria aporina* *Hook. fil. F.B.I.* v. 308; *l.c. Pl.* 2081; *Ridl. Mat.* i. 94.

Stems 2 to 6 in. long, densely villous hairy. Leaves lanceolate crowded, .25 to .5 in. long. Bracts small ovate acute. Flowers glabrescent, .5 in. long. Sepals broad ovate blunt, mentum as long. Petals narrow sub-spathulate. Lip broad-clawed, pandurate ciliate, side-lobes small rounded; midlobe retuse. *Hab.* Mountain forests. Selangor, Bukit Kutu. Perak, Gunong Batu Putih (Kunstler); Thaiping Hills. Kedah Peak (Williams).

(8) **T. hispidissima** *Kranzl. l.c.* 136. *Eria hispidissima* *Ridl. Journ. Bot.* xxxiv. 213; *Mat.* i. 94.

Slender, 6 in. tall. Leaves linear acuminate dense silky hairy, .5 to .75 in. long, .12 in. wide. Racemes flexuous hairy, .75 in. long. Flowers 5 to 6, sessile, .12 in. long. Bracts lanceolate-ovate. Sepals lanceolate hairy outside. Petals lanceolate. Lip oblong entire. Capsule .12 in. long, hairy. *Hab.* Rare. Selangor, Ulu Langat (Goodenough).

(9) **T. microphylla** *Bl. Bijdr.* 243.

A small long-creeping plant. Stems, leaves, sepals and fruit long-hairy, ascending stems 3 to 6 in. long. Leaves fleshy elliptic blunt, shortly narrowed at the base, .25 in. long, .1 in. wide. Flowers solitary, sub-terminal, .5 in. wide; pedicel very short. Upper sepal lanceolate, lower ones broadly oblong ovate, base broadly rounded, all hairy. Petals linear-oblong glabrous. Lip obovate-spathulate, retuse, claw rather long. Column short with a long foot. *Hab.* Mountains at 4000 to 4370 ft. altitude. Rare. Pahang, Fraser Hill (Sempang Mines), Semangkok Pass (Burkill and Holttum). *Distrib.* Borneo, Java, Sumatra.

(10) **T. poculata** *Kranzl. l.c.* 142. *Eria poculata* *Ridl. Journ. Linn. Soc.* xxxii. 305; *Mat.* i. 94.

Glabrous; stems slender, 2 ft. tall, base swollen. Leaves lanceolate acuminate acute coriaceous glabrous inæquilateral, 3 in. long, .5 in. wide; sheaths scabrid, 1 in. long, mouths red hairy. Racemes hardly .5 in. long, many-flowered, a cup-shaped red-hairy bract at base. Flowers greenish, .25 in. long, hairy outside. Bracts .25 in. long, ovate pilose. Pedicels .12 in. long. Upper sepal lanceolate sub-acute yellowish inside, laterals ovate acute keeled; mentum as long, saccate blunt. Petals lanceolate acute. Lip base linear, limb obovate cuneate orange, tip wider, 3-lobed fimbriate emarginate, white. Column purple. *Hab.* Johor, Gunong Belulut (Holttum). Pahang, Gunong Tahan. Perak, Thaiping Hills. Kedah Peak (Ridley).

var. *ophirensis* *Ridl.* Racemes 1 in. long. Lip acute. Malacca, Mt. Ophir (Ridley).

(11) **T. oligantha** *Kranzl. l.c.* 155. *Eria oligantha* *Hook. fil. F.B.I.* v. 807; *l.c. Pl.* 2079; *Ridl. Mat.* i. 95.

Stems 10 to 12 in. tall, hairy at top slender. Leaves thick coriaceous blunt ovate-lanceolate glabrous or thinly hairy beneath, 2 to 2.5 in. long, .5 in. wide. Flowers 1 or 2; peduncle .5 in. long, sparsely pubescent. Raceme .5 to .6 in. long. Bracts broad ovate, longer than ovary. Upper sepal lanceolate, laterals ovate acuminate; mentum spur-like. Petals oblanceolate acute. Lip pubescent, claw long narrow, limb obovate-spathulate shortly 3-lobed, side-lobes round, midlobe crenulate. *Hab.* Very rare. Penang (Maingay).

(12) **T. biflora** *Griff. Notulæ*, iii. 331, t. 315. *Eria monticola* *Hook. fil. F.B.I.* v. 806; *Ridl. Mat.* i. 95 (in part).

Nearly glabrous; stems 6 to 12 in. long. Leaves stiffly coriaceous lanceolate long acuminate, 4 in. long, .25 to .36 in. wide, glabrous; sheaths sparsely hairy. Raceme very short, 1 or 2 flowers. Bracts, basal one cup-shaped. Floral bract large ovate acuminate .25 in. long, all sparsely hairy. Flower nearly .5 in. long, sparsely red-hairy. Sepals oblong acuminate; mentum fairly long, white. Petals lanceolate shorter than sepal. Lip spathulate tip shortly trilobed, edge crenulate hairy papillose, yellow, base crimson, tip red. Column pink at base. Capsule elliptic, .5 in. long, the raceme lengthened. *Hab.* Pahang, Gunong Tahan (Ridley). Johor, Pulau Aor (Fielding). Malacca, Mt. Ophir (Griffith, Maingay). Negri Sembilan, Gunong Angsi (Williams). Selangor, Gunong Semangkok.

(13) **T. tuberosa** *Ridl.* *Eria tuberosa* *Hook. fil. l.c. Pl.* 2080; *F.B.I.* v. 807; *Ridl. Mat.* i. 95.

Stem 6 to 8 in. tall, base swollen glabrescent. Leaves linear-lanceolate acute, very coriaceous glabrous, 2 to 3 in. long, .12 in. wide. Flowers 2 on a hairy .6 in. long peduncle. Bracts large ovate sheathing. Sepals ovate-lanceolate, .15 in. long; mentum

very short saccate. Petals sparsely hairy narrow spatulate. Lip pubescent, claw long, limb obovate 3-lobed, midlobe retuse with a hairy central patch. Column pubescent. *Hab.* Rare. Perak, Selama (Scortechini).

Very near *T. biflora* Griff., but flowers smaller and more hairy.

(14) **T. gracilis** *Kranzl. l.c.* 143. *Eria gracilis* *Hook. fil. F.B.I.* v. 816; *l.c. Pl.* 2078; *Ridl. Mat.* i. 95.

Stems 4 to 6 in. long, glabrous. Leaves narrow linear-lanceolate, 2 in. long, .25 in. wide, glabrous, young sheaths pubescent. Flowers 2 to 3 in a short raceme. Bracts basal cup-shaped. Upper ones lanceolate acute, .25 in. long. Sepals lanceolate acute, laterals curved, mentum as long as ovary, all white red-hairy. Petals lanceolate, acute. Lip spatulate, claw long crimson, limb shortly 3-lobed, midlobe oblong thickened, yellow-hairy. Column hairy. Capsule elliptic hairy. *Hab.* Singapore, Bajau. Pahang, Tahan River (Ridley). Perak (Scortechini); Hermitage Hill. Penang Hill (Curtis).

14. PORPAX, Lindl.

Very small plants; pseudobulbs discoid with reticulate sheaths, crowded. Leaves 2. Flowers 1 or 2 sessile on the top of the pseudobulbs. Sepals connate in a tube. Petals shorter free. Lip ovate. Column short foot adnate to sepals. Pollinia 8. Species 4, Indian.

(1) **P. meirax** *King and Pantling, Ann. Bot. Gard. Calc.* viii. 115; *Ridl. Mat.* i. 105.

Pseudobulbs nearly .25 in. wide. Leaves elliptic-oblong petioled, .5 to 1 in. long. Flowers .5 in. long, brown. Bracts large ovate acute. Sepals free part ovate, awned. Petals shorter oblong-lanceolate blunt. Lip ovate-orbicular at base, midlobe oblong blunt. Foot twice as long as column. *Hab.* Very rare on rocks at 4000 ft. altitude. Kedah Peak (Ridley). *Distrib.* Tenasserim, Himalaya.

I have not seen flowers of this.

15. TYLOSTYLIS, Bl.

Rhizome long creeping; pseudobulbs distant of several internodes. Leaves coriaceous sessile, 2 or 3. Raceme sub-terminal, of few medium flowers. Sepals oblong-elliptic pubescent. Petals smaller. Lip articulate on column-foot, fleshy entire. Column long curved, foot very short. Species 2.

(1) **T. rigida** *Bl. Fl. Jav. Praef.* vi.; *Ridl. Mat.* i. 106. *Callostylis rigida* *Bl. Bijdr.* 340, t. 74. *Eria pulchella* *Lindl. Bot. Reg.* 1841; *Misc.* 52.

Pseudobulbs 1 in. apart, flattened lanceolate, base narrowed, 1.5 in. long, 1 in. wide, .25 in. through. Leaves broad lanceolate blunt bifid. Raceme 3 in. long, base nude. Flowers few, opening singly wide expanded, 1 in. across. Bracts orbicular recurved persistent. Upper sepal lanceolate blunt, laterals broader oblique. Petals spatulate-lanceolate falcate smaller; all ochre yellow finely

woolly. Lip cordate pubescent, .25 in. long, purple-brown, edges paler with 3 ridges in the middle. Column yellow, foot short broad, purple at tip. *Hab.* Common on trees up to 5000 ft. altitude. Singapore, Sungei Morai; Pulau Tekong, Johor, Batu Pahat; Sungei Kahang (Kelsall). Malacca, Bukit Batu Tiga. Sungei Ujong (Cantley). Pahang, Gunong Tahan. Perak (Scortechini). Penang (Curtis). Kedah Peak. *Distrib.* Rhio, Borneo, Java. *Native name*: Para Chinduai; Sakat bigus.

16. PHREATIA, Lindl.

Small glabrous epiphytes tufted. Leaves narrow distichous articulated. Scapes axillary slender. Flowers minute green or white. Sepals equal with a short mentum. Petals smaller. Lip sessile or clawed, jointed on the base or foot of the column. Column very short and broad; anther low. Pollinia 8 on a small viscid disc. Capsule very small ovoid. Species 75, Indo-Malayan, Polynesian.

Stems very short or 0, no pseudobulbs; bracts acuminate.

Leaves nearly 1 ft. long; scape over 1 ft. long; lip oblong (1) *Ph. densiflora*

Leaves 2 in. long or less; scape as long. Leaves linear narrow; lip obovate (2) *Ph. minutiflora*

Leaves linear narrow; lip with a short broad base limb orbicular (3) *Ph. microtidis*

Leaves fleshy recurved (4) *Ph. crassifolia*

Stem elongate; leaves ensiform; bracts short ovate Base pseudobulbous; leaves narrow linear. (5) *Ph. nana*

Lip reniform clawed (6) *Ph. listrophora*

Lip sessile ovate blunt (7) *Ph. linearis*

(1) *Ph. densiflora* Lindl. *Gen. and Sp. Orch. Pl.* 64. *Ph. myosurus* Lindl. *Journ. Linn. Soc.* iii. 61; *Ridl. Mat.* i. 106.

Rhizome stout. Leaves strap-shaped unequally blunt bilobed, 8 to 12 in. long, .5 in. wide. Scape over 1 ft. long, more than half nude. Flowers very numerous, white. Bracts lanceolate acuminate, .12 in. long. Sepals obtuse, mentum very short round. Petals similar. Lip sessile oblong or obtuse, tip 3-lobed or round. Column short broad. Rostellum entire. Capsule elliptic fusiform, .12 in. long. *Hab.* Mountains at 3000 to 4000 ft. altitude. Selangor, Menuang Gasing (Kloss). Perak, Thaiping Hills. *Distrib.* Borneo, Java, Philippines, Sumatra.

(2) *Ph. minutiflora* Lindl. *Journ. Linn. Soc.* iii. 82; *Ridl. Mat.* i. 107.

Rhizome 0; stems very short tufted. Leaves linear blunt, 1.5 to 2 in. long, up to .12 in. wide. Scapes 1.5 to 2 in. long, lower half nude. Bracts lanceolate acuminate minute; raceme rather lax. Sepals ovate sub-acute. Petals lanceolate. Lip ovate-cordate concave, base narrowed. Column broad, short. Capsule elliptic, .12 in. long. *Hab.* Mangroves. Singapore, Kranji; Jurong. Johor. Selangor, Batu Caves. *Distrib.* Sumatra, Borneo.

(3) **Ph. microtidis** *Lindl. Journ. Linn. Soc.* iii. 61.

Small plant, 2 in. tall or less, no pseudobulbs. Leaves linear fleshy, 1 in. long, .05 in. wide. Scape 1 in. long, base nude; bracts lanceolate acuminate. Sepals triangular-ovate keeled. Petals ovate shortly cuspidate. Lip base sub-quadrate round, limb orbicular. *Hab.* Mountains at about 4000 ft. altitude. Perak, Gunong Inas (Yapp); Bujong Malacca (Ridley). *Distrib.* Java and Sumatra.

(4) **Ph. crassifolia** *Ridl. Journ. F.M.S. Mus.* iv. 69.

Stems very short, .5 in. long. Leaves 6, fleshy linear curved, 1.25 in. long, .1 in. wide. Scapes 1.5 in. long, with a few lanceolate sheathing leaves. Flowers numerous crowded, white. Bracts lanceolate acuminate, longer than flowers. Ovary papillose. Sepals ovate blunt; mentum short saccate. Petals lanceolate blunt, nearly as broad. Lip ovate sub-acute cordate. Column very short, foot at top free. *Hab.* Mountains. Pahang, Telom (Robinson); Gunong Tahan; Bukit Fraser (Burkill). Perak, Thaiping Hills (Ridley).

(5) **Ph. nana** *Hook. fil. F.B.I.* v. 811; *Ic. Pl.* 2084.

Stems tufted, 1.5 to 2 in. long. Leaves narrow ensiform acute, .5 to .75 in. long, .09 in. wide. Scapes capillary as long as leaves. Bracts ovate acute. Flowers .05 in. long. Sepals broad ovate. Petals blunt. Lip ovate blunt. *Hab.* Mountain forests at 4000 to 5000 ft. altitude. Pahang, Gunong Tahan. Perak, Larut (Kunstler); Gunong Kerbau. Penang, Richmond Pool (Ridley).

(6) **Ph. listrophora** *Ridl. Journ. Linn. Soc.* xxxii. 307; *Mat.* i. 107.

Rhizome long; stem 1 in. tall. Leaves 6 in. long, hardly .25 in. wide, lanceolate acute unequally bilobed, narrowed to a petiole. Scape 7 to 8 in. long, more than half nude. Flowers small white fragrant. Bracts lanceolate acuminate, .12 in. long. Sepals ovate acute. Petals oblong-ovate. Lip with a linear claw and reniform limb. Rostellum 2-toothed. Capsule oblong, .2 in. long. *Hab.* Mountains at 3000 to 5000 ft. altitude. Selangor, Sempang Mines, Gunong Semangkok. Perak, Thaiping Hills (Ridley). Lankawi, Gunong Raya (Curtis).

(7) **Ph. linearis** *Ridl. Journ. F.M.S. Mus.* vi. 14.

Rhizome 1 in. long, closely covered with globose-conic pseudo-bulbs, .5 in. long. Leaves 2 or 3, narrow linear blunt, 4 in. long, .12 in. wide, midrib prominent, coriaceous narrowed to petioles. Scape 6 in. long, half nude with about 4 small lanceolate acuminate leaves. Flowers minute rather distant. Bracts narrow lanceolate subulate, .1 in. long, stouter than ovary. Sepals ovate. Petals narrower oblong. Lip sessile ovate entire blunt shorter. *Hab.* Selangor, Ulu Langat (Kloss).

17. **AGROSTOPHYLLUM**, Bl.

Stems tufted leafy, usually flattened. Leaves distichous, thinly coriaceous grassy or short oblong bilobed at tip; sheaths usually

flat. Flowers small, white in dense terminal heads. Sepals upper lanceolate or ovate, laterals wider, forming a mentum. Petals smaller. Lip saccate at base, with low side-lobes, often a transverse callus in front; midlobe longer broad ovate. Column broad, no foot. Pollinia 8, attached to a small disc. Species about 15, Indo-Malaya, Polynesia, Seychelles.

§ 1. *Eu-agrostophyllum*. Leaves long, grassy.

Flower-heads large compact.

- | | |
|---|-------------------------|
| Stem broad flat | (1) A. majus |
| Stem terete at base slender | (2) A. callosum |
| Head of small flexuous spikelets, lax | (3) A. glumaceum |

§ 2. *Appendiculopsis*. Leaves short oblong bilobed; stems long slender terete.

- | | |
|--|---------------------------|
| Leaves .25 in. long; stem 1 ft. long erect | (4) A. bicuspdatum |
| Leaves .75 in. long; stems very long pendulous | (5) A. Hasseltii |

(1) **A. majus** *Hook. fil. F.B.I. v. 824; Ic. Pl. 2096; Ridl. Mat. i. 108.*

Stems numerous, 2 to 3 ft. long, .5 in. wide, forming a large clump. Leaves lanceolate lorate blunt, 8 in. long, .5 in. wide, rather thin; sheaths flat, 2 in. long. Heads of flowers dense, 1 in. across. Outer bracts broad ovate, floral bracts small. Flowers numerous, .25 in. wide, white. Sepals ovate acute keeled. Petals much narrower, linear. Lip saccate, side-lobes low incurved almost meeting a transverse bar in front madder red, limb ovate, white. *Hab.* Common. Singapore, Selitar, Kranji (Ridley). Pahang, Pekan; Telom. Perak, Goping (Kunstler); Thaiping Hills. *Distrib.* Sumatra.

(2) **A. callosum** *Rchb. fil. Seem. Fl. Vit. 296; Ridl. Mat. i. 108.*

Stems woody, terete below slightly flattened above, 2 to 5 ft. tall in a tuft. Leaves linear blunt, 4 to 7 in. long, .25 in. wide; sheaths 1 in. long, edged black. Heads of flowers .5 to 1.5 in. wide, dense. Flowers .25 in. wide. Sepals ovate-orbicular. Petals orbicular. Lip 3-lobed, midlobe orbicular emarginate with a large divided callus near base. *Hab.* Rare. Selangor, Bukit Hitam (Kelsall); Rawang. *Distrib.* Sikkim, Burma.

(3) **A. glumaceum** *Hook. fil. F.B.I. v. 821; Ic. Pl. 2095; Ridl. Mat. i. 108.*

Stems tufted short flat, 6 in. long, .5 in. wide. Leaves distichous, lower sheath-like, upper two with flat sheaths 2 in. long and thin grassy leaves linear acuminate, 2 ft. long, .5 in. wide. Head 1.5 in. wide, lax; racemes very numerous, flexuous. Flowers white. Ovary short covered with black wool. Bracts ovate mucronate. Sepals ovate. Petals linear. Lip base saccate, side-lobes acute, limb large ovate. Column tall, arms triangular acute, edged crimson. Stigma with a tongue-shaped process. Anther-beak orange. Capsule narrow oblong, .25 in. long. *Hab.* On trees by streams. Negri Sembilan, Labu Reservoir, Seremban (Williams). Sungei Ujong (Cantley). Selangor, Rawang; Semangkok Pass, Ulu Gombak (Ridley). Perak, Ulu Bubong (Kunstler).

(4) **A. bicuspidatum** *J. J. Smith, Ic. Bogor. 110A.* Appendicula callosa *Bl. Bijdr. 303.* Podochilus callosa, *Schlechter, Mem. Herb. Boiss. 21, p. 62; Ridl. Mat. i. 197.*

Stems tufted slender terete, 6 to 18 in. long. Leaves numerous twisted at base distichous oblong blunt unequally bilobed, .25 in. long, .12 in. wide; sheaths hardly .25 in. long, angles with setaceous points. Head of many brown bracts, .1 in. wide. Flowers small, white. Sepals ovate acute; mentum long blunt. Petals linear. Lip base oblong round, limb ovate-orbicular, a yellow transverse oblong callus at base. Column stout, foot long, arms incurved pink. Capsule sessile cylindrical, .25 in. long. *Hab.* Very common on trees in forest to 3000 ft. altitude. Singapore, Sumbawang; Bukit Timah. Johor, Kwala Kahang (Kelsall). Pahang, Tahan River. Malacca, Mt. Ophir. Sungei Ujong (Cantley). Perak, Thaiping Hills; Haram Parah (Scortechini). Penang Hill. Kedah Peak (Robinson). *Distrib.* Tenasserim, Malay isles to Celebes.

(5) **A. Hasseltii** *J. J. Smith, l.c.* Appendicula Hasseltii *Bl. Bijdr. 304.* Appendicula elongata *Ridl. Trans. Linn. Soc. ii. 375.* Podochilus Hasseltii *Schlechter, l.c. 61; Ridl. Mat. i. 198.*

Stems 3 ft. long, pendulous flat. Leaves oblong blunt, base broad, tips round bilobed, .75 in. long, .37 in. wide, sheaths .25 in. long, truncate. Head of flowers .5 in. wide. Flowers white. Sepals ovate sub-acute, laterals wider. Petals lorate blunt. Lip sigmoid, 3-lobed, edges adnate to column, side-lobes round, midlobe concave crisped, a callus running from base to it. Column short, foot longer; arms long, erect. Capsule oblong, .25 in. long. *Hab.* Local on trees over rivers. Pahang, Tahan River; Telom. Penang, Highlands (Burkill). *Distrib.* Java, Sumatra.

18. POÆPHYLLUM, Ridl.

Epiphytes with slender leafy stems. Leaves narrow. Racemes lateral short with few very small flowers. Sepals lanceolate, laterals connate, forming a mentum. Petal shorter. Lip claw adnate to column foot by its edges, limb spathulate longer than sepals. Column short, foot slender, arms long, acute. Pollinia 4, ovoid sub-equal. Species 5 or 6, Malayan.

(1) **P. pauciflorum** *Ridl. Mat. i. 109.* *Agrostophyllum pauciflorum* *Hook. fil. F.B.I. v. 824; Ic. Pl. t. 2097.* *Eria minutiflora* *Ridl. Journ. Linn. Soc. xxxii. 297.*

Stems 2 ft. long. Leaves linear unequally bifid, 2 in. long, .5 in. wide; sheaths .5 in. long, deep split. Racemes hardly exsert, with a few minute white flowers. Bracts ovate acuminate. Sepals lanceolate acuminate, keeled. Petals linear. Lip limb ovate acute. Capsule cylindrical, .25 in. long. *Hab.* Local. Johor, Batu Pahat. Pahang, Tahan River (Ridley). Negri Sembilan, Gunong Angsi (Williams). Perak, Hulu Kwantu (Scortechini).

19. CERATOSTYLIS, Bl.

Small tufted epiphytes not pseudobulbous; stems simple or branched. Leaves 1 or 2, narrow coriaceous or fleshy. Flowers very small rarely medium solitary or in a tuft white or pink, lateral sepals forming a mentum. Petals narrower. Lip adnate to column foot by the claw, blade entire fleshy. Column short, tip broad; stigma very large with two long arms. Column foot long; anther 2-celled. Pollinia 8. Species 20 or more, Indo-Malaya, Polynesia.

Stems simple succulent, rush-like.

Leaf terete (1) *C. subulata*

Stems simple erect; leaf lanceolate (2) *C. lancifolia*

Stems very short tufted not branched; flowers from between leaves.

Flower .5 in. across; leaves lanceolate (3) *C. eriæoides*

Petals ovate oblique crimson; lip claw linear (4) *C. cryptantha*

Petals lanceolate acuminate white tipped purple;

lip base broad (5) *C. linearis*

Petals lanceolate white; lip narrow (6) *C. linearifolia*

Stems branched.

Leaves large lanceolate reticulate (7) *C. robusta*

Leaves linear reticulate (8) *C. clathrata*

Leaves elliptic-lanceolate; sheaths punctate (9) *C. puncticulata*

Stems long pendulous; flower heads scattered on stem (10) *C. pendula*

(1) *C. subulata* Bl. *Bijdr.* 304. *C. gracilis* Ridl. *Mat.* i. 106 (not Blume). *C. malaccensis* Hook. *fil. F.B.I.* v. 825; *Ic. Pl.* 2098.

Stems tufted terete with brown sheaths at base, 3 to 9 in. long. Leaf 1, erect terminal terete, .5 to 1.5 in. long. Flowers in a lateral tuft from leaf base, produced singly, .25 in. long, pale pink, pubescent. Bracts ovate. Sepals lanceolate blunt; mentum globose. Petals small lanceolate yellowish. Lip shoe-shaped pubescent, claw short. Column short, foot as long, arms longer than column. Capsule oblong sub-sessile. *Hab.* Common on trees and rocks. Johor, Batu Pahat. Pahang, Gunong Tahan on rocks (whole plant yellow); Telom. Malacca, Mt. Ophir (Griffith). Selangor, Menuang Gasing (Robinson); Semangkok Pass (Ridley). Perak, Thaiping Hills; Teluk Anson (Williams). Province Wellesley, Bukit Serayah. Kedah Peak. Pulau Adang. *Distrib.* Java.

I suppose this to be Blume's *C. subulata*. Specimens of *C. gracilis* Bl. from Blume, in Herb. Kew, have flat, not terete leaves, as Blume describes. But I have seen no specimen of our species from Java.

(2) *C. lancifolia* Hook. *fil. F.B.I.* v. 826; *Ic. Pl.* 2102; *Ridl. Mat.* i. 110.

Stems tufted, 2 to 4 in. long, covered with sheaths. Leaf 1, narrow linear-lanceolate acute, 1 to 3.5 in. long, .25 in. wide. Flowers opening singly, .3 in. wide; pedicel and ovary pubescent filiform, .5 in. long. Sepals oblong-lanceolate acute. Petals smaller; mentum short bilobed. Lip narrow, base oblong, tip thick dagger-shaped. Column arms long, oblong blunt. *Hab.* Selangor, Menuang Gasing (Kloss); Pahang, Bukit Fraser (Burkill). Perak (Scortechini).

(3) **C. eriæoides** *Hook. fil. Ic. Pl.* 2074 B; *Ridl. Mat.* i. 110. *Eria pygmæa* *Hook. fil. F.B.I.* v. 804.

Dwarf tufted plant; stems .5 in. long. Leaf 1, linear-oblongate blunt thick, 1.5 to 2 in. long, .25 in. wide. Scape as long filiform, 1-flowered. Flower .5 to .6 in. wide, tomentose. Sepals ovate-lanceolate; mentum short. Petals oblongate acute. Lip much shorter, base saccate, limb tongue-shaped with 2 pubescent keels. *Hab.* Selangor, Gunong Mengkuang Lebah (Robinson). Perak, without locality (Wray and Scortechini).

(4) **C. cryptantha** *Ridl. Journ. Linn. Soc.* xxxii. 309; *Mat.* i. 110.

Dwarf tufted plant; stems .5 in. long. Leaves 2, linear subacute, 5 in. long, .12 in. wide. Scape filiform, .36 in. long, woolly. Flower 1, .25 in. long; pedicel woolly. Bract minute ovate. Sepals ovate blunt pubescent, white. Petals ovate mucronate oblique, crimson, mucro and midrib white. Lip-claw long linear, side-lobes blunt broad, midlobe reniform, cream colour with fleshy ovate callus on disc. Column short, foot long slender; arms incurved obscure. Capsule elliptic, .25 in. long. *Hab.* On trees at 2000 ft. altitude. Selangor, Semangkok (Curtis). Perak, Thaiping Hills; Hermitage Hill (Ridley). Penang Hill (Curtis).

(5) **C. linearis** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 40.

Tufted plant, a short rhizome with close tufts of 2 leaves. Leaves linear, fleshy channelled, 2.5 in. long, .1 in. wide. Flower .2 in. long on a pedicel .25 in. long, white hairy. Peduncle .25 in. long. Bract long lanceolate acuminate. Sepals white pubescent oblong, mentum cylindrical blunt as long as ovary. Petals lanceolate acuminate, white with purple blotch on tip. Lip base broad, side-lobes short upcurved, midlobe ovate blunt white. Column short, broad, top edged purple. Capsule elliptic, .25 in. long. *Hab.* Rare. On mangrove and other trees. Singapore, Pasir Panjang. Kelantan, Chaning Woods (Ridley).

(6) **C. linearifolia** *Ridl.*

Stems short, thick, 1 in. long, covered with pale reticulate sheaths. Leaf 1, elongate linear-lanceolate coriaceous, 6 to 8 in. long, .25 in. wide, tip unequally bifid, base long narrowed to a petiole. Flower 1, white on a pedicel .5 in. long, hairy. Bract ovate acuminate, .08 in. long. Sepals narrow lanceolate long acuminate, .3 in. long, spur scrotiform. Petals as long narrower. Lip as long narrow, side-lobes round short erect, midlobe much longer linear acuminate fleshy. Column short thick, arms round-oblong, large. *Hab.* Pahang, Fraser Hill (Burkill and Holttum). Lankawi, Gunung Raya (Haniff).

(7) **C. robusta** *Hook. fil. F.B.I.* v. 827; *Ic. Pl.* t. 2103; *Ridl. Mat.* i. 111.

Stems stout branched, 8 to 10 in. tall, sheaths .5 to .75 in. long, reticulate silvery. Leaves 4 to 5 in. long, .5 in. wide, lanceolate acuminate. Flower 1, woolly, pale yellow, .5 in. long; pedicel

pubescent. Sepals ovate blunt pubescent; mentum spur-like, tip enlarged bilobed. Petals elliptic-lanceolate, blunt. Lip spathulate acute fleshy, claw long. Column arms tall erect. *Hab.* Rare. Mountains at 4900 ft. altitude. Perak, Ulu Batang Padang (Wray).

(8) **C. clathrata** Hook. *fil. F.B.I.* v. 825; *Ic. Pl.* 2099; *Ridl. Mat.* i. III.

Stems curved erect or ascending, much branched, 3 to 4 in. long; sheaths silvery brown, reticulate short blunt. Leaves linear fleshy, .5 to 1 in. long. Flowers minute on pilose pedicels. Bract ovate. Upper sepal oblong, laterals ovate gibbous pilose. Petals oblong-lanceolate. Lip base saccate, limb obcordate, truncate emarginate, 2 keels. Column arms short round. *Hab.* Mountains. Pahang, K'luang Terbang (Barnes); Bukit Fraser (Burkill). Perak, Batang Padang (Wray).

(9) **C. puncticulata** *Ridl. Journ. Roy. As. Soc. S. Br.* 37, p. 79; *Mat.* i. III.

Stems slender, weak, curved, 3 to 4 in. long, little branched; sheaths ampliate mucronate, puncticulate. Leaves narrow elliptic-lanceolate blunt petioled, 2 in. long, .25 in. wide. Flowers in pairs; pedicels slender. Sepals lanceolate acute. Lip spathulate, tip thickened acute. *Hab.* Very rare. Perak, Thaiping Hills at 5000 ft. altitude (Ridley).

(10) **C. pendula** Hook. *fil. F.B.I.* v. 826; *Ic. Pl.* 2100; *Ridl. Mat.* i. III.

Stems tufted, pendulous and rooting, 3 to 12 in. long; sheaths chestnut. Leaves linear blunt, 1 in. long, .25 in. wide, coriaceous. Flowers in distant tufts of ovate mucronate bracts, white minute. Ovary and pedicel pubescent. Sepals ovate acute. Petals lanceolate. Lip ovate-lanceolate, base pubescent, yellowish in centre, clawed. Column arms thick, round. *Hab.* On lofty trees in forests. Johor, Batu Pahat. Pahang, Pekan. Selangor, Ginting Peras; Kajang. Perak, Thaiping Hills (Kunstler). Penang, West Hill. *Distrib.* Borneo, Celebes, Philippines.

20. CHRYSOGLOSSUM, Bl.

Terrestrial, rhizome creeping; pseudobulbs cylindrical-conic with one herbaceous petiolate leaf. Scape usually tall from rhizome, raceme lax. Sepals and petals sub-similar, but lateral sepals falcate. Lip 3-lobed adnate to short column foot, no spur. Column tall arched, foot very short, arms linear-oblong from middle of the column. Anther 2-celled. Pollinia 2. Species 8, Indo-Malayan, Polynesia.

(1) **C. villosum** Bl. *Bijdr.* 338; *Orch. Arch. Ind.* 162, t. 47; *Ridl. Mat.* i. II2.

Leaf ovate villous, 6 to 9 in. long, 3 to 5 in. wide; petiole very short and thick. Scapes 12 to 18 in. tall. Flowers distant, 9 or 10, about 1 in. wide. Sepals and petals oblong blunt curved apiculate

yellow striped purple. Lip shorter, side-lobes oblong, midlobe wide ovate, 2 strong keels in centre or elliptic with a broad oblong tip. *Hab.* Scarce. Perak, Thaiping Hills (Scortechini). *Distrib.* Java.

21. COLLABIUM, Bl.

Terrestrial, rhizome creeping; pseudobulbs slender 1-leaved. Leaf broad ovate. Scape from rhizome. Flowers small scattered. Sepals narrow, laterals connate forming a mentum. Petals narrower. Lip 3-lobed, clawed. Column short winged, no arms, foot long. Anther hemispheric, pollinia 2. Species 2 or 3, Malaya, Formosa.

(1) *C. nebulosum* Bl. *Bijdr.* 357; *Ridl. Mat.* i. 112.

Leaf broad, lanceolate or ovate, marbled dark and light green, glabrous, 6 to 7 in. long, 4.5 in. wide. Scape purple, 18 in. tall. Flowers small, about 20. Ovary and pedicel .36 in. long, red. Sepal falcate, mentum long blunt. Petals bent in middle, narrower. All yellow broadly edged red. Lip white, side-lobes oblong falcate blunt, midlobe large orbicular undulate, 2 short oblong-ovate keels and 2 low ridges on disc. Column short, sigmoid, yellow barred red. *Hab.* Rare in mountain woods. Pahang, Telom near the cascade. Perak, Thaiping Hills at 3000 ft. altitude (Derry). *Distrib.* Java.

22. DIGLYPHOSA, Bl.

Terrestrial with a stout rhizome. Leaf solitary ovate acute, herbaceous plicate narrowed to petiole. Scape shorter from rhizome; raceme dense many-flowered, occasionally branched. Bracts lanceolate deflexed. Flowers small. Sepals lanceolate, laterals adnate to the column-foot falcate. Petals broader. Lip shorter attached to column-foot oblong, entire, base concave, curved with 2 lamellæ on the rounded limb. Column shortly winged with a rather long foot. Anther 2-horned. Pollinia 2.

(1) *D. latifolia* Bl. *Fl. Jav. Orch. Arch. Ind.* 163, t. 55 (*Diglyphis*).

Leaf 10 to 14 in. long, 3.5 to 5.5 in. wide; petiole 8 to 13 in. long. Scape purple, 8 to 13 in. long. Bracts purple, longer than ovary. Flowers .5 in. long, purplish yellow. Petals yellow. Column yellow. *Hab.* Perak, Thaiping Hills (Anderson). *Distrib.* Java.

23. ASCOTAINIA, Ridl.

Terrestrial pseudobulbs large conic with one lanceolate petioled leaf. Scape from rhizome tall. Flowers medium racemose. Sepals lanceolate free, no mentum. Lip 3-lobed, spurred; anther oblong, tip retuse. Pollinia 8, 2 pairs oblique lamelliform, 4 lower ones smaller ovate, disc small retuse. Species 3, Indo-Malayan.

(1) *A. penangiana* Ridl. *Mat.* i. 116. *Tainia penangiana* Hook. *fil. F.B.I.* v. 820; *Bot. Mag.* t. 7563.

Pseudobulb 3 in. tall, 2 in. through, purple. Leaf acuminate,

1 ft. long, 3 in. wide; petiole 4 to 5 in. long. Scape 1.5 ft. tall. Flowers 9 to 10, 1 to 2 in. across. Sepals acute. Petals shorter, pale yellow veined purple. Lip shorter, side-lobes round, midlobe ovate, buff or nearly white spotted violet, with 3 ribs, spur yellow. Column broad boat-shaped, spotted violet. Anther yellow, 2 crimson spots. *Hab.* On grassy banks. Penang Hill (Curtis). Kedah, Gunong Geriang. *Distrib.* Java and Amboina.



FIG. 167.—*Ascotainia penangiana*.

24. TAINIA, Bl.

Terrestrial herbs; stems succulent creeping. Leaves ovate or lanceolate petiolate solitary. Scape tall erect with few flowers from creeping stem. Sepals lanceolate, laterals forming a mentum adnate to column foot. Petals similar. Lip spurred adnate to column foot, entire or 3-lobed. Column tall, foot short, arms very short. Anther bilobed at top. Pollinia 8, very unequal. Species 10, Indo-Malaya.

Sepals long caudate acuminate.

Flowers pale yellow; leaves 1 to 3 on the rhizome

Flowers purple; leaves numerous approximate .

Sepals lanceolate acute.

Leaves large; raceme long, many-flowered .

Leaves small short, ovate; scape very slender 3- or

4-flowered

(1) *T. speciosa*

(2) *T. Maingayi*

(3) *T. latilingua*

(4) *T. vegetissima*

Fl.M.P., 4

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(1) **T. speciosa** *Bl. Bijdr.* 354; *Ridl. Mat.* i. 114. *Mitopetalum speciosum* *Bl. Fl. Jav. Orch. Arch.* 158. *t.* 50, *f.* 1.

Leaf lanceolate acuminate, 6 in. long, 1.5 in. wide; petiole slender, 6 in. long. Scapes 1 ft. long. Flowers 5 or 6, 3 in. across; pedicel and ovary .5 in. long. Bracts linear acuminate, .1 in. long. Sepals lanceolate caudate, 1.5 to 3 in. long, greenish yellow with red lines. Petals similar. Lip ovate acute bright yellow with red streaks inside. Column long, curved; anther-top violet. *Hab.* Mountain woods at 2000 to 4000 ft. altitude, Malacca, Mt. Ophir (Maingay). Pahang, Gunong Tahan (Robinson). Perak, Bujong Malacca (Curtis); Gunong Batu Putih (Wray). Kedah Peak. *Distrib.* Java.

(2) **T. Maingayi** *Hook. fil. F.B.I.* v. 822; *l.c. Pl.* 2094; *Ridl. Mat.* i. 115.

Creeping; stem stout, covered with fibre. Leaves very numerous elliptic-lanceolate acuminate, 8 in. long, 1.2 to 2 in. wide; petioles thick, 1 in. long. Scape 2 ft. long, stout. Flowers about 7, deep purple. Bracts lanceolate acuminate, .75 in. long. Sepals lanceolate caudate, 2 in. long. Petals shorter. Lip 3-lobed pubescent, side-lobes truncate, oblong toothed, midlobe ovate acuminate acute sides toothed, disc covered with short processes, 3 strong toothed keels between midlobes. Column slender. *Hab.* In rocky woods at 2000 to 3000 ft. altitude. Selangor, Bukit Kutu; Sempang Mines. Perak, Bujong Malacca (Curtis). Penang (Maingay). Kedah Peak.

(3) **T. latilingua** *Hook. fil. F.B.I.* v. 822; *l.c. Pl.* 2093.

Leaf elliptic acute, 8 in. long, 2.5 in. wide; petiole as long. Scape 1.5 to 2 ft. long. Flowers numerous, 1 in. wide. Bracts narrow lanceolate long acuminate, as long as ovary. Sepals and petals linear blunt equal falcate. Lip orbicular, side-lobes short blunt, midlobe orbicular longer, 3 crenulate ridges on disc. Column as long as foot. *Hab.* Perak (Scortechini).

(4) **T. vegetissima** *Ridl. Journ. Linn. Soc.* xxxviii. 328.

Rhizome short creeping; pseudobulbs crowded, .5 in. long, covered with reticulate sheaths. Leaf ovate acute, purplish, 6-nerved, 1.5 in. long, 1 in. wide; petiole short, crimson. Scape slender, 9 in. long, with 3 flowers. Bracts lanceolate acute, .25 in. long. Pedicel and ovary as long. Sepals lanceolate acuminate, .5 in. long, very narrow, lower ones gibbous at base pale yellow streaked crimson. Petals shorter and broader. Lip obovate-orbicular, .5 in. long, .25 in. wide, crimson edge yellow, 2 semi-orbicular calli. Column long curved. *Hab.* Mountains at 3300 ft. altitude. Pahang, Gunong Tahan (Robinson).

25. NEPHELAPHYLLUM, Bl.

Terrestrial succulent plants creeping ascending. Leaves few, cordate ovate, petiolate herbaceous. Scape terminal few-flowered

racemose. Sepals free lanceolate, no mentum. Petals similar. Lip entire or 3-lobed blunt attached to column base, spur clubbed. Column short, thick, footless. Anther 2-horned. Pollinia 8 unequal on a linear gland. Species 5, Indo-Malayan.

Leaves ovate; flowers crowded (1) *N. pulchrum*
 Leaves triangular acuminate; flowers remote (2) *N. tenuiflorum*

(1) *N. pulchrum* *Bl. Bijdr.* 373, t. 32; *Fl. Jav. Orch. Arch. Ind.* 171, pl. 61, fig. 1; *Bot. Mag.* t. 5332; *King, Ann. Bot. Gard. Calc.* viii. 105, pl. 145; *Ridl. Mat.* i. 116.

Stems erect portion 2 in. tall. Leaves ovate-cordate acute, brown marbled with darker marks, 3 in. long, 2 in. wide. Raceme 2 in. long. Flowers 7, crowded. Ovary and pedicel .5 in. long. Sepals and petals reflexed acute, nearly .5 in. long, olive green. Lip erect, .75 in. long, obovate or oblong, white veined pink, a central orange bar ending in 2 or 3 fimbriate ridges, spur pink. Column broad, white spotted pink. Anther quadrate, with 2 pink knobs. *Hab.* In damp forest on rotting leaves, not rare, from sea level to 5000 ft. altitude. Singapore, Bukit Timah; Bukit Mandai. Malacca, Bukit Sadanen (Derry). Negri Sembilan, Bukit Tangga. Pahang, Gunong Tahan at 3300 ft. altitude (Robinson); Telom. Perak, Thaiping Hills; Ulu Kal (Kunstler); Ulu Batang Padang (Wray); Gunong Kerbau (Robinson). *Distrib.* Java.

(2) *N. tenuiflorum* *Bl. Bijdr.* 373; *Fl. Jav. Orch. Arch.* 172. t. 61, fig. 2; *Ridl. Mat.* i. 116.

Stem slender. Leaves triangular-cordate acuminate, 2.5 to 3.5 in. long, 1 in. wide, brown marbled darker. Scape slender, 4 to 7 in. tall. Flowers 6 or 7, distant pendulous reversed. Sepals and petals linear, green purplish, .5 in. long. Lip white, edged and streaked violet, side-lobes short blunt, midlobe ovate truncate undulate, a tuft of purple processes in centre, spur purple. *Hab.* Mossy spots in forest at about 3300 to 4000 ft. altitude. Not very common. Pahang, Telom; Gunong Berumbun. Selangor, Gunong Mengkuang Lebah (Robinson). Perak. Kedah Peak. *Distrib.* Java, Borneo.

26. MISCHOBULBUM, Schlecht.

Terrestrial with habit of *Tainia*. Stems fleshy. Leaves ovate acuminate. Scape from the rhizome usually few-flowered. Flowers rather large; sepals and petals sub-equal, laterals forming a mentum. Lip more or less 3-lobed, not spurred. Column stout, foot broad nearly as long. Pollinia 8, 4 above, larger than 4 front ones. Species 7, Indo-Malaya, Formosa.

(1) *M. Wrayanum* *Rolfe, Orch. Review.* xx. 127. *Ipsa Wrayana* *Hook. fil. Ic. Pl.* 2085. *Tainia atropurpurea* *Ridl. Journ. Linn. Soc.* xxxii. 315; *Mat.* i. 115.

Leaves ovate-cordate, sub-acute, 6 in. long, 4 in. wide; petioles 4 in. long. Scape 1 ft. long. Flowers about 8, purple, 1 in.

wide. Bracts linear acuminate longer than pedicel. Sepals lanceolate acute. Petals wider. Lip ovate, side-lobes broad erect rounded purple, midlobe short acute, dark brown with 8 raised nerves and 3 keels. Column stout, wings rather large. *Hab.* Mountains on banks in forest, rare at about 4500 ft. altitude. Perak, Thaiping Hills (Kunstler, Curtis, etc.); Gunong Batu Putih (Wray).

27. ACANTHEPHIPIUM, Bl.

Terrestrial plants with a cylindric pseudobulb and few large herbaceous ovate leaves, ribbed and plicate petioled. Raceme short from the base of pseudobulb, base covered with large sheaths. Flowers large ventricose. Sepals cohering, tips recurved, laterals adnate to foot of column; mentum large saccate. Petals narrow erect. Lip very small stipitate on column foot, side-lobes broad erect, midlobe recurved, a callus on disc. Column short, stout, foot very long. Pollinia 8 erect. Species 5 or 6, Indo-Malaya, China.

(1) *A. javanicum* Bl. *Bijdr.* 353; *Fl. Jav. Orch. Arch.* 156, t. 49; *Bot. Mag. t.* 4492.

Stem about 4 in. long. Leaves oblong-lanceolate acute at both ends, 1.5 to 2 ft. long, 6 to 7 in. wide. Raceme stout, 4 in. long. Bracts large ovate acuminate green ribbed, 1.5 in. long. Pedicel and ovary shorter. Flower 2 in. long. Sepals yellowish striped pink. Petals nearly as broad. Lip claw long, side-lobes oblong, truncate, rosy white, disc 4 lamellæ toothed, in middle of lip. Anther conic. Capsule 3 in. long, clubbed. *Hab.* Woods. Negri Sembilan, Tampin (Burkill). *Distrib.* Java.

28. PACHYSTOMA, Bl.

Terrestrial herb, with underground rhizome. Leaves 1 or 2, post-floral, lanceolate narrow, plicate. Scape tall, slender; flowers pendulous racemed. Bracts large scarious. Sepals sub-equal, laterals adnate to column base. Petals narrow spathulate. Lip sessile erect, side-lobes oblong, midlobe short, disc with 3 to 5 fimbriate or crested ridges. Column slender, no foot. Anther 4-celled. Pollinia 8, pear-shaped. Species 6 to 8, Indo-Malaya, Africa, Australia, but nearly all might be considered one species.

(1) *P. sessile* Rchb. *fil. Bonplandia*, iii, 250; *Hook. fil. F.B.I.* v. 812.

Rhizome 1 to 2 in. long. Leaf 1, very narrow. Scape 2 to 3 ft. tall, with lanceolate acuminate sheath leaves. Flowers about 20, rather distant, pink. Bracts lanceolate long-acuminate caudate, .5 in. long. Pedicel and ovary .25 in. long, pubescent. Sepals .25 in. long, lanceolate long-acuminate pubescent, pink. Petals very narrow linear. Lip shorter, yellow. *Hab.* Local on sandy heaths. Lankawi, Burau (Robinson). Setul heath. *Distrib.* India.

29. SPATHOGLOTTIS, Bl.

Terrestrial, pseudobulbs conic, 1- to 3-leaved. Leaves long petioled narrow plicate. Scape lateral. Flowers large, yellow or crimson in lax racemes. Sepals free sub-equal. Petals similar or larger. Lip sessile, 3-lobed, side-lobes erect, midlobe clawed, disc tubercled at base. Column graceful arched, dilate above, 2-winged. Pollinia 8. Species about 10, Indo-Malaya, China, Australasia.

Petals broad. Large plants.

Flowers rose or white (1) *S. plicata*

Flowers yellow (2) *S. aurea*

Petals broad. Small plant; flowers yellow (3) *S. affinis*

Petals narrow. Small plant; flowers pink (4) *S. Handingiana*

(1) *S. plicata* Bl. *Bijdr.* 401, t. 76; *Ridl. Mat.* i. 117. *S. lilicina* Griff. *Notulæ*, iii. 323; *Íc. Pl. As. t.* 311, fig. 3.

Pseudobulb conic, covered with leaf fibres. Leaves 2 to 4 ft. long, 1 to 2 in. wide, lanceolate plicate; petioles 6 to 18 in. long. Scape 1 to 6 ft. tall, many-flowered. Bracts pink ovate to lanceolate. Flowers 1 in. across, magenta, rarely lilac or white, ovary and pedicel 1 in. long. Sepals ovate-oblong acute. Petals wider. Lip side-lobes oblong truncate, callus 1, obtuse hairy yellow with two small white lobes on the sides, midlobe obtuse, reniform emarginate; base narrow. Capsule oblong pendulous. *Hab.* Open country and wet rocks; very common, up to 2000 ft. altitude. Singapore, Johor, Malacca, Sungei Ujong, Selangor, Perak, Kemanan.

var. *alba*. *Ridl.* Flowers and bracts white. Rare. Dindings, on Pulau Sembilan (Ridley). *Distrib.* Malay islands to Samoa. *Native name:* Lumbah.

Our form is always self-fertilised with rostellum suppressed. The common form in the Malay islands has a rostellum, and is insect-fertilised.

(2) *S. aurea* Lindl. *Paxt. Fl. Gard.* i. 16; *Ridl. Mat.* ii. 118. *S. Wrayi* Hook. *fil. F.B.I.* v. 813.

Pseudobulbs globose, .5 in. through. Leaves lanceolate long acuminate, 2 ft. long, 1.5 to 3 in. wide. Scape 3 to 4 ft. tall. Flowers yellow, 3 in. across or less; pedicels and ovary 1.5 in. long. Bracts ovate blunt, green, .5 in. long. Sepals oblong-lanceolate blunt. Petals ovate-lanceolate. Lip shorter, side-lobes oblong falcate yellow, base pink, midlobe narrow, tip dilate, yellow, base red spotted, calli 2, horn-shaped and 2 oblong cuneate at base of midlobe. Column arched, wings narrow orange. *Hab.* Grassy spots on mountains at 3000 to 6000 ft. altitude. Pahang, Gunong Tahan (Robinson); Telom. Malacca, Mt. Ophir (all collectors). Selangor, Semangkok Pass (Ridley); Bukit Hitam (Kelsall), Perak, Thaiping Hills; Gunong Inas (Yapp); Gunong Batu Putih (Wray); Gunong Kerbau (Robinson). Kedah Peak. *Distrib.* Borneo, Java.

(3) *S. affinis* De Vriese, *Ill. Orch.* 2, pl. 15; J. J. Smith, *Orch. van Java*, pl. cix.

Rhizome 2 in. long. Leaves 5 in a tuft, very narrow linear acuminate, the longest 6 in. long, .1 in. wide. Scape lateral, appearing with the young leaves, 16 in. tall, pubescent, with a few sheathing leaves, uppermost one bract-like. Bracts lanceolate acuminate pubescent, .5 in. long, upper ones shorter. Flowers 7 or 8, yellow. Ovary and pedicel very slender, .75 in. long, pubescent. Sepals pubescent lanceolate acuminate, .5 in. long. Petals lanceolate acute, broader glabrous. Lip .6 in. long, side-lobes erect oblong rounded truncate broad, .25 in. long, claw of midlobe narrow pubescent, dilated at end into a triangular rounded retuse portion and with 2 short pubescent lateral lobes at base. Column slender, arched, .5 in. long. *Hab.* Mountains, Kedah Peak. at 2000 ft. altitude (Haniff). *Distrib.* Java.

(4) *S. Handingiana* Par. and Rchb. *fl. Otia. Hamb.* i. 45; *Ridl. Mat.* i. 110.

Pseudobulbs small globose. Leaves 2 or 3, lanceolate acuminate, 4.5 to 5 in. long, .75 to .1 in. wide or less. Scape slender, 8 in. long, purple. Flowers few, scattered, 1 in. wide, crimson or pale rose; pedicels 1.5 in. long. Bracts lanceolate acuminate, .25 in. long, red. Upper sepal lorate-lanceolate, laterals larger. Petals lanceolate acute oblique. Lip side-lobes triangular blunt, midlobe linear acuminate, calli 2, club-shaped truncate yellow. Column arched dilate above. Capsule cylindric. *Hab.* Rare. Lankawi isles (Curtis). *Distrib.* Burma, Siam.

30. CALANTHE, R. Br.

Terrestrial herbs with a short or rarely long rhizome. Leaves broad herbaceous plicate in a large tuft. Scapes from the tuft of leaves tall; many-flowered. Flowers medium-sized to rather small, white, violet or yellow. Sepals and petals all similar lanceolate. Lip adnate to base of column, flat, 3- or 4-lobed, disc with lamellæ or calli arranged in rows, at the base, spur usually long (absent in *C. gracilis*). Column short horizontal adnate to lip base (except *C. gracilis*). Anther conic; pollinia 8 waxy, adhering in pairs to a disc.

Bracts ovate persistent short; flowers white or tinted violet. Plant nearly glabrous.

Lip with 4 linear lobes (1) *C. veratrifolia*

Lip, midlobe deeply bifid, lobes oblong spathulate (2) *C. Cecilie*

Lip midlobe obovate, lobes round fimbriate (3) *C. ovata*

Plant pubescent; midlobe deep bifid, lobes spathulate (4) *C. pubescens*

Bracts lanceolate caducous.

Leaves narrow; flowers few lax.

Flowers white (5) *C. angustifolia*

Flowers orange (6) *C. aurantiaca*

Leaves broad; raceme dense.

- Flowers white; midlobe broad reniform . . . (7) *C. albolutea*
 Flowers yellow or orange.
 Bracts 2 in. long, comose in bud; flowers
 small; midlobe ovate retuse . . . (8) *C. Forstermanni*
 Bracts 1 in. long; flowers medium orange;
 midlobe obovate, spur clubbed . . . (9) *C. speciosa*
 Bracts 1 in. long; flowers medium orange;
 midlobe oblong acute, spur hooked . . . (10) *C. curculigoides*
 Scapes lateral.
 Leaf one only; flowers pink few; midlobe spathu-
 late, spur short . . . (11) *C. monophylla*
 Leaves several on a leafy stem; midlobe sub-
 orbicular, no spur . . . (12) *C. gracilis*

(1) *C. veratrifolia* R. Br. *Bot. Reg. sub. t.* 573; *Lindl. Bot. Reg. t.* 720; *Bot. Mag.* 2615; *Ridl. Mat.* i. 120. *C. diploxiphion* Hook. *fil. F.B.I.* v. 849; *Ic. Pl.* 2111.

Stems short, 1 in. long. Leaves several lanceolate ovate-lanceolate acuminate, 12 to 18 in. long, 3 to 6 in. wide; petiole 3 to 6 in. long. Scape 1 to 2 ft. long, pubescent, nude below, raceme dense or lax, many-flowered. Bracts .75 in. long. Flowers white, .75 in. wide; ovary and pedicel 2 in. long or less. Sepals ovate acute or elliptic-obovate. Petals oblong or lanceolate. Lip 1 in. long, side-lobes linear, midlobe longer with 2 linear oblong lobes, callus or disc of connate tubercles in 3 rows, yellow or red. Spur slender clubbed, .75 in. long. *Hab.* Low wet woods, often abundant, Johor, Sedili River; Kukub woods. Pahang, Telom; Gunong Senyum (Evans, Robinson), Selangor, Menuang Gasing (Kloss). Negri Sembilan, Tampin Hill. Perak, Thaiping Hills (Hervey, Curtis); Goping (Kunstler). *Distrib.* Indo-Malaya, Australia.

The whole plant is somewhat variable; one form has silvery grey leaves, the others dark green. The raceme is densely conic or drawn out and elongate, and the flowers vary in size, and the lip in width of its lobes; the callus yellow or red. This is a popular pot plant.

(2) *C. Cecilie* Rehb. *fil. Gard. Chron.* 1883, i. 432; *Ridl. Mat.* i. 126. *C. Wrayi* Hook. *fil. F.B.I.* v. 850.

Stem short. Leaves elliptic-lanceolate blunt, 1 ft. long, 4 in. wide; petioles 3 to 6 in. long. Scape 12 to 18 in. long, pubescent; raceme short dense. Flowers 1 in. across, white tinted violet rarely all over violet. Bracts persistent ovate, .25 in. long. Ovary and pedicel 1 in. long. Sepals broad elliptic-ovate. Petals obovate. Lip side-lobes oblong blunt, midlobe deeply bifid, lobes spatulate round, callus horseshoe-shaped, yellow, 3 papillose ridges on disc, spur 2 in. long, slender, curved upwards. *Hab.* Local, sometimes abundant in damp forest, Pahang, Kota Glanggi (flowers all over violet); Gunong Tahan, Ulu Telai (Robinson). Selangor, Batu Caves; Bukit Hitam (Kelsall). Sungei Ujong, Pantai Reservoir, Seremban (Williams). Perak, Hermitage Hill; Sungei Siput, Kinta (Curtis). *Native name:* Suboi.

(3) *C. ovata* Ridl. *Journ. F.M.S. Mus.* iv. 69.

Leaves several obovate-lanceolate cuspidate, base narrowed, 8 in. long, 3 in. wide; petioles 6 in. long. Scape 30 in. tall; raceme 4 in. long. Flowers about 25. Bracts ovate cuspidate pubescent persistent, .25 in. long, lower ones lanceolate. Pedicels .5 in. long. Sepals ovate cuspidate. Petals narrower sub-spathulate, white, .5 in. long. Lip little longer, 4-lobed, side-lobes erect, oblong round, midlobe obovate bilobed, lobes round fimbriate, spur filiform, .5 in. long; callus horseshoe-shaped, yellow. Column violet. Fruit elliptic, .5 in. long. *Hab.* Rare, Mountain woods by streams, Pahang, Telom (Ridley).

(4) *C. pubescens* Ridl. *Kew Bulletin*, 1923, p. 117.

Leaves herbaceous pubescent beneath, elliptic acuminate narrowed to base; nerves elevate 7; 1 ft. long, 4 in. wide; petioles 6 in. long, densely velvety pubescent. Inflorescence 18 in. tall, pubescent, raceme 6 in. long. Flowers numerous crowded. Bracts persistent, lanceolate acuminate, upper ones ovate acuminate, pubescent, .5 in. long, .12 in. wide at base. Pedicels 1 in. long, pubescent. Sepals oblong-ovate acutely acuminate puberulous outside. Petals similar smaller. Lip side-lobes oblong rounded at tip short, midlobe deeply bilobed with a narrow claw, lobes spathulate with a long narrow claw, rounded at the tip, calli of 7 or 8 short tubercles in a line on the narrow claw of the lip, upper ones connate, spur very slender, nearly filiform, .5 in. long. Column base narrower, top dilate. *Hab.* Jungle at 2000 ft. altitude. Jalor, Bukit Besar (Gwynne-Vaughan).

(5) *C. angustifolia* Lindl. *Gen. and Sp. Orch. Pl.* 251; Ridl. *Mat.* i. 121. *C. pajooides* Rchb. *fil. Xenia Orch.* i. 207, t. 79; Hook. *fil. Ic. Pl.* 1864.

Rhizome long slender. Leaves narrow lanceolate acuminate both ends, 18 in. long, 1 in. wide in distant tufts; petioles 1 ft. long. Scapes 4 to 12 in. long, slender, a large sheathing bract near base; raceme lax or dense, 2 to 3 in. long. Flowers white. Bracts lanceolate acuminate, 1.5 in. long, caducous; pedicel and ovary .5 in. long. Sepals oblong acute. Petals broad. Lip sub-equally 4-lobed, midlobe retuse, 2 triangular plates at base yellow, spur curved clubbed, .25 in. long. Capsule .75 in. long. *Hab.* Mountain forests at 3000 to 5000 ft. altitude. Pahang, K'luang Terbang (Barnes); Telom, Gunong Berumbun; Bukit Fraser (Burkill). Perak, Thaping Hills (Kunstler, Curtis); Bujong Malacca. Kedah Peak (Robinson and Kloss). *Distrib.* Java.

var. *flava* Ridl. Flowers yellow ochre. Leaves broader. Petals and sepals shorter and bunter. Lip more deeply cleft. Pahang, Gunong Berumbun (Ridley).

Possibly a hybrid with *C. albolutea*.

(6) *C. aurantiaca* Ridl. *Journ. Roy. As. Soc. S. Br.* 39, p. 80; *Mat.* i. 122.

Leaves narrow lanceolate acuminate, 1 ft. long, .75 in. wide;

petioles 3 in. long. Scape 1 ft. long, slender, a large lanceolate sheath at base. Bracts caducous. Flowers .3 in. wide, orange. Pedicel and ovary .5 in. long. Sepals ovate. Petals narrower. Lip side-lobes sub-triangular, midlobe narrow linear blunt, 2 semi-ovate keels, spur narrow sigmoid blunt. *Hab.* Rare. Perak, Bujong Malacca (Ridley); Gunong Batu Putih (Wray).

(7) *C. albolutea* Ridl. *Journ. Roy. As. Soc. S. Br.* 39, p. 80; *Mat.* i. 121.

A large plant. Leaves broad lanceolate acute, 2.5 ft. long, 4 in. wide; petioles 8 in. long. Scape over 1.5 ft. tall. Bracts caducous. Flowers .5 in. wide; pedicel and ovary .25 in. long. Sepals and petals short broad ovate white. Lip 3-lobed, white, base yellow, side-lobes very short falcate acute, midlobe broad reniform-obovate bilobed, round, 2 semi-ovate ridges, spur under .25 in. long, curved clubbed. *Hab.* Mountain woods, Pahang, Telom. Perak, Thaiping Hills (Derry), Bujong Malacca (Ridley).

(8) *C. Forstermanni* Rehb. *fil. Gard. Chron.* 1883, p. 814. *C. Scortechinii* Ridl. *Mat.* i. 122 (not of Hooker).

Leaves lanceolate acuminate, 2 ft. long, 3 in. wide. Scape stout, 1.5 ft. long, with large loose sheaths. Raceme dense, 2 in. long. Bracts lanceolate acute, 2 in. long, pale green caducous. Flowers .5 in. across, yellow. Ovary and pedicel .25 in. long. Sepals lanceolate acute, connivent. Petals oblong broader. Lip side-lobes blunt very short, midlobe longer ovate often retuse with 2 low keels, spur much shorter than ovary, clubbed. *Hab.* Rocky mountain woods at 2000 to 4000 ft. altitude. Perak, Thaiping Hills (Scortechini, Curtis, etc.). Common here. *Distrib.* Assam.

The small dull yellow flowers and comose bracts distinguish this plant very well.

(9) *C. speciosa* Lindl. *Gen. and Sp. Orch. Pl.* 250. *C. Scortechinii* Hook. *fil. F.B.I.* v. 854.

Large plant with habit of *C. curculigoides*. Leaves ovate-lanceolate long-acuminate, narrowed to base, 3 ft. long, 5.5 in. wide; petioles 9 in. long. Raceme stout, nearly 2 ft. tall. Flowers very numerous, orange yellow. Bracts caducous. Sepals ovate mucronulate, .15 in. long. Petals obovate sub-acute wider. Lip rather short, 3-lobed, side-lobes oblong blunt short, midlobe obovate-obtriangular retuse, callus of two papillose keels, spur shorter than ovary, clubbed-shaped blunt. Ovary and pedicel slender, .5 in. long. *Hab.* Mountain forests at 3000 to 4000 ft. altitude. Perak, Gunong Batu Putih (Wray); Thaiping Hills (Kunstler). *Distrib.* Java.

The specimen of Hooker's *C. Scortechinii* is poor but it may be this species; J. J. Smith identifies Kunstler's plant with *C. speciosa*, and is probably right; its flowers are identical with those of Lindley's type.

(10) *C. curculigoides* Lindl. *Gen. and Sp. Orch. Pl.* 251; *Bot. Reg.* 1847, t. 8; Ridl. *Mat.* i. 122 (not of *Bot. Mag.* t. 6104).

Leaves lanceolate acuminate, 2 to 3 ft. long, 6 in. wide; petioles

7·5 in. long. Scape 1 to 2 ft. long; raceme dense. Flowers numerous, orange with red lip. Bracts lanceolate acute, caducous, 1·5 in. long. Pedicels with ovaries ·25 in. long. Sepals and petals ovate-lanceolate acute, ·5 in. long. Lip as long, adnate to column base, side-lobes waved erect, blunt, midlobe oblong acute, spur ·25 in. long, slender, tip hooked. *Hab.* In low wet woods to 2000 ft. altitude. Singapore (Wallich), Bukit Timah; Selitar. Johor, Kwala Tebing Tinggi; Gunong Pulai (Ridley). Perak, Maxwell's Hill (Wray). *Distrib.* Sumatra.

Formerly very abundant in Singapore, but largely exterminated by forest destruction.

(11) *C. monophylla* Ridl. *Journ. F.M.S. Mus.* iv. 70.

Leaf 1, ovate acute slightly narrowed at base, 6 to 7 in. long, 3 in. wide; petiole 3 to 6 in. long. Scape lateral, 7 to 9 in. tall, glabrous. Flowers 4 to 5, nodding. Bracts lanceolate acuminate, ·12 in. long. Ovary and pedicel nearly 1 in. long. Sepals and petals ovate cuspidate, ·5 in. long, rosy. Lip 3-lobed, side-lobes oblong acute, midlobe narrow spatulate bilobed lobes rounded, spur very short straight. Fruit elliptic, base narrowed, 1 in. long. *Hab.* Very rare. Mountain woods at 4000 ft. altitude. Pahang, Telom (2 plants only seen) (Ridley).

The pendent flowers do not expand, and it appears to be self-fertilised.

(12) *C. gracilis* Lindl. *Wall. Cat.* 7341; *Gen. and Sp. Orch. Pl.* 251; *Hook. fil. F.B.I.* v. 855; *Bot. Mag. t.* 4714. *Limatodes gracilis* Lindl. *Fol. Orch.* 1.

Stems ascending leafy, 1 ft. tall or more. Leaves glabrous elliptic lanceolate narrowed at both ends acuminate, 5 or 6 on a stem, 7 in. long, 1·5 in. wide. Scape lateral, 2 ft. tall, slender pubescent. Flowers about 15, distant. Bracts linear caducous; pedicel and ovary pubescent, 1·25 in. long. Sepals and petals narrow linear acuminate, white, ·5 to ·75 in. long. Lip oblong, ·25 in. long, side-lobes lanceolate acuminate, yellow, midlobe longer oblong, crisped, tip wider rounded retuse, 2 velvety patches on disc, no spur. Column free from lip. *Hab.* Mountains, Kedah Peak, at 3800 ft. altitude (Robinson and Kloss). *Distrib.* Indo-China.

Our form has a much more pubescent inflorescence than the Indian one, and the side-lobes of the lip are more acuminate. The flowers of the Indian form are usually yellowish green. A very abnormal species of the genus.

31. PREPTANTHE, Rchb. fil.

Epiphytic or rock plants; pseudobulbs large conic grey. Leaves appearing before flowers on the top of the pseudobulb, several broad lanceolate herbaceous. Scape tall, hairy from side of the leafless pseudobulb. Flowers numerous, at the apex pink or white. Bracts conspicuous. Sepals and petals broad, lanceolate spreading. Lip 3- or 4-lobed, adnate to column at base, spurred, no callus.

Column short, horizontal. Pollinia 8. Species 3 or 4, tropical Asia.

Flowers 2 in. wide, white; midlobe of lip obcordate . . . (1) *P. vestita*
 Flowers 1.5 in. wide, pink; midlobe bilobed (2) *P. rubens*

(1) *P. vestita* *Rchb. fil. in Fl. des Serres*, viii. 245. *Calanthe vestita* *Lindl. Gen. and Sp. Orch. Pl.* 250; *Bot. Mag. t.* 4671; *Ridl. Mat. i.* 123.

Epiphytic; pseudobulbs ovoid blunt angled, grey, 2.5 in. long. Leaves appearing after flowering, lanceolate, 12 to 18 in. long, 3 in. wide. Scape from side of pseudobulb 12 to 18 in. long, villous. Bracts persistent, ovate, .75 to 1 in. long. Flowers about 12 in lax raceme white; pedicel and ovary 1.5 in. long. Sepals ovate-lanceolate, 1 in. long. Petals broad oblong. Lip side-lobes cuneate obovate, midlobe fan-shaped obcordate, white with red or yellow eye, spur very long slender. *Hab.* Very rare. Selangor, top of Batu rocks (one plant). Pulau Adang, Pulau Nipis, pseudobulbs apparently of this on a fallen bough (Ridley). *Distrib.* Tenasserim, Borneo. Celebes.

(2) *P. rubens* *Ridl.* *Calanthe rubens* *Ridl. Gard. Chron.* 1890, i. 576; *Mat. i.* 123.

Pseudobulbs conic grooved, 6 in. long. Leaves 12 to 20 in. long, 5 to 6 in. wide, ovate-lanceolate. Scape 2 ft. long, woolly pubescent. Flowers rose pink or white. Bracts ovate acuminate pubescent, 1 in. long. Pedicel and ovary 2 in. long. Sepals lanceolate acuminate, .75 in. long. Petals shorter. Lip side-lobes oblong, erect blunt, midlobe linear-oblong bilobed blunt, base of lip darker, raised lines, spur filiform, .5 in. long. *Hab.* On rocks, Lankawi islands (Curtis). Perlis, Bukit Lagi (Ridley).

Like *P. vestita*, but flowers much smaller and usually pink.

32. PHAIUS, Lour.

Large terrestrial herbs. Leaves herbaceous plaited. Scape from rhizome or racemes axillary few-flowered from leafy stem. Flowers large showy. Sepals and petals lanceolate equal free. Lip adnate to column base embracing it convolute gibbous at base or spurred. Column long stout, no foot. Anther 4-celled. Pollinia 8, attached by fours to a disc. Species 14, Old World Tropics.

Scape from base of pseudobulb tall, racemose; flowers large.

Sepals and petals acute (1) *Ph. Wallichii*
 Sepals and petals obtuse (2) *Ph. callosus*

(1) *Ph. Wallichii* *Lindl. Wall. Pl. As. Rav.* ii. 46, t. 158. *P. Blumei* *Lindl. Gen. and Sp. Orch.*, 127; *Bl. Fl. Jav. Orch. Arch. Ind.* 2, t. 1. *P. bicolor* *Lindl. l.c.*; *Bot. Mag. t.* 4078.

Pseudobulbs 1 to 1.5 in. through. Leaves elliptic-lanceolate acuminate, 1 to 2 ft. long, 2.5 to 8 in. wide; petioles 8 to 10 in.

long. Scape 2 to 4 ft. long. Flowers 4 to 5 in. across. Sepals and petals lanceolate acute, white outside, brown (or orange) within. Lip convolute, midlobe lanceolate-ovate acute crisped, white, inside rose pink, spur .25 in. long. Column white. Capsule 2 in. long. *Hab.* Woods in the low country, not very common and nearly always self-fertilised, never opening the flowers. Malacca, Ayer Keroh; Bukit Sadanen (Derry); Pengkalan Kumpas, Linggi River (Williams). Selangor, Kwala Lumpur; Kedah, Bukit Bintang (Kloss). *Distrib.* Indo-Malaya, Polynesia, run wild in Jamaica and Panama.

A very favourite plant in cultivation.

(2) *Ph. callosus* Lindl. *Gen. and Sp. Orch. Pl.* 128; *Blume, Orch. Ind.* 4, t. 2; *Rchb. fil. Xen. Orch.* ii. t. 122; *Ridl. Mat.* i. 119. P. Kuhlîi *Rchb. Xenia* ii. t. 122, fig. 122.

Pseudobulbs short. Leaves elongate-lanceolate acuminate, 2 to 4 ft. long, 5 in. wide. Scape 3 ft. tall. Flowers 4 in. wide. Sepals oblong or linear-oblong, blunt pinkish or pure white behind, brown in front. Petals narrower. Lip convolute, yellow, midlobe round bilobed with 2 calli at base, pink, spur yellow. *Hab.* In dense hill-forests at 3000 to 5000 ft. altitude. Perak, Thaiping Hills abundant; Gunong Kerbau (Robinson). *Distrib.* Java.

33. LIMATODIS, Bl.

Stems erect, stiff angled, leafy above. Leaves broad ovate. Racemes short few-flowered, axillary from sheaths below the leaves. Flowers rather large, white or yellow. Sepals lanceolate. Petals similar but broader. Lip not convolute entire spurred. Column rather short and broad. Anther ovate beaked. Pollinia 8 on an ovate disc. Rostellum long acute. Species 4 or more, Malay Peninsula and islands. The genus was referred by Blume and all following him to *Phaius*, but appears to be quite distinct. Lindley's genus *Limatodes* is a mixture of this with some species of *Calanthe* and *Preptanthe*.

(1) *L. pallidus* Ridl. *Phaius pallidus* Ridl. *Journ. Linn. Soc.* xxxiii. 313; *Mat.* i. 119.

Stems 2 to 3 ft. tall, 4-angled, base with sheaths only, upper part leafy. Leaves ovate acuminate, 9 in. long, 3 in. wide. Racemes 2 to 4 in. long from the stem below the leaves. Flowers 7 or 8 in a raceme 2 in. across; pedicels 1 in. long. Sepals lanceolate acute yellowish. Petals wider, white, violet-spotted. Lip oblong-lanceolate sub-acute, orange-yellow with red spots in lines, spur .5 in. long, cylindric acuminate, pink. *Hab.* Mountain forests at about 3000 ft. altitude. Pahang, Tahan woods. Selangor, Bukit Hitam (Kellsall). Perak, Thaiping Hills (Curtis). *Distrib.* Sumatra.

This is possibly *L. punctata* Lindl., only known from a drawing by Vries, from Sumatra.

34. THUNIA, Rchb. fil.

Stems tall, leafy. Leaves distichous, narrow acuminate. Flowers large in a pendulous terminal short raceme large white (or purple). Bracts nearly as long as flowers, persistent. Sepals and petals narrow acuminate. Lip convolute spurred, margin fimbriate. Column tall, no foot. Pollinia 8, two outer pairs longer than inner ones. Species 4 or 5, Indian, Siamese and Chinese.

(1) *Th. alba* Rchb. fil. *Bot. Zeit.* 1852, 764. *Phaius albus* Lindl. *Wall. Cat.* 3749; *Bot. Mag.* 3991.

Stems 18 in. tall or more, fleshy, glaucous. Leaves linear-lanceolate acuminate glaucous, 6 in. long, 1 in. wide. Raceme 3 in. long. Flowers 4 to 8. Bracts 1.5 to 2 in. long, narrow boat-shaped. Sepals and petals oblong-lanceolate acuminate, 2.5 to 3.5 in. long, white. Lip much shorter, white with purple pink veins, edge crisped fimbriate. Column long, straight, wings rather large. *Hab.* Setul, Bukit Rajah Wang (Haniff). *Distrib.* Sikkim, Burma, Siam.

35. ARUNDINA, Bl.

Terrestrial woody herbs with narrow grassy leaves. Flowers showy in a short simple or sparingly branched terminal raceme. Bracts ovate persistent. Sepals lanceolate. Petals wider. Lip 3-lobed convolute round column, midlobe round, crisped, 2 or more raised nerves on disc. Column tall dilate above winged; anther helmet-shaped. Pollinia 8, in pairs on a disc. Capsule oblong. Species 5 or 6; Indo-Malaya, China.

Flowers large pink; petals ovate very broad; no yellow on lip or very faint

(1) *A. bambusifolia*

Flowers smaller; sepals and petals white, or tinted rose, a yellow patch on lip

(2) *A. speciosa*

Flowers very small, pink; leaves very narrow, revolute when dry

(3) *A. revoluta*

(1) *A. bambusifolia* Lindl. *Gen. and Sp. Orch. Pl.* 125. *A. speciosa* Ridl. *Mat.* i. 124 (not of Blume). *A. densa* Lindl. *Bot. Reg.* xxviii. t. 38.

Stems 3 to 7 ft. tall. Leaves linear acuminate, 2 to 8 in. long, .3 to .5 in. wide. Raceme not or rarely branched, 6 to 8 in. long, few-flowered. Bracts ovate acuminate. Flowers very large; pedicel 1 in. long. Sepals lanceolate rose pink, 1 in. long. Petals broader, 1.75 in. long, 1 in. wide, ovate cuspidate. Lip as long, deep pink (not yellow in centre), keels on lip 3. Capsule 3 in. long. *Hab.* Rocky spots in mountains, especially in gravelly islands in streams. Common. Johor, Gunong Janeng (Kelsall); Endau River. Pahang, Tahan River; Gunong Tahan (Ridley). Malacca, Mt. Ophir (all collectors). Perak, Gunong Kerbau (Robinson); Batang Padang valley (Wray). *Distrib.* Himalayas.

The lowland and gravelly island forms have often smaller flowers with occasionally some yellow in the lip and narrower leaves. The Ophir and Kerbau flowers are very large and deep coloured.

(2) *A. speciosa* Bl. *Bijdr.* 401, t. 73. *A. Philippii* Rehb. *fil. var. malayana* Ridl. *Mat.* i. 124.

Stems very slender, 3 ft. long or even less. Leaves linear acuminate, 4 to 6 in. long, .25 in. wide. Flowers much smaller than in *A. bambusifolia*, about 1 in. long, pale pink to white, with the lip only mauve at the tip with distinct central yellow bar. Sepals lanceolate, .2 in. wide. Petals lanceolate-ovate acute, 1 in. long, .5 in. wide. Lip rather narrow, .5 in. wide at the tip; keels two. Capsule 2 in. long. *Hab.* Not common. Kedah Peak on precipices (a form with brown streaks on sides of lip and dark crimson tip). Setul (Haniff); flowers nearly white, lip tip pale mauve. *Distrib.* Java, Burma.

This is commonly cultivated in Singapore, producing bulbils from the stem. It has run wild or been planted on rail-banks near Kwala Lumpur, Negri Sembilan and other places. The Hongkong plant commonly cultivated, distinguished by its very deep crimson tip to the lip, is probably Blume's *chinensis*, which is described, however, by him as having five ribs on the lip, which I have never seen in any *Arundina* flower. It is also the *A. Philippii* and *Meyenii* of Rehb. *fil.* It is closely allied to *A. speciosa*, but besides the deep-coloured apex of lip, does not produce bulbils, as that species does.

(3) *A. revoluta* Hook. *fil. F.B.I.* v. 858; *Ridl. Mat.* i. 124.

Stems slender, 2 to 3 ft. tall. Leaves linear long-acuminate, rather stiff and crowded, 4 to 7 in. long, .13 to .24 in. wide. Raceme 1 to 2 in. long. Bracts ovate acute, .12 in. long. Flowers few, 2.25 in. wide, pale violet rose. Sepals lanceolate acute, .25 in. wide. Petals oblong acute as long, nearly twice as broad. Lip little longer, side-lobes indistinct, midlobe bilobed with a tooth in notch, keels 2 and median one very low, pale rose, edge veined purple, a pale yellow central blotch. Column pinkish white. Capsule 1.12 in. long. *Hab.* Rare. Perak, Thaiping Waterfall (all collectors).

36. DILOCHIA, Lindl.

Epiphytic or terrestrial; stems stout, tall leafy. Leaves coriaceous broadly lanceolate. Inflorescence terminal paniced or racemose. Bracts large, coriaceous. Flowers medium size. Sepals and petals lanceolate. Lip 3-lobed with 5 crests. Column tall curved, with anthers. Capsule globose opening by slits half-way down. Species 4, Malay Peninsula and islands.

Bracts lanceolate acute; flowers in a long raceme . . . (1) *D. Wallichii*
 Bracts ovate blunt; flowers paniced (2) *D. Cantleyi*

(1) *D. Wallichii* Lindl. *Gen. and Sp. Orch. Pl.* 38; *Bl. Fl. Jav. Orch. Ind. Arch.* t. 8 and 5A; *Ridl. Mat.* i. 125. *Arundina Wallichii* Rehb. *fil. Xen. Orch.* ii. 13, t. 105, figs. 13 to 15.

Stems 1.5 to 5 ft. tall. Leaves ovate-lanceolate acuminate, 7 in. long, 1.5 in. wide; petioles .5 in. long, sheaths ribbed, 1 in. long. Racemes 1 to 3, erect lax, 6 to 9 in. long. Bracts lanceolate acute persistent, 1 in. long. Pedicel and ovary .75 in. long. Sepals

and petals oblong-lanceolate, ochre yellow inside, red to purplish violet outside, 5 in. long. Lip yellow or yellowish green marked red or purplish violet, sides revolute round; midlobe broad round. Column tall. Capsule globose, 1 in. long; pedicel 1 in. long. *Hab.* Epiphytic or on rocks. Singapore (Wallich). Perak, Thaiping Hills (Derry, Curtis). *Distrib.* Borneo, Sumatra, Java.

(2) **D. Cantleyi** *Ridl. Journ. Linn. Soc.* xxxii. 332; *Mat.* i. 125. *Arundina Cantleyi* *Hook. fil. F.B.I.* v. 858; *Ic. Pl.* 2112.

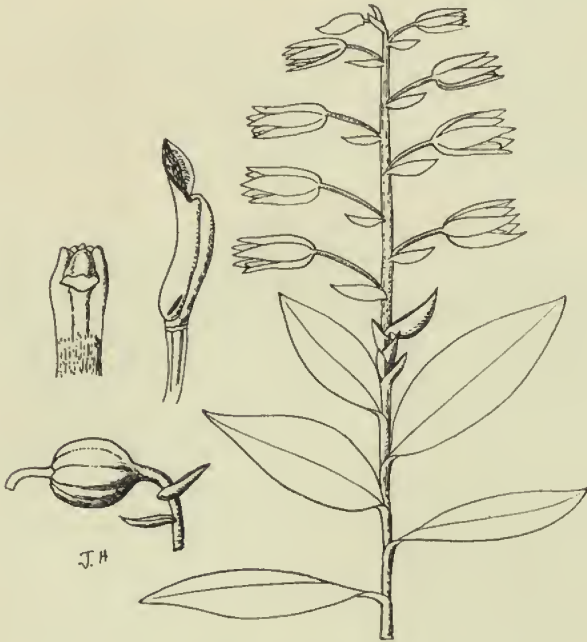


FIG. 168.—*Dilochia Wallichii*.

Terrestrial. Stems 2 to 8 ft. tall, purple. Leaves ovate acuminate, sub-erect, edged purple, 1.5 in. long, 1 in. wide (longer and thinner in forest). Uppermost leaves bract-like cymbiform pink, purplish or white. Racemes from 3 to 9, often branched, 3 in. long or more. Floral bracts boat-shaped, white or pink. Ovary and pedicel purple. Flowers 1.25 to 1.5 in. wide. Sepals oblong lanceolate falcate. Petals linear-oblong cream-white. Lip oblong, .5 in. long, side-lobes short round, tip truncate, 5 raised veins, dull purple-pink with cream edge or dark purple with yellow edge. Column yellow striped pink. Capsule pendulous, ovoid or globose, 1 in. long, green with a purple bar on each fertile segment and a

narrow one between. *Hab.* Mountains at 4000 to 7000 ft. altitude. On rocks, and the ground. Pahang, Gunong Tahan; Telom. Selangor, Menuang Gasing (Kloss). Perak, Gunong Bubu (Cantley); Gunong Inas (Yapp); Gunong Kerbau; Ulu Batang Padang (Wray). *Distrib.* Borneo.

37. CÆLOGYNE, Lindl.

Epiphytic or rock plants with a stout woody rhizome and 2-leaved pseudobulbs. Leaves coriaceous. Scape lateral from rhizome or terminal on top of pseudobulb. Bracts deciduous papery. Flowers racemose, white pale yellow or green, often large. Sepals oblong or lanceolate. Petals narrower. Lip sessile at base of column spurless, side-lobes erect embracing column; midlobe large, usually crested. Column tall, sides winged, top hooded, no foot. Anther conic, 2-celled. Pollinia 4 cohering by a disc. Capsule large, elliptic winged. Species about 70, Indo-Malayan.

Raceme long pendulous from side of pseudobulb.

Raceme short glabrous; flowers yellowish and brown (1) *C. testacea*

Racemes very long, many-flowered.

Pseudobulbs conic cylindrical; sepals broad white.

Rachis nigrohirsute; flowers distant (2) *C. tomentosa*

Rachis glabrous dense-flowered (3) *C. densiflora*

Pseudobulbs cylindrical; leaves obovate.

Flowers many; sepals narrow acute green (4) *C. Rochussenii*

Pseudobulbs 4-angled; leaves oblanceolate (5) *C. quadrangularis*

Racemes erect from side of pseudobulbs.

Flowers numerous, white, with orange or brown marks.

Bracts large ovate, very large plant (6) *C. asperata*

Bracts lanceolate smaller.

Petals narrower than sepals.

Sepals acuminate; flowers large, bulbs distant (7) *C. longibractata*

Sepals acute; flowers smaller (8) *C. stenophylla*

Petals wider than sepals.

Lobes of lip acute; flowers distant large (9) *C. Foerstermanni*

Lobes of lip blunt (10) *C. Kingii*

Flowers green and black.

Pseudobulbs orbicular, thin flat crowded (11) *C. pandurata*

Pseudobulbs conic or ovoid distant (12) *C. Mayeriana*

Flowers 1 or 2 on scape.

Flowers white; pseudobulbs in close masses (13) *C. Cumingii*

Flowers large flesh-colour and brown or yellow.

Flowers brown; midlobe of lip broad white tipped (14) *C. speciosa*

Flowers brown; midlobe of lip narrow acute (15) *C. xyrekes*

Flowers yellowish, lip bright yellow (16) *C. xanthoglossa*

Rhizome long creeping; flowers appearing singly on the top of a pseudobulb on an erect flexuous raceme.

- Leaves very coriaceous short; flowers long.
 Scape very stout; flowers rather large, 2 in.
 wide (17) *C. anceps*
 Scape slender; flowers 5 in. wide (18) *C. radicosus*
 Leaves lanceolate, side lobes acute;
 flowers 2 in. wide (19) *C. pallens*
 Flowers small, .5 in. long.
 Pseudobulbs distant fusiform.
 Leaves ovate; flowers bright green (20) *C. prasina*
 Leaves elliptic; flowers brown (21) *C. carnea*
 Leaves elliptic-lanceolate; flowers white (22) *C. stenochila*



FIG. 169.—*Cœlogyne testacea*.

(1) *C. testacea* Lindl. *Bot. Reg.* 1842; *Misc.* 38; *Bot. Mag.* t. 4785; *Ridl. Mat.* i. 127.

Pseudobulbs crowded, conic, 2 in. long, .75 in. through. Leaves
 F.L.M.P., 4 K

lanceolate acute, 7 to 8 in. long, 2 in. wide; petioles 2 in. long. Racemes pendulous, 6-flowered. Flowers 1 in. long, fœtid. Bracts persistent, oblong, flesh-coloured, .5 in. long. Sepals oblong, sub-acute, keeled. Petals linear narrow, flesh-colour. Lip .75 in. long, side-lobes round dark brown edged, white inside, midlobe ovate or oblong-orbicular round crisped with 4 crested ridges white marbled brown at tip. Column white. Anther conic brown. *Hab.* On stumps and tree bases, sandy spots near sea, local. Singapore, Chan Chu Kang; Kranji, etc. Johor, Tana Runto (Ridley). Negri Sembilan, Siliau (Williams).

(2) *C. tomentosa* Lindl. *Fol. Orch.* 3. *C. Dayana* Rehb. *fil. Gard. Chron.* 1886, p. 44, fig. 9; *Williams, Orchid Album* vi. t. 247; *Ridl. Mat.* i. 127.

Pseudobulbs crowded sub-cylindric, 4 in. long. Leaves lanceolate acuminate, base narrowed, 20 in. long, 3 in. wide; petioles 4 in. long. Raceme pendulous, 20 in. long. Flowers numerous, 20 to 30. Bracts oblong blunt, 1 in. long. Pedicels with ovaries 2 in. long, with rachis black-pubescent. Sepals lanceolate acute, keeled, 1.5 in. long. Petals lanceolate. Lip longer, side-lobes blunt, brown veined white inside, white with a brown patch outside, midlobe oblong-ovate, edge crisp white, keels on disc 3 crested, base brown, middle white, tips yellow with 2 more on midlobe. Column curved, white, brown in front. *Hab.* Mountains, on trees. Malacca, Mt. Ophir (Hullett). Pahang, Kluang Terbang (Barnes). Selangor, Ginting Bidai (Kloss). Perak, Thaiping Hills (all collectors), Penang (Curtis). *Distrib.* Borneo.

var. *Massangeana* Ridl. *C. Massangeana* Rehb. *fil. Gard. Chron.* 1878, p. 684.

Pseudobulbs and leaves shorter, keels on midlobe forming an irregular yellow mass. Racemes 4 ft. long. *Hab.* Pahang, Gunong Tahan (Ridley). Perak, Thaiping Hills (Derry). Kedah, Gunong Bintang (Kloss).

var. *cymbidioides* Ridl. *C. cymbidioides* Ridl. *Journ. Linn. Soc.* xxxviii. 837.

Pseudobulb narrower, 3 in. long; raceme more lax. Sepals and petals narrow, .25 in. wide; midlobe of lip small, keels as in *Massangeana*. *Hab.* Pahang, Gunong Tahan. Terrestrial on mossy banks. An odd abnormal form of the preceding variety.

This is a variable plant, but I am quite unable to separate any of the forms specifically. The leaves, in small plants especially, are often obovate, passing through broad oblanceolate to comparatively narrow lanceolate. The petals and sepals vary from white to flesh colour, the crests on the midlobe are distinct and separate or form a papillose mass. The amount of hairiness of the rachis varies very much.

(3) *C. densiflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 39, p. 81; *Mat.* i. 128.

Pseudobulb long, cylindric conic, narrow, 4 in. long. Leaves lanceolate acuminate, 15 in. long, 1.25 in. wide; petioles 2 in.

long. Raceme pendulous, 8 in. long, dense, not black pubescent. Flowers numerous smaller than in *C. Dayana*. Bracts oblong truncate red-brown, .5 in. long and wide. Sepals lanceolate acute. Petals narrower, .5 in. long, brownish. Lip side-lobes short acute, tips narrow, white, inside brown, white streaked, midlobe orbicular shortly apiculate, edge white, centre red brown, with a large yellow papillose mass, keels on disc crested. *Hab.* Very rare. Selangor, Bukit Hitam (Kelsall).

(4) *C. Rochusseni* De Vriese *Ill. Orch. t. 12, t. 11, fig. 6*; *Rchb. fl. Xenia Orch. 1, 212, t. 85*; *Ridl. Mat. i. 128*. *C. plantaginea* Lindl. *Gard. Chron. 1855, p. 20*. *C. macrobulbon* Hook. *fl. F.B.I. v. 830*.

Pseudobulbs close cylindric grooved, 3 to 6 in. long. Leaves obovate, 7 to 8 in. long, 4 in. wide; petioles 1.5 to 2 in. long. Raceme pendulous, 18 to 24 in. long, slender. Flowers numerous distant, 1.5 in. wide. Bracts oblong truncate, .5 in. long. Sepals lanceolate acute keeled narrow. Petals linear, all greenish yellow. Lip as long, side-lobes long, blunt, white outside, tawny, white veined inside, midlobe ovate acuminate, base narrowed, edge crisp white, centre yellow, 2 tawny spots near tip, keels 3, crested on disc, 2 more on midlobe, all brown at base, yellow-tipped. Column hood 3-lobed, middle lobe broad truncate. Capsule ovoid, 3 keeled, 2 in. long, 1 in. through. *Hab.* On trees. Common. Singapore, Selitar. Johor, Batu Pahat; Gunong Janeng (Kelsall); Pulau Dayak, and Pulau Aor (Feilding). Pahang, Tahan River. Malacca, Mt. Ophir; Cape Rachado (Williams). Selangor, Bukit Hitam (Kelsall); Rawang. Sungei Ujong (Cantley). Perak, Thaiping Hills (Kunstler). Penang (Wallich). *Distrib.* Sumatra, Java, Borneo. *Native name*: Sakat Tulo Ular.

(5) *C. quadrangularis* Ridl. *Journ. Linn. Soc. xxxii. 323*; *Mat. i. 129*.

Pseudobulbs conic, 4-angled, 3 in. long, 1.5 in. through. Leaves oblanceolate acute, base narrowed, 6 in. long, 2 in. wide; petioles .5 in. long. Raceme pendulous, 8 in. long. Flowers 8 to 12, distant, 2.5 in. wide; rachis black-pubescent. Bracts oblong, .25 in. long. Sepals lanceolate acute, laterals longer, falcate, keeled. Petals lanceolate-linear, white. Lip 1 in. long, side-lobes oblong blunt, white outside, brown white-veined inside; midlobe ovate blunt white, brown central spot keels 3, toothed, 2 extra on midlobe. Column white marked brown, hood truncate toothed. *Hab.* Local. Perak, Thaiping Hills, at 5000 ft. altitude (Ridley). *Distrib.* Borneo.

(6) *C. asperata* Lindl. *Journ. Hort. Soc. iv. 221*; *Warner's Orchid Album t. 311*.

Pseudobulbs crowded conic, in large clumps 5 to 7 in. long, 1 to 2 in. through. Leaves oblanceolate-obovate cuspidate, base narrowed, 2 ft. long, 4 in. wide; petioles 8 in. long. Raceme

10 in. long, drooping, basal 4 in. covered with large bracts. Flowers 15 to 20, fragrant, large. Bracts oblong, .75 in. long. Ovary and pedicel 1 in. long. Sepals oblong-lanceolate. Petals linear-lanceolate, white. Lip side-lobes long ovate, midlobe clawed, oblong blunt, crisp with an orange warty ridge. Capsule elliptic 2 in. long; wings low. *Hab.* On trees over streams and on rocks. Perak, Thaiping Hills; Temengoh River, Sungei Kertai. *Distrib.* Sumatra, Borneo.

A well-known pot-plant, very fragrant.

(7) **C. longibractata** *Hook. fil. F.B.I. vi. 194; Ann. Bot. Gard. Calc. vol. 26, t. 39; Ridl. Mat. i. 129. C. casta Ridl. Journ. Linn. Soc. xxxii. 322.*

Pseudobulbs conic, ribbed, 3 in. long, approximate. Leaves narrow lanceolate acute, 8 in. long, 1.25 in. wide; petioles 6 in. long. Raceme erect, base covered with green sheathing leaves 1 to 3 in. long, 2 upper ones foliaceous; rachis flexuous, 6 in. long. Flowers 5, white, 3 in. across. Bracts lanceolate acuminate papery, 2 in. long, narrow. Sepals lanceolate acuminate acute. Petals narrower. Lip shorter, side-lobes ovate blunt yellow veined orange, midlobe ovate cuspidate, edge at base crisp, white, a basal yellow spot, keels 3, crisp, 2 more on midlobe. Column dark orange, hood truncate, 2-toothed. *Hab.* Pahang, Gunong Tahan. Selangor, Semangkok Pass (Ridley). Bukit Hitam (Kelsall). Negri Sembilan, Siliu, Seremban (Williams). Perak, Thaiping Hills (Kunstler, Derry). Kedah, Gunong Bintang (Kloss).

A charming and fragrant plant.

(8) **C. stenophylla** *Ridl. C. angustifolia Ridl. Journ. Linn. Soc. xxxii. 322; Mat. i. 130 (not of Parish or Wight).*

Pseudobulbs 2.5 in. long, conic. Leaves lanceolate acute, 3-nerved, 10 in. long, 1 in. wide; petioles 3 in. long. Raceme 6 in. long, base for 1 in. loosely sheathed; rachis slender. Flowers small, about 6. Bracts lanceolate acute. Sepals lanceolate-lorate, sub-acute, 1 in. long. Petals much narrower spathulate-linear, all cream colour. Lip .75 in. long, side-lobes long blunt, brown inside, midlobe obovate-oblong, round edge undulate, keels 3, sinuate white, edge yellow spotted brown. Column arched cream tinted brown, hood round. *Hab.* Rare. Lankawi (Curtis).

Erroneously referred to a variety of *cinnamomea*, Teysm. (not Lindl.) by Pfitzer.

(9) **C. Foerstermanni** *Rchb. fil. Gard. Chron. 1886, ii. 262; Ridl. Mat. 130. C. Maingayi Hook. fil. F.B.I. v. 831.*

Large plant; pseudobulbs elongate conic grooved, 5 in. long, 1 in. through. Leaves lanceolate acute, 8 to 15 in. long, 2 to 2.5 in. wide; petioles 3 to 4 in. long. Raceme nodding, 2 ft. long, base sheathing. Flowers large, white, 7 or more. Bracts lanceolate acute, 3 in. long. Pedicel and ovary 1.5 in. long. Sepals

lanceolate, 1.5 in. long. Petals wider. Lip side-lobes broad acute, white streaked orange brown, midlobe ovate acute, crisped keels crested, 5, white centre yellow, a few red spots. Column green, edges yellow, hood emarginate toothed. *Hab.* On trees in low country often very high up. Singapore, Serangoon (Murton), Malacca (Maingay, Derry). Pahang, Kwantan (Durnford); Telang River (Machado). *Distrib.* Borneo.

(10) **C. Kingii** Hook. *fil. Ann. Bot. Gard. Calc.* v. 25, t. 38; *Ridl. Mat.* i. 130.

Pseudobulbs close or remote, long conic, 4 in. long, 1 in. through. Leaves lanceolate acute, 9 in. long, 1.5 in. wide; petioles .5 to 1 in. long. Raceme base 6 in. long, sheathed; rachis flexuous, 1 ft. long. Flowers 8, distant, white. Bracts 1.25 in. long. Sepals lanceolate acute, 1 in. long. Petals broader, spathulate-lanceolate. Lip .75 in. long, side-lobes rounded blunt, midlobe broader round mucronate crisped white, yellow spot on side-lobes and base of midlobe brown streaks on lip base, keels 3, waved toothed, 2 extra on midlobe. Column white, hood rounded notched. *Hab.* Rare. Negri Sembilan, Siliau (Williams). Perak, Thaiping Hills (Kunstler, Derry).

(11) **C. pandurata** Lindl. *Gard. Chron.* 1853, p. 791; *Bot. Mag.* t. 5084; *Warner's Orchid Album* t. 63; *Ridl. Mat.* i. 131.

Rhizome rather long; pseudobulbs orbicular-ovoid flat thin, 3 to 5 in. long, 1.5 in. wide. Leaves elliptic-lanceolate acuminate, 12 to 18 in. long, 2 to 3 in. wide; petioles 1 to 2 in. long. Raceme 6 to 18 in. long, lower half sheathed. Flowers 8 or 9 large distant green and black. Bracts 1 in. long, persistent. Ovary and pedicel 2 in. long. Sepals oblong-linear. Petals linear-sub-spathulate. Lip pandurate, side-lobes narrowed, midlobe sub-quadrate retuse, apple-green mottled and veined black. *Hab.* On trees over jungle streams not rare. Selangor, Rawang; Semangkok Pass; Ulu Gombak (Ridley). Perak, near Bujong Malacca (Kunstler); Batang Padang; Tanjong Malim (Williams). *Distrib.* Borneo, Sumatra.

(12) **C. Mayeriana** Rchb. *fil. Gard. Chron.* 1877, ii. 134; *Ridl. Mat.* i. 131.

Rhizome long, thick; pseudobulbs 3 to 4 in. apart, 2 in. long, 1 in. wide, ovate compressed. Leaves lanceolate acute, 8 in. long, 1 in. wide; petiole thick. Raceme 1 ft. long, far from pseudobulb, base 2 in. sheathed, upper sheaths leafy. Flowers 5 or 6, distant. Sepals 1.5 in. long, oblong. Petals smaller linear-lanceolate acute, bright green. Lip green with black dots and nerves, side-lobes blunt, midlobe pandurate, bilobed, crisp, keels on disc 3 on midrib, 4 toothed. Column green, wings wide. Capsule elliptic, 2 in. long, keels low. *Hab.* Low down on trees and stumps, sandy spots near sea. Singapore, Kranji; Chan Chu Kang. Johor. Tana Runto (Ridley). *Distrib.* South Borneo.

(13) *C. Cumingii* Lindl. *Bot. Reg.* 1840; *Misc.* 76; *Bot. Reg.* 1841, t. 29; *Bot. Mag.* t. 4645; *Ridl. Mat.* i. 131.

Pseudobulbs globose-conic wrinkled crowded, 1.5 in. long, 1 in. through; rhizome stout. Leaves lanceolate acute, 6 in. long, 1 in. wide. Raceme from among leaves 3 to 5 in. long. Flowers few, white, 3 in. across, fragrant. Bracts lanceolate acuminate, 1 in. long. Sepals oblong-lanceolate acute. Petals much narrower lanceolate. Lip side-lobes oblong blunt, white with orange below tips, midlobe large broad erose or entire sub-acute centre orange, keels 3, crisped, toothed on midlobe. *Hab.* In the low country on the tops of very lofty trees, and at 3000 ft. altitude, in large masses several feet across on rocks. Singapore (Cuming); Bukit Timah. Malacca, Mt. Ophir; Pulau Bawang (Derry). Pahang, Tahan River. Perak, Thaiping Hills; Waterloo (Curtis).

(14) *C. speciosa* Lindl. *Gen. and Sp. Orch. Pl.* 39; *Bot. Mag.* t. 4889; *Ridl. Mat.* i. 132.

Pseudobulbs ovoid angled crowded, 1.5 in. long. Leaf 1, elliptic or lanceolate acute, 4 to 9 in. long, 1.5 to 2 in. wide; petiole 1 to 2 in. long. Raceme from axil of young leaf 4 in. long. Flowers 1 or 2, large; bracts lanceolate caducous. Sepals oblong-lanceolate acute, 2.5 in. long, buff, flesh colour or greenish. Petals narrow linear. Lip large, side-lobes blunt toothed, midlobe with a broad claw tip broad oblong with 2 undulate crests yellowish blotched red brown, tip and edge white. Column tall. Capsule 2.5 in. long, ovoid, strongly winged. *Hab.* On trees in woods, usually sporadic, not rare. Singapore, Ulu Sumbawang. Johor, Sungei Tebrau. Pahang, Tras Route (Barnes); Tahan River. Negri Sembilan, Pantai (Williams). Selangor, Semangkok Pass; Menuang Gasing (Kloss). Perak, Thaiping Hills (common); Gunong Batu Putih (Wray); Gunong Kerbau (Robinson). Penang Hill, West Hill (Curtis); Richmond Pool. *Distrib.* Borneo, Java.

The keels and edge sometimes fimbriate.

(15) *C. xyrekes* Ridl. *Journ. F.M.S. Mus.* vi. 181.

Pseudobulbs oblong, 4-angled, 2 in. long. Leaves obovate to lanceolate, sub-acute, base long narrowed, 1 ft. long, 3 in. wide; petioles 4 in. long. Raceme 2- or 3-flowered. Sepals 2 in. long, pinkish. Petals very narrow linear, 1.5 in. long. Lip side-lobes rounded entire, midlobe .5 in. long, oblong round at tip, narrowed, keels 2, low deep brown, base of midlobe sepia brown edged flesh colour, side-lobes dark brown spotted white. Rostellum lanceolate. *Hab.* Pahang, Gunong Tahan, Teku River woods (Ridley).

Leaves and pseudobulbs larger than in *C. speciosa*, midlobe of lip much smaller. Perhaps a local form.

(16) *C. xanthoglossa* Ridl. *Journ. F.M.S. Mus.* vi. 180.

Rhizome woody; pseudobulb conic, 4-angled, 1.5 in. long. Leaf 1, oblanceolate acuminate, 7 in. long, nearly 2 in. wide; petiole

2 in. long. Raceme 2 in. long, 1- or 2-flowered; peduncle stout, 1.5 in. long. Bract lanceolate acuminate, 1.25 in. long. Sepals lanceolate acute, keeled, 2 in. long, pinkish. Petals very narrow linear. Lip side-lobes oblong, 1 in. long, midlobe lanceolate, acute edge crisp, canary yellow, keels 3, crisped, orange centre of midlobe orange, edges pinkish. Rostellum ovate large. *Hab.* Very rare. Pahang, Gunong Tahan at 5500 ft. altitude (Ridley).

(17) **C. anceps** Hook. *fil. F.B.I.* v. 840; *Ic. Pl.* 2109; *Ridl. Mat.* 132.

Rhizome stout; pseudobulbs .5 in. apart, fusiform. Leaves 2, elliptic, thickly coriaceous, acute, 2.5 to 5 in. long, 1.5 in. wide; petiole .5 in. long, stout. Raceme from top of pseudobulb 5 to 10 in. long, compressed, stout, not or hardly flexuous above. Flowers 2 in. wide, ovary and pedicel .25 in. long. Bracts .5 in. long. Sepals linear-oblong acute. Petals narrow linear. Lip side-lobes long, blunt, midlobe wider round much shorter with 2 short ridges. Column hood acute. *Hab.* Rare and little known. A very stiff-leaved plant with the biggest flowers in this section. Pahang, Gunong Tahan, at 7000 ft. altitude. Selangor, Gunong Mengkuang Lebah (Robinson). Perak (Scortechini). Kedah, Gunong Bintang (Kloss).

I take the Pahang and Selangor plants quoted to be *C. anceps*, because the leaves are very stiff and short coriaceous and the scape rigid with big flowers. They were white with 2 strong ochre ridges.

(18) **C. radicosus** Ridl. *Journ. F.M.S. Mus.* vi. 57.

Rhizome stout with very thick roots; pseudobulbs narrow cylindrical, nearly 1 in. apart, 2 in. long. Leaves 2, coriaceous lanceolate acute, base narrowed, strong-nerved, 4 in. long, 1 in. wide. Scape flexuous above, 3 in. long, base flattened. Pedicels .15 in. long. Sepals linear-oblong blunt, .5 in. long. Petals filiform as long. Lip shorter, side-lobes curved, tips lanceolate, midlobe flabellate rounded with 2 keels on disc. Column rather short, hood large ovate blunt entire. *Hab.* Rare. Mountains at 6000 ft. altitude. Perak, Gunong Kerbau (Robinson).

Resembles *C. anceps*, but the scape is much more slender and flowers much smaller.

(19) **C. pallens** Ridl. *Journ. Roy. As. Soc. S. Br.* 39, p. 81; *Mat.* i. 133.

Rhizome stout; pseudobulbs subcylindric, 2 to 3 in. long. Leaves 2, elliptic or oblanceolate, 3 to 6 in. long, 1 to 1.5 in. wide; petioles 1 in. long. Raceme terminal with 1 basal persistent bract at base above flexuous, 6 in. long. Flowers 2 in. wide. Sepals lanceolate acute, pale green or buff. Petals filiform. Lip pale buff, side-lobes long with toothed pubescent tips, base saccate, midlobe as long, with 2 long sinuous brown keels and a short middle one. Column hood 3-lobed, central lobe long undulate. *Hab.* On trees at 2500 ft. altitude. Perak, Thaipang Hills (Curtis); Bujong

Malacca. Kedah Peak (Haniff), a form with the flowers pale green with 4 unequal sinuous ridges, possibly distinct.

(20) *C. prasina* *Ridl. Journ. Linn. Soc.* xxii. 326; *Mat.* i. 133.

Rhizome long slender; pseudobulbs distant fusiform, 2 in. long. Leaves ovate or elliptic acute, 5 in. long, 1.25 in. wide; petioles .5 in. long. Raceme 6 in. long, flexuous. Bracts lanceolate acuminate, 1 in. long. Flowers 5, green, .75 in. wide; pedicels .5 in. long. Sepals lanceolate acute. Petals shorter filiform, base lanceolate. Lip much longer pandurate, side-lobes short, round, midlobe longer, base narrow, oblong, keels 2, thick. Column short, hood round. *Hab.* Local on trees and on the ground. Kedah Peak at 3000 to 4000 ft. altitude (Ridley).

(21) *C. carnea* *Hook. fil. F.B.I.* v. 838; *Ic. Pl.* 2107; *Ridl. Mat.* i. 134.

Rhizome long, stout; pseudobulbs distant fusiform, 1 to 2 in. long. Leaves elliptic-lanceolate, 2 to 4 in. long, .5 to 1 in. wide; petioles .5 to 1 in. long. Raceme slender, 8 to 9 in. long, base flattened, upper part flexuous. Bracts lanceolate acute, 1 in. long. Flowers 18 to 20, white or brown, .5 in. long. Petals linear-filiform. Lip longer, side-lobes round blunt, midlobe round blunt or retuse, keels 2, short, yellow. Capsule oblanceolate, 1 in. long, rather strongly winged. *Hab.* On rocks or moss, tree stumps or low bushes at 4000 ft. to 6000 ft. altitude. Pahang, Kluang Terbang (Barnes); Gunong Tahan; Telom. Selangor, Sempang Mines (flower sienna brown); Menuang Gasing (Kloss); Mengkuang Lebah (Robinson). Perak, Gunong Kerbau (Robinson); Gunong Inas (Yapp); Kedah, Gunong Bintang (Kloss).

The petals in *Ic. Pl.* 2107 are figured much too broad.

(22) *C. stenochila* *Hook. fil. F.B.I.* v. 837; *Ic. Pl.* 2106; *Ridl. Mat.* i. 134.

Rhizome very stout; pseudobulbs terete, 3 in. distant, 1 to 2 in. long. Leaves elliptic-oblong, 1 to 2 in. long, .5 to .6 in. wide. Raceme 8 in. tall. Flowers brownish flesh-colour, 1.5 in. wide. Sepals lanceolate acute, .75 in. long. Petals narrow linear. Lip narrow, side-lobes long, blunt, midlobe orbicular with 3 keels. Column hood truncate. *Hab.* Pahang, Gunong Tahan (Ridley). Perak, Gunong Batu Putih (Wray), one very small specimen with a smaller flower than the Tahan plant.

38. CRINONIA, Blume.

Rhizomatous with pseudobulbs. Leaves 2, coriaceous narrow lanceolate. Scapes from base of pseudobulbs, base covered with sheaths. Raceme slender of many small flowers. Sepals, upper one concave, laterals oblique larger. Petals broad. Lip clawed, claw descending, limb obscurely 3-lobed or entire, concave, with

2 calli. Column short thick, foot distinct, curved, attached to claw of lip, hood very flat. Anther flat; pollinia 4 obovate. Species 4, Malayan.

Leaves linear acuminate.

Pseudobulbs ellipsoid globose (1) *C. carnea*
Pseudobulbs elongate cylindrical; flowers white (2) *C. Elizabethiana*

Leaves lanceolate.

Pseudobulbs cylindrical; flowers pink (3) *C. parviflora*

(1) *C. carnea* *Bl. Bijdr.* 339; *Pfitzer, Pflanzenr.* 135, fig. 46, A.B. *Pholidota carnea Lindl. Gen. and Sp. Orch. Pl.* 37.

Rhizome branches elongate; pseudobulbs parallel to it thick oblong or ovate, 1·5 in. long, tips upturned. Leaves narrow linear, 3 in. long, ·12 in. wide; petioles slender, ·5 in. long. Scape slender, 3 in. long; flowers distant, ·15 in. across, flesh colour. Sepals ovate sub-acute. Petals shorter, broad blunt. Lip as long saccate, claw short, obscurely 3-lobed. *Hab.* Mountains at high altitudes. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Gunong Kerbau at 4200 ft. altitude (Robinson); Gunong Inas (Yapp). *Distrib.* Sumatra, Java.

(2) *C. Elizabethiana* *Ridl. Pholidota Elizabethiana Ridl. Journ. F.M.S. Mus.* vi. 181.

Rhizome 6 in. long, woody; pseudobulbs elongate cylindrical, 2 in. long. Leaves linear narrowed at top and long narrowed at base, 9 in. long, ·25 in. wide. Scapes 4 to 5 in. long. Flowers many distichous small white. Bracts ·12 in. long. Ovary and pedicel ·1 in. long. Upper sepal lanceolate, lower gibbous at base keeled. Petals oblong or ovate-oblong. Lip, base cymbiform with short blunt lobes, midlobe sub-orbicular crisp, obscurely 3-lobed, with 2 semi-linear fleshy ridges between side lobes. Column short, and broad, arms tooth-like. *Hab.* High mountains. Pahang, Gunong Tahan at 7100 ft. altitude; Gunong Ulu Riang at 6000 ft. altitude (Ridley).

(3) *C. parviflora* *Pfitzer, Pflanzenr.* 136. *Pholidota parviflora Hook. Ic. Pl.* 1891; *Ridl. Mat.* 135. *Ph. micrantha Hook. fil. F.B.I.* v. 847.

