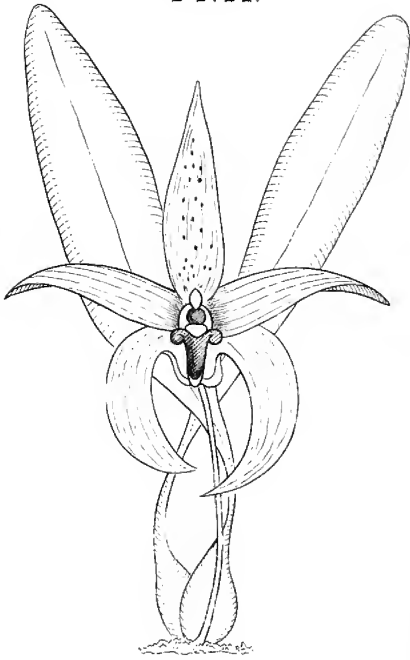
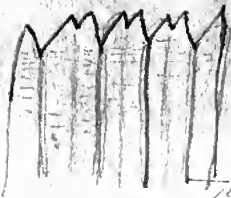


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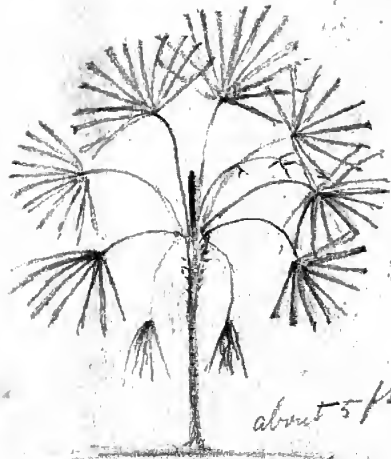


H. N. RIDLEY.



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paired  
central ribs



about 5 ft



Stem grey, obscurely annulate

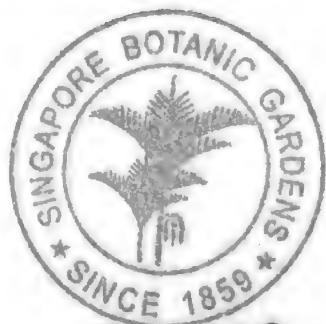
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*Licuala glabra* Griff.

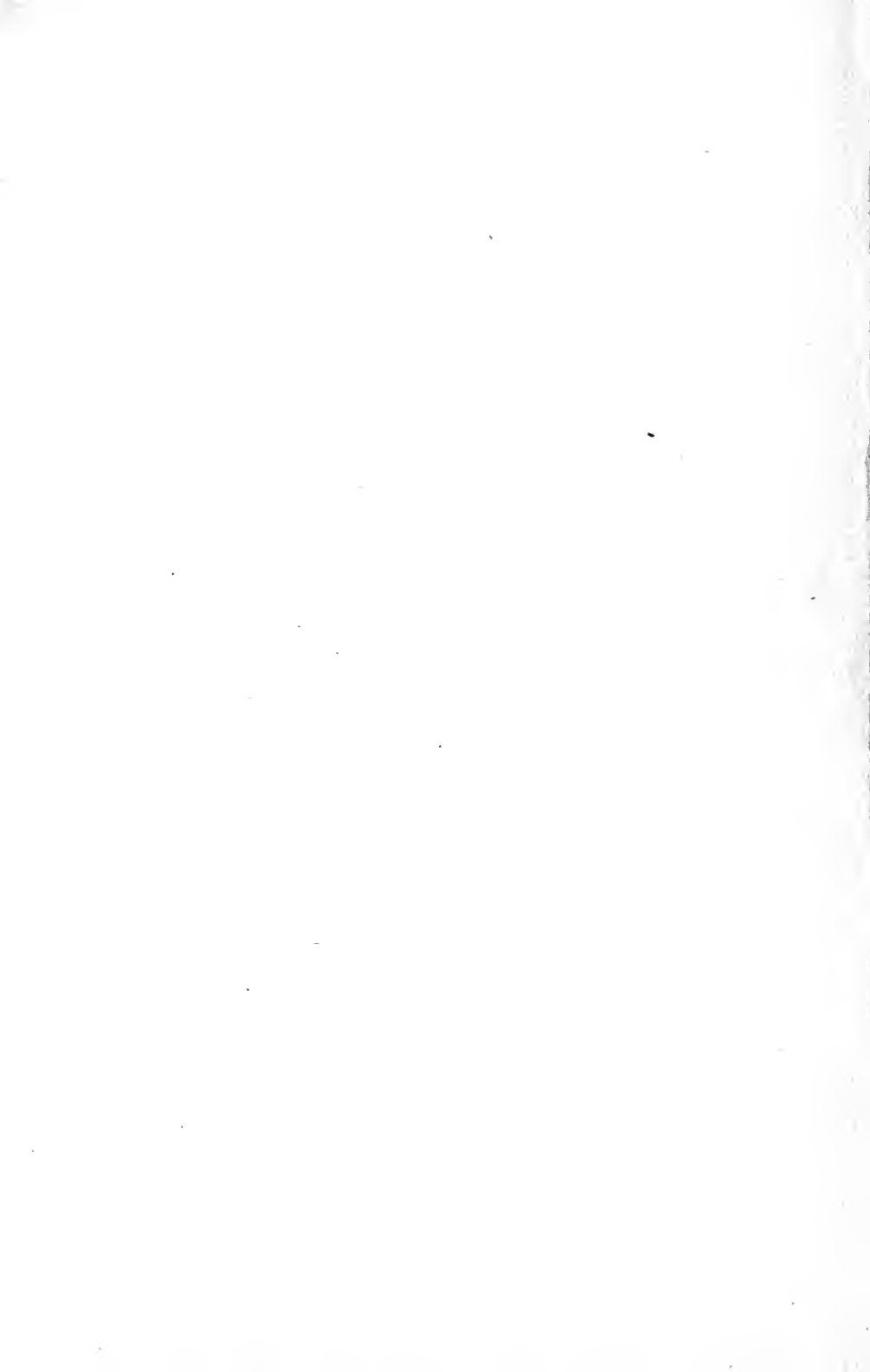


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**THE FLORA OF  
THE MALAY PENINSULA**



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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. V.—MONOCOTYLEDONES (*concluded*)  
GYMNOSPERMEÆ  
GENERAL INDICES

PUBLISHED UNDER THE AUTHORITY OF THE GOVERNMENT OF  
THE STRAITS SETTLEMENTS AND FEDERATED MALAY STATES



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# FLORA OF THE MALAY PENINSULA

## VOLUME V

### ORDER CLVI. PALMACEÆ

Shrubs or trees, erect or climbing, more rarely rhizomatous, often spiny. Leaves alternate; petioles sheathing, limb pinnatisect or palmate, sometimes entire or bi-pinnate. Inflorescence paniced or spicate, axillary or sub-terminal, enclosed at first in one or more sheathing bract (spathes). Flowers small, rarely medium or large, white, green or pink, uni- or bi-sexual, usually sessile and sunk in the rachis. Perianth inferior. Sepals 3. Petals usually longer, 3. Stamens 3 to 6 or more; filaments filiform. Ovary 1- to 3-celled or 3-carpelled; ovules 1 to 3 in a cell; stigmas 3, usually sessile. Fruit a drupe or nut; pericarp fleshy, fibrous or crustaceous or covered with imbricating scales. Seed, albumen horny, bony or soft, often ruminant; embryo very small. Species over 1000, chiefly tropical; most abundant in South America and Malaya.

I. ARECINEÆ. Leaves pinnate, more rarely entire orbiculate, bilobed. Inflorescences spicate or paniced, appearing from the axils of the leaves upwards. Flowers unisexual on the same inflorescence. Fruit drupaceous.

Male flowers minute on the tips of the spadix-branches; females fewer and larger at the base . . . . .

Male flowers in pairs on either side of a female flower.

Albumen ruminant; plants unarmed; spathes caducous.

Fruit small; stems usually several.

Sepals smaller than petals, usually orbicular

Sepals as long as petals, acuminate . . . . .

Fruit as large as an egg; stems solitary, very tall . . . . .

Fruit small oblong; spathes persistent; bushy unarmed palms; flowers sunk in rachis . . . . .

Fruit small globose; spathes caducous; palm spiny; panicle large . . . . .

Albumen not ruminant; palms unarmed.

Stem solitary, stout; fruit large globose . . . . .

Stems several, rather slender; fruit small oblong . . . . .

Male flower one to each female; slender stemmed bushy palms . . . . .

1. ARECA

2. PINANGA

3. NENGA

4. ACTINORHYZIS

5. IGUANURA

6. ONCOSPERMA

7. ORANIA

8. CYRTOSTACHYS

9. PTYCHORAPHIS

F.L.M.P., 5

B

II. CARYOTIDEÆ. Inflorescences unisexual of compound spikes, developing from the upper axils downwards, alternately male and female. Spathes short persistent. Leaves pinnate or bi-pinnate, rarely simple.

Leaves pinnate.

- Leaflets linear; very large palms . . . . . 10. ARENGA  
 Leaflets obtuse; dwarf palms . . . . . 11. DIDYMOSPERMA

Leaves bi-pinnate; leaflets obtuse; medium or tall palms . . . . . 12. CARYOTA

III. PHENICEÆ. Inflorescences much-branched, unisexual. Leaves stiff pinnate; leaflets pinched in at base.

Spathe 1, deciduous large; seed oblong ventrally grooved; albumen not ruminant . . . . . 13. PHENIX

IV. CORYPHÆ. Leaves orbicular or obtuse entire or cut into lobes. Inflorescence terminal or axillary. Spathes numerous tubular, persistent. Flowers bisexual.

Leaves orbicular, not deeply cut.

Inflorescence one terminal large paniced, tall monocarpic palms . . . . . 14. CORYPHA

Inflorescences lateral; albumen equable; fruit small, polycarpic palms . . . . . 15. LIVISTONA

Inflorescence lateral; albumen ruminant; fruit large . . . . . 16. PHOLIDOCARPUS

Leaves orbicular, deeply cut into obtuse segments.

Inflorescence long slender, of 1 or more spikes from axils or spathes; fruit small . . . . . 17. LICUALA

Leaves obtuse, very large, entire; compound spikes short, dense; fruit tessellate . . . . . 18. TEYSMANNIA

V. LEPIDOCARYINÆ. Leaves pinnate; leaflets numerous linear-lanceolate or obtuse. Inflorescence axillary or terminal. Spathe boat-shaped caducous or tubular persistent. Flowers unisexual. Fruit covered with imbricating scales.

Rhizomatous palms with huge erect stems; inflorescence wide-spreading, terminal . . . . . 19. METROXYLON

Tufted palms not climbing, spiny.

Flowers small in short dense axillary spikes . . . . . 20. ZALACCA

Flowers large in tall erect dense panicles . . . . . 21. EUGEISSONA

Climbing spiny palms; inflorescences axillary elongate.

Spathe boat-shaped enclosing the inflorescence, then caducous.

Spathes several, outer one enclosing the others; seed solitary . . . . . 22. DÆMONOROPS

Spathe 1 . . . . . 23. CERATOLOBUS

Spathes 8 to 10, outer one not enclosing others; seeds 2 or 3 . . . . . 24. CALOSPATHA

Spathes tubular persistent, not covering the inflorescence; seed solitary.

Scales of fruit large, in spirals . . . . . 25. CALAMUS

Scales of fruit minute, numerous, irregular . . . . . 26. PLECTOCOMIOPSIS

Monocarpic climbing spiny palms; inflorescence terminal, the branches dying after flowering.

Leaves cuneate erose; spikes dense; bracts 1-flowered . . . . . 27. KORTHALSIA

Leaves lanceolate acute; spikes lax; bracts ovate imbricate, many-flowered . . . . . 28. PLECTOCOMIA

VI. BORASSINÆ. Tall erect palms. Leaves fan-shaped, spadices interfoliar unisexual. Male flowers minute, sunk in cavities of the cylindrical spadix. Females large sessile with large round coriaceous bracts.

## 29. BORASSUS

VII. NIPACÆ. Stem stout, creeping. Leaves very large, pinnate, in tufts; leaflets narrow. Inflorescence axillary, dense with several bracts. Male flowers in dense catkins. Sepals linear, tips inflexed, 3. Petals smaller. Stamens 3. Female flowers in a dense head. Carpels 3. Fruit a syncarp of obovoid compressed fibrous and woody carpels, 1-celled, 1-seeded.

## 30. NIPA

## 1. ARECA, Linn.

Large or small palms; stems solitary or several. Leaves pinnate. Panicles infrafoliar, terminal part male, a few females at base of each branch. Males asymmetric, very small. Petals lanceolate oblique. Stamens 3 to 12. Females much larger. Fruit ovoid; pericarp fibrous. Albumen ruminant. Seed ovoid or fusiform. Species 10, Indo-Malaya, Australia.

Stamens 3.

- |  |                        |
|--|------------------------|
| Stem solitary, stout, 2 in. through; seed ovoid; leaflets narrow | (1) <i>A. pumila</i>   |
| Stem solitary, slender, 5 in. through; leaf-lobes very broad     | (2) <i>A. latiloba</i> |
| Stems numerous, 1 to 1.5 in. through; seed conic                 | (3) <i>A. triandra</i> |
| Stems slender, .5 in. through                                    | (4) <i>A. montana</i>  |
| Stamens 6; stem solitary, stout, 8 to 12 in. through             | (5) <i>A. catechu</i>  |
| Stamens 8 to 12.   |                        |
| Stems .25 in. through; fruit fusiform                            | (6) <i>A. furcata</i>  |

(1) *A. pumila* Bl. *Rumphia*, 71, t. 99, 102 (not of Mart.).

Stem solitary, 10 to 15 ft. tall, 2 in. through. Leaves 6 ft. long; leaflets broad, 18 in. long, 3 in. wide, acuminate. Spadix 9 in. long, branches about 13, 4 in. long. Male spikes slender, 6 in. long. Stamens 3. Fruit 1.5 in. long, .75 in. through, beaked, red or cream, tipped red both ends. Seed ovoid, base broad. *Hab.* Hill forests, Negri Sembilan, Gunong Angsi (Burkill); Ginting Bidai. Pahang, Telom. Perak, Thaiping Hills. Penang, Waterfall. Lan-kawi, Kwah (Curtis). *Distrib.* Java.

(2) *A. latiloba* Ridl.

Stem solitary, 5 ft. tall, .5 in. through. Leaves 3 ft. long or more, cut into broad rhomboid sigmoid lobes with broad bases, tip long acuminate; nerves strong, 10 to 12 on a lobe; lobes 1 ft. long, 3 to 4.5 in. wide, the top pair very unequal. Spadix 9 in. long; branches slender in flower, thicker in fruit, in pairs on a short peduncle below, solitary above. Male flowers 18 in. long. Sepals very small. Petals lanceolate-acute. Stamens 3; filaments connate below. Female flowers one on each branch or only on middle branches. Sepals ovate acute. Petals oblong blunt, .4 in. long. Fruit 1 in. long, .5 in. through, fibrous, coat thin. *Hab.* Mountain forests at 2400 ft. altitude. Negri Sembilan, Bukit Tangga (Ridley).



(3) **A. triandra** *Roxb. Hort. Beng.* 68; *Fl. Ind.* iii. 617.

Stems numerous, in a tuft, 12 ft. tall, 1 to 1.5 in. through, with basal shoots. Leaves 4 to 6 ft. long; leaflets 1.5 to 3 ft. long, 1 to 1.5 in. wide. Spathe 1 ft. long. Spadix as in *A. pumila* but flowers smaller. Stamens 3. Fruit 1 in. long, olive-shaped, bright red. Seed conic. *Hab.* North of peninsula in woods. Setul, Bukit Rajah Wang. Pulau Adang islands, Rawei isle (Ridley). *Distrib.* Tenasserim, Andamans.

(4) **A. montana** *Ridl. Mat.* ii. 136.

Stem 15 ft. tall, .5 in. through, ringed. Leaves 18 in. long, 24 in. wide, sheath 6 in. long; petioles 3 to 4 in. long; leaflets over 20, linear acuminate, .5 to 1 in. wide. Spadix 4.5 in. long; branches few, 3 in. long. Female flowers .25 in. long, ovate curved. Petals ovate blunt. *Hab.* Rare, mountain forests, Selangor, Semangkok Pass at 3000 ft. altitude (Burn-Murdoch).

(5) **A. catechu** *Linn. Sp. Pl.* 1189; *Mart. Hist. Nat. Palm.* iii. 169, *t.* 102; *Bl. Rumphia*, iii. 65, *t.* 102A and 104; *Griffith, Palms of Brit. Ind.* 147; *Hook. fil. F.B.I.* vi. 405.

Stem solitary, 20 to 80 ft. tall, 8 to 12 in. through, grey, ringed. Leaves 4 to 6 ft. long; leaflets numerous, 1 to 2 ft. long, 1 to 1.25 in. wide, uppermost confluent. Spathes oblong spatulate. Spadix 2 ft. long, branches numerous, secondary branches 18 in. long. Male flowers on the slender tips of the branches .1 in. long, white. Petals ovate acute. Stamens 6. Female flowers at base of spadix branches .25 in. long; sepals ovate blunt; petals similar, staminodes 6, connate. Fruit 2 in. long or more, orange or red; endocarp thick, fibrous; seed ovoid, base flattened, strongly ruminate. *Hab.* In villages and cultivated ground all over the Malay Peninsula, up to 1000 ft. altitude, frequently cultivated. *Distrib.* Malay Archipelago, South India. *Native names:* Pinang; Betelnut. *Use:* For chewing.

The original home of the Betel-nut appears to be quite uncertain; I have never seen it wild nor does it appear to establish itself outside cultivated ground. It was cultivated in Malacca before 1593, as it is mentioned there by Garcia da Orta, *Hist. Arom.* 99, published 1593, and it is mentioned in a Chinese work dated 140 to 86 B.C. under the name *Pinlang*, evidently a perversion of Pinang, which as a name for the tree is confined almost entirely to the Malay Peninsula and Sumatra.

(6) **A. furcata** *Becc. Males.* i. 23; *Ridl. Mat.* ii. 136.

Stems slender, .25 in. through. Leaves cuneate bilobed or irregularly pinnate; leaflets broad, 7 in. long; petioles 1 to 3 in. long. Spadix 2 in. long, with 5 branches. Male flowers .12 in. long. Stamens 11 or 12. Females, sepals falcate ovate. Drupe fusiform, .75 in. long. *Hab.* Johor, Gunong Janeng (Kelsall). *Distrib.* Borneo. *Native name:* Pinang Kaki Pelandok.

## 2. PINANGA, Bl.

Small to medium-sized palms usually several-stemmed, unarmed. Leaves pinnate or, more rarely, entire. Spadix simple or compound from below leaves. Flowers small, sunk in rachis, 2 males with 1 female between. Males symmetric. Stamens 6 or more. Females smaller, ovoid or globose; sepals and petals orbicular. Drupe ovoid or elliptic, usually black on the red rachis. Pericarp pulpy-fibrous. Albumen ruminant. Species 50, tropical Africa.

§ 1. *Spirantheæ*. Flowers in a spiral on a compressed spadix.

- Leaflets linear acuminate glaucous beneath; spathe 3 in. long; stems 1.5 in. through . . . (1) *P. Scortechinii*  
 Leaflets linear acuminate very narrow, not glaucous; spathe 7 in. long; stems under 1 in. through . . . (2) *P. densifolia*  
 Leaflets few, broad oblong acuminate . . . (3) *P. glaucescens*  
 Leaflets few, trapezoid; stems very slender . . . (4) *P. canina*  
 Leaflets falcate sigmoid . . . (5) *P. polymorpha*

§ 2. *Orthostichantheæ*. Flowers in 2 rows on spadix.

Dwarf palms; stems slender; leaf cuneate bifid at top, rarely lobed, with a few unequal leaflets.

Leaf half as broad as long.

Stems 2 ft. tall or less.

Stems several, slender; leaf mottled grey and green . . . (6) *P. disticha*

Stem solitary, stouter; leaf plain light green . . . (7) *P. limosa*

Almost stemless; leaves crowded, bases fibrous . . . (8) *P. acaulis*

Leaf less than half as broad as long.

Spadix simple, short, thick . . . (9) *P. subruminata*

Spadix simple, very slender . . . (10) *P. subintegra*

Leaf pinnate; leaflets about 30, linear . . . (11) *P. calamifrons*

Stout palm, 6 ft. tall, .5 in. through; leaves usually obtuse, 2 ft. long, 8 in. wide . . . (12) *P. Brewsteriana*

Bush palm; leaflets few and broad; stems short . . . (13) *P. fruticans*

Tall palms 5 to 15 ft. tall; stems stout; leaves pinnate; leaflets linear-acuminate.

Spadix small, simple, rarely 2-branched . . . (14) *P. paradoxa*

Spadix stout, branched; stems numerous, crowded; leaflets many.

Spadix branches erect, 6 to 8 . . . (15) *P. pectinata*

Spadix deflexed.

Branches 2 to 6, short, moderately stout . . . (16) *P. perakensis*

Branches 6, slender; flowers small . . . (17) *P. adangensis*

Spadix very stout, 1 ft. long; flowers large . . . (18) *P. malaiana*

Stems distant; rhizome creeping; leaflets 8 . . . (19) *P. riparia*

Leaflets sigmoid.

Spadix erect . . . (20) *P. patula*

Spadix deflexed . . . (21) *P. singaporensis*

(1) *P. Scortechinii* Becc. *Males.* i. 170; *Ridl. Mat.* ii. 138.

*P. robusta* Becc. *l.c.*

Stems several, 5 to 15 ft. tall, 1.5 in. through, green. Leaves 7 ft. long; leaflets 20, lower linear acuminate, upper broader, 3-toothed, backs glaucous; rachis brown, scurfy. Spathe 3 in. long. Panicle 6 in. long, spikes 4 to 8, stout. Flowers spiral. Males, petals ovate or lanceolate acute. Drupe elliptic blunt, .5 in.

long. Seed deeply ruminant. *Hab.* Common in mountain woods from 2000 to 4000 ft. altitude. Pahang, Kwala Tembeling; Telom. Selangor, Bukit Kutu; Menuang Gasing (Kloss). Sungei Ujong Bukit Temiang (Cantley). Perak, Thaiping Hills; Bujong Malacca; Jor (Henderson). Penang, Penara Bukit. Kelantan, Chaning; Kwala Rok (Haniff). *Native names:* Bayas Betina; Pinang Lukar.

(2) *P. densifolia* Ridl. *Journ. F.M.S. Mus.* iv. 85.

Tufted bushy plant, stems 9 to 10 ft. tall, .5 in. through. Leaves long; leaflets very numerous, narrow-linear acuminate, long cuspidate, 15 in. long, .25 in. wide, terminal one 6 in. long, 1 in. wide. Spathe broad, lanceolate-ovate, beaked, 7 in. long, 2 in. wide. Spadix 6 in. long; peduncle 1 in. long, branches 5 to 8. Flowers in 4 rows, spiral. Males .25 in. long. Sepals ovate-triangular. Stamens 10; filaments very short. Fruit elliptic, narrowed both ends, .5 in. long. Seed elliptic with few deep ruminations. *Hab.* Local on mountain ridges at 4500 ft. altitude. Pahang, Telom (Ridley), abundant here. 13917

(3) *P. glaucescens* Ridl.

Dwarf palm. Leaves 3 ft. long or more; midrib spotted brown; leaflets broad oblong-lanceolate, long-acuminate, base broad, mottled light and dark green above, glaucous beneath; nerves prominent, 12 to 16; 14 in. long, 3.5 in. wide, terminal pair connate at base for 6 in., free for 7 in., tip with numerous short teeth. Spadix erect, stout, of 2 or 3 branches; peduncle 1.5 in. long, branches 4 in. long. Flowers not seen. Fruiting spadix red, fruits black, ellipsoid, .5 in. long. Sepals short, round; stigmas small, sessile. Seed ellipsoid, .4 in. long, sparsely ruminant. *Hab.* Mountain forests, Negri Sembilan, Bukit Tangga at 2400 ft. altitude (Ridley).

(4) *P. canina* Becc. *Males.* iii. 135; *Ridl. Mat.* ii. 138.

Stem as thick as a pencil. Leaf-sheaths 2 in. long, ligule bifid, lobes lanceolate acute; petioles 4 in. long. Leaflets, one pair trapezoid acuminate, 4 in. long, 1.5 in. wide, 4-nerved; terminal pair very broad, 6 in. long, 3 in. wide, truncate. Spathes thin, 1 in. long. Spikes 4 on a short peduncle, 2 in. long. Flowers spiral, about 20 on a spike; rachis scurfy. *Hab.* Province Wellesley, Ara Kudah (Ridley). Very rare. *Distrib.* Borneo.

(5) *P. polymorpha* Becc. *Males.* iii. 173; *Becc. and Hook. fil. F.B.I.* vi. 407 (partly); *Ridl. Journ. F.M.S. Mus.* iv. 86; *Mat.* ii. 138.

Slender creeping, ascending palm, 4 to 6 ft. tall, .25 in. through. Leaves 12 to 14 in. long, 6 in. wide or more, sheaths 3 to 4 in. long; leaflets 2 to 4 pairs, strong nerved, mottled light and dark green; petioles 3 in. long. Spathe thin lanceolate, 3 in. long. Spadix 1.75 in. long; 2-branched, eventually red; branches .75 in. long. Flowers spiral. Male petals ovate-triangular, .25 in. long. Fruit black, narrowed at both ends, elliptic-oblong, .5 to .75 in. long. Seed ovate. *Hab.* Mountain woods, often forming dense thickets

at about 4000 ft. altitude. Pahang <sup>13917</sup> Telom. Selangor, Ginting Bidai; Semangkok Pass. Perak, Thaiping Hills; Gunong Berumbun and Gunong Batu Putih (Wray). Kelantan, Chaning Woods (Ridley).

(6) *P. disticha* Bl. *Rumphia*, ii. 77; *Ridl. Mat.* ii. 139. *P. maculata* *Bot. Mag. t.* 8011 (not of *Porte*). *P. bifida* Bl. *l.c.* 92, t. 113, fig. 2. *Areca curvata* *Griff. Ic. Pl. Ind. Or. t.* 248.

Stems several, 3 ft. tall or less, 12 in. through. Leaves usually simple, obcuneate, bilobed, 7 to 12 in. long, 3 in. wide, or with a few 3 to 7 in. broad, acuminate; leaflets 18 in. long, 2.5 in. wide, mottled light green; petioles 4 in. long; sheath 3 in. long. Spathe

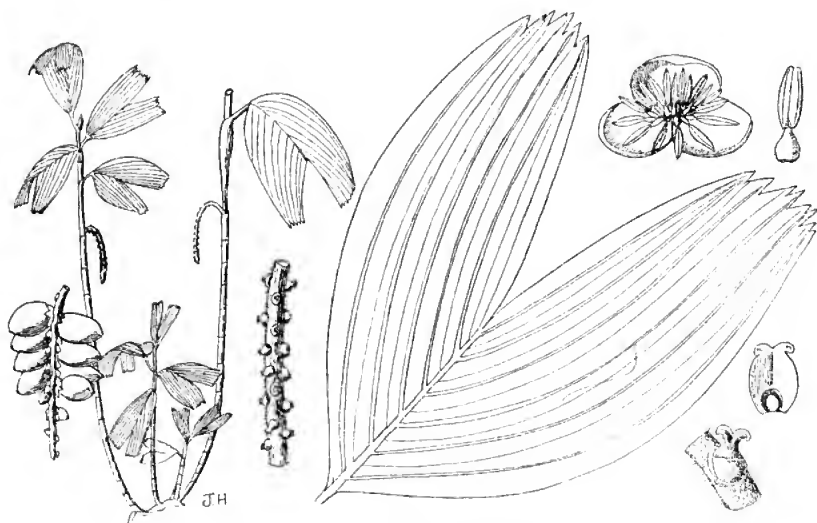


FIG. 210.—*Pinanga disticha*.

oblong beaked, 1 in. long. Spike solitary, rarely branched, 1.25 to 4 in. long, rachis slender, tomentose. Flowers distichous, males 12 in. long. Petals ovate acuminate. Stamens 15. Female petals ovate cuspidate. Drupe red, cylindric-ovoid, acute, .5 in. long. Seed elliptic, slightly ruminant. *Hab.* Common in lowland woods to 2000 ft. altitude. Singapore, Selitar. Johor, Batu Pahat; Gunong Pantai. Pahang, Pulau Tawar (Fox). Malacca, Ayer Panas (Goodenough); Mount Ophir. Negri Sembilan, Perhentian Tinggi. Selangor, Rawang; Bukit Hitam. Perak, Bujong Malacca (Curtis); Goping; Gunong Batu Putih (Kunstler). Penang Hill. Kedah Peak. *Distrib.* Siam, Sumatra. *Native name:* Pinang Luggong. *Batu caves 15343. Tempayan Bukit Johor 12921*

A very pretty, not uncommon, form has nearly white leaves with purplish blotches. The leaves are very rarely entirely green and only in old plants.

(7) ***P. limosa*** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 201; *Mat.* ii. 140.

Dwarf single-stemmed palm, 2 ft. tall, stem .25 in. through. Leaves entire obtuse, deeply bifid at top or with about 5 lobes, pale green, 12 in. long, 6 in. across. Spadix simple, deflexed, or with 3 branches, slender, 2 in. long. Flowers distichous, 28. Female flowers, sepals and petals orbicular. Fruit .25 in. long, white, sub-acute, testa fibrous. *Hab.* In muddy spots in dense forests in the south. Singapore, Selitar; Bukit Timah. Johor, Sungei Tebrau; Gunong Pulai; Kluang road to Mersing (Holttum).

(8) ***P. acaulis*** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 202; *Mat.* ii. 140.

Stem hardly 4 in. tall, solitary, covered with fibrous leaf bases. Leaves entire, cuneate, bifid, 15 in. long, 6 in. wide, or pinnate with 3 pairs of oblong acuminate leaflets, glaucescent beneath. Spathes oblong acute, strongly keeled, 1.5 in. long, .75 in. wide. Spadix simple, 2 in. long, densely covered with males. Males .25 in. long, white. Sepals acute. Petals ovate-triangular. Stamens 8 or 12. Female flowers rose-pink, distichous. Rachis crimson in fruit, 6 in. long. Drupe narrow cylindrical, .75 in. long, black. *Hab.* In forests. Rare. Perak, Kamuning Woods, Sungei Siput (Machado).

One of the smallest of palms.

(9) ***P. subruminata*** *Becc. Males.* iii. 174; *Ridl. Mat.* ii. 140.

Stems about 2 ft. tall, erect, .35 in. through. Leaves narrow cuneate, bifid, truncate at tip, light green, 1 ft. long, 4 in. wide; nerves prominent; petiole 2 in. long; sheaths 2 in. long. Spathe lanceolate-oblong, 1.5 in. long, 3-angled. Spike 1, deflexed, 4 in. long, slender. Flowers distichous or spiral. Males .25 in. long. Sepals deltoid, acuminate. Petals narrow-linear. Stamens 12. Drupe .5 in. long, elliptic, beaked, red. *Hab.* Common in woods up to 2000 ft. altitude. Singapore, Kranji. Johor, Bukit Tanah Abang (Kelsall); Serom; Batu Pahat. Pahang, Rumpin River; Tahan River. Muar, Sungei Pauli (Fox). Perak, Brial, Larut and Tapah (Wray). Penang (Kunstler). Kelantan, Chaning (Ridley).

The Muar plant has leaves 16 in. long and spathe 2 in. long; inflorescence of 3 stout branches; flowers partly distichous, partly spiral.

(10) ***P. subintegra*** *Ridl. Mat.* ii. 141.

Stem slender, 2 to 4 ft. tall. Leaves obtuse, deeply bifid, 8 in. long, 2.5 in. wide, base shortly narrowed; nerves prominent, 15 pairs; midrib and slender petioles 2 in. long, scurfy. Spadix simple, deflexed, 2.5 in. long, slender. Flowers distichous, sunk in oblong depressions in rachis with a short acute bract. Sepals oblong-orbicular, glabrous. Fruit elliptic (cylindrical acuminate when dry), base narrow, .75 in. long, .12 in. through, bright red. *Hab.* Mountain forest, Pahang, Telom. Perak, Bujong Malacca; Gunong

Batu Putih (Wray). Kelantan, Chaning Woods (Ridley); Sungei Ketch (Foxworthy).

(11) **P. calamifrons** *Becc. Males.* iii. 132; *Ridl. Mat.* ii. 141.

Stems slender, dark brown, .25 in. through. Leaves over 1 ft. long, rachis slender with brown scale-like hairs; leaflets 32, very narrow linear acuminate, 6 in. long, 1 in. wide. Spike simple, deflexed, or 2- to 4-branched; flowers distichous. Males unknown. Females, sepals orbicular dentate. Drupe sub-cylindric fusiform, acuminate, .5 in. long. Seed fusiform, hardly ruminant. *Hab.* Kedah Peak (Ridley). *Distrib.* Borneo.

(12) **P. Brewsteriana** *Ridl. Journ. F.M.S. Mus.* vi. 188.

Stems solitary or tufted, 6 ft. tall, .5 in. through, red-brown. Leaves usually simple, obtusate, deeply bilobed, 2 ft. long, 8 in. wide, occasionally with a pair of leaflets below, glaucescent beneath; sheaths 7 to 8 in. long; petioles stout, 6 to 12 in. long. Spathes boat-shaped, 6 in. long. Spadix 2- to 3-branched; peduncle 3 in. long, branches 4 in. long, densely red-woolly. Flowers distant, spiral. Males .12 in. long; petals triangular acuminate. Fruit olive-shaped, .5 in. long, black, on a red rachis. Seed nearly as long, deeply ruminant. *Hab.* Mountains at 4500 to 5500 ft. altitude. Local. Pahang, Gunong Tahan. In wet woods (Ridley).

The male flowers I could only find in the unopened spathe; they fell off directly the spathe opened, and I have no doubt that this palm is fertilised cleistogamously.

(13) **P. fruticans** *Ridl.*

A bush palm with many short stems 2 to 4 ft. tall, crowded together. Leaves 3 to 4 ft. long with about 10 linear acuminate leaflets 15 in. long, 1.25 to 3 in. wide, terminal pair 15 in. long, 3 in. wide, many toothed at top, dark green with paler spots. Spathes oblong, rather broad, 3 to 6 in. long, pink. Spadix sub-sessile, 7 in. long; branches 5. Flowers distichous, close, numerous. Males lanceolate-ovate acuminate, .15 in. long, flesh colour. Stamens 15. Females .15 in. wide. Sepals and petals round, equal, edges ciliate. Fruit oblong, black, .5 in. long with thin fibrous pulp; rachis red. Seed ellipsoid, strongly deeply ruminant. *Hab.* Dense woods in the north-east. Kelantan, Chaning Woods (Ridley).

This is extremely like a plant long cultivated in the Singapore Gardens under the name of *P. Kuhlii*, Bl. It certainly cannot be that species, which is described as having a stem 30 ft. tall and many narrow leaflets, whereas this only attains the height of 4 or 5 ft. and has few, rather broad, leaflets. We have no clue as to the origin of the Garden plant.

(14) **P. paradoxa** *Scheff. Natuurk. Tijdschr. Ned. Ind.* xxxii. 31; *Ridl. Mat.* ii. 141. *Areca curvata* *Griff. Notulæ*, iii. 64 (partly); *Not. Ic. Pl. As. t.* 248.

Stems several, 3 to 12 ft. tall, .25 in. through. Leaves 12 to 13 in. long; petioles 6 in. long, scurfy; leaflets 6 to 10 alternate, 5 in. long, 1 in. wide, terminal, broad cuneate, deeply cleft. Spikes

2 or 3 unbranched or with 2 branches, 3 to 4 in. long. Flowers distichous. Male .25 in. long. Petals lanceolate, long-pointed. Stamens 6. Drupe red, slender curved, fusiform, .5 in. long. Seed fusiform, albumen with 6 longitudinal lines of rumination. *Hab.* Mountain woods. Not rare. Johor, Gunong Pantai. Malacca, Ophir (Griffith). Selangor, Bukit Kutu; Bukit Hitam. Negri Sembilan, Gunong Angsi. Perak, Thaiping Hills. Kedah Peak (Ridley).

(15) *P. pectinata* Becc. and Hook. fil. *F.B.I.* vi. 410; *Ridl. Mat.* ii. 142.

Stems several, very hard, dark green, 10 to 15 ft. tall, 1 to 3.5 in. through. Leaves 3 to 4 ft. long; leaflets 15 in. long, 1 to 3 in. wide, linear acuminate, glaucous beneath. Spadix 6 in. long, base broad, branches 6 to 8, rather stout. Flowers distichous. Stamens many. Drupe .5 to .75 in. long, elliptic, narrowed both ends, purple-black. Seed elliptic small, deeply ruminant. *Hab.* Mountain forests and lowlands. Johor Gunong Pantai; Kwala Sembrong (Kelsall); Sungei Tebrau. Selangor, Batu Tiga. Perak, Goping (Kunstler); Sirah Rimau (Yapp).

(16) *P. perakensis* Becc. *Males.* iii. 175; *Hook. fil. F.B.I.* vi. 410; *Ridl. Mat.* ii. 142.

Stems stout, 4 to 5 ft. tall. Leaves 4 ft. long; leaflets narrower linear acuminate, 18 in. long, .5 to 1 in. wide, glaucous beneath. Spathe oblong, 5 in. long. Spadix 4 to 5 in. long, branches 3 to 6, flattened. Flowers distichous. Stamens many. Drupe, when young cylindrical fusiform, stigma pustular; when ripe elliptic blunt, base narrowed, .75 in. long, .25 in. through. Seed elliptic, much ruminant. *Hab.* Hill forests. Province Wellesley, Ara Kuda. Perak, Bujong Malacca; Gunong Keledang (Curtis). *Gunong Keledang*

(17) *P. adangensis* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 62.

Stems 23 ft. tall, 1.5 in. through, in large clumps. Leaves 5 ft. long; leaflets linear acuminate, bases broad, 20 in. long, 1 in. through, all green. Spathe 7 in. long, 3 in. wide. Spadix branches thick, the longest 7 in. long; rachis flexuous, hardly flattened, .12 in. through. Flowers distichous, very small. Males, sepals ovate. Petals triangular-ovate cuspidate falcate, .25 in. long. Stamens 20. Fruit obovoid, .5 in. long. *Hab.* Local, in damp forests by edge of stream. Adang islands, Pulau Rawei (Ridley).

This plant somewhat resembles *P. malaiana*, but the rachis is much more slender.

(18) *P. malaiana* Scheff. *Natuurk. Tijdschr. Ned. Ind.* xxxii. 175; *Ridl. Mat.* ii. 142. *Areca malaiana* Griff. *Palm. Brit. Ind.* 252, t. 230c.

Stems 12 ft. tall, 1 in. through. Leaves 5 to 8 ft. long; leaflets linear acuminate, usually 2-ribbed, dark green, glaucous beneath, 15 in. long, .5 to 1 in. wide; petioles 18 in. long. Spathe 10 in.

long, oblong. Spadix deflexed, 1 ft. long, branches 2 to 5 flattened, bright red in fruit, .5 in. through. Flowers large, distichous. Males, sepals lanceolate. Petals much longer. Stamens 40. Drupes 1 in. long, cream colour turning black, olive-shaped. Seed similar, tip blunt, base truncate, 1 in. long. *Hab.* Common in lowland forest. Singapore, Chan Chu Kang. Johor Gunong Pantai. Malacca (Griffith); Jus; Ayer Panas; Ayer Keroh. Pahang, Sungei Chenei (Fox); Kwala Lipis (Machado); Kwala Tenok. Negri Sembilan, Perhentian Tinggi. Selangor, Bukit Kudah. Perak, Thaiping Hills and Batang Padang (Kunstler). Penang Hill. Kelantan, Sungei Keteh (Foxworthy). *Distrib.* Sumatra. *Native names:* Pinang Boreng hijau; Pinang Dampong.

(19) **P. riparia** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 201; *Mat.* ii. 143.

Stems distant, 12 to 15 ft. tall, .5 to 1.5 in. through. Leaf 3 ft. long; leaflets 8 pairs, linear acuminate, 3- to 6-nerved, 8 to 9 in. long, 1.25 to 2 in. wide; rachis angled, scurfy. Spadix deflexed; peduncle stout, .75 in. long, branches 3 or 4, stout, 6 to 7 in. long. Flowers distichous, close. Females .12 in. long. Fruit .5 in. long, oblong blunt. *Hab.* In wet woods growing in water and sending out stolons throwing up numerous distant stems. Johor, Tebrau River (Ridley).

(20) **P. patula** *Bl. Rumphia*, ii. 86, t. 115; *Ridl. Mat.* ii. 143.

Stems several, 6 to 20 ft. tall, .5 to 1.5 in. through. Leaf 2 to 3 ft. long; leaflets 6 pairs, sigmoid long acuminate, base narrowed; nerves 3 to 7, 7 in. long, 2 to 2.5 in. wide. Spadix deflexed, 4-branched, branches rather slender, 6 in. long, red. Females, sepals erose crenulate. Drupes flesh colour, elliptic, over .25 in. long. Seed elliptic ruminant. *Hab.* Mountain woods. Scarce. Pahang, Tahan River, Kwala Tenok. Perak, Ulu Bubong (Kunstler). *Distrib.* Sumatra, Borneo.

(21) **P. singaporensis** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 38; *Mat.* ii. 144.

Stems tufted, 6 to 15 ft. tall, .75 in. through. Leaves 3 ft. long; petioles 8 in. long; leaflets 13, sigmoid acuminate, 12 in. long, 3 in. wide or less. Spathe boat-shaped, thin brownish-pink, 1.5 in. long. Spike erect, 4 in. long, branches 5, rachis cream colour. Flowers distichous. Males .25 in. long, white. Sepals small, ovate acute. Petals much longer, oblique. Stamens 14. Female flowers pink; sepals and petals ciliate. *Hab.* Very local and scarce in damp spots in the south. Singapore, Bukit Mandai; Bukit Timah; Selitar (Ridley). Muar, Sungei Segal (Fox).

This is probably extinct in Singapore now.

### 3. NENGA, Wendl.

Tufted palms with the habit of *Pinanga*. Leaves pinnate; leaflets linear-acuminate. Spadix of 3 or 4 deflexed spikes; flowers



spiral or in 4 or 6 series. Sepals and petals subequal, subulate-acuminate in the male. Stamens 6. Seed ovoid, short, base truncate. Ovule parietal, otherwise as in *Pinanga*. Species 3, Malayan.

Fruit 1 in. long	: . . . . .	(1) <i>N. Wendlandiana</i>
Fruit 1.5 in. long	: . . . . .	(2) <i>N. macrocarpa</i>

(1) *N. Wendlandiana* Scheff. *Ann. Jard. Buitenzorg*. i. 153, t. 9-10; *Ridl. Mat.* ii. 144. *Pinanga Nenga* Bl. *Rumphia*, ii. 77, t. 107.

Stems several, 10 to 15 ft. tall, 1.5 in. through. Leaves 5 ft. long or more; leaflets linear, fine, acuminate, 1.25 in. wide, 12 to 15 in. long; petioles 2 ft. long, sheath purplish. Spathe falcate ensiform, 7 to 9 in. long, 1 in. wide. Spadix 1 ft. long, stout. Flowers spiral; males, cream yellow, .25 in. long. Sepals linear; petals lanceolate, acuminate. Stamens pink. Drupe oblong, 1 in. long, blunt round, claret coloured. *Hab.* Common in low wet ground, in forests. Singapore, Garden Road (formerly); Changi; Selitar. Johor, Batu Pahat. Malacca, Ching (Griffith). Negri Sembilan, Tampin. Dindings, Bruas. Pahang, Pekan. Perak, Thaiping (Kunstler). Lankawi, Burau (Robinson). *Distrib.* Sumatra. *Native names*: Pinang Umu; Pinang Antan.

Beccari's var. *hexapetala* is apparently a monstrosity with 6 petals, collected in Perak by Scortechini.

(2) *N. macrocarpa* Scort. in *Becc. Males*. iii. 184; *Ridl. Mat.* ii. 145.

Stems few together, 6 to 18 ft. tall. Leaves 3 to 4 ft. long; leaflets as in *N. Wendlandiana*. Spathe oblong, purplish. Spadix over 1 ft. long, spikes 2 or 3. Male flowers .35 in. long. Fruit ellipsoid, black, 1.5 in. long. Seed ovoid, under .5 in. long, strongly ruminant. *Hab.* Hill forest, not rare, at 1500 to 3400 ft. altitude. Johor, Gunong Pantai. Negri Sembilan, Tampin Hill. Pahang, Tahan River, Kwala Tenok. Perak, Thaiping Hills (Scortechini); Gunong Keledang; Gunong Batu Putih (Wray); Bujong Malacca; Goping. Kedah Peak. Kelantan, Sungei Ketch (Foxworthy).

#### 4. ACTINORHYTIS, Wendl. and Drude.

Tall palm with a stout stem. Leaves large, pinnate, segments linear-lanceolate, tips obliquely toothed; rachis and petioles furfuraceous. Spadix large, twice branched, below the leaves. Spathes 2, with 2 crests on the back. Flowers below in threes, above solitary males. Male flowers minute asymmetric. Sepals imbricate. Stamens very numerous, anthers versatile, pistillode minute. Female flowers, sepals short ovate; petals imbricate, ovary 1-celled; stigmas short. Fruit large, ovoid-ellipsoid, red; exocarp thin, mesocarp fibrous. Seed large, round, attached to the mesocarp, ovoid. Albumen ruminant.

(1) **A. calapparia** Wendl. and Drude, *Linnaea*, xxxix. 184; Scheffer *Ann. Buitenzorg* i. 136, pl. 22, 23. *Areca cocoides* Griff. *Palm. Brit. Ind.* 230B. *Areca calapparia* Bl. *Rumphia*, ii. 68, pl. 100, 2 (*fruit*). *Seaforthia calapparia* Mart. *Hist. Nat. Palm*, iii. 313.

Tree 40 ft. tall, stem stout, ringed. Leaves 8 to 9 ft. long, 4 to 4.6 ft. wide, segments 2 ft. long, 1.25 to 1.5 in. wide, linear acuminate, 5-nerved. Spadix large, pendulous. Flowers in lower part of branches one female between two males, above, males only in pairs. Fruit ovate, 3 in. long, 2.5 in. wide, red. *Hab.* Cultivated ground near villages, Malacca, Ching and halfway to Malim (Griffith); Pahang, villages near Pekan (Ridley). *Distrib.* Malay islands from Rhio, and Sumatra to Amboina. *Native name:* Pinang penawar. *Use:* In medicine.

The origin of this palm seems to be unknown, but was probably in the eastern islands of the Archipelago. The plant is rarely cultivated, but the seeds are carried about by Malays and planted near villages for medicinal use.

## 5. IGUANURA, Bl.

Small unarmed palms. Leaves entire, obcuneate and deeply bifid or pinnate with few broad leaflets. Spathes 2, short, persistent. Spikes simple or branched on a long peduncle, slender. Flowers small spiral, one female between two males or males only on branch ends, sunk in sockets in the rachis. Males, sepals orbicular. Petals oblong, connate at base, lanceolate or ovate. Stamens 6 to 9. Pistillode large. Females, petals ovate. Staminodes 6. Stigmas sessile. Ovary 1 cell, 1 ovule. Fruit oblong, white turning red and finally black. Seed ruminant or not. Species 10, Malayan.

Leaves obcuneate bifid, occasionally few-lobed.

- |  |                             |
|--|-----------------------------|
| Spike simple, rarely 1- to 2-branched, long . . . . .                              | (1) <b>I. geonomæformis</b> |
| Spikes paniced; stem tall and stout; leaves 3 ft. long, obcuneate . . . . .        | (2) <b>I. spectabilis</b>   |
| Leaves obcuneate or variously lobed; stem short, slender; fruit elliptic . . . . . | (3) <b>I. Wallichiana</b>   |
| Leaves pinnate with narrow linear leaflets . . . . .                               | (4) <b>I. diffusa</b>       |
| Spike simple; fruit conic-cylindric curved . . . . .                               | (5) <b>I. corniculata</b>   |
| Spikes paniced.  |                             |
| Fruit ovoid; spike glabrous . . . . .  | (6) <b>I. polymorpha</b>    |
| Fruit cylindrical curved; spike red-woolly . . . . .                               | (7) <b>I. ferruginea</b>    |
| Fruit bilobed at top, glabrous . . . . .   | (8) <b>I. bicornis</b>      |

(1) **I. geonomæformis** Mart. *Hist. Nat. Palm*, iii. 229, t. 178; *Ridl. Mat.* ii. 150.

Stems 2 to 3 ft. tall, 5 in. through, few together. Leaves obcuneate bifid, occasionally with from 2 to 9 lobes acuminate, 18 to 24 in. long, 6 to 9 in. wide; midrib red-tomentose; petioles 1 ft. long. Spikes from axils of lower leaves simple or 2- or 3-branched, 1 ft.

long, rather thick tomentose, or slender and glabrous; peduncle 3 to 24 in. long. Spathes narrow lanceolate acuminate, 6 in. long, .25 in. wide. Flowers numerous, spirally arranged. Males, sepals orbicular. Petals oblong. Drupe .5 in. long. Seed .25 in. long. *Hab.* In damp forest, common usually by forest streams.

var. *typica*. Spike stout, woolly unbranched. Singapore, Bukit Timah. Johor, Gunong Pantai; Kwala Simpai (Kelsall). Pahang, Tahan River. Malacca, Sungei Hudang (Derry); base of Mount Ophir. Selangor, Ginting Bidai; Ginting Peras; Rawang.

sub-var. *ramosa*. *Slackia geomorpha* Griff. *Palms of Brit. Ind.* 162, t. 234. Inflorescence with 2 or 3 branches. Singapore, Chan Chu Kang. Pahang, Kwala Tenok. Malacca (Griffith); Mount Ophir (Hullett); Ayer Panas. Negri Sembilan, Perhentian Tinggi; Tampin Hill. Selangor, Semangkok Pass (Ridley).

var. *malaccensis*. *I. malaccensis* Becc. *Males.* iii. 102. Spikes simple slender, finally tomentose or glabrous. Pahang, Kota Glanggi. Malacca, Ayer Panas. Selangor, Bukit Kutu, Semangkok Pass (form with 3 branches to inflorescence); Menuang Gasing (Kloss, leaves many-lobed); Kwala Lumpur. Perak, Thaiping (Kunstler); Waterloo Estate (Glasgow); Ulu Bubong (Kunstler). *Native names*: Pinang Pachat; Pinang Burong Tikus; Pinang K'lasak.

An extremely variable plant both in foliage and inflorescence.

(2) ***I. spectabilis*** Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 40; *Mat.* ii. 151. *I. Wallichiana* var. *major*, Becc. in *Hook. fil. F.B.I.* vi. 416. *Geonoma Pynærtiana*, *Mast. Gard. Chron.* 1898, 258, fig. 28.

Stems single or several, 8 to 10 ft. tall, 1.5 in. through. Leaves entire obtuse, 3 ft. long or more, 1 ft. wide; petioles 6 to 12 in. long. Inflorescence branched, branches 4 to 7, stout, spreading, 9 in. long, on a peduncle from 12 to 18 in. long. Males, petals oblong acute, .12 in. long. Filaments thick, connate at base. Drupe ellipsoid, tip curved, black, .75 in. long on the thickened rachis. *Hab.* Local in damp forest. Dindings, Bruas (Curtis). Perak, Hermitage Hill; Goping (Kunstler). *Native name*: Teruno.

(3) ***I. Wallichiana*** Hook. *fil. Gen. Pl.* iii. 908; *Hook. fil. F.B.I.* vi. 416; *Ridl. Mat.* ii. 151.

Stems slender, 2 to 4 ft. tall. Leaves obtuse, deeply bifid, 30 in. long, 9 in. wide, more or less cut into long narrow lobes 13 in. long. Spathes narrow, 6 in. long. Panicle of spikes 2 ft. long; peduncle 18 in. long, branches about 8, slender, 6 to 12 in. long. Male sepals ovate. Petals oblong blunt. Filaments filiform 6. Drupe ellipsoid, red, .5 in. long. *Hab.* Common in forests. Muar, Sungei Pauh (Fox). Pahang, Tahan River. Negri Sembilan, Bukit Tinggi. Perak, Thaiping Hills; Bujong Malacca; Tapah (Wray); Selama (Kunstler). Province Wellesley, Ara Kudah.

Penang Hill (Porter, Wall. Cat. 8600). Kelantan, Chaning. *Native name*: Pinang Sapadan.

(4) **I. diffusa** *Becc. in Hook. fil. F.B.I. vi. 416.*

A nearly stemless tufted palm. Leaves 3 to 4 ft. long, with very numerous linear acuminate leaflets 1 ft. long or more, 1 in. wide, prominently 2-nerved, pale beneath. Spadices numerous, compound, branched, velvety hairy, branches spreading, 6 in. across. Flowers, male white, .05 in. long, sunk in sockets with hairy mouths. Sepals gibbous at base, oblique, hairy on edge and tip, oblong, as long as petals. Petals ovate. Stamens 6, dorsifixed. *Hab.* Mountain forests. Scarce. Perak, Thaiping Hills, Gunong Ijuk (hijau) (Scortechini). Kelantan, Chaning Woods (Ridley).

I have only seen a small pencil drawing of Scortechini's plant, and the description is very short and incomplete, but I think the Kelantan plant here described is Beccari's species.

(5) **I. corniculata** *Becc. Males. iii. 187; Ridl. Mat. ii. 152.*

Stems slender, 3 to 4 ft. tall, barely .25 in. through. Leaves 10 to 12 in. long, 6 to 8 in. wide; leaflets 5 to 6 pairs, cuneate and trapezoid, 3.5 to 4 in. long, 1 to 1.5 in. wide, tip broad dentate with a long point at upper edge, scurfy beneath; petioles 4 in. long. Spike simple, 8 to 12 in. long (of which the peduncle is 3 in. long), scurfy. Spathe 1, tubular. Fruit narrow elongate, horn-shaped, tip incurved, .5 to .75 in. long, .2 in. through. *Hab.* Rare in forests, Perak, Selama (Kunstler). Kelantan, Chaning Woods (Ridley). *Native name*: Pinang Angin.

(6) **I. polymorpha** *Becc. Males. iii. 182. I. brevipes Hook. fil. F.B.I. vi. 416.*

Stems 3 to 7 ft. tall, .25 in. through. Leaves 8 to 15 in. long, with 4 to 12 trapezoid acuminate leaflets, 4 in. long, 1.75 to 3 in. wide; sheaths large, 3 to 6 in. long. Peduncle 4 in. long, branches of panicle 6 to 9, slender, 6 in. long. Flowers very small, scattered. Petals oblong blunt. Drupe ovoid or elliptic-ovoid. *Hab.* Mountain woods. Perak, Thaiping Hills; Bujong Malacca. Kelantan, Glam Woods, Kota Bharu (Ridley). Rahman, Kota Bharu (Gwynne-Vaughan).

var. *canina* *Becc. l.c. 190.* Branches more numerous and thick, flowers sub-distichous, Perak, Thaiping Hills.

(7) **I. ferruginea** *Becc. in Hook. fil. F.B.I. vi. 432; Ridl. Mat. ii. 162.*

Stem very short or 0. Leaves about 10; leaflets 10 to 13, apices with blunt teeth; central leaflet much the biggest, 3 ft. long, 1 to 9 in. wide, deep green, petiole over 3 ft. long, thorny at base. Spadix horizontal or deflexed, 2 ft. long, branches simple. Spathes brown-pubescent, 4 in. long; mouths lacerate; rachis thickly red-tomentose. Flowers crowded, sessile or nearly so. Calyx cup-shaped; lobes ovate pubescent. Petals triangular, yellow. Drupe ellipsoid, rose-pink. *Hab.* Common in woods in the south.

Singapore, Garden Jungle; Bukit Timah, etc., Johor, Sungei Tebrau. Negri Sembilan, Tampin. Selangor, Batu Caves. Perak Sunkai (Kunstler). Kedah, Yan (Ridley). *Distrib.* Sumatra.

(8) ***I. bicornis*** *Becc. Males.* iii. 188; *Ridl. Mat.* ii. 153.

Stem 5 to 8 ft. tall. Leaves 1 ft. long, 4 to 6 in. wide; leaflets 2 to 4 pairs, sigmoid trapezoid, acuminate at tip; petioles 3 to 4 in. long, glabrous. Peduncle .75 to 1.5 in. long, branches 5 to 8, filiform, 4 to 8 in. long. Flowers minute. Fruit oblong, base narrowed bilobed, lobes round, 5 in. long. *Hab.* Mountain woods. Rare. Perak, Thaiping Hills (Kunstler and Scortechini).

### 6. ONCOSPERRMA, Bl.

Tall palms shortly soboliferous, forming clumps, strongly armed with black spines. Leaves pinnate; leaflets many narrow. Spathes large boat-shaped, 2, both spiny. Inflorescence large deflexed, of many long spikes on a peduncle. Flowers terminal, all male, lower ones one female with two males. Males asymmetric. Petals lanceolate cuspidate. Stamens 6 to 12. Drupe globose black. Seed ruminant. Species 5 or 6, Ceylon, Malaya.

Leaflets drooping; fruits .25 in. through . . . . (1) ***O. filamentosa***  
 Leaflets spreading; fruit .5 in. through . . . . (2) ***O. horrida***

(1) ***O. filamentosa*** *Bl. Rumphia*, ii. 97, t. 82, 103; *Ridl. Mat.* ii. 146. *Areca tigillaria* *Jack, Mal. Misc.* ii. No. 7, p. 88; *Griff. Palms of Brit. Ind.* 159, t. 133B. *A. nibung* *Mart. Hist. Nat. Palm.* iii. 173, 311, t. 153.

Stems numerous, 60 ft. tall, 6 in. through. Leaves 10 ft. long; leaflets drooping, 1 in. across. Spathes broad oblong, outer one 2 ft. long, 6 in. across, spiny, inner spathe tomentose. Panicle 2 ft. long, branches about 55. Male flowers yellow. Petals lanceolate cuspidate, .25 in. long. Drupe .25 in. through. *Hab.* Damp open ground and tidal rivers. Common. Singapore, Tanglin; Changi; Kranji. Johor. Malacca, Pringgit. Selangor, Jugra (Foxworthy). Adang islands, Pulau Rawei. *Distrib.* Cochinchina, Borneo. *Native names*: Nibong; and forms Lenau, Ibas or Ibu and Nibong Padi. *Use*: Wood for building, pig spears, etc.

The Malays have the above form-names for supposed varieties, of this plant, but I failed to see any real difference between the forms or states of this palm.

(2) ***O. horrida*** *Scheff. Natuurk. Tijdschr. Ned. Ind.* xxxii. 189; *Ridl. Mat.* ii. 147. *Areca horrida* *Griff. Palms of Brit. Ind.* 158, t. 233.

Stems several, 40 to 60 ft. tall, 6 in. through. Leaves 20 ft. long; leaflets about 60, 3 ft. long, 1 to 1.5 in. wide, spreading. Outer spathe 18 in. long, 12 in. across, spiny, inner 12 in. long, 4 in. wide. Panicle 2 ft. long, branches 15. Flowers as in *O. filamentosa*, but petals lanceate. Drupe .5 in. through. *Hab.* Dry

forests. Whole Peninsula. Singapore, Bukit Timah; Changi; Johor. Pahang, Tahan River. Malacca (Griffith). Perak, Bujong Malacca. Kelantan, Sungei Ketch (Foxworthy). *Distrib.* Borneo. *Native name*: Bayas.

### 7. ORANIA, Zippel.

Tall stout unarmed single-stemmed palms. Leaves large pinnate; leaflets linear acuminate. Spathes 2, lower one short tubular, upper one large oblong. Inflorescence large, much-branched. Flowers small, all male on branch ends, one female between two males below. Male sepals short, petals oblong or lanceolate. Stamens 3 to 6. Female petals ovate. Pistil 3-celled. Fruit globose, large, albumen not ruminant. Species 4 or 5, Malayan.

(1) *O. macrocladus* Mart. *Hist. Nat. Palm*, iii. t. 177, fig. 1; *Ridl. Mat.* ii. 145.

Stem 40 ft. tall, 6 in. through, smooth, grey. Leaves 12 to 15 ft. long; leaflets 3 ft. long, 2 in. wide, numerous. Inflorescence paniced, branches slender, over 1 ft. long. Flowers scattered. Stamens 6. Fruit smooth globular, green, 1 to 1.5 in. through. *Hab.* Woods at about 1000 ft. altitude. Singapore, Chan Chu Kang; Woodlands; Pulau Ubin. Pahang, Tahan Woods. Malacca, Ching (Griffith). Dindings, Lumut. Perak, Bujong Malacca; Temengoh. Kelantan, Ulu Kesial (Gimlette). *Native name*: Ibul. *Use*: The fruit is held in Kelantan to be exceedingly poisonous as is also the shoot (see Gimlette, "Malay Poisons," ed. ii. 148).

### 8. CYRTOSTACHYS, Bl.

Unarmed tufted palms. Leaves pinnate. Inflorescence pendulous of many spikes. Spathes 2, deciduous. Flowers one female between two males, in spirals. Males symmetric. Petals ovate. Stamens 11 to 15. Female petals larger than sepals. Drupe small, obovoid. Seed ovoid, not ruminant. Species 2, Malayan.

(1) *C. Lakka* Becc. *Ann. Jard. Buitenzorg.* ii. 141.

Stems 12 to 15 ft. tall, 3 in. through. Leaves erect, 5 ft. long; leaflets linear, glaucous beneath, 18 in. long, 1.5 in. wide; rachis, petioles 6 in. long and sheath 2 ft. long, red. Spathes broad oblong. Inflorescence 2 ft. long, branches 25, pendulous, green turning red. Males, sepals and petals ovate, green edged red; petals longer. Drupe black, base scarlet. Seed .25 in. long. *Hab.* In water in wet woods by tidal rivers, in the lowlands. Singapore, Kranji; Jurong. Pahang, Pekan. Selangor, Klang. Perak, Teluk Anson. *Distrib.* Borneo. *Native name*: Pinang Rajah. The red-stemmed or sealing-wax palm.

### 9. PTYCHORAPHIS, Becc.

Stems slender, tufted, unarmed. Leaves pinnate; leaflets narrow. Spathes 2, deciduous, sword-shaped. Panicle of several

slender spikes. Flowers in pairs, one male, one female, or males at tip, females at base. Males, sepals ovate or lanceolate. Stamens 6. Drupe ellipsoid. Seed ellipsoid, grooved on one face, ruminant. Species 2, endemic.

Rachis thick; dense-flowered; petals ovate . . . . (1) *P. singaporensis*  
Rachis slender; flowers scattered; petals lanceolate (2) *P. longiflora*

(1) *P. singaporensis* Becc. *Ann. Jard. Buitenzorg*. ii. 90, t. 196; *Ridl. Mat.* ii. 48.

Stems several, 6 to 12 ft. tall, 1 in. through, black, ringed. Leaves 4 ft. long; leaflets 12 in. long, .5 in. wide; petioles 3 ft. long. Spathe 6 in. long, inner one woolly. Panicle 6 in. long. Spikes .12 in. thick, 5 to 7. Flowers numerous and close. Males, sepals ovate orbicular. Petals larger, ovate acute, white or yellow. Females, bract transversely oblong. Sepals ovate truncate gibbous. Drupe red pulpy, .5 in. long. *Hab.* South of the peninsula in woods. Singapore, Tanglin; Sungei Buluh; Toas; Changi. Johor, Gunong Pulai (Hullett). Dindings, Lumut (Curtis). *Native name*: Rintin or Kerintin. *Use*: The stems make beautiful black walking-sticks.

(2) *P. longiflora* *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 32; *Mat.* ii. 148.

Habit and stems of *P. singaporensis*. Leaves 3 ft. long; leaflets 40 pairs, 18 in. long, .5 in. wide. Inflorescence of 4 or 5 branches, 6 to 7 in. long. Flowers scattered, 21 on a branch. Males with 2 orbicular gibbous bracts at base. Sepals orbicular, fringed. Petals lanceolate blunt, much longer. Female bract small. Sepals ciliate. *Hab.* Johor, on the top of Gunong Banang, Batu Pahat (Ridley).

This is very distinct from *P. singaporensis* in its slender branched inflorescence with distant flowers and lanceolate petals.

### 10. ARENGA, Labill.

Large unarmed palms, stems solitary or several. Leaves very large, pinnate, sheath breaking up into black fibre; leaflets very numerous, linear, narrowed and auricled at base, tips truncate notched. Inflorescence of very numerous long pendent spikes, unisexual, produced when the tree is adult from the upper axils downwards alternately male and female. Spathes numerous, short, persistent on peduncle. Male flowers large. Sepals orbicular. Petals longer, oblong coriaceous. Stamens very numerous. Females subglobose, oblong or flat at top. Sepals sub-orbicular; petals ovate. Ovary 3-celled; ovules 3. Fruit 2- or 3-seeded. Seed plano-convex, large. Albumen equable. Species 10. Indo-Malaya, Formosa, Australia.

Stem stout, covered with fibre; spikes 3 to 4 ft. long;  
petals oblong, 1 in. long, violet . . . . . (1) *A. saccharifera*

Stem more slender, not covered with fibre; spikes  
1.5 ft. long; petals ovate oblong, .5 in. long, pink (2) *A. Westerhoutii*

(1) **A. saccharifera** Labill. *Mem. Inst. Fr.* viii. 209; *Griff. Palms of Brit. Ind.* 164, t. 135; *Ridl. Mat.* ii. 154.

Stems usually solitary, occasionally 3 together, about 20 to 30 ft. tall, 1 ft. through. Leaves 20 ft. long; petioles stout; sheaths broken up into black fibre; leaflets about 60 pairs, glaucous white beneath, 25 in. long, 1 to 1.5 in. wide. Spathes 5, lanceolate oblong, sheathing peduncle. Inflorescence 3 to 4 ft. long. Males, sepals green. Petals 1 in. long, violet, oblong blunt. Females green, petals ovate, .5 in. long. Fruit oblong or sub-globose, top depressed, yellow, 3-angled, 2 in. long. Seed 1 in. long, black. *Hab.* Common in villages all over the peninsula. I met with it apparently wild on Bukit Jugra, Province Wellesley in forest, where the stems were more slender and less provided with fibre than in the typical plant. *Native names:* Enau (wild plant); Kabong (cultivated one). *Use:* The fibre is used for black rope, Tali hijau or vegetable horsehair. Trunks of trees are split and scooped out for water conduits. Sugar and molasses (gula Malacca) is obtained from flower shoots. Fruits (young) made into a sweetmeat.

This palm was introduced from the Moluccas by Chr. Smith into Penang in 1796.

(2) **A. Westerhouti** Griff. *Calc. Journ. Nat. Hist.* v. 474; *Palms of Brit. Ind.* 166, t. 235; *Ridl. Mat.* ii. 155. *A. obtusifolia* Hook. *fil. F.B.I.* v. 421 (not of Martius).

Stems usually several, 16 to 30 ft. tall, 6 to 8 in. through, grey and smooth. Leaves 16 to 18 ft. long; leaflets about 80 to 90 pairs as in *A. saccharifera*, 24 to 60 in. long, 1 to 2.5 in. wide. Male inflorescence 18 in. long, branches 16 to 18, about 8 to 9 in. long. Flowers nearly .75 in. long. Sepals gibbous orbicular. Petals pink, ovate-oblong, .5 in. long. Female, petals .5 in. long. Fruit oblong, depressed above, 2 in. long, 2.5 in. through, yellowish green and black. Seeds flattened, oblong, .25 in. through. *Hab.* On dry wooded hills, often very abundant. Pahang, Kwala Tahan. Malacca, Naning (Westerhout). Negri Sembilan, Tampin; Bukit Tangga. Perak, Bukit Kapayung; Thaiping Hills; Batang Padang. Province Wellesley, Bukit Lankap. Penang Hill. *Native name:* Langkap. *Use:* Pith eaten in curries.

#### 11. DIDYMOSPERMA, Wendl.

Dwarf palms, unarmed. Stems solitary or tufted. Leaves cuneate, oblong entire or pinnate with trapezoid leaflets. Spikes simple or branched, unisexual. Spathes numerous, persistent. Flowers rather large. Male calyx cupular, trifold. Petals oblong. Stamens 10 to 30. No pistillode. Female sepals round. Petals triangular. Ovary 2- to 3-celled. Fruit globose or oblong. Seeds 1 to 3. Albumen equable. Species 6, Assam and Malaya.



Leaves simple or of 4 or 5 leaflets, trapezoid subsessile.

- Spike 1, short erect . . . . . (1) **D. Hookeriana**  
 Leaves with ovate leaflets, base inæquilateral petiolate.  
 Spike 1, long slender . . . . . (2) **D. hastata**

(1) **D. Hookeriana** *Becc. Males.* iii. 186; *Ridl. Mat.* ii. 155.

Stems 1 or several 12 to 13 in. tall, .25 in. through. Leaves simple, obtuse, trapezoid, toothed, with a long point at tip, or more often 4 or 5 and a terminal one, base narrow obtuse, sessile or shortly petioled, 7 to 9 in. long, 1.5 in. wide or more. Spike single, 3 to 8 in. long with several linear spathes 4 in. long or less on the slender 4 in. peduncle. Males .25 in. long. Stamens numerous. Female spadix stouter with orange-coloured pistil. Fruit globose, orange, .25 in. through. *Hab.* Not rare; in forests. Pahang, Tahan River; Kota Glanggi. Perak, Teluk Pinang; Kwala Dipang (Curtis); Waterloo; Kamuning; Sungei Rayah and Gunong Mesah (Kunstler); Perlis, Kanga. Setul, Bukit Rajah Wang (a form with 5 pairs of narrow leaflets).

(2) **D. hastata** *Becc. Males.* iii. 99; *Ridl. Mat.* ii. 156.

Stems 3 to 6 ft. tall, .4 in. through. Leaves over 1 ft. long; leaflets 5 pairs, terminal pair not connate, ovate denticulate, base pairs usually inæquilateral, 8 in. long, 3 in. wide; petioles .25 to .5 in. long. Spike 7 in. long, slender, peduncle as long. Male flowers numerous, .1 in. long. Petals oblong. Stamens 15. *Hab.* In forests, less common than *D. Hookeriana*. Selangor, Rawang; Bukit Kudah. Perak, Selama (Kunstler). Kelantan, Chaning Woods (Ridley).

A specimen from Petaling (Selangor) has leaflets elongate rhomboid with a long point, and hardly any teeth, 6 in. long, 2 in. wide, and petioles slender, 1.75 in. long, base of leaflet long-narrowed.

## 12. CARYOTA, Linn.

Very tall or medium-sized palms, stems solitary or 5. Leaves very large, pinnate or bipinnate; leaflets obliquely flabelliform or obtuse, tip round or acuminate petioluled. Inflorescences produced from upper axils downwards alternately male and female, of many long pendulous spikes. Spathes short, 3 to 5. Male flowers rather large. Petals oblong. Stamens numerous. Female sepals gibbous, round. Staminalodes 3. Fruit globose, 1- to 3-seeded. Albumen ruminant. Species about 10, India, Cochin China, Malaya, Australia.

- Stem solitary, stout, 60 ft. tall . . . . . (1) **C. æquatorialis**  
 Stems 5, slender, 15 to 25 ft. tall . . . . . (2) **C. mitis**

(1) **C. æquatorialis** *Ridl.* *C. obtusa* *Griff. var. æquatorialis* *Becc. in Hook fl. F.B.I.* v. 423.

Stem solitary, 50 to 60 ft. tall and 1 ft. or more through. Leaves 18 ft. long; leaflets obtuse dentate or serrate, upper margin

acute or acuminate, 1 ft. long, 2.5 in. wide. Inflorescence 12 ft. long, spikes very numerous, 8 ft. long. Male flowers pale yellowish green, distant on the spike. Sepals round, base gibbous, .1 in. long. Petals oblong-oblongeolate, .6 in. long. Stamens over 100. Females, sepals broad. Petals oblong-acute. Fruit and seed globose. *Hab.* Sporadic in the mountain forests, in damp valleys, not rare but very difficult to collect on account of its great height. Johor, Gunong Pantai. Selangor, Semangkok Pass. Perak, Thaiping Hills; Gunong Batu Putih (Wray); Batang Padang. *Native name*: Dudok.

(2) **C. mitis** Lour. *Fl. Cochinchine*, ii. 57; *Ridl. Mat.* ii. 157. *C. sobolifera* Mart. *Hist. Palm.* 194, pl. 107, fig. 2; *Griff. Palms of Brit. Ind.* 171, t. 236.

Stems 5 from a root, 15 to 25 ft. tall, 4 in. through or less. Leaves 8 ft. long; sheaths mealy tomentose, 3 to 4 ft. long; petioles 2 to 3 ft. long, lamina large, bipinnate, pinnate about 2 ft. long; leaflets obtuse-erose, toothed at tip, .7 in. long. Panicles 10 in. long. Spikes 20 or more, pendulous. Male flowers, sepals round lacerate, green. Petals oblong, .25 in. long, violet. Female flowers, sepals hairy on the edge. Petals ovate purple. Fruit globose flat-topped, purple, .5 in. through. Seed 1, transversely elliptic, albumen sparsely ruminant. *Hab.* In woods and hedgerows, villages, etc. Very common. Singapore, Tanglin; Bukit Timah; Pulau Ubin. Malacca. Ayer Panas; Batang Malaka (Derry). Pahang River. Perak (Wray). Province Wellesley, Permatang Bertam. Penang Hill. Perlis, Besih Hangat; Tebing Tinggi. Adang islands, Pulau Rawei. *Distrib.* Burma; Andamans, Cochinchina. *Native names*: Tukus; Dudok. *Use*: The tomentum of the leaf sheaths is used by Sakais as wadding for the blow-pipe and for tinder. The stems produce an inferior sago.

### 13. PHŒNIX, Linn.

Stems short usually several (rarely tall or solitary). Leaves pinnate, rigid, spiny; leaflets linear spinous, sides pinched in at base. Inflorescence interfoliar, erect, branched, unisexual. Spathe complete, large. Flowers small, yellow. Males, calyx flat or cup-shaped, 3-lobed. Petals linear, ovate or oblong. Stamens 3 to 9; filaments subulate. Females, petals rounded, staminodes 6 free or connate. Carpels 3, free. Drupe oblong, 1-seeded. Seed oblong, grooved on one side. Species about 10, Africa, India, Siam.

(1) **P. paludosa** Roxb. *Hort. Beng.* 75; *Fl. Ind.* 789; *Griff. Palms of Brit. Ind.* 144, t. 229; *Ridl. Mat.* ii. 158.

Stems several, 5 to 8 ft. tall, 3 in. through. Leaves 4 to 8 ft. long; leaflets 1 to 2 ft. long, .5 in. across, linear acuminate, grey beneath. Male panicle 1 to 1.5 ft. long, peduncle broad flat, branches slender, 3 to 4 in. long. Petals linear. Female panicle stouter. Petals orbicular. Drupe .5 in. long, black. *Hab.* Tidal

swamps in the north. Dindings, Lumut. Province Wellesley, Prai; Krian. Kedah, Yan; Alor Sta. Perlis, Kanga (Ridley). *Distrib.* India, Siam, Andamans. *Native name*: Korma.

#### 14. CORYPHA, Linn.

Tall stout unarmed palms, dying after fruiting. Leaves orbicular, very large, multifid; petioles long, thorny. Spadix terminal erect, very large, paniced. Spathes many, tubular. Flowers small, bisexual. Calyx cupular, trifid. Petals connate below, ovate acute. Stamens 6. Ovary 3-celled. Fruit of 1 to 3 fleshy drupes. Seeds globose. Albumen equable. Species 6, tropical Asia.

(1) *C. elata* Roxb. *Fl. Ind.* ii. 176; *Hook. fil. F.B.I.* vi. 428; *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 214.

Stem 60 to 80 ft. tall, smooth, 1.5 ft. through. Leaves 8 ft. across, orbicular with 50 or more acute lobes; petioles thorny to the top, about 6 to 12 ft. long, thorns black-pointed. Spathes numerous. Spadix large, dense, decomposed. Flowers small, yellowish white. Fruit globose, dull green, pulp orange, 1 in. through, on a pedicel .12 in. long. *Hab.* Common in open country in the north. Kedah, Alor Sta. Perlis, Kanga (Ridley). *Distrib.* India, Burma, and probably Malay isles.

I believe this species to be Roxburgh's *C. elata*, but I have not seen a flowering spadix.

#### 15. LIVISTONA, Br.

Tall palms with a stout smooth trunk. Leaves large, orbicular, plicate, split halfway into linear lobes; petiole stout, edge thorny. Inflorescences very large, much-branched, axillary. Flowers bisexual, minute. Calyx cup-shaped, 3-lobed. Stamens 6, connate in a ring. Carpels 3, nearly free. Drupes elliptic or globose, albumen equable. Species 16, Assam, Malaya, China, Australia.

Stem 60 ft. tall, smooth . . . . .	(1) <i>L. cochinchinensis</i>
Stem 30 ft. tall, covered with brown fibre; sepals not gibbous . . . . .	(2) <i>L. tahanensis</i>
Stem 3 ft. tall, 6 in. through, covered with brown fibre; sepals gibbous . . . . .	(3) <i>L. rupicola</i>

(1) *L. cochinchinensis* Mart. *Hist. Nat. Palm.* iii. 242; *Ridl. Mat.* ii. 166. *L. spectabilis* Griff. *Palms of Brit. Ind.* 130, t. 236.

Stem 60 ft. tall or more, 8 in. through, smooth, grey. Leaves orbicular, 10 ft. wide, lobes long narrow, tips filiform pendulous; petioles long and stout, 2 in. through at base, thorns very large, recurved, .5 in. long. Spadices 4 to 5 ft. long, much-branched. Flowers sessile. Calyx cup-shaped, minute. Drupe globular, light blue, .5 in. long. *Hab.* In rice-fields and forests. Malacca (Griffith). Selangor, Jugra (Burn-Murdoch). Perak, Batang Padang valley. Province Wellesley, Permatang Bertam and all the rice-

fields. Penang (Lewis). *Distrib.* Cochinchina. *Native name*: Serdang.

(2) **L. tahanensis** *Ridl. Journ. F.M.S. Mus.* iii. Plate D (photograph of top of palm).