Rhizome thick; pseudobulbs cylindrical or ovoid, 1 to 1·5 in. long. Leaves elliptic-lanceolate acute, 1·5 to 3 in. long, ·5 in. wide or more. Scape slender flexuous, 5 in. long. Bracts lanceolate. Flowers ·12 in. wide, about 35. Sepals ovate or ovate-oblong acute. Petals smaller, all greenish pink turning pink. Lip boat-shaped, limb ovate, greenish white yellow with one or a double callus on centre, a raw sienna line in front. Column red. Capsule ·25 in. long. *Hab.* Mountains, Pahang, Gunong Tahan at 7000 ft. altitude (Robinson); Telom. Perak, Thaiping Hills (Derry, Long); Gunong Kerbau (Robinson); Chabang (Scortechini). Kedah, Gunong Bintang (Kloss).

var. *pumila* *Ridl.* Pseudobulbs crowded conic oblong, ·5 in.

long. Leaf ovate, .75 in. long, .4 in. wide. Scape 2 in. long. Flowers nearly .25 in. long. Pahang, Gunong Tahan (Ridley).

Apparently an alpine form.

39. CHELONISTELE, Pfitz.

Rhizome short; pseudobulbs crowded. Leaf 1, usually lanceolate. Scape appearing from rhizome with young leaves. Raceme lax. Flowers small. Bracts papery lanceolate acuminate caducous. Sepals sub-equal. Petals narrower. Lip side-lobes short on clawed base, keels 2. Column broad winged and hooded obovate, no foot. Species 7, Himalaya and Malay islands.

Plant about 1 ft. tall; side-lobes of lip truncate; leaf long lanceolate (1) *C. perakensis*
 Plant about 6 in. long or less, side-lobes acute; leaf oblanceolate blunt (2) *C. pusilla*

(1) *C. perakensis* *Ridl.* *Coelogyne sulphurea* *Hook. fil. F.B.I.* v. 833 (*not of Rchb. fil.*); *Ridl. Mat.* 1, l.c. *C. perakensis* *Rolfe, Bot. Mag. t.* 8203. *C. Beyrodtiana* *Schlecht. Orchis*, 1915, 70, t. 6, figs. 1 to 7.

Pseudobulbs crowded obpyriform, 1 to 1.5 in. long. Leaf elliptic or lanceolate, 3 to 6 in. long, .5 to 1 in. wide; petiole 1 to 3 in. long. Raceme 7 in. long, base covered by sheathing leaves, above lax. Flowers about 10 to 12, small. Sepals oblong-lanceolate acuminate, nearly .5 in. long. Petals very narrow linear, all pale green. Lip clawed, side-lobes narrow acute; midlobe oblong clawed, broad reniform, pale yellow with central orange spot; keels 2 on disc and claw. Column arched. *Hab.* Mountains, Perak, Thaiping Hills (all collectors).

Schlechter's *C. Beyrodtiana* has rather condensed flowers, like those of *C. pusilla* *Ridl.*, but is otherwise typical *C. perakensis*, and comes from the same well-known locality for both.

(2) *C. pusilla* *Ridl.* *Coelogyne pusilla* *Ridl. Journ. Linn. Soc.* xxxii. 327; *Mat.* i. 133.

Pseudobulbs crowded conic, 1 in. long, .25 in. through. Leaf 3 to 4 in. long, 1 in. wide, oblanceolate blunt; petiole 1 in. long. Raceme 4 in. long or more. Bracts lanceolate acute, 1 in. long. Flowers small; pedicels .75 in. long. Sepals lanceolate acute, 1 in. long, flesh colour. Petals linear-filiform. Lip clawed, blade deflexed, side-lobes small truncate, midlobe oblong ochre, tip dilate reniform, bilobed white with an orange red-spot at base, keels 2 between side-lobes. *Hab.* Local. Perak, Thaiping Hills at 4000 ft. altitude (Curtis).

40. CHELONANTHERA, Bl.

Rhizome long; pseudobulbs distant. Leaves 2, coriaceous. Scape flexuous. Bracts broad ovate. Pedicels short. Flowers

small. Upper sepal oblong-lanceolate, laterals broader, all blunt. Petals linear or broad oblong. Lip base boat-shaped, midlobe oblong bilobed deflexed, calli 2. Column curved, hood broad. Anther flat 4-celled; pollinia 4, sub-globose. Rostellum long bifid. Species 2, Malayan.

(1) *C. gibbosa* Bl. *Bijdr.* 383. *Pholidota gibbosa* De Vriese. *Ill. Orch. t. 10*; *Ridl. Mat. i. 135*.

Rhizome branched; pseudobulbs oblong-conic, 2 to 3 in. long. Leaves lanceolate or obovate with long point, 6 to 7 in. long, 1 to 3 in. wide; petioles 1 in. long. Scape 10 to 12 in. long, basal half nude. Flowers about 20. Bracts oblong-ovate, brown, .25 in. long. Sepals .25 in. long, with petals white. Lip base oblong, a pair of curved teeth at base, white, pinkish at base. Column hood waved, edged brown. Anther red. *Hab.* Pahang, K'luang Terbang (Barnes). *Distrib.* Sumatra and Java.

41. PHOLIDOTA, Lindl.

Rhizome short with crowded ovoid pseudobulbs or erect with narrow distant pseudobulbs. Leaves 2. Scapes from top of pseudobulb rachis often flexuous. Bracts distichous, dry yellowish. Flowers small, pink or white. Sepals concave. Petals flat. Lip sessile on column base, the base saccate oblong, terminal lobe usually bilobed. Column short-hooded. Anther 2-celled beaked. Pollinia 4, cohering by a disc. Species about 30, Indo-Malayan.

Pseudobulbs ovoid crowded on a short rhizome.

Spike long; bracts semi-circular persistent (1) *P. imbricata*

Pseudobulbs distant on a pendulous stem, cylindrical.

Bracts lanceolate (2) *P. decurva*

Pseudobulbs crowded; raceme dense erect.

Bracts elliptic (3) *P. grandis*

(1) *P. imbricata* Lindl. *Hook. Exot. Flora ii. t. 138*; *Bot. Reg. t. 1213, 1777*; *Ridl. Mat. i. 135*.

Pseudobulbs crowded conic, dark green, 1 to 3 in. long. Leaf 1, elliptic-lanceolate, 6 to 12 in. long; petiole 1 in. long or more. Raceme pendulous, 12 in. long; peduncle slender. Bracts distichous semi-circular, .3 in. wide, persistent. Flowers numerous crowded pale flesh-colour, .25 in. long. Upper sepal orbicular, laterals boat-shaped, keeled. Petals linear-oblong, falcate. Lip boat-shaped, terminal lobe rounded bilobed. *Hab.* Sporadic on rocks and trees. Selangor, Batu Caves. Perak, Bujong Malacca (Kunstler); Batu Kurau (Scortechini). Lankawi (Curtis). *Distrib.* India, Ceylon, Java, Sumatra, Borneo.

(2) *P. decurva* Ridl. *Journ. Linn. Soc. xxxii. 328*.

Stems elongate branched; pseudobulbs terete, 3 to 4 in. long. Leaves 2, obovate or oblanceolate acute, 4 in. long, 1.5 in. wide. Raceme 6 in. long, slender decurved above flexuous. Bracts lanceolate acute caducous. Flowers numerous, nearly 1 in. across.

Sepals ovate or oblong subacute. Petals smaller oblong, all flesh-colour. Lip boat-shaped, edges incurved, keels 5, thick, terminal lobe sub-quadrate bilobed, flesh-rose-colour, base orange. Column oblong pink. Rostellum ovate acute. *Hab.* Perak (Curtis).

(3) *P. grandis* *Ridl. Journ. F.M.S. Soc.* xlix, 32.

Pseudobulbs crowded elliptic or conic, 2 to 3 in. long, angled. Leaves 2, oblong-oblancoate acute, 1 ft. long; petioles 13 in. long. Scape erect from base of pseudobulb, 8 in. tall, lower half nude green spotted red. Raceme dense, many-flowered. Bracts caducous elliptic, .5 in. long, green. Sepals ovate blunt apple green. Petals smaller oblong white. Lip base saccate, edge raised undulate, side-lobes broad, midlobe irregularly oblong rounded bifid, edge white. Column short, hood broad truncate retuse green. Anther orange semi-orbicular. *Hab.* Selangor, Semangkok Pass (Ridley).

42. CLADERIA, Hook. fil.

Terrestrial, climbing a short way up trees. Leaves few ovate lanceolate plicate. Scape terminal erect, sometimes branched; rachis with short stiff bracts. Flowers large. Sepals oblong sub-acute, laterals oblique gibbous at base. Petals falcate, oblancoate. Lip concave, 3-lobed. Column long, curved, foot and arms absent. Anther helmet-shaped. Pollinia 2, elliptic acute, no disc. Species 2 or 3, Malayan.

(1) *C. viridiflora* *Hook. fil. F.B.I.* v. 810; *Ic. Pl.* 2083; *Ridl. Mat.* i. 136.

Rhizome long slender. Leaves in distant tufts, 6 to 12 in. long, 1 to 2.5 in. wide, green mottled darker. Scape 6 in. tall; raceme lengthening to 6 in. with a long lanceolate leaf below it. Bracts .12 in. long. Flowers 1 in. long, green reticulately veined. Lip side-lobes long subacute, midlobe orbicular retuse, base pubescent a club-shaped ridge on disc. Capsule oblong, 3 in. long, .5 in. through. *Hab.* Common in dry woods. Singapore, Garden Jungle; Bajau. Johor, Kampong Simpai (Kelsall); Batu Pahat. Pahang, Tahan River. Malacca (Maingay). Negri Sembilan, Siliau and Port Dickson (Williams). Perak, Sungei Rayah (Kunstler). Penang Hill. *Distrib.* Sumatra, Borneo.

TRIBE II. VANDEÆ (GENERA 43-70).

43. EULOPHIA, Br.

Terrestrial glabrous herbs tuberous or pseudobulbous. Leaves several appearing with or after the flowers. Scape lateral or sub-terminal. Sepals and petals free. Lip from column base saccate or spurred, side-lobes erect. Column long or short, base broad, no foot. Anther 2-celled. Pollinia 2 or 4, sessile or attached by a

short caudicle to a disc. Species numerous especially in Africa, Indo-Malaya.

- Pseudobulb short; leaves broad herbaceous; scape terminal; column short broad; sepals gibbous at base (1) **E. squalida**
 Pseudobulb large; leaves linear grassy; scape lateral.
 Leaves narrow; scape branched; lip side-lobes blunt (2) **E. graminea**
 Leaves lanceolate linear; scape simple; lip side-lobes acute (3) **E. Keithii**
 Pseudobulb rhizomatous, no leaves (4) **E. macrorrhiza**

(1) **E. squalida** Lindl. *Bot. Reg.* 1841; *Misc.* 77; *Ridl. Mat.* i. 137. *E. elata* Hook. *fl. F.B.I.* vi. 3.

Pseudobulb conic short. Leaves appearing with the flowers, lanceolate acuminate, 12 to 18 in. long, 1.5 in. wide. Scape 1 to 1.5 ft. tall. Flowers numerous. Bracts lanceolate acuminate, .5 in. long. Ovary and pedicel 1 in. long. Upper sepal lanceolate cuspidate, laterals prolonged at base into a conic mentum .25 in. long, brownish green, .5 in. long. Petals ovate-oblong crisp, veins on disc thick 4, base of lip ochreous, side-lobes veined ochre, tip pale lilac. Column broad with large opening to mentum, spur white streaked pink. Anther conic with 2 white or crimson knobs. Capsule fusiform, 2 in. long. *Hab.* Common in open grassy country. Singapore, Tanglin; Chan Chu Kang. Johor, Batu Pahat; Kota Tinggi (Ridley); Sedili River (Nanson). Malacca, Machap (Derry). Negri Sembilan, in old rubber fields (Williams). Perak (Scortechini). Penang Hill (Curtis). *Distrib.* Borneo, Java, Sumatra, Celebes.

Hooker's *E. elata* is based on Scortechini's specimen 2023, which is *E. squalida*, but Scortechini's drawing 2023 is of *E. macrorrhiza*.

(2) **E. graminea** Lindl. *Gen. and Sp. Orch. Pl.* 182; *Ridl. Mat.* i. 137. *E. inconspicua* Griff. *Notulæ*, 349; *Ic. Pl. As. t.* 326.

Pseudobulbs conic, 4 in. long, 1 in. thick, green. Leaves linear acute, 6 in. long, .25 in. wide. Scapes lateral, 1 to 3 ft. tall, slender branched. Flowers numerous, 1 in. long. Bracts .12 in. long, linear acuminate. Sepals lanceolate-linear acute. Petals little broader green with brown reticulations. Lip side-lobes blunt; midlobe obovate undulate crisp, white veined violet, white-hairy; nerves on disc 3, spur short clubbed. Column slender erect. Anther broad 2 purple processes at top. Capsule elliptic, 3 in. long. *Hab.* Common in fields and open sandy spots. Singapore (Wallich, Cuming). Chan Chu Kang. Johor, Batu Pahat (Kelsall). Malacca, Bukit Sabukor (Derry); Pulau Besar (Maingay). Pahang, Sungei Meang. Negri Sembilan, Siliau (Williams). Kelantan near Kota Bharu (Ridley). Selangor, Rawang (Kloss). Perak (Scortechini). Penang (Curtis). Pulau Adang. Lankawi, Kwah (Curtis). Perlis. Setul. *Distrib.* India, Siam. *Native name:* Bawang Hantu.

(3) **E. Keithii** *Ridl. Journ. Linn. Soc.* xxxii. 333; *Mat.* i. 138.

Pseudobulbs 3 to 5 in. long, 1 in. through, cylindroconic. Leaves linear acuminate, 2.5 in. long, .3 in. wide. Scape 1.2 in. tall, simple. Flowers 9, about 1.5 in. wide. Bracts .12 in. long, lanceolate acute; pedicels 1 in. long. Sepals .75 in. long, linear acute. Petals broader, all green. Lip green except midlobe white with brown reticulations, side-lobes falcate, midlobe obovate retuse crisp, keels 3 undulate ending in a conic yellow callus, spur clubbed, .25 in. long. Column broad winged; anther with 2 recurved red processes. *Hab.* Limestone rocks. Kedah, Gunong Geriang, Pulau Adang group, Pulau Butang, and Pulau Tengah (Ridley). Lankawi isles (Curtis). Perlis, Bukit Lagi. *Distrib.* Siam.

(4) **E. macrorrhiza** *Bl. Orch.* 183, t. 63, figs. 2AB, 66B.

Saprophytic leafless; rhizome very large, fleshy oblong. Scapes 1 or 2, about 2 ft. tall, dull reddish, stout. Flowers about 1 in. long, rather distant. Bracts subulate linear, over 1 in. long. Sepals oblong-lanceolate not gibbous at base. Petals broader and shorter, all dull red. Lip saccate at base, shortly broad spurred, side-lobes long, rather narrow, midlobe short ovate blunt, pink with a purple base and central whitish bar spur white. Column tall curved, with a short blunt hood. *Hab.* Rare. Perak (Scortechini drawing); on the track to Jor in Ulu Batang Padang (Ridley). *Distrib.* Java.

44. GEODORUM, Jack.

Terrestrial herbs with a tuberous rhizome and broad thin leaves. Scape from rhizome. Flowers medium in decurved racemes pink, yellow or white. Bracts narrow. Sepals and petals similar lanceolate acute. Lip sessile on column, base entire boat-shaped with a central ridge and callus. Column stout short, with low wings. Anther ovate. Pollinia 2, on a strap-shaped caudicle. Capsule large elliptic pendulous. Species 5 or 6, Indo-Malaya, Australia.

Sepals blunt; flowers pink, .5 in. long, opening. . . . (1) **G. purpureum**

Sepals lanceolate acute; flowers cream, 1.5 in. wide, expanded (2) **G. citrinum**

(1) **G. purpureum** *Br. Ait. Hort. Kew, Ed. ii. v. 207; King, Ann. Bot. Gard. Calc.* viii. 181, t. 245 (*var. album*); *Ridl. Mat.* i. 138. *G. fucatum* *Lindl. Bot. Reg. t.* 1687.

Pseudobulbs small; stem 3 to 4 in. tall. Leaves ovate-lanceolate acuminate, 9 to 12 in. long, 3 in. wide. Scape 18 in. tall; raceme 2 in. long, decurved. Bracts .36 in. long. Flowers pink (or white), .5 in. long, not spreading. Sepals oblong blunt. Petals little broader. Lip oblong entire or emarginate, pink dotted darker, a central yellow patch, callus at base conic. *Hab.* In grass-fields and waste ground. Malacca, Mt. Ophir (Griffith); Relau (base of Ophir); Bukit Sadanen (Derry). Negri Sembilan, Siliu (Williams). *Distrib.* India, Siam, Borneo, Java.

(2) **G. citrinum** Jack, *Andr. Bot. Rep. t. 626*; *Bot. Mag. t. 2915* (flowers too green); *Ridl. Mat. i. 139*.

Pseudobulb globose conic; stem 4 to 6 in. tall. Leaves ovate-lanceolate to lanceolate, 8 to 12 in. long, 1 to 2 in. wide; petioles 3 to 6 in. long. Scape 10 to 18 in. long. Flowers creamy yellow, 1.5 in. wide. Sepals and petals ovate broad acute nearly expanded. Lip ovate with purplish or brown veins. *Hab.* Woods. Perak, Grit (Ridley). Kedah between Baling and Kraw (Williams). Penang, Balik Pulau (Curtis); Telok Bahang. Lankawi, Pulau Hujong Duri (Curtis). Perlis, Ginting Kabok. *Distrib.* Burma, Siam.

45. PLOCOGLOTTIS, Bl.

Terrestrial herbs; rhizome creeping. Leaf 1 or several on a stem, ovate-lanceolate petioled. Scape from rhizome tall. Flowers in a lax raceme. Sepals lanceolate. Petals longer or shorter. Lip shorter, clawed mobile, limb oblong. Column short, broad, foot very short, arms 0. Anther ovate. Pollinia 4, each pair with a caudicle and round disc. Species 7 or more, Malayan.

Leaf 1 (rarely 2).

Raceme glabrous; flowers yellow spotted red.

Petiole long; leaf ovate; petals linear acute (1) **P. javanica**

Petiole short; leaf elliptic; petals long acuminate (2) **P. acuminata**

Raceme pubescent; flowers dull yellow; lip spotted black with purple processes (3) **P. porphyrophylla**

Leaves several on an erect stem 3 ft. tall (4) **P. fœtida**

(1) **P. javanica** Bl. *Bijdr. 381, t. 21*; *Orch. Arch. t. 14*; *Ridl. Mat. i. 113*.

Leaf 1, ovate-lanceolate acute, 9 in. long, 3 in. wide; petiole 5 in. long. Scape 1 to 2 ft. tall. Flowers about 30, glabrous. Bracts ovate acuminate. Upper sepal linear acute, .5 in. long, laterals wider falcate. Petals narrow linear. All yellow, red spotted. Lip quadrate truncate, edges decurved, side-lobes minute semi-ovate blunt pale yellow. Column red stout with large wings. *Hab.* In forests up to 3000 ft. altitude. Not rare. Singapore, Selitar. Johor, Tengarah (Feilding); Hulu Batu Pahat (Kelsall), Pahang, Kota Glanggi; Tahan River woods. Malacca, Batang Malacca (Goodenough). Selangor, Ginting Bidai; Semangkok; Menuang Gasing (Kloss). Negri Sembilan, Siliau (Williams). Perak, Thaiping Hills (Curtis, etc.); Temengoh; Kal and Chandering (Kunstler). Kedah Peak (Robinson). *Distrib.* Java.

(2) **P. acuminata** Bl. *Ann. Mus. Bot. Lugd. Bat. i. 46*.

Resembles *P. javanica*, but leaf elliptic narrowed to both ends acute, 10 in. long, 3 in. wide; petiole short, 3 to 4 in. long. Scape 15 in. tall. Bracts lanceolate acuminate, .25 in. long. Flowers larger, 1 in. across. Sepals lanceolate acuminate, light yellow blotched crimson. Petals lanceolate acuminate. Lip subquadrate

truncate with rather a long point. *Hab.* Mountain forests. Selangor, Ginting Bidai (Kloss). Perak, Bujong Malacca (Kunstler). *Distrib.* Java, Sumatra.

(3) *P. porphyrophylla* Ridl. *Trans. Linn. Soc.* iii. 368; *Journ. Linn. Soc.* xxxii. 317; *Mat.* i. 113.

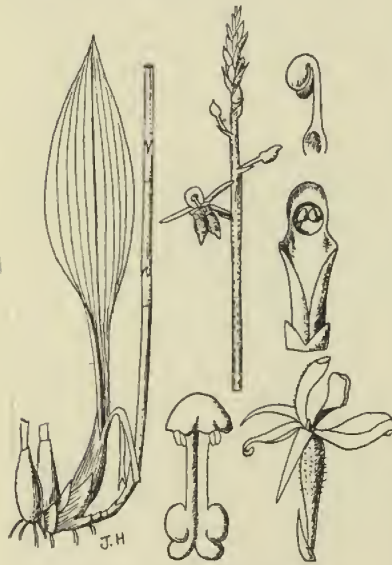


FIG. 170.—*Plocoglottis porphyrophylla*.

Rhizomes short; pseudobulbs slender, 3 in. long. Leaf 1 or 2 elliptic-lanceolate acute, strongly nerved purple, 8 to 18 in. long, 3 to 3.5 in. wide; petioles 1 to 6 in. long. Scape 1 to 3 ft. tall, raceme lax pubescent. Bracts ovate acuminate. Flowers about 30. Upper sepal locate, more than .5 in. long, yellow, laterals oblique oblong falcate, yellow, inner edges dark polished pink pubescent. Petals narrow linear acuminate. Lip .25 in. long, quadrate, edges at base up-curved, yellow, spotted black, fimbriate, tip very broad, with 2 purple horns on disc. Column as large as lip, yellow, above crimson. Capsule 1.5 in. long, oblong.

Hab. Common in sandy woods usually near the sea. Singapore, Kranji; Selitar. Johor, Tana Runto; Ulu Kahang (Kelsall). Pahang,

Pekan. Negri Sembilan, Perhentian Tinggi. Dindings, Lumut. Kedah (an entirely green form). *Distrib.* Sumatra, Borneo.

Conspicuous on account of its beautiful purple leaves, looking like pieces of stained glass when the setting sun shines through them. The extraordinary adaptation for fertilisation is described by me in *Journ. Linn. Soc.*, above quoted, and by Burkill.

(4) *P. foetida* Ridl. *Journ. Linn. Soc.* xxxii. 319; *Mat.* i. 133.

Rhizome stout. Leafy stems, 3 ft. long. Leaves several broad lanceolate acute, 3- to 5-nerved, 6 in. long, 1.5 to 1.75 in. wide; petioles short or 0. Scape 2 to 4 ft. long, pubescent. Flowers about 20, fetid. Bracts ovate, .25 in. long. Upper sepal .75 in. long, ovate-lanceolate acute, laterals twisted deflexed. Petals as long lanceolate acute. All orange spotted red. Lip as long and as wide, quadrate fleshy, 3-toothed, yellow. *Hab.* In wet spots in forest. Singapore, Bukit Timah. Johor, Tanjong Kupang. Malacca, Jus (Goodenough). Selangor, Rawang; Kwala Lumpur

(Curtis); Sungei Buluh. Dindings, Ulu Bruas (Curtis). Perak, Ulu Bubong (Kunstler); Asam Kumbong (Wray). *Native name*: Gulumbak.

46. CYMBIDIUM, Sw.

Epiphytes rarely terrestrial; stems short leafy sometimes pseudobulbous. Leaves usually long narrow and coriaceous, sometimes ovate and thin. Scape pendulous or erect racemose. Flowers medium to large. Sepals and petals sub-equal. Lip sessile at column, base concave, lobes erect. Column long, footless. Pollinia 2, sub-triangular on a broad reniform disc. Species 30, Asia, Africa, Australia.

Stems short flattened; leaves long linear.

Leaves stiff coriaceous; scape pendulous.

Leaves broad; scape long (1) **C. Finlaysonianum**

Leaves narrow; scape short (2) **C. pubescens**

Leaves very narrow; scape erect (3) **C. rectum**

Leaves thin, scape erect.

Lip midlobe ovate mucronate (4) **C. Dayanum**

Lip midlobe oblong truncate (5) **C. Munronianum**

Stem fleshy; leaves ovate-lanceolate petioled (6) **C. lancifolium**

Pseudobulbs large; leaves 2 oblong; flowers large (7) **C. stapeliæflorum**

(1) **C. Finlaysonianum** *Lindl. Gen. and Sp. Orch. Pl.* 164; *Ridl. Mat.* i. 139. *C. pendulum* *Bot. Reg.* 1840, t. 25; *Williams, Orch. Album.* x. 437.

Stems very short, flattened forming large masses several feet through. Leaves lorate, stiff coriaceous, 10-3 ft. long, 1.5 in. wide, tip round bilobed. Raceme pendulous, 2 ft. long. Flowers about 20, distant. Bracts ovate, sub-acute, 1.2 in. long. Ovary and pedicel 1.25 in. long. Sepals oblong blunt, 1 in. long or more. Petals lanceolate blunt, olive yellow tinted red. Lip side-lobes long acute, dark pink, midlobe obovate retuse blunt white, a yellow line at base, 2 crimson spots and a patch at tip, keels 2, crimson purple. Column stout deep pink. Capsule 2 in. long, elliptic. *Hab.* Common in low country on trees and stumps. Singapore, Chan Chu Kang; Pulau Ubin. Johor, Tanjong Kupang; Batu Pahat. Pahang, Kwala Pahang. Malacca, Merlimau (Derry). Selangor, Kwala Selangor. Perak, Penang (Porter); Telok Bahang (Curtis). *Distrib.* Borneo. *Native names*: Sakat Panggan Daun; Bunga Chandarek.

(2) **C. pubescens** *Lindl. Bot. Reg.* 1840; *Misc.* 75, 1841, t. 38; *Ridl. Mat.* i. 140.

Habit of *C. Finlaysonianum*, but leaves 18 in. long, .36 in. wide, linear, stiff. Raceme pendulous, 1 ft. long. Flowers 1 in. across, about 16. Sepals and petals linear-lanceolate greenish with dark purple central bar. Lip base saccate, lobes acute; midlobe oblong entire, yellow marked purple, pubescent, 2 median ridges broken into 4. Capsule elliptic, 2 in. long. *Hab.* On trees near coast.

Not rare. Singapore (Cuming); Sungei Jurong. Johor, Sungei Ban, Batu Pahat. Perak, Temengoh (Ridley). Landawi isles, Kwah (Curtis), Perlis Kanga. *Distrib.* Siam, Borneo.

Intermediate forms between this and the preceding occur, perhaps hybrids.

(3) *C. rectum* Ridl.

Habit of *C. pubescens*, but leaves erect, very stiff semi-terete, deeply grooved, coriaceous, 18 in. long, .25 in. wide, obtusely unequally bilobed. Scapes erect, 1 ft. long. Flowers few distant. Bracts short ovate acute. Ovary and pedicel 1 in. long. Sepals lanceolate, .75 in. long. Petals narrower, yellowish with a purple central band. Lip hardly lobed, side-lobes obscure rounded, midlobe ovate blunt, white with central yellow bar and a crimson spot near the tip, side lobes spotted crimson inside and on outside edge. Column straight rather broad, white densely spotted in front, back purple pink. Anther broad blunt, yellow. Pollinia 2, connate at top broad semi-orbicular, disc semi-lunar. *Hab.* Negri Sembilan, Siliau, Seremban (Williams). Perak, Thaiping Hills?.

First cultivated in the Gardens at Singapore, and believed to have been collected in Perak.

(4) *C. Dayanum* Rchb. *fl. Gard. Chron.* 1869, p. 710. *C. acutum* Ridl. *Journ. Linn. Soc.* xxxii. 334; *Mat.* i. 140. *C. Simonsianum* King and Pantling, *Ann. Bot. Gard. Calc.* viii. 188, *pl.* 250.

Tufted epiphyte; rhizome thick. Leaves narrow grassy not articulate, 1 ft. long, .25 in. wide. Scape erect or nodding. Flowers few. Bracts ovate acute. Pedicel and ovary 1 in. long. Sepals lanceolate acute white with median purple band 1 in. long. Petals shorter. Lip shorter, side-lobes long blunt, white, edges and veins crimson, disc yellow with 2 keels thickened at tip, midlobe ovate mucronate, deep crimson, central yellow spot. Column straight violet. Capsule fusiform beaked, 3 in. long. *Hab.* Perak, Thaiping Hills; Waterloo (Ridley). *Distrib.* Sikkim, Assam.

(5) *C. Munronianum* King, *Journ. As. Soc.* lxiv. 338; *Ann. Bot. Gard. Calc.* viii. *pl.* 249.

Tufted plant; stem about 2 in. long. Leaves grassy linear acuminate articulate, 20 in. long, .5 in. wide. Scape 14 in. long, with few distant flowers, base with lanceolate acuminate narrow sheaths. Bracts narrow lanceolate acuminate, .75 in. long or less. Pedicels 1.5 in. long. Flowers 2 in. wide. Sepals lanceolate acute, yellowish, green with purple lines. Petals ovate broader. Lip oblong, side-lobes hardly distinct incurved, midlobe oblong truncate, pinkish dotted darker. Column rather broad, yellowish with pink dots. *Hab.* Setul, Bukit Bunga (Haniff). Lankawi, Kwah (Haniff). *Distrib.* Sikkim.

(6) *C. lancifolium* Hook. *Exot. Flora*, t. 51; *Lodd, Bot. Calc.* i. 927; *Hook. fl. Ann. Bot. Gard. Calc.* 185, t. 247; *Ridl. Mat.* i. 141.

Terrestrial, stems 1 to 2 in. long, fleshy cylindric. Leaves 3,

lanceolate acuminate, 6 to 8 in. long, 1 in. wide, base narrowed to petioles, 1 in. long. Scape erect. Flowers 5 in lax raceme, 1 in. across. Bracts short ovate. Sepals oblong-lanceolate acute green. Petals broader with a central pink dotted line. Lip pandurate entire flat, tip broad, white, edge at base and some blotches crimson, a broad raised ridge from base, 2 short blunt ones in centre. Column broad stout green spotted pink. *Hab.* In forests, sporadic and uncommon up to 3500 ft. altitude. Malacca, Bukit Sadanen (Derry). Perak, Bujong Malacca; Gunong Batu Putih (Wray); Thaiping Hills (Kunstler). *Distrib.* India, China, Japan, Malay isles.

(7) **C. stapeliæflorum** *Teysm. and Binn. Nat. Tijdsch.* xxiv. 219. *C. Huttoni* *Hook. fil. Bot. Mag. t.* 5676; *Ridl. Mat.* i. 141. *C. Stephensii* *Ridl. Journ. Bot.* 1900, p. 71.

Large epiphyte with big ovoid pseudobulbs, 3 to 5 in. long. Leaves 2, oblong blunt thick coriaceous, 8 in. long, 4 in. wide. Raceme pendulous, 6 to 8 in. long with 10 large flowers 1 in. across. Bracts widely triangular. Sepals ovate-oblong acuminate yellowish densely spotted in lines with chocolate. Petals falcate chocolate. Lip 3-lobed, lobes broad blunt, midlobe round-orbicular channelled in centre. Column thick curved. *Hab.* Rare in mountain forests, Perak, Thaiping Hills (Stephens). *Distrib.* Sumatra, Java.

47. DIPODIUM, Lindl.

Stems leafy, terrestrial or climbing (or in Australia leafless). Leaves linear articulated, rather thin distichous. Racemes axillary lax, long peduncled. Flowers showy rather large. Sepals and petals similar, spreading. Lip adnate to column base, side-lobes small. Column short broad, wings large. Anther small. Pollinia 2, caudicles 2 linear, disc round. Species 6, Malaya, Australia, Polynesia.

Stem scandent; lip and sepals broad blunt . . . (1) **D. pictum**
 Stem erect; sepals narrow; lip narrow acute . . . (2) **D. paludosum**

(1) **D. pictum** *Rchb. Xen. Orch.* ii. 15 and 20, t. 107; *Bot. Mag. t.* 7951; *Ridl. Mat.* i. 141. *Wailesia picta* *Lindl. Journ. Hort. Soc.* iv. 262. (Fig. 171, p. 148.)

Stem climbing on trees from the ground and clasping by roots, 2 to 7 ft. tall. Leaves 8 in. long, 1 in. wide. Scape 10 to 12 in. long. Flowers 1.5 in. wide. Sepals oblong blunt, laterals oblique. Petals broader. All yellowish in front, with Indian red blotches on the back. Lip shorter oblong, side-lobes very small acute, white with pink spots and 3 pink keels woolly, especially on tip and keels. Column short broad orange, base woolly. Capsule broad elliptic, 2 in. long. *Hab.* In forests, creeping on ground and then climbing up trees. Singapore, Kranji; Changi. Malacca (Griffith); Mt. Ophir. Pahang, Tahan River; Telom. Selangor,

Bukit Kudah; Semangkok. Perak, Thaiping Hills (Curtis);
 Tapah (Wray). *Distrib.* Sumatra, Java.

This is rather variable in flowers in colour and form of lip.

(2) *D. paludosum* *Rehb. fil. Xen. Orch.* ii. 15; *Bot. Mag.* t. 7464; *Williams, Orch. Album*, t. 422.



FIG. 171.—*Dipodium pictum*.

Stem erect, 1 to 2 ft. tall. Leaves linear erect, 6 in. long, .25 in. wide. Scape 1 ft. tall. Flowers about 15, 1.5 in. wide. Bracts small ovate. Petals and sepals oblong-lanceolate, blunt, white with pink spots. Lip cuneate-oblong, narrow acute, with 2 short tooth-like side-lobes, white blotched purple, hairy. *Hab.* Rare.

In wet thicket swamps. Malacca, Ayer Panas (Griffith). Pahang, Kwantan (R. Little). Perak, (Wray). *Distrib.* Cochin China, Borneo.

48. GRAMMATOPHYLLUM, Bl.

Epiphytes often immense; stems terete leafy (or pseudobulbous). Leaves sub-coriaceous. Scapes erect from base racemose. Flowers very many large, yellow or green with brown spots. Sepals and petals similar broad spreading. Lip from base of column 3-lobed. Column tall, foot very short. Anther broad retuse at top. Pollinia 2, semi-oblong round on 2 very short points attached to disc. Capsule large, pear-shaped. Species 3 or 4, Malaya, Polynesia.

(1) *G. speciosum* Bl. *Bijdr.* 378, f. 20; *Rumphia* iv. 47, t. 191; *Bot. Mag. t.* 5157.

Stems terete grooved, 6 to 10 ft. tall, 1.5 in. through. Leaves flaccid linear, 12 to 18 in. long, 1 in. wide, acute. Scapes stout, 6 to 10 ft. tall. Flowers very numerous, 4 in. across, opening a few at a time. Pedicels 4 in. long, white. Bracts lanceolate-linear, .5 in. long. Sepals and petals oblong blunt. Petals wider. All yellow with brown spots. Lip side-lobes sub-acute, yellow, mid-lobe oblong pubescent much shorter dull pink, keels 3. Capsule oblong pyriform, 6 in. long. *Hab.* On trees, often over streams. Common. Singapore, Toas; Pulau Ubin; Bukit Timah. Malacca, Tanjong Kling; Hulu Chembong (Derry). Pahang, Tahan River; Telom. Selangor, Kwala Lumpur. Perak (Scortechini). Dindings (Finlayson). Kedah Peak at 300 ft. altitude. *Distrib.* Tenasserim, Borneo, Java, Solomon isles.

Our biggest orchid. Plants in the gardens of Penang and Singapore measured 40 ft. in circumference, and bore often 7000 flowers. It flowers in September. When grown on the ground the stems are erect, in trees they often droop. The lowest flowers on the spike are always abnormal, with 2 to 4 sepals and petals, no lip and abortive column. The flowers of the common form are rather irregularly blotched brown, and the sepals and petals oblong, but a form occurs with it having finely spotted flowers, often with shorter rounded sepals and petals.

49. BROMHEADIA, Lindl.

Stiff erect terrestrial or epiphytic plants; rhizome branched, stems compressed. Leaves distichous stiff coriaceous lanceolate flat or recurved pungent. Raceme terminal rarely lateral elongating or short. Bracts persistent. Flowers medium to small, white or yellow. Sepals lanceolate. Petals shorter and broader. Lip 3-lobed, side-lobes erect. Column elongate, curved, no arms, wings or foot hooded. Anther convex. Pollinia 2 semi-ovate with a wide emarginate disc. Capsule cylindric. Species about 10, Malaya, Siam, Burma.

Terrestrial, stems elongate; racemes terminal.

Stout; flowers white, purple markings (1) *B. palustris*

Slender; flowers orange	(2) <i>B. sylvestris</i>
Rock plant, stems tall; raceme lateral	(3) <i>B. rupestris</i>
Epiphytes; flowers terminal.	
Stems tall; raceme elongate	(4) <i>B. alticola</i>
Stems short; leaves narrow acute; racemes terminal short.	
Leaves ensiform erect	(5) <i>B. pungens</i>
Leaves ensiform curved	(6) <i>B. aporoides</i>
Leaves lanceolate acute short	(7) <i>B. brevifolia</i>
Leaves very narrow, long recurved	(8) <i>B. scirpoidea</i>

(1) *B. palustris* Lindl. *Bot. Reg.* xxvii. 1841; *Misc.* 184; *Hook. Bot. Mag.* t. 4001.

Stems tall wiry, 1 to 8 ft. tall. Leaves lanceolate blunt, 5 to 6 in. long, 1 to 1.5 in. wide. Racemes terminal gradually elongating, 3 to 12 in. long. Bracts distichous boat-shaped acute, .12 in. long. Flowers appearing singly fragrant, 3 in. across. Sepals lanceolate acute. Petals shorter, all white or tinted pink. Lip side-lobes lanceolate sub-acute, white veined violet, a median pubescent line on disc, midlobe obovate-oblong centre yellow mealy, edges white, base spotted violet. Column white, hood emarginate. Capsule sessile, 2.5 in. long. *Hab.* In open grassy spots, often very tall on wet rocks. Common. Singapore (common). Johor, Batu Pahat, Malacca (Cuming); Mt. Ophir (Derry). Dindings, Sembilan isles (Kloss). Perak, Thaiping Waterfall; Asam Kumbang (Wray). Legoh, Tomoh. (Machado). Kedah Peak. Setul Heath. *Distrib.* Cochinchina, Sumatra, Java, Borneo, Papua. *Native name:* Suraman.

(2) *B. sylvestris* Ridl. *Journ. Linn. Soc.* xxviii. 337; *Mat.* i. 144.

Habit of preceding but stems weak and slender, 1 to 6 ft. tall. Leaves lanceolate thin, 5 in. long, .75 in. wide, top unequally bifid. Racemes 1 or 2. Flowers 1 in. wide, smaller orange colour. Sepals lanceolate acuminate. Petals wider. Lip side-lobes erect blunt yellowish, veined crimson, edge white, midlobe ovate acute, white, centre orange. Column slender, curved yellow, base spotted crimson hood entire. *Hab.* In shady woods seldom flowering. Singapore, Kranji. Johor, Gunong Pantai and Gunong Pulau (Ridley). *Distrib.* Borneo.

(3) *B. rupestris* Ridl. *Journ. Linn. Soc.* xxxii. 341.

Terrestrial; stems 5 ft. tall, flattened. Leaves lorate-lanceolate fleshy, 4 in. long, .75 in. wide. Flowers 3 or 4 in a lateral tuft, 2 in. across. Ovary and pedicel 1 in. long. Sepals lanceolate blunt pale yellow or cream colour, backs tinted red. Petals shorter broader, pale yellow. Lip as long as sepals, side-lobes long falcate acute, white veined crimson, midlobe fleshy lanceolate oblong, sides incurved white red dotted edge crisped, raised bar of lip yellow. Column yellow, hood round, base pink. *Hab.* On rocks at 4000 ft. altitude. Malacca, Mt. Ophir. Pahang, Gunong Tahan (Ridley). Kedah Peak (Haniff).

(4) **B. alticola** *Ridl. Journ. Linn. Soc.* xxviii. 390; *pl.* xlii; *Mat.* i. 144.

Epiphyte, rhizome much branched forming a large mass with stems 1 to 3 ft. long. Leaves lanceolate-lorate blunt tip bilobed, thin coriaceous, 6 in. long, .5 in. wide. Racemes terminal flexuous, 2 to 3 in. long. Bracts .25 in. long, boat-shaped acute. Flowers opening singly, white fragrant, 2 in. across. Sepals lanceolate acute. Petals lorate-lanceolate, smaller. Lip shorter pubescent, side-lobes acute, white tipped violet, raised ridge between yellow; midlobe ovate sub-acute, yellow edges white. Column curved, white, edges purple, hood entire. Capsule erect sessile, 3 in. long. *Hab.* On lofty trees up to 3000 ft. altitude. Singapore, Bukit Panjang. Pahang, Tahan River; Gunong Tahan. Malacca, Mt. Ophir (Ridley). Negri Sembilan, Siliau (Williams). Perak, Kota Bharu (Kunstler).

(5) **B. pungens** *Ridl. Journ. Linn. Soc.* xxxii. 340; *Mat.* i. 145.

Stems 6 to 8 in. long. Leaves ensiform flat, stiff pungent erect. Raceme 1 in. long, covered with brown bracts. Flowers 1.5 in. wide. Sepals lanceolate acute yellowish. Petals narrower, white. Lip oblong, side-lobes indistinct, midlobe emarginate crisp with a thick central lobed yellow callus. Column nearly straight. *Hab.* On trees at high altitudes. Malacca, Mt. Ophir. Pahang, Gunong Tahan (Ridley).

(6) **B. aporoides** *Rchb. fl. Otia. Bot. Hamb.* 44; *Ridl. Mat.* i. 145.

Tufted epiphyte; stems numerous, 4 in. long. Leaves ensiform, stiff recurved, 4 in. long, .25 in. wide. Racemes very short crowded, .75 in. long, with numerous brown lanceolate bracts. Flowers 1 in. wide. Sepals lanceolate acute yellowish. Petals smaller. Lip pandurate, side-lobes blunt disc elevata yellow, midlobe oblong blunt crisped with two purple spots at base and a low spatulate orange callus. Column slender, hood retuse. *Hab.* On trees in forests. Singapore, Bukit Timah. Malacca, Mt. Ophir. Negri Sembilan, Siliau (Williams). Perak, Hermitage Hill. *Distrib.* Burma, Siam, Sumatra, Borneo.

(7) **B. brevifolia** *Ridl. Journ. Linn. Soc.* xxxii. 340; *Mat.* i. 145.

Stems tufted, 6 to 8 in. long, covered with distichous acute lanceolate erect leaves, .5 in. long, .25 in. wide. Flowers from a terminal tuft of bracts, .5 in. long. Ovary and pedicel red, .25 in. long. Sepals lanceolate acuminate acute, rosy. Petals shorter whitish yellow. Lip side-lobes broad curved falcate, base hairy whitish yellow, dotted purple between, midlobe white, centre yellow. Column slender, hood bilobed. Capsule over .5 in. long. *Hab.* On trees in mountain forest. Perak, Hermitage Hill; Thaiping Hills (Ridley). *Distrib.* Borneo.

(8) **B. scirpoides** *Ridl. Journ. Bot.* 1900, p. 71; *Mat.* i. 145.

Epiphyte stems flat, .6 in. tall. Leaves 4 or 5, narrow flat, curved pungent, 4.5 in. long, .06 in. wide. Racemes several, .3 in.

long, crowded in a terminal head with ovate bracts imbricate. Flowers 1 in. across; pedicels .25 in. long. Sepals lanceolate acute, yellowish. Petals broader pale yellow. Lip side-lobes ovate yellowish dotted purple, midlobe yellow, 2 pink spots. Column thin broad. *Hab.* Not common. Johor, Tebing Tinggi. Pahang, Tahan River. Negri Sembilan, Siliau (Williams). Perak, Ipoh. (Ridley). *Distrib.* Borneo.

50. POLYSTACHYA, Lindl.

Epiphytes with short pseudobulbs. *Leaves lanceolate thinly coriaceous. Inflorescence terminal erect, stem covered with papery bracts in the axils of which are one or more racemes or panicles of small green (or purple or yellow) flowers sub-sessile. Upper sepals lanceolate, laterals triangular adnate to the column foot. Petals very narrow. Lip jointed on the column foot clawed lobes small. Column short broad, foot long. Anther 1- to 2-celled. Pollinia 4 ovoid with (usually) a broad disc. Capsule small ellipsoid. Species 100, all tropics. Chiefly African.

All our species are very closely allied and show very little difference from the Brazilian *P. luteola* Lindl.

- | | |
|--|-----------------------------|
| Lip narrow, side-lobes oblong; midlobe ovate | (1) <i>P. singapurensis</i> |
| Lip broad, side-lobes short; midlobe oblong,
much longer | (2) <i>P. penangensis</i> |
| Lip broad, side-lobes short; mid-lobe oblong,
much longer | (3) <i>P. siamensis</i> |

(1) *P. singapurensis* *Ridl. Journ. Linn. Soc.* xxxii. 343; *Mat.* i. 146.

Pseudobulbs globose, .25 in. long. Leaves oblong-lorate, 2 to 4 in. long, 1 in. wide. Inflorescence 2 to 6 in. long; rachis of racemes pubescent. Flowers yellowish green. Bracts ovate acuminate. Sepals bullate. Petals linear-spathulate. Lip narrow thin, side-lobes falcate linear acute, midlobe longer ovate pulverulent, spotted pink inside. No rostellum. *Hab.* Rare. On trees near the sea. Singapore, Sungei Morai (Ridley).

(2) *P. penangensis* *Ridl. l.c.* 344; *Mat.* i. 146.

Pseudobulbs conic, 1 in. long. Inflorescence 5 to 10 in. long. Racemes branched, 1 in. long. Flowers greenish yellow. Sepals and petals acute. Petals spathulate. Lip broad, side-lobes short ovate, midlobe ovate blunt hardly longer, pubescent yellow with a brown median line. Capsule .5 in. long, reticulate between the ribs. *Hab.* Local. Penang Hill at 1800 ft. altitude (Curtis).

(3) *P. siamensis* *Ridl. l.c.* 343; *Mat.* i. 146.

Pseudobulbs .5 to 1 in. long. Leaves 5 in. long, .5 to 1 in. wide. Inflorescence 4 to 12 in. long; rachis pubescent. Flowers larger and more fleshy than preceding. Bracts ovate subulate. Sepal upper ovate-lanceolate, laterals triangular green. Petals narrower, falcate acute white. Lip obovate broad, mealy, side-lobes small

narrow falcate blunt, midlobe much longer, broad round retuse. Capsule narrow ellipsoid not reticulate, .36 in. long. *Hab.* Dindings, at Lumut. Lankawi, Kwah; Burau. Nangchiuk, Bukit Besar at 2500 ft. altitude (Annandale). Kedah, at Krau (Williams).

51. LUISIA, Gaud.

Epiphytes; stems stiff. Leaves long terete. Flowers few, small in short, lateral spikes. Bracts very short, thick persistent. Sepals oblong. Petals oblong, often longer and narrower. Lip sessile on column base, side-lobes small, midlobe oblong or round, flat, spurless. Column very short. Anther 2-celled. Species 15, Indo-Malay, Polynesia.

Petals little longer than sepals	(1) L. brachystachys
Petals much longer than sepals.	
Lip shorter than sepals	(2) L. antennifera
Lip longer than sepals	(3) L. tristis

(1) **L. brachystachys** *Bl. Rumphia* iv. 30; *Rchb. fil. Xen. Orch.* i. 204, t. 87, fig. 1; *Ridl. Mat.* i. 147.

Stem stout, 3 in. long, .12 in. through. Leaves 4 to 6 in. long, blunt; sheaths .5 in. long. Raceme .25 in. long. Flowers 3 or 4; pedicels and ovary .25 in. long. Upper sepal oblong, .12 in. long, laterals lanceolate. Petals lanceolate sub-acute, broad, little larger than sepals, all green edged pink. Lip oblong-ovate blunt entire, dark crimson. Column short crimson, arms round and blunt. Capsule .75 in. long. *Hab.* Lankawi isles (Curtis). Adang isles, Pulau Rawei. Perlis, Bukit Lagi. *Distrib.* India, Siam.

(2) **L. antennifera** *Bl. Rumphia* iv. 50; *Rchb. fil. Xen. Orch.* i. 265, t. 78, fig. 2; *Ridl. Mat.* i. 148.

Stem 2 ft. tall. Leaves blunt, 4 to 5 in. long, sheaths .5 to 1 in. long. Racemes stout, .5 to 1 in. long. Flowers .5 in. wide. Sepals sub-acute. Petals longer, narrow linear, base broader, all greenish. Lip shorter oblong-ovate purple. Column thick purple. Anther flat oblong yellow. Capsule 1.5 in. long. *Hab.* On low trees. Pahang, Pulau Chengei, Pahang River. Negri Sembilan near Port Dickson (Williams). Perak, Kurau (Scortechini); Batang Padang (Kunstler). *Distrib.* Java, Borneo.

(3) **L. tristis** *Hook. fil. F.B.I.* vi. 25; *Ridl. Mat.* i. 148.

Stem long and stout. Leaves 4 to 5 in. long, sheaths .75 in. long. Raceme 1 to 2 in. long. Flowers 3 or more. Upper sepal oblong blunt hooded, .5 in. long, laterals oblique triangular-lanceolate acute, densely pink spotted. Petals linear, base broad, twice as long, white tipped pink. Lip longer than sepals, base oblong, limb ovate-cordate blunt purple. *Hab.* Rare. Negri Sembilan, Port Dickson (Williams). Penang, Penara Bukit (Curtis). *Distrib.* New Caledonia.

52. ADENONCOS, Bl.

Small epiphytes. Leaves linear or oblong fleshy. Racemes very short few-flowered. Flowers small. Sepals lanceolate. Petals smaller. Lip flat, fleshy entire or side-lobes very small, no spur. Column short, arms small. Anther 1-celled. Pollinia 4, a linear caudicle and large disc. Capsule oblong or elliptic. Species 5 or 6, Malayan.

Leaves flat blunt lorate, 2 to 3 in. long; flowers green. (1) *A. major*

Leaves thick fleshy linear-oblong acute, 1 in. long;

flowers green (2) *A. virens*

Leaves terete very narrow; lip purple (3) *A. parviflora*

(1) *A. major* *Ridl. Journ. Linn. Soc.* xxxvii. 350; *Mat.* i. 148.

Stems 6 to 10 in. long. Leaves lorate blunt, 2 to 3 in. long, .36 in. wide, sheaths .25 in. long. Flowers sessile solitary, green, .25 in. wide. Bracts 3, ovate as long as ovary. Sepals ovate-lanceolate acute, .25 in. long. Petals much smaller linear acute. Lip obovate-obcuneate, side-lobes minute, midlobe broad, tip round, keel papillose. Capsule oblong, .25 in. long. *Hab.* Hill woods, Johor, Batu Pahat. Pahang, Kota Glanggi. Kedah Peak (Ridley).

(2) *A. virens* *Bl. Bijdr.* 381; *Ridl. Mat.* i. 149.

Stem 2 to 6 in. long. Leaves linear-oblong acute, recurved fleshy, 1 in. long, .12 in. wide; sheaths .12 in. long. Racemes short, 3- to 4-flowered. Flowers very small fragrant. Bracts ovate minute. Pedicel and ovary as long. Sepals lanceolate acuminate, laterals sub-falcate. Petals smaller. Lip entire cordate acute, a granular callus at base. *Hab.* Common on trees, mangroves, etc., up to 3900 ft. altitude. Singapore, Kranji, mangroves. Johor, Tanjong Kupang. Negri Sembilan, Port Dickson (Williams). Selangor, Petaling; Ginting Bidai; Batu Caves (Ridley). Perak, Gunong Inas (Yapp). *Distrib.* Borneo, Java.

(3) *A. parviflora* *Ridl. Journ. Linn. Soc.* xxxii. 350; *Mat.* i. 149.

Stem 2 to 4 in. tall. Leaves linear acute thick recurved, 1 to 2 in. long, very narrow. Flowers very small sessile. Sepals ovate-oblong acute, hardly .12 in. long. Petals linear smaller, all ochre. Lip ovate acute purple, side-lobes erect blunt short. Capsule .25 in. long. *Hab.* Very rare. Selangor, Batu Caves (Kelsall).

53. ACAMPE, Lindl.

Stems stout. Leaves coriaceous lorate. Racemes short stout. Flowers medium. Sepals and petals sub-similar connivent. Lip spurless or nearly so, 3-lobed, often pubescent. Column thick conic. Pollinia with a narrow caudicle and oval disc. Species 8 or 9, Indo-Malayan and African.

Some of the species included by authors have a distinct and rather large spur, and seem to me indistinguishable from *Saccolabium*.

(1) **A. penangiana** *Ridl. Journ. Linn. Soc.* xxxii. 358; *Mat.* i. 149.

Stem short and thick. Leaves lorate stiff, 7 in. long, 1.5 in. wide. Raceme 2.5 in. long; peduncle thick. Sepals .5 in. long, oblong-ovate broad blunt. Petals narrower spatulate, all yellow with red spots on back and red bars in front. Lip spurless, side-lobes curved long blunt, midlobe ovate yellow with 3 red streaks on side lobes, disc pubescent. Column base broad, yellow with 2 pink spots, arms short erect. *Hab.* Penang, Government Hill (Curtis). Terutau (Curtis). Lankawi (Williams).

54. STAUROPSIS, Benth.

Stems very stout, tall or short. Leaves very thick lorate bilobed at tip. Raceme lateral short tall. Flowers large fleshy showy. Sepals oblong. Petals little smaller. Lip adnate to base of column short spurless, side-lobes short, midlobe oblong, an oblong callus at base. Column short, broad, no foot, wings or arms. Rostellum bifid, entire or lobed processes from below stigma. Anthers conic 1-celled. Pollinia 2, on a broad caudicle, disc reniform. Species 10, Malayan and Indian, China, Polynesia.

(1) **S. gigantea** *Benth. Gen. Plant* iii. 572; *Ridl. Mat.* i. 150. *Vanda gigantea* *Lindl. Wall. Cat.* 7326; *Bot. Mag.* 5189.

Stems 2 ft. tall or more, very stout. Leaves lorate, 1 to 2 ft. long, 2 to 3 in. wide. Raceme 6 to 15 in. long. Flowers 12 to 15, about 2 in. wide. Upper sepal oblong blunt, laterals falcate yellow with red blotches. Petals narrower spatulate blunt. Lip half as long, base boat-shaped, pink, midlobe fleshy oblong with 3 low ridges yellow, callus conic; stigmatic process retuse. Capsule oblong, 4 in. long, 1.5 in. through. *Hab.* On trees and rocks. Lankawi isles, Kwah. Terutau (Curtis). Perlis, Kanga. *Distrib.* Burma, Siam.

55. PHALÆNOPSIS, Bl.

Epiphytes with short stems. Leaves oblong or obovate few, coriaceous. Racemes short or long pedicelled, sometimes several. Flowers often showy. Sepals sub-equal. Petals often larger. Lip spurless clawed or adnate to column base, side-lobes erect, usually with a forked or entire callus. Column rather long; anther 2-celled, caudicle linear or spatulate with a disc. Species about 25, India, Indo-China, Malaya.

Scape short; flowers large showy.

- | | |
|---|---------------------------|
| Lip glabrous | (1) P. violacea |
| Lip pubescent | (2) P. sumatrana |
| Scape long; rachis flat elongating | (3) P. cornu-cervi |
| Scape long; rachis not broad and flat. | |
| Flowers small; midlobe acute | (4) P. muscicola |
| Flowers large yellow; midlobe obovate round | (5) P. fuscata |

(1) *P. violacea* Teysm. and Binn. *Bat. Tijdschr.* xxiv. 10; *Williams, Orch. Album. t.* 182.

Leaves oblong to obovate, 5 to 9 in. long, 1.5 to 4 in. wide. Scape 3 to 12 in. long, stout, rachis thick not flattened. Flowers 1 to 3 in. wide. Sepals lanceolate, laterals broader oblique. Petals smaller, oblanceolate creamy white more or less marked violet purple. Lip narrow, side-lobes oblong truncate, midlobe spatulate or obovate violet purple, a bifid callus at base. Column rather long. Capsule cylindrical, 5 in. long.

var. *typica*. Sepals and petals violet with green tips, side-lobes of lip yellow dotted purple. Lip purple. *Hab.* Perak (Scortechini); Teluk Anson (Williams).

var. *Murtoniana* Rchb. fil. Sepals and petals creamy yellow, inner half of lower sepals violet purple, side-lobes of lip orange. Perak, Kinta (Murton); Bidor near Tapah (Curtis); Changkat Mentri (Kloss). *Distrib.* Sumatra.

(2) *P. sumatrana* Korth, and Rchb. fil. *Hamb. Gartenz.* xvi. 1860, 115; *Bot. Mag. t.* 5527.

Leaves 5 to 6, oblanceolate blunt, 1 ft. long, 4 in. wide. Scapes 1 ft. long; rachis 4-angled, flattened, 6 in. long. Flowers 2 in. wide. Upper sepal oblanceolate, laterals much wider. Petals lanceolate, base narrowed. All white or yellow transversely barred Indian red. Lip .75 in. long, side-lobes oblong truncate, a tooth on inner side white and orange within, disc with 3 two-toothed calli in a row; midlobe oblong, elevate in centre, white spotted crimson, a woolly tuft near the end. Column rather tall, hood toothed, arms 2-toothed. Capsule 6 in. long. *Hab.* On trees. Johor, Batu Pahat; Kwala Sembrong (Kelsall). Perak, Bidor (Curtis). *Distrib.* Sumatra, Borneo.

(3) *P. cornu-cervi* Par. and Rchb. *Gartenz.* 1860, p. 116. *Polychilus cornu-cervi* *Bot. Mag. t.* 5570; *Ridl. Mat. i.* 137.

Leaves 5 to 6 lorate blunt, 6 in. long, 1 in. wide. Scapes over 1 ft. long or less with flattened racemes flexuous, 3 in. long, broad with persistent bracts. Flowers 1.5 in. wide. Sepals lanceolate acute. Petals shorter, narrower. All yellow blotched brown. Lip .25 in. long, side-lobes oblong blunt white spotted violet inside, midlobe reniform or ovate acute, white, callus in midlobe tooth-like violet, with a slender forked process at base. Column tall, yellow with a short foot, 2 red processes at base. *Hab.* On trees. Not rare. Pahang, Gunong Senyum (Evans). Negri Sembilan, Jelebu (Davidson); Seremban (Braddon). Perak (Scortechini); Teluk Anson (Williams). Lankawi (Curtis).

Hybrid *P. Valentinii* Rchb. fil. *Gard. Chron.* 1886, p. 262. A hybrid between this species and *P. violacea* which has occurred more than once near Bidor in Perak. The sepals and petals are narrower and striped pink.

(4) *P. muscicola* *Ridl. Trans. Linn. Soc. iii.* 373; *Ridl. Mat. i.* 152.

Leaves oblanceolate blunt, 6 in. long, 2 in. wide. Scape slender,

6 to 8 in. long, sometimes branched; rachis not thickened. Flowers 1 in. across. Sepals lanceolate acute. Petals sub-spathulate acute, white spotted chestnut. Lip side-lobes 4-angled, tooth-like, yellow spotted chestnut, midlobe narrow, tongue-shaped, tip decurved rosy, an oblong bifid callus between side-lobes, a lanceolate blunt one at base of midlobe. Capsule linear narrow, 3 in. long. *Hab.* Very rare in dense dripping forest on mossy trees. Pahang, Tahan River (Ridley).

(5) **P. fuscata** *Rehb. fil. Gard. Chron.* 1874, ii. 6; *Rolfé Orch. Rev.* 1905, p. 226. *P. Kunstleri Hook. fil. F.B.I.* vi. 30; *Ridl. Mat.* i. 152. *P. Denisiana Cogn. Dict. Ic. Orch. Phal.* 6.

Leaves obovate-lanceolate or elliptic acute, 4 to 9 in. long, 2.5 to 3 in. wide. Scape 15 in. long or less. Racemes 1 to 4 in. thick, not flat, 3 in. long. Flowers 1.5 in. wide. Upper sepals lanceolate blunt, yellow with or without a red bar, laterals oblique with a transverse red bar, or all red at base, tip yellow. Petals spathulate or obovate. Lip side-lobes oblong truncate toothed white, midlobe obovate, tip round orange, central bar white elevate, 3 or more Indian red streaks on each side, callus bifid at base. Column narrowed, middle greenish, hood ovate. *Hab.* On trees. Johor, Sungei Tebrau forests. Perak, hot springs near Ipoh; Tapah; Sungei Siput (Curtis). Dindings (Curtis). *Distrib.* Phillipines (*vide* Cogniaux).

56. STAUROCHILUS, Ridl.

Big epiphyte, climbing. Leaves lorate coriaceous bilobed. Raceme long. Flowers large expanded. Sepals oblong, laterals falcate. Petals narrower. Lip spurless, side-lobes short erect, midlobe 3-lobed. Column short thick, arms erect. Anther ovate, beaked. Pollinia 2 on a spathulate caudicle, disc elliptic. Species 1, Siam and Malay Peninsula.

(1) **S. fasciatus** *Ridl. Journ. Linn. Soc.* xxxii. 350; *Mat.* i. 153. *Trichoglottis fasciata Rehb. fil. Gard. Chron.* 1872, p. 699; *Williams, Orch. Album, v.t.* 208.

Stem stout, 2 ft. tall or more. Leaves 5 in. long, .5 to .75 in. wide, blunt sheaths, .5 in. long. Raceme 4 to 6 in. long; rachis grooved. Bracts ovate acute persistent. Flowers 2 in. wide, fragrant. Sepals acute. Petals spathulate, yellow banded red. Lip .5 in. long, white slightly pubescent, side-lobes acute, midlobe of 3 equal lobes, callus at base linear-oblong toothed. Column red. *Hab.* On rocks and trees. Lankawi. Terutau (Curtis). *Distrib.* Siam.

57. KINGIELLA, Rolfe.

Epiphytic plants with the habit of *Phalænopsis*. Leaves oblanceolate blunt, broad. Scapes tall branched; flowers small. Upper sepal oblong, laterals larger curved. Petals smaller. Lip side-lobes erect, obovate, midlobe obcordate, base of lip adnate to foot of column and forming a mentum. Species about 5, Indo-Malaya.

(1) **K. decumbens** *Rolfe, Orch. Rev.* 1917. *Doritis Wightii Benth. Gen. Pl.* iii. 574. *Phalænopsis Wightii Rehb. fil. Bot. Zeit.* 1862; *Hook. fil. Ann. Bot. Gard. Calc.* v. 59, viii. t. 265; *Ridl. Mat.* i. 153. *P. alboviolacea Ridl. Trans. Linn. Soc.* iii. 373.

Leaves 2 to 3, thin coriaceous, 6 in. long, 2 in. wide. Scape 7 in. long; rachis thickened. Flowers .75 in. wide. Sepals and petals white (or yellow) tipped green. Lip side-lobes white with violet-rose streaks, oblong truncate, midlobe obcordate retuse, violet pink, callus bifid white between side-lobes. *Hab.* On trees, widely spread but not common. Malacca, Bukit Bangkang (Derry). Pulau Tioman (Nanson). Negri Sembilan, Siliu (Williams). Perak, Thaiping Hills (Stephens). Lankawi (Curtis). *Distrib.* India, Burma, Ceylon, Hainan.

58. DORITIS, Lindl.

Usually terrestrial. Leaves few, oblanceolate coriaceous blunt. Scape tall erect, raceme lax, many-flowered. Flowers pink or white, medium. Upper sepal oblanceolate, lower ovate oblique adnate to column foot. Petals obovate. Lip clawed, 2 narrow processes below the broad erect side-lobes, midlobe ovate. Column broad, dilate at base. Anther long-beaked; pollinia globose, caudicle long spatulate, disc rhomboid. Species 1, Burma, Cochin China, Siam.

(1) **D. pulcherrima** *Lindl. Gen. and Sp. Orch. Pl.* 178. *Phalænopsis Esmeralda Rehb. Gard. Chron.* 1874, p. 582; *Williams, Orch. Album*, vii. t. 21; *Bot. Mag.* t. 7196; *Ridl. Mat.* i. 152.

Leaves 4 to 6 in. long, 1.75 to 2 in. wide. Scape 1 to 2 ft. tall. Flowers 1 in. wide, purple crimson rose or white. Lip side-lobes yellow or pink, midlobe dark pink. *Hab.* On the ground beneath bushes on sandy heaths. Tringganu (Yapp). Lankawi (Curtis), Kedah Peak at 2000 ft. altitude (Haniff). Setul Heath (Dr. Ellis). Patani (Annandale).

59. VANDA, Lindl.

Terrestrial (or epiphytic) plants, often tall, scandent. Leaves coriaceous (flat) or terete. Flowers large showy in racemes or panicles. Sepals and petals sub-equal. Lip large, base saccate or spurred, side-lobes large or small. Column short. Species about 30, Asia and Australasia.

(1) **V. Hookeriana** *Rehb. fil. Bonplandia* 1856, p. 324; *Williams, Orch. Album.* t. 73; *Ridl. Mat.* i. 154.

Scandent stems slender, 12 ft. long. Leaves terete, 2 to 3 in. long. Flowers large thin, 2 to 3 in. wide, in racemes or few-branched panicles; peduncles 6 to 8 in. long. Upper sepal obovate pale rose, laterals much larger oblique oblong white. Petals broad obovate twisted pale rose. Lip 1.5 in. long, side-lobes oblong acuminate blunt deep purple, midlobe 3-lobed, side-lobes oblong,

tips enlarged, midlobe oblong-obovate, white or rose dotted crimson, spur very short, callus conic white. Column with a long foot. *Hab.* Local. Scrambling over bushes in open swamps. Johor, Kwala Batu Pahat (Kelsall). Perak, Kinta valley (all collectors). *Distrib.* Borneo.

The "Kinta weed."

60. ARACHNIS, Bl.

Stems very long scandent. Leaves linear-oblong blunt. Inflorescence large paniced. Sepals and petals spreading spatulate, lower ones incurved. Lip much shorter articulate at base of column, side-lobes broad truncate, midlobe tongue-shaped, base of lip between side-lobes shortly spurred. Species about 5, Malayan.

Flowers yellow and brown, lower sepals falcate . . .	(1) <i>A. moschifera</i>
Flowers salmon pink, lower sepals not falcate . . .	(2) <i>A. Maingayi</i>
Flowers white, smaller, lower sepals not falcate . . .	(3) <i>A. alba</i>

(1) *A. moschifera* *Bl. Bijdr.* 365, t. 26. *Arachnanthe moschifera* *Bl. Rumphia*, iv. t. 196, 199. *Renanthera arachnitis* *Lindl. Gen. and Sp. Orch. Pl.* 217; *Ridl. Mat.* i. 155.

Stems 20 to 30 ft. tall. Leaves 6 in. long, 1.5 in. wide, stiff. Panicles several feet long. Flowers 3 in. wide, tip of upper sepal musk-scented. Upper sepal linear-oblong spatulate, laterals shorter falcate. Petals linear abruptly falcate, yellow blotched chocolate. Lip .5 in. long, side-lobes quadrate yellow or white splashed red, edges purple brown, midlobe oblong cuneate pink with a large conic acute callus near tip. *Hab.* Selangor, Port Swettenham (Williams). Perak, Ulu Bubong (Kunstler). Penang, rocks at Ayer Hitam (Haniff). *Distrib.* Java, Borneo. *Native names*: Angrek Bunga Kasturi; Scorpion orchid.

(2) *A. Maingayi* *Schlechter, Fedde Rep.* x. 197. *Arachnanthe Maingayi* *Hook. fil. F.B.I.* vi. 28. *Renanthera Maingayi* *Ridl. Journ. Linn. Soc.* xxxii. 353.

Stems as *A. moschifera*, but leaves thinner and more flaccid, 5 in. long, 1.5 in. wide. Sepals linear, laterals not falcate, 1.5 in. long. Petals broadly dilate short at tip. All mottled and barred salmon-pink and white. Lip side-lobes rounded spreading, midlobe oblong, tip ovate pink striped with darker, and yellow blotches on side-lobes. *Hab.* Johor, Batu Pahat (Kelsall). Malacca (Maingay). *Distrib.* Islands south of Singapore.

Commonly cultivated in gardens.

(3) *A. alba* *Schlechter, Fedde Rep.* x. 197. *Arachnanthe alba* *Ridl. Trans. Linn. Soc.* iii. 369. *Renanthera alba* *Ridl. Journ. Linn. Soc.* xxxii. 353. *R. Hookeriana* *Rehb. fil. Xen. Orch.* ii. 42.

Stems 15 to 20 ft. tall. Leaves lorate blunt hard brittle often toothed at base, 3 in. long, 1.5 in. wide. Panicles long. Flowers

3 in. wide. Sepals linear, tip dilate spreading. Petals smaller, white. Lip side-lobes rounded yellowish white dotted pink, midlobe tongue-shaped acute rosy with darker stripes, 2 violet streaks and 2 dots between lobes. Column white, edge violet. *Hab.* Climbing on trees and bushes. Singapore, Pulau Selitar, in great masses. Pahang, Kwala Pahang (Ridley). *Distrib.* Isles south of Singapore, Borneo.

61. RENANTHERA, Lour.

Stems long or comparatively short. Leaves linear-oblong. Panicle often large spreading. Flowers (large) medium or small, red or orange. Sepals and petals spreading, lateral sepals broader than upper sepal. Petals narrower. Lip side-lobes erect, midlobe acute, spur conic between side-lobes. Column short and broad. Species 5 or 6, Malaya, India, China.

Flowers numerous small in a wide-spreading panicle . . . (1) *R. elongata*
 Flowers few long in a raceme (2) *R. matutina*

(1) *R. elongata* Lindl. *Gen. and Sp. Orch. Pl.* 218; *Ridl. Mat.* i. 156. *R. matutina* Lindl. *in. Bot. Reg.* 1843, t. 41 (not of *Gen. and Sp.*).

Stems 3 to 8 ft. tall. Leaves elliptic blunt, 3 in. long, 1 in. wide; sheaths 1.5 in. long. Panicle large spreading, branches 6 to 8 in. long. Flowers small numerous red. Upper sepal linear, .5 in. long, laterals larger deflexed oblong spatulate. Petals linear blunt, smaller. Lip very small, side-lobes broad blunt, midlobe oblong blunt, base white. Capsule elliptic, 1.5 in. long. *Hab.* On rocks and trees usually by the sea, not rare. Singapore (Wallich); Bukit Timah road; Pulau Ubin. Johor Kwala Batu Pahat (Kellsall). Malacca, Jasin (Goodenough). Selangor, Ulu Selangor. Dindings, Lumut. Perak, Kwala Kangsa (Stephens); Waterfall, Thaiping and Simpang (Wray); Ulu Bernam (Kunstler). Penang (Curtis). *Distrib.* Borneo, Java. *Native name*: Poko Api Sesudu.

(2) *R. matutina* Lindl. *Gen. and Sp. Orch. Pl.* 218; *Ridl. Mat.* i. 156. *R. angustifolia* Hook. *fil. F.B.I.* vi. 49; *l.c. Pl.* 2128.

Stem erect, 1 to 2 ft. tall. Leaves lorate, 7 to 8 in. long, .36 in. wide, blunt. Scape 15 in. long, sometimes branched. Flowers about 20, distant, 2 in. wide more or less pubescent. Upper sepal linear, laterals clawed broader lanceolate acuminate connate or free. Petals lanceolate acuminate. All red with darker blotches in lateral sepals. Lip very small, side-lobes round, tip tongue-shaped deflexed, spur conic rather large, white, edges of lip and spur crimson. Column pink. *Hab.* On rocks in forests. Perak, Bujong Malacca; Gunong Batu Putih (Wray). *Distrib.* Java.

62. RENANTHERELLA, Ridl.

Scrambling epiphyte, stems long. Leaves semi-terete. Racemes short flexuous. Flowers small. Sepals oblanceolate, laterals oblique. Petals narrower linear. Lip side-lobes erect, midlobe linear recurved, calli 2 quadrate, spur short conic. Column long, slender, arched. Anther conic; pollinia 2, caudicle broad spatulate, disc oblong. Capsule obconic. Species 1, endemic.



FIG. 172.—*Renantherella histrionica*.

(1) *R. histrionica* Ridl. *Journ. Linn. Soc.* xxxii. 355; *Mat.* i. 157. *Renanthera histrionica* Rehb. *fil. Gard. Chron.* 1878, p. 74.

Stem about 2 ft. long, slender. Leaves linear-lanceolate semi-terete acuminate, 3 in. long. Raceme lax, 4 in. long. Bracts short ovate. Flowers few, 1 in. wide. Sepals and petals yellow with red spots. Lip yellow, calli white. Capsule 1.5 in. long. *Hab.* On mangroves and other trees, sea level to 4000 ft. altitude. Singapore, Serangoon; Pasir Panjang. Malacca, Mt. Ophir. Negri Sembilan, Tampin Hill; Gunong Angsi (Williams). Perak, Gunong Keledang (Curtis).

63. TRICHOGLOTTIS, Bl.

Stems rather tall. Leaves coriaceous lanceolate lorate. Flowers small solitary; pedicels short. Sepals and petals similar spreading. Lip base boat-shaped or spurred, side-lobes 2 or 4, erect horn-like pubescent. Column short thick, no foot, arms short erect. Anther ovate; pollinia 2, caudicle linear, disc large. Species 36, Malay, Andamans, Siam.

Lip with one pair of side-lobes; flowers large . . . (1) **T. retusa**

Lip with 2 pairs of side-lobes; flowers small.

Base of lip boat-shaped (2) **T. scaphigera**

Base of lip spurred (3) **T. tetraceras**

(1) **T. retusa** *Bl. Bijdr. 360, fig. 8; Ridl. Mat. i. 157.*

Stem stout, 3 ft. long or more. Leaves thick lorate blunt bilobed, 5 in. long, .5 in. wide; sheaths reticulate, .5 in. long. Flowers .75 in. wide; pedicel and ovary .5 in. long. Sepals lanceolate acute. Petals narrower, yellow, marked with pale red. Lip base boat-shaped, side-lobes with long recurved points, midlobe oblong lanceolate pubescent, white tinted pink. Column half as long as lip, top dark crimson. *Hab.* Limestone rocks. Pahang, Kota Glanggi. Selangor, Batu Caves (Kelsall). Jalor, Bukit Tapang (Gwynne-Vaughan). *Distrib.* Siam, Cochin-China, Java, Borneo.

(2) **T. scaphigera** *Ridl. Journ. Linn. Soc. xxxii. 357; Ridl. Mat. i. 157.*

Stem weak, 2 ft. long. Leaves lanceolate acute, base narrowed, 3 in. long, .5 in. or less wide; sheaths .5 in. long. Flowers .5 in. wide. Sepals and petals oblanceolate blunt pubescent. All yellow blotched red. Lip base boat-shaped, side-lobes short blunt with a hairy callus at base, midlobe trifold, lateral lobes linear, mid-one shorter rounded, a large pubescent callus in centre. Column short, arms long hairy. Anther pubescent. *Hab.* Perak (Scortechini), Waterloo (Curtis). Penang Hill (Curtis); Batu Hitam. Naung chik, Bukit Besar (Annandale)

(3) **T. tetraceras** *Ridl. l.c.; Mat. i. 158.*

Stem weak, over 1 ft. long. Leaves 3 in. long, .5 in. wide, lanceolate acuminate, base narrowed; sheath .5 in. long. Flowers .5 in. wide. Sepals ochre oblong-ovate. Petals smaller ligulate. Lip flat, side-lobes tooth-like, 2 longer lobes in front, midlobe lanceolate-ovate blunt, 2 short and 2 long keels running from side-lobes to tip ending in a pubescent callus, spur acuminate blunt, a fleshy linear truncate callus in mouth. All white. Column short, arms tooth-like. *Hab.* On rocks. Lankawi, Goa Chirita (Curtis). Perlis, Tebing Tinggi, a form with narrower lip and longer spur.

Cleisostoma tenuicaule, *King, Journ. As. Soc. Beng. lxxvi. ii. 596.* *Saccotabium Pantlingii* *Ridl. Mat. i. 162*, is based on a plant cultivated in Calcutta Gardens, and said to have been collected in Perak by Kunstler. The drawing of it, all I have seen, resembles a *Trichoglottis* like the above species.

64. RHYNCHOSTYLIS, Bl.

Epiphytes; stems short stout. Leaves coriaceous lorate bilobed. Raceme short stout dense-flowered. Flowers small pink or white. Sepals and petals subequal. Lip adnate to column, base spurred, no side-lobes; midlobe clawed. Column short stout, no foot. Anther flat beaked. Pollinia 2, semi-ovate, caudicle linear, disc ovate. Rostellum bifid. Species 2, Indo-Malaya.

Leaves very broad bluntly bilobed; lip pandurate . . . (1) *R. gigantea*
 Leaves narrow, lobes acute; lip cuneiform (2) *R. retusa*

(1) *R. gigantea* Ridl. *Journ. Linn. Soc.* xxxii. 356; *Mat.* i. 158. *Saccolabium giganteum* Lindl. *Gen. and Sp. Orch. Pl.* 221; *Bot. Mag. t.* 5635.

Leaves 1 ft. long, 2 to 3 in. wide, very thick. Racemes 9 to 12 in. long, very dense-flowered. Flowers 1 in. wide, white or spotted pink, lip violet pink. Upper sepal ovate blunt, base narrow. Petals oblanceolate blunt. Lip pandurate retuse, a blunt tooth in notch and conic process beneath tip, spur straight flattened. Capsule 1.5 in. long. *Hab.* Very rare in Peninsula. Singapore, Selitar on a lofty Hopea (Ridley). Pulau Aor, east coast of Johor. *Distrib.* Cochin-China, Siam.

(2) *R. retusa* Bl. *Bijdr.* 286, t. 40; *Ridl. Mat.* i. 158. *Saccolabium guttatum* and *S. pramorsum* Lindl. *Orch. Pl.* 220, 221; *Bot. Mag. t.* 4108. *S. Blumei* Lindl. *Sert. Orch. t.* 47.

Leaves elongate lorate obliquely bilobed, lobes acute, 10 to 20 in. long, .6 to 2 in. wide. Racemes 4 to 20 in. long; flowers .5 to .6 in. wide, white blotches rosy purple. Sepals orbicular-ovate, upper one oblong. Petals elliptic blunt. Lip rosy purple, limb cuneiform entire or emarginate, spur compressed blunt pubescent inside. Capsule clavate, 1 to 1.5 in. long. *Hab.* Scarce. Perak, near Grit (Hobson). Lankawi isles (Curtis). Setul, Bukit Rajah Wang (Haniff). *Distrib.* India, Siam, Java, Philippines.

65. SACCOLABIUM, Bl.

Epiphytes; stems long or usually short. Leaves coriaceous lorate or oblong or terete, often bilobed at tip. Racemes or panicles lateral. Flowers small, usually numerous. Sepals and petals free, sub-similar. Lip sessile at column-base, side-lobes small erect forming walls to spur-mouth, midlobe small usually ovate, spur saccate or conic cylindrical usually with a callus in the back of the spur mouth and frequently a ridge more or less developed on the lower face, sometimes running as a wall across the spur and dividing it into two halves (septum). Column short footless, arms very short or none. Anther ovate usually beaked. Pollinia 2, more or less split into 4, caudicle narrow-linear, disc shorter ovate or

linear, very rarely longer. Species about 200, Africa, Indo-Malaya, China.

I am quite unable to keep separate the genera *Cleisostoma* and *Sarcanthus*, based on the development of the calli in the spur, but keep them as sections.

§ 1. *Calceolaria*. Racemes usually short. Lip basin-shaped, with no side-lobes or calli.

- | | |
|--|----------------------------|
| Terminal lobe denticulate; leaves coriaceous | (1) <i>S. bigibbum</i> |
| Terminal lobe entire; leaves thickly coriaceous | (2) <i>S. patinatum</i> |
| Lip saccate entire acuminata; flowers very small;
leaves lanceolate | (3) <i>S. minimiflorum</i> |

§ 2. *Cleisostoma*. Spur short broad, subglobose. Flowers yellow spotted red.

Leaves lorate bilobed.

- | | |
|---|--------------------------|
| Stem tall climbing; panicle wide spreading;
midlobe ovate | (4) <i>S. latifolium</i> |
| Stem short and thick; panicle lax; midlobe
hastate tongue-shaped | (5) <i>S. suffusum</i> |
| Stem stout short; panicle with 2 branches only;
midlobe ovate | (6) <i>S. validum</i> |

Stems short; flowers in a raceme or with 1 to 2 branches.

Callus in mouth bifid.

- | | |
|--|---------------------------|
| Scape several inches long; flowers fairly
large | (7) <i>S. hortense</i> |
| Scape very short; flowers small | (8) <i>S. parvum</i> |
| Callus of 2 ridges at base of midlobe, elevated
ridge in spur | (9) <i>S. setulense</i> |
| Callus crescent-shaped, side-lobes ovate | (10) <i>S. Hobsonii</i> |
| Callus semi-circular, side-lobes truncate | (11) <i>S. uteriferum</i> |
| Calli 0; leaves flaccid, spur cylindric | (12) <i>S. sylvestre</i> |
| Lip boat-shaped; midlobe large ovate | (13) <i>S. rugosulum</i> |

§ 3. *Sarcanthus*. Spur horn-shaped; midlobe fairly large, callus entire or lobed on back of spur with a ridge from front wall more or less dividing the spur in 2. Flowers brown-red with greenish central line, lip violet or white.

Leaves terete.

- | | |
|--|---------------------------|
| Leaves slender, spur not septate | (14) <i>S. halophilum</i> |
| Leaves thick, spur septate or partly so.
Midlobe triangular blunt, callus anchor-shaped | (15) <i>S. Machadonii</i> |
| Midlobe ovate acute | (16) <i>S. Kunstleri</i> |
| Leaves flat, the point terete subulate | (17) <i>S. secundum</i> |

Leaves flat, tip acute bilobed, base sub-petiolate.

- | | |
|---|-----------------------------|
| Stem very tall climbing | (18) <i>S. Scortechinii</i> |
| Leaves flat bluntly bilobed not narrowed at base.
Stem stout; racemes long | (19) <i>S. densiflorum</i> |
| Stem short, 3 to 6 in. tall.
Midlobe ovate septum complete | (20) <i>S. pensile</i> |
| Midlobe ovate, septum 0 | (21) <i>S. fissicors</i> |
| Midlobe reniform, spur with 2 pubescent keels | (22) <i>S. bicarinatum</i> |

§ 4. *Eu-saccolabium*. Spur long in proportion to sepals, no septum. Raceme very short of 2 or 3 very small flowers; stems long slender.

- | | |
|--|---------------------------|
| Lip midlobe linear bifid small | (23) <i>S. tenuicaule</i> |
| Lip midlobe lanceolate entire | (24) <i>S. miserum</i> |

- Lip midlobe oblong spathulate (25) **S. cornigerum**
 Racemes elongate of many very small flowers;
 leaves linear.
 Leaves very narrow; flowers white.
 Raceme branched, 1 in. long (26) **S. perpusillum**
 Raceme branched, 6 in. long (27) **S. minutiflorum**
 Leaves .3 in. wide; flowers small yellow (28) **S. penangianum**
 Leaves terete, spur globose pinched in above (29) **S. sacculatum**
 Leaves linear bilobed.
 Raceme dense erect; flowers .5 in. long, bright
 orange (30) **S. miniatum**
 Raceme dense pendulous; flowers .5 in. long,
 yellow (31) **S. saxicolum**
 Raceme slender; flowers .25 in. long.
 Stem flattened; leaves flaccid undulate;
 flowers yellow with red bands (32) **S. undulatum**
 Leaves 4 in. long; flowers .25 in. long, white
 and violet, spur short thick (33) **S. fissum**
 Leaves 1.5 in. long; flowers few in a second
 lax raceme, white and violet, spur
 clubbed (34) **S. secundiflorum**
 Leaves lanceolate thin, broad falcate, few.
 Flowers .5 in. wide, spur as long clubbed (35) **S. angræcum**
 Flowers minute, spur broad blunt (36) **S. myosurus**
 Flowers numerous in tall long peduncled
 panicles.
 Panicle pubescent; flowers very small violet
 Panicle glabrous; sepals free. (37) **S. pubescens**
 Flowers numerous small, .25 in. wide, spur
 not septate (38) **S. ionosmum**
 Flowers numerous, .5 in. wide, white, spur
 septate (39) **S. arachnanthe**
 Flowers few; lower sepals adnate to column
 beneath (40) **S. adnatum**

(1) **S. bigibbum** *Rehb. fil. Bot. Mag. t. 5766; Otia Hamb. 43; Hook. fil. F.B.I. vi. 61.*

Stem very short. Leaves oblong or linear falcate acuminate, 3 to 6 in. long, .25 in. wide. Raceme .5 in. long. Flowers .5 in. wide. Sepals and petals blunt spathulate yellow. Lip saccate, terminal lobe reniform toothed, ciliate white with a yellow dotted mass in middle. Column short, thick, arms incurved. Capsule oblong, .5 in. long. *Hab.* Rather common. Pahang, Kluang Terbang (Barnes); Gunong Tahan. Selangor, Menuang Gasing (Kloss). Perak, Thaiping Hills; Gunong Kerbau (Haniff). *Distrib.* Burma.

(2) **S. patinatum** *Ridl. Journ. As. Soc. S. Br. 39, p. 84. (S. catinatum misprint in Mat. i. 164.)*

Stem hardly 1 in. long. Leaves 2 or 3, very coriaceous oblong blunt bilobed, 7 in. long, 2 in. wide. Raceme very short. Flowers about 6, .75 in. wide. Sepals obovate-spathulate blunt. Petals narrower, all yellowish with red spots. Lip saccate round, terminal lobe ovate, triangular glabrous, white spotted violet. Capsule elliptic, base narrowed, 2 in. long. *Hab.* Rare. Pahang, Kota

Glanggi. Perak (Kunstler, picture in Herb. Kew). *Distrib.* Borneo.

(3) *S. minimiflorum* Hook. fil. *F.B.I.* vi. 59; *Ic. Pl.* 2133. *S. cortinatum* Ridl. *Journ. Bot.* 1898, p. 215.

Stem .25 to .5 in. long. Leaves 4 to 7 oblong lanceolate oblique, 2 in. long, .5 in. wide, narrowed to a petiole. Racemes slender erect, 4 in. long. Flowers numerous minute. Bracts lanceolate acuminate. Sepals narrow lanceolate acuminate red. Petals broader blunt. Lip saccate entire acuminate, a globose tubercle in mouth. Anther beaked. Rostellum large bifid, lobes semi-ovate. Capsule elliptic. *Hab.* Selangor, Batu Caves. Perak (Scortechini). Bandon, Kaw Nong (Robinson).

(4) *S. latifolium* Ridl. *Mat.* i. 165. *Cleisostoma latifolium* Lindl. *Bot. Reg.* 1840; *Misc.* 60. *C. fuscum* Lindl. *Journ. Hort. Soc.* 1850, p. 80.

Stem tall straggling stout. Leaves oblong blunt bilobed, 4 to 6 in. long, 1.5 in. wide. Panicle much branched purple spotted, 1 ft. long or more, the peduncle stout, nearly 10 in. long, branches 4 in. long or less. Flowers numerous, .5 in. wide. Sepals oblong blunt. Petals broader sub-spathulate. All lemon-yellow, backs spotted red. Lip side-lobes oblong quadrate, midlobe short ovate acute, all yellow, sometimes dotted red, spur large scrotiform retuse. Column very short. Anther ovate beaked. Capsule cylindrical, 1 in. long. *Hab.* Malacca (Maingay, Griffith); Brisu (Derry). Pahang, Temerloh. Negri Sembilan, Seremban (Williams). Selangor, Batu Caves (Kelsall). Perak, Thaiping (Wray). *Distrib.* Sumatra.

var. *striatum* Ridl. *Journ. Roy. As. Soc. S. Br.* 60, p. 199.

Leaves linear narrow, 7 in. long, .5 in. wide, hardly bilobed. Panicle 1 ft. long; branches ascending. Side-lobes of lip larger than in type. *Hab.* Selangor, Batu Caves (Kelsall). Setul, Bukit Rajah Wang (Ridley).

var. *parviflorum* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 41.

Leaf 9 in. long, 1.5 in. wide. Panicle 18 in. long. Flowers hardly .25 in. across, nearly all bright yellow, sepals edged red, callus in spur-mouth broad oblong toothed. *Hab.* Selangor, Sempang Mines, Semangkok. Perak, Matang Road, Thaiping (Goldham).

(5) *S. suffusum* Ridl. *Journ. Roy. As. Soc. S. Br.* 34, p. 189; *Mat.* i. 166.

Stem stout, 6 in. long, .5 in. through. Leaves lorate blunt unequally bilobed, 6 in. long, 1 in. through. Panicle lax, 3- to 4-branched, 18 in. long. Flowers numerous, .25 in. long; pedicel .12 in. long. Sepals lanceolate acute yellow suffused brown. Petals narrower linear. Lip side-lobes oblong blunt, midlobe hastate tongue-shaped, blunt, an erect tooth near tip, callus in spur mouth large decurved with 2 ribs attaching it to back wall, spur cylindrical, horizontal. *Hab.* Rare. Perak, Kamuning, Sungei Siput (Machado).

(6) **S. validum** *Ridl. Mat. i. 166.*

Stem 4 in. long, .5 in. through. Leaves ovate, 6 in. long, .75 in. wide. Panicles 9 in. long, slender; peduncles 2 in. long, branches 2. Flowers numerous remote. Pedicels .25 in. long. Sepals lanceolate sub-acute. Petals smaller, all dull yellow with red purple centre blotch. Lip side-lobes short oblong-rhomboid blunt, midlobe short ovate, spur horizontal blunt cylindrical, callus in mouth quadrate decurved. *Hab.* Rare. Perak, Kamuning (Machado).

(7) **S. hortense** *Ridl. Journ. Roy. As. Soc. S. Br. 39, p. 83; Mat. i. 166.*

Stem stout, 1 to 2 in. long. Leaves lorate blunt unequally bilobed, 4 to 6 in. long, .75 to 1 in. wide. Scapes erect, .5 to 6 in. long, branches 2 to 5, about .5 in. long at top. Flowers .25 in. wide. Sepals oblong blunt, laterals broader. Petals narrower, yellow edges, red. Lip yellow, side-lobes small erect with 2 sub-acute points, midlobe ovate acute, spur scrotiform broad red, callus in mouth a thin bifid lamina. Anther abruptly truncate beaked. Rostellum entire. Capsule elliptic-oblong, 1 in. long. *Hab.* Common on orchard trees. Singapore, Jurong. Johor, Tana Runto. Pahang, Pianggu Endau (Evans). Malacca, Sungei Rambei (Derry). Perak (Scortechini). Penang, Pulau Tikus. *Distrib.* Borneo.

(8) **S. parvum** *Ridl. Mat. i. 167. Cleisostoma parvum Ridl. Journ. Linn. Soc. xxxii. 366.*

Stem 1 in. long. Leaves lanceolate rather thin acute, 1.5 in. long, nearly .25 in. wide. Raceme .25 in. long. Flowers few, .12 in. long. Upper sepal lanceolate, laterals larger ovate. Petals lorate. Lip side-lobes quadrate, midlobe broad ovate, spur oblong saccate, callus lorate bifid. Rostellum linear. *Hab.* Rare. Pahang, Kota Glanggi (Ridley).

(9) **S. setulense** *Ridl. Journ. Roy. As. Soc. S. Br. 59, p. 198.*

Stems 1 in. long. Leaves lorate retuse, 6 to 7 in. long, .75 in. wide. Scapes racemose sometimes branched, slender, 4 to 6 in. long. Flowers numerous yellow small. Upper sepal linear-spathulate, laterals oblong broader, blunt, enlarged to tip. Petals spathulate linear. Lip, side-lobes short round, midlobe ovate papillose, spur scrotiform, calli 2 elevate fleshy ridges at base of mid-lobe, over spur mouth, a thin toothed lamina, and an elevated ridge along lower face of spur inside. Anther skull-shaped, with a long linear beak. Capsule elliptic, .25 in. long. *Hab.* Setul, on trees and rocks, Bukit Rajah Wang (Ridley). *Distrib.* South Siam.

(10) **S. Hobsonii** *Ridl. Journ. Roy. As. Soc. S. Br. 57, p. 97.*

Stems very short and stout, 2 in. long. Leaves oblong, 6 to 8 in. long, 3 in. wide, bases broad unequally bilobed at tip. Panicle or raceme 4 in. long, floriferous to base. Flowers dense sessile. Bracts lanceate caudate. Sepals and petals ovate blunt lemon yellow with red purple spots in lines at base. Lip, side-lobes ovate distinct, midlobe short ovate, spur large scrotiform, an oblique low

ridge on each side of mouth, a thin crescent-shaped callus at back. Anther hemispheric, beak upcurved. *Hab.* Perak, Lenggong and Slim (Ridley, Hobson).

(11) *S. uteriferum* *Ridl. Mat. i. 167.* *Cleisostoma uteriferum* *Hook. fil. F.B.I. vi. 74; Ann. Bot. Gard. Calc. v. 56, pl. 84.*

Stemless. Leaves lorate round or retuse, edges undulate, 7 in. long, 1 in. wide. Scape shorter, 3 in. long, unbranched spicate. Sepals obovate-oblong dull yellow, base red. Petals smaller. Lip side-lobes truncate, midlobe very small ovate; spur a large subglobose sac contracted above, callus semicircular convex. *Hab.* Pahang, Kota Tongkat (Evans). Negri Sembilan, Seremban reservoir (Williams). Perak (Kunstler), a drawing.

(12) *S. sylvestre* *Ridl. Journ. Roy. As. Soc. S. Br. 57, p. 98.*

Stem weak, 3 to 8 in. long. Leaves linear-oblong acute, base slightly narrowed flaccid, 3 or 4 in. long, .5 in. wide; sheath ribbed keeled, .25 to .5 in. long. Racemes 4 to 6 in. long, slender angled. Flowers nearly .25 in. long, numerous distant. Upper sepal ovate cymbiform, laterals ovate-orbicular slightly falcate. Petals narrower oblong blunt. All yellow with red streaks. Lip side-lobes oblong truncate, midlobe linear acuminate; spur longer than pedicel cylindrical dilate in middle, tip broad saccate, calli none. *Hab.* Perak, Temengoh, on tree-trunks (Ridley).

(13) *S. rugosulum* *Ridl. Journ. Roy. As. Soc. S. Br. 39, p. 82; Mat. i. 165.*

Stem stout tall. Leaves linear narrowed at base, bilobed at tip. 5 in. long, .5 in. wide; sheath .5 in. long, transversely wrinkled. Racemes short, .5 in. long, a few cup-shaped sheaths at base. Flowers .25 in. wide, yellow spotted red; pedicel .12 in. long. Sepals ovate coriaceous. Petals thinner. Lip boat-shaped, side-lobes very short oblong, midlobe large fleshy ovate grooved ending in a slender horn, bifid at tip; spur short conic blunt. Column large. *Hab.* Very rare. Kedah Peak (Ridley).

(14) *S. halophilum* *Ridl. Journ. Linn. Soc. xxxii. 367; Mat. i. 162.*

Stems 3 to 12 in. long, curved. Leaves terete pungent recurved sheaths .24 in. long. Raceme slender. Sepals oblong blunt. Petals smaller olive tinted pink. Lip side-lobes ovate, blunt rosy violet, midlobe hastate blunt, spur horizontal not septate; callus obtriangular white. Anther ovate beaked. Pollinia globose, caudicle linear, disc broad hastate. Capsule .36 in. long. *Hab.* On trees by the sea, common. Singapore, Pulau Tekong; Sungei Morai, Johor, Tana Runto, Negri Sembilan, Port Dickson and Siliu (Williams). *Distrib.* Sumatra, Rhio, Borneo.

(15) *S. Machadonis* *Ridl. Journ. Roy. As. Soc. S. Br. 39, p. 82; Mat. i. 163.*

Stems 1 ft. long. Leaves terete recurved, 3 in. long, pungent.

Racemes 2 in. long. Flowers scattered, .36 in. long. Sepals linear-oblong, blunt. Petals narrower, olive yellow. Lip pale violet, side-lobes erect oblong, truncate, midlobe much longer, hastate-triangular acuminate, blunt; spur short curved blunt, olive yellow, upper callus in mouth hemispheric with an anchor-shaped process on tip, lower callus conic ending in a lamina running to back of spur. Column stout sigmoid, yellow. Anther hemispheric, caudicle broad elongate narrowed to tip, disc saddle-shaped. *Hab.* Rare. Johor, Batu Pahat. Negri Sembilan, Port Dickson (Williams).

(16) **S. Kunstleri** *Ridl. Mat. i.* 163. *Sarcanthus Kunstleri* *King. Journ. As. Soc. Beng.* lxi. 594.

Stem 4 to 6 in. long, often branching. Leaves terete fleshy stout, 2.5 to 3 in. long, .25 in. thick. Panicle 6 in. long. Flowers numerous, .25 in. wide. Sepals sub-equal elliptic blunt. Petals narrower, all white with a pink mid-line. Lip side-lobes erect broadly oblong blunt, midlobe ovate acute pink; septum running to the back of the spur half dividing it, a large callus on back wall, spur short thick blunt slightly curved. Column thick, foot short. Anther truncate in front. *Hab.* Negri Sembilan, Port Dickson (Williams' drawing). Perak (Kunstler). Drawings only seen.

Near *S. Machadonis*, but without the peculiar anchor-shaped callus.

(17) **S. secundum** *Ridl. Mat. i.* 168. *Sarcanthus secundus* *Griff. Notulæ*, 362; *Ic. Pl. As. t.* 326; *Hook. fil. Ann. Roy. Bot. Gard. Calc. v.* 51, *pl.* 77 (not of *vol.* viii. *pl.* 321).

A foot or more tall; stem stout. Leaves linear acuminate flat, tip terete pungent, 1 ft. long, .5 in. wide, sheaths 1 in. long. Raceme dense pendulous, 2 to 4 in. long. Bracts ovate very short. Flowers .25 in. long. Sepals oblong-obovate blunt. Petals narrower. All green with 2 red bands. Lip side-lobes oblong with terete points, midlobe ovate fleshy, white tinted violet and yellow; spur horn-shaped white, septum running from a keel on the midlobes across spur, callus in mouth short clubbed. Anther quadrate beaked. Capsule cylindrical, .75 in. long. *Hab.* On trees often near sea or over rivers. Johor, Batu Pahat. Malacca, Sungei Kesang (Derry); Sungei Rambei. Sungei Ujong (Cantley); Siliau, Seremban (Williams). Perak, Thaiping Hills (Hervey). Lankawi (Curtis). *Distrib.* India, Sumatra, Borneo, Saigon. *Native name*: Sakat Ular.

(18) **S. Scortechinii** *Ridl. Mat. i.* 167. *Sarcanthus Scortechinii* *Hook. fil. F.B.I.* vi. 68; *Ic. Pl.* 2138.

A climber, about 6 ft. tall; stem .25 in. through. Leaves lanceolate acute or obtuse, base narrowed petiolate, 5 in. long, 1 in. wide, sheaths ribbed, 1 in. long. Flowers numerous subsessile, .5 in. wide. Upper sepal oblong, laterals obovate blunt. Petals narrower dark purple with yellowish central bar. Lip side-lobes low indistinct, midlobe broader triangular-hastate, violet

tip white; spur conic nearly straight shorter than ovary white, callus clubbed, septum thin nearly complete. Capsule oblong, .75 in. long. *Hab.* Johor, Temeoh River, Kota Tinggi. Pahang, Tahan River; Kota Glanggi. Perak (Scortechini); Batu Togoh (Wray); Teluk Anson (Williams). Penang (Curtis).

(19) **S. densiflorum** *Lindl. Gen. and Sp. Orch. Pl.* 220; *Ridl. Mat.* i. 167. *Cleisostoma spicatum* *Lindl. Bot. Reg. sub. t.* 32; *Hook. fil. Ann. Bot. Gard. Calc.* v. 55, *pl.* 83; *King, Ann. Bot. Gard. Calc.* viii. 311. *Sarcanthus castaneus* *Ridl. Trans. Linn. Soc.* xxx. 136.

Stem stout, 1 ft. long. Leaves oblong or linear, very coriaceous blunt bilobed, 6 in. long, 1 to 2 in. wide, sheaths 1 in. long. Raceme stout decurved, 4 to 8 in. long, sometimes branched; rachis pubescent. Bracts .5 in. long. Flowers .5 in. wide; pedicel and ovary .25 in. long. Sepals ovate-lanceolate, blunt yellowish with 2 red bands or thickly dotted red. Petals lanceolate smaller. Lip side-lobes oblong blunt, midlobe lanceolate blunt yellow tinted red; spur .25 in. long, tip dilate bilobed; callus thin forked, septum more or less developed. *Hab.* Singapore, Dalvey Road. Selangor. Rawang. Perak (Scortechini). Penang Hill (Wallich, Curtis), *Distrib.* India, Tenasserim, Borneo.

(20) **S. pensile** *Ridl. Mat.* i. 168. *Sarcanthus pensilis* *Ridl. Journ. Linn. Soc.* xxxii. 369.

Stem 3 in. long, stout. Leaves lorate obtuse bilobed, 6 in. long, 1 in. thick. Raceme long slender, lower half nude. Flowers scattered, .5 in. across. Pedicels .5 in. long. Sepals oblong-ovate. Petals smaller oblanceolate blunt greenish tinted red. Lip pink, side-lobes horn-shaped, midlobe short ovate blunt; spur cylindrical, septum complete, callus long thick blunt. *Hab.* Rare. Johor, Batu Pahat (Ridley).

(21) **S. fissicors** *Ridl. Mat.* i. 169.

Stem 4 to 5 in. long. Leaves linear-oblong rounded emarginate, 4 to 5 in. long, 1 in. wide, thick coriaceous. Raceme 10 in. long, very slender. Peduncle 6 in. long, nude purple. Flowers distant small; rachis black scurfy; pedicel and ovary .2 in. long, yellow green. Sepals ovate-oblong, .1 in. long, dark red brown. Petals linear. Lip side-lobes truncate yellowish, midlobe cordate acute centre violet, edge white; spur cylindrical flattened white, nearly as long as pedicel; callus an oblong truncate fleshy decurved lamina, no septum. Column tall, violet. Anther truncate, emarginate in front. *Hab.* Rare. Perak, Kamuning (Machado).

(22) **S. bicarinatum** *Ridl. Mat.* i. 169. *Sarcanthus rostellatus* *Ridl. Journ. Bot.* 1900, p. 13.

Stem 6 in. long. Leaves lorate bilobed flaccid, 7 in. long, .75 in. wide. Panicles of few branches, 6 in. long. Flowers about 20, distant, .25 in. wide; pedicels .25 in. long. Sepal oblong-ovate blunt deep red, with a median green line. Petals linear. Lip

white, side-lobes blunt, midlobe reniform hastate, spur horn-shaped curved blunt, keels in spur 2 pubescent. Column short red. Anther yellow. Rostellum long, deeply bifid. *Hab.* Perak, Tambun near Ipoh (Ridley).

(23) **S. tenuicaule** *Hook. fil. F.B.I. vi. 360; Ann. Bot. Gard. Calc. v. 49, t. 74; Ridl. Mat. i. 161.*

Stems slender, 1 ft. long, flexuous. Leaves linear narrow acute, 3 in. long, .12 to .36 in. wide; sheaths .25 in. long. Flowers 2 or 3 on a short tubercle about .12 in. long, yellow or white. Upper sepal lanceolate acute, laterals ovate acute. Petals ovate acute. Lip side-lobes oblong acute, midlobe much longer, linear bifid; spur thick curved blunt swollen at tip; no calli. Pollinia crescent-shaped, caudicle linear with 2 arms above. *Hab.* Selangor, Batu Caves. Perak (Scortechini); Gunong Batu Putih (Wray). Penang Hill (Curtis).

(24) **S. miserum** *Ridl. Journ. Linn. Soc. xxxii. 359; Mat. i. 162.*

Stem over 1 ft. long, .1 to .12 in. through. Leaves linear, 5 in. long, .25 in. wide; sheaths .5 in. long. Racemes very short, 3- to 4-flowered. Flowers very small yellow, lip white. Sepals elliptic-ovate, laterals a little broader. Petals smaller lanceolate-oblong. Lip side-lobes oblong-quadrate, midlobe ovate obtuse, a minute callus at base; spur short conic incurved. Column arms oval. Capsule elliptic, .5 in. long. *Hab.* Dindings, Gunong Tungul. Penang Hill (Curtis). Kedah, Baling (Williams). Lankawi (Curtis). Pulau Adang, Pulau Rawei.

(25) **S. cornigerum** *Ridl. Journ. Linn. Soc. xxxii. 361; Mat. i. 162.*

Stem long, flexuous. Leaves lanceolate acute, 3.5 in. long, .5 in. wide; sheaths .36 in. long. Racemes 2- or 3-flowered. Ovary and pedicels .5 in. long. Sepals oblong-spathulate, .36 in. long. Petals broader brownish yellow. Lip yellowish white, side-lobes erect horn-like, midlobe oblong-spathulate; spur straight conic. *Hab.* Rare. Penang, West Hill (Curtis).

(26) **S. perpusillum** *Hook. fil. F.B.I. vi. 56; Ic. Pl. 2199A; Ridl. Mat. i. 164.*

A small tufted plant, 2 to 4 in. tall. Leaves nearly terete acute recurved, 1 to 1.25 in. long. Racemes 1 in. long, covered with minute white pubescent flowers, withering yellow. Bracts minute lanceolate as long as pedicels. Sepals and petals ovate oblong. Lip side-lobes round, midlobe ovate fleshy; spur curved clubbed. Capsule .12 in. long, elliptic. *Hab.* On mangroves and other trees by rivers. Singapore, Sungei Buluh. Johor, Tempayang River. Malacca, Sungei Kesang and Sungei Rambei (Derry). Perak, Thaiping (Curtis).

(27) **S. minutiflorum** *Ridl. Journ. F.M.S. Mus. iv. 71.*

Stem 3 to 4 in. tall, rather stout. Leaves linear fleshy curved,

2·5 in. long, ·1 in. wide, sheaths ribbed, ·12 in. long. Panicle 6 in. long, very slender; peduncle 3 in. long; branches 4, slender, 3 in. long. Bracts lanceolate acuminate. Flowers numerous minute white. Upper sepal lanceolate, laterals ovate cuspidate keeled. Petals linear-oblong truncate. Lip side-lobes rounded indistinct, midlobe base narrow, tip dilate elliptic-ovate blunt, a round callus in centre, beneath a larger conic thickening; spur ellipsoid as long as lip, pendent. *Hab.* In mountain forests. Pahang, Telom on a fallen tree at 4000 ft. altitude (Ridley).

(28) **S. penangianum** *Hook fil. F.B.I.* vi. 57; *Ic. Pl.* 2129B; *Ann. Bot. Gard. Calc.* v. 47, *pl.* 71; *Ridl. Mat.* i. 171.

Stems 4 to 5 in. long, tufted. Leaves linear or narrow linear-lanceolate, 2·5 to 4 in. long, ·3 in. wide. Raceme 1 to 1·5 in. long, pubescent. Bracts subulate. Flowers very small pubescent, ·13 in. long, crowded yellow speckled red. Upper sepal obovate-oblong, laterals oblique. Petals much smaller. Lip side-lobes ovate, midlobe much smaller, ovate round; spur long swollen at top then narrowed and curved at blunt tip. *Hab.* Perak, Sungkei River (Curtis). Kedah Peak (Curtis).

(29) **S. sacculatum** *Ridl. Mat.* i. 164. *Sarcanthus sacculatus* *Ridl. Journ. Linn. Soc.* xxxii. 368.

Stem slender, 8 in. long. Leaves terete blunt, 6 in. long, ·1 in. through; sheaths 1 in. long. Raceme slender, 3 in. long. Flowers scattered, very small. Sepals ovate sub-acute. Petals smaller lorate. Lip shortly clawed, side-lobes ovate, midlobe linear-hastate; spur rather large saccate pinched in above, dilate below; callus clubbed bilobed. Anther ovate not beaked. Capsule sausage-shaped triquetrous, ·75 in. long. *Hab.* Rare. Lankawi isles (Curtis).

(30) **S. miniatum** var. **citrinum** *Rehb. Gard. Chron.* 1884, p. 542; *Ridl. Mat.* i. 170.

Stem stout woody, 8 in. long. Leaves linear obtuse, very coriaceous, 4 in. long, recurved, ·5 in. wide, sheaths ribbed. Raceme 3 to 4 in. long. Flowers densely crowded, nearly ·5 in. long, orange yellow. Sepals obovate. Petals nearly as long and broad. Lip side-lobes round, midlobe long, narrow oblong acute, spur long subterete. Anther red ovate beaked. *Hab.* On trees, Lankawi islands (Curtis). Perlis, Ginting Kabok, Kanga (Ridley). *Distrib.* Siam.

(31) **S. saxicolum** *Ridl. Trans. Linn. Soc.* iii. 374; *Mat.* i. 171. *S. flaveolum* *Ridl. Journ. Linn. Soc.* xxxii. 360.

Stem 1 ft. long or more. Leaves linear blunt equally bilobed, base narrowed, 3 in. long, ·12 in. wide; sheaths ribbed, ·75 in. long. Racemes slender, 2 to 3 in. long, base nude. Bracts ovate acute diflexed. Flowers numerous, ·5 in. long; pedicels ·25 in. long. Sepals ovate blunt yellow, red keel. Petals very small oblong acute oblique. Lip, side-lobes round, midlobe very small triangular-

ovate, a tongue-shaped callus in mouth; spur long nearly straight, narrowed to tip. *Hab.* On rocks and trees. Pahang, Kota Glanggi. Perak, Tambun (Ridley). Kedah Peak (Curtis), Gunong Geriang.

(32) **S. undulatum** *Ridl. Journ. Bot.* 1900, p. 72.

Stems flattened, 6 in. long. Leaves lorate undulate flaccid, 5 in. long, .75 in. wide. Racemes slender pendulous, 4 in. long, densely covered with very small flowers. Sepals oblong-ovate yellowish, with 2 red bands. Petals linear-lorate blunt narrower yellow with 4 red bands. Lip side-lobes hardly distinct, midlobe horn-like decurved; spur as long as pedicel, blunt sub-cylindric yellow, with 2 red spots in mouth. Capsule oblong pear-shaped. *Hab.* Rare. Perak, Telok Pinang near Ipoh (Ridley).

(33) **S. fissum** *Ridl. Journ. Linn. Soc.* xxxii. 367; *Mat.* i. 169.

Stem short stout. Leaves lorate deeply bifid acute, 4 in. long, .2 in. wide; sheaths .25 in. long. Racemes 3 in. long, base nude, rachis thickened. Flowers .25 in. wide. Sepals ovate broad. Petals linear-oblong, all white. Lip side-lobes short blunt, violet, midlobe violet edged white oblong-ovate, a hemispheric callus at base; spur short blunt half as long as ovary; anther yellow beaked, a purple median line. Pollinia ovoid, caudicle spathulate, tip triangular, disc ovate. *Hab.* Lankawi islands (Curtis).

(34) **S. secundiflorum** *Ridl. Journ. Bot.* 1898, p. 210; *Mat.* i. 170.

Stem 1 in. long. Leaves lorate, 1.5 in. long, .25 in. wide, tinted purple. Raceme 2 in. long. Flowers about 6 second small. Upper sepal lanceolate acute, laterals blunt, white. Petals linear, white tipped violet. Lip base saccate, side-lobes oblong yellowish white, midlobe obtuse, tip thickened truncate; spur clubbed thick curved, nearly as long as ovary. Column short, arms erect linear. Anther beak long upcurved linear bifid. Pollinia globose on a linear caudicle with a longer linear disc. *Hab.* Singapore, Chua Chu Kang. Negri Sembilan, Siliu (Williams). Pahang, Piangu, Endau (Evans). *Distrib.* Sinkep.

(35) **S. angræcum** *Ridl. Journ. Bot.* 1898, p. 214. *Pennilabium angræcum* *J. J. Smith, Orchid v. Java*, pl. cdlxxiii.

Stem 1 in. long. Leaves lanceolate falcate oblique blunt, 2 in. long, .6 in. wide. Raceme .75 in. long; rachis flattened. Bracts ovate acute, very short. Flowers .5 in. wide, white; pedicel .25 in. long. Sepals elliptic acute. Petals narrower. Lip shortly clawed, side-lobes large obliquely obovate, minutely toothed, midlobe minute cordate; spur nearly .5 in. long, clubbed. Capsule triquetrous, 1.5 in. long. *Hab.* Selangor, Batu Caves (Ridley). *Distrib.* Java.