Stem about 17 to 21 ft. tall and 3 to 4 ft. round, covered with fibre. Leaves orbicular, large, base broad, 7 ft. 8 in. long; petioles flat on one side, backs convex, edge with short flat pale blunt triangular thorns above, broad hooked at base, lobes acuminate, cleft for three-quarters of length of leaf. Spadices 2.5 ft. long, flattened; peduncle 1 in. wide at base, spadices 4, flat and keeled, basal one 9 in. long, limb 1.25 in. long, lanceolate acuminate, upper one 4 in. long. Spadix-branches, lowest 1 ft. long, laxly branched, branches slender, red, scurfy. Flowers very small, numerous. Sepals 3, free, ovate, tipped red, half as long as petals. Petals 3 oblong blunt, tip thickened, incurved. Stamens 6, shorter than petals, filaments short, thick. Anthers white, distinctly bilobed. Ovary 3-lobed; style short, conic. Drupe globose-oblong, .5 in. long, calyx and pedicel thickened. *Hab.* Mountain valleys. Pahang, Gunong Tahan, at Wray's Camp and Skeat's Hill at 3500 ft. altitude (Robinson, Pendlebury). *Native name*: Daun Tau.

The palms on the ridges are more stunted than those lower down. The fibre falls from the trunk with the leaf-bases, as the palm grows, leaving the trunk comparatively smooth though still with a fibre coat 1 in. thick (H. M. Pendlebury).

(3) **L. rupicola** *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 41; *Ridl. Mat.* ii. 166.

Stem 3 ft. tall, 6 in. through, densely covered with brown fibre. Leaves 2 ft. across, split into 12 points, tips setaceous; petioles 20 in. long, thornless or nearly so. Spadix short, slender, much-branched. Spathes cuspidate, dark brown, two lowest ones 3 in. long, branches very slender, spikes 2 in. long, lengthening to 4 in. in fruit, sinuous. Sepals round, gibbous. Petals similar. Stamen-ring with 6 subulate teeth. *Hab.* Limestone rocks. Selangor, Batu Caves (Ridley). Lankawi (Curtis). *Native name*: Serdang Batu.

## 16. PHOLIDOCARPUS, Bl.

Lofty palms with a big stout stem. Leaves fan-shaped; petioles stout, thorny. Inflorescence a very large, much-branched panicle. Flowers bisexual, sessile. Calyx tubular, 3-toothed. Corolla twice as long. Stamens 6, connate at base. Drupe large, globose, fleshy or crustaceous. Seed large, globose, ruminant. Species several, very little known. Malayan.

Fruit brown, tessellated . . . . . (1) **P. macrocarpa**  
 Fruit green, smooth . . . . . (2) **P. Kingiana**

(1) **P. macrocarpa** *Becc. Males.* iii. 91; *Ridl. Mat.* ii. l.c. 167.  
 About 50 ft. tall. Leaf 5- or 6-partite, very large; petioles

thorny to top. Spadix 5 ft. long, very thick, branches about 1 ft. long, 1 in. through at base. Spathes tubular, brown, scurfy. Flowers distant. Fruit ovoid, 6 in. long, 4 in. through, brown, tessellated on pedicels .25 in. long. Seed surrounded by fibre. *Hab.* Damp lowland jungle. Selangor, Klang to Petaling (Ridley).

(2) *P. Kingiana* Ridl. *Mat.* ii. 167. *Livistona Kingiana* Becc. *Males.* iii. 199.

Stem 40 to 80 ft. tall, 8 to 12 in. through, rough with leaf bases with a brown fibrous network. Leaves 3 to 5 ft. long, cut to base with linear acuminate lobes, 3 in. across; petioles 6 to 7 ft. long, 1 in. through, green with two yellow bands, thorax conic, base swollen, black. Spadix very large, orange brown; branches over 1 ft. long. Flowers .25 in. long, yellow. Calyx tubular, teeth lanceolate-triangular, ciliate. Petals blunt, pubescent. Drupe dark green, 2 in. through; pericarp fleshy, 2 in. thick, orange inside. Seed tessellate, 1 in. through, sub-ruminant. *Hab.* Low swampy woods. Singapore, Bukit Mandai; Chan Chu Kang. Johor, Batu Pahat. Selangor, Bukit Jugra (Burn-Murdoch). Dindings, Lumut. Perak. *Native name*: Kepau.

### 17. LICUALA, Roxb.

Low palms often bushy. Leaves orbicular plicate, deeply cut into cuneate segments, more rarely entire; petiole thorny on edge. Inflorescence interfoliolate, elongate, with tubular persistent spathes. Spikes simple, rarely compound, from the spathe axils, short, densely flowered. Flowers small, bisexual. Calyx cupular, 3-toothed. Petals connate. Stamens 6, free or connate, in a ring. Carpels 3, free or connate. Drupe small, globose or ellipsoid. Albumen equable. Species 50, India, Malaya to Australasia. *Native name*: Palas.

#### § 1. *Eu-licuala*.

Stem tall, 3 to 8 ft.

Inflorescence of compound spikes from axils of spathes; leaves large.

Spikes several together, fairly stout.

Spikes about 6 to 8; calyx glabrous, campanulate . . . . .

(1) *L. paludosa*

Spikes 16 on a spadix, long and slender; calyx pubescent campanulate . . . . .

(2) *L. patens*

Spikes few together; calyx cylindric, pubescent . . . . .

(3) *L. spinosa*

Spikes few, very slender; calyx urn-shaped, 3-toothed . . . . .

(4) *L. glabra*

Spikes few, moderately stout; calyx urn-shaped . . . . .

(5) *L. longepedunculata*

Spikes few; calyx cylindric lobed . . . . .

(6) *L. malayana*

Stemless, or nearly so; leaves large.

Inflorescence stout.

Leaflets 10 to 13; calyx cup-shaped; rachis red woolly . . . . .

(7) *L. ferruginea*

Leaflets 20; calyx cylindric . . . . .

(8) *L. longipes*

Inflorescence short slender.

Flowers pedicelled; calyx broad, campanulate . . . . . (9) **L. Kunstleri**

Flowers sessile; calyx short, lobes broad . . . . . (10) **L. acutifida**

Flowers sessile; calyx cylindric, hardly lobed; petals acute . . . . . (11) **L. modesta**

Inflorescence of 2 or 3 very slender branches. . . . . (12) **L. Wrayi**

Leaflets 3 to 7 cuneate, central one petioled; flowers very small . . . . . (13) **L. triphylla**

Leaflets 11 to 16 sessile linear; flowers sessile . . . . . (14) **L. pusilla**

Leaflets 10 to 17 sessile linear; flowers pedicelled . . . . . (15) **L. Scortechinii**

Inflorescence of 1 to 3 thick woolly spikes.

Spikes simple . . . . . (16) **L. Kingiana**

Spikes 3 . . . . . (17) **L. lanuginosa**

§ 2. *Pericyclus.*

Inflorescence lax paniced . . . . . (18) **L. paniculata**

(1) **L. paludosa** *Griff. Calc. Journ. Nat. Hist.* v. 233; *Palms of Brit. Ind.* 118, t. 221; *Ridl. Mat.* ii. 160.

Stems several, 10 to 20 ft. tall, 2 to 3 in. through. Leaf orbicular, 7- to 9-lobed, lobes 2 ft. long, 4 in. wide, blunt, toothed; petioles thorny at base. Spadix 3 to 6 ft. long. Spathes 6 in. long or more. Panicles 6 to 8 in. long, with 6 to 8 branches; rachis pubescent. Flowers turbinate. Calyx campanulate, irregularly split at top, glabrous. Corolla lobes ovate, glabrous. Staminal ring adnate to petals. Fruit globose, red, .25 in. through. *Hab.* In watery places in forest. Johor, Hadji Senawi near Batu Pahat. Malacca (Griffith) on Pulau Besar; Tanjong Kling. Muar, Sungei Segal (Fox). Dindings, Lumut.

(2) **L. patens** *Ridl. Journ. Roy. As. Soc. S. Br.* 81, p. 202.

Stem 10 ft. tall, 3 to 5 in. through. Leaf 2 to 3 ft. across; leaflets linear, obtuse, 21 in. long, 1.5 in. wide, teeth 4, broad, acuminate; petioles 6 to 8 ft. long, sparsely thorny at base, back round, edges sharp. Spadix 3 to 4 ft. long. Spathes 10 in. long or less, flattened, lacerate. Branches of spadix of about 16 spikes, 8 in. long, rather slender, with distant flowers; rachis puberulous. Flowers sessile, obconic. Calyx campanulate, ribbed, silky hairy. Corolla glabrous, short. *Hab.* Mountains. Perak, Gunong Bubu at 2500 to 4000 ft. altitude (Kunstler, Wray).

(3) **L. spinosa** *Wurmb. Verh. Genootsch;* *Ridl. Mat.* ii. 160; *Griff. Palms of Brit. Ind.* 119; *Bl. Rumphia*, ii. 39, t. 82, 88.

Bushy palm with many stems, 5 to 15 ft. tall, 2 in. through. Leaf orbicular; leaflets 18, linear-obtuse, 12 in. long, 1.5 in. across, top erose; petioles 3 ft. long, thorny the whole length. Spadix erect, 4 to 6 ft. long; spathes silvery with lanceolate point, 13 in. long; panicles several, hairy, twice or thrice branched. Flowers .12 in. long. Calyx cylindric, hairy, lobes ovate. Corolla white, pubescent, lobes ovate-lanceolate acute. Drupes oblong, orange, .25 in. long. Seed globose. *Hab.* In dry open places,

common. Singapore, Sepoy lines; Pulau Brani; Pulau Ubin. Johor, Pulau Tinggi. Malacca near town (Griffith). Pahang, Pekan. Perak, Mata Lumbu (Wray). Kedah, Alor Sta. Lan-kawi, Kwah (Curtis). Adang islands, Pulau Rawei. Kelantan, Chaning. *Distrib.* Andamans.

(4) ***L. glabra*** Griff. *Calc. Journ. Nat. Hist.* v. 229; *Palms of Brit. Ind.* 124, t. 233; *Ridl. Mat.* ii. 161.

Stems stout, 1 to 5 ft. tall, 1.5 to 2 in. through. Leaves fan-shaped, 16 to 18, lobes linear cuneate, rather deep, blunt toothed, .15 in. long; petioles rather slender, base thorny. Spadix over 5 ft. long, very slender, lowest spathe 8 in. long, branches about 7, slender, 2 to 6 partite glabrous, lower ones 5 in. long to upper ones .1 in. long. Flowers scattered distant on short bosses. Calyx urn-shaped, 3-toothed. Petals lanceolate. Drupe ellipsoid, .4 in. long. *Hab.* Mountain woods to about 3000 ft. altitude, local but abundant. Malacca, Mt. Ophir (Griffith and all collectors). Pahang, Tahan Woods. Selangor, Bukit Hitam (Kelsall); Bukit Kutu. Dindings, Lumut. Kelantan, Chaning.

var. *selangorensis* Becc. Stem up to 10 ft. tall, slender; leaflets 5 to 7, mid-ones much the widest, 2 in. across. Spadix branches of 5 spikes below. Selangor, Semangkok Pass (Ridley).

(5) ***L. longepedunculata*** Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 42; *Mat.* ii. 161.

Stem 3 to 8 ft. tall, 1 to 1.5 in. through. Leaves 4 to 5 ft. wide, lobes 6 or more, linear-obcuneate, teeth broad blunt, 15 to 18 in. long, 3 in. wide at top; petioles slender, not thorny. Spadix 3 ft. long or more; peduncle broad flat, quite glabrous, 2 ft. long. Spikes 4 together, 3 in. long. Flowers scattered, .12 in. long; rachis moderately stout. Calyx urn-shaped, not lobed. Petals lanceolate. *Hab.* Perak, Gunong Batu Putih (Wray).

(6) ***L. malayana*** Becc. *Males.* iii. 197; *Ridl. Mat.* ii. 161.

Stems several, 6 to 7 ft. tall, nearly 2 in. through. Leaves nearly orbicular, lobes 14 to 26, linear-obcuneate, 15 in. long, 1 to 2 in. wide; petioles slender, thorny for the lower third. Spadix slender, 2 ft. long, branches single, fairly thick, 4 in. long. Rachis pubescent. Flowers scattered on short tubercles, bracts small ovate. Calyx cylindrical, base intruded, teeth obscure, sometimes pubescent, splitting irregularly. Petals lanceolate. Fruit globose. *Hab.* Mountain forests, sometimes low down, up to 4000 ft. altitude. Pahang River, Chengei, etc. Perak, Bujong Malacca; Thaiping Hills; Goping (Kunstler); Salak (Scortechini). Kelantan, Sungei Ketch, Batu Papan (Foxworthy).

(7) ***L. ferruginea*** Becc. *in Hook. fl. F.B.I.* vi. 432; *Ridl. Mat.* ii. 162.

Stem very short or 0. Leaves about 10; leaflets 10 to 13, apex with blunt teeth, central leaflet much the biggest, 3 ft. long, 1 to 9 in. wide, deep green; petioles over 3 ft. long, thorny at base.

Spadix horizontal or depressed, 2 ft. long, branches simple; spathes brown, pubescent, 4 in. long, mouths lacerate; rachis thickly red-tomentose. Flowers crowded, sessile or nearly so. Calyx cup-shaped, lobes ovate pubescent. Petals triangular, yellow. Drupe ellipsoid, rose pink. *Hab.* Common in woods in the south. Singapore, Garden Jungle; Bukit Timah. Johor, Sungei Tebrau. Negri Sembilan, Tampin. Selangor, Batu Caves. Perak, Sunkai (Kunstler). Kedah, Yan (Ridley). *Distrib.* Sumatra.

(8) **L. longipes** Griff. *Calc. Journ. Nat. Hist.* v. 330; *Palms of Brit. Ind.* 125, t. 234; *Ridl. Mat.* ii. 162.

Stemless or almost so. Leaves orbicular; leaflets 14 to 18 in. long, 3 to 4 in. wide at top, erose crenulate, about 8 to 20; petiole over 1 ft. long, stout, thorny for two-thirds of its length. Spadix 5 to 24 in. long, stout, branches stout, 3 in. long, spreading, 5 or 6 on a peduncle. Spathes dilate. Flowers crowded, 12 in. long. Calyx cylindric, base broad, lobes short ovate. Fruit globose, .5 in. through. Seed globose. *Hab.* Common in woods on the hills to about 2500 ft. altitude. Johor, Gunong Pulau; Gunong Pantai. Malacca, Mt. Ophir, lower slopes (Griffith); Ayer Panas (Goodenough). Negri Sembilan, Tampin; Gunong Angsi. Selangor, Semangkok Pass. Perak, Thaiping Hills.

(9) **L. Kunstleri** Bccc. in *Hook. fil. F.B.I.* vi. 433; *Ridl. Mat.* ii. 162.

Stem 4 ft. tall, 4 to 5 in. through. Leaves large, 15-lobed, lobes about 18 in. long, over 1 in. wide; midlobe much larger, little erose, teeth of side-lobes 1 to 2 in. long; petioles slender, 3 ft. long, thorny for 2 ft., thorns large. Spadix 1 ft. long. Spikes 3, not branched; spathes silvery scurfy, lowest lacerate, 4 in. long. Rachis brown-tomentose. Flowers pedicelled, pedicel nearly as long as flower tomentose. Calyx short campanulate, lobes blunt. Petals lanceolate acute. *Hab.* Woods and forests. Pahang River, Tanjong Antan. Perak, Ulu Bubong (Kunstler). Kelantan, Chaning (Ridley).

(10) **L. acutifida** Mart. *Hist. Nat. Palm.* iii. 236, t. 35, figs. 3-4; *Griff. Palms of Brit. Ind.* 122, t. 222A, B; *Ridl. Mat.* ii. 163.

Stems 3 to 4 ft. tall or less (said to be sometimes 15 to 20 ft. tall). Leaves semi-circular, lobes 15 to 20, narrow linear, 3-toothed and nerved, teeth blunt, 1 ft. long, .75 in. wide; mid-one hardly bigger; petioles slender, 2.5 ft. long, base thorny. Spadix 15 in. long, branches 4, tomentose, lower ones 3-spiked, spikes 2 to 4 in. long. Spathes silvery pubescent, lowest 4 in. long. Flowers small on a boss. Calyx cup-shaped, hairy, lobes short. Petals lanceolate acute, pubescent. Drupe very small, orange, pea-shaped. *Hab.* Hill woods. Malacca, Sungei Hudang (Goodenough). Penang Hill (Wallich, Lewis and all collectors), common to about 3000 ft. altitude. Lankawi, Gunong Raya (Haniff). *Native names:* Palas Padi; Palas Tikus.

Sederek



I have never seen this palm with a stem over 1 ft. tall. Lewis states it is 15 to 20 ft. tall, and it is generally considered to have been the original "Penang Lawyer."

(11) **L. modesta** *Becc. Males.* iii. 195; *Ridl. Mat.* ii. 163.

Stem 4 to 10 ft. tall. Leaves semi-circular, lobes 13, obtusely linear, broad, 3- to 6-toothed at tip, 7 to 13 in. long, .5 to .75 in. wide, midlobe much broader; petioles 2 ft. long, thorns at base few, small. Spadix 2 ft. long, branches 3 of two or three rather slender pale scurfy or tomentose spikes 3 to 4 in. long. Flowers remote. Calyx tubular, silvery, lobes short acute. Petals pubescent, long acute. Drupe globose-ovoid, .5 in. long, pedicelled. *Hab.* Local, forests to 5000 ft. altitude. Perak, Kwala Kangsa; Thaiping Hills (Kunstler, etc.).

Near *L. acutifida*, but leaflets broader and more cuneate. Spikes much less tomentose, often merely scurfy, slender, lax.

(12) **L. Wrayi** *Ridl. Journ. Roy. As. Soc. S. Br.* 82, p. 201.

Palm 5 ft. tall. Leaves 7-lobed, central leaflet obtusely linear, 14 in. long, 4 in. wide at tip, teeth blunt, .25 in. long, side leaflets narrower linear; petioles triquetrous, 3 ft. long, thorny half-way. Spadix-peduncle 22 in. long, basal sheath 10 in. long, papery, two shorter ones above with lanceolate acute limbs. Inflorescence 3 in. long, woolly. Spikes 5 terminal, crowded towards top, 3 in. long; rachis thick, woolly. Flowers white, sessile, on small tubercles. Calyx .12 in. long, cylindrical, base dilate, lobes irregular, pubescent. Petals lanceolate-acuminate, nearly as long, glabrous. Staminal ring free from corolla. *Hab.* Mountains. Perak, Gunong Bubu (Wray); Gunong Hijau (Curtis).

(13) **L. triphylla** *Griff. Calc. Journ. Nat. Hist.* v. 352; *Palms of Brit. Ind.* 126, t. 255; *Ridl. Mat.* ii. 163. (Fig. 211, p. 29.)

Almost stemless with few leaves. Leaflets 3 to 7, broad obtusely crenate at top, 8 in. long; petioles slender, 15 in. long, thorns few, basal; sheaths of fibre-network. Spadix very slender, 8 in. long or less, branches 6, tomentose, .5 to 1 in. long. Spathes 1 in. long. Flowers minute, about 12, remote, sessile. Sepals ovate acute tomentose. Petals white. Drupe pea-like, red. *Hab.* Woods in low country. Singapore, Changi. Johor, Panchur. Muar (Fox). Malacca, Ayer Panas (Griffith); Chabau. Negri Sembilan, Tampin (Burkill); Pahang, Tahan River. Negri Sembilan, Gunong Angsi. Dindings, Gunong Tungul. Perak, Sunkai and Ulu Kerling (Kunstler).

var. *integrifolia* *Ridl. l.c.* A dwarf form, 1 ft. tall. Leaves entire obtusely ovate crenulate, 4 in. long, 2 in. wide; petioles 2 in. long, unarmed. Spadix 3 in. long. *Hab.* Pahang River, Lubok Pelang. *Native names:* Palas Rewang; Palas Tikus; Gurcheng.

(14) **L. pusilla** *Becc. Males.* iii. 194; *Ridl. Mat.* ii. 164.

Stem 6 in. tall or less. Leaflets 11 to 16, narrow linear, tips truncate with one long tooth and some short blunt ones, 9 in. long,

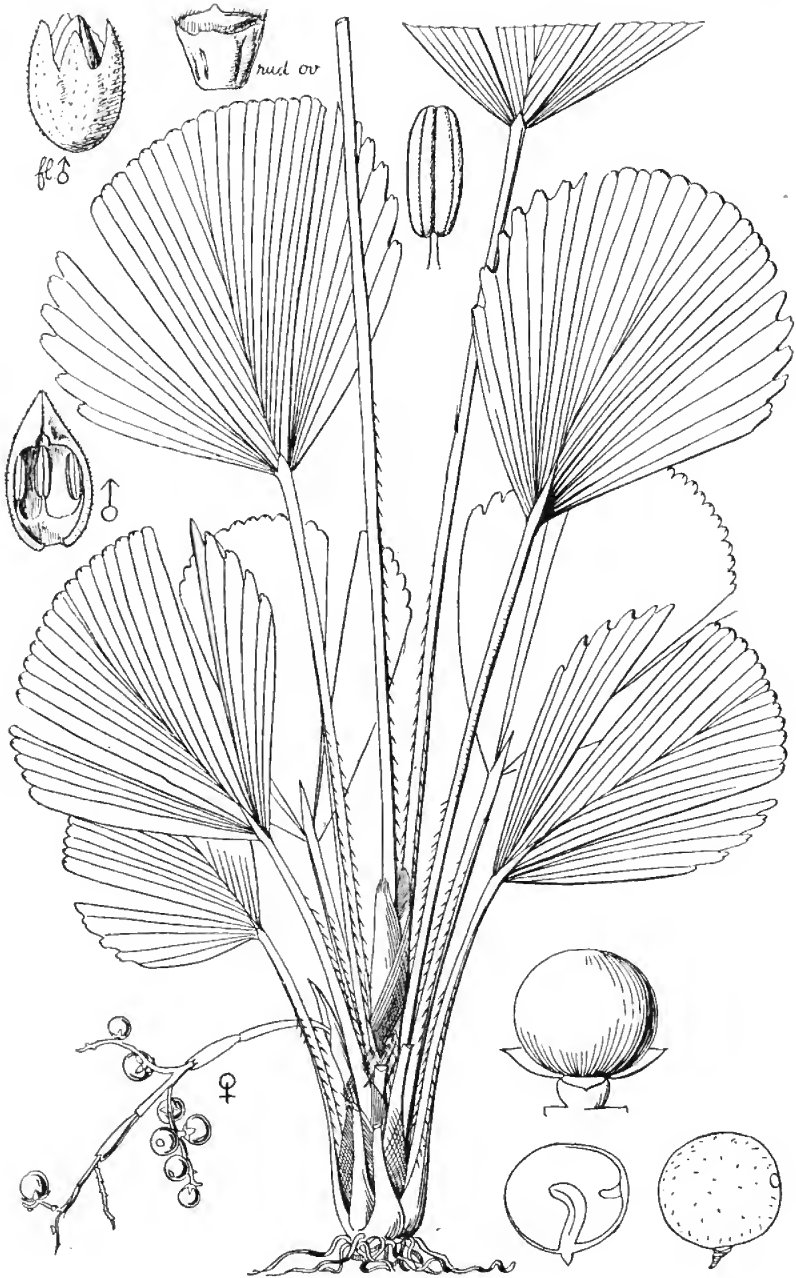


FIG. 211.—*Licuala triphylla*.

·75 in. wide; petioles ·18 in. long, slender triquetrous, thorny at base. Spadix 9 to 18 in. long. Spikes 2-branched or simple, 1·5 in. long, slender (in flower), pubescent. Calyx campanulate, base narrow, irregularly split, pubescent. Corolla pubescent, lobes ovate. Drupe pea-like, red; rachis thicker. *Hab.* Hill woods. Pahang, Tahan River woods. Perak, Thaiping Hills; Sunkai and Ulu Bubong (Kunstler).

(15) **L. Scortechinii** *Becc. Males.* iii. 192; *Ridl. Mat.* ii. 164.

Leaves semi-circular, lobes 12 to 17; leaflets 6 in. long, linear obtusate, teeth broad, bifid; petioles slender, 18 in. long. Spadix 18 in. long or less, slender, branches 1 or 2, pubescent, 4 to 6 in. long. Spathes oblong-linear, upper one with a long limb. Calyx obconic, stalked, pubescent, teeth 6 obscure. Petals pubescent. *Hab.* Perak (Scortechini). Kedah Peak (Ridley).

(16) **L. Kingiana** *Becc. Males.* iii. 193; *Ridl. Mat.* ii. 165.

Stem 5 ft. tall, 1 in. through. Leaves about 7-lobed; leaflets 3, central broad, 6 in. long, 3 in. wide, shortly blunt-toothed, lower two or three, only ·5 in. across and 4·5 in. long; petioles 6 in. to 2 ft. long, slender, base thorny. Spadix 8 in. long, with 1 or 2 dense erect silvery woolly spikes. Spathes 2 or 3, glabrous cuspidate, 4 in. long. Flowers numerous, crowded, sessile. Calyx cup-shaped, irregularly split, silvery hairy. Buds globose. *Hab.* Local in mountain forests. Perak, Bujong Malacca; Gunong Keledang; Sungei Siput; Goping (Kunstler).

(17) **L. lanuginosa** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 203.

Stem short; leaflets linear, teeth short broad, 6 to 11; 13 to 24 in. long, 1 to 1·5 in. wide; petioles 1 ft. long, ·25 in. through, thorny halfway. Spadix 1 ft. long, densely silvery woolly, branches 2 or 3, spikes stout, 2 in. long. Spathes silvery woolly lacerate. Flowers numerous globose, sessile. Calyx cylindrical, 6-lobed, dense hairy. Petals ovate-lanceolate, silky. Drupe globose, ·5 in. through, red. *Hab.* Hill forests, south and east. Johor, Gunong Pulai; Gunong Pantai. Pahang, Labong Endau (Evans) panicle branches more numerous.

(18) **L. paniculata** *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 42, *Mat.* ii. 165.

Leaf large, leaflets 2·5 ft. long, narrow, ·25 in. wide, teeth short. Spadix 3 ft. long, much-branched, paniced. Spikes long and slender, 5 to 7, glabrous or scurfy, 7 in. long or less. Spathes 6, lowest 8 in. long, ·5 in. wide. Flowers scattered, sessile, ·12 in. long. Calyx cylindrical glabrous, irregularly lobed. Petals ovate acute. *Hab.* In forest. Rare. Perak, Hermitage Hill (Ridley).

## 18. TEYSMANNIA, Miq.

Stem usually short. Leaves very large, obtusate, paddle-shaped, entire, upper edge notched; petioles long, thorny at base.

Inflorescence short, decurved, with a few stout branches. Spathes several, short. Flowers pedicelled. Sepals short, round. Petals much larger, lanceolate. Stamens 6, cuneate, in a ring. Fruit dry, pericarp corky warted. Seed 1, globular. Species 1, Malay Peninsula and Sumatra.

(1) **T. altifrons** *Miq. Ann. Mus. Bot. Lugd. Bat.* iv. 89, i. ii. iii.; *Ridl. Mat.* ii. 168.

Stem very short to 7 ft. tall. Leaves 6 to 7 ft. long, 20 to 24 in. wide, stiffly coriaceous; petioles 24 to 30 in. long. Spathes narrow, brown, furfuraceous, 6 in. long, 1 in. wide, oblong. Spadix 6 in. long, branches 6 or 7, red furry. Petals .12 in. long. Fruit brown, 1.5 in. through. Seed .75 in. long, globose. *Hab.* Hill woods; local but abundant. Johor, Gunong Pulai; Pahang, Tahan Woods to 3500 ft. altitude. Negri Sembilan, Bukit Tanga; Seremban (Napier). Perak, Gunong Keledang; Bukit Kapayung, Sungei Siput. *Native names*: Daun Sang; Daun Payong; K'roh (Pahang). *Use*: The great leaves of this noble palm are much valued by the explorer for roofing huts, as they are very large, strong and durable and easily arranged so as to be rain-proof.

### 19. METROXYLON, Rothb.

Rhizomatous palms with huge erect stems. Leaves very large, pinnate. Inflorescence terminal, wide-spreading, much-branched. Flowers sunk in large dense spikes. Bracts woolly. Male and female flowers irregularly mixed. Males sessile. Sepals 3, obovate blunt. Petals 3, oblong. Stamens 6. Pistillode small, 3-lobed. Females as males, but stamens infertile. Pistil cylindric, scaly; styles 3. Fruit globose, flat-topped, covered with scales. Species 5 to 7, Malay islands, Polynesia, the Sago-Palms.

Leaf sheaths smooth . . . . . (1) **M. sagus**  
 Leaf sheaths spiny . . . . . (2) **M. Rumphii**

(1) **M. sagus** *Rothb. Nyc. Saml. K. Dansk. Vid. Skrift.* ii. 527; *Ridl. Agric. Bull. Mal. Pen. Ser.* i. 62. *Sagu lævis* *Bl. Rumphia*, ii. 147, pl. 86.

Stems 40 ft. tall, 18 in. through, smooth, sheaths and inflorescence smooth, unarmcd. Leaves 20 ft. long, pinnæ 3 ft. long, about 60 pairs. Flower spikes 6 in. long, .5 in. thick. Bractcoles densely woolly. Sepals obovate blunt. Petals oblong obtuse, green and pink. Pistillode a small yellow 3-lobed process. Female flowers as male. Styles linear conic, 3. Fruit 2 in. through, yellow. *Hab.* Cultivated and half wild. Malacca and Johor and Singapore, Sumatra, Java, Borneo. *Native name*: Rumbia. *Use*: The starch of the stems supplies sago. The leaves are valued for attaps. The pith of leaf-stalk can be used for cork in insect boxes, etc.

(2) **M. Rumphii** *Mart. Hist. Nat. Palm.* iii. 213, pl. 102, 159. *Sagus Rumphii Willd. Sp.* pl. iv. 404.

Stems rather shorter than in *M. sagus* and leaves smaller. Leaf-sheaths armed with strong slender spines 6 in. long or less arranged on transverse curved ridges; midrib with similar spiny crests; pinnæ shorter than in *M. sagus*. Sheaths of inflorescence spiny. Spikes less woolly; sepals short, rounded. Petals elliptic. Pistillode of 3 terete pink processes. Styles in female connate in a beak. *Hab.* Less commonly cultivated in the Malay Peninsula than the smooth sago, but more commonly in the islands further east and probably a native of Papua. It is used in the same way as the smooth sago.

## 20. ZALACCA, Bl.

Stemless or short-stemmed bushy palms. Leaves pinnate long thorny, leaflets linear or lanceolate. Spadix from among leaves usually short, unisexual. Male spikes many, short, stout, cylindrical, usually woolly. Calyx tubular, 3-lobed, or sepals free to base. Corolla longer. Stamens 6, free. Female spikes larger. Staminodes 3 to 6 or 0. Drupe large, ovoid, with brown scales. Seeds 1 to 3, in acid pulp. Species 9 or 10, Assam, Malaya.

The Salak, *Zalacca edulis* Bl., is cultivated in Java and the edible fruits are sold in Singapore.

Leaflets linear acuminate; spadix bisexual, very dense; fruit yellow; scales flat . . . . .	(1) <b>Z. conferta</b>
Leaflets oblong falcate; spadices unisexual; spadix compact; fruit brown; scales flat . . . . .	(2) <b>Z. affinis</b>
Spadix elongate, trailing; fruit brown, scales with upcurved points; spathes shorter than glabrous spadices . . . . .	(3) <b>Z. glabrescens</b>
Spathes longer than woolly spadices . . . . .	(4) <b>Z. Wallichiana</b>

(1) **Z. conferta** *Griff. Calc. Journ. Nat. Hist.* v. 16; *Palms of Brit. Ind.* 19, t. 180 A, B, C; *Mart. Hist. Nat. Palm.* iii. 201, t. 137, 174; *Ridl. Mat.* ii. 169.

Stemless plant. Leaves 15 ft. tall; rachis spiny; leaflets linear acuminate. Spadix much-branched, dense; spikes 4 to 5 in. long. Flowers in pairs, one male, one female, 25 in. long. Calyx lobes linear, free to base. Petals twice as long. Drupe obovoid yellow, over 1 in. long, tip mammillate, scales smooth, flat, grooved, pulpy, very acid. *Hab.* Very common in low, wet woods forming impenetrable thickets, in water. Singapore, Tanglin; Bukit Timah; Changi, Malacca. Selangor, Kwala Lumpur. Dindings, Lumut. Perak. *Distrib.* Borneo. *Native names:* Asam Paya; Kelubi. *Use:* The acid fruit-pulp is eaten by Malays.

(2) **Z. affinis** *Griff. l.c.* 9; *Palms of Brit. Ind.* 12, t. 176; *Ridl. Mat.* ii. 169.

Stem short stout. Leaves 12 ft. long; leaflets oblong falcate, 12 in. long, 3 in. wide. Spadix 13 in. long, dense. Male spikes

crowded, cylindric, fluffy, 1 in. long. Sepals oblong, free. Petals oblong, cuspidate. Female spadix flattened, spikes 3 to 5 in. long, .5 in. through. Flowers .25 in. long (larger than males). Fruit 3 in. long, turbinate beaked, dark brown, scales flat, deep grooved. *Hab.* Wet spots in forest, scattered. Singapore, Bukit Timah; Chan Chu Kang. Johor, Gunong Pulau Road (Bert). Malacca, Batu Tiga. Dindings, Lumut; Gunong Tungul (Ridley); Perak, Thaiping (Kunstler). *Native name*: Salak Hutan.

(3) **Z. glabrescens** Griff. *l.c.* 14; *Palms of Brit. Ind.* 17, t. 179; *Ridl. Mat.* ii. 170.

Stemless plant. Leaves 12 to 15 ft. long, spines broad flat, in short transverse rows; leaflets oblong falcate acuminate, tip bristly, 8 to 12 in. long, 2 in. wide. Spadices 1 ft. long or more, trailing. Spathes, lower ones lanceolate convolute, upper tubular. Spikes cylindric, brown, 3 in. long, with broad short imbricate bracts. Sepals lanceolate connate halfway. Fruit fusiform globose, 1 in. long; scales dark brown, ending in upcurved points. Seeds 2. *Hab.* Forests. Not rare. Pahang, Tahan River Woods. Selangor, Kwala Lumpur; Ulu Selangor. Perak, Thaiping Hills at 3000 to 3500 ft. altitude (Kunstler). Penang Hill, road to Balik Pulau (Curtis). Kelantan, Chaning (Ridley); Kwala Krai (Haniff).

(4) **Z. Wallichiana** Mart. *Hist. Nat. Palm.* iii. 200, 325, t. 118, 119; *Ridl. Mat.* ii. 170. *Z. edulis* Wall. *Pl. As. Rar.* iii. 14, t. 222-224 (not of Blume). *Z. Rumphii* and *Z. macrostachya* Griff. *Palms of Brit. Ind.* 10, 13 t., 175 and 178.

Stem short, stout. Leaves 10 to 20 ft. long; rachis with flat thorns 2 or 3 together; leaflets elliptic acuminate at both ends, clustered in pairs or fours, tips setaceous, edges setulose; nerves prominent, 12 to 18 in. long, 3 in. wide. Male spadix 4 ft. long, peduncle 2 ft. long. Spathes lanceolate split villous. Spikes 7, cylindric, 2.5 to 3 in. long, woolly. Flowers .25 in. long. Sepals linear-lanceolate, free to base. Fruit in dense heads, obovoid, 1 in. long, brown, scales with long reflexed brittle points. *Hab.* Forests. Pahang, Tahan River. Malacca, Ching (Griffith). Province Wellesley, Permatang Bertam, Bukit Juru. *Distrib.* Tenasserim, Siam, Borneo. *Native name*: Kumbar.

## 21. EUGEISSONA, Griff.

Large tufted palms with short or no stem. Leaves pinnate; leaflets linear-lanceolate narrow. Spadix tall, erect dense, branches very short, covered with close-fitting spathes passing into bracts. Flowers very large, almost woody, 1 to 3 on ends of branches. Males calyx cupular 3-lobed. Petals lanceolate pungent. Stamens 12. Fruit ovoid, 1-seeded, covered with small beaked brown scales. Seed globose. Species 6, Malayan.

Plants very large; leaflets linear-lanceolate  
acuminate; spadix 6 ft. long . . . . . (1) **E. tristis**

Plants smaller; leaflets lanceolate caudate; spadix

3 ft. long . . . . . (2) **E. brachystachys**

(1) **E. tristis** Griff. *Calc. Journ. Nat. Hist.* v. 101; *Palms of Brit. Ind.* 109 to 220A; *Ridl. Mat.* ii. 171.

Leaves 15 to 20 ft. long; leaflets linear-lanceolate acuminate, 1 ft. long, .5 in. wide; petioles 7 to 10 ft. long. Spadix 4 to 6 ft. tall. Flowers 2 in. long, terminal on the branches. Fruit ovoid beaked, 2 to 3 in. long, 1.5 in. through, brown. Seed globose, 1 in. through. *Hab.* Dry hills in forests, gregarious Johor, Gunong Pulai, Malacca, Sungei Hudang (Griffith). Negri Sembilan, Senaling Inas (Holttum). Selangor, Kwala Lumpur. Perak, Thaiping Hills to 2400 ft. altitude; Tapah. Dindings. Province Wellesley. Penang (Curtis). Kelantan, Kwala Lebir. *Native name:* Bertam. *Uses:* The midribs are used for making "chicks," screens or partitions in houses, and the stalk of the inflorescence is carved into walking-sticks.

(2) **E. brachystachys** *Ridl. Journ. F.M.S. Mus.* vi. 184.

Leaves 14 to 20 ft. long; petioles 12 ft. long, glaucous, speckled red; leaflets lanceolate caudate, base narrowed, 2 ft. long, 3 in. wide, tail 4 in. long. Spadix 3 ft. long. Spathes lanceolate cuspidate, base green, above red, cusp acuminate, 6 in. long. Lower flowers paniced, upper racemose, peduncle 1.5 in. long. Calyx cylindrical. Petals linear acuminate, green, 2 in. long. Fruit ovoid, base stipitate beaked. Scales ovate-triangular, blunt, fimbriate. *Hab.* Local. Dry hill woods, local. Pahang, Kwala Teku (Ridley).

## 22. DÆMONOROPS, Bl.

Bush palms very spiny, producing long stems, generally scandent. Leaves pinnate with numerous narrow leaflets and ending in a bare portion of the rachis armed with hooks (flagellum). Spadix usually unisexual, male and female on the same stem, axillary, dense or lax, many-flowered peduncled. Spathes several, spiny, boat-shaped or oblong, at first covering the spadix then deciduous. Flowers coriaceous, brown or yellow, small. Calyx tubular, 3-toothed. Corolla 3-lobed, longer. Stamens 6 connate at the base. Pistillode small. Female flowers; ovary covered with scales. Stigmas 3, large. Fruit globose or oblong, covered with yellow, brown or red imbricating scales. Seed bony globose in a thin pulp, pitted or ruminant. Species 60, India, Cochinchina, Malaya.

These plants vary much in the size of leaflets, spathe and spadix, bristliness and arrangement of spines on the sheaths in different parts of the same plant. Many species have been based on totally inadequate herbarium material. I have seen many of the species wild, often in abundance, and cultivated many of them. Beccari's volume *Ann. Bot. Gard. Calc.* xii., with the large photographs of the herbarium specimens is invaluable, though I am by no means agreed as to some of his determinations. Specimens are

so bulky and spiny that collectors are apt to bring home mere scraps of the plant which are utterly unreliable. They can only be properly studied in the forests.

§ 1. *Cymbospathæ*. Spadix fusiform, the outer spathe spiny covering it and all the upper spathe, and completely falling off during flowering. Spadices short compact unisexual, rarely bisexual.

Spadix bisexual; male and female flowers in pairs, scandent.

- Fruit yellow, globose . . . . . (1) **D. angustifolius**
- Fruit brown, globose . . . . . (2) **D. Scortechinii**
- Fruit tawny, ovoid elliptical . . . . . (3) **D. Sepal**

Spadices unisexual. Plants with no climbing stems, forming a bush.

- Outer spathe densely covered with hair-like spines . . . . . (4) **D. calicarpus**
- Outer spathe with few scattered spines . . . . . (5) **D. microthamnus**

Scandent stems long. Outer spathe completely covering the others.

Outer spathe abruptly long-beaked, spines slender, black acicular; spadix in fruit elongate.

- Stems short; spathe under 1 ft. long, beak longer than body . . . . . (6) **D. monticolus**
- Stems tall, spathe over 1 ft. long, beak shorter . . . . . (7) **D. Lewisianus**

Spathe fusiform; peduncle long, spines very slender, greenish . . . . . (8) **D. aciculatus**

- Spathe large (when adult), spines scattered, dagger-shaped . . . . . (9) **D. grandis**
- Spines broad grey, beak 1 ft. long . . . . . (10) **D. carcharodon**

Outer spathe gradually tapering at both ends (11) **D. hygrophilus**

- Spadix in fruit very short and dense, thorns and stem yellow . . . . . (12) **D. congestus**

Dubious. *D. pseudosepal* Becc., *D. imbellis* Becc.

§ 2. *Piptospathæ*. Outer spathe not covering the others; panicle diffuse, large.

I. *Resinifera*. Fruit exuding dragon's blood.

Stem unarmed slender with low transverse ridges (13) **D. micracanthus**

Stem strongly spiny, stout.

- Leaflets in distant pairs, broad . . . . . (14) **D. didymophyllus**
- Leaflets equidistant . . . . . (15) **D. propinquus**

II. *Non-resinifera*. Fruit not resinous.

Stems with few scattered spines; peduncle long, thorny . . . . . (16) **D. leptopus**

Stems very thorny with strong spines at mouth of sheath.

- Leaflets equidistant; fruit oblong . . . . . (17) **D. hystrix**

Peduncle spiny short; leaflets linear.

Spines irregularly scattered on sheaths.

Dwarf plant 2 to 3 ft. tall.

Branches elongate; fruit brown, not beaked . . . . . (18) **D. Kunstleri**

Branches very short; fruit yellow brown; scales edged black . . . . . (19) **D. scapigerus**

Tall plant; fruit yellow edges, crose beaked (20) **D. elongatus**

Spines in short transverse crests on sheaths; tall plant . . . . . (21) **D. vagans**



Peduncle unarmed, long; leaflets linear-lanceolate . . . . .	(22)	<b>D. geniculatis</b>
Peduncle unarmed, flat, 2-edged . . . . .	(23)	<b>D. longipes</b>
Peduncle flat, edges spiny; leaflets in alternate threes distant . . . . .	(24)	<b>D. periacanthus</b>
Stems with rings of black bristles and long spines.		
Leaflets equidistant linear . . . . .	(25)	<b>D. verticillaris</b>
Leaflets not equidistant linear . . . . .	(26)	<b>D. setigerus</b>
Leaflets lanceolate broad in groups of 4.		
Leaflets 1 in. wide . . . . .	(27)	<b>D. Sabut</b>
Leaflets 3·75 in. wide . . . . .	(28)	<b>D. macrophyllus</b>

§ I. *Cymbospathæ*.

(1) **D. angustifolius** *Mart. Hist. Nat. Palm.* iii. 329; *Ridl. Mat.* ii. 174. *Calamus angustifolius Griff. Calc. Journ. Nat. Hist.* v. 89; *Palms of Brit. Ind.* 95, t. 213 A, B.

Stem 30 ft. tall, greenish yellow, purple scurfy. Leaves 12 to 14 ft. long; leaflets linear acuminate, 13 in. long, .75 in. wide, bristly on nerves and edge. Spadices bisexual, outer spathe canoe-shaped, 6 in. long, grey, dotted red, spines flat, black, along keels and in transverse rows, beak 4 in. long, inner spathes narrower, second only armed. Spadix dense, 6 in. long. Flowers .25 in. long, 1 male and 1 female together. Fruit .5 in. through, globose, scales in 8 rows, chestnut, edges silvery. Seed flattened, black, ruminant. *Hab.* Common in woods. Singapore, Garden Jungle; Johor, Sungei Tebrau. Malacca (Griffith). Selangor, Dusun Tua (Cantley), Negri Sembilan, Tampin Hill, Penang, Balik Pulau. *Native name:* Rotan Minyak.

(2) **D. Scortechinii** *Becc. Ann. Bot. Gard. Calc.* xii. 81, pl. 27. *D. Sepal* var. *sphærocarpus* *Becc. Rec. Bot. Surv. Ind.* ii. 220.

Flagellum rather long; leaflets linear or narrow linear-lanceolate, 8·5 in. long, .44 in. wide, bristly on midrib and nerves. Female spadix fusiform short-beaked, 7 to 8 in. long; peduncle .6 to 3 in. long. Spathe boat-shaped, beak 1·6 in. long. Fruiting spadix nodding. Fruit globular, .8 in. through or sub-turbinate. Scales 15 or 16 rows, tawny brown with darker edge, deep channelled. Seed globular not strongly ruminant. *Hab.* Perak (*Scortechini*).

I have not seen this. The plate and descriptions are inadequate; the plant much resembles *D. angustifolius*, except that the fruit is said to be brown.

(3) **D. Sepal** *Becc. in Hook. fil. F.B.I.* vi. 469; *Rec. Bot. Surv. Ind.* ii. 220; *Ann. Bot. Gard. Calc. l.c.* 77, pl. 24.

Climbing stems 18 to 27 ft. long, slender. Leaves, sheath covered with tobacco-coloured scurf, spines narrow, long, limb about 3 ft. long; petiole prickly on upper surface; leaflets 35 to 40 on each side linear or linear-lanceolate, tip filiform bristly, 3-nerved; nerves bristly. Male spadix fusiform, beak one half or one fourth as long. Flowers oblong obtuse. Fruits ovoid or elliptical

suddenly stoutly beaked, scales in 18 rows, tawny brown with dark marginal line, point exactly triangular. *Hab.* Mountains, Perak, Gunong Tambang Badak (Scortechini); Larut (Kunstler). *Native name* : Rotan Sepal.

I have not seen this. Beccari says it is very near *D. Scortechinii*, but requires more material to judge if it is distinct.

(4) ***D. calicarpus*** *Mart. Hist. Nat. Palm.* iii. 326, t. 175, fig. 6; *Ridl. Mat.* ii. 174. *Calamus calicarpus* *Griff. l.c.* v. 22; *Palms of Brit. Ind.* 99, t. 315. *C. petiolaris* *Griff. l.c.* 93; *Palms of Brit. Ind.* 101, t. 216. *Dæmonorops tabacinus* *Becc. in Hook. fil. F.B.I.* vi. 466

A bush, not climbing. Leaves 6 to 8 ft. long, thickly armed, spines grey; leaflets narrow; petioles short, 1.5 in. long. Spadices several among the leaves. Outer spathe boat-shaped, densely covered with stiff bristles, 6 to 7 in. long, beak linear flat, 4 in. long. Male spadix 4 in. long. Calyx obscurely lobed. Corolla-lobes blunt. Female spadix stouter; flowers larger. Fruit oblong-globose, 5 in. through, scales longer than broad, yellow edged dark brown. Seed pitted. *Hab.* Common in hill woods. Johor, Bukit Soga, Batu Pahat. Pahang, Fraser Hill (Burkill); Sungei Yu (Foxworthy); Malacca (Griffith); Bukit Sadanen (Derry); Chenana Putih (Cantley). Selangor, Dusun Tua. Dindings, Thaiping Hills; Gunong Keledang and Bujong Malacca (Curtis). *Native names* : Rotan Kusom; Rotan Cluchor. *Use* : For ataps.

Beccari keeps *D. petiolaris*, *D. calicarpus* and *D. tabacinus* distinct. I have seen very many bushes of *D. calicarpus* and am quite unable to separate the other two species.

(5) ***D. microthamnus*** *Becc. Rec. Bot. Surv. Ind.* ii. 221; *Ann. Bot. Gard. Calc.* xii. 92, pl. 32.

A small tufted palm; stem under .5 in. through. Leaves 6 ft. long; petioles short, unarmed; sheath with few spines; rachis abortively flagellate, densely hairy. Leaflets 18 to 20, linear acuminate, 1.5 in. long (only the spadix-branch ones shown), mid-rib spineless. Female spadix about 3 in. long, erect. Spathes boat-shaped sparsely spiny, beak 1.5 in. long. Fruit ovoid-globose, tip conic acute, about .5 in. long, scales cinnamon, tip fuscous, edges paler. *Hab.* Perak (Scortechini). Very rare.

Near *D. calicarpus*, but the whole plant much less spiny. The specimens are very incomplete. Beccari suggests it is a diminutive form of *D. petiolaris* (*D. calicarpus*).

(6) ***D. monticolus*** *Mart. Hist. Nat. Palm.* iii. 328, t. 173; *Ridl. Mat.* ii. 175; *Becc. Ann. Calc. l.c.* pl. 29. (*D. monticolus* var. *pinangianus*), *Calamus monticolus* *Griff. Palms of Brit. Ind.* 97, t. 214.

Stems tufted, climbing ones 15 ft. long, .5 in. through. Basal leaves about 12 to 14 ft. long, sheath mouth broad, thin-edged, spines .5 in. long, base black; petiole one-third the length; leaf-

lets linear, 16 in. long, .5 in. wide, bristles on keel and edge few, except at tip; leaves on flowering stems much shorter, 1 ft. long; leaflets very narrow. Spathes 4 to 10 in. long, outer lanceolate, spines very slender, black, beak longer than body of spathe. Spadix under 3 in. long. Fruit globose, .5 in. through, scales orange yellow, tips brown, in 6 rows. *Hab.* Local in hill forests. Malacca, Gunong Mering, Ophir (Griffith). Penang Hill (Griffith and all collectors. Common). *Distrib.* Borneo.

Griffith's type is the Penang Hill plant; the Ophir one I have not seen.

(7) **D. Lewisianus** *Mart. Hist. Nat. Palm.* 327, t. 175, fig. 4; *Ridl. Mat.* ii. 176. *D. malaccensis* *Mart. l.c.* 327. *D. Kirtong Griff. Palms of Brit. Ind.* 102. *Calamus Lewisianus Griff. C. acanthopis Griff. l.c.* 102, t. 217.

Stem stout, 20 ft. long, strongly black-spiny. Leaf large; leaflets 1 ft. long, .5 in. wide, bristly; petioles 7 in. long, base swollen, strongly spiny. Flagellum 4 ft. long, stout, hooks up to 6 together. Spathe 1 ft. long, 3 in. across, covered with bristle-spines, slender, over 1 in. long, beak 6 in. long. Spadix 1 ft. long, red-tomentose. Calyx hardly lobed. Female spadix 3 in. long or more. Fruit globose, .75 in. long, yellow, scales in 7 rows, edges paler. *Hab.* Hill forests, Johor, Bukit Soga, Batu Pahat. Malacca (Griffith). Province Wellesley, Bukit Juru. Penang (Lewis); Waterfall, etc., common.

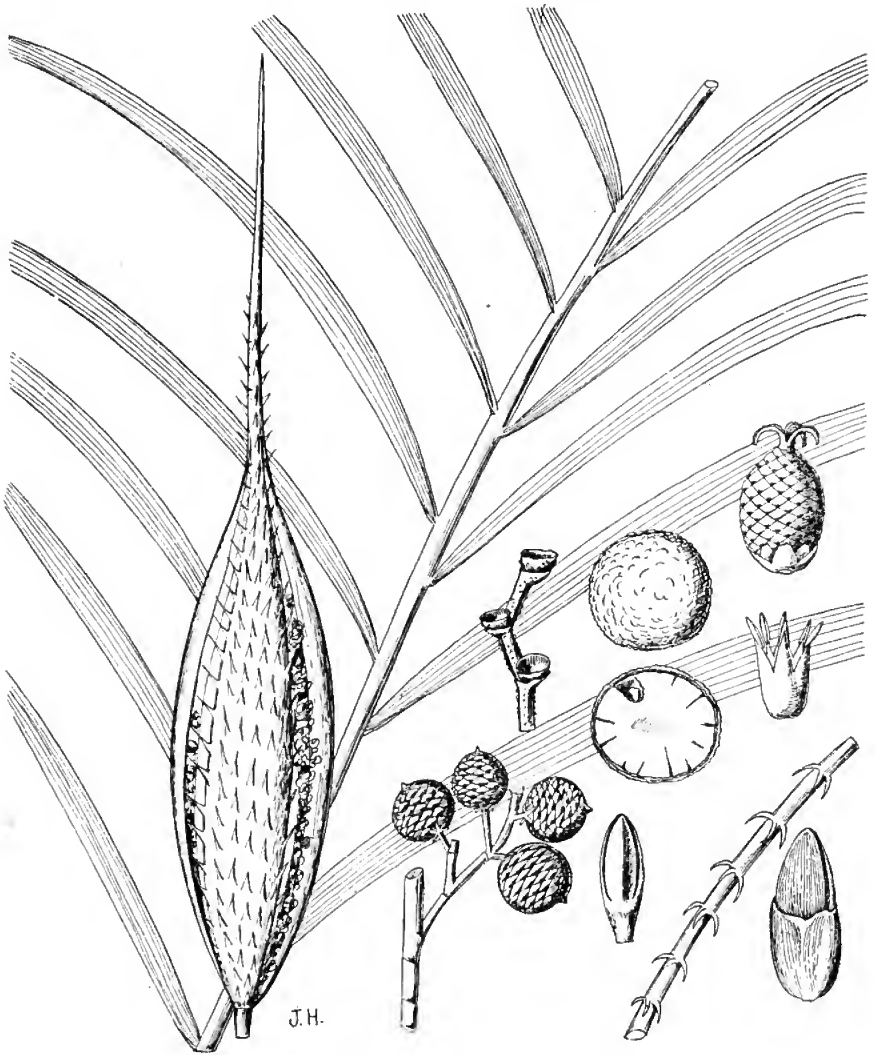
(8) **D. aciculatus** *Ridl. Mat.* ii. 176

Leaves 4 to 6 ft. long; petiole 6 in. long, thorny all over; leaflets 8 to 10 in. long, .75 in. wide, pale-bristly. Spathe thin fusiform, on a 4 in. long peduncle, armed with pale flat spines, spines on spathe very narrow, flat, greenish, .12 to 1.5 in. long. Spathe 8 in. long, 1.5 in. wide, beak 3 in. long. Male spadix 6 in. long, dense hairy. Calyx tubular cup-shaped, 3-lobed. Female in fruit 6 in. long. Fruit obovoid, over 1 in. long, yellow brown, scales in 8 rows, edged brown, broader than long. Seed very rugose, densely pitted. *Hab.* Perak, Thaiping Hills to top (Ridley).

(9) **D. grandis** *Mart. Hist. Nat. Palm.* iii. 227, t. 173; *Ridl. Mat.* ii. 177. *D. intermedius* *Mart. l.c.* 377, t. 175; *Becc. Ann. Bot. Gard. Calc.* 73, p. 20. *Calamus grandis Griff. Palms of Brit. Ind.* 91, t. 210. (Fig. 212, p. 39.)

Plant unisexual; stems 15 to 30 ft. long, 1 in. through. Leaves 10 ft. long; petiole 4 ft. long; leaflets broad linear, glabrous or with few bristles on upper midrib, 2 ft. long, 2 in. wide; flagellum 6 ft. long, stout. Spathe outer boat-shaped, 1.5 in. wide, up to 14 in. long, spines numerous, black, flat, 1.5 in. long, beak as long as spathe. Male spadix 6 in. long, branches 6 or 7, rusty mealy. Flowers .25 in. long. Calyx tubular, hairy on edge. Female spadix as large. Fruit globose, .5 in. through, scales yellow, edged brown, 10 rows. Seed elliptic, flattened, deeply pitted. *Hab.*

Forests, common. Singapore, Garden jungle; Bukit Timah. Malacca (Griffith). Selangor, Batu Tiga. Negri Sembilan, Bukit



J.H.

FIG. 212.—*Dæmonorops grandis*.

Sulu (Cantley). Perak, Gunong Mesah (Kunstler). Province Wellesley, Bukit Juru. Kedah Peak. *Native name*: Rotan Sumang.

(10) **D. carcharodon** *Ridl. Mat. ii. 178.*

Plant unisexual. Stems tall stout. Leaves large; petioles 8 in. long, base swollen with scattered grey spines; flagellum 3 ft. long, hooks in sevens or eights; leaflets linear, 10 in. long, .5 in. wide, bristly on ribs and tip. Peduncle narrow, 6 in. long. Spathe 7 in. long, beak 1 ft. long, flat narrow, spines numerous, grey flat broad. Male spadix short dense. Calyx broad cup-shaped, obscurely toothed. Fruit globose, scales cinnamon brown, longer than broad, tips deep brown, edges pale. *Hab.* Damp low-lying forest, not common. Singapore, Chan Chu Kang; Chua Chu Kang. Selangor, Batu Tiga. *Native name*: Rotan S'pat.

This is referred erroneously by Beccari to *D. angustifolius*.

(11) **D. hygrophilus** *Mart. Hist. Nat. Palm. iii. 204, t. 177; Becc. Ann. Bot. Gard. Calc. xii. 62, pl. 13. Calamus hygrophilus Griff. Palms of Brit. Ind. 96, t. 213C.*

Tall rattan 2 in. through. Leaves large; petiole stout, sheath dark coloured, covered with flat triangular spines; leaflets linear, 1 ft long, .5 in. wide, base narrowed, bristles few; flagellum stout, hooks in almost complete whorls. Spathe fusiform, 18 in. long, gradually narrowed to both ends, densely covered with flat thin spines, grey, .5 in. long, in short bars. Male spadix red, scurfy, large. *Hab.* Damp thickets and river banks. Malacca (Griffith); Bukit Sadanen (Derry). Selangor, Batang Berjuntai and Petaling (Ridley). Perak (Scortechini), Gunong Hijau 4300 ft. altitude (Burkill). *Native names*: Rotan Ayer; Rotan Chichi Landak.

(12) **D. congestus** *Ridl. Mat. ii. 179.*

Stem very stout, 1.5 in. through, bright yellow. Leaves very long; petioles stout, gibbous at base, with strong flat spines; leaflets distant, 18 in. long, 1.5 in. wide, linear acuminate, bristly at tip; flagellum long with semicircular clusters of black hooks. Spadix in fruit 2 in. long, dense compact. Fruit cylindrical, dark brown, scales raised, deep grooved, edges scarious. *Hab.* Singapore, Stagmount (Ridley) (extinct here and not seen elsewhere).

Beccari considered this to be a form of *D. leptopus* Mart., but it is very distinct.

#### DUBIOUS SPECIES.

D. PSEUDO-SEPAL *Becc. in Hook. fl. F.B.I. vi. 465; Ann. Bot. Gard. Calc. l.c. p. 79, pl. 25.* Stem 12 to 15 ft. long, .75 in. thick. Leaves 3 to 4 ft. long; leaflets distant, few, 7 in. long, .5 in. wide, narrowed to base, acuminate; petioles 1 ft. long, thorns on back stout, on edges very small, spines on sheath long, flat, 1 in. long. Spadix fruiting short slender, 3 in. long. Fruit globose, .75 in. through, yellow, scales in 5 or 6 rows, as long as broad, grooved. *Hab.* Perak, Batang Padang district (Kunstler).

Rare and insufficiently known.

**D. IMBELLIS** *Becc. Rec. Bot. Surv. Ind.* ii. 220; *Ann. Bot. Gard. Calc. l.c.* p. 80, pl. 26. Leaves not flagelliferous; rachis unarmed; leaflets narrow ensiform, 14 to 16 in. long, .5 in. wide, bristly on nerves and midrib beneath. Fruit-spadix lax, branched; peduncle 3 in. long, scales cinnamon-colour edged fuscous. Seed globose, ruminately-pitted. *Hab.* Perak (Scortechini).

I have seen no specimen of this plant, and the photograph and description are too poor to identify it by. I am not at all sure it is one of the *Cymbospathæ*.

§ 2. *Piptospathæ*.

(13) **D. micracanthus** *Becc. in Hook. fil. F.B.I.* vi. 467; *Ann. Bot. Gard. Calc. l.c.* 110, pl. 43; *Ridl. Mat.* ii. 180. *Calamus micracanthus* *Griff. Palms of Brit. Ind.* 92.

Tall slender rattan, stem unarmed with short low transverse ridges, 50 ft. long, .5 in. through. Leaves 4 ft. long or more; petioles 6 to 10 in. long, with distant very small thorns on ridge; leaflets 1 ft. long, .5 in. wide, linear acuminate, bristles few except at tip. Spathes linear-oblong, outer one armed with transverse crests of flat grey spines, .25 in. long. Spadix under 6 in. long; peduncle 3 in. long, lower half armed with short conic spines. Calyx saucer-shaped, nearly flat. Petals lanceolate, four times as long. Fruit oblong-globose, .75 in. through, rhomboid, broader than long, brownish yellow, resinous. *Hab.* Dense forests, not rare but rarely flowering. Singapore, Bukit Timah. Johor Lama. Malacca (Griffith). Negri Sembilan, Bukit Senaling, Kwala Pilah (Moorhouse). *Native name*: Rotan Jerenang.

(14) **D. didymophyllus** *Becc. in Hook. fil. F.B.I.* vi. 468; *Ridl. Mat.* ii. 180.

Stem 12 ft. long, 1 in. through; leaflets oblong-linear acuminate, 6 to 12 in. long, 1.5 in. wide, in alternate pairs about 20, no bristles; rachis rather slender, hooks in fours; flagellum 18 to 30 in. long. Spadix peduncle flattened with acute short spines on edge. Spathes tubular, 6, not overlapping, lowest 7 in. long, .75 in. wide, with short irregular processes in lines. Male spadix 14 in. long, spikes paniced zigzag. Female spadix 8 in. long. Corolla lobes broad ovate. Fruit oblong, .5 in. long, short beaked, deep brown, scales broader than long, red-resinous. *Hab.* Damp spots in dense forest; common up to 3000 ft. altitude. Singapore, Bukit Timah; Selitar; Changi. Johor, Tanjong Kupang; Jaffaria (King and Hullett). Perak, Thaiping Hills. Penang Hill. *Distrib.* Borneo. *Native names*: Rotan Getah; Rotan Hudang; Rotan Butong.

(15) **D. propinquus** *Becc. in Hook. fil. F.B.I.* vi. 467; *Ridl. Mat.* ii. 101. *Calamus Draco* *Griff. Palms of Brit. Ind.* 75, t. 201.

Stem 2 in. through, densely thorny with dark flat thorns 1 in. long; leaflets in opposite or sub-opposite pairs, 1 to 2 ft. long, 1.5 to 2 in. wide, sword-shaped acuminate, bristly on the back, nerves and tip. Male spadix cylindric, 18 in. long; peduncle

broad, flat with irregular spines .5 in. long or less. Lower spathe broad elliptic boat-shaped, thick, 2.5 in. long with long and short spines on the edge, second and third spiny on midrib only, rest cylindrical tubular, 4 in. long or less, unarmed. Spadix dense, over 1 ft. long. Fruit spadix spreading. Fruit elliptic, .75 in. long, scales round convex, yellow, thickly red-resinous. *Hab.* Common in forests. Singapore, Selitar; Bukit Timah. Malacca (Griffith). Selangor, Kwala Lumpur. Negri Sembilan. Kemaman. Perak, Tapah (Burkill). Kelantan, Sungei Keteh, Batu Papan (Foxworthy). *Native name*: Rotan Jerenang. *Use*: An important source of Dragon's blood, which is obtained from the fruits by shaking them in a swinging basket with cockleshells; the resultant resinous powder falls through interstices in the basket and is formed into cakes by hot water.

(16) **D. leptopus** *Mart. Hist. Nat. Palm.* iii. 206; *Ridl. Mat.* ii. 182; *Becc. Ann. Bot. Gard. Calc. l.c.* 128, pl. 52. *Calamus leptopus* *Griff. Palms of Brit. Ind.* 87, t. 205, A, B.

Stout rattan 1.5 in. through. Leaves large; petioles swollen at base; leaflets linear acuminate, 1 ft. long, .75 in. wide, bristles few or none; flagellum long hooks in sixes. Spadix 18 in. long; peduncle stout, spiny. Spathes leathery, lowest boat-shaped, 8 in. long, .2 in. wide with few thorns on two low ridges at base; upper spathes unarmed, second 9 in. long, all leathery. Spadix branches few, rusty, spikes short and thick. Calyx broad, deep lobed. Fruit globose, dark brown, scales convex, edges dark brown, not resinous. *Hab.* Common in dense forest. Singapore, Bukit Mandai; Kranji, etc. Johor, Sungei Tebrau. Malacca (Griffith); Sungei Hudang. Selangor, Langat. Perak, Goping (Kunstler). *Native names*: Rotan Bakau; Rotan Muruseh; Rotan Bachap and Rotan pata-pisau, according to Scortechini.

(17) **D. hystrix** *Mart. Hist. Nat. Palm.* iii. 205, t. 176, fig. 4; *Ridl. Mat.* ii. 182; *Becc. Ann. Bot. Gard. Calc. l.c.* 135, pl. 55. *Calamus hystrix* *Griff. Palms of Brit. Ind.* 80, t. 204.

Stem about 30 ft. long .5 in. through. Leaves 7 ft. long, sheaths with long deflexed spines below and crowded large erect ones on mouth; leaflets linear close set, 1 ft. long, .5 in. wide, bristly on both sides; flagellum 1.5 ft. long. Spadix 2 ft. long. Spathes, lowest woody, 6 in. long, spiny at mouth, above 5 to 7 spathes, broad coriaceous. Male panicle of stout branches, mealy red. Calyx cup-shaped. Female 18 to 20 in. long. Fruit oblong yellow, short, pedicelled, .75 in. long, scales broader than long. Seed oblong ruminant-pitted. *Hab.* Common in woods. Singapore, Garden Jungle; Bukit Timah, etc. Johor, Sungei Tebrau. Malacca, Chenana putih (Cantley); Ayer Panas (Griffith). Pahang, Kwala Lipis (Machado). Selangor, Batu Tiga. Dindings, Lumut. Perak, Goping and Thaiping Hills (Kunstler). *Native names*: Rotan Sabut; Rotan Machap Merah. *Use*: Rotans for rigging.

var. *minor* Becc. *l.c.* 138, pl. 56, seems to be only a smaller form. Malacca (Griffith), Thaiping Hills (Kunstler).

(18) **D. Kunstleri** Becc. *in Hook. fil. F.B.I.* vi. 469; *Ann. Bot. Gard. Calc.* 151, pl. 161.

Stem erect, 2 to 3 ft. tall, 3 in. through, sheaths dark, scurfy densely armed with greyish brown spines. Leaves about 3 ft. long; leaflets linear ensiform, bristles few or 0, 13 in. long, 1 in. wide. Male spadix unknown. Female elongate cylindrical, about 20 in. long, covered with scurfy tomentum; peduncle 7·8 in. long. Fruit spherical, 5 in. through, dark green (when dry, brown), scales darker edged, deep grooved, rhomboid. *Hab.* Mountains. Perak, Ulu Bubong (Kunstler); Gunong Tambong Batak (Scortechini).

(19) **D. scapigerus** Becc. *Bot. Surv. Ind.* ii. 228; *Ann. Bot. Gard. Calc.* xii. 195, pl. 87.

Leaves rather long, leaflets lanceolate-linear, long-acuminate, with pale brown hairs with a whitish base along the midrib beneath, longer and crowded at the tip, 1 ft. long, 5 in. wide, rachis fairly stout with short recurved solitary hooks. Spathes "thin papery lanceolate, 4 in. long, 5 in. wide," pale buff with dark edges. Spadix peduncle slender, 2 ft. long, armed below with distant needle-like spines, 6 in. long, spreading, above crowded, shorter deflexed, and in lines several together, branches scurfy 3 (to 6), short, stout, 1 to 2 in. long, spathe ovate, secondary branches 5 in. long, with 4 to 6 flowers. Flowers unknown. Sepals in fruit ovate. Petals lanceolate, blunt. Fruit ovoid, 6 in. long with a distinct beak. Scales sub-triangular, blunt, deeply channelled, on the centre light yellowish brown with a broad black edge. *Hab.* Johor, Ulu Madik (Holtum). *Distrib.* Borneo.

Lobb describes the stem as erect, 2 ft. tall. The plant is remarkable for its very long slender peduncle and few short thick branches.

(20) **D. elongatus** Bl. *Rumphia*, iii. 16; *Ridl. Mat.* ii. 185.

Leaf about 4 ft. long; petioles with strong flat pale spines along edge; leaflets linear acuminate, 1 ft. long, 75 in. wide, equidistant, bristly on nerves and tip; flagellum slender, 2 ft. long. Peduncle 6 in. long, very stout acute spiny edge, same spines 5 in. long surrounded by shorter ones in circles. Lowest spathe persistent coriaceous oblanceolate, 4 in. long, black spiny. "Male spadix 15 to 24 in. long, strict, branches 6 to 8 of 10 to 12 branchlets with 8 to 10 distichous spikes" (Blume). Flowers very small. Female spadix as long. Fruit globular-ovoid, 35 in. through, 1 in. long, greenish-yellow, scales rhomboid, edge erosely toothed. *Hab.* Forests. Singapore, Chan Chu Kang; North Selitar. Johor, Kwala Tebrau. Selangor, Bukit Kutu. Penang Hill and Balik Pulau (Curtis). Lankawi, Gunong Raya (Haniff). *Distrib.* Borneo.

(21) **D. vagans** Becc. *in Hook. fil. F.B.I.* vi. 469; *Ann. Bot. Gard. Calc. l.c.* 153, pl. 62.

Stem climbing, 15 to 25 ft. long, 5 in. through; petiole gibbous



at base; sheaths armed with black bristle-like processes, and flat spines in transverse crests. Leaves 6-6 ft. long including petiole and flagellum; leaflets linear-lanceolate, bristly at tip and on nerves, 1 ft. long, 4 in. wide. Male and female spadix and spathes unknown. Peduncle thorny all round, not flattened. Fruiting spadix nodding diffuse. Fruit spherical brown, .5 in. through. *Hab.* Mountains, very little known, Perak, Thaiping Hills at 4000 to 5000 ft. altitude (Kunstler). *Distrib.* Borneo.

This differs from *D. Kunstleri* in being a climber, sheath-spines arranged in series, gibbous petiole, and slightly smaller fruits.

(22) **D. geniculatus** *Mart. Hist. Nat. Palm.* iii. 329; *Ridl. Mat.* ii. 184. *Calamus geniculatus Griff. Palms of Brit. Ind.* 77, t. 202, A, B.

Stem 20 ft. long, 1 in. through, very spiny, spines fine, flat, pale on mouth of sheath, 2 to 6 in. long. Leaves 12 ft. long; petioles 2 ft. long; flagellum often long with strong hooks 4 or 5 together; leaflets linear-lanceolate equidistant, 14 in. long, 1.5 in. wide. Male spadix 2 ft. long on a long unarmed peduncle, branches about 8, lowest 5 in. of crowded branchlets 3 in. long with spikes 1 in. long of close distichous flowers .1 in. long. Spathes papery, 6 in. long or more, lanceolate unarmed. Female spadix 18 in. long, branches spreading, 6 in. long. Fruit globose, .75 in. long, yellowish brown, longer than broad. *Hab.* Common in woods. Singapore, North Selitar; Bukit Timah. Muar (Fox). Selangor, Ginting Bidai; Semangkok. Perak, Thaiping Hills; Bujong Malacca. Penang (Lewis, Curtis). Kedah Peak. Kelantan, Channing. *Native names*: Rotan S'grah, Rotan Dudok.

(23) **D. longipes** *Mart. Hist. Nat. Palm.* iii. t. 176, v. 2, 3; *Ridl. Mat.* ii. 184. *D. strictus Bl. Rumphia*, iii. 19, 163, A, B. *Calamus longipes, Griff. Palms of Brit. Ind.* 178, t. 203, A, B.

Stem 20 to 30 ft. long, stout. Leaves 12 ft. long; sheath with long stout spines at mouth and black bristles; flagellum 5 ft. long; leaflets equidistant or not, linear to linear-lanceolate, 14 in. long, 1 in. wide, bristly. Peduncle flat unarmed, over 1 ft. long. Spadix branches numerous. Spikes flexuous. Calyx tubular. Female spadix spreading. Fruit ellipsoid oblong mammillate, .75 in. long, yellowish scales in 14 rows longer than broad. *Hab.* Common in forests. Singapore, Chan Chu Kang; Changi; Bukit Timah. Johor, Sungei Tebrau. Muar (Feilding). Malacca (Griffith), Selandar. Negri Sembilan, Tampin Hill (Burkill). Penang (Fox). *Distrib.* Sumatra. *Native names*: Rotan Machap; Rotan Chochor; Rotan Sepah.

(24) **D. periacanthus** *Miq. Fl. Ind. Bat.* iii. 593. *D. dissitophyllus Becc. Nelle Foresti di Borneo*, 608; *Ridl. Mat.* ii. 183.

A very stout, very thorny rattan 20 ft. tall. Leaves 6 to 8 ft.

long; sheath armed with yellow spines strong at mouth; leaflets linear acuminate in alternate threes, 1 ft. long, 1.5 in. wide, sparsely bristly on sides, many bristles on the tip. Spadix about 1 ft. long; peduncle narrow flat, thorny on edge. Spathes 6 or 7, cartilaginous, brown, lanceolate, unarmed, lowest 6 in. long. Fruit globose, .5 in. long, scales yellow, as broad as long, edged brown. Seed ruminant. *Hab.* Not rare in forests. Singapore, Bukit Timah; Jurong. Johor, Gunong Pantai; Batu Pahat; Genuang. Perak, Bujong Malacca. *Distrib.* Borneo, Sumatra.

(25) **D. verticillaris** Mart. *Hist. Nat. Palm.* iii. 329, t. 175; *Ridl. Mat.* ii. 186. *Calamus verticillaris* Griff. *Palms of Brit. Ind.* 73, pl. 200.

Stems 50 to 60 ft. long, 1 in. through, densely covered with raised rings of flat grey spines, one row pointing up, the other down, mixed with numerous black bristles. Leaf 4 ft. long or more; flagellum long, slender; petioles over 1 ft. long, with strong flat half-whorled spines; leaflets equidistant, broadly linear-acuminate, 1 ft. long, 1 in. wide, bristly on nerves and tips. Male spadix 2 ft. long, peduncle armed with tufts of bristles on edges. Spathes 5 or 6, lowest 7 to 15 in. long, 1.25 in. wide, linear acuminate covered with rows of black bristles, upper ones thin, nearly glabrous. Spadix branches 2 to 4 in. long. Flowers alternate sub-distichous or spiral. Female spadix over 2 ft. long, spreading, much branched. Fruit dark red, .4 in. long, scales rhomboid, slightly resinous. *Hab.* Common in forests. Johor, Tebing Tinggi; Panchur. Malacca (Griffith); Ayer Panas; Selandor. Pahang, Kwala Lipis (Machado). Negri Sembilan, Seremban (Moorhouse). *Distrib.* Borneo. *Native name:* Rotan Chinchin. *Use:* For rigging.

(26) **D. setigerus** Ridl. *D. periacanthus* Ridl. *Mat.* ii. 185 (not of Miquel).

Stem 40 ft. long, 1 in. through, with raised rings of bristles and spines as in *D. verticillaris*. Leaves 5 ft. long; petioles over 1 ft. long, armed with long erect spines 3 in. long and half whorls of black bristles; leaflets unequally distant, linear, broad, 1 ft. long, .75 in. wide, bristly. Male spadix over 2 ft. long; peduncle 18 in. long with tufts of bristle-spines on edge. Spathes thin coriaceous, lowest 18 in. (or less) long, 1 in. wide, covered with brown bristles in tufts, lanceolate. Flowers closely distichous. Female spadix shorter and stouter. Fruit turbinate-globose on a pedicel .5 in. long, mammillate, yellow, scales broader than long, edge scarious with an inner dark brown line. *Hab.* Not rare. Forests. Singapore, Kranji; Chan Chu Kang. Johor, Sungei Tebrau. Pahang, Kwala Lipis (Machado); Tahan River. Malacca, Bukit Sadanen (Derry), Ophir. Selangor, Ulu Gombak. Perak, Thaiping Hills; Asam Kumbang (Wray); Bujong Malacca. *Native name:* Rotan Gulang.

(27) **D. Sabut** *Becc. in Hook. fil. F.B.I. vi. 469; Ann. Bot. Gard. Calc. l.c. 181, t. 77.* *D. oligophyllus* *Becc. in Hook. fil. F.B.I. vi. 470; Ann. Bot. Gard. Calc., l.c. 182, t. 78.*

Stem with rings bearing bristles and deflexed spines as in *D. verticillaris* but leaflets lanceolate, 1 ft. long, 1 in. broad or more, in groups of four some distance apart. Only portions of stem and leaves known.

The specimen described under *D. oligophyllus* seems to be from a younger shoot of *D. Sabut* than the specimen of *D. Sabut*.

These were both collected by Scortechini in Perak, on the Gunong Tambang Batak. He gives the name Rotan Sabut (which is really the name of *D. hystrix*) to the plant.

(28) **D. macrophyllus** *Becc. l.c. 470; Ann. Bot. Gard. Calc. l.c. 185, pl. 80.*

This plant has the same stem and arrangement of leaflets as *D. Sabut*, but the leaflets are 18 in. long by 3·75 in. wide.

This was also collected by Scortechini, but was only a leaf specimen; the spathes and spadix are unknown.

### 23. CERATOLOBUS, Bl.

Climbing unisexual palms. Leaves flagelliferous; leaflets distant, lanceolate or obcuneate. Spathe 1, thin, boat-shaped, unarmed or sparsely spiny. Spadix lax, short; spathels tubular. Calyx short, 3-lobed. Petals short, free to base. Stamens 6, adnate to petals at base. Female spadix shorter than male. Calyx tubular. Fruit as in *Calamus*. Species 5 or 6, Malay peninsula and isles.