(36) **S. myosurus** *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 84.

Stems short, 1 to 2 in. long, crowded in a mass. Leaves lanceolate falcate sub-acute, 3 in. long, .25 in. wide; sheaths .25 in. long.

Scapes slender, 3 in. long, scabrid, racemes 1 in. long, thickened. Bracts minute ovate. Flowers minute. Sepals lanceolate falcate. Petals narrower. Lip side-lobes oblong erect, midlobe ovate-lanceolate shorter; spur broad blunt as long as ovary. Capsule cylindrical, .5 in. long. *Hab.* Rare. Pahang, Kwala Tembeling (Ridley).

This has the habit of a *Dendrocolla* and flowers of a *Saccolabium*.

(37) **S. pubescens** *Ridl. Journ. Linn. Soc.* xxxi. 295. *Cleisostoma Kunstleri Hook. Ic. Pl.* 2335.

Stem 6 in. tall, stout. Leaves lorate blunt unequally bilobed, 4 to 12 in. long, 1 to 2 in. wide. Panicle tall erect, 15 in. long, pubescent above; branches at top 7, sometimes re-branched, 2.5 in. long. Flowers numerous crowded small, pale violet, .2 in. wide. Upper sepal oblong-lorate, laterals decurved sub-spathulate falcate blunt. Petals narrower spathulate. Lip side-lobes oblong, very obscure, midlobe blunt tongue-shaped; spur rather large, curved forwards, callus a very obscure low double ridge. *Hab.* Perak (Kunstler), drawing. Kedah, Bukit Sablah (Williams). *Distrib.* Borneo.

(38) **S. ionosmum** *Ridl. Mat.* i. 170. *Cleisostoma ionosmum Ridl. Journ. Linn. Soc.* xxxii. 336 (not of *Lindley*).

Stem 6 in. long. Leaves lorate blunt bilobed, 6 in. long, .75 in. wide; sheaths .25 in. long. Panicles 8 in. long, much branched, bare part 3 in. long; branches slender, 2 in. long. Flowers very numerous small, .25 in. wide; pedicels as long. Sepals oblong blunt. Petals smaller olive yellow, transversely barred violet. Lip side-lobes triangular blunt, violet, midlobe ovate with a conic calli; spur long, straight blunt, white, a tongue-shaped callus in mouth. Column short violet; anther flat, tip bilobed. *Hab.* Perak, Thaiping Hills (Ridley).

(39) **S. arachnanthe** *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 83; *Mat.* i. 171; *Burkill, Gard. Bull.* ii. (1915), p. 48.

Stem tall scandent. Leaves oblong blunt, 4 in. long, 1.5 in. wide; sheaths .5 in. long. Panicle 2 ft. long; peduncle long, nude purple. Flowers white, .5 in. wide, numerous on branches 3 to 4 in. long; pedicels long slender. Sepals and petals spreading, spathulate blunt, laterals falcate, white purple spotted at base. Lip side-lobes indistinct, midlobe ovate broad short; spur saccate round, callus in mouth notched. *Hab.* Perak and Kedah (Curtis).

(40) **S. adnatum** *Ridl. Sarcophilus adnatus Ridl. Journ. Linn. Soc.* xxxii. 373.

Stem tall and stout. Leaves lorate unequally bifid often red, 6 in. long, 1 in. wide. Racemes 3 in. long; peduncle stout purple. Flowers 12 to 16, 1 in. long; pedicels as long. Upper sepal elliptic-obovate blunt, laterals adnate to column-foot and lip beneath, tips free round, yellow tipped maroon and spotted red. Petals

lanceolate yellow. Lip claw narrow, side-lobes oblong blunt, mid-lobe shorter ovate yellow or white tipped maroon; spur porrect blunt, a callus in mouth. Column with a very short foot. Anther ovate blunt. Rostellum long subulate acute. *Hab.* Not common. Singapore, Sungei Toas. Johor, Kota Tinggi; Tebrau; Sednak. Negri Sembilan, Sendayan Forest Reserve (Williams). *Distrib.* Borneo.

DUBIOUS SPECIES

- S. *PANTLINGII* *Ridl. Mat. i. 162.* *CLEISOSTOMA TENUICAULE* *King. Journ. As. Soc. Beng. lxxvi. ii. 596.* Stem slender, 1 ft. long. Leaves linear-oblong acute, 2 in. long, .5 in. wide; sheaths .5 in. long. Flowers solitary, .5 in. across, pedicelled. Sepals and petals sub-equal oblong-lanceolate fleshy, orange barred Indian red. Lip yellowish white, side lobes very short terete blunt, 2 pairs, the front ones longest, midlobe decurved lanceolate, tip bifid; spur horizontal straight with a linear curved callus in mouth. Column short white, arms inconspicuous. *Hab.* Perak (Kunstler). Cultivated in Calcutta Gardens. A drawing in Herb. Kew.

I only know this from the drawing and description. It is suspiciously like a small-flowered *Trichoglottis tetraceras*.

66. MICROSACCUS, Bl.

Stems short tufted, covered with equitant leaves. Racemes very short. Flowers 1 or 2, white. Bracts ovate rather large. Sepals and petals sub-equal. Lip almost entire fleshy, spur saccate. Column short, arms blunt. Anther conic, 1-celled. Pollinia 4, caudicle narrow, disc small ovate. Rostellum rather long entire. Species 4, Burma to Malaya.

(1) *M. javensis* *Bl. Bijdr. 367. Ridl. Mat. i. 172.*

Stems 4 to 6 in. long. Leaves ovate curved blunt, .25 in. long. Flowers .12 in. wide. Bracts white. Sepals and petals ovate-lanceolate acute. Lip midlobe blunt, a yellow spot at base, spur stout. *Hab.* On mangroves and other trees. Singapore, Chan Chu Kang. Selangor, Batu Caves (Kelsall). Perak (Scortechini); Teluk Anson (Williams). *Distrib.* Java, Tenasserim, Cambodia.

67. TÆNIOPHYLLUM, Bl.

Epiphytes. Leafless (rarely with minute leaves) with very numerous long flat roots and very short stems. Racemes short and slender. Flowers minute or small. Bracts distichous persistent. Sepals and petals free or connate. Lip entire or 3-lobed. Column short, arms incurved. Anther beaked. Pollinia 4. Rostellum elongate. Capsule comparatively large sausage-shaped. Species 50, Indo-Malaya, Polynesia.

Sepals and petals free, broad and short.

Scape .5 in. long, floriferous to base; roots broad flat.

(1) **T. serrula**

Scape 2 in. long, lower part nude; roots long slender; lip ovate

(2) **T. macrorrhizum**

Scape .5 in. long; roots long slender; lip narrow lanceolate

(3) **T. culiciferum**

Sepals and petals connate narrow linear acuminate

(4) **T. rubrum**

(1) **T. serrula** *Hook. fil. F.B.I. vi. 77; Ridl. Mat. i. 173.*

Stem very short; roots numerous long flat. Raceme .5 to 1 in. long; peduncle short. Bracts acute pubescent. Flowers minute yellowish white. Sepals narrow lanceolate blunt. Petals narrower. Lip boat-shaped nearly entire, side-lobes rounded, spur scrotiform. Column arms blunt. Anther large with 2 violet spots, beak truncate. Capsule 1 in. long. *Hab.* Common on branches of trees and shrubs.

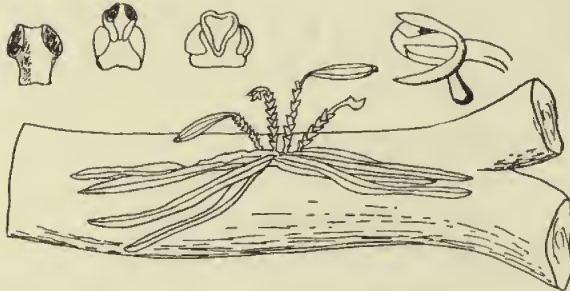


FIG. 173.—*Tæniophyllum serrula*.

Singapore, Tanglin; Chan Chu Kang. Johor, Kota Tinggi. Pahang, Pekan. Selangor, Kwala Lumpur. Tringganu, Cherating River. Perak, Thaiping; Ipoh (Curtis). Setul. Kelantan, Kwala Aring (Yapp). *Distrib.* South Siam.

(2) **T. macrorrhizum** *Ridl.* *T. gracillimum* *Ridl. Journ. Roy. As. Soc. S. Br. 50, p. 138 (not of Schlechter).*

Stem .1 in. long; roots numerous linear narrow, 3 to 8 in. long. Scape 1.5 in. long, very slender; raceme very short; rachis slightly thickened. Bracts minute ovate acute. Flowers white, .2 in. long to end of spur. Sepals free lanceolate blunt. Petals elliptic wider. Lip triangular-ovate blunt much larger, spur as long as pedicel and ovary, clubbed. Pollinia hemispheric, caudicle terete, disc ovate. *Hab.* On very lofty tree branches. Johor, Kukub; Tebrau River. Selangor, Batu caves; Petaling woods. Perak, Temengoh; Goping (Kunstler).

(3) **T. culiciferum** *Ridl.*

Stem 15 in. long; roots numerous very slender, 8 in. long or less. Peduncle filiform, 1 in. long; raceme .12 to .15 in. long, bracts

distichous, very small about 15. Pedicel filiform, .5 in. long. Sepals and petals narrow lanceolate-linear acuminate acute yellow, .12 in. long. Lip lanceolate acuminate broader and nearly as long as the pedicel. Fruit cylindrical, .5 in. long. *Hab.* Pahang, Rumpin River mouth (Evans). Kelantan, Chaning Woods.

(4) **T. rubrum** Ridl. *Journ. Linn. Soc.* xxxii. 363; *Mat.* i. 173.

Stem minute; roots few, slender terete. Raceme 1 in. long, upper part only floriferous. Bracts ovate distichous, red, pubescent. Flowers minute red, ovary short nearly sessile. Sepals, petals and lip connate. Sepals lanceolate acute, spur broad saccate. *Hab.* Very rare. One plant only seen. Sungei Ujong, Linsum Estate on a coffee bush. *Distrib.* Koh Samui. Siamese coast.

68. PELATANThERIA, Ridl.

Stems elongate. Leaves coriaceous rather close set, oblong. Racemes short. Flowers small. Sepals and petals similar. Lip side-lobes adnate to column; midlobe large flat, spur short, a callus in mouth, and a tooth-like one on midlobe. Column very short and thick, arms long erect. Anther 2- to 4-celled, beak truncate. Pollinia 2, half divided, caudicle short and broad with a large reniform disc as large. Species 3, India, Cochin-China, Malaya.

(1) **P. cristata** Ridl. *Journ. Linn. Soc.* xxxii. 373; *Mat.* i. 174.

Stems 8 in. long or more. Leaves blunt, 2 in. long, .5 in. wide. Raceme 4 in. long or more; rachis thickened. Bracts small ovate. Flowers .36 in. wide; pedicels short thick. Upper sepal oblong-spathulate, laterals falcate, all yellowish white with red stripes and a green crested keel. Petals oblong, white striped red. Lip white with pink stripes, side-lobes long incurved, midlobe cordate acuminate, spur short, callus in mouth clubbed large. Column white. Anther sub 4-celled, beak oblong truncate. Pollinia elliptic caudate, caudicle very short and broad, disc of 2 large crescent-shaped processes. Rostellum bifid. *Hab.* Forests and orchards. Pahang, Kota Glanggi; Tahan River. Negri Sembilan, Siliu (Williams).

In Kew Library is a copy of a drawing of *P. insectifera* Ridl. (*Sarcanthus insectifera* Hook. fil.), an Indian plant, said to be made from a plant collected in Perak by Kunstler, which flowered in the Calcutta Gardens. It is possible that the plant may occur in the Peninsula, but I am unwilling to incorporate it without further evidence. It has small flowers with a pink lip.

69. SARCOCHILUS, Br.

Stem usually short. Leaves close-set. Racemes short usually thickened upwards. Bracts persistent small. Flowers medium very fugacious opening singly. Sepals and petals sub-equal, or petals smaller free. Lip attached to column foot, side-lobes small

or large, midlobe very small or almost absent, spur large porrect. Column fairly long, arms 0, foot often long. Anther ovate. Pollinia 2, caudicle usually narrow, disc small. Species about 30, Indo-Malaya, Australia.

Stems short; leaves crowded.

- Flowers over 1 in. across; sepals and petals lanceolate (1) *S. unguiculatus*
 Flowers 1 in. long; sepals and petals long acuminate (2) *S. acuminatus*

Flowers under 1 in. across.

- Rachis not thickened or flat.
 Spur short broad clubbed (3) *S. caligaris*
 Rachis thickened; leaves short.
 Spur globose (4) *S. cladostachys*
 Spur long clubbed, laterally flattened sigmoid (5) *S. stenoglottis*
 Spur conic very short; flowers rather large, green (6) *S. virescens*
 Rachis thickened; leaves 2 ft. long, spur conic (7) *S. tanyphyllus*
 Rachis flat distichous; flowers small (8) *S. biserratus*

Stems 3 to 6 in. long; racemes very short, hardly thickened.

- Leaves elliptic, lip side-lobes sub-triangular; flowers white (9) *S. tahanensis*
 Leaves lorate; side-lobes oblique-ovate; flowers violet (10) *S. violaceus*
 Stem elongate pendulous flat; racemes short; flowers scarlet and salmon (11) *S. anceps*

(1) *S. unguiculatus* Lindl. *Bot. Reg.* 1840; *Misc.* 67; *Ridl. Mat.* i. 175. *S. aureus* Hook. *fl. F.B.I.* vi. 35; *Ann. Roy. Bot. Gard. Calc.* v. 64.

Stem short stout, 2 in. long. Leaves lorate, thick coriaceous blunt, 6 in. long, .5 in. wide, sheaths .5 in. long. Raceme 5 in. long. Flowers over 1 in. wide. Pedicel and ovary 1 in. long. Sepals and petals lanceolate acute white or pale yellow. Lip short, side-lobes incurved oblong large falcate, purple, midlobe broad, base narrowed to tip blunt, a low callus between side-lobes and large double one behind, yellowish spotted purple, spur short globose, base narrowed. Column dilate upwards, foot long. *Hab.* Perak (Kunstler). *Distrib.* Borneo, Philippines.

(2) *S. acuminatus* *Ridl. Journ. F.M.S. Mus.* iv. 72.

Stem .5 to 2 in. long. Leaves few elliptic narrow, base inæquilateral, tip blunt, 3 to 4.5 in. long, .75 to 1 in. wide. Raceme stout, 3 in. long, hardly thickened above. Sepals and petals long acuminate, 1 in. long, yellow. Lip side-lobes thin, midlobe short straight, white spotted purple at base, spur long. *Hab.* Pahang, Telom near river (Ridley).

(3) *S. caligaris* *Ridl. Trans. Linn. Soc.* iii. 372; *Mat.* i. 175.

Stem very short. Leaves lorate falcate acute unequally bifid, 3 to 5 in. long, .75 in. wide. Raceme .5 in. long, rachis not thickened.

Flowers 3 or 4, .5 in. wide. Sepals lanceolate acute. Petals subspathulate, narrower, all white. Lip side-lobes quadrate or linear crimson, midlobe very small retuse white with 2 yellow spots at base, spur short broad, clubbed. Column pale green. Anther ovate beaked yellow. Pollinia elliptic, caudicle broad triangular-spathulate, disc triangular small. Capsule linear, 4 in. long. *Hab.* On trees and lianes, dense forest. *Hab.* Singapore, Bukit Timah; Chan Chu Kang. Pahang, Pekan. Selangor, Batu Caves. Negri Sembilan, Labu Reservoir. Seremban (Williams). Perak.

(4) **S. cladostachys** Hook. *fil. F.B.I.* vi. 35.

Stem stout. Leaves lorate bifid crowded, 6 to 12 in. long, 1.5 to 2 in. wide. Peduncles 1 to 2 in. long, rachis thickened. Flowers 1.5 in. wide, cream-colour. Sepals and petals lanceolate acuminate. Lip shorter, side-lobes oblong blunt pale purple, midlobe bifid, lobes quadrate, spur globose spotted purple. Foot of column spotted purple, rather long. *Hab.* Perak (Kunstler, Scortechini, drawings only).

(5) **S. stenoglottis** Hook. *fil. F.B.I.* vi. 34; *Ridl. Mat.* i. 175; *Hook. Ann. Bot. Gard. Calc.* v. 41, pl. 62. *S. sigmoideus* *Ridl. Journ. Linn. Soc.* xxxi. 298.

Stem stout, 3 in. long. Leaves oblong lorate broadly blunt, 8 in. long, 1.5 in. wide. Raceme 3 in. long, thickened upwards. Flowers .5 in. wide, white. Sepals oblong obtuse, laterals broader. Petals lanceolate blunt, all white, base yellow with transverse crimson streaks. Lip shorter sigmoid, flattened laterally, side-lobes low with 2 short points, midlobe ovate, spur long curved upwards, white. Column foot short. Pollinia reniform, caudicle oblanceolate, disc shield-shaped. *Hab.* Perak (Scortechini). *Distrib.* Borneo, Sumatra.

(6) **S. virescens** *Ridl. Journ. Roy. As. Soc. S. Br.* 37, p. 85; *Mat.* i. 176.

Stem very short. Leaves lanceolate sub-acute, 1.5 in. wide or less. Raceme 1 in. long. Flowers 1 in. wide. Sepals ovate acute. Petals narrow lanceolate. All light green. Lip very short white, side-lobes short rounded, midlobe represented by an orange callus, spur short broad conic. Column foot as long as column. Anther orange, beak triangular. *Hab.* Rare. Perak, Tapah (Aeria), a drawing only seen; Tanjong Malim (Williams).

(7) **S. tanyphyllus** *Ridl. Trans. Linn. Soc.* iii. 372.

Stem hardly 1 in. long, stout. Leaves 4 or 5 lorate, 1 to 2 ft. long, 1.5 in. wide, unequally blunt bilobed. Racemes 4 to 5 in. long, hardly dilate. Bracts lanceolate. Flowers white large on pedicels 1 in. long. Sepals lanceolate acuminate. Petals broader lanceolate. Lip shorter, clawed, side-lobes lorate falcate large, midlobe shoe-shaped blunt, a large keel at base. Rostellum long bifid acuminate. Capsule oblong, 1.5 in. long. *Hab.* Rare on limestone rocks. Pahang, Kota Glanggi (Ridley).

(8) **S. biserratus** *Ridl. Journ. Bot.* 1900, p. 73.

Stems crowded, 3 to 4 in. long, slender. Leaves narrowed linear-lanceolate acute fleshy, 4 in. long, .25 in. wide, sheaths .12 in. long. Racemes flattened, 6 in. long. Flowers distichous, .5 in. wide. Bracts ovate small. Pedicel .25 in. long. Upper sepal lanceolate acute, laterals oblique. Petals narrower, all yellow white. Lip white, side-lobes linear acute curved outwards, midlobe minute, spur long, conic porrect, mouth violet, .25 in. long. Column slender, foot short. Anther ovate orange. *Hab.* Rare. Perak near Ipoh (Ridley).

(9) **S. tahanensis** *Ridl. S. crassifolius* *Ridl. Journ. F.M.S. Mus.* vi. 182 (not of *Rolfe*).

Stem 6 in. tall. Leaves 6, very fleshy, crowded at top elliptic broadly unequally bilobed, 1.5 in. long, 1 in. wide. Raceme short thick, 1 in. long, slightly flattened. Bracts ovate acute flat. Flower small white. Sepals ovate acute greenish white, upper one lanceolate. Lip side-lobes sub-triangular short, midlobe 0, spur broadly round fleshy with a brown blotch in throat. *Hab.* Rare. On trees near stream. Pahang, Gunong Tahan at 5500 ft. altitude (Ridley).

(10) **S. violaceus** *Ridl. Journ. F.M.S.* vi. 183.

Stem broad flat, 3 in. long. Leaves thick coriaceous lorate unequally bilobed round, dark green, purple beneath, 4 in. long, .5 in. wide. Raceme 1.5 in. long, sub-terete. Pedicels .25 in. long. Flowers .5 in. long. Upper sepal lanceolate acute, lower ones ovate-triangular, base gibbous, whitish violet outside, violet inside. Petals narrower lanceolate acute violet. Lip white, side-lobes oblique, ovate incurved, midlobe small indistinct, spur fleshy ovate, a brown bar near mouth, hairy within. *Hab.* Rare. On trees by stream. Pahang, Gunong Tahan at 5000 ft. altitude (Ridley).

(11) **S. anceps** *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 53.

Stems pendulous, over 1 ft. long, flattened. Leaves 2.5 in. long, .75 in. wide, numerous oblong blunt, sheaths 1 in. long, flat sharp-edged. Raceme short; peduncle 1 in. long. Flowers 3 or 4; pedicels .5 in. long. Sepals ovate blunt, .5 in. long, upper one lanceolate. Petals shorter ovate-oblong, all salmon colour. Lip .2 in. long, base saccate, side-lobes oblong falcate acuminate, as long as rest of lip, scarlet tipped white, midlobe round with retuse boss at base scarlet, yellowish red with 2 scarlet spots at base. Foot nearly as long as column. Pollinia 4-lobed. *Hab.* Rare. Johor, Tebrau River (Ridley).

70. ASCOCHILUS, Ridl.

Small epiphytes, stem short. Leaves linear or lorate falcate or elongate with terete leaves. Scapes short muricate or hairy. Flowers small in a short raceme, not or hardly thickened, lateral sepals larger than upper decurrent or adnate to column foot. Petals narrower. Lip 3- or 4-lobed, side-lobes large, midlobe large or

small, spur cylindric pendulous or porrect thick. Column tall and slender, foot narrow as long or longer. Anther beaked. Pollinia 2, globose; caudicle linear, disc small. Capsule narrow cylindric. Species 5 to 6, Andamans, Siam, Malaya.

- Stem elongate; leaves terete straight long (1) *A. teres*
- Stem 4 in. long; leaves terete strongly recurved. (2) *A. capricornis*
- Stem short; leaves broad.
- Lip 4-lobed (3) *A. hirtulus*
- Lip 3-lobed; flowers small.
- Sepals narrow acute yellow, glabrous (4) *A. siamensis*
- Sepals broad barred red, hairy (5) *A. hirsutus*
- Flowers minute; sepals lanceolate (6) *A. minutiflorus*

(1) *A. teres* *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 85; *Mat. i.* 178.

Stem slender, 6 in. long or more. Leaves terete acute, 4.5 in. long, .12 in. thick; sheaths ribbed and wrinkled, .5 in. long. Raceme slender, 4 in. long. Flowers few remote, .25 in. wide. Upper sepal oblanceolate hooded, laterals oblique-ovate much larger. Petals broad spatulate oblique. Lip side-lobes falcate lanceolate, midlobe hastate, basal lobes rounded, spur curved blunt. Column as long as foot. *Hab.* Rare. Johor, Bukit Banang near Batu Pahat (Ridley).

(2) *A. capricornis* *Ridl.*

Stems tufted branched, 4 in. tall. Leaves rigid terete recurved blunt, 1 in. long; sheaths .2 in. long, strongly ribbed and cancellate. Racemes 2 to 2.5 in. long, lax. Bracts ovate sheathing persistent. Pedicels .25 in. long. Sepals oblong rounded, upper one magenta, laterals falcate broad, brownish green mottled red. Petals oblong blunt as long, .1 in. long. Lip shortly clawed, side-lobes erect triangular, midlobe porrect much longer triangular-lanceolate acuminate, spur scrotiform, an oblong thick blunt callus in mouth of spur. Column tall, winged above. *Hab.* Pahang, Gunong Senyum (Evans).

(3) *A. hirtulus* *Ridl. Journ. Linn. Soc.* xxxii. 375; *Mat. i.* 178. *Sarcochilus hirtulus* *Hook. fil. F.B.I.* vi. 89; *Ic. Pl. t.* 2121.

Stem .5 in. long. Leaves falcate linear acute, 2 to 3 in. long. Scape .5 in. long, muricate; raceme very short. Flowers nearly .5 in. wide. Upper sepal lanceolate, laterals adnate to column, much larger oblanceolate. Petals linear-lanceolate, all cream with pink spots. Lip, side-lobes linear curved, midlobe bilobed, lobes linear, spur curved short blunt. Column tall slender, foot narrow. Capsule narrow cylindric, 1.5 in. long. *Hab.* In damp rocky spots. Pahang, Kota Glanggi. Malacca (Maingay). Negri Sembilan, Siliau (Williams). Selangor, Batu Caves. Perak, Larut (Kunstler). Penang Waterfall. Lankawi (Curtis). Kelantan, Chaning.

(4) *A. siamensis* *Ridl. Journ. Linn. Soc.* xxxii. 375; *Mat. i.* 178.

Stem 1 in. long. Leaves 5 in. long, hardly .5 in. wide, lorate falcate acute. Scapes 3 in. long, muriculate; racemes very short.

Flowers .25 in. wide. Upper sepal elliptic-lanceolate acute, laterals much larger rhomboid oblique keeled acute. Petals linear-lanceolate curved, all ochre. Lip white, side-lobes oblong round, midlobe tongue-shaped, small blunt, spur long slender cylindrical. Column sigmoid, foot long slender, arms short blunt erect. *Hab.* Negri Sembilan, Sendayan forest (Williams). Lankawi isles (Curtis). *Distrib.* Siam.

(5) **A. hirsutus** *Ridl. Mat. i. 179.* *Sarcochilus hirsutus* *Hook. fil. F.B.I. vi. 38; Ann. Bot. Gard. Calc. v. 44, pl. 67.*

Stem short stout. Leaves lorate, narrowed at the base, 4 to 8 in. long, 1 to 1.5 in. wide. Scapes pendulous hairy, 1 to 1.5 in. long. Flowers .75 in. across, 4 to 8, crowded at end; pedicels hairy, .25 in. long. Upper sepal oblong-obovate, laterals oblique larger, all hairy yellow with red bars and blotches. Petals lanceolate smaller. Lip, side-lobes oblong with 2 horn-shaped processes between, midlobe small truncate notched, spur large dilate at base then abruptly narrowed, all white, red blotches on side lobes and spur. Column foot fairly long. *Hab.* Perak (Kunstler). Teluk Anson (Curtis).

(6) **A. minutiflorus** *Ridl. Journ. Roy. As. Soc. S. Br. 39, p. 85.*

Stem very short. Leaves linear-lanceolate falcate acute, 3 in. long, .5 in. wide or less. Scape very slender, 1 in. long, pubescent; raceme very short. Bracts hooded ovate. Flowers .12 in. wide. Upper sepal lorate-oblong, laterals lanceolate, yellow with red spots. Petals obtuse yellow, a red spot at base. Lip, side-lobes large oblong truncate, midlobe very short truncate entire, spur short blunt scrotiform. Column tall curved, slender, foot hardly as long. *Hab.* Rare. Pahang, Kwala Tembeling (Ridley).

71. AERIDES, Lour.

Stems rather long. Leaves linear bilobed (or terete). Flowers in long racemes numerous (or few) showy. Sepals broad and spreading, laterals adnate to column foot. Petals broad. Lip adnate to end of column foot, side-lobes usually large (or absent), midlobe larger, spur pendent, calli 0. Column short, foot short or long. Anther 2-celled. Pollinia 2, globose. Rostellum bifid. Capsule oblong. Species 10, Indo-Malaya, China.

Flowers white or pinkish; lip midlobe narrow acute

Flowers rose purple; midlobe hastate-ovate

(1) **A. odoratum**

(2) **A. multiflorum**

(1) **A. odoratum** *Lour. Fl. Cochinchine, 525; Bot. Mag. 4139; King. Ann. Bot. Gard. Calc. viii. pl. 282; Ridl. Mat. i. 180.*

Stems about 1 ft. long or more, stout. Leaves lorate, 1 ft. long, .5 in. wide. Scape 1 ft. long or less. Raceme lax. Flowers 1 in. wide on pedicels 1 in. long, fragrant white or pinkish dotted pink; spur usually tipped green. Upper sepal obovate blunt, laterals

larger. Petals narrower. Lip large saccate, side-lobes long erect, curved, midlobe narrow acute, spur curved, horn-shaped. Capsule fusiform, 1 to 1.25 in. long. *Hab.* Not rare, especially on trees near the sea. Johor, Pulau Tinggi (Nanson). Malacca (Maingay). Selangor, Bukit Hitam (Kelsall). Perak. Kedah, Yan. Lankawi (Curtis). *Distrib.* Cochinchina, Indo-Malaya.

Very variable. The peninsular form is *A. virens* Lindl. Bot. Reg. 41, with flaccid leaves and short racemes, but the finer variety *A. suavissimum* Lindl. does occur. This has the lip midlobe longer and emarginate. Var. *bicuspidatum* Hook fil. F.B.I. l.c. 47, with the lip bicuspidate at tip occurs in Perak and Malacca (Maingay).

(2) **A. multiflorum** Roxb. *Cor. Pl.* iii. 63, t. 271; *Hook. F.B.I.* vi. 44. *A.* affine *Wall. Cat.* 7316; *Bot. Mag.* t. 4049. *A. roseum* Lindl. *Paxt. Fl. Gard.* ii. 109, t. 60.

Stem stout, 4 to 10 in. long. Leaves 6 to 8 in. long, bilobed. Racemes 6 to 12 in. long. Flowers .75 to 1.25 in. wide, rose purple (sometimes spotted darker). Sepals and petals sub-equal oblong round tipped. Lip twice as long, sides recurved, claw geniculate, bent, midlobe hastate-ovate, tip round, a 2-lobed callus on base, spur curved forward. Capsule .6 to 2 in. long, club-shaped. *Hab.* Kedah, Baling (Williams). *Distrib.* India to Tenasserim.

72. THRIXSPERMUM, Lour.

Terrestrial or epiphytic. Stems long or rather short, rooting at intervals. Leaves oblong or lorate bilobed or ovate amplexicaul. Peduncles long, rarely short; racemes flat with persistent distichous bracts gradually lengthening. Flowers large or medium, opening 1 or 2 at a time. Sepals and petals sub-similar lanceolate or ovate blunt or elongate caudate filiform. Lip saccate, side-lobes falcate, midlobe fleshy with 1 or 2 calli on disc. Column foot short. Anther ovate. Pollinia 2, with small or large disc, caudicle short or 0. Capsule narrow elongate.

Sepals and petals not caudate.

Leaves ovate amplexicaul; sepals and petals ovate blunt (1) **T. lilacinum**

Leaves lanceolate or lorate.

Sepals and petals lanceolate; flowers white.

Peduncle short flat, raceme broad.

Midlobe large conic (2) **T. calceolus**

Midlobe short blunt (3) **T. pauciflorum**

Peduncle slender; raceme narrow.

Flowers small (4) **T. montanum**

Sepals and petals long filiform caudate.

Lip 3-lobed.

Lip and petals 2 in. long, yellow; lip dotted pink (5) **T. arachnites**

Lip and petals 2.5 in. long, lanceolate to long-acuminate yellow (6) **T. Scortechinii**

Lip and petals .75 in. long; lip orange, pubescent (7) **T. crassifolium**

Lip and petals .75 in. long; lip violet	(8) T. iodochilus
Lip and petals long white	(9) T. leucarachne
Lip entire cuspidate; flowers small	(10) T. notabile

(1) **T. lilacinum** *Rchb. fil. Xen. Orch.* ii. 121; *Ridl. Mat.* i. 181. *Sarcochilus lilacinus Griff. Notulæ*, iii. 334; *Ic. Pl. As. t.* 320, fig. 2; *Bot. Mag. t.* 7754.

Stems 3 to 6 ft. long or more. Leaves amplexicaul ovate distant, 1 in. long, .75 in. wide. Peduncles stiff, 4 to 10 in. long; racemes 3 to 6 in. long; bracts ovate, .25 in. long. Flowers 1 in. across, lilac or white. Sepals and petals ovate blunt. Petals smaller, spreading. Lip shorter, side-lobes falcate acute, midlobe blunt conic with an oblong callus on disc, base saccate. Capsule cylindrical, 4 in. long, .25 in. thick. *Hab.* In grassy open swamps, terrestrial scrambling over bushes. Singapore, Holland Road; Selitar, Johor, Genuang. Pahang River, Pulau Chengei; Pekan, Malacca, Ayer Panas (Derry); Chabau, Selangor, Pudu (Good-enough); Port Swettenham (Williams). Perak, Thaiping; Changkat Jerin (Wray). Kelantan River near Chaning. *Distrib.* Borneo, Java. *Native name*: Rumput Sesudu Paya.

var. *montanum* *Ridl.* A fairly stout, much-drawn-up plant with more distant lanceolate leaves and stouter peduncle with longer sheathing leaves and sepals and petals rather acute. *Hab.* Mountains at 4000 to 5000 ft. altitude, in forest. Pahang, Telom. Perak, Thaiping Hills near cottage.

Perhaps Blume's ill-described *T. amplexicaulis*. I have never been able to find any flowers in a fit state to describe. Blume describes the lip of his species as muricate.

(2) **T. calceolus** *Rchb. fil. Xenia, Orch.* ii. 122; *Ridl. Mat.* i. 181. *Sarcochilus calceolus Lindl. Bot. Reg.* 1845, t. 19. *S. brachystachys Hook. fil. F.B.I.* vi. 41.

Stems stout, 10 to 12 ft. long or less, slightly flattened. Leaves lanceolate coriaceous, 2 to 4 in. long, bilobed, sheaths .5 in. long. Racemes 1 in. long, one to three together, sessile. Bracts ovate cucullate, .25 in. long. Flowers 2 in. across, white fragrant; pedicels and ovary .5 in. long. Sepals broad lanceolate acute keeled. Petals narrower oblanceolate. Lip shoe-shaped, base saccate, side-lobes falcate acute, midlobe conic blunt, callus oblong truncate, retuse at top, all white except orange round callus, and small orange and crimson dots at base of lip. Capsule cylindrical, 6 in. long. *Hab.* In large clumps on rocks or trees, prostrate. Singapore, Jurong River; Pulau Tekong. Johor, Tana Runto; Batu Pahat. Pahang, Kwala Tenok, Tahan River. Negri Sembilan, Gunong Angsi; Siliau (Williams). Dindings, Telok Sera (Curtis). Panang Hill (Maingay); Telok Bahang (Curtis). *Distrib.* Sumatra, Laos.

(3) **T. pauciflorum** *Ridl. Mat.* 182. *Sarcochilus pauciflorus Hook. fil. F.B.I.* vi. 41.

Stem .2 in. through. Leaves oblong blunt, 2.3 to 3 in. long,

1.25 to 1.5 in. wide. Racemes few-flowered, 11 n. long. Bracts sub-acute, .12 in. long. Sepals oblong-lanceolate, .6 in. long, white. Petals nearly as large obovate blunt. Lip stipitate yellow, side-lobes broad round, blunt, midlobe fleshy blunt, a conic callus at base and broad lamella between side-lobes, base of lip saccate, conic. Anther ovate blunt. Pollinia 2, deeply bifid. *Hab.* Perak, Thaiping Hills at 3000 ft. altitude (Scortechini).

(4) **T. montanum** *Ridl. Journ. Linn. Soc.* xli. 298.

Stem stout, 6 in. long or more. Leaves lorate blunt, 6 in. long, 1 in. wide. Peduncle slender, .3 in. long; raceme 1 in. long, few-flowered, slender. Bracts ovate acute. Flowers about 7. Sepals oblong-lanceolate sub-falcate. Lip saccate clawed, side-lobes hardly distinct truncate, midlobe short round, spur conoid correct, blunt. Column short broad. Anther ovate, beak truncate quadrate. Pollinia oblong. *Hab.* Selangor, Ulu Langat (Kloss).

(5) **T. arachnites** *Rehb. fil. Xen. Orch.* ii. 121. *Dendrocolla arachnites* *Bl. Bijdr.* 287, t. 67. *Sarcochilus scopa* *Hook. fil. F.B.I.* vi. 40.

Stem 4 to 6 in. long or more. Leaves lorate-oblong bilobed, .6 in. long, .75 in. wide; sheaths 1 in. long. Scapes several; peduncles 6 to 8 in. long; racemes 3 to 12 in. long. Bracts close acute, .25 in. long; pedicels hardly longer. Sepals and petals similar linear-lanceolate caudate, yellow, 2 in. long. Lip yellow red-spotted, .5 in. long, side-lobes erect falcate acute, midlobe blunt, thick, a quadrate truncate callus on disc, base of lip saccate blunt. Capsule cylindric, 3 in. long, .25 in. thick. *Hab.* On orchard trees or bushes, variable in length of stem. Singapore, Tanglin; Selitar. Johor, Batu Pahat; Kota Tinggi; Castlewood. Negri Sembilan, Siliau (Williams). Selangor, Bukit Hitam (Kelsall); Ulu Langat (Kloss). Perak, Chanderiang (Kunstler). Penang (Kunstler); Richmond Pool. *Distrib.* Borneo, Sumatra, Java.

var. *minor* *Ridl.* Leaves narrow linear acute or blunt, 4 in. long, .5 in. wide; peduncles 1 in. long; racemes .25 in. wide. Petals and sepals .5 in. long. Lip nearly white, a purple spot at column base. Kelantan, Kwala Lebir (Dr. Gimlette).

The common typical form has a short stem with close-set leaves, but it is not uncommon to find plants with elongate stems and distant leaves, especially in very shady spots. This latter form is Hooker's *S. scopa*.

(6) **T. Scortechinii** *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 42; *Mat.* i. 183. *Sarcochilus Scortechini* *Hook. fil. l.c.* 40.

Stem 6 in. long, very stout. Leaves oblong-lorate obtuse bilobed, 3 to 6 in. long, 1 to 1.5 in. wide. Scapes 9 in. long. Racemes 2 in. long. Bracts close, .6 in. long. Sepals and petals lanceolate acuminate, not filiform at tip, 2.5 in. long, yellow. Lip saccate, side-lobes short curved blunt, midlobe conic fleshy, yellow mottled red inside. Pollinia 4 in unequal pairs, caudicle short, disc crescent-shaped. *Hab.* Mountains. Perak (Scortechini); Gunong Kerbau at 2000 ft. altitude (Robinson). Kedah Peak.

(7) **T. crassifolium** *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 32; *Mat.* i. 183.

Stem 6 in. tall, stout. Leaves crowded thick leathery oblong blunt, 4 in. long, 1.25 in. thick. Scapes 3 to 5 in. long, base purple; racemes 1.5 to 4 in. long. Bracts .25 in. long, close set. Sepals linear caudate, base broader, .75 in. long, bright yellow. Petals narrower linear caudate. Lip .25 in. long, pubescent orange tipped cherry scarlet, spur saccate, side-lobes arched blunt, midlobe fleshy blunt ovate, callus tongue-shaped. Fruit angled linear, .3 in. long. *Hab.* On old coffee trees, rare. Johor, Castlewood (Ridley).

(8) **T. iodochilus** *Ridl.*

Habit of *T. arachnites*; stem about 4 in. long, covered with strongly ribbed sheaths. Leaves oblong-linear, 3 to 5 in. long, .5 in. wide. Racemes flat, 1 in. long or more on peduncles 1.5 in. long. Bracts boat-shaped as in *T. arachnites*. Flowers on pedicels .3 in. long. Sepals and petals triangular-lanceolate long caudate, tails filiform, very slender, .75 in. long, ochre yellow, spur pink short blunt, .12 in. long. Lip .25 in. long, linear narrow violet. *Hab.* Trees at 1000 ft. altitude. Negri Sembilan, Bukit Tangga Pass (Ridley).

(9) **T. leucarachne** *Ridl. Journ. Linn. Soc.* xxxii. 379.

Stem 4 to 5 in. long. Leaves broadly linear-lorate blunt, 6 in. long, .5 in. wide. Peduncles 6 in. long; racemes rather short; bracts acute. Sepals and petals linear-acuminate caudate filiform white. Lip saccate at base, side-lobes elongate, falcate acute, midlobe lanceolate acute, white, base crimson, lobes and disc inside violet spotted pubescent; callus small papilliform violet. *Hab.* Lankawi (Curtis). *Distrib.* South Siam.

(10) **T. notabile** *Ridl. Journ. Linn. Soc.* xxxii. 379; *Mat.* i. 183. *Sarcochilus* (Ridleya) *notabilis* *Hook. fil. F.B.I.* vi. 42; *Ic. Pl.* 2126.

Stem 2 in. long. Leaves broad lorate oblong, green or purple, 3 in. long, .5 to 1 in. wide. Scapes very slender, 3 in. long, purple, raceme 1 in. long. Bracts acute ovate purple. Flowers .75 to 1 in. wide. Sepals linear very narrow acuminate caudate. Petals similar, all yellow or reddish. Lip saccate ovate cuspidate, side-lobes not distinct, yellow with pink spots. Column foot adnate to lip, not distinct. *Hab.* Not common. Singapore, Chan Chu Kang; Bukit Mandai. Johor, Batu Pahat (Ridley). Perak, Teluk Anson (Williams).

73. DENDROCOLLA, Bl.

Small epiphytes; stems short. Leaves lorate or terete. Scapes erect; peduncle long; rachis thickened or not flattened. Bracts persistent not distichous. Flowers very fugacious small. Sepals and petals spreading. Lip broad convolute pubescent inside,

side-lobes small indistinct, no spur. Column short, foot small or 0. Pollinia 2, caudicle very small or 0, disc large. Capsule linear. Species about 20, Burma, Ceylon, Malay isles.

- Leaves terete slender; lip trilobed (1) **D. filiformis**
 Leaves lorate; stems short; lip pubescent.
 Bracts subulate; flowers white spotted pink (2) **D. pardalis**
 Bracts ovate acute.
 Midlobe very small truncate, side-lobes small (3) **D. trichoglottis**
 Midlobe round blunt, side-lobes large (4) **D. alba**
 Midlobe linear (5) **D. maculata**
 Midlobe ovate, no callus (6) **D. ciliata**
 Midlobe ovate, a woolly callus (7) **D. carnosa**
 Lip glabrous.
 Side-lobes short bilobed at tip (8) **D. brachyglottis**
 Side-lobes distinct linear.
 Stem broad flattened; leaves oblong; scape
 6 in. long (9) **D. carinatifolia**
 Stem short; leaves lorate; scape 3 in. long (10) **D. psiloglottis**

(1) **D. filiformis** *Ridl. Journ. Linn. Soc.* xxxii. 382; *Mat. i.* 184. *Sarcochilus filiformis* *Hook. F.B.I.* vi. 39; *Ic. Pl. t.* 2124.

Stems 2 to 4 in. long. Leaves few terete, slender acute, 6 in. long; sheaths .5 in. long. Scapes slender, 3 in. long; pedicels with ovary .5 in. long. Sepals lanceolate blunt. Petals little smaller, all white. Lip shorter, side-lobes round orange, midlobe oblong-elliptic fleshy, yellow, pulverulent. Pollinia reniform, disc transverse. *Hab.* On orchard trees. Singapore, Bukit Mandai, etc. Negri Sembilan, Siliau (Williams). Perak, Goping (Kunstler); Temengoh (Ridley).

(2) **D. pardalis** *Ridl. Journ. Linn. Soc.* xxxii. 382. *Sarcochilus pardalis* *Ridl. Trans. Linn. Soc.* ii. 371. *S. recurvus* *Hook. fl. F.B.I.* vi. 39; *Ic. Pl.* 2122.

Stems 10 in. long or less. Leaves lanceolate lorate acute, 2 in. long, 1 in. wide. Scapes 10 in. long, slender; racemes 2 in. long, thickened with crowded subulate bracts. Flowers hardly .5 in. wide. Sepals ovate blunt. Petals linear white with pink spots. Lip obtusely truncate, sides involute, yellow reddish covered with white wool. Capsule narrow linear, 3.25 in. long. *Hab.* On low trees and shrubs. Pahang River, Pulau Chengei. Perak, Goping (Kunstler); Temengoh. Kelantan, Kwala Aring (Yapp). *Distrib.* Borneo.

The type of Hooker's *S. recurvus* is flowerless, but I believe it to be this species.

(3) **D. trichoglottis** *Ridl. Journ. Linn. Soc.* xxxii. 381; *Mat. i.* 185. *Sarcochilus trichoglottis* *Hook. fl. F.B.I.* vi. 39; *Ic. Pl. t.* 2123.

Stem 2 to 6 in. long. Leaves stiff lorate blunt, 1.75 to 2 in. long, .5 in. wide. Scapes stiff; peduncles .5 to 2 in. long; racemes .5 in. long, thickened. Bracts ovate mucronate. Flowers long;

pedicels shorter. Upper sepal lanceolate acute, laterals wider ovate-lanceolate. Petals narrow spathulate, all pale yellow. Lip much shorter, base saccate, side-lobes very short broad truncate, hairy, midlobe very small truncate, callus oblong retuse, all yellowish with an orange spot near callus. Column foot narrow. Capsule slender, cylindric, 5 in. long. *Hab.* On orchard trees and bushes, very common. Singapore, Tanglin; Bukit Timah, etc. Negri Sembilan, Bukit Tangga Pass. Pahang, Tahan River; Pekan. Perak, Kwala Kangsa; Chanderiang (Kunstler); Temengoh, Dindings, Bruas. Tringgannu, Bundi (Rostados).

(4) *D. alba* *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 191; *Mat.* i. 185.

Stems 3 to 4 in. long. Leaves lorate-lanceolate, fleshy, 1 to 2 in. long, .25 in. wide. Peduncles 4 in. long; racemes .25 in. long, thickened. Bracts ovate acuminate. Flowers white, .75 in. wide; pedicels .25 in. long. Sepals lanceolate acute. Petals smaller. Lip .25 in. long, base saccate pubescent, side-lobes curved blunt edged with short clubbed hairs, midlobe little longer, round blunt excavate; callus oblong truncate; white, light brown blotches inside and on column foot. *Hab.* On coffee and other trees. Perak, Kamuning, near Sungei Sipau (Machado). Province Wellesley, Caledonia Estate (Ridley).

(5) *D. maculata* *Ridl. Linn. Soc.* xxxii. 381; *Mat.* i. 186.

Stem 3 in. long. Leaves linear. Peduncles 3 in. long; racemes as long; rachis thickened. Bracts ovate acute. Flowers .5 in. wide. Sepals lanceolate-spathulate, laterals dilate at base. Petals narrower, all yellow. Lip side-lobes round, toothed pubescent, yellow spotted crimson, midlobe linear yellow, base of lip saccate, callus oblong retuse in centre. Column short broad with involute wings, foot rather long. *Hab.* Rare. Singapore, Bukit Mandai, Chan Chu Kang (Ridley).

(6) *D. ciliata* *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 192; *Mat.* i. 186.

Stem 1 in. long. Leaves crowded about 6, elliptic blunt, base narrowed, 2.5 in. long, .75 in. wide. Peduncles 2 in. long; racemes hardly thickened. Bracts ovate acute minute. Flowers .25 in. wide; pedicels as long. Sepals oblong blunt. Petals smaller, ochre yellow. Lip as long, side-lobes oblong, white edged long hairs, midlobe short, conic fleshy. Pollinia ovoid, caudicle oblong flat, indent at sides, disc half as long. *Hab.* Rare. Perak, Kamuning, Sungei Siput (Machado).

(7) *D. carnososa* *Ridl. Journ. Bot.* 1898, p. 216; *Mat.* i. 186.

Stem 2 in. long. Leaves narrow linear acute not bilobed, 3 in. long, .25 in. wide; sheaths .25 in. long. Peduncles slender, 3 in. long. Racemes thick, 1 in. long. Bracts ovate acute. Flowers .25 in. wide; pedicels as long. Sepals and petals oblong-ovate dull yellow. Lip shorter, side-lobes long and broad, base saccate,

midlobe fleshy ovate blunt, a woolly papilla at base. *Hab.* On Dacrydium trees at 2500 ft. altitude. Penang Hill (Curtis).

(8) *D. brachyglottis* Ridl. *Sarcochilus brachyglottis* Hook. *fil. Ann. Bot. Gard. Calc.* v. 42, 63. *Thrixspermum brachyglottis* Ridl. *Mat.* i. 182.

Stem short. Leaves long oblanceolate acutely bifid, 4 to 8 in. long, 1 to 1.5 in. wide. Scape 1 in. long; raceme not thickened; bracts small ovate, not distichous. Flowers white, .5 in. wide. Sepals lanceolate sub-acute mucronulate on back. Petals lanceolate smaller. Lip not half as long, narrowed at the base, dilate saccate forwards, obtusate with a fleshy terminal linear lobe. Column short thick footless with broad triangular acuminate arms. Anther beaked. *Hab.* Perak (Kunstler) drawing only.

I am very dubious as to which genus this should be referred to, having seen no specimen.

(9) *D. carinatifolia* Ridl. *Journ. Linn. Soc.* xxxii. 382; *Mat.* i. 186. *Sarcochilus carinatifolius* Ridl. *Journ. As. Soc.* 1891, p. 136.

Stem 6 in. long, broad flat. Leaves fleshy oblong blunt, 2 in. long, .5 to 1 in. wide. Peduncles slender, 6 in. long. Racemes 1 in. long, slightly thickened. Bracts rather distant lanceolate. Flowers .25 in. wide, white. Sepals lanceolate acuminate, laterals enlarged at base. Petals linear-lanceolate. Lip saccate at base, side-lobes long linear acuminate, midlobe shorter, ovate, a blunt round callus, white, a yellow spot outside base. Capsule linear cylindric, 3 in. long. *Hab.* Johor, Kwala Sedili Besar and Pulau Aor (Feilding). *Distrib.* Christmas Isle.

(10) *D. psiloglottis* Ridl. *Mat.* i. 187. *Sarcochilus psiloglottis* Ridl. *Trans. Linn. Soc.* iii. 372.

Stem 1.5 in. long. Leaves lorate, 2 in. long, .25 in. wide, bilobed blunt. Peduncles 3 in. long; racemes .25 in. long, not thickened. Bracts lanceolate acuminate recurved. Flowers .25 in. wide. Upper sepal lanceolate acute, laterals triangular acute, pale yellow, with an orange spot at base. Petals sub-spathulate yellow. Lip, side-lobes long linear white, midlobe blunt recurved, fleshy, white with orange central spot. Capsule cylindric, 2 in. long. *Hab.* Rare. On trees. Pahang, Pekan (Ridley).

74. ACRIOPSIS, Reinwtdt.

Pseudobulbous epiphytes. Leaves linear or oblong articulate. Scape racemose or panicles slender, lateral. Flowers small pink and white or yellow. Sepals and petals narrow spreading, lateral sepals sometimes connate. Lip spurless, adnate to column half-way up, 3-lobed, central callus. Column tall arched hooded curved, arms long slender, porrect. Anther ovate. Pollinia 2, narrow, a long slender caudicle and very small disc. Rostellum ovate entire.

Capsule globose. Species 6 or 7, Tenasserim, Siam, Malaya, Australia.

Inflorescence paniced; leaves linear narrow.

Lip lanceolate, side-lobes broad (1) *A. javanica*

Lip very narrow linear, side-lobes small (2) *A. indica*

Inflorescence racemose.

Leaves linear; flowers yellow; lip white (3) *A. Ridleyi*

Leaves oblanceolate broad; flowers purple (4) *A. purpurea*



FIG. 174.—*Acriopsis Ridleyi*.

panicle several, 4 in. long. Flowers less than $\cdot 13$ in. wide. Sepals narrow linear-oblong, laterals connate. Petals broader oblong yellowish spotted red. Lip very narrow linear, 2 short lobes at base, callus near base of lip bilobed. Capsule $\cdot 5$ in. long. *Hab.* Perak, Haram Para (Scortechini). Penang Hill (Maingay, Curtis). Setul (Ridley). *Distrib.* Tenasserim.

(3) *A. Ridleyi* Hook fil. *F.B.I.* vi. 79; *Ridl. Mat.* i. 79.

Pseudobulbs close on a stout rhizome, oblong-ovate, 1 in. long.

(1) *A. javanica* Reinwtd. *Flora Literat.* 1825, ii. 4; *Ridl. Mat.* i. 187. *A. crispa* Griff. *Notula*, iii. 333; *Ic. Pl. As.* t. 318.

Pseudobulbs crowded ovoid, 1 in. long. Leaves 2 or 3, narrow linear, 3 to 6 in. long, $\cdot 3$ to $\cdot 25$ in. wide. Panicle over 1 ft. long. Sepal lanceolate, laterals connate, white tipped crimson. Petals spatulate white, crimson central bar. Lip side-lobes broad flat round, mid-lobe lanceolate blunt with 2 little triangular keels in centre, white with violet crimson spots. Column pink. Capsule globose, $\cdot 5$ in. long. *Hab.* Common in orchards and roadside trees. Singapore, Tanglin; Changi. Johor, Bukit Murdom (Kelsall); Batu Pahat. Malacca (Griffith). Pahang, Pekan. Selangor, Semangkok Pass. Sungei Ujong (Cantley). Perak, Thaiping Hills; Hermitage Hill. Penang, Balik Pulau (Curtis). *Distrib.* Tenasserim, Sumatra, Java.

(2) *A. indica* Wight, *Icones.* t. 1748; *Ridl. Mat.* i. 188.

Pseudobulbs dense crowded, $\cdot 5$ in. long, covered with old sheaths. Leaves linear, 3 in. long, $\cdot 1$ in. wide. Scape 6 to 8 in. long; branches of

Leaves 2 or 3 linear blunt, 4.5 in. long, .25 in. wide. Scape 10 to 13 in. long, base more than half nude. Flowers distant racemose, 15 to 20. Upper sepal linear, laterals spathulate connate. Petals broader, all yellow, spotted red. Lip white, side-lobes oblong, midlobe orbicular, base narrow, callus of 2 short keels on the claw of the midlobe crimson. Column white spotted crimson, arms long clubbed porrect. *Hab.* Singapore, Bukit Mandai (one plant only). Negri Sembilan, Labu Estate (Williams). Kedah Peak, at 3000 ft. altitude (Robinson).

(4) *A. purpurea* Ridl. *Trans. Linn. Soc.* ii. 406; *Mat.* i. 188.

Pseudobulbs crowded, .75 in. long, oblong. Leaves 2, oblanceolate, blunt coriaceous, 1.5 in. long, .5 in. wide. Scape 5 in. long. Flowers about 13, secund fleshy; pedicel and ovary .5 in. long, green and violet. Sepals narrow, laterals connate. Petals spathulate blunt, dark purple. Lip violet-rose, edged white, spathulate oblong truncate, side-lobes 2 small ears, callus square in centre of midlobe, white. Column purple, hood decurved. Capsule oblong, .5 in. long. *Hab.* Rare, Pahang, Pekan (Ridley). *Distrib.* Borneo.

75. THECOSTELE, Rchb.

Epiphytes; pseudobulbs ovoid crowded. Leaf solitary large. Raceme pendulous from base of pseudobulb. Flowers numerous, small to medium size, pink and white. Sepals spreading, laterals oblique. Petals smaller. Lip, base adnate to base of column and forming a tube with it, limb clawed with two short or large side-lobes and a larger midlobe. Column slender curved with long arms. Pollinia 2, caudicles 1 or 2, disc broad. Capsule sub-globose three-valved. Species 6, Tenasserim, Malaya, Java.

Flowers small, numerous on a long raceme.

Side-lobes very small (1) *T. maculosa*

Side-lobes large clubbed (2) *T. Zollingeri*

Flowers 1 in. or more across, few on short raceme.

Side-lobes small; midlobe large (3) *T. secunda*

Side-lobes large falcate; midlobe small.

No extra linear processes at base (4) *T. Maingayi*

Two linear processes at base (5) *T. quinquefida*

(1) *T. maculosa* Ridl. *Trans. Linn. Soc.* ii. 374; *Mat.* i. 189.

Collabium Wrayi Hook *fl. F.B.I.* v. 784; *Ic. Pl.*

Pseudobulbs conic, 4 in. long. Leaf lanceolate-oblong, 1 ft. long, 3 in. wide. Scape 12 to 18 in. long. Flowers small numerous. Upper sepal oblong sub-acute, laterals broader oblong oblique. Petals very narrow lanceolate acuminate falcate; all yellowish with chestnut purple spots. Lip side-lobes curved very short, midlobe pandurate retuse pubescent, white with dark crimson spots. Column slender, arms linear-lorate. Capsule ovoid, beaked, .5 in. long. *Hab.* Malacca (Goodenough). Sungei Ujong, Burunang (Cantley). Pahang, Kwala Tahan. Perak, Thaiping, Waterfall

Hill (Wray). Kedah, Yan. *Distrib.* Borneo. *Native name* : Sakat Belimbing.

(2) **T. Zollingeri** *Rchb. fil. Bonplandia* v. 1857; *Xen. Orch.* ii. 133, t. 147.

Pseudobulbs ovoid-conic, 1.5 in. long. Leaf lanceolate blunt, 8 in. long, 3 in. wide. Scape 6 in. long. Flowers .5 in. wide. Upper sepal lanceolate, laterals adnate to column base, ovate-rhomboid broad. Petals very narrow linear, all white tipped and blotched orange, base crimson. Lip side-lobes large obovate-spathulate twisted pubescent yellowish red, midlobe ovate, base narrowed, tip deeply bilobed and glandular pubescent pink. Column slender, curved, arms long. *Hab.* Perak, Waterloo (Curtis). Penang Hill (Curtis). *Distrib.* Borneo, Tenasserim.

(3) **T. secunda** *Ridl. Journ. Linn. Soc. Bot.* xxxi. 399; *Mat.* i. 190.

Pseudobulbs ovoid-oblong, 1.5 in. long, 1 in. through. Leaf lanceolate sub-acute, 8 in. long, 1 in. wide. Raceme 3 in. long. Flowers about 10, 1 in. wide. Upper sepal boat-shaped curved acute green with a red stripe. Petals linear-lanceolate acuminate, green, 3 red stripes. Lip side-lobes rounded arched olive green, 3 curved processes between, midlobe ovate white, a yellow spot edged crimson, and a purple spot near the tip. Column dark maroon, arms curved. *Hab.* Perak, Thaiping; Tapah; Waterloo (Curtis). *Distrib.* Borneo.

(4) **T. Maingayi** *Hook. fil. F.B.I.* vi. 20; *Ic. Pl. t.* 2118; *Ridl. Mat.* i. 190.

Pseudobulbs ovate-oblong, .6 to .7 in. long. Leaf elliptic or obovate, 3 to 4 in. long, 1.25 in. wide, petiolate. Raceme 4 to 5 in. long. Flowers 1 in. across. Upper sepal lanceolate acute, laterals much broader, ovate acuminate. Petals lanceolate acuminate. Lip small velvety, claw wide and long, side-lobes large curved with 2 small curved processes between, midlobe small ovate. *Hab.* Very rare. Malacca (Maingay). *Distrib.* Borneo.

(5) **T. quinquefida** *Hook. fil. F.B.I.* vi. 20; *Ic. Pl. t.* 2119.

Pseudobulbs ovate-oblong, 1 to 1.5 in. long. Leaf linear elongate petioled, 5 to 7 in. long, 1 to 1.5 in. wide. Raceme 2 to 3 in. long. Flowers .6 in. wide. Upper sepal lanceolate, boat-shaped, laterals ovate acute. Petals linear-lanceolate. Lip pubescent, 2 linear auricles at base, side-lobes large curved blunt, midlobe ovate. *Hab.* Very rare, Malacca (Maingay).

76. PODOCHILUS, Bl.

Slender often moss-like plants creeping or erect with small distichous leaves and minute flowers in small terminal or lateral racemes. Upper sepal lanceolate, laterals broader, forming a mentum. Petals smaller. Lip little longer entire or 3-lobed.

Column short, foot long. Rostellum triangular erect, bifid or bipartite. Anther erect. Pollinia 4 or 6, each pair enclosed in a calyptriform caudicle. Capsule ellipsoid. Species about 12, Indo-Malaya.

Stems creeping branched, forming mats on trees.

Leaves linear appressed, very narrow; lip cordate

(1) *P. tenuis*

Leaves broader spreading elliptic; lip base round

(2) *P. microphyllus*

Stems tufted erect; leaves elliptic, .25 in. long.

Lip 3-lobed (3) *P. lucescens*

(1) *P. tenuis* Lindl. *Gen. and Sp. Orch. Pl.* 235; *Ridl. Mat.* i. 192. *P. acicularis* Hook. *fl. F.B.I.* vi. 82; *l.c. Pl.* 147.

Slender tufted moss-like plant, branched, 3 to 12 in. long. Leaves linear acute, .12 in. long. Racemes very short. Flowers minute. Upper sepal ovate blunt, laterals larger oblique, mentum short round. Petals oblong blunt. Lip oblong-obovate blunt cordate with a horn on each side. Column arms ensiform truncate; anther ovate cordate at length bifid. Pollinia in pairs enclosed in a calyptriform caudicle, base linear, disc linear. *Hab.* On wet mossy trunks and rocks. Pahang, Tahan River; Telom. Selangor, Semangkok Pass. Perak, Thaiping Hills, Waterfall; Temengoh; Sungei Rayah (Kunstler); Bujong Malacca; Gunong Inas, Sira Rimau (Yapp). Penang Hill. Kedah Peak. *Distrib.* Sumatra, Borneo.

(2) *P. microphyllus* Lindl. *Wall. Cat.* 7335; *Gen. and Sp. Orch. Pl.* 234. *P. sciuroides* Rchb. *fl. Bonplandia*, v. 41; *Ridl. Mat.* i. 192.

Slender usually much branched. Stems 4 to 8 in. long. Leaves oblong-elliptic spreading, .5 in. long, mucronate. Racemes or panicles terminal, .25 in. long. Flowers minute white. Sepals ovate, laterals oblique, mentum bilobed blunt. Petals nearly as long and broader with a median violet line. Lip oblong-ovate blunt. Anther lanceolate acute, pollinia 6 elongate pear-shaped, caudicle 1, disc ovate red. Rostellum triangular-lanceolate minutely bifid. *Hab.* On trees, often forming mats. Common, Singapore, Chan Chu Kang; Kranji. Johor, Bukit Pengaram; Gunong Pulau. Pahang, Pekan. Malacca, Mt. Ophir. Negri Sembilan, Gunong Angsi (Burkill). Perak, Bujong Malacca. Tringganu, Bundi (Rostados). Kedah Peak. Penang (Wallich); Bukit Laksamana (Curtis); Richmond Pool. *Distrib.* Java.

More erect than the preceding, with broad-spreading leaves. Lindley has 2 species under *P. tenuis*, viz. Wallich's Penang plant, and a Himalayan one, now *P. khasyana* Hook. *fl.*

(3) *P. lucescens* Bl. *Bijdr.* 295, *t.* 12; *Ridl. Mat.* i. 193.

Stems tufted erect, 6 in. tall, not branched. Leaves narrow,

elliptic, .25 in. long or more, .12 in. wide, tip bluntly unequally bilobed. Racemes sub-terminal, .5 in. long, slender. Flowers minute white. Sepals and petals lanceolate blunt; mentum very short. Lip 3-lobed, side-lobes broad round, midlobe linear oblong with 3 raised ribs. Anther ovate blunt, pollinia 4, pyriform, caudicles calyprate. Rostellum 3-lobed. *Hab.* Not common. Johor, Ulu Kahang (Holtum). Penang, Waterfall (Curtis). Lankawi, Gunong Raya at 2500 ft. altitude (Curtis); Dayong Bunting (Robinson). Pulau Adang (Ridley). *Distrib.* Tenasserim, Siam, Borneo, Java.

77. APPENDICULA, Bl.

Epiphytes occasionally on rocks. Stems erect, leafy terete or flat. Leaves distichous elliptic to lanceolate unequally bilobed, thinly coriaceous articulate with sheath. Flowers small in axillary and sub-terminal racemes. Bracts usually persistent and often reflexed. Upper sepal lanceolate or ovate, laterals prolonged below into a mentum. Petals smaller. Lip base saccate adnate to column foot, usually quite entire, a callus usually horse-shoe-shaped at base of lip. Column short thick, arms small, foot long or short. Anther ovate beaked. Pollinia 4 to 8, pear-shaped narrowed to a small disc. Rostellum ovate-lanceolate bifid. Capsule small elliptic. Species about 40, Indo-Malayan.

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| Stem flattened winged | (1) <i>A. anceps</i> |
| Stems terete; racemes lax axillary or sub-terminal. | |
| Leaves oblong broad blunt. | |
| Stem long pendulous; racemes long; lip spatulate | (2) <i>A. purpurascens</i> |
| Stems erect stiff; racemes short. | |
| Flowers glabrous; lip with a callus. | |
| Callus square | (3) <i>A. cornuta</i> |
| Callus hooked | (4) <i>A. uncata</i> |
| Callus conic; leaves thick deep shining green | (5) <i>A. lucida</i> |
| Flowers hairy; leaves small close | (6) <i>A. muricata</i> |
| No callus; flowers glabrous; leaves oblong, .5 in. wide | (7) <i>A. reflexa</i> |
| No callus; flowery small glabrous; leaves very narrow linear | (8) <i>A. rupestris</i> |
| Stems elongate sometimes branched; leaves usually narrow, 1 in. long or more with reflexed bracts. | |
| Leaves close-set oblong; lip ovate acute | (9) <i>A. densifolia</i> |
| Leaves close-set oblong; lip limb crescent-shaped | (10) <i>A. robusta</i> |
| Leaves narrow lanceolate rather thin. | |
| Lip oblong pandurate | (11) <i>A. pendula</i> |
| Lip cuneate, tip trilobed | (12) <i>A. lancifolia</i> |
| Inflorescence terminal; bracts large, foliaceous, white, longer than flowers; bracts white | (13) <i>A. torta</i> |

(1) **A. anceps** *Bl. Bijdr.* 299. *A. Lewisii* *Griff. Notulæ*, ii. 360; *Ic. Pl. t.* 337. *A. complanata* *Ridl. Journ. Linn. Soc.* xxxiii 389. *Podochilus anceps*. *Schlecht. Mem. Herb. Boiss.* 2133; *Ridl. Mat.* i. 193.

Stem 6 to 18 in. tall, flattened. Leaves lanceolate or elliptic, base round, tip unequally bifid, 1.75 to 2 in. long, .5 to .75 in. wide, sheaths, .5 to 1 in. long, flat. Racemes lateral and terminal, .5 in. long; bracts blunt deflexed. Flowers greenish white. Sepals



FIG. 175.—*Appendicula cornuta*.

ovate blunt, mentum short round. Petals smaller. Lip ovate blunt, white, 2 purple streaks in spur, no callus. Anther acute, pustular crimson. Pollinia 6, pyriform. Rostellum acute ovate bifid. *Hab.* Common. Singapore (Wallich). Johor, Gunong Banang, Batu Pahat; Gunong Pulai. Malacca, Batu Tiga (Derry). Selangor, Batu Caves; Rawang; Bukit Hitam (Kelsall); Ulu Gombak. Perak, Relau Tujur (Wray); Thaiping Hills. Penang Hill (all collectors). Kelantan, Kampong Parit (Haniff). *Distrib.* Java.

(2) **A. purpurascens** *De Vriese. Ill. t.* 2, fig. 1. *Podochilus unciferus* *Hook. fil. F.B.I.* vi. 81; *Ic. Pl. t.* 2145.

Stems pendulous, 2 to 3 ft. long, slender often branched. Leaves

elliptic blunt, 1 in. long, .5 in. wide. Racemes numerous axillary filiform flexuous, 1 in. long. Flowers .2 in. long. Upper sepal lanceolate sub-acute, laterals much wider ovate, mentum long clubbed. Petals oblong-lanceolate. All white tipped violet rose. Lip entire spatulate truncate white tipped violet rose, callus at base linear, retuse. Pollinia 6 in 2 bundles in a calyptrate-pedicel disc round. Fruit elliptic, .25 in. long. *Hab.* Mountains at about 2000 to 5000 ft. altitude. Pahang, Kota Glanggi; Telom. Selangor, Ulu Gombak. Perak, Thaiping Hill (all collectors); Gunong Inas (Yapp); Gunong Kerbau (Robinson). *Distrib.* Java, Borneo to Philippines.

(3) *A. cornuta* *Bl. Bijdr.* 302. *A. bifaria* *Lindl. Hook. Kew Journ.* vii. 35; *King, Ann. Roy. Bot. Gard. Calc.* viii. 248, 330. *Podochilus cornutus* *Schlecht. Ic.* 34; *Ridl. Mat.* i. 194. (Fig. 175, p. 195.)

Stems tufted, 5 to 12 in. tall. Leaves oblong minutely bilobed, base half amplexicaul, .75 to 1 in. long, .25 in. wide; sheaths striate, .25 in. long. Racemes lateral and sub-terminal, .25 in. long. Flowers .25 in. long, white. Sepals ovate, laterals oblique, mentum as long. Petals ovate-elliptic or obovate, smaller. Lip obscurely 3-lobed, base oblong with a horseshoe-shaped ridge, midlobe ovate with a retuse callus in centre. Column short, foot long, arms erect acuminate. Pollinia 6 to 8 pyriform, disc lanceolate. Rostellum ovate acuminate bifid. Capsule oblong, .25 in. long. *Hab.* Common up to 2000 ft. altitude. Singapore, Kranji; Bukit Timah. Malacca, Mt. Ophir. Pahang, Tahan River; Telom. Selangor, Bukit Hitam (Kelsall). Dindings, Lumut. Perak, Thaiping (Scortechini); Gunong Kerbau (Robinson). Penang Hill. Kedah Peak. *Distrib.* India, Hongkong, Malaya to Philippines.

(4) *A. uncata* *Ridl. Journ. Linn. Soc.* xxxii. 390. *Podochilus uncatus* *Ridl. Mat.* i. 195.

Stems over 1 ft. tall, tufted. Leaves lanceolate acute, 2 to 3 in. long, .5 in. wide, sheaths .5 in. long, ribbed. Racemes lateral and sub-terminal, .5 in. long. Bracts strongly ribbed ovate reflexed. Flowers white. Sepals ovate acute; mentum rather large blunt. Petals ovate-lanceolate. Lip oblong, tip round, callus on disc claw-shaped. Rostellum triangular bifid. Capsule oblong, 5 in. long. *Hab.* Singapore, Bukit Timah road. Selangor, Petaling (Ridley).

(5) *A. lucida* *Ridl. Journ. Linn. Soc.* xxxii. 392. *Podochilus lucidus* *Ridl. Mat.* i. 195.

Stems crowded, 6 in. long. Leaves cordate-ovate, deep green polished, .75 in. long, .5 in. wide; sheaths terete, .25 in. long. Flowers whitish green in short axillary panicles. Bracts ovate brown. Sepals ovate blunt; mentum thick, short. Petals lanceolate smaller, all green with pale purple mid-line. Lip base oblong, limb ovate-orbicular white, a conic callus in centre. Column thick, arms indistinct. Pollinia 6, narrowed to ovate disc. Rostel-

lum long, bifid. *Hab.* Singapore, Bukit Timah road; Kranji; Chan Chu Kang. Selangor, Sepang (Ridley). *Distrib.* Rhio, Borneo.

(6) **A. muricata** *Teysm. and Binn. Tijdschr. Ned. Ind.* xxiv. 322. *A. echinocarpa* *Hook. fil. F.B.I.* vi. 83; *Ic. Pl. t.* 2152.

Stems tufted, 6 in. tall. Leaves oblong blunt, .25 in. long, .15 to 2.5 in. wide; sheaths very short. Flowers few terminal white. Ovary hairy. Sepals lanceolate acute hairy; mentum hardly any. Petals lanceolate narrower. Lip violet oblong dilate, limb round with a short conic tooth. Column stout, arms long broad acuminate; stigma crimson. Pollinia 4 lanceolate, pedicel spoon-shaped. Capsule .25 in. long, hairy. *Hab.* Mountains, Selangor, Bukit Hitam (Kelsall); Sempang Mines, Semangkok. Perak, Gunong Batu Putih (Wray); Bujong Malacca. Kedah Peak. *Distrib.* Java.

(7) **A. reflexa** *Bl. Bijdr.* 301. *A. cordata* *Hook. fil. F.B.I.* vi. 83; *Ic. Pl. t.* 2148.

Stems over 1 ft. tall. Leaves thin coriaceous oblong-elliptic, 11 in. long, .5 in. wide, equally bilobed; sheaths nearly .5 in. long. Racemes axillary, .5 in. long, bracts at base lanceolate acuminate. Flowers crowded very small. Upper sepal lanceolate-ovate blunt, laterals larger ovate; mentum as long round. Petals linear smaller. All light green. Lip white, sides adnate to column, base with a horseshoe-shaped ridge, limb ovate acute recurved. Pollinia 6. Capsule sessile oblong, .25 in. long. *Hab.* Not common. Johor, Batu Pahat. Pahang, Tahan River (Ridley), Perak (Scortechini).

(8) **A. rupestris** *Ridl. Journ. Linn. Soc.* xxxii. 391. *Podochilus rupestris* *Mat. i.* 194.

Stems tufted on a short stout rhizome, unbranched, 8 in. tall. Leaves linear-lanceolate, 1 in. long, .12 in. wide, minutely mucronate. Racemes sub-terminal, 1 in. long or less. Bracts sub-acute deflexed. Flowers very small, white. Upper sepal ovate-lanceolate, laterals larger, mentum short, blunt. Petals smaller lanceolate. Lip oblong-elliptic blunt. Column short, no arms. Anther cordate blunt. *Hab.* In clefts of rock in mountain streams. Pahang, Tahan River (Ridley). Perak, Bujong Malacca (Curtis).

(9) **A. densifolia** *Ridl. Podochilus densifolius* *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 86.

Stems over 1 ft. long. Leaves close-set distichous oblong blunt, base broad, 1 in. long, .5 in. wide; sheaths .25 in. long. Raceme terminal, 1 in. long, dense-flowered. Bracts ovate, reflexed. Flowers .13 in. long, white. Sepals ovate blunt, mentum long. Petals ovate. Lip ovate acute, a fleshy callus in centre, and thickened ridge to tip. Rostellum long acuminate deeply bifid. *Hab.* Rare. Pahang, Tahan River (Ridley).

(10) **A. robusta** *Ridl.*

Stems 20 ft. tall, robust. Leaves coriaceous bronzed elliptic

blunt closely distichous, 1·5 in. long, ·75 in. wide, sheaths funnel-shaped, ribbed obliquely truncate, ·25 in. long. Racemes 1 in. long, few-flowered. Bracts reflexed lanceolate blunt, 1 in. long. Flowers small. Sepals broadly ovate, spur rather large blunt sac-shaped. Petals lanceolate half as wide. Lip broadly saccate, limb horseshoe-shaped, bifid with incurved falcate points, a broad fleshy ovate callus pointing backwards below the limb in the sac. Column short and broad. Anther ovate short. Rostellum long lanceolate, tip minutely bifid. Stigma deep with a strongly elevated surrounding ridge. *Hab.* Terrestrial, mountain forest, Pahang, Upper Tras valley under Fraser Hill (Burkill and Holttum, 8856).

Allied to *A. pendula* Bl., but the broad blunt oblong leaves and bilobed lip distinguish it from any form of this section.

(11) *A. pendula* Bl. *Bijdr.* 298. *A. Maingayi* Hook. *fil. F.B.I.* vi. 85.

Stems 1 to 2·5 ft. tall. Leaves thin lanceolate-ovate unequally bilobed, 2 to 2·5 in. wide; sheaths ·5 in. long. Racemes sub-terminal or axillary pendulous, 1 to 8 in. long. Bracts ovate reflexed persistent. Flowers small. Upper sepal lanceolate, laterals ovate, mentum short broad. Petals narrow lanceolate, all pale green. Lip oblong pandurate blunt with an inner crescent lamella white edged purple. Column short thick yellow purple-marked, arms very short. Anther ovate orange. Pollinia 8, very unequal on a small round disc. *Hab.* On rocks or trees, Perak (Scortechini). Penang Hill (Maingay, Curtis, etc.). Jalor, Biserat (Gwynne-Vaughan). *Distrib.* Borneo to New Guinea.

(12) *A. lancifolia* Hook. *fil. F.B.I.* vi. 84; *l.c. Pl. t.* 2150.

Stems 2 ft. tall, often branched. Leaves thin dark green sulcate, 1·5 to 4 in. long, ·25 to 1 in. wide; sheaths ·25 to ·5 in. long. Racemes terminal, 2 to 3 in. long. Bracts ovate-lanceolate reflexed. Flowers ·12 in. long, green or yellow. Sepals ovate acute, mentum short broad. Petals obovate-oblong blunt. Lip cuneate oblong, limb 3-lobed, lobes round, midlobe ovate sub-acuminate, a horseshoe-shaped lamina running to side-lobes. Column short, foot long, arms short truncate. *Hab.* Pahang, Telom. Selangor, Bukit Hitam; Gunong Mengkuang Lebah (Robinson); Menuang Gasing (Kloss). Perak, Gunong Batu Putih, at 3000 to 4000 ft. altitude (Kunstler); Thaiping Hills at 5000 ft. altitude. Jalor, Bukit Besar at 3000 ft. altitude (Gwynne-Vaughan).

This is perhaps too near *A. pendula*.

(13) *A. torta* Bl. *Bijdr.* 303; *Rchb. fil. Xen. Orch.* ii. 117, t. 138. *A. rhodiola* *Rchb. fil. l.c.* 118.

Stems tufted, 6 to 8 in. long, flattened. Leaves oblong round, ·5 in. long; sheaths ·12 in. long. Spike terminal, ·25 in. long. Bracts distichous ovate leaf-like white, ·25 in. long, recurved. Flowers hidden in bracts small yellowish white. Sepals lanceolate

acute, laterals very oblique acuminate, mentum long. Petals lanceolate broader. Lip base oblong, limb broad, orbicular bilobed. Column short, arms round, foot long. Anther ovate acuminate crimson. Pollinia 4, connate with a caudicle, disc oblong. *Hab.* Selangor, Rawang; Batu Caves; Ulu Gombak. Perak, Thaiping Hills (Ridley).

78. THELASIS, Bl.

Epiphytes with sub-globose pseudobulbs or none, rhizomatous. Leaves 1 or 2 ligulate blunt. Scape from base of pseudobulb racemose or spicate above. Flowers small or very small, greenish yellow or fawn colour; perianth connivent. Sepals and petals lanceolate. Lip ovate-lanceolate entire, no callus. Column short. Rostellum long, bifid. Anther lanceolate. Pollinia 4 to 6 globose on a slender caudicle. Capsule small fusiform. Species 20 or more, Indo-Malaya.

§ 1. *Eu-thelasis*. Pseudobulbs ovoid swollen with 1 or 2 leaves.

Racemes short, dense; pseudobulbs small crowded (1) *T. elongata*

Racemes short dense; pseudobulbs small distant on a stout rhizome (2) *T. capitata*

Raceme long lax; pseudobulbs large (3) *T. macrobulbon*

§ 2. *Oxyanthera*. No pseudobulbs; leaves distichous articulate on a sheath.

Raceme long straight; flowers many distant (4) *T. carinata*

Raceme short decurved with few crowded flowers (5) *T. decurva*

(1) *T. elongata* Bl. *Orch. Arch. Ind.* 23, t. 7, fig. 2; *Ridl. Mat.* i.

Pseudobulbs ovoid depressed, .5 in. long. Leaf ligulate, base narrowed, 1.5 to 3 in. long, .25 to .5 in. wide. Scape 3 to 6 in. long, racemose part .5 to 3 in. long, covered with persistent ovate acuminate reflexed bracts. Flowers .12 in. long, greenish yellow. Sepals oblong acute. Petals spatulate smaller. Lip ovate-lanceolate. *Hab.* Mangroves and other trees. Common generally near the sea. Singapore, Kranji. Johor, Ulu Batu Pahat (Kelsall). Pahang, Pekan. Perak (Scortechini). Naungchik, Bukit Besar (Annandale). *Distrib.* Malay isles, Hongkong.

(2) *T. capitata* Bl. *Bijdr.* 386; *Orch. Arch. Ind.* 20, t. 7, fig. 1; *Ridl. Mat.* i. 199.

Rhizome very stout; pseudobulbs ovoid globose, nearly 1 in. apart. Leaf 4 in. long, .5 in. wide, lorate. Scape rather stout, 6 in. long, with a sheath .25 in. long in middle; raceme 1 in. long. Sepals lanceolate. Petals lanceolate blunt. Lip concave. *Hab.* In dense forests. Pahang Tahan woods, Selangor, Batu Caves. Perak (Scortechini). *Distrib.* Java.

Perhaps merely a jungle form of *T. elongata* Bl.

(3) *T. macrobulbon* *Ridl. Journ. Linn. Soc.* xxxii. 393; *Mat.* i. 199.

Pseudobulbs close-set of 2 internodes flask-shaped, lower inter-

node globose, upper cylindric, 1 in. long. Leaves 2, lower one small, upper 4 to 6 in. long, 1 in. wide, lanceolate or oblong petioled. Scape 6 to 10 in. long. Flowers green. Bracts lanceolate cuspidate. Sepals oblong blunt, not keeled. Petals smaller. Lip lanceolate sub-acute. *Hab.* Mountains. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Thaiping Hills; Bujong Malacca (Ridley).

(4) **T. carinata** *Bl. Bijdr.* 386; *Orch. Arch. Ind.* 25, pl. 7, fig. 3. *T. elata* *Hook. fil. F.B.I.* vi. 87. *Oxyanthera elata* *Hook. fil. Ic. Pl.* 2156; *Ridl. Mat.* i. 200.

Pseudobulb none. Sheathing base of leaves 2 in. long, blade 12 to 13 in. long, 1 in. wide, lorate blunt. Scape 12 to 18 in. long, racemose part 2 to 4 in. long. Flowers very numerous. Bracts lanceolate. Sepals lanceolate connivent acute. Petals smaller, all green tipped white. Lip with short erect side-lobes, midlobe oblanceolate mucronate white. Column short. Rostellum much longer bifid. Pollinia 6, semi-globose on a slender pedicel. Capsule .12 in. long, fusiform, terminated by the withered perianth. *Hab.* Common on mangroves and other trees. Singapore, Sungei Buluh; Kranji. Pahang, Pekan; Kota Glanggi. Selangor, Batu Caves (Ridley). Perak, Goping (Kunstler). Hermitage Hill (Curtis). Kedah Peak (Robinson). Penang Hill (Maingay). *Distrib.* Borneo, Sumatra, Java.

(5) **T. decurva** *Hook. fil. F.B.I.* vi. 87. *Oxyanthera decurva* *Hook. fil. Ic. Pl.* 2157. *O. micrantha* *Ridl. Mat.* i. 200.

Leaves 4 or 5 lanceolate blunt or sub-acute; sheaths 1 to 1.5 in. long, blade 6 in. long, .5 in. wide. Scape very slender, 5 in. long, raceme .5 in. long, decurved. Flowers .12 in. long, fawn-colour. Bracts ovate blunt. Sepals and petals lanceolate blunt. Lip lanceolate acute. Pollinia 8. Rostellum very long bifid. Capsule fusiform, .12 in. long. *Hab.* On mangroves and trees on river banks, Singapore, Kranji. Pahang, Tahan River. Penang Hill. *Distrib.* Malay Isles.

TRIBE III. NEOTTIÆ (GENERA 79-104)

79. VANILLA, Sw.

Fleshy climbers with ovate leaves or leafless. Racemes short stout axillary. Flowers usually large. Sepals and petals sub-equal spreading. Lip large 3-lobed or entire, flat or convolute. Column long, anther broad; pollinia granular. Rostellum entire or nearly so. Fruit long fleshy terete. Seeds minute globose.

Species about 20, all tropical countries.

Leaves large ovate-lanceolate.

Lip explanate 3-lobed short	.	.	.	.	(1) V. Griffithii
Lip convolute entire long	.	.	.	.	(2) V. montana
Leafless; flowers rather small, lip pink	.	.	.	.	(3) V. aphylla

(1) **V. Griffithii** *Rchb. fil. Bonplandia* ii. 88; *Ridl. Mat.* i. 201. *V. tolypephora* *Ridl. Trans. Linn. Soc.* iii. 276.

Stem about 20 ft. long. Leaves fleshy lanceolate or ovate-lanceolate, 6 in. long, 3 in. wide or less. Raceme 2 in. long, stout. Flowers numerous opening singly, 2 in. wide, white. Sepals ovate. Petals linear-obovate. Lip side-lobes round, disc with chestnut nerves, midlobe bilobed rounded fan-shaped plicate with a woolly ball at base. Fruit 2.5 in. long, .5 in. through. *Hab.* Common in forests, Singapore, Changi; Pulau Ubin. Johor, Batu Pahat. Pahang, Pekan. Malacca, Panchur (Goodenough). Selangor, Bukit Hitam (Kelsall). Perak, Thaiping Hills; Gunong Bubu (Kunstler). Dindings, Bruas. Penang, Waterfall; Telok Bahang (Curtis). Perlis, Kanga. *Distrib.* Karimun isles. *Native names:* Akar Punubal; Telinah Kerbau Bukit. *Use:* Flowers pounded with water rubbed on body for fever; leaves and stem, which contain an irritating latex, mashed, applied to the hair for strengthening it. Fruit sweet and edible.

(2) **V. montana** *Ridl. Journ. F.M.S.* vi. 58.

Long stout climber. Leaves lanceolate acuminate blunt, 5 to 6 in. long, 2 to 2.5 in. wide. Racemes .25 in. long. Bracts orbicular. Flowers 3 in. long. Sepals oblanceolate sub-spathulate acute. Petals smaller. Lip base narrow, limb entire convolute trumpet-shaped, edge in centre fringed with processes, callus in mouth fan-shaped pectinate with acute linear teeth. Column hooded bilobed. Fruit oblong. *Hab.* Rare. Perak, Gunong Kerbau at 4400 to 5500 ft. altitude (Robinson).

(3) **V. aphylla** *Bl. Rumphia* i. 198, t. 68. *V. Parishii* *Rchb. fil. Otia Hamb.* 39; *Hook fil. F.B.I.* vi. 90.

Slender leafless climber several feet long. Flowers few on a short raceme about .5 in. long; pedicels 2 in. long. Sepals oblong-ovate blunt, 1 in. long, pale greenish. Petals slightly narrower. Lip side-lobes convolute, midlobe longer plicate oblong-ovate pink, villous. Column slender as long as side-lobes. *Hab.* On low bushes, sandy heaths, rare. Setul Heath (Ridley). *Distrib.* Tenasserim, Java.

I presume *V. Parishii* to be the same thing; all I have seen of it is a sketch, but the flowers are said to be pure white.

80. GALEOLA, Lour.

Terrestrial leafless yellow saprophytes with thick fleshy roots. Stems short or very long branched sarmentose. Panicles large spreading, or a simple raceme. Bracts ovate persistent. Flowers medium, lateral sepals larger than upper one. Lip saccate entire. Column long curved straight. Anther oblong decurved, cells narrow. Pollinia ovoid curved. Fruit long capsular. Seeds globose with a broad circular wing. Species about 74, Indo-Malaya, Australia, Japan.

Stems long; panicle large.					(1) <i>G. Hydra</i>
Stem stout furfuraceous . . . . .	.	.	.	.	(2) <i>G. altissima</i>
Stem slender glabrous . . . . .	.	.	.	.	(3) <i>G. javanica</i>
Stem short; flowers racemose . . . . .	.	.	.	.

(1) *G. Hydra* *Rchb. Xena Orch.* ii. 77; *King, Ann. Bot. Gard. Calc.* viii. 364, *pl.* 351; *Ridl. Mat.* i. 202.

Stems very long stout furfuraceous. Panicle large. Flowers .75 in. wide. Sepals ovate acute, laterals oblique, larger yellow.



FIG. 176.—*Galeola Hydra*.

Petals lanceolate white. Lip obscurely 3-lobed, toothed papillose within yellowish white with dull red streaks. Column curved, foot short. Capsule cylindric, 6 in. long, .5 to 1 in. through. *Hab.* In open spaces among lalang and in cleared land. Singapore (Wallich); Kranji. Johor, Gunong Janing (Kelsall). Malacca, Tebong (Griffith); Bukit Besar, Mt. Ophir. Selangor, Batu Caves; Kajang; Kwala Lumpur (Curtis). Negri Sembilan, Siliu (Williams). Penang (Curtis). *Distrib.* Himalaya, Siam, Java, Sumatra.

Wray sends a curiously fasciated specimen.

(2) *G. altissima* *Rehb. fil. Xen. Orch. ii. 77.* *Hæmatorchis altissima* *Bl. Rumphia iv. t. 200 B.*

Stem very slender, 30 to 40 ft. long. Panicle large. Flowers .5 in. wide, yellow and brown. Sepals and petals linear-oblong blunt. Lip boat-shaped, tip round erose waved yellow barred purple, a broad pubescent central bar ending in a bilobed woolly mass. Capsule slender linear, 8 to 10 in. long. *Hab.* Less common than the last. Johor, base of Gunong Pantai; Bukit Murdom (Kelsall). Dindings, Lumut. Province Wellesley, Bukit Juru. Penang, Telok Bahang (Curtis). *Distrib.* Java.

(3) *G. javanica* *Benth. and Hook. Gen. Pl. iii. 390.* *Cyrtosia javanica* *Bl. Rumphia, i. 199, t. 69.*

A dwarf erect plant, 6 in. to 1 ft. tall, with thick fleshy roots. Stems thick reddish, not branched. Flowers on short racemes about .5 in. long in the axils of short ovate bracts; pedicels scurfy, .25 in. long. Sepals and petals connivent, olive yellow, .6 in. long, the sepals oblong, twice as broad as petals and rough scurfy outside. Lip dark yellow, shorter than the sepals, concave and slightly trilobed, the midlobe broad entire with 3 bosses in the centre below the anther, disc villous. Column short, dilate at the top with two toothed arms. Fruit sausage-shaped red acute, thick, about 3 in. long. *Hab.* In mountain forests. Rare. Selangor, Semangkok Pass. Perak, Ulu Batang Padang (Scortechini, Ridley). *Distrib.* Java.

81. APOSTELLIS, Thouars.

Tuberous herbs with one usually cordate petioled leaf appearing before the flowers. Flowers in a lax raceme or solitary, appearing after the disappearance of the leaf. Perianth connivent nodding, segments free. Lip entire (or more or less 3-lobed), no callus. Column long; anther helmet-shaped. Pollinia 2 or 4 without disc or caudicle. Species about 20, Old World tropics and subtropics.

These plants, originally described under the name of *Pogonia*, were at first separated by some botanists under the name of *Nervilia*, Gaudichaud 1826, but the oldest generic name is *Apostellis* of Thouars (1822).

Leaf large.

Petiole long; leaf glabrous; raceme many-flowered (1) *A. flabelliformis*

Petiole short; leaf velvety, purple; flowers 1 or 2 (2) *A. velutina*

Leaf small glabrous; flower 1, small (3) *A. punctata*

(1) *A. flabelliformis* *Ridl. Nervilia aragoana Gaud. Freyc. Voy. Bot. 422, t. 35. Pogonia flabelliformis Lindl. Gen. and Sp. Orch. pl. 415; Ridl. Mat. i. 203.*

Leaf orbicular-cordate, glabrous edged green often with a row of black blotches, 4 to 10 in. wide; petiole 4 to 8 in. long, purple. Flowering stem 6 to 18 in. long, lax. Bracts linear acuminate,

.5 in. long. Flowers about 13, pale green, 1 in. long. Sepals and petals lanceolate acute, petals narrower, blunt. Lip 3-lobed, side-lobes blunt, midlobe ovate acute hairy, white with green lines. *Hab.* In grassy spots. Pahang, Kwala Tembeling. Perak, Padang Rengas; Thaiping (Wray). Pulau Adang. Perlis, Ginting Kabok, Kanga. *Distrib.* India, Siam, Malaya. *Native name:* Daun Satu Taun.

(2) *A. velutina* *Ridl.* *Pogonia velutina* *Par. and Rehb. fil. Trans. Linn. Soc. xxx. 142; Hook. fil. F.B.I. vi. 119.*

Leaf orbicular-cordate plicate, velvety both sides, purple, paler beneath, 5 to 6 in. wide; petiole short, .5 in. long. Scape 3 to 5 in. tall, with 1 or 2 flowers. Sepals and petals very narrow lanceolate-linear acuminate, quite acute. Lip shorter spatulate, white veined pink. *Hab.* Penang Hill, Mount Erskine, near the bungalow. *Distrib.* Tenasserim and Siam.

(3) *A. punctata* *Ridl.* *Pogonia punctata* *Bl. Mus. Bot. Lugd. Bat. i. 32; Orch. Arch. Ind. 150, t. 49, fig. 2; Ridl. Mat. i. 203.*

Stem 1 in. long. Leaf ovate or orbicular cordate, 1 to 2 in. long and as wide, green. Flowers solitary, 1 in. long, on a peduncle 2 to 3 in. long; sheaths spotted pink. Bracts shorter than ovary. Ovary .5 in. long, purple. Sepals and petals narrow linear acuminate, pinkish spotted darker. Lip 3-lobed, white spotted violet, side-lobes short, midlobe lanceolate. Column long with thin wings, narrowed downward and ovate acuminate arms pointing downwards. *Hab.* In woods. Singapore, Bukit Timah; Chan Chu Kang. Johor, Sungei Tebrau. Perak, Temengoh (Ridley). Penang Waterfall (Curtis). Lankawi, Kwah. Terutau (Curtis). *Distrib.* Java.

82. CORYSANTHES, Bl.

Very small tuberous herbs with 1 orbicular or ovate leaf and 1 large flower. Dorsal sepal cucullate curved, laterals and petals, when present, filiform. Lip large, base tubular erect with a broad recurved limb. Column short stout; stigma broad. Rostellum short. Anther 2-celled reniform or ovoid. Pollinia 2 elliptic. Capsule erect elliptic on a long-lengthened pedicel. Species about 20, Indo-Malaya, Australia.

Lip broad round toothed	(1) <i>C. picta</i>
Lip ovate acuminate toothed broad	(2) <i>C. mucronata</i>
Lip smaller entire or nearly, limb small deflexed	(3) <i>C. fornicata</i>

(1) *C. picta* *Lindl. Gen. and Sp. Orch. pl. 394; Blume, Orch. Arch. Ind. 174, t. 64; Ridl. Mat. i. 204.*

Whole plant 2 in. tall. Leaf cordate acute dark green, white veined, .5 in. long. Flower deep red, .5 in. long. Upper sepal cuneate, 3-toothed, laterals and petals 1.5 in. long. Lip ovate recurved with tubular base, edge of limb toothed. Capsule elliptic. *Hab.* Mountains in moss at about 4000 ft. altitude. Pahang,

Kluang Terbang (Barnes). Malacca, Mt. Ophir. Perak, Tambak Batak (Scortechini). *Distrib.* Java.

(2) **C. mucronata** *Bl. Orch. Arch. Ind.* 175, t. 66; *Ridl. Mat.* i. 204.

Whole plant 2 in. tall. Leaf ovate-cordate, .5 in. long. Flower sessile, under .5 in. long, red with darker spots. Upper sepal entire mucronate, lateral sepals and petals 1 in. long. Lip white with red spots much smaller than preceding, limb ovate toothed. Capsule elliptic, .25 in. long; pedicel .3 in. long. *Hab.* On mossy rocks. Johor, Gunong Belumut (Holtum). Kedah Peak (Ridley). *Distrib.* Java.

(3) **C. fornicata** *Lindl. Gen. Sp. Orch. pl.* 394; *Blume, Orch. Arch. Ind.* 175, t. 64, fig. 2.

Stem .5 to 2 in. long. Leaf .5 to .6 in. long, ovate-cordate, not waved. Upper sepal .6 in. long, spatulate, 5-ribbed, rose-pink, lateral sepals and petals a little shorter. Lip, tube long produced downward in 2 spurs, limb fan-shaped with blackish purple ribs. *Hab.* Johor, Gunong Belumut (Holtum). Perak. Gunong Enar and Tambak Batak (Scortechini). *Distrib.* Java.

Blume's figure gives the lateral sepals much too short; they are quite as long as the lip.

83. APHYLLORCHIS, Bl.

Leafless saprophytes with long roots. Raceme long lax. Flowers mediocre to small, white or yellow. Bracts broad deflexed. Sepals and petals subsimilar or petals broader or narrower. Lip entire or 3-lobed, free from column. Column slender with no wings, arms or foot. Anther cap-shaped, 2-celled. Pollinia 2, hemispheric or sub-pyriform. Rostellum entire. Species 4 or 5, Indo-Malayan.

Stem 3 ft. tall; flowers 1 in. wide (1) **A. striata**
Stem 1 to 1.5 ft. tall; flowers .5 in. wide (2) **A. pallida**

(1) **A. striata** *Ridl. Mat.* i. 205. *Pogonia striata* *Ridl. Trans. Linn. Soc.* iii. 377.

Stem 3 ft. tall, white with violet streaks, sheaths numerous acuminate. Bracts lanceolate, .3 in. long. Flowers about 12. Sepals .5 in. long, lanceolate acute, white streaked violet. Petals broader, ovate white. Lip narrow lanceolate acute, white with a purple mid-line. Column violet, tip and anther yellow. Rostellum triangular. Capsule cylindrical pendulous, 1 in. long. *Hab.* Rare in dense forests. Johor, Gunong Banang, Batu Pahat. Pahang, Tahan River woods (Ridley).

(2) **A. pallida** *Bl. Bijdr. t.* 77; *Orch. Arch. Ind.* 52, t. 13; *Ridl. Mat.* i. 205.

Stems 10 to 18 in. tall, slender, yellow spotted purple, roots long stout, sheaths blunt oblanceolate. Raceme lax, 3 to 4 in. long; flowers numerous, .5 in. across. Ovary and pedicel .5 in.

long, yellow dotted purple. Sepals oblong blunt, laterals deflexed. Petals narrower lanceolate acute, all straw colour. Lip paler ovate obtuse, sides elevate. *Hab.* In forest, often on jungle tracks. Not rare. Singapore, Tanglin; Bukit Timah. Pahang, Kwala Tenok, Tahan River; Telom. Perak, Bujong Malacca; Thaiping Hills (Fox); Batang Padang (Wray); Temengoh; Gunong Kerbau (Robinson); Ulu Selama (Yapp). Penang (Kunstler); near Waterfall and stone quarry (Haniff). Kedah, Gunong Bintang (Kloss). *Distrib.* Java, Philippines.

84. DIDYMOPLEXIS, Griff.

Succulent leafless saprophytes with cylindric rhizome. Stem short, deeply sunk in ground. Flowers small, racemose. Upper sepal and petals connate, tips free, lateral sepals connate. Lip insert on column-foot short entire. Column 2-winged, arms short erect. Anther ovate. Pollinia reniform. Capsule elliptic on much lengthened thick pedicel, much longer than stem. Species 2 or 3, Indo-Malaya, Polynesia.

(1) *D. pallens* Griff. *Calc. Journ. Nat. Hist.* iv. 383, t. 17; *King, Ann. Bot. Gard. Calc.* viii. 260, pl. 346; *Ridl. Mat.* i. 206.

Rhizome .5 to 3 in. long; stem 3 to 6 in. long. Flowers few, .25 in. wide, pinkish white. Bracts small ovate. Upper sepal oblong-ovate blunt united to shorter petals, lateral sepals united half-way. Lip cuneate-oblong papillose. Capsule .5 to 1.5 in. long; pedicel 6 to 12 in. long, succulent. *Hab.* In thick forests. Singapore, Bukit Timah; Chan Chu Kang. Johor, Gunong Pantai. Perak (Scortechini, Wray). Penang, Richmond Pool. Kedah Peak. Jalor, Biserat (Gwynne Vaughan). *Distrib.* India, Malay isles.

85. LECANORCHIS, Bl.

Leafless saprophytes with black wiry stems and long fusiform roots. Raceme few-flowered. Flowers thin, the ovary slender, terminated by a toothed cup. Sepals and petals sub-equal. Lip adnate by its claw to the column, limb dilate. Column dilate upwards. Anther oblong, 2-celled terminal. Pollinia 2, elliptic granular, no caudicle. Species 3 or 4, Malayan and Japanese.

(1) *L. malaccensis* Ridl. *Trans. Linn. Soc.* ii. 377, t. 5; *Ridl. Mat.* i. 206.

Stems solitary or several slender branched, 8 to 24 in. tall. Flowers 1 in. long, pale flesh colour. Sepals and petals lanceolate-spathulate connivent. Lip, limb spatulate bearded, yellow, with 2 low keels from base to limb. Column slender, no rostellum. Capsule 1 in. long, narrow, terminated by a cup. *Hab.* In dense forests. Singapore, Bukit Timah; Bajau. Johor, Pengaram; Bukit Tenabang (Kelsall). Pahang, Tahan River. Malacca, Sadanen (Derry); Base of Mt. Ophir. Negri Sembilan, Gunong

Angsi. Perak, Temengoh. Penang Hill. Kedah Peak. *Distrib.* Borneo, Siam. *Native name*: Angrek Besih.

Schlechter, in Fedde's *Repertorium* ix. 248, makes the Bukit Timah plant a new species under the name of *L. Ridleyana* on the ground of its having a more or less 3-lobed lip, and suggests that the other ones are *L. javanica* Bl. I cannot see any difference between the Singapore plant and the Malacca one, and think it is quite distinct from the Java plant.

86. LEUCOLENA, Ridl.

Leafless saprophyte with elongate fusiform rhizome. Stem slender, raceme few-flowered. Flowers small. Upper sepal lanceolate blunt, laterals connate beneath lip. Petals adnate to upper sepal. Lip small subquadrate or bilobed, clawed. Column with very long decurved arms. Anther ovate papillose, attached to top of column with a short or long filament. Pollinia 2 or 4, longitudinally grooved on a quadrate disc. Rostellum very small, entire or absent. Species 1.

(1) *L. ornata* Ridl. *Journ. Linn. Soc.* xxvii. 340, *pl.* 43; *Journ. Roy. As. Soc. S. Br.* 50, p. 142; *Mat.* i. 147.

Stem 9 to 12 in. tall, olive coloured. Flowers about 7; pedicels short. Upper sepal and petals .25 in. long, olive brown, laterals olive brown with 2 darker streaks and a rosy base. Lip shorter, white, centre violet, quadrate bilobed. Column white. Pollinia 2, grooved flesh-colour on a disc. *Hab.* In dense forest. Malacca, Bukit Sadanen and Ophir range. Negri Sembilan, Bukit Tangga.

var. *singaporensis*. Lip sub-quadrate, with a median tooth, limb white, claw violet. Rostellum none. Pollinia 4 free, no disc, self-fertilised. Anther-filament much shorter than in type. *Hab.* Singapore, Stagmount on a stream bank. Johor, Sedenak (Ridley).

87. GASTRODIA, Bl.

Leafless saprophytes with a cylindrical rhizome and a solitary brownish succulent stem. Flowers in a lax raceme. Sepals and petals connate in a tube more or less split. Lip short adnate to the foot of the column and to the perianth entire obscurely 3-lobed. Column usually long, 2-winged, foot short or 0, arms short erect. Rostellum small; anther hemispheric. Pollinia in 2 granular masses. Species 8, Indo-Malaya, Japan, China, Australia.

Stem tall; perianth lobes free nearly to base (1) *G. malayana*
Stem short; perianth campanulate (2) *G. Hasselti*

(1) *G. malayana* Ridl. *Mat.* i. 207.

Rhizome cylindrical, 6 in. long, ringed, .5 in. thick. Stem 9 in. tall, purplish brown, with short sheaths with ovate limbs. Flowers few short peduncled. Bracts ovate, .25 in. long. Upper sepal lanceolate-lorate blunt, laterals prolonged into a short mentum, tips pustular, purple brown, mentum green. Petals lorate blunt,

green and purple. All free to near base. Lip base narrow, sides involute cuncate above, 3-lobed, side-lobes broad blunt, midlobe narrow straight blunt, orange yellow. Column foot long. Rostellum broad, entire. Capsule elliptic, 1 in. long. *Hab.* In rotten trees in dense forest. Rare. Singapore, Bukit Timah; Pulau Damar; Selitar. Johor, Sungei Tebrau (Ridley).

(2) **G. Hasselti** *Bl. Mus. Bot. Lugd. Bat.* ii. 175; *Orch. Arch. Ind.* 145, t. 52, figs. 5 to 8.

A small plant, 6 in. to 2 ft. tall (Blume). Bracts ovate-lanceolate. Flowers 3 or 4 fuscous outside, yellow inside, broadly campanulate, .5 in. long. Sepals and petals all adnate. Lip free, claw narrow, limb sub-orbicular, tip truncate. *Hab.* Perak (a drawing by Scortechini). *Distrib.* Java.

88. CORYMBIS, Thouars.

Tall leafy plants. Leaves broad plicate. Flowers large, white, in short sessile axillary panicles. Sepals and petals linear-spathulate at first cohering with spreading tips. Lip linear-spathulate erect from column base. Column as long as petals, terete, with 2 ears at top. Anther lanceolate acuminate. Pollinia 2, pyriform narrow on a linear caudicle, disc ovate. Rostellum shortly bifid. Capsule fusiform. Species 5 or 6, nearly all very closely allied and possibly all one species, Africa, Indo-Malaya, Australia.

Plants 6 to 10 ft. tall; leaves elliptic-lanceolate large; flowers numerous

(1) **C. longiflora**

Plant 1 to 2 ft. tall; leaves ovate, much smaller; flowers 2 or 3

(2) **C. brevistylis**

(1) **C. longiflora** *Hook. fil. F.B.I.* vi. 92; *Ridl. Mat.* i. 208. *C. rhytidocarpa* *Hook. fil. l.c.*

Stems 6 to 10 ft. tall, wiry, slender. Leaves broad elliptic-lanceolate to ovate acuminate, 2 in. long, 4 in. wide, many-nerved. Panicle 3 in. long. Flowers white, fragrant, 2 in. long. Bracts ovate acuminate, .25 in. long, lower ones .5 in. long. Petals and sepals linear-spathulate, edges of petals crisped. Lip spathulate, claw tubular. Capsule sub-triangular, 1 in. long, edges waved. *Hab.* Common in forests. Singapore, Pulau Ubin; Chan Chu Kang. Malacca, Selandor (Cantley). Pahang, Labong Endau (Evans). Selangor, Batu Caves. Dindings, Gunong Tungul. Perak, Thaiping Hills (Kunstler); Batang Padang (Kunstler); Kurau (Curtis); Temengoh. Pulau Adang; Lankawi, Gunong Rayah (Haniff).

(2) **C. brevistylis** *Hook. fil. F.B.I.* vi. 91; *Ridl. Mat.* i. 208.

Stem slender, 1 to 2 ft. tall. Leaves elliptic-ovate, base narrowed shortly acuminate; nerves slender, 9; 6 in. long, 3.5 in. wide. Racemes 2 in. long with few distant flowers. Bracts lanceolate acuminate, longest .15 in. long. Fruit (unripe) smooth cylindrical,

1 in. long. Column .3 in. long. *Hab.* Limestone rocks, Perak, Kwala Dipang (Kunstler).

A very little known plant.

89. TROPIDIA, Bl.

Stems wiry leafy. Leaves lanceolate acuminate membranous. Panicles or racemes short axillary or terminal. Flowers small, pale green or white. Sepals and petals lanceolate similar connivent. Lip entire, base saccate. Column short. Anther lanceolate. Pollinia 4 elongate pyriform with long slender caudicle and ovate disc. Rostellum triangular bifid. Capsule cylindric. Species 6 or 7, Indo-Malaya, China, Polynesia, Jamaica.

Racemes axillary and sub-terminal sessile; bracts short

Racemes peduncled; bracts 1.5 in. long or less (1) *T. curculigoides*

Spike terminal dense peduncled (2) *T. Maingayi*

. (3) *T. angulosa*

(1) *T. curculigoides* Lindl. Wall. Cat. 7386; *Gen. and Sp. Orch. pl.* 497. *T. squamata* Bl. *Orch. Arch. Ind.* 123, t. 41; *Ridl. Mat.* 1. 209.

Stems slender or stout, 8 to 12 in. tall. Leaves lanceolate long-acuminate plicate, 6 to 9 in. long, 1 to 1.5 in. wide. Racemes axillary or sub-terminal sessile, .5 in. long, with many broad ovate ribbed bracts. Flowers .25 in. long, greenish white, vanilla-scented. Sepals lanceolate falcate. Petals narrower, linear falcate. Lip lanceolate, base saccate. *Hab.* Common in forests. Singapore, Bukit Timah; Bukit Mandai; Chan Chu Kang. Johor, Batu Pahat. Malacca, Mt. Ophir. Pahang, Telom. Selangor, Ginting Bidai; Bukit Hitam (Kelsall). Perak, Thaiping Hills. Kedah Peak (Robinson and Kloss). *Distrib.* India, Ceylon, Borneo.

(2) *T. Maingayi* Hook. *fil. F.B.I.* vi. 93; *Ridl. Mat.* 1. 209.

Stem 12 to 18 in. tall. Leaves elliptic-lanceolate acuminate, 6 to 6.5 in. long, 1.5 in. wide, 7-ribbed. Spikes terminal and axillary, 1 in. long. Peduncle 1 to 2 in. long, flexuous. Bracts, lower ones .15 in. long, linear acuminate. Flowers .25 in. long, crowded. Sepals oblong-ovate blunt. Petals obliquely oblong. Lip ovate acute with 3 lamellate ribs. *Hab.* Rare. Malacca, Mt. Ophir (Maingay, Griffith).

(3) *T. angulosa* Bl. *Orch. Arch. Ind.* 122; *King Ann. Bot. Gard. Calc.* viii. 275, *pl.* 1365; *Ridl. Mat.* 1. 209.

Stem branched, 8 to 12 in. long. Leaves 2 or 3 terminal ovate acuminate, base round, 3 to 5 in. long, 1 to 3 in. wide. Spike terminal dense; peduncle 3 to 4 in. long. Bracts .5 to .75 in. long, narrow. Flowers nearly .75 in. long, greenish white. Upper sepal linear-lanceolate acute, laterals lanceolate connate to near tips. Petals narrow blunt. Lip oblong-ovate blunt, 2 lamellate nerves in centre, base spurred. Capsule .5 in. long. *Hab.* Rare. Perak, Ipoh (Curtis). *Distrib.* India, Burma, Formosa.

90. **PHYSURUS**, Rich.

Terrestrial succulent herbs. Leaves ovate or lanceolate petio- late. Flowers small in a terminal spike. Petals adnate to upper sepal or free. Lip short oblong entire, spur cylindric, bilobed. Column very short. Anther long-beaked. Pollinia 2 elongate pyriform on a small disc. Rostellum deeply bifid erect. Species about 20, few Indo-Malayan, Chinese, more American.

Stout tall plant; leaves 5-nerved (1) *P. latifolius*
Slender plant; leaves 3-nerved (2) *P. humilis*

(1) *P. latifolius* *Bl. Orch. Arch. Ind.* 95, *pl.* 27, *fig.* 1; *Ridl. Mat.* 1. 210.

Stem about 18 in. tall. Leaves distant ovate acute, 3 in. long, 2 in. wide; nerves 5; petioles 1 to 2 in. long. Scape 18 in. tall, pubescent, racemose part 6 to 7 in. long. Flowers numerous sessile erect, pinkish. Bracts lanceolate acuminate, hairy. Sepals hairy, .13 in. long, lanceolate blunt. Petals adnate to upper sepal linear-spathulate. Lip oblong blunt with 5 sinuate veins on disc, spur curved clubbed bilobed at tip. Capsule elliptic, .5 in. long. *Hab.* In forests. Rare. Perak, Thaiping Hills (Curtis). *Distrib.* Java.

(2) *P. humilis* *Bl. l.c. fig.* 2.

Stem shorter and more slender than the last. Leaves elliptic-oblong, 3-nerved, 1.75 to 3 in. long, 1 to 1.5 in. wide; petioles .75 in. long. Scape slender pubescent. Spike lax, 3 in. long. Flowers red-pubescent. Sepals and petals blunt oblong. Lip oblong concave, tip round decurved, spur longer acutely bifid. *Hab.* Rare. Selangor, Menuang Gasing, Ulu Langat (Kloss). *Distrib.* Java.

91. **VRYDAGZYNEA**, Bl.

Small herbs with ascending stems. Leaves ovate or lanceolate petioled. Flowers small spicate erect. Sepals and petals connivent. Lip entire short, spur rather long pendulous with 2 pedicelled glands (rudiments of the 2 lower stigmata) inside. Column short, arms thick erect. Anther ovate. Pollinia thick club-shaped on a large disc. Capsule ovoid. Species 5 or 6, Indo-Malayan.