Stem very stout; leaflets obcuneate rhomboid . . . (1) **C. Kingianus**  
Stem slender; leaflets linear acuminate . . . (2) **C. lævigatus**

(1) **C. Kingianus** *Becc. in Hook. fil. F.B.I. vi. 477; Ridl. Mat. ii. 187.*

Stem 25 to 50 ft. long, 1·25 in. through. Leaves 3 to 4 ft. long; sheaths unarmed, transverse rugose nearly white; petioles 6 to 8 in. long, base gibbous with short conic thorns. Leaflets few, obcuneate rhomboid plicate acuminate, toothed, white beneath, 6 to 9 in. long, 3 to 4 in. wide. Spadix sessile, 8 to 10 in. long, oblong, thin short-beaked. Fruit spherical, 75 in. through, scales brown, longer than broad. *Hab.* Perak, Larut Hills (Kunstler, Wray, Hullett).

(2) **C. lævigatus** *Becc. in Hook. fil. F.B.I. vi. 477; Ridl. Mat. ii. 187.* *Calamus lævigatus* *Mart. Hist. Nat. Palm. iii. 339.*

Stems 8 to 9 ft. long, 25 in. through. Leaves 2 ft. long; petioles very short, gibbous at base, sheaths with few broad, dagger-shaped scattered spines; leaflets linear-lanceolate, in distant fascicles of 2 to 5 or 6, 7 in. long, 5 in. wide. Spathe fusiform long-beaked, 6 to 8 in. long, almost unarmed. Spadix branches very slender. Fruit spherical, ovate beaked, 5 in. long,

chestnut red, scales rhombic, few. *Hab.* Common in mountain or hill woods. Selangor, Semangkok Pass; Damansara Hill, Kwala Lumpur. Perak, Goping (Kunstler); Thaiping Reservoir (Burkill); Bujong Malacca; Gunong Keledang; Kamuning (Machado). Dindings, Lumut (Ridley).

#### 24. CALOSPETHA, Becc.

Climbing palm, stem rather short. Leaves pinnate; leaflets lanceolate acuminate. Female spathes 8, the outer one not completely covering the others, oblong, thin, beaked. Calyx in fruit short with three points. Corolla longer, very deeply trifold, connate, bases of filaments forming a six-rayed cup. Fruit containing 2 or 3 seeds, globular, not or shortly beaked. Seeds with homogeneous albumen. Flowers unknown. Species 1. Perak Mountains.

(1) *C. Scortechinii* Becc. *Ann. Bot. Gard. Calc.* xii. (2), p. 17, pl. 12.

Stem rather short. Leaves large, hooks on rachis solitary; leaflets lanceolate acuminate, 1 ft. long, .75 in. wide, sparsely bristly. Peduncle flat, 9 in. long, spines dagger-like, pale brown. Spathes 5 to 10, deep cinnamon brown, stiffly papery, oblong, shortly sheathing at base, beak long subulate, lowest one 8 in. long, 1 in. wide, tip broad, spines numerous, pale, straight narrow, .25 in. long, on keels and beak. Spadix short, branchlets short; flowers few. Males unknown. Fruit globose, .5 in. through, not beaked in my plant, beaked shortly and stoutly in Scortechini's, scales in 10 rows, orange, edged brown. Seeds 3, inner face angled, back rounded. *Hab.* Perak (Scortechini); Gunong Keledang at the summit (Ridley).

#### 25. CALAMUS, Linn.

Climbing, rarely erect, palms, thorny and spiny, generally unisexual. Leaves pinnate ending in a bare portion armed with hooks (*Phyllanthectæ*) or with flagella from the leaf-sheath with one or two sheaths, formed of abortive spadices (*Mischanthectæ*). Inflorescence usually branched, long, slender, pendulous, axillary, with tubular sheaths (spathes), the branches with smaller ones (spathels). Flower spikes with small distichous flowers, each with a small sheath (spathellule), and an ovate bract. Calyx tubular, 3-lobed. Corolla longer. Stamens 6, connate at base. Female flowers larger; stigmas 3, recurved. Fruit globose or ellipsoid or turbinate scaly; testa pulpy thin. Seed 1, globose to oblong. Species about 200, chiefly Malayan, also African, and all Asia and Australia.

Beccari's invaluable work on this difficult group in the *Annals of the Botanic Gardens, Calcutta*, vol. xi., gives life-sized photographs of herbarium specimens of nearly all our species, and should be consulted.

§ 1. *Mischanthectæ*. Leaves without flagella (except sometimes on young stems), inflorescence flagellate.

Leaflets few lanceolate broad and distant; stems slender.

Lowest pair close to stem and deflexed round it.

Flowers male, distichous close, rather long . . . (1) **C. javensis**  
Flowers male distant, very short . . . (2) **C. penangensis**

Lowest leaflets not deflexed.

Leaflets 4, large, lanceolate, narrow at base . . . (3) **C. filipendulus**

Leaflets elliptic, base shortly narrowed; spadix long slender; slender plant . . . (4) **C. insignis**

Leaflets elliptic; spadix short compact, robust plant . . . (5) **C. subspathulatus**

Leaflets large rhomboid white beneath; rachis tomentose . . . (6) **C. tomentosus**

Very robust plants; leaflets lanceolate numerous.

Spadix very long slender; fruit small black . . . (7) **C. scipionum**

Spadix stout; leaflets glaucescent beneath when dry.

Fruit large globose pale red . . . (8) **C. ornatus**

Fruit large globose yellow . . . (9) **C. manan**

Leaflets linear numerous.

Spadix long simple with recurved spikes; spathes with short limb.

Spathels unarmed . . . (10) **C. densiflorus**

Spathels armed, spikes stouter . . . (11) **C. Ridleyanus**

Spadix much branched, slender; inflorescence short, branches scorpioid.

Stem scabrid, sparsely armed . . . (12) **C. exilis**

Stem densely spiny . . . (13) **C. Curtisii**

Stems stout; spadices very long, slender.

Leaflets linear; male spikes remote, 1 in. long, stout . . . (14) **C. Diepenhorstii**

Leaflets linear; male spikes .5 in. long, very narrow; flowers very close set . . . (15) **C. paspalanthus**

Leaflets lanceolate-linear.

Spikes curved; fruit ellipsoid . . . (16) **C. Burkillianus**

Spikes distant . . . (17) **C. pulaiensis**

Stems slender; spikes slender; leaflets linear-lanceolate.

Female flowers distichous, remote; spathels smooth . . . (18) **C. distans**

Male flowers distichous, very remote; spathels scabridulous . . . (19) **C. laxiflorus**

Male flowers distichous close.

Inflorescence smooth; stem closely thorny . . . (20) **C. luridus**

Inflorescence very scabrid with short thorns, stem very thorny; leaflets numerous narrow . . . (21) **C. radulosus**

Inflorescence of few short spikes, very scabrid; leaflets few broad; stem thorny . . . (22) **C. pauciflorus**

Inflorescence slightly scabrid; stem shortly thorny . . . (23) **C. scabridulus**

Stems with rough transverse ridges . . . (24) **C. rugosus**

Spathes with a long thin papery limb; spadices erect, comparatively short.

Spathe limb very long; spadices large . . . (25) **C. ramosissimus**

Spathe limb short; spadix short . . . (26) **C. perakensis**

Spathes without papery limb, spikes erect.

Low bushy rattan; leaves not flagellate;

  spathes thorny . . . . . (27) **C. siamensis**

Spathes loose unarmed, scandent . . . . . (28) **C. concinnus**

Dwarf plants; spadices dense with short crowded spikes; fruit black.

Leaves broad, white beneath . . . . . (29) **C. Lobbianus**

Leaves narrow, entirely green . . . . . (30) **C. conirostris**

§ 2. *Phyllanthectæ*. Leaves ending in flagella, no inflorescence flagella.

Stems slender; leaflets few distant lanceolate.

Leaflets white beneath; panicle large . . . . . (31) **C. cæsius**

Leaflets all green; panicle simple . . . . . (32) **C. distichus**

Stem stout; leaflets broad; panicle long . . . . . (33) **C. palustris**

Slender climbing rattans; leaflets linear numerous.

Leaflets in distant fascicles.

Spadix simple erect, few branched . . . . . (34) **C. brevispadix**

Spadix simple, unbranched, nodding . . . . . (35) **C. elegans**

Spadix long, much branched; spikes 2·5 in. apart.

Fruit oblong . . . . . (36) **C. viridispinus**

Fruit ovoid-elliptic . . . . . (37) **C. neglectus**

Spikes 1·5 in. apart; fruit globose . . . . . (38) **C. Oxleyanus**

Leaflets inæquidistant in pairs; fruit fusiform . . . . . (39) **C. longispatha**

Leaflets equidistant close lanceolate-linear . . . . . (40) **C. pallidus**

Spadix extremely long, unarmed . . . . . (41) **C. laxissimus**

Stout rattans; leaflets numerous; spikes broad; panicles usually large, scandent.

Leaflets narrow; stem densely armed with black thorns . . . . . (42) **C. aquatilis**

Leaflets broad distant; stem with few thorns . . . . . (43) **C. dumetorum**

Bush palms not climbing, spikes few, broad.

Fruit brown . . . . . (44) **C. castaneus**

More robust plant; fruit larger . . . . . (45) **C. Griffithianus**

Tree 20 ft. tall, very thorny . . . . . (46) **C. arborescens**

(1) **C. javensis** *Bl. Rumphia*, ii. pl. 137, iii. 62, pl. 153. *C. pincillatus Roxb. Fl. Ind.* iii. 781; *Ridl. Mat.* ii. 191. (Fig. 213, p. 50.)

Stems slender, 20 to 60 ft. tall, ½ in. through. Leaves 1 to 1·25 ft. long; petioles short or 0; sheaths thorny; leaflets 7 to 11 pairs, lanceolate or elliptic, the basal pairs deflexed and clasping stem, 6 in. long, 1 to 1·75 in. wide, 3-nerved. Male spadix, peduncle 5 ft. long, very slender, thorny. Spathes armed, mouth ciliate, branches 2·5 in. long, distant; spikes 4 to 8; flowers crowded. Female spadix stouter. Fruit oblong, yellow, ¼ in. long, scales broader than long, deep grooved. *Hab.* Common in forests. Singapore, Kranji; Bukit Timah. Johor, Gunong Pantai; Kwala Sembrong (Kelsall). Malacca, Bukit Sadanen. Selangor, Batu Caves. Pahang, Tahan River; Tembeling; Kwala Lipis. Sungei Ujong (Cantley). Penang (Roxburgh).

var. *purpurascens Ridl.* Stem short; leaves purplish; rachis of spikes crimson. *Hab.* In mountain districts chiefly, Malacca, Tebong. Selangor, Kwala Lumpur (Curtis). Perak, Thaiping Hills; Kamuning; Gunong Batu Putih and Relau Tujur (Wray); Batu Kurau (Burkill). Kelantan, Kwala Lebir (Gimlette). Rahman, Bukit Besar at 3000 ft. altitude (Gwynne Vaughan).

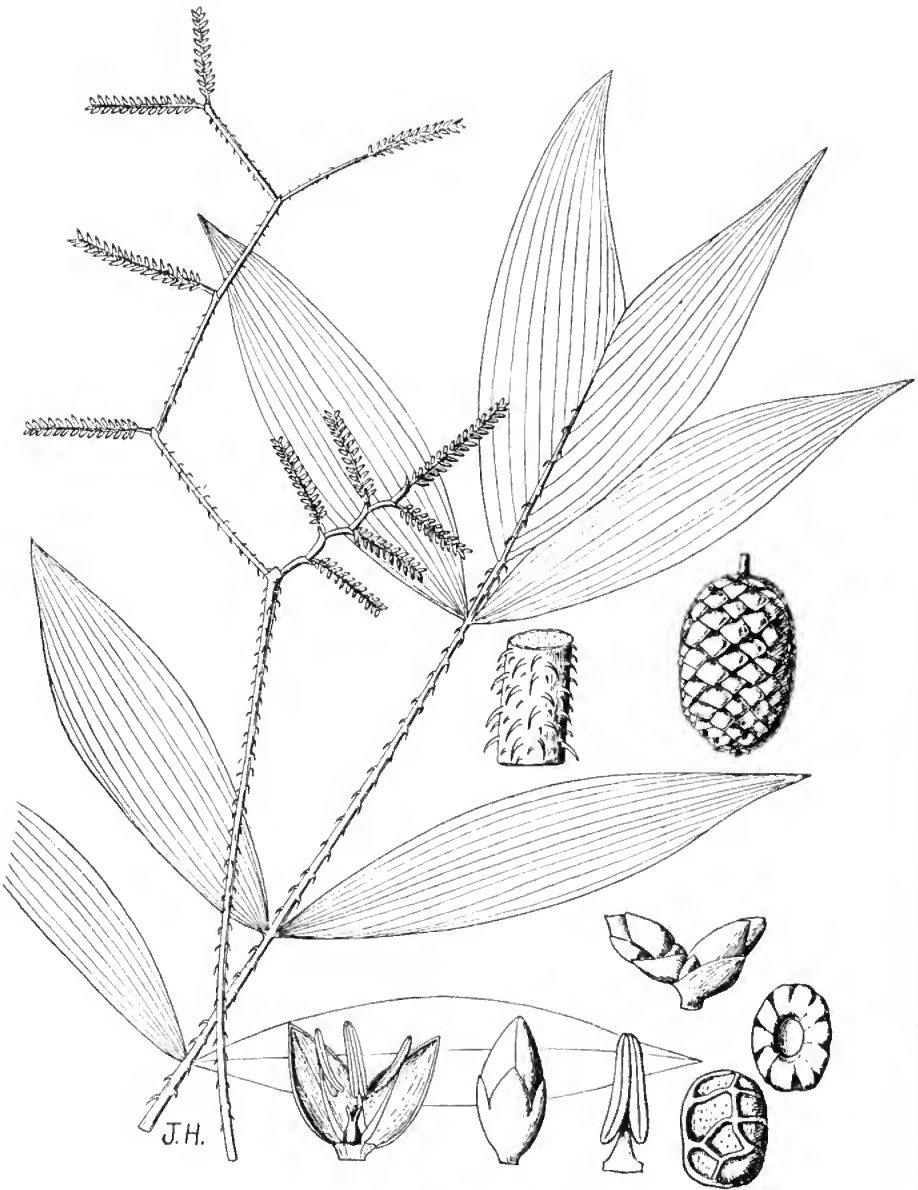


FIG. 213.—*Calamus javensis*.

var. *inermis*. Stem almost unarmed, *Hab.* Malacca, Mount Ophir. Negri Sembilan, Gunong Angsi (Ridley).

var. *penangianus* Becc. in *Hook. fil. F.B.I.* v. 443. Stem closely spiny with broad spines. *Hab.* Penang Hill, Mount Elvira (Curtis). *Distrib.* Java, Borneo. *Native names*: Rotan Lilin; Rotan Sindek; Rotan Sini.

This plant is very variable in number of leaflets and in armature.

(2) **C. penangensis** Ridl. *Mat.* ii. 192.

Stem pale, .25 in. through, strongly armed with short thorns. Leaves 14 in. long; leaflets 5 and a double pair at tip, elliptic cuspidate, 4.5 in. long, 1.5 in. wide, the two basal ones smaller, elliptic deflexed at base. Spadix very slender, 18 in. long, thorny, branches distant, lowest 4 to 6 in. long, spikes .75 in. long, flexuous; flowers .05 in. long, distant. Petals ovate. *Hab.* Very local at about 2500 ft. altitude. Penang Hill, West Hill (Curtis); near the Crag Hotel (Burkill).

Roxburgh's *C. pencillatus* *Fl. Ind.* iii. 781, may be meant either for this species or for *C. javensis*, the description and only specimen known of his, a leaf, are inadequate to decide, but I think it was intended for *C. javensis*.

(3) **C. filipendulus** Becc. in *Hook. fil. F.B.I.* vi. 443; *Ridl. Mat.* ii. 193; *Ann. Bot. Gard. Calc.* xi. 188, pl. 45.

Stem 15 to 30 ft. long, up to .75 in. through. Leaves 3 to 4 ft. long; sheaths with flat triangular spines; petioles 3 to 7 in. long, edges sharp-spined; leaflets 3 pairs, oblanceolate, base narrow, 10 to 24 in. long, 3 in. wide. Spadix slender, over 4 ft. long, branches 18 in. long; spathels sparsely thorny, spikes .25 to .5 in. long; spathels and spathellules scabrid. Calyx cylindrical. Corolla lobes three times as long. Fruit .25 to .4 in. through, creamy white. *Hab.* Rare, thick lowland forests. Selangor, Rawang. Perak, Batang Padang and Chanderiang (Kunstler).

(4) **C. insignis** Griff. *Calc. Journ. Nat. Hist.* v. 58; *Palms of Brit. Ind.*; *Ridl. Mat.* ii. 193. *C. spathulatus* Becc. in *Hook. fil. F.B.I.* vi. 459 (*excl. var. robustus*).

Stems few on a plant, 70 to 80 ft. long, .5 to .75 in. through, light green; sheaths with scattered thick-based thorns black-tipped; petioles 3 to 5 in. long; leaflets 4 to 9, oblanceolate, narrowed to both ends, in opposite pairs or single, distant on a slender spiny rachis, edges thickened papery, 8 in. long, 2 in. wide, 6-nerved with conspicuous transverse nervules, flagella 2 ft. long or more, with no sheaths. Spadix very slender, 2.5 ft. long, armed, branches few, 6 in. long, distant, spikes 1 in. long. Male spadix unknown. Female flowers about 10 in a spike. Fruit globose, yellow, .75 in. long, scales about 13 rows. *Hab.* Common in forests. Singapore, Bukit Timah; Garden Jungle. Johor, Panchur; Batu Pahat; Gunong Pulai. Malacca (Griffith). Selangor, Dindings, Lumut. Perak, Bujong Malacca. *Native name*: Rotan Batu. *Use*: This is much valued as a rattan.



(5) ***C. subspathulatus*** *Ridl. Mat.* ii. 194. *C. spathulatus* var. robustus *Becc. in Hook. fl. F.B.I.* vi. 459.

Stem 20 to 30 ft. long, .5 to .75 in. thick; sheaths with very powerful upward-pointed thorns; petioles very stout with very powerful thorns; leaflets elliptic-lanceolate narrowed gradually to base, 9 to 15 in. long, 2.5 to 4 in. wide; nerves numerous. Male flowers unknown. Female fruiting spadix 3 to 4 ft. long, branches 1 ft. long, very stout, spikes stout, 4 in. long, 23 on a branch, distichous. Fruit oblong, .5 in. long, straw-colour, scales numerous. *Hab.* Hill forests. Perak, Bujong Malacca (Kunstler, Curtis).

(6) ***C. tomentosus*** *Becc. in Hook. fl. F.B.I.* vi. 455; *Ann. Bot. Gard. Calc.* xi. 338, pl. 135. *C. rhomboideus* *Ridl. Mat.* ii. 194.

Stem 30 to 40 ft. long, over 1 in. through, sheaths, petioles, and rachis covered with white tomentum and armed with short black conic thorns; leaflets 8 to 14 in four distant pairs, coriaceous, ovate or ovate-lanceolate acuminate, base narrowed, 10 in. long, 6 in. wide, often tomentose beneath; main nerves 7 with many secondary and transverse nervules, flagellum strong, 8 to 10 ft. long. Female spadix about 6 ft. long, stout, spikes 4.5 in. long, distant. *Hab.* Forests up to 3000 ft. altitude, not common and imperfectly known, Sungei Ujong (Cantley). Perak, Thaiping Hills (Kunstler, etc.).

var. *korthalsiæfolius* *Becc. Rec. Bot. Surv. Ind.* ii. 209; *Ann. Bot. Gard. Calc.* 340, pl. 136. Sheaths sparingly armed, and covered with silvery scales. *Hab.* Perak, Gunong Tambang, Batak (Scortechini).

var. *intermedius* *Becc. l.c.* Slender, not as tomentose as type. *Hab.* Perak, Gunong Hijau (Scortechini).

(7) ***C. scipionum*** *Lour. Fl. Cochinchine*, i. 210; *Ridl. Mat.* ii. 195; *Becc. Ann. Bot. Gard. Calc.* 371, pls. 155, 156.

Gigantic rattan, over 80 ft. long, 3 in. through. Leaves 8 ft. long, sheath green with few dagger-shaped short flat spines solitary and in threes; petioles 1 to 3 ft. long, gibbous at base; leaflets broad lanceolate, 1 to 3 ft. long, 2 in. wide, alternate, distant; flagella 12 ft. long from mouth of sheath. Spadix 12 ft. long or more, much branched. Male spathes tubular strongly thorny; spathels 1.5 in. long, armed, branches 3 to 4 in. long with alternate distichous spikes .5 to 1 in. long. Flowers green, .12 in. long. Female spadix, spathels hardly armed, spikes 4 in. long, fruit .3 in long, black. *Hab.* Not very common in dense forests. Malacca, Ching (Griffith). Selangor, Batu Tiga (Curtis); Kwala Lumpur. Perak, Bujong Malacca. *Distrib.* Borneo, Sumatra. *Native names:* Rotan Semambu; Rotan Rajah; Malacca cane.

A plant cultivated in Singapore Gardens was bisexual, the spikes containing male and female flowers in pairs. The great length of the internodes in the upper part of the stem is very characteristic.

Loureiro's description of his *C. scipionum* is based apparently mainly on a walking-stick to which he adds a figure and some account of a rattan from

Piso's Mantissa 188. As more than one species of *Calamus* supplies the Malacca cane of trade, it may be doubtful as to which is the plant of Loureiro. The species above described, however, supplies most of the red Malacca canes, and has always been considered to represent Loureiro's plant.

(8) **C. ornatus** *Bl. Rumphia*, iii. t. 148; *Ridl. Mat.* ii. 196; *Becc. Ann. Bot. Gard. Calc.* 365, pl. 153.

Stems gigantic, over 80 ft. long, 2 in. through, dull green, with short, flat thorns in threes. Leaves 12 to 15 ft. long; petioles 1 in. long, thick spines scattered, .75 in. long; leaflets in alternate pairs, lanceolate, narrowed at base, 25 in. long, 2.5 in. wide (in young plants leaves flagelliferous). Spadix 16 to 18 ft. long; spathes 4 in. long, limb acuminate, 1 in. long, thorny, branches 6 or 7. Spikes 3 to 4 in. long, distichous, crowded. Flowers distichous. Females .25 in. long, crowded. Fruit oblong-globose, 1.5 in. long, scales 10 rows, pale red, with darker tips. *Hab.* Common in high forests. Singapore, Bukit Timah. Johor, Tebing Tinggi; Batu Pahat. Malacca, Durian Tungul (Fernandez, Griffith). Negri Sembilan, Bukit Senaling (Moorhouse). Perak, Larut (Kunstler). *Distrib.* Sumatra and Java. *Native names*: Rotan Manok Kelichek; Rotan Mantang.

This plant, I believe, supplies some at least of the white Malacca canes.

(9) **C. manan** *Miq. Fl. Nederl. Ind. Suppl.* 595; *Ridl. Mat.* ii. 196. *C. giganteus* *Becc. in Hook. fil. F.B.I.* vii. 460; *Ann. Bot. Gard. Calc.* 440, pl. 197.

Stem very long, 1.5 in. through. Leaves 6 ft. long; sheaths armed with flat black spines 1 in. long in rows; petioles gibbous at base, edges thorny; flagellum stout, on the leaf end; leaflets lanceolate, base narrowed, 1 ft. long, 3 in. wide. Spadix very large. Spathes thorny or not, limb ovate acuminate. Spikes 6 in. long. Flowers unknown. Fruits sub-globose-oblong, large, 1 in. long, scales in 8 rows, yellow or reddish, longer than broad. Seed oblong, strongly ruminant. *Hab.* Forests, Negri Sembilan, Bukit Senaling near Seremban (Moorhouse). Perak (Scortechini). *Distrib.* Sumatra. *Native name*: Rotan Manok Telor.

(10) **C. densiflorus** *Becc. in Hook. fil. F.B.I.* vi. 445; *Ridl. Mat.* ii. 196; *Becc. Ann. Bot. Gard. Calc.* 103, pl. 157.

Stems about 15 ft. tall, .75 in. through, green, with scattered flat thorns of pale colour .25 in. long, single or in rows of three. Leaf 6 to 8 ft. long; petioles short; rachis thorny on upper surface; leaflets equidistant, alternate, linear acuminate, 1 ft. long, .5 in. wide, 3-nerved, bristly on the edge, flagellum from sheath 5 ft. long. Male spadix over 1 ft. long, basal sheath thorny, 6 in. long; peduncle 9 in. long, upper spathes and spadix unarmed, branches 3 in. long or less; spikes recurved, 1 in. long. Flowers very close set, distichous. Calyx saucer-shaped pubescent. Petals ovate-lanceolate. Female spadix 5 to 6 ft. long; peduncle over 1 ft. long. Fruit ovoid beaked, .5 in. long, scales in 11 rows, longer

than broad, yellow, brown edged. *Hab.* Forests. Singapore, Garden Jungle; Bukit Mandai. Selangor, Kwala Lumpur. Perak, Thaiping. Province Wellesley, Batang Berjuntai. Kemaman (Vaughan Stephens). Kedah, Langgar (Burkill). *Native names*: Rotan chichi; Rotan Pahit.

(11) *C. Ridleyanus* Becc. *Rec. Bot. Surv. Ind.* ii. 205; *Ann. Bot. Gard. Calc. l.c.* 378, t. 158.

Stem 30 ft. long, 1.5 in. through, indistinguishable from that of *C. densiflorus*, green, covered with scattered thorns 1.5 in. long or less. Leaves 6 to 8 ft. long; leaflets equidistant, linear acuminate, 3-nerved, 2 ft. long, 1 in. wide, tip only bristly; petioles 6 in. long, edges spiny. Flagellum from upper part of sheath 5 ft. long. Male plant unknown. Female spadix 8 ft. long; peduncle 4.5 ft. long. Spathes tubular with short scattered thorns .5 in. long. Spikes recurved, 3 in. long; spathels short cup-shaped scurfy. *Hab.* Not very common in the forests of the south. Singapore, Garden Jungle; Mandai. Johor, Gunong Pulau (Ridley).

(12) *C. exilis* Griff. *Palms of Brit. Ind.* 51; *Ridl. Mat.* ii. 204.

Stem 15 to 20 ft. long, very slender. Leaves 3 to 4 ft. long; petioles 6 in. long, armed with thorns on the edge .12 in. long, sheath and back of petiole scabrid with minute thorns and some stout ones; rachis scurfy; leaflets lanceolate-linear long-acuminate, very bristly when young, 6 in. long, .25 in. wide. Male spadix few branched, ending in a long slender flagellum. Spathe tomentose, sometimes thorny. Flowers solitary or in pairs on the branchlets. Female spadix longer, branches 2 in. long, recurved; flowers more distant, pedicelled. Fruit oblong, .5 in. long, light brown, scales much longer than broad. *Hab.* Mountains. Johor, Gunong Pulau. Malacca, Mount Ophir, Gunong Tundok (Griffith and Ridley). Selangor, Sungei Buluh. Perak, Thaiping Hills (Kunstler, etc.). *Native name*: Rotan Paku.

I have described this from the type and plants gathered exactly at Griffith's locality by myself. The Perak plants are much more robust, the fruit being .75 in. long, the spadix over 3 ft. in length. Young plants found in lowland woods differ in being very much more hairy, especially on the ligule, the rachis and leaflets with hardly any thorns anywhere and a very weak depauperated male inflorescence. These are abundant in the wet woods round Castlewood in Johor, Tahan River (Pahang), and in the Thaiping Hills, and closely resemble (if they are not identical with) *C. ciliaris*, Bl. to which I formerly referred them. If, as Beccari says, all, including *C. Curtisii*, are specifically the same, the plant is extremely variable.

(13) *C. Curtisii* Ridl. *Mat.* ii. 204.

Stem .5 in. through. Leaf-sheaths scabrid, densely armed with flat, pale spines 1 in. long or less; petioles 8 in. long, triquetrous, with straight pale needle-like spines on edge; leaf 2 ft. long or more; rachis red-woolly; leaflets linear acuminate, closely equidistant, with bristles at tip only. Male spadix 2 ft. long, lower

spathe armed with needle-like spines, limb lanceolate, branches 6 in. long, spikes 1.5 in. long or less, slender. Female spadix stouter; flowers distant. *Hab.* Local in forests. Selangor, Kwala Lumpur (Curtis); Semangkok Pass; Bukit Kutu (Ridley).

This plant was referred by Beccari to *C. exilis*, but it differs greatly in the very strongly armed sheaths and petioles.

(14) **C. Diepenhorstii** *Miq. Fl. Ind. Bat. Suppl.* 594; *Palms Arch. Ind.* 27; *Ridl. Mat.* ii. 199; *Becc. Ann. Bot. Gard. Calc. l.c.* 324, pl. 126. *C. singaporensis* *Becc. in Hook. fil. F.B.I.* vi. 454; *Ann. Bot. Gard. Calc.* 325, pl. 127.

Stem 20 to 30 ft. long, stout. Leaves 3 to 4 ft. long; petioles over 1 ft. long, strongly armed with flat spines .75 in. long or less, with a broad pale base; leaflets 1 ft. long or more, .75 in. wide, linear, bristly on nerves and tip, edges thickened. Spadix 6 to 7 ft. long, large, decomposed, spathes thorny. Male spadix slender, unarmed in the upper part, spikes distant, 1 in. long, with pale close-set flowers, distichous, .1 in. long. Female spadix more robust, spikes stouter and flowers more distant. Fruit globose, orange-yellow, scales broader than long. Seed ovoid ruminant. *Hab.* Common in forests. Singapore, Garden Jungle; Bukit Timah. Johor, Kwala Tebing Tinggi, Batu Pahat; Mount Austin. Pahang, Tahan River. Negri Sembilan, Gunung Angsi (Holttum). Selangor (Cantley). Perak, Kinta valley; Bujong Malacca (Kunstler). Dindings, Lumut. Penang, Muka head (Curtis, Wallich). *Distrib.* Sumatra. *Native names:* Rotan Koman; Rotan Layo. *Use:* For tying thatch.

The form *singaporensis* has nearly or quite glabrous leaflets.

(15) **C. paspalanthus** *Becc. and Hook. fil. F.B.I.* vi. 450; *Ridl. Mat.* ii. 200. *Dæmonorops intumescens* *Becc. Rec. Bot. Surv.* ii. 222. *C. intumescens* *Ridl. Mat. l.c.* ii. 200.

Stem very long, .35 in. through, purple with flat olive-coloured spines .25 in. long with a thick base. Leaves 3 ft. long; petioles 18 in. long, base gibbous, spines long, slender, 1.25 in. long; leaflets narrow linear, bristly on nerves beneath, glaucous beneath, 1 ft. long, .35 in. wide; rachis red, scurfy and hairy. Flagellum 40 in. long, very slender. Male spadix over 7 ft. long, base very stout, red scurfy, branches long, slender, 9 in. long or less, with numerous pale spikes .6 in. long and close distichous flowers .9 in. long. Female spadix stout and long, spikes over 6 in. long. Fruit globose, .5 in. long, scales broader than long, dark red. *Hab.* In forests. Singapore, Bukit Timah. Johor, Batu Pahat and Serom. Perak, Gopong (Kunstler); Thaiping Hills. *Distrib.* Borneo. *Native name:* Rotan Semiang.

The very narrow male spikes with very close-set distichous flowers, really suggesting spikes of grass, are very distinctive.

(16) *C. Burkillianus* Becc. MSS.

Stem apparently stout, at least 1 in. through, pale. Leaves large, sheaths pale, armed with flat broad-based spines, .25 in. long or less, not flagellate; leaflets lanceolate linear, base narrowed, 1 ft. long, .6 in. wide, not bristly; rachis with stout short hooks, one to each leaflet. Male spadix unknown. Female spadix very long, slender, ending in a flagellum, strongly armed with black-pointed hooks, solitary to three together. Branches in fruit 1 ft. long. Spikes recurved, moderately slender, 1 in. long. Fruit ellipsoid, narrowed, conoid at the tip, .3 in. long; scales straw-yellow with a dark line and a scarious edge, broader than long, in 10 rows. Seed small oblong not ruminant. *Hab.* Pulau Tioman, Juara Bay (Burkill).

(17) *C. pulaiensis* Becc. *Ann. Bot. Gard. Calc.* xi. *App.* 34, pl. 18.

Leaf about 3 ft. long; petioles over 5 in. long, rather flattened, with straight thorns .24 in. long on edges; leaflets 6 in. long, .4 in. wide, lanceolate-linear, equidistant, rather close. Male spadix unknown. Spadix female 2 ft. long or more with 3 or 4 remote branches 7 in. long. Spikes in young fruit distant, 1.25 in. long. Spathes tubular with numerous scattered short stout black-tipped thorns. Corolla twice as long as calyx. Top of spadix flagellate. *Hab.* Johor, Gunung Pulai (Ridley). Rare and very little known.

(18) *C. distans* Ridl.

Leaves, rachis rather slender, armed with distant strong recurved thorns, leaflets remote, 3 in. or more apart, linear-lanceolate, long acuminate, base slightly narrowed, 15 in. long, 1 in. wide, quite glabrous, thin; nerves 5. Spadix, female 4 ft. long, slender, peduncle 3 ft. long, base strongly armed with numerous straight thorns .2 in. long, on edges and back, above the first spathe with distant hooked thorns on the back, in threes and fours. Flowering branches slender, 6 in. long, unarmed, spikes 2 to 3 in. long, 1 in. apart; spathules smooth narrow, slightly dilate upwards. Fruits (young) distant, distichous, ovoid-oblong, beaked, scales in 5 rows, olive, triangular, blunt. Calyx cylindrical, .1 in. long, lobes triangular acute. Petals slightly longer. *Hab.* Kelantan along the ridge of Gunung Sitong (Foxworthy).

(19) *C. laxiflorus* Becc. *Ann. Bot. Gard. Calc.* xi. *Appendix*, p. 13, pl. 7.

Slender plant. Leaflets numerous, equidistant, not close, linear-lanceolate, attenuate both ends, tip bristly, 10.8 in. long, 1 in. wide. Male spadix long slender, 3-branched. Spikes filiform, very slender. Spathes narrow elongate, scabrid; flowers distichous and very remote. Spathels scabridulous; flowers cylindrical. Calyx strongly ribbed. *Hab.* Singapore, Woodlands (Ridley). Very rare.

(20) *C. luridus* Becc. in Hook. *fl. F.B.I.* vi. 445; *Ann. Bot. Gard. Calc.* 243, pl. 80; *Ridl. Mat.* ii. 198.

Stem 15 to 20 ft. long, slender, dark purple when dry, with

strong broad thorns. Leaves 2·5 ft. long; petioles 6 to 12 in. long, thorny; leaflets alternate remote linear-lanceolate, 2 ft. long, ·75 in. wide, 3-nerved, bristly. Male spadix 4 to 6 ft. long, very slender, smooth. Spathes unarmed. Spikes very slender; flowers not crowded, alternate, very small. Female spadix shorter and much stouter; spathes thorny. Spikes deflexed, 1·5 in. long. Flowers ·1 in. long. Fruit globose-ovoid, ·12 in. long, yellow, scales longer than broad. *Hab.* Forests in the south. Johor, Sungei Tebrau. Selangor, Rawang. Negri Sembilan, Kwala Pilah (Moorhouse). Perak, Kinta valley; Thaiping Hills up to 4000 ft. altitude. *Distrib.* Borneo. *Native names:* Rotan Perut Ayam; Rotan Kerai.

(21) *C. radulosus* Becc. in Hook. fil. *F.B.I.* vi. 443; *Ann. Bot. Gard. Calc.* xi. 174, pl. 35; *Ridl. Mat.* ii. 198.

Stems 30 to 40 ft. long, 1 to 1·25 in. through with very short scattered thorns. Leaf 3 to 5 ft. long, no petiole, sheath densely armed with short flat thorns; rachis strongly thorny; leaflets equidistant, linear long-acuminate, base shortly narrowed, 10 to 18 in. long, ·5 to 1 in. wide, 3-nerved; flagellum 5 to 6 ft. long. Male spadix 8 to 15 ft. long; peduncle 6 in. long. Spathes 1 in. long, densely covered with very short thorns with swollen bases, and a number of very small processes. Spikes rather narrow, ·12 in. wide, spreading and deflexed, 3 in. long. Flowers very close, distichous. Fruit pea-shaped, long-beaked. *Hab.* Perak, Goping (Kunstler). *Native name:* Rotau Kikir.

(22) *C. pauciflorus* Ridl.

Stem ·3 in. through, armed with scattered, straight thorns thick based, dagger-shaped, ·1 in. long. Leaves 2 ft. long, with 4 leaflets, distant except the lowest pair sub-opposite, and a terminal portion of 2 or 3 leaflets connate a quarter to halfway from the base, rachis armed with distant deflexed thorns; leaflets chartaceous oblong-oblanceolate, tip of 2 to 4 acuminate bristly points, narrowed; nerves conspicuous 5, secondary nerves 6, fainter transverse nervules very numerous, 10 in. long, 2·25 in. wide. Spadix male, very slender filiform, 3 ft. long, with numerous hooked thorns in pairs. Spikes 9 in. apart, usually 3 only, very slender, 5 in. long or less. Spikelets about 20, cylindric, dense-flowered, ·25 in. long. Spathels ·15 in. long, roughly scabrid with short acute processes, campanulate with a lanceolate acute point, ribbed spathellules ovate lanceolate acute. Calyx cup-shaped, with three short points. Petals ·05 in. long, oblong-lanceolate acute. Female spadix as in male but 2·6 ft. long, with one flowering branch 2 in. long, spikes 8, distant, ·2 in. long, spathels scabrid. Flowers 2 or 3 on a spike. Sepals ovate ribbed. Petals longer, oblong acute. Young fruit obovoid, ·1 in. long, yellow, scales broader than long, tips blunt, brown, persistent; style cylindric as long as fruit. *Hab.* Perak, Tapah, Pahang Road 10th mile (Burkill 13446, 13451).

This species is allied to *C. radulosus* Becc. and *C. ruvidus* Becc., but is remarkable for its few very broad leaflets and very much reduced inflorescence.

(23) **C. scabridulus** *Becc. Rec. Bot. Surv. Ind.* 2, p. 203; *Ann. Bot. Gard. Calc. l.c.* 171, pl. 32.

Leaves over 3 ft. long, sheath with short stout thorns; rachis stout, red-brown; leaflets ensiform acuminate, rather distant, 15 in. long, 1 in. wide, strongly 5-ribbed. Spadix male very long, several feet in length. Peduncle slightly flattened below on one face, with slender thorns 1 in. long at base and numerous small pustules. Spathes limb short lanceolate with short thorns. Spadix branches long lax spreading, the spathelets very scabrid. Spikes 1 in. long, slender, over 20 in a branch; flowers close set, small. *Hab.* Muar, Sungei Semangat (Fox). *Distrib.* Billiton, Borneo.

(24) **C. rugosus** *Becc. in Hook. fil. F.B.I.* vi. 443; *Ann. Bot. Gard. Calc.* xi. 175, pl. 36; *Ridl. Mat.* ii. 198.

Stem 15 to 20 ft. long, .35 in. through, dark green, covered with transverse curved rough ridges with 1 or 2 thorns short and flat. Leaf 4 to 5 ft. long; petioles 9 in. long, edges and back thorny; leaflets 24 pairs, narrow linear acuminate, subulate, 9 in. long, .25 in. wide, tip bristly. Spadix male 3 ft. long or more, very slender. Spathes narrow with numerous recurved thorns, branches 6 in. long. Spikes .75 in. long; flowers .13 in. long. Female spadix stouter; spikes stouter, .5 in. long. Fruit oblong beaked, dark brown, scales 9 rows, edge white, laciniate. *Hab.* Perak, Thaiping Hills at 3000 to 4000 ft. altitude. Abundant in the forest (Ridley and Curtis).

(25) **C. ramosissimus** *Griff. Calc. Journ. Nat. Hist.* v. 78; *Palms of Brit. Ind.* 87, t. 207; *Ridl. Mat.* ii. 201.

Stem 30 to 40 ft. long, 1 to 1.5 in. through. Leaves, petioles stout, channelled around with flat brown spines 3 in. long; sheath closely spiny, spines 4 in. long; leaflets inæquidistant, lanceate or nearly linear, 13 to 24 in. long, 1.5 to 3 in. wide; nerves numerous, tip bristly. Male spadix 2.5 ft. long, much branched, erect, over 1 ft. long, lower branch 8 in. long, upper branch shorter with numerous side-branches 4 in. long or less covered with slender spikes .3 in. long or less with numerous distichous close-set flowers. Spathes thorny below with a thin coriaceous brown linear acuminate limb 2 ft. long, 1.5 in. wide, the upper ones shorter than the lower ones. Female spadix not branched, 9 in. long, stouter; spikes stout, 2 in. long. Fruit small, globose, brown or dark claret colour, .3 in. through. *Hab.* Mountains in forest. Pahang, Kwala Tenok. Malacca. Negri Sembilan, Gunong Angsi. Perak, Gunong Keledang; Bujong Malacca; Goping (Kunstler); Thaiping Hills; Tanjong Pondok (Burkill). Kedah Peak (Ridley). Kelantan, Sungei Ketch (Foxworthy).

(26) **C. perakensis** *Becc. in Hook. fil. F.B.I.* vi. 451; *Ridl. Mat.* ii. 202; *Ann. Bot. Gard. Calc.* xi. 290, pl. 108.

Stem 2 to 3 ft. long, .5 in. through, densely covered with flat brown thorns 4 in. long. Leaf about 2 ft. long; petioles with

numerous short curved thorns; leaves equidistant, linear, 7 to 8 in. long, .25 in. wide, 3-nerved, edges and tip bristly, young leaves white woolly beneath. Male spadix 3 ft. long, very slender, branches few, 6 in. long, branched as in *C. ramosissimus* but shorter, slightly white woolly. Spathes 9 in. long, with a limb 9 in. long, .5 in. wide. Flowers distichous, 12 in a spike. Female spadix over 2 ft. long, 3 branches 6 in. long, distant. Spikes flexuous, thick, 1 in. long. Fruit globose, less than 5 in. long, light-brown, scales rounded. *Hab.* Mountain forests, Pahang, Telom. Selangor, Bukit Kutu; Bukit Hitam. Perak, Bukit Kapayung (Ridley).

var. *lanata* Ridl. *Mat.* ii. 202. A shorter, more compact plant with shorter male spadix, more densely woolly, thorns of spathe thick conic, not circular. Female spadix 18 in. long, young fruit globose, dark red scales, lanceolate. *Hab.* Selangor, Semangkok Pass, road to the mines (Ridley), Pahang, Gunong Tahan (Haniff).

Beccari reduces this variety to his *C. perakensis*, but it is a very different-looking plant. He states that the fruit described is that of *C. Guruba* Roxb., a species only known from Assam and Burma, and not known at all in the Peninsula. The fruit and male flowers came off the same thicket mass and undoubtedly belong to the same plant.

(27) *C. siamensis* Becc. *Rec. Bot. Surv. Ind.* ii. 203; *Ann. Bot. Gard. Calc.* xi. 208, pl. 59; *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 216.

A low bushy rattan about 6 ft. tall. Leaves not flagellate, about 3 ft. long, with 80 close-set equidistant narrow lanceolate leaflets; midrib with stiff spinules; sheaths with many pale spines; petioles very short with long spines on the edge, 1.5 in. long, even on back of rachis. Male spadix 2 ft. long, lowest spathe with straight horizontal spines, stem-portion with hooks, branches 3 to 4 in. long, ending in a flagellum 2 ft. long. Flowers crowded. Female spadix 7 in. long, the flowers in pairs or solitary. Fruit globose, .25 in. through, cream white, scales in about 6 rows, tipped brown. Seed orbicular rugose flattened, .25 in. long, not ruminant. *Hab.* Open country in thickets in the north. Kedah, Alor Sta. Perlis, Kanga. Setul (Ridley). Common here. *Distrib.* Siam.

(28) *C. concinnus* Mart. *Hist. Nat. Palm*, iii. 208; *Becc. Ann. Bot. Gard. Calc.* xi. 219, pl. 60. *C. multiramea* Ridl. *Mat.* ii. 202.

Scandent plant. Leaves large; leaflets numerous linear-lanceolate, 3-ribbed, edge and midrib bristly, 10 to 18 in. long, 1 to 1.5 in. wide; rachis and spadix rusty-tomentose. Spadix stout, decomposed, short. Spathes loose coriaceous, unarmed. Male flowers distichous. Female decomposed, branches 6 in. long, thick. Fruit small, globose, dirty straw-colour, scales with edges toothed. *Hab.* Open country east and north, Pahang River, Kwala Luit. Setul, Bukit Rajah Wang (Ridley). *Distrib.* Tenasserim.

(29) *C. Lobbianus* Becc. *in Hook. fil. F.B.I.* vi. 462; *Ann. Bot. Gard. Calc.* xi. 482, pl. 220; *Ridl. Mat.* ii. 204.

Stem short, rather thick, not climbing, 3 to 7 ft. long. Sheaths



short, very spiny, thorns needle-like, 3 in. long. Leaves 3 ft. long; petioles 6 in. long; leaflets lanceolate-linear, deep green above, white beneath, 18 in. long, 1 in. wide. Spadix 3 to 6 in. long. Peduncle 1 ft. long or less with acicular strong spines. Spathes base tubular, limb 6 to 12 in. long, densely spiny, spines over 1 in. long; spadix-branches 3 or 4, very dense with short thick spikes crowded into a mass. Female flowers .25 in. long. Fruit obovate, beaked, black, shining, over 1 in. long. *Hab.* Common in forests, chiefly in the south. Singapore, Bukit Timah; Bukit Mandai; Pulau Damar. Johor, Ulu Batu Pahat (Kelsall); Gunong Pantai (Kunstler). Pahang, Pulau Tawar; Tahan Woods. Selangor, Petaling; Semangkok Pass (Ridley). Kelantan, Sungai Ketch (Foxworthy).

(30) *C. conirostris* Becc. in Hook. fil. *F.B.I.* vi. 461; *Ridl. Mat.* ii. 205; *Ann. Bot. Gard. Calc.* xi. 480, pl. 220.

Stem 10 to 20 ft. tall, 1 to 1.25 in. through. Leaf 6 to 8 ft. long; sheaths with very long spines at mouth, 4 in. long; leaflets narrow ensiform, plain green, 9 in. long, .5 in. wide, bristly. Spadix very stout, over 2 ft. long. Branches solitary, remote, very stout, 4 in. long. Spathes with thorns in short transverse series, limb hardly any. Fruit 1.25 in. long, narrow ovoid, beak stout, black. *Hab.* Rare in forests. Selangor, Weld's Hill (Ridley). Perak, Goping (Kunstler).

(31) *C. cæsius* Bl. *Rumphia*, iii. 57; *Ridl. Mat.* ii. 205.

Stems medium, slender, glaucescent. Leaves about 6 ft. long; leaflets in distant alternate pairs, lanceolate, narrowed at both ends, pale green above, white beneath, 3- to 6-nerved, 6 to 8 in. long, 1 to 1.25 in. wide. Male spadix 2 ft. long; spathes grey thorny, branches decurved, 3 in. long. Spikes about 15, distant, .5 in. long; flowers distichous, close, about 11. Corolla .1 in. long. Female spadix 6 ft. long, lower spathes 8 in. long, thorny. Spathels and spathellules infundibuliform unarmed, mouths ciliate. Fruit oblong beaked, 5 in. long; scales small, yellow, edge darker. *Hab.* Open country. Muar (Pears). Johor, Batu Pahat (Machado). Negri Sembilan, Kwala Pilah (Moorhouse). *Distrib.* Borneo, Sumatra. *Native name:* Rotan Segar perak. The most highly valued rattan, often cultivated by Malays and Dyaks, and possibly all the above localities are where it has been introduced.

(32) *C. distichus* Ridl. *Mat.* ii. 206; *Becc. Ann. Bot. Gard. Calc.* xi. *Append.* 96, pl. 54.

Stem .5 in. thick. Leaves over 1 ft. long; sheaths armed with flat spines, .5 in. long; petioles 1 to 1.5 in. long with short strong spines on edge; leaflets 20 in alternate pairs of four, lanceolate acuminate, 6 in. long, 1.5 in. wide, flagellum 8 in. long. Spadix 2 ft. long; peduncle with horizontal spines .5 in. long; sheaths hardly armed. Male spikes distant, 1.5 in. long. Flowers close distichous, rather large. Females longer. *Hab.* Mountains, rare at 4000 ft. altitude. Selangor, Hulu Semangkok (Ridley).

(33) **C. palustris** Griff. *Calc. Journ. Nat. Hist.* v. 62; *Palms of Brit. Ind.* 71, t. 199.

Stem 30 to 80 ft. long, 2 to 3 in. through. Leaves 8 to 12 in. long; sheaths with a few flat spines or nearly unarmed; petioles gibbous at base; leaflets in alternate pairs, lanceolate, 1 to 2 ft. long, 3 to 5 in. wide, tip bristly. Male spadix long, branched; branches 6 in. long or less. Spathes tubular with short and few hooks. Flowers distichous. Fruit ellipsoid oblong, .5 in. long, scales trapezoid, pale brown, edge blackish brown. *Hab.* Open country. Negri Sembilan, Bukit Sulu (Cantley). Perak (Scortechini). *Distrib.* Tenasserim, Andamans. *Native names:* Rotan Segar Badak; Rotan Kumbang. *Use:* For tying beams in houses.

(34) **C. brevispadix** Ridl. *Mat.* ii. 207. *C. bubuensis* Becc. *Ann. Bot. Gard. Calc.* xi. 417, pl. 183.

Stem .5 in. through. Leaves long; sheaths densely spiny, spines flat, 1 in. long, grey; petioles over 1 ft. long, spiny on edge; leaflets in distant groups of 4 to 6 and 6 in. apart, elongate lanceolate, 11 in. long, .75 in. wide, 5-nerved. Male spadix slender. Female 2 ft. long or less, erect, branches 3 or 4; peduncle slender, 8 in. long, thorns in tufts on edge. Spathes unarmed papery, lowest 3 in. long, spikes few, 2 in. long. Fruit elliptic beaked, .25 in. long, blackish brown, scales 6 rows as broad as long, tips lacerate. *Hab.* Mountains rare, Johor, Gunong Belumut (Holtum). Semangkok Pass at 4000 ft. altitude. Perak, Gunong Bubu at 5000 ft. altitude (Wray).

(35) **C. elegans** Ridl. *Mat.* ii. 207; *Journ. F.M.S. Mus.* iv. 87.

Stem .25 in. through, thickly covered with flat spines .25 in. long. Leaves 4 ft. long, spines of sheaths short terete, bases broad, pale; petioles 15 in. long; leaflets in distant fascicles of 5 or 6, about 4 to 6 in. apart, narrow lanceolate-linear acuminate, 8 in. long, .5 in. wide; flagellum 18 in. long. Male spadix very slender, filiform, 3 ft. long, branches 3, 8 to 9 in. long, lowest sheath 2 in. long, with a few thorns, spikes 20, .5 to 1 in. long. Female spadix 3 ft. long, branches two, 5 to 6 in. long, spikes 6, each 1 to 1.5 in. long; flowers 20 on each. Fruit cylindrical-oblong beaked, .25 in. long, yellow, edged brown. *Hab.* Mountain forests, Pahang, Telom; Gunong Tahan (Haniff). Perak, Bujong Malacca (Ridley).

(36) **C. viridispinus** Becc. in *Hook. fil. F.B.I.* vi 458; *Ann. Bot. Gard. Calc.* xi. 418, pl. 184.

Stem 20 to 25 ft. long, not thick. Leaf-sheaths armed with flat green spines passing into bristles above. Leaflets in distant fascicles lanceolate-linear, 10 in. long, 1 in. wide; rachis stout, 2.5 ft. long. Male spadix over 4 ft. long, slender, quite unarmed except at extreme base, branches few, long, flattened, spikes curved, 2 in. long. Spathes, lower one 1 ft. long, limb lanceolate blunt, 1 in. long. Flowers not distichous. Female spadix very long. Fruit small ellipsoid, beaked, .5 in. long, scales broader than long,

light brown, edge darker. *Hab.* Mountain forests, Selangor, Menuang Gasing (Kloss). Perak, Thaiping Hills (all collectors).

(37) **C. neglectus** *Becc. in Hook. fil. F.B.I. vi. 458; Ann. Bot. Gard. Calc. xi. 416, pl. 182; Suppl. 100, pl. 56.*

Leaf flagellate; leaflets linear-lanceolate, 6 in. long, .5 in. wide, close set (only the top of leaf seen). Spadix female, 1 ft. long, stout. Spathes with short strong claws with swollen bases 4 in a line on the back of the short limb; spathelets with few claws and very short ones in upper part, branches rather stout, lowest 6 in. long. Spikes in young fruit 3 in. long, rather thick. Fruits distichous distant ovoid-elliptic mucronate, .6 in. long, straw-colour, red brown. Seed deeply pitted and tubercled. *Hab.* Malacca (Griffith). Selangor, Kwala Lumpur.

This plant is apparently rare or perhaps overlooked and is but little known.

(38) **C. Oxleyanus** *Teysm. Binn. Cat. Pl. Hort. Bogor. 1906, p. 75; Ridl. Mat. ii. 208. Rotan Pajare Griff. Palms of Brit. Ind. 98. C. Fernandezi Wendl. in Kerchove Les Palmiers, 236; C. diffusus Becc. in Hook. fil. F.B.I. vi. 447; Ridl. Mat. ii. 209.*

Stems about 20 ft. long, .5 in. through; sheaths dark green with close-set thorns scattered and in bands 2 in. long and less, dark green, base yellow. Leaves 4 to 5 ft. long; petioles 6 in. long covered with flat spines; leaflets in fascicles of 5 to 8 pairs distant, 8 to 12 in. long, .5 in. wide; flagellum 3 ft. long. Male spadix stout, 2 ft. long, branches 6 to 7 in. long with many rather stout spikes 2 in. long. Spathes tubular, lowest 3 in. long, limb lanceolate acuminate, 1 in. long. Flowers distant. Female spadix much larger, 3 ft. long, and stouter. Fruit globose, .5 in. long, yellow with brown margin. *Hab.* Lowland forests. Singapore, Bukit Timah; Toas. Johor, Gunong Pulai; Batu Pahat. Malacca (Griffith).

(39) **C. longispatha** *Ridl. Mat. ii. 209; Becc. Ann. Bot. Gard. Calc. xi; Appendix, 134.*

A large stout rattan. Leaves very large; petioles .5 in. through, four-angled, edge with short thorns, back with hooks; leaflets remote ensiform acute, 26 in. long, .75 in. wide, tip only bristly. Spadix female very stout, 8 ft. long; peduncle thorny, woody, thick. Spikes 2 in. long, thick. Spathes large, the lowest 18 in. long covered with short black-tipped hooks. Fruit fusiform, .5 in. long, scales yellow, edges dark. *Hab.* Mountain forests. Selangor, 15th mile on the Semangkok Pass road (Ridley).

I think it better to exclude the Perak plants I added formerly to this species until I can examine them again.

(40) **C. pallidus** *Becc. in Hook. fil. F.B.I. vi. 457; Ann. Bot. Gard. Calc. xi. 447, pl. 200.*

Stem stout, green, .5 in. through; sheaths with irregular short thick thorns in short rows. Leaves sub-sessile, drying light green;

leaflets alternate not fascicled, distant, ensiform acuminate to lanceolate-linear with a swelling at the base, 6.5 in. long, .5 in. wide; rachis stout, angled. Spadix large, branches over 1 ft. long, spikes numerous, 3 in. long in fruit. Spathes lowest strongly hooked, upper ones with a few hooks near the mouth. Fruit spherical, beak short, thick, .75 in. through, scales as broad as long. *Hab.* Forests, not common. Singapore, Jalan Bray (Ridley). Perak, Thaiping (Wray).

(41) **C. laxissimus** *Ridl. Mat. ii. 210.*

Leaf-rachis slender; leaflets ensiform in distant pairs, over 1 ft. long, .75 in. wide. Male spadix very long and slender, several feet long. Peduncle 1 ft. long with short needle-like thorns on the edge, branches 3 to 4 in. long. Spathes long tubular with a thin lanceolate limb, the mouth with slender erect processes 1 in. long, all unarmed or nearly so. Female spadix 6 ft. long or more, rather stouter, branches 6 in. long. Spikes 1- to 8-flowered. *Hab.* Mountain forest, overhanging the river. Rare. Pahang, Tahan River (Ridley).

(42) **C. aquatilis** *Ridl. Journ. Roy. As. Soc. S. Br. 41, p. 43; Mat. ii. 210.*

Stem stout, about 30 ft. long. Leaf-sheaths densely covered with black bristle-like spines. Leaves large; petioles 1 ft. long, edges spiny, spines 2 in. long or less, black, slender; leaflets linear equidistant, 1 ft. long, 1 in. wide or more; flagellum 5 ft. long. Spadix very large and stout, .5 ft. through at base; branches numerous, 2 ft. long or less, branchlets 6 in. long with brown distichous spikes .25 in. long, about 30 on a branchlet; flowers close-set distichous. Spathes armed with hooks, solitary and in threes, limb .5 in. long. Female spadix with branchlets 2 to 3 in. long, unarmed. Fruit small, globular, beaked, .5 in. long, yellow or brownish yellow, scales as broad as long. Seed albumen equable. *Hab.* In tidal thickets, common in the south. Singapore, Serangoon road; Changi. Johor, Panchur; Batu Pahat. Pahang, Kwala Pahang (Ridley).

(43) **C. dumetorum** *Ridl. Mat. ii. 211.*

Stem stout, moderately thick. Leaves large; sheaths with strong flat spines, 1.5 in. long; petioles thick, over 1 ft. long; leaflets single or in pairs, distant elliptic-lanceolate, 6 in. long, 2 in. wide, narrowed both ends, pale beneath. Spadix large, 18 in. long or more, branches pendulous, 4 in. long. Spikes 1 in. long with close-set distichous flowers. Lower spathes flattened, edge thorny at the top; spathels scurfy, pubescent. *Hab.* Thickets in open country; rare. Perak, Lahat near Ipoh (Ridley).

(44) **C. castaneus** *Griff. Calc. Journ. Nat. Hist. v. 28; Palms of Brit. Ind. 37, t. 185; Ridl. Mat. ii. 211.*

A bushy, not climbing, palm. Leaves very long; petioles with broad flat greenish spines in short transverse rows of over 1 in.

long, the others short; leaflets linear, 15 in. long, 1 in. wide, greyish beneath, bristly. Spadices male over 2 ft. long, flexuous, with several branches over 1 ft. long. Spikes 3 or 4 together, curved, with numerous short flowers distichous in short and broad spatheules. Female spadices rather shorter and stouter; flowers large. Fruit .75 to 1 in. long, oblong ellipsoid beaked, dark brown, scales numerous, few rows or fewer and larger. *Hab.* Common in forests, Johor, Serom. Malacca, Nyalas; Selandor; Ayer Panas. Pahang, Tahan river; Kwala Lipis (Machado). Selangor, Kwala Lumpur. Negri Sembilan, Tampin (Burkill). Perak, Bujong Malacca; Tapah; Goping (Kunstler). Sungkai. Dindings, Lumut (Curtis). Kelantan, Chaning. *Native name:* Rotan Atap Chuchur. *Use:* The leaves are used for thatching.

(45) *C. Griffithianus* Mart. in Hook. fil. F.B.I. vi. 440.

More robust than *C. castaneus*, with stems up to 4 ft. tall. Fruit sub-globose rather larger with fewer and larger scales. Usually grows with *C. castaneus* and is probably a larger state or form, less common.

(46) *C. arborescens* Griff. Calc. Journ. Nat. Hist. v. 33; *Palms of Brit. Ind.* 42, t. 188, A, B, C.

A tufted erect palm with smooth green stems about 3 in. through, 15 to 20 ft. tall. Leaves 5 to 6 ft. long; leaflets 8 to 18 in. long, 1 to 1.25 in. wide, linear-lanceolate, white beneath, edges bristly; petioles armed with flat spines. Spadix male very long; spikes 4 to 6 in. long, .75 in. across; flowers nearly .5 in. long. Spathes with many half whorls of black spines. Female spadix 18 in. long with 10 branches 7 in. long. Fruit cylindrical-oblong, beaked, scales few rows, ovate rhomboid, brown with white lacerate edge. Seed oblong flattened ruminant. *Hab.* Wet, muddy spots in the north. Lankawi Gunong Raya (Haniff). Perlis, Telor Jambu. Setul, Bukit Rajah Wang. *Distrib.* Pegu.

## 26. PLECTOCOMIOPSIS, Becc.

Very large rattans with the habit of *Plectocomia*. Leaves pinnate; leaflets usually broad, flagelliferous. Inflorescence of numerous pendulous panicles, of slender branches, unisexual on each plant, sub-terminal. Spathes and spatheules tubular, spatheules ovate acute, shorter than the flower. Male flowers in short scorpioid spikes with 2 rows of flowers, distichous. Calyx cup-shaped, shortly 3-lobed. Corolla 3-lobed nearly or quite twice as long. Stamens 6, filaments stout, connate at base. Female spadix stouter, branches shorter. Flowers fewer in the spike and much larger. Species 6 or 7, Tenasserim, Borneo, Sumatra.

Scales of fruit regular small, brown.

Stems covered with short conic thorns.

Petioles of upper leaves short; male flowers

globose-ovoid . . . . . (1) *P. geminiflorus*

Petioles of upper leaves long; male flowers narrow clavate . . . . .	(2) <b>P. Wrayi</b>
Petioles of upper leaves long; male flowers ovate acute . . . . .	(3) <b>P. dubius</b>
Stems with long flat spines in semi-circles.	
Leaflets broad, lanceolate, in threes, 3 in. wide .	(4) <b>P. annulatus</b>
Leaflets linear-lanceolate, 1 in. wide, edges thorny	(5) <b>P. ferox</b>
Scales quite irregular minute, fruit green . . . . .	(6) <b>P. Scortechinii</b>

(1) **P. geminiflorus** *Becc. in Hook. fil. F.B.I. vi. 479; Ann. Bot. Gard. Calc. xii. 48; pls. 30, 31. Calamus geminiflorus Griff. Palms of Brit. Ind. 70, t. 199A. Calamus turbinatus Ridl. Mat. ii. 212.*

Gigantic rattan 60 ft. long or more, 2 in. through. Leaf-sheaths pale (when dry), sprinkled all over with short conic acute spines; petioles 1 in. thick in lower leaves; leaflets numerous, equidistant, lanceolate acuminate, 1 ft. long, 1.5 in. wide, with a yellow pulvinus at base, terminal ones reduced to sheaths with very narrow leaflets; flagellum 6 in. long or more. Male spadix nearly 2 ft. long with very numerous flexuous branches, 8 in. long or more. Spathels tubular infundibuliform, mouth truncate and ciliate. Spikes recurved zigzag, 1 in. long; flowers secund of 5 to 7 flowers in two rows. Flowers globose-ovoid. Calyx broadly 3-toothed. Petals ovate-elliptic acute. Stamens 6. Female panicle large spreading. Flowers broadly ovoid, blunt trigonous, 2 to 4 together in a spikelet. Fruit obturbinate, base narrowed, cinnamon brown, scales subtriangular, acute, edges lacerate, 1 in. through. *Hab.* Forests. Malacca (Griffith). Negri Sembilan, Kwala Pilah (Ridley). Perak, Gunong Tambak Batak (Scortechini). *Distrib.* Sumatra, Tenasserim. *Native names:* Rotan Relang; Rotan Rahilang.

(2) **P. Wrayi** *Becc. in Hook. fil. F.B.I. vi. 180.*

Rattan 30 to 80 ft. long, .5 in. through. Leaves 6 to 10 ft. long, sheaths very sparsely prickly with short sharp conical spines, mouth horizontally truncate, no ligule; petioles flattened above with distant short acute conic thorns on edge and base, about 7 in. long; leaflets equidistant, very narrowly lanceolate, narrowing to both ends, 9 in. long, .4 in. wide; Male spadix a large terminal panicle over 1 ft. long; peduncle 6 in. long; spathels .25 in. long, tubular infundibuliform, mouth horizontally truncate; spikelets scorpioid, .1 in. long, with 7 or 8 flowers in each row; flowers terete blunt apiculate, very small in pubescent spathellules. Calyx urceolate campanulate, shortly broadly 3-toothed. Corolla twice as long, solid below with 3 semi-oval acute lobes. Female spadix smaller than male with fewer stouter branches, 5 to 7 in. long. Spikelets reduced to 1 pair of flowers to each spathellule, 8 to 10 spikelets on a branch. Flowers narrow ovoid-elliptic, conical above. Calyx thick, cupular-campanulate, broadly 3-lobed. Corolla nearly twice as long, woody, tubular, ventricose. Fruit globular turbinate, shortly conic-

beaked, scales cinnamon brown in about 24 vertical rows; perianth not accrescent, becoming woody. *Hab.* Wet low ground in forest, Perak, Sungai Larut (Wray, Kunstler). *Native name:* Rotan Tiga Sagi.

(3) *P. dubius* Becc. *Ann. Bot. Gard. Calc.* xii. 56, pl. 37.

Stem over 1 in. through. Leaf-sheaths armed with short conic thorns with enlarged bases, solitary or in threes; petioles with stouter thorns broad-based, .15 in. long; leaflets lanceolate acuminate with a long point gradually narrowed to base, 1 ft. long, 1 in. wide. Flagellum from inflorescence. Basal spathe 18 in. long, slender unarmed at base, with sheaths 2 to 3 in. long and a very narrow linear setaceous limb 3 in. long. Spadix large of several panicles, unarmed; panicles over 1 ft. long; peduncles stout, 6 in. long or more; spathes tubular, 1 in. long, branches pendulous, 1 ft. long. Spathels infundibuliform hairy with a long point. Spikes scorpioid, .2 in. long, distichous; spathellules very short with a broad ovate acute limb slightly hairy. Flowers ovate acute (not open). Calyx 3-toothed. Corolla deeply 3-lobed. *Hab.* Forests. Selangor, Rantau Panjang (Ridley).

I took this plant for a form of *P. Wrayi*, and Beccari seemed to be doubtful if it was not. The leaflets are wider, the spikes longer and it seems to be much more thorny on the sheaths.

(4) *P. annulatus* Ridl. *Mat.* ii. 213. *Myrialepis Scortechinii* (Male) Becc. *Ann. Bot. Gard. Calc.* xii. 140.

Plant with the habit of *Plectocomia Griffithii*; stem 60 to 80 ft. tall, 2 in. through. Leaf-sheaths armed with flat yellow spines 1.5 in. long, in half rings of 12 or fewer. Whole leaf 10 to 15 ft. long; petioles 3 ft. long, spines in threes; leaflets in alternate threes, broadly lanceolate acuminate at both ends, dark green on both sides, 1 ft. long, 3 in. wide. Flagellum 2 to 6 ft. long, stout. Male spadix 3 ft. long, pendulous, branches over 1 ft. long, spathes tubular with a lanceolate point 2 in. long. Spathel 1 in. long, branchlets 3 in. long. Spikes about 20 on a branch, .25 in. long, with 16 flowers; bracts ovate-lanceolate; bracteole bilobed, lobes acute; flowers not seen. Female spadix stout, branches 8 in. long, spikes .5 in. long; flowers 5 or 6, .1 in. long. Calyx campanulate, deeply 3-lobed, lobes ovate. Corolla lobes little longer, ovate. Fruit subglobose, .5 in. through, brown; scales minute lanceolate acuminate, points free. *Hab.* Jungle in the south. Singapore, Botanic Gardens; Bukit Timah; Bukit Mandai (Ridley).

Owing to an accidental transference of a label in the Kew Herbarium Beccari mistook a male specimen for the male inflorescence of his *Myrialepis Scortechinii* and reduced my *P. annulatus* to this species, describing and figuring the male flowers as those of *Myrialepis*.

(5) *P. ferox* Ridl.

Leaf-sheaths armed with strong, flat, triangular long-pointed, yellow brown spines, .75 in. long, .2 in. wide at base, in lines of

2 or 3; petioles stout, .5 in. through; rachis .5 in. through, armed with distant lines of 3 flat spines 1.25 to 1.75 in. long on an elevated ridge on the back; leaflets linear acuminate, 15 in. long, .6 in. wide, pinched in at base, edges spinulose. Male panicle 9 in. long. Basal spathe broadly lanceolate papery, 4 in. long, 1 in. wide, upper ones smaller. Spadix of about 12 branches subdistichous, the lowest 5 in. long. Spikes numerous, crowded, distichous, .3 in. long. Spathels ovate boat-shaped acute, .25 in. long, scurfy. Spathellules cup-shaped, in 2 rows of 6 on a spike. Calyx stiff, tubular and cut halfway into 3 ovate lobes. Corolla lobes lanceolate stiff, about twice as long, .8 in. long. *Hab.* Lankawi, Telok Apan (Haniff).

(6) **P. Scortechinii** Ridl. *Mat.* ii. 213. *Myrialepis Scortechinii* Bcc. in *Hook. fil. F.B.I.* vi. 480; *Ann. Bot. Gard. Calc.* xii. 2, 65, pl. 41.

Stout rattan 60 to 70 ft. long, 1 in. through. Leaves 8 ft. long; sheaths armed with spines in circles and half circles 1.5 in. long, yellow, tipped red; petioles short; leaflets in threes, linear acuminate, 7 in. long, .5 in. wide. Flagellum 2 ft. long. Spadix about 2 ft. long, branches recurved, stout, distichous, distant. Spathes tubular striate, 1 to 2 in. long, limb short. Spikes .5 in. long. Calyx cup-shaped, lobed halfway. Petals larger. Stamens 6, connate, in a tube round the pistil. Fruit globular, green, 1 in. through; scales minute acuminate. *Hab.* Damp spots forming low thickets. Singapore, Bukit Mandai Road (Ridley). Perak (*Scortechinii*). *Native names*: Rotan Rajah; Rotan Kirtong.

Beccari's plate 40 in *Ann. Bot. Gard. Calc.*, contains a male spadix of *Plectocomiopsis annulatus* Ridl., and portion of stem of *P. Scortechinii* Ridl.

## 27. KORTHALSIA, Bl.

Climbing palms. Leaves pinnate, usually rhomboid, ligule often dilated, large amplexicaul (ochrea) frequently containing ants' nests. Spadix subterminal of several branches with tubular spathes and pendulous cylindrical spikes covered with short truncate round bracts, woolly inside. Flowers bisexual. Calyx saucer-shaped or cupular, 3-lobed. Corolla tube short, lobes oblong. Stamens filaments adnate to corolla, short. Ovary conic, scaly; style 1. Species 20, Burma, Andamans to Malaya.

Ochrea inflated.

Ochrea long ciliptic, spiny; leaves linear lanceolate . . . . . (1) **K. echinometra**

Ochrea cymbiform, thorny.

Leaves rhomboid . . . . . (2) **K. scaphigera**

Leaves linear-lanceolate . . . . . (3) **K. Scortechinii**

Ochrea cylindrical thorny; leaves rhomboid . . . . . (4) **K. Machadonis**

Ochrea not inflated, tight-fitting.

Stems gigantic; leaves obtusate rhomboid.

Ochrea short; petioles calloused at base . . . . . (5) **K. wallichiæfolia**

Ochrea 5 in. long; petioles not calloused . . . . . (6) **K. grandis**

Stems more slender; bracts shorter than calyx; leaves glaucous on back.

Sheaths thorny; leaflets broad obtusate . . . . . (7) **K. ferox**



- Sheaths unarmed; leaflets narrow obtuse.
- Flowers .25 in. long; spadix few, branched;  
stem .2 in. through . . . . . (8) **K. tenuissima**
- Flowers .1 in. long; spadix many, branched;  
stem .4 in. through . . . . . (9) **K. polystachya**
- Stems moderately stout; leaves red tomentose  
on back.
- Leaflets narrow elongate, 3 in. long, oblanceolate . . . . . (10) **K. flagellaris**
- Leaflets linear-oblong, 12 to 18 in. long . . . . . (11) **K. rubiginosa**

(1) **K. echinometra** *Becc. Males. ii. 66. t. 7; Ridl. Mat. ii. 215.*

Stem 50 to 100 ft. long, .5 in. through. Leaves 8 to 10 ft. long. Ochrea inflated, oblong, 4 in. long, armed with black needle-like spines 3 in. long; leaflets 26, linear-lanceolate acuminate, 1 ft. long, 1 in. wide, backs white. Spadix large, branches 6 in. long. Spikes 4 to 6 in. long, .25 in. thick. Fruit oblong, brown, .5 in. long. Scales rhomboid lacerate. *Hab.* Damp places in forests, rarely flowering. Singapore, Bukit Timah; Chan Chu Kang, Negri Sembilan, Seremban (Moorhouse); Bukit Kandang (Cantley). Perak, Taiping Hills to 3200 ft. altitude. *Distrib.* Borneo. *Native name:* Rotan Hudang.

(2) **K. scaphigera** *Mart. Hist. Nat. Palm. iii. 211; Ridl. Mat. ii. 216; Becc. Males. ii. 67, t. 5. Calamosagus scaphigera Griff. Palms of Brit. Ind. 30, t. 184A.*

Stems 30 to 60 ft. long, .5 in. through or less. Ochrea swollen, elliptic, 1.5 to 3 in. long. Leaves 3 ft. long; flagellum very slender; leaflets 12, obtuse, whitish beneath, 6 to 7 in. long, 2 in. wide. Spadix 1 ft. long; branches few, about 3; spikes 8 in. long, .25 in. through. Flowers orange. Fruit oblong, .5 in. long, beaked, yellow, scales as broad as long. *Hab.* Common in forests. Singapore, Garden Jungle; Bukit Timah. Johor, Ulu Kahang (Holtum). Malacca (Griffith); Sungei Hudang. Sungei Ujong (Cantley); Perak, Asam Kumbang (Wray); Taiping Hills (Kunstler). *Native name:* Rotan Semut.

Ants live in the swollen ochrea.

(3) **K. Scortechinii** *Becc. in Hook. fil. F.B.I. vi. 475.*

Ochrea elongate, inflated, armed with short scattered spines, with sheath 6 to 8 in. long; leaflets linear or oblanceolate cuneate, 14 to 16 in. by 1.5 to 2 in., white beneath, acute, toothed. *Hab.* Perak (Scortechini).

This plant is probably a form of *K. scaphigera*. I have not seen it.

(4) **K. Machadonis** *Ridl. Mat. ii. 216.*

Stem slender, ochrea cylindric, 1.5 in. long, thorny; petioles 1 ft. long, very thorny, thorns short; leaflets remote, 12, obtuse rhomboid, bidentate, with a long point 6 in. long, 3 in. wide. *Hab.* Perak, Kamuning (Machado).

I have only seen a young plant but it seems very distinct from *K. scaphigera*.

(5) **K. wallichiaefolia** Wendl. in Kerchoff. *Palm.* 248; Becc. in Hook. *fl. F.B.I.* vi. 475; Ridl. *Mat.* ii. 217. *Calamosagus wallichiaefolius* (harinaefolius in text) Griff. *Palms of Brit. Ind.* 29, t. 184.

Stem 100 ft. long or more, 1.5 in. through; ochrea short, tight-fitting, 1 in. long, ending in a network of brown fibres; sheath glaucous and strongly thorny on back; petioles strongly thorny with a blackish green semi-circular callus at the base; leaflets obovate cuneate, blunt, toothed, glaucous, white beneath, 8 in. long, 5 in. wide, about 14. Spadix very large, spikes over 6 in. long. *Hab.* Very common in the south, in forests, very rarely flowering. Singapore, Bukit Timah. Johor, Kwala Sembrong (Kelsall). Malacca, Kussan (probably Kesang) (Griffith).

(6) **K. grandis** Ridl. *Mat.* ii. 217.

Stem 50 ft. long, 1.5 in. through. Leaves 10 ft. long; sheaths unarmed except a few conic thorns on back; ochrea oblong, 5 in. long, tip round; petioles 1 ft. long, not gibbous or calloused at base; leaflets distant, broad obtuse, white beneath, 10 in. long, 5 in. wide, toothed with an acuminate median tooth; petioles flat, orange. Spadix 4 to 5 ft. long, branches 2 ft. long, spikes 4 to 8 in. long, .5 in. through. *Hab.* Forests. Singapore, Selitar; Bukit Mandai (Ridley).

(7) **K. ferox** Becc. *Males.* ii. 73; Ridl. *Mat.* ii. 217. *var.* Malayana Hook. *fl. F.B.I.* vi. 476.

Stem 20 to 30 ft. long, .5 in. through. Leaves 1.5 to 2 ft. long; sheath sparsely short-thorny; ochrea .5 in. long, not swollen; rachis and flagellum with short conic stout thorns; leaflets trapezoid, pale beneath, obtuse, irregularly blunt-toothed; petioles (lower ones) .5 in. long. Spadix 1 ft. long. Spikes 4, about 4 in. long. Spathes dilate upwards; bracts much shorter than calyx, woolly. *Hab.* Mountain forests to 5500 ft. altitude. Perak, Thaiping Hills (Kunstler, Scortechini). Penang Hill. *Distrib.* Borneo.

(8) **K. tenuissima** Becc. *Males.* ii. 275; Ridl. *Mat.* ii. 218.

Stems 100 ft. long, or less, very smooth, .1 in. through. Sheaths smooth; ochrea short, thin, .12 in. long. Leaves 9 in. long with about 6 narrow obtuse-oblong leaflets with a long central point, 4 in. long, 1.25 in. wide; petiolules .1 in. long. Spikes few, 1.5 in. long. Bracts much shorter than calyx, less woolly than most. Corolla .25 in. long. *Hab.* Perak, Larut, low ground (Kunstler).

(9) **K. polystachya** Mart. *Hist. Nat. Palm.* iii. 210, t. 172, fig. 1; Ridl. *Mat.* ii. 218. *Calamosagus polystachyus* Griff. and C. ochriger Griff. *Palms of Brit. Ind.* p. 31, t. 216.

Stems long, .5 in. through. Sheaths smooth, white scurfy; ochrea tight-fitting, papery, .5 in. long; petioles 2 to 3 in. long, a few thorns on back; leaflets obtuse, 7 in. long, 4.5 in. wide or less; petiolules 1 in. long, red scurfy. Spadix about 2 ft. long; branches 4 or 5. Spikes numerous, 4 to 5 in. long. Bracts very short, sparsely woolly, as long as calyx. Fruit oblong, .4 in. long,

scales longer than broad. *Hab.* Rather common in forests and more often flowering than most species. Singapore, Bukit Timah. Johor, Batu Pahat. Malacca (Griffith). Pahang, Raub (Burn-Murdoch).

(10) *K. flagellaris* *Miq. Journ. Bot. Neerl. Fl. Ind. Bat. Suppl.* 255, 591; *Ridl. Mat.* ii. 219.

Leaves 1 ft. long; sheaths very spiny; petioles 5 in. long, stout; ochrea not seen or described; leaflets obtuse, 3 in. long, 1 in. wide, red tomentose beneath; petiole thin, flat. Spadix large, stout, branches over 1 ft. long. Spikes 3 to 4 in. long, 18 in. through, sessile, densely red woolly; bracts shorter than wool. Fruit yellow; scales fimbriate. *Hab.* Not common. Perak, Asam Kumbang (Wray). *Distrib.* Sumatra.

(11) *K. rubiginosa* *Becc. Males.* ii, 72; *Ridl. Mat.* ii. 219.

Stems 60 ft. long or more, 1.5 in. through. Leaves long; sheath thorny with short thick conic thorns lacerate into red-brown fibres; ochrea 4 in. long, lanceolate-oblong; petioles over 1 ft. long, thorny; leaflets linear-oblong, base cuneate, 12 to 18 in. long, 1.5 to 2 in. wide, plicate, red-scurfy behind; petiolules .5 in. long. Spadix 1 ft. long or more. Spikes 3 in. long, 13 in. through. *Hab.* Johor, Mount Austin and Batu Pahat and common in the swampy woods along the railway from Johor to Perak, very rarely flowering. *Distrib.* Borneo. 13, 94

## 28. PLECTOCOMIA, Mart.

Gigantic climbing unisexual rattans, stems thickening upwards. Leaves very large, flagelliferous, with broad leaflets. Inflorescence very large, of long pendulous spikes covered with broad imbricating brown bracts, sub-terminal. Male spikes short, many-flowered. Calyx cupular. Petals free nearly to base. Stamens 6 to 12. Female flowers large and fewer. Fruit globose 1- to 3-seeded, covered with brown triangular scales with a free recurved point. Species 5 or 6, Assam, Malaya.

(1) *P. Griffithii* *Becc. in Hook. fil. F.B.I.* vi. 478; *Ridl. Mat.* ii. 220. *P. elongata* *Griff. Palms of Brit. Ind.* 104, t. 217A, B, C (not of *Blume*).

Stems 100 ft. long or more, 3 in. through above. Leaves 10 ft. long; sheaths with strong red spines 3 in. long in rows on back, margins and mouth; leaflets elliptic acuminate, glaucous beneath, 1 ft. long, 3 in. wide, in distant clusters of 2 or 3. Spikes 6 ft. long. Bracts nearly 2 in. long, ovate angled truncate, edges pubescent, deep brown. Spikelets in male 1 in. long; flowers .24 in. long, 3 to 6. Female bracts small; flowers .4 in. long, 4 together. Fruit as large as a twelve-bore bullet, scales with edges lacinate. *Hab.* Forests. Common all over the peninsula from Singapore to Penang. In the hills it ascends to about 4000 ft. altitude, but is generally dwarfed there. *Native name:* Rotan Dahan. *Use.* For legs of long chairs and mining baskets.

## 29. BORASSUS, Linn.

Stem solitary, stout, unarmed. Leaves very stiff, fan-shaped, multifid; petiole spiny or not. Spadices very large, simply branched; peduncle sheathed with open spathes. Male with many cylindrical stout branches covered with imbricating bracts enclosing spikelets of minute flowers. Sepals 3. Petals shorter obovate spatulate truncate. Stamens 6. Female spadix few-branched; flowers large, globose, scattered. Sepals reniform; petals smaller. Staminodes 6 to 9. Fruit large globose with 3 pyrenes.

Species of Africa, Madagascar, India, Malaya, and Papua.

(1) **B. Machadonis** *Ridl. Journ. Roy. As. Soc. Sr. Br.* 44, p. 23; *Mat.* ii. 221. *Borassodendron Machadonis* *Becc. Webbia*, iv. 359.

Stem tall and nearly as thick as a coconut palm. Petioles 12 to 15 ft. long, unarmed; leaf-blade 6 ft. long, 4 ft. wide, split nearly to base into linear-acuminate lobes. Male spikes 3, 14 in. long, 1.25 in. thick. Calyx .25 in. long, as long as bract. Corolla lobes 3, linear. Female spadix 1 ft. long; peduncle 3 in. long; flowers about 20. Bracts 2 semi-circular, 1 in. long, edge lacerate, orange. Pyrenes woody, hairy, 3 in. long, 1 in. through. *Hab.* Rare and local in forests. Perak, in dense forest at Kamuning, Sungei Siput (Machado). *Distrib.* Siam. *Native name:* Chang-kai.

*B. flabellifer* *Linn. Sp.* pl. 1187, the Lontar of Malacca or Palmyra palm is often found near Hindu temples and towns near the sea, introduced by Hindus. The native name is said to be from Lon, an old form of Pohou (tree) and Tah, a form of Tal, the Hindu name for the tree. *Beccari, l.c.* p. 321, separates this plant from *B. flabellifer* under the name of *B. sundaica*.

## 30. NIPA, Wurmbr.

Tidal river plant, stems creeping in mud, very thick. Leaves pinnate, very large; leaflets narrow. Inflorescence sub-terminal, on short peduncles covered with sheathing leaves. Male flowers in catkins with setaceous bracts. Sepals linear, tips broad inflexed; petals similar, smaller. Stamens 3, filaments short cuneate. Female flowers in a head. Carpels 3. Fruit an enormous head of obovoid compressed irregular carpels, tops pyramidal angled, 1-celled, 1-seeded. Albumen soft, lining the testa. Species 1. India, Ceylon, Malaya to Australia; fossil in the London Clay of England, one species being very closely allied to or identical with *N. fruticans*.

(1) **N. fruticans** *Wurmbr. Verh. Bat. Genootsch.* i. 349; *Bl. Rumphia*, iii. 76, pls. 164, 165; *Ridl. Mat.* ii. 158.

Creeping stem, branched, 3 ft. through, grey, ringed. Leaves 15 to 20 ft. tall, erect, glaucescent beneath. Inflorescence 2 to 3 ft. long. Bracts orange. Male spikes 2 in. long. Fruit about 2 ft. through, dark brown. *Hab.* Tidal rivers all along the Peninsula in mud. *Native name:* Nipah. *Uses:* The leaves form the best ataps for roofing, the leaflets of unexpanded leaves form cigarette-papers, sugar and alcohol are obtained from the flower-spikes,

a considerable number of liqueurs and other drinks were at one time made from the alcohol obtained from the sugar, and proposals have been made to use it for motor spirit; the albumen of the seed is eaten by children.

## ORDER CLVII. PANDANACEÆ.

Unisexual shrubs or trees or scandent shrubs (*Freycinetia*) with strong stilt or aerial roots, usually branched. Leaves in a spiral, linear or lorate, acuminate or tailed, spinulose on the edges or keel (very rarely unarmed), coriaceous. Spikes axillary or terminal, with leafy bracts. Flowers very numerous, small. Perianth none. Male flowers of numerous, free or connate stamens. Female flowers of a one-celled ovary with or without staminodes, free or connate in a head. Style spine-like, simple or branched. Stigma sessile, generally linear. Fruit a globose or cylindrical mass of woody or fleshy angular drupes of solitary or several connate ovaries. Seeds minute. Species 200, tropical Asia and Africa to Polynesia.

Stems erect; carpels one-ovuled . . . . . 1. PANDANUS  
Stems scandent; carpels many-ovuled . . . . . 2. FREYCINETIA

### 1. PANDANUS, Linn.

Unisexual trees or shrubs, erect, branched, with grey stems often rough, with suppressed roots, and with numerous stilt roots at the base. Male spikes pendulous with white bracts, fragrant. Female flowers in globose or oblong heads (*syncarp*), solitary or up to 6 on a raceme. Drupes several connate into one mass, or separate woody or somewhat fleshy, closely compressed in the syncarp, the free top conic or flat, often angled, the style spiny, simple, or with 2 to 4 acute points. Stigma linear on the upper (*Ryckia*) or lower style face.

In most species the male plants are very rare or quite unknown, although the females may be abundant; consequently ripe fruit is also rare. The earlier descriptions of species are often extremely poor, being derived mainly from herbarium scraps. These plants can only be adequately studied and described in the field.

Species about 150, Old World tropics. *Native name*: Pandan or Mengkuang.

§ 1. *Keura*. Drupes connate, 5 or 6 in one mass. Syncarp very globose, orange.

Sea-shore shrub; style very short, horseshoe-shaped . . . . .

Mountain shrub; style with 2 spreading points . . . . . (1) *P. fascicularis*

. . . . . (2) *P. Klossii*

§ 2. *Ryckia*. Drupes separate; stigmas forked on upper side of style.

Syncarp solitary, oblong, over 1 ft. long; tree . . . . . (3) *P. Houlettii*

Syncarp solitary, globose.

Leaves conspicuously 3-nerved.

Stem erect.

Leaves 1 to 3 ft. long, 2 to 3 in. wide;

style flattened with 2 points . . . . . (4) *P. bidens*

- Leaves 1 to 3 ft. long, 1 in. wide; style short with 3 or 4 points . . . (5) **P. tetradon**
- Leaves under 3 ft. long, .5 in. wide; styles 5-pointed . . . (6) **P. pentodon**
- Stem submersed; leaves very long erect . . . (7) **P. immersus**
- Leaves not nerved.
- Stem short erect; syncarp oblong . . . (8) **P. bicornis**
- Syncarps several on a peduncle.
- Stigma points 3 to 6 . . . (9) **P. stelliger**
- Stigma obtriangular, points 3 . . . (10) **P. stenophyllus**
- Style simple.
- Drupes 1- to 3-celled, free top, subcylindric . . . (11) **P. irregularis**
- Drupes convex, abruptly terminated by style.
- Style swollen at base; dwarf plant . . . (12) **P. Prainii**
- Style not swollen at base; tree over 20 ft. tall; syncarp cylindric . . . (13) **P. helicopus**
- Drupes with conic top passing into style.
- Leaves short, broad; syncarp oval . . . (14) **P. Scortechinii**
- Leaves long, very long-caudate; syncarp cylindric . . . (15) **P. muarensis**
- Leaves narrow linear; bush . . . (16) **P. militaris**
- § 3. *Acrostigma*. Stamens free. Stigmas on lower face of style.
- Leaves broad linear oblong 3-nerved abruptly tailed.
- Syncarps globose.
- Syncarp 1.5 in. long; shrub, 3 ft. tall . . . (17) **P. parvus**
- Syncarp 2 in. long; shrub, 10 to 12 ft. tall . . . (18) **P. glaucophyllus**
- Syncarp 2 in. oblong-globose; nerves invisible . . . (19) **P. unguiculatus**
- Leaves gradually tapering to tip.
- Syncarp globose, small.
- Erect shrub; leaves broad . . . (20) **P. globuliferus**
- Creeping tufted plant; leaves very narrow, .25 in. wide . . . (21) **P. ovatus**
- Bushy erect plant; leaves very narrow, .25 in. wide, rather thin . . . (22) **P. collinus**
- Syncarp globose, large; fruits very narrow . . . (23) **P. pilaris**
- Syncarp ovate-elliptic; drupes broad, top rounded; leaves glaucous beneath . . . (24) **P. monothecca**
- Syncarp oblong-cylindric; drupes very narrow; leaves glaucous beneath . . . (25) **P. Ridleyi**
- Syncarp cylindric solitary long pendent (sometimes 2 or 3) . . . (26) **P. ornatus**
- Syncarps several in a raceme.
- Syncarps 6, oblong-ovoid, brown, large; leaves 20 ft. long; tree . . . (27) **P. atrocarpus**
- Syncarps oblong, 4 or 5, green; leaves 6 ft. long; tree . . . (28) **P. penangensis**
- Syncarps 5, sub-globose, orange red; stems slender; bush . . . (29) **P. aurantiacus**
- Syncarps 3 or 4; drupes smaller . . . (30) **P. perakensis**
- (1) **P. fascicularis** Lam. *Encycl.* 373, t. 1; *Ridl. Mat.* ii. 223. *P. odoratissimus* Roxb. *Cor. Pl.* t. 22, fig. 12.

A big shrub 10 to 15 ft. tall, much-branched. Leaves linear caudate-acuminate, glaucous beneath, strongly thorny on edge and keel, 6 ft. long, 2 in. across. Male inflorescence 2 to 3 ft. long. Bracts white, tipped green, leaf-like, 3 ft. long. Spikes 3 or more,

white, 3 in. long. Stamens connate in tufts .5 in. long, anthers whorled. Syncarps globose, as big as a man's head, orange red, 6 to 8 in. through. Drupes of several carpels, connate, 2 in. long or more, obconic, top round. *Hab.* Common on sea coasts and planted for fences and for mat-making. Singapore, Jurong River, etc., Johor, Tanjong Bunga. Malacca. Pahang, Pekan. Perlis, Kanga, Lankawi. Kelantan, river mouth (Ridley). *Distrib.* Mauritius and tropical Asia. *Native names* : Pandan Duri; Pandan Todas. *Uses* : The leaves are used for making mats and ataps. The flowers are fragrant.

(2) *P. Klossii* *Ridl. Journ. F.M.S. Mus.* vi. 190.

Stems solitary, 8 to 20 ft. tall, 3 in. through. Leaves linear,

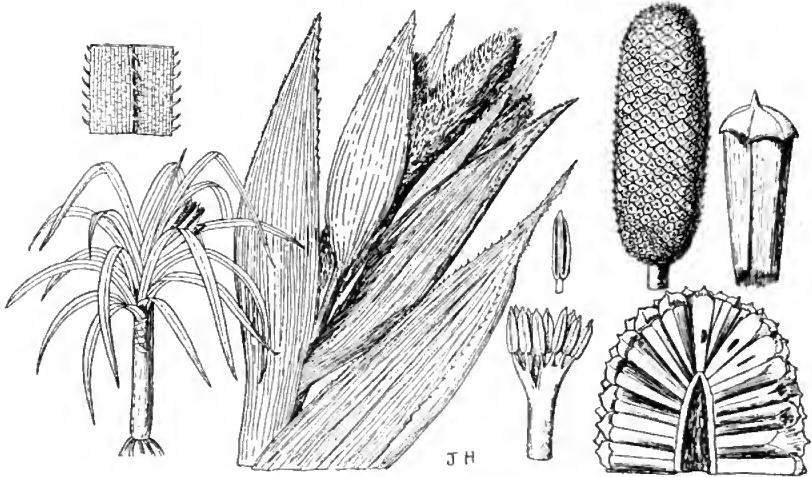


FIG. 214.—*Pandanus Houlletii*.

abruptly cuspidate, hard, coriaceous, 5 ft. long, 3 in. wide; thorns hooked, black, .25 in. long, on lower edge and keel, smaller upwards and very small on the 1 in. long cusp. Males unknown. Female, syncarp globose or oblong, solitary, as big as a man's head. Peduncle 6 in. long, stout. Drupes 6 or 7, connate, 2.5 in. long, bluntly angled above, tip shortly free, truncate, cone-shaped. Style .12 in. long, slightly bent, acute, simple or branched, broad, with two spreading points. Stigma linear, the whole length of the style. *Hab.* Mountains, local, Pahang, Gunong Tahan at 5500 ft. altitude abundant (Ridley).

(3) *P. Houlletii* *Carriere, Rev. Hort.* 1868, p. 210, fig. 23; *Bot. Mag. t.* 8197; *Ridl. Mat.* ii. 224.

Stem 7 to 8 ft. tall to the leaves, simple or with 1 or 2 branches at top, 4 in. through. Leaves linear acuminate, coppery purple when young, later dark green, spines very small, 8. ft. long, 4 in.

wide. Male inflorescence 2 ft. long or more. Lower bracts 14 in. long, 3 in. wide, broadly lanceolate acuminate. Spikes 6 to 8 in. long, .75 in. through. Filaments connate, in tufts, branching at the top, .24 in. long. Female syncarp solitary, in fruit cylindrical, 1 ft. long, 4 in. through, orange, fleshy. Drupes .5 in. across, crown flat truncate; styles 1 or 2 curved. *Hab.* Forests in the south. Singapore, Bukit Timah and other woods. Johor, Sungei Tebrau; Pulau Tinggi (Burkill). Negri Sembilan, Gunung Angsi (Burkill). *Native names:* Pandan hutan; Mengkuang hutan. *Use:* Fruit soft and sweet tasting like a pineapple.

(4) **P. bidens** Ridl. *Mat.* ii. 224; *P. crinifolius* Martelli *Boll. Soc. Bot. Ital.* 1904, p. 301.

Shrub 5 to 8 ft. tall. Leaves linear caudate-acuminate, 1.5 to 3 ft. long, 2 to 3 in. wide, keel at tip and tail shortly thorny; nerves 3, prominent; nervules and transverse bars prominent giving the leaf a tessellate appearance when dry. Male flowers unknown. Syncarp oblong sessile or nearly so, 4 to 5 in. long, 3 in. wide, dark claret colour. Drupes .5 in. long, free, top conic obscurely angled. Style flattened, rather long, ending in 2 sharp horizontal points. *Hab.* In open jungle, rare. Perak, Gunung Mesah at 1500 to 2000 ft. altitude (Kunstler).

I have seen no specimen of Martelli's *P. crinifolius*, "Penin. Malese Perak, H. Calc."; it may be this species, but the description is not full enough to identify any pandanus by.

(5) **P. tetradon** Ridl. *Journ. Roy. As. Soc. S. Br.* 68, p. 13.

Large bushy shrub resembling *P. fascicularis*. Leaves linear acuminate, 2 ft. long or more, 1 in. wide; thorns pale, close, along the edges. Peduncle flexuous, 7 in. long, stout. Male unknown. Female, syncarp solitary, blunt, cylindrical, 3.5 in. long, 2.5 in. through. Drupes .75 in. long, tips broad, round; style quadrate, flat, broad, .1 in. long, dark brown, with 3 or 4 distinct teeth. *Hab.* Local in tidal woods. Singapore, Pasir Panjang along the West road (Ridley).

(6) **P. pentodon** Ridl.

Leaves coriaceous linear acuminate, keel prominent, thorns on edge distant, more crowded on tip, pale, ascending, 15 to 30 in. long, .5 in. wide. Syncarp single, oblong globose (young), 3 in. long, 1.5 in. wide. Bracts, outer one ovate caudate, keeled, 3 in. long, thorny, second bract ovate-lanceolate, as long, but narrower, third not tailed, ovate thin keeled, keel thorny. Fruits oblong, free for one-third of their length, free portion angled. Stigma 4- or 5-toothed, lowest ones 2- or 3-toothed, teeth forming a star eventually. *Hab.* Johor, Ulu Kahang at 250 ft. altitude. (Holtum, 10861.)

Near *P. tetradon* Ridl., of which I have only seen ripe fruits, while this is in fairly young female flower, but besides the larger number of points to the star-like stigma, this plant has very much narrower leaves, only half the width of those of *P. tetradon*.



(7) **P. immersus** Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 48; *Mat.* ii. 224.

A stout pandan growing immersed in water, the stem hardly rising above. Leaves very tall, broad, linear, erect, glaucous beneath, long acuminate, thorns numerous, 5 or 6 ft. long, 4 in. wide. Male unknown. Female syncarp on a thick flexuous peduncle 2 in. long, oblong thick, 4 in. long, 1.5 in. thick. Drupes small with a very short curved simple (occasionally bifurcate) style. *Hab.* In streams forming dense thickets, all through the low country of Selangor and Perak, conspicuous from its tall erect sword-like leaves. Selangor, Labu River and Batu Tiga (Ridley). *Native name*: Mengkuang Ayer.

(8) **P. bicornis** Ridl. *Roy. As. Soc. S. Br.* 41, p. 49; *Mat.* ii. 225.

Stems short, 1 to 2 ft. tall. Leaves dark green, glaucescent at top, broad linear, abruptly caudate, 2 ft. long, 2 in. wide, tail 3 in. long, edge and keel thorny. Male unknown. Female bracts broad ovate, outer ones abruptly caudate, 6 in. long, tail 2 in. long, inner ones blunt. Syncarp solitary oblong, top rounded, 4 in. long and nearly as thick. Drupes nearly .5 in. through, .75 in. long, top broad, free, obscurely angled. Style short, broad, with 2 short sharp horns .12 in. long. *Hab.* Dense forests. Perak, Thaiping Hills at 2500 to 3000 ft. altitude (Ridley).

(9) **P. stelliger** Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 49; *Mat.* ii. 225.

A slender stemmed plant about 10 ft. tall, branched. Leaves linear acuminate, shining grey green, over 1 ft. long and 1 in. wide, point 3 in. long, thorns distant except at tip. Males unknown. Female syncarps in a cluster of 4, nearly sessile, oblong-ovoid, 2 in. long, 1 in. through. Drupes large, .25 in. through. Style oblong, top round, square with 3 to 6 sharp points. *Hab.* Rare in forests, at 2500 ft. altitude or upwards. Selangor, Semangkok Pass. Perak, Thaiping Hills at 2500 ft. altitude (Ridley).

(10) **P. stenophyllus** Kurz. in *Miq. Ann. Mus. Bot. Lugd. Bat.* ii. 52.

| Branches slender, .25 in. through at the top. Leaves thin linear, narrowed to a long point, obscurely nerved, thorns on edges short, ascending, very numerous at base and tip, smaller and scattered on midrib beneath, 2.5 ft. long, 1 in. wide. Syncarps 3 or 4, oblong rounded, 2 in. long, 1.5 in. through. Drupes obconic, .5 in. long, .25 in. across, top broad, round, flattened, free, cell 1 in the upper part, sub-globose. Stigma obtriangular with 3 short acute points, base narrowed. *Hab.* Kelantan, along the ridge of Gunong Sitong at 5000 ft. altitude (Nur and Foxworthy). *Distrib.* Java, Sumatra.

(11) **P. irregularis** Ridl.

| Leaf long, very broad, leathery, margin with distant ascending black-tipped thorns, 4.25 in. wide. Syncarps sub-globose, several,

6 in. long. Drupes 1-, 2- or 3-celled, 1.5 in. long, .3 to .5 in. wide, top free for .5 in., cylindrical oblong blunt. Style short, curved, one to each cell, tooth-like recurved; cells median, .5 in. long. *Hab.* Kelantan, Sungei Ketah, Batu Bau (Nur and Foxworthy).

Specimen very incomplete.

(12) **P. Prainii** Martelli, *Boll. Soc. Bot. Ital.* 1904, p. 301.

Small pandan, stem 8 to 12 ft. tall. Leaves stiff, thick, glossy, green, linear acuminate, wide; nerves invisible, tip closely thorny, margins and keel with fewer thorns. Male unknown. Female syncarp 4 to 5 in. long, 2 to 3 in. thick, elliptic-oblong; peduncle stout. Drupes small narrow oblong, terminated by a hemispheric bulb the base of the style. Style terete, base swollen; stigma on inner face. *Hab.* In small water holes with the top of the fruit just above the water, Perak, Chanderiang (Kunstler).

(13) **P. helicopus** Kurz. in *Miq. Ann. Mus. Bot. Lugd. Bat.* ii. 54, t. ii. *P. johorensis* Martelli, *l.c.* 302 (not of Ridley).

Stems much branched, 15 to 20 ft. tall, 3 in. through, red-brown becoming purple-grey. Leaves glaucous linear, long-acuminate, terminal, half deflexed, base orange, 6 ft. long, 3 in. wide, spines black. Male inflorescence long, pendent. Bracts lanceolate long acuminate, white, 10 to 12 in. long, 1 in. wide. Spikes 9 in. long, .75 in. through. Stamens connate in bundles. Female syncarp solitary, cylindrical, 2 in. long; peduncle 9 in. long; in fruit cylindrical, woody broad and blunt both ends, 5 in. long, 3 in. through, golden brown. Drupes narrow, .12 in. through. Style 1, slender. *Hab.* Forming dense thickets in rivers, often for miles, and blocking the water-way. Johor, Sungei Tebrau; Kota Tinggi. Selangor, Rawang (Ridley). *Distrib.* Sumatra, Bangka. *Use:* The fruit is used for baiting fish traps.

(14) **P. Scortechinii** Martelli, *Boll. Soc. Bot. Ital.* 1904, p. 302.

Shrub from 2 to 4 ft. tall, stem .25 in. through. Leaves linear-lorate, gradually acuminate, 9 in. long, 1 in. wide, base and upper part thorny, middle part smooth. Male bracts broad lanceolate acute, unarmed, 2 to 2.5 in. long, .5 in. wide. Spikes cylindrical, 3 in. long, .5 in. through. Stamens connate at base with very short bulbous filaments; anthers longer, oblong. Syncarp solitary, oval, 1 to 2 in. long, .75 to 1.25 in. through. Drupes prismatic, oblong, cuneate, pyramidal. Styles long, setiform, shining. *Hab.* Perak, Asam Kumbang and Thaiping (Wray, Kunstler).

(15) **P. muarensis** Ridl. *P. johorensis* Ridl. *Mat.* ii. 302 (not of Martelli).

Leaves distinct, 3 ft. long, 1 in. wide, tail nearly 1 ft. long. Male unknown. Female syncarp solitary on a peduncle 10 in. long, slightly flexuous. Bracts lanceolate acuminate. Syncarp (young) oblong, 2 in. long, 1 in. through. Drupes round at tip; style setiform, yellow, long acute. *Hab.* Muar, Sungei Pauh (Fox).

(16) **P. *militaris*** Balf. *fl. Journ. Linn. Soc.* xvii. 53; *Ridl. Mat.* ii. 227. *Fisquetia militaris* Gaud. *Voy. Bonite*, 1843, t. 5, figs. 2-7.

A bushy pandan about 5 ft. tall. Leaves narrow-linear acuminate to a long point, 2 ft. long, 1 in. wide, edged with red thorns. Males unknown. Female syncarp solitary (occasionally 3 small ones), 3 in. long, 2 in. through. Drupes .5 in. long, base narrow cylindrical dilate upwards, oblong, top round; style short, dagger-like, broad based. *Hab.* in streams. Singapore, Bukit Mandai. Johor. Malacca near Tampin. Pahang, Ulu Kuantan (Craddock).

(17) **P. *parvus*** *Ridl. Journ. As. Soc. S. Br.* 33, p. 171; *Mat.* ii. 227. *P. flagellifer* Warb. *Pflanzenreich*, iv. 80.

Stem slender, branched above, 3 ft. tall, .5 in. through. Leaves linear-oblong, abruptly caudate, glaucous beneath, rather thin, spines very small, 1 ft. long, 3 in. wide. Male inflorescence 6 in. long, white. Bracts oblong, boat-shaped, keeled, mucronate, lowest 4 in. long. Flowering bracts 7, ovate, ivory white, spiny, terminal one .5 in. long. Stamens free, .12 in. long. Female syncarp solitary, globose, 1.5 in. long. Drupes conic; style .25 in. long. *Hab.* In woods chiefly in the south, up to 2400 ft. altitude. Singapore, Changi; Pulau Ubin; Kranji. Johor, Sungei Ban; Sungei Tebrau. Malacca (Griffith). Negri Sembilan, Bukit Tangga; Gunung Angsi (Burkill). Perak, Bujong Malacca. *Native name*: Pandan Kura.

(18) **P. *glaucophyllus*** *Ridl. Journ. Roy. As. Soc. S. Br.* vi. 50; *Mat.* ii. 227.

Stems 10 to 12 ft. tall, .5 in. through. Leaves linear-oblong, abruptly caudate, minutely thorny on edge, rather flaccid, 1 to 2 ft. long, 2 in. wide. Male unknown. Female syncarp globose, 2 in. through; peduncle 3 in. long, thick. Drupes rounded, tapering into a stout upcurved spine .12 in. long, acute. *Hab.* Dense mountain forests, local. Perak, Thaiping Hills (Ridley).

(19) **P. *unguiculatus*** *Ridl. Mat.* ii. 229.

Small shrub. Leaves linear-lorate acuminate caudate, thorns small pale red-tipped, 20 in. long, 1 in. wide. Male unknown. Female syncarp solitary, oblong, 2 in. long, 1.25 in. through; peduncle 2 in. long or more. Drupes linear-oblong, .5 in. long, top conic, 5-angled, broad. Style beak-shaped, curved upwards, short, acute; stigma linear, the whole length. *Hab.* Selangor, Bukit Kutu (Ridley).

(20) **P. *globuliferus*** *Ridl. Journ. Roy. As. Soc. S. Br.* 61, p. 42.

Dwarf pandan with the habit of *P. parvus*. Stem .2 in. through. Leaves linear, abruptly acuminate-caudate, 8 to 12 in. long, .5 in. wide, edges with very short slender thorns closer at tip, which is setaceous very thorny for 2 in. Males unknown. Female syncarp solitary, globose, 1 in. long. Bracts oblong, cuspidate, thorny, 1 in.

long, .25 in. wide. Peduncle 1 in. long. Drupes with a broad round top, not dilate. Style .12 in. long, very slender, spiniform; stigma whole length of lower face. *Hab.* Local. In mountain forests. Selangor, Gunong Semangkok at 4000 ft. altitude (Ridley).

(21) **P. ovatus** Kurz, *Journ. As. Soc. Beng.* xxxviii. 147; *Ridl. Mat.* ii. 228. *Fisquetia ovata* Gaud. *Voy. Bonite*, t. 4, fig. 1. *Pandanus elostigma* Martelli, *Boll. Soc. Ital.* 1904, p. 302. *P. Kingianus* Martelli, *Webbia*, iv. 431.

A low creeping and rooting plant, stem .25 in. through. Leaves numerous, linear acuminate, grey green, 1 ft. long, .25 to .35 in. wide, stiff, many thorns. Male flowers unknown. Female syncarp almost globose, 1.5 in. long, on a peduncle 5 in. long or less from among the leaves, with 2 distant shorter leaves. Drupes broad, top round; style conic, stout, curved acute, .15 in. long. *Hab.* Open grassy spots, often forming low tufts. Johor, north of Gunong Belumut (Holtum); Malacca (Gaudichaud); Selangor; Ayer Panas. Province Wellesley, Tasek Gelugur. Kedah Peak (Low). Perlis, Kanga. Setul heath (Ridley). *Distrib.* South Siam. *Native name*: Sendayan Masing.

(22) **P. collinus** Ridl. *Mat.* ii. 228.

Dwarf bush 4 to 7 ft. tall. Leaves linear, gradually acuminate, 15 in. long, .25 in. wide, with red tipped thorns very small, all along edge. Male flower unknown. Female syncarp globose, 3 in. long, .75 in. through; peduncle 3 in. long. Drupes dilate and round at top. Style .12 in. long, conic acute, angled. *Hab.* Dry ridges in mountains at 3000 to 4000 ft. altitude. Pahang, Telom. Perak, Gunong Batu Putih at 3000 to 4300 ft. altitude (Wray). Kedah Peak (Ridley).

var. *spinulosus* Ridl. Leaves strongly spiny. *Hab.* Kelantan, Ridge of Gunong Sitong (Foxworthy).

(23) **P. pilaris** Ridl. *Journ. Roy. As. Soc. S. Br.* 86, p. 311.

A low bushy plant. Leaves 8 ft. long, 1 in. wide, 3-nerved, linear acuminate, dark green, with numerous very small thorns on the edge and 3 nerves towards the tip. Peduncle stout, 8 in. long, a broad lanceolate bract over 6 in. long below the syncarp. Male flowers unknown. Female syncarp globose, 4 in. through. Drupes cylindric angled, nearly 1 in. long, and .18 in. through. Style .25 in. long, acute, slightly curved; stigma linear on the underside. *Hab.* Mountain forests, 2000 ft. altitude. Negri Sembilan, Bukit Tangga (Ridley).

(24) **P. monotheca** Martelli, *l.c.* 303; *Ridl. Mat.* ii. 228.

A bush like *P. ornatus*, stems stout. Leaves linear acuminate, caudate, 3 ft. long, .5 in. wide, thorns small, pale, all along edge. Male flowers unknown. Female, syncarp oblong, 2 in. long, 1 in. through; peduncle 4 in. long. Drupes obovate with broad round top and 5 ribs radiating from style. Style very short, dagger-

shaped; stigma the whole length. *Hab.* Malacca, Gunong Tunduk, Mount Ophir at 4000 ft. altitude (Ridley).

(25) **P. Ridleyi** Martelli, *l.c.* 303; *Ridl. Mat.* ii. 228. *P. Yvani* Solms-Laubach, *Linnaea*, xlii. 1878, p. 21 (probably).

Shrub 8 to 10 ft. tall, stem 1.5 to 3 in. through. Leaves deep green, linear, long-acuminate, 14 to 18 in. long, 1 in. across, edge entirely red, thorny as is the upper part of keel. Male inflorescence waxy white, spikes 2, cylindric, 2 in. long; peduncles 1.5 in. long. Stamens free; filaments twice as long as the oblong anthers. Female syncarp solitary; bracts, lowest 8 in. long, broad lanceolate acuminate, upper ones 5 in. long, 1 in. wide; peduncle 6 in. long. Syncarp oblong-cylindric, 2.75 in. long, 1 in. through. Drupes narrow, oblong, .12 in. long. Style setiform, as long; stigma linear. *Hab.* Damp forests and woods. Singapore, Bukit Mandai; Serangoon Road. Malacca, Sungei Hudang. Selangor, Bukit Kutu; Ginting Bidai. Sungei Ujong, Gunong Berumban (Cantley). Perak (Kunstler). *Native name*: Pandan Tikus.

Solms-Laubach's *P. Yvani* is too imperfectly described to identify it, but it may be intended for this species.

(26) **P. ornatus** Kurz, *Journ. As. Soc. Beng.* xxxviii. 747; *Ridl. Mat.* ii. 229. *Fisquetia ornata* Gaud, *Voy. Bon. t.* 5.

A dense much-branched erect bush 12 ft. tall, stems crowded, thorny above, grey. Leaves narrow linear, gradually acuminate, glaucous beneath, grey-green, with spines white very small and close, 6 ft. long, 1 in. wide. Male inflorescence 9 in. long with 6 spikes. Bracts lanceolate cuspidate, 6 in. long, .75 in. wide. Spikes 3 in. long, .25 in. through. Stamens free, filaments very short. Female of 1, rarely 3, oblong, grey-green, cylindric syncarps 6 in. long, 2 in. through, on a stout hanging peduncle 8 in. long triquetrous. Bracts 3 or 4, narrow, lanceolate, acuminate. Drupes .5 in. long, oblong, top irregularly angled. Style curved forwards, .12 in. long, brown, acute. Stigma nearly the whole length. *Hab.* Common in woods. Male plants very rare. Singapore, Bukit Timah. Johor, Gunong Pulau; Kota Tinggi; Gunong Belumut (Holttum). Malacca, Mount Ophir (Derry); Nyalas; Selandor (with five syncarps). Selangor, Bukit Kutu, Dindings, Tanjong Hantu. Perak, Thaiping Hills (Kunstler); Tanjong Malim (Burkill). Penang Hill. Kedah Peak (Ridley). *Native name*: Pandan Berduri.

(27) **P. atrocarpus** Griff. *Notulæ*, 160; *Ridl. Mat.* ii. 230.

Tree 40 to 60 ft. tall, branched, stem 6 in. through, thorny. Leaves linear acuminate, long, keel and edge thorny, 20 ft. long, 4 in. wide. Male inflorescence 2 ft. long or more; bracts white, lowest 1 ft. long. Spikes 4 to 6 in. long. Stamens free; filaments conic, very short; anthers much longer. Female inflorescence 3 to 4 ft. long; peduncle woody, 3-angled, 1 in. through. Spikes 6 ovoid, 6 in. long, 2.5 in. through. Drupes 1 in. long, free part

conic angled, dark brown; style short conic. *Hab.* Edges of woods in wet ground, common. Singapore, Tanglin; Bukit Mandai Road. Johor and Malacca. (Griffith, Ridley). *Native name*: Mengkuang. *Use.* The leaves are used for making Kajangs, coverings for ox carts, roofing, screens, hats, etc.

(28) **P. penangensis** *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 50; *Mat.* ii. 230.

Tree about 20 ft. tall, 4 in. through. Leaves linear acuminate, 6 ft. long or more, 4 in. across, marbled light and dark green when young. Male flowers unknown. Female heads 4 to 5, oblong, 6 in. long, 3 in. through. Drupes 1 in. long, green, free, part conic, .3 in. long. Style stout, curved forwards, 5 in. long, dark brown. *Hab.* Local on dry hills. Penang Hill at 2500 ft. altitude (Ridley).

(29) **P. aurantiacus** *Ridl. Roy. As. Soc. S. Br.* 41, p. 49.

Large branching shrub 12 ft. tall. Leaves linear long-acuminate, glaucous, 3 ft. long, 1.5 in. wide. Male flowers unknown. Female of five globose-oblong spikes, 2.5 in. long, 1 in. through, bright orange-red. Drupes oblong pyramidal, 5-angled, tip conic, passing into a long stout not very hard beak. *Hab.* Tidal thickets and rivers, very showy in fruit. Singapore, Bukit Mandai Road. Johor, Tanjong Bunga; Pulau Kukub (Ridley). Pahang, Kwala Lipis (Machado). Kelantan, Sungei Kertah (Nur). *Distrib.* Siam, Borneo. *Native names*: Pandan Ikan; Mengkuang Bunga.

(30) **P. perakensis** *Ridl. Mat.* ii. 231.

Leaves 5 ft. long, 1.5 in. wide, linear acuminate with strong pale thorns at base on edge and numerous small ones closer above. Males unknown. Female syncarps 3 or 4, globose, 2 in. long, on a stout peduncle 6 in. long. Drupes linear-oblong, .5 in. long, ending in a pyramidal style, point stout, spine-like; stigma broad, as long as style. *Hab.* Forests. Perak, Maxwell's Hill; Lahat (Ridley).

#### DOUBTFUL SPECIES.

**P. HERBACEUS** *Martelli, l.c.* 303. "Trong, Perak," doubtless Trang.

This is not described, and the diagnosis is too incomplete. I have not seen the specimen on which the species is based.

**P. ODORUS** *Ridl.* Stems stout, eventually 10 to 12 ft. tall, more commonly low branching. Leaves 30 in. long, 2 in. wide, linear acute, glaucous beneath, thornless except for a few minute thorns at tip. *Native names*: Pandan Jelinek; Pandan Wangi. *Use.* Cultivated round villages for the leaves, which are scented, and cut up fine, boiled with rice to flavour it; also used in "Gunga Rumpoh," a kind of potpourri, with sandal-wood and rose-water, distributed at weddings.

This plant seems never to have been described, nor have I ever seen or heard of its flowering.

Another species apparently undescribed is an epiphytic plant with very narrow linear stiff leaves forming a large tuft. Common in Johor and Perak; but no trace of inflorescence has ever been seen.

## 2. FREYCINETIA, Gaud.

Scandent shrubs on tree trunks. Stems often rather slender, rooting. Leaves narrow, acuminate, linear, thorny. Bracts often bright coloured red or yellow. Spikes racemose; peduncles cylindrical. Males slender; filaments filiform or conic. Females, spikes stouter, often with staminodes. Ovary unilocular. Seeds numerous. Stigmas sessile, usually horse-shoe-shaped. Species 60, Burma, Ceylon, Malay isles to Polynesia.

Bracts not leaflike, boat-shaped, orange or red.

Leaves very narrow, .12 in. wide.

Bases unarmed . . . . . (1) *F. angustifolia*

Bases armed . . . . . (2) *F. confusa*

Leaves narrow, stiff, .25 in. wide . . . . . (3) *F. acuminata*

Leaves flaccid, .4 in. wide, base not narrowed . . . . . (4) *F. malaccensis*

Leaves .5 in. across, base narrowed; bracts boat-shaped . . . . . (5) *F. lucens*

Leaves .5 in. wide, not narrowed at base; bracts flat, lanceolate . . . . . (6) *F. montana*

Bracts resembling the leaves, green or yellowish.

Leaves lanceolate-linear, unarmed except at base and tip . . . . . (7) *F. Kingiana*

Leaves linear, very long, strongly armed . . . . . (8) *F. valida*

(1) *F. angustifolia* *Bl. Rumphia*, i. 159, t. 43; *Ridl. Mat.* ii. 232.

Stems very slender, .12 in. through, very long. Leaves narrow linear acuminate, unarmed except a few thorns at tip, 9 to 10 in. long, .12 in. wide. Male inflorescence; bracts 4, ovate acuminate to ovate lanceolate, .5 to 1 in. long, .5 in. wide, tip spiny. Spikes 4, umbelled, cylindrical, .5 in. long, slender. Female spikes 3 or 4, racemose, .25 in. long, cylindrical. Pistils oblong, very small. *Hab.* Rather rare in the south, climbing on trees. Malacca, Merlimau and Bukit Bruang (Derry). *Distrib.* Borneo, Sumatra, Java. *Native names:* Rotan Musang; Akar Ular.

(2) *F. confusa* *Ridl. Mat.* ii. 233 (not of *Elmer*).

Stem .25 in. through. Leaves linear acuminate, 9 to 12 in. long, .12 in. wide, only the sheath and base of leaf and tip thorny. Male unknown. Female bracts lanceolate acuminate, thorny on tip and keel, lowest one on edge also, 2 in. long, .75 in. wide. Spikes 2, nearly sessile, cylindrical, stout, 1 in. long, .25 in. through; stigmas 1 or 2, distant from each other. *Hab.* Lowland forests. Singapore, Selitar; Kranji (Ridley). Perak, Batu Togoh (Wray).

(3) *F. acuminata* *Ridl. Mat.* ii. 233.

Stem stout, .35 in. through. Leaves stiff erect linear acute, 1 ft. long, .25 in. wide, sheath with 2 ligule-like processes .25 in. long, edged with flat yellow thorns, tip with small thorns. Bracts red, lanceolate long-acuminate, lower one with thorny edge, 7 in. long, point longer than blade, second bract 6 in. long. Male spikes

5, narrow cylindric, 2 in. long. Female spikes 3, nearly sessile, cylindric, 1 in. long, .25 in. through; stigmas 1 or 2. *Hab.* Forests up to 4000 ft. altitude. Selangor, Kwang (Ridley); Sungei Buluh (Long). *Native name*: Mengkuang Puchat.

(4) **F. malaccensis** *Ridl. Mat. ii. 233.*

Stems slender, .12 in. through. Leaves flaccid linear, long-acuminate, point and keel thorny, 9 in. long, .35 in. wide. Male inflorescence; bracts orange buff, 6 lower ones lanceolate caudate, 1 in. long, tail 1 in. long. Peduncle .5 in. long. Spikes .5 in. long, slender, on peduncles .25 in. long. Female spikes 4, fleshy, .75 in. long, cylindric. Peduncle 1 in. long; stigmas 2 or 3. *Hab.* Common in lowland woods. Singapore, Bukit Mandai; Kranji; Bukit Timah. Johor, Kota Tinggi. Malacca, Mount Ophir; Bukit Bruang (Ridley). Perak, Sungkai (Kunstler). Penang Hill and Telok Bahang (Curtis). *Native name*: Nanchang Besih.

(5) **F. lucens** *Ridl. Mat. ii. 233.*

Stems rather stout. Leaves shining dark green, linear-oblong, base narrow, tip shortly acuminate and thorny, 4 to 5 in. long, .5 in. wide. Male inflorescence; bracts canoe-shaped, orange-salmon, 3 in. long, .5 in. wide, thick, tail thorny. Spikes 3, very slender, 1.5 in. long. Female spikes 3, sub-umbellate, 2 in. long, thick fleshy, nearly .5 in. through. *Hab.* Common in lowland woods climbing on trees. Singapore, Bukit Timah; Bukit Mandai; Kranji. Malacca (Maingay). Negri Sembilan, Seremban (Egerton). Perak, Thaiping (Ridley).

(6) **F. montana** *Ridl. Mat. ii. 234.*

Stem .13 in. through. Leaves linear acuminate, a few thorns at tip, base not narrowed, 6 to 7 in. long, .5 in. wide. Male inflorescence; bracts lanceolate flat, edge thorny, 2.5 in. long, .5 in. wide. Spikes 3, very slender, 1.25 in. long; peduncle angled, with short hair-like processes. Female spikes 3 or 4, umbelled, 1 to 1.5 in. long, .25 to .3 in. through. Peduncles .25 in. long; stigmas 4 to 6. *Hab.* Scarce in mountain forests. Selangor, Bukit Hitam. Perak, Thaiping Hills (Ridley).

(7) **F. Kingiana** *Ridl. Mat. ii. 234.*

Stem .3 in. through. Leaves lanceolate-linear acuminate, 8 in. long, .5 in. wide, few thorns at base and tip. Male unknown. Female, bracts foliaceous lanceolate acuminate, edge thorny, yellowish. Spikes 1 or 2, oblong, .5 to 1.5 in. long; peduncle stout, curved, sheaths ovate, secondary peduncle 1 in. long. Free part of drupe conic angled; stigmas 2 or 3, uniform. *Hab.* Perak, Goping (Kunstler).

(8) **F. valida** *Ridl. Mat. ii. 234.*

Very stout climber, 20 to 30 ft. long, .25 in. through. Leaves linear acuminate, strongly thorny along edge and sheath, 2 ft. long, .5 to 1.5 in. wide. Male not seen. Female bracts leaf-like, not coloured. Spikes 1 to 3, umbelled, on a stout cylindric peduncle



with secondary peduncles stout 2 in. long, cylindric blunt, 1.5 in. long in flower, to 4 in. long, and .75 in. through in fruit. Style conic, angled, free, stigmas 2 to 4. *Hab.* Common in forests, Singapore, Garden Jungle; Chua Chu Kang; Bukit Mandai. Johor, Gunong Belumut (Holtum). Malacca, Mount Ophir. Perak, Thaiping Hills (Ridley). Penang (Curtis).

Very near *F. sumatrana* Hemsl., but that has much smaller thorns; the type specimen of that is, however, rather a poor one.

## ORDER CLVIII. AROIDEÆ.

Herbs erect tuberous, or with a creeping rhizome, or scandent and shrubby. Leaves alternate petioled; petiole sheathing at base or for its whole length; lamina herbaceous or coriaceous, entire or lobed. Flowers uni- or bi-sexual, sessile, spicate on a spike (spadix) more or less enclosed in a large bract (spathe) green or coloured, in unisexual-flowered plants the males are at the top of the spadix, the females at the base with abortive flowers (neuters) between them, the top of the spadix sometimes of aborted flowers (appendage). Perianth-lobes scale-like or absent. Anthers 2- to 4-celled dehiscing by pores or slits. Ovary sessile, 1- to 3-celled. Style usually very short. Stigma discoid or lobed. Ovules 1 or more. Fruit baccate, rarely capsular. Seeds few or one, rarely many. Species about 1000. Whole world, but most occur in the tropics. They are abundant in the forests of the plains, disappearing at about 4000 ft. altitude (Ridley, *Mat. Fl. Pen.* iii. 1 to 52).

*Flowers unisexual (occasionally bisexual in No. 3), no perianth.*

- |   |                   |
|---|-------------------|
| i. ARINEÆ. Spadix appendaged (except No. 1). Leaves entire or lobed. Stamens free; ovary 1-celled; ovules orthotropous.   |                   |
| Floating stemless herb; leaves obovate  | 1. PISTIA         |
| Submerged or aquatic herbs; spadix very short; spathe long, tubular; leaves ovate or lanceolate   | 2. CRYPTOCORYNE   |
| Terrestrial tuberous herbs, often unisexual; leaves lobed; neuters few or more  | 3. ARISÆMA        |
| Terrestrial tuberous herbs, bisexual; leaves ovate or lobed; neuters numerous above females   | 4. TYPHONIUM      |
| ii. PYTHONIÆ. Tuberous herbs large. Leaves appearing without flowers, solitary, very large, 3-lobed or pinnatisect. Spadix usually appendaged; ovules anatropous.                           |                   |
| Spadix with large appendage   | 5. AMORPHOPHALLUS |
| iii. COLOCASIEÆ. Herbs not tuberous (except No. 6); stem creeping, subterranean or erect. Leaves undivided, cordate or peltate. Spadix appendaged or not. Anthers sessile, free or connate. |                   |
| Small tuberous herbs; female part of spadix adnate to spathe  | 6. HAPALINE       |
| Stout caulescent herbs; spadix free to base.  |                   |
| Ovules many, parietal; fruit sub-capsular   | 7. COLOCASIA      |
| Ovules few, basal; fruit drupaceous, red  | 8. ALOCASIA       |

- iv. PHILODENDRÆ. Terrestrial herbs with entire or cordate leaves. Spadix shorter than the spathe, no appendage. Fruit enclosed in the spathe-tube.
- Spathe eventually deciduous; fruit a red drupe . . . 9. AGLAONEMA  
 Spathe persistent; drupes very small, not drupaceous or red . . . 10. HOMALOMENA  
 Limb of spathe deciduous in flower.  
 Spathe contracted in the middle, below the limb . . . 11. SCHISMATOGLOTTIS  
 Spathe not contracted below the limb . . . 12. PIPTOSPATHA
- Flowers bisexual, no perianth except No. 13.*
- v. CALLEÆ. Climbers often woody. Spadix with no appendage. Ovary truncate. Stigma linear, central.
- Perianth usually present, drupes distinct, red . . . 13. ANADENDRUM  
 No perianth; fruits crowded not drupaceous or red.  
 Ovary 1-celled, 1-seeded.  
 Leaves ovate to oblong-lanceolate entire . . . 14. SCINDAPSUS  
 Ovary 1-celled, 2-ovuled.  
 Creeping plant; leaves ovate-cordate . . . 15. AMYDRIMUM  
 Ovary 1-celled, 1-seeded.  
 Stout plants, climbing, large; entire or lobed leaves . . . 16. EPIPREMNUM  
 Ovary 2-celled, cells 1-seeded.  
 Leaves large, lobed . . . 17. EPIPREMNOPSIS  
 Ovary 2-celled, many-ovuled.  
 Stout climbers; leaves entire or lobed . . . 18. RAPHDOPHORA
- vi. ORONTIÆ. Flowers bisexual. Perianth of 4 to 6 segments. Terrestrial herbs.
- Prickly erect herbs, nearly stemless.  
 Spadix much shorter than the long spathe, sessile.  
 Leaves lobed . . . 19. LASIA  
 Spadix nearly as long as spathe, stipitate.  
 Leaves sagittate . . . 20. PODOLASIA  
 Spadix longer than spathe, sub-sessile.  
 Leaves sagittate . . . 21. CYRTOSPERMA
- vii. POTHONEÆ. Climbing plants not prickly.  
 Flowers bisexual; perianth lobes 6 . . . 22. POTHOS
- viii. ACORINÆ. Rhizomatous plant. Leaves ensiform.  
 Spathe none . . . 23. ACORUS

### 1. PISTIA, Linn.

A stemless, stoloniferous floating herb. Leaves sessile, obovate-obcuneate, erect. Spathe shortly peduncled, small; limb ovate, enclosing one flask-shaped pistil. Anthers 4, sessile, connate, in a basin-shaped spathe. Fruits membranous, few-seeded. Seeds oblong or obovoid. Species 1. All the tropics; variable in size and shape of leaves.

(1) *P. stratiotes* Linn. *Sp. Pl.* 963; *Griff. Notulæ*, 12, 211; *Bot. Mag. t.* 4564; *Hook. fil. F.B.I.* vi. 497; *Ridl. Mat.* iii. 3.

Root tufted, white. Leaves bright green, obovate-spathulate obcuneate, tip rounded, white beneath. Spathe tomentose, white, limb .5 in. long. *Hab.* Commonly cultivated by the Chinese to

feed pigs on. Possibly wild in the Batu Pahat River, Johor; the Pahang River near Pekan; Perak near Lenggong; Tringganu (Yapp). *Native name*: Kiambang or Kambang.

## 2. CRYPTOCORYNE, Fisch.

Aquatic herbs with a long or short creeping rhizome. Leaves herbaceous or leathery. Spathe tubular with connate edges, limb ovate or lanceolate, coloured. Spadix very short, in the dilated base of the spathe. Male portion conic, wrapped in an involute valve of the spathe. Anthers 2-celled. Female flowers few in a single whorl. Ovaries flask-shaped, many ovuled. Fruit capsular, or several connate 2-valved carpels. Seeds numerous. Species about 25, Indo-Malaya, China.

- |   |     |                           |
|---|-----|---------------------------|
| Leaves leathery, lanceolate, erect; tidal-mud plant | (1) | <i>C. ciliata</i>         |
| Leaves thin, ovate or lanceolate, floating.         |     |                           |
| Tube of spathe much longer than limb; limb tailed.  |     |                           |
| Tail of limb short, limb lanceolate yellow          | (2) | <i>C. cordata</i>         |
| Tail of limb short, limb ovate purple               | (3) | <i>C. purpurea</i>        |
| Tail of limb longer than the tube                   | (4) | <i>C. pontederiæfolia</i> |
| Tube of spathe as short or shorter than limb.       |     |                           |
| Limb ovate tailed                                   | (5) | <i>C. Griffithii</i>      |
| Limb narrow lanceolate twisted                      | (6) | <i>C. affinis</i>         |
| Limb not tailed.                                    |     |                           |
| Limb lanceolate                                     | (7) | <i>C. elliptica</i>       |
| Limb ovate-oblong, very small plant                 | (8) | <i>C. minima</i>          |

(1) *C. ciliata* Fisch. Schott, *Meletem*, 16; *Wight. Ic. t. 775*; *Griff. Trans. Linn. Soc. xx. t. 10-12*; *Ridl. Mat. iii. 4*.

Tuberous and stoloniferous plant. Leaves erect, leathery; petioles 18 in. long, blade 6 to 14 in. long, 2 in. wide, dark green, lanceolate or linear-oblong. Scape short. Spathe 4 to 12 in. long, limb oblong cuspidate, 2 to 3 in. long, fimbriate, yellowish or purple, fimbriae purple. Spadix male cylindrical. Female portion 5- to 7-flowered. Fruit globose conic, 1 in. through. Seeds 6 to 8. *Hab.* In mangrove mud and brackish or saline ditches near the sea, very abundant all over the Peninsula from Singapore to Tringganu and Penang, seldom flowering. Singapore, Kranji. Johor, Batu Pahat. Malacca (Griffith). Selangor Klang. Penang, Pulau Betong (Curtis). Tringganu (Ridley). *Distrib.* India, Borneo, Java.

(2) *C. cordata* Griff. *Notulæ*, iii. 138; *Ic. Pl. As. t. 172*; *Hook. fl. F.B.I. vi. 493*; *Ridl. Mat. iii. 4*.

Submerged herb. Leaves ovate to oblong-ovate, blunt, 2 in. long, 1 in. wide, cordate, olive green above, reddish beneath; petioles 6 in. long. Scape 1 in. long, tube of spathe 7 to 8 in. long, white; limb lanceolate caudate, yellow above, fuscous beneath, 2 in. long, .4 in. wide. Spadix .5 in. long. Male part cylindrical, yellow above, a curved club-shaped appendix, below a nude portion. Female portion a connate cone, .25 in. long at base, with 6 rounded

yellow bodies (sterile females) above the pistils. *Hab.* Streams in forests. Malacca (Griffith); Jus (Goodenough); Bukit Sadanen and Sungei Hudang (Derry). *Distrib.* Borneo, and Java.

(3) **C. purpurea** *Ridl. Journ. Roy. As. Soc. S. Br.* 46, p. 44; *Mat.* iii. 5. *C. Griffithii* *Hook. fil. Bot. Mag.* 7719 (not of *Schott*).

Stoloniferous plant. Leaves ovate or elliptic-ovate, base broad, 3 in. long, 1.75 in. wide; petiole 4 in. long. Scape .5 in. long. Spathe 3 in. long or more, tube twisted, .25 in. through, white, limb ovate caudate, .5 to 1 in. wide, pustular, purple, mouth yellow. Spadix appendix small, elliptic, clubbed. Male flowers few. Females 6 to 8 in a circle, 5 or more neuters above them. *Hab.* In slow streams in forest. Johor, Kota Tinggi (Ridley).

(4) **C. pontederiæfolia** *Schott, Miq. Ann. Mus. Bot. Lugd. Bat.* i. 122; *Ridl. Mat.* iii. 5.

Leaves ovate cordate, auricled, 2 in. long, 1.5 in. wide; petioles 3 in. long. Spathe tube 4 in. long, rather stout, limb ovate-lanceolate, 1.5 in. long, .5 in. wide, tail 5 in. long, deep purple. Fruit obconic, carpels 5. Seed elongate cylindric, ribbed. *Hab.* Rare in slow running streams. Johor, between Johor town and Gunong Pulai (Ridley). *Distrib.* Sumatra.

(5) **C. Griffithii** *Schott, Syn. Aroid. i.*; *Prodr. Syst. Aroid.* 14; *Hook. fil. F.B.I.* vi. 493.

Leaves ovate, olive above, pink beneath, 2 in. long, 1.25 in. wide; petioles 4 to 5 in. long. Scape 1 in. long. Spathe tube cylindric, 1.5 in. long, white, limb ovate cuspidate pustular, dark red. Spadix appendage slender. Female ovaries connate pustular, 6. Capsule conic, 6-lobed, pink; styles persistent, .5 in. long. *Hab.* In slow streams in thick jungle, common in the south, Singapore, Tanglin; Kranji; Bukit Timah; Chan Chu Kang. Johor, Ulu Batu Pahat (Kelsall). Malacca, Tabong (Griffith); Bukit Sadanen (Derry).

(6) **C. affinis** *N. E. Br. in Hook. fil. F.B.I.* vi. 494; *Ridl. Mat.* iii. 6.

Leaves lanceolate-oblong, sub-cordate obtuse, bullate, dark green above, purple beneath, 2 to 3 in. long, .75 to 1 in. wide. Scape .5 to 1 in. long. Spathe-tube 3 in. long, .25 in. through, limb narrow lanceolate, 2 to 2.5 in. long, purple above, white beneath, spirally twisted. Spadix appendage ovoid. Carpels 6 or 7. *Hab.* In shallow gravelly streams forming a mat of leaves, the spathe always seems to lie horizontally beneath the water. Pahang, Tahan River. Perak (Scortechini); Grit and Ulu Temengoh (Ridley).

(7) **C. elliptica** *N. E. Br. in Hook. fil. F.B.I.* vi. 495; *Ridl. Mat.* iii. 6.

Leaves orbicular or ovate cordate, blunt, 1.5 in. long, 1 in. wide; petioles 2 to 3 in. long; peduncle .5 in. long, hardly lengthening in fruit. Spathe tube 1.5 to 2 in. long; limb not pustular, lanceo-

late; tip twisted and bent back. *Hab.* Perak, Larut, Sungei Larut (Kunstler and Wray).

(8) *C. minima* *Ridl. Journ. Roy. As. Soc. S. Br.* 54, p. 61.

A very small plant, rhizome stout, 1 in. long. Leaves ovate to ovate-lanceolate, sub-acute, base rounded, 1 to 1.5 in. long, .75 to 1 in. wide, dull green bullate above, purple beneath; petioles 2 to 2.25 in. long. Spathe sessile, tube .5 in. long, limb ovate-oblong, .25 in. long, yellow, spotted with brown. Fruit obovoid, purple, .5 in. long, on a short pedicel. *Hab.* Rare in muddy patches near forest. Perak, Tapah (Ridley).

### 3. ARISÆMA, Mart.

Tuberous herbs with one or two petioled trilobed or pedatisect herbaceous leaves. Spathe tube convolute, limb usually decurved and tailed. Spadix included or exerted with a filiform, often very long appendage. Male flowers stipitate. Anthers 2 to 5. Females densely crowded. Ovary 1-celled. Style short or 0. Neuters none or above the flowers subulate. Berries one to few-seeded. The species of the Malay peninsula are usually unisexual. The appendage frequently grows in length after the spathe is open. Species about 50, temperate and tropical Asia and North America.

Leaves trifoliate.

Appendix shorter than limb.

Limb of spathe .5 in. wide, ovate-lanceolate . . . (1) *A. Roxburghii*

Limb of spathe 2 in. across, broadly ovate . . . (2) *A. filiforme*

Limb of spathe broadly ovate, .75 in. wide, 1 in. long . . . (3) *A. anomalum*

Appendix very long fimbriate . . . (4) *A. fimbriatum*

Leaves pedatisect, lobes 4 to 8.

Limb of spathe very large, longer than tube . . . (5) *A. Wrayi*

Limb of spathe shorter than tube . . . (6) *A. Scortechinii*.

(1) *A. Roxburghii* *Kunth. Enum.* ii. 18; *Hook. fil. F.B.I.* vi. 497. *Arum cuspidatum* *Roxb. Fl. Ind.* iii. 506; *Wight, Icones.* t. 784.

Tuber sub-globose. Leaves 1 or 2; petioles 8 to 10 in. long, grey or green, mottled red; leaflets 3, ovate acuminate, 5 in. long, 2.25 in. wide; petiolules of side-lobes .25 in. long, of central lobe .75 in. long. Peduncle 7 in. long, mottled pink. Spathe tube 1 in. long, dull pink, limb ovate acuminate, yellowish green, 1 in. long, .5 in. wide. Spadix short, filiform, 1.25 in. long, appendage .75 in. long, yellowish, lower part of spadix dark green. Anthers 4 or 5 in a cluster. Fruit spike 2 in. long. *Hab.* Banks and woods to 5000 ft. altitude. Selangor, Batu Caves; Gunong Mengkuang Lebah at 5000 ft. altitude (Robinson). Pahang, Kota Glanggi; Telom. Perak, Gunong Kerbau (Robinson). Pulau Adang. Lan-kawi. Penang Hill.

var. *Kunstleri* *A. Kunstleri* *Hook. fil. l.c.* A rather smaller plant with somewhat narrower leaflets. Perak, Thaiping Hills (Kunstler and Derry). Penang Hill (all collectors).

(2) **A. filiforme** *Bl. Rumphia*, i. 102, 28; *Ridl. Journ. F.M.S.* iv. 89.

Leaves 1 ft. tall, trifoliate; leaflets 3 ovate cuspidate, bases rounded, outer pair inæquilateral, 4 to 5 in. long, 3 in. wide, main nerves few inarching; petiolules .5 in. long. Scape 4 in. tall. Spathe tube 1 in. long and stout, limb oblong, cuspidate, 4 in. long, 2 in. wide, cusp 2 in. long, edges widely everted, dark brown. Spadix white, appendage conic at base becoming filiform, 4.5 in. long, a few subulate neuters on it. Anthers 5 or 6 on a short stalk. *Hab.* Local in dense forest. Pahang, Gunong Irau and Gunong Berumbun (Kloss, Ridley). *Distrib.* Java.

(3) **A. anomalum** *Hemsl. Journ. Bot. t. 7211; Hook. fil. F.B.I. l.c. 498; Ridl. Mat. iii. 7.*

Tuber elongate, shortly rhizomatous. Leaves 1 or 2, trifoliate, 18 in. long; petioles 1 ft. long; leaflets ovate acuminate cuspidate, inæquilateral, 5 in. long, 2 in. wide; petiolules .25 to .5 in. long. Scape 8 in. long. Spathe 2 in. long, tube 1.25 in. long, white, limb ovate cuspidate purple, edges everted round mouth. Spadix little longer than tube, appendix filiform. Male flowers, <sup>Stamens</sup> ovaries <sup>5-6</sup> many, stigma penicillate, 4-celled. *Hab.* Among rocks and in woods, from 3000 to 5000 ft. altitude. Not rare. Perak, Thaiping Hills; Hermitage Hill; Batang Padang; Telom. Selangor, Menuang Gasing (Kloss).

(4) **A. fimbriatum** *Masters, Gard. Chron.* 1884, ii. 680, fig. 119; *Bot. Mag. t. 7150; Hook. fil. F.B.I. vi. 502; Ridl. Mat. iii. 8.*

Tuber hemispheric, .75 in. through. Leaves 2, petioles 6 to 8 in. long, stout; leaflets 3 ovate cuspidate, slightly inæquilateral, 6 to 7 in. long, 5 in. wide; petiolules .25 in. long, glaucous beneath. Scape 8 to 12 in. long. Spathe 2 to 3 in. long, limb ovate acuminate, arched, 3 in. long, deep red purple. Spadix 9 in. long, appendage filiform, covered with hair-like processes, purple, male portion 2 in. long; flowers pedicellate, 6-celled. Female portion .5 in. long. *Hab.* Limestone rocks, in the north and east, Pahang, Kota Glanggi. Lankawi islands (Curtis, Robinson). *Distrib.* South Siam.

(5) **A. Wrayi** *Hemsl. Journ. Bot.* 1887, p. 205; *Ridl. Mat. iii. 8.*

Leaf 1, pedatisect; petiole 8 to 12 in. long, reddish with transverse lighter patches, lobes 4 to 8, narrow lanceolate or elliptic acuminate, 6 to 8 in. long, .5 to 1.5 in. wide, deep green; petiolules, lateral .5 in. long, terminal 1 in. long. Scape mottled, 1.5 ft. long. Spathe tube 3 in. long, stout, limb broad ovate acuminate, 4.5 in. long, 2 in. wide, light green, margins very broad, deflexed. Spadix appendix long, filiform, pale green, 6 in. long. *Hab.* Mountain forests, Pahang, Telom (Ridley). Perak, Thaiping Hills (all collectors); Gunong Inas (Yapp).

(6) **A. Scortechinii** *Hook. fil. F.B.I. vi. 503; Ridl. Mat. iii. 8.*

Tuber oblong. Leaf 1 or 2, pedatisect; petioles 4 in. long, pale with reddish bars, limb 3- to 6-lobed, lobes linear or lanceolate

acuminate, deep green with 2 longitudinal white bars, 6 to 7 in. long. Scape 13 in. tall, pale with transverse reddish bars. Spathe tube green, limb ovate, 1 in. long, .75 in. wide, yellow striped and tipped green. Male spadix 2 in. long, appendix filiform, yellow, hardly projecting from tube. Anthers 3, connate, stipitate. Female unknown. *Hab.* Mountain woods. Selangor, Bukit Hitam; Semangkok Pass; Mengkuang Lebah (Robinson). Perak, Bujong Malacca. Penang, Government Hill (Curtis).

#### 4. TYPHONIUM, Schott.

Tuberous herbs. Leaves few, entire or 3- to 5-lobed or pedatisect. Spathe base tubular, limb ovate-lanceolate or linear deciduous. Spadix exsert, appendix long. Male flowers numerous. Anthers oblong sessile. Females crowded, some neuters above them. Ovary 1-celled. Berries oblong, 1- or 2-seeded. Species 15, Old World tropics.

Limb of spathe broadly ovate acuminate.

Stem subterranean tuberous.

Appendix short and thick; tip of spathe not coiled . . . . . (1)

Appendix longer, slender; lip of spathe coiled . . . . . (2)

Stem above ground, supported by roots . . . . . (3)

Limb linear, stem tuberous.

Small plant; inflorescence 3 in. long . . . . . (4)

Large plant; inflorescence 6 in. long . . . . . (5)

(1) **T. trilobatum** Schott, *Wien Zeitschr.* iii. 72; *Hook. fil. F.B.I.* vii. 509; *Ridl. Mat.* iii. 9.

Tubers .5 in. across. Leaves trilobed, 3 or 4; midlobe ovate acuminate, 6 in. long, 3 in. wide, laterals shorter, sub-bilobed at base, inæquilateral; petioles 15 in. long. Scape 1 in. long, green, mottled red. Spathe tube broad, 2 in. long, 1 in. wide, olive, blade ovate acuminate, deep red, 5 to 7 in. long, 3 in. across. Spadix nearly 6 in. long. Appendix cylindrical red, base dilated and truncate, 3 in. long, .4 in. through, nude part below, .25 in. long. Male part rose pink, .5 in. long; anthers 4-lobed. Below a nude part, .5 in. long, then numerous filiform neuters. Female portion .4 in. long. Fruit oblong, 1-seeded. *Hab.* Waste ground in villages, chiefly on the east coast and in the north, Pahang, Pekan and other spots on the Pahang River. Perlis, Kanga. Kelantan, Chaning. Rahman, Koh Chai Kow, foot of Bukit Besar (Gwynne-Vaughan). Jalor, Biserat (Gwynne-Vaughan). *Distrib.* Upper Laos, Cambodia, Siam, India, Ceylon.

(2) **T. Roxburghii** Schott, *Aroid.* i. 12 t. 17; *Ridl. Mat.* iii. 10.

Tuber sub-globose, young leaves ovate cordate, adult 3-lobed, side-lobes lanceolate very inæquilateral on the outer side, 3.5 in. long, 1.5 in. wide; midlobe ovate acuminate, 5 in. long, 3 in. wide; petioles 6 in. long. Scape 1 in. long. Spathe tube 1.5 in. long,

greenish, streaked brown-red, limb 2 in. across, ovate acuminate, dark brown red, tip greenish, convolute. Spadix 8 in. long. Appendix 6 in. long, cylindric acuminate, deep purple. Male portion .4 in. long. Stamens in 8 or 9 whorls, yellow, pollen pink; below a nude portion bent, .5 in. long. Neuters cylindric, yellow. Female portion short. *Hab.* Weed in waste ground, Singapore, Botanic Gardens. Malacca (Cantley). Penang (Curtis). *Distrib.* India, Ceylon, Borneo, Philippines, Java.

(3) **T. fultum** *Ridl. Roy. As. Soc. S. Br.* 41, p. 45; *Mat.* iii. 10.

Not tuberous, the stem emitting short stilt roots. Leaves 5 or 6, ovate-cordate or deltoid-hastate, 2 to 3 in. long, 2 in. wide, tip acute; petioles .5 in. long. Scape .25 in. long. Spathe tube green, dilate, .25 to .5 in. long, limb 1 to 2 in. long, .5 in. wide, purple ribbed, tip green. Spadix as long, appendix orange brown, cylindric, base thick, acuminate above, below a nude part, then male, 6 rows of yellow anthers, then a longer nude portion; neuters numerous, horn-shaped, white. Female one whorl of pistils. *Hab.* Limestone rocks, in shady damp spots. Selangor, Batu Caves (Ridley). Lankawi islands (Curtis).

(4) **T. filiforme** *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 45; *Mat.* iii. 11.

Tuber globose, .3 in. through. Leaves 2 or 3, deltoid-hastate acuminate, lobes acute, 2 to 3 in. long, .75 to 1.5 in. wide; petioles slender, 2 to 5 in. long. Scape .25 in. long, tube .25 in. long, olive green, limb linear very narrow, yellowish, spotted red. Spadix slender, 3.5 in. long; appendix ochre, 3 in. long, filiform, nude portion long; male short; neuters filiform twisted. Female flowers few. *Hab.* Rare, Limestone rocks, Perak, Kwala Dipang (Ridley).

(5) **T. cuspidatum** *Bl. Cat. Hort. Buit.* 101; *Rumphia*, i. 133, pl. 10, figs. 1-3; *Ridl. Mat.* iii. 11; *Hook. fil. F.B.I.* vi. 511. Arum flagelliforme *Lodd. Bot. Cat. t.* 396; *Wight Ic. t.* 791.

Tuber oblong or globose, 1 in. long. Stem 2 in. tall. Leaves 3 or 4, ovate-hastate or triangular, 4 in. long, 1 to 1.5 in. wide; petioles 3 to 9 in. long. Scape 1 in. long. Spathe base dilated, globose, bright green, .75 in. long; limb linear acute, deflexed, 4 in. long, .5 in. wide, green, edged red-brown. Spadix 4 to 6 in. long; appendix filiform, base conic, yellow, 3 to 5 in. long. Male flowers yellow, below these white decurved neuters, and horizontal purple-tipped ones. Female portion short. *Hab.* Waste ground. Singapore, Gardens (probably introduced). Malacca (Griffith), in ditches near the town. Penang, Sepoy lines; Pulau Tikus (Curtis). *Distrib.* India, Siam, Malaya, Cambodia to Philippines and Timor.

var. *angustissimum* *Ridl. Journ. Roy. As. Soc. S. Br.* 218. Blade of leaf trifid with narrow linear lobes, central one erect, 5 to 6 in. long, .5 in. wide at base. *Hab.* Perlis, Kanga (Ridley). *Distrib.* South Siam.



## 5. AMORPHOPHALLUS, Bl.

Herbs usually with large round tubers. Leaves produced singly from the top of the tuber, often very tall; petiole tall and stout, smooth mottled or scabrid, blade 3-lobed with pinnatisect segments. Spathe produced after the fall of the leaf, peduncled, tube convolute, limb usually broad. Spadix with a large conic or cylindric appendix. Male and female flowers usually numerous, dense, neuters 0. Anthers 3 or 4 sessile oblong cells with apical pores. Ovaries globose or flattened. Style short or long. Berries elliptic or sub-globose. Species about 40, tropics of the whole world.

Style longer than ovary.

Petiole scabrid; spathe very broad; peduncle short; appendage cone-shaped . . . (1) **A. campanulatus**

Style short; petiole smooth.

Spadix little longer than spathe or shorter, base tubular.

Bulbiferous; appendage fusiform; male flowers scattered . . . (2) **A. sparsiflorus**

Not bulbiferous; appendage cylindric-conic; flowers crowded; spadix 6 in. long . . . (3) **A. bufo**

Not bulbiferous; appendage cylindric-conic; male flowers very numerous, crowded; spadix 3 in. long . . . (4) **A. minor**

Not bulbiferous; appendage cylindric-conic; spathe limb green, oblong, cleft to base . . . (5) **A. viridis**

Not bulbiferous; appendage very attenuate . . . (6) **A. perakensis**

Spadix longer than spathe.

Appendage large, conic.

Spathe yellow; ovaries discoid . . . (7) **A. Prainii**

Spathe flesh colour; ovaries flask-shaped . . . (8) **A. carnosus**

Appendage long, cylindric.

Peduncle 1 ft. tall; leaf 5-lobed . . . (9) **A. hæmatospadix**

Peduncle 2 to 3 ft. tall; leaf pinnatisect . . . (10) **A. variabilis**

Peduncle 3 ft. tall; leaf 3-branched, lobes 3 or 4 on each branch . . . (11) **A. elegans**

(1) **A. campanulatus** Bl. *Rumphia*, i. 139, t. 32, 33. *A. malaccensis* Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 46; *Mat.* iii. 12.

Tuber hemispheric, brown, 6 in. across, warted. Leaf, petiole 5 ft. tall, 1 in. through, green, scabrid, blade 5 ft. across, light green, lobes 6 to 10 in. long, acuminate. Peduncle stout, 2 or 3 in. long, growing to 30 in. long in fruit. Spathe broadly campanulate, tube pale pinkish and greenish with white spots, 3 to 4 in. long, limb undulate spreading, red brown, 12 to 18 in. across. Spadix about 18 in. tall. Appendage large, conoid, blunt, wrinkled and indented, deep red brown, 6 in. long. Male portion cylindric, 3 in. long; anthers oblong, crowded. Female portion longer than male, 3.5 in. long; styles .25 in. long. Drupes red, .5 in. long, numerous on a stout peduncle, 30 in. tall. *Hab.* Open pastures and borders of woods, not rare. Very fœtid of carrion when first open. Malacca, Panchur (Goodenough); Bukit Payong (Hervey). Pahang, Kwala

Tembeling. Selangor. Perak, Thaiping; Kampong Kota (Wray). Perlis near Kanga in grassy fields. Jalor, Biserat (Gwynne-Vaughan). *Distrib.* Andamans, Siam, Sumatra, Java.

(2) **A. sparsiflorus** Hook. *fl. F.B.I.* vi. 516; *Ridl. Mat.* iii. 12. *A. microspadix* Engl. *Pflanzenreich* iv. 23c, p. 94.

Tuber orange-shaped. Leaf bulbiferous at the top of the petiole; petiole green, shaded red brown; leaflets 7, oblanceolate acuminate, 6 to 8 in. long, 1.5 in. wide, shortly petiolulate. Peduncle 1 to 2.5 in. long. Spathe 4 to 5 in. long, tube 1.5 in. long, red-brown, spotted purplish brown, limb ovate-oblong, sub-erect, acute, 2 in. across, edges revolute round the tube mouth. Spadix 3.5 in. long; appendage fusiform-conic, 2 in. long. Male portion .5 in. long. Stamens scattered. Female portion as long. Pistils sessile globose; style very short. *Hab.* Mountain forests. Perak, Thaiping Hills at 2500 ft. altitude (Wray).

(3) **A. bufo** Ridl. *Journ. F.M.S. Mus.* iv. 89.

Tuber hemispheric, 3 in. wide. Leaf 4 ft. tall; petiole mottled grey and green, smooth, blade 18 in. across, much divided, lobes ovate to lanceolate, cuspidate, decurrent. Peduncle 3 ft. tall, 1.5 in. through at base, mottled and blotched greenish-grey. Spathe tube 3 in. long and as wide at the mouth, limb 6 in. long, 4 in. broad, oblong ovate, the front with circular greenish blotches on a brown purple background, back pale olive, spotted pale greenish. Spadix 6 in. long. Appendage blunt, cylindrical-conic, 3 in. long, 1 in. through, dull purple. Male portion 1 in. long. Stamens, anther cells 2. Female .5 in. long; pistile sub-stipitate; style cylindrical distinct. *Hab.* Mountain forests, Pahang, Telom Woods at 4000 ft. altitude (Ridley). Selangor, Menuang Gasing (Kloss).

(4) **A. minor** Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 46; *Mat.* iii. 13.

Tuber 1 in. through; petiole 9 in. long, slender, blade 3-branched; leaflets numerous thin, green, lanceolate acuminate inæquilateral, 3 in. long, 1 in. wide. Peduncle 8 to 12 in. long. Spathe 3 to 4 in. long, base convolute, limb lanceolate acuminate, 1 to 7.5 in. across. Spadix 3 in. long, appendage cylindrical, conic, 1 in. long. Male portion as long; flowers very numerous, crowded. Females few; styles very short. *Hab.* Forests. Perak, Thaiping Hills. Province Wellesley, Tasek Gelugur (Ridley).

(5) **A. viridis** Ridl. *Journ. Roy. As. Soc. S. Br.* 51, p. 63.