Leaves narrow lanceolate to both ends (1) *V. lancifolia*
Leaves ovate.
Stem tall; leaves green, 2.5 in. long (2) *V. albida*
Stem very short; leaves purple with 3 paler red
stripes, 1 in. long (3) *V. tristriata*

(1) *V. lancifolia* *Ridl. Journ. Linn. Soc.* xxxii. 398; *Mat.* 1. 210.

Stem 6 to 9 in. tall. Leaves lanceolate acute oblique, 1.5 in. long, .25 to .75 in. wide; petioles .25 to .5 in. long. Scape usually rather long; raceme dense cylindric. Flowers glandular-pubescent

or glabrous, white tipped pink. Sepals lanceolate, laterals falcate broader. Petals shorter cohering to upper sepal. Lip much shorter oblong blunt, sides involute, spur sub-cylindric blunt, glands globose, pedicels free. Capsule nearly .5 in. long. *Hab.* In damp forests. Singapore, Bukit Timah; Chan Chu Kang. Johor, Batu Pahat; Gunong Pantai. Negri Sembilan, Bukit Tangga. Perak (Scortechini); Gunong Inas (Yapp).

(2) *V. albida* *Bl. Orch. Arch. Ind. Pl.* 75, t. 19, fig. 2.

Stem rather stout, 7 in. long or more. Leaves distant ovate, narrowed at base, acute at tip, 2 in. long, 1.25 in. wide; petioles .5 to .75 in. long. Peduncle 2.5 in. long with a large broad lanceolate sheathing bract below spike. Spike in flower dense cylindrical, 1 in. long. Bracts broad lanceolate nearly blunt. Sepals .1 in. long, curved white oblong blunt. Petals shorter. Lip oblong-lanceolate blunt, a papillose band in the middle, spur cylindrical-conic dilate in middle, glands short-pedicelled. Spike elongate in fruit to 5 in. long and pedicels longer. Capsule elliptic. *Hab.* Mountain woods. Pahang, Telom. Perak, Batang Padang Valley (Wray); Temengoh. *Distrib.* Java, Philippines.

(3) *V. tristriata* *Ridl. Journ. Linn. Soc.* xxxii. 398; *Mat.* i. 211.

Stem 3 in. tall. Leaves ovate acute, 1.5 in. long, .5 in. wide, olive-colour with 3 pink stripes. Spike sub-sessile shorter than leaves dense. Flowers white. Sepals lanceolate-oblong, laterals oblique. Petals adnate to upper sepal. Lip lanceolate-tongue-shaped blunt, a pustular cushion in middle, spur long saccate, glands yellow globose, pedicels adnate to spur for half their length. *Hab.* In wet woods, local. Singapore, Chan Chu Kang. Johor, Sedenak. Perak (Scortechini).

92. CYSTORCHIS, Bl.

Terrestrial plants. Leaves ovate petioled or rarely absent. Flowers small pubescent. Upper sepals adnate to petals, laterals larger. Lip clawed, side-lobes involute, midlobe distinct or not, base spurred. Column short; stigma broad. Anther ovate. Pollinia 2, deeply grooved on an ovate disc. Species 3 or 4, Malayan.

Leaves ovate-lanceolate (1) *C. variegata*
 Leafless saprophyte (2) *C. aphylla*

(1) *C. variegata* *Bl. Orch. Arch. Ind.* 89, t. 24, figs. 3 and 38c; *Ridl. Mat.* i. 212.

Whole plant 6 to 18 in. tall. Leaves ovate-lanceolate acute crisped, olive green with lighter patches, 3 in. long, 1 in. wide or smaller; petioles 1 in. long or less. Scape spicate pubescent; flowers crowded small. Bracts lanceolate acuminate red, .5 in. long. Upper sepal green with adnate petals white with a trans-

verse orange bar, pubescent oblong-lanceolate. Lip side-lobes involute orange, midlobe ovate, base narrowed, white. *Hab.* In damp woods. Singapore, Chan Chu Kang; Kranji. Johor, Gunung Pantai. Pahang, Tahan River. Selangor, Kwala Selangor. Negri Sembilan, Perhentian Tinggi. Perak, Batu Kurau (Curtis). Kedah Peak.

var. *purpurea* Ridl. *C. javanica* Bl. l.c. 87. Leaves deep purple usually a smaller plant with smaller leaves. *Hab.* Singapore, Chan Chu Kang. Pahang, Tahan River woods. Perak (Scortechini). *Distrib.* Java, Borneo.

(2) *C. aphylla* Ridl. *Journ. Linn. Soc.* xxxii. 400; *Mat.* i. 212.

Saprophytic leafless plant, 6 in. tall, roots thick; stems covered with ovate acuminate sheaths. Flowers 4 or 5 in short terminal spike. Sepals lanceolate acuminate, .25 in. long. Petals shorter narrower. Lip lanceolate, base saccate, side-lobes involute hardly distinct, midlobe blunt. Anther ovate beaked curved upwards. Rostellum o. *Hab.* In forests scarce and difficult to find. Pahang, Gunung Tahan (Haniff). Malacca, Merlimau. Selangor, Semangkok Pass (Ridley). *Distrib.* Java, Borneo, Philippines.

93. ANÆCTOCHILUS, Bl.

Terrestrial herbs; stems ascending. Leaves ovate or lanceolate; petioled. Scapes glandular pubescent. Flowers medium size or small. Upper sepal adnate to petals forming a hood, laterals spreading. Lip adnate to column base, base saccate or spurred. Side-lobes erect or spreading; midlobe clawed, claw often pectinate, blade broadly bilobed, lobes divaricate or nearly entire, round. Column short with 2 wings in front. Anther lanceolate. Pollinia clubbed on a shield-like disc. Rostellum long bifid. Stigmata 2 pustular on each side of rostellum. Species about 50, Indo-Malaya, China, including *Odontochilus*, *Myrmechis*, and *Cystopus*.

§ 1. *Eu-Anæctochilus*. Stem short ascending with ovate leaves brown-purple veined with gold. Claw of lip fimbriate.

Spur entire.

Claw of lip horizontal, spur horizontal . . . (1) *A. Reinwardtii*

Claw at base parallel to column then geniculate;
spur pendulous (2) *A. geniculatus*

Spur bifid at tip; lip horizontal (3) *A. albolineatus*

§ 2. *Odontochilus*. Stem rather elongate; flowers numerous. Leaves green.

Stem 1 ft. long; lip claw fimbriate, base saccate (4) *A. pectinatus*

Stem 6 in. long; lip claw with 3 or 4 teeth, base
saccate (5) *A. brevistylis*

Stem very slender; leaves very small brown, claw
crenulate; lip spurred (6) *A. calcaratus*

Stem short; flowers 1 or 2 large; lip claw entire,
base saccate (7) *A. macranthus*

(1) **A. Reinwardtii** *Bl. Orch. Arch. Ind.* 48, t. 12, fig. 2; *Belg. Hort.* 1861, t. 18; *Ridl. Mat.* i. 213.

Stem 1 to 2 in. tall. Leaves orbicular or ovate, purple brown reticulated with gold, 1 to 2 in. long, 1 in. wide. Scapes 4 to 6 in. tall, 3 or 4 flowers at tip pubescent. Sepals dull red pubescent, upper one greenish attached to white petals .5 in. long, laterals ovate-lanceolate. Lip straight white, claw narrow fimbriate, blade transverse oblong, lobes round with median tooth, spur horizontal, 2 masses of papillæ inside. *Hab.* In dark forests. Perak, Thaiping Hills. Kedah Peak (Ridley). *Distrib.* Sumatra, Java.

(2) **A. geniculatus** *Ridl. Journ. Linn. Soc.* xxxii. 406; *Ridl. Mat.* i. 213.



FIG. 177.—*Anætochilus geniculatus*.

Stem and leaves resembling the last. Flowers as large but lateral sepals gibbous at base. Lip base narrow erect, parallel to column then abruptly deflexed forming a knee, white, 2 red spots below knee, claw of midlobe with 18 filaments, lobes obtuse erect truncate, spur .75 in. long, curved, oblong compressed, 2 ovoid papillose calli inside. Anther long acuminate. Capsule elliptic, .75 in. long. *Hab.* Commoner than the last. Singapore, Bukit Timah. Johor, Gunong Pantai. Malacca, Mt. Ophir. Negri Sembilan, Tampin Hill (Robinson). Perak, Maxwell's Hill (Wray).

This and the two allied species are known as "Bunga Tulis" by Malays. Formerly, when abundant, plants were sold as pot-herbs in the markets. They are usually found in small groups of 2 or 3 together in rotten leaves.

(3) **A. albolineatus** *Par. and Rchb. fil. Trans. Linn. Soc.* xxx. 141. *A. brevilabris* *Ridl. Mat.* i. 213 (not of Lindley).

Whole plant 6 in. tall. Leaves oblique ovate, 1.5 in. long, .5 in.

wide, deep purple netted gold with a broad pale bar down centre; petioles .25 in. long. Flowers about 8. Sepals reddish or dark brownish red pubescent. Petals adnate to the upper sepal thin white. Lip white horizontal, claw short, a pair of oblong calli at base; filaments 6 to 8 on each side, limb of 2 short truncate lobes, spur curved rather long, tip bifid. Column with broad triangular wings and forked process from the centre. Anther ovate pubescent. *Hab.* In woods, rarely flowering. Selangor, Bukit Hitam (Kelsall). Perak, Thaiping (Derry). *Distrib.* Burma.

(4) **A. pectinatus** *Ridl. Mat. i. 214.* *Odontochilus pectinatus* *Hook. fil. F.B.I. vi. 99; Ic. Pl. 2165.*

Stem 1 ft. long, internodes 1 in. long. Leaves crowded above, ovate oblique, 3 in. long, 1 in. wide, green; petioles .5 in. long. Spike 2 in. long, base nude; flowers about 10, .5 in. long. Upper sepal and petals adnate ovate pubescent, laterals ovate, green. Lip much longer, white, base saccate, two curved clubbed processes inside, side-lobes short round, claw with many filaments, lobes of limb falcate, blunt. *Hab.* Perak, Thaiping Hills, at 3000 to 4000 ft. altitude (all collectors).

(5) **A. brevistylis** *Ridl. Mat. i. 214.* *Odontochilus brevistylis* *Hook. fil. F.B.I. vi. 100; Ic. Pl. 2166.*

Stem about 6 in. long. Leaves ovate acuminate oblique, 1.5 in. long; petioles .25 to .5 in. long. Peduncle 1 in. long, pubescent, with 3 or 4 flowers at top. Flowers .5 in. long, white. Upper sepal ovate, laterals obliquely ovate, with tuft of hairs at tip. Petals free semi-ovate acuminate. Lip base saccate (not spurred), claw with 3 or 4 falcate teeth, limb bifid, lobes semi-ovate round. Anther ovate. *Hab.* Rare. Pahang, Fraser Hill at 4000 to 4370 ft. altitude (Burkill and Holtum). Perak, Gunong Batu Putih (Wray).

(6) **A. calcaratus** *Ridl. Mat. i. 214.* *Odontochilus calcaratus* *Hook. fil. F.B.I. vi. 99.*

A slender erect plant, 2 to 5 in. tall. Leaves ovate sessile or short-petioled, .25 to .3 in. long, brown, or green dashed with crimson and veined gold (Wray) or purple (Scortechini). Flowers 2 or 3, white, .5 in. across. Sepals lanceolate, base connate in a mentum. Petals linear-lanceolate free. Lip spurred, side-lobes curved, claw crenulate, limb of 2 quadrate truncate lobes. Column with a bifid elongate process descending into the spur. Pollinia with 2 caudicles. *Hab.* Rare on rocks in forest at about 300 ft. altitude. Perak (no locality) (Scortechini, Wray); Hermitage Hill (Ridley).

(7) **A. macranthus** *Ridl. Mat. i. 215.* *Odontochilus macranthus* *Hook. fil. F.B.I. vi. 98; Ic. Pl. 2161.*

Stem nodose ascending, 4 in. long. Leaves lanceolate, 1 in. long, .5 in. wide or smaller. Flowers 1 or 2 terminal large, white sessile. Bracts lanceolate blunt adnate to the semi-ovate petals, laterals gibbous at base. Lip spatulate, sides involute, base

saccate with 2 small processes, claw entire narrow, blade of 2 rounded crenulate lobes. Column with 2 lanceolate horizontal processes from the base. Anther lanceolate. Rostellum arms as long blunt. *Hab.* Local in dead leaves in forests at 2000 to 4000 ft. altitude. Perak, Thaiping Hills, Maxwell's Hill (Scortechini, Wray, Curtis, etc.).

This really belongs to the genus *Cystopus* Bl., but I do not find that this genus can be kept distinct.

94. DOSSINIA, Morren.

Terrestrial herb. Leaves ovate petioled. Scape tall; flowers small. Upper sepal adnate to petals. Lip adnate to base of column, saccate with 2 glands inside, side-lobes short; midlobe clawed, tip dilate. Column short with a boat-shaped process in front projecting into the lip-sac. Anther acuminate. Pollinia 2 in a single caudicle. Species 1, Malayan.

(1) *D. marmorata* Morren, *Ann. Bot. Gard. Calc.* iv. 171, t. 195; *Ridl. Mat.* i. 215.

Leaves ovate or ovate-elliptic, 2 to 3.5 in. long, 1.75 to 2.5 in. wide, deep velvety green marbled and veined with lighter colour; petioles short, sheaths broad reddish. Scape 1 ft. long or more, pubescent. Flowers numerous. Sepals ovate pink, laterals larger falcate. Lip longer, white bilobed. *Hab.* Local. Penang, Telok Bahang (Curtis). *Distrib.* Borneo.

95. MACODES, Lindl.

Terrestrial herbs. Leaves ovate petiolate. Spike tall, pubescent; flowers numerous small. Bracts lanceolate. Sepals and petals connivent. Lip saccate 3-lobed, spurless with 2 calli at base. Column short thick. Anther long. Pollinia long-stalked on very small disc. Rostellum bifid, lobes very long, curved. Two very large curved laminae from column below stigma. Species recorded about 6, Malay isles to Solomon isles.

(1) *M. petola* Lindl. *Gen. and Sp. Orch. Pl.* 497; *Bl. Orch. Arch. Ind.* 119, pl. 31, fig. 2; *Ridl. Mat.* i. 215.

Stem short. Leaves ovate rounded, 2 in. long, 1.25 in. wide, sometimes acute, dark green reticulated with gold; petioles .25 in. long. Flowering stem pubescent, 2 to 6 in. long; flowers about 12. Sepals lanceolate blunt reddish, pubescent. Petals linear, shorter. Lip pandurate, twisted, side-lobes curved up; midlobe narrow, spathulate blunt, with 2 fleshy hooks at base. *Hab.* Not rare, in damp spots. Singapore, Chua Chu Kang. Johor, Gunong Pantai. Malacca, Mount Ophir. Selangor, Semangkok Pass. Perak, Gunong Keledang (Goldham). Kedah Peak. *Distrib.* Java, Lingga.

96. *HÆMARIA*, Lindl.

Creeping herbs with few ovate or lanceolate petioled leaves. Flowers rather large racemed white. Upper sepal adnate to petals forming a large ovate hood, laterals oblong-ovate spreading. Lip saccate at base adnate to base and sides of column, terminal lobe broad oblong bilobed, lobes spreading. Column dilate upwards. Anther ovate acuminate. Pollinia long curved pyriform. Species 1, Malayan and Chinese.

(1) *H. discolor* Lindl. *Gen. and Sp. Orch. Pl.* 490; *Miq. Choix des Plantes t.* 16; *Ridl. Mat.* i. 216. *Ludisia discolor* Bl. *Orch. Arch. Ind.* 113, *pl.* 34, *figs.* 2, 3 and 44. *Goodyera discolor* Ker, *Bot. Reg. t.* 271; *Bot. Mag.* 2055.

Stem 4 to 12 in. tall, fleshy. Leaves deep velvety brown with pink midrib and 2 outer veins, 1 to 3 in. long, .75 to 1.5 in. wide. Spike 3 to 8 in. long, white pubescent. Ovary and pedicel white woolly, .75 in. long. Flowers fragrant. Lip twisted, side-lobes short erect, base with 2 small glands, terminal lobes divaricate. Anther yellow. *Hab.* On bare rocks, sometimes in great masses. Johor Pulau Tiunan; Pulau Aor; Pulau Tinggi. Penang Hill (Wallich); Pulau Betong (Curtis). Kelantan, Gunong, Kota Bharu. Setul, Bukit Rajah Wang in great masses. *Distrib.* Tenasserim, Cochin China, China.

var. *Ordiana* Williams. Leaf green with golden veins.

var. *Olletæ*, *H. Olletæ* Rolfe, *Ill. Hort.* xxxviii. 31, *pl.* 124, with narrow lanceolate leaves dark purple.

var. *Dawsoniana* H. *Dawsoniana* *Bot. Mag. t.* 7486. Leaves broad dark purple reticulate with gold.

All these varieties grow together, except var. *Ordiana*, which occurs more rarely, on Pulau Aor. The type is a rather small-leaved state with plain purple brown leaves. It is often cultivated in gardens, and is known to the Malays as Daun Low (after Sir Hugh Low).

97. *ZEUXINE*, Lindl.

Terrestrial herbs ascending. Leaves linear-lanceolate to ovate. Flowers small spicate. Sepals sub-equal, upper one forming a hood with the petals. Lip adnate to column, saccate with calli inside tip, broad more or less bilobed. Column very short with lamellar or conic processes in front. Stigmas 2 distinct. Pollinia pyriform with an oblong disc. Species 60, tropical Asia and Africa.

- | | |
|--|---------------------------|
| Leaves narrow linear-lanceolate | (1) <i>Z. sulcata</i> |
| Leaves ovate or lanceolate broad. | |
| Flowers .25 in. long; leaves small ovate | (2) <i>Z. affinis</i> |
| Flowers .25 in. long; leaves 3 in. long, ovate
acuminate | (3) <i>Z. reniformis</i> |
| Flowers very small numerous in a long spike, 2 calli
in lip | (4) <i>Z. clandestina</i> |
| Flowers very small, 12 in spike, callus 1 bilobed | (5) <i>Z. palustris</i> |

- Flowers very small, 20 in spike, callus of 2 crenulate ridges, claw with 2 lobes (6) *Z. biloba*
 Flowers 2 small; lip bilobed with oblong truncate lobes (7) *Z. rupestris*
 Flowers 5 or 6; lip tip round blunt (8) *Z. violascens*

(1) *Z. sulcata* Lindl. *Gen. and Sp. Orch. Pl.* 484; *King, Ann. Bot. Gard. Calc.* viii. 286, *pl.* 381.

Stem erect, 2 to 16 in. tall. Leaves linear-lanceolate acuminate erect, 1 to 2 in. long, .12 in. wide. Raceme dense sub-sessile globose. Bracts lanceolate acuminate, .25 to .5 in. long. Flowers white, yellow or pink, .16 in. long. Sepals and petals oblong blunt. Lip yellow boat-shaped, with short pubescent claw and transverse oblong or bilobed limb. *Hab.* Rare. Malacca, Sungei Rambai (Derry). *Distrib.* Indo-Malaya, China.

(2) *Z. affinis* Benth. *Gen. Plant.* iii. 600; *Ridl. Mat.* i. 217.

Whole plant 6 to 12 in. tall. Leaves ovate or ovate-lanceolate acute, 1 in. long, .5 in. wide. Scape 6 in. long, pubescent. Flowers many, .25 in. long. Upper sepal oblong blunt, laterals ovate pubescent green. Petals oblong. Lip, sac broad with 2 curved processes inside, claw narrow, limb bilobed, lobes spreading blunt yellow. Anther lanceolate. *Hab.* Rare. Penang Hill (Maingay, Haniff). *Distrib.* India.

(3) *Z. reniformis* Hook. *fil. F.B.I.* vi. 107; *l.c. Pl.* 2173.

Stem below leaves 6 to 10 in. tall. Leaves ovate-lanceolate, base round, top acuminate, 2 to 3.6 in. long, 1 in. wide; petioles .5 in. long. Scape 2 in. long, pubescent. Bracts .3 in. longer than ovary. Sepal .25 in. long, ovate sub-acute glabrous. Petals semi-ovate. Lip, sac hemispheric clawed, calli 2-toothed inside, terminal lobe reniform, crenate, 2 semi-ovate lamellæ on its base. *Hab.* Perak (Scortechini).

(4) *Z. clandestina* Bl. *Orch. Arch. Ind.* 70, *pl.* 39, *fig.* 4; *Ridl. Mat.* i. 218.

Plant slender, 1 ft. tall or less. Leaves distant, 5, lanceolate-ovate, 1.25 in. long, .36 in. wide; petioles .25 in. long. Scape slender hairy, 6 in. long, base nude. Flowers often numerous very small. Upper sepal adnate to petals forming an acute hood, laterals oblong green tipped white, hairy. Lip base saccate green, with 2 curved processes, side-lobes involute, limb white bilobed spreading. Capsule .25 in. long. *Hab.* On stony paths and edges of woods. Singapore, Garden Jungle; Bukit Timah. Negri Sembilan, Rubber Estates, Siliu (Williams). Penang Hill near Waterfall on the track, up to 2500 ft. altitude; Richmond Pool (Ridley). *Distrib.* Java.

(5) *Z. palustris* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 100.

Whole plant 15 in. tall. Leaves 4, ovate blunt 3-nerved, 1 in. long, .5 in. wide; petioles .25 in. long. Scape pubescent; raceme 3 in. long; flowers 12. Bracts shorter than ovary. Sepals narrow

lanceolate acute glabrous reddish. Petals white adnate to upper one. Lip, base saccate narrowed to limb, which is bilobed, lobes oblong divaricate, callus in sac conic emarginate. *Hab.* Very rare. Perak, Temengoh in a grassy swamp, one plant (Ridley).

(6) *Z. biloba* *Ridl. Journ. F.M.S. Mus.* iv. 73.

Stem 6 to 7 in. tall. Leaves ovate-lanceolate, base round, tip acute, 2.5 to 3 in. long, .75 to 1 in. wide; petioles .5 to .74 in. long. Scape 8 in. tall, pubescent, lower part nude. Flowers about 20, lax. Upper sepal lanceolate blunt red-spotted at base, tip white, laterals oblong blunt red-hairy, .25 in. long. Petals linear blunt. Lip, base saccate, 2 short crenulate ridges inside, claw short channelled with a pair of triangular lobes on edge, limb large of 2 white obovate round lobes. *Hab.* Rare. Mountain forests. Pahang, Telom (Ridley).

(7) *Z. rupestris* *Ridl. Journ. Roy. As. Soc. S. Br.* 39, p. 86; *Mat.* i. 218.

Plant slender, 6 to 8 in. tall. Leaves few lanceolate narrow blunt, .5 to .75 in. long, .12 in. wide. Scape slender pubescent. Flowers 2, terminal white. Sepals ovate hairy. Petals adnate to upper sepal. Lip with 2 linear processes in sac, claw minutely denticulate terete, limb of two oblong truncate lobes. Capsule .25 in. long. *Hab.* Rare, on the top of rocks in dead leaves at 2500 ft. altitude. Penang Hill (Ridley).

(8) *Z. violascens* *Ridl. Mat.* i. 218. *Heteraria purpurascens* *Bl. Orch. Ind.* 105, *pl.* 37. *Psychechilus purpurascens* *Bl. l.c.* p. 71, *pl.* 18, *fig.* 3.

Slender plant, 6 to 10 in. tall. Leaves lanceolate or ovate-lanceolate acute purple with or without a central pink vein, .5 to 1 in. long, .5 in. wide; petioles .12 in. long. Scape pubescent. Flowers 5 or 6 crowded at tip. Sepals oblong blunt, .2 in. long. Petals adnate to upper one. Lip as long as sepals, 2 curved processes in sac, sides involute, tip broader rounded obtuse. *Hab.* Very rare, in wet forest, Johor, Tanjong Kupang (Ridley). *Distrib.* Sumatra, Java.

98. CHEIROSTYLIS, Bl.

Terrestrial herbs, with small flowers in a raceme. Sepals connate in a gibbous-based tube to middle. Petals narrow. Lip insert at base of column, base saccate erect, limb shortly clawed, then broadly dilate toothed, crenate or entire. Column short with 2 appendages in front. Rostellum bifid; stigmas 2 lateral. Anther erect, pollinia 2, caudicle short, disc oblong. Species about 20, Indo-Malaya, China, Formosa.

(1) *Ch. flabellata* *Wight, Ic.* v. 16; *Hook. fil. F.B.I.* vi. 105. *C. Goldschmidtiana* *Schlechter Orchis*, 1915, 4, *pl.* i.

Whole plant 3 to 6 in. tall. Leaves ovate, .5 to 6 in. long, .25 in. wide, blunt. Scape slender with a few rather large sheathing

bracts; raceme .5 in. long. Sepals obtuse, glandular pubescent. Petals glabrous sub-spathulate obtuse. Lip base boat-shaped with a pair of short conic cylindrical calli on each side, limb broad of about 4 acute teeth on each side. *Hab.* Penang at the spout above the Waterfall (Haniff). *Distrib.* India, Burma.

99. GOODYERA, R. Br.

Terrestrial herbs. Leaves ovate or lanceolate petioled. Flowers small or medium spicate. Upper sepal forming a hood with petals, laterals free. Lip saccate attached to column, no side-lobes or claw, boat-shaped, tip small acute recurved, with 1 or 2 calli or hairy within sac. Column short. Anther lanceolate acuminate. Pollinia 2 to 4, club-shaped, with 1 or 2 caudicles on a small disc. Stigmas 1. Species 40, Europe, Asia, Mascarene isles, North America.

§ 1. *Eu-Goodyera*. Flowers small not hairy in lip.

Flowers with 1 or 2 calli in lip. (1) *G. gracilis*

§ 2. *Georchis*. Flowers usually medium-size, lip hairy in sac.

Flowers small; leaves small (2) *G. pusilla*
Flowers medium-sized.

Leaves oblong-lanceolate acuminate; spike many-flowered (3) *G. rubens*

Leaves ovate-lanceolate acute; spike sessile; bracts long (4) *G. foliosa*

Flowers few, rather large.

Leaves ovate broad-based (5) *G. cordata*

Leaves lanceolate narrow (6) *G. lanceolata*

(1) *G. gracilis* Hook. *fil. F.B.I.* vi. 112; *Ic. Pl.* 2183; *Ridl. Mat.* i. 219.

Whole plant 8 to 13 in. tall, glabrous. Leaves crowded elliptic-ovate blunt dark green, 1 in. long, .75 in. wide; petioles .25 to .5 in. long. Scape 6 to 12 in. tall. Flowers rather crowded at top, white fragrant. Sepals .12 in. long, linear-oblong or lanceolate, laterals gibbous at base. Petals linear-lanceolate blunt. Lip ovate concave shortly beaked with 2 calli in sac and a broad raised ridge in centre. *Hab.* Perak, Thaiping Hills at 5000 ft. altitude (all collectors).

var. *unicallosa* Ridl. A tall plant with rather larger flowers, and one cylindrical blunt callus in the sac. *Hab.* Selangor, Menuang Gasing (Kloss).

(2) *G. pusilla* Bl. *Orch. Arch. Ind.* 36, t. 9B, fig. 3.

A slender dwarf plant with ascending stems, about 6 in. tall. Leaves lanceolate acuminate, 1 in. long, .5 in. wide, dark purple veined reticulate light red. Raceme few-flowered. Flowers small pinkish. Upper sepal ovate blunt, lateral slightly falcate. Petals minutely crenulate. Lip entire boat-shaped, edge crenulate, spur globose hairy within. Anther ovate. *Hab.* Very rare. Perak. No locality (Scortechini). *Distrib.* Java.

(3) *G. rubens* Bl. *Orch. Arch. Ind.* 43, pls. 9c, 9d.; *Ridl. Mat.* i. 219.

Stem stout, 8 in. tall or more. Leaves 8 or 9, rather distant oblong-lanceolate acuminate oblique, 3 to 7 in. long, 1.5 to 2.5 in. wide. Scape 1 ft. tall, reddish pubescent. Flowers numerous sessile red. Bracts lanceolate subulate longer than ovary, .5 in. long. Sepals blunt acuminate puberulous. Petals adnate to upper one. Lip saccate, boat-shaped, tip acute, sac villous inside. Anther lanceolate; pollinia 2, clubbed tapering, on one caudicle to disc. *Hab.* Local, Perak, upper part of Badang Padang valley (Wray). *Distrib.* Java.

(4) *G. foliosa* Hook fil. *F.B.I.* vi. 113; *King, Ann. Bot. Gard. Calc.* 281, pl. 374. *Georchis foliosa* Lindl. *Gen. and Sp. Orch. pl.* 496.

Whole plant about 6 to 12 in. tall. Leaves ovate-lanceolate oblique acute, 1.5 to 2.5 in. long, 1.25 in. wide; petioles .3 in. long. Spike sessile, 2 to 3 in. long, pubescent. Bracts .3 in. long, longer than the flowers. Flowers pink (white tinged) flesh colour (Wray). Sepals ovate-lanceolate blunt, .24 in. long. Petals half oblong. Lip base deep saccate hairy within. Anther lanceolate. Rostellar arms long slender. *Hab.* Rare. Perak, Gunong Brumber Pahang at 7000 ft. altitude (Wray). *Distrib.* India, Burma.

(5) *G. cordata* Hook fil. *F.B.I.* vi. 114; *lc. Pl.* 2187; *Ridl. Mat.* i. 220. *Georchis cordata* Lindl. *Gen. and Sp. Orch. pl.* 496.

Stem slender ascending. Leaves about 4, ovate acute, crisped, 1 in. long, .75 in. wide; petioles .5 in. long. Scape 3 to 4 in. tall. Flowers 2 to 8, red, .5 in. long. Sepals lanceolate acute acuminate greenish tipped red or all red. Petals adnate to upper sepals. Lip short oblong sub-acute, tip recurved, two hairy patches at base. Anther lanceolate long-acuminate. Pollinia 4 clubbed, one caudicle. Rostellum long, lobes linear-lanceolate. *Hab.* Perak (Scortechini). Penang, Fern Hill (Ridley and Curtis). *Distrib.* India.

(6) *G. lanceolata* Ridl. *Journ. Roy. As. Soc. S. Br.* 39, p. 86; *Mat.* i. 220.

Stem 9 in. tall. Leaves lanceolate acuminate, 1.5 in. long, .5 in. wide. Scape 3.5 in. tall, pubescent, few-flowered. Bracts 36 in. long, woolly-pubescent. Sepals lanceolate, laterals oblique, .5 in. long, acuminate, reddish woolly-pubescent. Petals adnate to upper sepals, reddish. Lip base saccate adnate to column, glabrous within with a tuft of digitate processes on each side, apex acuminate. Anther very long acuminate. Pollinia .25 in. long, clubbed, with 2 yellow caudicles connate half-way. Rostellum long, shortly acutely bifid. *Hab.* Mountains, very rare. Selangor. Semangkok Pass (Curtis). One specimen.

100. HETÆRIA, Bl.

Terrestrial herbs, with a creeping ascending stem. Leaves ovate or lanceolate, petioled. Spike slender dense. Flowers small.

Upper sepal usually adnate to petals pubescent. Lip uppermost, boat-shaped with 2 or more small calli inside, tip narrow, sides involute and often connate into a tube. Column rather large with long rostellar arms. Differs from *Zeuxine* in the absence of a dilated end to the lip. Species about 40, Africa, Indo-Malaya, Polynesia.

Calli in sac of lip 2.

Plant 2 ft. tall; flowers comparatively large, yellow

(1) *H. alta*

Plant short slender; flowers small

(2) *H. obliqua*

Calli 4 in 2 pairs with a 2-toothed lamina in front; flowers small; ovary glabrous

(3) *H. elata*

Calli 2 semi-ovate, ridges and 2 short keels ovary hairy

(4) *H. pauciflora*

Calli a row of linear processes on each side of sac

(5) *H. nitida*

Calli numerous short processes in lip-sac.

Tall many-flowered plants; leaves ovate, 3 to 4 in. long.

Lip tip sub-acute

(6) *H. ophirensis*

Lip tip with a fleshy wart

(7) *H. elegans*

Slender plant, few flowers; leaves sub-sessile, 1 in. long

(8) *H. parvifolia*

(1) *H. alta* *Ridl.* (misprinted *alba*) *Journ. Linn. Soc.* xxxii. 404; *Mal. i.* 221.

Plants nearly 2 ft. tall. Leaves numerous ovate acuminate acute oblique, 4 in. long, 1.75 in. wide; petioles 1 in. long; sheaths large. Spike 10 in. long. Flowers yellow glabrous, except pubescent ovary, .75 in. long. Bracts .25 in. long. Sepals lanceolate blunt. Petals free, as long. Lip shorter boat-shaped with 2 linear calli inside, limb lanceolate, sides involute. Anther lanceolate-linear. Column arms obliquely oblong cuneate. Rostellum lobes shorter than anther. Capsule ellipsoid, .5 in. long. *Hab.* Hill-forests, Perak, Hermitage Hill; Kamuning (Ridley).

(2) *H. obliqua* *Bl. Orch. Arch. Ind.* 104, t. 34, fig. 1; *Ridl. Mal. i.* 222.

About 1 ft. tall; stem long-creeping stout. Leaves oblique lanceolate, dark green, often with a median silver bar, 2 to 3 in. long, .75 to 1 in. wide; petioles .5 to 1 in. long. Scape slender pubescent. Spike 3 to 10 in. tall. Flowers numerous reversed. Bracts half as long as ovary, pubescent. Upper sepal nearly .25 in. long, connate half-way with petals, white, laterals pubescent, lanceolate blunt, dull red base gibbous. Lip very small, base boat-shaped, edges meeting at tip rolled into a narrow tube then open spoon-shaped, white, 2 triangular toothed calli in lip. Column large yellow; anther lanceolate red. Pollinia 2 clubbed narrowed to 2 caudicles, disc oblong. Rostellar arms long, linear. Capsule elliptic sessile, .36 in. long. *Hab.* Common in woods. Singapore, Serangoon Road; Bukit Timah; Pulau Damar. Johor, Panchur. Sungei Ujong, Bukit Danan (Cantley). Perak. Penang, Pulau Betong (Curtis). *Distrib.* Borneo, Sumatra. *Native name:* Poko Tumbak Hutan. *Use:* For poulticing sores.

(3) *H. elata* Hook. *fil.* *F.B.I.* vi. 116; *Ic. Pl. t.* 2191; *Ridl. Journ. F.M.S. Mus.* iv. 74 (not of *Materials* i. 221).

Stem below leaves 1 in. long. Leaves 3 or 4 ovate acuminate, base round, 4 in. long, 1.5 in. wide; petioles 2 in. long. Peduncle 14 in. long; raceme dense, many-flowered, 4 in. long, pubescent. Bracts longer than ovary, .2 in. long. Sepals ovate blunt, .1 in. long. Petals oblong blunt, as long. Lip ovate saccate, sides towards tip involute, tip ovate, 4 cylindric processes in 2 pairs, and orbicular plate with 2 processes pointing backwards. Anther short pear-shaped, beak blunt. Rostellum broad with 2 short points, stigmatic wall broad with 2 short teeth. Capsule elliptic, .25 in. long. *Hab.* Local on banks in forests. Perak, Batang Padang valley (Wray); Gunong Berumbun, summit (Ridley).

(4) *H. pauciflora* *Ridl. Journ. F.M.S. Mus.* iv. 73.

Stem 5 in. long. Leaves narrow lanceolate acuminate, 2 in. long, .4 in. wide; petioles .1 in. long, sheaths .25 in. long. Peduncle 2.5 in. long; raceme 1 in. long, with 6 flowers; rachis pubescent. Bracts as long as ovary, .1 in. long. Sepals ovate blunt, glabrous red dotted white, .1 in. long. Petals white linear narrower. Lip shorter saccate ovate, tip rolled into a tube, 2 semi-ovate ridges at base, and 2 central short keels. Pollinia pyriform elongate with large thick elliptic disc. Stigma deep and wide with projecting round walls. Rostellum broad with 2 subulate points. *Hab.* Rare. Pahang, Telom (Ridley).

(5) *H. nitida* *Ridl. Journ. Linn. Soc.* xxxii. 404; *Mat.* i. 222.

Stem 1 ft. tall. Leaves ovate acute dark polished green, 3.5 in. long, 1.5 in. wide; petioles 1.25 in. long. Scape 9 in. long, pubescent. Spike dense, many-flowered. Flowers .25 in. long. Bracts red, .25 in. long. Sepals ovate blunt pubescent red. Petals free spatulate white. Lip adnate to column ovate boat-shaped, edges at tip involute to an acute point, a row of linear processes on each side in lip base. Column arms linear. Anther ovate beaked. Pollinia pyriform on a single caudicle, disc linear. Rostellar arms linear short. *Hab.* In damp woods. Singapore, Bukit Timah; Chan Chu Kang. Penang, Pulau Betong (Curtis).

(6) *H. ophirensis* *Ridl.* *H. elata* *Ridl. Mat.* i. 221 (not of *Hook. fil.*).

Stem 2 to 3 in. long. Leaves ovate acuminate, 3-nerved, 4 in. long, 1.25 in. wide; petioles slender, 1 in. long. Peduncle slender, 1 ft. long. Raceme 3 in. long. Flowers very small. Bracts lanceolate long acuminate. Sepals ovate. Petals linear falcate. Lip boat-shaped ovate, tip sub-acute with numerous short processes in sac. Anther ovate. Column arms rather long. Rostellum deeply bifid. *Hab.* Malacca, Mt. Ophir on Gunong Tunduk at 3000 ft. altitude (Ridley).

(7) *H. elegans* *Ridl. Journ. Linn. Soc.* xxxviii. 330.

Stem 3 in. long. Leaves ovate acuminate, 3-nerved, 3 in. long,

1 in. wide; petioles 1.5 in. long. Peduncle 1 ft. long; raceme 6 in. long, lax, white pubescent. Flowers greenish, hardly more than .08 in. long; pedicel and ovary .25 in. long. Sepals ovate blunt glabrous. Petals narrow linear, tip dilate. Lip oblong-ovate saccate with many fleshy clubbed processes in sac, and a fleshy wart on tip. *Hab.* Mountains. Rare. Pahang, Gunong Tahan at 5000 to 6000 ft. altitude (Robinson).

(8) *H. parvifolia* *Ridl. Journ. Roy. As. Soc. S. Br.* v. 39, p. 87; *Mat.* i. 222.

Stem 2 in. tall. Leaves lanceolate acute sub-sessile, 1 in. long, .25 in. wide; sheaths .25 in. long. Scape slender pubescent, 5 to 6 in. long; raceme 2 in. long. Flowers very small, .12 in. long. Upper sepal adnate to petals ovate acuminate pubescent, laterals lanceolate acute. Lip, base saccate, with minute cylindrical processes inside, lanceolate acute, sides of tip involute forming a tube. Anther with a long narrow beak. Rostellar arms nearly as long linear truncate. *Hab.* Rare. Penang Hill (Ridley).

101. HYLOPHILA, Lindl.

Terrestrial herbs with long creeping stem. Leaves many, lanceolate petioled. Spike peduncled rather lax of many small flowers, pubescent. Upper sepal hooded attached to petals, laterals broad gibbous, forming a mentum. Lip a sub-globose sac with a small linear limb, and a callus in base of sac. Column very short, no arms. Anther long beaked. Pollinia pear-shaped, caudicle tapering to disc. Rostellum very long bifid. Species 4, Malay isles to New Guinea and Philippines.

Spike long slender; flowers small (1) *H. mollis*
 Spike dense subsessile; flowers .25 in. long (2) *H. lanceolata*

(1) *H. mollis* *Lindl. Gen. and Sp. Orch. Pl.* 490; *Bl. Orch. Arch. Ind.* 115, *pls.* 35, 36F; *Ridl. Mat.* i. 223.

Rhizome long, creeping ascending, 6 to 8 in. tall. Leaves numerous thin lanceolate acute polished green, 4 in. long, 1.25 in. wide; petioles 2 in. long. Peduncle 1.5 ft. tall or less, spicate part 6 in. long. Flowers small, all sticky pubescent green. Bracts shorter than ovary, .25 in. long. Sepals .12 in. long, upper one saccate beaked, laterals ovate oblique. Lip globose saccate. Capsule elliptic sessile, .25 in. long. *Hab.* In wet forests, sometimes very abundant. Singapore (Wallich); Teban; Bukit Timah; Toa Payoh. Malacca (Griffith). Perak, Thaiping Hills (Kunstler). *Distrib.* Sumatra.

(2) *H. lanceolata* *Hook. F.B.I.* vi. 110; *Ridl. Mat.* i. 223. *Dicerostylis lanceolata* *Bl. Orch. Arch. Ind.* 116, *pl.* 38, *fig.* 1.

Stem stout ascending, 6 in. tall. Leaves narrow lanceolate, caudate acuminate waved, 4 to 5 in. long, 1.25 to 1.5 in. wide; petioles 1 in. long. Spike 3 in. long, dense, nearly sessile. Flowers

numerous white, glabrous or nearly. Sepals .25 in. long. Petals oblique ovate. Lip sac nearly globose. *Hab.* Rare. Perak (Scortechini); Bujong Malacca (Curtis). *Distrib.* Java.

102. LEPIDOGYNE, Bl.

A large stout plant with thick creeping stem and long sessile linear acuminate leaves. Scape tall covered with sheaths. Spike long and dense with long linear bracts. Flowers small pink. Upper sepal adnate to petals. Lip saccate, base adnate to column with several short processes inside, side-lobes short, terminal lobe linear. Column short; rostellum deeply bifid, lobes linear. Anther elongate lanceolate acuminate. Pollinia pear-shaped narrowed into caudicles, a narrow linear disc. Species 3, Malayan.

(1) *L. longifolia* Bl. *Orch. Arch. Ind.* 94, pl. 25; *Ridl. Mat.* i. 224.

Leaves 12 to 18 in. long, 2 in. wide. Scape nearly 3 ft. long, spicate portion 1 ft. long. Flowers very numerous. Sepals lanceolate acuminate, .25 in. long. Capsule elliptic, .5 in. long. *Hab.* Local in woods. Johor, Pulau Kukub in the peat-woods (Ridley). Penang, Mt. Elvira (Curtis). *Distrib.* Lingga, Sumatra, Java, Philippines.

In the peat-woods the ground is completely composed for a depth of 20 ft. or more of decaying leaves and sticks with hardly a trace of mineral matter.

103. STEREOSANDRA, Bl.

Leafless slender saprophyte with swollen tuberous rhizome. Flowers secund pendulous. Bracts linear-lanceolate. Pedicels short. Sepals and petals similar connivent. Lip as long and similar, entire with two round cushions at base. Column very short. Anther large. Pollinia elongate pyriform. No rostellum. Stigma transversely oblong on a distinct short style. Capsule elliptic. Species 1 or 2, Malayan, Siam.

(1) *S. javanica* Bl. *Mus. Bot.* 2, p. 176; *Orch. Arch. Ind.* 30, t. 10, fig. 3, t. 11, fig. 9. (Fig. 178, p. 225.)

Rhizome .5 to .75 in. long, .36 in. through, ringed. Stem 15 in. long, pale with 4 or 5 sheaths. Flowers about 10 distant on purple pedicels. Sepals and petals .35 in. long, acuminate. All white with black-violet tips. Lip white, edges sinuate and tip deep black-violet. Anther with 2 violet blotches. Capsule elliptic, .25 in. long. *Hab.* In woods very scarce and difficult to find. Singapore, Bukit Panjang on banks of a stream. Johor, near Castlewood (Ridley). Negri Sembilan (Williams). Perak, Temengoh. Penang Hill (Curtis). *Distrib.* Malay Isles.

104. CRYPTOSTYLIS, R. Br.

Terrestrial herbs with woolly roots. Leaves basal, 1 or 2, long-petioled. Scape lateral tall racemose at tip; flowers many. Sepals

and petals very narrow. Lip superior erect entire, base embracing column. Column very short. Anther oblong blunt. Pollinia 2 pyriform, deeply lobed, with small disc or separate. Rostellum broad thick. Capsule elliptic. Species 15, Indo-Malaya, Polynesia and Australia, Formosa.

(1) *C. arachnites* *Bl. Orch. Arch. Ind.* 132, t. 45; *Ridl. Mat.* i. 225. *C. filiformis* *Bl. l.c.* 133, t. 45, fig. 3.

Leaves elliptic or ovate, 2.5 to 6 in. long, 1.5 to 3 in. wide;



FIG. 178.—*Stereosandra javanica*.

petioles 1 to 4 in. long. Scape 6 to 30 in. tall.; raceme 1 to 6 in. long. Sepals and petals .5 to .7 in. long, green linear. Lip .36 to .5 in. long, lanceolate narrow or wide, light brown with darker red spots. Capsule elliptic, .75 in. long. *Hab.* In woods from sea level to 5500 ft. altitude. Common. Singapore, Bukit Timah; Pulau Damar. Pahang, Gunong Tahan. Malacca, Merlimau (Derry). Selangor, Bukit Hitam (Kelsall); Gunong Mengkuang Lebah (Robinson); Menuang Gasing (Kloss). Perak, Thaiping Hills to 5500 ft. altitude (Wray); Gunong Inas (Yapp). Penang Hill.

Kedah, Peak; Gunong Bintang (Kloss). *Distrib.* India, Ceylon, Java, Sumatra. *Native name*: Bunga Bangkong.

This plant is very variable in size of plant and breadth of the lip, and more than two species have been made of it. *C. filiformis* Bl. is a dwarf form with shorter petiole.

TRIBE IV. OPHRYDEÆ (GENERA 105).

105. **HABENARIA**, Linn.

Terrestrial herbs. Leaves herbaceous. Flowers in a terminal spike or raceme. Sepals subequal or laterals longer spreading. Petals simple often connivent with upper sepal or bilobed. Lip adnate to column, base simple or 3-lobed, spurred. Anther adnate to top of column, 2-celled, bases of cells sometimes prolonged into tubes. Pollinia 2, clubbed or pear-shaped, granular, with a long or short caudicle and small disc to each. Stamines 1 or 2 viscid processes on the face of the column below the anther. Rostellum erect entire. Capsule usually ellipsoid. Species about 400, whole world.

Lip entire, spur long slender (1) *H. zosterostyloides*

Lip trifid; petals undivided, spur long.

Lip, side-lobes broad undivided.

Midlobe broad deeply bifid yellow (2) *H. xanthochila*

Midlobe broad retuse pink or white (3) *H. carnea*

Lip, side-lobes broad pectinate; midlobe small.

Flowers 3 to 4 in. wide, white (4) *H. Susannæ*

Lip, all lobes narrow linear.

Leaves narrow linear-lanceolate.

Raceme few-flowered; sepals pink (5) *H. roseata*

Raceme few-flowered; flowers yellow (6) *H. acuiifera*

Leaves lanceolate broad; flowers numerous
in a lax raceme fairly large, a tall plant (7) *H. Kingii*

Leaves lanceolate narrow, flaccid; flowers
very small in a lax raceme (8) *H. inconspicua*

Lip trifid, spur long; petals bifid.

Flowers crowded, medium, greenish white (9) *H. singapurensis*

Lip trifid; spur short saccate.

Plant 4 to 5 ft. tall; spike dense; bracts long. (10) *H. gigas*

Plant 2 ft. tall; raceme rather lax; flowers
small; bracts as long as ovary (11) *H. glaucescens*

Small plants 1 ft. tall or less.

Flowers small white; lip lobes linear (12) *H. lacertifera*

Flowers very small green, lip lobes filiform. (13) *H. monticola*

(1) *H. zosterostyloides* Hook. *F.B.I.* vi. 155. *Ridl. Mat.* i. 226.

Whole plant 2 ft. tall or less. Leaves, radical ovate acute, 4 in. long, 2 in. wide, with petioles 2 in. long or more; cauline sessile lanceolate. Raceme lax; flowers medium green. Bracts lanceolate acute shorter than ovary, .25 to .5 in. long. Upper sepal ovate, laterals linear-oblong. Petals triangular ovate. Lip linear entire as long as sepals; spur cylindrical acute. Capsule sub-sessile elliptic-

oblong, .5 in. long. *Hab.* In mossy or open damp spots, mountains at 4000 to 5500 ft. altitude, common. Malacca, Mt. Ophir (Griffith). Pahang, Gunong Tahan. Selangor, Menuang Gasing (Kloss); Gunong Mengkuang Lebah (Robinson). Perak, Gunong Brumber Pahang (Wray); Gunong Inas (Yapp).

(2) *H. xanthochila* Ridl. *Journ. Linn. Soc.* xxxii. 411; *Mat.* i. 226.

Whole plant 1 ft. tall. Leaves basal lanceolate acuminate, 6 in. long, 1 to 1.25 in. wide. Raceme lax, about 10-flowered;



FIG. 179.—*Habenaria carnea*.

flowers 1 in. across. Bracts 1 in. long, acuminate. Ovary .5 in. long. Upper sepal ovate blunt, green, laterals ovate-oblong deflexed. Petals spathulate oblong. Lip 1.5 in. long, bright yellow, 3-lobed, side-lobes oblong-spathulate falcate truncate, midlobe obovate bifid, spur decurved slender, 2 in. long. *Hab.* Rare and local. Penang, Pulau Betong and by the spout above the Waterfall (Curtis).

(3) *H. carnea* N.E. Brown *Gard. Chron.* 1891, ii. 729, fig. 105; *Ridl. Mat.* i. 226.

Leaves basal oblong or lanceolate acute, 3 in. long, 1 in. wide,

dull olive green with white spots or plain. Scape 6 to 12 in. tall. Bracts ovate-acuminate. Flowers 6 to 20, rose-pink or white, 1 in. wide. Sepals ovate. Petals ovate. Lip 1 in long, side-lobes very broad round, midlobe reniform or nearly orbicular retuse, base narrowed. *Hab.* Limestone rocks, Lankawi, Kwah; Terutau (Curtis).

var. *minor* Ridl. is a smaller form with plain leaves and white flowers. *Distrib.* S. Siam.

(4) *H. Susannæ* Br. *Prodr.* 312; *Hook. fil. F.B.I.* vi. 137. *H. gigantea* Don. *Prod.* 24; *Bot. Mag.* t. 3374.

A tall stout plant, 2 to 4 ft. tall. Leaves ovate-oblong, 2 to 6 in. long, 1.5 to 2 in. wide. Raceme 3- to 5-flowered. Flowers 3 to 4 in. across, white fragrant. Upper sepal broad rhomboid, laterals blunt quadrate-oblong. Petals linear acute. Lip side-lobes very broad pectinate, midlobe linear, spur twice as long as ovary, 4 in. long, cylindric. *Hab.* Lankawi, Kwah (Curtis). Setul (Haniff). *Distrib.* India, Burmah, China, Malay Isles.

(5) *H. roseata* Ridl. *Journ. Roy. As. Soc. S. Br.* 49, p. 42.

Stem slender, 2 ft. tall. Leaves few, distant linear-acute, 3 in. long, .25 to .5 in. wide. Raceme lax, about 9-flowered. Upper sepal ovate blunt, boat-shaped, forming a hood with the oblong petals, pale rose pink, laterals oblique ovate blunt, 3-ribbed, spreading. Lip trifid to base, lobes narrow linear, white, middle one longest, .5 in. long, spur slender, .75 in. long, slender geniculate in middle. *Hab.* Rare. Setul heath among bushes (Ridley). *Distrib.* Trang.

(6) *H. acuífera* Wall. *Lindl. Gen. and Sp. Orch. Pl.* 325; *Hook. F.B.I.* vi. 146.

Rather slender plant, 6 to 15 in. tall, with scattered linear-lanceolate leaves, 1.5 to 2.75 in. long, .25 in. wide, passing into narrow setaceous bracts. Spike short, 1.5 in. long, bracts longer than ovary. Flowers yellow, .6 in. wide. Sepals oblong, upper one broad, laterals concave. Petals much smaller linear-oblong. Lip as long as sepals, side-lobes short subulate, midlobe linear, spur slender slightly clubbed, half as long as ovary. *Hab.* Tringganu, Ismail Rantau (Down). Jalor, Biserat (Gwynne Vaughan). *Distrib.* Khasiya, Tavoy, Indo-China, China.

(7) *H. Kingii* Hook. *fil. F.B.I.* vi. 144; *Ridl. Mat.* i. 227. *H. Murtoni* Hook *fil. l.c.*

Whole plant 1 to 2.5 ft. tall; stem rather stout, 4-angled ciliate on angles. Leaves crowded towards base, lanceolate or elliptic-lanceolate, 6 to 10 in. long, 1.5 in. wide, undulate, shining green. Raceme 6 in. long, lax. Flowers numerous, whitish green. Bracts .75 in. long. Upper sepal hooded, obovate, .25 in. long; laterals deflexed cultrate triangular, falcate, base narrowed. Petals linear blunt. Lip 8-lobed, lobes narrow linear equal, spur arched, slender

cylindric dilate towards tip. *Hab.* Local, usually on limestone rocks. Negri Sembilan, Labu Reservoir (Williams). Perak, near Gunong Mesah (Kunstler); Ipoh (Curtis); Gunong Pondok (Murton). *Distrib.* Siam.

Murton's and Scortechini's plants have slightly smaller upper sepals, otherwise they appear to me identical with Kunstler's, and come from the same district. They form Hooker's *H. Murtoni*.

(8) *H. inconspicua* Ridl. *Journ. F.M.S. Mus.* iv. 75.

Plant very slender, nearly 2 ft. tall. Leaves about 6, thin flaccid lanceolate acuminate, 3 to 4 in. long, .5 to .75 in. wide, and 4 to 6 in. above the base. Raceme 6 to 8 in. long, slender with numerous sub-secund distant flowers, very small green. Sepals .1 in. long, upper one lanceolate, lower deflexed acuminate. Petals larger triangular. Lip 3-lobed, middle linear blunt, side-lobes filiform twice as long, spur cylindric, slightly dilate towards tip, .2 in. long. *Hab.* Rare in damp flat ground in forest. Pahang, Telom, at 4000 ft. altitude (Ridley).

(9) *H. singapurensis* Ridl. *Journ. Linn. Soc.* xxxii. 410; *Mat.* i. 228.

Whole plant 3 ft. tall, lower part bare of leaves. Leaves about 12, lanceolate acuminate, 6 in. long, 1 in. wide, sheaths 1 in. long. Stem above glaucescent. Flowers numerous, crowded at tip. Bracts glaucous, .75 in. long. Pedicel and ovary 1 in. long. Upper sepal lanceolate—boat-shaped with a long point, laterals oblong oblique with a long point, greenish white, .36 in. long. Petals bifid with long olive green linear lobes. Lip 3-lobed nearly to base, lobes linear, midlobe shorter; spur slender cylindric, .75 in. long. *Hab.* In damp wet jungle swamps, local. Singapore, Chua Chu Kang; Johor, Batu Pahat (Ridley).

(10) *H. gigas* Hook. *fil. F.B.I.* vi. 160; *Ridl. Mat.* i. 227.

Stem 4 to 5 ft. tall, hollow at base and nearly 1 in. through, nearly 3 ft. long below the leaves. Leaves elliptic acuminate, 8 to 10 in. long, 3 to 4 in. wide, petioled. Spike dense cylindric, 8 in. long. Flowers small pale green. Bracts longer, .75 in. long. Upper sepal linear-oblong blunt; laterals longer lanceolate. Lip as long, bluntly trifid, spur short oblong. Capsule linear-oblong, .75 in. long. *Hab.* Mountain forests at 2000 ft. altitude. Selangor, Menuang Gasing (Kloss). Perak, Batang Padang (Wray).

(11) *H. glaucescens* Ridl. *Journ. Linn. Soc.* xxxii. 412.

Plant 2 ft. tall with large tubers 2 in. long. Leaves 3 above the base of stem, 5 in. long, 2 in. wide, ovate acute, dark green above, glaucous beneath. Raceme 8 in. long; flowers small, green, very numerous. Bracts .5 in. long, as long as ovary. Sepals linear pubescent, .25 in. long, reddish green. Petals shorter wider, lanceolate olive. Lip trifid, lobes equal lanceolate blunt, spur saccate. *Hab.* Lankawi islands, Pulau Hujung Duri (Curtis). *Distrib.* Kasum, Tongka.

(12) *H. lacertifera* Benth. *Fl. Hongkong* 362. *H. Maingayi* King *Journ. As. Soc. Beng.* lxvi. ii. 604. *Peristylus candidus* J. J. Smith *Orchid v. Java* 36, pl. xviii.

Whole plant 8 to 18 in. tall, roots tuberous. Leaves 2 or 3 at base of stem, lanceolate or elliptic-lanceolate acute. Spike 6 to 9 in. long. Flowers small appressed, fragrant, white. Upper sepal ovate; laterals falcate oblong blunt, nearly .25 in. long. Petals oblong-lanceolate shorter. Lip short broad with 3 short blunt lobes, central one longest, rarely central shortest, spur very short, conic pointed green. *Hab.* Common on roadsides and grassy open spots. Singapore, Tanglin; Jurong. Johor, Castlewood. Malacca, Sungei Ujong (Derry); Nyalas. Penang Hill. *Distrib.* Mergui, Tavoy, N. India, Sumatra, Lingga, Java, Borneo, Hongkong.

(13) *H. monticola* Ridl. *Journ. Linn. Soc.* xxxii. 413; *Mat.* i. 228.

Whole plant 5 to 12 in. tall or less, very slender, tubers oblong. Leaves basal, 3 or 4, lanceolate acute, 1.5 to 2.25 in. long, .5 in. wide. Stem slender, 3 to 6 in. long. Raceme lax, 1.5 in. long, of very small green flowers. Sepals oblong-ovate. Petals elliptic oblong shorter. Lip trifid with a short claw, side-lobes filiform nearly 2, midlobe much shorter, spur as long as sepals, bifid. *Hab.* Mountains on banks, not common. Malacca, Mt. Ophir. Penang Hill, near the Crag Hotel (Ridley). Kedah Peak (Haniff).

TRIBE V. CYPRIPEDIEÆ (GENERA 106).

106. PAPHIOPEDILUM, Pfitz.

Herbs usually terrestrial. Leaves radical often tessellate. Scape 1 or 2 (or many) flowered. Flowers large. Sepals spreading, laterals connate beneath the lip. Petals free usually narrower and longer. Lip sessile, lateral lobes inflexed, short, midlobe large saccate. Column short terete; anthers 2 globose with a large disc-like staminode between and covering them. Stigma round, disc-shaped. Capsule long and narrow, elliptic.

Distrib. Tropical Asia, about 30 species, N. and E. India, Malay Isles to China.

Terrestrial. Leaves oblong tessellate herbaceous.

Petals as broad as petals not warted; flowers white (1) *P. niveum*

Petals narrower than sepals; flowers purple and green and white.

Edges warted with hairs on warts; upper sepal sub-acute or blunt (2) *P. barbatum*

Edges warted, no hairs; upper sepal abruptly acuminate (3) *P. Robinsonii*

Petals warted all over (4) *P. superbians*

Epiphytic, leaves lorate coriaceous plain green.

Scape several flowered long (5) *P. Lowii*

(1) *P. niveum* Pfitzer *Engler's Jahrbuch*. xix. 40. *Cypripedium niveum* Rehb. *fil. Gard. Chron.* 1869, x. in *Orch.* ii. 155; *Bot. Mag.* t. 5922.

Leaves oblong, green above blotched darker, dark purple beneath. Scape purple, 6 to 8 in. tall, 1- or 2-flowered pubescent. Flowers 3 in. wide, white dotted purple. Upper sepal broad orbicular laterals ovate-oblong, smaller. Petals broad oblong-blunt, longer. Lip sac ovoid, mouth contracted. Staminode reniform oblong yellow, edge white. *Hab.* On limestone rocks. Lankawi, Kwah (Curtis, and all collectors). Kedah, Baling (Williams) the var. *P. album* Desbois with very few spots. *Distrib.* Tembilan islands.

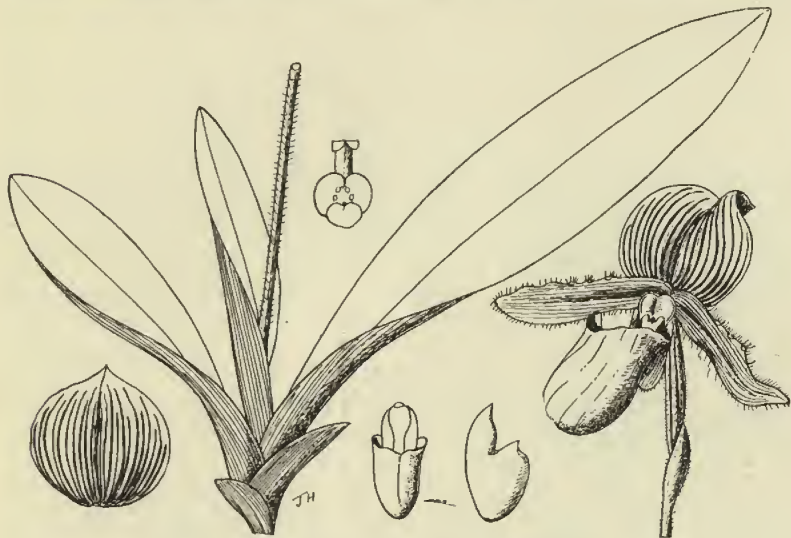


FIG. 180.—*Paphiopedilum barbatum*.

Hybrid, *Cypripedium Pereira* Ridl. *Gard. Chron.* 1914, i. 326. Leaves linear faintly mottled; peduncle longer, bract longer. Flower white with pink spots at base of upper sepal and petals. Upper sepal more ovate. Petals oblong slightly twisted at tip, all pubescent. Lip glabrous longer in proportion to breadth. Staminode obovate. *Hab.* Islands north of Lankawi, probably a hybrid with *C. exul*. Ridl. See also Burkill, *Gardens Bulletin* ii. 1918, 48.

(2) *P. barbatum* Pfitzer *Pringsh. Jahrb. Wiss. Bot.* xix. 150. *Cypripedium barbatum* Lindl. *Bot. Reg.* 1841; *Misc.* 53, 1842, pl. 17; *Bot. Mag.* pl. 4234.

Leaves oblong or linear-oblong, pale green with darker spots, 4 to 8 in. long, 1 in. wide. Scape 10 to 12 in. tall, pubescent. Bracts shorter than ovary. Flowers 1 or 2, and 2 to 3 in. wide. Upper

sepal broad ovate or orbicular acute or blunt white, veined purple, base greenish. Petals greenish brown, 2 in. long, linear-oblong curved with a few black warts and hairs on edge. Lip reddish purple, helmet-shaped. Staminode reniform rather deeply emarginate in front. Capsule 1 in. long. *Hab.* Mountains at 2500 to 4000 ft. altitude on grassy slopes and rocks. Johor, Gunong Pantai; Gunong Belulut (Holtum), Malacca, Mt. Ophir (all collectors), Penang Hill (all collectors), formerly very abundant at Richmond Pool but much persecuted by collectors. Kedah Peak. *Distrib.* Siam. *Native name*: Bunga Kasut.

The plant is very variable in depth of colour of flowers and colouring of foliage. Many varieties are known in cultivation.

(3) **P. Robinsonii** *Ridl.* *Cypripedium Robinsonii* *Ridl. Journ. F.M.S. Mus.* vi, 83.

Stem often stoloniferous. Leaves about 4, elliptic-oblong, pale green spotted and tessellated darker, 3 in. long, 1.5 in. wide. Peduncle over 1 ft. long, purple hairy; flower solitary. Upper sepal broad ovate, base narrowed, tip abruptly acute, base dull purple above green hairy, 1.5 in. long, .75 in. wide; lower sepals ovate shorter pale green. Petals 2 in. long, spatulate broadest at tip, base half twisted, dull yellowish-green centre bar purple, spotted. Lip glabrous, purplish, 1.25 in. long, .75 in. wide. Staminode orbicular wide emarginate at tip retuse behind yellowish centre green. Capsule 2 in. long. *Hab.* Local in woods and shady spots near streams in deep moss. Mountains. Pahang, Gunong Tahan at 5000 to 6000 ft. altitude (Ridley).

(4) **P. superbiens** *Pfitzer Engl. Jahrb.* xix, 40. *Cypripedium superbiens* *Rehb. fil. Bonplandia* 1855, p. 227; *William's Orch. Album* xi, pl. 486; *Ridl. Mat.* i, 230.

Leaves oblong tessellate, 5 to 7 in. long, 1.5 in. wide. Scape 9 to 12 in. long. Flowers 4 in. across, solitary. Upper sepal orbicular acute, white veined with green. Petals broad oblong greenish-white, ciliate along edge and dotted all over with purple warts. Lip helmet-shaped, reddish. Staminodes sub-orbicular, 2-lobed, green. *Hab.* Very rare. Malacca, Mt. Ophir (Lobb).

This has never been seen on Mt. Ophir again, nor apparently anywhere else.

(5) **P. Lowii** *Pfitzer l.c.* 41. *Cypripedium Lowii* *Lindl. Gard. Chron.* 1847, p. 765; *William's Orchid Album* 9, pl. 428.

Epiphytic. Leaves lorate narrow plain green, 9 to 15 in. long, 1 to 1.5 in. wide, coriaceous, bilobed. Scape 2 to 3 ft. tall, 3- to 5-flowered; flowers pubescent, 3 to 4 in. wide. Upper sepal ovate acute, yellowish-green, base purplish; lower ones similar smaller. Petals 3 in. long, spatulate twisted decurved, base yellow spotted black, tip bilobed, purple. Lip cylindric helmet-shaped brown-purple. Staminode obcordate green edged purple hairs, a tooth

on base and in sinus. *Hab.* Rare. High up in tall trees. Selangor, Semangkok Pass near Sempang Mines (Curtis). *Distrib.* Borneo.

I have twice found plants of a small *Paphiopedilum* with faintly tessellate leaves in sandy spots on the south shore of Johor; no flowers were seen, and I failed to grow it. It appears to be allied to *P. barbatum*.

ORDER CXXXVII. ZINGIBERACEÆ

Herbs terrestrial, rarely epiphytic, rhizomatous aromatic. Leaves thinly membranous or rather fleshy, large ovate or lanceolate, usually petioled shortly, and ligulate, sheathing below. Flowers medium to large and showy, irregular, in panicles or dense cymes or heads, bracteate, terminal or from the rhizome, rarely (*Plagiostachys*) falsely lateral. Calyx tubular usually trifid. Corolla tubular with three linear or oblong lobes. Lip usually broad and differently coloured, entire or trilobed. Staminodes 2, petaloid or reduced to points at the base of the lip or absent. Stamen one, 2-celled; anther terminal, the connective often prolonged into a crest or lateral spurs. Style slender filiform, lying between the anther-cells; stigma cup-shaped. Ovary superior 3-celled; ovules axile. Fruit capsular or sub-baccate. Seeds usually numerous aromatic, often arillate, albumen floury. Numerous in the tropics of the Old World, scanty in the New World.

Staminodes broad petaloid.

Spike or panicle terminal on a leafy stem.

Filament filiform longer than the corolla.

Lip adnate to the filament above the corolla;
flowers small 1. GLOBBIA

Lip free, lobes entire; flowers large 2. HEDYCHIUM

Lip adnate to corolla at base, lobes toothed;
flowers medium 3. ODONTYCHIUM

Filament short broad; staminodes broader than
petals.

Anther dorsifixed versatile 4. CAMPTANDRA

Anther-cells on a broad thin connective 5. KÆMPFERIA

Staminodes not broader than petals.

Anther thick terminal 6. GASTROCHILUS

Spikes radical cone-like.

Flowers in a head of broad persistent herbaceous
bracts.

Staminodes larger or smaller than petals;
stamen not spurred 7. HITCHENIOPSIS

Staminodes not broader than corolla-lobes;
stamen spurred 8. CURCUMA

Staminodes smaller; anther with long curved
arms; bracts rigid 9. CONAMOMUM

Staminodes at lip base; anther oblong
created; bracts papery 10. CARENOPHILA

Staminodes small, absent or adnate to lip.

Stamen with thin flat filament; lip large con-
volute; spike terminal in one species 11. COSTUS

- Stamen filament thick fleshy; scapes radical.
 Anther with long curved beak; lip 3-lobed . . . 12. ZINGIBER
 Anther with 3-curved arms; lip large broad . . . 13. AMOMUM
 Anther neither spurred nor crested.
 Lip narrow fleshy.
 Spikes sub-sessile buried in ground; capsule
 thin 14. HORNSTEDTIA
 Spikes on tall stout peduncles; capsule
 woody 15. PHEOMERIA
 Lip narrow deeply bifid; raceme radical . . . 16. GEOCHARIS
 Lip broad.
 Spike lateral from a leafy stem 17. PLAGIOSTACHYS
 Panicle creeping horizontal with distant
 few-flowered spikes 18. ELETTARIOPSIS
 Panicle compact erect or pendulous from
 rhizome 19. GEOSTACHYS
 Anther with small round crest or none.
 Panicle many branched terminal on a leafy
 stem 20. ALPINIA

1. GLOBBA, Linn.

Slender erect herbs with short rhizome. Leaves ovate or lanceolate. Inflorescence terminal, paniced lax. Flowers small, yellow, white or violet. Calyx tubular, 3-toothed. Corolla tube longer slender, lobes boat-shaped, reflexed. Staminodes similar. Lip base adnate to stamen forming a tube with it, limb narrow deflexed, often bilobed. Stamen filament long slender; anther decurved, ellipsoid, connective prolonged into a simple margin or 2 to 4 spurs. Style longer. Ovary 1-celled. Capsule globose, small. Seeds arillate. *Hab.* In damp spots. Bulbils are produced in the inflorescence occasionally in nearly all species. Species about 30, India, China, Malaya.

§ 1. *Aplanthera*. Anthers spurless; flowers yellow.

- Lip entire (1) *G. Wallichii*
 Lip bilobed (2) *G. uliginosa*

§ 2. *Ceratanthera*. Anther 2-spurred. Panicle lax slender.
 Flowers yellow.

- Anther-spurs narrow subulate from anther-base;
 staminodes about as long as corolla lobes.
 Leaves lanceolate narrow; calyx unequally
 3-toothed (3) *G. panicoides*
 Leaves lanceolate; calyx teeth equal (4) *G. fasciata*
 Leaves oblong; panicle stout and long . . . (5) *G. pendula*
 Leaves elliptic or ovate-lanceolate; stami-
 nodes much longer than corolla lobes . . . (6) *G. valida*
 Anther-spurs triangular from whole side of
 anther (7) *G. montana*
 Panicle short and dense on long peduncle . . (8) *G. malaccensis*
 Flowers white or violet.
 Lip oblong-ovate entire (9) *G. elegans*
 Lip bilobed obtuse; leaves glabrous . . . (10) *G. albiflora*
 Lip bilobed oblong; leaves glabrous . . . (11) *G. regalis*
 Lip bilobed oblong; leaves pubescent broad . (12) *G. leucantha*
 Lip bilobed linear; leaves oblong-lanceolate
 hairy (13) *G. violacea*

§ 3. *Marantella*. Anther 4-spurred. Flowers yellow or orange. Leaves numerous.

- Panicle short dense on a long peduncle.
 Leaves and peduncle hairy (14) *G. aurantiaca*
 Leaves glabrous; peduncle soft pubescent (15) *G. perakensis*
 Panicle elongate lax; bracts large persistent red
 or yellow (16) *G. variabilis*
 Panicle nodding; bracts green; flowers yellow;
 lip bilobed.
 Dwarf plant, bracts persistent; anther-spurs
 short unequal (17) *G. cernua*
 Tall plant, bracts caducous; anther-spurs
 long (18) *G. macranthera*
 Lip entire; bracts persistent (19) *G. brachycarpa*
 Leaf single; panicle dense decurved (20) *G. umifolia*

(1) *G. Wallichii* Bak. in Hook. fil. F.B.I. vi. 202; Ridl. Mat. Fl. Mal. Pen. ii. 3.

About 2 ft. tall. Leaves lanceolate long-acuminate pubescent or hairy on midrib beneath and ligule and sheath, 5 in. long, 1·5 in. wide, sheath spotted purple. Panicle long slender; branches 1 in. long, distant. Flowers few crowded at tips orange; bracts very small. Calyx campanulate, 2 long and 1 short lobes, ·12 in. long. Staminodes linear-oblong, ·15 in. long. Lip short linear entire, orange with a brown spot. Filament ·5 in. long; anther spurless. Capsule globose smooth. *Hab.* Local. Perak, Thaiping Hills (Fox); Penang Hill (Wallich, Curtis, etc.).

(2) *G. uliginosa* Miq. Fl. Ind. Bat. Supp. 613; Ridl. Mat. ii. 3.

Stems slender, 2 ft. long or less. Leaves lanceolate acuminate, 3 in. long, ·5 in. wide, pubescent beneath; sheaths spotted red hairy. Panicle slender; branches ·25 in. long. Flowers 2 or 3 on each. Bracts oblong green. Calyx funnel-shaped, lobes rather long. Corolla tube ·25 in. long, lobes ovate-oblong, upper one boat-shaped, ·5 in. long, orange. Staminodes oblong blunt. Lip narrow bilobed, orange with a black spot. Filament ·25 to ·5 in. long; anther elliptic, no margin or spurs. *Hab.* Damp spots, but not common. Singapore, Bukit Mandai. Malacca, Chabau (Griffith); Alor Gajah. Perak, Thaiping Hills; Goping (Kunstler). *Distrib.* Sumatra, Banca,

Closely resembles *G. panicoides*, Miq., except in the spurless anther.

(3) *G. panicoides* Miq. Fl. Ind. Bat. Supp. 614; Ridl. Mat. ii. 4.

Stems few tufted, 9 to 24 in. long. Leaves narrow lanceolate acuminate to ovate, 1·75 to 5 in. long, ·75 to 1·5 in. wide; ligule hispid; sheaths red spotted pubescent. Panicle slender; branches usually short. Flowers few orange. Calyx unequally 3-toothed, one tooth longer than the others, lanceolate blunt. Corolla-tube ·5 in. long, lobes ·5 in. long. Staminodes longer. Lip short oblong bilobed, central spot brown. Filament 1 in. long, connective developed all round, spurs two subulate. Capsule globose, ·25 in. long. *Hab.* Common in damp low-lying spots. Singapore, Bukit

Timah; Chan Chu Kang. Johor, Tempayan River. Malacca, Sungei Hudang and Ayer Panas (Derry). Negri Sembilan, Perhentian Tinggi. Selangor, Batang Berjuntai; Kwala Lumpur. Dindings, Bruas. Lankawi (Curtis). *Distrib.* Sumatra, Borneo. *Native names*: Haliya hutan; Haliya K'ra; Meroyan Tingal; Meroyan Berchoin; Pua birah; Bunga Lidah Muntah. *Use*: Rhizome aromatic, used in fever and rheumatism and in confinement medicine.

(4) *G. fasciata* Ridl. *Journ. Roy. As. Soc. S. Br.* 56, p. 101.

Two to three ft. tall. Leaves lanceolate acuminate caudate glabrous dark green with silver median bar, beneath pale, 7 in. long, 1 in. wide; ligule edges pubescent; sheaths glabrous. Panicle 6 to 9 in. long; branchlets very short with 2 or 3 orange flowers. Calyx funnel-shaped, teeth equal lanceolate acuminate orange. Corolla-tube twice as long, lobes oblong boat-shaped. Staminodes ovate shorter, broader. Lip narrow, lobes 2 deep spatulate. Anther-spurs slender, base broad, tip linear acuminate, longer than anther. Capsule globose sub-triangular, 1 in. long. *Hab.* Rare. Banks in woods. Perak, Temengoh River (Ridley).

(5) *G. pendula* Roxb. *As. Res.* xi. 359; *Fl. Ind.* i. 79; *Corom. Pl. t.* 228; *Ridl. Mat.* ii. 4.

Three ft. tall or more. Leaves oblong cuspidate glabrous, 9 in. long, 4 in. wide; ligule round pubescent, sheaths red-spotted, edges pubescent. Panicle long, stout, branches .25 in. long or more, few-flowered at end. Flowers orange. Calyx funnel-shaped, lobes unequal. Corolla-tube .5 in. long, lobes .25 in. long. Staminodes oblanceolate. Lip narrow bilobed, spot maroon. Stamen filament over .5 in. long; anther-spurs 2 linear subulate as long as the anther, a process at the anther tip. *Hab.* Local. Pahang, Tahan River. Perak, Thaiping Hills; Gunong Kerbau (Robinson); Changkat Serdang (Wray); Temengoh; Sira Rimau (Yapp). Penang (Roxburgh); near Waterfall. Kedah, Yan. *Distrib.* Tenasserim.

(6) *G. valida* Ridl. *Journ. F.M.S. Mus.* iv. 76.

Three ft. tall. Leaves elliptic or ovate-lanceolate shortly cuspidate glabrous, .7 in. long, 2 in. wide; sheath spotted purple hairy at mouth; ligule hairy. Panicle 18 in. long; branches 1 in. long, stout. Calyx cupular, .1 in. long with 2 cusps. Corolla-tube .5 in. long, lobes boat-shaped, .25 in. long. Staminodes linear-oblong much longer, all orange yellow. Lip short linear retuse. Stamen filament .5 in. long; anther-spurs 2, subulate from base, shorter than anther. *Hab.* Rare. Pahang, Telom woods.

(7) *G. montana* Ridl. *Journ. Roy. As. Soc. S. Br.* 22, p. 92.

About 2 ft. tall. Leaves lanceolate cuspidate pubescent beneath shortly petioled, 7 in. long, 1.5 in. wide; ligule pubescent; sheath hairy. Panicle 12 to 18 in. long, slender; branches 1 to 2 in. long, distant. Calyx campanulate, .12 in. long. Corolla tube .5 in. long, lobes broad ovate, .25 in. long, yellow. No staminodes. Lip small,

free above corolla entire. Filament .5 in. long, spurs triangular running whole length of anther. *Hab.* Rare. Kedah Peak and Yan (Ridley).

(8) *G. malaccensis* *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 93; *Mat.* ii. 5.

Two ft. tall or more. Leaves broad elliptic-lanceolate acuminate glabrous, 6 in. long, 2 in. wide; petioles sometimes .5 in. long; ligule and sheath pubescent. Panicle short compact, on a long peduncle nude except for linear green bracts, lowest 2 in. long; branches .25 in. long. Calyx cylindric, .25 in. long, lobes short. Corolla-tube .25 in. long, lobes ovate, under .25 in. long, yellow. Staminodes blunt oblong as long. Lip short oblong entire. Filament .75 in. long. Anther-spurs 2 triangular subulate lateral. Capsule globose wrinkled, .25 in. long. *Hab.* Common in woods. Johor, Gunong Pantai (King); Batu Pahat. Malacca, base of Mt. Ophir; Bukit Sadanen (Goodenough). Negri Sembilan, Bukit Kandang, and Bukit Sulu (Cantley). Selangor, Bukit Hitam (Kelsall). Perak, Bujong Malacca. *Native names:* Pua Rimbah; Pua Hudang; Pua Gajah. *Use:* In childbirth.

(9) *G. elegans* *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 96; *Mat.* ii. 5.

Over 1 ft. tall. Leaves lanceolate acuminate pubescent beneath, 5 in. long, 1.25 in. wide. Panicle slender; branches .5 in. long. Bracts persistent lanceolate green, .12 in. long. Flowers few, crowded at branch ends, white. Calyx-lobes unequal, .25 in. long. Corolla-tube .3 in. long, lobes oblong-ovate blunt. Staminodes similar. Lip oblong-ovate entire, central spot violet. Filament .5 in. long. Anther spurs 2 linear upcurved. Capsule globose, .4 in. long. *Hab.* Local. Dindings, Bruas and Gunong Tungul (Ridley).

(10) *G. albiflora* *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 96; *Mat.* ii. 6.

Three ft. tall. Leaves narrow lanceolate acuminate, glabrous green with silvery variegation when young, 8 in. long, 1 in. wide; sheath glabrous. Panicle 12 to 15 in. long, branches 1 in. long or less. Flowers white, 1 or 2 on branch-ends. Calyx tubular, lobes short lanceolate. Corolla-tube .5 in. long, lobes ovate boat-shaped. Staminodes oblong-linear longer. Lip obtusely bilobed, lobes rather long. Stamen filament, .75 in. long; anther-spurs 2, linear acuminate falcate, longer than anther. *Hab.* Local. Tringganu, Bundi (Rostados). Penang Hill, at 1200 ft. altitude (Curtis). *Native name:* Munkoa Bukit.

(11) *G. regalis* *Ridl. Journ. F.M.S. Mus.* iv. 75.

Plant 4 ft. tall. Leaves lanceolate or ovate-lanceolate long-pointed, 1 ft. long, 3 in. wide, base and midrib on back hairy, tip scabrid; ligule hairy; sheath edged with hairs. Panicle 18 in. long; branches many, .5 in. long, with 2 or 3 flowers ivory-white.

Calyx campanulate short and broad, .12 in. long, teeth short. Corolla-tube .25 in. long, pubescent, lobes boat-shaped violet. Staminodes shorter and broader. Lip narrow oblong bilobed. Stamen filament .5 in. long; anther-spurs 2 linear acuminate deflexed. All orange. *Hab.* By stream banks. Pahang, Telom (Ridley). Selangor, Menuang Gasing (Kloss) (sheaths red-spotted).

12) *G. leucantha* Miq. *Fl. Ind. Bat. Supp.* 712; *Ridl. Mat.* ii. 6. *G. pallidiflora* and *G. floribunda*, *Bak. in Hook. fil. F.B.I.* vi. 203 and 204. *G. stenothyrsa* var. *Cumingii* *Bak. l.c.* 204.

Two ft. tall or less, roots with tuberous swellings. Leaves broad

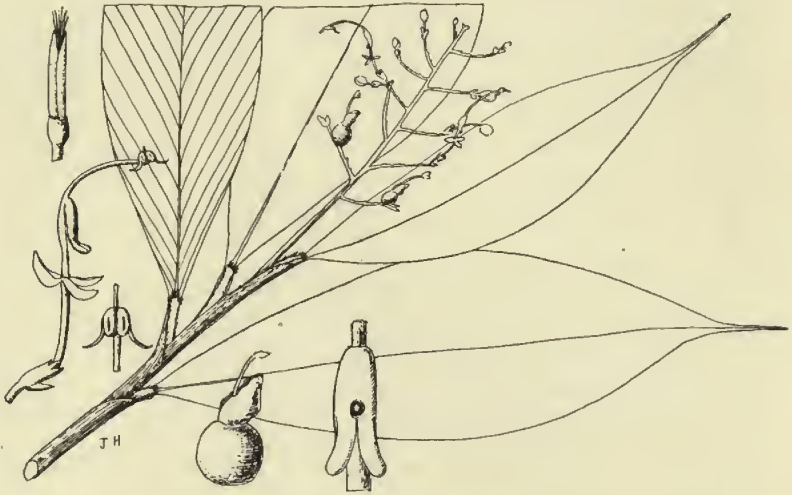


FIG. 181.—*Globba leucantha*.

lanceolate acute pubescent purple beneath, 8 in long, 3 in. wide; sheaths purple spotted hairy. Panicle lax; branches 2 in. long or more. Bracts ovate, white. Calyx tubular, .25 in. long, pubescent, 2 teeth longer than third. Corolla-tube .5 in. long. lobes boat-shaped, .25 in. long, white. Staminodes narrower oblong. Lip short oblong usually with purple central spot. Stamen filament 1 in. long; anther cordate, spurs 2, slender subulate. Ovary white pubescent. Capsule .5 in. long. *Hab.* In woods. Singapore, Bukit Timah (abundant); Bidadari. Johor, Tana Runto; Gunong Pulau; Gunong Pantai (King). Dindings, Lumut. Perak, Larut (Kunstler). *Distrib.* Sumatra.

Forms with the leaves on flowering stems suppressed occur. I think the type specimen of *G. stenothyrsa* var. *Cumingii* *Bak.* from Malacca, Cuming is young *G. leucantha*.

(13) **G. violacea** *Ridl. Journ. Roy. As. Soc. S. Br. 32, p. 97; Mat. ii. 7.*

One to two ft. tall, stout. Leaves oblong-lanceolate, long acuminate strigose hairy, 7 to 10 in. long, 2 in. wide; ligule and sheaths very hairy. Panicle long; branches many, .5 in. long. Bracts ovate-lanceolate white. Calyx cylindrical with 3 short points one shorter than others, white. Corolla-tube .25 in. long, lobes ovate, violet or white. Staminodes longer and narrower, violet. Lip linear bilobed, violet or white, spot darker. Anther-spurs 2 linear. Capsule globose, white. *Hab.* Forests to 4000 ft. altitude. Johor, Gunong Pulai. Selangor, Bukit Hitam (Kelsall). Dindings. Perak, Bujong Malacca; Gunong Keledang; Ipoh (Curtis); Gunong Inas (Wray); Gunong Kerbau at 4000 ft. altitude (Robinson).

(14) **G. aurantiaca** *Miq. Fl. Ind. Bat. Supp. 613; Ridl. Mat. ii. 7.*

About 18 in. tall, hairy. Leaves oblong-ovate cuspidate hairy beneath, 7 in. long, 3 in. wide, sheaths hairy. Peduncle 8 in. long or less, hairy; panicle short dense, 3 to 8 in. long; branches .25 in. long, dense. Flowers few orange. Bracts oblong hairy orange. Calyx funnel-shaped, .25 in. long, teeth short blunt. Corolla-tube .5 in. long, lobes large oblong. Staminodes short. Lip short broad oblong bilobed, central spot brown. Stamen filament .25 in. long; anther-spurs triangular 4. *Hab.* Hill woods to 5000 ft. altitude, common. Malacca, Brisu (Derry). Negri Sembilan Perhentian Tinggi; Gunong Berumbun (Cantley). Selangor, Sungei Buluh; Bukit Hitam; Menuang Gasing (Kloss). Perak, Thaping Hills; Sirah Rimau, base of Gunong Inas (Yapp). Penang, Moniot's Road and Penara Bukit. *Distrib.* Sumatra. *Native name:* Pua Gumbur.

(15) **G. perakensis** *Ridl. Journ. Roy. As. Soc. S. Br. 32, p. 98.*

Stout plant, 1 ft. tall or more. Leaves obovate cuspidate glabrous, 8 in. long, 4 in. wide; petioles .25 in. long, hairy; sheaths hairy. Peduncle 8 in. long. Bracts large ovate orange. Panicle short dense, 1 in. long; branches .5 in. long. Calyx .12 in. long, short pubescent orange. Corolla .25 in. long, lobes ovate. Staminodes linear-oblong blunt. Lip short oblong bilobed, spot brown. Anther-spurs 4 triangular. Capsule globose pustulate orange. *Hab.* Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Ipoh (Curtis); Bujong Malacca; Gunong Kerbau (Robinson).

(16) **G. variabilis** *Ridl. Trans. Linn. Soc. iii. 378; Mat. ii. 8.*

Stems over 1 ft. tall. Leaves ovate to ovate-lanceolate acuminate, glabrous, 4 in. long, 1.5 in. wide, dark green above, purple beneath. Panicle 4 to 5 in. long. Peduncle 6 in. long or more. Bracts 4 in. long, oblong orange or scarlet persistent. Calyx cylindrical orange. Corolla-tube more than twice as long, lobes oblong. Staminodes lanceolate-oblong shorter. All orange. Lip cuneate-oblong bi-

lobed, .25 in. long, spot chestnut. Anther-spurs 4, upper ones longest. Capsule sub-globose, wrinkled. *Hab.* Johor, Gunong Pantai; Gunong Pulai. Pahang, Tahan River and Kota Glanggi; Pulau Tiunan (Burkill). Selangor, Bukit Kutu. Perak, Thaiping Hills, Kelantan, Chaning. *Distrib.* Lingga, Borneo.

(17) ***G. cernua*** *Bak. F.B.I.* vi. 205; *Ridl. Mat.* ii. 8.

Stems tufted, 1 ft. tall, base purple. Leaves ovate acuminate cuspidate glabrous except midrib, 4 in. long, 1.5 in. wide; petioles .25 in. long or less; sheath pubescent. Panicle short lax nodding, 6 in. long, pubescent slender, with 6 lanceolate acute green bracts on the bare part. Flowers clustered on branch ends lemon yellow. Bracts ovate pale yellow. Calyx tubular, .25 in. long, lobes equal blunt. Corolla-tube .75 in. long, pubescent, lobes ovate, .25 in. long. Staminodes linear-oblong longer. Lip short oblong dilate towards bilobed tip, lobes acute, spot green. Anther-spurs 4, upper ones subulate, lower broader. Capsule green wrinkled. *Hab.* Hill woods, common where it occurs. Negri Sembilan, Bukit Tangga, Selangor, Ginting Bidai; Semangkok Pass. Perak, Thaiping Hills (abundant); Goping (Kunstler); Gunong Kerbau (Robinson).

(18) ***G. macranthera*** *Ridl. Journ. F.M.S. Mus.* iv. 76.

Plant 3 ft. tall or more. Leaves ovate to ovate-lanceolate, glabrous, 5.5 in. long, .75 in. wide; sheath and ligule glabrous. Panicle very lax decurved, about 10 in. long; branches distant, .5 in. long. Bracts linear-oblong, .5 in. long. Calyx cylindrical, teeth short lanceolate orange. Corolla-tube .5 in. long, lobes .25 in. long, ovate-lanceolate yellow. Staminodes .75 in. long, linear-oblong. Lip lobes divaricate yellow, central orange blotch. Stamen filament 1.5 in. long. Anther-spurs 4, long acuminate. *Hab.* Stream banks in forest, rare. Pahang, Telom (Ridley).

(19) ***G. brachycarpa*** *Bak. in Hook fil. F.B.I.* vi. 205.

Plant 15 in. tall. Leaves pubescent beneath ovate acuminate, 4.5 in. long, 1.5 in. wide; sheaths hairy. Panicle nodding, about 5 in. long; branches .5 in. long, all pubescent. Bracts on lower part, .25 in. long, oblong green. Flowers 4 or 5 at ends of branches, light yellow. Calyx funnel-shaped very short blunt, 3-lobed or entire, .12 in. long. Corolla-tube .25 in. long, lobes ovate. Lip linear entire. Anther-spurs 4, equal triangular. Capsule pustular. *Hab.* Perak, Thaiping Hills (Kunstler, Curtis).

I doubt if this is anything but a large form of *G. cernua*. Baker no doubt intended the name to be *trachycarpa*, on account of the pustular fruit, but it was incorrectly printed.

(20) ***G. unifolia*** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 193.

Rhizome creeping; stems 2 in. apart, 4 to 6 in. tall, covered with pubescent sheaths 1 in. long or less. Leaf 1, ovate acute, glabrous, 6 to 8 in. long, 3 in. wide; petioles .5 to 1 in. long. Panicle dense decurved, 2 in. long, pubescent. Bracts oblong-ovate pubescent. Calyx funnel-shaped, teeth obscure unequally bilobed pubescent.

Corolla-tube .25 in. long, lobes oblong. Staminodes similar. Lip very short sub-spathulate bilobed. Stamen filaments nearly .75 in. long; anther-spurs linear acuminate, upper ones larger. *Hab.* Very rare. Tringganu, Bundi (Rostados).

G. marantina Linn. Mantiss ii. 170, a short tufted plant usually less than 1 ft. tall, with large persistent ovate bracts, the flowers always replaced by large bulbils, occurs in gardens as a weed introduced from Java. Singapore, Botanic Gardens. Penang, Ayer Hitam (Curtis).

2. HEDYCHIUM, Koen.

Epiphytic or terrestrial herbs. Stems elongate leafy. Leaves oblong or lanceolate. Inflorescence terminal showy with subcoriaceous oblong or lanceolate bracts. Flowers one or more to each bract, large white, red or yellow. Calyx tubular 3-toothed. Corolla tube long, slender, lobes linear. Staminodes linear. Lip large bilobed; stamen long slender. Ovary 3-celled, many ovuled; style long filiform. Capsule 3-valved. Seeds with red aril. Species about 40, chiefly Indian, fewer Malayan.

H. coronarium Linn. A terrestrial species with pure white or yellowish white flowers, native of the Malay islands, is often cultivated in gardens. *Native name*: Ganda suli.

Terrestrial, roots fibrous; spikes elongate.

Lip broad bilobed white; bracts narrow . . . (1) *H. collinum*

Lip narrow; bracts broad (2) *H. malayanum*

Epiphytic, roots very thick fleshy grey.

Spike dense; flowers crowded, scarlet and orange (3) *H. longicornutum*

Spike lax; flowers distant, white (4) *H. macrorrhizum*

(1) *H. collinum* *Ridl. Journ. Roy. As. Soc. S. Br. l.c.* 103; *Mat.* ii. 9.

Terrestrial tufted plant, about 3 to 5 ft. tall. Leaves broad lanceolate acuminate cuspidate glabrous, 6 in. long, 3 in. wide. Spike lax nodding, 6 in. long. Bracts oblong truncate, about 20. Flowers white in pairs. Calyx cylindric, 1.5 in. long. Corolla 3 in. long, lobes linear narrow. Staminodes broader linear, 1.5 in. long. Lip cuneate bilobed, shorter. Filament red; anther very small. Capsule oblong. *Hab.* Rocky spots on mountains, Pahang, Gunong Tahan at 4000 ft. altitude. Kedah Peak on precipices at 4000 ft. altitude (Ridley).

(2) *H. malayanum* *Ridl.*

Leaves quite glabrous, oblanceolate sub-acute, long or narrowed at base, 16 in. long, 3.5 in. wide; petioles 9 in. long or more. Spike broad, 6 in. long; peduncle 6 in. long, sparsely silky hairy with a pair of linear bracts, the longest 3.5 in. long, .15 in. wide half-way. Floral bracts broad oblong, the lowest 3 in. long, 1.5 in. wide, with a mucro .25 in. long, upper ones shorter, very shortly

mucronate. Calyx-tube glabrous, .5 in. long, tubular, with a short ovate limb. Corolla-tube slender, 2 in. long, lobes linear, very narrow, 1.5 in. long. Staminodes as long, wider. Lip 1.25 in. long, base .25 in. long, narrow linear, limb sub-triangular deeply bifid. Stamen 2 in. long, filament slender; anther linear with the cells long, prolonged below into 2 horns. Style very slender; stigma cup-shaped hairy. Fruits orange. *Hab.* Mountain forest, Selangor, Fraser's Hill, Semangkok Pass (Mrs. Ferguson-Davie).

Allied to *H. erythrostemon* Schum. of Celebes, but distinct in its short calyx-tube.

(3) *H. longicornutum* *Bak. in Hook. fl. F.B.I. vi. 228; Ridl. Mat. ii. 10.* *H. crassifolium* *Bak. l.c.*

Epiphyte with a short rhizome and large thick fleshy roots. Stems 2 ft. tall. Leaves oblong acuminate, edges hairy, 1 ft. long, 4 in. wide; ligule 2 in. long, sheaths hairy. Spike dense, 4 in. long. Bracts lower ovate, upper lanceolate, brown silky. Calyx spathaceous oblique pink, 1 in. long. Corolla 3 in. long, lobes narrow linear, red. Staminodes and lip similar undulate orange, 1.12 in. long, .25 in. wide. Stamen filament 5 in. long, pinkish white; anther linear orange. Capsule oblong dark hairy brown, orange inside. Seeds 16, aril crimson. *Hab.* Widely scattered in forests on stems and branches of small trees. Johor, Castlewood; Muar (Feilding). Malacca, Ayer Panas and base of Mt. Ophir; Tabong (Griffith). Pahang, Gunong Senyum (Evans). Selangor, Ginting Bidai. Perak, Thaiping Hills; Ulu Bubong (Kunstler); Gunong Inas (Yapp). *Distrib.* Sumatra. *Native names:* Tepus Lada; Ubat Chaching. *Use:* Roots used for earache and as a vermifuge.

(4) *H. macrorrhizum* *Ridl. Journ. Roy. As. Soc. S. Br. 32, p. 202; Mat. ii. 10.*

Epiphyte, rhizome thick branched. Stems 1 ft. tall. Leaves lanceolate acute glabrous, 8 in. long, 2 in. wide. Spike nodding lax, 10 in. long. Bracts oblong blunt, 1 in. long, .25 in. wide, green hairy. Flowers 2 or 3 in a bract, white. Calyx pubescent, green, teeth 2. Corolla-tube 1.5 in. long, lobes linear, 1 in. long, very narrow. Staminodes similar. Lip deeply bifid, lobes lanceolate. Stamen filament 1.5 in. long. *Hab.* Very rare. Selangor, Semangkok Pass, on a very lofty tree (Ridley).

3. ODONTYCHIUM, Schumann.

Terrestrial with numerous stems. Leaves linear-lanceolate. Panicle terminal lax with short 3-flowered branches. Bracts cup-shaped. Calyx tubular brown papery unequally bilobed. Corolla tube cylindrical, upper lobe linear hooded, lower linear spatulate adnate to lip base. Staminodes linear. Lip linear, tip trilobed, lobes toothed. Stamen twice as long as the petals. Capsule globose.

(1) **O. denticulatum** Schum. *Pflanzenreich. Zingib.* p. 59; *Ridl. Mat. ii. 11.* *Hedychium denticulatum* Ridl. *Journ. Roy. As. Soc. S. Br. 32*, p. 102.

Stem 2 ft. tall. Leaves glabrous spinulose on edge, 8 in. long or more, 3 in. wide; sheath hairy. Panicle 1 ft. long. Bracts 1 in. long. Calyx .5 in. long. Corolla-lobes pinkish white, base green, 1.75 in. long, laterals green. Lip green, base red. Stamen white. Staminodes red. *Hab.* Very local. In hill woods. Dindings, Lumut, abundant (Ridley).

4. CAMPTANDRA, Ridl.

Small glabrous herbs; stems few. Leaves few ovate petioled. Flowers several enclosed in a terminal green spathe, fugacious white or violet. Calyx tubular, lobes equal. Corolla-tube slender, lobes lanceolate or oblong. Lip obovate bilobed. Staminodes large obovate. Stamen shortly projecting; anther long curved dorsifixed, base with 2 parallel processes. Style slender. Capsule oblong. Seeds curved fusiform, aril lacerate. Species 5, Malay Peninsula, Borneo.

- Stems several; leaves 4 or 5, base narrowed (1) **C. parvula**
- Stems solitary; leaves 1 to 4 distant, base round, often cordate.
- Stems tall; leaves large cordate; corolla tube short (2) **C. latifolia**
- Stems shorter; leaves fewer peltate; corolla tube longer than spathe (3) **C. ovata**
- Stems 2 or 3-leaved; corolla tube much longer than short spathe (4) **C. tahanensis**

(1) **C. parvula** Ridl. *Journ. Roy. As. Soc. S. Br. 32*, p. 104; *Mat. ii. 11.* *Kæmpferia parvula* Bak. in *Hook. fil. F.B.I. vi.* 233. (Fig. 182, p. 244.)

Stems several, 6 in. tall. Leaves 4 or 5, ovate acuminate oblique, 2 to 3 in. long, 1 in. wide; petioles 1 in. long. Spathe ovate acute, 1 in. long. Flowers 1 in. across, white. Calyx .5 in. long. Corolla tube .5 in. long, lobes oblong truncate. Lip oblong-ovate bilobed crenulate, with a central yellow spot and some pink marks. Staminodes sub-spathulate, .5 in. long. *Hab.* Common on rocks and banks in forest at 2000 to 4000 ft. altitude. Pahang, Tahan River; Telom. Negri Sembilan, Bukit Tangga; Gunong Angsi (Holtum). Selangor, Bukit Kutu. Perak, Thaiping Hills; Bujong Malacca; Goping (Kunstler); Temengoh; Gunong Kerbau (Robinson). Tomoh (Machado). Penang Hill. Tringganu, Bundi (Rostados).

The Temengoh plant has curiously fleshy leaves.

(2) **C. latifolia** Ridl. *Journ. Roy. As. Soc. S. Br. 32*, p. 105; *Mat. ii. 12.*

Stem usually solitary succulent, base swollen. Leaves 1 to 4, cordate acuminate, 5 in. long, 2 in. wide; petioles 1 in. long, dark

purple. Spathe ovate green, 1.5 in. long. Flowers 1 in. across, white or violet. Calyx red spotted. Corolla tube 1.5 in. long, lobes lanceolate blunt. Staminodes oblong round. Lip orbicular bilobed, 1.5 in. across, white or violet with yellow basal ridges. Capsule .5 in. long. *Hab.* Hills, very local. Pahang, Gunong Berumbun near Telom. Perak, Bujong Malacca (Ridley).

(3) *C. ovata* Ridl. *Mat.* ii. 12.

Stems solitary, 3 to 6 in. tall, base covered with sheaths. Leaves 2 or 3 peltate-ovate acuminate inæquilateral, base round, 1.5 to 3.5 in. long, .75 to 2 in. wide; petioles 1 to 1.5 in. long. Peduncle



FIG. 182.—*Camptandra parvula*.

.5 to 1 in. long. Bract .5 to 1 in. long, urn-shaped, tip recurved. Flowers 2 or 3. Calyx dilate upwards. Corolla tube slightly longer than bract, lobes pale blue or white, .25 in. long. Capsule oblong grey dotted brown, thin. *Hab.* Rare. Selangor, Hulu Semangkok at 4000 ft. altitude (Burn-Murdoch); Gunong Mengkuang Lebah at 5600 ft. altitude (Robinson).

(4) *C. tahanensis* Ridl. *Journ. F.M.S. Mus.* vi. 184.

Herb 5 to 6 in. tall. Leaves 2 to 4, ovate acuminate caudate oblique, base cordate round, 3 to 3.5 in. long, 1.25 in. wide; petioles 1 in. long. Peduncle .5 to .25 in. long. Bract urn-shaped, .75 in. long, green, 2-flowered. Calyx .25 in. long, reddish. Corolla tube .5 in. long, projecting, lobes white, .75 in. long, oblong. Lip large, obovate with 2 semi-ovate yellow keels. Capsule oblong .25 in.

long. *Hab.* Rare. By streams at 5000 ft. altitude. Pahang, Gunong Tahan (Ridley).

5. KÆMPFERIA, Linn.

Herbs with tuberous aromatic rhizomes; stems usually very short. Leaves large thin. Spike short-peduncled, bracts few, thin. Flowers fugacious showy, white or violet. Calyx short, cylindrical. Corolla tube slender, lobes narrow linear. Staminodes very large. Anther crested round, clawed spreading; lip similar bilobed. Stamen thin, flat included. Capsule oblong thin-walled. Species about 20, India, Burma, Siam, few in Malaya. Several species cultivated in gardens for the aromatic rhizomes.

§ 1. *Sincorus*. Flowers appearing with the leaves.

Flowers violet; leaves few basal.

- | | |
|--|--------------------------|
| Leaves ovate broad short petioled | (1) K. pulchra |
| Leaves oblong or lanceolate; petioles long | (2) K. elegans |
| Flowers white; leaves orbicular | (3) K. galanga |
| Leaves on a tall leafy stalk; lip violet | (4) K. cyanescens |

§ 2. *Protanthium*. Leaves disappearing before flowering, erect lanceolate.

Flowers showy (5) **K. rotunda**

(1) **K. pulchra** *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 107; *Mat.* ii. 13.

Leaves 2 flat spreading ovate blunt dark olive black with grey markings, 7 in. long, 5 in. wide. Spike from between leaves 1 in. long covered with convolute bracts, inner ones about 20, thin lanceolate; peduncle 3 in. long. Calyx very thin. Corolla tube 1 in. long, lobes linear blunt, .5 in. long. Staminodes rounded, broad mauve. Lip deeply bilobed, lobes oblong, mauve, base yellowish white. All flat forming a flower 1 in. across. Anther-crest long linear. *Hab.* On limestone rocks, growing in cracks. Kedah, Gunong Geriang. Jalor, Biserat (Gwynne-Vaughan), Lankawi (Curtis). *Distrib.* Siam.

(2) **K. elegans** *Wall. Cat.* 6593 (*sub Monolophus*); *Pl. As. Rar.* i. 24, t. 27; *Ridl Mat.* ii. 13.

Stem about 6 in. tall. Leaves 2, lanceolate-ovate blunt dark velvety, olive green, 5 in. long, 3 in. wide. Peduncle 1.5 in. long. Calyx spathaceous, limb long linear, 3-toothed. Corolla tube 1.5 in. long, lobes linear acute, white. Staminodes ovate violet, base yellowish. Lip deep bilobed violet. Altogether about 1 in. across. *Hab.* Limestone rocks. Kedah, Gunong Geriang. Lankawi (Curtis). *Distrib.* Pegu, Tenasserim.

(3) **K. galanga** *Linn. Sp. Pl.* 2; *Hort. Cliff.* 2.

With short stem and flat spreading, plain green leaves sub-orbicular, 3 to 6 in. across, sub-sessile and white flowers appearing singly in the centre, about 1 in. across with a purple spot on the lip base. *Hab.* Occurs in old gardens and as an escape. Cultivated as a spice and known as Chekur.

(4) **K. cyanescens** *Ridl.* Elettariopsis cyanescens *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 82.

Rhizome short, stout. Leafy stems, 27 in. tall, slender, glabrous. Leaves oblong-lanceolate, long acuminate, thin, base gradually narrowed, 6 in. long, 1.25 in. wide; petioles very short or none. Flowers with the leaves in basal spikes 1 in. long; peduncle .25 in. long. Bracts lower ones ovate, upper ones lanceolate, .5 in. long, reddish white. Calyx slender tubular spathaceous split on one side, more than half-way with 3 small points. Corolla tube 2 in. long, slender, lobes lanceolate acute thin white, 1 in. long. Staminodes lanceolate acute as long but broader white. Lip large obovate bilobed, violet veined with white. Anther white hairy. *Hab.* Mountain forests, Negri Sembilan, Bukit Tangga (Napier, Ridley).

(5) **K. rotunda** *Linn. Sp. Pl.* 3.

Has erect lanceolate leaves 1 ft. long and beautifully marbled dark green and grey and purple beneath. The flowers appear when the leaves have died down, on a short thick scape, and are large and showy, lilac with purple on the lip. *Native name*: Kunchur.

Valued as a spice and occasionally cultivated.

6. GASTROCHILUS, Wall.

Small herbs with rhizome. Stems short or long or none. Leaves lanceolate or ovate petioled, erect solitary or 3 or 4 in a tuft. Spikes axillary or from the rhizome; bracts numerous. Flowers thin opening singly white, yellow or red. Calyx tubular spathaceous. Corolla tube long and slender lobes oblong or lanceolate. Staminodes similar or larger. Lip oblong or obcuneate usually saccate or convolute, entire lobed. Stamen filament thick fleshy; anther oblong, crest rounded or lobed or o. Species about 30, Indo-Malaya, Siam.

§ 1. *Acranthi*. Stems tall and leafy; spikes axillary in the upper leaves. Lip saccate.

Petioles 2 in. long (1) **G. albo-sanguinea**
 Petioles short (2) **G. pulcherrima**

§ 2. *Mesanthi*. Rhizome short and thick; leaves in a tuft, the spike from between them.

Large tufted plants; leaves large, spikes elongate.

Bracts glabrous (3) **G. plicata**
 Bracts woolly (4) **G. Klossii**

Leaves several in a tuft, rhizome short and thick.

Spike cylindrical, bracts imbricate.

Leaves pubescent on back (5) **G. Prainiana**
 Leaves glabrous.

Spike 3 in. long; lip large connate (6) **G. lurida**
 Spike 6 in. long; lip orbicular (7) **G. tillandsioides**

Spike not cylindrical; bracts not imbricate.

Leaves glabrous; petioles short; corolla tube short; flowers yellow (8) **G. flava**

Leaves glabrous; petioles long; flowers white, tip of lip crimson, tube very long (9) **G. longiflora**

- Leaves glabrous; petiole long; flowers smaller, pink and white, tube short . (10) *G. pandurata*
- Leaves pubescent on back.
- Corolla-lobes oblong-lanceolate blunt . (11) *G. Curtisii*
- Corolla-lobes lanceolate acuminate acute . (12) *G. acuta*
- Corolla-lobes linear . (13) *G. clivalis*
- Leaves in distant pairs, rhizome slender.
- Spike elongate; bracts ligulate, spiral distant. (14) *G. scaphochlamys*
- Spike elongate; bracts oblong cuspidate distant (15) *G. lancifolius*
- Spike elongate; bracts narrow lanceolate acuminate . (16) *G. subbilobus*
- Spike sessile short; bracts linear; leaves glabrous . (17) *G. lanceolatus*
- Spike sessile short; bracts narrow lanceolate . (18) *G. longipes*
- Spike sessile short; bracts lanceolate pubescent; leaves softly hairy . (19) *G. puberula*
- § 3. *Exanthi*. Spike arising directly from rhizome; leaves solitary distant on slender rhizome.
- Leaf ovate, base round; petiole short.
- Bracts narrow, .5 in. long (20) *G. biloba*
- Bracts broad, 1 in. long (21) *G. oculata*
- Leaf lanceolate cordate; petiole long (22) *G. concinna*
- Leaf lanceolate, base narrowed inæquilateral; lip entire (23) *G. minor*
- Leaf lanceolate, base acuminate; lip bilobed (24) *G. longifolia*

(1) *G. albo-sanguinea* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. III; *Mat.* ii. 15.

Stem 12 to 18 in. tall, leafy. Leaves oblong-lanceolate acuminate, base broad round, 8 in. long, 2.5 in. wide; petioles slender, 2 in. long. Spike central, 5 in. long. Bracts lanceolate acute. Calyx spathaceous, .25 in. long. Corolla tube 1 in. long, lobes linear white. Staminodes oblong blunt, white tinted pink. Lip saccate white, edged red, .75 in. long. Anther crestless, .5 in. long. *Hab.* Perak, Thaiping Hills (Woolridge). Penang. Lankawi (Curtis).

(2) *G. pulcherrima* Wall. *Pl. As. Rar.* i. 22; *Bot. Mag. t.* 3930; *Ridl. Mat.* ii. 15.

Stems 6 to 12 in. tall. Leaves oblong caudate sessile or short-petioled, 4 to 6 in. long, 2 to 2.5 in. wide. Spike among leaves, 2 to 3 in. long. Bracts oblong-lanceolate green, 1.5 in. long. Calyx spathaceous, half as long as corolla tube, lobes linear-oblong, .5 in. long, white. Staminodes as long, white. Lip obovate cuneate saccate, 1 in. long, white tipped crimson. Filament short, no anther crest. *Hab.* Rare. Penang (Maingay). *Distrib.* Burma, Borneo.

(3) *G. plicata* Ridl. *Journ. Roy. As. Soc. S. Br.* 34, p. 196; *Mat.* ii. 15.

Large tufted plant. Leaves ovate acute plicate, 1 ft. long, 6 in. wide; petioles stout, 4 to 5 in. long. Spike lengthening to 8 in. long, and .5 in. through with numerous narrow sheaths with small blades at the top. Corolla tube 1 in. long, white, lobes linear acute, .5 in. long. Staminodes sub-spathulate rounded, 1 in. long, .5 in.

wide, light yellow. Lip 1 in. long, oblong entire, tip round, yellow, a red band at base or in centre and red tip. Stamen white crestless. *Hab.* Woods, Johor. Pulau Tiunan (Burkill). Selangor, woods near Klang Gates. Kelantan, Kwala Lebir (Gimlette); Kwala Aring (Yapp); Chaning Woods (Ridley).

(4) **G. Klossii** *Ridl. Mat. ii. 16.*

Rhizome long. Leaves numerous, oblanceolate, base cuneate, sub-acute, inæquilateral, 9 in. across; petioles 7 in. long. Spikes 3 in. long, 1 in. through; peduncles .5 in. long. Bracts lanceolate acute woolly pubescent. Flowers in pairs. Corolla pubescent. Anther crest ovate. *Hab.* Johor, near Gunong Pulai (Kloss).

(5) **G. Prainiana** *Ridl. Journ. Roy. As. Soc. S. Br. 32, p. 115; Mat. ii. 18. Kæmpferia Prainiana Bak. in Hook. fil. F.B.I. vi. 220.*

Leaves about 4 in a tuft, lanceolate acute narrowed to base, 8 in. long, 1.5 in. wide, pubescent beneath; petioles 5 to 6 in. long. Spike shortly stalked, central. Bracts numerous oblong blunt. Corolla tube slender, 1 in. long, lobes oblong, under .5 in. long, white. Staminodes similar. Lip oblong cuneate blotched red inside. Anther crestless. *Hab.* Perak, Goping (Kunstler). *Distrib.* Sumatra.