Tuber elongate cylindrical. Leaf, petiole 9 in. tall, smooth, green, blade 18 in. across; leaflets elliptic acuminate acute, 4 in. long, 1 in. wide, about 4 pinnæ to the lamina. Peduncle 1 ft. tall. Spathe 4 to 6 in. long, cleft nearly to the base, apple green, limb oblong, tip rounded, 4 to 5 in. long, 1 in. wide. Spadix shorter. Appendage cylindrical obtuse slender, 3 in. long, cream white. Male part .75 in. long; flowers cream, margined with violet. Female flowers about 20, yellow. Drupes 1- or 2-seeded, oblong or sub-globose, .25 in.

long, red. *Hab.* Adang islands on Pulau Tengah in screes of dusty dry clay and on the seashore (Ridley).

(6) **A. perakensis** Engler, *Pflanzenreich*, iv. 23c, p. 90.

Tuber small. Leaf, petiole 2 ft. long, blade glaucescent trisect, segments impartite then pinnate partite, lobes oblong-lanceolate acuminate, 1·2 to 2·4 in. long. Peduncle 1·5 in. long. Spathe 3 in. long, 1 in. wide. Spadix appendage very attenuate, 1·5 in. long. Male portion 2 in. long. Stamens 2 or 3 in a flower, crowded; anthers sub-sessile, female part short; ovaries sub-globose; style as long; stigma 3- to 5-lobed. *Hab.* Perak, no locality given (Wray 3474).

I have not seen this plant.

(7) **A. Prainii**, Hook. *fil. F.B.I.* vi. 516.

Tuber 6 in. across or more. Leaf petiole 2 to 6 ft. tall, stout, green, marbled white, blade light green, 4 ft. across; leaflets 4 to 8, on each branch, lanceolate caudate, 5 in. long, 2 in. wide. Peduncle 3 in. long, thick, mottled like petiole, with large pink sheaths. Spathe tube 2 to 3 in. long, pinkish outside, inside lemon yellow, deep maroon purple at the base, limb ovate, broad blunt, 8 in. across, yellow. Spadix as long; appendage 2 in. long, 1·5 in. through, greyish white. Male portion 1 in. long. Stamens numerous, crowded, white. Female flowers in 3 or 4 spirals, crimson; style stout; stigma bilobed. Drupes ·25 in. long, elliptic, red. *Hab.* The commonest species in forests, especially by forest paths. Singapore, Bukit Timah; Selangor, Batu Caves. Pahang River. Perak, Thaiping Hills. Dindings. Penang, Penara Bukit and Hill (Curtis, etc.). Rahman, Bukit Besar (Gwynne-Vaughan). *Distrib.* Sumatra. *Native names:* Loki; Likir; in Sakai language, Begung. *Use:* For admixture with *Antiaris* latex in dart poison, used by Sakais.

I once found a plant in Penang in which the appendage was quite suppressed.

(8) **A. carnosus** Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 47; *Mat.* iii. 14.

Tuber rounded, flat topped, 2 in. across. Leaf, petiole 14 to 15 in. tall, ·5 in. through at base, smooth, dirty white with Indian red blotches, blade 3-branched, 6 to 8 in. wide; leaflets lanceolate, light green, 5·5 in. long, 1·5 to 1·75 in. wide. Peduncle 3·5 in. long. Spathe 5 in. long, loosely convolute, limb pinkish, blotched brown. Spadix a little longer; appendage conic, obtuse, 3 in. long, 1 in. through at base, flesh colour; male portion 2 in. long, greenish; flowers crowded densely. Ovaries flask-shaped; styles short and thick. *Hab.* On limestone rocks where a few decayed leaves have rested. Lankawi island (Curtis). Setul, Bukit Rajah Wang. Perlis, Bukit Lagi, Kanga (Ridley).

(9) **A. hæmatospadix** Hook. *fil. F.B.I.* vi. 517; *Ridl. Mat.* iii. 14.

Tuber hemispheric. Leaf 2 ft. tall; petiole 20 in. long, ·75 in.

through at base, olive colour, blade 1 ft. across, trifold, with 5 oblong-lanceolate acuminate dark green leaflets 5 to 7 in. long, 2 in. across, narrowed at base. Peduncle 10 to 12 in. tall, black; sheaths 6 in. long, orange at base. Spathe 6 in. long, tube broad, limb lanceolate acuminate, 1 in. wide, pure white, base and back pinkish. Spadix 6 to 7 in. long; appendage cylindrical, blunt, deep purple, almost black. Male portion short red. Female portion cylindrical; flowers crowded, sessile, globose; style stout. *Hab.* On limestone rocks. Lankawi isles. Terutau (Curtis). Perlis, near Kanga. Jalor, Biserat (Gwynne-Vaughan).

(10) *A. variabilis* *Bl. Rumphia*, i. 146, t. 36, 37; *Ridl. Mat.* iii. 14. *A. elatus* *Hook. fil. F.B.I.* vi. 316. *Brachyspatha variabilis* *Schott, Syn.* 35; *Gen. Ar. t.* 29; *Gard. Chron.* 1876, figs. 129, 130.

Tuber cylindrical, carrot-shaped or hemispheric. Leaf, petiole 6 to 30 in. tall, base .75 in. through, smooth, olive green with pale spots, blade trifold pinnatisect, lobes ovate to lanceolate acuminate, 5 in. long, 2 in. wide. Peduncle 3 to 4 ft. long, marbled olive brown. Spathe base campanulate, 2 in. long, limb lanceolate narrow, .5 in. long. Spadix 1 ft. long or more; appendage cylindrical acuminate, .5 in. through, white. Male portion 1.5 in. long; flowers crowded, light brown. Female shorter; pistils globose; style very short. *Hab.* Limestone rocks growing in clefts. Lankawi. Terutau. Perak, Thaiping Hills. *Distrib.* Java.

(11) *A. elegans* *Ridl. Journ. Roy. As. Soc. S. Br.* 86, p. 310.

Tuber 3 in. through, globose. Leaf, petiole slender, 2 to 3 ft. tall, green, mottled grey, smooth, blade of 3 branches, two outer ones 3-branched with petiolules 3 in. long, lobes 3 or 4 on each branch oblong, long-cuspidate, base cuneate inequilateral; nerves 11 pairs, secondaries nearly as conspicuous, all inarching in an intramarginal nerve; 6 in. long, 1.5 in. wide, cusp 1 in. long; petiolules .12 in. long. Peduncle slender, 3 ft. tall, mottled grey-green and pink with scattered light green blotches. Spathe limb narrow, lanceolate acute, 5 in. long, pale green with small dark green blotches. Female portion of spike .5 in. long, green with sessile yellow stigmas. Male portion cylindrical, 3 in. long. Stamens white; anther-cells pink. Appendage long cylindrical, slender rugose white, 4 in. long. *Hab.* Mountain forests, Negri Sembilan, Bukit Tinggi (Ridley).

## 6. HAPALINE, Schott.

Small tuberous herbs. Leaf 1, petiolate thin, cordate. Scape slender. Spathe tubular at base, limb lanceolate or linear-oblong. Spadix as long, slender. Male part elongate. Female part adnate to the tube. Male flower an elongate peltate stipitate scale with four to eight anther-cells from margin. Ovaries few flask-shaped, 1-celled, 1-ovuled. Species 3, Burma, Malay Peninsula, Borneo.

(1) **H. Brownei** *Hook. fil. F.B.I.* vi. 521; *Bot. Mag. t.* 7325; *Ridl. Mat.* iii. 15.

Tuber small globose. Leaf, petiole 3 to 7 in. long, blade ovate, cordate, lobes rounded, edges crisped, undulate above bullate, 3 to 6 in. long, 2.5 to 3 in. across. Peduncle 4 to 5 in. long, pink. Spathe tube 1 in. long, limb lanceolate acute, 1.5 in. long, .5 in. wide, white, reflexed. Spadix 3 in. long, erect, slender. Male flowers scattered, .15 in. long; anthers 8. Females flowers few. *Hab.* On rocks. Kedah, on Gunong Geriang (Ridley). Lankawi islands (Curtis).

## 7. COLOCASIA, Linn.

Large herbs with a stout erect stem and large ovate cordate leaves. Spathe 1 or several peduncled, base convolute constricted at the mouth, limb dilate. Spadix shorter. Appendage conic cylindrical or o. Male portion large; flowers crowded. Female portion shorter, with a number of neuters between it and the male. Ovaries conic or oblong; style and stigma globose. Ovules numerous and parietal. Fruit oblong. Seeds very numerous, small. Species 6 or 7, tropical Asia.

Leaves 6 in. long or little more, dark green; spadix

slender yellow . . . . . (1) **C. antiquorum**

Leaves 6 ft. long, white beneath; petiole white;

spadices several, large, white . . . . . (2) **C. gigantea**

(1) **C. antiquorum** *Schott, Melet.* i. 18; *Hook. fil. F.B.I.* vi. 523.

Dwarf plant with stolons. Leaves ovate-cordate, dark green, 6 to 16 in. long, 6 to 8 in. wide; petioles 12 to 40 in. long. Spathe 8 to 18 in. long, caudate acuminate, yellow. Spadix short. Female portion as long as that of the neuters. Male part much longer. *Hab.* Common in low, wet ground, largely cultivated by the Chinese as pig food, and often persisting in abandoned ground. It is cultivated in all hot countries. *Native names:* Keladi Telor; Keladi China, or Keladi Hudang.

The form we have is *C. nymphaefolium* Vent., with small-sized leaves and narrow spathe-limb.

(2) **C. gigantea** *Hook. fil. F.B.I.* vi. 524; *Ridl. Mat.* iii. 15.

Stem short and stout. Leaves, petioles 4 ft. long, thick hoary, blade ovate-cordate, 6 ft. long, thin, light green, white beneath. Spadices several in the leaf axil, on peduncles 6 in. long. Spathe tube 2 in. long, thick, green, limb ovate, boat-shaped, pure white, 5 in. long, fragrant. Spadix white; appendage conic blunt. Male portion 4 in. long, .5 in. through. Flowers .12 in. across, irregular, flat. Neuter portion 1.5 in. long. Female conic, .75 in. long. Ovaries yellow. Fruit dry, capsular, .25 in. long. Seeds fusiform, ribbed. *Hab.* Among limestone rocks and on edges of forests. Not rare. Selangor, Batu Caves. Perak, Tambun cliffs (Burkill);

Ipoh (Curtis). Perlis, Tebing Tinggi. Adang islands, Pulau Rawei. Kelantan, Chaning (Ridley). *Distrib.* Cochinchina, Siam, Borneo, Java.

### 8. ALOCASIA, Schott.

Herbs with short or long stout erect stems. Leaves ovate cordate, or hastate, rarely entire, long-petioled. Spathes peduncled, base convolute, constricted above, limb lanceolate or cymbiform, deciduous. Spadix shorter; appendage cylindrical; flowers as in *Colocasia*, but ovules few basilar erect. Fruit drupaceous, pulpy, red. Seeds large, 1 to 3. Species about 20, tropical Asia.

Leaves entire, peltate . . . . .	(1) <b>A. Beccarii</b>
Sinus deep, lobes long, divaricate.	
Petiole mottled; stigma sessile . . . . .	(2) <b>A. denudata</b>
Petiole plain; style distinct . . . . .	(3) <b>A. Lowii</b>
Sinus shallow.	
Lobes of leaf short, rounded, glabrous . . . . .	(4) <b>A. ovalifolia</b>
Lobes of leaf blunt, pubescent beneath . . . . .	(5) <b>A. pubera</b>

(1) **A. Beccarii** *Engl. Bull. Soc. Tosc. di Ort.* 1879, p. 300; *Malesia*, i. 293, pl. 26; *Ridl. Mat.* iii. 16. *A. perakense* *Hemsl. Journ. Bot.* 1887, p. 205.

Stem creeping, 6 in. long or more. Leaves several; petioles 6 in. long, blade entire, lanceolate acuminate or elliptic, peltate, 9 in. long, 4 in. wide; nerves 3 or 4 pairs. Peduncle 3 to 8 in. long, white. Spathe white, tube cylindrical, 1 in. long, limb cymbiform, 1 in. long. Spadix 1.75 in. long, appendage cylindrical obtuse, .75 in. long. Male part .5 in. long. Female flowers in three rows. Drupe .25 in. long. Seed globose. *Hab.* On rocks in forest streams, at 2000 to 4000 ft. altitude. Selangor, Bukit Hitam (Kelsall). Pahang, Telom. Perak, Thaiping Hills (all collectors). *Distrib.* Borneo.

(2) **A. denudata** *Engl. Arac.* 507; *Hook. fil. F.B.I.* vi. 525; *Ridl. Mat.* iii. 17. *A. singaporensis* *Linden, Garten-flora*, xiv. 252. *A. Curtisii* *Hemsl. Kew Bulletin*, 1894, p. 347. (Fig. 215, p. 98.)

Stem 2 in. long. Leaves 1 to 3; petioles 15 to 24 in. long, .5 in. through, marbled transversely with grey, blade hastate, lobes divaricate, blunt or sub-acute, over 1 ft. long, 9 in. wide, dark green, veins paler, occasionally purple beneath. Spadices 1 to several; peduncles 6 to 12 in. long, marbled grey. Spathe 4 to 6 in. long, tube 1 to 1.5 in. long, swollen, limb pale green or white, oblong cuspidate at length reflexed, 5 in. long, 1 in. wide. Spadix 3.5 to 4 in. long. Appendage cylindrical, 1.5 in. long, pale ochre or orange. Male part .5 in. long, white; flowers oblong crenulate; stamens 6. Neuter portion .25 in. long, white or orange. Female portion cone-shaped, .5 in. long; stigmas 4-horned, sessile. Fruit globose, red, 1- to 3-seeded. Seeds black, sub-globose, .12 in. long. *Hab.* Common in hedges, woods, etc., all over the Peninsula. Somewhat variable in leaf form. Singapore, Bukit Timah; Woodlands, etc.,

very common. Johor, Bukit Murdom (Kelsall); Pulau Dayong (Feilding). Pahang; Kota Glanggi; Bukit Telega (Machado). Malacca (Maingay); Pulau Besar (Griffith); Ayer Bumban (Ridley). Dindings, Lumut. Perak. Lankawi islands (Curtis). Kedah, Gunong Geriang. *Distrib.* Lingga, Borneo. *Native names*: Keladi Rimau; Keladi Ular.

The species was based on a leaf collected by Gaudichaud in Singapore, and is doubtless this very common Singapore plant. *A. longiloba* Miq. *Fl. Ind. Bat.* iii. 207, may be this, but Hallier suggests it is *A. Lowii*; the description is quite insufficient to decide. *A. denudata* varies much in the form of the leaves, and seedlings have entire peltate leaves like those of

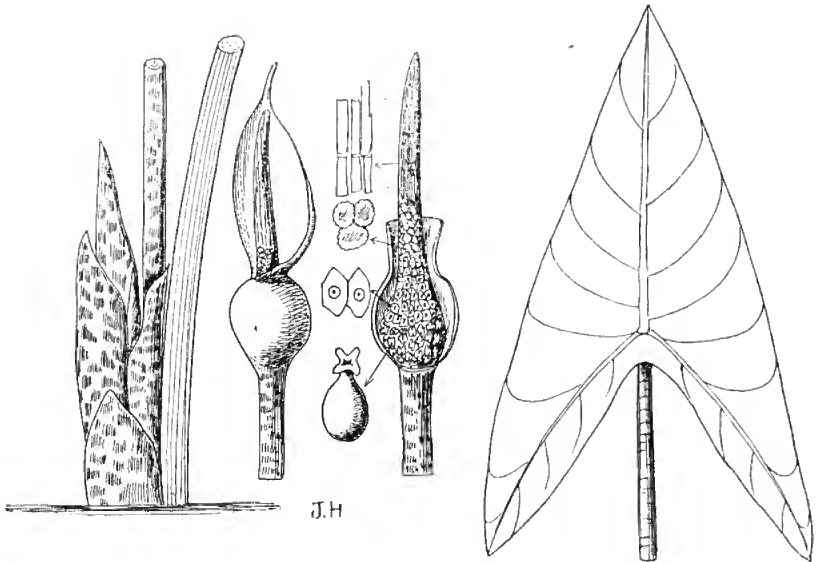


FIG. 215.—*Alocasia denudata*.

*A. Beccarii*; adult forms vary from rounded leaves with sub-parallel basal lobes, to narrow acuminate leaves with long, narrow, widely divaricate lobes. The Bukit Telega plant had the leaves deep purple beneath and the veins above very pale, and much resembled *A. Lowii*, but the petiole was clouded, and it was certainly a form of *A. denudata*, unless perhaps a hybrid with *A. Lowii*.

(3) *A. Lowii* Hook. *fil. Bot. Mag. t.* 5376; *Ridl. Mat.* iii. 18. *Caladium Lowii* Lem. *Ill. Hort. t.* 360.

Stem short, stout. Leaves 1 or 2; petioles 1.5 to 2 ft. tall, greyish green with fine black marks, not mottled, blade ovate cordate to hastate cuspidate, 1.5 ft. long, 7 to 12 in. wide, dark green, veins and margin white, back purple. Peduncle 8 to 14 in. long, pale green. Spathe 5 in. long, tube 1 in. long and as thick, limb 4 in.

long, .5 to 1.25 in. wide, boat-shaped, pale green. Spadix 3.5 in. long, base nude. Appendage cylindrical acute, cream-colour, 1.5 to 3 in. long, .25 in. thick. Male part .6 to 1 in. long; flowers rhomboid crenulate. Female part 1 in. long; pistils in six whorls; ovaries sub-globose; styles thick, distinct. *Hab.* On limestone rocks. Selangor, Batu caves. Perak, Kwala Dipang. Perlis at Kanga. *Distrib.* Borneo, Java.

(4) *A. ovalifolia* Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 47; *Mat.* iii. 18.

Stem 1 ft. tall. Leaves ovate cordate acute; lobes rounded, dark green, 1 to 2 ft. long, 5 to 12 in. wide; nerves 20 pairs; petioles over 1 ft. long. Peduncle 6 in. long or less. Spathe 3 to 6 in. long, tube 1.5 in. long, limb 3 in. long, .5 in. wide, oblong obtuse. Spadix slender. Appendage cylindrical, .75 in. long. Male part 1 in. long, below a nude portion. Female portion 1 in. long. *Hab.* Forests. Johor, Gunong Pantai. Selangor, Semangkok Pass; Ginting Peras; Bukit Kutu. Perak, Thaiping Hills. Penang, Moniot's Road. *Native name*: Kelembahang.

(5) *A. pubera* Schott, *Syn.* 47.

Stem stout. Leaves ovate cordate, lobes blunt, pubescent beneath; nerves 10 pairs; 6 in. long by 6 in. wide (or larger); petioles 15 in. long. Spathe 4 in. long, tube green, limb lanceolate, white, finely lined with crimson. Spadix, appendage cylindrical, blunt, yellow. Peduncle 7 in. long. Fruiting spike 1 in. long. *Hab.* Perak, Sungei Larut (Wray). *Distrib.* Java.

#### CULTIVATED SPECIES.

*A. INDICA* Schott, *Oestr. Bot. Wochenbl.* 1854, 410; *Hook. fl. l.c.* 525. A tall stemmed plant with ovate deep cordate leaves, 2 to 3 ft. across and *A. macrorrhiza* Schott, *l.c.* 409; *Hook. fl. l.c.* 526, a similar plant with more peltate leaves, the lobes connate for one-tenth of their length. *Native names*: Birah; Keladi Sebaring. *Use*: The stems are cooked and eaten like yams.

These plants are cultivated here as in most part of the tropics and occasionally remain in abandoned gardens for a time.

*A. CUCULLATA* Schott, with broad ovate cordate leaves and 6 or 7 pairs strongly marked nerves also occurs in waste ground but less commonly, as it is not popular with the natives.

Of the allied genus *Xanthosoma* Schott, inhabitants of the South American and the West Indies, two or three species are now cultivated in native gardens; a large green-leaved one, *X. sagittifolium* Schott, and a purple-leaved one, *X. violaceum* Schott.

#### 9. AGLAONEMA, Schott.

Herbs with an erect or creeping stem. Leaves ovate or oblong, entire. Spathes peduncled, boat-shaped, base shortly convolute,



deciduous. Spadix as long or shorter, base nude, no appendage. Upper male portion cylindrical or clubbed. Male flowers, stamens 2 to 4, oblong. Female flowers few, ovary 1- or 2-celled; stigma discoid; ovules solitary. Drupes fleshy, 1-seeded. Species about 20, Indo-Malayan.

Stems creeping.

Leaves stiff linear-oblong, base narrow . . . (1) **A. Griffithii**  
 Leaves broad ovate, base broad . . . (2) **A. costatum**

Stems erect; spadix cylindrical.

Leaves linear-oblong coriaceous large, close-  
 nerved . . . (3) **A. oblongifolium**  
 Leaves thin oblong; nerves 7 to 10 pairs, con-  
 spicuous . . . (4) **A. Schottianum**  
 Leaves narrow lanceolate linear . . . (5) **A. angustifolium**  
 Spadix clubbed; leaves smaller, oblong-ovate . . . (6) **A. pictum**.

(1) **A. Griffithii** Schott, *Syn.* 123; *Hook. fil. F.B.I.* vi. 528; *Ridl. Mat.* iii. 19. *A. palustre* Teysm. and Binn. *Naturl. Tijdsch.* xxv. 305. *Aglaodorum Griffithii* Schott, *Gen.* 758.

Rhizome creeping, stout. Leaves erect fleshy, linear-oblong, blunt, 12 to 16 in. tall, 3 to 4 in. wide, dull dark green; petioles 26 in. long or more. Peduncle from rhizome, 6 to 12 in. long. Spathe boat-shaped, cuspidate, 3 in. long, 1 in. across, edges overlapping at base, pale green. Spadix as long. Male part cylindrical stout, 2.5 in. long. Female part, pistils 5, yellow, base broad, narrowed upwards. Fruit ovoid, 1.5 in. long, 1 in. through, green. Pericarp thick. *Hab.* In tidal swamps among Nipa palms probably common in all tidal swamps. Singapore. Malacca (Griffith). *Distrib.* Sumatra and Borneo.

The large green ovoid fruit of this differs much from the red drupes of the other species, being adapted for river and tide dispersal.

(2) **A. costatum** N. E. Br. *Gard. Chron.* 1892, i. 426; *Hook. fil. F.B.I.* vi. 531; *Ridl. Mat.* iii. 19.

Rhizome creeping, 5 to 6 in. long or more. Leaves often crowded; petioles 3 in. long or more, blade coriaceous lanceolate or ovate acute, base broad rounded, 6 to 12 in. long, 3 in. wide, deep blackish green with white blotches. Peduncle 3 in. long. Spathe 1 in. long, oblong, green. Spadix 1.25 in. long, nude base .25 in. long. Male portion thick blunt, 1 in. long. Female flowers 10 in one whorl. *Hab.* On and about limestone rocks, Lankawi, woods near Kwah (Curtis).

var. *immaculatum* Ridl. *l.c.* 20. Leaves more scattered; petioles longer to 9 in. long, blade deep black green with a white midrib. Occurs with the last and is commoner. *Distrib.* Siam, Laos.

A popular and easily grown pot plant.

(3) **A. oblongifolium** Schott, *Wien Zeitschr.* iii. 1829, p. 892; *Hook. fil. F.B.I.* vi. 528; *Ridl. Mat.* iii. 20. *A. integrifolium* Schott, *Melet.* 20. *Calla oblongifolia* Roxb. *Fl. Ind.* iii. 516; *Wight Ic. t.* 806. *Calla nitida* Jack, *Mal. Misc.* i. No. 1, 24.

Stem stout, erect, 2 ft. tall. Leaves thick linear-oblong, narrowed at the base, dark green usually with white or grey splashes; nerves very close, 1 ft. long, 3.5 in. wide; petioles 4 to 6 in. long. Spadices numerous; peduncles 4 to 5 in. long. Spathe oblong mucronate, light polished green, 2 in. long. Spadix longer. Male part 1.5 in. long, cylindrical blunt, white. Female part .5 in. long. Ovaries in three whorls. Drupe .75 in. long. Seed elliptic-oblong, green. *Hab.* In damp spots in dense forests, common. Singapore (Wallich); Chan Chu Kang; Bukit Mandai. Pahang, Kwala Tenok, Tahan river. Sungei Ujong, Bukit Sulu (Cantley). Selangor, Batu Caves. Perak, Chanderiang (Kunstler); Hermitage Hill (Curtis). Penang Waterfall. Kedah, Gunong Geriang. Kelantan, Kwala Pertang (Haniff).

var. *Curtisii* N. E. Br. *Gard. Chron.* 1897, 21, p. 70. Leaves striped with white at an angle with the midrib. *Hab.* Penang, Penara Bukit (Curtis). *Distrib.* Lingga, Borneo. *Native name:* Daun Lidah Gajah.

(4) *A. Schottianum* Miq. *Fl. Ind. Bat.* iii. 316; *Hook. fil. l.c.* 530; *Ridl. Mat.* iii. 20. *A. malacense* Schott, *Bonplandia*, 1859, p. 30.

Stem stout, erect, 1 to 2 ft. tall. Leaves, petioles 4 in. long; blade oblong, cuspidate, inæquilateral, herbaceous, base broad; nerves conspicuous, 7 to 10 pairs, 9 to 10 in. long, 2.5 in. wide. Peduncles 1.25 in. long. Spathe oblong cuspidate, 1 in. long, pale green. Spadix white, little longer, not stipitate. Male part cylindrical blunt, fawn colour, with some sterile flowers below. Female flowers few, green. *Hab.* Common in low forests. Whole peninsula, Singapore, Pulau Ubin; Chan Chu Kang. Malacca, Chabau (Griffith). Dindings, Pulau Sembilan; Pulau Rumpia (Kloss). Perak, Larut Hills (Kunstler, Wray). Penang, Pulau Betong (Curtis). Lankawi (Curtis); Terutau (Curtis). *Distrib.* Burma, Java, Borneo.

(5) *A. angustifolium* N. E. Br. *Kew Bulletin*, 1895, p. 19; *Ridl. Mat.* iii. 20.

Stem 2 ft. tall, 1 in. through. Leaves numerous; petioles 3 in. long; lamina lanceolate-linear acuminate falcate fleshy-subcoriaceous; nerves 12 pairs, 1 ft. long, 1.5 in. wide, blackish green. Peduncles 3 in. long. Spathe oblong mucronate, 1.5 in. long, convolute round, pale green. Spadix 2 in. long. Male part cylindrical blunt, 1.5 in. long; neuters few, scattered. Female portion short; ovaries globose. Stipes long. Fruit elliptic-oblong. *Hab.* Forests in the south. Common, Singapore, Chan Chu Kang; Garden Jungle; Bukit Timah. Johor, Gunong Janing (Kelsall). Pahang, Telom. Malacca. Sungei Ujong (Cantley).

var. *undulatum* *Ridl. Mat.* iii. 21. Leaves light green, margins undulate crenulate. *Hab.* Dindings at Lumut (Ridley). *Native names:* Sagut; Sumpuh Bulau; Sumpuh Kring; Pengegehe. *Use:* A decoction of the roots for fever and dropsy.

The type-plant described by Brown was the very local form var. *undulatum*. The leaves of young plants of typical *A. angustifolium* are almost black.

(6) ***A. pictum* Kunth. Enum. iii. 55.** *A. minus* Hook. fil. *F.B.I.* vi. 530; *Ridl. Mat.* iii. 21.

Stem 6 to 9 in. tall, slender. Leaves oblong-ovate or elliptic acuminate, 4 in. long, 1 in. wide, dark green marbled with grey or white or plain green; nerves 3 to 7 pairs; petioles 1 to 1.5 in. long. Peduncles 1 in. long, dark green. Spathe short and broad, oblong, swollen, mucronate, .5 in. long, greenish white. Spadix longer. Male part clubbed, oblong obtuse, .5 in. long, white, a few neuters below. Female flowers about 10, stipes long, base rather long, bent. Drupes .25 in. long, oblong, red. *Hab.* In damp spots in forest; common and variable. Singapore (Wallich); Bukit Timah; Jalan Bray; Chan Chu Kang. Johor, Bukit Soga, Batu Pahat. Malacca, Merlimau. Negri Sembilan, Bukit Sulu (Cantley). Pahang, Pekan. Selangor, Kwala Lumpur.

var. *Scortechinii* *Ridl. l.c.* *A. Scortechinii* Hook. fil. *l.c.* Leaves ovate round, rather abruptly cuspidate; nerves 7 pairs, petioles .5 in. long. *Hab.* Mountain districts, Malacca, Mount Ophir (Derry). Muar, Sungei Pauh (Fox). Selangor, Ginting Bidai; Dusun Tua, Perak (Scortechini).

var. *nanum* *Ridl. l.c.* *A. nanum* Hook. fil. *l.c.* Leaves longer, oblong; nerves more prominent. *Hab.* Perak, Ulu Bubong (Kunstler). *Distrib.* Burma, Sumatra. *Native name:* Selimpat Ayer. *Use.* Leaves eaten as a vegetable.

### 10. HOMALOMENA, Schott.

Stems very short, occasionally stout, rarely over 6 in. long. Leaves herbaceous, oblong-lanceolate or cordate, ovate. Spathe base or the whole convolute persistent in fruit. Spadix included. Male and female portions close together, base often nude, no appendage, neuters often between the male and female. Stamens in hexagonal groups; anther-cells oblong, opening by slits or pores, connective, broad. Female flowers, ovaries ovoid or globose, more or less 2- to 4-celled; ovules in two rows; stigmas sessile, white. Clubbed staminodes subtending each ovary. Berries small, not red, few or many-seeded. Species about 30, Indo-Malaya and Tropical America.

§ 1. *Eu-Homalomena*. Large plants. Leaves broad, usually cordate.

Spathe contracted above the female inflorescence.

- |  |     |                                    |
|--|-----|------------------------------------|
| Leaves oblong narrowed to base . . . . .         | (1) | <b><i>H. rostrata</i></b>          |
| Leaves ovate sagittate . . . . .                 | (2) | <b><i>H. sagittæfolia</i></b>      |
| Leaves oblong hastate . . . . .                  | (3) | <b><i>H. paludosa</i></b>          |
| Spathe not contracted in the middle.             |     |                                    |
| Leaves ovate with deep sinus . . . . .           | (4) | <b><i>H. cœrulescens</i></b>       |
| Leaves triangular-ovate, sinus shallow . . . . . |     | var. <b><i>pontederiæfolia</i></b> |
| Leaves deltoid; spathe small, beaked. . . . .    | (5) | <b><i>H. deltoidea</i></b>         |

§ 2. *Chamaecladon*. Small plants. Leaves rarely cordate, never hastate. Stem short.

- Leaves ovate or oblong velvety (in life), pustulate when dry; petioles rather thick . . . . . (6) *H. humilis*  
 Leaves ovate thin, not pustulate, veins faint; petioles slender; stem short erect . . . . . (7) *H. purpurascens*  
 Leaves ovate thin, not pustulate; nerves faint; rhizome long creeping . . . . . (8) *H. repens*  
 Leaves elliptic rounded smooth larger; females few . . . . . (9) *H. yohorensis*  
 Leaves elliptic-ovate, edges undulate; females in 2 spirals . . . . . (10) *H. undulatifolia*  
 Stem stout; leaves ovate to ovate-lanceolate, shining, 6 in. long, broad . . . . . (11) *H. Griffithii*  
 Stem stout; leaves ovate-triangular, broadest at base . . . . . (12) *H. obliquata*  
 Stem stout; leaves deltoid, male part twice as long as female . . . . . (13) *H. trapezifolia*  
 Leaves lanceolate silvery, base round . . . . . (14) *H. argentea*  
 Leaves narrowed to base, lanceolate; male part twice as long as female.  
 Leaves falcate; spathes oblong . . . . . (15) *H. falcata*  
 Leaves elliptic; spathes ovate or oblong; petioles 5 in. long . . . . . (16) *H. nutans*  
 Leaves ovate; spathes oblong small; petioles 7 in. long . . . . . (17) *H. elliptica*  
 Leaves lanceolate; spathes oblong small.  
 Female flowers about 10 . . . . . (18) *H. Curtisii*  
 Female flowers in 4 rows . . . . . (19) *H. angustifolia*  
 Female part nearly or quite as long as male.  
 Leaves lanceolate; petioles 9 in. long; blade 6 in. wide; nerves 8 to 10 pairs . . . . . (20) *H. lancifolia*  
 Leaves lanceolate falcate; nerves 3 or 4 pairs . . . . . (21) *H. multinervia*  
 Leaves fleshy elliptic; peduncles short, thick . . . . . (22) *H. crassa*  
 Leaves elliptic-lanceolate; peduncles slender, 4 in. long . . . . . (23) *H. Scortechinii*  
 Male spadix with intermixed abortive female flowers . . . . . (24) *H. mixta*

(1) *H. rostrata* Griff. *Notulæ*, iii. 154; *Hook. fil. F.B.I.* vi. 532; *Ridl. Mat.* iii. 24; *Engler, Pflanzenreich*, iv. 23, p. 66, fig. 42. *Chamaecladon sanguinolentum* Griff. *l.c.* 147.

Stem stout, 2 or 3 in. tall. Leaves linear-oblong, acutely acuminate, base narrowed to petiole, 15 to 24 in. long, 4.5 to 5 in. wide; nerves 9 pairs; petioles 1 ft. long. Spathe 6 in. long, constricted in the middle, green, edged white. Spadix, base nude, .5 in. long. Male portion 3 in. long. Flowers irregularly rhomboid. Female portion 1 in. long; ovaries 2-celled; stigmas discoid, grooved. Staminodes capitate. *Hab.* Damp spots in forests in the south. Johor. Malacca, Alor Gajah (Griffith); Bukit Bruang; Brisu (Holmberg). Pahang, Pekan. Negri Sembilan, Tampin (Burkill). Selangor, Kwala Lumpur; Batang Berjuntai (Ridley).

(2) *H. sagittæfolia* Jungh. *Schott, Prodr.* 311; *Hook. fil. F.B.I.* vi. 531; *Ridl. Mat.* iii. 23; *Engler, Pflanzenreich, l.c.* 73, fig. 48.

Stem stout, 1 to 2 ft. tall, 2 in. through. Leaves ovate sagittate acuminate, lobes spreading, 9 in. long, .12 in. wide; nerves 12 to

16 pairs, deep green. Spathes numerous on peduncles 6 in. long, base dilated, 1.25 to 2 in. long, constricted above, upper part boat-shaped, greenish white or pure white tinted pink at the tip. Spadix 4 in. long, nude base .25 in. long. Male part 2.75 in. long, slender, white, upper flowers sterile. Female portion over 1 in. long; pistils globose. *Hab.* Common in forests. Singapore, Bukit Timah, Johor, Pulau Tioman (Burkill). Selangor, Semangkok Pass; Ginting Bidai. Sungei Ujong, Bukit Tumiang (Cantley), Perak, Thaiping Hills (Kunstler, etc.) Jor (Henderson). Penang (Delessert). *Native names* : Kalamoyiang; Kemoyang; a name applied to most species.

A very aromatic smelling plant.

(3) *H. paludosa* Hook. *fil. F.B.I.* vi. 531; *Ridl. Mat.* iii. 24; *Engler, Pflanzenreich, l.c.* 73, fig. 50. *H. Ridleyana* Engler, *Bot. Jahrb.* xxxvii. 123.

Stem stout, 3 in. through. Leaves oblong sagittate, long acuminate, lobes blunt, sinus shallow; nerves 12 pairs; 1 ft. long, 3 to 6 in. wide, deep shining green; petioles 8 to 15 in. long, sheathing half their length. Spathes several on peduncles 6 in. long, pale green or red, 5 in. long, 1 in. through, constricted above the females. Spadix base nude. Male portion 3.5 in. long, white. Female 1.25 in. long; stigmas large. *Hab.* Damp spots in dense forest, common. Singapore, Bukit Timah; Changi. Johor, Tanjong Kupang. Perak, Larut (Kunstler); Ulu Selama (Scortechini). *Distrib.* Borneo.

(4) *H. cœrulescens* Jungh. in *Schott, Prodr.* 310; *Hook. fil. F.B.I.* vi. 533; *Ridl. Mat.* iii. 24. *H. Wallichii* Schott, *Bonplandia* 1859, p. 30. *H. major* Griff. *Notulæ*, iii. 153. *H. minor* Griff. *l.c.* 152. *H. curvata* Engler, *Pflanzenreich, l.c.* 53, fig. 29.

Stem stout, fleshy, 6 in. tall. Leaves ovate cordate, dull green, lobes rounded, tip acuminate, 8 in. long, 7 in. wide; petioles 1 ft. long, slightly glaucous. Spathes few on stout peduncles 2.5 in. long, oblong-cylindric cuspidate, 3 in. long, 1 in. through or less, not contracted above the female portion, pale green or red. Spadix a little longer. Male portion cylindric blunt, white, 1.75 in. long, nearly .5 in. through. Female portion 1 in. long. Fruit-spike 1.75 in. long, grey. Seeds 6 oblong, ribbed. *Hab.* Common in forests Singapore, Selitar; Bukit Mandai. Malacca, Pulau Besar (Griffith). Pahang, Tahan River. Selangor, Kampong Kerling; Dusun Tua; Semangkok Pass. Dindings, Gunong Tungul. Penang Hill (Wallich, Curtis). *Distrib.* Java.

var. *pontederiæfolia* Ridl. *H. pontederiæfolia* Griff. in *Hook. fil. F.B.I.* vi. 533, *Engler, Pflanzenreich, l.c.* 55, fig. 31. Leaves deltoid or triangular-ovate and less cordate, sometimes entire with a broader base. *Hab.* With the other form in the south, less common. Singapore, Garden Jungle; Bukit Timah. Malacca, Ayer Panas and Rhim (Griffith).

*H. curvata* Engl., seems to me another slight variation of this species. It was obtained by Engler on Weld's Hill, Kwala Lumpur. After searching the whole hill I could find nothing there but common and typical *H. cœrulescens*.

(5) **H. deltoidea** Hook. *fil. F.B.I.* vi. 536; *Ridl. Mat.* iii. 25.

Stem short, erect. Leaves ovate cordate acuminate with a shallow sinus or deltoid, ovate, lobes rounded, 6 in. long; petioles slender, 1 ft. long, sheath 2.5 in. long. Peduncle 3 in. long. Spathe 1 in. long, cuspidate not constrict. Spadix shorter, hardly stipitate. Male portion clubbed, broad, .5 in. long. Female nearly as long. *Hab.* Forests. Johor, Gunong Pulau (Ridley). Perak (Scortechini).

(6) **H. humilis** Hook. *fil. F.B.I.* vi. 533; *Ridl. Mat.* iii. 25; *Engler, Pflanzenreich, l.c.* fig. 27. *Calla humilis* Jack, *Mal. Misc.* i. No. 1, p. 22.

Small plant, stem erect, 1 in. long. Leaves ovate cordate, velvety-looking, pustular beneath, dark green or red; nerves 20 pairs; edge irregularly notched, 3 to 4 in. long, 2 to 3 in. wide; petioles 6 in. long. Spathes numerous; peduncles .75 in. long, cylindrical, beaked, .5 in. long, red or green. Spadix .75 in. long, white. Male portion as long or twice as long as female. Female flowers in five spirals, short styled. Base of spadix not nude. *Hab.* Generally on banks in forests at 1000 ft. altitude upwards, but sometimes lower down. Selangor, Bukit Kutu; Semangkok Pass. Dindings, Lumut. Perak, Thaiping Hills; Gunong Keledang; Gunong Batu Putih (Wray). Penang (Wallich); Hill (Ridley).

var. *velutina* Ridl. *l.c.* *H. velutina* Hook. *fil. l.c.* 534; *Engler, l.c.* fig. 28. A larger form with deep red spathes and leaves beneath bright red; petioles short. *Hab.* Selangor, Batu Caves; Petaling; Weld's Hill. Perak, Sungei Rayah (Kunstler); Bujong Malacca.

var. *undulata* Ridl. Petioles long slender; nerves less conspicuous, edges of blade undulate. *Hab.* Pahang, Gunong Tahan; Telom (Ridley). *Distrib.* Sumatra.

(7) **H. purpurascens** Schott, *Bonplandia*, 1858, p. 369. *H. pumila* Hook. *fil. F.B.I.* vi. 535; *Ridl. Mat.* iii. 26. *H. pygmæa* Engler, *Pflanzenreich, l.c.* 34, fig. 15.

A dwarf plant with ovate or elliptic-ovate acute or blunt leaves, deep olive green above, red beneath; nerves 3 or 4 pairs; 1.5 to 3 in. long, 1 to 1.5 in. wide; petioles slender, 1 to 4 in. long, red. Peduncles .25 to .75 in. long, slender. Spathes oblong, bases broad, tip blunt, cuspidate, red, .5 in. long and nearly .25 in. through. Spadix stipitate, hardly .5 in. long. Male portion three times as long as the female, white. Female portion with three or four whorls of flowers. Staminodes none or very small, shorter than the ovary. *Hab.* Dense forest, common in the south. Singapore, Bukit Timah. Johor, Gunong Pulau; Batu Pahat. Malacca (Hervey). Negri Sembilan, Gunong Angsi (Burkill). Perak, Ipoh. Dindings.

var. *pumila* Hook. *fil.* Leaves, petioles and spathes green. Commoner than the original *H. purpurascens* and growing with it.

(Hooker's species was based on a bad specimen collected by Maingay in Singapore.) *Distrib.* Malay islands.

This little plant is very variable, and several forms are to be met with. One form from Mount Austen, Johor, had lanceolate acuminate leaves narrowed to the base. Another form collected at 4000 ft. altitude on Gunung Kerbau by Robinson has long slender spreading petioles 3 in. long, and thin ovate leaves 2 in. across.

(8) **H. repens** *Ridl.*

Rhizome long creeping, 6 in. long or more, ascending at tip. Leaves thin elliptic, base shortly narrowed, tip acutely rather abruptly acuminate, main nerves fine, about 3 or 4 pairs; 4 in. long, 2 in. wide; petioles weak, 3.5 in. long; sheaths one-third of length. Peduncles .5 in. long. Spathes short, thick, .5 in. long. Male portion longer than female. *Hab.* Perak, Gunung Inas at 3600 ft. altitude on rocks above a streamlet (Yapp).

The leaves somewhat resemble those of *H. humilis*, but the plant has a long creeping rhizome with long wiry roots.

(9) **H. yohorensis** *Engler, Pflanzenreich, l.c. 37.* *H. propinqua* *Ridl. Mat. iii. 26* (not of *Schott*).

Stems stout erect, 1 in. long or more. Leaves elliptic oblique acute, base rounded, 6 in. long, 2.5 in. wide, thin; nerves 7 pairs; petioles 3 to 4 in. long. Peduncle .5 in. long. Spathe narrow cuspidate, .75 in. long. Spadix slender not stipitate. Male portion three times as long as female. Pistils very few. *Hab.* Johor, Gunung Pantai. Rare in forests (Ridley).

This resembles *H. pumila* *Hook. fil.* but is much larger.

(10) **H. undulatifolia** *Ridl. Journ. Roy. As. Soc. S. Br. 57, p. III.*

Small plant. Leaves ovate, narrowed slightly at base or rounded, acute cuspidate, edges undulate curved in beneath, grey when dry, paler beneath; nerves 4 pairs, invisible beneath, 1.5 in. long, .5 to .75 in. wide; petioles .5 in. long. Peduncle slender, under .5 in. long. Spathe ovoid mucronulate, .5 in. long. Spadix shorter. Male portion twice as long as female, conic acute, flowers few. Female flowers 8, in two spirals. *Hab.* In forests, local. Perak, Temengoh, banks of Sungei Kertai (Ridley).

(11) **H. Griffithii** *Hook. fil. F.B.I. vi. 534; Ridl. Mat. iii. 26; Engler, Pflanzenreich, l.c. 43, fig. 23.* *H. Kingii* *Hook. fil. l.c. fig. 21.*

Stem stout, 1 to 5 in. long and .25 in. thick, erect. Leaves variable in shape on the same plant, ovate to ovate-lanceolate, more or less inæquilateral, base narrowed or broad, acuminate, polished light green, 5 to 7 in. long, 1.5 to 2.5 in. wide; petioles 3 to 6 in. long, sheathing about halfway, red. Spathes green, cylindric, curved, 1 to 1.25 in. long, cusp .12 in. long; peduncles 1.5 in. long. Male part twice as long as female, white. Female flowers numerous, ovoid; stigma small. Base of spadix generally nude. *Hab.* Very common in lowland woods, often in small clumps. Singapore, Bukit Timah.

Johor, Batu Pahat; Kluang (Holtum). Pahang, Tahan River, Malacca, Ayer Panas (Griffith); Merlimau (Cantley); Ayer Keroh; Jasin. Negri Sembilan, Bukit Tumiang (Cantley); Selaru (Holtum). Kelantan, Kwala Pertang (Haniff).

var. *ovata*. *H. ovata* Hook. fil. 536. Robust plant. Leaves ovate, with a broad base, 4 in. wide. *Hab.* Singapore (Wallich); Bukit Timah, with the type form. *Distrib.* Borneo. *Native names*: Kelamoyiang; Kumayan; Kumayan jantan; Asam Tikus. *Use*: In native medicines and curries.

(12) *H. obliquata* Hook. fil. *F.B.I.* vi. 534; Engler, *Pflanzenreich*, l.c. 39, fig. 18.

Rhizome stout, 1.5 in. long, 1 in. through. Leaves ovate-triangular acuminate, broadest at base, base often inæquilateral, shortly acute to lanceolate; nerves conspicuous, about 5 pairs, 4 to 5 in. long, 1.5 to 2 in. wide; petioles 3 to 6 in. long, sheathing less than half-way. Peduncles 1 in. long. Spathe oblong-lanceolate, very shortly cusped, thick, 1 in. long. Spadix sessile. Female portion half as long as male. *Hab.* Penang Hill (Wallich, Phillips).

This may be a local variety of *H. Griffithii*. Wallich's specimens have all sub-triangular, Phillips' almost lanceolate leaves. The Malacca plant (*Ayer Bombon*, Maingay), referred to *H. obliquata* by Hooker is typical *H. Griffithii*.

(13) *H. trapezifolia* Hook. fil. *F.B.I.* vi. 536; Ridl. *Mat.* iii. 28.

Rhizome stout, creeping. Leaves deltoid-ovate, base broad, or ovate with cuneate base, tip long acuminate, stiff, bright green, 4 to 6 in. long, 1.25 to 3 in. wide at the base in the deltoid form; nerves 7 pairs, oblique; petioles 4 to 8 in. long, sheathing for 1 or 2 in. Peduncles 2 in. long. Spathe broad, curved cuspidate, 1 in. long. Spadix base nude. Male part conic acute, much longer than female. Ovaries broad, flask-shaped. Staminodes nail-shaped or none. *Hab.* Forests. Malacca, Sabatu (Burkill) form with leaves 4 in. wide at base, ovate-trapezoid. Perak, Thaiping Waterfall (Wray); Temengoh a form approaching *H. falcata* (Ridley).

(14) *H. argentea* Ridl. *Journ. Bot.* xl. 1902, p. 35; *Mat.* iii. 27; Engler, *Pflanzenreich*, l.c. 31.

Stem 1 in. long. Leaves obliquely lanceolate, inæquilateral, base rounded, apex acute, silvery; nerves numerous, 3 in. long. 1.25 in. wide; petioles 2 in. long, red. Peduncles short, to .5 in. long in fruit, red. Spathes lanceolate, no cusp, striate red, .5 in. long. Spadix shorter, base not nude. Male part cylindrical, three times as long as female. Female flowers about three rows; ovaries broad, dotted pink. Staminodes large or absent. *Hab.* Rare. Malacca (R. Derry).

(15) *H. falcata* Ridl. *Journ. Bot.* xl. 35; Engler, *Pflanzenreich*, l.c. 34.

Rhizome stout, roots woolly. Leaves numerous, crowded,



oblique lanceolate falcate, acuminate, base cuneate; nerves 6 pairs; 5 in. long, 1.25 in. wide; petioles 3 to 7 in. long, red purple. Spathes 1.5 in. long, on peduncles 1 to 2 in. long, oblong, cuspidate. Spadix base nude. Male cylindrical, twice as long as female. *Hab.* Rocks in streams, rare. Kedah, in a stream at Yan (Ridley).

(16) *H. nutans* Hook. *fl. F.B.I.* vi. 335; *Ridl. Mat.* iii. 27.

Rhizome elongate, creeping. Leaves coriaceous, elliptic acuminate at each end, tip mucronate, 4.5 to 5 in. long, 2 to 2.25 in. wide; nerves very obscure; petioles 3 to 5 in. long. Spathe turgid-oblong or broadly ovate, cusp long recurved decurved. Spadix only half as long. Male portion twice as long as female, conic-ovoid blunt, base of spadix not nude. Ovaries ovoid. Staminodes none. *Hab.* Mountain forests. Perak, Thaiping Hills (Kunstler).

(17) *H. elliptica* Hook. *fl. F.B.I.* vi. 536; *Ridl. Mat.* iii. 28; *Engler, Pflanzenreich*, l.c. 37, fig. 17.

Rhizome creeping, covered with red leaf bases. Leaves lanceolate to ovate-lanceolate subfalcate, base inæquilateral, subcoriaceous, 3 in. long, 1.5 in. wide; petioles slender, 3 to 6 in. long, sheathing for one-eighth to one-sixth of the length. Peduncles 3 in. long. Spathe oblong beaked, rather thick, .5 in. long. Spadix base shortly nude. Male part slender acuminate. Female not half as long. Staminodes present. *Hab.* Perak (Scortechini).

(18) *H. Curtisii* Ridl. *Journ. Bot.* xl. 1902, p. 34; *Mat.* iii. 28.

Stem short, erect. Leaves lanceolate acuminate, oblique, weak, deflexed, deep green to dark red above, red beneath; nerves ascending, 4 or 5 pairs, 4 to 5 in. long, 1 to 1.5 in. wide; petioles slender, red, 3 to 4 in. long. Spadix stipitate. Male part yellow, .5 in. long. Female flowers few, about 10. Staminodes clubbed, shorter than ovaries. *Hab.* Mountain forests. Rare. Perak, Bujong Malacca (Curtis).

(19) *H. angustifolia* Hook. *fl. F.B.I.* vi. 533; *Ridl. Mat.* iii. 28; *Engler, Pflanzenreich* l.c. 31, fig. 12. *Calla angustifolia* Jack, *Mal. Misc.* i. 124.

Rhizome long, creeping. Leaves inæquilateral lanceolate, smooth, dark green, pale beneath, base cuneate, narrowing to the petiole, 4 to 7 in. long, .75 to 1.5 in. wide; nerves 4 pairs, raised beneath; petioles 3 to 9 in. long, sheaths 1 to 3 in. long. Spathes on slender peduncles 1.5 in. long, oblong cuspidate, green, cusp .12 in. long. Spadix cylindrical curved, sub-acute, white, .5 in. long. Male part three times as long as female; flowers rounded, 4-lobed. Female of four rows of pistils. Staminodes shorter, obtuse. *Hab.* In rocks in mountain streams from 1000 to 5000 ft. altitude. Johor, Gunong Pantai. Pahang, Tahan River; Gunong Tahan. Negri Sembilan, Bukit Tangga. Selangor, Semangkok Pass. Perak, Thaiping Hills; Bujong Malacca. Dindings. Penang, Richmond Pool; Telok Bahang. Kedah Peak (Ridley).

var. *ophirensis* Ridl. *Mat.* iii. 29. Leaf-sheaths red. Leaves ovate to lanceolate, 3 in. long, 1 in. wide, base often broad; petioles slender, 4 in. long; nerves 4 pairs or more. *Hab.* Mountain streams in clefts of rock, Malacca, Mount Ophir on Padang Batu. Kedah Peak at 4000 ft. altitude.

var. *parvula*. A very dwarf form. Leaves 1.5 by .24 in.; petioles .5 in. long, and spathe long-cusped. *Hab.* Pahang, in the fall of the Teku River, Gunong Tahan at 5500 ft. altitude.

(20) *H. lancifolia* Hook. *fil. F.B.I.* vi. 533; *Ridl. Mat.* iii. 29; *Engler, Pflanzenreich, l.c.* 47, fig. 26.

Stem stout, creeping, with numerous leaves lanceolate acuminate at both ends, apex mucronate, oblique, 6 to 8 in. long, 1.5 to 2 in. wide, dark green above, paler beneath; nerves about 8 pairs; petioles 4 to 5 in. long; peduncles slender, numerous, 1.5 to 2 in. long. Spathe elliptic, beaked, .5 to 1 in. long. Spadix slender, female portion as long as the male. Staminodes very small. Male flowers oblong. *Hab.* Banks at an altitude of from 3000 to 6700 ft. Pahang, Tahan River. Selangor, Semangkok Pass. Perak, Gunong Batu Putih (Wray).

(21) *H. multinervia* Ridl. *Journ. Bot.* 1902, p. 36; *Mat.* iii. 29.

Rhizome very stout, creeping. Leaves numerous, lanceolate acuminate, acute at both ends, falcate, 6 in. long, 1.5 in. wide; primary nerves 3 or 4, not very distinct, the others faint and very numerous; petioles 6 in. long, bases red, sheathing for 1 in. Peduncles 1.5 in. long. Spathes oblong cuspidate, .5 to .75 in. long. Spadices shortly stipitate. Male and female parts nearly equal. Pistils in about five series. Staminodes none. *Hab.* Mountain woods. Malacca, woods at base of Mount Ophir (Ridley).

(22) *H. crassa* Ridl. *Journ. Bot.* 1902, p. 36; *Mat.* iii. 29.

Stem short and thick, 1 in. long, roots stout. Leaves fleshy, elliptic, mucronate, base rounded, 5 in. long, 2 in. wide; nerves 4 pairs, not very prominent; petioles stout, 3 in. long, sheathing half-way, sheaths broad, .5 in. wide at base. Spadices few, thick, oblong, 1.25 in. long, beaked, on peduncles 1 in. long. Spadix 1 in. long, base not nude. Male part cylindrical obtuse. *Hab.* Rare in forests, Selangor, Ginting Peras; Kajang (Ridley).

(23) *H. Scortechinii* Hook. *fil. F.B.I.* vi. 534; *Ridl. Mat.* iii. 29; *Engler, Pflanzenreich, l.c.* 31, fig. 14.

Rhizome creeping, stout. Leaves elliptic or oblong-lanceolate or oblanceolate acuminate, mucronulate, base narrowed, acute or obtuse; nerves 5 to 7 pairs; 5 to 7 in. long, 1 to 2 in. wide, deep velvety green; petioles 6 in. long. Peduncles slender, 4 in. long. Spathe large, 1.5 in. long, broad oblong cuspidate, dark green. Spadix white, base not nude. Male portion rather longer than the female. Pistils about six series. *Hab.* Dense bamboo forest and high forests, Negri Sembilan, Tampin, Bukit Plangi (Burkill).

Selangor, Ulu Gombak (Holttum). Perak, Ulu Bubong (Kunstler); Temengoh. (A smaller form with leaves 3·5 in. long, ·5 in. wide; petioles 3 in. long.) (Ridley.)

Engler figures the spadix as nude at the base, but it is not so in the type.

(24) *H. mixta* *Ridl. Journ. Bot.* 1902, p. 36; *Mat.* iii. 30.

Rhizome thick. Leaves elliptic or oblanceolate, base cuneate, tip acuminate, rather thin, 6 to 9 in. long, 3 in. wide; nerves prominent, numerous, about 5 pairs more conspicuous; petioles 6 in. long or more, broadly sheathing for 1 in. Spadices very many, about 11, on slender 3 in. peduncles. Spathes oblong, shortly cuspidate, ·75 to 1 in. long. Spadices shorter. Male part cylindrical acute, three times as long as the female, with abortive female flowers mixed with the males to the top of the spadix. *Hab.* Mountain forests to 3700 ft. altitude. Pahang, Tahan River woods, rare (Ridley); Fraser Hill (Burkill).

#### EXCLUDED SPECIES

*H. SINGAPORENSIS* *Regel. Ind. Sem. Hort. Petrop.* 1869, p. 8; *Hook. fil. Fl. Brit. Ind.* vi. 537. A native of Papua, long cultivated in Singapore Botanic Gardens. A large plant with red petioles.

#### 11. SCHISMATOGLOTTIS, Zoll. and Mor.

Herbs usually short-stemmed. Leaves herbaceous ovate, often cordate or lanceolate. Spathe cylindrical, upper half usually white, constrict above the female part and deciduous, ovate or lanceolate. Spadix, male part usually clubbed, or terminal part sterile of oblong abortive flowers. Stamens 2 or 3. Female part separated from male by a bare part or by abortive flowers. Pistils flask-shaped, 1-celled. Species 15, one Burma, the rest Malaya.

Leaves cordate.

Spadix clubbed at top, free from spathe to base;

leaves large ovate . . . . . (1) *S. calyptrata*

Spadix appendage conic narrow . . . . . (2) *S. mutata*

Spadix conic blunt; leaves lanceolate . . . . . (3) *S. cordifolia*

Spadix appendage cylindrical-conic acute, as long

as cylindrical male part . . . . . (4) *S. Ridleyana*

Spadix appendage cylindrical; spathe 4 in. long;

leaves oblong-lanceolate . . . . . (5) *S. linguiformis*

Leaves round, entire at base.

Leaves ovate-lanceolate cuspidate, 6 in. long . . . . . (6) *S. Wallichii*

Leaves blunt elliptic-ovate, 2 in. long; spadix

adnate to spathe . . . . . (7) *S. minor*

Leaves elliptic; petiole slender not crenulate;

rhizome long creeping . . . . . (8) *S. brevicuspis*

Leaves elliptic; petiole thick crenulate . . . . . (9) *S. Scortechinii*

Leaves lanceolate, narrowed to base.

Peduncles very short . . . . . (10) *S. marginata*

Peduncles long and slender . . . . . (11) *S. longifolia*

(1) **S. calyptrata** Zoll. and Mor. Syst. Verz. 83; Ridl. Mat. iii. 31; Engler, Pflanzenreich, iv. 23, p. 114. *S. longipes* Hook. fil. F.B.I. vi. 538.

Stem rather large. Leaves ovate cuspidate cordate, lobes rounded, 9 in. long, 5 in. wide, light green; petioles 9 to 12 in. long; sheaths 2 to 3 in. long. Peduncle 2 to 4 in. long in flower, 6 to 7 in. long in fruit. Spathe 3 in. long, tube swollen, nearly 1 in. long and 1 in. through, deep green; limb convolute, 1.75 to 2 in. long, cuspidate, greenish white. Spadix not stipitate, 2.5 in. long, apex clubbed, .75 in. long, of sterile male flowers, below fertile male portion narrowed at base .75 in. long. Female portion 1 in. long; stigmas very small. *Hab.* Very common in rocky places in forests, whole Peninsula.

The following are the forms of this species.

var. (a) *concolor* Hallier, Bull. Herb. Boiss. 1898, p. 20; Ridl. l.c. Leaves entirely pale green. *Hab.* Singapore, Bukit Timah. Pahang, Tahan River woods. Penang, Waterfall.

var (b) *picta* Hallier Ann. Buitenzorg. xiv. ii. 260. *S. picta* Schott, Oesterr. Bot. Zeitschr. viii. 317. Leaves light green with a yellow green band on each side of the midrib. With *concolor* and nearly as common. *Hab.* Singapore, Bukit Timah. Johor Pengaram; Batu Pahat; Pulau Tioman. Pahang, Tahan River. Negri Sembilan, Perhentian Tinggi. Selangor, Petaling; Batu Caves. Perak (Scortechini); Thaiping Hills. Penang, Tanjong Tokong and Waterfall (Curtis).

var. (c) *ornata* Ridl. Leaves darker green with white spots. *Hab.* Selangor, Semangkok Pass (Ridley). *Distrib.* Burma, Malay Archipelago to New Guinea and Philippine islands.

(2) **S. mutata** Hook. fil. F.B.I. vi. 538. Ridl. Mat. iii. 32; Engler, Pflanzenreich, l.c. 110.

Stem sometimes 2 ft. tall, nearly 1 in. through. Leaves ovate cordate or sub-sagittate acute, lobes rounded; nerves 18 to 20 pairs, 1 to 9 in. long, 4 to 5.5 in. wide; petioles 9 in. long, sheathe 3 to 4 in. long. Peduncles 2 to 4 in. long. Spathe nearly 5 in. long, very narrow, acuminate, slightly constricted below the middle. Spadix nearly as long, acute, slender. Appendage narrow conic acute, 1 in. long. Male portion 1 in. long below a bare portion (or covered with neuters). Female portion as long as male with some abortive flat-topped pistils at base. *Hab.* Limestone rocks and forest, Selangor, Batu caves (Engler); Semangkok Pass. Perak, Goping (Kunstler); Jor, Batang Padang (Henderson).

(3) **S. cordifolia** Ridl. Journ. Roy. As. Soc. S. Br. 57, p. 112.

Stem short. Leaves lanceolate cuspidate, deeply cordate, lobes rounded, 1 to 6 in. long, 3 in. wide; petioles 8 in. long, sheathing for 3 in. Peduncles 3 in. long or less. Spathe 2 in. long, tube 1 in. long, limb elliptic cuspidate, white. Spadix appendage conic

blunt, slightly narrowed to base, .25 in. long. Male portion narrowed to base, .5 in. long. Female .75 in. long. *Hab.* In forests, Perak, Temengoh (Ridley).

(4) **S. Ridleyana** Engler, *Pflanzenreich*, l.c. 116, fig. 70.

Stem 1 in. thick. Leaf 6 to 9 in. long, 3 to 6 in. across, thick, rigid, dark green above, yellowish beneath, ovate-cordate, shortly acuminate, lobes rather long, rounded; nerves 11 or 12 pairs meeting in an intramarginal nerve; petioles 6 to 9 in. long, more than half sheathing. Peduncles 3 to 4 in. long, slender, spathe limb oblong with an acute point 2.5 in. long. Spadix appendage cylindrical conic acute, as long as the cylindrical male part, below which is a small space nude except for some neuters. Female part elliptic. No abortive flowers. *Hab.* Forests at 2000 ft. altitude. Perak, Thaiping Hills on Maxwell's Hill (Ridley).

(5) **S. linguiformis** Engler, *Pflanzenreich*, l.c. 93.

Stem .5 in. thick. Leaves oblong-lanceolate, glaucous beneath, base cordate, tip narrowed, lobes nearly semi-orbicular; nerves 15 to 20; 7.8 to 8 in. long, .8 to 1.6 in. wide; petioles 9 in. long. Peduncle 3.9 in. long. Spathe 4 in. long, tube 2 in. long, over .4 in. through. Spadix, male portion slender cylindrical, 2 in. long. Female portion conoid, 1.2 in. long. Ovaries ovoid with a short style and capitate stigma. *Hab.* Perak (Scortechini).

I have not seen this plant.

(6) **S. Wallichii** Hook. *fl. F.B.I.* vi. 537; *Ridl. Mat.* iii. 33; Engler, *Pflanzenreich*, l.c. 98, fig. 63.

Stem short, 1 to 2 in. long. Leaves several, bright green, lanceolate acuminate, base oblique, broad or narrowed, entire, rarely shortly bilobed, 6 to 9 in. long, 1 to 3 in. wide; nerves 12 pairs; petioles 2 to 9 in. long, sheathing halfway. Peduncle 3 to 5 in. long. Spathe 3 in. long, limb broad lanceolate with a long point, white. Spadix 2 to 2.5 in. long, slender; appendage cylindrical blunt dilate, .5 in. long. Male portion .75 in. long. Female portion as long or longer. Ovaries very numerous, small. *Hab.* Common in forests. Singapore (Wallich); Bukit Timah. Johor. Malacca, Bukit Sadanen (Derry). Negri Sembilan, Bukit Tumiang (Cantley). Selangor, Bukit Berjuntai. Perak, Goping and Ulu Bubong (Kunstler); Tapah (Wray). Province Wellesley, Kubang Ulu (Curtis). Kelantan, Kwala Lebir (Gimlette).

var. *fasciata* Ridl. l.c. Leaves more coriaceous, deep blackish green with a grey feather on each side of the midrib. *Hab.* Hill forest, Selangor, Semangkok Pass. Perak, Temengoh (Ridley).

var. *oblongata* Hook. *fl. l.c.* This plant has a more rounded leaf-base. It grows with the common form.

The commonest form of this plant has plain bright green leaves, but one with a central grey feather often occurs mixed with it. Wallich's type has this colouring, and it also occurs on Bukit Timah in Singapore, and Tapah (Wray).

(7) **S. minor** Hook. *fl. F.B.I.* vi. 538; *Ridl. Mat.* iii. 32.

A weak, long-creeping plant, with a slender stem bearing scattered leaves. Leaves ovate-lanceolate or elliptic subacute, 2 to 2.5 in. long, 1 in. wide, base rounded cordate, back of midrib and petioles scurfy; petioles slender, 2 in. long. Spadix 1 or more; peduncles slender, 2 to 2.5 in. long. Spathe tube .6 in. long, limb oblong-ovate acute, hardly contracted at base. Spadix with female inflorescence adnate to the spathe for half its length. Ovaries scattered; stigmas pulvinate sessile. *Hab.* Rare and little known. Perak, without specific locality (Scortechini).

(8) **S. brevicuspis** Hook. *fl. F.B.I.* vi. 537; *Ridl. Mat.* iii.

33. Stem creeping and rooting, 4 in. long or more. Leaves rather distant, lanceolate to ovate-lanceolate cuspidate, base crowded, 4 to 6 in. long, 2.5 in. wide; petioles 4.5 to 8 in. long. Peduncle 1 in. long. Spathe narrow, 2 in. long, little dilate above, long-beaked. Spadix shorter; appendage thicker, conic. Male portion cylindrical. Female portion narrowed upwards, above it a short bare portion. Ovaries flask-shaped; stigmas discoid. *Hab.* Hill woods, Johor, Pulau Tiunan, Juara Bay (Burkill). Pahang, Tahan River woods. Malacca, Mount Ophir. Selangor, Ginting Peras. Perak (Scortechini); Temengoh. Penang, Waterfall (Curtis).

(9) **S. Scortechinii** Hook. *fl. F.B.I.* vi. 538; *Ridl. Mat.* iii.

32. *S. brevipes* Hook. *fl. l.c.* 538. *S. Kingii* Engler, *Pflanzenreich*, l.c. 97, fig. 62 (probably).

Stem short, about 2 in. long. Leaves ovate acuminate, base broad, slightly retuse, dark green, marked grey; nerves about 25 pairs nearly horizontal; 9 in. long, 3.5 to nearly 4 in. wide; petioles 4 to 5 in. long, sheathing for one-third of the length, grooved, margins crisped along the edge. Peduncle 1 in. long, lengthening to 2 in. in fruit. Spathe greenish white, 2 to 3 in. long, limb little enlarged, acuminate. Spadix not acuminate. Male portion cylindrical blunt, twice as long as the rest of the spadix. Female portion .5 in. long, between a narrow portion of oblong neuters. *Hab.* Banks in woods, local but not rare. Johor, Gunong Pulai. Pahang, Tahan River. Selangor, Rawang; Ginting Bidas; Kwala Lumpur. Perak, Bujong Malacca.

*S. Kingii* Engler, *Pflanzenreich* 97, fig. 62, is a description of a leaf only. I see nothing to show it is not this species. It was collected in Johor by King.

(10) **S. marginata** Ridl. *Journ. Bot.* 1902, p. 36; *Mat.* iii. 34.

Stem stout, almost woody, roots thick. Leaves lanceolate acuminate, narrowed to petiole, margin undulate; nerves 10 pairs; 3 to 6 in. long, 1 to 2 in. wide; petioles 2 to 3 in. long; sheaths one-third the length, crisped. Peduncle .5 in. long. Spathe 1.75 in. long, narrowed at base. Spadix 1.5 in. long. Male portion cylindrical, 1 in. long. Female portion few-flowered, above it a narrow part

covered with neuters. *Hab.* Forests, rare. Pahang, Tahan woods (Ridley).

(11) **S. longifolia** *Ridl. Journ. Bot.* 1902, p. 737; *Mat.* iii. 34; *Engler, Pflanzenreich, l.c.* fig. 58.

Stem short. Leaves elliptic to lanceolate mucronate, narrow to base, 6 to 12 in. long, 1.5 to 3.5 in. wide; petioles 6 to 15 in. long. Spadices very numerous; peduncles 5 to 15 in. long. Spathe slender, white, 2 in. long, beak .5 in. long. Spadix nodding, 1 in. long; appendage cylindrical-conic, orange. Male portion short. Female portion .25 in. long, adnate at back to the spathe. Pistils subglobose; stigma capitate. *Hab.* Hill forests about 2500 ft. altitude. Perak, Thaiping Hills; common; Temengoh (Ridley); Relau Tujur (Wray); Tanjong Pondok (Burkill).

## 12. PIPTOSPATA, N. E. Br.

Terrestrial herbs, stems short and stout. Leaves lanceolate, base narrowed; petioles long. Spathes short and broad, on long peduncles, not constricted in the middle, upper part deciduous. Spadix shorter, sessile. No appendage of barren flowers. Male portion rounded, terminal. Anthers with the connective prolonged, horned or hemispheric. Female portion as long. Fruiting spathe funnel-shaped. Seeds fusiform. Species about 8, Malay Peninsula and Borneo.

Leaves broad ovate-lanceolate . . . . (1) **P. Ridleyi**  
 Leaves narrow conspicuously nerved . . . . (2) **P. perakensis**

(1) **P. Ridleyi** *Hook. fil. Bot. Mag. t.* 7410; *Ridl. Mat.* iii. 35.

Leaves lanceolate or elliptic, undulate acute, dark green or spotted with light green; nerves about 4 pairs; 2 to 6 in. long, 1 to 3 in. wide; petioles 3 to 6 in. long, red. Peduncles 4 to 5 in. long. Spathe 1 in. long, ovoid, beaked, beak recurved, striped and spotted pink. Spadix .25 in. long, thick cylindrical. Male portion as long as female. Anthers quadrate oblong, connective hemispheric pubescent. Ovaries ovoid; stigma sessile discoid. *Hab.* On rocks in streams in forests, local. Johor, Gunong Pantai; Gunong Janeng (Kelsall); Gunong Pulai (Ridley). Selangor, Menuang Gasing (Kloss).

var. *lanccolata* *Ridl.* Leaves narrow lanceolate, acuminate at both ends, nerves 8 pairs; 6 in. long, 1.5 in. wide, petioles slender, 6 in. long. *Hab.* Johor, Ulu Kahang (Holttum).

(2) **P. perakensis** *Ridl.* *Schismatoglottis elongata* *Hook. fil. F.B.I.* vi. 539 (not of *Engler*). *Piptospatha elongata* var. *perakensis* *Engler, Pflanzenreich, iv.* 23, p. 125.

Stem stout, short. Leaves lanceolate acute with a tubular mucro, base cuneate, margin undulate; nerves 7 pairs or more; 2 to 9 in. long, .5 to 3 in. wide; petioles 1 to 6 in. long. Peduncle 1.5 to 5 in. long. Spathe nodding, fusiform, beaked, cream colour, 1 to 2 in. long. Spadix short. Male portion cylindrical blunt. Female

portion shorter. Fruiting spathe funnel-shaped, nearly .5 in. long. *Hab.* In cracks in rocks in mountain streams in forest at 1000 ft. altitude. Common. Negri Sembilan, Tampin Hill. Pahang, Tahan River. Selangor, Semangkok Pass; Menuang Gasing (Kloss); Ulu Gombak. Perak, Thaiping Hills; Temengoh; Bujong Malacca (Ridley).

### 13. ANADENDRUM, Schott.

Climbing epiphytes. Leaves entire or pinnate; petiole geniculate at top. Spathe ovate caducous. Spadix shorter cylindric, base nude. Flowers bisexual, dense. Perianth 0 or a thin semicircular limb. Stamens 3 to 6; filaments oblong short; anthers terminal, linear-oblong, cells reniform. Ovaries obconic, 1-celled; stigma linear. Ovule 1, rarely 2. Drupes fleshy, 4-angled red. Species 4 or 5, Malayan.

Petiole shortly sheathing.

- |   |     |                      |
|---|-----|----------------------|
| Leaf narrowed at base, wide, dries pale . . . . . | (1) | <b>A. latifolium</b> |
| Leaf broad at base, dries black . . . . .         | (2) | <b>A. montanum</b>   |
| Petiole winged to top, dries pale . . . . .       | (3) | <b>A. marginatum</b> |

(1) **A. latifolium** Hook. *fil. F.B.I.* vi. 540; *Ridl. Mat.* iii. 36.

Stem 4 to 6 ft. long, .25 in. thick, woody. Leaves oblong-elliptic, inæquilateral, narrowed at base, 8 to 10 in. long, 4 to 5 in. wide, coriaceous stiff, dark green mottled lighter; nerves 20 pairs; petioles 6 to 7 in. long, sheathing at base only. Peduncle 4 in. long. Spathe 2 to 3 in. long, greenish outside, white inside, beak half or a quarter of the length. Spadix cylindric, base .25 in. long. *Hab.* Climbing on trees in forests. Not common. Negri Sembilan, Bukit Sulu (Cantley); Johol. Selangor, Menuang Gasing (Kloss). Perak, Goping and Gunong Bubu (Kunstler). *Native name:* Akar Surudang.

(2) **A. montanum** Schott, *Bonplandia*, v. 1857; *Prodr.* 371; *Hook. fil. F.B.I.* vi. 540; *Ridl. Mat.* iii. 36. *Scindapsus montanus* Kunth. *Enum.* iii. 64. *Pothos elegans* Wall. *Cat.* 4444.

Stem creeping on tree trunks, 3 or 4 ft. long or even longer, terete. Leaves coriaceous, dark green, ovate-oblong to oblong-lanceolate, base rounded or slightly cordate, narrowly cuneate, 6 to 8 in. long, 3.5 in. wide; petioles slender, sheath 2 to 3 in. long. Peduncles several, 2 to 3 in. long. Spathe glaucous, green, cylindric, cuspidate, 1 in. long, cusp .5 to 1 in. long. Spadix as long as spathe, .12 in. through. Perianth thin, white, edged with black, oblong truncate. Stamens 3; filaments broad, connective black; anther-cells linear, yellow. Drupe quadrangular, red. *Hab.* Common in the low country growing low down on tree trunks in thick forest. Singapore, Garden Jungle; Changi. Johor, Bukit Tana Abang (Kelsall). Pahang, Kwala Tembeling. Malacca (Griffith). Negri Sembilan, Bukit Sulu (Cantley). Selangor, Sungei Hudang; Batu



Caves. Dindings, Pulau Sembilan; Lumut. Perak, Ipoh (Curtis); Gunong Batu Putih (Wray). Penang (Wallich). Lankawi.

var. *cordatum* Ridl. A form with ovate cordate leaves. *Hab.* Selangor, Batu Caves (Ridley).

var. *longirostris* Hook. fil. Leaves long, rather narrow, beak of spathe as long as limb. *Distrib.* Tenasserim, Borneo, Java. *Native names*: Akar Asam Tebing Darat; Akar Merayan; Akar Sumbang, Akar Sugunja. *Use*: Leaves eaten in curries and roots used in native medicine.

A peculiarly badly named plant, as it is almost exclusively a lowland species, though Wray found it at 3400 ft. altitude. The leaves are very variable, sometimes almost equilateral, at others very unequal-sided, the base is usually broad and round but sometimes cuneate, narrowing to the petiole.

(3) **A. marginatum** Schott, in *Oestr. Bot. Wochenbl.* 1857, p. 117; *Prodr.* 390; *Hook. fil. l.c. F.B.I.* vi. 540; *Ridl. Mat.* iii. 37. *Pothos marginatus* Wall. *Cat.* 4443.

Stem several feet long, .25 in. thick. Leaves crowded or distant, ovate to lanceolate, inæquilateral acute, base broad or acute; nerves 16 pairs, 5 to 9 in. long, 3 to 4 in. wide; petioles 3 to 9 in. long, broadly winged nearly to the top. Peduncles numerous, 3 in. long, slender. Spathe 1.5 in. long, cylindric, thick. Spadix cylindric, 1 in. long. Perianth cupular. Stamens 6. Drupe oblong, red, .25 in. long. *Hab.* Local on trees and rocks. Pahang, Tahan River. Selangor, Batu Caves; Ginting Bidai; Ulu Gombak. Perak, Selama (Kunstler). Penang (Porter). *Distrib.* Sumatra.

#### 14. SCINDAPSUS, Schott.

Climbers. Leaves stiff, entire; petioles long sheathing. Spathe boat-shaped, deciduous. Spadix cylindric dense. Flowers bisexual. No perianth. Stamens 4. Ovary 1-celled, 1-ovuled. No style. Stigma orbicular or elliptic. Berries crowded, not red. Seed 1. Species 20, Indo-Malaya.

Stem short, stout; leaves thick, 6 to 15 in. long . . . (1) **S. Beccarii**

Stems elongate, slender; leaves ovate to lanceolate.

Leaves young ovate cordate spotted; petioles 1.5 in. long . . . (2) **S. pictus**

Leaves ovate round; petioles 3 to 4 in. long . . . (3) **S. Scortechinii**

Leaves oblong-lanceolate.

Leaves 4 to 8 in. long; petioles broad; fruit 4 in. long . . . (4) **S. hederaceus**

Leaves 9 to 10 in. long; petioles broad, 4 to 6 in. long . . . (5) **S. perakensis**

Leaves 8 in. long; petioles slender, 3 in. long . . . (6) **S. rupestris**

(1) **S. Beccarii** *Engl. Bot. Jahrb.* i. 182; *Pflanzenreich*, iv. 23B, p. 69, fig. 28; *Hook. fil. F.B.I.* vi. 542; *Ridl. Mat.* iii. 39. *S. crassipes* *Engl. l.c.*; *Malesia*, i. 277.

Stem usually short, 2 to 3 ft. long, and stout. Leaves thickly coriaceous, dark green, lanceolate acute or oblong blunt, 6 to 15 in. long, 2 to 5 in. wide; petioles 4 to 6 in. long, sheathing for

most of the length. Spathe boat-shaped, white, 1.5 to 3 in. long on a peduncle 1 in. long. Flowers transversely oblong or hexagonal. Perianth cupular, adnate to ovary. Stamens flat, linear. Fruit greyish white. *Hab.* Usually on rocks above the tidal rivers, not rare. Perak, Larut (Kunstler). Dindings, Pangkor; Lumut. Province Wellesley (Kunstler). Kemaman (Johnston). Tringganu. *Distrib.* Borneo and Sumatra.