(6) **G. lurida** *Ridl. Mat. ii. 17.*

Leaves 2 or more in a tuft ovate-lanceolate undulate glabrous, 6 in. long, 1.5 to 2.5 in. wide; petioles 4.5 in. long. Spike subsessile, 3 in. long, flat deep purple. Bracts lanceolate acuminate, 1.5 to 2 in. long. Calyx spathaceous, .5 in. long. Corolla tube thick, 1.5 in. long, lobes oblong blunt, .75 in. long, pinkish. Staminodes obovate retuse, .5 in. wide. Lip convolute, 1 in. long, tip broad dark pink. Anther crestless. *Hab.* Very rare. Lankawi (Curtis).

(7) **G. tillandsioides** *Bak. in Hook. fil. F.B.I. vi. 218; Ridl. Mat. ii. 18.*

Leaves oblong sub-acute, base round, green above, purple beneath, 6 to 8 in. long; petioles nearly as long. Spike 6 in. long, sub-sessile. Bracts oblong, 20 to 30 imbricate. Calyx and corolla not described. Staminodes .25 to .3 in. long, white, linear-oblong. Lip orbicular cuneate, .5 in. long and wide, white with yellow spot in throat. *Hab.* Perak (Kunstler, cult. in Herb. Bot. Calc.). Rare and little known.

(8) **G. flava** *Ridl. G. minor Ridl. Mat. ii. 17 (not of Baker).*

Rhizome short. Leaves 4 in a tuft, oblanceolate blunt, 4 in. long, 1.25 in. across, dark green with a median central bar; petioles 1 in. long, sheaths red. Spike short central. Bracts yellowish. Flowers large, yellow, 1 in. across. Calyx tubular. Corolla tube as long as bract, lobes oblong blunt yellow. Staminodes oblong yellow, red spots at base. Lip 1 in. long, .5 in. wide, flat oblong blunt, yellow spotted red. Stamen long arched pink; anther-crest broad, obscurely 3-lobed. *Hab.* Perak, Batang Padang (Curtis); Bujong Malacca; Bukit Kapaiyung (Ridley).

(9) **G. longiflora** Wall. *Pl. As. Rar.* i. 22, t. 26; *Bot. Mag.* t. 4010; *Ridl. Mat.* ii. 17.

Leaves 4 in a tuft, cordate or cuneate glabrous, 6 to 12 in. long; petioles long. Spike short central. Bracts several lanceolate, 2 in. long. Calyx tubular, 3-pointed. Corolla tube 2 to 3 in. long, lobes .5 to 1 in. long, white blunt oblong. Staminodes longer obovate. Lip longer oblong cuneate, margins upcurved white, tipped dark crimson. *Hab.* Perak (Curtis, cultivated in Penang Gardens). *Distrib.* India.

Exact locality doubtful. The plant referred to this from Malacca by Baker is *G. pandurata*, Ridl.

(10) **G. pandurata** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 114. *Kämpferia pandurata* Roxb. *As. Res.* xi. 320; *Bot. Reg.* t. 173; *Rose, Scit. Pl.* t. 96.

Rhizome short aromatic. Leaves tufted, about 5, elliptic-lanceolate narrowed at base, 3 to 10 in. long, 2 to 3.5 in. wide; petioles 5 in. long. Spike central, 2 in. long. Corolla white or pink, tube 1.5 in. long or less, lobes lanceolate sub-acute. Staminodes similar. Lip saccate oblong white, spotted pink. *Hab.* Cultivated in gardens and occasionally occurring as an alien, probably of Sumatran origin. Malacca (Griffith); Lankawi (Haniff). *Native name*: Temu Kinchi.

(11) **G. Curtisii** Bak. *Bot. Mag.* t. 7363; *Ridl. Mat.* ii. 18.

Leaves 4 in a tuft ovate-oblong acute, 5 to 12 in. long, 2 to 5 in. wide, pubescent beneath; petioles stout, 6 in. long. Spike central, 1 in. long. Bracts oblong white, 1 in. long. Calyx as long, lobes oblong-lanceolate pubescent. Corolla tube 2 in. long, lobes oblong-lanceolate, 1 in. long. Lip blunt flat yellow cream with red marks. Anther-crest broad truncate. *Hab.* Lankawi. On limestone rocks (Curtis).

Colour variable, lip sometimes with lateral red blotches, sometimes plain; staminodes sometimes blotched.

(12) **G. acuta** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 202.

Leaves tufted ovate elliptic acuminate, base round, 10 in. long, 5 in. wide, hairy beneath. Spike central, 2 in. long; bracts lanceolate acute. Corolla tube 1 in. long, lobes lanceolate acuminate acute, white, .5 in. long. Staminodes .25 in. long, blunt narrow oblong. Lip short, .5 in. wide, obovate clawed, claw white with 2 pink streaks, limb light yellow, crenulate with 2 raised veins on disc. Anther-crest retuse. *Hab.* Setul on Batu Bunga (Ridley).

(13) **G. clivalis** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 114; *Mat.* ii. 18.

Rhizome slender. Leaves 3 or 4 in a tuft ovate to lanceolate acute, base narrowed inæquilateral, 4.5 to 8 in. long, 2 in. wide; petioles 5 to 6 in. long. All glabrous except a few hairs on back. Spike central, 3 in. long. Bracts long narrow with 4 or 5 flowers in each. Calyx tube .5 in. long, lobes lanceolate, 2 longer than third. Corolla tube 2 in. long, lobes linear, .5 in. long. Staminodes

broader. Lip oblong entire, tip round crisp. Anther-crest oval. *Hab.* Selangor, Semangkok Pass, on banks (Ridley).

(14) *G. scaphochlamys* *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 112; *Mat.* ii. 16; *Scaphochlamys malaccana* *Bak. in Hook. fil. F.B.I.* vi. 252.

Rhizome long creeping. Leaves 2 or 3 in a tuft, lanceolate inæquilateral acute or blunt pubescent beneath, 6 to 7 in. long, 1.5 in. wide; petioles 3 to 4 in. long, pubescent. Scape central, 5 to 9 in. long. Bracts spiral ligulate blunt distant pubescent green, sheaths red, 1 in. long, .5 in. wide. Flowers white, fragrant. Corolla tube 1 in. long, lobes oblong-lanceolate, .5 in. long, as are staminodes. Lip obovate undulate bilobed, a central yellow bar. Anther-crest large orbicular. *Hab.* Muar, Bukit Muar (Feilding); Malacca, Mt. Ophir (Cuming, Griffith, etc.).

(15) *G. lancifolius* *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 112; *Mat.* ii. 16.

Rhizome slender. Leaves in pairs lanceolate acuminate acute inæquilateral, 7 to 8 in. long, 2 in. wide; petiole 5 in. long. Spike central, 3 in. long. Bracts 5 or 6, oblong cuspidate distant, .5 to 1 in. long. Flowers in threes, small yellow. Calyx .75 in. long. Corolla tube 1 in. long, lobes linear, .25 in. long. Staminodes oblong round broader. Lip bilobed round, .5 in. long. Anther-crest cuneate trilobed. *Hab.* Rare. Johor, Kwala Sembrong (Kelsall). Negri Sembilan, Senaling Forest Reserve (Holtum).

(16) *G. subbilobus* *Burkill MS.*

Rhizome moderately stout. Leaves crowded, ovate-lanceolate slightly oblique, narrowed at the base, papillose beneath and with rather long sparse hairs, or glabrous; nerves fine, 6 pairs with many more slender nervules between; 4 to 6 in. long, 1.75 to 2 in. wide; petioles 3 to 4.5 in. long; sheaths 1 to 3 in. long. Racemes 3 to 4.5 in. long, slender hairy. Bracts 5, lanceolate acuminate narrow, 1 in. long, hairy distant, 2-flowered. Corolla tube very slender, 1 in. long, lobes lanceolate, .3 in. long. Staminodes as long oblong blunt. All white. Lip broad obtuse, tip broad sub-truncate, very shortly bilobed, white with a yellow central patch. *Hab.* Johor, Pulau Tioman, Joara Bay (Burkill).

(17) *G. lanceolatus* *Ridl. Mat.* ii. 16.

Rhizome slender woody. Leaves paired light green barred white lanceolate oblique, base narrow blunt, 4 in. long, glabrous; petioles 1.25 in. long. Bracts linear-lanceolate narrow, .75 in. long. Flowers white. Calyx spathaceous. Corolla tube 1 in. long, lobes lanceolate, .25 in. long. Staminodes narrower. Lip obtuse, .5 in. long. Anther-crest broad truncate. *Hab.* Rare in forests, Johor, Gunong Pantai (Ridley).

(18) *G. longipes* *Journ. Roy. As. Soc. S. Br.* 32, p. 113; *Mat.* ii. 17.

Rhizome far creeping. Leaves 2, elliptic-ovate sub-acute,

glabrous, 8 in. long, 4 in. wide; petioles 9 in. long. Spike central, 2 in. long. Bracts few narrow long lanceolate. Corolla tube long, lobes lanceolate. Staminodes broader than petals and longer than lip. Lip entire oblong, tip round, edges crisp, .25 in. long. Anther-crest large, rounded. *Hab.* Perak, Bria (Wray).

(19) **G. puberula** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 102.

Rhizome long creeping. Leaves 2 or 3 lanceolate narrowed to petioles acuminate, beneath softly hairy, 9 to 12 in. long; petioles 6 to 8 in. long. Spike central, 2 in. long. Bracts lanceolate pubescent. Corolla tube 1.5 in. long, lobes oblong-linear blunt, .5 in. long, white. Staminodes broad oblong truncate, white. Lip obcuneate shortly trilobed at tip yellow, central ridge edged red. Anther-crest oblong retuse. *Hab.* Rare. Muddy stream banks, Perak, Temengoh, on Sungei Tampan (Ridley).

(20) **G. biloba** *Ridl. Trans. Linn. Soc.* iii. 379. *G. calophylla* *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 115.

Rhizome rather long and slender. Leaves solitary distant obovate or oblong, base round blunt, deep blue green with a white feather, rose pink beneath, 6 in. long; 4 in. across; petiole 2 in. long. Spike close to leaf from rhizome enclosed in sheath; peduncle 1 in. long. Bracts blunt red, .75 in. long. Calyx very short. Corolla 1 in. long, lobes lanceolate acute. Staminodes shorter blunt, white. Lip obovate, bilobed white, centre yellow. Anther-crest broad retuse. *Hab.* Creeping among dead leaves in dense forest, rare. Pahang, Tahan River. Selangor, Semangkok Pass. Perak (Kunstler).

(21) **G. oculata** *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 117; *Mat.* ii. 19.

Rhizome rather long, creeping. Leaf solitary ovate dark green, back purplish, 8 in. long, 4.5 in. wide; petiole 10 in. long. Peduncle 1 in. long, enclosed in sheath. Spike 1.5 in. long. Bracts .5 in. long, red, lower blunt, upper acute. Flowers 2 in bract. Calyx .5 in. long, 2-lobed. Corolla tube 1 in. long, lobes lanceolate acute, .75 in. long. Staminodes oblong-lanceolate, .5 in. long. All white. Lip obovate bilobed, .5 in. wide white, centre yellow, 2 crimson spots at base. Anther pubescent, crest short round. *Hab.* Johor, Gunong Janeng (Kelsall). Pahang, Selinsing (Machado). Selangor, Semangkok Pass (Ridley).

(22) **G. concinna** *Ridl. Journ. Roy. As. Soc. S. Br.* 34, p. 116. *Kæmpferia concinna* *Bak. F.B.I. l.c.* 221.

Rhizome slender. Leaf solitary lanceolate acuminate, base round cordate, 6 in. long, 1.5 in. wide; petiole slender, 9 in. long. Spike 3 in. long, peduncled. Bracts lanceolate acute, red. Calyx very short. Corolla-tube over 1 in. long, lobes white striped red. Lip oblong, edges incurved. Anther-crest small entire. *Hab.* Perak, Ulu Bubong (Kunstler).

(23) **G. minor** *Bak. in Hook. fil. F.B.I. vi. 217.* *G. biloba* var. *lanceolata* *Ridl., Journ. Roy. As. Soc. S. Br. 57, p. 102.*

Rhizome long creeping. Leaves solitary or paired distant oblanceolate sub-acute narrowed to base, 5 in. long, 2 in. wide; petiole 3 in. long. Spike sub-sessile enclosed with the petiole base in a sheath about 2 in. long. Corolla tube slender, as long as bract, 1 in. long, lobes oblong sub-acute, white. Staminodes about .5 in. long. Lip .75 in. long, entire white and marked with red and yellow, sides incurved. *Hab.* Perak, Larut (Kunstler); Temengoh, on banks (Ridley).

Having seen a type of this at Kew, I note that it is not the plant I identified it with previously, but is allied to *G. biloba*. The Temengoh plant described by me as *G. biloba* var. *lanceolata* seems to be the same thing.

(24) **G. longifolia** *Ridl.*

Rhizome short. Leaves solitary elliptic-lanceolate shortly cuspidate, base rather long-narrowed; nerves prominent about 6 pairs, above glabrous, beneath softly hairy especially on the midrib, 9 in. long, 3 in. wide; petiole 7 in. long, hairy. Spike oblong, 1.5 to 2 in. long; peduncle 1 to 3 in. long, with a basal bract lorate-oblong, 1.5 in. long, .25 in. wide, pubescent. Floral bracts lanceolate acuminate strongly ribbed hairy, the lowest about 1 in. long. Corolla tube slender curved at the top, 1 in. long, lobes linear acute, .25 in. long, white. Lip .5 in. long, .25 in. wide, oblong-obovate bilobed, lobes round. *Hab.* Banks of streams in forest. Selangor, Ulu Gombak (Ridley).

7. HITCHENIOPSIS, Ridl.

Herbs with creeping rhizomes. Leaves solitary or many in a tuft. Spike peduncled with numerous large herbaceous bracts as in *Curcuma* from centre of tuft or separate when only one leaf, but always appearing with the leaf. Calyx spathaceous. Corolla tube long, lobes oblong or linear. Staminodes larger or narrower. Stamen without spurs. Species about 10, Cochinchina, Malay Peninsula.

Valeton suggests the genus *Gastrochilus* for these in part, but I cannot agree; the whole habit of these plants is so *Curcuma*-like that Baker and I formerly put them into that genus. Baker's section *Hitcheniopsis* contains a mixture of *Curcuma* and other genera, and he does not put in *C. Kunstleri*. However, the name is not occupied generally, so I use it.

Leaves in pairs broad ovate; peduncle short; flowers medium-size

(1) **H. Kunstleri**

Leaves 2 or 3 narrow lanceolate; peduncle tall slender; flowers very small

(2) **H. lanceolata**

Leaf solitary ovate, base round; peduncle long slender

(3) **H. sylvestris**

(1) **H. Kunstleri** *Ridl.* *Curcuma Kunstleri* *Bak. F.B.I. vi. 214; Ridl. Mat. ii. 22.* *Kæmpferia lutea* *Wright, Kew Bulletin, 1907, p. 60.*

Rhizome moderately stout. Leaves paired obovate cuspidate,

1 ft. long, 6 in. across, dark green above, purple and pubescent beneath; petioles 4 in. long. Spike from between leaves 4 in. long. Bracts few, 1 in. long, deep red. Corolla tube 1 in. long, white, lobes lanceolate acute, .5 in. long, white or light yellow. Staminodes oblong blunt. Stamens pubescent. Lip obovate bilobed denticulate yellow, with pink streaks at base. Stamen pubescent, crest none or very short. *Hab.* In forests locally abundant. Perak, Thaiping Hills; Tapah (Wray); Temengoh; Goping; Sira Rimau (Yapp); Dindings, Gunong Tungul (Ridley). Kedah Gunong Bintang (Kloss).

var. *rubra* Ridl. Staminodes, lip and anther dark red. Perak, Kwala Dipang, base of limestone cliffs (Curtis, Ridley).

Curcuma grandiflora Wall. *Bak. F.B.I.* v. 216. "Malay Peninsula," a drawing in *Herb. Kew*, looks suspiciously like this plant.

(2) *H. lanceolata* Ridl. *Curcuma lanceolata* Ridl. *Mat.* ii. 22.

Leaves 2 or 3 in a tuft, lanceolate sub-acute narrowed to base, midrib beneath hairy, 8 in. long, 2.5 in. wide; petioles 6 in. long. Peduncle 3 in. long. Spike obconic, 1 to 2 in. long. Bracts ovate-lanceolate green acute, .75 in. long or less. Calyx .25 in. long. Corolla tube .5 in. long, lobes oblong, .25 in. long. Staminodes much smaller, pubescent. Lip oblong blunt white, tip yellowish, sides barred crimson. Filament pubescent; anther-crest small ovate. *Hab.* Wet spots in forest. Perak, Bujong Malacca (Curtis); Tapah; Chanderiang (Kunstler).

(3) *H. sylvestris* Ridl. *Curcuma sylvestris* Ridl. *Trans. Linn. Soc.* iii. 378; *Mat.* ii. 22.

Rhizome slender, far creeping. Leaf 1, ovate acute, base round, glabrous, 8 in. long, 4 in. wide, purple beneath; petiole slender, 18 in. long. Peduncle 4 to 6 in. long. Spike obconic, 1.5 in. long. Bracts broad ovate, tips recurved rosy. Flowers white. Corolla tube .5 in. long, lobes linear acute, .5 in. long. Staminodes broader lorate blunt. Lip oblong-obovate emarginate round, white, central bar yellow, with violet streaks. Anther oblong, crest broad recurved, violet. *Hab.* Very local, but abundant. Pahang, Tahan River woods to mouth of Teku River (Ridley).

8. CURCUMA, Linn.

Herbs usually with thick fleshy rhizomes, stems short or 0. Leaves oblong thin usually tufted. Spikes peduncled. Bracts large ovate forming a cone, upper ones empty, lower ones containing several fugacious flowers with several bracteoles. Calyx short, cylindric toothed. Corolla tube funnel-shaped, lobes oblong or ovate. Staminodes petaloid. Lip orbicular or ovate. Stamen filament broad short, anther-cells linear, spurred at base. Style filiform; ovary 3-celled. Capsule globose, 3-valved. Seed arillate. Species about 35, India, Siam, Malaya, Australia.

(1) *C. zedoaria* *Roscoe Scitam. t. 109; Ridl. Mat. ii. 21. C. zerumbet Roxb. As. Res. xi. 33; Corom. Pl. t. 101.*

Rhizome large fleshy, orange inside. Leaves paired, lanceolate green with a purple central splash, 18 in. long, 6 in. wide. Scape outside the leaf tuft; peduncle 18 in. long. Spike 6 in. long or more. Bracts about 20, lower ones green, tipped pink, upper ones lanceolate, deep crimson. Flowers 4 in a bract. Calyx .25 in. long, hairy. Corolla tube 1 in. long, yellowish white, lobes .5 in. long. Staminodes oblong. Lip oblong-obovate, bilobed yellowish, tipped orange. Anther spurred. *Hab.* Common in waste ground and abandoned cultivation. Singapore, Penang, Kedah. *Distrib.* India, Malay isles. *Native name:* Temu Kuning.

CULTIVATED SPECIES.

- C. DOMESTICA* *Valeton Bull. Jard. Bot. Buitenz. xxxviii. 31. C. longa Koen., Ridl. and other authors.* This is the local Turmeric, *Kunyit* of the Malay Peninsula. Native of Java. The original *C. longa* Linn. is altogether dubious. *C. domestica* has a rhizome deep orange colour inside, short leaves of a light green and a short spike of green bracts about 4 in. long, the uppermost usually tipped pink. Flowers pale cream with a strong yellow bar down the lip. It supplies the Turmeric used in curries and is also used as a dye.
- C. MANGGA* *Valeton l.c. 50. Temu Pauh.* Rhizome yellow inside with smell and taste of wild carrots. Leaves long with a purple splash in centre or entirely green. Spike produced outside the leaves. Lower bracts white, median green, terminal bracts violet red. Sparsely cultivated.

I have never seen this in flower.

- C. XANTHORHIZA* *Roxb. Fl. Ind. i. 25; Valeton l.c. 61. Temu Lawas.* Rhizome deep orange inside. Leaves deep green with a purple central feather. Spike lateral, scape short. Bracts pale green edged red, uppermost red violet, base green striped. *Distrib.* Java.
- C. AERUGINOSA* *Roxb. Fl. Ind. i. 27; Valeton l.c. 65. Temu hitam.* Rhizome grey polished, inside bluish. Leaves glabrous green with purple central bar. Scape separate from leaves. Upper bracts hairy red violet lighter below, mucronate. Flowers short, broad. Petals and tube dark pink red, inner parts yellow, middle of lip deep yellow. *Distrib.* Java, Burma.

9. CONAMOMUM, Ridl.

Stout tall plants with a woody stilted rhizome. Leafy stems tall. Leaves oblong-lanceolate. Scapes peduncled from rhizome

with large dense spike of flowers with stiff coriaceous green or brown persistent bracts. Calyx tubular. Corolla tube short, thick, upper lobe largest. Staminodes linear smaller. Lip entire or 3-lobed. Stamen short broad; anther with curved linear arms. Species 3.

Spikes glabrous.

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| Inner bract utricular; calyx utricular | (1) C. utriculosum |
| Inner bract ovate; calyx tubular | (2) C. citrinum |
| Spikes velvety; ligule silky | (3) C. sericeum |

(1) **C. utriculosum** *Ridl. Journ. Roy. As. Soc. S. Br. 32, p. 122; Mat. ii. 23.*

Rhizome very large, stilted. Stems 6 ft. tall, clubbed at base. Leaves lanceolate or oblong cuspidate, 18 in. long, 2 to 4 in. wide; petioles 1 in. long. Spikes glabrous, 6 to 18 in. tall; peduncles 6 in. tall. Outer bracts ovate acute, 1 in. long. Bracteole utricular, 6-lobed. Calyx utricular enclosing corolla tube, lobes 3, blunt round. Corolla lobes oblong blunt. Lip fan-shaped clawed, buff with red veins. Staminodes linear. Anther-crest ovate round. Capsule fusiform, 1 in. long. *Hab.* Mountain forests. Perak, Thaiping Hills (Ridley); Gunong Batu Putih (Wray).

(2) **C. citrinum** *Ridl. Journ. Roy. As. Soc. S. Br. 32, p. 121; Mat. ii. 23.*

Leaf-stems tall. Leaves oblong cuspidate to base acute, 1 ft. long, 3 in. wide. Scapes 13 in. tall; peduncle 8 in. long. Spike dense. Bracts light green ovate glabrous. Calyx .25 in. long. Corolla lobes elliptic-oblong white, upper one .5 in. long, others shorter. Staminodes linear, dull red. Stamen .5 in. long; anther yellow, spotted red. Capsule globose, .5 in. long, purple. *Hab.* Mountain forests. Perak, Thaiping Hills; Bujong Malacca (Ridley); Gunong Kerbau (Robinson).

(3) **C. sericeum** *Ridl. Journ. F.M.S. Mus. vi. 185.*

Rhizome large, stilted. Stems 8 ft. tall. Leaves oblong-lanceolate, 18 in. long, 7 in. across, glabrous except tip and ligule silky. Peduncles 6 to 7 in. long. Spikes cylindric, .4 in. long; rachis hairy. Bracts urceolar subulate silky. Calyx tubular papery. Corolla tube shorter, lobes elliptic-oblong white. Lip ovate 3-lobed, lobes sub-equal, yellow, midlobe darker, sides spotted pink. Anther-crest 3-lobed, white tinted and spotted pink. Fruit elliptic. *Hab.* Pahang, Gunong Tahan in damp woods at 4000 to 5000 ft. altitude (Ridley).

10. CARENOPHILA, Ridl.

Stem tall. Leaves linear acuminate. Spike from rhizome; peduncle short with papery bracts, floral ones ovate, large. Calyx bifid longer than corolla tube. Corolla lobes oblong blunt. Lip entire oblong blunt. Staminodes of 2 thin oblong lobes at base of

lip. Anther large oblong, crest large round entire. Ovary glabrous. Fruit globose, smooth, deep claret colour. Species 1.

(1) *C. montana* Ridl. *Journ. F.M.S. Mus.* vol. iv. 78.

Stems about 3 ft. tall. Leaves 12 to 15 in. long, 2 in. wide, woolly hairy beneath, sheath and ligule yellow woolly hairy. Spike 5 in. long. Bracts ovate pink, uppermost 3 in. long. Calyx 1 in. long, pink. Corolla tube pink, lobes white, 1 in. long. Lip little longer entire edges upcurved white, speckled red. Fruit as big as a cherry. *Hab.* Rare. Pahang, summit of Gunong Berumbun, Telom at 6000 ft. altitude (Ridley).

11. COSTUS, Linn.

Stems tall, often spiral, sometimes branched. Leaves lanceolate, shortly petioled, ligule forming a complete ring. Spike terminal or on rhizome. Bracts stiff, often spiny. Calyx tubular trilobed. Corolla funnel-shaped, lobes large. Lip obovate usually entire, trumpet-shaped. Stamnodes 0. Stamen very broad and thin, crest long, acute or upcurved. Capsule woody splitting on one side. Species about 40, South America, Africa, Indo-Malaya, Australia.

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| Spike terminal; flowers white. | (1) <i>C. speciosus</i> |
| Spike on rhizome, large. | |
| Bracts strongly spiny; flowers red | (2) <i>C. globosus</i> |
| Bracts hairy not pungent; flowers yellow | (3) <i>C. Kingii</i> |
| Bracts broad hairy and pungent; whole plant hairy; flowers red | (4) <i>C. velutinus</i> |
| Spike small; bracts glabrous thin | (5) <i>C. Kunstleri</i> |

(1) *C. speciosus* Sm. *Trans. Linn. Soc.* i. 249; *Ridl. Mat.* ii. 24.

Stems 6 to 10 ft. tall and up to 1 in. through, branched and spiral. Leaves 9 in. long, 3 in. wide, above glabrous, beneath more or less pubescent oblong acuminate. Spike ovate or oblong, terminal (very rarely on rhizome), 6 in. long or less. Bracts ovate mucronate, red, .75 in. long. Calyx short, red. Corolla .25 in. long, lobes 2 in. long, white, often tinged rose. Lip very large, 4 in. long and wide, white, central bar yellow. Stamen 2 in. long, hairy on back, crest oblong acuminate, orange beneath. *Hab.* Common in damp open spots and edges of forests, from Singapore to Perlis.

var. *argyrophyllus* Wall. *Cat.* 6555. A more slender woodland form, more branched, leaves silky on the back, flowers and spikes smaller. Lip entirely white smaller; petals often pink-tinted. *Hab.* In forests. Common. *Distrib.* Indo-Malaya. *Native name:* Tawar or S'tawar. *Use:* In magic ceremonies.

(2) *C. globosus* Bl. *Enum. Pl. Jav.* 62; *Ridl. Mat.* ii. 25.

Stems 6 to 8 ft. tall, rather slender. Leaves on one side of the stem, oblanceolate acuminate, midrib pubescent beneath, 7 in.

long, 2.5 in. wide. Spike on rhizome; peduncle 3 in. long. Bracts broad ovate shortly mucronate, red, 1 in. long. Calyx tubular with three sharp points, red. Corolla-lobes pubescent lanceolate acute. Lip obovate convolute, 2 in. long, fringed with hairs. All cherry red. Anther-crest ovate blunt, red, back woolly. *Hab.* Common in dense forests. Malacca (Maingay). Singapore, Bukit Timah. Johor, Gunong Pantai; Pulau Tioman (Burkill). Pahang, Tahan River. Negri Sembilan, Tampin. Selangor, Batu Caves. Perak, Thaiping Hills; Temengoh (Ridley). *Distrib.* Sumatra, Java, Borneo.

(3) *C. Kingii* Bak. in *Hook. fil. F.B.I.* vi. 250; *Ridl. Mat.* ii. 25.

About 6 ft. tall, stout. Leaves oblanceolate-oblong cuspidate, soft pubescent beneath, ligule very short, 8 in. long, 3 in. wide. Spike from rhizome 2 in. long, conic cylindrical, 3 in. long, 2 in. through. Bracts ovate, .75 in. long, mucronate, not pungent. Calyx lobes mucronate, not pungent. Corolla-lobes oblong pubescent. Lip .3 in. long, 2 in. wide, obovate convolute. All orange yellow. Filament white woolly, rather short, tip round, orange. *Hab.* In dense forests. Perak, Thaiping Hills (Kunstler). Penang, Pulau Betong and Balik Pulau (Curtis).

(4) *C. velutinus* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 103.

About 6 ft. tall, leaf sheaths softly densely velvety. Leaf oblanceolate cuspidate narrowed to base, 9 in. long, 2.25 in. wide, glabrous above except midrib, softly silky beneath. Spike from rhizome on peduncle 4 in. long, hairy, obconic, 2 in. long and wide. Bracts outer oblong-ovate, soft hairy, broad mucronate, pungent. Calyx 1 in. long, points pungent. Corolla tube as long, lobes lanceolate acute, 1.5 in. long, hairy outside. Lip obcuneate, 1.5 in. long and wide, hairy outside. All cherry red. Anther hairy, .5 in. long. *Hab.* Rare. In dense forest. Perak, Ulu Temengoh (Ridley).

(5) *C. Kunstleri* Ridl. *Mat.* ii. 25. *C. oligophyllus* Schum. *Pflanzenreich. Zingib.* 408.

Very slender plant, 18 in. tall or more, glabrous. Leaves oblanceolate acuminate, 6 to 7 in. long, 2.5 in. wide. Peduncle 1.5 to 3 in. long, slender on rhizome. Spike obconic, 1.5 in. long. Bracts thin lanceolate, not spiny. Calyx-tube .5 in. long. Corolla tube 1 in. long, slender, lobes oblong. Lip obovate convolute, 1.5 in. long, .5 in. across. Stamen crest linear. *Hab.* Rare. A very small species. Perak, Thaiping Hills (Kunstler).

12. ZINGIBER, Adans.

Rhizome stout aromatic. Stems leafy. Leaves lanceolate. Spike cylindrical or conic red or yellow from rhizome. Bracts large containing 1 or more flowers. Calyx tubular short. Corolla tube little longer than bract, lobes oblong or lanceolate. Staminodes o.

Lip 3-lobed; midlobe the longer. Stamen filament linear; anther-cells linear, connective forming a long curved beak. Capsule thin-walled, three-valved. Seed black, arillate. Species 30, Indo-China, Malaya.

The ginger plant "*Haliya*" *Zingiber officinale* Rosc. is commonly cultivated in fields. It is about 1 ft. tall, with narrow leaves, the spike borne on a peduncle from the rhizome, rarely terminal; bracts green, flower yellow densely spotted black.

Spikes with broad base and blunt tip; bracts recurved at tip.

Leaf stems 4 to 7 ft. tall.

Spikes cylindric, large; bracts broad . . . (1) *Z. spectabile*
Spikes oblong large; bracts lanceolate . . . (2) *Z. Kunstleri*

Leaf stems slender, about 2 ft. tall.

Spikes obconic; bracts narrow . . . (3) *Z. Wrayi*

Spikes cylindric-globose green turning red, blunt; midlobe entire . . . (4) *Z. aromaticum*

Spikes ellipsoid brown; flowers pink; rhizome purple; lip bilobed . . . (5) *Z. Ottensi*

Spikes cylindric acute purplish-green; midlobe bifid . . . (6) *Z. Cassumunaar*

Spikes yellow cylindric.

Lip-midlobe pink bifid . . . (7) *Z. chrysostachys*

Leaf stems 6 ft. tall.

Lip-midlobe entire creamy.

Leaves 18 in. long; spike 7 in. long . . . (8) *Z. chryseum*

Leaves 8 in. long; spike 4 to 5 in. long . . . (9) *Z. citrinum*

Spikes fusiform acuminate pink.

Lip-midlobe bifid; plant slightly pubescent . . . (10) *Z. gracile*

Lip-midlobe entire lanceolate acute slightly pubescent . . . (11) *Z. Griffithii*

Lip-midlobe entire oblong blunt; plant woolly, very tall . . . (12) *Z. puberula*

(1) *Z. spectabile* Griff. *Notulæ*, iii. 413; *Ridl. Mat.* ii. 26.

Stems 7 ft. tall, .5 in. through. Leaves lanceolate mucronate, 1 ft. long, 4 in. wide. Peduncles stout, 1 ft. long or more. Spike cylindric, over 1 ft. tall, thick. Bracts stiff ovate edges recurved, at first yellow, then scarlet. Calyx spathaceous, 1.5 in. long, white. Corolla tube 1.5 in. long, lobes lanceolate acute, as long, lower ones connate and adnate to lip. Lip shorter, side-lobes broad round, midlobe bifid, all lemon-yellow, mottled purple or black. Anther broad, yellow, appendage long, purple. Capsule 1 in. long. *Hab.* Common and very showy, in forests. Malacca (Griffith); Panthur (Goodenough). Pahang, Tahan and Pahang Rivers. Negri Sembilan, Tampin Hill. Selangor, Petaling. Perak, Thaiping Hills; Temengoh. Dindings, Lumut. Penang, Pulau Betong (Curtis). Perlis, Ginting Kabok. *Distrib.* Sumatra.

(2) *Z. Kunstleri* King, in *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 127; *Mat.* ii. 27.

Rhizome very thick, 2 in. through. Stems 4 to 6 ft. tall. Leaves lanceolate acuminate, over 1 ft. long, 3 in. wide. Peduncle over 1 ft. tall, stout. Spike 3 to 6 in. long, 3 to 4 in. through,

cylindric. Bracts lanceolate, tips deflexed, red. Corolla lobes narrow acute lanceolate. Lip shorter lanceolate acute. Anther beak as long as cells. *Hab.* Rare in dense forest. Perak, Thaiping Hills (Kunstler).

(3) *Z. Wrayi* Prain, in *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 32; *Mat.* ii. 27.

Stems slender, over 1 ft. tall. Leaves elliptic-lanceolate glabrous, 9 in. long, 3 in. wide, narrowed at base. Peduncle 4 in. long. Spike 3 in. long, obconic. Bracts thin elliptic, 1.5 in. long, .5 in. wide or less. Flowers solitary yellow, lip spotted and marked with purple. Anther narrow linear, beak .12 in. long. *Hab.* Very rare and little known. Upper Perak, at 300 ft. altitude (Wray).

(4) *Z. aromaticum* Valetton *Bull. Jard. Bot. Buitenz.* xxvii. 131. *Z. Zerumbet* *Ridl. Mat.* ii. 27 (not of Smith).

Rhizome thick, yellow becoming white inside. Stems 12 to 18 in. tall. Leaves broad lanceolate glabrous except midrib beneath, 4 to 6 in. long, 2.5 to 3 in. wide. Spike oblong blunt, 3 in. long on a 3 to 4 in. long peduncle. Bracts broad rounded green, turning red, edges hairy. Calyx spathaceous, .5 in. long, lobes lanceolate acute, white. Lip side-lobes round, midlobe orbicular or ovate retuse pale yellow with central orange bar. Capsule oblong. *Hab.* Common in orchards, waste ground, gardens, etc. Singapore, Malacca, Selangor, at Kwala Selangor, Perak, Thaiping, etc. *Distrib.* Java. *Native name:* Lampoyang. *Use:* In native medicine.

(5) *Z. Ottensi* Valetton *Bull. Jard. Bot. Buitenz.* xxvii. 136, t. xix.

Habit of *Z. aromaticum* Valetton. Rhizome dark purple inside. Leaves sub-sessile oblong-oblancoate or elliptic acutely acuminate, base rounded, sub-arachnoid beneath; petioles very short hairy. Spike large ellipsoid, 4 in. long. Bracts brown-red becoming bright red. Flower faint pink spotted yellow. Calyx .5 in. long, truncate or 2-toothed. Corolla tube 1.75 in. long, dorsal petal ovate blunt. Lip oblong acute emarginate. Staminodes big obovate, tip round. *Hab.* Malacca, Pringit (Griffith). *Distrib.* Java.

Distinguished from *Z. aromaticum* Valetton by its purple rhizome and pink flowers.

(6) *Z. Cassumunaar* Roxb. *As. Res.* xi. 347, t. 5; *Bot. Mag.* t. 1456; *Rosc. Scit.* t. 85.

Rhizome thick yellow inside. Stems 1 to 6 ft. tall. Leaves oblong-lanceolate pubescent beneath, 6 to 18 in. long, 2 to 3 in. wide. Peduncle 6 to 12 in. long. Spike cylindric acuminate. Bracts oblong rounded, 1 to 1.5 in. long, greenish red to bright red, edges hairy. Calyx tube .5 in. long. Corolla tube little longer, lobes yellowish white, lanceolate acute, 1 in. long. Lip side-lobes oblong blunt, midlobe orbicular bilobed. Capsule small globose. *Hab.* In gardens and waste ground, not common. Penang, Telok Bahang (Curtis). *Distrib.* India.

(7) **Z. chrysostachys** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 129; *Mat.* ii. 28.

Stems slender, 2 ft. tall, purplish. Leaves 10, lanceolate acuminate, 5 in. long, 1.5 in. wide, ligule 1 in. long. Peduncles 2 in. long, thick. Spikes 4 in. long, cylindrical. Bracts broad truncate retuse, yellow. Corolla white, lobes lanceolate acute, 1 in. long. Lip base narrow linear, lobes ovate blunt white, midlobe bifid dotted crimson. Anther-cells elliptic, pink-spotted. *Hab.* Local in dense woods. Perak, Thaiping Hills (Curtis, Wray).

(8) **Z. chryseum** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 149.

Stems often tall, stout. Leaves oblong-lanceolate caudate, dark green glabrous, base round, 18 in. long, 3.75 to 4 in. wide; ligule very short. Spikes cylindrical acuminate, 7 in. long; peduncle as long. Bracts .75 in. across, rounded glabrous, lemon yellow. Calyx spathaceous oblique entire, 1 in. long. Corolla tube 2 in. long, lobes lanceolate acuminate, over 1 in. long, cream white. Lip side-lobes round, midlobe oblong blunt entire, 1 in. long, cream white. *Hab.* Very rare. Singapore, in a wood at Stagmount in 1908, cleared and burnt a year or so later.

(9) **Z. citrinum** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 129; *Mat.* ii. 28.

Stems 1 ft. tall. Leaves broad lanceolate dark green, pubescent beneath, 8 in. long, 4 in. wide; ligule very short. Spike oblong blunt, 4 to 5 in. long; peduncle 3 in. long. Bracts broad round, lemon yellow (pink in fruit). Calyx .75 in. long, bifid. Corolla tube 2.5 in. long, lateral-lobes connate and adnate to lip, .75 in. long, yellowish. Lip side-lobes large oblong round, midlobe lanceolate blunt, yellow. *Hab.* In woods. Johor, Gunong Janeng (Kelsall). Selangor, Ginting Peras; Ginting Bidai; Dusun Tua. Perak, Ulu Bubong (Kunstler). *Native name*: Tepus Tenok.

(10) **Z. gracile** Jack, *Mal. Misc.* 1, No. 1; *Ridl. Mat.* ii. 29.

Stems glabrous slender, 2 ft. tall or more. Leaves ovate or ovate lanceolate acute pubescent beneath, 6 in. long, 2.5 in. wide. Peduncle 6 to 12 in. long. Spike 4 to 6 in. long, cylindrical acute, base narrowed. Bracts ovate blunt or acute pink. Calyx lobes long lanceolate acute. Corolla tube 1 in. long, lobes lanceolate acute, yellowish white. Lip side-lobes round, .5 in. long, midlobe deeply bifid acute. Capsule .5 in. long, elliptic. *Hab.* Woods not rare. Singapore, Bukit Timah. Pahang, Kwala Tembeling; Tahan River. Malacca, Sungei Hudang (Goodenough); Mt. Ophir (Hullett). Selangor, Bukit Hitam (Kelsall); Kwala Lumpur. Perak, Batang Padang (Kunstler). Penang (Jack).

var. *elatior* Ridl. Taller and more slender, 5 ft. tall. Leaves narrow linear acuminate. Peduncle 18 in. long. Spike 7 to 8 in. long. Perak, Thaiping Hills (Kunstler). Penang Hill.

(11) **Z. Griffithii** Bak. in *Hook fil. F.B.I.* vi. 246.

About 3 ft. tall, .25 in. through. Leaves elliptic acuminate,

pubescent beneath as are sheaths, 8 in. long, 3 in. wide. Spikes fusiform, 4 to 5 in. long; peduncles 3 in. long. Bracts broad ovate pubescent, pink, 1 in. long and wide. Calyx spathaceous, .25 in. long. Corolla tube 1 in. long, lobes lanceolate acute, lower connate for half their length. Lip side-lobes round, midlobe lanceolate acute. Anther brown, beak yellow. *Hab.* Common in forests. Singapore, Bukit Timah. Johor, Bukit Tanah Abang, Batu Pahat (Kelsall). Pahang, Gunong Senyum (Evans). Malacca (Griffith); Bukit Sedanen. Dindings, Tanjong Hantu (Ridley).

var. *major* Ridl. Five ft. tall, stout. Leaves elliptic-oblong, 18 in. long, 5 in. wide, stiff, sheaths glabrous. Spike glabrous; flowers 3 in. long. Corolla tube 2 in. long. Pahang, Kwala Tembeling. Perak, Bujong Malacca. *Native names*: Tepus Merah; Tepus Kechil.

(12) **Z. puberula** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 130; *Mat.* ii. 29.

Stems stout, 6 to 8 ft. tall, .5 in. through. Leaves oblong acuminate, 1 ft. long, 3.25 in. wide, beneath brown furry; petiole and ovate bilobed ligule furry. Spikes fusiform acute, 3 to 6 in. long; peduncles as long. Bracts ovate blunt, pink edged with brown fur. Calyx spathaceous, 1 in. long, truncate. Corolla tube 2 in. long, lobes lanceolate cream-yellow, 1 in. long, lower shorter than upper, connate and adnate for .25 in. to lip. Lip shorter, side-lobes oblong round, midlobe longer blunt, cream white to yellow. Anther narrow oblong, brownish red, beak yellow. *Hab.* In forests, Singapore, Serangoon Road; Bajau. Johor, Tanjong Kupang; Serom; Batu Pahat. Negri Sembilan, Perhentian Tinggi. Selanjor, Ginting Bidai. *Native name*: Lampoyang Anjing.

13. AMOMUM, Linn.

Rhizome usually long. Leafy stems tall. Leaves lanceolate-oblong or linear, acuminate. Spike obconic or cylindrical peduncled on the rhizome. Bracts lanceolate or ovate, cartilaginous or papery, containing one or more flowers enclosed in thick bracteoles. Calyx tubular as long as corolla tube. Corolla lobes oblong or lanceolate. Staminodes small, sometimes 0. Lip large convolute. Stamen filament broad; anther-crest usually present, entire or with 2 curved processes from the top. Capsule globose or oblong, often covered with short processes. Seeds numerous. Species numerous, Africa and Indo-Malaya.

Staminodes absent or small.

Lip large convolute.

- | | |
|--|------------------------------|
| Anther-crest small round, upper angles prolonged | (1) A. xanthophlebium |
| Anther-crest small round with 2 long curved arms | (2) A. aurantiacum |
| Anther-crest of 2 curved arms only | (3) A. xanthoglossum |
| Anther-crest of 2 curved arms and median tooth; spike elongate | (4) A. spiceum |

- Anther-crest reniform, angles not prolonged . (5) *A. flavum*
 Anther-crest very small or none; fruit spinous.
 Lip bilobed at tip; fruit oblong (6) *A. lappaceum*
 Lip centre toothed; fruit large globose (7) *A. ochreum*
 Lip small boat-shaped; staminodes and crest
 very small, 3 lobed sometimes present (8) *A. uliginosum*
 Lip broad; flowers in a dense sub-globose head (9) *A. cephalotes*
 Lip narrow spatulate; staminodes small (10) *A. Holttmuii*
 Stamines conspicuous.
 Spikes cylindrical tall on tall peduncles.
 Bracts ovate not recurved at tip.
 Calyx truncate; peduncle and flowers
 tomentose pubescent (11) *A. cylindraceum*
 Calyx urceolate trilobed; peduncle and
 flowers glabrous (12) *A. cylindrostachys*
 Bracts with acute recurved tips; flowers
 small (13) *A. squarrosom*
 Spike short on short peduncle, cylindrical; stami-
 nodes linear setaceous (14) *A. perakense*
 Spikes obconic.
 Lip trilobed hastate (15) *A. hastilabium*
 Lip bifid at tip (16) *A. macrodon*
 Lip entire spoon-shaped; bracts papery brown (17) *A. testaceum*
 Lip entire oblong; flowers very small (18) *A. micranthum*

(1) *A. xanthophlebium* *Bak. in Hook fil. F.B.I. vi. 241; Ridl. Mat. ii. 31. A. stenoglossum* *Bak. l.c.*

Stems stout, 6 ft. tall. Leaves oblong-lanceolate cuspidate, 2 ft. long, 2 to 4 in. wide, glabrous; petioles 1 in. long. Spikes obconic, 6 in. long, 3 in. through or more. Peduncles 4 to 6 in. long. Bracts oblong, 2 in. long, 1 in. wide, red. Flower 1 in. in a bract. Calyx 1 in. long, trifid, brown pink. Corolla tube thick, 1.5 in. long, upper lobe ovate, lower oblong; all cherry red. Lip little longer obovate convolute, yellow, streaked red. Anther-crest round, upper angles horn-like. Capsule oblong, 1 in. long, pubescent. *Hab.* Common in lowland forest up to 3000 ft. altitude. Singapore, Bukit Timah; Bukit Mandai; Selitar. Johor, Gunong Pulau. Malacca (Maingay); Nyalas (Goodenough). Dindings, Pangkor. Perak, Thaiping Hills (Kunstler); Bujong Malacca. Penang Hill (Curtis). *Native name*: Tepus. *Use*: Flowers as a sumbul in curries.

(2) *A. aurantiacum* *Ridl.*

Stem stout tall, glabrous. Leaves oblong acuminate sub-coriaceous shortly narrowed at base; petioles short thick, ligule oblong truncate, longer. Spikes ovoid, 1.5 in. long; peduncles stout, 2 in. long, covered with ovate blunt round bracts pubescent, .75 in. long, .5 in. wide. Flowers large orange, lip centre red. Calyx spathaceous glabrous except the pubescent tips of the two lobes, 1 in. long. Corolla tube as long, lobes linear-oblong round, 1.25 in. long. Lip obovate broad round, 1 in. long and nearly as wide. Stamens shorter, anther-crest small round, arms broad oblong curved truncate, 8-nerved; style hairy. *Hab.* Kelantan in Glam Wood Kota Bharu (Ridley).

(3) **A. xanthoglossum** Ridl.

Stem tall glabrous. Leaves oblong-lanceolate cuspidate narrowed to the base glabrous, 15 in. long, 3 in. wide; petioles slender, .5 in. long, ligule shorter, top round. Spikes obconic short-peduncled, 3 in. long, glabrous. Bracts smooth chartaceous oblong, tip round, upper ones with a short mucro, lower ones 1 in. long, .6 in. wide. Calyx tubular truncate, glabrous, .5 in. long. Corolla tube cylindrical, silky hairy, 1 in. long, lobes oblong white. Lip broadly obovate, clawed, 1 in. wide, yellow inside, veined red at base. Stamen 1 in. long, no crest, but 2 elongate curved linear arms. *Hab.* Kelantan, Chaning Woods (Ridley).

(4) **A. spiceum** Ridl.

Plant forming a very large tuft of slender leafy stems 6 ft. tall. Leaves narrow linear-oblong acuminate, base narrowed, 18 in. long, 1 in. wide; ligules oblong, rounded adnate to petiole, edges ciliate, .3 in. long. Spikes linear-oblong, 7 to 8 in. long, on a peduncle 1 in. long; rachis velvety. Flowers single, enclosed in three papery lanceolate acuminate bracts 1.25 in. long and with a long lanceolate dry papery outer bract 2 in. long, .3 in. wide, all distant imbricating. Calyx spathaceous, split in front, 1.5 in. long, buff. Corolla tube as short. Upper lobe broad oblong, 1.5 in. long, blunt, lower ones linear, red. Lip large obovate entire yellow finely punctate, red on both sides. Anther oblong, with a crest of two long curved arms, and a very short median process. *Hab.* Dense mountain forests. Negri Sembilan, Bukit Tangga (Ridley); Gunong Angsi (Holttum).

This is very unlike any other species in its drawn-out spike of long papery bracts, and has more of the appearance of a *Geostachys*.

(5) **A. flavum** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 133; *Mat.* ii. 31.

Stems pubescent, 12 to 15 ft. tall. Leaves oblong-lanceolate pubescent beneath, 1 ft. long, 2 in. wide. Spikes 1 in. long, 2.5 in. through, sub-globose on peduncles 1.5 in. long. Bracts bilobed, .5 in. long, pubescent. Corolla ochreous, upper lobe obovate hooded, laterals narrower lanceolate. Lip 1 in. across, obovate convolute, yellow, spotted red. Filament broad pale orange, anther-crest reniform. *Hab.* Penang Waterfall and Penara Bukit (Curtis). *Distrib.* Sumatra.

(6) **A. lappaceum** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 134; *Mat.* ii. 31.

Stems 6 ft. tall. Leaves oblong-lanceolate cuspidate glabrous, 18 in. long, 4 in. wide. Spikes cylindrical, gradually elongating, rachis tomentose. Bracts oblong bifid, red, 1.5 in. long, 1 in. wide. Calyx tube 1 in. long, red. Corolla as long, lobes linear, .5 in. long, lobes linear, .5 in. long, ochre yellow. Lip obovate round bilobed. Staminodes minute. Anther crest small round. Fruit oblong, .75 in. long, covered with conic subulate spines; pedicel .75 in. long.

Hab. Dense forests at about 3000 ft. altitude or less. Johor, Pulau Tinggi (Burkill). Pahang, Telom. Selangor, Ginting Peras. Perak, Thaping Hills (Ridley). *Use*: Fruit eaten by Sakais.

The plants originally described by me had no staminodes or crest, but the Telom plant had both.

(7) **A. ochreum** *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 135; *Mat.* ii. 35.

Stems tall and stout. Leaves oblong cuspidate glabrous, 3 ft. long, 7 in. wide; petioles .5 in. long. Spikes short globose, elongating in fruit; peduncles 1.5 in. long. Bracts lanceolate, 1.5 in. long. Flowers large yellow. Calyx 1 in. long, lobes lanceolate, tips hairy. Corolla tube thick, lobes oblong blunt, .75 in. long. Lip over 1 in. long, convolute, edge toothed. Anther oblong. Fruit large, globose covered with short processes green. *Hab.* Rare. In mountain forests. Selangor, Ginting Bidai (Ridley). Pahang, Upper Tras Valley, under Fraser Hill (Burkill).

(8) **A. uliginosum** *Koen, Retz. Observ.* iii. 56.

Rhizome long, much branched. Stems 5 ft. tall. Leaves narrow lanceolate, long cuspidate, glabrous, 1 ft. long, 1 in. wide. Spikes obconic, 1.5 in. long, 1 in. across; peduncles 1 to 4 in. long. Bracts ovate-elliptic, pink or brown. Calyx .5 in. long, pink, lobes .5 in. long. Corolla tube little longer, lobes narrow acute pink. Lip boat-shaped geniculate, knee crimson, limb short white, central bar yellow edged crimson, .5 in. long. Staminodes 0. Anther oblong, crest 3-lobed. Fruit globose, .5 in. through, covered with soft red processes. *Hab.* Abundant in woods and banks in forest to about 3000 ft. altitude. Johor, Ulu Kahang (Holttum); Muar, Sungei Pauh (Fox). Malacca, Bukit Sadanen (Derry). Pahang, Kwala Tembeling. Negri Sembilan, Tampin Hill. Perak, Larut (Kunstler); Temengoh. Dindings. Penang, Balik Pulau. Kedah, Yan. *Distrib.* Siam, Borneo. *Native names*: Pua Hijau; Pua Gajah; Tepus Merah. *Use*: Fruit is eaten by Jakuns and sometimes the plant is cultivated by them.

(9) **A. cephalotes** *Ridl.*

Stems slender, glabrous. Leaves linear acuminate, base narrowed glabrous, 1 ft. long, 8 in. wide, ligules .25 in. long, oblong entire. Heads sub-globose, 1.5 in. long, on peduncles 5 in. long, covered with lanceolate bracts, glabrous, outer bracts lanceolate pubescent, 1 in. long. Flowers numerous, cream with yellow mid-rib and tips slightly streaked with brown; pedicel stout velvety, .25 in. long. Calyx spathaceous with saccate hairy points. Corolla tube .1 in. long, lobes linear-oblong blunt, .5 in. long. Lip obovate as long, .3 in. wide with 2 central keels. Stamen filament very short; anther broad oblong with no crest or arms, pubescent. *Hab.* Pahang, Gunong Senyum (Evans).

(10) **A. Holttumii** *Ridl.*

Leaves narrow lanceolate acuminate, tip very narrow, base

long-narrowed, very finely and closely nerved, 10 in. long, 1·75 in. wide; petioles ·5 in. long, pubescent beneath, slender; ligule narrow entire, ·15 in. long. Racemes 3 in. long, obconic, lengthening as they develop, rachis softly densely hairy, flexuous. Bracts oblong-lanceolate, blunt, base pubescent, 1·25 in. long, ·5 in. wide. Flowers solitary in bracts. Calyx 1 in. long, cylindric truncate, glabrous except the base. Corolla-tube 1·25 in. long, cylindric, lobes linear-oblong, ·75 in. long, ·15 in. wide. Staminodes ·1 in. long, lanceolate acuminate. Lip 1 in. long, entire broadly spatulate, tip wide rounded. Anther linear, ·25 in. long, crest ovate blunt rounded, side-lobes very short blunt obscure. *Hab.* Negri Sembilan, Gunong Tampin (Holtum).

(11) **A. cylindraceum** *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 136; *Mat.* ii. 32.

Stems 6 ft. tall. Leaves oblong-lanceolate, grey green, glabrous, 18 in. long, 2 in. wide; ligules ·5 in. long, bifid, lobes acute. Spike cylindric stout, 6 in. long; peduncle as long, tomentose. Bracts ovate bifid, brown. Calyx ·75 in. long, truncate pubescent. Corolla tube 1 in. long, pubescent, lobes oblong blunt, orange. Lip 3-lobed, lobes round, dark orange. Staminodes lanceolate acuminate. Anther-crest oblong with 2 points at sides. Fruit globose, brown, ribbed, ·5 in. long. *Hab.* Rare. Woods, Dindings, Telok Sera (Ridley).

(12) **A. cylindrostachys** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 42.

Stems 6 ft. tall. Leaves lanceolate acuminate, caudate glabrous, 9 in. long, ·25 in. wide. Peduncles 5 in. long, covered with distant sheaths 1 in. long, split to base. Spikes cylindric, 3 in. long, 1 in. through. Bracts ovate-lanceolate, ·25 in. long, green. Calyx ·25 in. long, urceolate trilobed. Corolla ·75 in. long, lobes narrow acute, lanceolate white. Lip 3-lobed, ·35 in. long, lobes short round; midlobe oblong truncate, yellow centre darker, 2 red streaks at base. Anther-crest trifid dark red, centre lobe very short, laterals arcuate linear. *Hab.* Mountain forest. Selangor, Sempang Mines, Semangkok Pass (Ridley).

(13) **A. squarrosus** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 104.

Stems 4 to 5 ft. tall. Leaves linear-lanceolate acuminate, hairy pubescent beneath, 10 to 15 in. long, 1 to 1·5 in. wide; petioles 1 to ·75 in. long, glabrous, ligules hairy. Scapes 2 to 6 in. tall, with distant glabrous (pubescent when young) sheaths split on the side. Spike dense obconic in flower, ·2 in. long. Bracts ovate acuminate, greenish white, tips recurved. Calyx tubular, 3-toothed. Corolla small, lobes ·25 in. long, oblong blunt. Lip longer fleshy narrow obovate entire. Anther oblong, two upper corners recurved linear, crest very short round entire. Fruit-spike elongate cylindric, 4 in. long. Capsule globose, smooth, ·5 in. long. *Hab.* Not rare.

Selangor, Semangkok Pass. Perak, Tapah (Wray); Temengoh.
Native name: Pua Tada Umbon.

(14) **A. perakense** *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 135;
Mat. ii. 33.

Rhizome stout on stilt roots woody. Stems slender, .25 in. through. Leaves lanceolate long acuminate, 8 in. long, 1 in. wide. Peduncles 2 in. long, flexuous. Spikes sub-cylindric, as long. Bracts narrow oblong, .75 in. long, caducous. Calyx tube .5 in. long, lobes lanceolate acute. Corolla tube slender, lobes .5 in. long. Lip obovate longer. Staminodes linear setaceous, longer than filament. Anther .25 in. long, crest round. *Hab.* Rare. Perak, Thaiping Hills (Wray).

(15) **A. hastilabium** *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 137;
Mat. ii. 33.

Rhizome slender, short. Stems 3 to 4 ft. tall, stout. Leaves oblong lanceolate acuminate, 9 to 18 in. long, 2 to 4 in. across; petioles .5 in. long; ligules ovate. Spike short obconic, 1 to 2 in. long; peduncle 1 in. long. Bracts ovate, papery light brown, 1 in. long, .5 in. wide. Calyx cylindrical truncate, .75 in. long. Corolla tube 1 in. long, slender, lobes oblong blunt white, .5 in. long. Lip broad hastate, base narrow linear, white; mid-lobe narrow oblong, orange, darker central bar, with purple side marks. Staminodes lanceolate acuminate, setaceous. Anther oblong, crest orange, broad oblong truncate. Capsule globose, .5 in. long, ribbed hairy. *Hab.* In dense forests. Singapore, Bukit Timah. Johor, Gunong Pantai. Selangor, Dusun Tua (Ridley). Perak (Wray).

(16) **A. macrodons** *Scort. Nuov. Giorn. Bot. Ital.* 1886, p. 309,
pl. xii.

Stem 2 ft. tall, slender. Leaves few elliptic caudate, 6 to 8 in. long, 2 to 3 in. wide. Spike obconic, 2 in. across. Bracts ovate lanceolate, densely streaked red. Calyx tubular, spathaceous. Corolla .65 in. long, lobes ovate, .5 in. long. Lip as long, oblong bifid, lobes round pubescent, yellow, base purple. Staminodes lanceolate puberulous, red. Anther-crest emarginate ciliate. *Hab.* Perak, Kinta (Scortechini). Not seen.

(17) **A. testaceum** *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 135;
Mat. ii. 33.

Stems 12 ft. tall, clubbed at base. Leaves lanceolate cuspidate glabrous, 2 ft. long, 4 in. wide. Spikes cylindrical or fusiform, 3 to 4 in. long; peduncles 6 in. long. Bracts papery, pale brown, oblong silky. Calyx trifid silky. Corolla tube little longer, lobes linear-oblong white, .5 in. long. Lip spoon-shaped, white, tipped yellow, 2 red lines at base. Staminodes oblong truncate buff. Anther short quadrate, upper angles prolonged, crest entire oblong blunt. Spike elongating in fruit. *Hab.* In thick woods, local but wide-scattered, chiefly near limestone rocks. Johor, Pulau Tioman. Selangor, Batu Caves. Setul, Rajah Wang. Perlis, Ginting Kabok (Ridley).

(18) **A. micranthum** *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 138; *Mat.* ii. 34.

Rhizome slender, long. Stems slender, 2 ft. tall. Leaves narrow lanceolate acuminate, 6 to 7 in. long, .25 in. wide. Spikes obconic, 1 in. long; peduncles 1 in. long. Bracts narrow lanceolate acute pubescent, .25 in. long, brown. Flowers .5 in. long. Calyx green. Corolla tube little longer, lobes linear narrow, pale yellow. Lip oblong enlarged towards tip then suddenly narrowed and bifid, pale yellow, dotted pink. Staminodes short linear; anther oblong, upper angles prolonged to acute, curved processes, crest round entire. Fruit small globular with short processes, purple brown. *Hab.* Negri Sembilan, Gunong Angsi. Selangor, Batu Tiga. Perak, Gunong Haram (Scortechini). Penang (Curtis).

14. HORNSTEDTIA, Retz.

Rhizome stout woody. Stems rarely under 10 ft. tall, stout. Leaves oblong. Spikes conic, or ovoid on a short peduncle, radical sunk in the ground, or little above. Outer (involucral) bracts large red ovate or oblong forming a cup. Bracteoles thin tubular. Flowers numerous, sessile in a head, red. Calyx spathaceous, thin. Corolla tube long, lobes narrow connivent. Lip narrow linear or oblong, sides at base convolute over stamen. Staminodes 0. Stamen short and thick. Anther fleshy bent at an angle with filament, crest small or 0. Capsule oblong thin-walled. Seeds numerous. Species numerous, 1 Indian, the rest Malayan.

Lip little longer than the corolla, fleshy.

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| Outer bracts glabrous, cancellate | (1) H. scyphus |
| Outer bracts pubescent finely ribbed, ovate-lanceolate acute | (2) H. ophiuchus |
| Outer bracts pubescent finely ribbed, broad ovate, rounded | (3) H. striolata |
| Outer bracts, edges hispid transversely ribbed | (4) H. grandis |
| Outer bracts silvery, tomentose | (5) H. conica |
| Outer bracts thin lanceolate; stems tall; flowers numerous | (6) H. leonurus |
| Outer bracts thin lanceolate; stems under 12 in. long, few | (7) H. pusilla |

Lip much longer than corolla, thin.

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| Spike large ovate; bracts ovate, all rose colour | (8) H. triorgyale |
| Spike short cylindric; flowers few, lip edged white | (9) H. albomarginata |
| Flowers 2 or 3 only; bracts thin lanceolate | (10) H. pauciflora |
| Bracts ovate thin. | |
| Lip spatulate, red, edged yellow | (11) H. megalochilus |
| Lip linear emarginate, red, centre yellow | (12) H. metrichilus |
| Lip linear deeply bilobed, pink | (13) H. macrochilus |

(1) **H. scyphus** *Retz. Observ.* iv. 18. *Amomum scyphiferum* *Koen. Retz. Observ.* iii. 68; *Baker in Hook. fil. F.B.I.* vi. 140. *Stenochasma ureolare Griff. Notulæ*, iii. 431.

Rhizome stout, woody. Stems 10 ft. tall, .5 in. through. Leaves

oblong, pubescent beneath, 2 ft. long, 6 in. across; petioles .25 in. long; ligules .5 in. long, hairy. Spike cylindrical enlarged upwards, 6 in. long, covered with oblong-ovate stiff red bracts transversely and longitudinally ribbed, 2 in. long. Calyx spathaceous trifid, 1 in. long, red, tipped white. Corolla tube 3 in. long, slender, upper lobe hooded, .75 in. long, lower ones shorter, adnate to lip. Lip narrow fleshy little longer, tongue-shaped pubescent, all dark red. Capsule oblong, .75 in. long. *Hab.* Common in lowland woods. Singapore, Bukit Timah, etc. Johor, Tanjong Bunga. Malacca, Ching (Griffith). Selangor, Kwala Lumpur. *Distrib.* Sumatra, Borneo.

(2) *H. ophiuchus* *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 141; *Mat.* ii. 36.

Stems 12 ft. tall, clubbed at base. Leaves oblong-lanceolate glabrous, 15 in. long, 3 in. wide; ligules pubescent. Spike fusiform, 4 in. long. Bracts ovate acute mucronate ribbed, silky pubescent, 2 in. long, 1 in. wide. Flowers 5 in. long, red. Calyx 3 in. long, base silky. Corolla lobes lorate. Lip as long, red, edges white. Anther crestless, red. *Hab.* Rare. Pahang, Tahan woods (Ridley).

(3) *H. striolata* *Ridl. Mat.* ii. 36.

Stem tall. Leaves linear-lanceolate acuminate glabrous, 18 in. long, 2 in. wide; petioles 3 in. long. Spike cylindrical, 5 in. long, 1 in. through. Bracts ovate rounded at tip, finely striate pubescent above, 1 in. long and nearly as wide. Calyx 1.5 in. long, unequally bilobed. Corolla tube 2 in. long, lobes linear-oblong, blunt, 1 in. long. Lip as long. Anther-crest large round. *Hab.* Rare, Selangor, Hulu Semangkok at 4000 ft. altitude (Ridley).

(4) *H. grandis* *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 141; *Mat.* ii. 36.

Rhizome stilted on stiff roots. Stems 12 to 15 ft. tall, base clubbed. Leaves oblong cuspidate, 3 ft. long, 6 in. across, glabrous; petioles .5 in. long. Spikes elongate conic-cylindrical, 8 in. tall. Bracts ovate round, edges hairy, minutely striolate with irregular transverse elevations. Calyx 2 in. long, trilobed. Corolla 5 in. long, upper lobe 1 in. long. Lip side-lobes small, tip round pubescent. Filament hairy; anther-crest ovate acute. *Hab.* In forests at 3000 to 4000 ft. altitude. Pahang, Telom; Fraser Hill (Burkill). Perak, Thaiping Hills (Ridley).

(5) *H. conica* *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 142; *Mat.* ii. 37.

Stems 5 ft. tall. Leaves oblong-lanceolate cuspidate, 1 ft. long, 3 to 4 in. wide, sometimes pubescent beneath; petioles .5 to 1 in. long. Spikes fusiform acuminate, 4 in. long. Bracts ovate acute, pink covered with silvery tomentum, finely ribbed. Flowers purplish pink. Calyx tubular with a long cusp, 2 in. long. Corolla tube 4 in. long, lobes oblong, .5 in. long. Lip rather longer. *Hab.* Not very

common. Singapore, Bukit Panjang. Johor, Batu Pahat; Gunong Pantai. Selangor, Langat; Bukit Hitam (Ridley).

(6) **H. leonurus** Retz. *Observ.* vi. 18; *Ridl. Mat.* ii. 37. *Amomum Ridleyi* Bak. in *Kew Bulletin*, 1892, p. 127. *Stenochasma convolutum* Griff. *Notulæ*, iii. 433.

Rhizome rather slender. Stems 6 to 12 ft. tall. Leaves oblong acuminate polished, dark green, 16 in. long, 4.5 in. wide. Spikes cylindric buried in the ground, 3 in. long. Bracts thin coriaceous lanceolate silvery pubescent, 2.5 in. long, .75 in. wide. Calyx spathaceous, 3 in. long. Corolla tube as long, lobes linear hooded, 1 in. long, red, whitish tips. Lip hastate, blunt, as long. Stamen 1.5 in. long, deep red. Anther .5 in. long. No crest. *Hab.* Common in lowland forest. Singapore, Garden Jungle; Bukit Panjang; Pulau Ubin. Johor, Gunong Pantai. Malacca, Rim (Griffith). Pahang, Pulau Tawar. Dindings, Bukit Segari (Ridley). *Native name*: Pua hitam.

(7) **H. pusilla** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 143; *Mat.* ii. 27.

Rhizome slender. Stems 8 in. tall, very slender. Leaves 3 or 4, elliptic-lanceolate cuspidate, 6 in. long, 1.5 in. wide; sheaths hispid. Spikes small, few-flowered; peduncle .5 in. long. Bracts ovate mucronate glabrous, red. Calyx short. Corolla tube .5 in. long, lobes linear. Lip narrow linear, entire. Anther .4 in. long, crestless. *Hab.* Rare, in forests. The smallest species known. Pahang, Kwala Tembeling (Ridley).

(8) **H. triorgyale** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 144; *Mat.* ii. 38. *Amomum triorgyale* Bak. in *Hook. fil. F.B.I.* vi. 237.

Stems 18 to 20 ft. tall, pubescent. Leaves oblong acute, 2 ft. long, 7 in. across, softly pubescent beneath; petioles .5 in. long. Spike ovate, 4 in. long, 2 in. through. Bracts ovate, 2 in. long and as wide, papery, striate pubescent, deep rose. Calyx bifid mucronate, 3 in. long, cherry red. Lip oblong blunt, 1 in. longer than the corolla, cherry colour. Anther crestless. *Hab.* Mountain woods. A very handsome plant. Selangor, Ginting Peras. Perak, Thaiping Hills (Kunstler). Kelantan, Kwala Aring (Yapp).

(9) **H. albomarginata** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 145; *Mat.* ii. 38. *Amomum sphærocephalum* Bak. in *Hook. fil. F.B.I.* vi. 234.

Rhizome far creeping. Stems 4 to 10 ft. tall, glabrous, red. Leaves when young light green barred red, adult dark green, glabrous or pubescent beneath, sessile, 18 in. long, 3 in. wide. Spikes 2 in. long, sub-cylindric, few-flowered. Bracts thin lanceolate mucronate, red, 2 in. long, .5 in. wide, pubescent. Calyx tubular trifid, 1.5 in. long, lobes tipped with yellow hairs. Corolla tube 3 in. long, lobes linear, red, tipped white hairs. Lip 2 in. long, deep red, side-lobes edged white, tip narrow linear, entire or lobed. Anther oblong. *Hab.* Common in mountain forests to 3000 ft. altitude. Negri

Sembilan, Kwala Pedas; Bukit Tangga. Selangor, Petaling. Dindings, Lumut. Perak, Thaiping Hills; Gunong Keledang. Penang (Maingay, Curtis, etc.). Kelantan, river banks (Ridley).

(10) *H. pauciflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 144; *Mat.* ii. 38.

Stems 12 ft. tall. Leaves oblong cuspidate glabrous, 18 in. long, 4 in. wide; petioles .5 in. long; ligules 1 in. long. Spikes 2- to 4-flowered. Bracts narrow lanceolate, fleshy white. Calyx tube trifid, lobes acute, 3 in. long, red. Corolla, upper lobe lanceolate, cherry red, lower deep red, shorter blunt. Lip narrow lanceolate



FIG. 183.—*Hornstedtia megalochilus*.

blunt entire, flame-colour, central bar yellow. Anther oblong emarginate, red. *Hab.* Rare. Woods by limestone rocks. Selangor, Batu Caves, Perak, Sirah Rimau, foot of Gunong Inas (Yapp).

(11) *H. megalochilus* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 146; *Mat.* ii. 38. *Achasma macrocheilus* Griff. *Notulæ*, iii. 426, *pl.* cclcxv. *Amomum megalochilus* and *A. rubroluteum* Bak. in *Hook. fil. F.B.I.* vi. 236.

Stems 12 to 15 ft. tall, base clubbed, 1.5 in. through. Leaves broad oblong cuspidate, glabrous, 2 to 3 ft. long, 2.5 to 4.5 in. wide; petioles .5 in. long. Spike 2 to 3 in. long, deep sunk in ground. Bracts ovate acute mucronate, thin papery coriaceous (inner ones fleshy), edges ciliate red, 1 in. long. Calyx 3 in. long, trifid, lobes

acuminate. Corolla tube 2 in. long, lobes 1 in. long, red. Lip 2 in. longer than corolla, limb spathulate, thin, entire or emarginate red edged yellow. Anther crestless, red. *Hab.* Common, often forming dense thickets in low wet forests. Singapore, Bukit Mandai. Pahang, Tahan Woods. Malacca, base of Ophir (Griffith); Bukit Sadanen. Negri Sembilan, Tampin Hill. Selangor, Kwala Lumpur; Langat. Perak, Thaiping Hills; Temengoh; Ulu Selama (Yapp). Penang Hill (Maingay, Curtis). Kelantan, Chaning. Setul, Rajah Wang. *Distrib.* Sumatra.

(12) *H. metriochilus* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 147; *Mat.* ii. 39. *Achasma megalochilus* Griff. *Notula* iii. 427; *Ic: Pl. As. t.* 356. *Amomum metriochilus* Bak. in *Hook. fil. F.B.I.* vi. 234.

Stems about 12 ft. tall. Leaves oblong mucronate softly velvety pubescent or glabrous beneath, 3 ft. long, 6 in. wide; petioles 2 in. long. Spike 2 in. long. Bracts ovate, ribbed, glabrous, red thin, 1 in. long. Corolla tube 2 in. long, lobes broad lanceolate, crimson, 1 in. long. Lip 2 in. longer, linear emarginate, crimson, with yellow centre. Anther broad, almost square, emarginate, pink. *Hab.* Wet forests. Johor, Gunong Pantai; Gunong Pulai; Batu Pahat. Malacca (Griffith). Selangor, Ginting Bidai; Batu Caves. Perak, Thaiping Hills; Ipoh (Curtis). Penang Hill. Kelantan, Kwala Lebir.

(13) *H. macrochilus* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 147; *Mat.* ii. 39.

Stems 12 ft. tall. Leaves elliptic-oblong cuspidate glabrous, 15 in. long, 4 in. wide; petioles .5 in. long; ligules shorter. Spike sub-cylindric. Bracts thin lanceolate acute, glabrous. Calyx tubular, lobes 3 acute, 1.5 in. long. Corolla tube 2 in. long, lobes blunt short. Lip 1.25 in. long, narrow linear, deeply bifid, lobes .25 in. long. All dark pink. Anther .25 in. long. *Hab.* Damp forests. Less common than last two. Johor, Kwala Tebing Tinggi; Batu Pahat. Pahang, Telom. Malacca, Ayer Panas (Griffith). Perak, Thaiping Hills (Curtis, Kunstler); Sirah Rimau (Yapp). Kelantan, Chaning woods.

15. PHÆOMERIA, Lindl.

Stems tall, stout. Leaves oblong. Spikes large conic or sub-globose on tall, stout peduncles. Outer bracts usually spreading involucrel. Flowers very numerous capitate. Floral bracts linear-oblong. Bracteoles spathaceous tubular, 3-lobed. Calyx short. Corolla lobes lorate, tube short. Lip little longer, sides convolute. Filament flat; anther oblong. Fruit obconic, pericarp woody, thick. Species 16, Malayan.

Involucrel bracts ovate spreading, pink; spike cone-shaped	(1) <i>P. imperialis</i>
Involucrel bracts ovate acute mucronate, red	(2) <i>P. fulgens</i>
Involucrel bracts erect forming a cup	(3) <i>P. venusta</i>
Involucrel bracts not spreading, round, silky; head globose	(4) <i>P. Maingayi</i>

(1) **P. imperialis** Lindl. *Nat. Syst. Ed. 2*, p. 446. *Hornstedtia imperialis* Ridl. *Mat. ii.* 40. *Alpinia magnifica* Roscoe, *Scit.* 75; *Bot. Mag. t.* 3192. *Nicolaia imperialis*, Horan, *Mon. Scit.* 32, *pl.* 1.

Stems about 13 ft. tall, 1 in. through. Leaves glabrous, 2 ft. long, 6 in. across. Peduncle 3 ft. tall. Spike cone-shaped, elongating to 4 in. long. Involucral bracts ovate-oblong, spreading, pink, edged white, 4 in. long, 2 in. wide, fleshy. Floral bracts linear pink, edged white. Corolla tube 1 in. long, lobes lorate, pink. Lip little longer, pink, edged white. Fruit green hairy, 1 in. through. *Hab.* Johor, Kota Tinggi. Perak, Thaiping Waterfall. Probably planted here. Largely cultivated for its flower shoots used in curry. *Native name*: Kantan.

var. *speciosa* Ridl. Margins of lip yellow. Wild in forests. Selangor, Rawang. Perak, Tambun; Ipoh; Thaiping Hills. *Distrib.* Java and Sumatra.

(2) **P. fulgens** Schum. *Pflanzenreich. Zingib.* 262. *Hornstedtia fulgens* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 149.

Stems 15 ft. tall. Leaves 2 ft. long, 6 in. wide, edges hairy, purple beneath; ligules woolly. Peduncles 4 ft. tall. Spikes conic, 3 in. tall, 4 in. across. Involucral bracts stiff coriaceous ovate mucronate, 3 in. long and wide, blood-red polished, edged white. Floral bracts linear-oblong, red, edged white. Corolla lobes 1.5 in. long, pink. Lip ovate blunt, deep red, edged yellow. Fruit obconic long beaked, 1.5 in. long, velvety yellow. *Hab.* Forests, Thaiping Hills (Ridley).

(3) **P. venusta** Schum. *l.c.* 264. *Hornstedtia venusta* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 149.

Stems 10 ft. tall, base swollen. Leaves over 2 ft. long, 6 in. wide, edge pubescent. Scape 2 ft. tall, sheaths arachnoid, upper ones pink. Spike broad cup-shaped, base broad, 3 in. tall, 4 in. across. Involucral bracts very broad oblong, tips recurved, 3 in. long, 2.25 in. wide, rosy. Floral bracts linear-oblong, 2 in. long. Calyx 1.5 in. long, red. Corolla lobes linear-spathulate, 1.5 in. long, pink. Lip .25 in. long, oblong blunt, white, centre spotted pink. Stamen hairy. Fruit obconic, long-beaked, glabrous, red, 3 in. long, 1.5 in. through. *Hab.* Mountain woods. Pahang, Telom. Selangor, Ginting Bidai (Ridley).

(4) **P. Maingayi** Schum. *l.c.* 266. *Hornstedtia Maingayi* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 150.

Rhizome very long branching, red. Stems 9 ft. tall, .75 in. through. Leaves oblong acute, 18 to 24 in. long, 5 in. wide, pubescent beneath. Peduncle 1 to 2 ft. long, sheaths pink. Spike subglobose, 1.5 in. long. - Outer bracts appressed, broad, round, retuse, pink, silvery pubescent, edged glabrous, crimson. Flowers 2 in. long, rose pink. Lip 3-lobed, side-lobes erect oblong, midlobe longer deep rose. Fruit obconic, nearly glabrous, .5 in. long, pink. *Hab.* In rocky woods. Singapore, Bukit Timah; Sungei Buluh. Johor,

Batu Pahat. Pahang, Kota Glanggi. Malacca (Maingay). Selangor, Dusun Tua. Perak, Temengoh (Ridley).

16. GEOCHARIS, Ridl.

Rhizomes rather slender throwing up leafy stems and inflorescences at internodes. Inflorescence racemose long peduncled, many flowered. Flowers orange or red, short pedicelled. Bracts small spathaceous. Calyx tubular trifid, lobes caudate ciliate. Corolla lobes long. Lip deeply bifid in two narrow linear lobes adnate to corolla. Filament broader than anther involute forming a tube with lip, with 2 short subulate staminodes. Anther broad oblong, crest entire ovate. Species about 4, Sumatra, Borneo.

(1) *G. aurantiaca* Ridl. *Journ. Roy. As. Soc. S. Br.* 50, p. 144.

Stems 2 ft. tall, sheaths hairy. Leaves 1 ft. long, 4.5 in. wide, elliptic; petioles .5 in. long, hairy. Peduncle 1 in. long, raceme 5 in. long; flowers numerous orange. Calyx 1.25 in. long. Corolla lobes linear-oblong. Lip crimson, edged yellow. *Hab.* Rare. In peaty woods. Johor, Kukub (Ridley). *Distrib.* Borneo.

17. PLAGIOSTACHYS, Ridl.

Stems tall; leaves lanceolate. Spike or panicle from the side of the leafy stalk on short peduncle. Flowers small, densely crowded fleshy. Bracts ovate laciniate. Calyx spathaceous. Corolla tube short and thick, lobes oblong, fleshy. Lip flat oblong. Staminodes 2 short subulate processes. Anther oblong emarginate, crestless. Capsule ovoid or oblong crustaceous. Seeds 3 or 4 in a cell. Species 4, Malayan.

Spikes half-way up stem; corolla lobes red; lip emarginate orange

(1) *P. lateralis*

Spikes near base; corolla lobes white; lip obovate bifid yellow streaked red

(2) *P. albiflora*

(1) *P. lateralis* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 152; *Mat.* ii. 41.

Stems 6 ft. tall, stout. Leaves pubescent, 2.5 ft. long, 4 in. wide; petioles 1 in. long; ligules bilobed, .25 in. long. Spikes 1 to 3, cylindrical, 6 in. long; rachis pubescent. Bracts brown. Calyx .25 in. long, white. Corolla-lobes dark red, .4 in. long, ovate acute. Lip emarginate, papillose orange. Stamen pubescent. Capsule .5 in. long, ovoid. *Hab.* Wet spots in forest. Singapore, Bukit Timah and Bukit Mandai. Johor, Batu Pahat. Pahang, Pulau Tawar. Negri Sembilan, Perhentian Tinggi (Ridley). Selangor, Klang (Burkill).

(2) *P. albiflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 50, p. 150.

Stems 6 ft. tall, bases swollen. Leaves glabrous, 13 in. long, 3 in. wide; petioles 2 in. long; ligules bilobed, .25 in. long. Spikes from near base of stem 1 to 3, oblong blunt, 2 in. long, 1.5 in. through. Bracts oblong pectinate, brown, base pink. Calyx-lobes unequal

ovate. Corolla-lobes lanceolate acute, white, tipped pink. Lip obovate, hairy at base bifid, yellow, streaked red. Stamen white. Staminodes not visible. Fruit elliptic-obovate, sub-triquetrous, dull red, .5 in. long. *Hab.* Rare. In dense wet forest. Johor, Kukub (Ridley).

18. ELETTARIOPSIS, Bak.

Rhizome, long, creeping and slender. Leaves solitary or few in a tuft or on a leafy stem. Flower spikes scattered on long branches of the rhizome, very short, with a few fugacious flowers in the axils of small bracts. Calyx tube long, trilobed. Corolla tube long and slender, lobes narrow, white. Lip longer, obovate or oblong, white, central yellow bar and red streaks. Staminodes 0. Stamen, filament short; anther-crest large round. Fruit a globose capsule. Species about 15, South Siam, Malay islands to Celebes.

Leaf 1, erect from rhizome	(1) <i>E. exserta</i>
Leaves 2, erect from rhizome; flower shoot short	(2) <i>E. Curtisii</i>
Leaves several on a leafy stem.	
Stem 1 ft. tall; corolla tube 3 in. long	(3) <i>E. latiflora</i>
Stem 2 ft. tall; corolla tube 1 in. long; leaves thick pubescent beneath	(4) <i>E. pubescens</i>
Stem several ft. tall; corolla tube 3 in. long	(5) <i>E. longituba</i>

(1) *E. exserta* *Bak. F.B.I.* vi. 251; *Ridl. Mat.* ii. 42. *Cyphostigma exsertum* *Scort. Nuov. Giorn. Bot. Ital.* viii. 310, t. 13.

Leaf solitary elliptic acute narrowed to base, 2.5 to 3 ft. tall, about 6 in. across. Scape short erect. Flower 1. Calyx 1 in. long. Corolla tube 3 in. long, lobes lanceolate, .75 in. long. Lip oblong, yellow, streaked red. Anther-crest short, round. *Hab.* Forests local but abundant in spots, rarely flowering. Perak, Kinta (Scortechini); Tapah; Batang Padang to Jor (Ridley).

(2) *E. Curtisii* *Bak. in Hook fil. F.B.I.* vi. 252; *Ridl. Mat.* ii. 42. *E. serpentina*, *Bak. l.c.*

Rhizome slender covered with loose sheaths. Leaves 2 or 3 in a tuft lanceolate acuminate narrowed to petioles, 6 to 8 in. long, 3 in. wide; petioles 5 to 7 in. long. Flowering stems 3 in. long, covered with short brown sheaths; flowers rather distant. Calyx tube 1 in. long. Corolla longer, 1.5 in. long, slender, lobes oblong, 5 in. long. Lip oblong-obovate rounded, .75 in. long. Anther-crest large oblong round. *Hab.* Dry hills local and scarce. Penang Hill at 1000 to 3000 ft. altitude and Bukit Laksamana (Curtis, Kunster).

(3) *E. latiflora* *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 154; *Mat.* ii. 43.

Rhizome .25 in. through. Leafy stems 6 to 12 in. tall. Leaves about 5 lanceolate to ovate-lanceolate pubescent beneath, 10 to 13 in. long, 2 to 4 in. wide; petioles 2 to 4 in. long. Flower stems 3 to 6 in. long, spikes 2-flowered. Bracts pink, .5 in. long. Calyx 1.5 in. long, tip entire lanceolate. Corolla 3 in. long, slender, lobes oblong blunt, .75 in. long. Lip obovate, 1 in. long and wide, white,

tipped yellow, and centre bar yellow, edged red, or all yellow. Anther-crest ovate toothed. *Hab.* Dense muddy woods. Singapore, Bukit Timah. Perak, Larut (Kunstler); Bujong Malacca. Kedah Peak (Ridley).

(4) *E. pubescens* Ridl. *Journ. Roy. As Soc. S. Br.* 32, p. 150; *Mat.* ii. 43. *Amomum clatteroides* Bak. in *Hook. fil. F.B.J.* vi. 240. *A. biflorum* Jack. *Mal. Misc.* i. 2.

Stems 2 ft. tall, .5 in. thick. Leaves 5 or 6, soft pubescent beneath, 6 to 8 in. long, 1.5 to 2 in. wide; petioles .25 in. long. Floral stems 2 ft. long or less. Spikes 1 in. long. Bracts ovate pubescent ribbed edges ciliate. Calyx long, lobes linear acute, silky. Corolla tube thick, silky, lobes .5 in. long, narrow. Lip 1 in. long, obcuneate blunt pubescent. Anther-crest 3-lobed. *Hab.* Thickets and waste ground especially near villages. Common. Malacca (Griffith). Negri Sembilan, Tampin. Dindings, Lumut. Perak, Temengoh. Penang, Waterfall; Penara Bukit. Setul. Adang isles, Pulau Rawei. Lankawi, Burau Bay (leaves larger). *Native name:* Pua Kampong.

(5) *E. longituba* Ridl. *Trans. Linn. Soc.* iii. 382; *Mat.* ii. 44.

Stem several ft. tall. Leaves 2 ft. long, 3 in. wide, woolly pubescent beneath; petioles 1 in. long. Flowering stems very long, eventually woody. Spikes numerous, .5 in. apart. Bracts oblong cuspidate, 2 in. long. Calyx tube 2 in. long, tip ovate, 3-toothed. Corolla tube 2.25 in. long, lobes oblong, rose-pink, 1 in. long. Lip obovate crenulate, 1.5 in. long, white, tip yellow, 4 pink lines in centre. Anther-crest 4-toothed. Capsule 1 in. through, globose white. *Hab.* Mountain forests. Pahang, Tahan River. Selangor, Bukit Hitam (Goodenough). Perak, Upper (Wray).

19. GEOSTACHYS, Ridl.

Rhizome woody, not subterranean. Leafy stems 2 to 3 ft. tall. Leaves lanceolate cuspidate, glabrous. Scapes from rhizome decurved rarely erect. Flowers 2 to 4 in a bract on a short peduncle. Calyx tubular with an ovate cuspidate limb. Corolla short, thick, lobes oblong as long. Staminodes 0. Anther linear with small round crest. Capsule globose or elongate, orange or red. Species 5, Malay Peninsula, high up on mountain rocks.

Panicles short, peduncled decurved.

- | | |
|---|---------------------------|
| Spikes distant on long peduncles | (1) <i>G. decurvata</i> |
| Spikes densely crowded on short peduncles. | |
| Leaves elliptic-lanceolate thin; panicles 4 in. long | (2) <i>G. secunda</i> |
| Leaves elliptic-lanceolate, rather thick; panicles 1 in. long | (3) <i>G. rupestris</i> |
| Leaves narrow lanceolate acuminate. | |
| Panicle dense-flowered; rachis hairy | (4) <i>G. densiflora</i> |
| Panicle short; flowers small; rachis glabrous | (5) <i>G. penangensis</i> |
| Leaves oblong-lanceolate; panicle short; rachis densely white hairy | (6) <i>G. primulina</i> |
| Panicle erect, long peduncled | (7) <i>G. elegans</i> |

(1) *G. decurvata* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 158; *Mat.* ii. 45. *Alpinia decurvata* Bak. in *Hook. fil. F.B.I.* vi. 257.

Stems 4 to 5 ft. tall. Leaves narrow lanceolate acuminate, 18 in. long, 1.5 in. wide; petioles .5 in. long. Leaves 12 to 14 in. long, with long dry lanceolate sheaths at base. Spikes secund distant lanceolate, 1 in. long on peduncles .5 in. long. Flowers 2 in a spike. Corolla-lobes lanceolate blunt, .5 in. long, buff. Lip 1 in. long, obtuse oblong buff. Anther-crest small, round. Capsule elongate dark red. *Hab.* Forests at 3000 ft. altitude. Perak, Thaiping Hills (Kunstler).

(2) *G. secunda* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 158; *Mat.* ii. 44. *Alpinia secunda* Bak. in *Hook. fil. F.B.I.* vi. 257.

Stems 18 in. tall. Leaves about 4, elliptic-lanceolate cuspidate, base narrow, 1 ft. long, 3 in. wide; petioles 1.5 in. long. Scapes decurved, 4 in. long; flower spikes numerous secund; peduncles .5 in. long. Flowers 2 in a spike, yellowish. Bracts pubescent. Calyx .25 in. long. Corolla tube shorter, lobes .5 in. long. Lip oblong, obtuse longer. Anther crestless. Capsule .5 in. long, dark red. *Hab.* Mountains on rocks at 3000 to 4000 ft. altitude. Perak, Gunung Batu Putih (Kunstler); Bujong Malacca.

(3) *G. rupestris* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 157; *Mat.* ii. 45.

Rhizome woody, stout. Leaves broad lanceolate cuspidate, 8 in. long, 1.5 in. wide; petioles short. Scapes decurved secund, 3 in. long. Spikes 1 in. long. Calyx spathaceous, pink, limb ovate cuspidate, .5 in. long. Corolla tube slender shorter, lobes oblong lanceolate, yellow. Lip obovate yellow with red marks. Anther-crest small rounded. *Hab.* Mountains on rocks at 4000 ft. altitude. Pahang, Gunung Tahan. Kedah Peak (Ridley).

(4) *G. densiflora* Ridl.

Rhizome stout woody. Stem over 1 ft. tall. Leaves narrow lanceolate, narrowed to base, 16 to 18 in. long, 1.5 in. wide; petioles .5 to 1 in. long, slender; ligules narrow, .5 in. long. Scape 4 in. long. Rachis and peduncles hairy. Spikes .75 in. long, 2-flowered. Calyx pink spathaceous long-cuspidate. Corolla lobes linear-oblong, pink. Lip obovate-oblong, buff, .75 in. long. Anther-crest large round. Capsule sub-globose red. *Hab.* Local at 4000 ft. altitude. Perak, Gunung Kerbau (Robinson).

(5) *G. penangensis* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 159.

Stem about 18 in. tall. Leaves narrow lanceolate acuminate both ends, 1 ft. long, 1 to 1.5 in. wide; petioles .25 in. long. Scapes deflexed second, 3 in. long. Bracts slightly pubescent. Spikes .6 in. long including 2 flowers; peduncles .1 in. long. Calyx .5 in. long. Corolla tube shorter, red, lobes .5 in. long. Lip nearly 1 in. long, .5 in. across, trilobed, side-lobes short, midlobe obovate ochre yellow. Anther crestless. *Hab.* Very local. Penang Hill. Abundant at 2000 ft. altitude on banks (Curtis).

(6) *G. primulina* Ridl.

Stems tall. Leaves oblong-lanceolate cuspidate, 12 to 13 in. long, 2.5 in. wide; petioles .5 in. long; ligules .25 in. long. Scapes dense, 3 in. long; rachis densely hairy, basal bracts ovate, 1.5 in. long, .5 in. wide, ribbed; peduncles .2 in. long, hairy. Flowers 2 on a spike 1 in. long; bracts lanceolate acute, papery. Calyx spathaceous cuspidate. Anther crestless. *Hab.* Selangor, Semangkok Pass (Ridley).

(7) *G. elegans* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 160; *Mat.* ii. 46.

Stems 3 ft. tall. Leaves narrow, 1 ft. long, 1 in. wide; petioles .25 in. long. Scapes erect, 18 in. tall, base covered with loose sheaths. Panicle 5 to 6 in. long. Flowers in pairs in an ovate bract, outer bracts pubescent. Corolla tube .5 in. long, lobes oblong blunt, buff. Lip obovate retuse. Capsule globose orange, .4 in. long, glabrous. *Hab.* Malacca, Mt. Ophir (Derry, etc.).

20. ALPINIA, Linn.

Rhizome short, usually thick. Stems tall leafy. Leaves lanceolate petioled. Panicles terminal; flowers numerous. Bracts caducous often petaloid. Calyx short tubular. Corolla thick, little longer, lobes linear or oblong. Lip large and convolute (*Catimbium*) or small and nearly flat (*Hellenia*). Stamines broad spatulate, small or o. Stamen long fleshy; filament thick. Anther-crest absent (except *Cenolophon*). Fruit globose or cylindric, yellow red or black. Seeds numerous, black angled, aromatic, in a sweet aril. Species upwards of 100, tropical Asia and North Australia.

A number of species which do not occur wild in the Malay Peninsula were recorded by mistake in Hook. fil. F.B.I., either mis-identifications or from garden plants. The fine *A. nutans*, Roscoe, with very long hanging panicle of large flowers, occurs in gardens only. *A. malaccensis*, Roscoe, apparently a native of India, is occasionally to be seen in gardens, but is not a native of the Malay Peninsula.

§ 1. *Hellenia*. Flowers small white or pink. Lip narrow, not convolute, often bifid. Anther often crested. Capsule small globose few-seeded.

Lip entire obovate (1) *A. conchigera*

Lip entire narrow oblong; flowers secund (2) *A. secundiflora*

Lip bifid.

Slender plant, lobes of lip narrow (3) *A. melanocarpa*

Big plants, over 6 ft. tall; panicle large.

Lip lobes spatulate; no anther crest (4) *A. Galanga*

Lip lobes narrow linear; anther crested (5) *A. scabra*

§ 2. *Catimbium*. Flowers large. Lip broad convolute red and yellow. Panicle erect, many flowered. Bracts often large oblong white. Anther not crested. Capsule trivalved globose, often hairy, large, orange or green. Seeds numerous or small black, aril white.

Stamines o.

Bracteoles small caducous (6) *A. mutica*

Bracteoles large boat-shaped, 1 in. long (7) *A. assimilis*

- Bracteoles ovate, .5 in. long; flowers small . . . (8) *A. Murdochii*
 Staminodes blunt very obscure; flowers .4 in.
 across (9) *A. Seimundii*
 Staminodes subulate glabrous.
 Corolla orange; panicle short dense.
 Stems 3 to 4 ft. tall, slender; corolla tube
 twice as long as calyx; lip round entire . . . (10) *A. Rafflesiana*
 Stems 6 ft. tall, stout; corolla tube as long as
 calyx; lip acute bifid (11) *A. aurantiaca*
 Corolla white; panicle medium; bracts per-
 sistent (12) *A. pahangensis*
 Corolla white; panicle very large; lip longer
 than broad (13) *A. nobilis*
 Staminodes short blunt, hairy.
 Lip broader than long (14) *A. latilabris*
 Panicle pendulous usually short and dense;
 bracteoles cup-shaped.
 Bracts oblong; panicle rather lax (15) *A. javanica*
 Bracts broad ovate thin; panicle large capi-
 tate (16) *A. capitellata*
 Bracts lanceolate; panicle lax, heads small
 distant (17) *A. campanaria*
 § 3. *Cenolophon*. Flowers large. Lip flat entire or lobed. Anther
 crested. Fruit oblong or fusiform. Seeds few, large.
 Raceme lax nodding.
 Leaves elliptic-oblong; sheaths hairy; lip
 obovate, crest dentate (18) *A. petiolata*
 Leaves ovate-oblong; sheaths glabrous; lip
 orbicular, crest lobed (19) *A. pulcherrima*
 Raceme erect dense; bracts linear.
 Leaves unequally cordate at base (20) *A. macrostephana*
 Leaves narrowed at base, lanceolate (21) *A. vitellina*
 Leaves narrowed at base, ovate-lanceolate (22) *A. cannæfolia*
 Raceme dense erect; bracts connate cap-shaped (23) *A. comosa*

(1) *A. conchigera* Griff. *Notulæ*, iii. 424; *Ic. Pl.* 534; *Ridl. Mat.*
 ii. 47.

Stems slender, 2 to 5 ft. tall, tufted on a slender rhizome. Leaves
 oblong glabrous, edges ciliate, 6 to 12 in. long, 1.5 to 3 in. wide;
 petioles .5 in. long. Panicle 1 ft. long, branches short. Calyx
 short, thick. Corolla tube very short, lobes white, .5 in. long,
 elliptic-oblong. Lip obovate, 2 short teeth at base, yellowish
 white with 4 red streaks on each side, a retuse callus edged pink
 at base. Stamen curved, yellow. Capsule pea-shaped, pink.
Hab. Open country near villages. Singapore, Galang, Johor,
 Kwala Sembrong (Kelsall); Kota Tinggi. Pahang, Rumpin River.
 Malacca (Griffith); Umbai; Chenana putih. Province Wellesley,
 Kubang Semang (Curtis). Perak, Kwala Kangsa. *Distrib.* Chitta-
 gong. *Native names*: Lankwas Ranting; Jurunang. *Use*: A
 decoction of rhizomes for rheumatism.

(2) *A. secundiflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 165;
Mat. ii. 48.

Leaves lanceolate acute, 18 in. long, 2 in. wide, glaucous beneath,
 glabrous; petioles winged, .5 in. long. Panicle nearly 1 ft. long,

branches pubescent. Flowers numerous secund. Bracts ovate, 5 in. long. Calyx 1 in. long, lobes pubescent equal ovate. Corolla tube 1-12 in. long, funnel-shaped, lobes oblong. Lip shorter oblong blunt. Staminodes flat wing-shaped subulate, 1 in. long. Anther not crested. *Hab.* Very rare. Selangor, Bukit Hitam (Kelsall).

(3) **A. melanocarpa** Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 123; *Mat.* ii. 48.

Stems 2 to 3 ft. tall, slender from a stout rhizome. Leaves lanceolate acuminate, 6 in. long, 2 in. wide. Panicle 6 in. long, branches short, usually 3-flowered. Calyx .5 in. long, white, funnel-shaped. Corolla-tube little longer, lobes oblong blunt, white. Lip base narrow, limb bilobed, lobes oblong blunt, pink, .25 in. long. Staminodes 2 small green teeth at base of stamen. Capsule pea-shaped, black or red. *Hab.* Sandy places near the sea. Singapore, Kranji; Selitar. Pahang, Kwala Pahang; Rumpin River (Evans). *Native name*: Munkanang. *Use*: A decoction of the flowers for cholera.

This is not the *Hellenia melanocarpa* Teysm. of Sumatra, which has no staminodes, but an anther-crest.

(4) **A. Galanga** Sw. *Obs. Bot.* 8; *Ridl. Mat.* ii. 48.

Rhizome thick, aromatic. Stems 6 to 7 ft. tall, stout. Leaves lanceolate acute, 1 in. long, 3-25 in. wide; petioles .25 in. long. Panicle 6 in. long, branches numerous, crowded, 1 in. long. Calyx unequally trifid, .5 in. long, lobes ovate, white. Corolla tube as long, lobes linear recurved, .75 in. long, green. Lip 1 in. long, spatulate bifid, white with red streaks, base green. Staminodes 2 short processes, pink. Stamen 1 in. long. Fruit elliptic, red, .25 in. long. Seeds 1 or 2. *Hab.* Often cultivated and occurring in abandoned cultivations, all over the Peninsula. *Native name*: Lankuas. *Use*: Rhizome used in curry.

(5) **A. scabra** Benth. *Gen. Pl.* iii. 648; *Ridl. Mat.* ii. 49. *Hellenia scabra* Bl. *Enum.* 60.

Stout plant 6 or more ft. tall. Leaves lanceolate cuspidate, scabrid when dry, 18 in. long, 2 in. wide; petioles .25 in. long, winged to base. Panicle 2 ft. long, lowest branches 6 in. long, upper ones short. Flowers white. Calyx campanulate, .25 in. long. Corolla tube longer slender, lobes lanceolate-oblong blunt, .25 in. long. Lip shorter narrow deeply bifid, lobes linear. Filament slender. Capsule .12 to .25 in. through, globose black. *Hab.* Common in wet Hill Forest at 1000 to 3000 ft. altitude. Johor, Gunong Pulai. Negri Sembilan, Bukit Tangga. Selangor, Bukit Hitam (Kelsall). Perak, Thaiping Hills; Hermitage Hill; Bujong Malacca (all collectors); Gunong Kerbau (Haniff). Kedah Peak. *Distrib.* Java.

(6) **A. mutica** Roxb. *Fl. Ind.* i. 67; *Ridl. Mat.* ii. 49; *Rosc. Pl. Scitam.* t. 69.

Stems 3 to 6 ft. tall. Leaves narrow lanceolate very acuminate

at both ends glabrous, 18 in. long, 2 in. across; petioles 1 in. long. Panicle few to many-flowered with several short branches. Bracteoles very small, .25 in. long, oblong white. Calyx dilate above, split half-way, .5 in. long, white. Corolla tube shorter, lobes oblong, 1 in. long. Lip indistinctly 3-lobed, tip truncate crisp orange with numerous red dots and veins, a dark red swelling at the base on each side. Capsule orange-red hairy, trivalved. *Hab.* In swampy spots. Common as a garden plant in Singapore. Johor, Pulau Aor and Pulau Dayong (Feilding). Penang (Roxburgh). *Distrib.* Malay isles.

(7) *A. assimilis* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 166; *Mat.* ii. 50. *A. mutica* Hook. *fl. Bot. Mag.* t. 6908 (not of Roxburgh).

Stems 6 ft. tall. Leaves lanceolate acuminate, 1.5 ft. long, 1.5 in. wide, glabrous. Panicle 6 to 12 in. long, pubescent; branches few short. Bracteoles ovate, white, 1 in. long. Calyx .75 in. long. Corolla, tube .25 in. long, upper lobe 1 in. long, .75 in. wide, others smaller. Lip obovate, obscurely 3-lobed, 2 in. long, 1.5 in. wide, midlobe short crisp, orange, spotted and veined red, a pair of conic pubescent processes at base. Capsule orange hairy. *Hab.* By rivers and in open swamps. Singapore (Kunstler). Johor, Kota Tinggi. Pahang, Pekan. Province Wellesley, Ara Kudah and near Prai. Penang, Batu Feringhi (Curtis). *Distrib.* Malay isles.

(8) *A. Murdochii* Ridl. *Journ. Roy. As. Soc. S. Br.* 44, p. 196; *Mat.* ii. 50.

Stem over 1 ft. tall. Leaves elliptic-lanceolate acuminate, 7 in. long, 2 in. wide, pubescent, closely beneath; petioles very short with ligule and sheath very hairy. Panicle dense, 4 in. long, golden hairy; bracteole broad ovate hairy outside. Calyx .5 in. long, hairy at base. Corolla tube shorter, upper lobe hooded with a boss at the top, yellowish white, finely dotted red. Lip shorter obovate, 3-lobed, mid-lobe bifid narrower, edges undulate, dotted and streaked red. Filament short. *Hab.* Mountains. Selangor, Semangkok Pass at 4000 ft. altitude; Gunong Mengkuang Lebah (Robinson); a less hairy form.

(9) *A. Seimundii* Ridl.

Stem slender, sheaths at top and petiole pubescent. Leaves lanceolate acuminate with a long point, glabrous except midrib pubescent on the back, 1 ft. long, 2 in. wide; petioles .25 in. long; ligules silky. Panicle 5 in. long, pubescent, with tufts of hair below the branches, which are distant and about .5 in. long, and usually 1-flowered. Bracts tubular broad with a round mouth, hairy, .5 in. long. Corolla tube slightly longer, lobes oblong blunt, hairy outside, .5 in. long. Lip 3-lobed with a narrow base .4 in. long, .3 in. wide, side-lobes rounded, median one smaller bifid, ending in 2 short slender points, 3 strong nerves running along the disc to the tip of the midrib. Staminodes very short at the base of the stamen. Anther-cells elliptic pointed below, back hairy. *Hab.* Pahang, Kwala Teku (Seimund).

(10) *A. Rafflesiana* Wall. *Cat.* 6575; *Bak. in Hook. fil. F.B.I.* vi. 255; *lc. Pl.* 1963; *Ridl. Mat.* ii. 50.

Stems slender, 3 to 4 ft. tall. Leaves lanceolate cuspidate pubescent, 1 ft. long, 3 in. wide. Panicle short compact, 2 to 4 in. long. Bracts oblong short. Calyx dilate upwards, .5 in. long, red. Corolla tube nearly twice as long, lobes orange, tipped red, 1.5 in.



FIG. 184.—*Alpinia Rafflesiana*.

long. Lip longer broad ovate, orange, veined darker. Staminodes 2 short purple processes toothed. Capsule globose hairy, green, .75 in. long. *Hab.* Not rare in woods from sea level to 4000 ft. altitude. Singapore, Changi; Toas. Johor, Batu Pahat; Kluang (Holttum). Malacca, Sungei Hudang. Negri Sembilan, Johol. Selangor, Bukit Hitam (Kelsall). Perak, Thaiping Hills and Waterloo (Curtis); Goping (Kunstler). Penang (Wallich, Porter). *Native names* : Pua Munkang; Tepus Kijoi.

(11) *A. aurantiaca* Ridl. *Journ. F.M.S. Mus.* iv. 78.

Tall plant 6 ft. high. Leaves lanceolate cuspidate, 1 ft. long, 3 in. wide, softly hairy beneath; petioles 1 to 2 in. long, pubescent. Panicle spicate dense; rachis thick, pubescent. Bracts ovate pubescent. Calyx .5 in. long, brown, bilobed. Corolla tube as long, lobes oblong hooded, orange. Lip a little shorter broad obovate tapering to a point ending in two short tails, orange, streaked red on the side-lobes. Staminodes erect fleshy, glabrous dark red. Stamen orange. *Hab.* Dense mountain forest. Pahang, Telom to Gunong Berumbun to 4500 ft. altitude (Ridley). Kelantan, Chaning Woods (Ridley),

var. *hirtior* Ridl. Panicle densely golden silky. Perak, Gunung Kerbau at 4000 ft. altitude (Robinson). Kelantan, Chaning Woods (Ridley).

(12) *A. pahangensis* Ridl.

Stem moderately stout. Leaves linear-oblong with a setaceous point, base acuminate softly hairy all over, 2 ft. long, 3.5 in. wide; petioles .5 in. long, ligules ovate blunt hairy. Raceme stout, 8 in. long, velvety hairy. Bracts at base lanceolate acuminate with a long setaceous point, pale papery, lowest 4.25 in. long. Flowers numerous; pedicels densely velvety hairy, .2 in. long. Bracts persistent, .5 in. long, hairy at base and top sheathing the flower. Calyx tubular truncate or obscurely 3-lobed, .4 in. long. Corolla tube as long, lobes linear-lanceolate hairy acute, .6 in. long. Lip 1 in. long, side-lobes broad truncate, midlobe oblong entire, with 2 short processes at base. Stamen .75 in. long, crestless. Ovary silky. *Hab.* Pahang, Pekan (Evans).

(13) *A. nobilis* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 169; *Mat.* ii. 51.

Stems stout, 6 to 12 ft. tall, 1 in. through, pubescent. Leaves oblong cuspidate, base oblique, 2 ft. long, 6 in. wide, velvety pubescent beneath; petioles 1 in. long, brown velvety, ligules as long. Raceme 1 ft. long, with 2 very large sheaths. Bract 3-lobed, 2 in. long, white pubescent, tipped carmine. Corolla tube shorter, lobes oblong, 1.5 in. long, hairy white. Lip 2.5 in. long, 2 in. wide, cordate bilobed, lobes large oblong crisped, sides and disc blood-red with lines of yellow white spots, tip lemon, nerves crimson hairy, keel at base and pustular elevations at base of stamen. Stamen pubescent. Capsule globose, flattened at both ends, orange hairy. *Hab.* Forests near streams. A splendid species. Pahang, Kwala Tembeling. Selangor, Ginting Bidai (Ridley).

(14) *A. latilabris* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 168; *Mat.* ii. 51.

About 12 ft. tall, stout, glabrous except midrib, petiole and ligule, 2.5 ft. long, 3 in. wide, narrow lanceolate; petioles 1 in. long. Panicle pubescent large, outer bracts oblong-lanceolate, 2 in. long, 1 in. across, rosy white. Calyx dilate upwards white, rose-tipped.

Corolla tube as long. Lip 1.75 in. long, 2 in. wide, cordate not lobed, tip shortly bifid, lobes acute orange, densely red spotted, central bar and veins deep red, edged yellow. Staminodes at base horn-shaped, .25 in. long, crimson. Fruit globose orange, nearly glabrous. *Hab.* River banks. Pahang River. Perlis, Bukit Lagi (Ridley).

(15) *A. javanica* *Bl. Enum. Pl. Jav. Ed. ii. 59; Ridl. Mat. ii. 52.*
A. involucrata *Griff. Notulæ, iii. 422.*

Stems about 6 ft. tall, .5 in. through. Leaves oblong cuspidate, 18 in. long, 6 in. wide, pubescent beneath; petioles 1.5 in. long, pubescent; ligules split to base hairy. Panicle 6 to 12 in. long, pendulous. Bracts oblong white, soon turning brown; bracteoles cup-shaped, .5 in. long, enclosing 2 or 3 flowers. Calyx .75 in. long, dilate upwards, glabrous sub-entire. Corolla tube thick, upper lobe 1.5 in. long, mucronate, lower hooded pubescent. Lip ovate trumpet-shaped, edge denticulate, 2 in. long, 1.5 in. wide, orange speckled and veined crimson at base, edge white. Staminodes with 2 or 3 points crimson. Stamen pubescent. Capsule globose green. *Hab.* Common in woods. Johor, Gunong Pantai. Malacca, Ayer Panas (Griffith); Bukit Bruang; Sungei Hudang. Negri Sembilan, Tampin. Muar (Curtis). Selangor, Ulu Selangor; Bukit Bintang (Goodenough). Perak, Ipoh (Kunstler); Waterloo. Kelantan, Chaning (Ridley).

var. *colorata* *Ridl.* with calyx, tips of corolla lobes and centre of lip red. Perak, Kinta Valley, Ipoh. *Distrib.* Sumatra, Java. *Native names:* Poko Gingin; Kantan hutan.

(16) *A. capitellata* *Jack. Mal. Misc. ii. No. 7; Ridl. Mat. ii. 52.*

Over 6 ft. tall, 1 in. through, purplish brown pubescent. Leaves oblong cuspidate, edges pubescent, 2 ft. long, 4 in. wide; petioles 3 in. long or more pubescent. Panicle head-like obconic nodding, 4 in. long. Bracts 3 in. long and wide, thin ovate cuspidate. Calyx sub-sessile, .5 in. long, obscurely lobed, tipped red. Corolla tube little longer, upper lobe oblong, 1 in. long, .75 in. wide, white with red mucro, side-lobes obovate, with red boss on tip. Lip obovate, tip bifid, edge crisp, 1.5 in. long, 2 in. wide, orange, dotted red, edge white. Staminodes adnate to edge of lip and stamen, dark brown. Capsule green, minutely pubescent. *Hab.* Local. Perak, Ulu Selama (Yapp). Province Wellesley, Ara Kudah. Dindings, Gunong Tungul. *Distrib.* Sumatra.

(17) *A. campanaria* *Ridl.*

Tall plant. Leaves oblong cuspidate acuminate, glabrous except the ciliate edge, 2 ft. long, 5 in. wide; petioles 4 in. long, glabrous; ligules oblong, .4 in. long. Raceme stout velvety, 11 in. long, flower heads long, distant on peduncles 1.25 in. long, stout velvety. Bracts lanceolate, the lowest 2.25 in. long, upper ones .5 in. long, silky. Involucral bracts cupular campanulate, .4 in. long, .5 in. wide, silky containing 4 shorter rounded silky bracts each with one flower on a short silky pedicel. Calyx campanulate, silky,

white, .5 in. long and as wide. Corolla silky, tube .5 in. long, lobes oblong blunt, .6 in. long, buff with white knobs at top. Lip broad obovate convolute, 1.5 in. long, 2 in. wide, white, base yellow, barred red. Stamen, filament broad oblong-linear; anther oblong, no crest. Staminodes at base of stamen large, rhomboid with acute points. *Hab.* Mountain forests at 2400 ft. altitude. Negri Sembilan, Bukit Tangga (Ridley).

(18) **A. petiolata** *Bak. in Hook. fil. F.B.I. vi. 255; Ridl. Mat. ii. 53.*

Stems about 3 ft. tall. Leaves few elliptic-oblong acuminate, glabrous, 15 in. long, 4 in. wide; petioles 3 in. long. Raceme pendulous slender, 6 in. long. Flowers 20. Bracts narrow linear. Calyx .5 in. long, white, lobes 3 tipped with hairs. Corolla lobes oblong-linear, 1 in. long, yellow white, pubescent. Lip flat obovate, edge crisp, 1.5 in. long, orange red veined and central bar red. Staminodes 0. Anther broad, crest reniform dentate emarginate. Fruit fusiform, 2 in. long, hairy. *Hab.* Forests. Not common. Selangor, Bukit Kutu. Perak, Taiping Hills (Curtis); Gunong Haram (Scortechini); Goping (Kunstler).

(19) **A. pulcherrima** *Ridl. Journ. F.M.S. Mus. iv. 79.*

Stems 3 ft. tall or less, few. Leaves ovate cuspidate, base round broad glabrous, 15 in. long, 3.5 in. wide; petioles 7 in. long; sheaths 1 ft. long, hairy brown. Raceme pendulous, 10 in. long, pubescent. Flowers 22, pedicels .01 in. long. Calyx cylindrical white, 1 in. long, split on one face. Corolla tube short, lobes oblong white. Lip 2 in. wide, orbicular undulate, pale yellow, veined red. Anther oblong, crest 5-lobed. Fruit fusiform, 3 in. long, hairy. *Hab.* Pahang, Telom woods. Selangor, Semangkok Pass (Ridley).

(20) **A. macrostephana** *Ridl. Journ. Roy. As. Soc. S. Br. 32, p. 175; Mat. ii. 53. Amomum macrostephanum Bak. in Hook. fil. F.B.I. vi. 243.*

Stem very slender, 4 to 8 ft. tall. Leaf oblong, base cordate round, abruptly cuspidate at tip, glabrous, 2 ft. long, 3 in. wide; petioles slender, 5 in. long. Spike 3 to 4 in. long on a slender peduncle enclosed in sheath 8 in. long. Calyx .25 in. long, bilobed, lobes round pubescent. Corolla tube shorter slender, lobes linear minutely pubescent, .75 in. long. Staminodes linear obtuse, short. Anther hairy, crest very large 3-lobed. *Hab.* Rare. Perak, Larut at 500 to 1000 ft. altitude (Kunstler).

(21) **A. vitellina** *Ridl. Journ. Roy. As. Soc. S. Br. 32, p. 173; Mat. ii. 53. Cenolophon vitellinum Horan. Prodr. 36. Amomum vitellinum Bot. Reg. 1847, t. 32.*

Stems 3 to 3.5 ft. tall, flattened. Leaves lanceolate acuminate, 10 in. long, 3 in. across; petioles .5 to 1.75 in. long. Panicle erect with few short branches, 4 in. long; rachis pubescent. Bracts narrow linear, 3 in. long. Flowers sessile. Calyx 1 in. long, pubescent green. Corolla as long, lobes linear, 1 in. long, yellow.

Lip longer flat oblong-cuneate bifid, edges crisped, orange, veins darker. Stamen orange. Anther oblong, upper corners prolonged, crest very large 3-lobed toothed. Staminodes 2 short red horns. *Hab.* In dense forest to 2500 ft. altitude. Rather rare. Johor, Batu Pahat. Selangor, Dusun Tua. Penang Hill (Kunstler), etc.

(22) *A. cannæfolia* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 174; *Mat.* ii. 54.

Stem stout, 4 to 5 ft. tall. Leaves ovate or oblong-ovate, base narrowed cuspidate glabrous, 1 ft. long, 6 in. wide; petioles 4 in. long. Raceme erect, 6 in. long; peduncle 1 ft. long, pubescent. Bracteoles very small. Calyx pubescent, .5 in. long. Corolla tube slender, lobes linear blunt, 1 in. long. Lip 1.5 in. long, oblong entire crisp. Staminodes 0. Stamen 1 in. long; filament broadly broadly winged, pubescent. Anther-crest 3-lobed, midlobe largest. Fruit oblong pubescent. Seeds 2 or 3 oblong, .25 in. long, black. *Hab.* In woods. Rare. Negri Sembilan, Bukit Sulu and Gunong Berembun (Cantley); Bukit Tangga. Selangor, Dusun Tua. *Native name:* Pua Minyah. *Use:* Decoction of roots and leaves for fever.

(23) *A. comosa* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 170; *Mat.* ii. 54. *A. oxymitra* Schum. *Pflanzenreich. Zingib.* 336.

Stems slender, 6 to 10 ft. tall. Leaves narrow lanceolate acuminate cuspidate serrate, tip hairy, 1 ft. long, 1.5 to 2 in. wide, sessile. Raceme 6 in. long, dense pubescent. Bracts conic acute white, falling off before the flower opens. Calyx spathaceous white, 5 in. long. Corolla funnel-shaped, lobes oblong pubescent, .5 in. long, white. Lip .75 in. long, sides broad upturned, tip narrow bifid white, base pale yellow with a bar of crimson dots each side. Staminodes spathulate, tip round, white, with patch of crimson dots. Filament linear, anther-crest oblong round small. Capsule cylindric ribbed brown yellow, 2 in. long, .5 in. through. *Hab.* Rare. Kedah Peak, in forests (Ridley). *Distrib.* Siam.

ORDER CXXXVIII. MARANTACEÆ.

Herbs somewhat shrubby, rhizome not aromatic. Leaves ovate-oblong or lanceolate chartaceous; petioles long with a knee below the blade. Inflorescence spicate racemose or paniced. Bracts stiff, often persistent. Flowers usually small fugacious. Sepals free sub-equal. Corolla, base tubular, lobes free. Fertile stamen 1 with a petaloid filament and 1 linear anther-cell. Staminodes petaloid connate below, hooded. Style very stout involute. Ovary inferior, 1- to 3-celled, cells 1-ovuled. Fruit capsular or sub-baccate. Seeds 1 to 3, usually arillate. Species about 300, chiefly South American, few Asiatic and African.

- Stems erect shrubby branched; panicles sub-terminal 1. DONAX
 Stemless plants.
 Bracts imbricate.
 Spikes solitary elongate erect from rhizome 2. STACHYPHRYNIUM
 Spikes panicle from the side of a petiole 3. PHACELOPHRYNIUM
 Bracts not imbricate.
 Spikes in a compact head from side of petiole 4. PHRYNIUM

1. DONAX, Lour.

Stems tall, shrubby much branched. Leaves ovate or oblong; petioles short; sheaths long. Panicles lax. Bracts narrow lanceolate. Flowers rather small, white. Sepals narrow. Staminal tube cylindrical. Stamines obovate unequal. Ovary 3-celled, cells 1-ovuled. Style stout incurved. Fruit indehiscent or dehiscent, 1- to 3-seeded, globose or trigonous. Seeds sub-globose. Aril lacinate. Species 5, Indo-Malayan.

- Stems 15 ft. tall; racemes numerous pendulous; fruit globose, 1-seeded (1) *D. grandis*
 Stems 8 ft. tall or less; racemes few erect; fruit often trigonous, 3-seeded (2) *D. arundastrum*
 Stems short; racemes pendulous hairy; flowers very small; fruit 2-seeded, seed warted (3) *D. parviflora*

(1) *D. grandis* Ridl. *Journ. Roy. As. Soc. S. Br.* 32, p. 176; *Mat.* ii. 56. *Maranta grandis* Miq. *Fl. Ind. Bat. Supp.* 616. Actoplans Ridley *Schum. Pflanzenreich. Marant.* 35.

A tall bamboo-like plant, 15 ft. high or more. Stems smooth green, branches clustered spirally on a thickened part of stem. Leaves ovate acute, 1 ft. long, 6 in. wide, base round; petioles 1 in. long. Racemes numerous pendent from upper leaf axils, 1 ft. long. Flowers rather distant. Sepals lanceolate acute. Lip oblong-obovate yellow. Fruit globose smooth, yellowish white, 1-seeded. *Hab.* Common in forests. Singapore, Bukit Panjang; Bukit Timah (Hullett). Johor, Hulu Sembrong (Ke'sall). Pahang, Tahan River; Gunong Senyum (Evans). Malacca, Bukit Panchur; Sungei Hudang (Derry). Negri Sembilan, Tampin. Selangor, Batu Caves; Rawang. Dindings, Telok Sera. Perak, Thaiping Hills (Curtis). Kelantan, Kwala Aring (Yapp); Chaning (Ridley). Province Wellesley, Krian. Perlis, Tebing Tinggi. Legeh, Blimbing (Gwynne-Vaughan). *Distrib.* Burma, Andamans, Siam, Sumatra, Borneo. *Native name:* Bemban. *Use:* Stems for making baskets.

(2) *D. arundastrum* Lour. *Fl. Cochinchine* 15.

Stems numerous slender, up to 8 ft. tall; branches dichotomous. Leaves elliptic, base round; petioles 24 in. long. Panicles spreading erect, 2 to 8 in. long; branches few. Flowers in pairs short pedicelled with a yellow conic gland below, ovary larger than in *D. grandis*. Sepals spathulate, upper one 1.5 in. long. Lip small

spathulate bilobed. Fruit obconic 3-lobed, 3-seeded, rarely 1-seeded and globose. *Hab.* Tidal rivers, forming thickets in the water. Common. Johor, Kota Tinggi. Pahang, Pekan. Selangor, Langkat. Perak, Kinta River; Temengoh; Changkat Mentri (Kloss). Kelantan, Kamposa; Kota Bharu. Kedah, Alor Sta. Perlis rivers. Jalor, Biserat (Gwynne-Vaughan). *Distrib.* Burma, Siam, Borneo. *Native name:* Bemban Ayer.

(3) **D. parviflora** *Ridl. Journ. Roy. As. Soc. S. Br.* 53, p. 59.

Short stems. Leaves ovate acute inæquilateral, 3 to 6 in. long, 2.5 to 4 in. wide, a fringe of long hairs on midrib. Panicle 3 to 6 in. long, pendulous hairy, especially on nodes. Bracts linear lanceolate, .5 to 1 in. long, silky. Flowers very small. Ovary silky. Calyx lobes lanceolate, .1 in. long. Corolla tube .05 in. long, lobes .2 in. long. Fruit globose sparsely hairy. Seeds 2, outer face convex with 5 rows of 4 warts. *Hab.* Woods. Not common. Pahang, Kwala Tembeling; Pulau Tawar. Selangor, Batu Caves. Perak, Ipoh. Kelantan, Glam wood, Kota Bharu (Ridley).

2. STACHYPHYNIUM, Schum.

Stems numerous. Leaves elliptic long-petioled. Inflorescence simply spicate, rarely branched on a rhizome. Bracts imbricate. Flowers in pairs in the bracts enclosed in a thin bracteole. Calyx lobes narrow. Corolla tube longer, lobes oblong white. Petaloid stamen short cucullate. Lip oblong or ovate with a narrow crest. Capsule oblong, 2- or 3-seeded. Seed oblong, aril irregular or of two long claw-shaped processes. Species 8, Indo-Malayan.

Spikes flattened tall; bracts distichous	(1) S. Griffithii
Spike cylindric fusiform; leaves often 6 ft. long	(2) S. cylindricum
Spike cylindric fusiform, short; leaves 1 ft. long	(3) S. Jagoranum
Spike small oblong; leaves small	(4) S. parvum

(1) **S. Griffithii** *Schum. Pflanzenreich, Marant* 49; *Ridl. Mat.* ii. 57. *Phrynium spicatum* *Griff.* (not of *Roxburgh*). *P. Griffithii* *Bak. in Hook fil. F.B.I.* vi. 260. (Fig. 185, p. 288.)

Very large tufted plant. Leaves erect; petioles 3 ft. long or more, blade oblong, glaucous beneath, 2 ft. long, 6 in. wide. Spikes 4 to 6 in. long, 3 in. wide, flattened. Bracts whitish, edges connate, tip recurved. Flowers small fragrant. Capsule 1 in. long, fawn colour. Seeds 2. *Hab.* Common in rocky forest. Singapore, Bukit Timah; Bukit Mandai. Johor, Gunong Pantai; Batu Pahat. Malacca, Ching (Griffith); Bukit Bruang. Negri Sembilan, Tampin Hill (Goodenough). Pahang, Tahan River.

(2) **S. cylindricum** *Schum. l.c.* 49; *Ridl. Mat.* ii. 58. *Phrynium cylindricum* *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 178.

Tufted plant like the last. Leaves, petioles 4 ft. long, blade oblong-ovate, 2 ft. long, 8 in. wide, glaucous beneath. Peduncle

8 in. long. Spike narrow fusiform cylindric, 6 in. long. Bracts pale green ovate-oblong truncate. Sepals lanceolate acute reddish, .25 in. long. Corolla tube 1 in. long. *Hab.* On limestone rocks and in rocky woods. Perak, Ipoh and Kwala Dipang. Kelantan, Kwala Lebir (Ridley).

(3) *S. Jagoranum* Schum. *l.c.* 48; *Ridl. Mat.* ii. 58; *Phrynium Jagoranum* Koch, *Wochenschr.* vi. 358.

Leaves 1 to 3 together; petioles 8 to 9 in. long, blade oblong cuspidate, 6 to 7 in. long, 3 in. across, grey green with darker patches or plain; midrib and knee pubescent. Spike fusiform, 2 in. long. Peduncle 1 in. long. Bracts about 4 lanceolate acute. Corolla

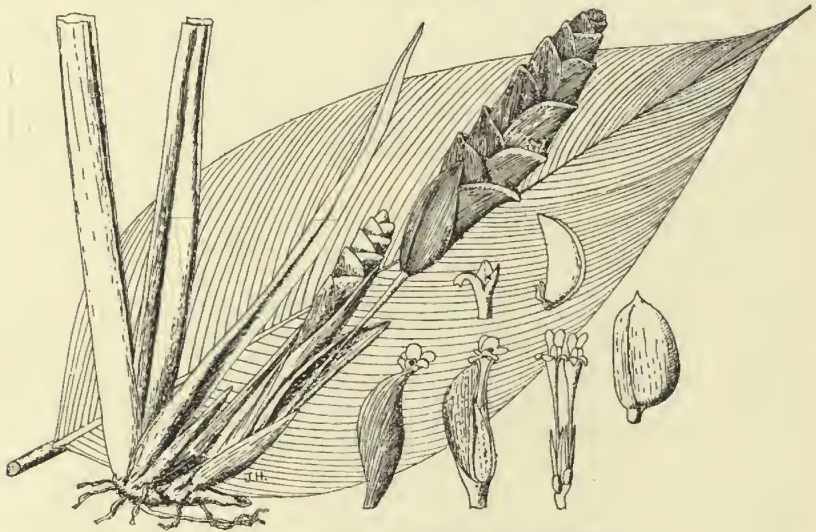


FIG. 185.—*Stachyphrynium Griffithii*.

tube .5 in. long, lobes yellow. Capsule oblong oblique. Seeds 2 oblong brown, aril red with 2 long claws. *Hab.* Forming patches on the ground in orchards and pastures, rarely flowering. Selangor, Dusun Tua; Kwala Lumpur. Perak, Temengoh. Kedah, Alor Sta. Perlis, Kanga. Setul.

(4) *S. parvum* *Ridl.* *S. minus* *Ridl. Mat.* ii. 59 (not of *Schumann*).

Rhizome long slender creeping, with stems 3 to 4 in. long. Leaves 3 or 4 crowded; petioles slender, 18 in. tall, blade lanceolate acuminate, base narrowed, 8 in. long, 1.5 in. wide. Peduncle slender, 3 in. long, heads of flowers 1 in. long. Calyx-lobes lanceolate, .25 in. long. Corolla tube slender, .5 in. long, lobes as long, white. *Hab.* Covering the ground in dense masses. Very seldom flowering. Singapore, Reservoir woods. Johor, Sedenah and Tebrau (Ridley); Gunong Belumut (Holtum).

3. PHACELOPHRYNIUM, Schum.

Large tufted herbs. Leaves long-petioled. Inflorescence a dense or interrupted panicle of spikes with distichous bracts, from a petiole. Flowers in twos or threes pedicelled. Sepals linear or sub-ovate. Corolla tube short, lobes oblong, white. Lip with oblique villous ridge. Petaloid stamen spatulate. Capsule 3-angled, 2- or 3-seeded. Species 6, Nicobars, Malay isles.

(1) **P. tapirorum** *Schum. l.c. 122; Ridl. Mat. ii. 59.* Phrynum tapirorum *Ridl. Trans. Linn. Soc. iii. 382.*

Large tufted plant. Leaves, petioles 4 to 5 ft. tall; blade ovate lanceolate, 18 in. long, 8 in. wide, acuminate. Peduncles stout, 1 ft. long. Spikes 2 or 3 in a tuft, the tufts distant, 4 in. long. Bracts ovate-lanceolate brown. Flowers 1 in. long, in threes each in 2 bifid bracteoles. Capsule .5 in. long. *Hab.* In forests. Not common, at 2000 ft. altitude. Pahang, Tahan River. Selangor, Ginting Bidai (Ridley).

4. PHRYNIUM, Willd.

Stemless herbs with ovate or oblong long-petioled leaves. Inflorescence capitate produced from side of petiole with a few large outer bracts, numerous inner bracts and flowers 1 to 3 on a peduncle. Sepals linear or oblong. Corolla little longer, lobes oblong or ovate. Petaloid stamen ovate. Lip shorter, callus transverse. Seeds 1 to 3 ellipsoid, aril thin, dry. Species 12, Indo-Malayan.

- Inflorescence from near base of petiole (1) **P. basiflorum**
- Inflorescence high up on petiole near the blade.
- Bracts very hairy (2) **P. hirtum**
- Bracts nearly glabrous, spikes dense (3) **P. malaccense**
- Bracts quite glabrous, spikes three elongate (4) **P. tristachyum**
- Inflorescence on a leafless stem (5) **P. terminale**

(1) **P. basiflorum** *Ridl. Journ. Roy. As. Soc. S. Br. 32, p. 182; Mat. ii. 60.*

Rhizome rather long. Leaves tufted on a very short woolly stem; petioles tall slender; blades oblong, 2 ft. long, 6 in. wide, base broad, edges hairy. Head 3 in. through from near the base, compact. Bracts woolly, numerous glabrous. Flowers in pairs. Sepals linear setaceous, .75 in. long. Corolla little longer, pink. Lip .4 in. long and wide. *Hab.* In damp woods in great masses, local. Negri Sembilan, Perhentian Tinggi (Ridley).

var. *nobile*. *Ridl.* Leaves and petiole 8 ft. long, light green with dark green bars, beneath rose colour. Perak, Tapah (Ridley). *Distrib.* Borneo.

(2) **P. hirtum** *Ridl. Journ. Roy. As. Soc. S. Br. 32, p. 181; Mat. ii. 60.*

Leaf-petioles, 2 to 4 ft. long, blades oblong acute, 15 in. long, 8 in. wide, glabrous. Heads 3 in. through, emitted from the petiole about half-way up, outer bracts 3 in. long, lanceolate brown

woolly; inner bracts oblong truncate, 1.5 in. long, glabrous breaking up into fibres. Flowers .75 in. long, white. Capsule globose obscurely 3-angled, .5 in. long. Seeds 3, oblong. *Hab.* Hill woods. Johor, Gunong Pantai; Sungei Tebrau. Negri Sembilan, Bukit Tinggi. Selangor, Dusun Tua; Semangkok Pass; Ulu Gombak. Perak, Thaiping Hills; Hermitage Hill; Bujong Malacca; Ulu Kerling (Kunstler). Penang Hill (Maingay, Curtis). Kedah, Yan. *Native name*: Lerek Betina.

(3) ***P. malaccense*** *Ridl. Journ. Roy. As. Soc. S. Br.* 32, p. 180; *Mat.* ii. 61.

Tufted plant. Petioles about 3 ft. long, slender, blades 15 in. long, 5 in. wide, lanceolate cuspidate, glaucous beneath, midrib brown-furry. Head about half-way up petiole or higher, 2 in. across of about 5 spikes. Bracts lanceolate acute stiff dark green, glabrous, 1.5 in. long, .75 in. wide. Flowers small short stalked. Calyx-lobes lanceolate acute hairy white as long as corolla tube. Corolla-lobes ovate blunt spotted purple. Lip spatulate white with pink line. Capsule .25 in. long, angled red-hairy. Seeds 1 to 3, oblong angled. *Hab.* Woods, common. Muar. Malacca, Panchur (Derry). Negri Sembilan, Tampin (Goodenough); Perhentian Tinggi. Pahang, Kwala Tembeling; Pekan. Dindings, Gunong Tungul. Perak, Thaiping Hills.

(4) ***P. tristachyum*** *Ridl.*

Leaves stiff, oblong, base narrowed, 2 ft. long, 8 in. wide; petioles stout, 30 in. long. Inflorescence lateral; peduncle stout, .75 in. long, spikes three cylindrical, 3.5 in. long, .75 in. through. Bracts at base ovate lanceolate acute, lowest 1.5 in. long. Floral bracts ovate-lanceolate broad, quaquaversal splitting up at tip into 8 to 10 points; spikelets numerous, 1 in. long, acute. Flowers white, two in a bract. Fruit oblong triquetrous hairy .4 to .5 in. long. *Hab.* Selangor, Bukit Lagong, 11th mile Rawang Road from Kwala Lumpur (Foxworthy and Burkill).

This species seems more nearly allied to *Ph. capitatum* Roxb., of India, but differs from all species I have seen in the elongate spikes and acute bracts. Unfortunately the flowers in the only specimens I have seen are completely rotten.

(5) ***P. terminale*** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 105.

Tufted. Leaves elliptic acute, base round glabrous purple beneath, 18 in. long, 6 in. wide; petioles over 18 in. long. Head on a slender leafless peduncle 18 in. long, from rhizome, about 2 in. long in fruit. Two outer bracts broad oblong truncate, lowest one 1.5 in. long, 1 in. wide. Capsule on a pedicel .5 in. long, oblong truncate top flat, 3-angled, .5 in. long, minutely pubescent. Seed oblong, nearly .5 in. long, aril small bilobed. *Hab.* Rare in woods. Perak Temengoh and Lenggong (Ridley). Flowers not seen. *Distrib.* Sumatra.

ORDER CXXXIX. CANNACEÆ.

Tall herbs; rhizome short, not aromatic. Stems leafy. Leaves large thin, oblong or ovate acute petioled, sheathing at base. Raceme lax terminal simple or branching. Flowers showy red or yellow. Sepals 3, free, superior, oblong or lanceolate acute. Corolla-tube cylindric, lobes 3, lanceolate. Stamens in a cylindric tube with three unequal petaloid lobes. Anther 1-celled, adnate to the edge of one of the smaller lobes. Ovary inferior, 3-celled; style adnate to the stamen tube. Fruit globose or oblong muricate, capsular. Seeds large globose, smooth, black, no aril. One genus, *Canna* Linn. Species 20 to 30, all tropical American, one or two now widely scattered over the Tropics. Many species and hybrids cultivated in gardens.

1. CANNA, Linn.

(1) *C. orientalis* Rose. *Pl. Scitam.* t. 12.

Stems 3 to 4 ft. tall. Leaves ovate acuminate, 12 to 14 in. long, 3.5 to 7 in. wide; petiole sheathing, 6 in. long. Raceme a panicle of 2 or 3 racemes 9 to 12 in. long. Lower bracts linear acute, 4 in. long, .5 in. wide or less. Floral bracts ovate truncate, .5 in. long and as wide. Flowers 8 or more, sub-sessile. Sepals lanceolate acute, .25 in. long, lengthening in fruit, pinkish or green. Corolla-tube .25 to .3 in. long, lobes linear acute, red, 1 in. long, .1 in. wide. Staminal lobes oblanceolate-spathulate, red, 1.5 in. long, .25 in. wide. Lip linear-spathulate, 1 in. long, red with yellow centre or with yellow spots. Capsule oblong, .75 to 1 in. long, black muricate with short processes crowned by the enlarged calyx. Seeds globose black. *Hab.* Common in waste ground and old gardens, often reappearing when abandoned cultivations are dug over, Singapore, Malacca, etc. Certainly not wild here, but now widely distributed over the Old World, probably native of India. *Native name:* Sebiak or Sebek, often called Pisang Sebiak. *Use:* Leaves used for wrapping up parcels.

C. Warszewiczii Dietr. in *Otto et Dietr. Allg. Gart. Zeit.* 290; *Bot. Mag. t.* 4854. Established itself for some time in waste ground in Singapore. Stem 3 ft. tall, with the leaves, ovaries, calyx and bracts deep purple blood red, and pruinose. Leaves 1 ft. long, 6 in. wide. The flower is scarlet, the corolla-lobes broader than in *C. orientalis*, and the upper one notched at the tip. Capsule black and covered with warts. Native of Costa Rica and South Brazil.

ORDER CXL. LOWIACEÆ.

Tufted stemless plants. Leaves rather stiff oblong or elliptic, petioled. Flowers solitary or on a short panicle from the rhizome.

Bracts lanceolate. Flowers medium to large. Calyx-tube cylindric nearly solid, lobes 3, lanceolate. Petals 2, small lanceolate, one (the lip) very large obovate. Stamens 5, short. Style 1, stigma 3-armed. Capsule fusiform acute. Seeds numerous flask-shaped, hairy. Genus 1, *Orchidantha* (Lowia). Species 3, Borneo and Malay Peninsula.

1. ORCHIDANTHA, N.E.Br.

Stemless plants. Leaves elliptic or oblong petioled. Flowers in a paniced cluster from among the leaves, sometimes very large.



FIG. 186.—*Orchidantha longiflora*.

Calyx-tube long cylindric, lobes lanceolate long. Petals 2 small and 1 very large obovate. Stamens 5 very short. Style 1 with 3 stigmas. Capsule large fusiform acute purple. Species 3, one Bornean.

Leaves large lanceolate tapering to base; lip
trilobed, 4 in. long (1) *O. longiflora*

Leaves elliptic smaller long petioled, lip 1.5 in.
long, entire (2) *O. maxillarioides*

(1) *O. longiflora* Ridl. *Lowia longiflora*, *Scott. Nuov. Giorn. Bot. Ital.* 1866, p. 308, pl. ii.; *Ridl. Mat.* ii. 62.

A large plant forming big tufts of lanceolate acute leaves 3 ft.

long, 4 in. wide, narrowed to the petiole. Flowers solitary axillary. Bracts long purple. Calyx tube 3 in. long, lobes 5 in. long, 1 in. across, purple. Petals linear acuminate, 1 in. long, yellowish. Lip clawed obovate, 4 in. long, 2 in. across, cream-colour or lilac, claw purple, 3-lobed at tip; midlobe toothed. Stamens as long as petals. Style long and slender. Stigmas large linear with numerous teeth rising from a cup. All purple. *Hab.* Common in forests in wet spots, but rarely flowering. Malacca. Selangor, Ulu Langat; Klang Gates (very large); Batu Caves. Perak, Kinta Valley (Scortechini); Temengoh; Gunong Kerbau (Haniff). *Native name:* Lobak hutan.

(2) *O. maxillarioides* Ridl. *Lowia maxillarioides* Hook. *fl. Bot. Mag.* t. 7351; *Ridl. Mat.* ii. 62. *Protamomum maxillarioides* Ridl. *Trans. Linn. Soc.* iii. 383.

Tufted plant, about 1 to 2 ft. tall. Leaves elliptic-lanceolate acuminate, 8 in. long, 3 in. wide; petioles 1 to 2 ft. long. Panicle 3 in. long. Calyx tube 3 in. long, purple, lobes lanceolate acute, 1.25 in. long, deep purple. Petals very small oblong mucronate-violet. Lip oblong blunt, claw short, white tinted violet, 1.5 in. long, .5 in. wide. Stamens thick short. Style short and thick, arms short toothed. Capsule 1.5 in. long, fusiform 3-angled acuminate purple. Seeds flask-shaped, brown hairy. *Hab.* Rare. Dense forests. Pahang, forests at Pulau Tawar (Ridley).

ORDER CXLI. MUSACEÆ.

Gigantic tree-like herbs with broad oblong leaves transversely nerved, long-petioled. Inflorescence spicate (or paniced) with large bracts persistent or caducous. Calyx tubular or free. Petals 3 or tubular. Stamens 5; filaments slender. Staminode 1 or 0. Style slender. Stigma 3- to 5-lobed. Fruit baccate (or capsular). Seeds numerous or few. Species about 60, all tropics.

The *Heliconias* of S. America and Polynesia and the *Ravenala*, Traveller's Tree of Madagascar, cultivated in our gardens belong to this order.

1. MUSA, Linn.

Gigantic herbs, stem of convolute leaf sheaths. Leaves oblong very large. Spike deflexed or erect. Bracts ovate coloured leathery or herbaceous. Flowers sessile in rows in the bracts, lower ones female, upper ones male. Calyx tubular, 3- to 5-toothed, split on one side. Corolla as long, tubular. Stamens 5 (6th rudimentary or 0), filaments filiform. Anthers linear. Style filiform. Fruit an oblong berry, fleshy sub-trigonous. Seeds numerous angled. Species 35, tropics of Old World.

Musa sapientum Linn., the banana or plantain, Pisang of the Malays, is largely cultivated for fruit. Its origin is uncertain, probably India in part, but I think some of the Malay varieties are derived from *M. malaccensis*.

Spike decurved.

Bracts lanceolate brown; stem thin slender . . . (1) *M. malaccensis*

Bracts oblong purple violet; stem stout, 1 ft. through . . . (2) *M. truncata*

Bracts ovate broad, bright yellow . . . (3) *M. flava*

Spike erect.

Bracts acuminate violet . . . (4) *M. violascens*

(1) *M. malaccensis* Ridl. *Trans. Linn. Soc.* iii. 383; *Mat.* ii. 63.

Stems 10 ft. tall or more, 6 in. through. Leaves 8 ft. long, barred or splashed brown when young. Spike decurved; rachis brown hairy. Bracts lanceolate sub-acute dark brown. Male flowers 1.5 in. long, curved white. Female flowers 16 in a row. Fruit sub-cylindric, 4 in. long, yellow, pulp scanty sweet. *Hab.* Common in hill forests, often in immense quantity. Malacca, Panchar (Goodenough); Ching. Pahang River. Selangor, Kwala Lumpur and up to Ginting Sempah to 1500 ft. altitude. Perak, Thaiping Hills; Kamuning; Batang Padang Valley. Adang islands, Pulau Tengah. Kelantan, Kwala Krai (Haniff).

var. *minor* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 205. A dwarf form 6 ft. tall. Leaves 14 in. long, 2 in. across; rachis glabrous. Bracts oblong blunt, 3 in. long, 1 in. wide (in male part). Flowers 1.25 in. long. Fruit 2 in. long, cylindric angled obscurely. Perlis, limestone rocks at Bukit Lagi (Ridley). Perhaps specifically distinct. *Native names:* Pisang Karok; Pisang Surong. *Use:* The fruit is edible and used by wild tribes, but the pulp is scanty.

(2) *M. truncata* Ridl. *Journ. F.M.S. Mus.* iv. 80.

A big banana, stem 20 ft. tall, 1 ft. through, purple brown. Leaves 20 ft. long, 2.5 ft. wide, green, base round, tip truncate with midrib projecting as a filament; petioles thick, 45 in. long. Spike pendulous, 4 ft. long. Bud deep violet acute. Bracts purple violet (young maroon pink). Male flowers 1.5 in. long. Calyx boat-shaped, longer than corolla, 4-lobed. Fruit narrow cylindric, 5 in. long in two rows of 11 each in a bract. *Hab.* Dense forests at about 2000 ft altitude, above the zone of *M. malaccensis* and *M. violascens*. Pahang, Telom. Selangor, Ginting Sempah. Perak, Thaiping Hills (Ridley).

(3) *M. flava* Ridl. *Trans. Linn. Soc.* iii. 383; *Mat.* ii. 63.

Leaves large, 16 in. across. Spike decurved pubescent. Bracts broadly ovate blunt leathery, 4 in. long, 1.5 in. wide, bright yellow. Male flowers 16 in a row shortly pedicelled. Calyx 5 in. long, teeth 5, equal. Corolla .75 in. long, oblong mucronate. Female flowers 16 in a row. Fruit 2 in. long, 5-angled. *Hab.* Rare. Pahang River at Pulau Tijau (Ridley).

(4) *M. violascens* Ridl. *Trans. Linn. Soc.* iii. 384; *Mat.* ii. 64.

Stems slender, 8 to 10 ft. tall. Leaves 10 in. across, glaucous beneath. Spike erect acute. Bracts lanceolate narrow acute

violet or white tinted violet, 9 in. wide, persistent and pendent on pubescent rachis after fall of flower. Male flowers 6 in a row, 1 in. long, white. Calyx oblong, 2 outer teeth longest. Corolla .75 in. long. Females 6 in a row. Fruit green, 3 in. long, 1 in. through, angled. Seeds .25 in. long, cylindric, truncate not angled. *Hab.* Common, growing with *M. malaccensis* in great plenty. Pahang, Tahan woods; Kwala Lipis (Machado). Negri Sembilan, Linsum. Selangor, Kwala Lumpur; Ginting Sempah. Perak, Thaiping Hills; Sungei Siput (Burkill). Temengoh; Batang Padang Valley (Ridley).

M. sp. A dwarf plant. Leaves lanceolate acuminate blunt mucronulate, 2 ft. long, 5 to 6 in. wide; petioles rather slender. Fruits cylindric solitary short pedicelled, 3 in. long, erect, few, about 6, white with longitudinal violet bands, slightly angled. Seeds oblong; peduncle 8 in. long. *Hab.* Johor, Gunung Pulai; Tempayan River (Ridley).

I have twice seen this curious species, but only in fruit.

ORDER CXLII. APOSTASIACEÆ.

Erect herbs with leafy stems bearing a terminal raceme or panicle of medium or small flowers white or yellow. Perianth superior of 3 sepals and 3 petals, lanceolate cuspidate. Stamens 3, or one aborted. Anthers dorsifixed; filaments connate below. Style cylindric. Stigma capitate. Ovary triquetrous, 3-celled. Fruit capsular, rarely baccate. Seeds minute. Species about 10, Malayan.

Flowers moderately large; stamens 3 1. NEUWIEDIA
Flowers small; perfect stamens 2 2. APOSTASIA

1. NEUWIEDIA, Bl.

Herbs with erect or creeping stems. Leaves numerous plicate, lanceolate. Flowers racemose. Bracts long. Sepals and petals equal and similar. Stamens 3 fertile. Anthers linear-oblong, filaments connate for two-thirds of their length. Style stout. Fruit capsular or baccate. Species 6, Malayan isles to Louisiades.

Fruit capsular.

Flowers yellow (1) *N. Lindleyi*
Flowers white (2) *N. Griffithii*
Flowers buff; petals caudiculate hairy (3) *N. ocrea*
Fruit baccate; flowers yellow (4) *N. Curtisii*

(1) *N. Lindleyi* Rolfe, *Journ. Linn. Soc.* xxv. 232, t. 48, figs. 10 to 12; *Hook. fil. F.B.I.* vi. 175; *Bot. Mag.* t. 7368. (Fig. 187, p. 296.)

Stem 2 to 4 ft. tall, erect. Leaves lanceolate acuminate tapering to a petiole, 18 to 24 in. long, 2 in. wide. Raceme 1 to 2 ft.

long, dense. Flowers yellow. Sepals $\cdot 5$ in. long, lanceolate pubescent. Capsule $\cdot 5$ in. long, with 3 broad reflexed valves. *Hab.* In forests. Singapore, Chua Chu Kang; Bukit Timah. Malacca, Bukit Lintang (Derry). Sungei Ujong (Cantley). Penang (Curtis). *Distrib.* Borneo. *Native name:* Jamba.

(2) *N. Griffithii* Rehb. *fil. Xen. Orch.* ii. 215; *Hook. fil. F.B.I.* vi. 176; *Bot. Mag. t.* 7425.

Rhizome long creeping. Leaves lanceolate petioled, 8 in. long, $1\cdot 75$ in. wide; petioles 2 in. long. Raceme shorter than leaves, 4 to 5 in. long, dense. Flowers white. Sepals lanceolate pubescent, $\cdot 2$ in. long, pubescent. Petals broader. Stamens 3, white; anther-cells divaricate at base. Stigma clubbed obscurely 3-lobed. Capsule $\cdot 25$ in. long. *Hab.* Banks and streams in forests. Singapore, Sungei Morai; Bukit Timah. Johor, Genuang. Malacca, Bukit Sadanen. Perak, Ulu Bubong (Kunstler). *Distrib.* Borneo.

(3) *N. ocrea* Ridl. *Journ. Roy. As. Soc. S. Br.* 86, p. 308.

Stem below leaves, $1\cdot 5$ in. long, roots very stout; no rhizome. Leaves 7 or 8, elliptic, long-acuminate, base narrowed to petiole, glabrous, 10 in. long, $2\cdot 25$ in. wide; petioles strongly ribbed, 4 in. long. Raceme 5 in. long. Bracts at base lanceolate acuminate, $\cdot 75$ in. long, glabrous, above $\cdot 5$ to $\cdot 2$ in. long, glandular hairy conspicuously nerved. Flowers about 40 ocre; pedicels



FIG. 187.—*Newwiedia* Lindleyi.

hairy, $\cdot 1$ in. long. Sepals and petals $\cdot 75$ in. long, linear-lanceolate with short caudicles from below the tip glandular hairy. Petals narrower and shorter than the sepals keeled, keel hairy. Stamens 3, anthers oblong, filaments free at the top, below connate to the stout curved style. Ovary hairy. *Hab.* Forest, on mountains at 2200 ft. altitude. Negri Sembilan, Bukit Tangga (Ridley). Rare.

(4) **N. Curtisii** Rolfe *Journ. Linn. Soc.* xxv. 233, t. 48, fig. 13; *Ridl. Mat.* i. 232.

Stem erect, 1 ft. tall or more. Leaves lanceolate broad, 18 in. long, 2 to 2.5 in. wide; petioles 3 in. long. Raceme 4 to 5 in. long, pubescent. Flowers yellow. Sepals linear-lanceolate, .25 in. long. Petals broader. Fruit a red succulent berry. *Hab.* In woods. Singapore (Wallich, *Tupistra singaporeana*); Changi. Johor, Gunong Pantai; Gunong Pulai. Negri Sembilan, Gunong Ansi (Ridley). Perak, Goping (Kunstler). Penang (Curtis). *Distrib.* Sumatra.

2. APOSTASIA, Bl.

Stems slender, woody ascending. Leaves linear acuminate sheathing. Inflorescence terminal paniced or racemose nodding. Flowers small white. Ovary long narrow. Petals and sepals similar connivent or recurved. Stamens perfect 2, the third reduced to a staminode or absent. Capsule linear. Species 10, India, China, Malaya, Australia.

Filament of 3rd stamen present	(1) A. Wallichii
No trace of 3rd stamen.	
Leaves narrow linear	(2) A. nuda
Leaves broad lanceolate	(3) A. latifolia

(1) **A. Wallichii** *Br. Wall. Pl. As. Rar.* i. 76, t. 85; *Ridl. Mat.* i. 232.

Stem 6 to 12 in. tall. Leaves linear acuminate, 6 to 8 in. long, .25 in. wide. Racemes slender, 2 to 3 in. long, recurved spreading with few or no bracts at base. Flowers yellow. Ovary and pedicel .25 in. long. Sepals and petals linear acuminate recurved. Filament of third stamen present. *Hab.* Forests. Johor, Gunong Pantai. Pahang, Tahan River. Selangor, Bukit Hitam. Perak, Ulu Bubong (Kunstler). Penang (Curtis). *Distrib.* India, Sumatra, Philippines.

(2) **A. nuda** *R. Br. Wall. Pl. As. Rar.* i. 76, t. 85. *A. Brunonis* *Griff. Notulæ*, iii. 243; *Ic. t.* 282.

Stems 1 to 2 ft. tall. Leaves linear acuminate, 5 to 8 in. long, .25 to .5 in. wide. Panicle decurved, 2 to 4 in. long, with numerous crowded linear bracts at base of branches. Sepals and petals white, rarely yellow, lanceolate cuspidate. No trace of third stamen. *Hab.* Forests. Singapore, Changi; Jurong. Johor, Bukit Murdom (Kelsall). Negri Sembilan, Perhentian Tinggi. Malacca, Mt. Ophir (Hullett). Pahang, Wray's Camp, Tahan. Dindings, Lumut. Perak, Gunong Batu Putih and Tapah (Wray). Penang, Moniot's Road. Kedah Peak. *Distrib.* India, Borneo. *Native names*: Pelampas Budak; Senjuan Hutan Jantan; Kenching Pelandok. *Use*: Medicinally for diarrhœa and hydrophobia.

(3) **A. latifolia** Rolfe, *Journ. Linn. Soc.* xxv. 242; *Ridl. Mat.* i. 233.

Stem 6 in. to 3 ft. tall. Leaves lanceolate acuminate petioled,

3 to 6 in. long, .75 to 1 in. wide. Racemes 1 to 5 in. long. Bracts lanceolate subulate. Ovary sessile. Petals and sepals linear-oblong. Anther linear cordate. No trace of third stamen. *Hab.* Not common. In forests. Malacca, Mt. Ophir. Perak, Ulu Batang Padang (Wray).

ORDER CXLIII. AMARYLLIDACEÆ.

Herbs with a short stem or a bulb. Leaves radical herbaceous. Scapes naked. Perianth superior, tube long or short or 0; lobes subequal and similar. Stamens 6 adnate to base of lobes; filaments slender; anthers linear. Ovary 3-celled inferior; ovules many, 2-seriate in the inner angle of the cells. Fruit capsular or baccate. Seeds few or many, albuminous. *Distrib.* Whole world, rarer in tropics.

TRIBE i. *Hypoxideæ*. Rootstock thick, not bulbous. Flowers spicate or racemose.

Ovary not beaked; fruit capsular 1. HYPOXIS
Ovary beaked; fruit baccate 2. CURCULIGO

TRIBE ii. *Amaryllideæ*. Stem bulbous; flowers umbellate.

Leaves linear or lorate 3. CRINUM
Leaves ovate petiolate 4. EURYCYLES

1. HYPOXIS, Linn.

Stem tuberous. Leaves narrow. Flowers yellow, racemed or umbellate or solitary. Perianth rotate sessile on the top of the ovary. Stamens with short filaments; anthers erect dorsified. Style short. Stigmas 3 stout. Capsule 3-valved or circumsciss, not beaked. Seeds sub-globose. Species about 50, chiefly African and Australian.

(1) *H. aurea* Lour. *Fl. Cochinchine* 200; *Hook. fil. F.B.I.* vi. 277; *Ridl. Mat.* ii. 64. *H. minor* Don, *Prodr.* 53; *Royle. Ill. t.* 91, f. 3.

A small hairy herb; stem cylindrical or globose, fibrillose. Leaves linear acuminate, 6 in. long, .25 in. wide, glabrous. Scapes hairy, .5 to 4 in. long, 1- or 2-flowered. Flowers yellow. Perianth-lobes elliptic-lanceolate, backs hairy, .5 in. long. Capsule trivalved, clavate, .25 to .3 in. long. Seeds black tubercled. *Hab.* In sandy grassy spots. Rare. Pahang, Pulau Manis, Pahang River. Province Wellesley, Tasek Gelugur. Setul (Ridley). *Distrib.* India, Malay islands, China, Japan.

2. CURCULIGO, Gaertn.

Stem tuberous or a corm. Leaves large plicate petiolate lanceolate or linear flat. Scapes short. Flowers yellow spicate, racemed or sub-capitate. Perianth base produced into a solid stipes above the ovary, limb rotate 6-lobed. Fruit baccate, beaked. Species about 12, Tropical Asia and Africa.

- Perianth limb sessile on ovary; spike nodding . . . (1) *C. recurvata*
 Perianth limb stipitate; spikes erect.
 Bracts stiff oblong large (2) *C. villosa*
 Bracts small ovate-lanceolate or lanceolate acuminate.
 Flowers 1.5 in. across; fruit oblong, 1 in. long . . . (3) *C. latifolia*
 Flowers 1 in. across; fruit club-shaped, 2 in. long (4) *C. megacarpa*

(1) *C. recurvata* Dryand, *Ait. Hort. Kew, ed. 2, ii. 253*; *Bot. Reg. t. 770*; *Hook. fil. F.B.I. vi. 278*; *Ridl. Mat. ii. 65*.

Leaves about 6 ft. long, blade plicate lanceolate acuminate,



FIG. 188.—*Curculigo recurvata*.

36 in. long, 6 in. wide. Peduncles 2 in. long, flat hairy. Raceme capitate decurved, 2 in. through. Bracts lanceolate acuminate, lower ones 3 in. long, .5 in. wide, keel brown-furry. Pedicels .25 in. long. Perianth-lobes .5 in. long, yellow, backs furry. Ovary not beaked, furry. Fruit globose white. *Hab.* Woods and forests, common to 2000 ft. altitude. Singapore, Tanglin, Sungei Ujong (Cantley). Perak, Thaiping Hills. *Distrib.* India, Ceylon, Malaya, China, Australia. *Native name:* Lumbah Merah. *Use:* Fruits eaten.

(2) *C. villosa* Wall. *Cat.* 5763A; *Kurz, Ann. Mus. Bot. Lugd. Bat.* iv. 176; *Ridl. Mat.* ii. 66. *C. latifolia* var. *villosa* Bak. *Journ. Linn. Soc.* xvii. 125; *Hook. fil. F.B.I.* vi. 280.

Leaves lanceolate acuminate-caudate plicate, glabrous above, cobwebby beneath, 2.5 ft. long, 6 in. wide. Racemes erect, 2 in. long; peduncles short flat. Bracts stiff oblong acute, tips recurved, 2 in. long, .5 in. wide, glabrous. Flowers ochre yellow, .75 in. across. Sepals lanceolate acute. Petals shorter blunter. Ovary pubescent, beaked. Fruit greenish white, long-beaked. Seeds few and small. *Hab.* In long grass and scrub in open country in the south of the Peninsula. Singapore (Wallich); Garden Jungle. Johor (Ridley). *Distrib.* Malay islands.

(3) *C. latifolia* Dryand *Ait. Hort. Kew, ed. ii.* II. 253; *Bot. Mag. t.* 2034; *Bot. Reg. t.* 754; *Hook. fil. F.B.I.* vi. 280; *Ridl. Mat.* ii. 66. *C. sumatrana* Roxb. *Fl. Ind.* ii. 146; *Lodd. Bot. Cab. t.* 443; *Wight Ic. t.* 2042.

Stem very short. Leaves lanceolate hairy on both sides, 3.5 ft. long or less, 6 in. wide; petioles over 6 in. long. Spikes erect on peduncles 3 to 4 in. long, at first globose, then lengthening to as much as 6 in. Lower bracts ovate acute, .5 in. long. Flowers bright yellow, .5 in. across. Ovary pubescent beaked. Perianthlobes oblong. Fruit 1 in. long, ovoid white, hairy. Seeds acini-form, ribbed with minute papillæ. *Hab.* In woods and on banks over the whole Peninsula, very common and variable from sea level to 6700 ft. altitude.

var. *glabrescens* Ridl. *l.c.* Leaves 1 to 1.5 ft. long, 2 to 4 in. wide; petioles 2 to 8 in. long, almost or completely glabrous. Raceme elongating to 2 in. long. Bracts lanceolate hairy. With the last, less common and more of a mountain plant. A beautiful variety with the upper side of the leaves silvery and back purple occurs at Ipoh (Curtis). *Distrib.* Burma, Andamans, Malay Archipelago. *Native names:* Lumbah; Linsubah (Pahang). *Use:* Fruit eaten; fibre of leaves used for fishing nets.

(4) *C. megacarpa* Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 33; *Mat.* ii. 67.

A large tufted plant with a stout stem. Leaves oblong-lanceolate acuminate, glabrous, 20 in. long, 3 in. wide; petioles 8 in. long. Peduncle 4 in. long, tomentose. Spike cylindrical-conic, 2 to 4 in. long. Flower 1 in. across. Sepals lanceolate acute, dirty yellow. Petals bright yellow. Ovary hairy beaked. Fruit 2 in. long, club-shaped, white. Seeds very numerous, angled ribbed. *Hab.* Rare. In dense forest at 2000 to 3000 ft. altitude. Perak, Thaiping Hills (Ridley).

3. CRINUM, Linn.

Stem bulbous. Leaves lorate or ensiform. Scape stout leafless. Flowers umbelled, white. Involucral bracts lanceolate or ovate,

floral linear. Perianth tube long, slender, lobes linear or oblong similar. Stamens with slender filaments adnate to base of tube. Anthers linear dorsifixed. Style filiform; stigma minute; ovules usually few. Fruit subglobose membranous or coriaceous dehiscent irregularly. Seeds few large, rounded or irregular, testa thick corky. Albumen large. Species about 60, tropics generally.

- | | |
|--|--------------------------|
| Bulb very large long-necked, not stoloniferous. Sea-shore plant | (1) C. asiaticum |
| Bulb large stoloniferous; leaves narrower; fruit very large; tidal mud | (2) C. Northianum |
| Bulb small, dwarf plant. Meadows | (3) C. defixum |

(1) **C. asiaticum** Linn. *Sp. Pl.* 419 (partly); *Bot. Mag. t.* 1073; *Hook. fl. F.B.I.* vi. 280; *Ridl. Mat.* ii. 68. **C. toxicarium** Roxb. *Fl. Ind.* ii. 134; *Wight Ic. t.* 2021, 2022; *Lodd. Bot. Cab. t.* 669.

Stem base globose, large, neck stout, 2 ft. long. Leaves lanceolate acuminate, 2 to 6 ft. long, 5 to 6 in. wide. Scapes several, 3 to 4 ft. tall, axillary. Flowers numerous. Perianth tube green, 3 to 6 in. long, lobes linear white, 3.5 in. long, .7 in. wide. Stamens crimson, base white; anthers fuscous. Style dark red. Fruit white irregularly globose, about 2 in. through. Seeds large, irregular in shape, green inside. *Hab.* Sandy seashores. Singapore, Changi; Sungei Buluh. Johor, Tana Runto. Pahang, Pekan. Malacca, Pulau Besar (Maingay); Kundur (Griffith). Dindings. Penang, Batu Feringhi (Curtis). *Distrib.* Tropical Asia. *Native name:* Tembaga Suasa.

(2) **C. Northianum** Baker, *Gard. Chron.* 1882, i. 671; *Ridl., Agric. Bulletin*, iii. 1904, p. 310.

Stem usually producing long stolons from the base. Leaves linear, 5 to 7 ft. long, 3 in. wide, acute. Peduncle 18 in. tall, .5 in. thick. Flowers 12 to 40 in an umbel. Perianth tube 6 in. long, green, lobes linear, 4 in. long, .36 in. wide, white tinted and tipped pink. Stamens 3 in. long, pink or white; anthers black. Style pink. Capsule very large, more or less pear-shaped, 4 in. long, pointed at both ends. Seeds larger than in *C. asiaticum*. *Hab.* Tidal ditches in mud, Kedah at Alor Sta. Kelantan near Tumpat, Kota Bharu (Ridley). *Distrib.* Sarawak.

The leaves are much longer and narrower than in *C. asiaticum*, and the fruit is much larger, often purplish. In Sarawak it produces long stolons creeping in the mud; in Kedah I did not see these.

(3) **C. defixum** Ker, *Quart. Journ. Sci. and Arts*, iii. 105; *Bot. Mag. t.* 2208. *Lodd. Bot. Cab. t.* 362; *Hook. fl. F.B.I.* vi. 281; *Ridl. Mat.* ii. 68. (Fig. 189, p. 302.)

Bulb small, neck 3 to 4 in. long. Leaves linear, 2 ft. long, 4 in. wide. Scape stout, 2 ft. long, with an umbel of about 12 flowers. Bracts deltoid-ovate, 1.5 in. long. Perianth tube 6 in. long, greenish. Ovary 1 in. long, lobes linear acute reflexed, white, 3 in. long, .5 in. wide. Filaments red, anthers fuscous. Style red.

Fruit sub-globose, 1.5 in. through, purplish. Seeds flat, ovoid elliptic. *Hab.* Damp low-lying fields near rivers. Pahang at Renchong. Setul and Perlis in old rice-fields. Kelantan, Kwala Lebir and all along Kelantan River (Ridley). Jalor, Biserat (Gwynne-Vaughan). *Distrib.* India, Siam, Borneo.



FIG. 189.—*Crinum defixum*.

4. EURYCLES, Salisb.

A bulbous plant. Leaves petiolate orbicular-cordate or oval-oblong with distant veins and transverse veinlets. Flowers numerous in an umbel, white. Involucral bracts 2 or 3 lanceolate, floral bracts linear. Perianth-tube funnel-shaped, tube slender, lobes broad. Stamens shorter, connected by a petaloid cup (corona). Anthers oblong, sagittate. Ovary 3-locular; ovules 2 in a cell.

Capsule globose, fleshy. Seeds usually solitary. Species 2, one Australian, the other Malayan.

(1) *E. sylvestris* Salisb. *Trans. Hort. Soc.* i. (1812), 337. *E. amboinensis* Lindl. *Lond. Encycl. Pl.* 242. *E. australasica*, Lindl. *l.c.*

Leaves several ovate-cordate sub-acute, 9 to 13 in. long and as wide; nerves about 30; petioles 6 to 12 in. long. Scape 1 ft. long or more. Bracts lanceolate acuminate, 3 in. long. Flowers about 20; pedicels 1.25 in. long. Perianth-tube 1.5 in. long, lobes oblong-lanceolate white, corona very short. *Hab.* Seashores and sandy spots and rocky places. Commonly cultivated. *Distrib.* Malaya, Australia. *Native name*: Daun Sapenoh.

Certainly wild, I think, at Perlis on rocks at Tebing Tinggi, and probably in other places of the east coast. The leaves play a part in magic ceremonies (see Skeat, *Malay Magic*, pp. 355 etc.), and the plant is often to be found in native gardens, especially near the sea.

ORDER CXLIIIA. BURMANNIACEÆ.

Small herbs often saprophytic. Stem usually short. Leaves narrow linear green, or reduced to scales, white. Perianth superior tubular. Petals and sepals small, 3 each (rarely petals 0). Stamens 3 or 6 adnate to tube; filaments very short; anther oblong, 2-celled inflexed included. Ovary obconic; ovules very numerous. Capsule obconic, opening by a lid. Seed minute, not winged. *Distrib.* All tropics.

Non-saprophytic. Leaves linear, green	1 § I.	BURMANNIA
Saprophytic. Leaves reduced to scales.		
Stamens 3; ovary trilocular	1 § II.	BURMANNIA
Stamens 3; ovary unilocular	2.	GYMNOSIPHON
Stamens 6; sepals free; petals present	3.	THISMIA
Stamens 6; sepals connate by tips; petals 0	4.	BAGNISIA

1. BURMANNIA, Linn.

Saprophytes or non-saprophytes. Stem short ascending or tuberous. Leaves linear acuminate, green, or reduced to scales. Flowers solitary or racemose, blue or white. Perianth tube thin, urn-shaped, often winged, lobes very small ovate. Stamens 3, included. Anthers reniform or oval, opening laterally. Style trifid; stigmas cordate. Capsule oblong or globose, 3-celled. Seeds fusiform. Species about 20, all tropics.

§ 1. *Viventes*. Non-saprophytic; leaves green.

Stems short; leaves crowded at base.

Flowers distichous secund racemose (1) *B. disticha*

Flowers 1 to 6 crowded at top of stem (2) *B. coelestis*

Stem elongate; leaves scattered (3) *B. longifolia*

§ 2. *Saprophyticæ*. Saprophytes; leaves reduced to scales.

Perianth tube winged.

- Flowers numerous on long racemes (4) **B. gracilis**
 Flowers 1 or 2 at apex of stem.
 Perianth-wings narrow (5) **B. Wallichii**
 Perianth-wings broad (6) **B. oblonga**
 Perianth-tube cylindric not winged.
 Rhizome tuberous (7) **B. tuberosa**
 Rhizome elongate covered with scale leaves. . . . (8) **B. Championii**

(1) **B. disticha** Linn. *Sp. Pl.* 287; *Hook. fil. F.B.I.* v. 664; *Ridl. Mat.* ii. 70; *Roxb. Cor. Pl. t.* 242.

Rhizome short and thick. Stem 1 to 2 ft. tall, seldom branched. Leaves ensiform, acuminate, 4 to 6 in. long, .12 to .3 in. wide, crowded at the base, a few sheathing ones above. Racemes terminal 2 or more, 1 to 2 in. long, 10- to 26-flowered. Flowers distichous secund, erect, .5 in. long, blue or nearly white. Perianth-tube broadly winged. Sepals ovate. Petals oblong-linear green. *Hab.* High mountains at from 3000 to 6000 ft. altitude. Malacca, Mt. Ophir (all collectors). Pahang, Gunong Tahan. Kedah Peak (Robinson). *Distrib.* India, Ceylon, Sumatra, China, Papua, Australia.

The peninsular form has more narrow acuminate leaves than the Indian form and is the var. *sumatrana* of Hooker.

(2) **B. coelestis** Don, *Prodr.* 44; *Hook. fil. F.B.I.* vi. 665; *Ridl. Mat.* ii. 71. *B. azurea* Griff. *Notulæ*, iii. 336; *Ic. Pl. As. t.* 272, fig. i. *Cryptonema malaccensis* Turcz. *Flora* 1848, i. 590. *Nephrocælium malaccense* Turcz. *l.c.* 1853, i. 287. (Fig. 190, p. 305.)

A slender herb 3 to 12 in. tall, simple or branched; rhizome short, subterranean. Leaves lanceolate acuminate, .25 to .5 in. long, .1 in. wide, sessile. Flowers 1 to 6, terminal .5 in. long, light blue. Perianth-tube urn-shaped, 3-winged for its whole length. Sepals and petals ovate, yellowish white; petals much the largest. Anthers oval, connective broad, 2-crested above, prolonged into a tooth below. *Hab.* Grassy and sandy spots common in open country. Singapore, Botanic Garden, grass-plots, Changi. Malacca, Ayer Panas (Goodenough); Sungei Hudang (Derry). Pahang, Kwala Pahang. Selangor, Ampang Reservoir (Brooks). Province Wellesley, Tasek Gelugur. Penang, Telok Bahang (Curtis). Lankawi, Dayong Bunting (Robinson). Tringganu (Yapp). *Distrib.* India, Siam, Malay isles, China. *Native names:* Rumput Sisik Naga; Rumput Jarum.

(3) **B. longifolia** Becc. *Malesia* i. 244; *Hook. fil. F.B.I.* v. 664; *Ridl. Mat.* ii. 70.

Rhizome creeping, woody, stem ascending, 18 to 24 in. tall. Leaves scattered below, linear acuminate, 8 in. long, .25 in. wide or less. Racemes terminal 2, nodding. Flowers few, white or pale blue, .5 in. long. Bracts lanceolate acuminate white. Perianth-tube winged and dilate at base narrowed upwards. Sepals lanceolate; petals smaller. *Hab.* High mountains in damp shady

spots in moss, at 3000 to 5000 ft. altitude. Pahang, Gunong Tahan; Kluang Terbang (Barnes). Selangor, Bukit Hitam; Gunong Semangkok (Curtis). Perak, Thaiping Hills; Gunong Batu Putih (Kunstler); Gunong Kerbau (Robinson); Gunong Inas (Yapp). Kedah, Gunong Bintang (Kloss). *Distrib.* Borneo, Papua.

(4) **B. gracilis** *Ridl. Journ. Roy. As. Soc. S. Br.* 22, p. 335; *Mat.* ii. 71.

Very slender, 6 to 12 in. tall, branched. Leaves narrow lanceolate scale-like scattered on stem. Racemes 2, opposite terminal, 1 in. long or more. Flowers 14, secund, erect, white, .25 in. long. Perianth-tube winged with broad semi-elliptic wings for its whole length. Sepals lanceolate; petals smaller. Capsule urn-shaped. *Hab.* On limestone rocks beneath trees, local. Lankawi islands, Terutau (Curtis). *Distrib.* S. Siam.

(5) **B. Wallichii** *Hook. fil. F.B.I.* v. 666; *Ridl. Mat.* ii. 71. *Gonyanthes Wallichii* *Miers, Trans. Linn. Soc.* xviii. 537. *Burmattia Griffithii* and *B. lutescens* *Becc. Malesia* i. 254.

A very delicate white saprophyte, 4 to 5 in. tall. Leaves ovate-lanceolate remote on stem. Flowers 1 or 2 terminal, .25 in. long. Perianth-tube nearly cylindrical, wings 3 somewhat narrow or very narrow. Sepals ovate sub-acute pustular thick. Petals minute or o. Style stout, arms short curved.

Hab. Sporadic in dense forest. Not common. Singapore, Kranji. Pahang, Tahan Woods. Selangor, Semangkok Pass, Kedah Peak (Ridley). *Distrib.* Nepal, Mergui, Borneo, Hongkong.

B. lutescens *Becc.* is a form with wide wings to the tube.

(6) **B. oblonga** *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 33; *Mat.* ii. 72.

Slender, little or not branched white saprophyte. Leaves, sheath-like scales. Flowers white 1 or 2 on end of stem .36 in. long and .25 in. wide across the wings, tube narrow with oblong

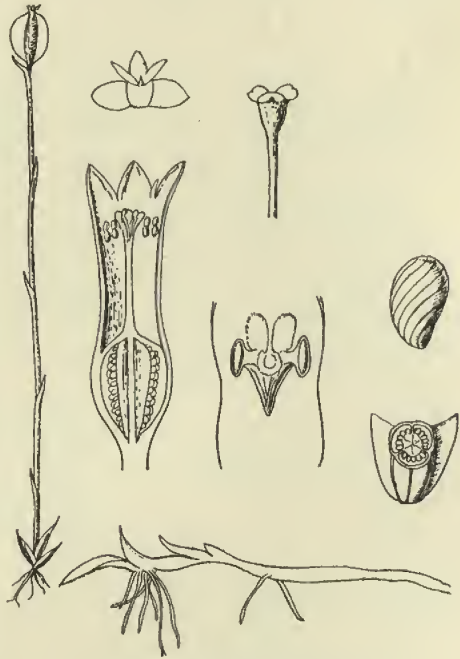


FIG. 190.—*Burmattia coelestis*.

straight-edged round-tipped wings. Sepals and petals blunt; petals much shorter than sepals. *Hab.* On paths and rocks at 1500 to 3000 ft. altitude. Local. Selangor, Semangkok Pass (Napier, Ridley); Penang at 1500 to 2000 ft. altitude (Kunstler).

(7) **B. tuberosa** Becc. *Males.* i. 245, t. 14, figs. 1 to 4; *Ridl. Mat.* ii. 72.

A fleshy white saprophyte 3 to 6 in. tall; rhizome tuberous. Leaves lanceolate scale-like scattered on stem. Flowers 5 or 6 clustered on the tip of the stem, erect, white, .25 in. long, not winged. Sepals yellow, ovate obtuse. Petals smaller. Capsule elliptic, .25 in. long. Seeds oval, nodulose. *Hab.* In damp swampy forest buried for half its length in decayed leaves. Not rare, but sporadic. Flowers scented like cowslips. Singapore, Bukit Timah; Changi. Malacca, Sungei Hudang (Hervey); Mt. Ophir. Selangor, Petaling. Kedah Peak (Ridley). *Distrib.* Borneo.

(8) **B. Championii** Thwaites, *Enum.* 325; *Hook. fil. F.B.I.* v. 666; *Trimen, Flora of Ceylon* iv. 131, pl. 87; *Ridl. Mat.* ii. 72.

Fleshy saprophyte, 2 to 6 in. tall; rhizome thick, over 2 in. long, covered with ovate scales. Leaves lanceolate acuminate, .12 to .25 in. long. Flowers 4 or 5, white crowded, terminal .5 in. long, tube cylindric, not winged. Sepals ovate, .12 in. long. Petals very small terete. Capsule globose. *Hab.* Rare. In damp woods deeply buried in decaying leaves. Selangor, forests by Labu River (Ridley). *Distrib.* Ceylon.

2. GYMNOSIPHON, Bl.

Slender saprophytes with scale-like leaves and small flowers in raceme or cyme. Perianth tube cylindric, not winged. Sepals broad. Petals small or absent. Stamens 3, oblong, sessile near the mouth of the tube, connective broad, no appendages. Style trifid. Ovary unilocular. Capsule oblong or globose crowned with persistent lower half of the tube. Seeds sub-globose rugose. Species 12, chiefly S. American, 1 African and 2 or 3 Malayan.

(1) **G. aphyllum** Bl. *Enum. Pl. Jav.* 29; *Ridl. Mat.* ii. 73. *G. borneense* Becc. *Males.* i. 241, t. 14, figs. 5-9.

Stem wiry, branched, 4 to 5 in. tall. Leaves ovate or lanceolate blunt few. Flowers few very delicate, pale violet, .25 in. long on slender pedicels, tube short. Sepals ovate. Petals minute linear-lanceolate. Capsule cylindric, reticulate below, crowned by the enlarged perianth-tube. Seeds elliptic-ovoid, dark brown, ribbed. *Hab.* In damp woods, common all over the Peninsula but sporadic. Singapore, Bukit Timah. Johor, Batu Pahat (Kelsall). Malacca, Bukit Sadanen. Pahang, Taka Tahan. Selangor, Petaling. Perak, Gunung Batu Putih (Wray); Tapah. Kedah Peak (Ridley). *Distrib.* Sumatra, Borneo to Papua.

3. THISMIA, Griff.

Fleshy whitish saprophytes; rhizome creeping and ascending a few inches tall with scale-like leaves and 1 or 2 rarely more terminal flowers rather large for the plant. Perianth-tube campanulate or turbinate usually with a ring (annulus) round the mouth, falling off as the fruit ripens. Sepals and petals usually elongate lanceolate acuminate or caudate. Stamens 6, adnate to tube; filaments very short; connectives broad deflexed. Style short. Ovary turbinate, 1-locular. Capsule fleshy opening by a deciduous lid. Seeds very numerous, oblong ribbed. Species 12 to 15, tropical Asia and S. America.

- Stems several; flowers 4 to 6 in a raceme . . . (1) **Th. racemosa**
- Stems simple; flowers 1 or 2 terminal.
 - Sepals and petals flat lanceolate acuminate . . . (2) **Th. fumida**
 - Sepals short flat; petals caudate . . . (3) **Th. arachnites**
 - Sepals and petals caudate terete.
 - Perianth tube erect large urn-shaped, pink striped . . . (4) **Th. grandiflora**
 - Perianth tube erect obconic, yellow . . . (5) **Th. aseroe**
 - Perianth tube bent at an angle with ovary, brown pink and yellow . . . (6) **Th. chrysops**

(1) **Th. racemosa** *Ridl. Journ. Roy. As. Soc. S. Br.* 69, p. 113.

Plant 2 in. tall; stems several. Flowers 4 to 6 in a raceme; pedicels .5 in. long. Bracts persistent linear acuminate, .12 in. long. Perianth tube .25 in. long, cylindric, limb .25 in. wide. Sepals and petals 6 short triangular-ovate similar, annulus in mouth large. Fruit .12 in. long, semi-globose, narrowed at base, crowned by the raised edge of corolla-tube. *Hab.* Pahang, Temerloh, low ground near a swamp (Burn-Murdoch).

(2) **Th. fumida** *Ridl. Journ. Roy. As. Soc. S. Br.* 22, p. 338; *Mat.* ii. 74.

Whole plant 4 in. tall; rhizome with 3 or 4 stems. Flower solitary, .25 in. long, nearly .5 in. across. Perianth-tube subglobose, scabrid narrowed at base, white striped pink. Sepals and petals equal, greenish grey, lanceolate, tips subulate. Style very short. Capsule short, ribbed, edge crenulate. *Hab.* Dense forest among dead leaves. Very rare. Singapore, Chan Chu Kang. Selangor at Petaling (Ridley).

(3) **Th. arachnites** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 197; *Mat.* ii. 74.

Stem 1 to 3 in. tall. Flowers 2 or 3; perianth-tube urn-shaped, base narrowed, .75 in. long, semi-transparent, ribbed and barred whitish with 6 red vertical streaks, annulus in tube-mouth yellow. Sepals ear-like, short. Petals caudate, white, 1.5 in. long; style short. Capsule cup-shaped, .25 in. long and as wide. *Hab.* Rare in dense forest. Perak, Thaping Hills just above the Tea Gardens (Ridley).

(4) **Th. grandiflora** *Ridl. Ann. Bot.* ix. 324, pl. xii, figs. 10-17; *Mat.* ii. 74.

Plant 1.5 in. tall, 1-flowered. Leaves and bracts lanceolate with glandular hairs. Perianth-tube 1 in. long, urn-shaped pink, striped darker. Sepals and petals triangular with terete processes from the backs, pink, annulus brown. Style longer than in most species, arms oblong-lanceolate papillose. *Hab.* Very rare. Johor, Bukit Tana Abang, Sembrong River (Kelsall).

(5) **Th. aseroe** *Becc. Malesia* i. 252, pl. 10; *Ridl. Journ. Roy. As. Soc. S. Br.* 22, p. 336; *Mat.* ii. 74; *Groom. Ann. Bot.* ix. 327, pls. 13, 14.

Plant 2 to 3 in. tall; stem erect from creeping rhizome, branched or single. Flowers solitary on the end of each branch. Perianth-tube obconic, .5 in. long, fuscous. Sepals and petals similar, triangular, terminated by cylindric tails, .5 in. long, bright orange. Capsule brown ribbed. *Hab.* In dense forest, the commonest and most conspicuous species. Singapore, woodlands (Beccari); Bukit Timah; Kranji. Pahang Kota Glanggi; Selangor, Petaling (Ridley).

(6) **Th. chrysops** *Ridl. Ann. Bot.* ix. 323, pl. xii, figs. 1-9; *Mat.* ii. 75.

Plant 3 in. tall. Flowers 1 or 2 on short dark brown pedicels. Perianth-tube oblong deflexed above the ovary, .25 in. long, deep chocolate brown; annulus yellow. Sepals and petals filiform from a wider base, deep brown, ciliate. Ovary pink. Capsule turbinate rugose. Seeds fusiform rugose. *Hab.* Malacca, Mt. Ophir on rotten logs at about 3000 ft. altitude (Ridley). Very rare.

4. BAGNISIA, Becc.

Fleshy saprophytes like *Thismia*, but the sepals are spatulate and connate at tip, forming a dome over the mouth of the tube. No petals. Stamens 6 connate by the connectives. Style short; stigma 6-lobed. Species (including *Geomitra* Becc.) 3 or 4, Borneo and Malay Peninsula.

(1) **B. crocea** *Becc. Males.* i. 249; *var. brunnea* *Ridl. Mat.* i. 75.

A very small saprophyte 1 in. tall; rhizome stout entirely red brown. Flower solitary, larger than the stem. Perianth-tube enlarged upwards thick almost pear-shaped. Sepals linear connate at tips. *Hab.* Very rare. A single specimen obtained in dense forest below Gunong Hijau on the Thaipung Hills at about 4000 ft. altitude. The original species is from Borneo.

ORDER CXLIV. TACCACEÆ.

Herbs, stem very short, rhizomatous. Leaves herbaceous entire lobed or pinnatifid. Scape tall, leafless. Flowers umbelled green or purple with 2 to 6 large involucrel bracts and long filiform floral bracts. Perianth superior urceolate or campanulate of 6 lanceolate or ovate lobes. Stamens 6, adnate to tube; filaments very short; connective hooded; anthers very small. Ovary 1-celled; style short; stigmas 3 broad, reflexed. Fruit baccate or 3-valved. Seeds numerous ovoid ribbed. Genera 2. Species 25, tropical and sub-tropical Asia, and America.

1. TACCA, Forst.

Character of the order, fruit baccate, not dehiscing. Species about 10, tropical Asia and Australia.

- Leaves pinnatifid (1) **T. pinnatifida**
- Leaves palmate (2) **T. palmata**
- Leaves entire lanceolate.
- Involucrel bracts 2 inner large ovate clawed
purple and white (3) **T. cristata**
- Involucrel bracts 2 inner large ovate sessile
purple (4) **T. Chantieri**
- Involucrel bracts 2 inner small lanceolate green . . . (5) **T. minor**

(1) **T. pinnatifida** Forst. *Plant. Escul.* 28; *Char. Gen. t.* 35. *Lodd.*; *Bot. Cab. t.* 692; *Regel Gartenflora, t.* 582; *Griff. Notulae*, 238; *Ic. Pl. As. t.* 272A; *Hook. fil. F.B.I.* vi. 287; *Ridl. Mat.* ii. 76.

Tuber large globose. Leaf solitary, 1 to 3 ft. tall; petiole fluted, blade 2 to 3 ft. across, tripartite or pinnatifid. Flowers numerous green on a scape 2 to 3 ft. tall. Involucrel bracts 8, lanceolate acute, 2 in. long, .5 in. wide. Floral bracts 6 in. long. Perianth .5 in. long, green, lobes lanceolate. Fruit ovoid ribbed as big as a pigeon's egg. *Hab.* Sandy places, usually near the sea, not very common. Pahang near Pekan; Cherating River. Malacca, Pulau Besar. Tringganu, Pulau Redang (Yapp). Lankawi at Kwah. *Distrib.* Tropical Asia, Polynesia, Australia and Africa. *Native name:* Lukeh. *Use:* Tubers eaten.

(2) **T. palmata** Bl. *Enum.* i. 83; *Ridl. Mat.* ii. 76.

Tuber small. Leaves palmate, lobes 4 to 7, oblong lanceolate acute, 6 in. long, 1 to 3 in. wide; petioles slender, 1 ft. long. Scape 1 ft. tall or more. Involucrel bracts 2 outer ovate acute, .75 in. wide, 2 inner ovate petiolate, 1.75 in. long. Floral bracts 0. Flowers 10 or more small green. Perianth tube campanulate, .12 in. long, lobes orbicular. Fruit globose, .25 in. long. *Hab.* In damp shady spots, rare. Johor, woods at Genuang and on Pulau Aor. Tringganu, Redang islands, Pulau Pinang (Yapp). *Distrib.* Malay islands, Borneo, Java.

(3) *T. cristata* Jack, *Mal. Misc.* i. No. v. 23; *Hook. fil. F.B.I.* vi. 287; *Ridl. Mat.* ii. 77. *T. Rafflesiana* Jack in *Wall. Cat.* 5172. *Ataccia cristata* Kunth. *Enum.* v. 476; *Bot. Mag. t.* 4587.

Rootstock thick, 4 in. long. Leaves lanceolate acuminate, 1.75 to 2 ft. long, 4 to 7 in. across; petioles 1 ft. long or more. Scapes 1 to 3 ft. tall. Involucral bracts 2, oblong or lanceolate, 6 in. long, 4 in. wide, inner larger, erect, ovate long-clawed, base



FIG. 191.—*Tacca cristata*.

purple, above white, or all purple. Floral bracts numerous filiform, 6 in. long, purple, white-tipped. Flowers 5 to 18, about 1 in. long. Sepals oblong, .5 in. long. Petals orbicular, all purple. Berry 3.5 in. long, 1.25 through, oblong, narrowed to base, 6-keeled purple black. Seeds elliptic ribbed, brown. *Hab.* Common in forests all over the Peninsula up to 2000 ft. altitude from Singapore (Wallich 5172), Bukit Timah. Johor, Batu Pahat. Malacca, Selandor; Jus. Selangor, Kwala Lumpur; Ginting Sempah; Ulu Langat (Kloss). Perak, Thaiping Hills (Kunstler); Kwala Kangsa.

Penang Hill (Curtis). *Distrib.* Burma. *Native names:* Sebiak; Jangut Bawo.

(4) **T. Chantieri** *Andre Rev. Hort.* 1901, 541, pl. 241. *T. vespertilio*, *Ridl. Mat.* ii. l.c. 77.

Leaves elliptic-lanceolate, base rounded, 1 ft. long or less, 6 in. across; petioles 6 to 8 in. long. Scape over 1 ft. long. Involucral bracts, 2 outer short lanceolate acuminate, 1.5 in. long, .5 in. wide, green, tipped purple, 2 inner ovate sessile alternate brown purple, 2 in. long. Flowers 3 to 5, purplish. Bracts filiform, 7 in. long, purple, tipped white. Sepals lanceolate acute, .25 in. long. *Hab.* Orchards and village grounds. Local. Perak, Kamuning; Ulu Temengoh. Perlis, Tebing Tinggi. Setul (Ridley).

(5) **T. minor** *Ridl. Mat.* ii. 78.

Rootstock cylindric, 1.5 in. tall. Leaves elliptic acuminate or lanceolate narrowed at base, 6 to 10 in. long, 2 to 4 in. wide; petioles shorter. Scapes 3 to 6 in. long. Involucral bracts olive green, 2 outer lanceolate acuminate, 2 inner ovate acuminate (not clawed), .75 to 1 in. long. Floral bracts filiform, .5 in. long, dusky, pale tipped. Flowers few, .5 in. across, brownish green. Sepals lanceolate acuminate. Petals oblong-triangular. Fruit 1.5 in. long. Seeds crescent-shaped, 8-ribbed. *Hab.* Local on banks, in shady spots. Perak, Kwala Kangsa; Tambun near Ipoh. Kelantan, Kwala Lebir (Gimlette).

ORDER CXLV. DIOSCOREACEÆ.

Rhizome often tuberous. Stem climbing or short erect. Leaves entire or trifoliolate ribbed, reticulate. Flowers small or minute paniced, racemose or spicate, unisexual, rarely bisexual. Perianth superior 6-lobed, tube short or rather long. Stamens in male on base of perianth or on the lobes, 3, with or without 3 staminodes or 6; filaments short. Pistillode sometimes present. Ovary triquetrous, 3-celled; ovules 2 in a cell. Fruit 3-winged, baccate or capsular. Seeds flat winged or globose. Whole world.

Flowers bisexual.

Stem erect; flowers moderate size; fruit baccate . . . 1. TRICHOPUS

Stem climbing; flowers small; capsule elongate . . . 2. STENOMERIS

Flowers unisexual on different plants, minute.

Capsule 3-winged, oblong or orbicular 3. DIOSCOREA

1. TRICHOPUS, Gaertn.

Small erect herb with simple wiry stems 3 to 4 in. tall. Leaf sub-terminal cordate petiolate reticulate. Flowers several on long pedicels bisexual fascicled at base of leaf. Ovary 3-winged. Perianth tube very short. Sepals and petals sub-equal. Stamens

6; filaments very short; anthers broad, cells divaricate; connective prolonged into a cylindrical process. Style short and thick; stigmas 3 bilobed, pear-shaped. Fruit indehiscent 3-winged. Species 2, India and Ceylon; Malay Peninsula.

(1) *T. malayanus* Ridl. *T. zeylanicus* Hook. *fil. Bot. Mag. t. 7530*; *Ridl. Mat. ii. 79* (not of Gaertner).

Rhizome very short. Stems with 1 leaf, lanceolate or cordate-ovate, 3 to 4 in. long, 1 to 2.5 in. wide; petioles 2 to 3 in. long. Flowers 1 to 4 from the tuft of bracts; pedicels 1 to 2 in. long.



FIG. 192.—*Trichopus malayanus*.

Perianth purple, .5 in. across. Fruit .75 in. long, fleshy green with pink spots; pedicel 2 in. long. *Hab.* Rare. In sandy spots in woods in small patches. Pahang, Tahan woods; Kelantan near Kwala Lebir, Chaning (Ridley).

2. *STENOMERIS*, Planch.

Climbers. Leaves ovate or ovate-lanceolate cordate, many-nerved reticulate. Cymes axillary short. Flowers small pedicelled bisexual green or brown urceolate, lobes narrow. Stamens 6; filaments adnate to mouth of tube, connective prolonged to a short point. Style short conic. Capsule elongate, 3-winged, 3-valved

septicidal. Seed compressed winged above. Species 3, Malay isles.

(1) *S. borneensis* Oliv. *Ic. Pl.* 2328.

Stem slender. Leaves ovate-lanceolate cordate acuminate, 5 to 7 in. long, 1.5 to 3 in. wide; nerves 5 to 10. Flowers .25 in. long, lobes linear. Fruit 10 in. long, .75 to 1 in. through. *Hab.* Selangor, Batu Caves, climbing on bushes, very rare (Ridley). *Distrib.* Borneo.

3. DIOSCOREA, Linn.

Slender climbers with large tubers. Stems branched smooth, winged, or thorny. Leaves opposite or alternate entire or digitately 3- to 5-foliolate with 3 to 9 veins on each leaflet. Flowers green, very small in spikes or racemes pendulous unisexual. Male flower, perianth-lobes short rotate. Stamens 6 or 3 perfect only, at base of segments. Female flower, perianth as in male. Staminodes 3 to 6. Style short or 0; stigmas 3 linear, entire or bifid; ovary 3-angled, 3-celled; ovules 2 in a cell. Capsule 3-winged, loculicidal. Seeds flat winged. Species 150, all warm parts of the world.

(Synopsis of *Dioscoreas* of Old World by Prain and Burkill, *Journ. As. Soc. Beng.* x. 6.)

Leaves 3- to 5-foliolate.

Leaflets 3-foliolate.

- 3 to 7 in. long; stamens 6 (1) *D. triphylla*
 2 to 4 in. long; stamens 3 (2) *D. tamarisciflora*

Leaflets.

- Glabrous above (3) *D. Scortechinii*
 Hairy all over (4) *D. pentaphylla*

Leaves simple; perianth not tubular; stem not winged.

Capsule longer than broad; leaves deeply cordate.

- Male flowers in numerous long spikes, lobes free; plant bulbiferous (5) *D. bulbifera*

Capsule unknown; leaves deeply cordate.

- Male flowers saucer-shaped in solitary racemes (6) *D. aculeata*

Capsule orbicular or transversely oblong broader than long.

Leaves ovate pubescent or puberulous beneath.

- Panicles tomentose; leaves cordate (7) *D. polyclades*
 Panicles glabrous; leaves not cordate (8) *D. pyrifolia*

Leaves glabrous, thin; panicles glabrous.

- Leaves ovate-lanceolate cordate (9) *D. myriantha*
 Leaves ovate entire (10) *D. orbiculata*
 Leaves elliptic-oblong (11) *D. Zollingeriana*

Leaves oblong-ovate or oblong.

- Buds gibbous at base; spikes very short (12) *D. gibbiflora*
 Buds not gibbous; spikes .5 in. long (13) *D. glabra*

Leaves glabrous, coriaceous.

- Leaves linear-oblong, 5-nerved (14) *D. Porteri*
 Leaves linear or elliptic, 3-nerved (15) *D. laurifolia*

- Stem winged; perianth not tubular; leaves orbicular cordate (16) *D. alata*
 Perianth tubular, long; leaves oblong stiffly coriaceous (17) *D. stenomeriflora*
 Dubious species, stem strongly thorny; leaves large ovate cordate (18) *D. piscatorum*

(1) *D. triphylla* Linn. *Amoen. Acad.* iv. 131. *D. dæmona*, *Roxb. Hort. Beng.* 72; *Fl. Ind.* iii. 305; *Ridl. Mat.* ii. 80, *var. reticulata* *Prain and Burkill, l.c.* 25.

Tubers large. Stem spiny glaucous. Leaves trifoliolate; leaflets thin ovate cuspidate reticulate, side ones inæquilateral; nerves hairy, 3 to 6 in. long, 2 to 4 in. wide; petioles 3 to 6 in. long. Male panicles lax, 4 to 6 in. long, tomentose. Flowers crowded, very small, greenish yellow. Perianth tomentose. Stamens 6. Female spikes solitary. Capsule oblong with 3 stout ridges 2 in. long, .75 in. wide, tomentose. Seeds 1 in. long, oblong. *Hab.* Common in villages. Singapore, Changi. Malacca, Sungei Hudang; Malaka pindah, etc. Selangor, Kwala Lumpur. Perak, Thaiping. Penang, Muka Head (Curtis). *Distrib.* Burma, Siam, Malaya. *Native names:* Gadung; Ubi Akar. *Use:* Tubers eaten after being sliced and left for some time in running water. An extract is used by the Sakais for poisoning darts.

(2) *D. tamarisciflora* *Prain and Burkill, Journ. As. Soc. Beng.* x. 22.

Stem slender hairy. Leaves alternate trifoliolate, above sparsely hairy, beneath nerves red-hairy; midlobe narrow elliptic long-acuminate, 2 to 4 in. long, 1 in. wide, laterals inæquilateral, base acute; petioles .1 in. long. Male spikes 15 in. long. Flowers 45, in solitary or paired spikes; rachis hairy. Sepals lanceolate-ovate hairy. Petals spatulate. Stamens 3. *Hab.* Lankawi (Curtis).

(3) *D. Scortechinii* *Prain and Burkill, Journ. As. Soc. Beng.* iv. 455. *D. pentaphylla* *Ridl. Mat.* ii. 80 mostly.

Stems stoutly thorny. Leaves 3- to 5-foliolate; leaflets unequal cuspidate elliptic red tomentose on the nerves beneath, 2 in. long and as wide; petioles 1.5 to 2 in. long, brown, tomentose; petiolules .2 in. long. Male panicles 2 ft. long, with long tomentose branches. Flowers sessile crowded, white. Sepals lanceolate acute pubescent. Stamens 3 with 3 staminodes. Female spikes solitary or panicked, 6 to 8 in. long. Capsule oblong round at both ends or base cordate, 2 in. long, 1 in. wide. *Hab.* Forests. Johor, Gunong Pantai. Malacca, Merlimau. Pahang, Tahan Valley. Selangor, Bukit Kutu. Negri Sembilan. Tampin (Burkill). Perak, Thaiping Hills at 3000 ft. altitude (Burkill). Kemaman (Vaughan Stevens). *Distrib.* Cambodia. *Native name:* Ubi pasir. *Use:* The tubers are a valued food by the Sakais.

(4) *D. pentaphylla* Linn. *Spec. Pl.* 1032. *var. malaica* *Prain and Burkill l.c.* x. 23.

Stems sparsely thorny. Leaves 3- or 5-lobed, leaflets red pubes-

cent on nerves, hairy all over elliptic-oblong or oblanceolate shortly cuspidate, 4 in. long, 1.25 in. wide, median one the biggest; petiolules .1 in. long or 0; petioles slender, 3 to 3.5 in. long. Male spikes unknown. Female spikes 6 in. long, with distant flowers red pubescent. Ovary .15 in. long, pubescent, narrowed to tip. Petals and sepals glabrous. Fruit oblong, .5 in. long, .25 in. wide. *Hab.* Cultivated ground in hedges. Malacca (Maingay). Negri Sembilan, Kendong and Tampin (Burkill). Penang Town (Burkill). *Distrib.* Indo-Malaya; Polynesia. *Native name:* Ubi Chiabet.

(5) **D. bulbifera** Linn. *Sp. Pl.* 1035. *D. sativa* Thunb. *Fl. Jap.* 191; *Ridl. Mat.* ii. 84.

A long moderately stout unarmed climber bearing numerous round brown flattened tubers 3 in. across or more in the axils. Leaves light green, herbaceous ovate cordate acuminate, glabrous, 3 to 6 in. long, 3 to 5 in. wide, petioles 4 in. long, slender. Male spikes in pairs fascicled or paniced, 1 to 1.5 in. long. Flowers white. Sepals narrow linear, lanceolate acute. Stamens 6. Female flowers in spikes fascicled or paniced, 4 to 10 in. long. Capsule oblong, 1 in. long, wings large. *Hab.* Waste ground and village compounds. Singapore, Tanglin; Changi. Johor, Kwala Tebing Tinggi. Malacca (Maingay). Negri Sembilan, Seremban. Selangor, Kwala Lumpur; Batu Caves (Burkill); Bukit Rajah Estate, Klang (Burkill). Perak, Ipoh (Burkill). Penang, Waterfall. *Distrib.* Indo-Malaya, China, Japan, Australia. *Native names:* Akar Kumili hutan; Ubi Kistale.

Burkill and Prain mention a number of varieties, of which the peninsular form seems to be all var. *sativa*. The yams were not considered by the Javanese coolies as fit to eat.

(6) **D. aculeata** Linn. *Amoen. Acad.* iv. 131. *D. fasciculata* Roxb. *Hort. Beng.* 72; *Hook. fil. F.B.I.* vi. 296.

Tubers produced in a bunch, roots spiny; stem rather slender prickly below, unarmed above. Leaves broadly cordate, abruptly acute, sinus deep, lobes round, glabrous or hairy beneath, 3 to 3.5 in. long, 3.5 to 4.5 in. wide; petioles slender hairy, 4 in. long. Male flowers 1 or 2 together in a long woolly spike-like raceme 6 to 7 in. long. Perianth woolly outside nearly sessile, lobes 6 lanceolate. Stamens insert near the edge. *Hab.* Kedah, Gunong Kuang (Burkill). *Distrib.* India and Malay isles. Often cultivated.

(7) **D. polyclades** Hook. *fil. F.B.I.* vi. 294; *Ridl. Mat.* ii. 81.

Stems stout, pubescent, base thorny. Leaves ovate-cordate cuspidate, hairy on both sides, especially beneath, 2.5 to 3 in. long, 2 to 2.5 in. wide; petioles 2 to 3 in. long, tomentose. Young leaves thin, elliptic cordate, 6 in. long, 3.5 in. wide. Male panicles 1 to 2 ft. long, long branched; branches spreading, 6 in. long, with 6 to 10 spikes in a whorl, .5 in. long; all tomentose. Flowers green tomentose. Sepals ovate. Petals elliptic. Cap-

sule broad, oblong transversely, hairy, .75 in. long, 1.5 in. across. *Hab.* Not common, forest edges. Singapore, Chan Chu Kang; Sungei Pandan (Ridley); Bukit Timah (Burkill). Perak, Gunong Malacca near limestone Hills (Kunstler). *Distrib.* Sumatra, Java, Borneo.

(8) *D. pyrifolia* Kunth. *Enum.* v. 384; *Ridl. Mat.* ii. 82. *D. cornifolia* Kunth. *Enum.* v. 38.

Base of stem thorny, above pubescent. Leaves opposite, coriaceous ovate cuspidate; nerves 5, base round entire pubescent beneath, 2.5 to 4 in. long, 2 to 2.5 in. wide; petioles stout pubescent,



FIG. 193.—*Dioscorea pyrifolia*.

1 to 2 in. long, young leaves deltoid cordate, 6 to 9 in. long, 3.5 in. wide. Male panicles 1 ft. long or more, spikes 4 to 10 in a whorl, 1 to 2 in. long. Flowers green, sessile, scattered. Sepals orbicular. Petals cuneate obovate. Stamens 3. Female spikes 4 in. long. Capsule orbicular, 1 in. long, 1.5 in. wide. Seed orbicular, .75 in. across. *Hab.* The commonest species in hedges and thickets. Pahang, Endau (Evans); Malacca, Alor Gajah (Burkill). Negri Sembilan, Kendong (Burkill); Tampin. Selangor, Telok Gadong (Burkill); Sungei Buluh. Perak, Bukit Keledang, base (Burkill).

var. *ferruginea* Burkill *Synops.* 33. Leaves red beneath with red pubescence when dry. Singapore (Wallich); Chan Chu Kang; Changi. Johor; Kota Tinggi; Ulu Kahang (Kelsall). Malacca (Cuming). Perak, Goping and Thaiping (Kunstler). The leaves

are variable in shape and size. The commonest form is the variety *ferruginea*. *Distrib.* Cambodia, Malay Archipelago. *Native name*: Akar Guluno.

(9) **D. myriantha** Kunth. *Enum. Pl.* v. 382.

Slender glabrous unarmed climber. Leaves alternate, thin ovate-lanceolate acuminate, base cordate, lobes rounded, 5-nerved, 3 to 3.5 in. long, 1.5 in. wide; petioles slender, 1.5 in. long. Male panicles slender solitary axillary, 2 to 6 in. long. Spikes numerous slender, .5 to 1 in. long, glabrous. Flowers very small; bracts 2, one ovate-acuminate, inner one smaller. Perianth urceolate, .05 in. long; sepals ovate rounded. Petals obovate smaller. Stamens 6, minute. Female spikes 4 in. long, with distant flowers. Fruit transversely oblong, wings rounded, 1 in. long, 1.5 in. wide. *Hab.* Lankawi, Kwala Kwah (Haniff and Nur). *Distrib.* Philippines.

(10) **D. orbiculata** Hook. *fl. F.B.I.* vi. 292; *Ridl. Mat.* ii. 82. *D. sativa* Wall. *Cat.* 5108C (not of Thunberg).

Stem moderately stout. Leaves thin, glabrous above, reticulate with stellate hairs on the back, ovate cuspidate, base broad entire, 2 to 5 in. long, 1.5 to 2 in. wide; petioles 2 to 3 in. long, pubescent; young leaves ovate cordate, 5 in. long, 4 in. wide. Male panicles 1 ft. long, pubescent. Spikes in distant whorls of 4 or 5, 3 in. long or less. Flowers yellow, small; rachis pubescent. Sepals ovate. Petals oblong. Capsules obovate. *Hab.* Open country, thickets. Malacca (Cuming); Sungei Hudang (Goodenough); Batang Malaka (Burkill). Negri Sembilan, Gemas (Burkill). Perak, Thaiping and Goping (Kunstler); Tapah (Wray), Sungei Siput (Burkill). Penang Hill (Curtis, Phillips). Kedah Peak (Haniff). *Distrib.* Sumatra, Borneo. *Native name*: Akar Kakop.

(11) **D. Zollingeriana** Kunth. *Enum. Pl.* v. 384; *Ridl. Mat.* ii. 82. *D. deflexa* Hook. *fl. F.B.I.* vi. 293; *Ridl. Mat.* ii. 83. *D. tenuifolia* Ridl. *Journ. Roy. As. Soc. S. Br.* 41. p. 34.

A slender climber, base slightly spiny. Leaves opposite or alternate, thin membranous to thinly coriaceous, glabrous elliptic-oblong, cuspidate, base entire rounded or slightly narrowed; young leaves cordate, 2 to 4 in. long, 1.75 to 2 in. wide; petioles 1 in. long. Male flowers in panicles 1 ft. long. Spikes 3 to 5 in a whorl, 1 to 3 in. long, slender, deflexed; rachis and flowers pubescent. Sepals ovate. Petals narrower oblong. Stamens 6, short. Female panicle much branched. Spikes 18 in. long. Flowers distant. Capsule rounded transversely oblong, top retuse, 1 in. long, 2 in. wide, lobes round. *Hab.* Woods and forests. Singapore, Bukit Timah; Garden Jungle (Ridley). Malacca (Maingay). Selangor, Batu Caves (Burkill). Perak, Larut Hills (Kunstler). *Distrib.* Nicobars, Sumatra, Java.

(12) **D. gibbiflora** Hook *fl. F.B.I.* vi. 294; *Ridl. Mat.* ii. 82.

Stem slender. Leaves opposite, thin, glabrous oblong-lanceo-

late, base entire or cordate, 2 to 3 in. long, 1.5 in. wide; petioles slender, 1 in. long. Panicle 1 ft. long, lax; branches 2 to 4 in. long, very slender; spikes .25 in. long, in pairs or threes. Flowers minute, bases gibbous in bud. Sepals and petals ovate. *Hab.* Penang (Wallich). Not seen again. *Distrib.* Java and Moluccas.

(13) *D. glabra* Roxb. *Hort. Beng.* 72; *Fl. Ind.* iii. 803; *Ridl. Mat.* ii. 83.

Stem moderately stout, thorny at base. Leaves elliptic-ovate to lanceolate acuminate, base round or cordate, glabrous beneath, 2 to 4 in. long, 1.5 to 2 in. wide; petioles 1 in. long; young leaves ovate, deeply cordate, 6 in long, 4 in. wide; petioles 2 in. long. Male panicles 3 to 12 in. long. Spikes 3 to 6 in a whorl, under 1 in. long. Flowers sessile. Sepals ovate. Petals oblong-obcuneate spatulate. Female spikes 1 ft. long. Capsule round retuse, 1 in. long, 1.5 to 2 in. wide. *Hab.* Common in woods. The var. *grisea*, with ovate leaves, grey velvety beneath is commonest. *Hab.* Singapore, Garden Jungle. Malacca, Ayer Kuning (Cantley). Negri Sembilan, Bukit Sulu and Burunang (Cantley); Perak, Thaiping (Wray, Kunstler). Province Wellesley, Bukit Juru; Machang Bubo (Burkill). Penang Hill (all collectors); Penara Bukit (Burkill). Kedah, Alor Sta. Lankawi, Kwah (Curtis). *Distrib.* Tenasserim, Java, Sumatra.

var. *salicifolia* Prain and Burkill, *Journ. As. Soc. Beng.* x. 37. Leaves linear-lanceolate to sagittate sub-coriaceous, 3 to 4.5 in. long, .5 to 1.5 in. wide. *Hab.* Penang Hill (Curtis, King). *Distrib.* Borneo. The original form and other varieties occur in India, Indo-China and China. *Native names:* Akar Jangut Kulonak; Akar Munujan; Akar Mawas.

(14) *D. Porteri* Prain and Burkill, *MSS.*

Shrubby climber, base thorny. Leaves (adult) opposite, oblong or linear-oblong, cuspidate, base rounded, 5-nerved, outer nerves intra-marginal, 3.5 in. long, 1 in. wide; petioles 1 to 2 in. long. Male flowers not seen. Fruiting panicles 8 in. long, in axils of each leaf. Capsules distant, transversely oblong, 1 in. long, 1.5 in. wide, wings rounded. *Hab.* Penang (Porter). Government Hill (Curtis) between Ayer Hitam and Penara Bukit (Burkill).

var. *purpureo-venia* Prain and Burkill. Leaves oblong linear acuminate, base deeply bilobed, lobes parallel, oblong rounded at tip, more or less tinted purple below, 6 in. long, 1.3 in. wide. *Hab.* Negri Sembilan, Gemas; Tampin (Burkill).

var. *Andersoni* Prain and Burkill. Leaves oblong cuspidate, base entire, rounded; nerves 7, 6 in. long, 2.25 in. wide, above dark green, beneath glaucous; nerves beneath and petioles 1.5 in. long, purple. *Hab.* Singapore, Holland Road (Burkill). Negri Sembilan, Tampin (Nur). Penang, Moniot's Road (Nur).

These last two varieties seem to be young states of *D. Porteri*; none bear flowers or fruits.

(15) **D. laurifolia** Wall. *Cat.* 5111; *Hook. F.B.I.* vi. 293; *Ridl. Mat.* ii. 83.

Base of stem smooth or prickly, stem rather slender. Leaves lanceolate to oblong or elliptic blunt acuminate, coriaceous, 3-nerved, strongly reticulate beneath, entire narrowed at base, 2 to 3.5 in. long, 1.5 in. wide; petioles 1 in. long. Male panicles 1 to 2 ft. long. Spikes deflexed in pairs 1 to 3 in. long. Flowers minute, green. Sepals ovate. Petals linear-oblong. Female panicles 1 ft. long, few branched. Capsule glaucous transversely elliptic, retuse, 2 in. wide, 1 in. long. *Hab.* Not rare, edges of woods ascending to 4400 ft. altitude. Singapore, Tanglin; Garden Jungle. Johor, Batu Pahat. Pahang, Gunong Tahan (Haniff); Leban Chondong, Rumpin River (Evans). Malacca, Merlimau; Mt. Ophir. Negri Sembilan, Tampin (Burkill). Selangor, Kwala Lumpur; Semangkok Pass. Perak, Hermitage Hill; Gunong Keledang; Thaiping Hills (Kunstler). Penang (Porter); Government Hill (Burkill). *Native names*: Akar Surinting; Akar Kamahang.

Generally quite unarmed, but Burkill sends a plant with prickly base from Gunong Hijau, Perak, at 4500 ft. altitude.

(16) **D. alata** Linn. *Sp. Pl.* 1033; *Ridl. Mat.* ii. 84.

Stems fleshy, 4-angled and winged. Leaves deeply cordate orbicular or ovate, 5- to 7-nerved. Male flowers in slender fascicled spikes. Capsule obcordate, 1 to 1.5 in. long. *Hab.* A commonly cultivated yam, very rarely flowering. The best known varieties are Ubi Jawa, tubers short white-fleshed; Ubi Teropong, with long white yams, Ubi Kenduduk, tubers small, red; Ubi Nasi, large red tubers.

This plant, cultivated all over the East, is only known in cultivation.

(17) **D. stenomeriflora** Prain and Burkill, *Journ. As. Soc. Beng.* x. 40.

Stem climbing to 80 ft. tall, purple. Leaves alternate coriaceous, glabrous elliptic abruptly acuminate, cordate or sagittate or entire, 3-nerved with strong nervules from midrib; 5 to 10 in. long; petioles .5 in. long. Male flowers in solitary or paired axillary spikes glabrous. Perianth-tube 0.4 in. long. Sepals triangular ovate blunt. Petals ovate blunt, all spotted red. Stamens 6. Female spikes 1 ft. long, 1 to 3 together. Perianth greenish yellow, spotted red, .4 in. long, tube 6-keeled. Sepals ovate. Petals lanceolate. *Hab.* Forest edges. Singapore, Changi. Selangor, Batu Tiga. Perak, Larut Hills at 1500 to 2000 ft. altitude (Kunstler).

This extraordinary plant, with its long-tubed flowers, might very well be put in a distinct genus.

DOUBTFUL SPECIES.

(18) **D. piscatorum** Prain and Burkill, *MSS.* *D. sp. Ridl. Mat.* ii. 84; *Prain and Burkill, Journ. As. Soc. Beng.* lxxiii. 186. Tuberos. Stem long, woody angled covered with triangular

flat thorns forming short thorny edges. Leaves ovate deep cordate acuminate, 6 in. long and as wide; nerves 11; petioles 4 to 5 in. long, thorny on upper edge. Flower and fruit unknown. *Hab.* Johor, Pulau Tioman (Burkill); Perak, Sungei Siput (Machado). *Distrib.* Sumatra. *Native name:* Tuba Ubi. *Use:* As a piscicide.

ORDER CXLVI. ROXBURGHIIACEÆ.

Herbs erect or climbing. Leaves alternate or opposite, petioled, 3 or more nerved with parallel cross nervules. Flowers axillary uni- or bi-sexual. Perianth superior or half inferior. Sepals 2; petals 2. Stamens 4, from base of perianth; anthers dorsifixed. Ovary 1-celled; stigma sessile; ovules 12 or more. Capsule 2-valved. Seeds oblong.

Climbers.

Leaves ovate cordate; flowers medium-size . 1. STEMONA

Erect herbs.

Leaves lanceolate or elliptic; flowers minute . 2. STICHONEURON

1. STEMONA, Lour.

Climbers, rarely erect with tuberous roots. Leaves ovate thin. Flowers on axillary peduncles medium-size. Perianth lobes 4. Stamens 4, connective broad, prolonged beyond the anther cells. Ovary unilocular; stigma sessile; ovules 3 to many. Capsule bivalved. Seeds 2 to many, albuminous. Species 12, Burma, Indo-Malaya, China, Japan, Australia.

(1) *S. tuberosa* Lour. *Fl. Cochinchine*. 404; *Ridl. Mat.* ii. 86. *S. Curtisii* Hook. *fil. F.B.I.* vi. 298; *Bot. Mag. t.* 7254; *Wright, Journ. Linn. Soc.* xxxii. 495. (Fig. 194, p. 321.)

Stem slender. Leaves opposite or alternate, ovate-cordate acuminate, 9- to 11-nerved, 4 to 5 in. long, 2 to 3 in. wide; petioles 2.5 to 3 in. long. Flowers unisexual pendent, 1 in. long, about 6 in axillary racemes, peduncles 2 in. long; pedicel .25 in. long. Sepals 2, lanceolate acute connate at base pink recurved. Petals erect pink, backs green. Filaments petaloid pink. Capsule oblong beaked, 1 in. long. Seeds ribbed. *Hab.* In dry thickets, common in the north. Pahang, Pahang River. Dindings, Lumut. Adang Islands, Pulau Rawei. Penang, near the Waterfall (Curtis). Kedah Yan. Perlis. Kanga. Kelantan, Chaning, Lebir River (with very deep claret flowers). *Distrib.* Siam, Cochinchina.

2. STICHONEURON, Hook. fil.

Erect herbs with creeping rhizome. Leaves membranous, linear-oblong or elliptic 3- to 5-nerved. Peduncles axillary filiform. Raceme short, of minute green or purple flowers. Perianth cam-

panulate, 4-ribbed. Stamens 4, connate at base and adnate to the perianth; filaments broad, anther cells short. Ovary half inferior or superior; ovules numerous. Fruit unknown. Species 2, 1 Himalayan.

(1) *S. caudatum* Ridl. *Journ. Roy. As. Soc. S. Br.* 57, p. 107.

Plant 1 ft. tall, few branched, glabrous. Leaves elliptic acuminate, base rounded; nerves 3 pairs; 3 in. long, 1.75 in. wide; petiole .25 in. long. Peduncle 2 in. long; pedicels 5, crowded at tip, .5 in. long. Bracts broad lanceolate. Flowers .12 in. long, purple,

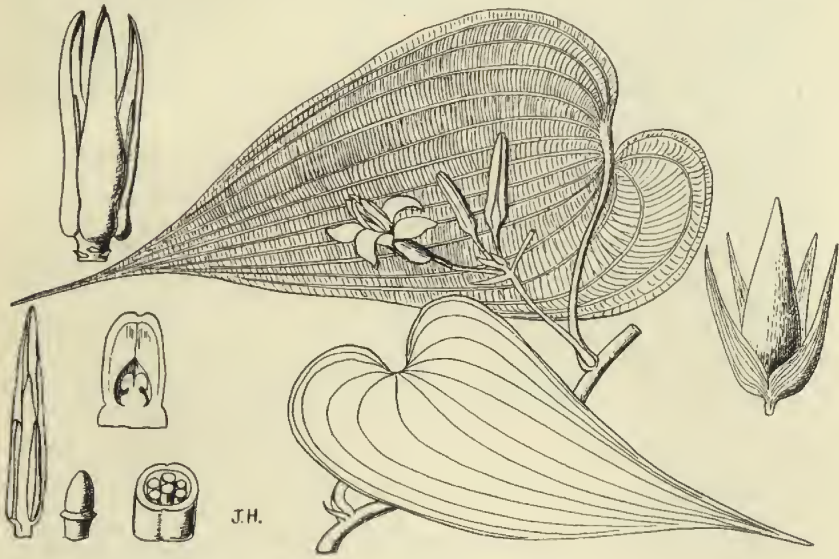


FIG. 194.—*Stemonon tuberosa*.

lobes triangular caudate pubescent. Filaments papillose pubescent; anthers dorsifixed broad elliptic orange. Ovary superior subglobose ovoid green; stigma minute conic sessile. *Hab.* Rare but locally abundant on banks, Perak, Ulu Temengoh (Ridley).

ORDER CXLVII. LILIACEÆ.

Herbs, shrubs or trees. Leaves various. Flowers usually bisexual. Perianth inferior petaloid of 3 sepals and 3 petals (rarely 4 or 10) (half superior in some species of *Peliosanthes*). Stamens 6, rarely 3; filaments generally long, filiform. Anthers oblong or linear. Ovary 3-celled; ovules 2 or more in a cell. Style 1 (rarely

3). Fruit baccate, drupaceous or capsular. Seeds globose or flattened. Species about 2500, whole world.

- § 1. *Protoliriaceæ*. Fruit capsular.
 Small leafless parasite; ovary of 3 distinct follicles . . . 1. PROTOLIRION
- § 2. *Ophiopogoneæ*. Capsule dehiscing long before the seed is ripe, exposing fleshy-coated seeds, blue.
 Filaments connate in a ring; leaves broad . . . 2. PELIOSANTHES
 Filaments free; leaves grassy . . . 3. OPHIOPOGON
- § 3. *Anthericeæ*. Herbs; leaves narrow linear; inflorescence paniced lax.
 Capsule 3-lobed; seeds flat; petals not fringed, white . . . 4. CHLOROPHYTUM
 Capsule 3-lobed; seeds flat; petals fringed, blue . . . 5. THYSANOTUS
 Fruit baccate pulpy.
 Filaments linear flat, half as long as anther . . . 6. RHUACOPHILA
 Filaments thick fleshy . . . 7. DIANELLA
- § 4. *Aspidistreeæ*. Rhizomatous with large broad leaves. Perianth campanulate; stamens adnate to tube.
 Fruit baccate.
 Style 1; stigma discoid or clubbed . . . 8. TUPISTRA
 Style 0; stigmas 3 . . . 9. TRICALISTRA
- § 5. *Asparagineæ*. Scandent shrubs, no leaves, replaced by linear cladodes, fruit baccate.
 Flowers small . . . 10. ASPARAGUS
- § 6. *Dracaeneæ*. Shrubs or trees often large. Perianth cylindric or campanulate.
 Berry 1- or 2-seeded . . . 11. DRACÆNA
- § 7. *Uvulariæ*. Rootstock tuberous or creeping. Stem leafy; leaves not sheathing; flowers axillary.
 Stem erect; flowers median size; fruit a berry . . . 12. DISPORUM
 Stem climbing by tendrilled leaves; flowers large; fruit a capsule . . . 13. GLORIOSA
- § 8. *Smilacææ*. Shrubs climbing, rarely erect often thorny with tendrils. Fruit a berry.
 Leaves 3- to 5-nerved, reticulate; flowers unisexual, umbelled small.
 Petals and sepals free to base . . . 14. SMILAX
 Petals and sepals connate in a tube . . . 15. HETEROSMILAX

1. PROTOLIRION, Ridl. and Groom.

Slender saprophyte or parasite; rhizome slender; stem erect. Leaves scale-like. Raceme corymboid. Flowers small pedicelled. Sepals narrow. Petals broader. Stamens 6, 3 epigynous, 3 epipetalous. Anthers basi-fixed. Nectaries 3, opposite petals. Pistil of 3 follicles, syncarpous and adnate to base of perianth below, free above. Follicles ovoid dehiscing above. Seeds 12 in each. Species 1.

(1) *P. paradoxum* Ridl. and Groom, *Ann. Bot.* ix. 45, Pl. iii; *Mat.* ii. 87.

Rhizome 1 to 8 in. long. Stem slender, 1 to 3 in. tall, scale-leaves crowded at base, all yellow. Flowers 6, yellow; pedicels .5 in. long. Sepals lanceolate acuminate. Petals larger ovate blunt. Stamens shorter. Carpels narrowed upwards into short styles.

Hab. On mountains in dry woods at the foot of Dacrydiums at 1000 to 3000 ft. altitude. Not uncommon. Pahang, Gunong Tahan. Perak, Thaiping Hills; Sungei Siput; Gunong Bubu (Wray). Kedah Peak (Robinson and Kloss).

2. PELIOSANTHES, Andr.

Herbs with short creeping stem. Leaves petioled lanceolate plicate coriaceous. Scapes usually shorter. Flowers racemose green, white or purple, small. Perianth-tube short campanulate, lobes all similar lanceolate. Stamens 6; filaments broad, connate in a fleshy ring, often adnate to perianth-tube; anthers introrse very small. Pistil adnate to stamen ring or free; style short; stigmas 3. Fruit capsular splitting at top when very young. Seeds 1 to 3, developed pushing through the capsule top, outer coat fleshy, blue, oblong, endosperm globose. Species about 15, Indo-Malaya, China, Siam. *General native names*: Lumbah Bukit; Pinang Lumbah; Tukas Tikus.

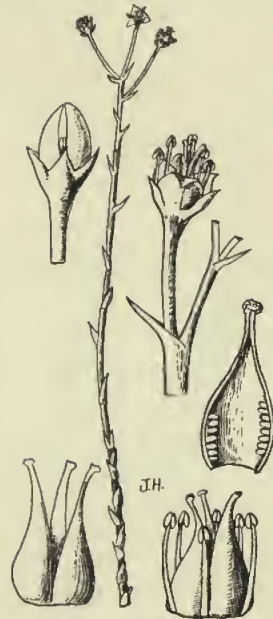


FIG. 195.—*Protolirion paradoxum*.