There are two forms of this, one with narrow leaves and a small inflorescence, the other much broader in leaf and with a large spadix, but they pass into each other.

(2) **S. pictus** Hassk. *Cat. Bogor*, 1844, p. 58; *Hook. fil. F.B.I.* vi. 541; *Ridl. Mat.* iii. 37. *S. argyræus* Engler. *Arac.* 255.

Stem very long, slender, 40 ft. long or more. Leaves (young) ovate or orbicular or falcate cordate, green blotched with white, 3 in. long, 2 in. wide; petioles slender, 1.5 in. long; (adult) lanceolate falcate or ovate cordate, 4.5 to 6 in. long, 1.5 to 5.5 in. wide, dull green; petioles stout, sheathing to top, .5 to .75 in. long. Spathe ovate cuspidate, white, thick coriaceous, 2 in. long, on peduncle .5 to .75 in. long. Spadix stout, 1.25 in. long, white. Filaments very short. *Hab.* In forests, very common all over the Peninsula. Singapore, Bukit Timah; Changi. Perak, Larut (Kunstler); Legoh (Machado). *Distrib.* Borneo, Java, Celebes.

As this plant only flowers when it reaches the tops of lofty trees it is seldom collected, but young plants with their ornamental spotted leaves can be seen all over the Peninsula.

(3) **S. Scortechinii** Hook. *fil. F.B.I.* vi. 541; *Ridl. Mat.* iii. 38; *Engler, Pflanzenreich*, iv. 23B, p. 74, fig. 31.

Stem slender, creeping over rocks and trees. Leaves coriaceous ovate acute, base rounded or lanceolate, dark green, very close-nerved, 5 in. long, 1.5 to 3 in. wide; petioles 3 to 4 in. long, thick. Spathe 2 in. long, ovate acute, white. Spadix 1 to 1.5 in. long, .25 in. thick, white. Pistil top elliptic rounded. Seed reniform. *Hab.* On mountains at from 3000 to 5500 ft. altitude. Not rare. Selangor, Bukit Hitam; Bukit Kutu; Gunong Mengkuang Lebah at 5000 ft. altitude (Robinson). Pahang, Gunong Tahan (at 5500 ft. altitude). Perak, Thaiping Hills; Bujong Malacca; Gunong Batu Putih; Gunong Inas (Yapp). Kedah Peak. *Distrib.* S. Siam, Bandon.

(4) **S. hederaceus** Schott, *Bonplandia*, v. 1857, p. 45; *Hook. fil. F.B.I.* vi. 542; *Ridl. Mat.* iii. 38. *S. Treubii* Engler, *Pflanzenreich*, l.c. 77, fig. 33.

Stem 30 ft. tall or more, climbing, .5 in. through. Leaves falcate, lanceolate to oblong, inæquilateral, deep green, acute or subacute, base usually narrowed, 4 to 8 in. long, 1 to 4 in. wide; petioles 3 to 4 in. long, sheathing nearly to the top. Spathe boat-shaped, acuminate, white, 3 in. long. Spadix 1.25 in. long, cylindrical blunt, .25 in. through, white. Flowers 4- or 5-sided, .25 in. across. Filaments obcuneate; anthers large obovate, opening by pores in

the top. Stigma linear. Fruit grey pulpy. *Hab.* Not rare, climbing on rocks and trees in the low country. Singapore, Serangoon Road; Sungei Buloh. Johor, Ulu Batu Pahat. Malacca, Selangor (Cantley). Pahang, Pekan. Selangor, Batu Caves. Perak, Kwala Woh (Wray). Penang, Government Hill (Curtis). Kedah, Yan. *Distrib.* Java. *Native names:* Akar Lubang Alah; Akar Ular (snake climber). *Use:* A decoction of the stem used for rheumatism.

(5) *S. perakensis* Hook. *fil. F.B.I.* vi. 542; *Ridl. Mat.* iii. 39; *Engler, Pflanzenreich, l.c.* 75, fig. 32.

Stem 30 to 40 ft. long, very stout. Leaves oblong-lanceolate acuminate, elliptic or nearly ovate, coriaceous, 9 to 10 in. long, 2.5 to 3 in. wide; petioles 4 to 6 in. long, broadly winged to base. Peduncles 4 in. long, rather stout. Spathe creamy white, ovate cuspidate, leathery, 3 in. long and as wide; cusp 1 in. long. Spadix 4 to 6 in. long, .5 to 1.5 in. through (in fruit); stigmas linear. Fruit slaty blue, .3 in. across. Seed lenticular black. *Hab.* Rocky hill woods. Malacca, Batu Tiga. Negri Sembilan, Bukit Sulu (Cantley). Selangor, Batu Caves. Perak, Trong (Wray); Ulu Bubong (Kunstler). *Native name:* Akar Surundang.

(6) *S. rupestris* Ridl. *Journ. Roy. As. Soc. S. Br.* 44, p. 184; *var. siamensis* Engler, *Pflanzenreich l.c.* 77. *S. siamensis* Engler, *Botanisk Tidssk.* xxiv. 171.

Stems .25 in. thick. Leaf narrow lanceolate inæquilateral, base sub-acute, apex acuminate subfalcate, 8 in. long, 1 in. wide; nerves numerous, close, fine; petioles sheathing to the knee in upper leaves, 3.5 in. long, slender. Peduncles 2 in. long. Spathe shell-shaped, white, 1 in. long, .5 in. thick. Spadix sessile, cylindric, .6 in. long. Pistil small; stigmas elliptic. *Hab.* On rocks in forests. Malacca (Maingay). Perak, Larut (Kunstler). *Distrib.* Tenasserim, Siam, Sumatra, Borneo.

I have only seen Maingay's No. 1544, which certainly resembles my *S. rupestris* from Borneo in its tall, slender petiole.

### 15. AMYDRIUM, Schott.

Creeping plant with ovate cordate leaves. Spathe ovate shell-shaped, brown. Spadix sessile, very short. Stamens 4; filaments linear, anthers ovoid. Ovary obpyramidate, 4-angled unilocular; ovules 2; style thick; stigma hemispheric. Species 1, Malay Peninsula and islands.

Referred by Hooker to *Epipremnum* and by myself, in the *Materials*, to *Raphidophora*. Engler thinks it better to keep it separate; though it hardly differs from the two genera generically, still its habit is so different that it may be kept separate temporarily at least.

(1) *A. humile* Schott, *Ann. Mus. Bot. Lugd. Bat.* i. 127. *Raphidophora humile* Ridl. *Mat.* iii. 41. *Epipremnum humile* Hook. *fil. F.B.I.* vi. 549.

Stem slender, long creeping, .25 in. through. Leaves ovate

cordate cuspidate, dark shining green, 4 in. long, 3.75 in. wide; petioles 5 in. long, sheathing at base. Peduncle 2 in. long. Spathe ovate, boat-shaped, 1.25 in. long, whitish, finally brown purple. Spadix cylindrical blunt, 1 in. long, white. Flowers in six series. Stamens 4; stigmas circular. *Hab.* On rocks and banks often in considerable abundance, but rarely flowering. Perak, Bujong Malacca. Pahang, Telom (Ridley). Penang, top of Government Hill on a big rock (Curtis, etc.). *Distrib.* Sumatra.

### 16. EPIPREMNUM, Schott.

Stout, large-leaved climbers. Leaves coriaceous entire or lobed. Spathe large, leathery, boat-shaped. Spadix large. Stamens 4; filaments linear, broad. Ovary prismatic, 1-celled. Ovules 2, rarely 4 or many; style 0; stigma oblong linear. Berries 1-celled, 1- to 8-seeded. Seeds kidney-shaped. Embryo curved. Species 14. Tenasserim, China, Malay islands to Papua.

Close to *Raphidophora* and included under it by me in the *Materials*, differing mainly in the form of the seeds.

Leaves very large entire . . . . . (1) **E. giganteum**  
 Leaves deeply cut into acuminate lobes . . . . . (2) **E. mirabile**

(1) **E. giganteum** Schott, *Bonplandia*, v. 1857, p. 45. *Hook. fil. F.B.I.* vi. 548; *Bot. Mag. t.* 7952. *Scindapsus giganteus* Schott, *Meletem*, i. 21. *Pothos giganteus* Roxb. *Fl. Ind.* 1. 134. *Raphidophora gigantea* Ridl. *Mat.* iii. 44.

Stem 40 to 60 ft. long, over 1 in. through, green. Leaves very coriaceous, 1 to 3 ft. long, 6 to 8 in. wide, dark green, tip blunt or mucronate, base rounded cordate; petioles 8 to 15 in. long, sheathing the whole length. Peduncle very short, thick, 1 in. long. Spathe 12 to 15 in. long, yellow when fully developed. Spadix yellow, 10 in. long. Flowers rhomboid, narrow. Stamens 4. Stigmas linear depressed. Ovary 1-celled with two basal ovules. *Hab.* On rocks and trees, common. Singapore, Bukit Timah; Siglap. Malacca. Dindings, Lumut. Perak, Larut (Kunstler). Penang (Roxburgh); Government Hill (Curtis). Perlis, Kanga. *Distrib.* Siam, Cochinchina. *Native name:* Ringut. *Uses:* The powdered spadices are used to mix with the dart poison by some of the Sakai tribes.

(2) **E. mirabile** Schott, *Gen. Aroid. t.* 79. *Hook. fil. F.B.I.* vi. 549. *E. pinnatum* Engler, *Pflanzenreich*, l.c. 60, fig. 25.

Stem very stout, climbing high on the trees. Leaves 10 to 18 in. long, cut into linear acuminate lobes, about 1 ft. long, finely reticulate nerved; petioles 2 ft. long. Spadices several, cylindrical, 4 in. long, .5 in. through. Peduncle 8 in. long, surrounded by long fibres. Spathe 4 in. long, boat-shaped, acuminate, greenish white. *Hab.* Dense forest, not common, Singapore, Bukit Timah, fern valley. Penang (Roxburgh). *Distrib.* Tenasserim, China, all Malaya and Polynesia.

### 17. EPIPREMNOPSIS, Engl.

Climbing plants. Leaves distant when adult, young leaves distichous close set, entire, sessile; adult broad oblong, lobed and perforated; petioles long, sheathing at the base. Peduncles long. Spathe persistent thick, beaked, spreading. Spadix stipitate. Perianth none. Stamens 6; filaments short, triangular; anthers 2-celled. Ovary flat-topped, 2-celled, each cell 1-seeded. One species from Tenasserim, throughout the Peninsula and Malay Archipelago.

(1) **E. media** Engler, *Pflanzenreich*, iv. 23b, p. 1, fig. 19a. *Anadendron* medium Schott, *Bonplandia*, v. 1857, p. 45; *Hook. fil. F.B.I.* vi. 540. *Raphidophora Huegeliana* Schott, *Bonplandia*, l.c. *Ridl. Mal.* iii. 45. *Pothos celatocaulis* Hort (young state). *Pothos pinnatus* Wall. *Cat.* 4438.

Stem 20 to 30 ft. tall, .5 to .75 in. through. Leaves when young lanceolate falcate, sub-sessile, light green, often overlapping, 2 to 7 in. long, .75 to 3 in. wide (*Pothos celatocaulis*). Adult leaves with 5 to 14 lobes, oblong truncate, acute or cuspidate at upper angle, 8 to 15 in. long, 7 to 12 in. wide; petioles 10 to 13 in. long. Peduncle 3 in. long, slender. Spathe 1 to 3 in. long, .5 to 1.5 in. across. Spadix 1 to 1.5 in. long, stipes .5 in. long. Fruit white, .25 in. across. *Hab.* Very widely distributed through the lowland woods on the trunks of trees, Singapore (Wallich); Bukit Timah; Reservoir Woods; Garden Jungle. Johor, Gunung Pantai. Negri Sembilan (Cantley). Selangor, Bukit Kudah; Ginting Bidai. Perak (Scortechini); Goping (Kunstler). Penang, Batu Feringhi (Curtis). *Distrib.* Java, Philippines, Borneo. *Native name*: Sakat Gajah.

This plant is really intermediate between *Anadendrum* and *Raphidophora*. It has much of the habit of the former, but the fruit of the latter. Young plants develop a series of very remarkable leaves as they ascend a tree trunk, commencing with the curved distichous lanceolate overlapping leaves appressed to the tree trunk forming the *Pothos bifarius* and *P. flexuosus* and *P. celatocaulis* of Gardens. Higher up they become oblong acute, 6 to 8 in. long, 4 in. wide; with petioles 1 to 1.5 in. long still appressed to the trunk. Then they became ovate-cordate as large, but the petiole is 5 in. long and they stand erect, finally taking on the adult form (Ridley, *Gard. Chron.* 1864, p. 526).

### 18. RAPHIDOPHORA, Schott.

Big or moderate climbers. Leaves entire perforate or lobed; petiolate. Spathe boat-shaped, deciduous. Spadix cylindrical sessile, usually floriferous to base. Perianth none. Stamens 3 to 6; filaments flat linear. Ovaries more or less hexagonal at the tip; stigmas pulvinate or linear. Berries many-seeded, confluent. Seeds oblong. Species 60, Indo-Malaya, China.

Leaves entire.

Leaves oblong-ovate, base round; petioles long,

slender, 7 to 9 in. long; spadix 3 in. long (1) **R. gracilipes**

- Leaves elliptic, base round; petioles 5 in. long; spadix 6 in. long . . . . . (2) **R. Burkilliana**  
 Leaves lanceolate or oblong-lanceolate; petioles short.  
 Spadix short, 1 in. long.  
 Leaves fleshy, drying thin, lanceolate, 1 in. across . . . . . (3) **R. minor**  
 Leaves coriaceous, oblong-lanceolate acute, 2 to 3 in. wide . . . . . (4) **R. Lobbia**  
 Spadix 2 in. long.  
 Leaves thick coriaceous . . . . . (5) **R. crassifolia**  
 Leaves thinly coriaceous.  
 Leaves thinly coriaceous lanceolate falcate . . . . . (6) **R. Wrayi**  
 Leaves ovate lanceolate, main nerves very prominent . . . . . (7) **R. Scortechinii**  
 Spadix 5 to 10 in. long.  
 Leaves coriaceous, close-nerved, lanceolate . . . . . (8) **R. Maingayi**  
 Leaves thin, hardly coriaceous.  
 Petioles narrowly winged . . . . . (9) **R. Kunstleri**  
 Petioles broadly winged . . . . . (10) **R. pteropoda**  
 Leaves perforate with several holes . . . . . (11) **R. foraminifera**  
 Leaves lobed.  
 Leaves lanceolate acuminate, base cuneate, 3-lobed (12) **R. Beccarii**  
 Leaves ovate cordate, few lobed . . . . . (13) **R. tetrasperma**  
 Leaves broad, deeply lobed, lobes 9 pairs . . . . . (14) **R. Korthalsii**

(1) **R. gracilipes** Hook. fil. *F.B.I.* vi. 545; *Ridl. Mat.* iii. 41. Engler, *Pflanzenreich*, l.c. iv. 23B, 30, fig. 10.

Stem 30 to 40 ft. long, 1 to 1.5 in. through. Leaves oblong cuspidate, inaequilateral, 7 in. long, 3.5 in. wide; petioles slender, 7 to 9 in. long, channelled, with a low marginal sheath halfway. Peduncle 1 in. long. Spathe coriaceous, 3 in. long, 1 in. wide, lanceolate cuspidate, yellow cream. Spadix, shorter flowers hexagonal. Stamens 6. Stigmas pulvinate. *Hab.* Perak, Larut and Ulu Bubong, low down (Kunstler).

(2) **R. Burkilliana** Ridl.

Stem climbing, .25 in. through. Leaves .5 in. apart, blade thinly sub-coriaceous, elliptic acute, base broad, rounded; nerves sub-equal, slender, closely parallel, 9 in. long, 3 in. wide; petioles slender, 5 in. long; sheaths short, very narrow; knee very inconspicuous. Spathe not seen. Spadix 6 in. long, .5 in. through, on a peduncle 3 in. long and shortly stipitate. Stamens 6. Pistils oblong, top bluntly 6-angled; stigma pulvinate sessile. *Hab.* Selangor, Batu Caves, common on the rocks (Mohammed Nur).

This is allied to *R. gracilipes*, but the spadix is more than twice as long, and the stigma is quite round and sessile.

(3) **R. minor** Hook. fil. *F.B.I.* vi. 544; *Ridl. Mat.* iii. 41; Engler, *Pflanzenreich*, l.c. 21, fig. 4.

Stems long creeping, rather woody, less than .25 in. through. Leaves elliptic-lanceolate, often falcate acute, mucronate, dull green, 3 to 4 in. long, .5 to 1 in. wide; petioles 1 in. long, slender. Peduncle .5 to 1 in. long. Spathe beaked, 1 to 2 in. long, white

or green. Spadix 1 in. long or less, yellowish. Flowers very small. Ovary, top rounded not angled; stigma circular. Fruit .12 in. long. Seed elliptic, flat, brown. *Hab.* On trees in tidal rivers, wide-spread, often in great masses covering trees. Singapore, Toas. Johor, Kota Tinggi; Tebrau River. Pahang, Pekan. Malacca. Perak, Matang (Wray). Setul. *Distrib.* Borneo at Kuching. *Native name:* Kelamoyiang Ayer.

(4) **R. Lobbii** Schott, *Bonplandia*, v. 1857, p. 45; *Hook. fil. F.B.I.* vi. 544; *Ridl. Mat.* iii. 41.

Stem slender, .25 in. through, 4-angled below, 12 to 14 ft. long. Leaves oblong-lanceolate, falcate or lanceolate, cuspidate, narrowed at base, thinly coriaceous flaccid, dull green, paler beneath; nerves 12 pairs or more, distinct; 8 to 9 in. long, 2 to 3 in. wide; petioles 1 to 3 in. long, base thickened, for .5 in., channelled to knee. Peduncle 1 in. long. Spathe cylindric cuspidate, 1 in. long, yellow, thick. Spadix .75 in. long in flower, 1 in. long in fruit, blunt. Stigmas discoid. Seeds 6, elliptic flattened. *Hab.* On low trees and shrubs in jungle swamps. Common. Singapore, Bukit Timah, Chan chu Kang. Johor, Batu Pahat. Malacca, Selangor. Perak (Cantley); Ulu Bubong (Kunstler); Larut. *Distrib.* Borneo. *Native name:* Akar Asam Tebing Paya. *Use:* Leaves eaten in curries.

(5) **R. crassifolia** Hook. *fil. F.B.I.* vi. 543; *Ridl. Mat.* iii. 42; *Engler, Pflanzenreich, l.c.* 22, fig. 5.

Stem 20 to 30 ft. long, .25 in. through, 4-angled. Leaves thickly coriaceous; nerves numerous, fine, invisible beneath when dry; lanceolate oblique, minutely cuspidate, base narrowed, acute, 6 to 7 in. long, 1.5 to 2 in. wide; petioles 1.25 to 2.5 in. long, slender. Peduncles .5 in. long. Spathe cylindric, thick coriaceous, 3 in. long, cream colour. Spadix purple and yellow. *Hab.* Rare on trees in forests. Selangor, Rawang, Camphor forests. Perak, Batang Padang (Kunstler); Thaiping Waterfall.

(6) **R. Wrayi** Hook. *fil. F.B.I.* vi. 544; *Ridl. Mat.* iii. 42.

Stem woody, 30 to 40 ft. long, .12 in. thick, angled. Leaves narrow, lanceolate acuminate falcate, narrow at base, thinly coriaceous, 8 to 9 in. long, 1.25 in. wide; petioles slender, 1.5 in. long, channelled. Peduncles 1 to 2 in. long. Spathe 1.25 in. long, .4 in. wide, cylindric cuspidate. Spadix oblong blunt, 1.5 to 2.5 in. long. Stamens 2. Ovary-top small, rhomboidal. Fruit very small. Seeds 6, narrowly elliptic, deep brown. *Hab.* Climbing on trees in forests, Pahang, Telom, abundant; Fraser Hill (Burkill). Selangor, Batu Caves (Engler). Perak, Thaiping Hills; Gunong Batu Putih (Wray). Penang Hill (Burkill).

(7) **R. Scortechinii** Hook. *fil. F.B.I.* vi. 515; *Ridl. Mat.* iii. 42.

Stem creeping on stones, nearly as thick as the little finger. Leaves ovate-lanceolate inaequilateral, caudate acuminate, base

cuneate sub-coriaceous; nerves 14 to 20 pairs, strongly elevate on both sides when dry; 10 to 12 in. long, 3 to 4 in. wide; petioles 4 to 6 in. long, broadly channelled to the blade. Peduncle 3 to 4 in. long. Spadix 2 in. long, .75 in. wide; stigmas elliptic. Seeds winged according to Scortechini. *Hab.* Perak (Scortechini). Rare and little known.

(8) **R. Maingayi** *Hook. fil. F.B.I.* vi. 545; *Ridl. Mat.* iii. 43.

Stem 20 to 30 ft. long, 4-angled, nearly .5 in. through. Leaves on young stems lanceolate falcate, 3 in. long, .5 in. wide; petioles .12 in. long; adult elliptic obtuse mucronulate, base cuneate or rounded, 7 in. long, 2 in. wide; petioles 3 in. long, slender. Peduncles 2 in. long. Spathe cylindric, nearly 5 in. long, .75 in. thick, leathery. Spadix nearly as long. Stamens 6. Ovaries hexagonal, .2 in. across. *Hab.* On rocks and trees in forests common but rarely flowering. Singapore, Bukit Timah. Malacca, Panchar (Goodenough). Selangor, Batu Caves. Penang, Pulau Betong (Curtis).

(9) **R. Kunstleri** *Hook. fil. F.B.I.* vi. 546; *Ridl. Mat.* iii. 43.

Stem 40 to 60 ft. long, 3 to 4 in. through. Leaves lanceolate falcate inæquilateral, or oblong to oblong-lanceolate acuminate, sub-membranous, base acute or cuneate, 6 to 15 in. long, 2 to 6 in. wide, deep green; petioles slender, 8 to 15 in. long, grooved, and channelled to the blade. Peduncle stout, 1 to 3 in. long. Spathe cylindric, 8 in. long, acuminate, thick-walled, white, beak long and straight. Spadix cylindric, 5 to 8 in. long. Ovaries hexagonal; stigmas discoid rather large. *Hab.* Perak, Larut at 5000 to 8000 ft. altitude and Goping (Kunstler).

(10) **R. pteropoda** *Engl. Bull. Soc. Tosc. di Ort.* 1879, p. 268; *Males.* i. 268. *R. lætevirens* *Ridl. Journ. Bot.* 1902, p. 87; *Mat.* iii. 43.

Stem terete, 12 to 14 ft. long or more, creeping. Leaves herbaceous, light green, oblong-lanceolate acuminate, with broad rounded bases; nerves numerous, conspicuous beneath; 2 ft. long, 8 in. wide; petioles 8 in. long, winged to the knee. Peduncle stout, 3 in. long. Spathe cylindric, 6 to 8 in. long, thick. Spadix cylindric, 7 in. long, .2 in. wide. Ovaries hexagonal; stigmas discoid. *Hab.* Creeping over rocks and climbing up trees. Selangor, Batu Caves. Perak, Thaiping Hills; Jor. Penang, Penara Bukit. *Distrib.* Sumatra and New Guinea.

(11) **R. foraminifera** *Engler, Pflanzenreich*, iv. 23B, 45, fig. 19; *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 113. *Epipremnum foraminiferum* *Engler's Jahrbuch*, xxxv. 11.

A stout climber. Leaves fleshy, ovate to lanceolate acuminate, base cuneate with 1 to 7 oblong or elliptic perforations .25 to .5 in. long on each side of and close to the midrib, 16 in. long, 5 to 6 in. wide; petioles 4 to 6 in. long. Spathe cylindric cuspidate, green, 2 in. long. Peduncle 1 in. long. Spadix cylindric, 1.25 in. long,



sessile. Ovaries irregularly hexagonal; stigmas pulvinate. Seeds 2 in a cell, pale brown, blunt at top, narrowed to the base. *Hab.* On trees in mountain forests and overhanging rivers. Perak, Thaiping Hills, Maxwell's Hill (Engler); Temengoh (Ridley).

(12) **R. Beccarii** *Engl. Bot. Jahrb.* i. 181; *Males.* i. 271, fig. 19, t. 6 to 9; *Hook. fil. F.B.I.* vi. 546; *Ridl. Mat.* iii. 44.

Stem short and stout, creeping, nearly .5 in. through. Leaves lanceolate, base cuneate, entire when young, acuminate pinnatifid when adult, inæquilateral, about 3-lobed; lobes falcate acuminate, rather thinly coriaceous, deep green, 9 to 24 in. long, 3 to 7 in. wide; petioles rather slender, 6 to 8 in. long. Peduncle 6 in. long. Spathe cylindrical cuspidate, 3 in. long, .25 in. through, cream colour. Spadix shorter, cylindrical, blunt, white. Ovaries hexagonal; stigmas circular. *Hab.* On rocks in jungle streams. Selangor, Rawang; Ginting Bidai; Ulu Gombak. Pahang, Tahan River; Telom cascade (Ridley). Perak, Ulu Bubong (Kunstler); Temengoh, banks of Kertam River; Grit. Penang, Penara Bukit. *Distrib.* Borneo.

(13) **R. tetrasperma** *Hook. fil. F.B.I.* vi. 548; *Ridl. Mat.* iii. 44.

Stem flexuous terete, internodes 3 to 4 in. long. Leaves broadly ovate or orbicular cordate, often very inæquilateral, lobed with two broad blunt lobes on each side, deeply cut, acute cuspidate, 1- or 2-nerved. Whole leaf 5 to 7 in. long, 6 in. wide; petioles 3 in. long or more, channelled to the knee. Peduncle stout, 1 or 2 in. long. Spathe 1.5 to 2 in. long, turgidly cymbiform acute, white. Spadix sub-clavate. Stigmas linear. Berries 2-celled, cells 2-ovuled. *Hab.* Forests, Pahang, Gunong Berumbun (Wray). Perak (Scortechini).

(14) **R. Korthalsii** *Schott, Ann. Mus. Bot. Lugd. Bat.* i. 129; *Hook. fil. F.B.I.* vi. 548; *Ridl. l.c.* 45; *Engler, Pflanzenreich*, iv. 23, 49, fig. 21.

Stem 20 to 30 ft. long, .5 in. through, densely crinite. Leaves pinnatisect coriaceous, deep green, 18 to 24 in. long, 6 to 8 in. wide; lobes oblong falcate, about 9 pairs, lowest 3 in. long, .5 in. wide, upper ones 5 in. long, 2 in. wide; petioles 9 in. long. Peduncles 2 to 9 in. long, very stout. Spathes coriaceous, several, boat-shaped, beak short stout, 6 to 8 in. long, .25 in. wide, green, edged cream colour. Spadix 2 to 6 in. long, cylindrical, .5 in. through, yellow. Ovaries small hexagonal; stigmas linear. Fruit .25 in. across. Seeds 4, flattened, ovoid. *Hab.* Not rare, climbing on trees in damp jungle, Singapore, Bukit Timah; Johor, Pulau Tinggi (Feilding). Selangor, between Fraser Hill and Semangkok Pass (Burkill). Perak, Thaiping Hills, Penang Hill. *Distrib.* Java and Borneo.

var. *angustiloba* *Engler, Pflanzenreich, l.c.* 49. *R. angustiloba* *Ridl. MSS.* A finer-cut leaved variety, lobes 6 to 8, narrow. *Hab.* Selangor, Batu Caves (Ridley).

19. **LASIA**, Lour.

A large marsh plant with stout stem. Leaves long-petioled, pinnatifid or entire hastate, petiole, midrib, nerves beneath and the tall peduncle thorny. Spathe very long narrow, opening only at the base. Spadix short, cylindrical. Flowers bisexual. Sepals 4 to 6, ovate cuncate. Stamens as many; filaments broad; anther-lobes broad blunt. Pistils conic, 1-celled, 1-ovuled; styles stout; stigmas discoid. Drupe sub-globose ribbed and warted. Species 1, India, Cochinchina, China, Malaya.

(1) **L. aculeata** Lour. *Fl. Cochinchine*, 81; *Ridl. Mat.* iii. 46. *L. heterophylla* Schott, *Melct.* i. 21; *Hook. fil. F.B.I.* vi. 550.

Stem 2 to 3 ft. long, .5 in. through. Leaf blade deeply cut into 4 to 8 pairs of lanceolate acuminate lobes, 1.5 in. across, basal lobes deflexed, trifid, 1 ft. long; petioles 1 to 4 ft. long. Peduncle 1 ft. long, green. Spathe cylindrical acuminate, 14 in. long, brown purplish. Spadix 1.5 in. long, yellow. Sepals pale green. Fruiting spadix 3 in. long, thick, green. Berry .5 in. long. *Hab.* In river mud usually tidal, common. Singapore, Jurong; Chan Chu Kang. Johor, Sungai Tebrau. Selangor, Batu Caves. Pahang, Pekan. Perak, Simpang (Wray); Temengoh. Perlis, Kanga. *Native names:* Gli-Gli; Bekil.

20. **PODOLASIA**, N. E. Brown.

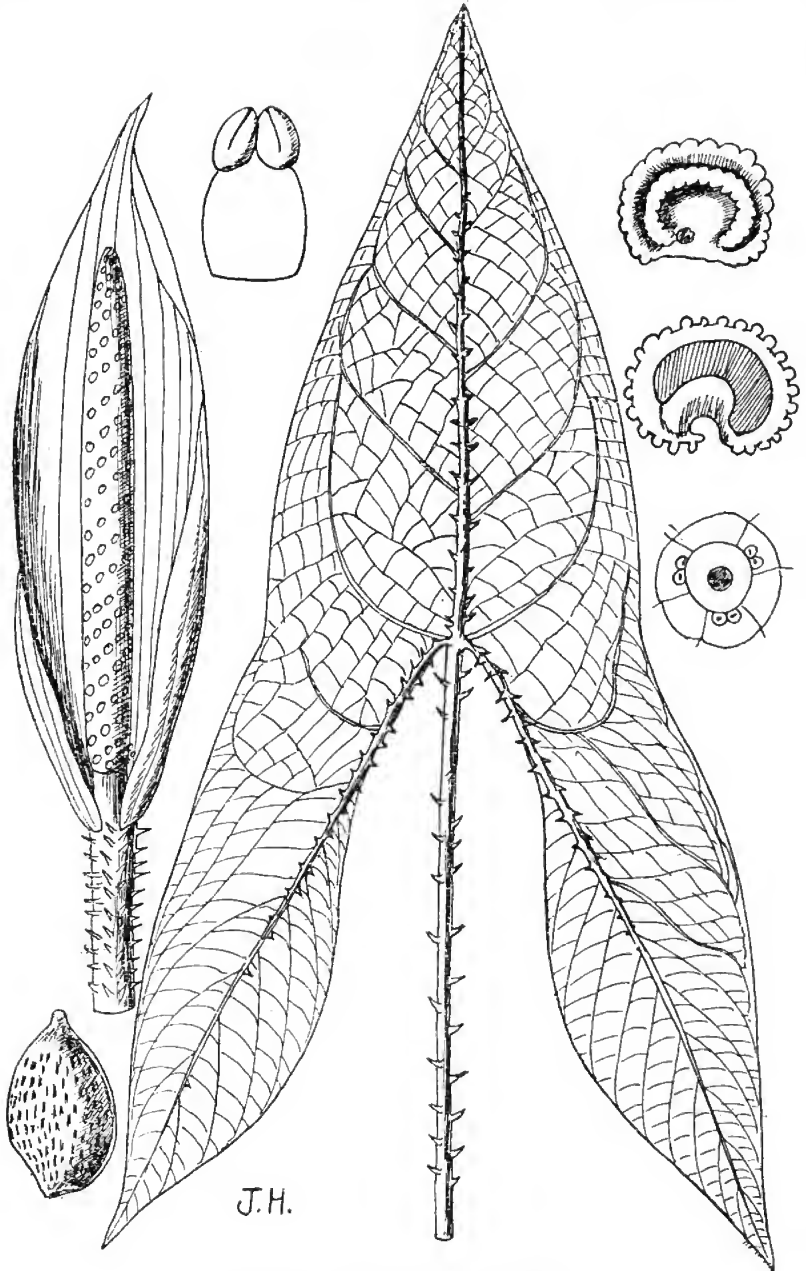
Stem creeping. Leaves hastate, sagittate or 3-lobed, long-petioled thorny. Spathe linear or ovate, expanded. Spadix half as long, stipitate cylindrical. Perianth segments 4 to 6. Stamens as many, opposite. Ovary ovoid-oblong truncate, 1-celled, 1 basal ovule. Drupe red. Species 1, Malay Peninsula, Sumatra and Borneo.

(1) **P. stipitata** N. E. *Br. Gard. Chron.* 1882, ii. 70; *Hook. fil. F.B.I.* vi. 550; *Ridl. Mat.* iii. 46.

Terrestrial plant with a short thick stem 1 in. long. Leaves 10 to 20 in. long, 1.5 to 2 in. wide, dark olive green; nerves prominent; petioles 21 in. long or less, thorny, base sheathing. Peduncle 17 to 27 in. long, thorny below. Spathe 5 in. long, .5 to 1 in. wide, purple. Spadix, on a stipe .5 to 1 in. long, cylindrical blunt, over 2 in. long, base white, tip purple. Fruiting spadix 6 in. long. Drupe globose red, .25 in. long. Seed globose. *Hab.* Local and not very common in dry woods. Johor, Gunong Pantai; Gunong Pulau. Perak, Thaiping Hills; Relau Tujor (Wray). Dindings, Telok Sera (Ridley).

21. **CYRTOSPERMA**, Griff.

Tall aquatic aroids with long petioles often thorny, and hastate leaves. Peduncle tall thorny. Spathe persistent, ovate, expanded. Spadix short, stipitate or not. Sepals 4 to 8 truncate, tips incurved.

FIG. 216.—*Cyrtosperma lasioides*.

Stamens 4 to 8. Ovary 1-celled; ovules 1 or more, semianatropous, very crowded, fleshy. Seed compressed, crested, reniform. Species 10, Africa, Malaya and South America.

(1) *C. lasioides* Griff. *Itin. Not.* iii. 149;  *Ic. Pl. As. t.* 169; *Schott. Aroid. t.* 84; *Hook. fil. F.B.I.* vi. 551; *Engler, Pflanzenreich*, iv. 23C, fig. 7; *Ridl. Mal.* iii. 47. (Fig. 216, p. 126.)

Stem very stout. Leaves sagittate, 20 in. wide and as long or less, edge of lobes and midrib thorny; petioles 2 to 3 ft. long. Spathe ovate acuminate, 4 in. long, 1.25 in. wide, outside brown purple striped green, shining, inside cream colour. Spadix 3 in. long, pink, stipes .5 in. long. Sepals spatulate. Drupe obcuneate, green, tip purple. Seed reniform with 4 crests of blunt processes. *Hab.* Common in open swamps, Singapore, Tanglin, Johor, Sungei Tebrau; Kluang (Holttum). Malacca (Griffith); Ayer Panas (Derry). Pahang, Kwala Mahang. Negri Sembilan (Cantley). Perak, Goping and Chanderiang (Kunstler). Province Wellesley, Batu Kurau (Curtis). *Distrib.* Borneo. *Native name:* Gli-Gli.

## 22. POTHOS, Linn.

Climbing plants, branched and slender. Leaves distichous with a sheathing often winged petiole, coriaceous oblong or lanceolate. Spadix peduncled, globose or slender cylindric. Flowers numerous, small, densely crowded, bisexual. Perianth lobes 6. Stamens 6. Ovary 3-celled; stigma small; ovules 1 in the inner angle of each cell anatropous. Berries 1- to 3-seeded, fleshy. Species 20, Madagascar, Tropical Asia, Australia, Polynesia.

Spadix globose; petiole broad linear flat.

Stalk of spadix .12 in. long; peduncle short . . . (1) *P. scandens*

Stalk of spadix .5 in. long; peduncle long . . . (2) *P. macrocephalus*

Spadix cylindric slender.

Flowers whorled; leaf sheathing nearly to top,  
not flattened . . . (3) *P. latifolius*

Flowers dense, not whorled.

Spathe linear narrow.

Sepals narrow at tip.

Leaves elliptic, cuspidate, sheath narrow,  
long . . . (4) *P. Barberianus*

Leaves broad elliptic . . . (5) *P. ellipticus*

Sepals broad, triangular at tip.

Petiole very short, .15 in. long . . . (6) *P. inæqualis*

Petiole 1.5 to 3 in. long; leaves thin . . . (7) *P. lorispatha*

Spathe lanceolate acuminate; leaves lanceolate linear . . . (8) *P. salicifolius*

Spathe oblong boat-shaped; leaf lanceolate acuminate . . . (9) *P. lancifolius*

Spathe ovate-lanceolate, 4 in. long; leaves large . . . (10) *P. Kingii*

Spathe ovate acuminate, broad, 2.5 in. long . . . (11) *P. grandispatha*

(1) *P. scandens* Linn. *Sp. Pl.* 968; *Hook. fil. Bot. Reg. t.* 133;  *Ic. Pl.* 175; *F.B.I.* vi. 551; *Ridl. Mal.* iii. 48.

Stem long slender, 6 to 10 ft. long or more. Leaves lanceolate

acuminate to ovate acuminate, 3 in. long, .2 to 1.5 in. wide; petioles obtuse to spear-shaped, 1 to 3 in. long, .25 to .5 in. wide at the tip. Peduncles axillary, .25 in. long, with several ovate acute bracts. Spathe ovate cuspidate, boat-shaped, .1 in. long, green or purple. Spadix with a stipes .1 in. long, head of flowers globose, as long.

var. (a). Petiole long narrow, blade lanceolate. *Hab.* On trees, Selangor, Batu Caves.

var. (b). *cognatus* Engler. *P. cognatus* Schott, *Aroid*, i. 22, t. 48. Petiole broadly obtuse, blade ovate to oblong-elliptic. *Hab.*

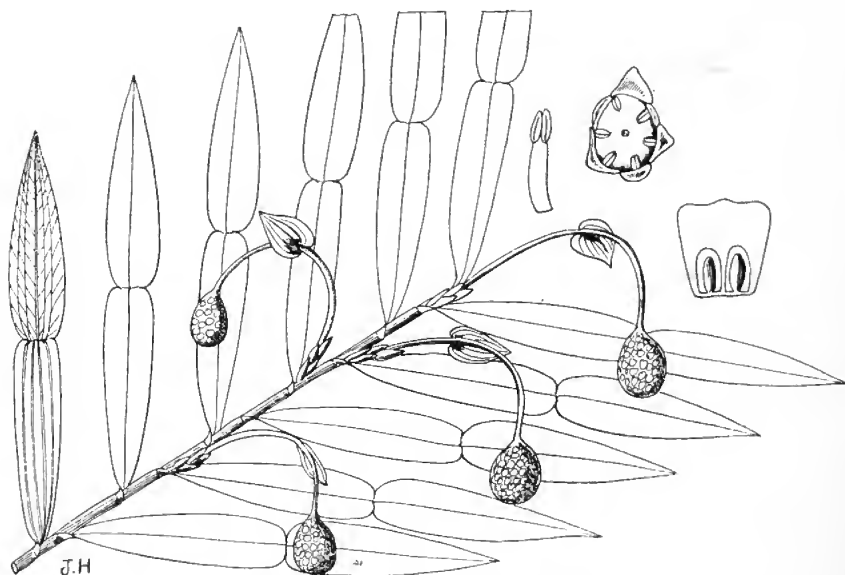


FIG. 217.—*Pothos macrocephalus*.

Perak, Kwala Kangsa; Temengoh; Kwala Dipang (Kunstler); Selama (Scortechini). Penang, Waterfall (Curtis). Kedah, Alor Sta. Perlis, Kanga. Kelantan, Kota Bharu (Ridley). *Distrib.* India, Siam, Malay islands. *Native name:* Juloh-Juloh. *Use:* Leaves powdered applied to the body to cure small-pox, stem cut up with camphor, smoked like tobacco for asthma.

(2) *P. macrocephalus* Scortechini in Hook. *fl. F.B.I.* vi. 553; *Ridl. Mat.* iii. 49.

Stems 60 to 80 ft. long, thicker than in *P. scandens*. Leaves dark green, blade lanceolate to linear-lanceolate, 1.5 to 3 in. long, .4 to .5 in. wide; petioles 2 to 3 in. long, linear. Peduncle 1 to 1.75 in. long, curved. Bracts ovate, .1 in. long or more. Spathe ovate cuspidate, .5 in. long and wider, dark greenish, black or pale

green. Spadix, stipes .5 in. long, head globose or pyriform, yellow, .25 in. long. *Hab.* Perak (Scortechini), Goping (Kunstler), Waterloo (Curtis). Rare.

(3) *P. latifolius* Hook. *fil. F.B.I.* vi. 554; *Ridl. Mat.* iii. 49. *P. Maingayii* Hook. *fil. l.c.* *P. Curtisii* Hook. *fil. l.c.* *P. Kunstleri* Hook. *fil. l.c.*

Stems woody, moderately stout, 10 to 15 ft. long or more. Leaves broadly elliptic or elliptic-lanceolate cuspidate, base rounded or cuneate, 4 to 8 in. long, 1.5 to 2.25 in. wide; intramarginal nerve close to the edge, main nerves close together; petioles 2 to 4 in. long, winged to the short .25 in. long knee. Peduncle .5 to 2 in. long, deflexed. Spathe linear, 1 to 1.5 in. long, pale green. Spadix 3 to 6 in. long, stipitate, cylindric. Flowers whorled, close or distant. Berry .25 to .4 in. long, oblong, red. *Hab.* Not rare. On trees over the whole Peninsula. Singapore, Bukit Mandai; Kranji, Johor. Ulu Kahang (Holttum); Malacca (Maingay). Negri Sembelan, Selaru (Holttum); Selangor, Kwala Lumpur; Semangkok Pass. Dindings, Lumut. Perak, Thaiping Hills (all collectors); Sungkai (Kunstler); Gunong Keledang. Penang, Batu Feringhi (Curtis). *Distrib.* Malay islands. *Native name:* Akar Lidah Badak; "Rhinoceros tongue."

(4) *P. Barberianus* Schott, *Aroid*, 24, t. 53; *Hook. fil. F.B.I.* vi. 558; *Ridl. Mat.* iii. 49.

Stems slender. Leaves lanceolate cuspidate or oblong-ovate acuminate, base rounded, 5 in. long; 1 in. wide, finely reticulate with intramarginal nerves; petioles 2 in. long, .1 to .25 in. across, sheathing to the knee. Peduncle over 1 in. long, with numerous sheaths at base, two or three lanceolate acuminate, 1 in. long. Spadix sessile slender, cylindric, dense, 1 in. long, .12 in. through. Perianth pubescent. Drupe oblong, .25 in. long. *Hab.* Not common, in woods. Pahang; Sungei Yeh, Fraser Hill (Burkill); Perak, Thaiping Hills (Curtis); Brial (Wray). Dindings, Lumut. Jalor, Biserat (Gwynne-Vaughan). *Distrib.* Sumatra, Borneo.

var. *Wallichii* Ridl. *l.c.* *P. Wallichii* Hook. *fil. l.c.* A more slender plant, leaf-sheaths narrower and spadix more stipitate: style more distinct. *Hab.* Penang (Porter in Wall. Coll. 4439B, *P. tenera*). Perak (Scortechini). *Distrib.* Borneo.

I think this is only a weak form. Mr. Gwynne-Vaughan collected in Jalor specimens which though flowerless appeared to be showing the young leaves produced on the lower part of the plant. They are ovate-cordate shortly cuspidate, 1 in. long and nearly as wide, the petioles .1 in. long, so that one lobe of the leaf at base overlaps the slender rhizome.

(5) *P. ellipticus* Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 84; *Mat.* iii. 50.

Stem fairly stout. Leaves elliptic cuspidate, 5 in. long, 2.5 in. wide, base rounded, one intramarginal nerve some way from the edge, an outer one close to the edge; petioles 3 in. long, sheathing broadly to the knee, which is .25 in. long. Peduncle stout, 2 in.

long. Spathe linear-oblong. Spadix nearly sessile, .75 to 1 in. long, thick, dense. Fruit oblong, .5 in. long. *Hab.* Rare on the banks of the Pahang River at Kwala Tembeling, and Pulau Tawar (Ridley).

(6) *P. inæqualis* Ridl. *Journ. Roy. As. Soc. S. Br.* 41, p. 47; *Mat.* iii. 50.

Stem slender, much branched. Leaves elliptic-oblanccolate with a long point, base cuneate; intramarginal nerve far from the edge, undulate, another very close to the edge, main transverse nerves large and distant; 4 to 7 in. long, 1 to 2 in. wide; petiole .5 to 1 in. long, sheathing to the thick half-inch knee. Peduncle 1.5 to 2 in. long. Spathe not seen. Spadix 1 in. long, cylindric, dense. *Hab.* Pahang, Pulau Tawar, River-bank thickets, rare (Ridley).

(7) *P. lorispatha* Ridl. *Journ. Roy. As. Soc. S. Br.* 86, p. 310.

Slender woody climber, internodes 1 in. long. Leaf thin subcoriaceous, inæquilateral, lanceolate, long acuminate, base narrowed; nerves numerous inconspicuous, intramarginal .5 in. from the edge, 1 ft. long, 3 in. wide; petiole 1.5 to 3 in. long, narrowly winged to the top, knee obscure short. Peduncle slender, 1 in. long. Spathe narrow, strap-shaped, acute, 4 in. long, .4 in. wide, dark green. Spadix narrow cylindric, 3 in. long, .12 in. through. Peduncle .25 in. long. Bracts blunt, triangular at top, keeled strongly below. Sepals small, blunt, triangular. Stamens shorter. Ovary oblong-sub-quadrate; stigma small circular. *Hab.* Limestone cliffs, Selangor, Batu Caves (Ridley).

(8) *P. salicifolius* Ridl.

Branches slender flexuous, internodes 1 to 1.5 in. long. Leaves coriaceous lanceolate-linear acuminate, base narrowed slightly, 3-nerved, margin thickened; nerves eleviate beneath, midrib with numerous eleviate nervules joining the two side nerves, and many nervules joining these and the edge, reticulations conspicuous, 6 in. long, 2 in. wide; petioles .5 in. long, terete, knee transversely rugose. Peduncle 1.75 in. long. Spathe lanceolate acuminate, 2 in. long, .25 in. wide at the base. Spadix slender cylindric, 1.1 in. long. Perianth lobes oblong quadrate. Pistil top flat, obscurely 5-angled. Stigma pulvinate. Drupes .25 in. long, globose-oblong, dull yellow. *Hab.* Mountains. Epiphyte climbing close to trunk, Pahang, Fraser Hill at 4000 to 4370 ft. altitude (Burkill and Holttum).

(9) *P. lancifolius* Hook. *fl. F.B.I.* vi. 554; *Ridl. Mat.* iii. 51.

A large slender, woody, branched climber with conspicuously jointed internodes, .5 in. long. Leaves lanceolate long-acuminate; base cuneate, intramarginal nerves inconspicuous, 4 to 7 in. long, .5 to .75 in. wide; petioles 2 to 3 in. long, strongly winged to the knee, .12 in. long. Peduncle rather stout, 1 in. long, no bracts. Spathe oblong cuspidate, 1 to 1.5 in. long, and very broad, lurid

purple. Spadix thick, curved, cylindric, blunt, .75 to 1.5 in. long, .12 in. through. Drupe .25 in. long. *Hab.* Perak (Scortechini).

(10) **P. Kingii** *Hook. fil. F.B.I.* vi. 553; *Ridl. Mat.* iii. 51.

Stem 20 to 30 ft. long, stout. Leaves oblong cuspidate, or oblong-lanceolate caudate acuminate, base narrowed, rounded, often inaequilateral, rather thin, 6 to 10 in. long, 3 to 4 in. wide; petioles 3 to 4 in. long, edges membranous at length fibrous, tip 2-auricled, knee .25 in. long. Bracts 1.5 to 2 in. long. Spathe ovate-lanceolate, 4 to 6 in. long, dark purple inside, pale outside. Spadix 2 to 3 in. long, dense; stigma penicillate. *Hab.* Rare, in mountain forest. Perak, Thaiping Hills at 2000 to 3000 ft. altitude (Kunstler).

(11) **P. grandispatha** *Ridl. Journ. Roy. As. Soc. S. Br.* 41, p. 48; *Mat.* iii. 51.

Stem less than .12 in. thick. Leaves lanceolate cuspidate, cusp .5 in. long, base narrowed, blunt, 6 to 8 in. long, 2 to 2.5 in. wide; petioles 2 in. long, rather broadly sheathing to the very short .12 in. long knee; sheath eventually breaking up into fibres. Peduncle 2 in. long. Spathe broadly ovate acuminate, narrowed at base, purple, 2.5 in. long, 1 in. wide. Spadix very slender, 1 in. long, sessile. *Hab.* Hill forests. Rare. Penang on West Hill (Curtis).

### 23. ACORUS, Linn.

Marsh herbs with an aromatic rhizome. Leaves distichous, ensiform, erect. Peduncle leaf-like. Spathe ensiform erect continuous with the peduncle. Spadix sessile, cylindric, dense-flowered. Sepals 6, orbicular, tips incurved. Stamens 6; anthers reniform. Ovary conic, 2- to 3-celled; ovules many. Berries few-seeded. Species 2, north temperate zone.

(1) **A. calamus** *Linn. Sp. Pl.* 324; *Griff. Notulæ*, iii. 157;  *Ic. Pl. As. t.* 162; *Ridl. Mat.* iii. 52.

Leaves 3 to 6 ft. tall, .75 to 1.5 in. wide. Peduncle 19 in. long. Spathe 6 to 30 in. long, acuminate. Spadix green, 2 to 4 in. long, obtuse. *Hab.* Cultivated and in old damp cultivated ground all over the Peninsula, seldom flowering, probably introduced. *Native names:* Jeringu and Deringu. *Distrib.* Nearly the whole world. *Use:* In native medicine and magic.

## ORDER CLIX. LEMNACEÆ.

Minute or very small floating plants, scale-like, green, rootless or bearing 1 or more slender roots on the under side of the frond. Flowers minute, 1 to 3, naked or in a spathe. Perianth 0. Stamens 1 or 2 with 1- or 2-celled anthers. Ovary flask-shaped, 1-celled. Seed 1 or more.



- Fronds with one or more roots from the under surface;  
 flowers lateral . . . . . 1. LEMNA  
 Fronds with no roots; flowers on the upper surface . . . . . 2. WOLFFIA

### 1. LEMNA, Linn.

Fronds flat with 1 or more roots. Flowers 1 or more in a spathe on the edge of the frond. Species about 12, whole world.

Root one.

- Fronds elliptic asymmetric . . . . . (1) *L. paucicostata*  
 Fronds ovoid acuminate . . . . . (2) *L. tenera*

Roots several.

- Frond orbicular . . . . . (3) *L. polyrrhiza*

(1) *L. paucicostata* *Hegelmaier, Lemnaceæ, 139, t. 8; Hook. fil. F.B.I. vi. 556; Ridl. Mat. iii. 52. L. minor Griff. Notulæ, iii. 216.*

Roots solitary, frond asymmetric elliptic or ovate, .12 in. long, light green. Spathe truncate. Stamens 1 or 2. Pistil very short, flask-shaped, truncate. Ovules solitary. *Hab.* Ditches and ponds. Singapore, Garden Lake; Angmokio. Pahang, Pekan. Malacca, well in Residency garden. Province Wellesley, Permatang Bertam. The commonest species. *Distrib.* Tropics generally.

(2) *L. tenera* *Kurz, Journ. As. Soc. Beng. xl. 1871, ii. 78; Ridl. Mat. iii. 52.*

Root solitary. Frond thin ovate acuminate or lanceolate with 1 or 2 young ones budding off from one side, .25 in. long. Flowers not seen. *Hab.* In ditches and ponds. Singapore, Galang; Telok Kurau (Ridley). Dindings, Bruas. *Distrib.* Pegu.

(3) *L. polyrrhiza* *Linn. Sp. Pl. 970; Hook. fil. l.c. vi. 557; Ridl. Mat. iii. 53. L. major Griff. Notulæ, iii. 216; Ic. Pl. As. t. 264. L. orbiculata Roxb. Fl. Ind. iii. 565.*

Roots several, .5 in. long. Frond orbicular or ovate, rather thick, .13 in. long, green above, purple beneath. Spathe 2-lipped. Stamens 2; ovules 1 or 2. *Hab.* Ditches, not common. Singapore, ditches by Alexandra Road. *Distrib.* Whole world.

The greater Duckweed.

### 2. WOLFFIA, Horkel.

Fronds minute, dark green, rootless. Flowers on the upper surface. Spathe 0. Anthers sessile, 1-celled. Style short; stigma depressed. Ovule 1. Species 12, whole world.

(1) *W. arhiza* *Winn. Fl. Schlesw. 140; Ridl. Mat. iii. 53. Lemna arhiza Linn. Mantiss. 294. Grantia globosa Griff. Notulæ, iii. 229; Ic. Pl. As. t. 267, fig. 2.*

Fronds globose, green, microscopic. *Hab.* In ditches and wells. Singapore, Tanglin. Malacca, in a well at the Residency (Ridley). *Distrib.* Europe, India, Java.

This plant occurs mixed with *Lemna* but is not common, and when it occurs it is often immensely abundant for a time, then disappearing.

## ORDER CLX. ERIOCAULACEÆ.

Herbs (shrubs and trees in South America) with fibrous roots. Stem usually very short. Leaves grassy herbaceous or stiff, crowded at the base in our species. Flowers minute, unisexual, in a head on a slender scape, white. Bracts forming an involucre at the base. Male flowers, sepals 2 or 3, free on connate. Petals 2 or 3, rarely 0 in a tube. Stamens 6 or fewer, usually black, anthers 2-celled. Female flowers in the same head, pedicelled or not. Sepals 2 or 3, narrow. Petals 3, usually ciliate. Stigmas 2 or 3, slender. Ovary 3- (rarely 2-)celled; ovules solitary in the cell. Capsule trilobed. Seeds very minute papillose. Species 600 to 700, chiefly South American.

## 1. ERIOCAULON, Linn.

Description as above. All other genera are South American. This genus, the largest, occurs all over the world in temperate and tropical regions.

Scapes 1 ft. tall.

Heads columnar ovate; leaves thin grassy . . . . . (1) **E. sexangulare**

Heads semi-globose, .26 in. through; scape tall;  
leaves rather stiff . . . . . (2) **E. silicicolum**

Heads sub globose, .3 in. wide; scape 4 in. tall;  
leaves short rigid . . . . . (3) **E. Hookerianum**

Dwarf plants, scapes very slender, 2 to 3 in. tall;  
leaves shorter, 1 in. long, thin; heads .12 in.  
through.

Involucral bracts ovate or oblong short.

Flowers hairy . . . . . (4) **E. truncatum**

Flowers glabrous . . . . . (5) **E. glabriflorum**

Involucral bracts acute, longer than the heads . . . . . (6) **E. xeranthemum**

Involucral bracts spatulate with a few minute  
teeth . . . . . (7) **E. disepalum**

(1) **E. sexangulare** Linn. *Sp. Pl.* 87; *Hook. fil. F.B.I.* vi. 580; *Ridl. Mat.* iii. 54. **E. Wallichianum** *Mart. in Wall. Pl. As. Rar.* 26, t. 249.

Leaves long linear obtuse, dark green, 3 to 13 in. long, .12 to .25 in. wide, herbaceous. Scapes numerous, terete, 12 to 18 in. long. Heads globose or columnar, hard, white, .25 in. long. Receptacle conic. Involucral bracts ovate obtuse. Floral bracts spatulate. Male flowers, sepals usually connate, boat-shaped. Petals tipped with hairs. Female flowers pedicelled or sessile. Sepals boat-shaped. Petals filiform. Capsule flat, broad-winged. Seeds elliptic, ribbed papillose. *Hab.* Very common in open damp spots, ditches, old rice-fields, etc. Singapore, Tanglin; Reservoir. Johor, Tana Merah. Malacca (Griffith); Bukit Sabukor (Derry); Ayer Panas. Sungei Ujong, Bukit Sulu (Cantley). Pahang, Pekan, Penang Hill. Setul. Kelantan, Chaning (Ridley). *Dis-*

*trib.* Madagascar, tropical Asia. *Native names*: Rumpuť Suasa; Rumpuť Kumpai Bunang.

In plants in very wet spots the heads are often bulbiferous.

(2) *E. silicolum* Ridl. *Journ. F.M.S. Mus.* vi. 191.

Stem very short, covered with leaf bases. Leaves linear flaccid, herbaceous, acute, 5 to 8 in. long,  $\cdot 12$  to  $\cdot 13$  in. wide, with a few white hairs. Scapes 1 to 3, slender, glabrous, 12 to 18 in. tall, basal sheath 4 in. long, limb lanceolate elongate. Head  $\cdot 25$  to

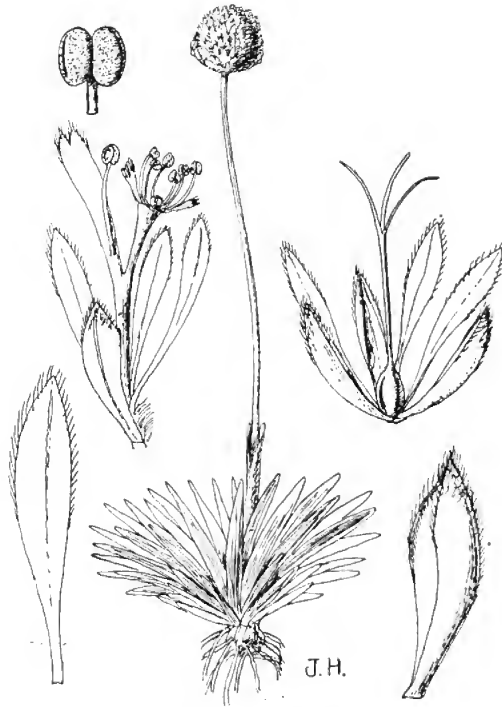


FIG. 218.—*Eriocaulon Hookerianum*.

nearly  $\cdot 5$  in. wide. Involucral bracts oblong, tip rounded pubescent. Bracteoles cuneate, rounded, tip covered thickly with white hairs. Male flowers stalked. Sepals oblong cuneate, tipped with white hairs and black dotted, connate for most of their length. Corolla hardly longer, lobes 3, very unequal, crested with white hairs. Anthers black. Female flower; sepals as in male. Petals linear, free to base, with long white hairs. Capsule trilobed globose. Seed oblong obtuse. *Hab.* High mountains, local. Pahang, Gunong Tahan at 5500 ft. altitude in damp, open spots (Ridley).

(3) **E. Hookerianum** Stapf. *Trans. Linn. Soc.* iv. 243. (Fig. 218, p. 134.)

Stem very short. Leaves densely crowded, linear, erect or recurved, acute or obtuse, stiff, 1·5 to 3 in. long, ·13 to ·25 in. wide at base. Scape 5 to 7 in. long. Head ·25 in. across. Involucral bracts rounded or ovate rounded, glabrous. Receptacle villous. Bracteoles obovate cuneate, ashy blue, tipped with white hairs. Male flowers; sepals for one-third of length, connate obovate, white pilose. Corolla tubular-campanulate, stipitate, lobes unequal, oblong, with a black gland. Stamens 6. Female flower, sepals free, spatulate cuneate, tips pilose. Corolla-lobes spatulate, villous with a black gland. Seed ellipsoid or sub-globose. *Hab.* High mountains among rocks. Pahang, Gunong Tahan on Gunong Riang and the summit of Gunong Tahan at 7100 ft. altitude on dry rocky spots. *Distrib.* Mount Kinabalu in Borneo.

(4) **E. truncatum** Ham. *Mart. in Wall. Pl. As. Rar.* iii. 29; *Hook. fil. F.B.I.* vi. 578; *Ridl. Mat.* iii. 54.

A small plant with acute linear leaves, 1 to 2 in. long, ·12 in. wide. Scape 1 to 4 in. tall. Head greyish white, hemispheric, ·12 in. long. Involucral bracts ovate, margins lacerate. Receptacle flat. Bracteoles cuneate toothed. Male flowers stalked. Petals usually coherent. Female flowers pedicelled. Sepals 3, linear. Petals 3, linear ciliate. Ovary and petals stipitate. Seeds elliptic, ribbed. *Hab.* Very common little weed in damp paths and plashes especially in sandy ground. Singapore, Tanglin; Bukit Mandai. Malacca (Griffith); Bukit Sabukor; Ayer Panas. Pahang, Kwala Pahang. Perak. Dindings, Lumut. Penang Hill. Lankawi, Kwah (Ridley). *Distrib.* Indo-Malaya, China. *Native name:* Rumput Durian.

Hooker, *l.c.*, separates the Malay plant as a variety, var. *malaccensis*, on its broader floral bracts and sessile flowers (but they are usually stipitate here). It is a variable plant but quite the same as the Indian form.

(5) **E. glabriflorum** Ridl.

A dwarf plant resembling *E. truncatum*, Ham., but with much narrower leaves, linear-acuminate, ·5 to 1 in. long, ·05 to ·1 in. wide. Scapes slender, 3 to 4 in. tall. Heads semi-orbicular, ·1 in. wide, yellowish white, glabrous. Bracts oblong sub-obtuse, shorter than the head. Inner bracts spatulate, yellowish white tipped fuscous. Male flowers; sepals 2, narrow spatulate acute, longer than corolla. Corolla-lobes 3, short equal; anthers black. Females; sepals 2, linear, spatulate. Petals 3, similar. All glabrous. *Hab.* Damp sand and rocks in the north. Lankawi, Burau Bay by the seven wells (Robinson); Terutau (Robinson). Singgora (Annandale).

(6) **E. xeranthemum** Mart. *Wall. Pl. As. Rar.* iii. 29; *Hook. fil. F.B.I.* vi. 584; *Ridl. Mat.* iii. 55.

A very small species, 2 to 3 in. tall. Leaves linear acute, 1 in.

long, narrow. Scapes 2 to 3 in. tall, three-ribbed and twisted. Head very small with 7 or 8 lanceolate acute toothed involucrel bracts longer than the flowers. Floral bracts lanceolate acuminate, toothed. Male flowers; sepals obtuse, black with white processes. Petals 3, spatulate, black tipped. Seeds elliptic, yellow, obscurely dotted. *Hab.* Very rare. Near the quarry in grassy spots. Penang, Waterfall Gardens. *Distrib.* India and Africa.

(7) **E. disepalum** Ridl.

Dwarf plant 4 to 6 ft. tall. Leaves linear-acuminate, 2.5 in. long, 1.5 in. wide. Scapes 5 to 6 in. long, slender, ribbed, numerous. Heads .2 in. wide, glabrous. Involucrel bracts white, spatulate, top round with a few minute teeth. Floral bracts spatulate, slightly fuscous at top. Male flowers; sepals 2, short, spatulate. Corolla-tube longer. Anthers black, 6. Female flower; sepals linear, 3. Petals 0. Style long and slender. Seed yellow, ellipsoid, ribbed. *Hab.* Kelantan, rice-fields at Tumput, Kota Bharu (Ridley).

## ORDER CLXI. RESTIACEÆ.

Herbs wiry with a woody rhizome covered with scales or wool. Culms simple or branched. Leaves (few radical cyperaceous) or reduced to sheaths, tubular. Inflorescence varied. The plants separately male or female or the inflorescence bisexual. Flowers resembling those of *Cyperaceæ*, but with a perianth. Bracts stiff, brown. Perianth regular, 3 to 6 scarious lobes. Stamens in males 3, filaments filiform. Anthers oblong, 1 or 2 locular. Female flower; ovary 1- to 3-celled. Styles as many, filiform. Ovules solitary. Fruit dry, compressed or triquetrous, 1- to 3-seeded. Species 230. Chiefly African and Australian, 1 in Chili, 1 Cochinchina.

### 1. LEPTOCARPUS, Br.

Leaves reduced to sheaths. Heads many-flowered, or in female rarely one-flowered, paniced, spiked or capitate. Fruit usually 3-angled. Species 22, Africa, Australia, New Zealand, Chili, Cochinchina.

(1) **L. disjunctus** Mast. *Journ. Linn. Soc.* xvii. 344.

Rhizome stout, woody, densely woolly. Culms stiff, 2 ft. tall or more, .1 in. through, sheaths .5 in. long, convolute acuminate, chestnut red. Spikelets fascicled in a short branched panicle 4 to 6 in. long. Fascicles .1 in. long, outer bracts lanceolate, coriaceous, red, with an awn. Spikelets 1-flowered, upper male, lower female or all male. Bracts and 2 bracteoles coriaceous lanceolate, red. Perianth of 6 lobes, outer ones oblong acute, inner ones 2 or 3 smaller. Stamens in male 3; filaments slender; anthers ellipsoid apiculate, 1-celled. Ovary in female triquetrous. Style short. Stigmas 3, linear. Fruit indehiscent, 1-seeded. *Hab.* Marshy ground, rare. Tringganu, Kresag (A. Vesterdal). *Distrib.* Singora and Cochinchina.

## ORDER CLXII. CYPERACEÆ.

Herbs grass-like with solid, often triquetrous, culms. Leaves linear or oblong, sheathing with tubular sheaths or reduced to sheaths only. Flowers bisexual, small or minute, solitary in the axils of a glume, arranged in spikes. Perianth 0, or of hypogynous bristles or scales. Stamens 1 to 3. Anthers linear, basifixed. Ovary 1-celled, 1-ovuled. Style slender with 2 or 3 stigmatic arms. Fruit a biconvex or trigonous nut. Species about 3000, over the whole world.

I. EUCYPEREÆ. Glumes few or many, all distichous. No hypogynous bristles.

Style bifid; flowers 1 or 2, in spikelet . . . . . 1. KYLLINGA

Style bifid; flowers numerous . . . . . 2. PYCREUS

Style trifid.

Rachilla of spikelet persistent after fall of glumes . . . . . 3. CYPERUS

Rachilla disarticulating above last 2 glumes . . . . . 4. MARISCUS

II. SCIRPEÆ. Flowering glumes in a spiral. Hypogynous scales or bristles often present.

Style-base constrict above top of nut; spikelet 1; no leaves; bristles 5 to 8 . . . . . 5. ELEOCHARIS

Style-base persistent or completely deciduous; leafy plants; no bristles . . . . . 6. FIMBRISTYLIS

Style-base deciduous but leaving a small knob on the nut . . . . . 7. BULBOSTYLIS

Style-base not articulate passing into nut gradually; bristles 0 or 6 linear . . . . . 8. SCIRPUS

Scales 3 to 6, broad obovate or spatulate . . . . . 9. FUIRENA

Scales 2, thin, boat-shaped, enclosing nut . . . . . 10. LIPOCARPHA

III. RHYNCHOSPOREÆ. Glumes not distichous; several empty ones at base, bisexual, 1 or 2, terminal, male or empty.

Bristles linear or 0; spikes paniced.

Style bifid, base thick conic, persistent . . . . . 11. RHYNCHOSPORA

Style bi- or tri-fid, base conic, not persistent . . . . . 12. ACTINOSCHÆNUS

Style trifid.

Three or more lower glumes empty, 2 or 3

upper fertile . . . . . 13. SCHÆNUS

Lowest flower fertile . . . . . 14. CLADIUM

Upper flower fertile.

Hypogynous scales broad . . . . . 15. LEPIDOSPERMA

Scales and bristles 0.

Big tufted plant with large panicles . . . . . 16. GAHNIA

Creeping sand-plant, flowers in a head . . . . . 17. REMIREA

IV. HYPOLYTRÆ. Spikelets of 1 glume-like bract, 2 thin boat-shaped glumes with 1 stamen each and 4 to 9 thin glumes (*squamellæ*) 1 or more with a stamen. Female flower terminal.

Spikes in a corymbose panicle.

Style bifid, squamellæ 2, monandrous . . . . . 18. HYPOLYTRUM

Style trifid, squamellæ 6, 2 or 3 monandrous . . . . . 19. THORACOSTACHYUM

Spikes solitary or several in a head; leaves

pandan-like . . . . . 20. MAPANIA

Spikes in a short panicle; leaves pandan-like . . . . . 21. SCIRPODENDRON

Spikes solitary on leafless stem . . . . . 22. LEPIRONIA

V. SCLERIEÆ. Spikelets unisexual or 1 or more male above a female. Nuts stipitate on a disc, bony white or purple, smooth or tessellate.

23. SCLERIA

VI. CARICEÆ. Spikelets of male or female flowers, or both. Nut enclosed in an utricle . . . . . 24. CAREX

## 1. KYLLINGA, Rottb.

Rhizome sometimes elongate. Culms erect, leafy below. Leaves narrow. Spikes 1 to 3, sessile, capitate, with 3 or 4 leafy bracts below, ovoid or cylindric of numerous small compressed spikelets. Glumes 4 or 5, distichous, two lowest empty, third bisexual empty or male. Style 2-branched. Nut compressed, laterally. Species 33, all warm countries.

Heads white.

Fertile glume winged in upper half; heads ovoid (1) *K. monocephala*

Fertile glume not winged; heads cylindric (2) *K. cylindrica*

Heads green. Fertile glume not winged.

Rhizome elongate; leaves long (3) *K. brevifolia*

Rhizome thick and short; leaves very few and short (4) *K. melanosperma*

(1) *K. monocephala* Rottb. *Descr. & Ic.* 13, t. 4, fig. 4; *Ridl. Mat.* iii. 58.

Rhizome usually short, culms tufted, grassy, 6 to 12 in. long. Spikes 1 to 3, ovoid, white, .25 in. long. Spikelets .15 in. long, lowest glume linear, second and third ovate, crested in upper half, crest toothed. *Hab.* In waste ground, roadsides, etc., very common, all over the Peninsula. Singapore (Wallich) very common. Johor, Pahang, Malacca, Selangor, Perak, Penang. *Distrib.* All the tropics. *Native name*: Rumput Butong.

(2) *K. cylindrica* Nees in *Wight, Contrib.* 91; *Clarke in Hook. fil. F.B.I.* vi. 588; *Ridl. Mat.* iii. 59.

Rhizome very short. Culm 6 in. tall. Leaves numerous, shorter. Head of 3 spikes, white, median one cylindric, .25 in. long, laterals shorter ovoid. Bracts 3 or 4, 1 to 3 in. long. Spikelets narrow. Fertile glume ovate, keel hardly distinct, with few teeth, ribs conspicuous. Nut yellow, turning black. *Hab.* Very rare. Singapore in the sandy lawns of the cathedral and Raffles School (Hullett). *Distrib.* India, Africa, Australia.

(3) *K. brevifolia* Rottb. *Descr. and Ic.* 13, t. 4, fig. 3; *Ridl. Mat.* iii. 58. *K. cruciata*, Nees, *Linnaea*, ix. 286.

Rhizome 3 to 4 in. long or more. Culms often distant, 4 to 12 in. long. Leaves 6 to 8 in. long. Spikes 1 to 3 ovoid, .25 in. long, green. Lowest glumes small, 3 and 4 lanceolate, keel toothed. *Hab.* Common on roadsides and waste ground. Singapore, Pahang, Malacca, Selangor, Province Wellesley, Penang. *Distrib.* All warm countries. *Native name*: Rumput Tuki. *Use*: The rhizome for poulticing sore legs.

(4) *K. melanosperma* Nees in *Wight, Contrib.* 91; *Ridl. Mat.* iii. 59. *K. vaginata*, *Zoll. Verz. Ind. Arch.* ii. 63.

Rhizome short, thick: Culms 15 to 18 in. tall, triquetrous above. Leaves few, 1 to 4 in. long, .2 in. wide. Head 1, ovoid, green, .25 in. long. Bracts .75 to 4 in. long. Spikelets narrow. Fertile glume ovate, strongly ribbed, keel with few short teeth.

Nut oblong, black. *Hab.* Damp grassy spots, rare. Singapore near Tanglin; Thomson Road (Ridley). Perak, Gunong Hijau (Burkill). *Distrib.* Africa, India and Java.

## 2. PYCREUS, Beauv.

Stems erect, leafy at base only. Inflorescence of oblong or linear flattened spikes, umbellate or capitate; rachecola persistent. Glumes distichous, 2 lowest empty, upper ones bisexual, terminal one or two empty. Stamens 1 to 3. Style 2-branched. Nut laterally compressed. Only differs from *Cyperus* in the 2-branched style and flattened nut. Species about 50, warm and temperate regions.

Tall plants.

Leaves distant on stem; glumes ovate, red or pale . . . . . (1) **P. sanguinolentus**

Leaves at base only.

Glumes yellow or brown; spikelets narrow . . . . . (2) **P. polystachyus**

Glumes broad, red, oblong . . . . . (3) **P. puncticulatus**

Small annual tufted plant.

Glumes ovate mucronate, silvery . . . . . (4) **P. nitens**

(1) **P. sanguinolentus** Nees, *Linnæa*, ix. 283; *Clarke in Hook. fil. F.B.I.* vi. 590; *Ridl. Mat.* iii. 60. *Cyperus sanguinolentus Vahl. Enum.* ii. 351. *C. eragrostis Vahl. Enum.* ii. 322. *C. cruentus Roxb. Fl. Ind.* i. 196 (not of *Rottboell*).

Rhizome creeping. Culm 4 to 24 in. tall. Leaves distant on the stem in the lower half, sheaths 3 in. long or less, blade 6 to 9 in. long. Umbel simple, of 5 branches, peduncles 2 in. long and a central sessile spikelet, occasionally reduced to a head. Spikelets oblong or linear, brown or dark red, .25 to .5 in. long, nearly .12 in. wide. Glumes ovate obtuse keeled, loosely imbricate, 3-nerved. Nut half as long, dark brown or black, obovoid, biconvex, puncticulate. *Hab.* Rather rare, in rice-fields and damp open spots. Pahang, Kwala Tembeling. Negri Sembilan, at Kwala Pedas. Penang, Waterfall (Ridley). *Distrib.* Tropical Asia and Australia.

(2) **P. polystachyus** Beauv. *Fl. D'Owar* ii. 48, t. 86, fig. 2; *Clarke in Hook. fil. F.B.I.* vi. 592. *Cyperus polystachyus Br. Prodr.* 214; *Ridl. Mat.* iii. 60.

A tufted plant 12 to 30 in. tall. Leaves longer or shorter than culm. Umbel simple with 4 or 5 branches 2 in. long or contracted into a head. Spikelets crowded, erect, narrow, linear, .25 to .5 in. long. Glumes numerous, yellow or brown, lanceolate acute, closely imbricating. Nut oblong truncate, black, half as long as the glume.

var. *b. laxiflora* Benth. *Fl. Austral.* vii. 261. *Cyperus paniculatus Rottb. Descr. and Ic.* 40. *C. plenus Kunth. Enum.* ii. 12. Tall and weak branches of umbel longer and narrower, widely spreading and redder in colour. *Hab.* Waste ground, pastures



and roadsides over all warm countries. Common over the whole Peninsula, Singapore, Selangor, Pahang, Kelantan, Penang.

var b. occurs with the type form, but is scarcer.

(3) **P. puncticulatus** *Nees, Linnæa*, ix. 283; *Clarke in Hook. fil. F.B.I.* vi. 593; *Ridl. Mat.* iii. 61. *Cyperus puncticulatus Vahl. Enum.* ii. 348.

Culm triangular, over 1 ft. tall. Leaves about as long. Umbel simple or compound, 4 in. long. Spikelets .5 in. long, red, spicate. Glumes dark red, blunt, margin scarious, ribbed. Nut broad ellipsoid truncate, half as long as the glume. *Hab.* River banks, scarce. Perak by the river at Teluk Anson (Ridley). *Distrib.* India and China.

(4) **P. nitens** *Nees, Linnæa*, ix. 283; *Clarke in Hook. fil. F.B.I.* vi. 591. *Cyperus punilus Linn. Sp. Pl.* 69. *C. nitens Vahl. Enum.* ii. 331.

A small tufted plant 1 to 6 in. tall. Leaves as long as culms or longer. Umbel simple with slender peduncles, .5 in. long, or reduced to a single head. Bracts long. Spikelets .25 in. long, linear-oblong, silvery. Glumes 10 to 20, ovate mucronate, closely imbricating, silvery, keel green, ribs on each side, 2. Stamen 1 (rarely 2). Nut obovoid, compressed. *Hab.* Sandy spots, local but often abundant. Singapore, Macpherson Road; Changi. Malacca, Ayer Panas (Cantley). Perak, Telok Pinang, Ipoh. Penang, Dato Kramat (Curtis). *Distrib.* Tropical Asia. *Native name*: Rumput Taman.

### 3. CYPERUS, Linn.

Culms erect, leafy at base only. Inflorescence umbelled, simple or compound or capitate. Rachilla of spikelet persistent after fall of glumes. Glumes distichous, the 2 lowest and one or two uppermost empty, the rest bisexual. Stamens 2 or 3, rarely 1. Style continuous with nut, 3-branched. Nut triquetrous. Species 300, whole world.

- |   |                            |
|---|----------------------------|
| Nut with corky edges; plant large . . . . .   | (1) <b>C. platystylis</b>  |
| Nut without corky edges.  |                            |
| Dwarf annuals; glumes mucronate.  |                            |
| Glumes usually dark red, nut sides parallel . . . . .                                   | (2) <b>C. castaneus</b>    |
| Glumes pale or brown; not obovoid . . . . .   | (3) <b>C. uncinatus</b>    |
| Small or middle-sized plants with very numerous short spikelets; leaves narrow.         |                            |
| Stems acutely triquetrous weak; umbels spreading . . . . .                              | (4) <b>C. haspan</b>       |
| Stems stiff; umbels dense . . . . .   | (5) <b>C. pulcherrimus</b> |
| Plant flaccid; spikelets fuscous in dense globose heads . . . . .                       | (6) <b>C. difformis</b>    |
| Tall woodland plants, leaves and bracts broad; umbels compound; spikelets small, green. |                            |
| Spikelets flat . . . . .  | (7) <b>C. diffusus</b>     |
| Spikelets turgid . . . . .  | (8) <b>C. bancanus</b>     |

- Sea-sand plant, culms very short; umbel capitate or with long rays . . . . . (9) **C. radians**
- Culms tall slender; leaves narrow; rhizome short or o. Glumes very short, hardly longer than nut, yellow . . . . . (10) **C. Iria**
- Glumes much longer than nut. Rachis hairy . . . . . (11) **C. pilosus**
- Rachis glabrous. Glumes red; spikelets narrow; umbel condensed . . . . . (12) **C. babakensis**
- Glumes silvery; spikelets broad . . . . . (13) **C. compressus**
- Glumes yellowish; spikelets narrow; umbel simple . . . . . (14) **C. Zollingeri**
- Culms slender distant on a long rhizome, tuberous at base. Umbel simple, lax or dense; spikelets narrow, red; waste ground inland . . . . . (15) **C. rotundus**
- Umbel dense; spikelets pale; seashores . . . . . (16) **C. stoloniferus**
- Culms stout tall; rhizome long. Umbels large; glumes narrow, distant . . . . . (17) **C. distans**
- Umbels large; glumes broad blunt, close set. Leaves long . . . . . (18) **C. procerus**
- Leaves very short, nearly reduced to sheaths . . . . . (19) **C. malaccensis**
- Tall leafy plants with large umbels decomposed, no rhizome; glumes yellow. Spikes cylindric dense . . . . . (20) **C. radiatus**
- Umbel lax; anthers not crested . . . . . (21) **C. digitatus**
- Umbel lax; anthers crested . . . . . (22) **C. elatus**

(1) **C. platystylis** Br. *Prodr.* 214; *Clarke in Hook. fil. F.B.I.* vi. 498; *Journ. Linn. Soc.* xxi. 117, t. 1, figs. 7-9; *Ridl. Mat.* iii. 63. **C. pallidus** Nees, *Linnaea*, ix. 284.

Culm stout triquetrous, 18 to 24 in. tall. Leaves 12 to 18 in. long, .25 in. wide. Bracts serrulate on edge and keel, broad, about 8. Umbel 3 to 7 in. across, compound. Spikelets .50 in. long, .12 in. wide. Glumes close imbricate, ovate mucronate, red, about 40. Style shorter than nut. Nut nearly as long as glume, oblong acute with yellow corky angles. *Hab.* Rare, in rice-fields. Malacca, Ching. Negri Sembilan, Kwala Pedas (Ridley). Penang (Wallich). *Distrib.* Indo-Malaya, Australia.

(2) **C. castaneus** Willd. *Sp. Pl.* i. 278; *Roxb. Fl. Ind.* i. 195; *Clarke in Hook. fil. F.B.I.* vi. 598; *Ridl. Mat.* iii. 63.

A dwarf plant 2 to 6 in. tall, with tall tufted culms. Leaves shorter or as long. Umbel rays 5, sometimes reduced to 1 head. Bracts .5 in. long. Spikelets linear, .36 in. long. Glumes chestnut, about 26, blunt with a long recurved point and a rib on each side. Nut oblong, half as long as the glume, sides parallel. *Hab.* Very rare, Perak at Ulu Bera (Kunstler). *Distrib.* India, Cochinchina, Australia.

(3) **C. uncinatus** Poir. *Encycl.* vii. 247; *Ridl. Mat.* iii. 64. **C. cuspidatus** H.B.K. *Nov. Gen. & Sp.* i. 204; *Clarke in Hook. fil. F.B.I.* vi. 599.

Dwarf plant 2 to 6 in. tall. Umbels of 4 or 5 rays or con-

tracted to a head. Spikelets linear, .36 in. long, pale or dark red. Glumes strongly 3-nerved with a strong recurved point. Nut oblong-ovoid. *Hab.* Sandy places beneath coconut palms, etc. Not rare. Singapore, Macpherson Road. Negri Sembilan, Tampin, (Burkill). Penang, Dato Kramat (Curtis). Kedah, Yan. Tringganu (Yapp). Kelantan, Kota Bharu. *Distrib.* Warm regions.

This species is only distinguished from *C. castaneus* by the form of the nut.

(4) **C. haspan** *Linn. Sp. Pl.* 66; *Clarke in Hook. fil. F.B.I.* vi. 600; *Ridl. Mat.* iii. 64.

A weak plant with rhizomes 6 in. long or more and distant solitary stems, or sometimes shorter and crowded. Culms triquetrous, slender, flaccid, 4 to 30 in. long. Leaves often shorter. Bracts long, broad, leaf-like, tip triquetrous. Umbel usually large, compound, spreading, rays 4 in. long or less. Spikelets usually few, small, sometimes numerous, crowded, .12 to .75 in. long. Glumes usually few 10 to 40, ovate obtuse, hardly mucronate, reddish, keel green. Nut obovoid triquetrous, very small, white or pale brown. *Hab.* Very common in ditches and wet spots, very variable in size and development of umbel according to locality. Whole Peninsula from Singapore to Penang, in low country, up to 3000 ft. altitude on Kedah Peak. *Distrib.* All warm regions. *Native names:* Rumput Sumbuh; Rumput Bilis jantan.

(5) **C. pulcherrimus** *Willd. in Kunth. Enum.* ii. 35; *Clarke in Hook. fil. F.B.I.* vi. 600; *Ridl. Mat.* iii. 64.

A tufted plant with numerous culms 14 to 18 in. tall, fairly stout. Leaves shorter. Umbels decompound, 6 to 8 in. across, dense, with very numerous spikelets clustered at the end of the rays. Spikelets .12 in. long or less, yellowish brown. Glumes ovate-oblong obtuse, tip incurved. Nut broadly elliptic. *Hab.* Damp spots and paddy fields, not rare. Pahang, Pekan. Selangor, Batu Caves. Penang, Pulau Betong (Curtis); Ayer Rajah Road (Nur). Perlis, Kanga. *Distrib.* India, Java and Borneo.

(6) **C. difformis** *Linn. Sp. Pl.* 67; *Clarke in Hook. fil. F.B.I.* vi. 599.

Annual 4 to 20 in. tall. Leaves flaccid. Culm triquetrous at top. Umbel contracted of 4 or 5 rays 1 to 2 in. long or less. Heads globose, .25 in. through. Spikelets oblong blunt, .1 in. long or less. Glumes close packed, concave, quite blunt, truncate, greyish white. Nut broad ellipsoid, nearly as long as glume, triquetrous. *Hab.* Rare. Ricefields in Kelantan near Kota Bharu (Ridley). *Distrib.* Tropics of Old World.

(7) **C. diffusus** *Vahl Enum.* ii. 321; *Clarke in Hook. fil. F.B.I.* vi. 603; *Ridl. Mat.* iii. 65. *C. elegans Sw. Obs. Bot.* 30.

Culms solitary, 8 to 36 in. tall, stout, triquetrous. Leaves as tall or taller, .25 to .5 in. wide. Umbel compound, 4 to 14 in. across, rays 6 or more. Bracts many, leafy, to .5 in. wide. Spike-

lets flat, very numerous, .33 to .37 in. long, olive-green, digitate, 3 to 9 together. Glumes ovate, boat-shaped, mucronate. Nut broad elliptic, triquetrous. *Hab.* In sandy woods. Common. Singapore, Bukit Timah. Pahang, Tahan River. Selangor, Kwala Lumpur. Kelantan, Kwala Aring (Yapp); Kwala Lebir. Kedah, Alor Sta (Ridley).

var. *pubisquama* Ridl. l.c. *C. pubisquama* Steud. *Syn. Cyp.* 20; *Clarke l.c.* 604. Spikelets very numerous, longer, more closely imbricate and occasionally scabrid. *Hab.* In sandy woods, Johor, Kota Tinggi. Pahang, Tahan river. Selangor, Ginting Bidai; Kwala Lumpur. Perak, Simpang (Wray). Penang (Wallich). Pulau Betong (Curtis). *Distrib.* of the species, tropics generally. *Native names*: Rumput Parah Parah; Rumput Bumban.

(8) *C. bancanus* Miq. *Fl. Ind. Bat. Supp.* 260, 599; *Ridl. Mat.* iii. 65. *C. turgidulus* Clarke, *Journ. Linn. Soc.* i. 130; *in Hook. fil. F.B.I.* vi. 604.

Tufted or solitary stems 12 to 18 in. tall. Leaves numerous, as long or longer, flaccid, .5 in. wide. Culm stout triquetrous. Umbel compound, 3 to 4 in. wide, rays 2 in. long. Bracts large, leaf-like. Spikes small capitate dense, spikelets very small turgid, few-flowered, .06 in. long. Glumes ovate, mucronate, many-ribbed, keel green, sides brown. Nut ovoid-lanceolate acute, 3-angled, dark brown, as long as glume. *Hab.* sandy woods, common, Malacca, St. Paul's Hill (Hervey). Pahang, Pekan. Sungei Ujong, Gunong Berumbun (Cantley). Penang, Tanjong Bunga (Curtis). Setul. *Distrib.* Assam, Burma, Siam, Malay islands. *Native names*: Rumput Pa-parah; Rumput Chukor Kerbau.

(9) *C. radicans* Nees and Meyen, *Linnæa*, ix. 285; *Clarke in Hook. fil. F.B.I.* vi. 605; *Ridl. Mat.* iii. 66. *C. radicans* Kunth. *Enum.* ii. 95. *C. Griffithii* Steud, *Syn. Cyp.* 316.

A stiff tufted plant, culms solitary or several together, 1 to 3 in. tall. Leaves longer, 3 to 6 in. long. Umbel simple or compound, sometimes reduced to a head, sometimes with rays 1 to 12 in. long. Bracts numerous. Spikelets .12 in. long or more, rarely .75 in. long. Glumes close ovate mucronate, red brown, with many ribs. Nut obovoid, black punctate, half as long as glume. *Distrib.* Tenasserim, China, Malaya. *Hab.* Seasands. A very variable sedge in size, Singapore (Wallich); Gelang to Changi. Malacca (Griffith); Pulau Besar. Pahang, Sungei Meang. Tringganu, Cherating River. Kelantan, Kamposa. Penang, Telok Bahang and Batu Feringhi (Curtis). A flaccid green form occurs in shady spots at Sungei Meang, Pahang. *Distrib.* Tenasserim, Malaya, China.

(10) *C. Iria* Linn. *Sp. Pl.* 67; *Roxb. Fl. Ind.* i. 201; *Clarke in Hook. fil. F.B.I.* vi. 606; *Ridl. Mat.* iii. 67.

Culms solitary or tufted, 4 to 24 in. tall. Leaves shorter than stem, .2 to .25 in. wide. Umbel 2 to 5 in. across, usually com-

pound, primary rays corymbose at the ends or umbelled again. Spikes lax, .5 to 2 in. long. Spikelets linear, 6- to 20-flowered. Glumes yellow or brown, not imbricating, obovate obtuse very short. Nut triquetrous, yellow, much narrowed to base, nearly as long as the glume. *Hab.* Common in waste ground and rice fields. Whole Peninsula. *Distrib.* All warm parts of Europe, Africa, Asia, Australia. *Native name*: Rumput Tuloh Belalang.

The dwarf annual form *micro-iria*, Steud., only a few inches tall is not rare.

(11) **C. pilosus** Vahl. *Enum.* ii. 354; *Clarke in Hook. fil. F.B.I.* vi. 609; *Ridl. Mat.* iii. 67.

A rather stout plant with slender stolons. Culms flaccid or stiff, acutely triquetrous, 1 to 3 ft. tall. Leaves shorter, broad, .2 to .25 in. wide. Umbel short, compact to wide-spreading, rays generally few, 1 to 6 in. long. Bracts longer, secondary, umbels lax or very dense with innumerable spikelets, .25 in. long; rachis pilose. Glumes ovate blunt, usually red, keel green, loosely imbricate. Nut ovate acute, apiculate, triquetrous, yellow brown to black, three-fourths the length of the glume. *Hab.* Common in ditches and marshy wet ground. Whole Peninsula, Singapore, Jurong; Gelang; Chan Chu Kang. Johor, Kluang (Holttum). Pahang, Pekan. Malacca. Selangor, Kwala Lumpur. Negri Sembilan, Kwala Sawar. Perak, Thaiping. Penang, Waterfall (Curtis). *Distrib.* Tropical Africa, Asia, Australia.

(12) **C. babakensis** Steud. *Zoll. Verz. Ind. Arch.* ii. 62; *Clarke in Hook. fil. F.B.I.* vi. 610.

Whole plant 1 ft. tall. Leaves shorter than the triquetrous culm. Bracts long, 6 in. or more. Spikelets red, .25 in. long, condensed into dense heads 1 in. through, sessile with 1 peduncled rachis not pilose. Glumes boat-shaped, hispid, scabrous at top of keel. Nut hardly half as long as glume. *Hab.* Rare. Damp woods. Kelantan, Glam woods, Kota Bharu. *Distrib.* India, Java.

This plant resembles *C. pilosus*, but has a dense umbel and is not pilose.

(13) **C. compressus** Linn. *Sp. Pl.* 68; *Clarke in Hook. fil. F.B.I.* vi. 605; *Ridl. Mat.* iii. 67.

A tufted plant. Culms several or numerous, 6 to 12 in. tall, rather stout. Leaves nearly or quite as long. Bracts 3 to 8 in. long. Umbel simple, rays 1 to 3 in. long. Spikelets 3 to 10 in a cluster, .5 to .75 in. long, rather broad. Glumes ovate mucronate, silvery with a green keel, many-nerved. Nut obovoid obtuse, acutely triquetrous, black. *Hab.* Very common in waste ground all over the Peninsula. *Distrib.* All warm parts of the world. *Native name*: Rumput Tiga Sagi.

(14) **C. Zollingeri** Steud. *Zoll. Verz. Ind. Archip.* ii. 62; *Syn. Cyp.* 17; *Clarke in Hook. fil. F.B.I.* vi. 613; *Ridl. Mat.* iii. 68.

Rhizome short stout woody. Culms several, slender, 1 to 2 ft.

tall, bases covered with red sheaths, triquetrous above. Leaves shorter, narrow. Bracts longer than umbel. Umbel simple, rays few, 3 to 4 in. long, erect or nodding. Spikelets 7 or 8 together, narrow linear, .50 in. long. Glumes rather distant, boat-shaped narrow sub-acute, yellow, keel green. Nut ellipsoid or obovoid, bluntly trigonous, black, half as long as the glume. *Hab.* Common in dry waste ground. Whole Peninsula, Singapore, Tanglin; Changi. Malacca, Pulau Besar. Pahang, Pekan. Perak, Thaiping. Penang, Waterfall (Curtis). *Distrib.* Africa, Asia and Australia.

(15) *C. rotundus* Linn. *Sp. Pl.* 67; *Clarke in Hook. fil. F.B.I.* vi. 614; *Ridl. Mat.* iii. 68.

Rhizome long, creeping, slender, tuberous. Culms 6 to 24 in. tall, slender. Leaves shorter, 2 to 8 in. long. Umbel simple, rarely compound, 1 to 3 in. long, rays slender erect. Spikelets narrow linear, .5 to 1 in. long, dark red. Glumes narrow lanceolate, sub-acute not mucronate, closely imbricate, rachis winged. Nut ellipsoid, nearly half as long as the glume. *Hab.* Common in waste ground, gardens, roadsides in open spots. Singapore, Selangor. *Distrib.* All warm parts of the world. *Native name:* Rumput Haliya hitam (lit. Black ginger grass). *Use:* The tubers for smoking in cases of pain in the nose.

A troublesome weed in garden beds as it readily propagates itself by its tubers, and is difficult to eradicate.

(16) *C. stoloniferus* Retz. *Observ.* iv. 10; *Clarke in Hook. fil. F.B.I.* vi. 615; *Ridl. Mat.* iii. 69. *C. littoralis* Br. *Prodr.* 216. *C. tuberosus* Boj. *Hort. Maur.* 379.

Rhizome long-creeping, woody. Culms tuberous at the base, distant, 6 to 18 in. tall, slender. Leaves shorter, 3 to 14 in. long, stiff or flaccid. Umbel simple, usually contracted to a head, rays sometimes 2 in. long. Spikelets oblong or linear, .5 in. long or less, pale or red. Glumes oblong obtuse, closely imbricate, 3-ribbed, back greenish, sides dark red. Nut obovoid or elliptic, obscurely trigonous, black. *Hab.* Sandy sea shores, and tidal mud. In the former short and wiry, in the latter taller and longer-leaved. Common. Singapore, Changi. Malacca, Tanjong Kling, Pahang, Pekan. Penang, Bagian Jennal (Curtis). Lankawi (Curtis). *Distrib.* Mauritius, Indo-Malaya, China, Australia.

(17) *C. distans* Linn. *fil. Suppl.* 103; *Clarke in Hook. fil. F.B.I.* vi. 607; *Ridl. Mat.* iii. 69; *Jacq. Ic.* ii. t. 299.

Stoloniferous plant. Culms usually rather distant, stout, bluntly triquetrous, 18 to 24 in. tall. Leaves .25 in. wide or less. Bracts long, longest 9 to 14 in. long. Umbel compound, lax, spreading, 8 to 14 in. wide. Spikelets .25 in. long, very slender, 10- to 20-flowered, dark red. Glumes distant not imbricate, elliptic, obtuse. Nut oblong or narrowly elliptic, black. *Hab.* Common in

ditches and damp waste ground. Whole Peninsula from Singapore to Kelantan. *Distrib.* All tropics. *Native name:* Rumput Wangi.

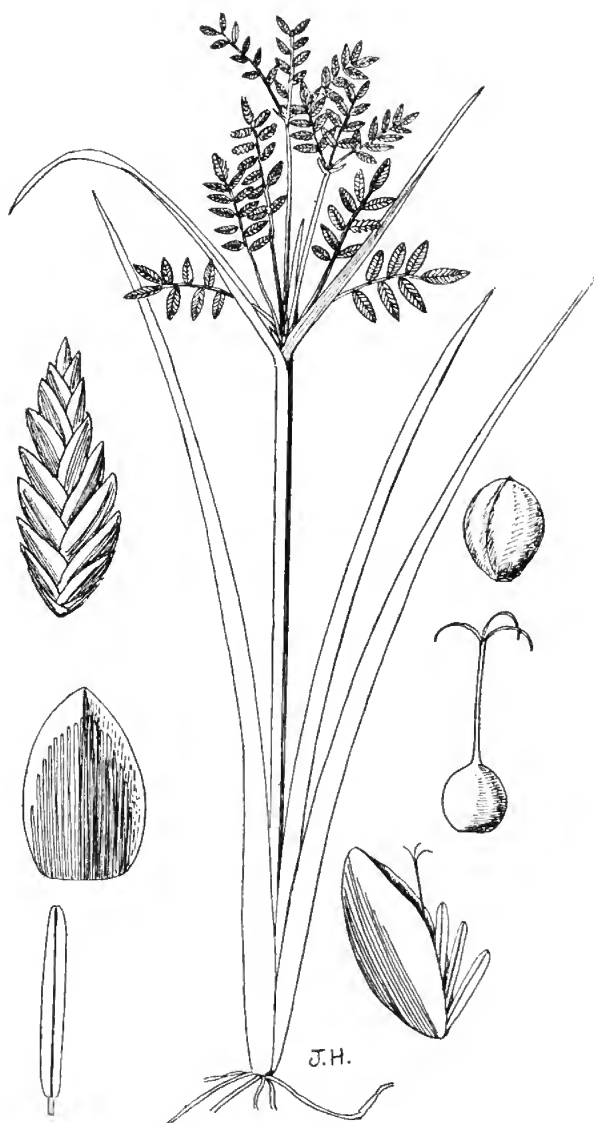


FIG. 219.—*Cyperus procerus*.

(18) **C. procerus** *Rottb. Descr. and Ic.* 29, t. 5, fig. 3; *Roxb. Fl. Ind.* i. 203; *Clarke in Hook. fil. F.B.I.* vi. 610; *Ridl. Mat.* iii. 70. *C. ornatus* *Br. Prodr.* 217. (Fig. 219, p. 146.)

Rhizome slender. Stems rather distant, 3 ft. tall, stout, triquetrous. Leaves over 2 ft. long and .25 in. wide. Bracts as long as or longer than umbels. Umbel lax, with 5 to 7 spikes, occasionally branched, 3 in. long or little more. Spikelets remote, .5 to 1 in. long, rather broad, 20 to 46 flowers. Glumes broad ovate, quite blunt, red, keel paler, ribs 3 or 4 on each side. Nut obovoid, half as long as glume. *Hab.* In rice-fields and damp spots. Not common. Malacca, rice-fields (Ridley). Penang, near Waterfall (Curtis). Kelantan, Kamposa (Ridley). *Distrib.* Tropical Asia and Australia.

(19) **C. malaccensis** *Lam. Ill.* i. 146; *Clarke in Hook. fil. F.B.I.* vi. 608; *Ridl. Mat.* iii. 70.

Rhizome stout woody, creeping, with distant stout triangular stems 2 to 3 ft. tall. Leaves few and short, sheaths 6 to 8 in. long, limb .25 in. wide. Bracts long and broad. Umbel 3 to 4 in. long, rays usually short, sometimes compound, usually congested. Spikelets narrow-linear, .5 in. long, 6- to 12-flowered. Glumes boat-shaped, blunt, rather distant, reddish, no keel, edge pale. Nut narrowly oblong trigonous, three-fourths as long as the glume. *Hab.* Common in tidal-river mud, whole Peninsula. Singapore, Balestier Plain. Pahang, Pekan. Malacca, Province Wellesley (Curtis). Tringganu, Pulau Ketam. Kelantan, Kamposa. Kedah, Alor Sta. Lankawi. *Distrib.* Persia, Indo-Malaya, Australia.

(20) **C. radiatus** *Vahl. Enum.* ii. 369; *Clarke in Hook. fil. F.B.I.* 617; *Ridl. Mat.* iii. 70.

A tall plant 1 to 3 ft. high. Leaves rather shorter and 3 ft. wide. Umbel simple or compound, about 6 in. across, rays 3 in. long or less. Bracts about 1 ft. long. Spikes 1 in. long, .3 in. wide, very dense. Spikelets .12 to .2 in. long, of 13 to 15 flowers. Glumes yellowish brown, closely imbricate, short and broad, mucronate. Rachilla with persistent oblong wings. Nut ovoid, nearly half as long as glume. *Hab.* River banks, rather rare. Johor, on the Scudai River. Penang, at Bagian Jennal (Curtis). *Distrib.* Tropics.

(21) **C. digitatus** *Roxb. Fl. Ind.* i. 205; *Clarke in Hook. fil. F.B.I.* vi. 618; *Ridl. Mat.* iii. 71. *C. auricomus* *Benth. Fl. Austr.* vii. 286. *C. venustus* *Nees in Wight, Contrib.* 86.

A fine tall plant 3 to 4 ft. high, stems triquetrous. Leaves long, nearly half an inch across, often as long as the stem. Umbel very large, sometimes 2 ft. across, compound, with long spreading rays. Bracts usually longer, .25 in. wide. Spikes cylindrical, 2 in. long, golden brown. Spikelets numerous, very small. Glumes narrow, closely imbricate, ovate acute. Anthers not crested. Nut oblong-ovoid, half as long as glume. *Hab.* River banks and ditches, common in the low country. Our biggest species. Johor, Batu Pahat. Pahang, Pekan. Malacca. Selangor, Kwala Lumpur.



Sungei Ujong, Port Dickson. Dindings, Bruas. Perak, Kwala Kangsa. Penang (Wallich); Dato Kramat (Curtis). Kedah, North of Gurun (Burkill). *Distrib.* All the tropics.

(22) *C. elatus* Linn. *Sp. Pl.* 67; *Clarke in Hook. fil. F.B.I.* vi. 618; *Ridl. Mat.* iii. 71.

Stems 3 to 4 ft. tall. Leaves nearly as long, .50 in. wide. Umbel large, compound, primary rays 6 in. long. Spikes narrow, cylindrical dense. Spikelets brown, linear, 14-flowered; anthers oblong, crested, wings of rachilla lanceolate caducous. Nut half to two-thirds the length of the glume. *Hab.* Penang (Wallich). *Distrib.* Madras, Malaya and Polynesia.

This species has not been seen in the Peninsula since Wallich's time.

#### 4. MARISCUS, Vahl.

Plants with the habit of *Cyperus*, usually tall with grassy leaves. Glumes persistent, basal two empty, upper ones bisexual. Style branches 3. Rachilla disarticulating above, the two lowest glumes leaving a knob. Species 160, all warm regions.

Spikelets in compact heads.

Base of stem thickened; spikelets in a dense white head . . . . . (1) *M. Dregeanus*

Bases of stem not thickened; spikelets lax, green.

Spikes cylindrical on long rays . . . . . (2) *M. Sieberianus*

Spikes broad on short rays or sessile . . . . . (3) *M. cyperinus*

Spikes sessile in a head; leaves long weak . . . . . (4) *M. tenuifolius*

Umbel compound.

Spikelets oblong reddish with 3 to 6 nuts . . . . . (5) *M. albescens*

Spikelets linear in globose heads on long rays, nuts 14 . . . . . (6) *M. microcephalus*

(1) *M. Dregeanus* Kunth. *Enum.* ii. 120; *Clarke in Hook. fil. F.B.I.* vi. 620; *Ridl. Mat.* iii. 72. *M. kyllingæformis* Boeck. *Flora*, xlii. 443, 496. *Cyperus dubius* Rottb. *Neu. Schr. Gesells. Freunde*, Berl. iv. 193; *Roxb. Fl. Ind.* i. 189.

Stems forming a tuft swollen at base, culms 1 to 2 ft. tall. Leaves narrow, shorter. Bracts long, deflexed. Umbel reduced to a compact ovoid head very dense, white, .5 in. long, of many ovoid spikelets. Glumes ovate, not keeled nor mucronate, 2 to 6, many-ribbed. Nut oblong or obovoid, beaked, trigonous, half as long as glume. *Hab.* Sea shores and sandy spots. Common. Whole Peninsula on both coasts, Singapore from Galang to Changi on the coast. Johor, Batu Pahat. Malacca (Griffith and Cuming); Pulau Besar. Pahang, Sungei Meang; Rumpin River. Dindings, Lumut. Kelantan, Kamposa. *Distrib.* Africa, India, Borneo.

(2) *M. Sieberianus* Nees, *Linnaea*, ix. 286; *Clarke in Hook. fil. F.B.I.* vi. 622; *Ridl. Mat.* iii. 72. *M. umbellatus* Vahl. *Enum.* ii. 376 (partly).

Rhizome stout. Culm 18 to 30 in. tall, bluntly triangular, often .25 in. through. Leaves shorter, .25 to .4 in. wide. Bracts 5 to 10, long and broad. Umbel 5 to 10 rays, 1 to 4 in. long, erect. Spikes of numerous spikelets, cylindrical dense, .5 to 1.5 in. long,

green. Spikelets linear. Fertile glumes 1 or 2, narrow. Nut narrow linear-oblong, brown, bluntly angled. *Hab.* Common in waste ground. Whole Peninsula up to 3800 ft. altitude, on Kedah Peak (Robinson). *Distrib.* Africa and Asia to Polynesia. *Native name*: Mendarong Ekor Tapai (squirrel-tail sedge).

var. *evolution* Clarke *l.c.* *Cyperus cylindrostachys* Boeck. *Linnaea*, xxxvi. 383. A big plant with some of the umbel rays 3 in. long and the floriferous portion 1.25 in. long. *Hab.* Johor, Serom. Pahang, Pekan. Selangor, Batu Caves. Penang, Pulau Betong (Curtis).

var. *subcomposita* Clarke. Is bigger still with the floriferous portion branched. It occurs in Singapore.

(3) **M. cyperinus** Vahl. *Enum.* ii. 377; *Clarke in Hook. fil. F.B.I.* vi. 621; *Ridl. Mat.* iii. 73.

Rhizome hardly any. Culm 18 in. tall. Leaves narrow, in sandy spots, rather stiff. Umbel simple with very short rays, .25 in. long or less. Spikes lax, .5 in. long. Spikelets spreading, linear, .25 in. long, reddish. Glumes narrow, keeled, 5. Nut linear-oblong curved, chestnut brown, trigonous. *Hab.* Common in waste ground, whole Peninsula. *Distrib.* Tropical Asia and Polynesia. *Native names*: Rumput Pinang; Rumpur Payong.

(4) **M. tenuifolius** Schrad. *in Mart. Fl. Brazil*, ii. 46; *Clarke in Hook. fil. F.B.I.* vi. 622.

Stolons slender, hardly .04 in. through. Culms slender-flaccid, 1 ft. tall. Leaves narrow, 13 to 15 in. long, .1 in. across. Umbel simple, contracted, rays .1 in. long. Spikes solitary cylindric or ovoid, loose, .25 in. long. Spikelets with 1 to 3, usually 2 nuts, dusky green. *Hab.* Malacca (Griffith). Rare. *Distrib.* Ceylon.

This plant looks like a very depauperate weak long-leaved form of *M. cyperinus*.

(5) **M. albescens** Gaud. *Freye. Bot. Voy.* 415; *Clarke in Hook. fil. F.B.I.* vi. 623; *Ridl. Mat.* iii. 75. *Cyperus pennatus* Lam. *Ill.* i. 144. *C. canescens* Vahl. *Enum.* ii. 355.

A coarse tufted plant with many stiff leaves longer than the culms, .25 in. wide or less. Culms stiff, triangular, about 3 ft. tall. Umbels usually large and dense, 3 to 12 in. across, the rays 4 in. long. Spikelets crowded, .25 in. long. Glumes short, ovate obtuse, striate not keeled, pale or reddish. Nut obovoid trigonous, hardly half as long as the glume, pale brown. *Hab.* Sea-shores, rocks, sand or tidal mud; rare inland. Common, Singapore, Tanjong Ru; Bajau. Johor, Tana Runto; Batu Pahat. Pahang, Sungei Meang. Malacca (Griffith); Alor Gajah; Ayer Panas (Ridley). Kedah, Yan. Kelantan, Kamposa. *Distrib.* Tropical Africa, Asia and Australia. *Native names*: Rumput Sulingsen; Rumput Surai.

(6) **M. microcephalus** Presl. *Rel. Haenk.* i. 182; *Clarke in Hook. fil. F.B.I.* vi. 624; *Ridl. Mat.* iii. 74. *M. dilutus* Nees *in Wight, Contrib.* 90.

A large tufted plant. Culms 18 to 36 in. tall. Leaves nearly as

long, .3 in. across. Umbel compound, 8 to 12 in. across or more, rays 1 to 6 in. long. Spikelets in globose stellate heads, dark red (rarely pale), narrow linear, .25 to .5 in. long. Glumes 4 to 8, narrow lanceolate, keeled. Nut narrow linear, curved, beaked. *Hab.* Common near the sea, or rivers, or in damp waste ground. Singapore (Wallich); Galang. Johor, Batu Pahat. Pahang, Pekan. Malacca (Griffith). Selangor, Kwala Lumpur. Perak, Teluk Anson. Penang, Waterfall (Curtis). Legeh, Tomoh (Machado). Kelantan, Kamposa. *Distrib.* Indo-Malaya to Philippines.

### 5. ELEOCHARIS, R. Br.

Glabrous plants, leafless. Culms simple erect with no nodes but sometimes septate with partitions in the pith. Leaf-sheaths cylindrical, truncate or with a small tooth. Spikelet solitary terminal, erect. Glumes obtuse, imbricate all round. Stamens 1 to 3. Styles linear, branches 2 or 3, base dilate, constricted on the nut, persistent. Hypogynous bristles 5 to 8. Nut obovoid plano-convex when style has 2, trigonous when it has 3, branches. Species 113, whole world.

Culms tall septate.

Culms stout, 18 to 26 in. tall . . . . . (1) *E. plantaginea*

Culms slender, 12 to 15 in. tall . . . . . (2) *E. equisetina*

Culms not septate.

Culms tall terete . . . . . (3) *E. variegata*

Culms triquetrous . . . . . (4) *E. fistulosa*

Culms very slender.

Spikelet cylindrical . . . . . (5) *E. ochrostachys*

Spikelet sub-globose . . . . . (6) *E. capitata*

Culm setaceous, very short . . . . . (7) *E. chætaria*

(1) *E. plantaginea* Br. *Prodr.* 224; *Clarke in Hook. fil. F.B.I.* vi. 625; *Ridl. Mat.* iii. 75.

Rhizome stout, culms 18 to 24 in. tall, rather stout, transversely septate when dry, terete. Spikelet cylindrical, not wider than the stem, .75 to 1 in. long. Glumes oblong rounded, straw colour, keel green. Style bi- or tri-fid. Nut half as long as glume or less, obovate, yellow. Bristles longer, scabrid. *Hab.* Grassy swamps and rice-fields. Not very common, Singapore, Reservoir; Garden Lake. Malacca, Ayer Panas; Chabau. *Distrib.* Tropics of Old World.

(2) *E. equisetina* Presl. *Rel. Hænk.* i. 195; *Clarke in Hook. fil. F.B.I.* vi. 625; *Ridl. Mat.* iii. 75.

Rhizome slender. Culms rather slender, 12 to 15 in. tall, septate. Spikelet wider than cylindrical sub-acute, .25 to .5 in. long, straw colour. Glumes broad rounded, not keeled. Style bifid. Nut obovoid, white. *Hab.* Wet places, chiefly in the north. Penang, Waterfall quarry. Tringganu (Yapp). Perlis, Kanga. Setul, extremely abundant in a marsh at the foot of Bukit Rajah Wang. *Distrib.* Ceylon, Malay islands.

This species is allied to *E. plantaginea*, but is much more slender.

(3) **E. variegata** Kunth. *Enum.* ii. 153; *var. laxiflora* Clarke in *Hook. fil. F.B.I.* vi. 626; *Ridl. Mat.* iii. 96. *Scirpus laxiflorus* Thw. *Enum.* 435.

Culms 1 to 2 ft. tall, slender or moderately stout, not septate. Spikelet .5 in. long. Glumes green, centre darker, oblong obtuse. Bristles 6 or 7, longer than the nut; style trifid, red, base conic, green. Nut ovoid, yellow. *Hab.* In swamps, ponds and ditches, the commonest species. Singapore, Garden Lake; Reservoir. Johor, Batu Pahat. Pahang, Pekan. Malacca, Merlimau (Derry). Perak, Selama (Wray). Penang, Waterfall Gardens; Telok Bahang (Curtis). *Distrib.* Indo-Malaya, China, Polynesia, the typical *E. variegata* with red-edged glumes and shorter bristles is found in the Mascarene isles.

(4) **E. fistulosa** Schultes in *Roem. and Schultes, Syst.* ii.; *Mart.* 89; *Clarke in Hook. fil. F.B.I.* vi. 627; *Ridl. Mat.* iii. 76. *E. acutangula* and *E. media* Schultes, *l.c.* 91. *E. planiculmis* Steud. *Syn. Cyp.* 80.

Culms rather stout, 18 in. tall, triquetrous above. Spikelet .5 to 1 in. long, broader than stem, acute. Glumes broad ovate obtuse, laxly imbricate. Style bifid, conic, base short. Bristles 6, as long as the nut. Nut ovoid, base narrowed, brown. *Hab.* Damp spots, not common. Malacca, Tanjong Kling; Bukit Sabukor (Derry). Lankawi, Kwala Kwah (Haniff). *Distrib.* Tropics generally.

(5) **E. ochrostachys** Steud. *Syn. Cyp.* 80; *Clarke in Hook. fil. F.B.I.* 626; *Ridl. Mat.* iii. 76.

A tufted plant with slender culms 12 to 14 in. long, numerous sterile ones, terete not septate. Spikelet slender, .25 in. long, pale. Glumes lax, few, narrow, sub-acute. Style trifid. Bristles 8. Nut obovoid truncate, light brown, ribbed. *Hab.* By ponds and ditches. Local, Singapore, Tanglin; Telok Kurau; Changi. Johor, Kota Tinggi. Malacca (Griffith); Merlimau (Derry). Pahang, Pekan. Dindings, Lumut (Ridley). *Distrib.* Java, Borneo. *Native name:* Rumput Sikat.

(6) **E. capitata** R. Br. *Prodr.* 225; *Clarke in Hook. fil. F.B.I.* vi. 627; *Ridl. Mat.* iii. 77.

A tufted plant 2 to 16 in. tall. Culms numerous, slender. Spikelet .12 to .2 in. long, sub-globose, conic obtuse, pale. Glumes oblong-ovate, blunt. Bristles 6 or 7, red or brown. Nut obovoid compressed, black. *Hab.* Local in damp spots near jungle, Singapore north end, Changi; Tampenis. *Distrib.* Europe to Africa. Tropical Asia and America.

(7) **E. chætaria** Roem. and Schultes, *Syst.* ii. 1541, and *Mant.* ii. 90; *Clarke in Hook. fil. F.B.I.* vi. 629; *Ridl. Mat.* iii. 77. *E. setacea* R. Br. *Prodr.* 224.

A small tufted plant, sometimes developing long, slender, profliferous hair-like culms in water, 3 to 6 in. tall. Culms very slender,

sheaths red at base. Spikelet .12 in. long with very few flowers. Glumes lanceolate acute sub-distichous, usually dark red, edge and central bar pale. Bristles little longer than the nut. Nut large obovoid, plano-convex trigonous, with a broad 3-lobed apex. *Hab.* Damp spots by ditches and in shallow water, common, Singapore, Selitar. Malacca, Tanjong Kling (Griffith). Selangor, Kwala Lumpur. Kelantan, Kota Bharu (Ridley). *Distrib.* Tropics.

Often bulbiferous and propagated by bulbils in the axils of the spikelet when in shallow water.

## 6. FIMBRISTYLIS, Vahl.

Tufted or rhizomatous herbs. Culms sub-terete. Leaves at base only. Inflorescence of 1 to many terminal spikelets in umbels or corymbs. Spikelets solitary or clustered, many-flowered. Glumes imbricate all round, or (section *Abilgaardia*) distichous at base of spikelet, basal and terminal ones empty. Bristles 0. Style long terete or flattened bi- or tri-fid, base dilated and constricted below the dilatation, but deciduous. Nut obovoid trigonous, usually stalked, no knob at apex. Species 25, all warm regions.

§ 1. ELEOCHAROIDES. Culms with 1 or 2, rarely 3, spikelets, all glumes spiral.

Style bifid, nut biconvex or plano-convex.

Nut cylindrical oblong reticulate . . . . . (1) *F. tetragona*

Nut obovoid transversely wrinkled.

Spikelet erect narrow.

Stems 6 to 12 in. long; nut 5-ridged . . . . . (2) *F. acuminata*

Stems 2 to 6 in. long; nut 7-ridged . . . . . (3) *F. setacea*

Spikelet oblong at an angle with stem . . . . . (4) *F. nutans*

Nut obovoid smooth.

Spikelets oblong, obtuse, 1 to 3 . . . . . (5) *F. polytrichoides*

Spikelets 1 or 2 ovoid, .5 in. long . . . . . (6) *F. schœnoides*

Style bifid; nut tubercled very small . . . . . (7) *F. pauciflora*

§ 2. DICHELOSTYLIS. Spikelets many umbelled or congested. All glumes spiral. Style bifid flat. Nut biconvex.

Spikelets solitary on the branches.

Nut white, obovoid, longwise striate with transverse bars; leaves linear; style villous . . . . . (8) *F. diphylla*

Nut narrow, obovoid, black, striate; style flabrous; leaves filiform . . . . . (9) *F. trichophylla*

Nut orbicular-ovoid smooth, on a short red stalk . . . . . (10) *F. podocarpa*

Nut ovoid reticulate.

Dwarf tufted leafy annual; glumes mucronate . . . . . (11) *F. æstivalis*

Tall plant nearly leafless . . . . . (12) *F. ferruginea*

Tall plant; leaves long; spikelets .5 in. long or more . . . . . (13) *F. longispica*

Spikelets clustered capitate.

Umbels compound large; plant rigid; maritime . . . . . (14) *F. spathacea*

Umbel capitate, dwarf plant . . . . . (15) *F. argentea*

Umbel simple or compound; leaves broad stiff silvery . . . . . (16) *F. sericea*

§ 3. TRICHELOSTYLIS. Spikelets usually numerous. Glumes spiral. Style trifid not flattened. Nut more or less trigonous.

- Small annual with short broad leaves; spikelets few . . . . . (17) **F. obtusata**  
 Spikelets sub-globose; nut tubercled.  
 Leaves long narrow; spikelets .2 in. long . . . . . (18) **F. miliacea**  
 Usually leafless; spikelets .13 in. long . . . . . (19) **F. globulosa**  
 Spikelets narrow lanceolate, very numerous.  
 Nut tubercled . . . . . (20) **F. complanata**  
 Nut trabeculate, not tubercled . . . . . (21) **F. asperrima**  
 Spikelets clustered.  
 Stems very slender; leaves very narrow . . . . . (22) **F. leptoclada**  
 Stem stout; leaves large stiff . . . . . (23) **F. nigrobrunnea**

§ 4. ABILGAARDIA. Spikelets solitary on the branches. Glumes at base distichous. Upper ones spiral. Style trifid.

- Spikelets 1 or 2 on a stem, broad; glumes solitary . (24) **F. monostachya**  
 Spikelets numerous on slender branches; glumes red brown.  
 Leaves stiff denticulate; spikelets .2 in. long . (25) **F. rigidifolia**  
 Leaves narrow linear.  
 Culms over 1 ft. tall; spikelets .25 in. long . (26) **F. fusca**  
 Dwarf plant under 6 in. tall; spikelets small . (27) **F. fuscoides**

(1) **F. tetragona** R. Br. *Prodr.* 226; *Clarke in Hook. fil. F.B.I.* vi. 631; *Ridl. Mat.* iii. 88.

A tufted plant 6 to 24 in. tall. Leaves often reduced to sheaths or with blade 1.5 in. long. Culms slender, wiry. Spikelet 1, erect conic, .5 to .6 in. long. Glumes pale brown, oblong, rounded, striate. Style linear bifid, villous. Nut narrow cylindrical, stalked, half as long as glume, plano-convex, straw-coloured, reticulate. *Hab.* Sandy open spots, local, not common, Singapore, Balestier plain (Hullett). Pahang, at Kwala Pahang (Ridley). *Distrib.* Indo-Malaya and Australia.

(2) **F. acuminata** Vahl. *Enum.* ii. 285; *Clarke in Hook. fil. F.B.I.* vi. 631; *Ridl. Mat.* iii. 89.

A tufted plant 6 to 12 in. tall; culms very numerous, slender, leafless, with a tubular sheath with an acute point. Spikelet 1, lanceolate fusiform acute, pale, .12 to .25 in. long. Glumes oblong obtuse, keeled, mucronate. Style bifid, linear above, base broad, arms very short. Nut obovoid, turbinate biconvex with about 5 transverse ridges. *Hab.* Damp grassy spots, jungle paths, common, Singapore, Bukit Timah; Changi. Malacca (Griffith); Ayer Panas. Pahang, Kwala Pahang. Perak, Thaiping. Penang, Telok Bahang (Curtis). Tringganu (Yapp). Kedah, Alor Sta, in rice-fields. *Distrib.* Indo-Malaya, China, Australia.

(3) **F. setacea** Benth. *Hook. Lond. Journ. Bot.* ii. 239; *Clarke in Hook. fil. F.B.I.* vi. 623; *Ridl. Mat.* iii. 89.

Small tufted plant, 2 to 6 in. tall. Culms slender wiry, leafless except for 2 small tubular sheaths. Spikelet 1, lanceolate acute, .11 in. long. Glumes oblong obtuse, keeled, mucronate, pale, keel green, often with red patches on the side. Style bifid. Nut obovoid

biconvex with about 7 wrinkles, dark brown. *Hab.* Grassy spots, Singapore, Balestier plain (Hullett); Tanglin; Galang. Pahang, Kwala Pahang. Malacca, Chabau; Chinchin (Burkill). Selangor, Port Swettenham (Burkill). Penang, Gardens (Haniff). *Distrib.* Burma, Malaya, Australia.

Very near *F. acuminata*, but smaller and more slender with a smaller nut.

(4) ***F. nutans*** Vahl. *Enum.* ii. 285; *Clarke in Hook. fil. F.B.I.* vi. 632; *Ridl. Mat.* iii. 89.

A large tufted plant 8 to 12 in. tall. Culms wiry, leafless except for 1 or 2 sheaths at base. Spikelet oblong or lanceolate acute bent at an angle with the stem at the top, .5 in. long. Glumes broad, rounded, with a low ribbed keel ending in a short mucro, reddish. Style bifid broad, villous above. Nut obovoid-turbinate transversely wrinkled, grey. *Hab.* Damp sandy spots, Singapore, Changi. Malacca, Ayer Keroh; Ayer Panas; Pulau Besar. Penang (Curtis). *Distrib.* India, Borneo, China, Australia.

(5) ***F. polytrichoides*** Vahl. *Enum.* ii. 248; *Clarke in Hook. fil. F.B.I.* vi. 632; *Ridl. Mat.* iii. 90

Culms 8 to 12 in. tall, slender, sheaths at base brown, upper ones 2, cylindric with very narrow leaves, 1.5 to 3 in. long. Spikelets 1 or 2 (rarely 3), oblong obtuse, .25 to .3 in. long, with bract .5 in. long. Glumes oblong rounded, obtuse, mucronate, keeled, red brown, mealy pubescent. Style broad linear, bifid villous. Nut white, obovate, biconvex, smooth. *Hab.* Salt mud near the sea, Singapore, Sungei Jurong; Galang. Malacca (Griffith). Pahang, Pekan. Penang (Wallich). *Distrib.* Indo-Malaya, Australia.

(6) ***F. schœnoides*** Vahl. *Enum.* ii. 286; *Clarke in Hook. fil. F.B.I.* vi. 634; *Ridl. Mat.* iii. 90. *F. bispicata* Nees in *Wight, Contrib.* 97.

Culms tufted, 4 to 12 in. tall, slender. Leaves sometimes as long or longer, but usually only half as long, very narrow. Spikelets 1 or 2, ovoid blunt, pale .3 to .6 in. long. Glumes broad ovate obtuse, keeled, ribbed. Style bifid, villous above. Nut stalked, ovate, pale brown, one-fourth the length of the glume, biconvex. *Hab.* Open spots, Singapore (Kurz). Malacca, Chabau; Ayer Panas. Selangor, Kwala Lumpur (Seimund). Penang, Telok Bahang (Curtis). Kelantan, Kota Bharu (Ridley). *Distrib.* South-east Asia and Australia.

(7) ***F. pauciflora*** R. Br. *Prodr.* 225; *Clarke in Hook. F.B.I.* vi. 633; *Ridl. Mat.* iii. 90. *F. filiformis* Kunth. *Enum.* ii. 221. *F. malaccana* Boeck. *Flora*, xli. 597.

Culms very slender, bright green, erect or prostrate, forming large round tufts 6 to 12 in. across, 6 to 14 in. long, leafless or occasionally with a leaf blade on one of the sheaths. Spikelet very small, .12 in. long, green, lanceolate acute. Glumes narrow lanceolate, subacute, few, 3 or 4, nut-bearing. Style trifid, narrowed upwards from broad base, villous above. Nut obovoid tubercled,

white. *Hab.* Common on grassy and sandy spots, especially jungle paths, often completely covering them; culms erect in drier places, longer and prostrate in wetter spots. Whole Peninsula, Singapore to Penang. *Distrib.* Mergui, Malay islands, Australia and Polynesia. *Native name* : Rumpu Girah.

(8) **F. diphylla** Vahl. *Enum.* ii. 289; *Clarke in Hook. fil. F.B.I.* vi. 626; *Ridl. Mat.* iii. 91. *F. laxa* Vahl. *l.c.* 292. *F. communis* Kunth. *Enum.* ii. 234.

A tufted plant with very short or no rhizome. Culms 1 to 24 in. long, 3- to 5-angled. Leaves linear, glabrous or hairy. Umbels 1 to 8 in. across, rays generally numerous. Spikelets obovoid or oblong acute or blunt. Glumes ovate, keeled, sometimes mucronate, chestnut, glabrous, keel green. Style villous. Nut half as long as glume, obovoid, ribbed, with numerous transverse bars. *Hab.* Common in waste ground everywhere. Very variable in size and development of umbel, all over the Peninsula. *Distrib.* All warm countries, very common.

var. *b. pluristriata* Clarke *l.c.* *F. pilosa* of most authors, except Vahl. *F. tomentosa* Vahl. *l.c.* 290. A plant about 3 ft tall. Leaves and sheaths especially, roughly hairy. Nut often more or less tubercular on the shoulders. *Hab.* Singapore at Chua Chu Kang and Chasseriau Estate (Ridley). *Distrib.* China, India, Borneo. *Native names* : Rumpu Parah; Rumpu Purun Batu.

(9) **F. trichophylla** Ridl.

A densely tufted plant. Leaves filiform linear, very slender, 6 to 9 in. tall. Culms filiform, 6 to 12 in. tall; umbel of 4 or 5 slender branches 1 to 1.25 in. long, each bearing 1 spike, with a central spike sessile in the centre of the umbel or spikes, 1 sub-terminal, terminal leaf longer than the umbel. Spikes ovate, .1 in. long. Glumes ovate blunt mucronate, not keeled, pale brown. Style glabrous, bifid. Nut black, obovoid, flattened longitudinally, ribbed and minutely trabeculate. *Hab.* Lankawi, Telok Apan (Haniiff 7077).

(10) **F. podocarpa** Nees in Wight, *Contrib.* 98; *Clarke in Hook. fil. F.B.I.* vi. 638; *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 222.

A stiff wiry sedge. Culms 2 ft. tall, tufted, on a short rhizome. Leaves narrow linear blunt, stiff, 4 in. long, 1 in. wide. Umbel cymose, 1 in. long. Spikelets 5 to 12, .5 in. long, cone-shaped. Glumes ovate, hardly keeled, pale with yellowish brown edge. Style flat, edge ciliate. Nut orbicular-obovoid, smooth, straw colour, on a short red stalk. *Hab.* Rice-fields and damp heaths in the north, Kedah, Alor Sta. Perlis, Kanga. Setul heath (Ridley). *Distrib.* Indo-Malaya, China.

(11) **F. æstivalis** Vahl. *Enum.* ii. 288; *Clarke in Hook. fil. F.B.I.* vi. 637; *Ridl. Mat.* iii. 92. *F. Griffithiana* Steud. *Syn. Cyp.* 110.

A small tufted annual 2 to 10 in. tall. Leaves half as long as the



culm or less, pubescent or glabrescent. Culms slender, ribbed. Umbel compound, 1 to 2 in. across. Spikelets numerous, oblong, sub-cylindric, yellow-brown, .12 to .25 in. long. Glumes narrow lanceolate, keeled, mucronate, squarrose. Style slender. Nut obovoid, yellowish, reticulate, shortly stalked and beaked, one-third the length of the glume. *Hab.* Waste ground and open spots, Singapore Gardens. Malacca (Griffith). Pahang, along the river to Kwala Tembeling and along the Rumpin River. Dindings, Pulau Sembilan. Kelantan, Kota Bharu in rice-fields. *Distrib.* Indo-Malaya, China and Japan, Australasia. *Native name:* Rumput Surai.

(12) **F. ferruginea** Vahl. *Enum.* ii. 291; *Clarke in Hook. fil. F.B.I.* vi. 638; *Ridl. Mat.* iii. 92.

Rhizome short and stout or none. Culms several, 10 to 30 in. tall, stout, angled, base covered with dark brown polished sheathing leaves. Leaves usually 1, narrow, blunt, stiff, 1 to 6 in. long. Umbel simple or compound, 3 in. long or shorter with 5 to 7 (rarely more) to 30 spikelets. Spikelets oblong cylindric, acute, .25 to .3 in. long. Glumes broad, rounded mucronate, keeled, red-brown at first, grey-pubescent. Style broad linear, hairy. Stigmas 2, slender. Nut ovoid, half the length of the glume, dark brown, finely reticulate. *Hab.* Tidal mud, common; Singapore, Pulau Ubin; Kranji. Johor, Tanjong Surat (Kelsall). Malacca (Griffith); Ayer Panas (Cantley). Penang (Diedrichsen). Kelantan, Kamposa. Setul Heath (Ridley).

var. *arvensis*, *F. arvensis* Vahl. *Enum.* ii. 291. Plant tufted, hardly rhizomatous. Stems slender, 18 in. tall. Leaves very narrow-linear acute, 1 to 3 to a stem, 6 to 9 in. long. Spikelets ovate acute, .25 in. long. Glumes paler, broader. *Hab.* Damp inland spots, Selangor, Ampang (H. S. Hume 7391, 7347, 7333).

These two forms are utterly dissimilar in habit, but Clark considered them the same species, and these are more or less intermediate forms.

(13) **F. longispica** Steud. *Syn. Cyp.* 118; *Clarke in Hook. fil. F.B.I.* vi. 639; *Ridl. Mat.* iii. 93.

Culms crowded on a short stout rhizome, bases swollen, with brown scale-leaves, 18 to 24 in. tall, rather stout. Leaves shorter, 4 to 12 in. long, .12 in. across, blunt stiff. Umbel simple or compound, 1 to 3 in. long. Bracts short. Spikelets cylindric, .5 in. long, brown. Glumes broad oblong rounded, strongly mucronate, edges pubescent. Stamens 2. Style broad, edge fimbriate. Nut obovoid reticulate. *Hab.* Sandy heaths, very local, Pahang, Pekan and Rumpin river. Setul (Ridley). Tringganu (Yapp). *Distrib.* China and Japan.

The forms from the two last localities are short-leaved, leaves only 4 in. long.

(14) **F. spathacea** Roth. *Nov. Pl. Sp.* 24; *Clarke in Hook. fil. F.B.I.* vi. 640; *Ridl. Mat.* iii. 93. *F. glomerata* Nees, *Linnaea*, ix. 290. *F. rigida* Kunth. *Enum.* ii. 231.

Tufted stiff plant, 4 to 20 in. tall, with dry brown sheaths at

base. Leaves 3 to 8 in. long, rather stiff. Umbels compound, as long as 2 in. in strong plants, often contracted into a head. Bracts stiff, .25 to .5 in. long. Spikelets numerous, .11 to .25 in. long, oblong, brown. Glumes ovate obtuse, margins pale, scarious, keel low, mucro short, red-brown. Nut two-thirds the length of the glume obovoid, smooth or slightly warty, yellow brown. *Hab.* Sands and rocks by the sea, common. Singapore, Tanjong Ru to Changi. Johor town. Malacca, Tanjong Kling. Pahang, Kwala Pahang; Cherating river. Lankawi, Burau bay (Ridley). *Distrib.* All warm regions.

(15) **F. argentea** Vahl. *Enum.* ii. 294; *Clarke in Hook. fil. F.B.I.* vi. 640; *Ridl. Mat.* iii. 94. *Scirpus argenteus* Rottb. *Descr. and Ic.* 51. t. 17, fig. 6.

A small tufted plant 6 to 8 in. tall, the culm bases covered with sheaths. Leaves about half as long, narrow. Bracts linear, much longer than umbel. Umbel reduced to a head, .25 to .5 in. across. Spikelets sessile, 4 to 20, cylindric, .25 in. long, light brown. Glumes narrow blunt, keeled, silver grey or reddish, keel green. Stamen 1 (or more). Nut very small, obovoid, biconvex, yellowish, smooth. *Hab.* Rare, Kelantan at Kamposa (Ridley). *Distrib.* India and Ceylon.

(16) **F. sericea** R. Br. *Prodr.* 228; *Clarke in Hook. fil. F.B.I.* vi. 641; *Ridl. Mat.* iii. 94.

Rhizome stout woody, descending or horizontal. Leaves 6 to 9 in. long, .12 in. wide, silky, crowded. Culms 4 to 6 in. long, stiff. Umbel simple or compound, rays 3 in, long. Bracts short hairy. Spikelets crowded in heads on the ends of the rays, 4 to 6 together, .25 in. long, broad oblong. Glumes ovate, hairy, strongly keeled, brown, edges scarious. Nut one-third to one-fifth the length of the glume, obovoid, smooth. *Hab.* Sandy spots along the east coast from Johor to Kelantan. Johor, Jambu Larang (Feilding). Pahang River; Cherating River. Kelantan, Kamposa; Kwala Kelantan. *Distrib.* Indo-Malaya, Australia, China, Japan.

(17) **F. obtusata** Ridl. *F. tenera* R. and Schultes *Syst. II. Mant.* 57. *var. obtusata* Clarke in Hook. fil. *F.B.I.* vi. 642; *Ridl. Mat.* iii. 94.

Small tufted plant 4 to 7 in. tall, no rhizome. Leaves short, 1 to 2 in. long, .1 in. wide, linear, blunt, spirally arranged. Culms very slender with a simple umbel of 3 or 4 spikelets, 2 or more on slender rays, 1 central, sessile. Bracts glume-like. Spikelets .12 to .25 in. long, cylindric sub-acute. Glumes ovate, yellowish or reddish, keel stout, glabrous. Nut ovoid, half as long as the glume, yellow, tuberculate, hardly stalked. *Hab.* In grass plots, common in Singapore, Tanglin; Jurong. Pahang, Kwala Pahang. Malacca, Sungei Baru Ulu. Penang, Gardens (Nur); Telok Bahang (Curtis). *Distrib.* Bengal, Borneo.

The broad leaves and verrucose nut distinguish this plant from *F. tenera* R. and S.

(18) **F. miliacea** Vahl. *Enum.* ii. 287; *Clarke in Hook. fil. F.B.I.* vi. 644; *Ridl. Mat.* iii. 95.

A tufted erect plant 1 to 2 ft. tall. Leaves thin, narrow, half or nearly as long as culm. Stem slender blunt, trigonous. Umbel 2 to 4 in. long, decompound. Spikelets subglobose, .12 in. long, brown. Glumes oblong blunt, chestnut, keel green. Style short, 3 arms long. Nut ovoid, warted, with numerous transverse bars. *Hab.* Common in damp spots, waste ground, etc., all over the Peninsula. *Distrib.* All warm regions. *Native names:* Rumput Keladi (*Colocasia* grass); Rumput Kerbau (Buffalo grass). No doubt on account of its being common in spots where *Colocasia* grows and which buffalos haunt.

A form from Perlis has broader stiffer leaves and cone-shaped spikelets as in *quinquangularis* Kunth.

(19) **F. globulosa** Kunth. *Enum.* ii. 231; *Clarke in Hook. fil. F.B.I.* vi. 645; *Ridl. Mat.* iii. 95.

Rhizome short but distinct in old plants. Culms 8 to 18 in. tall; sheaths at the base often without leaf-blades or with longer or shorter leaves. Umbel 1 to 2 in. long, rays few, sub-erect. Bracts .25 to .50 in. long, erect. Spikelets globular or oblong, .11 in. long, few. Glumes ovoid obtuse, chestnut, edge scarious. Nut one-third the length of the glume, obovoid, thickly tubercled. *Hab.* Common in damp spots, in open country, whole Peninsula up to 3000 ft. altitude on Gunong Kerbau (Robinson). *Distrib.* Indo-Malaya, China. *Native name:* Rumput Sandang.

Among forms of this common species, I have noted some with the umbels reduced to one spikelet, and a form in Johor with a number of empty glumes at the top making the spikelets lanceolate.

(20) **F. complanata** Link. *Hort. Berol.* i. 292; *Clarke in Hook. fil. F.B.I.* vi. 646; *Ridl. Mat.* iii. 96. *F. scabra* Kunth. *Enum.* ii. 245.

Rhizome short and stout or absent. Culms 8 to 24 in. tall, flattened. Leaves linear blunt or præmorse, 6 to 8 in. long. Umbel compound, 1 to 4 in. long. Spikelets .12 in. long, narrow acute, brown. Glumes narrow lanceolate, brown-red, keel and mucro green. Nut small obovoid, white, tubercled. *Hab.* Common in shady spots in woods, Singapore, Chan Chu Kang; Tanglin. Malacca, Chabau. Pahang, Kwala Tembeling. Selangor, Kwala Lumpur (Seimund). Penang (King). *Distrib.* All warm regions.

(21) **F. asperrima** Boeckl. *Linnaea*, xxxviii. 40; *Clarke in Hook. fil. F.B.I.* vi. 643; *Ridl. Mat.* iii. 96.

Plant usually large, tufted, with very numerous leaves 2 to 3 ft. long; rhizome stout and short. Leaves 18 in. long or more, .11 to .25 in. wide. Culms 18 to 24 in. long. Umbel decompound, 6 in. long. Spikelets very numerous, often over 100, fusiform, acute, brown, .12 in. long. Glumes narrow lanceolate, keeled, mucronate. Nut ellipsoid, yellowish, trabeculate, half as long as the glume.

*Hab.* Common in woods and forests up to 2000 ft. altitude, Singapore, Upper Bukit Mandai. Johor, Gunong Pantai. Malacca, Merlimau (Derry); Tanjong Kling. Pahang, Tahan River. Sungei Ujong, Gunong Berumbun (Cantley). Selangor, Weld's Hill (Nur). Perak (Wray). Legeh, Tomoh (Machado). Kelantan. Penang Hill (Curtis). Adang Islands, Pulau Rawei. *Distrib.* Ceylon, Tavoy, Siam. *Native names:* Rumpet Siamet; Rumpet Pulut; Rumpet Bawang (onion grass, from its narrow leaves).

(22) **F. leptoclada** Benth. *Fl. Hongkong*, 393 (not of *Flora Australis*); *Clarke in Hook. fil. F.B.I.* vi. 647; *Ridl. Mat.* iii. 96.

A small tufted plant 12 to 18 in. tall with slender wiry culms and very narrow linear leaves, 6 to 8 in. long. Umbels small, .25 to .5 in. long, 1 or 2 rays bearing a cluster of small dark brown conic spikelets at the end, or reduced to a single cluster. Glumes ovate, keeled. Nut obovoid, yellow brown, thickly tubercled. *Hab.* Dry sandy spots near woods. Singapore (abundant). Pahang. Pekan. Malacca (Griffith). Setul heath. *Distrib.* Ceylon, Borneo, China.

(23) **F. nigrobrunnea** Thw. *Enum.* 434; *Clarke in Hook. fil. F.B.I.* vi. 648; *Ridl. Mat.* iii. 97. *Abilgaardia Eragrostis* Boeck. *Linnaea*, xxxvii. 55.

Rhizome very short and stout with very large roots. Leaves many, 3 to 6 in. long, .12 in. wide, stiff, blunt, bases scabrous on edge. Culms 8 to 30 in. tall. Umbel simple or decompound. Bracts .5 in. long. Spikelets crowded on the ends of 2 or 3 recurved rays, .5 in. long. Glumes obscurely distichous, oblong, keeled, mucronate. Style trifid. Nut obovoid, yellow-brown, warty or nearly smooth. *Hab.* Rare, Kedah on Gunong Jerai (Kedah Peak) at 3000 ft. altitude (Ridley). *Distrib.* India and Cambodia.

(24) **F. monostachya** Hassk. *Pl. Jav. Rar.* 61; *Clarke in Hook. fil. F.B.I.* vi. 649. *Abilgaardia monostachya* Vahl. *Enum.* ii. 296.

A tufted plant with wiry roots, 17 in. tall. Leaves slender, very narrow, half as tall as culms. Spikelet 1, erect, pale whitish, ovate or lanceolate, .25 in. lengthening to .75 in. long as they develop and the lower glumes fall. Glumes ovate acute or mucronate, whitish, lower ones distichous. Nut half as long as the glume, globose, ovoid, white to brown, tubercled, trigonous, bluntly beaked. Style trifid, villous to near base. *Hab.* Sandy heaths, Perlis at Kanga (Ridley). *Distrib.* All warm regions.

(25) **F. rigidifolia** Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 223.

Base of stem short, thick, densely covered with broad leaf sheaths. Leaves stiff linear blunt, margins toothed, 1 to 3 in. long, .12 in. wide, recurved. Culms slender, 12 to 16 in. tall, rather stout. Umbel compound, branches slender, 1 to 3 in. long, spikelets lanceolate narrow, .2 in. long. Glumes lanceolate sub-distichous acuminate, brown, scurfy. Nut obovoid trigonous. Style hardly dilate at base. *Hab.* Setul on heaths (Ridley).

(26) **F. fusca** *Benth. Gen. Pl.* iii. 1048; *Clarke in Hook. fil. F.B.I.* vi. 649; *Ridl. Mat.* iii. 97. *Abilgaardia fusca* *Nees in Wight, Contrib.* 95.

Rhizome very short or none. Leaves half the length of the stem, very narrow. Culm 18 in. tall, weak. Umbel of 4 or 5 rays about 1 in. long. Bracts short. Spikelets .25 in. long, lanceolate. Glumes acuminate lanceolate, brown, pubescent. Nut oblong or obovoid, trigonous, yellow brown, obscurely warty. *Hab.* Sandy spots, rare, Singapore, Holland Road. Penang, Government Hill. *Distrib.* Cambodia, Malaya.

(27) **F. fuscoides** *Clarke, Kew Bulletin, Add. Ser.* viii. 25. *F. angustifolia* *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 223.

A densely tufted plant. Culms slender, 6 to 10 in. tall. Leaves setaceous, linear, numerous, 4 to 5 in. long, .05 in. wide. Umbel rays slender, 1 in. long. Spikelets narrow lanceolate acute. Glumes, lower ones ovate acute distichous, upper ones lanceolate mucronate, sub-distichous, reddish brown, keeled, with a raised rib on each side. Nut obovoid, minutely pustular, white. Style red, base dilate. *Hab.* Sandy places on heaths, Setul (Ridley). *Distrib.* Labuan, Cambodia.

## 7. BULBOSTYLIS, Kunth.

Small tufted plants, stems slender, leafy at base only. Leaves very narrow. Corymb umbellate or congested. Spikelets small, many flowered. Glumes imbricate on all sides, 1 or 2 lowest ones empty. Bristles 0. Style as long as nut, linear, trifid, base very small, bulb-shaped, deciduous, leaving a minute button on the top of the nut. Nut obovoid, trigonous, smooth. Species 70, all warm regions.

Stems glabrous . . . . . (1) **B. barbata**  
 Stems pubescent . . . . . (2) **B. puberula**

(1) **B. barbata** *Kunth. Enum.* ii. 208; *Clarke in Hook. fil. F.B.I.* vi. 657; *Ridl. Mat.* iii. 77. *Scirpus barbatus* *Rottb. Descr.* 52, t. 17, fig. 4.

Glabrous plant. Culms 3 to 12 in. long, very slender. Leaves half as long. Spikelets up to 20 in a head, brown, .12 in. long. Glumes ovate lanceolate sub-acute chestnut, keel green, mucronate, ciliate on edge. Nut obovate, smooth, with a minute black button. *Hab.* Sandy places, very common all over the Peninsula from Singapore to Penang and Tringganu. *Distrib.* All warm regions.

I found in Pahang, at Pekan, a form with the heads of spikelets nearly an inch across, with a few slender rays half an inch or more long, bearing solitary spikelets .25 in. long at the ends.

(2) **B. puberula** *Kunth. Enum.* ii. 213; *Clarke in Hook. fil. F.B.I.* vi. 652; *Ridl. Mat.* iii. 78. *Scirpus puberulus* *Poir. Encycl.* vi. 767.

Much resembling *B. barbata* but stems 6 to 14 in. long, pubescent

Leaves pubescent, hardly half as long. Spikelets crowded into a head. Glumes pubescent, mucro longer. Nut larger, obovoid, transversely wrinkled. *Hab.* In similar localities to *B. barbata*, but much rarer, Singapore (Burbidge, Cantley); Changi. Malacca (Kunstler). Perak (Cantley). Penang (Curtis). *Distrib.* Ceylon, Indo-Malaya.

**8. SCIRPUS, Linn.**

Glabrous herbs, short or tall; leafless, or leafy at base only. Culms terete or trigonous. Spikelets 1 to many, terminal or lateral oblong or ovoid. Glumes spirally imbricate, lowest two and uppermost empty. Bristles scabrid 2 to 7, or 0. Style bifid or trifid, slender, base not dilate. Nut obovoid trigonous or biconvex with no button at top. Species 125, all world.

Spikelets 1 or more in a lateral head.

- Tall leafless plant; stem stout . . . . . (1) **S. mucronatus**
- Spender leafy annual plants.
- Bristles 0 . . . . . (2) **S. supinus**
- Bristles 6 or 7 . . . . . (3) **S. erectus**
- Spikelets solitary, terminal, on slender wiry stems . . . . . (4) **S. Clarkei**
- Spikelets very numerous in a large corymb . . . . . (5) **S. grossus**

(1) **S. mucronatus** *Linn. Sp. Pl.* 73; *Rchb. Ic. Fl. Germ.* viii. 40. *t.* 303; *Clarke in Hook. fil. F.B.I.* vi. 657; *Ridl. Mat.* iii. 79.

Culms 3 to 4 ft. tall, stout, triquetrous, leafless, except for a sheath with a small limb at base. Spikelets 6 or 7, in 1 or 2 heads. Bract 2 in. long, acute, erect like the continuation of the stem. Spikelets cylindric, .25 to .5 in. long. Glumes ovate mucronate, brown, edges pubescent. Bristles 6. Style trifid. Nut obovoid trigonous, black, smooth. *Hab.* Common in ponds and ditches. Whole Peninsula, Singapore, Chan Chu Kang; Thompson Road (Murton). Pahang, Pekan. Malacca (Griffith). Selangor, Klang; Kwala Lumpur; Ampang (Hume). Negri Sembilan, Seremban. Perak, Thaiping. Penang, Pulau Betong (Curtis). Setul. *Distrib.* Europe and Old World tropics.

(2) **S. supinus** *Linn. Sp. Pl.* 73 (partly); *Roxb. Fl. Ind.* i. 217; *Clarke in Hook. fil. F.B.I.* vi. 655; *Ridl. Mat.* iii. 79.

Culms slender or very slender, solitary or tufted, 6 to 12 in. tall. Leaves narrow, one-fourth as long. Spikelets few in a single head, .25 in. long. Bract as in *S. mucronatus* but 1 to 3 in. long, very narrow. Glumes ovate, keeled, mucronate. Bristle 0. Nut obovoid trigonous, wrinkled, black. *Hab.* Rare in rice-fields, Province Wellesley, Permatang Bertam. Kelantan Kota Bharu (Ridley). *Distrib.* Tropics generally.

(3) **S. erectus** *Poir. Encyc.* vi. 761; *Clarke in Hook. fil. F.B.I.* vi. 656; *Ridl. Mat.* iii. 79. *S. debilis Pursh, Fl. Am. Sept.* 1, 55. *S. juncoides Roxb. Fl. Ind.* i. 261.

Culms solitary or tufted, slender or very slender, 6 to 24 in. long. Leaves few or reduced to sheaths. Spikelets solitary or 4 to 6,

·25 to 1 in. long, conic or cylindrical. Bract narrow-linear acuminate, 1 to 3 in. long, erect. Glumes rounded ovate, not keeled. Bristles 5 or 6. Style bi- or tri-fid. Nut obovoid, flattened, plano-convex, yellow or black. *Hab.* Rice-fields, Malacca, Selandor; Bukit Sabukor (Derry). Negri Sembilan, Kwala Pedas. Pahang, Temerloh. Province Wellesley, Permatang Bertam. Perak. Grit. (Burkill). Penang. Kedah, Alor Sta (Ridley). *Distrib.* Asia, Australia, North America. *Native name*: Rumput Prut Tikus.

(4) **S. Clarkei** *Stapp. Trans. Linn. Soc. iv. 244.*

A tufted slender plant 6 in. to 2 ft. tall. Lower leaves truncate with a short mucro, upper one blade subulate, ·6 to 1 in. long, edges serrulate. Spikelets solitary, oblong-linear, ·25 in. long, few to 8-flowered. Glumes 5 or fewer, the lowest empty, ovate oblong obtuse, pale chestnut, keel green. Bristles very slender, 6. Stamens 3. Style trifid. Nut ashy grey, obovate-oblong, ·1 in. long, apiculate. *Hab.* Mountains, in cracks of rocks in streams, very local, Pahang, Gunong Tahan at 5600 ft. altitude, abundant (Ridley). *Distrib.* Borneo, Mount Kinabalu.

(5) **S. grossus** *Linn. Suppl. 104; Clarke in Hook. fl. F.B.I. vi. 659.*

A tall stout plant 3 to 4 ft. high. Leaves long acuminate, ·75 in. wide. Bracts long acuminate, 14 in. long or less. Panicle lax, 4 in. long, and about as wide, decompose, with very numerous brown ovate spikelets ·25 in. long. Glumes ovate mucronate, keeled. Bristles 6, scabrous. Nut trigonous, obovoid. *Hab.* Ditches and wet ground, often coming up in rice-fields after the crop is taken, in great abundance. Singapore (formerly) at Wayang Satu. Tanglin. Malacca, Pahang. Perak. Kedah, Kelantan. Penang. *Distrib.* India, Ceylon, Cochinchina; Malay islands. *Native names*: Rumput Musiang, Murong or Mendarong. *Use*: For making mats and baskets.

### 9. FUIRENA, Rottb

Annual or perennial plants, usually hairy. Stems leafy, leaf sheaths entire with an annular membrane at mouth. Spikelets sessile, in close axillary or terminal pedunculate clusters. Glumes spirally imbricate, keeled, cuspidate or mucronate. Hypogynous scales spatulate or quadrate, narrowed at base, 3-nerved. Style trifid, slender. Nut trigonous, narrowed at both ends. Species 26, all warm regions.

Perennial, rhizomatous	. . . . .	(1) <b>F. umbellata</b>
Annual, no rhizome	. . . . .	(2) <b>F. glomerata</b>

(1) **F. umbellata** *Rottb. Descr. and Ic. 70, t. 19, fig. 2; Clarke in Hook. fl. F.B.I. vi. 666; Ridl. Mat. iii. 80. F. paniculata Lam. Ill. i. 150, t. 39.*

Rhizome woody, short. Culms 2 to 3 ft. tall, trigonous, fairly stout. Leaves distant, linear, acute, 4 to 8 in. long, ·5 to ·75 in.

wide. Umbel axillary and terminal, hairy, 2 in. long. Spikelets crowded in dense heads, 13 or fewer. Glumes oblong-ovate, with recurved mucro, hairy. Scales oblong spathulate, with a central tooth ribbed, chestnut-brown. Nut obovate trigonous, beaked, yellowish. *Hab.* Very common in ditches. Whole Peninsula from Singapore to Penang. *Distrib.* All the tropics. *Native names:* Rumput Kelulut (lit. Trigona-bee grass); Rumput Buku Buloh; Rumput Lida Menkarong.

(2) **F. glomerata** Lam. *Ill.* i. 150; *Clarke in Hook. fil. F.B.I.* vi. 666; *Ridl. Mat.* iii. 81.

Annual hairy herb, no rhizome. Culm 4 to 16 in. tall, slender. Leaves narrow, 1 to 3 in. long, .12 in. wide. Spikelets in 1 to 3 clusters of 3 to 10, .25 in. long. Glumes obovate-oblong, mucro stout, hairy. Scales quadrate cordate clawed, 3-ribbed, brown, glabrescent. Style trifid. Nut triquetrous, long stalked and beaked. *Hab.* Rice-fields, Perak (Kunstler). Province Wellesley, Permatang Bertam, Lankawi, Kedah, Alor Sta. Kelantan, Glam wood, Kota Bharu (Ridley). *Distrib.* Old World tropics.

### 10. LIPOCARPHA, Br.

Glabrous plants. Culms leafy at base only, with a single terminal head of few spikelets. Glumes numerous, narrow. Flower with 2 elliptic transparent scales enclosing the nut. Stamens 1 to 3. Style small slender, shortly bifid (rarely trifid). Nut small oblong cylindrical or ovoid, plano-convex reticulated. Species 15, all warm regions.

Spikelets white; glumes spathulate acute . . . . . (1) **L. argentea**  
Spikelets green; glumes aristate . . . . . (2) **L. microcephala**

(1) **L. argentea** A. Br. *Appendix to Tuckey's Voyage to Congo*, p. 349; *Clarke in Hook. fil. F.B.I.* vi. 667; *Ridl. Mat.* iii. 81.

A tufted or solitary-stemmed plant. Leaves 4 to 10 in. long, .16 in. wide, linear acuminate. Culms 18 to 24 in. long, terete, head of 1 to 8 oblong blunt white spikelets .25 to .3 in. long. Bracts narrow to 4 in. long. Glumes oblong spathulate, tip acute, white, central line green. Scales lanceolate acute, as long as trifid style. Nut cylindrical reticulate, yellow. *Hab.* Very common in damp spots all over the Peninsula from Singapore to Penang. *Distrib.* Tropics of the Old World. *Native name:* Rumput Rotan.

(2) **L. microcephala** Kunth. *Enum.* ii. 268; *Clarke in Hook. fil. F.B.I.* vi. 668; *Ridl. Mat.* iii. 82.

Culms very slender, 4 to 24 in. tall. Leaves narrow, half as tall. Spikelets 3 to 4 in a head, .25 in. long (or less), oblong, obtuse, green. Bracts linear acuminate, 2 in. long or less. Glumes narrow acuminate with a long recurved point. Scales very thin. Nut long, curved, cylindrical. *Hab.* Local in open sandy spots. Singapore, Bukit Timah; Galang; Chan Chu Kang; Bukit Mandai. Penang, Gardens (Burkill). Kelantan, Kota Bharu. *Distrib.* China, Japan, Australia.



## 11. RHYNCHOSPORA, Vahl.

Herbs usually tall and leafy throughout. Leaves narrow. Spikelets usually numerous, small, ovoid, brown, capitate, corymbose or paniced. Glumes spirally imbricate, 3 or 4, lowest empty, 1 or 2 bisexual, uppermost empty. Bristles 0 or 6 scabrid. Style bifid, slender, base broad conic, persistent. Nut ovoid, biconvex, beaked by style base. Species upwards of 200, all regions.

Culm leafy at base only; spikelets capitate.

Nut obovoid . . . . . (1) *R. Wallichiana*

Nut linear elliptic . . . . . (2) *R. Wightiana*

Culm leafy throughout.

Spikelets in globose heads in a spike . . . . . (3) *R. malasica*

Spikelets in axillary and terminal corymbs.

Corymbs large; style and stigma short . . . . . (4) *R. aurea*

Corymbs small; stigmas long . . . . . (5) *R. glauca*

(1) *R. Wallichiana* Kunth. Enum. ii. 289; Clarke in Hook. fil. F.B.I. vi. 668; Ridl. Mat. iii. 82.