- Flowers several to a bract (1) **P. Teta**
var. *angustifolia*
- Flowers solitary in a bract, rarely 2.
Ovary superior.
Flowers globose, deep purple-black (2) **P. violacea**
var. *Clarkei*
- Flowers expanded, green or purplish (3) **P. viridis**
- Flowers small, 3 in. across; bracts narrow linear, 3 in. wide; bracts at base broad lanceolate (4) **P. monticola**
- Flowers large, 5 in. across (5) **P. lurida**
- Ovary inferior or half inferior.
Petals and sepals ovate white; raceme long lax (6) **P. albida**
- Petals and sepals ovate yellow; raceme short dense (7) **P. grandifolia**
- Petals and sepals linear green, dwarf plant nearly free (8) **P. stellaris**
- Petals and sepals oblong-ovate green very small; stamens in a ring; leaves long (9) **P. parviflora**

(1) **P. Teta** *Andr. Rep. t. 605; Bot. Mag. t. 1302; Hook. fil. F.B.I. vi. 265; Ridl. Mat. ii. 89.* var. *angustifolia* *Ridl. Journ. Roy. As. Soc. S. Br. 59, p. 207.*

Leaves narrow lanceolate, 5-nerved, 6 to 9 in. long, 1 in. wide;

petioles 6 in. long. Raceme lax, 8 in. tall; rachis purple. Bracts ovate-lanceolate acuminate, .25 in. long. Flowers 2 or 3 in a tuft .4 in. across; pedicels shorter than bracts. Sepals ovate, green edged violet. Petals shorter, tips round, dark green, edged white. Stamen-ring adnate to petals nearly to top, dark violet. Style 3-lobed nearly to base. Ovary quite inferior. *Hab.* Mountain woods in the north. Penang Hill and Pulau Badak (Curtis); Lankawi, Gunong Raya (Haniff). *Distrib.* South Siam, of type-species India.

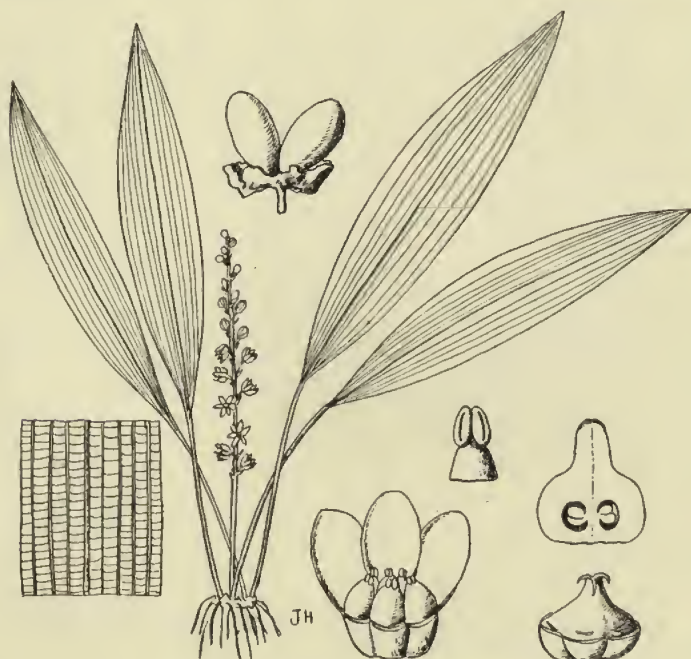


FIG. 196.—*Peliosanthes violacea*.

(2) *P. violacea* Wall. *Cat.* 5084; *Bak. Journ. Linn. Soc.* xvii. 502; in *Hook. fl. F.B.I.* vi. 266; *Ridl. Mat.* ii. 89. *var. Clarkei* *Bak. l.c. Bot. Mag. t.* 8276.

Leaves ovate-lanceolate acute or acuminate, 9-nerved, 7 to 8 in. long, 2.5 in. wide; petioles 6 in. long. Raceme about 4 in. tall, deep purple. Flowers crowded, 1 to a bract, campanulate globose fleshy, nodding, black-purple. Sepals and petals ovate blunt, .25 in. long. Stamen ring free from perianth and ovary. *Hab.* Woods. Singapore, Bukit Timah. Pahang, Tahan River. Selangor, Kwala Lumpur. Perak, Thaiping Hills; Kwala Dipang.

Penang Hill (Curtis). Perlis, Kanga. Jalor, Biserat (Gwynne-Vaughan). *Distrib.* Khasiya, South Siam. *Native name* : Seludang Pinang.

The specimens included under this species by Wallich and Baker are a mixture of two or three species.

(3) *P. viridis* Ridl. *Journ. Roy. As. Soc. S. Br.* 31, p. 93; *Mat.* ii. 89.

A compact plant. Leaves numerous lanceolate acuminate both ends, 7 to 8 in. long, 1.5 in. wide; nerves 5 to 7; dark green above, glaucescent beneath; petioles 8 to 9 in. long. Raceme 5 in. long, with lanceolate acuminate bracts. Flowers numerous nodding, pale emerald green, .4 in. across. Sepals ovate. Petals oblong. Staminal ring free from perianth and pistil. *Hab.* Woods; local in the south. Singapore, Chan Chu Kang. Johor, Bukit Soga, Batu Pahat. Malacca, Chabau (Ridley). *Distrib.* Sumatra.

(4) *P. monticola* Ridl.

Small plant, with silvery papery sheaths at base of leaves and a rather stout woody rhizome. Leaves lanceolate acuminate at both ends, 5 in. long, 1.5 in. wide; petioles 5.75 in. long. Raceme 2 in. long on peduncle 1 in. long. Lower bracts broad lanceolate, .25 in. long, .1 in. wide. Upper bracts (floral) narrow lanceolate linear. Perianth .3 in. wide, lobes oblong blunt, tips round. Stamens forming a complete ring; anthers very small free from perianth nearly to base. Ovary free from the stamen-ring, superior. *Hab.* Mountains, rare. Perak, Gunong Kerbau at 5000 ft. altitude (Robinson).

(5) *P. lurida* Ridl. *Journ. Roy. As. Soc. S. Br.* 31, p. 96; *Mat.* ii. 89.

Leaves large lanceolate, long acuminate; nerves 15 to 19; 12 to 13 in. long, 3 to 3.5 in. wide; petioles 8 to 12 in. long. Raceme 4 or 5 in. long. Flowers .5 in. across. Sepals and petals ovate lurid green with a central line or shading of purple. Staminal ring deep violet. *Hab.* Rocky woods. Pahang, river at Khol; Telom. Malacca, woods at base of Mt. Ophir. Selangor, Sempang Mines (Ridley). Penang; Penara Bukit on rocks (Curtis). Lan-kawi, Kwah (Curtis). *Native name* : Pinang Lumbah.

(6) *P. albida* Bak. *Bot. Mag. t.* 7110; *Ridl. Mat.* ii. 90.

Leaves lanceolate acuminate, 8-nerved, 10 in. long, 2 in. wide; petioles over 1 ft. long. Raceme slender lax, 9 in. long, covered to base with small white flowers on very short pedicels nodding. Sepals and petals white; petals rounder and blunter. Stamen-ring low. Ovary half-inferior, adnate half-way to the stamen ring; ovules 5 in a cell. *Hab.* Rocky spots in woods. Local. Negri Sembilan, Tampin Waterfall. Selangor, Menuang Gasing (Kloss). Perak, Thaiping Hills. Penang Hill (Curtis, Maingay). *Distrib.* Sumatra, Borneo.

(7) *P. grandifolia* Ridl. *Journ. Roy. As. Soc. S. Br.* 31, p. 97; *Mat.* ii. 90.

Leaves very large and stiff oblanceolate cuspidate; nerves 13; 1 ft. long, 6 in. wide; petioles thick, .25 in. through, 6 in. long. Raceme 6 in. long, flowering to base. Flowers nodding, waxy yellow, .25 in. across. Sepals and petals ovate blunt. Stamen-ring adnate to perianth; anthers broad. Style very stout. Ovary quite inferior. *Hab.* Mountain forests. Perak, Thaiping Hills (Ridley).

(8) *P. stellaris* Ridl. *Journ. Roy. As. Soc. S. Br.* 31, p. 97; *Mat.* ii. 90. *P. humilis* Andr. *Bot. Rep.* i. 634; *Hook. fil. F.B.I.* vi. 267 (*partly*).

A small species. Leaves lanceolate acuminate, 5-ribbed, 4 in. long, 1 in. across; petioles 3 in. long. Raceme 2 in. long. Flowers star-shaped, small, green. Sepals and petals linear, blunt, less than .12 in. long. Stamen-ring green, stamens nearly free, anthers orange. Ovary quite inferior, large obconic; style violet, longer than stamens. *Hab.* Rocky woods, chiefly in the north, Pahang, Tahan Woods; Telom. Perak, Gunong Kerbau at 4000 ft. altitude (Robinson). Province Wellesley, Tasek Gelugur. Penang Hill (Curtis). Kedah, Alor Sta. *Distrib.* Siam.

P. humilis Andr. *Bot. Rep., l.c.*, was perhaps meant for this species, but it is not certain.

(9) *P. parviflora* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 61.

Leaves lanceolate-acuminate, both ends 10-nerved, 7 in. long, 2.25 in. wide; petioles 6 in. long. Scapes 4 in. long. Flowers solitary or two together, .2 in. wide; pedicels .25 in. long. Sepals and petals oblong-ovate blunt, blue green. Stamen-ring above the mouth of tube, adnate to ovary at base only; anthers white. Ovary half inferior; style stout. *Hab.* Pulau Adang islands, Rawei and Pulau Adang (Ridley).

Leaves much taller than in *P. stellaris*, but flowers as small or smaller.

3. OPHIOPOGON, Ker.

Stems creeping short or erect elongate. Leaves linear (or lanceolate) sub-coriaceous. Scape racemose. Bracts scarious. Flowers small, white or pink, several in a bract. Perianth superior. Stamens 6, free from leaves of segments. Ovary 3-celled. Style columnar; stigma 3-toothed. Fruit and seed as in *Peliosanthes*. Species 10 or more, India, Java, China, Japan.

Stamens quite free; flowers small; anthers lanceolate

Stamens quite free; flowers .5 in. across; anthers linear

Stamens united by a ring

(1) *O. malayanus*

(2) *O. intermedius*
var. *macranthus*

(3) *O. prolifera*

(1) *O. malayanus* Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 34; *Mat.* ii. 91.

Stem stout erect, 4 in. long or more, covered with scarios sheaths of fallen leaves. Leaves linear acuminate, 9 in. long, .4 in. wide, glaucous beneath. Scape 4 in. long. Flowers small, white. Sepals and petals ovate sub-acute, .12 in. long. Stamens quite free. *Hab.* Grassy spots. Local. Perak, Padang Rengas (Fox). Lankawi, Gunong Raya (Curtis).

(2) *O. intermedius* Don, *Prod. Fl. Nep.* 48. *var. macranthus* Ridl. *F.M.S. Journ.* iv. 81.

Stem woody. Leaves linear acuminate, 18 in. long, .25 in. wide, paler beneath. Scape 18 in. (or more) long, base .6 in. long, nude. Flowers few, white. Bracts .25 in. long. Flowers campanulate, .5 in. wide. Sepals and petals oblong truncate, tip round. Stamen filaments very short. Anthers linear-oblong. *Hab.* Very rare. By streams in forests at 4500 ft. altitude. Pahang, Cameron's Plateau (Robinson and Kloss). *Distrib.* Of species, Himalayas.

(3) *O. prolifera* Lindl. *Journ. Hort. Soc.* i. 76; *Hook. F.B.I.* vi. 270.

Stem erect with stilt roots. Leaves ensiform recurved, 6 to 10 in. long, .7 in. wide. Scape purple; flowers clustered, obovate between fleshy and spongy, .25 in. across. Stamens united by a short fleshy ring. Style pyramidal; stigmas 3, point-like. *Hab.* Penang (Lewis). Cult. in Hort. Soc. Gardens. Not seen since.

A sketch is in the Lindley Herbarium at Cambridge. Mohammed Haniff found a plant on Penang Hill which to some extent resembles this. It has the habit of *O. malayanus*. The scape violet, flowers white rather fleshy, .25 in. across, but the stamens are quite free to base, the style elongate cylindrical tapering upwards; perianth lobes lanceolate acute; ovary inferior.

4. CHLOROPHYTUM, Ker.

Herbs. Leaves long, flaccid, crowded at base. Inflorescence racemose or paniced. Flowers medium or small, white. Sepals and petals linear-oblong. Stamens 6; filaments filiform; anthers linear versatile. Ovary globose; ovules 4 to 20 in a cell; style elongate filiform; stigma capitate minute. Capsule trigonous, deeply 3-lobed, lobes flattened. Seeds discoid black. Species 40, India, Africa, Australia and America, few Malayan.

(1) *C. orchidastrum* Lindl. *Trans. Hort.* vi. 79; *Bot. Reg.* 813; *Ridl. Mat.* ii. 92.

Large tufted plant. Leaves elliptic-lanceolate, 2 ft. long, 2 in. wide. Panicles 12 to 18 in. tall, with a few long branches. Bracts at base long papery acuminate, 1 to 3 in. long. Flowers numerous, 2 or 3 together, white, .6 in. wide. Sepals and petals linear-lanceolate acute. Capsule .25 in. long. *Hab.* In forest or on limestone rocks. Not common. Perak, Kwala Dipang, limestone rocks;

Temengoh, in forests. Perlis, Tebing Tinggi, limestone rocks.
Distrib. Africa, India, Cambodia.

5. THYSANOTUS, R. Br.

Herbs with fascicled or tuberous roots. Leaves grassy or terete. Scapes leafless. Flowers paniced or racemose or umbelled. Sepals lanceolate, green. Petals blue and fringed. Stamens 6, shorter than sepals; anthers linear basifixed. Ovary small, globose; style filiform. Capsule globose delhiscing from top. Seeds subglobose, 2 in a cell. Species 19, all Australian but 1, in China and Philippines and 1 Malay Peninsula.

(1) *Th. siamensis* *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 209.

Leaves terete glaucous, green, 8 in. long, very slender. Scapes 10 in. tall, .1 in. through. Flowers about 6 or 7 in a terminal umbel; pedicels .5 in. long. Sepals lanceolate-oblong blunt, .12 in. long. Petals as long, oblong-lanceolate, blue with white central bar. Stamens half as long as sepals; filaments very short. Capsule .25 in. long. *Hab.* Setul, on sandy heaths, rare (Ridley).

6. RHUACOPHILA, Bl.

Stems 6 to 8 ft. tall, flattened. Leaves flaccid glaucous, linear acuminate unarmed. Panicle not peduncled. Bracts lanceolate leafy. Flowers white. Sepals oblong blunt. Petals wider. Stamens shorter; filaments linear flat, half as long as the long linear blunt anther, the base of which is shortly bifid. Style cylindric, as long as petals. Berry oblong. Seeds 4 in a cell, ellipsoid. Species 1, Java, Borneo, Sumatra, Philippines.

(1) *R. javanica* *Bl. Enum.* i. 14. (Fig. 197, p. 329.)

Stems several, tall. Leaves sub-coriaceous, 1 ft. long, .5 in. wide. Panicle wide, spreading, 3 to 6 in. long, leafy with broad bracts to the base; branches 3 in. long. Flowers .75 in. across; pedicels slender, .5 in. long. Berry oblong, .5 in. long. Seeds .1 in. long. *Hab.* On rocky spots in streams at high altitudes. Pahang, Gunong Tahan, Teku River, at 5600 to 6000 ft. altitude (Ridley). Perak, Gunong Kerbau (Haniff, Robinson).

7. DIANELLA, Lam.

Herbs with a short stem and distichous linear leaves. Scapes tall, paniced. Flowers small, blue or white, nodding pedicels pointed at top. Sepals and petals narrow recurved. Stamens, filaments thick, anthers basifixed opening by pores. Ovary 3-celled; ovules 4 to 8 in a cell; style filiform; stigma minute. Berry blue or white. Seeds few ovoid flat, black. Species about 10, chiefly Australian and Polynesian.

Flowers .5 in. across; petals as long as sepals . . . (1) *D. ensifolia*
Flowers .25 in. across; petals longer than sepals . . . (2) *D. parviflora*

(1) *D. ensifolia* Redoute *Lil. t.* 1; *Bot. Mag. t.* 1404; *Ridl. Mat.* ii. 92.

Stems 1 ft. tall or less, flattened. Leaves linear-lanceolate acuminate, 1 to 2 ft. long, 1.5 in. wide. Scape 2 ft. tall. Panicle 6 in. long or more; pedicels .5 in. long, persistent. Flowers .25 in.

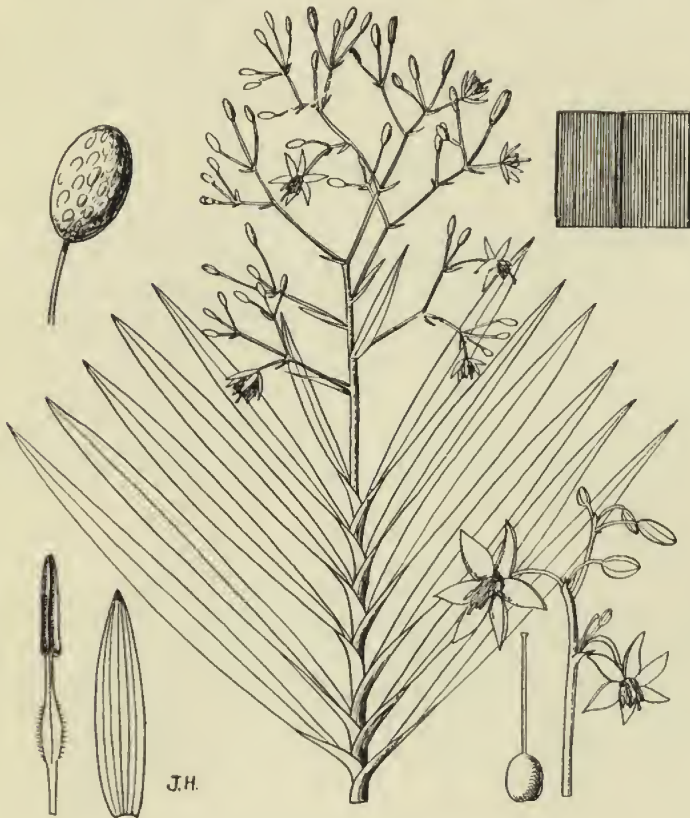


FIG. 197.—*Rhuacophila javanica*.

across, blue or white. Petals thinner and broader than sepals. Berry .4 in. through, blue or white. Seeds 5 or 6. *Hab.* Common on seashores and open woods up to 4000 ft. altitude. Singapore, Tanglin; Pulau Ubin (Hervey); Pahang, Lebau Chondok, Rumpin River (Evans). Malacca, Bukit Bruang (Derry); Ayer Panas (Maingay). Selangor, Ulu Selangor. Perak, Thaiping; Gunong Batu Putih at 4300 ft. altitude (Wray). Province Wellesley, Kubu Semang (Curtis). Penang Hill (Maingay). Kedah Peak

(Robinson). Setul. *Distrib.* India, Siam, Malaya. *Native names*: Satagit; Siak-Siak jantan; Senjuang; Benjuan.

(2) *D. parviflora* Ridl. *Journ. F.M.S. Mus.* vi. 186.

Rhizome stout. Stems 1 or 2 about 6 in. long, slightly flattened. Leaves linear acuminate, stiffly coriaceous, minutely thorny on midrib and edges, 12 to 18 in. long, .5 in. wide. Panicle 14 in. long, lax, branches few and short, .5 in. long. Flowers .25 in. across. Sepals ovate blunt. Petals longer elliptic blunt, blue, edged white. Filaments dilate into a yellow swelling above. Berry deep blue, globose. *Hab.* Rare, high mountains. Pahang, Gunong Tahan (Ridley).

8. TUPISTRA, Ker.

Herbs. Stem short erect or creeping. Leaves large. Scape shorter, stout. Flowers many, fleshy rather large, purple or yellow. Perianth campanulate short broad, lobes recurved, 6 to 8. Stamens 6 or 8 insert on middle of tube; filaments very short or 0; anthers dorsifixed. Ovary small, 3, or 4-celled; style short, stout; stigma large peltate, clubbed or capitate. Berry globose, usually 1-seeded. Species about 10, tropical Himalaya, Burma, China.

Flowers .75 in. wide; spike long; stigma orbicular flat (1) *T. grandis*

Flowers, .5 in. wide; spike short; stigma clubbed . (2) *T. violacea*

(1) *T. grandis* Ridl. *Journ. Bot. March*, 1900, p. 73; *Mat.* ii. 93; *Bot. Mag. t.* 7829.

Stems stout, 3 to 4 in. long. Leaves lanceolate acute, 2 ft. long, 6 in. wide, narrowed to a long winged petiole. Spike 1 ft. long or more. Flowers 50 or more, sessile, densely crowded, 1 in. long, .75 in. wide. Perianth purple-black. Anthers sessile 6. Style stout taller than tube; stigma very large, orbicular, white. *Hab.* In dense dark forests. Perak, Bujong Malacca (Ridley); Gunong Kerbau at 4000 ft. altitude (Robinson); Batang Padang (Wray).

(2) *T. violacea* Ridl. *Journ. Roy. As. Soc. S. Br.* vi. 35.

Stem short and stout. Leaves oblong-oblancheolate acute narrowed to base, 3 ft. long, 3 in. wide. Spike 8 in. long; flowers sessile, .5 in. across, tube hemispheric violet, lobes oblong, darker. Anthers sessile, 6. Style white, spotted violet. Stigma club-shaped, obscurely 3-lobed. *Hab.* Mountain forests, not common. Perak, Bujong Malacca (Curtis). Penang, Highlands (Curtis).

EXCLUDED SPECIES.

TUPISTRA SINGAPOREANA Wall. *Cat.* 5195; *Hook. fil. F.B.I.* vi. 325, is *Neuwiedia Curtisi*, Rolfe (*Apostasiaceæ*).

9. TRICALISTRA, Ridl.

Stem woody, creeping. Leaves oblanceolate petioled, sub-coriaceous. Spike erect. Flowers small campanulate, lobes short,

all similar recurved. Stamens 6, in mouth of tube; filaments short; anthers oblong. Pistil short sub-globose; style 0; stigmas three horseshoe-shaped. Ovary 1-celled; ovules 2. Fruit drupaceous globose, green, 1-seeded. Species 1.

(1) *T. ochracea* Ridl. *Journ. F.M.S. Mus.* iv. 83.

Stem woody, .5 in. through. Leaves 16 in. long, 4 in. wide, dark green; petioles 6 in. long. Spike 8 in. tall, base nude, 4-angled. Bracts ovate blunt. Flowers sessile ochre-yellow. Fruit as large as a 12-bore bullet. *Hab.* Very rare in dense forests at 4000 ft. altitude. Pahang, Telom and Gunong Berumbun (Ridley).

10. ASPARAGUS, Linn.

Shrubby half scandent plants, often thorny. Leaves reduced to minute scales with tufts of flat or acicular branches (cladodes) in axils. Flowers very small, white, axillary fascicled, solitary or racemed. Perianth campanulate, 6-lobed. Stamens from base of perianth. Ovary 3-celled; ovules 2 or more in a cell; style 1; stigmas 3. Seeds 2 to 6, black. Species about 100. Europe, Asia, Africa.

(1) *A. racemosus* Willd. *Sp. Pl.* ii. 152.

Scandent woody, spines long (cladodes), 2- to 6-nate, .75 to 1 in. long, linear acuminate falcate. Racemes solitary or fascicled sometimes branched. Flowers .12 in. or less across. Berry .25 in. through. *Hab.* Lankawi, on limestone rocks (Curtis), very rare. *Distrib.* Africa, India, Java, Australia.

11. DRACÆNA, Linn.

Trees or shrubs. Leaves linear sessile or lanceolate petioled. Flowers white or pink cylindrical in terminal panicles or racemes. Sepals and petals linear more or less connate at base. Stamens 6 from base of tube; filaments long filiform; anthers narrow versatile. Ovary 3-celled; ovules 1 in a cell. Berry globose, 1- to 3-seeded. Seeds globose or hemispheric. Species about 40. Africa, Asia, Australia. The well-known "Dracena" of gardens is *Cordyline terminalis*, Kunth. Enum. v. 25. It is probably of Papuan origin and is not wild here. Many varieties are in cultivation. *Native name:* Andong.

Panicles or racemes erect; branches few, short, stiff.

Leaves linear acuminate not petioled.

Tree 60 ft. tall, much branched; leaves thin, narrow

Shrubs little or not branched; panicles with few or no branches; leaves narrow linear sessile.

Stout shrub; raceme thick dense; leaves 1.5 in. wide

Slender shrub; raceme slender lax; leaves .5 in. wide

(1) *D. granulata*

(2) *D. robusta*

(3) *D. conferta*

- Small shrubs, 1 to 2 ft. tall; raceme lax.
 Leaves very narrow and long, .25 in.
 across (4) *D. graminifolia*
 Leaves oblong cuspidate, 2.25 in. wide (5) *D. cuspidata*
 Leaves linear-lanceolate narrowed both
 ends, 6 to 15 in. long (6) *D. Porteri*
 Leaves lanceolate-linear long acuminate,
 20 to 30 in. long (7) *D. Curtisii*
 Leaves oblanceolate petioled.
 Shrubs.
 Stem 2 to 3 ft. tall; raceme lax (8) *D. umbratica*
 Stem weak, 1 ft. long (9) *D. singaporensis*
 Leaves lanceolate acuminate both ends;
 petiole 2 in. long (10) *D. siamica*
 Petiole long; raceme dense short, flowers
 large (11) *D. congesta*
 Petiole long; raceme elongate; flowers
 very small (12) *D. breviflora*
 Panicle lax few-branched. (13) *D. longifolia*
 Panicle large erect.
 Much branched tree 60 ft. tall; leaves oblanceo-
 late (14) *D. Maingayi*
 Big shrub; leaves lanceolate, not petioled (15) *D. penangensis*
 Big shrub; leaves coriaceous ensiform, 2 ft. long
 Big shrub; leaves broad marbled or purple
 lanceolate (17) *D. aurantiaca*
 Panicle lax; branches slender, nodding.
 Leaves narrow linear slender, large shrub (18) *D. nutans*
 Leaves broad oblanceolate (19) *D. pendula*
 Leaves small lanceolate, small shrub (20) *D. elliptica*
 Flowers very short; fruit small; leaves rigid (21) *D. yuccæfolia*

(1) *D. granulata* Hook. *fil. F.B.I.* vi. 327; *Ridl. Mat.* ii. 95.
D. graminifolia *Ridl. Journ. Bot.* 1896, 2 (not of *Wallich*).

A tall tree 20 to 60 ft. high, 4 in. through, much branched, bark white. Leaves linear acuminate, 6 to 10 in. long, .25 to .5 in. wide. Panicle lax, 1 ft. long, 6 in. across; branches erect. Flowers 1 in. long, whitish green, on pedicels .25 in. long. Sepals and petals free half-way. Fruit globose orange, .75 in. through. *Hab.* In swampy wet spots in forest. Singapore, Bukit Timah; Bukit Mandai. Johor, Scudai River (*Ridley*). Perak, Larut (*Kunstler*).

(2) *D. robusta* *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 42.

Shrub 9 ft. tall, stem 2 in. through, grey. Leaves rather stiff linear-lanceolate acuminate, hardly narrowed to base, 10 in. long, 1 in. wide. Raceme stout, over 1 ft. long, dense-flowered; flowers in threes, sub-sessile. Flowers .75 in. long, base dilate pink, lobes split half-way, white. Stamens shorter than lobes. Fruit globose, .25 in. through when dry. *Hab.* Mountain forests. Selangor, Sempang Mines, Semangkok, at 4000 ft. altitude. Perak, Gunong Kerbau (*Robinson*); Thaiping Hills. Kelantan, Kwala Lebir (*Ridley*).

(3) *D. conferta* *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 35; *Mat.* ii. 96.

Stem 6 to 10 ft. tall. Leaves narrow linear acuminate, 24 to

27 in. long, .6 in. wide. Raceme 2 ft. long, dense; peduncle stout with a few sheathing leaves. Flowers white, tufted, 3 or 4 together; pedicels very short, .5 in. long, split half-way. Fruit as large as a pea, globose. *Hab.* Malacca or Sungei Ujong (Cantley). Perak, Selama at 300 to 500 ft. altitude (Kunstler). *Native name:* Poko San Juan hutan jantan.

(4) *D. graminifolia* Wall. *Cat.* 5149; *Hook. fl. F.B.I.* vi. 327; *Ridl. Mat.* ii. 96. *D. Finlaysonii* Bak. *Journ. Bot.* 1873, 261 (in parts).

Shrub 2 ft. tall, hardly branched, stem less than .25 in. through. Leaves linear long-acuminate, 15 in. long, .25 in. wide. Raceme simple or few branched at base, 12 to 18 in. long. Flowers 3 or 4 in tufts crowded; pedicels very short, white, 1 in. long, split more than half-way. Fruit pea-shaped, orange. *Hab.* Forests, local. Dindings (Finlayson); Pangkor; Lumut. Perak, Bujong Malacca (Ridley). Province Wellesley, Bukit Mertajam at 1500 ft. altitude (Burkill).

var. *angustissima* Ridl. *Mat.* ii. 97. Leaves very slender with long points. *Hab.* Perak, Gunong Putih (Kunstler); Jor (Ridley).

(5) *D. cuspidata* Ridl.

Low shrub, stem stout .25 in. through. Leaves oblong, narrowed at top with an abrupt cusp .5 in. long, setaceous at tip, base narrowed to sheath, 9 in. long, 2.5 in. wide. Panicle racemiform, 5 in. long. Flowers in threes on short pedicels, very slender, slightly clubbed at tip, 1 in. long, lobes very narrow linear. Stamens, filaments longer, anthers oblong. *Hab.* Kelantan, Chaning Woods (Ridley).

(6) *D. Porteri* Bak. *Journ. Bot.* 1873, p. 262; *Ridl. Mat.* ii.

97.

A low, little branched shrub, 2 to 5 ft. tall. Leaves linear-lanceolate acuminate, narrowed to base, 6 to 15 in. long, .5 to 1.5 in. wide. Panicle with a few branches 1 to 2 in. long at base, upper part racemose, 6 to 9 in. long. Flowers 2 or 3 together, white, .75 in. long, lobes free half-way, tube dilate at base. Fruit .4 in. long with 1 to 3 seeds, orange. *Hab.* Common in lowland woods. Singapore (Wallich); Garden Jungle. Johor, Gunong Pulau. Pahang, Gunong Tahan at 3300 ft. altitude (Robinson). Malacca, Ayer Panas; Mt. Ophir. Negri Sembilan, Johol; Tampin. Selangor, Petaling; Damansara Hill, Kwala Lumpur (Ridley). Perak, Larut. Penang, Waterfall (Wallich, Curtis). Kelantan, Chaning, Kelantan River. *Native name:* Jarum-Jarum.

(7) *D. Curtisii* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 210.

Leaves lanceolate-linear acuminate to a long point narrowed to base, thin coriaceous, 20 to 30 in. long, 1 to 1.25 in. wide. Panicle 30 in. long with 3 to 5 remote branches 4 to 6 in. long. Flowers 4 to 6 together in short tufts. Perianth .75 in. long, lobes very narrow, free nearly to base, dilate. Fruit globose, 1- or 2-seeded, .25 in. through (dry). *Hab.* Open woods in the north. Lankawi, Kwah (Haniff, Wooldridge). Setul (Ridley).

(8) **D. umbratica** *Ridl.* *D. terniflora* *Ridl. Mat.* ii. 97 (not of *Roxburgh*). *D. terniflora*, *var. Curtisii* *Hook. fil. F.B.I.* vi. 329.

A low little-branched shrub, 2 to 3 ft. tall. Leaves elliptic to elliptic-lanceolate cuspidate, base narrowed into petiole, 3 in. wide; petioles of lower leaves 1 to 2 in. long, channelled not winged; of upper leaves broadly winged. Inflorescence racemose not or hardly branched, 9 in. long, the lower half flowerless. Flowers 5 or 6 in a tuft, white on pedicels .12 in. long. Perianth 1 in. long, split half-way, lobes linear blunt. Berry small globose to 3-lobed, .25 in. through when 1-seeded, orange red. Seeds 1 to 3. *Hab.* Common in lowland woods. Singapore, Garden Jungle; Changi, Johor, Tanjong Surat and Jambu Larang (Feilding). Malacca, Sungei Hudang. Pahang, Tahan River. Perak, Kol; Ulu Kal and Larut (Kunstler). Dindings, Lumut. Penang, Balik Pulau and Pulau Betong (Curtis). Kedah, Gurun (Robinson).

This has commonly been identified with the Indian *D. spicata*, *Roxb.* but that is described as caulescent by *Roxburgh* and as arboreous by *Hooker*. It resembles *D. Porteri*, but has broad elliptic leaves.

(9) **D. singaporensis** *Ridl. Journ. Bot.* 1896, p. 4; *Mat.* ii. 166.

Dwarf shrub, 1 ft. tall, .25 in. through. Leaves elliptic or lanceolate acute, 7 in. long, 2.5 in. wide, dull green; petioles slightly winged, 2 in. long or less. Raceme 2 in. long; pedicels .12 in. long. Flowers white, lobes free more than half-way lorate. Stamens shorter. Fruit small, globose red. *Hab.* Not common in dense jungle in the south. Singapore, Bukit Timah; Chan Chu Kang, Johor, Gunong Pantai (*Ridley*).

(10) **D. siamica** *Ridl. Journ. Bot.* 1896, p. 166.

Dwarf shrub, 1 ft. tall, stem .12 in. through. Leaves oblong or elliptic or lanceolate acuminate, 6 in. long, 2 in. wide, light green with pale circular blotches; petioles 1 in. long. Raceme 4 or 5 in. long; flowers rather crowded. Flowers .5 in. long, pinkish, pedicels less than .24 in. long. *Hab.* Open sandy spots in the north. Perlis, sandy heath on Ginting Kabok (*Ridley*). *Distrib.* South Siam.

(11) **D. congesta** *Ridl. Trans. Linn. Soc.* iii. 388; *Mat.* ii. 98. *D. pachyphylla* *Kurz Journ. As. Soc.* 42, p. 249 (in part).

A dwarf species with a woody stem 3 to 6 in. tall and .5 in. through with stout roots. Leaves elliptic to nearly lanceolate acuminate or cuspidate rather abruptly narrowed at the base, 6 to 9 in. long, 2.5 to 3 in. wide; petioles 3 to 6 in. long, slightly winged, sheathing at base and .25 in. wide. Panicle short and dense, 3 in. long, many flowered; peduncle 2 in. long. Flowers reddish white, 1 in. long; pedicels .11 in. long. Perianth-lobes free half-way down linear blunt. Berry small, 1- to 3-seeded. *Hab.* In woods, and especially among limestone rocks in shady spots. Pahang, Kota Glanggi, limestone rocks; Tahan woods.

Malacca, (Maingay); Ayer Panas (Goodenough); Tebong; Mt. Ophir (Hullett); Bukit Rejang (Derry). Selangor, Batu Caves (limestone rocks). *Distrib.* Borneo.

Kurz in his account of *D. pachyphylla* of the Andaman islands gives Maingay's plant as *pachyphylla*, but his description of the species does not at all agree with the Malacca plant.

The striking features of this species are the shortness of the petioles of the lower leaves, those of the upper leaves being twice as long or more, the abruptly narrowed base of the blade, and the short condensed flower-raceme.

(12) **D. breviflora** Ridl. *Journ. Bot. April*, 1896, p. 165; *Mat.* ii. 98.

Dwarf shrub, nearly stemless. Leaves elliptic-lanceolate acuminate, base shortly narrowed, 1 ft. long, 3 in. wide; petioles channelled, not winged, 8 in. long, base sheathing. Raceme 2 in. long, on a peduncle 2 in. long. Flowers densely crowded; pedicels .12 in. long. Perianth campanulate, .25 in. long, greenish-white split half-way, lobes oblong blunt recurved. *Hab.* In tidal mud forests. Johor, Ulu Batu Pahat (Kelsall); Tebrau River (Ridley).

This is peculiar for its very short flowers.

(13) **D. longifolia** Ridl. *Trans. Linn. Soc.* iii. 388.

A low shrub. Leaves elongate lanceolate acuminate, 2 ft. long, 2.5 in. wide, narrowed into the very long winged petioles. Panicle 16 in. long, shorter than the leaves, erect graceful lax with few branches. Bracts numerous lanceolate acuminate acute, scattered on the peduncle and at the bases of the branches. Floral bracts ovate. Flowers in tufts, two or three, white, .75 in. long, on pedicels .12 in. long. Perianth cleft for three-fifths of its length. *Hab.* Dense forest, Pahang, Tahan River woods (Ridley).

This was referred by me erroneously to *D. Jackiana* Wall. in *Mat.* ii. 99.

(14) **D. Maingayi** Hook. *fil. F.B.I.* vi. 329; *Ridl. Mat.* ii. 98.

A very large tree, 40 to 60 ft. tall, 1.5 to 2 ft. through, bushy. Leaves coriaceous dark green, lanceolate-oblong acuminate, 1 ft. long, 3 in. wide; petioles 1 in. long, winged to base. Panicles 2 ft. long, branches spreading. Flowers light yellow in tufts of 5, half an inch apart. Perianth 1 in. long. Pedicels .35 in. long. Berries 1 in. through, globose orange. *Hab.* Sea-coasts and dry woods. Singapore, Changi seashore; Bukit Panjang. Johor, Batu Pahat. Malacca, Pulau Besar (Griffith); Bukit Bruang. Selangor, Ulu Selangor (Kunstler). Perak, Larut (Kunstler).

(15) **D. penangensis** Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 36; *Mat.* ii. 98.

Stems 8 to 10 ft. tall, 1 in. through. Leaves young, oblong petioled, adults shorter, upper ones lanceolate acuminate, 6 to 7 in. long, 1 to 1.25 in. wide; petioles 1 in. long, base sheathing. Panicle erect, 8 to 10 in. long with 11 or 12 stiff branches 4 in. long or less. Flowers white in twos and threes on slender pedicels.

Fruit .75 in. through, scarlet. *Hab.* Penang, Batu Feringhi and Highlands (Curtis).

(16) *D. trachystachys* Hook. *fil. Herb. Kew, F.B.I.* vi. 328. (*D. brachystachys* by printer's error); *Ridl. Mat.* ii. 96.

Tree 10 to 20 ft. tall, 10 to 12 in. through, little branched. Leaves tufted at branch ends, ensiform acuminate, 2 to 3 ft. long, 2 in. wide, coriaceous gradually narrowed to base. Panicle large; peduncle woody, over 2 ft. long, .5 in. through at base, branches 1 ft. or more, scabrid. Flowers in tufts of 2 to 4, about .5 in. long, lobes free half-way. Berry globose or 3-lobed, large, orange.

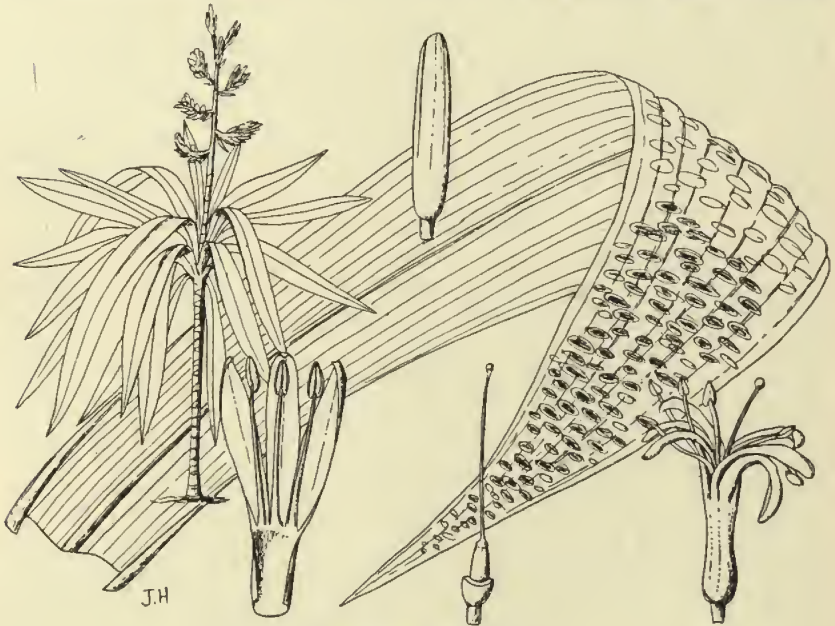


FIG. 198.—*Dracæna aurantiaca*.

Hab. Forests, scattered. Singapore, Pulau Serapu. Malacca, Hulu Belankas (Derry). Selangor, Bukit Kutu. Perak, Hermitage Hill, Penang, Moniot's Road (Curtis).

Hooker wrote *trachystachys* in the Kew herbarium, and evidently intended this name; *brachystachys* is an utterly unsuitable name.

(17) *D. aurantiaca* Wall. *Cat.* 544; *Hook. fil. F.B.I.* vi. 329; *Ridl. Mat.* ii. 99. *D. Cantleyi* Bak. *Journ. Bot.* 1881, p. 326. *D. marmorata* Bak. *Bot. Mag. t.* 7078.

Shrub 12 ft. tall, little or not branched. Leaves crowded on the ends, elliptic-lanceolate-ovate or almost lorate coriaceous polished green or purple with circular lighter patches 1 to 3 ft. long, 4 to 5 in. wide, narrowed into the broad winged petioles. Panicle large

stout, 15 in. long, spreading. Flowers purple outside, white inside, rarely greenish-white, 1 in. long in threes and fours; pedicels .35 in. long. Fruit as big as a cherry, orange. *Hab.* In damp open spots, swamps and wet forest edges. Singapore (Wallich). Bukit Timah; Tampenis; Kranji; Pulau Serapu, common; Pulau Brani. Johor. Malacca, Nyalas; Panchur (Goodenough). Penang, Paya Trobong (Curtis). Adang islands, Pulau Rawei (Ridley). *Distrib.* Borneo.

The transverse nerves of the leaf are very curiously undulate.

(18) **D. nutans** *Ridl. Trans. Linn. Soc.* iii. 406; *Mat.* ii. 100.

Tall shrub about 10 to 12 ft. high, stem .25 in. through, much branched. Leaves narrow linear acuminate mucronate, 1 ft. long, .5 in. wide. Panicle 2 ft. long, nodding; branches 6 or 7 in. long very slender. Bracts ovate acute. Flowers single or paired, on pedicels .5 in. long, greenish white, 1.5 in. long, cleft for two-thirds length, lobes spatulate-linear. Stamens shorter. Fruit as large as a pea, orange. *Hab.* In damp thickets, half sarmentose. Rare. Pahang, Ayer hitam, Pekan (Ridley).

(19) **D. pendula** *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 36; *Mat.* ii. 100.

Stem 6 ft. tall. Leaves broad oblong-lanceolate acuminate narrowed to the base, 8 to 14 in. long, 1.5 to 3.5 in. wide; petioles winged. Panicle graceful, nodding, 15 in. long, branches few, slender, 7 to 8 in. long. Flowers in distant tufts of 2 or 3, white, .75 to 1 in. long, cleft half-way. *Hab.* Swampy woods. Malacca, Panchur (Goodenough). Dindings, Gunong Tungul. Perak, Kwal Dipang; Goping (Kunstler).

(20) **D. elliptica** *Thunb. Diss. Bot. Drac.* 6; *Ridl. Mat.* ii. 100. *D. terniflora* *Roxb. Fl. Ind.* ii. 159.

A slender stemmed shrub, 5 to 6 ft. tall. Leaves oblong or oblanceolate, 6 in. long, 3 in. wide; petioles .5 in. long. Panicle 6 to 12 in. long, lax, drooping; branches slender. Flowers white, .75 in. long, solitary or paired, cleft more than half-way. Fruit .5 in. long, globose or 2- or 3-lobed, orange red. Seeds 1 to 3. *Hab.* Common in forests. Singapore, Garden Jungle; Chan Chu Kang. Johor, Tanjong Kupang; Gunong Pantai. Selangor, Batu Caves; Menuang Gasing (Kloss). Perak, Larut (Kunstler).

var. *gracilis*, *D. gracilis* *Wall. Cat.* 5150. Leaves narrow-lanceolate, 5 in. long, 1.5 in. across. Panicle and flowers smaller. *Hab.* Mountain forests. Malacca, Mt. Ophir at 4000 ft. altitude (Hullett, etc.). Pahang, Gunong Tahan at 4000 ft. altitude. Perak, Thaiping Hills at 4000 to 5000 ft. altitude (Kunstler); Gunong Kerbau. Penang, West Hill (Curtis). Kedah Peak.

var. *montana*. Stem scandent, much branched. Leaves 4 in. long, .5 to .75 in. wide. Panicles 2 in. long with few branches, on the old wood. Flowers and leaves purple. Bracts ovate larger.

Hab. Mountains in forest. Perak, Gunong Hijau at 5500 ft. altitude (Ridley). *Distrib.* of species, Himalayas, Andamans, Sumatra, Java, Borneo.

(21) *D. yuccæfolia* Ridl. *Journ. Bot.* 1896, p. 168.

Branched shrub. Leaves crowded at branch ends, stiff coriaceous ensiform, acuminate, 15 in. long, 1 in. wide. Panicle large, spreading, branches numerous pubescent. Flowers 12 in. long, yellowish white, sub-sessile. Perianth turbinate, lobes oblong, free nearly to base. Stamens shorter; filaments red. Fruit 12 in. long, globose red, 1-seeded. *Hab.* On limestone rocks in the north. Setul, Bukit Rajah Wang (Ridley, Curtis). *Distrib.* South Siam.

DOUBTFUL SPECIES

D. JACKIANA Wall. *Cat.* 1545, Penang, Jack.

I have seen nothing exactly matching this. It seems to be a robust plant with elliptic cuspidate leaves 9 in. long, 2 in. wide, narrowed into a broad winged petiole. The panicle is very incomplete and the flowers are only in young bud, in tufts of 2 or 3. It has been variously referred to *D. longifolia* Ridl., *D. pachyphylla* Hook. fil., *D. terniflora* Hook. fil. (i.e. *umbratica*) and *aurantiaca*, Wall. and it is quite possible it is an abnormal specimen of the last named.

12. DISPORUM, Salisb.

Herbs. Roots creeping. Stem erect angled. Leaves sessile or nearly so, thin, strong-nerved. Flowers in terminal or axillary umbels; pedicels slender decurved. Perianth campanulate, lobes saccate or spurred at base. Stamens 6; anthers dorsifixed extrorse. Ovary 3-celled. Style long or short. Stigmas 3. Ovules 2 to 6 in a cell. Berry pea-shaped, black or blue. Seeds sub-globose. Species about 12, Asia and North America.

(1) *D. pullum* Salisb. *Trans. Hort. Soc.* i. 330; *Ridl. Journ. F.M.S. Mus.* iv. 82.

Stem 2 to 4 ft. tall, branched. Leaves lanceolate acuminate, 4 in. long, 1 to 2 in. wide; petioles 12 in. long. Flowers 4 or 6 in an umbel; peduncles 5 to 1 in. long; pedicels 1 to 1.5 in. long. Sepals and petals 5 in. long, lanceolate-oblong, cuspidate, saccate at base, greenish tinted red. Stamens half as long; filaments broad, flat, as long as anthers. Berry dark blue, 1- to 3-seeded. *Hab.* Rare in sandy woods. Pahang, Telom (Ridley). *Distrib.* India, Java, Sumatra, China.

Our form is the variety *multiflorum*.

13. GLORIOSA, Linn.

Herbs. Rhizome tuberous, stem climbing by the tips of the leaves. Flowers large, yellow, becoming red. Petals and sepals linear undulate. Stamens with long filaments; anthers versatile; style long bent at an angle with the ovary. Fruit capsular. Species 4 or 5, chiefly African.

(1) **G. superba** *Linn. Sp. Pl.* 305; *Hook. fil. F.B.I.* vi. 358.

Stem climbing on bushes, 4 to 10 ft. tall. Leaves 6 to 8 in. long, narrow. Flowers solitary on pedicels 4 to 6 in. long, 3 to 4 in. across, base of petals yellow two-thirds red, finally all red. Petals and sepals crisped. *Hab.* Sandy open places, very doubtfully wild here, but it sometimes establishes itself from cultivation. It is poisonous. Malacca, Tanjong Kling "apparently wild" (Maingay). *Distrib.* Africa, India, Cambodia, Malay islands.

14. SMILAX, Linn.

Climbing, rarely erect, shrubs often thorny. Leaves alternate, rarely opposite, ovate or lanceolate reticulate, coriaceous, 3- to 5-nerved; petiole often with 2 tendrils at base. Flowers unisexual small unbelled, green or yellow. Sepals and petals 3 each. Stamens 6 from base of perianth, filaments filiform or short, rarely none. Staminodes in female flowers 3 or 6. Style short or 0; stigmas 3. Berry with 1, 2 or 3 globose or hemispheric seeds. Species about 200, all tropics and some in temperate regions.

Small wiry erect shrub; anthers sessile . . . (1) **S. calophylla**
Climbers.

Filaments very short; sepals incurved in flower.

Leaves thin, green, oblong-ovate caudate
acuminate (2) **S. myosotiflora**

Leaves thick coriaceous, white beneath, ovate
Filaments long, buds oblong. (3) **S. peguana**

Filaments long, buds oblong.

Stems rather slender; leaves moderate size.

Branches unarmed.

Fruit small; leaves lanceolate acute, thin (4) **S. lævis**

Fruit small; leaves elliptic, rather thin . (5) **S. extensa**

Fruit as large as a cherry; leaves stiffly
coriaceous (6) **S. megacarpa**

Branches thorny.

Stem sparsely thorny; leaves oblong . (7) **S. Helferi**

Stem closely thorny (8) **S. polyacantha**

Stem papillose granular and thorny . (9) **S. odoratissima**

Stem stout; leaves very large ovate; petiole
with a large sheath; leaves white
beneath.

Stem hairy; sheaths moderate . . . (10) **S. barbata**

Stem thorny not hairy (11) **S. leucophylla**

Leaves not white beneath, perfectly glabrous (12) **S. Kingii**

Leaves plain green; nerves and nervules
sunk above, beneath tomentose . . . (13) **S. Blumei**

(1) **S. calophylla** *Wall. Cat.* 5131; *A. DC. Mon. Smilax*, 60; *Ridl. Mat.* ii. 102.

A wiry erect shrub, 2 ft. tall, unarmed. Leaves lanceolate acuminate, base acute, 3-nerved, glaucous beneath, 4 to 6 in. long, .75 to 2 in. wide; petioles .12 to .24 in. long. Umbels small sessile or nearly so. Male flowers globose, yellow. Sepals hooded obovate-oblong. Petals smaller, ovate flat. Anthers sessile on a disc. Fruit globose, red brown, .3 in. through. Seed 1, globose. *Hab.*

Common in woods up to 5000 ft. altitude. Singapore, Bukit Timah; Garden Jungle. Johor, Tanjong Bunga; Johor Bharu. Pahang, Kota Glanggi. Malacca, Mount Ophir. Negri Sembilan, Bukit Tangga. Selangor, Mengkuang Lebah (Robinson); Sempang Mines; Bukit Kutu. Perak, Thaiping Hills. Penang Hill. Kedah Peak. *Distrib.* Sumatra. *Native names:* Dawi-Dawi; Dedawi; Sadawi; Akar Kanchil. *Use:* As an aphrodisiac and the roots for gonorrhœa.

A very large-leaved form 9 in. by 3·5 in. with some of the leaves round at base, occurred on Gunong Tahan at 4000 ft. altitude.

(2) *S. myosotiflora* DC. *Mon. Smilax*, 65; *Hook. fil. F.B.I.* vi. 303; *Ridl. Mat.* ii. 103.

A slender climber. Leaves herbaceous, oblong-ovate or lanceolate caudate-acuminate, 3-nerved, finely reticulate, base cuneate to cordate, 4 to 6 in. long, ·5 to 3 in. wide; petioles twisted, ·25 to ·35 in. long, tendrils slender. Umbel globose, ·5 in. across on a peduncle 1 in. long; pedicels ·25 in. long. Flowers green. Sepals ovate. Petals narrower lanceolate. Anthers nearly sessile. Female flowers ·25 in. across. Berry 1- or 2-seeded, ·4 in. long. *Hab.* Common in forest climbing on bushes and low trees. Singapore, Garden Jungle. Johor, Gunong Pantai. Malacca, Bukit Sabukor; Mount Ophir. Negri Sembilan, Gunong Angsi. Perak, Thaiping Hills and Goping (Kunstler). Dindings, Lumut. Penang (Porter). Kedah Peak.

(3) *S. peguana* DC. *Mon. Smilax*, 62; *Hook. fil. F.B.I.* vi. 303; *Ridl. Journ. F.M.S. Mus.* vi. 187.

Slender low climber, unarmed. Leaves stiff coriaceous elliptic to ovate, short acuminate, base round, 5- to 7-ribbed, white beneath, 2 in. long, 1·5 in. wide; petioles ·25 in. long, sheath short. Umbels 1 to 3 on very slender peduncles 1·5 in. long, secondary peduncles ·5 in. long. Flowers 5 or 6 in an umbel. Sepals ovate concave. Petals very small. Filaments very short. Berry green, ·25 in. through. *Hab.* Exposed rocks on mountains. Local. Pahang, Gunong Tahan, at 5000 ft. altitude on the open rocks. *Distrib.* Burma (not Pegu) and Borneo.

(4) *S. lævis* Wall. *Cat.* 5116A; DC. *Mon. Smilax*, 56; *Ridl. Mat.* ii. 103.

A slender climber unarmed. Leaves thin coriaceous lanceolate or ovate acute, base shortly narrowed; nerves 3, from base; 2 to 4 in. long, 1 in. wide; petioles ·5 in. long, twisted. Peduncle 1 in. long. Umbel ·5 in. across. Flowers very small greenish white; pedicels ·12 in. long. Sepals and petals linear. Fruit less than ·24 in. through. *Hab.* Mountains at 2000 to 5000 ft. altitude. Malacca, Mount Ophir. Pahang, Gunong Tahan. Selangor, Gunong Mengkuang Lebah (Robinson). Perak, Gunong Keledang; Thaiping Hills (Fox, Kunstler); Gunong Bubû (Wray). Penang Hill (Wallich, etc.), Kedah Peak. *Distrib.* China.

De Candolle makes the Ophir plant a variety under the name of var. *ophirensis* on account of its reticulated leaves; the Gunong Mengkuang Lebah plant is the same. It appears to be merely a local state.

(5) *S. extensa* Wall. *Cat.* 5126B; *DC. Mon. Smilax*, 179; *Ridl. Mat.* ii. 104.

Stem rather slender unarmed. Leaves coriaceous, elliptic or oblong-lanceolate acute, base shortly narrowed, 3 to 6 in. long, 1.5 to 3 in. wide; petioles thick, .2 in. long. Umbels 1 to 3 on a peduncle .1 to .25 in. long, with longer secondary peduncles .4 in. across; flowers small. Sepals linear blunt. Stamens long, filaments filiform. *Hab.* Hill forests. Penang (Wallich); Moniot's Road (Curtis).

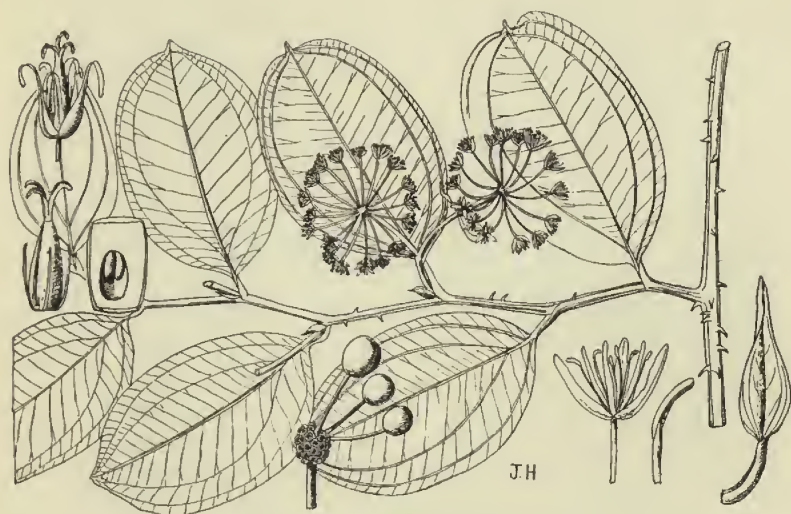


FIG. 199.—*Smilax Helferi*.

(6) *S. megacarpa* DC. *Mon. Smilax*, 186; *Ridl. Mat.* ii. 104.

Stem stout, woody, thorny at base. Leaves (adult) stiff coriaceous, dark green, when young mottled grey, oblong to elliptic, base round or narrowed, tip round or blunt; nerves 3; 3 to 8 in. long, 1 to 4 in. wide; petioles .5 to 1.5 in. long, thick twisted, sheathing half-way. Tendrils strong, 10 in. long. Umbels .5 in. across; pedicels short. Male flowers .25 in. long, white. Sepals linear-oblong. Females larger. Staminodes 3. Fruit as big as a cherry, yellow or purple-black. Seeds discoid. *Hab.* Common in low country in woods. Singapore, Tanglin; Bukit Mandai. Malacca, Malaka Pindah; Panchur; Batang Malaka (Derry). Negri Sembilan, Tampin. Dindings, Lumut. Perak, Thaiping

Hills. Penang, Balik Pulau. *Distrib.* India, Tonkin. *Native names*: Akar Banau; Akar Rabana; Akar K'luna; Akar Lampan Bukit. *Use*: Tubers eaten by Sakai.

(7) **S. Helferi** A. DC. *Mon. Smilax*, 176; *Ridl. Mat.* ii. 104. *S. zeylanica* *Ridl. Mat.* ii. 105. (Fig. 199, p. 341.)

A rough, stout climber, thorny. Leaves stiffly coriaceous, oblong blunt, strongly 3-nerved, base round, 2 to 5 in. long, .75 to 3 in. wide; petioles hardly .25 in. long. Umbels 1 in. across, single or 2 to 3 on peduncle .5 in. long; pedicels .25 in. long. Sepals and petals oblong blunt. Stamens 6; filaments linear. Berries as large as peas. *Hab.* Common in open country, climbing on bushes. Pahang, Pekan and all along the Pahang River. Malacca, Ayer Panas; Bukit Bruang. Sungei Ujong, Gunong Berumbun (Cantley); Seremban. Selangor, Kwala Lumpur. Perak, Tambun; Ulu Bubong and Goping (Kunstler); Larut (Kunstler). Province Wellesley, Krian. Legeh, Tremengan (Gwynne-Vaughan). Kelantan, Kamposa; Kwala Aring (Yapp). Lankawi (Curtis). *Distrib.* Tenasserim. The type has a short point to the leaves, otherwise it is similar. *Native names*: Akar Kulona Betina; Akar Gadung Tikus.

The plants referred to *S. zeylanica*, Linn. in *Mat.* ii. are all *Helferi*. *S. zeylanica* var. *penangensis*, DC *Mon. Smilax*, 190, is based on a sheet at Kew containing a specimen of *S. laevis*, Penang Hill (no collector) and a scrap of possibly *S. megacarpa*, collected by Griffith in Malacca.

(8) **S. polyacantha** Wall. *Cat.* 5127; *Kunth. Enum.* v. 239; *Hook. fil. F.B.I.* vi. 311; *Ridl. Mat.* ii. 105.

Stem slender, very thorny, thorns short. Leaves elliptic-lanceolate, rather thinly coriaceous, narrowed at both ends, 3- to 5-ribbed, 4 to 6 in. long, 1.5 to 2 in. wide; petioles thick, .4 to .5 in. long; tendrils filiform. Umbels solitary or 2 on a short .5 in. peduncle. Female flowers very small; ovary with recurved styles. Male flowers and ripe fruit unknown. *Hab.* Penang (Porter). Not collected again by anyone.

(9) **S. odoratissima** Bl. *Enum.* 19. *S. aspericaulis* Wall. *Cat.* 5129; DC. *Mon. Smilax*, 195; *Ridl. Mat.* ii. 106.

Stems slender thickly covered with small pustules and a few scattered thorns extending to the leaf-sheaths. Leaves thinly coriaceous oblong, blunt with a short point, base broad; nerves prominent beneath, 5; 3 to 8 in. long, 1.5 to 3 in. wide; petioles .5 in. long, sheath small rough. Peduncle .5 in. long, bearing 1 or 2 peduncled umbels about .3 in. across. Sepals linear-oblong. Stamens as long. Berry .5 in. through. *Hab.* Mountain forests. Selangor, Ginting Bidai; Menuang Gasing (Kloss). Perak, Thaiping Hills (Kunstler). *Distrib.* India, Java.

(10) **S. barbata** Wall. *Cat.* 5125; DC. *Mon. Smilax*, 196; *Ridl. Mat.* ii. 106.

Stem stout, woody, nearly .5 in. through, covered with red or

whitish bristles and conic thorns. Leaves very coriaceous, dark green, white beneath, ovate-cuspidate, base round; nerves 5, very prominent beneath; 6 to 8 in. long, 3 to 6 in. wide; petioles thick, 1.5 in. long. Peduncles bristly, 1.5 in. long, bearing 5 peduncled umbels .5 to .75 in. across of green flowers. Fruit dark red, as big as a pea. *Hab.* Common and conspicuous in open country edges of woods in the south. Singapore (Wallich); Tanglin; Bukit Timah, etc. Malacca, Sungei Hudang (Derry); Ayer Panas. Selangor, Kwala Lumpur. Perak, Thaiping Hills to 2000 ft. altitude. *Distrib.* Bangka. *Native names:* Akar Banok; Akar Kuranting Jantan.

The branch ends are often glabrous and unarmed and specimens of these might be mistaken for *S. leucophylla*.

(11) **S. leucophylla** *Bl. Enum.* 18; *Hook. fil. F.B.I.* vi. 313; *Ridl. Mat.* ii. 106.

Stout woody climber, sparsely thorny. Leaves stiffly coriaceous ovate or oblong acuminate, base shortly narrowed strongly 3-nerved and white beneath; 6 to 11 in. long, 3 to 6 in. wide; petioles .5 in. long with a very large dilated sheath. Peduncles 1 in. long with 3 or 4 branches 1.5 in. long, bearing umbels 1 in. across. Buds, male clavate cylindrical. Sepals and petals linear. Fruit .5 in. through, grey. *Hab.* In forests, chiefly in the north and on mountains. Singapore, Bukit Timah. Johor, Pulau Dayong (Feilding). Pahang, Tanjong Api, Kwantan (Foxworthy). Selangor; Bukit Hitam; Sungei Buluh. Perak, Thaiping Hills; Chanderiang (Kunstler). Penang, Penara Bukit (Curtis). *Distrib.* Borneo Java, Cochinchina. *Native name:* Ubi Danan.

(12) **S. Kingii** *Hook. fil. F.B.I.* vi. 307; *Ridl. Mat.* ii. 107.

Stem very thick woody, .4 in. through, branches 4-angled, thorns scattered conic, .25 in. long, large. Leaves coriaceous green ovate or orbicular acuminate, nerves 3 prominent beneath, 5 to 12 in. long, 6 in. wide or less; petioles very stout, 2 or 3 in. long, with very large sheath at base, tendrils very stout. Umbels 1 to 3 on a very short common peduncle, secondary peduncles 1 to 3 in. long; pedicels 1.5 to 2 in. long. Flowers pink. Berry 1 in. through, green. *Hab.* Open jungle. Negri Sembilan, Bukit Tangga. Perak, Thaiping Hills at the base (Kunstler, Wray).

(13) **S. Blumei** *DC. Mon. Smilax*, 202; *Hook. fil. F.B.I.* vi. 313; *Ridl. Mat.* ii. 107.

Stout climber, stems prickly. Leaves coriaceous ovate or orbicular acute or blunt, base round, 7-nerved, nerves and transverse nervules deeply sunk above, elevate beneath, tomentose beneath, 8 to 24 in. long and as wide; petioles 2 in. long, stout, sheath large, 1 in. long. Umbels 1 to 3 on a short .5 in. long common peduncle, secondary peduncles 1 to 2 in. long. Flowers yellow. *Hab.* Dense jungle, not common. Malacca (Maingay). Perak, Ulu Bubong (Kunstler); Thaiping Hills. *Distrib.* Java.

EXCLUDED SPECIES

- S. SINGAPORENSIS A. DC. *Mon. Smilax*, 177. "*S. calophylla* Wall. *Cat.* 5131 in Herb. Rich. only" is indeterminable. It cannot be any part of Wall. *Cat.* 5131, which is all *calophylla*, and it is evident that the label was wrong and the plant is not from Singapore. It is possibly *S. Helferii* from somewhere else.

15. HETEROSMILAX, Kunth.

Climbers resembling *Smilax* with tubular perianth, 3- to 6-fid. Stamens 3 connate. Fruit a 2-seeded berry. Species 5. Indo-Malaya, China.

(1) *H. indica* A. DC. *Mon. Smilax*, 43; *Ridl. Mat.* ii. 108.

Stem slender unarmed. Leaves ovate-lanceolate, rather thin, base round, 3 to 8 in. long, 1 to 3.5 in. wide; nerves 5; petioles 1 to 1.5 in. long. Peduncles solitary, 2 in. long; umbel 1 in. through. Stamens connate half-way. Fruit globose, .5 in. through. Seeds 2, hemispheric. *Hab.* Singapore, thickets near the sea at Tanjong Katong (Hullett). Once found only, and now quite disappeared. *Distrib.* India.

ORDER CXLVIII. PONTEDERIACEÆ.

Aquatic plants with a short rootstock, and erect or floating leaves. Flowers in spikes or racemes from the axils of upper leaves, bisexual, blue, pink or white. Sepals 3 and petals 3, free fugacious. Stamens 6, one usually the longer. Ovary free, 3-celled or 1-celled with 3 parietal placentas. Style slender. Capsule membranous. Seeds minute, ribbed. About 36 species, tropics of both hemispheres.

1. MONOCHORIA, Presl.

Leaves radical and solitary at the top of the stem or branches petioled ovate. Perianth widely expanded or campanulate blue fugacious. Stamens 6, five sterile, one fertile. Species 5 or 6, tropics of Old World.

- Leaves hastate or cordate; flowers long-pedicelled
 fascicled light blue (1) *M. hastæfolia*
 Leaves narrow hastate; flowers racemose (2) *M. elata*
 Leaves ovate or linear; flowers short-pedicelled
 dark blue (3) *M. vaginalis*

(1) *M. hastæfolia* Presl. *Rel. Haenk.* ii. 128; *Hook. fil. F.B.I.* vi. 362; *Ridl. Mat.* ii. 109. *Pontederia hastata* Linn. *Fl. Zeyl.* 129; *Roxb. Corom. Pl.* ii. t. 63. *P. dilatata* Andr. *Bot. Rep.* vii. t. 490.

Rhizome usually short. Leaves 1 to 2 ft. tall, blade hastate or deltoid, base cordate or entire, broad, 2 to 6 in. long, 2 to 6 in. wide.

Flowers crowded on a short 2 in. long raceme, included in the leaf sheath; pedicels .5 to 2 in. long. Petals over .5 in. long, light violet, keels green. Capsule globose, nearly .5 in. long. *Hab.* Common in ditches in the whole Peninsula. Singapore, Galang; Orchard Road. Pahang, Pekan. Malacca, Nyalas (Derry). Negri Sembilan, Kwala Pedas. Perak, Ulu Slim (Kunstler). Province

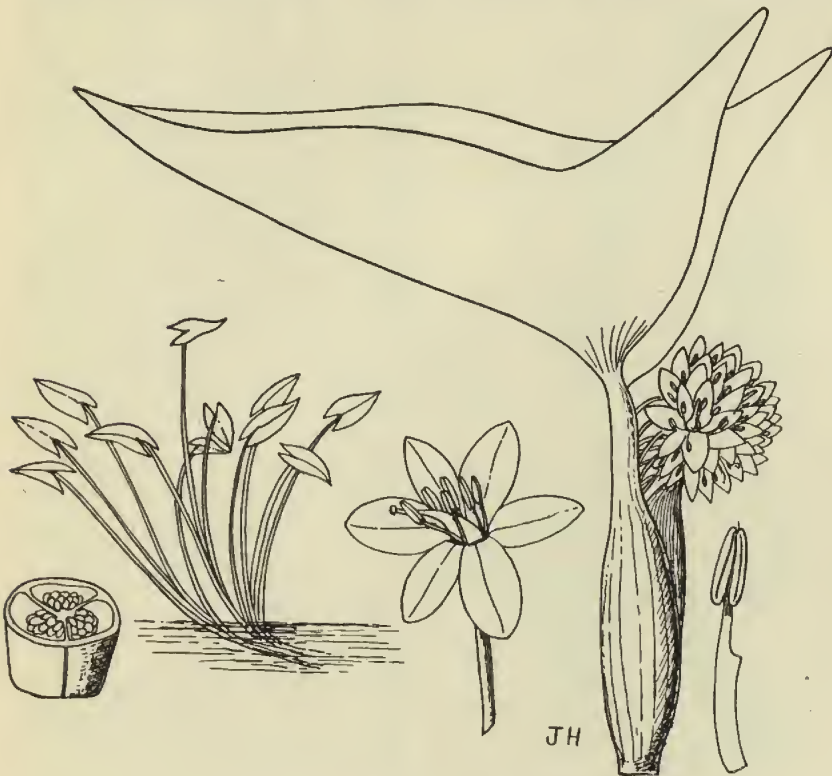


FIG. 200.—*Monochoria hastæfolia*.

Wellesley. Penang (Curtis), Kelantan, Kota Bharu. *Distrib.* India, Malaya and China. *Native names:* Chacha Layer; Kankon Ayer.

(2) *M. elata* Ridl. *Journ. Roy. As Soc. S. Br.* 79, p. 99.

Herb 6 to 8 ft. tall. Leaves narrow linear hastate, 4 in. long, .3 in. wide; petioles 24 in. long. Flowers blue in a many-flowered raceme 3.5 to 5 in. long on slender pedicels .4 in. long. Sepals and petals .75 in. long, lanceolate acuminate. Capsule oblong. *Hab.* Kedah, at Jerum, abundant in rice-fields (Haniff). *Distrib.* Patalung.

(3) *M. vaginalis* Presl. *Rel. Haenk.* ii. 128; *Hook. fil. F.B.I.* vi. 363; *Ridl. Mat.* ii. 109. *Pontederia vaginalis* Linn. *Mantissa*, 228; *Roxb. Cor. Pl.* ii. t. 110.

Rhizome often lanceolate or ovate acute, base rounded, 1 to 2 in. long, .5 to 1 in. wide. Raceme 1 in. long, 2- or 3-flowered. Flowers dark blue, .25 to .36 in. wide. Stamens violet.

Capsule oblong, nearly .5 in. long. *Hab.* Ditches and damp ground. Very common; whole Peninsula. Singapore, Tanglin; Loyang; Ang Mo Kio. Malacca (Griffith); Bukit Panchar. Pahang, Pekan; Kwala Tembeling; Gunong Senyum (Evans). Selangor, Ulu Selangor. Perak, Ulu Bubong (Kunstler). Province Wellesley, Permatang Bertam. Penang (Curtis).

var. *plantaginea* Solms
Laub. DC. Prod. iv. 524.
A smaller form with narrow, often linear leaves, in shallow ditches. Common. *Hab.* Singapore, Tanglin. Malacca, Malaka Pondok (Hervey). Perak, Ulu Bubong (Kunstler). Kelantan, Kota Bharu in rice-fields. *Distrib.* Indo-Malaya, China and Africa. *Native name:* Rumpit Ayer.



FIG. 201.—*Philydrum lanuginosum*.

ORDER CXLIX. PHILYDRACEÆ.

Herbs with narrow linear leaves. Inflorescence spicate or paniced. Bracts rather large. Flowers small, bisexual irregular, yellow. Sepals petaloid. Stamens 1 on the base of the anterior petal. Staminodes 2 petaloid. Ovary 3-celled, free; placentas 3-parietal. Style stout; stigma capitate. Capsule 3-valved. Seeds numerous oblong, elliptic pustulate, albuminous. Genera 3. Species 3; chiefly Australian.

1. PHILYDRUM, Banks.

Leaves long ensiform. Spike elongate. Species 1.

(1) *Ph. lanuginosum* Banks, *Gaertn. Fruct.* 62, t. 16, fig. 10; *Bot. Mag. t.* 783; *Griff. Notulæ*, iii. 231; *Ic. Pl. As. t.* 269, 270; *Hook. fil. F.B.I.* vi. 363; *Ridl. Mat.* ii. 110. (Fig. 201, p. 346.)

Leaves ensiform, 18 in. long, .5 in. wide. Stem 30 in. tall. Spike simple or branched. Floral bracts lanceolate acuminate woolly, .5 in. long. Petals fugacious, woolly lanceolate, .25 in. long. Anther-cells twisted spirally. Capsule woolly, .25 in. long. *Hab.* In shallow water, rice-fields, etc. Singapore at Bedok. Malacca; common, Bukit Sabukor; Tanjong Kling; Ayer Panas. Province Wellesley (Curtis). *Distrib.* Burma, Andamans, China, Malaya.

ORDER CL. XYRIDEÆ.

Tufted herbs with stiff, grassy leaves, and simple scapes, naked, bearing a short terminal head of stiff dark brown imbricating bracts. Flowers sessile bisexual, fugacious, yellow. Bracteoles (or sepals) 3, boat-shaped, unequal. Petals 3, clawed, orbicular, often lacinate, yellow. Stamens 3; anthers sagittate. Staminodes 3. Ovary free, imperfectly 3-celled; placentas 3; ovules many; style trifid; stigmas capitate. Capsule 3-valved. Seeds very numerous, linear or ellipsoid.

XYRIS, Linn.

Characters of the order. Distribution, tropics of both hemispheres. Species about 80. All tropics.

Leaves quite flat and broad.

Leaves .5 in. across, sword-shaped; flowers small . (1) *X. grandis*

Leaves .25 in. across, linear acute; flowers large . (2) *X. indica*

Leaves narrow linear.

Scape 2-edged; leaves stiff rigid, heads cylindrical, over .5 in. long . (3) *X. anceps*

Scape terete; leaves small flaccid, heads sub-globose, .25 in. long . (4) *X. pauciflora*

Scape terete; leaves long flat, narrow, heads obovoid, .5 in. long . (5) *X. oreophila*

Slender short-leaved plant; heads globose . (6) *X. Ridleyi*

Dwarf plant; leaves very short tufted; heads small, few-flowered . (7) *X. bancana*

(1) *X. grandis* *Ridl. Journ. Linn. Soc.* xxxviii. 332; *Journ. F.M.S. Mus.* ii. 138.

A very large species. Leaves sword-shaped acuminate equitant, 24 in. long, .75 in. wide. Scape shorter, 19 in. long. Head obovoid, .5 in. through. Bracts lanceolate acute, .5 in. long, dark brown. Flowers rather small. Sepals lanceolate acute, dark brown. Petals cuneate-oblong, edges lacerate. *Hab.* In damp wooded spots, in mountains at 5000 ft. altitude and upwards, Pahang, Gunong

Tahan at 5500 ft. altitude (Ridley). Kelantan, Ridge of Gunong Sitang (Mhd Nur).

(2) *X. indica* Linn. *Sp. Pl.* 62; *Mart. in Wall. Pl. As. Rar.* iii. 30; *Hook. fil. F.B.I.* vi. 364; *Ridl. Mat.* ii. III.

A large tufted plant. Leaves linear acute or blunt, herbaceous, 1.5 in. long, .25 in. wide. Scape 2 ft. tall. Head .25 to .5 in. through, .75 in. long, globose or oblong. Bracts orbicular, dark brown. Flowers .5 in. across. Bracteoles winged serrulate. Petals orbicular crose. *Hab.* Rice-fields. Not rare. Malacca, Bukit Sabukor. Selangor (Cantley). Province Wellesley. Penang. Lankawi at Kwah. Kedah, Alor Sta (very common). Perlis. *Setul.* *Distrib.* Siam, Indo-Malaya. *Native names:* Rumput Bagau; Jeringu Padang.

(3) *X. anceps* Lam. *Ill.* i. 132; *Hook. fil. F.B.I.* vi. 364; *Ridl. Mat.* ii. III.

Leaves rigid, often twisted, linear acuminate, bases broad, red, 4 to 24 in. long, .12 in. wide. Scape slender, twisted, 6 to 24 in. long. Head ovoid to cylindric, .75 in. long or less. Bracts light brown, convex, margins scarious. Bracteoles keeled and spinulose. Petals ob-



FIG. 202.—*Xyris oreophila*.

fimbriate, .25 in. wide. *Hab.* Sandy open country. Common. Singapore, Balestier Plain; Pulau Tekong; Changi. Johor, Tanjong Surat (Feilding). Malacca, Pulau Besar; Tanjong Kling; Merlimau (Derry). Pahang, Pekan. Negri Sembilan, Seremban. Tringganu (Yapp). *Setul* heath. *Distrib.* India, Burma, Malay isles.

(4) *X. pauciflora* Willd. *Phytogr.* i. 2, t. 1, Fig. 1; *Sp. Pl.* i. 235; *Hook. fil. F.B.I.* vi. 365; *Ridl. Mat.* ii. 112.

Leaves thin grassy, narrowly linear acuminate, edges thickened, scabrid, 3 to 10 in. long, .06 to .12 in. wide. Scapes 6 to 15 in. long, two-keeled. Head globose or ovoid, few-flowered. Bracts convex, edge green. Petals yellow, broadly ovate. *Hab.* Damp grassy spots. Common. Singapore, Reservoir; Balestier Plain. Pahang, Pekan. Province Wellesley, Bukit Juru. Lankawi isles, Kwah. Setul Heath. *Distrib.* India, China, Malay and Australia.

(5) **X. oreophila** *Ridl. Journ. F.M.S. Mus.* vii. 121. (Fig. 202, p. 348)

Tufted plant, 12 to 18 in. tall. Leaves flaccid acuminate, 8 in. long, 1 in. wide or rigid and narrower. Culms 8 to 18 in. tall. Head obovoid, .2 in. long. Glumes oblong, lower ones truncate emarginate with a pale low keel. Flowers .3 in. long, tube exsert. Petals oblong-obovate minutely toothed, .15 in. wide. Fruit fusiform. *Hab.* Kedah Peak, at 3,000 ft. altitude (Robinson).

(6) **X. Ridleyi** *Rendle, Journ. Bot.* 1899, p. 505, *Pl.* 404, Figs. 12 to 16; *Ridl. Mat.* ii. 112.

A dwarf tufted plant with narrow linear herbaceous leaves dilate at base, reddish, 7 to 8 in. long, .06 in. wide. Scapes 9 to 15 in. tall or less, sub-terete, keeled. Head obovoid, .25 in. long or more. Bracts ovate, dark brown, keeled, few. Bracteoles linear falcate not keeled. Capsule oblong unilocular. Seed ellipsoidal. *Hab.* Grassy open spots, on mountains, at 3000 to 5500 ft. altitude. Pahang, on Gunong Tahan, abundant. Kedah Peak at 3000 ft. altitude (Ridley, Robinson).

(7) **X. bancana** *Miq. Fl. Ind. Bat. Suppl.* 608; *Hook. fl. l.c.* 66; *Ridl. Mat.* ii. 112.

Dwarf tufted plant. Leaves flat linear-acuminate, very narrow, 1 to 1.25 in. long. Scapes few, very slender, terete, 9 to 10 in. long. Head small, few-flowered, obconic, .12 to .25 in. long. Bracts ovate sub-acute. Bracteoles linear-lanceolate ciliate. *Hab.* Local in open sandy spots. Pahang, at Pekan. Malacca near the sea (Griffith, Maingay). *Distrib.* Bangka, Labuan.

ORDER CLI. COMMELINACEÆ.

Herbs erect or ascending (rarely scandent). Leaves thin herbaceous with parallel nerves usually petioled, and sheathing. Inflorescence paniced cymose (rarely racemose). Flowers bisexual rarely unisexual. Perianth inferior. Sepals 3, herbaceous. Petals 3, thin, fugacious blue, white or pink or rarely yellow. Stamens 6, perfect, or 2 or more sterile; filaments often bearded; anthers oblong or globose. Ovary free, 2- or 3-celled. Style 1. Stigma small. Capsule usually loculicidal, rarely indehiscent. Seeds angled sometimes arillate. Species about 300, tropics and subtropics.

Fruit indehiscent, crustaceous, blue.	
Stout plants; inflorescence terminal	1. POLLIA
Capsule loculicidal whitish; flowers bisexual.	
Stamens 3 perfect; staminodes 1 to 3.	
Cymes solitary in a spathe	2. COMMELINA
Cymes several, no spathe	3. ANEILEMA
Stamens 6 perfect.	
Cymes terminal, often in imbricating bracts or axillary	4. CYANOTIS
Flowers in a terminal panicle	5. FLOSCOPA
Cymes lateral, very large plants; capsule pink	6. FORRESTIA
Flowers unisexual; males terminal paniced; females cymose enclosed in bract	7. SPATHOLIRION

1. POLLIA, Thunb.

Large herbs; leaves lanceolate petioled. Panicle terminal, dense or lax. Sepals 3. Petals free, white. Stamens 6, or 3 with 3 staminodes; filaments naked. Ovary 3-celled; ovules many. Capsule crustaceous, globose-ovoid, blue. Species about 15, Asia, Australia.

Panicle short, conic, dense; stamens 6	(1) <i>P. thyrsiflora</i>
Panicle lax, few-flowered; stamens 3.	
Leaves pubescent beneath; sepals hairy	(2) <i>P. sumatrana</i>
Leaves glabrous; sepals glabrous	(3) <i>P. subumbellata</i>
Panicle lax, many-flowered, peduncled, pubescent	(4) <i>P. sorzogonensis</i>

(1) *P. thyrsiflora* Endl. *Gen.* 1029; *Ridl. Mat.* ii. 14.

Stem stout, .25 in. through, ascending to 2 ft. tall. Leaves oblanceolate acuminate narrowed to a broad petiole, glabrous, 10 to 15 in. long, 3 to 4 in. wide; petioles 2 in. long. Panicle thyrsoid, dense sessile, puberulous, 1 to 3 in. long. Stamens 6. Fruit ellipsoid, deep steel blue. *Hab.* Common in damp spots in hill forest. Pahang, Tahan River. Selangor, Kwala Lumpur (Curtis); Ginting Bidai. Perak, Waterloo; Gunung Kerbau (Haniff). *Distrib.* Andamans, Malay isles.

(2) *P. sumatrana* Hassk. *Commel. Ind.* 57; *Ridl. Mat.* ii. 114 (not of Clarke).

Stem ascending, 1 ft. long, slender. Leaves elliptic acuminate, thinly scabrid above, thickly hairy beneath, 5 to 6 in. long, 1.25 in. wide; midrib and petioles .5 in. long, red-hairy. Panicle 1 to 2 in. long, pubescent, 2 in. wide. Sepals hairy. Fruit .25 in. long, ovoid lead-colour. *Hab.* Hill woods, Perak, Hermitage Hill (Ridley). Gunung Pordoh (Burkill). Rare. *Distrib.* Sumatra.

(3) *P. subumbellata* Clarke, *Journ. Linn. Soc. Bot.* xi. 451; *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 24.

Stem slender, ascending to 3 ft. tall. Leaves thin lanceolate, long-acuminate at both ends, 3 to 4 in. long, 1 in. wide, glabrous; petioles 1 in. long. Panicle lax, 1.5 in. long; peduncles 2 in. long; branches .75 to 1 in. long. Sepals orbicular, glabrous. Stamens 3. Fruit elliptic, blue. *Hab.* On limestone rocks, local. Kedah, Gunung Geriang (Ridley). *Distrib.* Himalaya to Assam.

(4) *P. sorzogonensis* Endl. *Gen. Pl.* 1029; *Ridl. Mat.* ii. 114.
 Stem tall erect, rather slender. Leaves lanceolate acuminate,

base narrowed to a petiole or sessile, glabrous or pubescent beneath, 6 to 8 in. long, 2.5 in. wide. Panicle pubescent, spreading, 3 to 4 in. long and as wide, on a peduncle 2 to 4 in. long. Sepals elliptic. Petals orbicular. Stamens 3. Capsule subglobose, light blue, .25 in. long. *Hab.* Common in forests in hilly districts. Singapore, Pulau Ubin. Malacca, Selangor. Selangor, Semangok Pass; Klang gates; Ginting Bidai. Negri Sembilan, Tampin Hill. Perak, Kenering (Wray); Temengoh; Sirah Rimau (Yapp). Tomoh (Mac-hado). Lankawi (Hanniff). Jalor, Biserat, Bukit Goa (Gwynne-Vaughan). *Distrib.* Asia, from India to China and New Caledonia. *Native names:* Tebu K'loi; Seburas; Pakululoi.



FIG. 203.—*Pollia sorzogonensis*.

2. **COMMELINA**, Linn.

Usually slender creeping ascending branched herbs, rarely stout. Leaves ovate to lanceolate with a sheath at base. Flowers fugacious in short-branched cymes enclosed in a green folded funnel-shaped spathe, peduncled, terminal and axillary. Petals blue, occasionally white. Stamens 3 perfect, 3 sterile. Capsule oblong beaked, thin, 2- or 3-celled. Seeds 1 or 2 in a cell. Species about 90, all tropics.

Slender weak creeping ascending herbs.

Capsule 3-celled, two cells with 2, and one with 1 seed.

Leaves elliptic to ovate-lanceolate glabrous.

- Seeds cylindrical reticulate (1) *C. nudiflora*
- Seeds pyramidal rugose (2) *C. sikkimensis*

- Seeds cylindric conic smooth (3) **C. Hasskarli**
 Leaves linear-lanceolate.
 Prostrate plant in sand; leaves 1 in. long (4) **C. attenuata**
 Erect diffuse plant; leaves 3 to 6 in. long (5) **C. salicifolia**
 Leaves elliptic or ovate blunt pubescent (6) **C. benghalensis**
 Capsule 2-celled, one cell empty, one 1- or 2-seeded.
 Stem creeping; leaves glabrous. Seeds nearly smooth (7) **C. clavata**
 Erect rather stout plant, spathe 1. Seeds rugose (8) **C. suffruticosa**
 Stout plant with large heads of funnel-shaped bracts (9) **C. obliqua**

(1) **C. nudiflora** *Linn. Sp. Pl.* 41; *Ridl. Mat.* ii. 115.

Stem long, creeping, slender. Leaves lanceolate acute, 2 to 3 in. long, .5 in. wide, sheaths .25 in. long. Spathe ovate-lanceolate, .5 to 1.5 in. long; peduncles .5 in. long. Cymes 2. Sepals ovate, boat-shaped, blue, white-edged. Petals 2, reniform, clawed, .25 in. long and one much smaller, azure-blue. Stamens 6, 3 fertile; filaments blue. Capsule elliptic, 3-celled, 5-seeded. Seeds cylindric, reticulate. *Hab.* Very common in waste ground everywhere. *Distrib.* All tropics. *Native name:* Pulau Aur; Rumput Kukupu; Tapak Eti. *Use:* Leaves for poulticing sores, shoots as a vegetable.

White-flowered forms occur.

(2) **C. sikkimensis** *Clarke, Comm. and Cyrt. Beng. t. 6; Monog.* 147.

Stem slender, widely creeping. Leaves lanceolate, base unequal, usually round, 2 to 3 in. long, .25 to .3 in. wide. Spathe 1.5 to 2 in. long, glabrous acuminate, ovate-lanceolate cordate; peduncles .3 to 1 in. long. Cymes bifid, upper branch 6- to 12-flowered. Petals blue. Capsule 2-seeded, conic acute. Seeds pyramidal not reticulate, slightly rugose. *Hab.* Open country in the north. *Setal*, Bukit Rajah Wang. Perlis, Chupeng; Tebing Tinggi (Ridley). *Distrib.* Bengal.

(3) **C. Hasskarli** *Clarke, Comm. and Cyrt. Beng. t. 3, Monog.* 157.

Sparingly pubescent or glabrous. Leaves lanceolate, usually narrow, 2 in. long, .5 in. wide, with a short petiole; sheath .2 in. long, not hairy at mouth. Spathe very short, ovate broad, not acuminate, base round, .5 in. long; peduncle .1 in. long. Raceme 1- or 2-flowered. Flowers blue. Capsule 5-seeded, tip conic acute. Seeds cylindric conic, quite smooth. *Hab.* Tringganu (Yapp). *Distrib.* India, Sumatra, Philippines.

I have only seen one poor specimen which does not altogether resemble ordinary *Hasskarli*, but Clarke seems to have passed it in the Kew herbarium as that species. It is very distinct from our other species in the very short, broad spathe and the smooth seeds.

(4) **C. attenuata** *Vahl. Enum.* ii. 168; *Ridl. Mat.* ii. 116.

Tufted creeping, prostrate, plant 1 ft. long. Leaves narrow linear-lanceolate recurved, 1 in. long, .12 in. wide, or none; sheath hairy. Spathe narrow lanceolate recurved, 1 in. long or less; peduncles .5 in. long, hairy. Sepals oblong. Petals bright blue.

Stamens 3. Capsule globose or oblong, .25 in. long, 1-, 2-, or 4-seeded. Seed sub-globose, smooth truncate at both ends, terminated by a white appendage. *Hab.* Sandy sea-shores. Singapore, Changi; Galang; Tanjong Kling, common here (Ridley). *Distrib.* Ceylon.

(5) *C. salicifolia* Roxb. *Fl. Ind.* i. 172; *Clarke in Hook. fil. F.B.I.* vi. 370.

Slender diffuse plant. Leaves linear-lanceolate, 3 to 6 in. long, .12 to .5 in. wide, nearly glabrous. Spathes 1.5 to 2 in. long, axillary, solitary, acute or acuminate, base round, lanceolate. Flowers small, dark blue. Capsule 5-seeded. Seeds globose, smooth, truncate. *Hab.* Abandoned rice-fields. Perlis, Kanga (Ridley). *Distrib.* India, Java.

(6) *C. benghalensis* Linn. *Sp. Pl.* 41; *Ridl. Mat.* ii, 116.

Low creeping plant, or ascending to 1 ft. tall, hairy or glabrous. Leaves elliptic-ovate, pubescent, 1 to 3 in. long, .5 to 1 in. wide; petioles .25 in. long. Spathes 1 to 3, turbinate, .5 in. long. Petals 2, spatulate round, one small ovate, violet blue. Stamens 4, violet. Seeds closely pitted. *Hab.* Common in waste and cultivated ground. Singapore, Galang; Tanglin. Malacca, Ayer Moley; Malacca town. Sungei Ujong (Cantley). Tringganu (Yapp), Setul. Kelantan, Kota Bharu. *Distrib.* Tropical Africa and Asia. *Native name:* Rumput Mayiam.

(7) *C. clavata* Clarke *Comm. and Cyrt. Beng. t.* 5; *Monog.* 171.

Stem creeping. Leaves lanceolate acuminate, 2 in. long, .3 in. wide; sheaths .5 to .6 in. long, mouth ciliate. Spathe lanceolate acuminate, .75 in. long, margins free to base; peduncle slender, .5 in. long. Flowers several; pedicels slender. Petals much larger than those of *C. nudiflora*, and deep blue. Capsule oblong quadrate, .14 in. long, bi-ocular, 4-seeded. Seeds oblong, conspicuously reticulate. *Hab.* Damp spots in open country. Selangor near Batu Caves. Perak, Ulu Selama (Yapp). *Distrib.* India, Java, Sumatra.

Clarke suggests this is a variety of *C. nudiflora* in which one cell of the capsule is empty or obsolete. The plant which I take to be his *C. clavata* has much larger and deeper blue petals, and the leaves and spathe are more acuminate.

(8) *C. suffruticosa* Bl. *Enum.* 3; *Clarke Comm. and Cyrt. Beng.* 12; *Monog.* 188, *t.* 2, Fig. 5; *Hook fil. F.B.I.* vi. 374.

Stems from a short rhizome, erect, branched, stout or slender, 1 ft. tall, with distant tubular sheaths. Leaves sub-terminal, ovate-lanceolate acuminate, base narrowed sessile, scabrid pubescent, 3 in. long, 1 in. wide; sheaths .5 in. long, hairy near the mouth. Spathes shortly peduncled, ovate-cordate, .75 in. long. Raceme simple. Flowers 6 to 12, blue or white. Capsule bilobed, 2-celled, obovate, .25 in. long, pedicelled. Seed one in each cell, ellipsoid,

rugose, brown. *Hab.* Kelantan, Kwala Krai (Haniff). *Distrib.* India, Java.

The only form collected here is the weak small-leaved form, *C. rugulosa*, C. B. Clarke; the typical plant is much stouter.

(9) *C. obliqua* Ham. in Don Prodr. Fl. Nepal 45; *Ridl. Mat.* ii. 116.

A stout erect plant, over a foot tall. Leaves lanceolate oblique acuminate, many nerved, base narrowed to a short petiole, 6 in. long, 1.25 to 2 in. wide, sheath 1 in. long, hairy on mouth and edge. Spathes numerous crowded in a sub-sessile head, funnel-shaped, .5 to 1 in. wide, glabrous or pubescent, edges of spathes hairy. Petals blue. Capsule ovoid, 3-edged, nearly .25 in. long. Seeds ellipsoid compressed. *Hab.* Forests in shady spots. Selangor, Ginting Bidai at 2,000 ft. altitude. Perak, Temengoh. Perlis, Tebing Tinggi (Ridley). *Distrib.* Indo-Malaya.

3. ANEILEMA, Br.

Herbs, roots often tuberous. Flowers small, axillary and terminal panicles, rarely solitary, pink, white or blue. Bracts not spathaceous. Stamens 2 to 4; filaments often bearded. Staminodes 2 to 4. Ovary 2- or 3-celled, cells 1- to many-seeded. Capsule 3-valved. Species about 60, Africa and Asia.

1. *Tricarpellaria*.

Capsule 3-celled, 3-valved, cells 3- to 6-seeded.

- | | |
|--|----------------------------|
| Stout plant with large leaves | (1) <i>A. lineolatum</i> |
| Weak decumbent plant; flowers solitary axillary. | (2) <i>A. clandestinum</i> |
| Diffuse creeping herb; leaves ovate | (3) <i>A. pauciflorum</i> |

Ovary cells 2-ovuled; capsule cells 2-seeded.

- | | |
|---|--------------------------|
| Small herb, decumbent; flowers pink | (4) <i>A. nudiflorum</i> |
| Small herb, tuberous, with long basal leaves; flowers lilac | (5) <i>A. sinicum</i> |
| Tall herb 2 ft. or more tall; flowers large, blue | (6) <i>A. giganteum</i> |

2. *Dictyospermum*. Cells of ovary 1-ovuled, cells of capsule 1-seeded.

Slender herbs.

- | | |
|---|---------------------------|
| Tufted plant, stem-leaves reduced to sheaths; leaves fleshy linear | (7) <i>A. vaginatum</i> |
| Weak herb 2 ft. tall; leaves lanceolate petioled; panicle lax; fruit adhesive | (8) <i>A. protensum</i> |
| Weak herb 8 in. tall; flowers few racemose; fruit not adhesive | (9) <i>A. subovatum</i> |
| Stout herb; leaves 5 to 8 in. long; panicle sessile, wide spreading | (10) <i>A. conspicuum</i> |

(1) *A. lineolatum* Kunth. Enum. iv. 69; *Ridl. Mat.* ii. 117. *A. herbaceum* Wall. Cat. 5223; *Clarke, Monog.* 204.

Stems leafy, stout, 15 in. tall. Leaves, lower ones in a rosette, elliptic-lanceolate acute undulate, base round, broad, 6 in. long, 1.25 in. wide, glabrous; sheaths .5 in. long, hairy. Panicle terminal,

wide spreading, 6 to 8 in. long, 2 to 4 in. wide. Sepals ovate-oblong cartilaginous. Petals white. Stamens 6, 3 fertile, very hairy, hairs violet, 3 sterile. Capsule oblong beaked, .25 in. long. *Hab.* Forests. Pahang, Tahan River. Selangor, Rawang. Perak, Kwala Dipang (Ridley). Tomoh (Machado). Legoh, Blimbing (Gwynne Vaughan). Kedah, Gunung Geriang. Lankawi, Kwah (Curtis). Kelantan, Kwala Aring (Yapp); Kwala Kerai (Haniff); Perlis, Tebing Tinggi. *Distrib.* Indo-Malaya. *Native name*: Poko Mati Hidup. *Use.* As an abortient.

(2) **A. clandestinum** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 108.

Weak decumbent herb, 1 ft. long. Leaves lanceolate acuminate, edge undulate denticulate, 2 in. long, .25 in. wide; sheaths .25 in. long, hairy. Flowers solitary axillary, .12 in. wide, white; peduncle short with two leafy bracts. Stamens 3; filaments silky, one smaller staminode. Capsule linear-oblong, .25 in. long, 3-celled. Seeds 6 in a cell, small, cubic wrinkled. *Hab.* Rare. In a wet grassy swamp in woods, Perak, Temengoh (Ridley).

(3) **A. pauciflorum** *Wight, Ic. Pl.* 2077; *Ridl. Mat.* ii. 118.

Stem creeping, succulent; branches ascending, 3 to 4 in. tall, lower leaves elliptic-ovate, upper ovate glabrous, amplexicaul 1 to 1.25 in. long, .4 in. wide; pedicels axillary, 1 to 3 together, hairy, .25 in. long. Sepals boat-shaped, hairy. Petals yellow. Capsule elliptic, 3-valved. *Hab.* Rare. Lankawi, Kwah, in swamps (Curtis). *Distrib.* India, Celebes.

(4) **A. nudiflorum** *Br. Prodr.* 271; *Ridl. Mat.* ii. 118.

Slender herb, 4 to 15 in. long, shortly creeping. Leaves narrow linear or lanceolate acute, .75 to 3 in. long, .1 to .5 in. wide; sheaths bearded, .25 in. long. Cyme terminal branched 5 or 6, slender, 1 to 2 in. long. Petals small pink. Stamens bearded. Capsule ovoid beaked, .12 in. long, 3-valved. Seeds oblong, smooth. *Hab.* A common weed in waste ground and dry sandy places, whole peninsula. *Distrib.* Tropical Asia. *Native name*: Rumput Lipah Lumbu; Rumput Sarang Tupai; Rumput Kurunit; Rumput Tapah burong.

Variable, from a very small plant only a few inches tall in old rice-fields, to the big form, var. *terminalis*, Clarke, which occurs in sandy spots by rivers, at Negri Sembilan, Johol and Kelantan, Channing (Ridley).

(5) **A. sinicum** *Lindl. Bot. Reg. t.* 659; *Ridl. Mat.* ii. 119.

Herb with tuberous roots. Basal leaves flaccid linear acute, base dilate, 8 in. long, .25 in. wide. Stems 1 ft. tall or less, hairy. Leaves lanceolate hairy, 1 in. long, 1 in. wide. Cymes terminal and axillary on peduncles 1 or 2 in. long. Bracts ovate, large. Flowers crowded, pale lavender. Stamens 6, 2 fertile, 1 bearded, 3 sterile. Capsule sub-globose. Seeds slightly wrinkled. *Hab.* Sandy open country. Johor, Pulau Tinggi (Feilding). Pahang, Pekan; Pulau Tawar. Setul Heath (Ridley). *Distrib.* Africa, China, Siam, Malay isles, India.

(6) *A. giganteum* Br. *Prod.* 271; Clarke in *Hook. fl. F.B.I.* vi. 379; *Ridl. Mat.* ii. 119. *A. longifolium* Hook. *fl. Exot. Flora*, t. 204. *A. ensifolium* Wight, *l.c.* t. 2074.

Stems slender erect, 2 ft. tall. Leaves, basal narrow linear, 15 in. long, .12 in. wide, stem-leaves shorter, all glabrous; sheaths .5 in. long. Panicle terminal, of 1 to 3 racemes lengthening as the flowers fall, each 1 to 2 in. long. Bracts caducous. Flowers large,



FIG. 204.—*Ancilema protensum*.

light blue. Stamens 6, 3 fertile bearded, 3 sterile. Capsule oblong, .25 in. long. *Hab.* Dry rocky and sandy spots, Johor, Minyak Buku, Batu Pahat. Kedah Peak (Robinson and Kloss). Perlis, Ginting Kabok Kanga. Setul on sandy heaths, common here. *Distrib.* Indo-Malaya, China, Africa.

(7) *A. vaginatum* Br. *Prodr.* 271; *Ridl. Mat.* ii. 119.

Tufted herb, glabrous. Stems slender, 6 to 10 in. tall. Leaves, basal fleshy linear, 3 in. long, .12 in. wide, stem-leaves reduced to sheaths. Flowers 1 or 2 from each upper sheath. Petals blue. Stamens 6, 2 fertile, 4 sterile, bearded. Capsule globose, .12 in.

long. Seeds 1 in a cell. *Hab.* Sandy places among coconuts, and open heaths. Singapore, Telok Kurau. Johor, Tanjong Surat (Feilding). Pahang, Rumpin River. Tringganu (Yapp). Lankawi (Curtis). Setul, Heaths (Ridley). *Distrib.* India, China.

(8) **A. protensum**, *Wall. Cat.* 5218; *Ridl. Journ. F.M.S. Mus.* iv. 84. *A. scaberrimum*, *Kunth. Enum.* iv. 69. (Fig. 204, p. 356.)

Weak herb, 2 ft. tall, glabrous. Leaves lanceolate acuminate acute, narrowed to petiole, 4 to 6 in. long, .5 to 1 in. wide; petioles 5 in. long; sheaths .5 in. long, mouth ciliate. Panicle very lax, spreading widely, slender, 4 in. long. Upper bracts cup-shaped. Sepals small ovate. Petals white. Stamens 5, 2 with linear anthers, 1 anther reniform, 2 bifurcating with two yellow balls at tip. Pistil densely grey-hairy. Capsule sub-globose, densely covered with hooked adhesive bristles .1 in. long. Seeds 3. *Hab.* Damp spots in forest. Rare. Pahang, Telom (Ridley). *Distrib.* India, Ceylon, Malay isles.

(9) **A. subovatum** *Ridl.*

Weak creeping herb about 8 in. tall; stem branched, slender, with petioles and back of leaves pubescent. Leaves thinly herbaceous ovate, or lanceolate acuminate, base narrowed; 3.5 in. long, 1.25 in. wide, more or less crowded at the branch ends, main nerves very fine, 2 pairs; petioles .25 in. long. Panicle slender and few branched, 1.5 in. long. Flowers few distant; pedicels .1 in. long. Calyx and corolla in flower not seen. Capsule pendent, .1 in. long, obovate. Sepals broad oblong blunt, as long as the capsule. *Hab.* Lankawi, Telok Apan (Haniff). *Distrib.* Andaman Islands (Kurz), Annam, Angkor (Godefroy). Borneo, Banjermassin (Motley).

Clarke has written this up at Kew and quoted the Andaman and Annam plants as *A. ovatum*, Wall., a much bigger and more robust plant with large leaves and numerous racemes, and the sepals in fruit narrow lanceolate and much shorter than the capsule.

(10) **A. conspicuum** *Kunth. Enum.* iv. 69; *Ridl. Mat.* ii. 119. *A. imberbe* *Ridl. Trans. Linn. Soc.* iii. 389.

Stems stout, leafy, erect, 18 in. tall. Leaves lanceolate acuminate at both ends, petiolate, 5 to 8 in. long, 1.25 to 2.25 in. wide, glabrous; sheaths 1.5 in. long. Panicle wide spreading, 2 to 4 in. long, sessile terminal. Flowers .24 in. across, violet. Stamens not bearded. Capsule globose, .13 in. long. Seeds 1 in a cell. *Hab.* In forest. Pahang, Kwala Tembeling. Malacca, Bukit Sadanen (Derry). Perak, Temengoh. Penang, Pulau Betong (Curtis). Kelantan, Kwala Lebir (Ridley). *Distrib.* Burma, Siam, Java, Sumatra. *Native name:* Poko Tampoh Kalin. *Use:* Medicinal.

4. CYANOTIS, Don.

Branched, often creeping herbs. Leaves linear or oblong amplexicaul. Flowers in dense scorpioid cymes in a double row or

irregularly crowded in biseriate secund foliaceous falcate bracts (rarely in exposed racemes). Petals blue, often united in a tube below. Stamens 6, all perfect, usually bearded. Ovary 2-celled, ovules 2 in a cell. Capsule 3-celled. Seeds 2 in a cell. Species about 30, tropical Asia and Africa.

Cymes scorpioid, enclosed in biseriate imbricate bracts.

- | | |
|--|-------------------------|
| Bracts very broad | (1) C. cristata |
| Bracts small | (2) C. barbata |
| Cymes with narrow lanceolate bracts not imbricate | (3) C. capitata |
| Cymes from the leaf sheaths axillary; bracts small | (4) C. axillaris |

(1) **C. cristata** *Roem. and Schultes, Syst. 7, 1150; Hook. fil. F.B.I. vi. 385; Ridl. Mat. ii. 120.*

Tall weak herb, hairy or glabrous. Leaves oblong-lanceolate blunt, 1 to 3 in. long, edge hairy. Cymes terminal scorpioid, 1 in. long. Bracts falcate ovate, edge ciliate in two rows. Sepals lanceolate. Flowers blue. *Hab.* Grassy spots, not common, chiefly in the north. Malacca, Pulau Besar. Penang in the quarry (Curtis). Lankawi (Curtis). Kelantan, Gunong, Kota Bharu. Tringganu (Yapp). Jalor, Biserat (Gwynne Vaughan). *Distrib.* Tropical Africa, Indo-Malaya.

(2) **C. barbata** *Don, Prodr. 46; Ridl. Mat. ii. 121.*

Prostrate fleshy herbs, 1 ft. long, hairy. Leaves lanceolate oblong or linear-lanceolate, hairy, 1 in. long, .25 to .5 in. wide. Peduncles 1 or 2 from terminal axil. Bract usually long narrow recurved. Floral bracts broad, round, hairy. Sepals hairy. Petals pale blue. Capsule short, broad, hairy. *Hab.* Sandy seashores. Singapore, Changi; Gelang. Pahang, Pekan; Rumpin River; Leban Chondong, Rumpin (Evans). Penang (Wallich). *Distrib.* India.

(3) **C. capitata** *Clarke, Monog. 243; Ridl. Mat. ii. 121; Journ. Roy. As. Soc. S. Br. 57, p. 69.*

Weak herb, creeping and rooting, a foot or more long. Leaves oblong-lanceolate, 1 to 2 in. long, .5 in wide, edges hairy. Heads of flowers small axillary and terminal, few-flowered, .5 in. long. Bracts lanceolate. Flowers small, white or light mauve (Yapp). Sepals lanceolate hairy. Capsule oblong hairy. *Hab.* Grassy spots in and on the edge of woods. Pahang River, Pulau Jellam. Selangor, Batu Caves. Perak, Temengoh (Ridley). Kelantan, Kwala Aring (Yapp). *Distrib.* Cochinchina, Java, Japan.

(4) **C. axillaris** *R. and Sch. Syst. 7, 1154; Hook. F.B.I. vi. 388.*

A succulent red-stemmed herb, 1 to 2 ft. long. Leaves fleshy linear acuminate, 2 to 6 in. long, .25 to .3 in. wide, glabrous; sheaths short inflated. Flowers clustered in the sheaths, bright blue. Filaments bearded. *Hab.* Local in rice-fields. Perlis, Kanga. Kelantan, Kota Bharu (Ridley). *Distrib.* India, Siam, Australia.

5. FLOSCOPA, Lour.

Slender erect or decumbent herbs. Leaves lanceolate. Flowers small, pink (or blue) in a terminal panicle of secund flowered cymes. Sepals oblong. Petals obovate. Stamens 6, perfect or 1 imperfect; filaments glabrous. Ovary 2-celled; cells 1-ovuled. Capsule globose. Species 12, Africa and America, one Asiatic.

(1) **F. scandens** *Lour. Fl. Cochinchine*, 193; *Ridl. Mat.* ii. 122.

Herb, creeping and ascending, 6 to 12 in. tall; glabrous. Leaves elliptic-lanceolate or linear-lanceolate acute, edges ciliate. Panicle large dense, 1 to 3 in. long, viscid hairy; rachis pink. Sepals ovate viscid hairy. Petals pink. Capsule shorter than sepals. *Hab.* Common in muddy ditches. Singapore, Tanglin. Johor, Tanjong Kupang; Bukit Muar (Feilding). Malacca, Brisu; Machap. Negri Sembilan, Seremban. Selangor, Klang; Ulu Gombak. Perak, Padang Rengas; Thaiping; Sirah Rimau (Yapp). Penang, Waterfall. Kelantan, Kwala Pertang (Haniff). *Distrib.* Tropical Asia. *Native names:* Rumpuk Kumpai Tikus; Rumpuk Tapak Eti.

6. FORRESTIA, Lesson.

Stout herbs usually creeping and ascending. Leaves broad lanceolate petioled, with tubular, usually hairy, sheaths. Cymes axillary densely capitate, rarely lax. Flowers small, white. Sepals 3, boat-shaped. Petals lanceolate or obovate. Stamens 6, bearded at tip. Ovary 3-celled, cells 1- or 2-ovuled. Capsule trigonous, pink. Seeds 1 or 2. Species 6. Indo-Malaya, Formosa.

- Stem slender, .25 in. through, erect (1) **F. gracilis**
- Stems stout, .5 in. or more through, creeping ascending.
- Heads small compact sub-glabrous (2) **F. Griffithii**
- Leaves glabrate (3) **F. glabrata**
- Heads large lax much branched (4) **F. marginata**
- Heads dense soft-hairy.
- Leaves hairy both sides; sheaths bearded (5) **F. mollis**
- Leaves glabrous above, bullate (6) **F. monosperma**
- Heads densely covered with spiny hairs (7) **F. irritans**

(1) **F. gracilis** *Ridl. Journ. Roy. As. Soc. S. Br.* 48, p. 37; *Mat.* ii. 123.

Stems slender, creeping shortly at base, .25 in. through, erect part 3 ft. tall, glabrous. Leaves lanceolate acuminate, glabrous above, velvety beneath, edge red-hairy, 8 in. long, 2 in. wide; petioles winged, red-hairy as is mouth of sheath. Heads small, few-flowered, sessile. Bracts ovate, white, pubescent. Sepals 12 in. long, white. Petals lanceolate. Capsule oblong, pink. *Hab.* Common in woods, lowlands. Singapore, Tanglin; Pulau Ubin. Johor, Tanjong Bunga. Pahang River. Malacca, Sungei Buluh.

Negri Sembilan. Gunong Tampin (Holtum). Selangor, Kwala Lumpur (Goodenough). Sungei Ujong, Gunong Berumbun (Cantley), Dindings, Telok Sera. Kedah Peak. Kelantan, Chaning woods (Ridley); *Native name*: Setawa Betina.

(2) **F. Griffithii** Clarke, *Monog.* 236; *Ridl. Mat.* ii. 123.

Stem 1 in. through, 3 ft. tall. Leaves lanceolate acuminate, base narrowed to petiole, hairy all over, 9 in. long, 3 in. wide; petioles 2 in. long, very hairy, sheaths .5 to 2 in. long. Heads .5 in. through. Sepals oblong glabrous. Capsule oblong, .4 in. long. Seed 1 in a cell, reniform. *Hab.* In forests. Johor, Gunong Pulai. Malacca, Ayer Panas (Griffith); Jasin; Bukit Sadanen (Derry, Holmberg); base of Mt. Ophir (Hullett). Negri Sembilan, Perhentian Tinggi (Ridley); Tampin (Robinson).

(3) **F. glabrata** Hassk. *Flora* 1864, 360; *Ridl. Journ. F.M.S. Mus.* iv. 84.

Stems stout and tall, completely glabrous. Leaves lanceolate acuminate, gradually narrowed to sheath, 8 to 12 in. long, 2 in. wide; sheaths 1 to 1.5 in. long. Heads compact, 1 in. through. Sepals oblong, .4 in. long. Capsule elliptic-oblong, top round, .25 in. long. Seeds 2 in a cell. *Hab.* Rare; in mountain forest. Pahang, Telom. Selangor, Menuang Gasing (Kloss). Penang (Wallich). *Distrib.* India, Cambodia, Sumatra, Java.

(4) **F. marginata** Hassk. *Flora*, 1864, 630; *Ridl. Mat.* ii. 123. *F. hispida* Bot. Mag. t. 5425 (not of Rich).

Stem very stout, far-creeping and rooting, about 5 ft. or more long. Leaves elliptic-lanceolate acuminate, base narrowed hardly petioled, 12 to 14 in. long, 3 to 4 in. wide, glabrous above, edge, tip and back hairy. Heads on stem below the leaves much branched, lax, over 1 in. through. Bracts ovate hairy, purple. Flowers .4 in. long. Capsule oblong, .25 in. long. Seeds 2 in a cell, semi-ovate. *Hab.* In rocky wet forest scrambling on rocks, not rare. Singapore (Wallich), Bukit Timah. Johor, Gunong Pantai; Tanjong Kupang; Pulau Tiunan. Pahang, Telom. Malacca, Bukit Kedondong (Derry). Negri Sembilan, Bukit Tangga; Tampin (Robinson). Perak, Woods, Lenggong. Penang, Pulau Betong (Curtis). Kelantan near Kota Bharu; Kwala Lebir (Ridley).

(5) **F. mollis** Hassk. *Flora* 1864, p. 68; *Ridl. Mat.* ii. 124.

Stem stout. Leaves elliptic-ovate acuminate, base narrowed to a winged petiole, hairy all over, 1 ft. long, 5 in. wide; petioles 4 in. long; sheath thickly bearded. Heads .75 in. through, softly red-hairy. Sepals linear-oblong, red-hairy at tip. Petals linear. Filaments glabrous. Capsule sub-globose, trigonous, hairy, .25 in. long. *Hab.* Mountain forests. Johor, Sedenak; Gunong Belumut (Holtum). Malacca (Griffith); base of Mt. Ophir. Perak, Thaiping Hills. *Distrib.* Malay isles.

(6) **F. monosperma** Clarke, *Bulletin Herb. Boiss*, vi, 1898, p. 359; *Ridl. Mat.* ii. 124.

Stems stout, creeping ascending, 4 ft. tall, 3 in. through. Leaves oblong-lanceolate, dark green bullate above, purple beneath, glabrous, 15 in. long, 6 in. wide; petioles broad channelled; sheaths soft hairy, 3 in. long. Heads on creeping part of stem, 1 in. through. Sepals coriaceous, oblong, hairy, 5 in. long, pink, green tipped. Petals lanceolate. Filaments filiform, spiral with tuft of long hair at tip. Capsule oblong shorter. Seeds 2 in a cell, flat, covered with scarlet aril. *Hab.* In rocky forest. A very handsome plant. Pahang, Tahan river. Selangor, Batu Caves. Perak, Thaiping Hills; Waterloo (Curtis). Temengoh; Ulu Batang Padang (Ridley).

(7) **F. irritans** Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 38; *Mat.* ii. 124.



FIG. 205.—*Spatholirion ornatum*.

Stem tall and stout. Leaves elliptic-lanceolate acuminate, hairy all over, 9 in. long, 3 in. wide; petioles broad flat; sheaths 1.5 in. long, glabrous except for the hairy edges. Heads globose over 1 in. through, dense, and thickly covered with red spiny hairs. Sepals lanceolate, spiny, hairy. *Hab.* Mountain forests. Not common. Selangor, Semangkok Pass. Sungei Ujong, Bukit Kapayung (Cantley). Perak, Bujong Malacca (Ridley).

7. SPATHOLIRION, Ridl.

Stemless herbs with short rhizome (or climbers). Leaves ovate-cordate (or lanceolate), fleshy. Panicles terminal. Flowers unisexual. Females at base few, enclosed in the spathe-like leaf, larger than males. Anthers sterile. Pistil cylindrical; style terete; stigma 3-lobed. Male flowers numerous, terminal. Sepals 3, lanceolate-ovate. Petals linear as long. Stamens 6, bearded below.

Capsule oblong, 3-valved, chartaceous. Seeds 5 to 7 in two rows. Species 3, two Chinese.

(1) *S. ornatum* *Ridl. Journ. Bot.* 1896, p. 329, Pl. 360; *Mat.* ii. 125. (Fig. 205, p. 361.)

Leaves 6 or 7, deep green marked white, back pubescent purple, 4 in. long and wide; petioles 4 in. long, brown, pubescent. Scape purple, 6 in. long; branches .25 in. long. Spathe thick ovate mucronate, 1.5 in. long. Flowers rosy, .25 in. across. Petals white. Filaments with yellow beard at base. Pistil orange. *Hab.* Legeh, Tomoh (Machado) Cult. Botanic Gardens, Singapore 1896, sent down alive by A. D. Machado.

ORDER CLII. ALISMACEÆ.

Aquatic or marsh plants. Leaves herbaceous, radical, ovate, lanceolate or linear. Inflorescence paniced or umbellate. Flowers fugacious, white or pink, regular. Sepals 3, herbaceous. Petals 3. Stamens 6 or more, hypogynous or perigynous; anthers basifixed. Carpels 3 to 6 or more, sessile or stalked, on a flat or raised receptacle. Style 1. Stigma simple. Ovules 1 or more. Fruit small achenes or follicles. Seeds exalbuminous.

Achenes long-beaked	.	.	.	.	.	1. RANALISMA
Achenes very numerous rounded	.	.	.	.	.	2. SAGITTARIA

1. RANALISMA, Stapf.

A stoloniferous herb. Leaves ovate with 9 pairs of nerves. Inflorescence cymose, 2 or 3 flowers or one only. Sepals persistent. Receptacle convex, lengthening in fruit. Stamens 9 in one whorl, hypogynous. Carpels compressed, winged, tipped with the persistent style. Species 1, Malay Peninsula.

(1) *R. rostrata* *Stapf. Ic. Pl.* 2652; *Ridl. Mat.* ii. 127. (Fig. 206, p. 363.)

Petioles very slender, 4 to 7 in. long, leaf blade thin, rounded, 1 to 1.5 in. long, .75 to 1 in. wide. Scape 3 to 5 in. long, slender. Flowers small, white. Pedicels .5 to 1 in. long. Bracts oblong, connate at base. Fruit .5 in. through. *Hab.* Very rare, in a patch of black mud in dense forest. Selangor, Batu Caves (Ridley).

I have never seen this plant again.

2. SAGITTARIA, Linn.

Aquatic with long-petioled elliptic-ovate, cordate or sagittate leaves. Flowers paniced or spicate whorled, unisexual or bisexual. Stamens 6 or more. Carpels numerous crowded on a globose or

oblong receptacle, flat crested or winged. Species about 15, whole world.

(1) *S. guayanensis* Humb. Bonpl. Kunth. Nov. Gen. and Sp. i. 250; Hook. fil. F.B.I. vi. 561; Ridl. Mat. ii. 127.

Leaves orbicular or ovate-cordate obtuse floating, 1.5 to 2 in. long, lobes broad; petioles 6 to 8 in. long. Scapes 3 to 8 in. long; branches few, short. Bracts ovate, .25 in. long. Pedicels .5 in. long. Flowers .25 to .6 in. across. Sepals oblong-lanceolate. Petals cuneate. Stamens 9 to 12. Carpels in a globose head, .5 in. through, flat orbicular, dentate not beaked. *Hab.* Rice-fields, Pahang, Pulau Tawar. Malacca, Merlimau (Derry). Province Wellesley, Permatang Bertam. Penang, Pulau Betong (Curtis). *Distrib.* Indo-Malaya, China, Australia. *Native names:* Keladi Ayer; K'lipoh Padang.

S. sagittifolia, L., a Chinese form, is sometimes cultivated to feed pigs. I have never seen it in flower. It has a tuberous rhizome and sagittate leaves with tall erect petioles.



FIG. 206.—*Ranalisma rostrata*.

ORDER CLIII. TRIURIDEÆ.

Very small slender saprophytic herbs. Stem capillary, simple or branched from a creeping rhizome. Leaves scale-like ovate, scattered. Flowers minute unisexual, in a terminal raceme. Petals and sepals similar. Male flowers with 2 to 6 stamens with short or no filaments. Pistillodes 3 or more or 0. Females with 0 to 6 staminodes and numerous crowded carpels in a head, 1-ovuled.

Style terminal or lateral. Achenes globose or ovoid in a head. Genera 2, 1 tropical Asiatic to South America, 1 South America only.

1. SCIAPHILA, Bl.

Perianth 3- to 8-lobed. Anthers sessile or sub-sessile, at the base of the perianth. Species 21, Tropical Asia to Polynesia, Africa and South America.

Sepals and petals ovate; pistillodes in male flowers . . . (1) *S. affinis*

Sepals and petals lanceolate; no pistillodes in male flowers . . . (2) *S. major*

Sepals and petals linear subulate, no pistillodes . . . (3) *S. asterias*

(1) *S. affinis* *Becc. Malesia*, iii. 331, Pl. xxxiv. 14-18; *Ridl. Mat.* ii. 126.

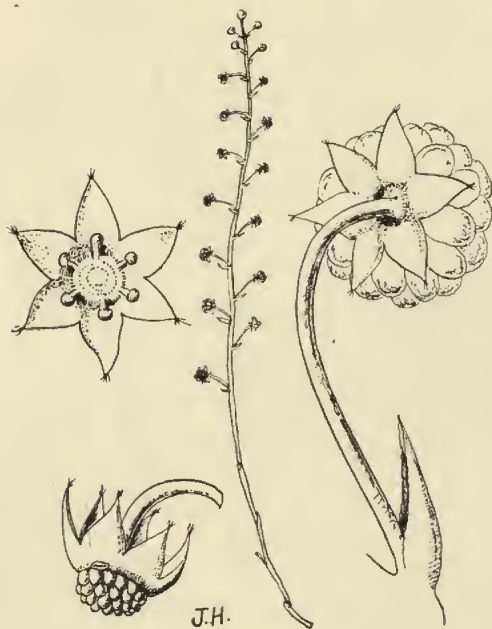


FIG. 207.—*Sciaphila affinis*.

Keledang; Gunong Kerbau (Robinson); Gunong Bubu (Wray); Sungei Siput (Haniff), 10 in. tall and much branched. *Distrib.* Borneo.

(2) *S. major* *Becc. Malesia* iii. 332, Pl. xl. Figs. 1 to 11; *Ridl. Mat.* ii. 126.

Simple or much branched, 4 to 6 in. tall. Leaves ovate blunt. Flowers numerous on very short pedicels, pale lilac; bracts small

Stems filiform, purple, often branched, 4 to 5 in. tall. Leaves ovate acuminate, scale-like. Flowers numerous, scattered; pedicels .25 in. long. Bracts lanceolate acute. Petals and sepals ovate acute. Male flowers; stamens 3; filaments very short; pistillodes numerous. Female flowers; carpels numerous in a globose head, smooth; staminodes 6, short. *Hab.* Common in dark woods among rotten leaves, to 4000 ft. altitude. Singapore, Bukit Timah; Selitar. Malacca. Bukit Sadanen; Mt. Ophir. Selangor near Semangkok Pass. Pahang, Tahan River; Gunong Tahan. Perak, Gunong

oblong. Male flowers star-shaped. Sepals and petals lanceolate acuminate. Stamens 2 or 3. No pistillodes. Female flowers; pistils glandular globose. Carpels sub-globose. *Hab.* Dense forests, usually at about 4000 ft. altitude. Malacca, Bukit Bruang. Pahang, Gunong Tahan. Kedah Peak (Ridley); *Distrib.* Borneo.

(3) *S. asterias* *Ridl. Journ. F.M.S. Mus.* vi. 188.

Stems slender, 10 to 11 in. tall. Leaves lanceolate acuminate, not sheathing. Bracts shorter than pedicels which are .12 in. long. Perianth .25 in. across. Sepals and petals linear subulate from a broader base. Male flowers; anthers 3, sessile orbicular or oblong; no pistillodes. Female flowers smaller; carpels oblong clavate papillose. *Hab.* Dense forests in mountains. Pahang, Gunong Tahan, Wray's Camp at 3300 ft. altitude (Ridley).

ORDER CLIV. NAIADACEÆ.

Aquatic submerged fresh-water or marine herbs with slender stems and linear leaves sheathing at base. Flowers unisexual, axillary, very small, green with a very small hyaline perianth or o. Fruit sessile. Stamen 1. Carpel 1.

1. NAIAS, Linn.

Fresh or brackish water herbs, branched. Leaves opposite, alternate or whorled, entire or toothed. Flowers axillary unisexual. Male with a tubular or inflated entire 2- to 4-toothed utricle and an inner one. Stamen 1. Female flower perianth o or adnate to carpel. Carpel 1, sessile 1-ovuled. Stigmas 2 to 4. Achene oblong. Species about 10, whole world.

Male and female flowers without a spathe (1) *N. graminea*

Male and female flowers with a spathe.

Anther 1-locular; leaf-sheaths truncate rounded (2) *N. minor*

Anther 4-locular; leaf sheath broad, edges overlapping (3) *N. Kingii*

(1) *N. graminea* *Delile, Descr. Egypt. Hist. Nat.* ii. 282, t. 60, Fig. 3; *Hook. fil. F.B.I.* vi. 569; *Rendle, Trans. Linn. Soc.* v. 424, Pl. xlii, Figs. 192-201; *Ridl. Mat.* ii. 128. *N. seminuda* *Griff. Notulæ*, iii. 184; *Ic. Pl. As. t.* 251, Fig. 2, t. 253, 254.

Stems 8 to 9 in. long or more. Leaves ternate acuminate toothed, .5 in. long; sheaths truncate, toothed, basal auricles toothed. Flowers solitary or few together. Males shortly pedicelled, nude; perianth bilobed above. Females 2 to 4 together; achenes elliptic beaked, with longitudinal areolæ. *Hab.* Ditches and ponds. Pahang at Pekan. Province Wellesley, Permatang Bertam; Prai (Burkill). *Distrib.* Europe, Africa, Asia and Australia.

var. *angustifolia* Rendle, *l.c.* 427, Pl. xlii. 202. A weaker plant; leaves narrower, tips nearly setaceous, teeth more conspicuous and fruit smaller. *Hab.* Singapore, Garden lake and ditches in great abundance. *Distrib.* Borneo.

‡ (2) *N. minor* All. *Fl. Pedem.* ii. 221; *Hook. fil. l.c.* 569; *Rendle, l.c.* 410, Pl. xli. 105-115. *N. ternata* Griff. *Notulæ*, iii. 183; *Ic. Pl. As. t.* 252.

Leaves falcately recurved, base broad, toothed, .5 in. long; sheaths rounded truncate with prominent teeth, rarely auricled.



FIG. 208.—*Ruppia maritima*.

Flowers solitary. Male sessile in an ellipsoid spathe with a short cylindric-toothed neck, perianth 2-lipped. Female flower nude; ovary ellipsoid; achene obliquely linear oblong, testa hard, brown, marked with scalariform rows of pits. *Hab.* Malacca (Griffith). *Distrib.* Europe, Temperate Asia, India, Burma.

(3) *N. Kingii* Rendle, *Trans. Linn. Soc.* v. 415, Pl. xli. Figs. 126-131 and 422; *Ridl. Mat.* ii. 129.

Branches long straggling ending in a dense bushy growth, internodes 1.25 to 1.5 in. long. Leaves over 1 in. long, tip 1- or 2-toothed with numerous ascending teeth 16 to 19 on each edge, apex tipped with a dark brown spine; sheath broad with over-

lapping edges, upper edge truncate, shoulders broad rounded with 10 teeth. Flowers solitary. Male and female on the same shoot. Male sessile; spathe ellipsoidal ending in a cylindric neck with numerous spines at the mouth. Perianth fitting closely to the ellipsoidal 4-locular anther ending in two thickened lips. Achene with 30 rows of small hexagonal pits. *Hab.* Singapore, in ditches at Tanglin (Ridley). *Distrib.* Andamans and Tonkin.

ORDER CLIVA. POTAMOGETONACEÆ.

Aquatic submerged herbs. Flowers uni- or bi-sexual terminal, very small. Perianth usually absent. Anthers several, sessile. Carpels free, 1 to 4.

1. RUPPIA, Linn.

Submerged aquatic plant with very slender branches. Leaves filiform narrow; sheaths stipule-like. Flowers minute, 2 to 6 on a short peduncle from the leaf-sheath. Perianth none. Anthers 2, sessile, opposite, 2-celled. Carpels 4, 1-ovuled; stigma sessile. Achenes beaked ovoid (or blunt) borne on lengthened pedicels, the peduncle lengthening straight (or spiral) in fruit. Species 1, whole world usually in brackish or salt water.

(1) *R. maritima* Linn. *Sp. Pl.* 127; *Ic. Fl. Germ.* vii. t. 17; *Hook. fil. F.B.I.* vi. 568; *Griff. Notulæ*, iii. 196; *Ic. Pl. As.* t. 257-259. (Fig. 208, p. 366.)

Stem creeping at base up to 2 ft. long, very slender. Leaves alternate 1 to 3 in. long, very narrow, dark blackish green. Peduncle straight in fruit, 1 to 6 in. long. Achene brown, ovoid, beaked, .08 in. long. *Hab.* Rice-land. Province Wellesley. Prai (Burkill). *Distrib.* Europe and Asia, Africa, America, Australia.

ORDER CLV. FLAGELLARIACEÆ.

Climbing shrubs, or terrestrial or aquatic herbs. Leaves many nerved; petioles sheathing. Flowers small in terminal panicles, uni- or bi-sexual. Sepals 3, imbricate. Petals little longer. Stamens 6, hypogynous; anthers basifixed. Ovary superior, 3-celled. Style long or short. Stigmas 3. Fruit a drupe or 1- to 3-seeded berry.

Flowers bisexual; stem woody climbing by cirrhose leaves

Flowers unisexual; stems erect reed-like, hollow	1. FLAGELLARIA
Flowers unisexual; stem herbaceous; leaves large	2. JOINVILLEA
	3. SUSUM

1. FLAGELLARIA Linn.

Stem slender. Leaves sessile, narrow lanceolate (or broad) ending in a cirrhose point by which it climbs. Panicles lax. Flowers small, white, bisexual. Seeds 1 or 2. Species 4, one Polynesian, rest Old World tropics.

(1) *F. indica* Linn. *Sp. Pl.* 333; *Ridl. Mat.* ii. 130.

Stems woody, slender, .25 in. through, very long. Leaves 6 to 10 in. long, .12 to .5 in. wide. Panicles 2 to 3 in. or more long, much branched. Flowers clustered, white, sessile. Sepals orbicular. Petals oblong blunt. Styles 3, thick and long. Drupe globose, .25 in. through, pink, thinly pulpy. Seed one, black. *Hab.* Seashores. Common. Singapore, Kranji; Bajau. Johor, Tanah Merah. Pahang, Pekan. Malacca, Sungei Rambai (Derry). Selangor, Jugra (Foxworthy). Province Wellesley. Krian (Borges). Lan-kawi, Dayong Bunting (Robinson).

var. *minor* Bl. *Roem and Schultes Syst.* vi. 1493. Stems short, very slender. Leaves 3 to 4 in. long, .12 in. wide. Panicle 1 to 3 in. long. *Hab.* Sandy spots by tidal rivers. Common. Singapore (Wallich *F. angustifolia*). Changi. Malacca, Bukit Sabukor (Derry); Perak (Kunstler); Pulau Sembilan, Pulau Rumpia (Kloss). Penang (Wallich). Patani (Gwynne Vaughan). *Distrib.* Tropical Africa, Asia and Australia. *Native names:*

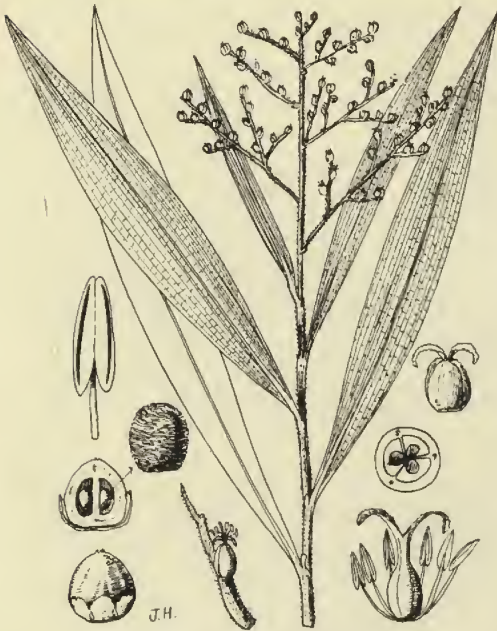


FIG. 209.—*Joinvillea malayana*.

Rotan Bini; Rotan Tikus. *Use:* For basket-making.

2. JOINVILLEA, Gaud.

Reed-like erect hollow-stemmed plants. Leaves stiff lanceolate or linear acuminate. Panicles lax pubescent, large. Flowers scattered, small. Sepals chartaceous. Petals as long. Stamens 6, or 1 aborted. Ovary conic. Style simple; stigmas 3, linear. Berry very small succulent, 2- or 3-seeded. Species 4, Polynesia and Malay isles.

(1) *J. malayana* Ridl. *Journ. Roy. As. Soc. S. Br.* 44, p. 199; *Mat.* ii. 131.

Stems numerous, 6 to 8 ft. tall, .25 in. through. Leaves coriaceous plicate, linear acuminate, 18 to 24 in. long, 2 in. wide.

Panicle 8 in. long, hairy. Flowers sessile or nearly so, .12 in. long. Sepals ovate. Petals oblong ciliate. Stamens 5 and 1 aborted; stigmas plumose. Fruit globose, red, 3-seeded. *Hab.* Mountains at 4000 to 5000 ft. altitude. In dry spots. Selangor, Semangkok Pass (Ridley). Perak, Thaiping Hills; Gunong Batu Putih (Wray); Gunong Kerbau (Robinson). *Distrib.* Borneo.

3. SUSUM, Linn.

Fleshy herbs, aquatic or terrestrial, large, with creeping rhizomes. Leaves fleshy ensiform or lanceolate. Panicles spreading, branches in half whorls, bracteate. Flowers small green or yellow. Sepals and petals sub-equal orbicular or ovate. Stamens 5 or 6, filiform, base broad. Pistillode small. Female. Pistil ovoid or lobed; stigmas 3, flat. Ovary 3-celled. Fruit fleshy, 1-seeded. Species 2 or 3, Ceylon and Malaya.

Aquatic plant, tall; leaves ensiform (1) *S. anthelminticum*
Forest plant shorter; leaves lanceolate petioled (2) *S. malayanum*

(1) *S. anthelminticum* Bl. Schultes, *Syst.* vii. 1493; *Ridl. Mat.* ii. 132.

Tall aquatic plant with long floating stolons. Stem 1 in. through, creeping. Leaves 6 ft. long, 6 in. wide, sword-shaped, glabrous. Panicle 2 ft. long, 8 in. across or more, much branched. Bracts lanceolate, 8 in. long. Flowers greenish yellow, sessile. Berry fusiform, usually 1-seeded. *Hab.* In ponds and rivers, very local, Malacca (Griffith), probably extinct. Perak, Lahat and along the railway in swamps, Kinta Valley, abundant (Ridley). *Distrib.* Java, Sumatra, and Ceylon. *Native name:* Bakung.

(2) *S. malayanum* Hook. *F.B.I.* vi. 361; *Ridl. Mat.* ii. 132.

Stems short, a few inches to 2 to 3 ft. long. Leaves slightly cobwebby beneath, lanceolate acuminate, 12 to 50 in. long, 2 to 4 in. wide; petioles channelled, 3 to 12 in. long. Panicles 1 to 2 ft. long; branches stiff, 2 to 6 in. long, tomentose with leafy bracts. Flowers sessile. Male panicles slender, branched. Sepals 2 or 3, orbicular. Petals 3, oblong-lanceolate. Female panicles stouter. Sepals gibbous at base. Petals much longer. Stigmas 3, short. Fruit pink turning black, fleshy, globose or oblique, .25 in. through, or as big as cherries. Seed 1, flattened. *Hab.* Common in forests in damp spots to 4500 ft. altitude. Singapore, Bukit Timah; Selitar. Johor, Kwala Sedili (Kelsall). Pahang, Gunong Tahan at 4000 ft. altitude. Malacca, Batu Tiga. Selangor, Kwala Lumpur. Negi Sembilan, Gunong Talan; Bukit Sulu (Cantley). Perak, Gunong Batu Putih (Wray) and Gunong Bubu; Thaiping (Kunstler). Penang (Jack), Hill (Curtis). *Distrib.* Borneo, Java. *Native names:* Bangkok; Bangkok Rimbah; Lobak Jantan.

INDEX OF ORDERS, GENERA, SPECIES, AND SYNONYMS

VOLUME IV

The Orders are printed in small capitals and the Synonyms in italics

	PAGE		PAGE		PAGE
Acampe, <i>Lindl.</i>	154	Alpinia (<i>contd.</i>)		Amomum (<i>contd.</i>)	
<i>penangiana, Ridl.</i>	155	<i>campanaria, Ridl.</i>	283	<i>elatterioides, Bak.</i>	275
Acanthephippium, <i>Bl.</i>	116	<i>cannæfolia, Ridl.</i>	285	<i>flavum, Ridl.</i>	263
<i>javanicum, Bl.</i>	116	<i>capitellata, Jack</i>	283	<i>hastilabium, Ridl.</i>	266
Achasma		<i>comosa, Ridl.</i>	285	<i>Holttumii, Ridl.</i>	264
<i>macrocheilus, Griff.</i>	270	<i>conchigera, Griff.</i>	278	<i>lappaceum, Ridl.</i>	263
<i>megalocheilus, Griff.</i>	271	<i>decurvata, Bak.</i>	276	<i>macrodon, Scort.</i>	266
Acriopsis, <i>Reinwtd.</i>	189	<i>Galanga, Sw.</i>	279	<i>macrostephanum,</i>	
<i>crispa, Griff.</i>	190	<i>involutrata, Griff.</i>	283	<i>Bak.</i>	284
<i>indica, Wight</i>	190	<i>javanica, Bl.</i>	283	<i>megalocheilus, Bak.</i>	270
<i>javanica, Reinwtd.</i>	190	<i>latilabris, Ridl.</i>	282	<i>metriochilus, Bak.</i>	271
<i>purpurea, Ridl.</i>	191	<i>macrostephana,</i>		<i>micranthum, Ridl.</i>	267
<i>Ridleyi, Hook. fil.</i>	190	<i>Ridl.</i>	284	<i>ochreum, Ridl.</i>	264
Actoplanes		<i>magnifica, Rosc.</i>	272	<i>perakense, Ridl.</i>	266
<i>Ridleyi, Schum.</i>	286	<i>malaccensis, Rosc.</i>	277	<i>Ridleyi, Bak.</i>	269
Adenoncos, <i>Bl.</i>	154	<i>melanocarpa, Ridl.</i>	279	<i>rubroluteum, Bak.</i>	270
<i>major, Ridl.</i>	154	<i>Murdochii, Ridl.</i>	280	<i>scyphiferum, Koen</i>	267
<i>parviflora, Ridl.</i>	154	<i>mutica, Hook. fil.</i>	280	<i>spherocephalum,</i>	
<i>virens, Bl.</i>	154	<i>mutica, Roxb.</i>	279	<i>Bak.</i>	269
Aerides, <i>Lour.</i>	182	<i>nobilis, Ridl.</i>	282	<i>spiceum, Ridl.</i>	263
<i>affine, Wall.</i>	183	<i>nutans, Rosc.</i>	277	<i>squarrosom, Ridl.</i>	265
<i>multiflorum, Roxb.</i>	183	<i>oxymitra, Schum.</i>	285	<i>stenoglossum, Bak.</i>	262
<i>odoratum, Lour.</i>	182	<i>pahangensis, Ridl.</i>	282	<i>testaceum, Ridl.</i>	266
<i>roseum, Lindl.</i>	183	<i>petiolata, Bak.</i>	284	<i>triorgyale, Bak.</i>	269
Agrostophyllum, <i>Bl.</i>	106	<i>pulcherrima, Ridl.</i>	284	<i>uliginosum, Koen</i>	264
<i>bicuspidatum,</i>		<i>Rafflesiana, Wall.</i>	281	<i>vitellinum, Bot.</i>	
<i>J. J. Smith</i>	108	<i>scabra, Benth.</i>	279	<i>Reg.</i>	284
<i>callosum, Rchb. fil.</i>	107	<i>secunda, Bak.</i>	276	<i>xanthoglossum,</i>	
<i>glumaceum, Hook.</i>		<i>secundiflora, Ridl.</i>	278	<i>Ridl.</i>	263
<i>fil.</i>	107	<i>Seimundii, Ridl.</i>	280	<i>xanthophlebium,</i>	
<i>Hasseltii, J. J.</i>		<i>vitellina, Ridl.</i>	284	<i>Bak.</i>	262
<i>Smith</i>	108	AMARYLLIDACEÆ	298	<i>Anæctochilus, Bl.</i>	212
<i>majus, Hook. fil.</i>	107	Amomum, <i>Linn.</i>	261	<i>albolineatus, Par.</i>	213
<i>pauciflorum, Hook.</i>		<i>aurantiacum, Ridl.</i>	262	<i>brevilabris, Ridl.</i>	213
<i>fil.</i>	108	<i>biflorum, Jack</i>	275	<i>brevistylis, Ridl.</i>	214
ALISMACEÆ	362	<i>cephalotes, Ridl.</i>	264	<i>calcaratus, Ridl.</i>	214
Alpinia, <i>Linn.</i>	277	<i>cyindraccum, Ridl.</i>	265	<i>geniculatus, Ridl.</i>	213
<i>assimilis, Ridl.</i>	280	<i>cylandrostachys,</i>		<i>macranthus, Ridl.</i>	214
<i>aurantiaca, Ridl.</i>	282	<i>Ridl.</i>	265	<i>pectinatus, Ridl.</i>	214

	PAGE		PAGE		PAGE
Anæctochilus (<i>contd.</i>)		Appendicula (<i>contd.</i>)		Bulbophyllum,	
Reinwardtii, <i>Bl.</i>	213	purpurascens, <i>De</i>		<i>Thouars</i>	53
Aneilema, <i>Br.</i>	354	<i>Vriese</i>	195	acuminatum, <i>Ridl.</i>	79
clandestinum,		<i>reflexa, Bl.</i>	197	adenopetalum,	
<i>Ridl.</i>	355	<i>rhodiola, Rchb. fil.</i>	198	<i>Lindl.</i>	71
conspicuum,		<i>robusta, Ridl.</i>	197	alcicornae, <i>Par.</i>	66
<i>Kunth.</i>	357	<i>rupestris, Ridl.</i>	197	Annandalei, <i>Ridl.</i>	78
<i>ensifolium, Wight.</i>	356	<i>torta, Bl.</i>	198	apodum, <i>Hook. fil.</i>	73
giganteum, <i>Br.</i>	356	<i>uncata, Ridl.</i>	196	arachnites, <i>Ridl.</i>	73
<i>herbaceum, Wall.</i>	354	<i>Arachnanthe</i>		araniferum, <i>Ridl.</i>	61
<i>imberbe, Ridl.</i>	357	<i>alba, Ridl.</i>	159	<i>auratum, Ridl.</i>	78
lineolatum, <i>Kunth.</i>	354	<i>Maingayi, Hook.</i>		<i>avicella, Ridl.</i>	64
<i>longifolium, Hook.</i>		<i>fil.</i>	159	Blumei, <i>J. J.</i>	
<i>fil.</i>	356	<i>moschifera, Bl.</i>	159	<i>Smith</i>	74
nudiflorum, <i>Br.</i>	355	<i>Arachnis, Bl.</i>	159	botryphorum, <i>Ridl.</i>	69
pauciflorum, <i>Wight</i>	355	<i>alba, Schlechter</i>	159	brevipes, <i>Ridl.</i>	70
protensum, <i>Wall.</i>	357	<i>Maingayi, Schlechter</i>		breviscapum, <i>Ridl.</i>	74
<i>scaberrimum,</i>		<i>ter</i>	159	campanulatum,	
<i>Kunth.</i>	357	<i>moschifera, Bl.</i>	159	<i>Rolfe</i>	78
sinicum, <i>Lindl.</i>	355	<i>Arundina, Bl.</i>	125	capitatum, <i>Lindl.</i>	70
subovatum, <i>Ridl.</i>	357	<i>bambusifolia,</i>		<i>catenarium, Ridl.</i>	61
<i>vaginatum, Br.</i>	356	<i>Lindl.</i>	125	cinnamatum, <i>Ridl.</i>	65
Aphyllorchis, <i>Bl.</i>	205	<i>Cantleyi, Hook. fil.</i>	127	<i>citrinum, Ridl.</i>	78
<i>pallida, Bl.</i>	205	<i>densa, Lindl.</i>	125	<i>Lindl.</i>	69
<i>striata, Ridl.</i>	205	<i>Philippii, Rchb. fil.</i>	126	clandestinum,	
Apostellis, <i>Thouars</i>	203	<i>revoluta, Hook. fil.</i>	126	<i>Lindl.</i>	69
<i>flabelliformis, Ridl.</i>	203	<i>speciosa, Bl.</i>	126	cleistogamum,	
<i>punctata, Ridl.</i>	204	<i>speciosa, Ridl.</i>	125	<i>Ridl.</i>	69
<i>velutina, Ridl.</i>	204	<i>Wallichii, Rchb.</i>		concinnum, <i>Hook.</i>	
<i>Aporum</i>		<i>fil.</i>	126	<i>fil.</i>	70
<i>micranthum, Griff.</i>	35	<i>Ascochilus, Ridl.</i>	180	<i>coniferum, Ridl.</i>	67
APOSTASIACEÆ	295	<i>capricornis, Ridl.</i>	181	<i>Curtisii, Ridl.</i>	77
Apostasia, <i>Bl.</i>	297	<i>hirtus, Ridl.</i>	182	<i>densiflorum, Ridl.</i>	68
<i>Brunonis, Griff.</i>	297	<i>hirtulus, Ridl.</i>	181	<i>dryas, Ridl.</i>	62
<i>latifolia, Rolfe</i>	297	<i>minutiflorus, Ridl.</i>	182	<i>ephippium, Ridl.</i>	74
<i>nuda, R. Br.</i>	297	<i>siamensis, Ridl.</i>	181	<i>epicrianthes, Hook.</i>	
<i>Wallichii, Br.</i>	297	<i>teres, Ridl.</i>	181	<i>fil.</i>	64
Appendicula, <i>Bl.</i>	194	<i>Ascotainia, Ridl.</i>	112	<i>fascinator, Rolfe</i>	74
<i>anceps, Bl.</i>	195	<i>penangiana, Ridl.</i>	112	<i>flammuliferum,</i>	
<i>bifaria, Lindl.</i>	196	<i>Asparagus, Linn.</i>	331	<i>Ridl.</i>	74
<i>callosa, Bl.</i>	108	<i>racemosus, Willd.</i>	331	<i>galbinum, Ridl.</i>	58
<i>complanata, Ridl.</i>	195	<i>Ataccia</i>		<i>gigas, Ridl.</i>	67
<i>cordata, Hook. fil.</i>	197	<i>cristata, Kunth.</i>	310	<i>globulus, Hook. fil.</i>	73
<i>cornuta, Bl.</i>	196	<i>Bagnisia, Becc.</i>	308	<i>Griffithianum, Par.</i>	
<i>densifolia, Ridl.</i>	197	<i>crocea, Becc.</i>	308	<i> & Rchb. fil.</i>	80
<i>echinocarpa, Hook.</i>		<i>Blyxa, Thouars</i>	2	<i>hirtulum, Ridl.</i>	65
<i>fil.</i>	197	<i>malayana, Ridl.</i>	3	<i>hispidum, Ridl.</i>	61
<i>elongata, Ridl.</i>	108	<i>Bromheadia, Lindl.</i>	149	<i>lasianthum, Lindl.</i>	65
<i>Hasseltii, Bl.</i>	108	<i>alticola, Ridl.</i>	151	<i>leptosepalum,</i>	
<i>lancifolia, Hook. fil.</i>	198	<i>aporoides, Rchb. fil.</i>	151	<i>Hook. fil.</i>	72
<i>Lewisii, Priff.</i>	195	<i>brevifolia, Ridl.</i>	151	<i>lilacinum, Ridl.</i>	68
<i>lucida, Ridl.</i>	196	<i>palustris, Lindl.</i>	150	<i>limbatum, Lindl.</i>	65
<i>Maingayi, Hook.</i>		<i>pungens, Ridl.</i>	151	<i>linearifolium,</i>	
<i>fil.</i>	198	<i>rupestris, Ridl.</i>	150	<i>King</i>	72
<i>muricata, Teysm.</i>		<i>scirpoidea, Ridl.</i>	151	<i>Lobbi, Lindl.</i>	60
<i> & Binn.</i>	197	<i>sylvestris, Ridl.</i>	150	<i>longiflorum, Ridl.</i>	59
<i>pendula, Bl.</i>	198			<i>longistelidium,</i>	
				<i>Ridl.</i>	64

	PAGE		PAGE		PAGE
Bulbophyllum (<i>contd.</i>)		Bulbophyllum (<i>contd.</i>)		Calanthe (<i>contd.</i>)	
macranthum,		stenophyllum, <i>Ridl.</i>	80	<i>Scortechinii</i> , Hook.	
<i>Lindl.</i>	57	striatellum, <i>Ridl.</i>	62	<i>fil.</i>	121
Makoyanum, <i>Ridl.</i>	79	subumbellatum,		<i>Scortechinii</i> , <i>Ridl.</i>	121
maximum, <i>Ridl.</i>	81	<i>Ridl.</i>	61	<i>speciosa</i> , <i>Lindl.</i>	121
medusæ, <i>Rchb. fil.</i>	75	tenerum, <i>Ridl.</i>	65	<i>veratrifolia</i> , <i>R. Br.</i>	119
megalanthum,		tinea, <i>Ridl.</i>	62	<i>vestita</i> , <i>Lindl.</i>	123
<i>Griff.</i>	57	titania, <i>Ridl.</i>	62	<i>Wrayi</i> , Hook. <i>fil.</i>	119
membranaceum,		trichoglottis, <i>Ridl.</i>	67	<i>Callostylis</i>	
<i>T. & B.</i>	64	trifolium, <i>Ridl.</i>	68	<i>rigida</i> , <i>Bl.</i>	104
membranifolium,		<i>trisetosum</i> , <i>Griff.</i>	69	Camptandra, <i>Ridl.</i>	243
<i>Hook. fil.</i>	60	<i>truncicola</i> , Schlech-		<i>latifolia</i> , <i>Ridl.</i>	243
microbulbon, <i>Ridl.</i>	79	<i>ter</i>	64	<i>ovata</i> , <i>Ridl.</i>	244
microglossum,		vaginatum, <i>Rchb.</i>		<i>parvula</i> , <i>Ridl.</i>	243
<i>Ridl.</i>	60	<i>fil.</i>	76	<i>tahanensis</i> , <i>Ridl.</i>	244
minutulum, <i>Ridl.</i>	62	<i>vanessa</i> , <i>King</i>	69	CANNACEÆ	291
modestum, <i>Hook.</i>		<i>variabile</i> , <i>Ridl.</i>	59	Canna, <i>Linn.</i>	291
<i>fil.</i>	71	<i>vermiculare</i> , <i>Hook.</i>		<i>orientalis</i> , <i>Rosc.</i>	291
montigenum, <i>Ridl.</i>	72	<i>fil.</i>	71	<i>Warszewiczii</i> ,	
musciferum, <i>Ridl.</i>	66	<i>viridescens</i> , <i>Ridl.</i>	73	<i>Dietr.</i>	291
nematocaulon,		<i>vitellinum</i> , <i>Ridl.</i>	64	Carenophila, <i>Ridl.</i>	255
<i>Ridl.</i>	63	<i>Wrayi</i> , Hook. <i>fil.</i>	66	<i>montana</i> , <i>Ridl.</i>	256
<i>oblancoelatum</i> ,		<i>xanthum</i> , <i>Ridl.</i>	68	<i>Cenolophon</i>	
<i>King</i>	72	BURMANNIACEÆ	303	<i>vitellinum</i> , <i>Horan</i>	284
ochraceum, <i>Ridl.</i>	81	Burmanna, <i>Linn.</i>	303	Cerastostylis, <i>Bl.</i>	109
ochranthum, <i>Ridl.</i>	71	<i>azurea</i> , <i>Griff.</i>	304	<i>clathrata</i> , <i>Hook.</i>	
odoratum, <i>Lindl.</i>	72	<i>Championii</i> ,		<i>fil.</i>	111
oeneum, <i>Burkill</i>	63	<i>Thwaites</i>	306	<i>cryptantha</i> , <i>Ridl.</i>	110
oreas, <i>Ridl.</i>	63	<i>coelestis</i> , <i>Don</i>	304	<i>eriaoides</i> , <i>Hook.</i>	
pan, <i>Ridl.</i>	63	<i>disticha</i> , <i>Linn.</i>	304	<i>fil.</i>	110
patens, <i>Hook. fil.</i>	57	<i>gracilis</i> , <i>Ridl.</i>	305	<i>gracilis</i> , <i>Ridl.</i>	109
paullum, <i>Ridl.</i>	70	<i>Griffithii</i> , <i>Becc.</i>	305	<i>lancifolia</i> , <i>Hook.</i>	
perakense, <i>Ridl.</i>	77	<i>longifolia</i> , <i>Becc.</i>	304	<i>fil.</i>	109
pileatum, <i>Lindl.</i>	57	<i>lutescens</i> , <i>Becc.</i>	305	<i>linearifolia</i> , <i>Ridl.</i>	110
planibulbe, <i>Ridl.</i>	75	<i>oblonga</i> , <i>Ridl.</i>	305	<i>linearis</i> , <i>Ridl.</i>	110
polystictum, <i>Ridl.</i>	59	<i>tuberosa</i> , <i>Becc.</i>	306	<i>malaccensis</i> , <i>Hook.</i>	
psittacoides, <i>Ridl.</i>	76	<i>Wallichii</i> , <i>Hook.</i>		<i>fil.</i>	109
<i>pteriphilum</i> , <i>Rolfe.</i>	82	<i>fil.</i>	305	<i>pendula</i> , <i>Hook. fil.</i>	111
pulchellum, <i>Ridl.</i>	80	Calanthe, <i>R. Br.</i>	118	<i>puncticulata</i> , <i>Ridl.</i>	111
punctatissimum,		<i>albolutea</i> , <i>Ridl.</i>	121	<i>robusta</i> , <i>Hook. fil.</i>	110
<i>Ridl.</i>	77	<i>angustifolia</i> , <i>Lindl.</i>	120	<i>subulata</i> , <i>Bl.</i>	109
purpurascens,		<i>aurantiaca</i> , <i>Ridl.</i>	120	Cheirostylis, <i>Bl.</i>	218
<i>Teysm.</i>	78	<i>Ceciliae</i> , <i>Rchb. fil.</i>	119	<i>flabellata</i> , <i>Wight</i>	218
pustulatum, <i>Ridl.</i>	60	<i>curculigoides</i> ,		<i>Goldschmidtiana</i> ,	
restrepia, <i>Ridl.</i>	75	<i>Lindl.</i>	121	<i>Schlechter</i>	218
rhizophoreti, <i>Ridl.</i>	77	<i>diploxiphion</i> , <i>Hook.</i>		Chelonanthera, <i>Bl.</i>	138
rugosum, <i>Ridl.</i>	60	<i>fil.</i>	119	<i>gibbosa</i> , <i>Bl.</i>	139
rupicolum, <i>Ridl.</i>	77	Forstermanni,		<i>Chelonistele</i> , <i>Pfitz.</i>	138
<i>sanguineo-macula-</i>		<i>Rchb. fil.</i>	121	<i>perakensis</i> , <i>Ridl.</i>	138
<i>tum</i> , <i>Ridl.</i>	60	<i>gracilis</i> , <i>Lindl.</i>	122	<i>pusilla</i> , <i>Ridl.</i>	138
sarcanthoides,		<i>monophylla</i> , <i>Ridl.</i>	122	Chlorophytum, <i>Ker.</i>	327
<i>Ridl.</i>	71	<i>ovata</i> , <i>Ridl.</i>	120	<i>orchidastrum</i> ,	
selangorense, <i>Ridl.</i>	73	<i>phajoides</i> , <i>Rchb.</i>		<i>Lindl.</i>	327
semibifidum, <i>Ridl.</i>	79	<i>fil.</i>	120	Chrysoglossum, <i>Bl.</i>	111
siamense, <i>Rchb. fil.</i>	60	<i>pubescens</i> , <i>Ridl.</i>	120	<i>villosum</i> , <i>Bl.</i>	111
Skeatianum, <i>Ridl.</i>	78	<i>rubens</i> , <i>Ridl.</i>	123	<i>Cirrhopetalum</i>	
stella, <i>Ridl.</i>	69			<i>acuminatum</i> , <i>Ridl.</i>	79

PAGE		PAGE		PAGE	
	<i>Cirrhopetalum</i> (contd.)		<i>Cœlogyne</i> (contd.)		<i>Corysanthes</i> (contd.)
	<i>auratum</i> , Ridl. 78		<i>macrobulbon</i> , Hook.		<i>mucronata</i> , Bl. 205
	<i>Blumei</i> , Lindl. 74		<i>fil.</i> 131		<i>picta</i> , Lindl. 204
	<i>breviscapum</i> , Rolfe 74		<i>Maingayi</i> , Hook. 132		<i>Costus</i> , Linn. 256
	<i>Brienianum</i> , Rolfe 80		<i>fil.</i> 132		<i>globosus</i> , Bl. 256
	<i>caudatum</i> , Wight 76		<i>Massangeana</i> ,		<i>Kingii</i> , Bak. 257
	<i>citrinum</i> , Ridl. 78		Rchb. <i>fil.</i> 130		<i>Kunstleri</i> , Ridl. 257
	<i>concinnum</i> , Hook.		<i>Mayeriana</i> , Rchb.		<i>oligophyllus</i> ,
	<i>fil.</i> 80		<i>fil.</i> 133		Schum. 257
	<i>Curtisii</i> , Hook. <i>fil.</i> 77		<i>pallens</i> , Ridl. 135		<i>speciosus</i> , Sm. 256
	<i>fascinator</i> , Rolfe 74		<i>pandurata</i> , Lindl. 133		<i>velutinus</i> , Ridl. 257
	<i>gamosepalum</i> ,		<i>perakensis</i> , Rolfe 138		<i>Crinonia</i> , Bl. 136
	Griff. 80		<i>plantaginea</i> , Lindl. 131		<i>carnea</i> , Bl. 137
	<i>gracillimum</i> , Rolfe 76		<i>prasina</i> , Ridl. 136		<i>Elizabethiana</i> ,
	<i>lineavifolium</i> , Ridl. 80		<i>pusilla</i> , Ridl. 138		Ridl. 137
	<i>Makoyanum</i> , Rchb.		<i>quadrangularis</i> ,		<i>parviflora</i> , Pfitger 137
	<i>fil.</i> 79		Ridl. 131		<i>Crinum</i> , Linn. 300
	<i>maximum</i> , Ridl. 81		<i>radicosa</i> , Ridl. 135		<i>asiaticum</i> , Linn. 301
	<i>medusæ</i> , Lindl. 75		<i>Rochussenii</i> , De		<i>defixum</i> , Ker 301
	<i>microbulbon</i> , Ridl. 79		<i>Vriese</i> 131		<i>Northianum</i> , Bak. 301
	<i>ochraceum</i> , Ridl. 81		<i>speciosa</i> , Lindl. 134		<i>toxicarium</i> , Roxb. 301
	<i>planibulbe</i> , Ridl. 75		<i>stenochila</i> , Hook.		<i>Cryptonema</i>
	<i>psittacoides</i> , Ridl. 76		<i>fil.</i> 136		<i>malaccensis</i> , Turcz. 304
	<i>punctatissimum</i> ,		<i>stenophylla</i> , Ridl. 132		<i>Cryptostylis</i> , R. Br. 224
	Rolle 77		<i>sulphurea</i> , Hook.		<i>arachnites</i> , Bl. 225
	<i>semibifidum</i> , Ridl. 79		<i>fil.</i> 138		<i>filiformis</i> , Bl. 225
	<i>vaginatum</i> , Lindl. 76		<i>testacea</i> , Lindl. 129		<i>Curculigo</i> , Gaertn. 298
	<i>Claderia</i> , Hook. <i>fil.</i> 140		<i>tomentosa</i> , Lindl. 130		<i>latifolia</i> , Dryand 300
	<i>viridiflora</i> , Hook.		<i>xanthoglossa</i> , Ridl. 134		<i>megacarpa</i> , Ridl. 300
	<i>fil.</i> 140		<i>xyreks</i> , Ridl. 134		<i>recurvata</i> , Dryand 299
	<i>Cleisostoma</i>		<i>Collabium</i> , Bl. 112		<i>sumatrana</i> , Roxb. 300
	<i>fuscum</i> , Lindl. 166		<i>nebulosum</i> , Bl. 112		<i>villosa</i> , Wall. 300
	<i>ionosum</i> , Ridl. 174		<i>Wrayi</i> , Hook. <i>fil.</i> 191		<i>Curcuma</i> , Linn. 253
	<i>Kunstleri</i> , Hook. 174		COMMELINACEÆ 349		<i>aeruginosa</i> , Roxb. 254
	<i>latifolium</i> , Lindl. 166		<i>Commelina</i> , Linn. 351		<i>domestica</i> , Valeton 254
	<i>parvum</i> , Ridl. 167		<i>attenuata</i> , Koen. 352		<i>Kunstleri</i> , Bak. 252
	<i>spicatum</i> , Lindl. 170		<i>benghalensis</i> , Linn. 353		<i>lanceolata</i> , Ridl. 253
	<i>tenuicaule</i> , King 175		<i>clavata</i> , Clarke 353		<i>longa</i> , Koem. 254
	<i>uteriferum</i> , Hook.		<i>Hasskarli</i> , Clarke 352		<i>mangga</i> , Valeton 254
	<i>fil.</i> 168		<i>nudiflora</i> , Linn. 352		<i>sylvestris</i> , Ridl. 253
	<i>Cœlogyne</i> , Lindl. 128		<i>obliqua</i> , Ham. 354		<i>xanthorhiza</i> , Roxb. 254
	<i>anceps</i> , Hook. <i>fil.</i> 135		<i>salicifolia</i> , Roxb. 353		<i>zedoaria</i> , Rosc. 254
	<i>angustifolia</i> , Ridl. 132		<i>sikkimensis</i> , Clarke 352		<i>zerumbet</i> , Roxb. 254
	<i>asperata</i> , Lindl. 131		<i>suffruticosa</i> , Bl. 353		<i>Cyanotis</i> , Don. 357
	<i>Beyrodtiana</i> ,		<i>Conamomum</i> , Ridl. 254		<i>axillaris</i> , R. & Sch. 358
	Schlecht. 138		<i>citrinum</i> , Ridl. 255		<i>barbata</i> , Don. 358
	<i>carnea</i> , Hook. <i>fil.</i> 136		<i>sericeum</i> , Ridl. 255		<i>capitata</i> , Clarke 358
	<i>casta</i> , Ridl. 132		<i>utriculosum</i> , Ridl. 255		<i>cristata</i> , Roem. &
	<i>Cumingii</i> , Lindl. 134		<i>Corymbis</i> , Thouars 208		Schultes 358
	<i>cymbioides</i> , Ridl. 130		<i>brevistylis</i> , Hook.		<i>Cymbidium</i> , Sw. 145
	<i>Dayana</i> , Rchb. <i>fil.</i> 130		<i>fil.</i> 208		<i>acutum</i> , Ridl. 146
	<i>densiflora</i> , Ridl. 130		<i>longiflora</i> , Hook.		<i>Dayanum</i> , Rchb.
	<i>Foerstermanni</i> ,		<i>fil.</i> 208		<i>fil.</i> 146
	Rchb. <i>fil.</i> 132		<i>rhytidocarpa</i> , Hook.		<i>Finlaysonianum</i> ,
	<i>Kingii</i> , Hook. <i>fil.</i> 133		<i>fil.</i> 208		Lindl. 145
	<i>longibractata</i> ,		<i>Corysanthes</i> , Bl. 204		<i>Huttoni</i> , Hook. <i>fil.</i> 147
	Hook. <i>fil.</i> 132		<i>fornicata</i> , Lindl. 205		<i>lancifolium</i> , Hook. 146

	PAGE		PAGE		PAGE
<i>Cymbidium (contd.)</i>		<i>Dendrobium (contd.)</i>		<i>Dendrobium (contd.)</i>	
<i>Munronianum,</i>		<i>cornutum, Hook. fil.</i>	46	<i>mellitum, Ridl.</i>	41
<i>King</i>	146	<i>crocatum, Hook.</i>		<i>metachilinum,</i>	
<i>pendulum, Bot. Reg.</i>	145	<i>fil.</i>	47	<i>Rchb.</i>	44
<i>pubescens, Lindl.</i>	145	<i>cruentum, Rchb.</i>		<i>metrium, Kvanzl.</i>	45
<i>rectum, Ridl.</i>	146	<i>fil.</i>	52	<i>modestum, Ridl.</i>	45
<i>Simonstanum,</i>		<i>crumenatum,</i>		<i>pachyglossum,</i>	
<i>King & Pant.</i>	146	<i>Swartz</i>	42	<i>Par. & Rchb. fil.</i>	40
<i>stapelæiflorum,</i>		<i>Dalhousieanum,</i>		<i>pallidiflorum, Ridl.</i>	31
<i>Teysm. & Binn.</i>	147	<i>Wall.</i>	52	<i>pandaneti, Ridl.</i>	44
<i>Stephensi, Ridl.</i>	147	<i>Derryi, Ridl.</i>	47	<i>panduriferum var.</i>	
<i>Cyphostigma</i>		<i>eriæiflorum, Griff.</i>	51	<i>serpens, Hook.</i>	
<i>exsertum, Scort.</i>	274	<i>eulophotum, Lindl.</i>	35	<i>fil.</i>	47
<i>Cypripedium</i>		<i>euphlebium, Lindl.</i>	44	<i>pensile, Ridl.</i>	40
<i>barbatum, Lindl.</i>	231	<i>exilicaule, Ridl.</i>	50	<i>perakense, Hook.</i>	
<i>Lowii, Lindl.</i>	232	<i>flabellum, Rchb.</i>	30	<i>fil.</i>	96
<i>niveum, Rchb. fil.</i>	231	<i>flavidulum, Hook.</i>		<i>Pierardi, Roxb.</i>	51
<i>Peveinæ, Ridl.</i>	231	<i>fil.</i>	45	<i>planibulbe, Lindl.</i>	41
<i>Robinsonii, Ridl.</i>	232	<i>flexile, Ridl.</i>	39	<i>prostratum, Ridl.</i>	38
<i>superbiens, Rchb.</i>		<i>Foxii, Ridl.</i>	49	<i>pumilum, Roxb.</i>	34
<i>fil.</i>	232	<i>gemellum, Lindl.</i>	40	<i>pyropum, Ridl.</i>	47
<i>Cyrtosia</i>		<i>geminatum, Hook.</i>		<i>quadrangulare,</i>	
<i>javanica, Bl.</i>	203	<i>fil.</i>	28	<i>Ridl.</i>	34
<i>Cystorchis, Bl.</i>	211	<i>gracile, Lindl.</i>	41	<i>revolutum, Lindl.</i>	43
<i>aphylla, Ridl.</i>	212	<i>grande, Hook.</i>	36	<i>rhizophoreti, Ridl.</i>	36
<i>javanica, Bl.</i>	212	<i>Haniffii, Ridl.</i>	51	<i>rhodostele, Ridl.</i>	35
<i>variegata, Bl.</i>	211	<i>hercoglossum,</i>		<i>roseatum, Ridl.</i>	48
<i>Damasonium</i>		<i>Rchb. fil.</i>	45	<i>rosellum, Ridl.</i>	35
<i>indicum, Roxb.</i>	3	<i>heterocarpum, Wall.</i>	51	<i>roseo-punctatum,</i>	
<i>Dendrobium, Sw.</i>	32	<i>Hosei, Ridl.</i>	43	<i>Ridl.</i>	31
<i>abietinum, Ridl.</i>	40	<i>hymenopterum,</i>		<i>rupicolum, Ridl.</i>	42
<i>acerosum, Lindl.</i>	38	<i>Ridl.</i>	48	<i>sanguinolentum,</i>	
<i>aduncum, Hook. fil.</i>	45	<i>hymenopterum,</i>		<i>Lindl.</i>	50
<i>ægæ, Ridl.</i>	47	<i>Hook. fil.</i>	48	<i>Scortechinii, Hook.</i>	
<i>aggregatum, Roxb.</i>	52	<i>Kelsalli, Ridl.</i>	30	<i>fil.</i>	52
<i>Ardeni, Ridl.</i>	30	<i>kentrochilum,</i>		<i>secundum, Lindl.</i>	46
<i>atropurpureum,</i>		<i>Hook. fil.</i>	50	<i>serpens, Hook. fil.</i>	47
<i>Miq.</i>	37	<i>kentrophyllum,</i>		<i>serra, Lindl.</i>	35
<i>atrorubens, Ridl.</i>	37	<i>Hook. fil.</i>	39	<i>setifolium, Ridl.</i>	41
<i>aureum, Lindl.</i>	51	<i>Kunstleri, Hook.</i>		<i>sinuatum, Lindl.</i>	37
<i>bifarium, Lindl.</i>	42	<i>fil.</i>	30	<i>subflavidum, Ridl.</i>	49
<i>bifidum, Ridl.</i>	31	<i>lacinosum, Ridl.</i>	31	<i>subulatum, Hook.</i>	
<i>calcaratum, Lindl.</i>	39	<i>lamellatum, Lindl.</i>	46	<i>fil.</i>	39
<i>callicopis, Ridl.</i>	48	<i>leonis, Rchb.</i>	37	<i>superbum, Rchb.</i>	
<i>callibotrys, Ridl.</i>	44	<i>lepidum, Ridl.</i>	48	<i>fil.</i>	52
<i>cerinum, Rchb. fil.</i>	50	<i>lobatum, Miq.</i>	36	<i>tenuicaule, Ridl.</i>	50
<i>chloroleucum, Ridl.</i>	49	<i>Lobbii, Teysm.</i>	39	<i>teres, Lindl.</i>	38
<i>citrino-castaneum,</i>		<i>lonchophyllum,</i>		<i>terminale, Par. &</i>	
<i>Burkill</i>	29	<i>Hook. fil.</i>	29	<i>Rchb. fil.</i>	36
<i>clarissimum, Ridl.</i>	49	<i>longicolle, Lindl.</i>	27	<i>tetrodon, Rchb. fil.</i>	45
<i>clavator, Ridl.</i>	41	<i>longipes, Hook. fil.</i>	28	<i>Teysmanni, Miq.</i>	39
<i>clavipes, Hook. fil.</i>	41	<i>macranthum, Hook.</i>		<i>trifide, Lindl.</i>	52
<i>comatum, Bl.</i>	30	<i>fil.</i>	52	<i>trivernium, Ridl.</i>	51
<i>compressum, Lindl.</i>	46	<i>macropodium,</i>		<i>tropæoliflorum,</i>	
<i>concinnum, Miq.</i>	37	<i>Hook. fil.</i>	28	<i>Hook. fil.</i>	49
<i>constalix, Rchb.</i>	39	<i>Mannii, Ridl.</i>	36	<i>truncatum, Lindl.</i>	41
		<i>megaceras, Hook. fil.</i>	50	<i>tuberiferum, Hook.</i>	41

	PAGE		PAGE		PAGE
Dendrobium (<i>contd.</i>)		Dioscorea, Linn.	313	Dracæna (<i>contd.</i>)	
uniflorum, Griff.	43	aculeata, Linn.	315	breviflora, Ridl.	335
villosulum, Wall.	40	alata, Linn.	319	Cantleyi, Bak.	336
virescens, Ridl.	47	bulbifera, Linn.	315	conferta, Ridl.	332
viridicatum, Ridl.	45	cornifolia, Kunth.	316	congesta, Ridl.	334
Dendrochilum,		dæmona, Roxb.	314	Curtisii, Ridl.	333
Blume	81	deflexa, Hook. fil.	317	cuspidata, Ridl.	333
album, Ridl.	82	fasciculata, Roxb.	315	elliptica, Thunb.	337
angustifolium,		gibbiflora, Hook. fil.	317	Finlaysonii, Bak.	333
Ridl.	82	glabra, Roxb.	318	graminifolia, Ridl.	332
bracteosum, Rchb.	25	laurifolia, Wall.	319	graminifolia, Wall.	333
crassum, Ridl.	82	myriantha, Kunth.	317	granulata, Hook.	
ellipticum, Ridl.	83	orbiculata, Hook.		fil.	332
linearifolium,		fil.	317	gracilis, Wall.	337
Hook. fil.	25	pentaphylla, Ridl.	314	Jackiana, Wall.	338
pallidifolium,		pentaphylla, Linn.	314	longifolia, Ridl.	335
Hook. fil.	82	piscatorum, Prain		Maingayi, Hook.	
spathulatum,		& Burkill	319	fil.	335
Ridl.	82	polyclades, Hook.		marmorata, Bak.	336
Dendrocolla, Bl.	186	fil.	315	nutans, Ridl.	337
alba, Ridl.	188	Porteri, Prain &		pachyphylla, Kurz.	334
arachnites, Bl.	185	Burkill	318	penangensis, Ridl.	335
brachyglottis,		pyrifolia, Kunth.	316	pendula, Ridl.	337
Ridl.	189	reticulata, Prain &		Porteri, Bak.	333
carinatifolia, Ridl.	189	Burkill	314	robusta, Ridl.	332
carnosa, Ridl.	188	sativa, Thunb.	315	siamica, Ridl.	334
ciliata, Ridl.	188	sativa, Wall.	317	singaporensis, Ridl.	334
filiformis, Ridl.	187	Scortechinii, Prain		terniflora, Ridl.	334
maculata, Ridl.	188	& Burkill	314	terniflora, Roxb.	337
pardalis, Ridl.	187	stenomeriflora,		trachystachys,	
psiloglottis, Ridl.	189	Prain & Burkill	319	Hook. fil.	336
trichoglottis, Ridl.	187	tamarisciflora,		umbratica, Ridl.	334
Desmotrichum, Bl.	29	Prain & Burkill	314	yuccæfolia, Ridl.	338
Ardeni, Ridl.	30	tenuifolia, Ridl.	317	Elettariopsis, Bak.	274
bifidum, Kranzl.	31	triphylla, Linn.	314	Curtisii, Bak.	274
criniferum, Lindl.	30	Zollingeriana,		cyanescens, Ridl.	246
fimbriatum, Bl.	30	Kunth.	317	exserta, Bak.	274
Kelsalli, Ridl.	30	Diplocaulobium,		latiflora, Ridl.	274
laciniosum, Kranzl.	31	Rchb. fil.	27	longituba, Ridl.	275
lonchophyllum,		longicolle, Kranzl.	27	pubescens, Ridl.	275
Kranzl.	29	Dipodium, Lindl.	147	serpentina, Bak.	274
pallidiflorum, Ridl.	31	paludosum, Rchb.		Enhalus, Richard	4
roseo-punctatum,		fil.	148	acoroïdes, Zoll.	4
Ridl.	31	pictum, Rchb.	147	Koenigii, Rich.	4
Dianella, Lam.	328	Disporum, Salisb.	338	marinus, Griff.	4
ensifolia, Redoute	329	pullum, Salisb.	338	Enhydrias, Ridl.	1
parviflora, Ridl.	330	Donax, Lour.	286	angustipetala, Ridl.	2
Dicerostylis		arundastrum, Lour.	286	Ephippium	
lanceolata, Bl.	223	grandis, Ridl.	286	ciliatum, Bl.	74
Didymoplexis, Griff.	206	parviflora, Ridl.	287	Eria, Lindl.	83
pallens, Griff.	206	Doritis, Lindl.	158	aeridostachya,	
Diglyphosa, Bl.	112	pulcherrima, Lindl.	158	Rchb. fil.	96
latifolia, Bl.	112	Wightii, Benth.	158	albido-tomentosa,	
Dilochia, Lindl.	126	Dossinia, Morren	215	Lindl.	98
Cantleyi, Ridl.	127	marmorata, Morren	215	aporina, Hook. fil.	102
Wallichii, Lindl.	126	Dracæna, Linn.	331	bidens, Ridl.	86
DIOSCOREACEÆ	311	aurantiaca, Wall.	336		

PAGE		PAGE		PAGE
	<i>Eria</i> (contd.)		<i>Eria</i> (contd.)	
	<i>bractescens</i> , Lindl. 91		<i>reptans</i> , Ridl. 97	
	<i>Braddoni</i> , Rolfe 92		<i>Ridleyi</i> , Rolfe 87	
	<i>brunea</i> , Ridl. 97		<i>rotundifolia</i> , Ridl. 102	
	<i>carnea</i> , Ridl. 93		<i>saccata</i> , Ridl. 90	
	<i>carunculata</i> , Ridl. 94		<i>saccifera</i> , Hook. fil. 92	
	<i>cephifolia</i> , Ridl. 90		<i>Scortechinii</i> , Hook. fil. 88	
	<i>citrina</i> , Ridl. 87		<i>stellata</i> , Lindl. 96	
	<i>crassifolia</i> , Ridl. 98		<i>striolata</i> , Rchb. fil. 96	
	<i>crassipes</i> , Ridl. 97		<i>suaveolens</i> , Ridl. 91	
	<i>cristata</i> , Ridl. 101		<i>tahanensis</i> , Ridl. 87	
	<i>dasystachys</i> , Ridl. 98		<i>tenuiflora</i> , Ridl. 90	
	<i>densa</i> , Ridl. 90		<i>teretifolia</i> , Griff. 99	
	<i>diluta</i> , Ridl. 95		<i>tuberosa</i> , Hook. fil. 103	
	<i>dissitiflora</i> , Ridl. 85		<i>velutina</i> , Lindl. 101	
	<i>Earine</i> , Ridl. 88		<i>vestita</i> , Lindl. 100	
	<i>elata</i> , Hook. fil. 96		<i>xanthocheila</i> , Ridl. 91	
	<i>Endymion</i> , Ridl. 91		<i>Eulophia</i> , Br. 140	
	<i>floribunda</i> , Lindl. 89		<i>elata</i> , Hook. fil. 141	
	<i>gracilis</i> , Hook. fil. 104		<i>graminea</i> , Lindl. 141	
	<i>hispidissima</i> , Ridl. 102		<i>inconspicua</i> , Griff. 141	
	<i>iridifolia</i> , Hook. fil. 86		<i>Keithii</i> , Ridl. 142	
	<i>Kingii</i> , Hook. fil. 87		<i>macrorrhiza</i> , Bl. 142	
	<i>lancifolia</i> , Hook. fil. 85		<i>squalida</i> , Lindl. 141	
	<i>larutensis</i> , Ridl. 86		<i>Eurycles</i> , Salisb. 302	
	<i>latibracteata</i> , Ridl. 92		<i>amboinensis</i> , Lindl. 303	
	<i>leiophylla</i> , Lindl. 99		<i>australasica</i> , Lindl. 303	
	<i>leptocarpa</i> , Hook. fil. 88		<i>sylvestris</i> , Salisb. 303	
	<i>linearifolia</i> , Ridl. 97		FLAGELLARIACEÆ 367	
	<i>longerepens</i> , Ridl. 95		<i>Flagellaria</i> , Linn. 367	
	<i>longifolia</i> , Hook. fil. 88		<i>angustifolia</i> , Wall. 368	
	<i>lorifolia</i> , Ridl. 98		<i>indica</i> , Linn. 368	
	<i>Maingayi</i> , Hook. fil. 92		<i>Floscopa</i> , Lour. 359	
	<i>major</i> , Ridl. 87		<i>scandens</i> , Lour. 359	
	<i>minutiflora</i> , Ridl. 108		<i>Forrestia</i> , Lesson 359	
	<i>monticola</i> , Hook. fil. 103		<i>glabrata</i> , Hassk. 360	
	<i>neglecta</i> , Ridl. 95		<i>gracilis</i> , Ridl. 359	
	<i>nutans</i> , Lindl. 94		<i>Griffithii</i> , Clarke 360	
	<i>obliqua</i> , Lindl. 86		<i>hispidata</i> , Bot. Mag. 360	
	<i>ochracea</i> , Rolfe 95		<i>irritans</i> , Ridl. 361	
	<i>oligantha</i> , Hook. fil. 103		<i>marginata</i> , Hassk. 360	
	<i>pannea</i> , Lindl. 99		<i>mollis</i> , Hassk. 360	
	<i>pellipes</i> , Hook. fil. 99		<i>monosperma</i> , Clarke 360	
	<i>pendula</i> , Ridl. 89		<i>Galeola</i> , Lour. 201	
	<i>pilifera</i> , Ridl. 89		<i>altissima</i> , Rchb. fil. 203	
	<i>poculata</i> , Ridl. 103		<i>Hydra</i> , Rchb. 202	
	<i>pubica</i> , Ridl. 85		<i>javanica</i> , Benth. & Hook. 203	
	<i>pulchella</i> , Lindl. 104		<i>Gastrochilus</i> , Wall. 246	
	<i>pygmæa</i> , Hook. fil. 110		<i>acuta</i> , Ridl. 249	
	<i>ramulosa</i> , Ridl. 94		<i>albo-sanguinea</i> , Ridl. 247	
	<i>recurvata</i> , Hook. fil. 92		<i>biloba</i> , Ridl. 251	
			<i>Gastrochilus</i> (contd.)	
			<i>biloba</i> var. <i>lanceolata</i> , Ridl. 252	
			<i>calophylla</i> , Ridl. 251	
			<i>clivalis</i> , Ridl. 249	
			<i>concinna</i> , Ridl. 251	
			<i>Curtisii</i> , Bak. 249	
			<i>flava</i> , Ridl. 248	
			<i>Klossii</i> , Ridl. 248	
			<i>lanceolatus</i> , Ridl. 250	
			<i>lancifolius</i> , Ridl. 250	
			<i>longiflora</i> , Wall. 249	
			<i>longifolia</i> , Ridl. 252	
			<i>longipes</i> , Ridl. 250	
			<i>lurida</i> , Ridl. 248	
			<i>minor</i> , Bak. 252	
			<i>minor</i> , Ridl. 248	
			<i>oculata</i> , Ridl. 251	
			<i>pandurata</i> , Ridl. 249	
			<i>plicata</i> , Ridl. 247	
			<i>Prainiana</i> , Ridl. 248	
			<i>puberula</i> , Ridl. 251	
			<i>pulcherrima</i> , Wall. 247	
			<i>scaphochlamys</i> , Ridl. 250	
			<i>subbilobus</i> , Burkill 250	
			<i>tillandsioides</i> , Bak. 248	
			<i>Gastrodia</i> , Bl. 207	
			<i>Hasselti</i> , Bl. 208	
			<i>malayana</i> , Ridl. 207	
			<i>Geocharis</i> , Ridl. 273	
			<i>aurantiaca</i> , Ridl. 273	
			<i>Geodorum</i> , Jack 142	
			<i>citrinum</i> , Jack 143	
			<i>fucatum</i> , Lindl. 142	
			<i>purpureum</i> , Br. 142	
			<i>Georchis</i>	
			<i>cordata</i> , Lindl. 220	
			<i>foliosa</i> , Lindl. 220	
			<i>Geostachys</i> , Ridl. 275	
			<i>decurvata</i> , Ridl. 276	
			<i>densiflora</i> , Ridl. 276	
			<i>elegans</i> , Ridl. 277	
			<i>penangensis</i> , Ridl. 276	
			<i>primulina</i> , Ridl. 277	
			<i>rupestris</i> , Ridl. 276	
			<i>secunda</i> , Ridl. 276	
			<i>Globba</i> , Linn. 234	
			<i>albiflora</i> , Ridl. 237	
			<i>aurantiaca</i> , Mig. 239	
			<i>brachycarpa</i> , Bak. 240	
			<i>cernua</i> , Bak. 240	
			<i>elegans</i> , Ridl. 237	
			<i>fasciata</i> , Ridl. 236	
			<i>floribunda</i> , Bak. 238	
			<i>leucantha</i> , Mig. 238	
			<i>macranthera</i> , Ridl. 240	

	PAGE		PAGE		PAGE
Globba (<i>contd.</i>)		Hæmaria (<i>contd.</i>)		Hornstedtia (<i>contd.</i>)	
malaccensis, <i>Ridl.</i>	237	discolor, <i>Lindl.</i>	216	scyphus, <i>Retz.</i>	267
marantina, <i>Linn.</i>	241	Otleæ, <i>Rolfe.</i>	216	striolata, <i>Ridl.</i>	268
montana, <i>Ridl.</i>	236	<i>Hæmatorchis</i>		triorgyale, <i>Ridl.</i>	269
<i>pallidiflora</i> , <i>Bak.</i>	238	altissima, <i>Bl.</i>	203	venusta, <i>Ridl.</i>	272
panicoides, <i>Miq.</i>	235	Halophila, <i>Thouars.</i>	4	<i>Hydrocharidææ</i>	I
pendula, <i>Roxb.</i>	236	ovata, <i>Gaud.</i>	4	Hydrilla, <i>Rich.</i>	I
perakensis, <i>Ridl.</i>	239	Hedychium, <i>Koen.</i>	241	verticillata, <i>Presl.</i>	I
regalis, <i>Ridl.</i>	237	collinum, <i>Ridl.</i>	241	Hyplophila, <i>Lindl.</i>	223
<i>stenothyrsa</i> var.		coronarium, <i>Linn.</i>	241	lanceolata, <i>Hook.</i>	223
<i>Cumingii</i> , <i>Bak.</i>	238	crassifolium, <i>Bak.</i>	242	mollis, <i>Lindl.</i>	223
uliginosa, <i>Miq.</i>	235	denticulatum, <i>Ridl.</i>	243	Hypoxis, <i>Linn.</i>	298
unifolia, <i>Ridl.</i>	240	longicornutum,		aurea, <i>Lour.</i>	298
valida, <i>Ridl.</i>	236	<i>Bak.</i>	242	minor, <i>Don.</i>	298
variabilis, <i>Ridl.</i>	239	macrorrhizum,		<i>Ipsea</i>	
violacea, <i>Ridl.</i>	239	<i>Ridl.</i>	242	<i>Wrayana</i> , <i>Hook. fil.</i>	115
Wallichii, <i>Bak.</i>	235	malayanum, <i>Ridl.</i>	241	Joinvillea, <i>Gaud.</i>	368
Gloriosa, <i>Linn.</i>	338	<i>Hellenia</i>		malayana, <i>Ridl.</i>	368
superba, <i>Linn.</i>	339	<i>scabra</i> , <i>Bl.</i>	279	Kæmpferia, <i>Linn.</i>	245
<i>Gonyanthes</i>		Heteraria, <i>Bl.</i>	220	<i>concinna</i> , <i>Bak.</i>	251
<i>Wallichii</i> , <i>Miers.</i>	305	alta, <i>Ridl.</i>	221	cyanescens, <i>Ridl.</i>	246
Goodyera, <i>R. Br.</i>	219	clata, <i>Hook. fil.</i>	222	elegans, <i>Wall.</i>	245
cordata, <i>Hook. fil.</i>	220	elata, <i>Ridl.</i>	222	galanga, <i>Linn.</i>	245
discolor, <i>Ker.</i>	216	elegans, <i>Ridl.</i>	222	lutea, <i>Wright.</i>	252
foliosa, <i>Hook. fil.</i>	220	nitida, <i>Ridl.</i>	222	<i>panjurata</i> , <i>Roxb.</i>	249
gracilis, <i>Hook. fil.</i>	219	obliqua, <i>Bl.</i>	221	<i>parvula</i> , <i>Bak.</i>	243
lanceolata, <i>Ridl.</i>	220	ophirensis, <i>Ridl.</i>	222	<i>Prairiana</i> , <i>Bak.</i>	248
pusilla, <i>Bl.</i>	219	parvifolia, <i>Ridl.</i>	223	pulchra, <i>Ridl.</i>	245
rubens, <i>Bl.</i>	220	pauciflora, <i>Ridl.</i>	222	rotunda, <i>Linn.</i>	246
Grammatophyllum, <i>Bl.</i>	149	<i>purpurascens</i> , <i>Bl.</i>	218	Kingiella, <i>Rolfe.</i>	157
speciosum, <i>Bl.</i>	149	Heterosmilax, <i>Kunth.</i>	344	decumbens, <i>Rolfe.</i>	158
Gymnosiphon, <i>Bl.</i>	306	indica, <i>A. DC.</i>	344	Lecanorchis, <i>Bl.</i>	206
aphyllum, <i>Bl.</i>	306	Hippeophyllum,		malaccensis, <i>Ridl.</i>	206
borneense, <i>Becc.</i>	306	<i>Schlechter.</i>	18	<i>Ridleyana</i> ,	
Habenaria, <i>Linn.</i>	226	<i>Scortechinii</i> ,		<i>Schlecht.</i>	207
acuifera, <i>Wall.</i>	228	<i>Schlechter.</i>	18	Lepidogyne, <i>Bl.</i>	224
carnea, <i>N. E.</i>		Hitcheniopsis,		longifolia, <i>Bl.</i>	224
<i>Brown.</i>	227	<i>Ridl.</i>	252	Leucolena, <i>Ridl.</i>	207
<i>gigantea</i> , <i>Don.</i>	228	<i>grandiflora</i> , <i>Wall.</i>	253	ornata, <i>Ridl.</i>	207
gigas, <i>Hook. fil.</i>	229	Kunstleri, <i>Ridl.</i>	252	LILIACEÆ	321
glaucescens, <i>Ridl.</i>	229	lanceolata, <i>Ridl.</i>	253	<i>Limatodes</i>	
inconspicua, <i>Ridl.</i>	229	sylvestris, <i>Ridl.</i>	253	<i>gracilis</i> , <i>Lindl.</i>	122
Kingii, <i>Hook. fil.</i>	228	Hornstedtia, <i>Retz.</i>	267	<i>Limatodis</i> , <i>Bl.</i>	124
lacertifera, <i>Benth.</i>	230	albomarginata,		<i>pallidus</i> , <i>Ridl.</i>	124
<i>Maingayi</i> , <i>King.</i>	230	<i>Ridl.</i>	269	Liparis, <i>Richard.</i>	19
monticola, <i>Ridl.</i>	230	conica, <i>Ridl.</i>	268	<i>atrosanguinea</i> ,	
<i>Murtoni</i> , <i>Hook. fil.</i>	228	fulgens, <i>Ridl.</i>	272	<i>Ridl.</i>	19
roseata, <i>Ridl.</i>	228	grandis, <i>Ridl.</i>	268	comosa, <i>Ridl.</i>	23
singaporensis, <i>Ridl.</i>	229	<i>imperialis</i> , <i>Ridl.</i>	272	compressa, <i>Lindl.</i>	24
Susannæ, <i>Br.</i>	228	Leonurus, <i>Retz.</i>	269	<i>crenulata</i> , <i>Lindl.</i>	23
xanthochila, <i>Ridl.</i>	227	macrochilus, <i>Ridl.</i>	271	disticha, <i>Lindl.</i>	24
zosterostyloides,		<i>Maingayi</i> , <i>Ridl.</i>	272	elegans, <i>Lindl.</i>	23
<i>Hook.</i>	226	megalochilus, <i>Ridl.</i>	270	ferruginea, <i>Lindl.</i>	20
Hæmaria, <i>Lindl.</i>	216	<i>metriochilus</i> , <i>Ridl.</i>	271		
<i>Dawsoniana</i> , <i>Bot.</i>		ophiuchus, <i>Ridl.</i>	268		
Mag.	216	pauciflora, <i>Ridl.</i>	270		
		pusilla, <i>Ridl.</i>	269		

	PAGE		PAGE		PAGE
Liparis (<i>contd.</i>)		Mischobulbum,		Oberonia (<i>contd.</i>)	
<i>flaccida</i> , Rchb.	23	<i>Schlecht.</i>	115	<i>lunata</i> , Lindl.	14
<i>furcata</i> , Ridl.	22	<i>Wrayanum</i> , Rolfe	115	<i>miniata</i> , Lindl.	16
<i>gracilis</i> , Hook. fil.	23	<i>Mitopetalum</i>		<i>pendula</i> , Ridl.	18
<i>lacerata</i> , Ridl.	22	<i>speciosum</i> , Bl.	114	<i>porphyrochila</i> ,	
<i>latifolia</i> , Lindl.	22	<i>Monochoria</i> , Presl.	344	<i>Ridl.</i>	16
<i>longipes</i> , Lindl.	23	<i>elata</i> , Ridl.	345	<i>Prainiana</i> , King	14
<i>Maingayi</i> , Ridl.	21	<i>hastifolia</i> , Presl.	344	<i>Rolfeana</i> , King	18
<i>parviflora</i> , Lindl.	23	<i>vaginalis</i> , Presl.	346	<i>rosea</i> , Hook. fil.	15
<i>parvula</i> , Ridl.	22	MUSACEÆ	293	<i>Scortechinii</i> , Hook.	
<i>pectinifera</i> , Ridl.	21	<i>Musa</i> , Linn.	293	<i>fil.</i>	18
<i>purpureo-iridis</i> ,		<i>flava</i> , Ridl.	294	<i>sinuosa</i> , Ridl.	15
<i>Burkill</i>	21	<i>malaccensis</i> , Ridl.	294	<i>spathulata</i> , Lindl.	17
<i>robusta</i> , Hook. fil.	22	<i>truncata</i> , Ridl.	294	<i>stenophylla</i> , Ridl.	15
<i>Scortechinii</i> , Hook.		<i>violascens</i> , Ridl.	294	<i>subnavicularis</i> ,	
<i>fil.</i>	22	NAIADACEÆ	365	<i>King</i>	14
<i>tabularis</i> , Rolfe	19	<i>Naias</i> , Linn.	365	<i>Odontochilus</i>	
<i>transtillata</i> , Ridl.	21	<i>graminea</i> , Delile	365	<i>brevistylis</i> , Hook.	
<i>tricallosa</i> , Rchb.	20	<i>Kingii</i> , Rendle	366	<i>fil.</i>	214
<i>venosa</i> , Ridl.	20	<i>minor</i> , All.	366	<i>calcaratus</i> , Hook.	
<i>Wrayi</i> , Hook. fil.	21	<i>seminuda</i> , Griff.	365	<i>fil.</i>	214
LOWIACEÆ	291	<i>ternata</i> , Griff.	366	<i>macranthus</i> , Hook.	
<i>Lowia</i>		<i>Nephelaphyllum</i> , Bl.	114	<i>fil.</i>	214
<i>longiflora</i> , Scort.	292	<i>pulchrum</i> , Bl.	115	<i>pectinatus</i> , Hook.	
<i>maxillarioides</i> ,		<i>tenuiflorum</i> , Bl.	115	<i>fil.</i>	214
<i>Hook. fil.</i>	293	<i>Nephrocacium</i>		Odontochium,	
<i>Ludisia</i>		<i>malaccense</i> , Turcz.	304	<i>Schumann</i>	242
<i>discolor</i> , Bl.	216	<i>Nervilia</i>		<i>denticulatum</i> ,	
<i>Luisia</i> , Gaud.	153	<i>aragoana</i> , Gaud.	203	<i>Schum.</i>	243
<i>antennifera</i> , Bl.	153	<i>Neuwiedia</i> , Bl.	295	<i>Ophiopogon</i> , Ker.	326
<i>brachystachys</i> , Bl.	153	<i>Curtisii</i> , Rolfe	297	<i>intermedius</i> , Don.	327
<i>tristis</i> , Hook. fil.	153	<i>Griffithii</i> , Rchb. fil.	296	<i>malayanus</i> , Ridl.	327
<i>Macodes</i> , Lindl.	215	<i>Lindleyi</i> , Rolfe	295	<i>prolifera</i> , Lindl.	327
<i>petola</i> , Lindl.	215	<i>ocrea</i> , Ridl.	296	Orchidantha, N. E.	
MARANTACEÆ	285	<i>Nicolaia</i>		<i>Bv.</i>	292
<i>Maranta</i>		<i>imperialis</i> , Horan	272	<i>longiflora</i> , Ridl.	292
<i>grandis</i> , Miq.	286	Oberonia, Lindl.	13	<i>maxillarioides</i> ,	
<i>Microsaccus</i> , Bl.	175	<i>anceps</i> , Lindl.	15	<i>Ridl.</i>	293
<i>javensis</i> , Bl.	175	<i>aurantiaca</i> , Ridl.	15	ORCHIDEÆ	4
<i>Microstylis</i> , Nutt.	10	<i>Bertoldi</i> , King	17	<i>Ottelia</i> , Pers.	3
<i>acutangula</i> , Hook. fil.	11	<i>biaurita</i> , Hook. fil.	14	<i>alismoides</i> , Pers.	3
<i>calophylla</i> , Rchb.	11	<i>brunnescens</i> , Ridl.	17	<i>Oxyanthera</i>	
<i>congesta</i> , Rchb.	12	<i>caudata</i> , King	18	<i>decurva</i> , Hook. fil.	200
<i>flavoviridis</i> , Ridl.	12	<i>ciliolata</i> , Hook. fil.	16	<i>elata</i> , Hook. fil.	200
<i>furcata</i> , Hook. fil.	22	<i>condensata</i> , Ridl.	18	<i>micrantha</i> , Ridl.	200
<i>macrochila</i> , Rolfe	11	<i>dissitiflora</i> , Ridl.	14	<i>Oxysepala</i>	
<i>Maingayi</i> , Hook.		<i>flava</i> , Ridl.	17	<i>ovalifolia</i> , Wight	69
<i>fil.</i>	21	<i>gracilis</i> , Hook. fil.	17	<i>Oxystophyllum</i>	
<i>micrantha</i> , Hook.		<i>gracillima</i> , Ridl.	14	<i>carneum</i> , Bl.	37
<i>fil.</i>	12	<i>grandis</i> , Ridl.	16	<i>Pachystoma</i> , Bl.	116
<i>memoralis</i> , Ridl.	13	<i>Griffithii</i> , Wight	15	<i>sessile</i> , Rchb. fil.	116
<i>parvula</i> , Hook. fil.	22	<i>insectifera</i> , Hook.		<i>Paphiopedilum</i> ,	
<i>perakensis</i> , Ridl.	11	<i>fil.</i>	15	<i>Pfitz.</i>	230
<i>plantaginea</i> , Hook.		<i>intermedia</i> , King	17	<i>barbatum</i> , Pfitzer	231
<i>fil.</i>	11	<i>iridifolia</i> , Lindl.	14	<i>Lowii</i> , Pfitzer	232
<i>Scottii</i> , Hook. fil.	11			<i>niveum</i> , Pfitzer	231

PAGE		PAGE		PAGE
	Paphiopedilum (<i>contd.</i>)		Philydrum, <i>Banks</i>	347
	Robinsonii, <i>Ridl.</i>	232	lanuginosum,	
	superbiens, <i>Pfitzer.</i>	232	<i>Banks</i>	347
	Pelatantheria, <i>Ridl.</i>	177	Pholidota, <i>Lindl.</i>	139
	<i>cristata</i> , <i>Ridl.</i>	177	<i>carnea</i> , <i>Lindl.</i>	137
	<i>insectifera</i> , <i>Ridl.</i>	177	<i>decurva</i> , <i>Ridl.</i>	139
	Peliosanthes, <i>Andr.</i>	323	<i>Elizabethiana</i> ,	
	<i>albida</i> , <i>Bak.</i>	325	<i>Ridl.</i>	137
	<i>grandifolia</i> , <i>Ridl.</i>	326	<i>gibbosa</i> , <i>De Vriese.</i>	139
	<i>humilis</i> , <i>Andr.</i>	326	<i>grandis</i> , <i>Ridl.</i>	140
	<i>lurida</i> , <i>Ridl.</i>	325	<i>imbricata</i> , <i>Lindl.</i>	139
	<i>monticola</i> , <i>Ridl.</i>	325	<i>micrantha</i> , <i>Hook.</i>	
	<i>parviflora</i> , <i>Ridl.</i>	326	<i>fil.</i>	137
	<i>stellaris</i> , <i>Ridl.</i>	326	<i>parviflora</i> , <i>Hook.</i>	137
	<i>Teta</i> , <i>Andr.</i>	323	Phreatia, <i>Lindl.</i>	105
	<i>violacea</i> , <i>Wall.</i>	324	<i>crassifolia</i> , <i>Ridl.</i>	106
	<i>viridis</i> , <i>Ridl.</i>	325	<i>densiflora</i> , <i>Lindl.</i>	105
	<i>Pennilabium</i>		<i>linearis</i> , <i>Ridl.</i>	106
	<i>angyæcum</i> , <i>J. J.</i>		<i>listrophora</i> , <i>Ridl.</i>	106
	<i>Smith.</i>	173	<i>microtidis</i> , <i>Lindl.</i>	106
	<i>Peristylus</i>		<i>minutiflora</i> , <i>Lindl.</i>	105
	<i>candidus</i> , <i>J. J.</i>		<i>myosurus</i> , <i>Lindl.</i>	105
	<i>Smith.</i>	230	<i>nana</i> , <i>Hook. fil.</i>	106
	Phacelophrynum,		Phrynium, <i>Willd.</i>	289
	<i>Schum.</i>	289	<i>basiflorum</i> , <i>Ridl.</i>	289
	<i>tapirorum</i> , <i>Schum.</i>	289	<i>cylindricum</i> , <i>Ridl.</i>	287
	Phæomeria, <i>Lindl.</i>	271	<i>Griffithii</i> , <i>Bak.</i>	287
	<i>fulgens</i> , <i>Schum.</i>	272	<i>hirtum</i> , <i>Ridl.</i>	289
	<i>imperialis</i> , <i>Lindl.</i>	272	<i>Jagoranum</i> , <i>Kock.</i>	288
	<i>Maingayi</i> , <i>Schum.</i>	272	<i>malaccense</i> , <i>Ridl.</i>	290
	<i>venusta</i> , <i>Schum.</i>	272	<i>spicatum</i> , <i>Griff.</i>	287
	Phaius, <i>Lour.</i>	123	<i>tapirorum</i> , <i>Ridl.</i>	289
	<i>albus</i> , <i>Lindl.</i>	125	<i>terminale</i> , <i>Ridl.</i>	290
	<i>bicolor</i> , <i>Lindl.</i>	123	<i>tristachyum</i> , <i>Ridl.</i>	290
	<i>Blumei</i> , <i>Lindl.</i>	123	Physurus, <i>Rich.</i>	210
	<i>callosus</i> , <i>Lindl.</i>	124	<i>humilis</i> , <i>Bl.</i>	210
	<i>Kuhlii</i> , <i>Rchb.</i>	124	<i>latifolius</i> , <i>Bl.</i>	210
	<i>pallidus</i> , <i>Ridl.</i>	124	Plagiostachys, <i>Ridl.</i>	273
	<i>Wallichii</i> , <i>Lindl.</i>	123	<i>albiflora</i> , <i>Ridl.</i>	273
	Phalaenopsis, <i>Bl.</i>	155	<i>lateralis</i> , <i>Ridl.</i>	273
	<i>alboujolacea</i> , <i>Ridl.</i>	158	Platyclinis, <i>Benth.</i>	24
	<i>cornu-cervi</i> , <i>Par.</i>		<i>carnosa</i> , <i>Ridl.</i>	26
	& <i>Rchb.</i>	156	<i>gracilis</i> , <i>Hook. fil.</i>	25
	<i>Denisiana</i> , <i>Cogn.</i>	157	<i>graminea</i> , <i>Ridl.</i>	26
	<i>Esmeralda</i> , <i>Rchb.</i>	158	<i>Kingii</i> , <i>Hook. fil.</i>	27
	<i>fuscata</i> , <i>Rchb.</i>		<i>linearifolia</i> , <i>Ridl.</i>	25
	<i>fil.</i>	157	<i>linearis</i> , <i>Ridl.</i>	26
	<i>Kunstleri</i> , <i>Hook.</i>		<i>longifolia</i> , <i>Hemsl.</i>	25
	<i>fil.</i>	157	<i>odorata</i> , <i>Ridl.</i>	26
	<i>musciola</i> , <i>Ridl.</i>	156	<i>pulchella</i> , <i>Ridl.</i>	26
	<i>sumatrana</i> , <i>Korth.</i>	156	<i>sarawakensis</i> , <i>Ridl.</i>	27
	<i>Valentinii</i> , <i>Rchb.</i>		Plocoglottis, <i>Bl.</i>	143
	<i>fil.</i>	156	<i>acuminata</i> , <i>Bl.</i>	143
	<i>violacea</i> , <i>Teysm. &</i>		<i>foetida</i> , <i>Ridl.</i>	144
	<i>Binn.</i>	156	<i>javanica</i> , <i>Bl.</i>	143
	<i>Wightii</i> , <i>Rchb. fil.</i>	158	<i>porphyrophylla</i> ,	
	PHYLDRACEÆ	346	<i>Ridl.</i>	144
			Poæphyllum, <i>Ridl.</i>	108
			<i>pauciflorum</i> , <i>Ridl.</i>	108
			Podochilus, <i>Bl.</i>	192
			<i>acicularis</i> , <i>Hook.</i>	
			<i>fil.</i>	193
			<i>anceps</i> , <i>Schlecht.</i>	195
			<i>bicolor</i> , <i>Miq.</i>	39
			<i>callosa</i> , <i>Schlechter.</i>	108
			<i>cornutus</i> , <i>Schlecht.</i>	196
			<i>densifolius</i> , <i>Ridl.</i>	197
			<i>Hasseltii</i> ,	
			<i>Schlechter.</i>	108
			<i>lucescens</i> , <i>Bl.</i>	193
			<i>lucidus</i> , <i>Ridl.</i>	196
			<i>microphyllus</i> ,	
			<i>Lindl.</i>	193
			<i>rupesstris</i> , <i>Ridl.</i>	197
			<i>sciuroides</i> , <i>Rchb.</i>	
			<i>fil.</i>	193
			<i>tenuis</i> , <i>Lindl.</i>	193
			<i>uncatus</i> , <i>Ridl.</i>	196
			<i>unciferus</i> , <i>Hook.</i>	
			<i>fil.</i>	195
			<i>Pogonia</i>	
			<i>flabelliformis</i> ,	
			<i>Lindl.</i>	203
			<i>punctata</i> , <i>Bl.</i>	204
			<i>striata</i> , <i>Ridl.</i>	205
			<i>velutina</i> , <i>Par. &</i>	
			<i>Rchb. fil.</i>	204
			Pollia, <i>Thunb.</i>	350
			<i>sorzogonensis</i> ,	
			<i>Endl.</i>	351
			<i>subumbellata</i> ,	
			<i>Clarke</i>	350
			<i>sumatrana</i> , <i>Hassk.</i>	350
			<i>thyrsiflora</i> , <i>Endl.</i>	350
			<i>Polychilus</i>	
			<i>cornu-cervi</i>	156
			<i>Polystachya</i> , <i>Lindl.</i>	152
			<i>penangensis</i> , <i>Ridl.</i>	152
			<i>siamensis</i> , <i>Ridl.</i>	152
			<i>singapurensis</i> ,	
			<i>Ridl.</i>	152
			PONTERIDIACEÆ	344
			<i>Pontederia</i>	
			<i>dilatata</i> , <i>Andr.</i>	344
			<i>hastata</i> , <i>Linn.</i>	344
			<i>vaginalis</i> , <i>Linn.</i>	346
			Porpax, <i>Lindl.</i>	104
			<i>meirax</i> , <i>King &</i>	
			<i>Pantling</i>	104
			POTAMOGETONACEÆ	367
			Preptanthe, <i>Rchb.</i>	
			<i>fil.</i>	122
			<i>rubens</i> , <i>Ridl.</i>	123
			<i>vestita</i> , <i>Rchb. fil.</i>	123

	PAGE		PAGE		PAGE
<i>Protamomum</i>		<i>Saccolabium (contd.)</i>		<i>Sarcochilus (contd.)</i>	
<i>maxillarioides</i> ,		<i>latifolium, Ridl.</i>	166	<i>brachystachys</i> ,	
<i>Ridl.</i>	293	<i>Machadonis, Ridl.</i>	168	<i>Hook. fil.</i>	184
<i>Protolirion, Ridl. &</i>		<i>miniatum var.</i>		<i>calceolus, Lindl.</i>	184
<i>Groom</i>	322	<i>citrinum, Rchb.</i>	172	<i>caligaris, Ridl.</i>	178
<i>paradoxum, Ridl.</i>		<i>minimiflorum,</i>		<i>carinatifolius,</i>	
<i>& Groom</i>	322	<i>Hook. fil.</i>	166	<i>Ridl.</i>	189
<i>Psychechilus</i>		<i>minutiflorum, Ridl.</i>	171	<i>cladostachys,</i>	
<i>purpurascens, Bl.</i>	218	<i>miserum, Ridl.</i>	171	<i>Hook. fil.</i>	179
<i>Ranalisma, Stapf.</i>	362	<i>myosurus, Ridl.</i>	173	<i>crassifolius, Ridl.</i>	180
<i>rostrata, Stapf.</i>	362	<i>Pantlingii, Ridl.</i>	175	<i>filiformis, Hook.</i>	187
<i>Renanthera, Lour.</i>	160	<i>parvum, Ridl.</i>	167	<i>hirsutus, Hook. fil.</i>	182
<i>alba, Ridl.</i>	159	<i>patinatum, Ridl.</i>	165	<i>hirtulus, Hook. fil.</i>	181
<i>angustifolia, Hook.</i>		<i>penanganium,</i>		<i>vilacinus, Griff.</i>	184
<i>fil.</i>	160	<i>Hook. fil.</i>	172	<i>notabilis, Hook. fil.</i>	186
<i>arachnitis, Lindl.</i>	159	<i>pensile, Ridl.</i>	170	<i>pardalis, Ridl.</i>	187
<i>elongata, Lindl.</i>	160	<i>perpusillum, Hook.</i>		<i>pauciflorus, Hook.</i>	
<i>histrionica, Rchb.</i>		<i>fil.</i>	171	<i>fil.</i>	184
<i>fil.</i>	161	<i>præmorsum, Lindl.</i>	163	<i>psiloglottis, Ridl.</i>	189
<i>Hookeriana, Rchb.</i>		<i>pubescens, Ridl.</i>	174	<i>recurvus, Hook. fil.</i>	187
<i>fil.</i>	159	<i>rugosulum, Ridl.</i>	168	<i>scopa, Hook. fil.</i>	185
<i>Maingayi, Ridl.</i>	159	<i>sacculatum, Ridl.</i>	172	<i>Scortechini, Hook.</i>	
<i>matutina, Lindl.</i>	160	<i>saxicolum, Ridl.</i>	172	<i>fil.</i>	185
<i>Renantherella, Ridl.</i>	161	<i>Scortechinii, Ridl.</i>	169	<i>sigmoideus, Ridl.</i>	179
<i>histrionica, Ridl.</i>	161	<i>secundiflorum, Ridl.</i>	173	<i>stenoglottis, Hook.</i>	
<i>Rhuacophila, Bl.</i>	328	<i>secundum, Ridl.</i>	169	<i>fil.</i>	179
<i>javanica, Bl.</i>	328	<i>setulense, Ridl.</i>	167	<i>tahanensis, Ridl.</i>	180
<i>Rhynchostylis, Bl.</i>	163	<i>suffusum, Ridl.</i>	166	<i>tanyphyllus, Ridl.</i>	179
<i>gigantea, Ridl.</i>	163	<i>sylvestre, Ridl.</i>	168	<i>trichoglottis, Hook.</i>	
<i>retusa, Bl.</i>	163	<i>tenuicaule, Hook.</i>		<i>fil.</i>	187
ROXBURGHIAEÆ	320	<i>fil.</i>	171	<i>unguiculatus,</i>	
<i>Ruppia, Linn.</i>	367	<i>undulatum, Ridl.</i>	173	<i>Lindl.</i>	178
<i>maritima, Linn.</i>	367	<i>uteriferum, Ridl.</i>	168	<i>violaceus, Ridl.</i>	180
<i>Saccolabium, Bl.</i>	163	<i>validum, Ridl.</i>	167	<i>virescens, Ridl.</i>	179
<i>adnatum, Ridl.</i>	174	<i>Sagittaria, Linn.</i>	362	<i>Sarcopodium, Lindl.</i>	28
<i>angræcum, Ridl.</i>	173	<i>guayanensis,</i>		<i>citrino-castaneum,</i>	
<i>arachnanthe, Ridl.</i>	174	<i>Humb.</i>	363	<i>Ridl.</i>	29
<i>bicarinatum, Ridl.</i>	170	<i>sagittifolia, Linn.</i>	363	<i>geminatum,</i>	
<i>bigibbum, Rchb.</i>		<i>Sarcanthus</i>		<i>Kranzl.</i>	28
<i>fil.</i>	165	<i>castaneus, Ridl.</i>	170	<i>longipes, Kranzl.</i>	28
<i>Blumei, Lindl.</i>	163	<i>insectifera, Hook.</i>		<i>macropodium,</i>	
<i>catinatum, Ridl.</i>	165	<i>fil.</i>	177	<i>Kranzl.</i>	28
<i>cornigerum, Ridl.</i>	171	<i>Kunstleri, King</i>	169	<i>Scaphochlamys</i>	
<i>cortinatum, Ridl.</i>	166	<i>pensilis, Ridl.</i>	170	<i>malaccana, Bak.</i>	250
<i>densiflorum, Lindl.</i>	170	<i>rostellatus, Ridl.</i>	170	<i>Sciaphila, Bl.</i>	364
<i>fissicors, Ridl.</i>	170	<i>sacculatus, Ridl.</i>	172	<i>affinis, Becc.</i>	364
<i>fissum, Ridl.</i>	173	<i>Scortechinii, Hook.</i>		<i>asterias, Ridl.</i>	365
<i>flaveolum, Ridl.</i>	172	<i>fil.</i>	169	<i>major, Becc.</i>	364
<i>giganteum, Lindl.</i>	163	<i>scundus, Griff.</i>	169	<i>Serpicula</i>	
<i>guttatum, Lindl.</i>	163	<i>Sarcochilus, Br.</i>	177	<i>verticillata, Roxb.</i>	I
<i>halophilum, Ridl.</i>	168	<i>acuminatus, Ridl.</i>	178	<i>Smilax, Linn.</i>	339
<i>Hobsonii, Ridl.</i>	167	<i>adnatus, Ridl.</i>	174	<i>aspericaulis, Wall.</i>	342
<i>hortense, Ridl.</i>	167	<i>anceps, Ridl.</i>	180	<i>barbata, Wall.</i>	342
<i>ionosmum, Ridl.</i>	174	<i>aureus, Hook. fil.</i>	178	<i>Blumei, DC.</i>	343
<i>Kunstleri, Ridl.</i>	169	<i>biserratus, Ridl.</i>	180	<i>calophylla, Wall.</i>	339
		<i>brachyglottis, Hook.</i>		<i>extensa, Wall.</i>	341
		<i>fil.</i>	189	<i>Helferi, A. DC.</i>	342

	PAGE		PAGE		PAGE
<i>Smilax</i> (<i>contd.</i>)		<i>Tacca</i> (<i>contd.</i>)		<i>Thunia</i> , <i>Rchb. fil.</i>	125
Kingii, <i>Hook. fil.</i>	343	palmata, <i>Bl.</i>	309	alba, <i>Rchb. fil.</i>	125
lævis, <i>Wall.</i>	340	pinnatifida, <i>Forst.</i>	309	<i>Thysanotus</i> , <i>R. Br.</i>	328
leucophylla, <i>Bl.</i>	343	<i>Rafflesiana</i> , <i>Jack.</i>	310	siamensis, <i>Ridl.</i>	328
megacarpa, <i>DC.</i>	341	<i>vespertilio</i> , <i>Ridl.</i>	311	<i>Tricalistra</i> , <i>Ridl.</i>	330
myosotiflora, <i>DC.</i>	340	<i>Tæniophyllum</i> , <i>Bl.</i>	175	ochracea, <i>Ridl.</i>	331
odoratissima, <i>Bl.</i>	342	culciferum, <i>Ridl.</i>	176	<i>Trichoglottis</i> , <i>Bl.</i>	162
peguana, <i>DC.</i>	340	<i>gracillimum</i> , <i>Ridl.</i>	176	<i>fasciata</i> , <i>Rchb. fil.</i>	157
polyacantha, <i>Wall.</i>	342	macrorrhizum,		retusa, <i>Bl.</i>	162
singaporensis, <i>DC.</i>	344	<i>Ridl.</i>	176	scaphigera, <i>Ridl.</i>	162
<i>zeylanica</i> , <i>Ridl.</i>	342	rubrum, <i>Ridl.</i>	177	tetraceras, <i>Ridl.</i>	162
<i>Spathoglottis</i> , <i>Bl.</i>	117	serrula, <i>Hook. fil.</i>	176	<i>Trichopus</i> , <i>Gaertn.</i>	311
affinis, <i>De Vriese</i>	118	<i>Tainia</i> , <i>Bl.</i>	113	malayanus, <i>Ridl.</i>	312
aurea, <i>Lindl.</i>	117	<i>atropurpurea</i> , <i>Ridl.</i>	115	<i>zeylanicus</i> , <i>Hook.</i>	
<i>Handingiana</i> , <i>Par.</i>		latilingua, <i>Hook.</i>		<i>fil.</i>	312
& <i>Rchb. fil.</i>	118	<i>fil.</i>	114	<i>Trichotomia</i> , <i>Blume</i>	99
<i>lilacina</i> , <i>Griff.</i>	117	Maingayi, <i>Hook.</i>		aporina, <i>Kranzl.</i>	102
plicata, <i>Bl.</i>	117	<i>fil.</i>	114	biflora, <i>Griff.</i>	103
<i>Wrayi</i> , <i>Hook. fil.</i>	117	<i>penangiana</i> , <i>Hook.</i>		cristata, <i>Kranzl.</i>	101
<i>Spatholirion</i> , <i>Ridl.</i>	361	<i>fil.</i>	112	ferox, <i>Bl.</i>	101
ornatum, <i>Ridl.</i>	362	speciosa, <i>Bl.</i>	114	gracilis, <i>Kranzl.</i>	104
<i>Stachyphrynium</i> ,		vegetissima, <i>Ridl.</i>	114	hispidissima,	
<i>Schum.</i>	287	<i>Thecostele</i> , <i>Rchb.</i>	191	<i>Kranzl.</i>	102
cylindricum,		maculosa, <i>Ridl.</i>	191	microphylla, <i>Bl.</i>	102
<i>Schum.</i>	287	Maingayi, <i>Hook.</i>		oligantha, <i>Kranzl.</i>	103
Griffithii, <i>Schum.</i>	287	<i>fil.</i>	192	poculata, <i>Kranzl.</i>	103
Jagoranum,		quinquefida, <i>Hook.</i>		pyrrhotricha, <i>Ridl.</i>	101
<i>Schum.</i>	288	<i>fil.</i>	192	rotundifolia,	
minus, <i>Ridl.</i>	288	secunda, <i>Ridl.</i>	192	<i>Kranzl.</i>	102
parvum, <i>Ridl.</i>	288	Zollingeri, <i>Rchb. fil.</i>	192	tuberosa, <i>Ridl.</i>	103
Stauorchilus, <i>Ridl.</i>	157	<i>Thelasis</i> , <i>Bl.</i>	199	velutina, <i>Kranzl.</i>	101
fasciatus, <i>Ridl.</i>	157	capitata, <i>Bl.</i>	199	vestita, <i>Kranzl.</i>	100
Stauopsis, <i>Benth.</i>	155	carinata, <i>Bl.</i>	200	TRIURIDEÆ	363
gigantea, <i>Benth.</i>	155	decurva, <i>Hook. fil.</i>	200	<i>Tropidia</i> , <i>Bl.</i>	209
Stemona, <i>Lour.</i>	320	elata, <i>Hook. fil.</i>	200	angulosa, <i>Bl.</i>	209
<i>Curtisii</i> , <i>Hook. fil.</i>	320	elongata, <i>Bl.</i>	199	curculigoides,	
tuberosa, <i>Lour.</i>	320	macrobulbon, <i>Ridl.</i>	199	<i>Lindl.</i>	209
<i>Stenochasma</i>		<i>Thismia</i> , <i>Griff.</i>	307	Maingayi, <i>Hook. fil.</i>	209
convolutum, <i>Griff.</i>	269	arachnites, <i>Ridl.</i>	307	squamata, <i>Bl.</i>	209
urceolare, <i>Griff.</i>	267	aseroe, <i>Becc.</i>	308	Tupistra, <i>Ker.</i>	330
Stenomeris, <i>Planch.</i>	312	chrysops, <i>Ridl.</i>	308	grandis, <i>Ridl.</i>	330
borneensis, <i>Oliv.</i>	313	fumida, <i>Ridl.</i>	307	singaporeana,	
Stereosandra, <i>Bl.</i>	224	grandiflora, <i>Ridl.</i>	308	<i>Wall.</i>	297
javanica, <i>Bl.</i>	224	racemosa, <i>Ridl.</i>	307	violacea, <i>Ridl.</i>	330
<i>Stichoneuron</i> , <i>Hook.</i>		<i>Thrixspernum</i> ,		<i>Tylostylis</i> , <i>Bl.</i>	104
<i>fil.</i>	320	<i>Lour.</i>	183	rigida, <i>Bl.</i>	104
caudatum, <i>Ridl.</i>	321	arachnites, <i>Rchb. fil.</i>	185	<i>Vanda</i> , <i>Lindl.</i>	158
Susum, <i>Linn.</i>	369	brachyglottis, <i>Ridl.</i>	189	gigantea, <i>Lindl.</i>	155
anthelminticum,		calceolus, <i>Rchb. fil.</i>	184	Hookeriana, <i>Rchb.</i>	
<i>Bl.</i>	369	crassifolium, <i>Ridl.</i>	186	<i>fil.</i>	158
malayanum, <i>Hook.</i>	369	iodochilus, <i>Ridl.</i>	186	<i>Vanilla</i> , <i>Sw.</i>	200
TACCACEÆ	309	leucarachne, <i>Ridl.</i>	186	aphylla, <i>Bl.</i>	201
<i>Tacca</i> , <i>Forst.</i>	309	lilacinum, <i>Rchb. fil.</i>	184	Griffithii, <i>Rchb. fil.</i>	201
Chantieri, <i>Andre</i>	311	montanum, <i>Ridl.</i>	185	montana, <i>Ridl.</i>	201
cristata, <i>Jack</i>	310	notabile, <i>Ridl.</i>	186	Parishii, <i>Rchb. fil.</i>	201
minor, <i>Ridl.</i>	311	pauciflorum, <i>Ridl.</i>	184	<i>tolypephora</i> , <i>Ridl.</i>	201
		Scortechinii, <i>Ridl.</i>	185		

	PAGE		PAGE		PAGE
<i>Vrydagzynea, Bl.</i>	210	<i>Xyris (contd.)</i>		<i>Zingiber (contd.)</i>	
<i>albida, Bl.</i>	211	<i>Ridleyi, Rendle</i>	349	<i>aromaticum,</i>	
<i>lancifolia, Ridl.</i>	210			<i>Valeton</i>	259
<i>tristriata, Ridl.</i>	211			<i>Cassumunaar, Roxb.</i>	259
<i>Wailesia</i>		<i>Zeuxine, Lindl.</i>	216	<i>chryseum, Ridl.</i>	260
<i>picta, Lindl.</i>	147	<i>affinis, Benth.</i>	217	<i>chrysostachys,</i>	
<i>XYRIDEÆ</i>	347	<i>biloba, Ridl.</i>	218	<i>Ridl.</i>	260
<i>Xyris, Linn.</i>	347	<i>clandestina, Bl.</i>	217	<i>citrinum, Ridl.</i>	260
<i>anceps, Lam.</i>	348	<i>palustris, Ridl.</i>	217	<i>gracile, Jack.</i>	260
<i>bancana, Miq.</i>	349	<i>reniformis, Hook.</i>		<i>Griffithii, Bak.</i>	260
<i>grandis, Ridl.</i>	347	<i>fil.</i>	217	<i>Kunstleri, King</i>	258
<i>indica, Linn.</i>	348	<i>rupestris, Ridl.</i>	218	<i>Ottensi, Valeton</i>	259
<i>oreophila, Ridl.</i>	349	<i>sulcata, Lindl.</i>	217	<i>puberula, Ridl.</i>	261
<i>pauciflora, Willd.</i>	348	<i>violascens, Ridl.</i>	218	<i>spectabile, Griff.</i>	258
		<i>ZINGIBERACEÆ</i>	233	<i>Wrayi, Prain.</i>	259
		<i>Zingiber, Adans.</i>	257	<i>Zerumbet, Ridl.</i>	259

ERRATA

VOL. I.

P. 322, l. 2, for *Hook. fil. F.B.I. i. 200*, read *v. 200*.

P. 443, l. 26, for *PLEUROSTYLIS* read *PLEUROSTYLIA*.

P. 452, l. 35, for **PLEUROSTYLIS** read **PLEUROSTYLIA**.



Protektion paradoxum
Nell

198*