Leaves tufted at base only, 3 to 24 in. long, narrow, numerous. Culm triquetrous, 8 to 24 in. tall. Spikelets in a terminal compact head, .5 in. across, glabrous, light reddish. Glumes, basal two short, upper ones lanceolate smooth acute, 6 or 7, only one fertile. Bristles 6, short, red. Nut obovoid biconvex, a quarter of the length of the glume, stalked, a small conic boss on the top, black above, bristly. Hab. Common in dry open country among bracken. Singapore, Jurong, Selitar. Malacca (Griffith); Bukit Bruang; Alor Gajah. Pahang, Kwala Pahang (Ridley). Distrib. Tropics of Old World.

(2) *R. Wightiana* Steud. Cyp. 148; Clarke in Hook. fil. F.B.I. vi. 669.

Culms tufted, 4 to 24 in. long, slender or rather stout. Leaves one-fourth to three-fourths of length of stem, .1 in. or less across. Spikelets numerous in a dense head as in *R. Wallichii*, about .3 in. wide. Bracts 2 to 6 in. long, bases ciliate. Glumes red. Bristles as long as nut, scabrid, 6. Style shortly bifid. Nut linear-oblong, black, half as long as nut, pale. Hab. Rare in open sandy spots in the north, Tringganu (Yapp). Setul Heath (Ridley). Nangchik, Road to Bukit Besar (Gwynne-Vaughan). Distrib. Cochinchina, India.

(3) *R. malasica* C. B. Clarke in Hook. fil. F.B.I. vi. 670; Ridl. Mat. iii. 83.

Culms leafy, stout, 1.5 to 2 ft. tall. Leaves flaccid, 1 ft. long, .25 in. wide. Spikelets pale brown, in a spike of about 5 heads, .5 in. across. Style branches short. Bristles twice as long as nut. Nut obovoid, dark brown, biconvex, transversely barred, beak short, conic. Hab. Grassy swamps, local, Singapore, Bedoh; Bukit Mandai. Johor, Kota Tinggi. Malacca (Griffith); Ayer Keroh. Distrib. Borneo.

(4) *R. aurea* Vahl. Enum. ii. 229; Clarke in Hook. fil. F.B.I. vi. 670; Ridl. Mat. iii. 83.

Culms 2 to 3 ft. tall, stout, leafy, edges scabrid. Corymbs peduncled, axillary and terminal, several. Spikelets .25 in. long, clustered, 3 to 5. Glumes 7 or fewer, basal short empty, fifth ovate lanceolate fertile. Upper ones male or empty, all bright brown. Bristles 6, white, longer than nut. Nut obovoid, beak larger, conic, yellow. *Hab.* Whole Peninsula, very common in wet spots in open country. *Distrib.* All tropics.

(5) **R. glauca** Vahl. *Enum.* ii. 233; var. *chinensis* Clarke in *Hook. fil. F.B.I.* vi. 670; *Ridl. Mat.* iii. 84. *R. chinensis* and *R. glauca* Boeckl. (partly); *Linnaea*, xxxvii. 585-586.

Rhizome woody. Culms 2 ft. tall or more, leafy. Leaves 8 to 10 in. long. Corymbs small, axillary and terminal, .5 in. long. Spikelets reddish brown, clustered. Glumes 6 or 7, ovate cuspidate. Bristles short, style branches long, slender. Nut obovoid biconvex, slightly wrinkled, beak broader than top of nut conic, three-quarters of its length. *Hab.* Sandy places, usually near the sea, rarely on high mountains, Singapore, Balestier Plain; Changi. Pahang, Gunong Tahan at 5500 ft. altitude. Selangor, Kuala Lumpur (Seimund). Perlis, Kanga. Setul Heath (Ridley). *Distrib.* Tropics generally.

## 12. ACTINOSCHÆNUS, Benth.

Herbs; rhizome slender short. Culms numerous. Leaves few, very narrow, basal. Spikelets small in a single globose head. Glumes 4 to 8, distichous, 1 to 3 bisexual. Bristles 0. Style bi- or tri-fid. Nut obovoid trigonous. Species 7, Asiatic.

(1) **A. filiformis** Benth. *l.c. Pl.* xiv. 33, *t.* 1346. var. *chinensis* *Ridl. Mat.* iii. 84. *Arthrostylis chinensis* Benth. *Fl. Hongkong* 397.

Rhizome very short, roots long wiry. Leaves half the length of the culm. Culms 8 to 18 in. tall. Spikelets in a dense head, .25 in. through. Glumes 4 to 6, lanceolate acuminate, brown, keel 3-ribbed, green, ending in a long recurved point, one only fertile. Style trifid. Nut small, pale, smooth. *Hab.* Usually on rocks by the streams at 1000 to 7000 ft. altitude, occasionally lower. Johor, Gunong Belumut (Holtum). Malacca, Mount Ophir. Perak, Thaiping. Kedah Peak. Penang, Sungei Telok Bahang (Burkill). *Distrib.* Malay islands and Hongkong. Typical form Ceylon.

var. *rupestris* *Ridl.* A dwarf tufted form 6 in. tall with very slender erect culms and small heads. *Hab.* Rare. Pahang, rocky slopes of Gunong Tahan. Perak, Gunong Batu Putih (Wray). *Distrib.* Lingga and Borneo.

Clarke refers this plant to the genus *Fimbristylis*, but it seems to me to represent a very good distinct genus.

## 13. SCHÆNUS, Linn.

Wiry herbs; culms leafy or not; leaves narrow stiff. Spikelets capitate or paniced. Glumes distichous, basal, 3 or more empty,

1 to 4 fertile, terminal ones empty. Bristles present or 0. Style trifid, slender, not enlarged at base nor constricted there. Nut trigonous not beaked. Species 60, mostly Australian, few tropical and few in temperate regions of both hemispheres.

Tall plants with elongate inflorescence . . . . . (1) *S. calostachyus*  
 Dwarf plant with short flat stem and distichous leaves (2) *S. distichus*

(1) *S. calostachyus* Poir, *Encyl. Suppl.* ii, 251; Clarke in *Hook. fil. F.B.I.* vi. 673; *Ridl. Mat.* iii. 85. *Chætospora calostachya* Br. *Prodr.* 233. *Cyclocampe Waigouensis Steud. Syn. Cyp.* 156. *Cyclocarpa Waigouensis Miq. Fl. Ind. Bat.* iii. 339.

Rhizome woody. Culms 2.5 ft. tall, leafy. Leaves numerous at base, few above, lower ones 6 to 8 in. long, wiry. Spikelets solitary, axillary in upper leaves, cylindrical conic, .5 to 1 in. long; pedicels .5 in. long. Glumes brown, 10, edges hairy, lowest 4 to 8 empty, upper 2 or 3 fertile. Bristles half as long as the nut. Nuts ovoid trigonous, black, sunk in hollows of the zigzag rachis. *Hab.* Rare. Sandy heaths, Singapore, Changi. Pahang, Pekan. *Distrib.* Malay isles, Australia, Polynesia.

(2) *S. distichus* *Ridl. Journ. F.M.S. Mus.* vi. 194.

A low tufted plant forming small tussocks from 1 to 6 in. tall, branches covered with distichous linear triquetrous leaves, 1 to 6 in. long, .08 in. wide. Culm with 2 or 3 sheathing leaves; from the sheaths arise one or two branches .5 in. long, angled, scabrid with one fusiform spikelet .1 in. long. Glumes 4, imbricate lanceolate, violet, lower ones empty, terminal one fertile. Style trifid. Nut pale, pyriform, 3-angled and beaked. Bristles 0. *Hab.* High mountains at 5000 to 7000 ft. altitude. Rare. Pahang, Gunong Tahan, on the Padang (Ridley). Perak, Gunong Kerbau at 7000 ft. altitude (Haniff).

#### 14. CLADIUM, P. Brown.

Large herbs, culms leafy or not. Leaves flat linear, or distichous equitant. Spikelets paniced in clusters, small, brown. Glumes spirally imbricate, basal one to four empty, one to three bisexual, terminal male or empty. Bristles small or none. Style trifid, base dilate, fused with the top of the nut. Nut with pyramidal or button-shaped beak. Species 44, whole world.

Leaves terete, rather stout . . . . . (1) *C. glomeratum*  
 Leaves narrow linear elongate; panicle elongate lax . . . . . (2) *C. undulatum*  
 Leaves narrow linear, short; panicle short dense . . . . . (3) *C. pulchrum*  
 Leaves very broad, sword-like, distichous; panicle large lax . . . . . (4) *C. Maingayi*

(1) *C. glomeratum* R. Br. *Prodr.* 237; Clarke in *Hook. fil. F.B.I.* vi. 675; *Ridl. Mat.* iii. 85.

Stoloniferous plant, 3 ft. tall. Leaves few, terete, as tall. Culm leafy. Panicle lax, slender, 8 in. long. Spikelets clustered, 1 to 3, .2 to .25 in. long, brown. Glumes lanceolate glabrous, 2 to 4 fertile but only 1, rarely 2, nuts produced. No bristles. Nut as

long as glume, oblong-ellipsoid, beak conic, small, hairy, bright-chestnut. *Hab.* Swampy spots usually near the sea, rare. Singapore, Changi; Bukit Mandai. *Distrib.* China, Japan, Australia, New Zealand.

(2) **C. undulatum** *Thw. Enum.* 353; *Clarke in Hook. fil. F.B.I.* vi. 674; *Ridl. Mat.* iii. 86. *Tricostularia fimbristylloides Benth. Fl. Austral.* vii. 863.

Rhizome short, stout, whole plant forming large tussocks. Leaves numerous wiry, 6 to 12 in. long, very narrow. Culms 18 to 24 in. tall, slender. Panicle 5 to 6 in. long, diffuse, bracts long. Spikelets clustered, 2 to 5 together, on zigzag branches, brown. Glumes narrow lanceolate acute, keeled, 2 basal empty. Bristles 6, half the length of the nut. Nut .05 in. long, ovoid, beak small hairy, brown. *Hab.* Sandy or dry open country, local, but abundant where it occurs. Pahang at Pekan. Setul Heath (Ridley). *Distrib.* Ceylon, Sumatra, Borneo, Labuan, Australia.

(3) **C. pulchrum** *Ridl. Journ. F.M.S. Mus.* vi. 192.

Rhizome short, base of stem swollen, covered with red-brown sheaths. Leaves linear, 6 to 9 in. long, .08 in. wide, enlarged bases .25 in. across. Inflorescence 10 to 14 in. tall, panicle 1.5 to 3 in. long, dense; rachis flexuous, branches 6 or 7, .5 in. long, lower glumes of spikelets 3, empty, broadly lanceolate, red, fertile one lanceolate. Stamens 3. Bristles 3, pubescent, half as long as the nut. *Hab.* High mountains on sandstone rock Pahang, Gunong Tahan on the Padang at 5500 ft. altitude (Ridley).

(4) **C. Maingayi** *Clarke in Hook. fil. F.B.I.* vi. 674; *Ridl. Mat.* iii. 86.

Large tufted plant with stout rhizome and broad sword-shaped acute distichous leaves, 3 ft. long, .5 to .75 in. wide. Culm 4 ft. tall or more with one or two leaves, paniced with numerous sinuate branches. Spikelets ovoid, deep brown, clustered. Glumes ovate, edges ciliate, two or three basal empty, two to four fertile. Bristles 6, hairy above. Nut trigonous turgid, beak long pyramidal, hairy. *Hab.* Mountains at 3000 to 5000 ft. altitude. On wet rocks. Malacca, Mount Ophir (all collectors). Pahang, Gunong Tahan (Ridley). Perak, Gunong Bubu (Wray). *Distrib.* Celebes. *Native name:* Jeringu Laut.

### 15. LEPIDOSPERMA, Labill.

Stiff stoloniferous plants, leafy at base only. Panicle of many spikelets, of 5 to 10 glumes with 2 or 3 flowers, rarely producing more than 1 nut, lower flower male. Bristles 6 ovate with setaceous or acute point. Style trifid, branches long, base glabrous, fused into nut. Nut smooth trigonous. Species, 36, all Australian except 1 species.

(1) **L. chinense** *Nees and Meyen. Linnæa* ix. 302; *Clarke in Hook. fil. F.B.I.* vi. 676; *Ridl. Mat.* iii. 98.

Leaves terete glaucous acute, 18 to 24 in. long. Culm 3 ft. long

or more, terete, glaucous. Panicle 3 to 4 in. long, dense. Glumes black-brown, oblong, truncate. Bristles oblong, acute, yellowish. Nut oblong trigonous, narrowed at both ends, yellow, dotted dark red. *Hab.* Mountains on rocks at 3000 to 7000 ft. altitude. Rare, Johor, Gunong Belunut (Holttum), Malacca, Mount Ophir, Pahang, Gunong Tahan. Perak, Gunong Kerbau, 6600 ft. altitude; Gunong Inas (Yapp). Kedah, Gunong Bintang (Kloss). *Distrib.* South China.

var. *alpina* Ridl. Dwarf tufted plant, 6 to 8 in. tall, rigid. Leaves acute, nearly as long as flowering stems. Panicle 1 in. long, denser. Bristles ovate acuminate broader. *Hab.* Pahang, Gunong Tahan (Ridley).

### 16. GAHNIA, J. R. and G. Forster.

Large coarse tufted plants. Leaves usually numerous and scabrid. Culms leafy. Panicle dense spike-like, or lax nodding. Spikelets numerous, clustered, dark brown or black. Glumes, lower three empty, often hairy, middle one only fertile, upper ones empty. Bristles 0. Stamens 3; filaments persistent, holding the nut. Styls trifid, base continuous, forming a small black cone on the top of the nut. Nut oblong trigonous or rounded, whitish yellow, then red, and finally black. Species 27, chiefly Australian and Polynesian.

Panicle dense, erect; spikelets crowded in heads . . . (1) *G. tristis*

Panicle lax, nodding.

Leaves narrow; bracts at bases of panicle-branches short narrow; flowers black . . . (2) *G. javanica*

Leaves flat, broad at base; bracts at bases of branches broad and long; flowers brown . . . (3) *G. castanea*

(1) *G. tristis* Nees. *Linnaea* ix. 301; *Ridl. Mat.* iii. 98.

A large plant forming tussocks. Leaves numerous, 2.5 to 3 ft. long, narrow, scabrid. Panicle stout, stiff, spiciform, 2 to 3 ft. tall, with 17 or 18 dense black spikes of clustered spikelets. Bracts broad-based, limb very narrow. Spikelets clustered, 3 or 4 in cluster, small. Glumes; lowest short broad, middle ones lanceolate keeled, tip elongate scabrid, upper 4 oblong, blunt, short. Nut .12 in. long, broadly fusiform, trigonous, yellowish, tip conic, black, when ripe all black. *Hab.* Sea coasts and river banks near the sea in dry spots, also on mountains at 4000 ft. altitude. Singapore, common. Johor, Panchur; Scudai River. Malacca, on Mount Ophir. Pahang, Gunong Tahan. Selangor, Kwala Lumpur. *Distrib.* Malay isles near Singapore, Borneo, China, Annam.

(2) *G. javanica* Moritzi, *Verz. Zoll. Pfl.* 98. var. *penangensis* Clarke in *Hook. fl. F.B.I.* vi. 676; *Ridl. Mat.* iii. 99.

A large tufted plant, sometimes with a stout prostrate stem 3 ft. long covered with leaf bases and roots. Leaves 3 to 4 ft. long, linear acuminate, scabrid. Culms erect, 8 to 12 ft. tall, panicle 18 to 24 in. long, black, lax nodding, much branched. Spikelets very numerous,

less than .25 in. long. Glumes black-brown, basal three or four, lanceolate, mucronate, upper ones blunt. Nut oblong (retained by filaments), blunt, trigonous, yellow, then red, less than 1 ft. long. *Hab.* Mountains at from 2500 to 7000 ft. altitude. Common. Johor, Bukit Murdom (Kelsall); Gunong Pulau; Pengaram Hill, Batu Pahat. Malacca, Mount Ophir. Pahang, Gunong Tahan, Selangor, Bukit Hitam; Menuang Gasing (Kloss). Perak, Thaiping Hills; Gunong Batu Putih (Wray); Gunong Kerbau (Robinson). Penang Hill. Kedah Peak. *Distrib.* Malay islands to Polynesia, China. *Native name*: Sereh Bukit.

(3) *G. castanea* Ridl. *Journ. F.M.S. Mus.* vi. 1, p. 60.

A large tufted plant. Leaves with a broad purple sheathing base, over 2 ft. long. Panicle 18 in. long; spikelets on slender peduncles about 50, with 5 or 6 spikelets at apex. Glumes lanceolate mucronate chestnut-red, lower one tubular enclosing two or three branchlets. Spikelets 1-flowered, .2 in. long, glumes imbricate. Stamens 3, filaments very long; anthers long acuminate. Ovary cylindric; style very long, black. *Hab.* Perak, Gunong Kerbau (Robinson). *Distrib.* China.

### 17. REMIREA, Aublet.

Rhizome very long, throwing up short leafy stems. Leaves long, stiff. Spikes capitate, of numerous densely crowded spikelets. Glumes 4, lowest empty, uppermost bisexual. Bristles 0. Stamens 3, unilateral. Style trifid, not dilate at base. Nut cylindric, brown, reticulated. Species 1. All tropical sea shores.

(1) *R. maritima* Aubl. *Pl. Guian.* i. 45, t. 16; *Clarke in Hook. fil. F.B.I.* vi. 677; *Ridl. Mat.* iii. 99.

Leafy stems, 2 to 4 in. tall. Leaves pungent, 1 to 6 in. long. Head of spikes sessile or peduncled. Spikes ovoid, about 4. Spikelets curved, .12 in. long. *Hab.* Common in sea-sand, whole Peninsula on both coasts. Singapore, Tanjong Katong. Pulau Tioman (Burkill). Malacca (Griffith). Pahang, Sungei Meang; Cherating. Penang, Batu Feringhi (Curtis). Lankawi, Burau Bay. Pulau Adang.

### 18. HYPOLYTRUM, L.C. Rich.

Tufted herbs; leaves broad, 3-nerved. Culms with one or two leaves, bearing a corymb of oblong spikes, on stiff branches. Bracts leaf-like. Spikelets globose, small, of 1 terminal female flower, and 2 boat-shaped glumes containing 1 stamen each (squamellæ). Style continuous with ovary. Nut small, biconvex, bony, style forming a conic beak. Species 25, tropics.

Stout plant with broad leaves; glume-edges not scarios . . . . . (1) *H. latifolium*

Small plants with narrow leaves.

Glume edges scarios, white; leaves thin herbaceous . . . . . (2) *H. proliferum*

Glumes red-brown, hairy; leaves coriaceous . . . . . (3) *H. radians*

(1) **H. latifolium** *Rich. Pers. Syn. i. 70; Clarke in Hook. fil. F.B.I. vi. 678; Bot. Mag. t. 6282; Ridl. Mat. iii. 100.*

A large plant. Leaves numerous, 16 to 36 in. long, .5 to 1 in. wide. Culm 1 to 3 ft. tall; corymb 3 to 6 in. across, compound, dense or rather lax, branches scabrid. Spikes very numerous, at first oblong, then globose and stellate in fruit, .25 in. across. Glume ovate acute, brown. Squamellæ boat-shaped. Nut obovoid, pale, dotted red, eventually black, .026 in. long. *Hab.* In woods, whole Peninsula, common. *Distrib.* India, China, Malaya, Australia. *Native names:* Rumput Giring-Giring: Rumput Supiding; Rumput Susat Belukar.

var *penangense* *Clarke, l.c. 679*, seems to me a remarkable form of this species with cylindrical spikes (young) over .25 in. long. A single specimen was found by Maingay on Penang Hill, and I had it from De Lisle island and Tasan near the Mergui Archipelago, both without fruit. Elongate spikes occur here and there in the corymbs of typical *H. latifolium*, but in this variety they are all elongate.

(2) **H. proliferum** *Boeckl. Linnæa, xxxvii. 126; Clarke in Hook. fil. F.B.I. vi. 679; Ridl. Mat. iii. 101.*

Usually a small plant about 1 ft. tall with narrow leaves. Leaves linear acuminate, 5 to 24 in. long, .12 to .5 in. wide. Culm slender, 6 to 15 in. tall, with 1, more rarely 2, leaves above the base. Spikes 1 to 20 together, in from 1 to 6 terminal peduncled clusters. Bracts long leafy. Glume pale brown, edged white, ovate blunt. Nut obovoid acute, brown. *Hab.* Damp shady spots, Singapore, Economic Gardens. Pahang, Sungei Chenei (Fox). Penang Hill. *Distrib.* Carimon isles, Borneo.

The usual form is dwarf with narrow short leaves and a small corymb of spikes, but in 1921, in the Singapore Gardens, I found much larger plants with tall 2 ft. long culms and much broader leaves, growing with the dwarf form.

(3) **H. radians** *Ridl. Mapania radians Clarke, Kew Bulletin, Misc. vii. 53.*

Rhizome short, thick, erect. Leaves coriaceous distichous, crowded, linear acuminate, narrowed and red at base, 30 in. long, .25 in. wide. Culms very slender, red, 2 to 9 in. long; sheaths several with lanceolate acuminate limbs. Spikes cylindrical, narrowed at the tip, 12 to 20 in a head, spreading, .25 in. long, dark red. Outer glumes ovate, dark red, hairy. Floral glumes narrow lanceolate, boat-shaped, pale, hairy on the keel. Stamen filament slender, exsert. Nut ovoid stalked, .1 in. long. *Hab.* Johor, Gunong Belulut (Holttum). *Distrib.* Mount Matang, Sarawak. Borneo.

### 19. THORACOSTACHYUM, Kurz.

Habit of *Hypolytrum latifolium*. Leaves and panicle as in that species but squamellæ 4, and style trifid. Nut bony, shining black or brown, beak conic. Species 6, Mascarene isles, Malaya, Australia.

Panicle small; rays short; flowers brown . . . (1) **Th. bancanum**  
 Panicle large; glumes pale; rays long . . . (2) **Th. hypolytroides**

(1) **Th. bancanum** Kurz, *Tijdschr. Nat. Vereen. Ned. Ind.* xxvii. 286; Clarke in Hook. *fil. F.B.I.* vi. 680; Ridl. *Mat.* iii. 102. *Hypolytrum bancanum* Kurz, *Journ. As. Soc. Beng.* xxxvii. 11, p. 74; *Miq. Ill. Fl. Arch. Ind.* 59.

Rhizome rather stout. Leaves 18 in. long, .25 to .5 in. wide, edges rough. Culm 2 ft. tall, triquetrous. Panicle 2 to 3 in. across, branches scabrid. Bracts 6 to 12 in. long. Spikes few to 50, clustered in 2 to 35, pale. Glume ovate. Squamellæ 4, outer two keeled, ciliate. Nut narrow at base, above acuminate beaked, beak black or dark brown, 3-grooved, shining. *Hab.* In damp woods, common in the south. Singapore (Wallich); Chan Chu Kang; Changi. Johor, Sempang Kiri, Batu Pahat, Malacca (Griffith); Ayer Keroh. Pahang, Pekan. Perak (Wray). *Distrib.* Banca and Borneo. *Native name*: Rumput Senayan Batu.

var. *longispica* Clarke, *l.c.*, is a form with elongate cylindric spikes .5 in. long due to the attacks of an *Ustilago*. It occurs with the normal form.

(2) **Th. hypolytroides** Clarke in Hook. *fil. F.B.I.* vi. 681; Ridl. *Mat.* iii. 102. *Mapania hypolytroides* Benth. *Fl. Austral.*, vii. 341.

Stolons long, stout. Leaves 3 ft. long, 1 in. wide, edges scabrid. Culm taller, stout, trigonous. Panicle very large, decompose, branches spreading, 6 in. long or more. Spikes very numerous, sub-globose, pale, solitary or in threes. Glume pale, dotted red, ovate. *Hab.* Wet swamps in forests, local. Johor, Kwala Kahang (Kelsall). Malacca, Merlimau; Sungei Udang. *Distrib.* Australia, New Guinea. *Native names*: Umbai; Rumput Biru. *Use*: For making mats.

## 20. MAPANIA, Aubl.

Tufted forest plants with narrow or broad scabrid leaves often resembling those of a *Pandanus*. Inflorescence a single spike or head of spikes on a scape shorter than the leaves. Spikes containing many spikelets, each spikelet consisting of 1 ovate glume and 6 narrow hyaline glumes (squamellæ), lanceolate, boat-shaped, 3 keeled, containing 1 stamen each and 3 empty and a terminal pistil with a long trifid style. Nut rather large, ovoid or pyriform, stipitate. Species about 40, tropics of Asia, Assam, Ceylon, Malaya, Africa and South America.

Leaf linear acuminate.

Spikes several in a head.

Scape tall, stout; spikes 10 to 20 . . . . . (1) **M. palustris**

Scape slender long; spikes 1 to 15; leaves dull green, very scabrid . . . . . (2) **M. Kurzii**

Scape slender long; spikes 1 to 15; leaves pale glaucescent, minutely scabrid . . . . . (3) **M. albescens**

Scape long stout; spikes long cylindric . . . . . (4) **M. longispica**

Scape short; spikes ovoid, 4 . . . . . (5) **M. valida**

Scape stout, 4 to 6 in. long; spikes in a dense ovoid head, 1.5 in. long . . . . . (6) **M. Wallichii**

Spikes solitary.

Scapes 1 to 2 ft. long, slender . . . . . (7) **M. longa**



- Scapes 4 to 6 in. long, very slender; leaves narrow  
 Leaf broadly sheathing at base, petioled; limb broad, abruptly cordate. (8) *M. tenuiscapa*  
 Limb 20 times as long as broad . . . . . (9) *M. humilis*  
 Limb 3 or 4 times as long as broad . . . . . (10) *M. triquetra*

(1) *M. palustris* *Benth. Gen. Pl.* iii. 1070; *Clarke in Hook. fl. F.B.I.* vi. 681. *Pandanophyllum palustre* *Boeckl. Linnæa*, xxxvii. 138. *Lepironia palustris* *Miq. Ill. Fl. Arch. Ind.* 63, t. 25.

A large tufted plant, rhizome .5 in. through. Leaves 4 ft. long or more, 1 in. across, linear acuminate, edges and keel scabrous, 3-nerved. Scape 6 to 18 in. long, stout, with several sheaths at base. Head of 10 to 30 spikes, 1 to 2.5 in. through. Spikes .5 in. long. Glumes ovate broad. Squamellæ nearly as long, linear-oblong. Nut sub-globose, base narrowed, beak long, black, .2 in. long. *Hab.* In dense forests. Not rare. Singapore, Bukit Timah; Pulau Ubin; Selitar. Johor, Gunong Pantai; Batu Pahat, Malacca (Griffith). Negri Sembilan. Ulu Rembau (Burkill). Pahang, Kwala Tenok. Perak, Thaiping Waterfall; Temengoh. Dindings, Lumut. *Native names:* Mengkuang Tedong; Mengkuang Lubo. *Use:* For mats and basket-making.

(2) *M. Kurzii* *Clarke in Hook. fl. F.B.I.* vi. 681; *Ridl. Mat.* iii. 104.

Large tufted plant; rhizome thick. Leaves 4 ft. long, .5 to 1 in. wide, linear acuminate, edges and keel very rough. Scapes 4 to 18 in. long, stout. Spikes 1 to 15 in a head, 1 in. through, cylindrical acuminate, .75 in. long. Glumes ovate obtuse, ribbed. Squamellæ longer, ciliate. Nut ellipsoid, white, base narrowed and beaked. *Hab.* Forests at 1000 ft. altitude and upwards, in the North. Perak, Thaiping Hills (Curtis); Sungei Siput. Penang Hill; Tanjung Bunga; Balik Pulau.

(3) *M. albescens* *Clarke, Kew Bulletin, Add. Ser.* viii. 54.

Leaves 5 ft. 6 in. long, 1.3 in. wide, glaucescent, very minutely thorny on the edge and keel. Scape rather slender, 7 in. long. Head .5 in. long and wide (young), sub-globose. Outer bracts ovate oblong, striate acuminate, .5 in. long. Spikes several, light reddish brown. *Hab.* Forests, rare. Dindings, Lumut (Ridley).

(4) *M. longispica* *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 25; *Mat.* iii. 104.

Large tufted plant. Leaves linear acuminate, margins thorny, 5 ft. long, 1 in. wide. Scape over 1 ft. tall with a head of 4 to 8 cylindrical spikes. Spikes 1.25 in. long, .25 in. through. Glumes ovate acute, ribbed. Nut trigono-globose, endocarp green, separable, endocarp black. *Hab.* Mountain forests at 2000 ft. altitude or more. Perak, Thaiping Hills (Ridley).

(5) *M. valida* *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 205; *Mat.* iii. 104.

Large tufted plant with a stout woody rhizome, numerous

leaves linear acuminate, 2.5 ft. long, .75 in. wide, margins thorny, tip long and slender. Scapes stout, 4.5 in. long. Heads with 3 or 4 oblong-conic spikes, over .5 in. long. Glumes ovate, dark brown, ribbed. Nut pear-shaped with a ridge on one side, pale brown, small. *Hab.* Dense forests, local. Singapore, Bukit Timah; Changi (Ridley).

(6) **M. Wallichii** Clarke in Hook. fil. *F.B.I.* vi. 682; *Ridl. Mat.* iii. 105.

A large tufted plant, stem 2 in. tall, .5 in. through, woody, erect. Leaves linear, edges and keel thorny, 3 to 4 ft. long, 2 in. across. Scape .5 to 8 in. tall, spike fusiform, .75 in. long in fruit; conic, 1 in. long, .75 in. through. Glumes ovate, lower ones mucronate,

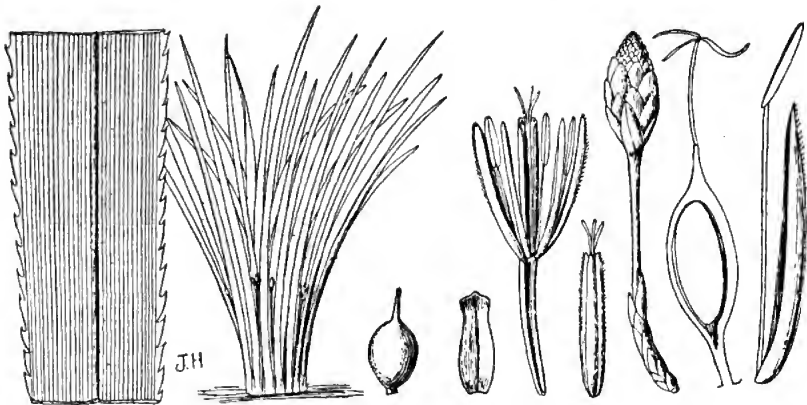


FIG. 220.—*Mapania Wallichii*.

upper ones mucous narrower. Squamellæ 6. Nut .25 in. long, ovoid turgid, base narrowed, beak incurved. *Hab.* Dense forests, local. Singapore (Wallich); Bukit Timah (Ridley). *Distrib.* Borneo.

(7) **M. longa** Clarke in Hook. fil. *F.B.I.* vi. 683; *Ridl. Mat.* iii. 105.

A large pandanus-like plant with a long rhizome. Leaves 3 to 4 ft. long, .75 in. wide, linear acuminate, edges and keel thorny. Scapes slender, 10 to 25 in. long with 1 or 2 spikes ovoid, .75 in. long, .5 in. through in fruit. *Hab.* In jungle streams. Rare. Singapore at Selitar (Ridley). *Distrib.* Borneo.

(8) **M. tenuiscapa** Clarke in Hook. fil. *F.B.I.* vi. 683; *Ridl. Mat.* iii. 105.

Rhizome erect with thick roots, .25 in. through. Leaves linear distichous, long acuminate, 3 ft. long, .36 in. wide, 4-nerved, edges and keel thorny. Scapes slender, 3 to 6 in. tall. Head solitary, cylindrical at first, base narrowed, at length ovoid. Nut ovoid beaked. *Hab.* In muddy spots by river banks. Johor,

Kwala Sembrong (Kelsall); Sungei Tebrau. Malacca (Griffith). Perak, Temengoh. Kedah, Alor Sta. Lankawi, Burau Bay (Ridley). *Distrib.* Sumatra, Borneo.

(9) *M. humilis* *Naves and Villar in Blanco Fl. Filip. Append.* 309; *Clarke in Hook. fil. F.B.I.* vi. 683; *Ridl. Mat.* iii. 105. *Lepironia humilis* *Miq. Ill. Fl. Arch. Ind.* 61, t. 23.

Stem short, 2 to 3 in. long. Leaves equidistant at base. Sheaths over 1 in. across, above a petiole half as long as blade, blade suddenly dilated oblong serrulate, ending abruptly in a slender tail, 28 in. long, 1 in. wide, tail 3 to 4 in. long. Scape .5 to .12 in. long, with a single spike, fusiform when young, ovoid when adult. Glumes ovate blunt, ribbed. Squamellæ 6, shorter; anthers white. Stigmas long, pink. Nut .25 in. long, broad fusiform oblique, beak short, brown. *Hab.* Common in forests, whole Peninsula. Singapore, Bukit Timah; Kranji. Johor, Castlewood; Pulau Tioman (Burkill). Pahang, Tahan River. Gunong Tahan 3500 ft. altitude (Haniff). Malacca (Griffith); Selendor (Cantley). Negri Sembilan, Perhentian Tinggi. Selangor, Petaling. Perak, Thaiping Hills. *Distrib.* Borneo.

var. *petiolata*, *M. petiolata* *Clarke in Kew Bulletin Add. Ser.* viii. 54. Leaves elongate linear-oblong, abruptly cuspidate, 28 in. long, 1.5 in. wide; petioles 5 in. long. Peduncle of scape 9 in. long, triquetrous. *Hab.* Singapore, Bukit Timah. Pulau Tioman (Burkill). *Distrib.* Borneo.

I believe this variety is only a large fully developed form of *M. humilis*.

(10) *M. triquetra* *Ridl. Mat.* iii. 106.

Stem ascending or erect, 6 in. tall, triquetrous from the broad leaf sheaths, 1.5 in. long, 1 in. wide, green, edged pink; petioles 2 to 3 in. long, green, blade oblong, 6 to 8 in. long, 2 in. wide, dark green, paler beneath, tail 1.5 in. long, thorny. Scape 3 in. long, red. Spike .5 in. long. Squamellæ 6, two outer ones with ciliate keels. Anthers linear-oblong twisted. Style long; stigmas 3, short. *Hab.* Forests. Negri Sembilan, Bukit Tumiang (Cantley). Dindings, Lumut; Pangkor. Perak, Larut (Kunstler). Penang Hill (Curtis). Kelantan, Chaning Woods. *Distrib.* Borneo.

*M. lucida* *N.E. Br. Ill. Hort.* xxxii. 77, t. 557, described from a garden plant, may be this species; if so, this is the oldest name.

## 21. SCIRPODENDRON, Kurz.

Large coarse pandan-like plant, rhizome horizontal. Leaves linear long, acuminate, thorny. Inflorescence a head of many dense spikes on a short peduncle hidden among the leaves. Glumes oblong coriaceous, one- or more flowered. Squamellæ numerous, two outer broader, monandrous, keel ciliate, inner more than 6. Stamens long. Style slender, bifid. Nut large ellipsoid, deeply grooved, acute at both ends, epicarp fleshy. Seed globose. Species 1, Ceylon, Malaya, Australia, Samoa.

(1) **S. costatum** Kurz. *Journ. As. Soc. Beng.* xxxviii. 285; *Clarke in Hook. fil. F.B.I.* vi. 684; *Ridl. Mat.* iii. 106; *Miq. Ill. Fl. Arch. Ind. t.* 28. *Chionanthus* Ghaeri *Gaertn. Fruct.* i. 119.

Leaves 10 ft. long, 1 to 1.5 in. wide, tip filiform, scabrid 6 to 10 in. long. Inflorescence lengthening in fruit to 1 ft. long. Spikes ovoid, yellowish white. Bracts, lower 4 ft. long or less, upper ones shorter, white. Nut .5 to .6 in. long. *Hab.* Common in tidal swamps and rivers forming dense masses. Singapore, Kranji, Johor, Kota Tinggi; Sempang Kiri. Malacca (Griffith), Setul. *Native name* : Selingsing.

## 22. LEPIRONIA, L. C. Rich.

A rush-like leafless plant with a creeping rhizome, culms tall, terete, with a sheath at base. Spike 1, oblong-obtuse cylindrical lateral, with a terete bract appearing like a continuation of the culm. Glumes brown. Squamellæ 8 to 11, two outer ones boat-shaped, monandrous, inner ones male or empty. Style short bifid. Nut ovoid, beak compressed. Species 1, Madagascar, Ceylon, Malaya, Australia, Fiji.

(1) **L. mucronata** Rich. *Pers. Syn.* 170; *Miq. Ill. Fl. Arch. Ind.* 60, t. 20; *Clarke in Hook. fil. F.B.I.* vi. 684; *Ridl. Mat.* iii. 107.

Rhizome scaly. Culms 1 to 3 ft. tall, transversely septate. Spike .5 in. long, .25 in. through. Bract 1 to 2 in. long. Glumes chestnut brown, blunt, spirally imbricating. Nut ovoid compressed, margins ciliate. *Hab.* Ponds and swamps, common in the south. Singapore, Jurong. Johor. Pahang, Sungei Chenei (Fox). Malacca (Griffith). Dindings, Tanjong hantu. *Use* : In mat-making.

## 23. SCLERIA, Berg.

Rough herbs with leafy stems. Leaves linear acuminate scabrid, sheath triquetrous or winged. Panicle terminal compound. Spikelets unisexual, rarely bisexual, with one female flower below and several male ones above. Glumes 2 to 4 basal empty, 1 or more above floriferous. Style bifid, not thickened at base. Nut small, bony, white or purple, smooth, reticulate or tubercled on a fleshy disc entire or lobed. Species 150, all tropical regions.

§ 1. HYPOPORUM. Most of the spikelets bisexual.

Leaves very narrow; panicle very narrow . . . . . (1) **S. lithosperma**

Leaves broad, 3-nerved, glabrous; stems winged.

Panicle large, corymbs several; nut ellipsoid . . . . . (2) **S. corymbosa**

Panicles small, corymbs few, small; nut ellipsoid. . . . . (3) **S. Ridleyi**

Leaves hairy; nut trigonous hairy . . . . . (4) **S. gonocarpa**

§ 2. EUSCLERIA. Spikelets unisexual.

Nut smooth.

Tall stout plant with dense panicle . . . . . (5) **S. oryzoides**

- Slender weak plants.
- Nut ovoid . . . . . (6) **S. zeylanica**
  - Nut globose, top flattened . . . . . (7) **S. levis**
  - Robust plant; panicle large hairy; nut ovoid . . . . . (8) **S. radula**
  - Annual dwarf plant; leaves herbaceous; flowers and fruit minute in axillary tufts . . . . . (9) **S. caricina**
- Nut reticulate velvety or pubescent.
- Panicles dense, terminal; secondary bracts long setaceous . . . . . (10) **S. bancana**
  - Panicles lax; sheaths not winged; leaves whorled.
  - Disc short, 3-lobed . . . . . (11) **S. multifoliata**
  - Disc long, cylindric, bright red . . . . . (12) **S. sumatrensis**
  - Panicle slender lax; leaves not whorled; sheaths winged . . . . . (13) **S. hebecarpa**
- Nut tessellate; tall stout plants.
- Ligule ovate hairy . . . . . (14) **S. elata**
  - Ligule scarious brown . . . . . (15) **S. chinensis**
  - Nut tessellate; small, weak plant . . . . . (16) **S. biflora**
- Dwarf plant, hairy; spikes large, in 2 or 3 heads in panicle shorter than leaves.
- Nut  $\cdot 1$  in. long, pustular . . . . . (17) **S. carphiformis**

(1) **S. lithosperma** Sw. *Prod.* 183; *Fl. Ind. Occ.* 92; *Clarke in Hook. fil. F.B.I.* vi. 685; *Ridl. Mat.* iii. 108.

Rhizome short, woody. Culms 18 to 24 in. tall, slender, tufted. Leaves narrow, 8 in. long,  $\cdot 06$  in. wide; sheaths only pubescent. Panicle narrow, 1 to 3 in. long, with distant spikelets or clusters of spikelets, many bisexual. Glumes acuminate, dark brown. Nut  $\cdot 1$  in. long, ovoid smooth, white. *Hab.* Dry woods, Pahang, Rumpin River; Kwala Pahang, Malacca (Griffith); Nyalas (Goodenough); Alor Gajah. Negri Sembilan, Tampin Hill (Goodenough); Linggi River. Dindings, Lumut. Penang (Wallich); Waterfall (Curtis). Pulau Adang, Rawei island. Setul.

var. *Roxburghii* Clarke *in Hook. fil. F.B.I.* vi. 686. A rather smaller plant. Glumes mucronate. Nut oblong trigonous apiculate tubercled. *Hab.* Rare. Johor, Batu Pahat. Dindings, Lumut. *Distrib.* All tropical regions except Africa.

(2) **S. corymbosa** Roxb. *Fl. Ind.* iii. 574; *Clarke in Hook. fil. F.B.I.* vi. 686; *Ridl. Mat.* iii. 109.

A stout robust plant nearly glabrous, culms 2 to 8 ft. tall. Leaves 12 to 20 in. long,  $\cdot 5$  to 1 in. wide; sheaths angled or strongly winged. Panicle 18 to 24 in. long, of 6 or 7 compound corymbose axillary panicles 3 in. long. Bracts setaceous. Spikelets  $\cdot 25$  in. long, nearly all bisexual. Glumes greenish, pale. Nut ellipsoid, acute at both ends, smooth, white,  $\cdot 12$  in. long. Disc small, brown, obscurely 3-lobed. *Hab.* Damp spots by paths in forests from sea-level to 4000 ft. altitude. Singapore, Bukit Timah, Johor, Gunong Pantai. Muar, Bukit Muar (Feilding). Malacca (Griffith); Ayer Keroh; Batang Malacca (Derry). Negri Sembilan, Tampin Hill (Ridley). Dindings, Telok Sera. Selangor, Bukit Hitam, 4000 ft. altitude (Kelsall). Perak, Goping (Kunstler). Penang (Curtis). Kelantan, Chaning (Ridley). *Distrib.* India and Ceylon.

(3) **S. Ridleyi** Clarke in Hook. fil. F.B.I. vi. 686; Ridl. Mat. iii. 109.

Culms 18 to 24 in. tall, rather slender, hardly trigonous. Leaves 1 ft. long or less, .36 in. wide, nearly glabrous. Panicle of 4 distant partial panicles, rather compact, 1.5 to 2 in. long, light brown. Spikelets 8 to 30 in each, bisexual. Nut ellipsoid, smooth, white. *Hab.* In damp sandy open spots. Rare. Singapore, Changi. Dindings, Lumut. Pahang near Kwala Tenok (Ridley). *Distrib.* Pulau Buru and Hongkong.

(4) **S. gonocarpa** Ridl. *S. trigonocarpa* Ridl. Mat. iii. 110 (not of Boeckeler).

Culms stout over 2 ft. tall; leaves 18 in. long, .5 in. across, long acuminate, sheaths triquetrous not winged, blade 3-nerved, apex long acuminate scabrid, beneath pubescent. Panicle rather narrow pubescent, partial panicles 1.5 in. long. Spikelets brown, mostly bisexual. Nut when young covered with rusty hairs, white, smooth, trigonous acuminate to a broad triangular tip, on a yellowish irregularly wrinkled disc. *Hab.* Rare in woods. Pahang, Tahan River (Ridley); near Raub (Machado).

(5) **S. oryzoides** Presl. *Rel. Haenk.* i. 201; Clarke in Hook. fil. F.B.I. vi. 691; Ridl. Mat. iii. 110.

Culms stout, 3 to 6 ft. tall, glabrous, triquetrous from a long stoloniferous rhizome. Leaves 3 ft. long, .5 in. wide, sheaths trigonous or winged. Panicle 6 to 8 in. long, dense, on a 6 in. long peduncle. Spikelets solitary, unisexual, on slender branches, females few, one or two at base of spikes. Glumes keeled and mucronate, brown-red. Nut globose, white, smooth, disc 3-lobed. *Hab.* Ditches and rice-fields. Common. Singapore, Changi. Johor Serom. Malacca (Griffith); Ching. Perak, Trang (Kunstler). Kedah, Alor Sta. Perlis, Kanga. *Distrib.* East Africa, Indo-Malaya, Australia. *Native name:* Rumput Siku Dana.

(6) **S. zeylanica** Poir. *Encycl.* vii. 3; Clarke in Hook. fil. F.B.I. vi. 687; Ridl. Mat. iii. 111.

A slender tufted plant 6 to 12 in. tall, nearly glabrous. Leaves up to 4 in. long, .12 in. wide. Panicle of one or two spikes only; spikelets small, .12 in. wide. Glumes brown. Nut very small, whiet, smooth, ovoid. *Hab.* Grassy places. Common. Singapore, Galang; Changi. Pahang, Kwala Pahang. Malacca, Ayer Panas. Penang, Telok Bahang (Curtis). *Distrib.* Ceylon, Burma, Malay islands.

(7) **S. levis** Retz. *Obs.* iv. 13; Clarke in Hook. fil. F.B.I. vi. 694; Ridl. Mat. iii. 111.

Culms triquetrous, slender, 2 to 3 ft. tall, from a short rhizome. Leaves 1 ft. long, .25 in. wide. Panicle narrow, partial panicle small, terminal one pyramidal, dark red or brown. Nut smooth, globose, white or black, tip flattened, disc white, fleshy; lobes 3, ovate, toothed. *Hab.* Common in grassy spots. Singapore, Tang-

lin; Changi. Johor, Tana Merah Road. Pahang, Pulau Tawar; Pekan. Malacca, Pulau Besar (Griffith); Alor Gajah. Penang (Wallich). *Distrib.* India, Siam, China, Malaya.

(8) *S. radula* Hance, *Ann. Sc. Nat. Ser. iv.* xviii. 232; *Clarke in Hook. fil. F.B.I.* vi. 691; *Ridl. Mat.* iii. 111.

A tall stout plant over 4 ft. tall. Leaves 2 ft. long, 1 in. wide, 3-nerved, sheaths stout not winged, ligule rounded. Panicles triangular, 3 in. long, 2 in. wide, on triquetrous peduncle 3.5 in. long. Spikelets cylindrical, purple, .1 in. long, unisexual, bracts at base of branches very narrow linear setaceous, 1 in. long or less. Nut smooth, white, globose or oblong apiculate. *Hab.* Hill forests. Pahang, Gunung Tahan on wooded stream-banks at 5500 ft. altitude. Selangor, Menuang Gasing (Kloss). Perak, Thaiping Hills; Gunung Kerbau at 4200 ft. altitude; Gunong Inas (Yapp). Penang, West Hill. *Distrib.* Hongkong.

(9) *S. caricina* Benth. *Fl. Austral.* vii. 426; *Clarke in Hook. fil. F.B.I.* vi. 688; *Ridl. Mat.* iii. 111. *Diplacrum caricinum* Br. *Prodr.* 241.

A small plant, apparently annual, tufted or in long grass longer and weak, 6 to 15 in. tall, glabrous. Leaves 1 to 2 in. long, .1 to .12 in. wide, flaccid, usually 3-nerved. Spikelets in very small axillary clusters just emerging from the leaf axils, unisexual. Nut minute, 3-ribbed and cancellate. *Hab.* Common in waste ground and sandy paths. Whole Peninsula, Singapore, Bukit Mandai; Tanglin. Johor, Sungei Tebrau. Malacca, Merlimau; Pulau Besar. Pahang, Pekan. Setul. *Distrib.* India, China, Malaya, North Australia.

(10) *S. bancana* Miq. *Fl. Ind. Bat. Suppl.* 602; *Clarke in Hook. fil. F.B.I.* vi. 693; *Ridl. Mat.* iii. 112.

A rough, stout, nearly glabrous plant about 3 ft. tall. Leaves 2 ft. long or less, .25 to .5 in. wide, trinerved, scabrid; sheaths triquetrous, occasionally narrowly winged. Partial panicles densely crowded at the top, light green, with the long setaceous, secondary bracts very conspicuous. Spikelets numerous unisexual. Nut ovoid-globose, reticulate, minutely pubescent, small, disc yellowish, undulate recurved. *Hab.* Common in open country all over the Peninsula.

var. *nana* Ridl. *Journ. Roy. As. Soc. S. Br.* 59, p. 225. A dwarf variety about 2 ft. tall forming tussocks, in sandy spots. Panicles reddish. *Hab.* Heaths, Setul (Ridley). *Distrib.* Tenasserim, Cochinchina, Malaya, Oceania. *Native name:* Rumpit Sendayan Bukit.

(11) *S. multifoliata* Boeck. *Linnaea*, xxxviii. 510; *Clarke in Hook. fil. F.B.I.* vi. 693; *Ridl. Mat.* iii. 112.

Culms usually fairly stout, about 3 ft. tall, glabrous. Leaves in upper part in false whorls of 2 to 6 together with short sheaths, whorls 2 in. apart, 12 to 16 in. long, .25 to .5 in. wide. Panicles

pyramidal, lax, red; spikelets rather distant, unisexual. Nut ·1 in. long, reticulate, edges and reticulations hairy, white or reddish, disc covering nearly all the nut, 3-lobed. *Hab.* In woods and more commonly rocky open places, from the level to 3000 ft. altitude. Whole Peninsula tolerably common.

var. *b. pilosula* Clarke, *l.c.* A more hairy plant, leaves beneath densely softly hairy. Spikelets greenish white. *Hab.* Penang Hill at 600 to 1000 ft. altitude (Kunstler).

var. *c. ophirensis* Clarke, *l.c.* Stouter plant, leaves broader, glabrous, lower peduncles of panicles slender, 4 in. long. Male spikelets dark red, in dense pyramidal pubescent heads. *Hab.* Malacca, Mount Ophir at 3000 ft. altitude in long grass (Hullett, Ridley). *Distrib.* Burma, Malaya.

(12) *S. sumatrensis* Retz. *Obs.* v. 19, t. 2; Clarke in *Hook. fil. F.B.I.* vi. 575; *Ridl. Mat.* iii. 113.

A rather slender weak plant 3 ft. tall, to 20 ft. in tall scrub, glabrous. Leaves 9 to 12 in. long, ·25 in. wide, in false whorls of 2 to 4, 1 ft. apart. Panicle 6 in. long, lax, light brown, partial panicles ascending. Glumes reddish. Nut black, reticulate pubescent, nearly globose, at least half concealed in the very large bright red cylindric crenulate fleshy disc. *Hab.* Very common in open country. Whole Peninsula, Singapore to Penang. *Distrib.* Malay islands. *Native names:* Rumput Kumbor; Rumput Siamet; Sendayan.

Young dried specimens are often difficult to separate from *S. multifoliata*, but in life the brilliant red fleshy disc is most conspicuous.

(13) *S. hebecarpa* Nees, *Linnaea*, ix. 303; Clarke in *Hook. fil. F.B.I.* vi. 689; *Ridl. Mat.* iii. 113.

A weak slender plant 2 to 3 ft. tall. Leaves 12 to 14 in. long, ·16 in. wide, scabrous, sheaths winged, scabrid. Panicles usually thin and black, terminal one sometimes pyramidal. Bracts usually long, exsert. Spikelets unisexual. Nut ·1 in. long, ovoid, velvety, white, obscurely reticulate when young. *Hab.* Common in open country. Whole Peninsula, Singapore, Tanglin; Pulau Ubin; Changi. Johor, Kota Tinggi; Gunong Pantai. Selangor, Kwala Lumpur. Pahang, Pekan. Penang, Tanjong Bunga (Curtis). Setul. *Distrib.* Indo-Malaya, China, Japan, Australia and Polynesia.

(14) *S. elata* Thw. *Enum.* 353A (partly); Clarke in *Hook. fil. F.B.I.* vi. 690; *Ridl. Mat.* iii. 114.

A stout plant from 3 to 4 ft. tall. Leaves 1 to 2 ft. long, ·25 to ·5 in. wide, scabrid, sheath 3-winged, ligule rounded, hairy. Panicle usually large and spreading, partial panicles 3 to 6 in. long, branches divaricate hairy, bracts conspicuous. Spikelets scattered, numerous, unisexual, red. Nut white or dark red, minutely hairy and tessellate, globose-ovoid. *Hab.* Forests at high altitudes from



100 to 3000 ft. Johor, Gunong Pulai. Pahang, Kwala Lipis (Machado). Perak, Thaiping Hills. Penang at 2500 to 3000 ft. altitude.

var. *decolorans* Clarke, *l.c.* Robust plant, dark red. Nuts finally black purple. Penang Hill. *Distrib.* India, Ceylon, Java, China.

(15) **S. chinensis** Kunth, *Enum.* ii. 357; Clarke in Hook. *fil. F.B.I.* vi. 690; *Ridl. Mat.* iii. 114.

Tall rather slender plant, 2 ft. long or more, glabrous. Leaves 6 to 15 in. long, .12 in. wide or more, sheaths triquetrous, not winged, ligules with an ovate-oblong blunt brown biauriculate process .2 in. long. Panicles pyramidal, lax, about 4, dark red. Bracts setaceous conspicuous. Nut small ovoid-oblong blunt, tessellate purple. *Hab.* Mountains, rare, on Kedah Peak at 3000 ft. altitude. Penang Hill (Ridley). *Distrib.* Ceylon, Malaya, China, Australia.

(16) **S. biflora** Roxb. *Fl. Ind.* iii. 573; Clarke in Hook. *fil. F.B.I.* vi. 687; *Ridl. Mat.* iii. 115.

A small tufted glabrous plant 12 to 18 in. tall or less. Leaves 6 to 18 in. long, about .12 in. wide, nearly as long as the culms. Panicle narrow elongate, .5 to 1 in. long; spikelets unisexual, dark brown. Nut globose hairy, tessellate, .1 in. long, with a short black beak (the style base). *Hab.* Common in grass plots and by roadsides. Singapore, Tanglin; Blakan Mati; Bukit Timah. Pahang, Pulau Tawar. Penang, Waterfall (Curtis). *Distrib.* Indo-Malaya and China.

(17) **S. carphiformis** Ridl. *Journ. F.M.S. Mus.* vi. 194. *S. Neesii* Kunth. *Enum.* ii. 358. var. *Borneensis* Clarke, *l.c.* 688; *Ridl. Mat.* iii. 115.

Culms 3 together in a tuft, base covered with hairy sheaths. Leaves 3 or 4, linear, blunt, 6 in. long, .12 in. wide, glaucous, green, edges and keel with long white hairs. Panicle 2 in. long, with 2 or 3 distant fascicles of spikelets subsessile. Bracts leafy, 1.5 in. long or less. Spikelets two or three males to one female. Male .25 in. long, glumes dark red, with white hairs, 4 lower ones empty, 4 upper ones with 3 stamens each. Female spikelets shorter. Glumes 4 as in the male, 1-flowered. Style trifid. Nut hemispheric, base broad, .1 in. long, white, pustular, with stellate brown hairs, disc orbicular. *Hab.* Open places on mountains, rare, in damp spots. Pahang, Gunong Tahan at 6000 ft. altitude. Kedah Peak at 3000 ft. altitude (Ridley).

#### 24. CAREX, Linn.

Herbs with leafy culms. Spikelets few or many, remote or clustered, bisexual or unisexual, lower flowers female, upper ones male. Glumes imbricate spirally, males with two or three stamens. Females a compressed trigonous ovary with a slender bifid or trifid

style enclosed in an urceolate sac (utricle). Nut biconvex or trigonous enclosed in the utricle. Species about 500, whole world.

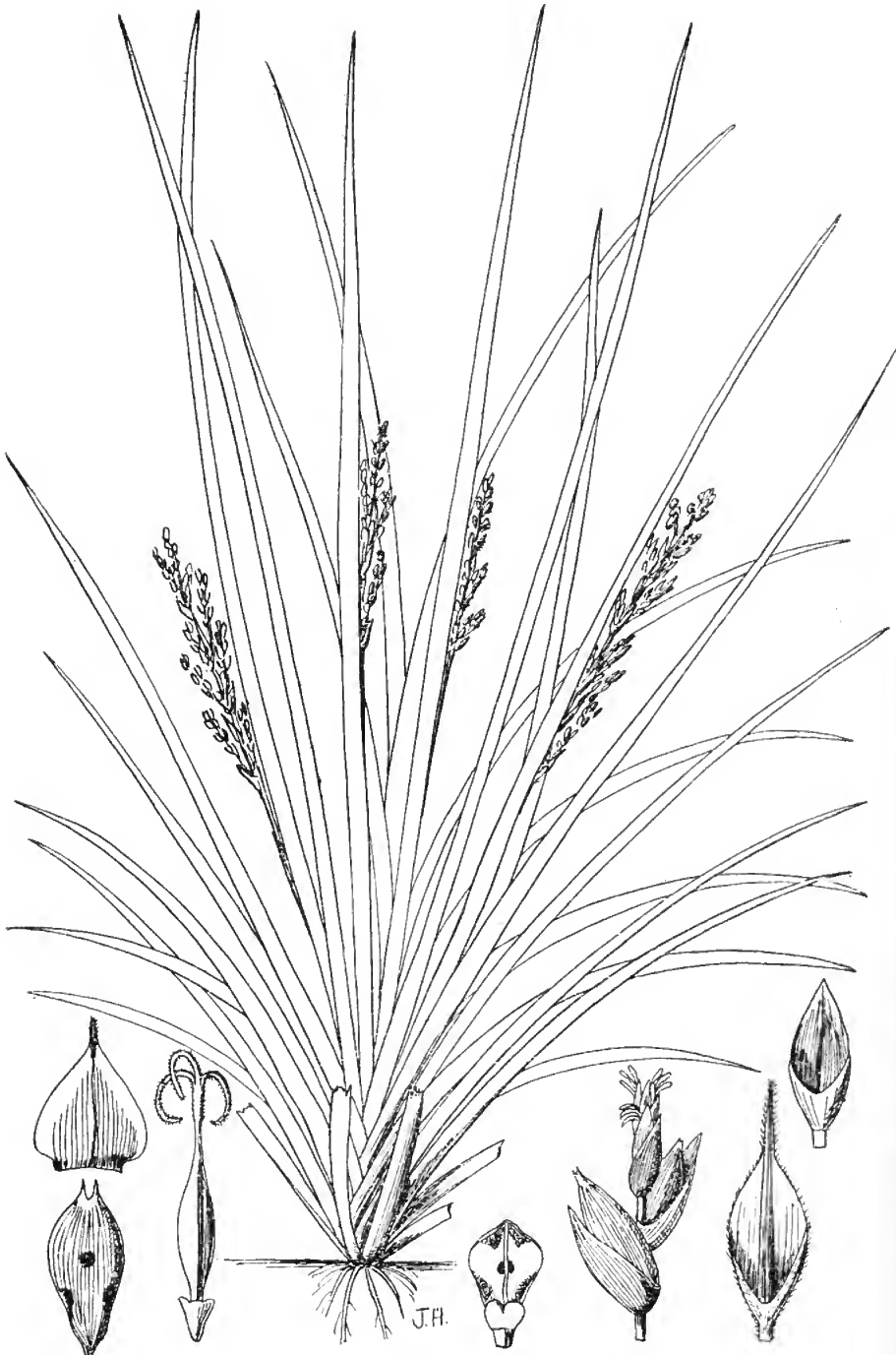
- Terminal spikes male, lower female; utricle inflate at base, hairy . . . . . (1) *C. ligata*
- Terminal spikes female at base, male at top.  
Sub-scapose, basal leaves longer than scape; spikelets distant . . . . . (2) *C. cryptostachys*
- Inflorescence very short, shorter than leaves; spikelets crowded . . . . . (3) *C. Curtisii*
- Inflorescence long slender lax.  
Spikelets few, ovate, white, glabrous . . . . . (4) *C. malaccensis*
- Spikelets few, slender, pendulous.  
Rachis glabrous; glumes half as long as narrow hairy utricle, awned . . . . . (5) *C. breviglumis*
- Rachis hairy; glumes half as long as narrow utricle, ovate-lanceolate glabrous . . . . . (6) *C. Clarkeana*
- Rachis glabrous; glumes lanceolate awned nearly as long as narrow utricle . . . . . (7) *C. rivulorum*
- Spikelets numerous, white, short; utricle ovoid hairy . . . . . (8) *C. perakensis*
- Spikelets numerous; glumes red, edged white.  
Leaves .5 in. wide; spikelets stout . . . . . (9) *C. arridens*
- Leaves narrow; spikelets slender . . . . . (10) *C. Walkeri*
- Spikelets very numerous, forming a large panicle; utricles dilate succulent red . . . . . (11) *C. baccans*
- Spikelets yellowish or brown in elongate or pyramidal panicles.  
Spikelets yellow; utricle sub-globose . . . . . (12) *C. indica*
- Spikelets ferruginous; utricle ellipsoid . . . . . (13) *C. cruciata*

(1) *C. ligata* Boott in Benth. *Fl. Hongkong* 402; *Illustr. iv. 211*; *Kukenhal, Pflanzenreich, Cyperaceæ-caricoideæ* 473, f. 75, G-K.

Rhizome thick tufted. Leaves linear scabrid, 17 in. long, .1 in. wide. Culms slender, 5 to 12 in. long. Spikes 3 or 4, distant, terminal one male filiform, .75 to 2 in. long, lower ones female cylindrical rather dense, .5 to 1 in. long. Glumes sub-ovate oblong rounded, ciliate, brown, edges white, hyaline, keel green. Utricle longer, rhomboidal, flask-shaped, inflate at base stipitate, yellow-green, minutely puberulous, beak rather long, bifid. *Hab.* Mountains, damp woods by streams at 5600 ft. altitude. Pahang, Gunong Tahan (Ridley). *Distrib.* Formosa and China.

(2) *C. cryptostachys* Brongn. *Bot. Voy. Coquille* 152 t. 25; *Clarke in Hook. fil. F.B.I. vi. 714* (*C. cyrtostachys* by misprint); *Ridl. Mat. iii. 116.* (Fig. 221, p. 182.)

Rhizome stout, .25 in. through. Leaves numerous linear acuminate, 1 to 2 ft. long, .3 to .5 in. wide. Scapes shorter, 6 to 8 in. long, branched. Spikelets linear, pale green, lax, .5 in. long. Female glumes ovate, white, keel green, half as long as the utricle. Style trifid. Utricle .12 in. long, pale green, hairy, oblong, narrow towards the base, beak short. Nut small, yellow, on a pedicel swollen at tip. *Hab.* Banks and damp spots in woods, abundant, to 4000 ft. altitude. Singapore, Bukit Timah. Johor, Batu Pahat.

FIG. 221.—*Carex cryptostachys*.

Sungei Ujong (Cantley); Tampin Hill. Dindings, Lumut. Pahang, Telom at 4000 ft. altitude. Perak, Thaiping Hills at 3500 to 4000 ft. altitude (Kunstler). Penang Hill (Wallich, Curtis). *Distrib.* Malay islands, China. *Native name*: Rumput Ringgin.

(3) **C. Curtisii** *Ridl. Mat. iii. 117.*

Rhizome short woody. Leaves sub-basal, crowded, 6 to 8 in. long, .13 in. wide. Inflorescence shorter, 3 to 4 in. long. Bracts longer. Spikelets erect, crowded, utricles numerous. Female glumes shorter, broad, glabrous. Style trifid. Utricles .12 in. long, oblong, base narrowed, abruptly beaked, ribbed, trigonous. Nut oblong trigonous, truncate, dark brown. *Hab.* Penang, Government Hill at 2500 ft. altitude (Curtis).

(4) **C. malaccensis** *Clarke in Hook. fl. F.B.I. vi. 722; Ridl. Mat. iii. 116.*

Whole plant 2 ft. tall, culm slender. Leaves narrow, 1 ft. long, .1 in. across. Bracts 4 in. long, .13 in. wide, spreading. Spikes 3, white, .5 in. long, oblong-globose. Spikelets 3 or 4, male and female parts sub-equal, widely ovate, .25 in. long or less. Female glumes minutely hairy, ovate ribbed, mucronate. Utricle glabrous, strongly nerved, ovate inflated, acuminate, pale and trigonous, beak conical-linear, flattened edges, scabrous. Style long, red, stigmas 3. *Hab.* Rare. Lankawi islands at Kwala Malacca (Curtis); Telok Apan (Haniff). *Distrib.* Siam.

An unfortunate name, as it does not occur at Malacca.

(5) **C. breviglumis** *Ridl.*

Leaves elongate, narrowed to a very slender point, 2 ft. long, .25 in. wide. Culm as long, slender, partial panicles 3 or 4, distant, narrow, 1 in. long. Male part short, slender. Female glumes ovate truncate, awned, awn scabrid. Utricle much longer, .2 in. long, narrow, ellipsoid-lanceolate, triquetrous, pale green, tapering into a long bifid beak, base narrowed, ribs several scabrid, edges shortly-hairy. Style red, trifid. Nut narrow lanceolate triquetrous, narrowed at both ends. *Hab.* In mountain forests, rare. Pahang, Telom at 4000 ft. altitude (Ridley).

(6) **C. Clarkeana** *Kukenthal, Bull. Herb. Boiss. 2, Ser. iv. 52; Pflanzenreich, Cyp.-caric. 282.*

Culms 4 ft. long, stout. Leaves as long, flat, glaucous, .4 in. wide. Inflorescence 28 in. long, slender, partial panicles 9 oblong-lanceolate lax, long-peduncled remote. Rachis densely hairy. Spikelets numerous, crowded. Male part ovate, .2 in. long. Glumes pilose, long, awned. Female glumes ovate mucronate, pale red, purple striped, keel yellow. Utricles much longer, ovate-lanceolate not inflate, .13 in. long, glabrous, many nerved, lead-colour reddish, edges hairy, beak long incurved bifid. Nut elliptic. *Hab.* Perak (Wray 4104).

I have not seen this species.

(7) **C. rivulorum** *Ridl. Journ. F.M.S. Mus.* vi. 195.

Stoloniferous tufted plant. Leaves linear acuminate, 2 ft. long, .25 in. wide, back scabrid. Culm 3 ft. long, weak. Spikes 6, very slender cylindrical pedunculate, 1 in. long, .1 in. through; lower ones female or with male flowers at tip; upper ones male. Glumes ovate-lanceolate keeled, with a long mucro, pale brown pubescent. Utricle .25 in. long, fusiform narrowed, stipitate at base, long-beaked, mouth bifid, triquetrous, ribbed, hairy. Stigmas 3. Nut short, fusiform triquetrous, dark brown. *Hab.* Mountains on mossy wooded stream-banks, rare. Pahang, Gunong Tahan at 5600 ft. altitude (Ridley).

(8) **C. perakensis** *Clarke in Hook. fil. F.B.I.* vi. 720; *Ridl. Mat.* iii. 116.

Stem stout woody. Leaves flaccid, 2 ft. long, .25 in. wide, slender acuminate, bases broad shining, dark brown. Panicle lax, 6 in. long. Partial panicles pale, 2 to 3 in. long, narrow linear or oblong. Spikelets oblong, 1 to 4 utricles. Glume as long as utricles, white, lanceolate mucronate. Style trifid, red. Utricle ellipsoid hairy, green, many-nerved, beak shortly bifid. *Hab.* Mountain forests, scarce. Selangor, Semangkok Pass. Perak, Thaiping Hills (Ridley, Wray).

(9) **C. arridens** *Clarke in Hook. fil. F.B.I.* vi. 726; *Ridl. Mat.* iii. 117.

A robust plant, glabrous except utricles, with a stout woody rhizome. Leaves longer than inflorescence, 18 in. long, .5 in. wide. Inflorescence 1 ft. long. Peduncles one or two from each sheath, distant, 2 in. long, erect. Spikelets linear-lanceolate, dark red, .5 to .75 in. long. Male glumes oblong-ovate obtuse, red-brown, edges scarious. Females ovate acuminate. Style trifid. Utricle ovoid trigonous nerveless, golden hairy, suddenly beaked, beak slender with 2 large lips. Nut ellipsoid trigonous, pyramidal at both ends. *Hab.* Rare, in mountain forest. Perak, Larut Hills at 3000 ft. altitude (Kunstler). *Distrib.* Burma.

(10) **C. Walkeri** *Arn. in Boott. Trans. Linn. Soc.* xx. 129; *Illustr.* i. 2 t. 4; *Clarke in Hook. fil. F.B.I.* vi. 725.

Rhizome woody stoloniferous. Leaves about 2 ft. long, .25 in. wide. Culm 2.5 to 3 ft. tall. Panicle interrupted, spikes copious, narrow cylindrical, purple, 1.5 to 2 in. long, female portions short, on slender long peduncles. Glumes lanceolate very narrow, acuminate mucronate, purple with a green keel and mucro and a white edge. Utricles longer, sub-erect linear-lanceolate trigonous, reddish olive, pilose above, narrowed into a beak long bidentate, mouth hyaline. Nut narrow oblong stipitate. *Hab.* Rare. Perak, Gunong Kerbau at 6600 ft. altitude (Robinson). *Distrib.* South India, Ceylon, Java and Philippines.

(11) **C. baccans** *Nees, Wight Contrib.* 122; *Hook. fil. Bot. Mag.* t. 7288; *Kukenthal, Pflanzenreich, Cyp.-car.* 258, fig. 39, E-H.

A stout plant 4 ft. tall or less, culm trigonous. Leaves linear

acuminate as long as or longer than culms broad or narrow, scabrid. Inflorescence of several panicles, 3 to 5 in. long, much branched, rachis scabrid. Spikes numerous, about 1 in. long, apex (one-third) male, narrow cylindrical, lower part female. Glumes ovate obtuse, red or pale, many nerved mucronate edges hyaline. Utricles as long, spreading, ovate, very swollen, tip rounded, .1 in. long, olive-brown to red, shining, strongly ribbed, edges hispid, beak short bidentate. Nut ovate trigonous. Stigmas 3. *Hab.* In mountain forests, a handsome plant with its large inflated utricles. Pahang, Gunung Berumban and Telom (Ridley). *Distrib.* India, Java, Sumatra, Cambodia, Formosa.

(12) *C. indica* Linn. *Mant.* ii. 574; *Boott. Illustr.* ii. 87, t. 250, 252, 253; *Clarke in Hook. fil. F.B.I.* vi. 714; *Kukenthal, Pflanzenreich, Cyp.-car.* 262, fig. 40.

Rhizome woody thick. Leaves linear acuminate, as long as the culm, .25 in. wide. Culms 2 to 3 ft. tall, stout, triquetrous. Panicles distant, spreading, about 2 in. long. Spikelets male portion cylindrical slender, .5 in. long. Female flowers two or three at base. Glumes ovate keeled, mucronate, mucro scabrid, often long in female, pale straw-colour. Utricles longer, divaricate ovate, more or less inflate, olive-green, many-nerved, beak long conic, mouth entire obliquely cut, edges scabrid. Nut ovate. *Hab.* In dry spots in the north. Penang, Batu Feringhi. Kedah Peak at 3000 ft. altitude; Alor Sta, in great abundance on Bukit Pinang. Lankawi islands, Burau. Adang Islands, Rawei island (Ridley). *Distrib.* India, Siam, Cochinchina, Java.

var. *latebrunnea* Clarke in *Hook. fil. F.B.I.* vi. 715. Glumes brown. Utricles brown not divaricate. *Hab.* Muddy and rocky river banks, Pahang, banks of Tahan River (Ridley, Seimund). Johor (Lake and Kelsall); Kota Tinggi River bank (Ridley). *Distrib.* Ceylon and Burma.

var. *fissilis* Kukenthal, *Pflanzenreich, Cyp.-car.* 264; *C. fissilis* Boott. *Illustr.* ii. 86, pl. 245; *Carex indica* var. *Milnei* Clarke in *Hook. fil. F.B.I.* vi. 715. Panicles denser; utricles divaricate, mouth bidentate. *Hab.* Muddy banks of rivers, where it is often submerged, Pahang, Sungei Jelei (Machado); Pahang River (Ridley). Kelantan River, Jeram panjang, above Chaning; Kelumpur (Haniff). *Distrib.* Borneo to Fiji. *Native name:* Rumpur Sesayak.

(13) *C. cruciata* Wahl. *Konigl. Vetensk. Acad. Stockholm*, xxiv. 129; *Clarke in Hook. fil. F.B.I.* vi. 715; *Ridl. Mat.* iii. 118; *Kukenthal, Pflanzenreich, Cyp.-car.* 266.

Rhizome woody horizontal, over 6 in. long. Culms 2 to 3 ft. tall. Leaves linear acuminate, 1 to 2 ft. long, .25 to .5 in. wide, margins at tip scabrid. Panicles narrow, strict, erect, 2 in. long, branches short pubescent. Spikelets .1 to .25 in. long; flowers few. Glume ovate acuminate or mucronate keeled. Utricle longer, ovate, yellow, orange, or olive-coloured, ribbed, beak long curved, margins scabrid entire. Nut ovate-elliptic. *Hab.* High mountains,

Pahang, Gunong Tahan at 6000 ft. altitude (Ridley); Gunong Berumban (Henderson). Perak, Thaping Hills (Kunstler). *Distrib.* India, China and Madagascar.

var. *condensata*, *C. condensata* Nees in *Wight Contrib.* 123; *Clarke in Hook. fil. F.B.I.* vi. 716; *Ridl. Mat.* iii. 118. Leaves very long, 1 to 2.5 ft. long, .36 in. wide. Partial panicles three or four, distant, lax, oblong, hardly pyramidal, long peduncled. Spikes .25 to .35 in. long, brown, clustered with 3 to 6 utricles in each. Utricle ellipsoid trigonous ribbed, beak short bifid, scabrid pilose. *Hab.* Mountains, rare, Malacca, Mount Ophir, in a stream on Gunong Mering (Ridley). *Distrib.* India.

### ORDER CLXIII. GRAMINEÆ.

Herbs erect or decumbent, or (*Bambusaceæ*) with tall woody stems (*culms*). Culms hollow, rarely solid, jointed. Leaves entire linear or lanceolate, base sheathing, ligulate. Inflorescence terminal or axillary as well, of spikelets arranged in spikes or heads. Spikelets of 3 or more dry distichous bracts (*glumes*). The two lowest usually empty, the others on a flexuous rachilla, 1 or more containing a flower; each glume normally has a flattened glume, thin and 2-nerved (*palea*), enclosing the flower which consists of 2 to 6 scales often minute or absent (*lodicules*). Stamens 3 (rarely 1 to 6) hypogynous; filaments long slender; anthers linear. Pistil 1-celled, 1-ovuled. Styles 3, rarely 2 or 1, plumose. Fruit a 1-seeded utricle (*grain*). Seed 1. Albumen copious mealy, embryo minute. Species 3000, whole world.

I have received much help in the grasses from Dr. Stapf and in the *Bambusaceæ* from Mr. Gamble.

I. MAYDEÆ. Stout grasses. Flowers unisexual in separate spikes or panicles on the same culm.

Lower spikelet female enclosed in a hardened bony glume . . . . .

1. COIX

II. ANDROPOGONEÆ. Usually slender grasses. Rachis not jointed; spikelets solitary, unilateral on rachis . . . . .

Flowers bisexual.

Spikelets in pairs 1 sessile, 1-pedicelled, 1-flowered.

2. DIMERIA

Rachis not jointed; panicle spike-like, white, silky . . . . .

3. IMPERATA

Rachis jointed. Panicle large white silky; culm solid, no awns . . . . .

4. SACCHARUM

Panicle large not white silky; culm hollow, no awns . . . . .

5. SCLEROSTACHYUM

Panicle large silky; rachis hardly jointed; spikelets awned . . . . .

6. MISCANTHUS

Panicle large not silky; rachis jointed; spikelets awned . . . . .

7. SORGHUM

- Spikelets in pairs, 2-flowered; rachis fragile.
- Racemes solitary.
- Glumes not pectinate, awned . . . . . 8. POGONATHERUM
- Glumes pectinate; spikelets secund awnless . . . . . 9. EREMOCHLOA
- Racemes solitary or several together, yellow- or white-silky, awned . . . . . 10. EULALIA
- Racemes several together terminal slender fragile, awned . . . . . 11. POLLINIA
- Racemes 2, rarely 1 or more, appressed, rather thick, fragile.
- Spikelets paired, 1 pedicelled, 1 sessile; glume 1, stiff . . . . . 12. ISCHÆMUM
- Racemes solitary.
- Spikelets sunk in pits in a jointed rachis.
- Sessile spikelets solitary.
- Racemes numerous, cylindric, on long peduncles, awnless . . . . . 13. CÆLORRACHIS
- Racemes very short; spikelets globose pitted . . . . . 14. MANISURIS
- Racemes tough, hardly disarticulate, flattened; pedicelled spikelet occasionally awned . . . . . 15. HÆMARTHRIA
- Sessile spikelets 2 . . . . . 16. MNESITHEA
- Spikelets ternate in short racemes enclosed in a peduncled spathe . . . . . 17. APLUDA
- Racemes short, paniced.
- Racemes of 1 sessile bisexual and 2 pedicelled male spikelets . . . . . 18. CHRYSOPOGON
- Racemes of many pairs of spikelets, branches of panicle whorled . . . . . 19. VETIVERIA
- Racemes shortly peduncled digitate or paniced; awn from the stipitiform glume IV . . . . . 20. AMPHILOPHIS
- Racemes solitary or few at end of culm; glume IV reduced to an awn . . . . . 21. DICHANTHIUM
- Racemes solitary at ends of branches of culm with a spathe-like bract at base of branches . . . . . 22. SCHIZACHYRIUM
- Racemes binate with spathe at base, in large panicles; aromatic grasses . . . . . 23. CYMBOPOGON
- Spikelets in clusters of 5 or more, the 4 lowest forming an involucre round the upper bisexual ones; panicles often very tall . . . . . 24. THEMEDA
- Raceme solitary; spikelets rounded, awn very long hairy . . . . . 25. HETEROPOGON
- III. PANICACEÆ. Spikelets articulate upon pedicels or deciduous with them; 1- or 2-flowered, rarely awned; rachis not breaking up into joints.
- § PANICEÆ. Glumes membranous. Glume I usually small or suppressed; upper floret only fertile, not silky.
- Rachis flat ribbon-like with the spikelets in 1 or more rows on one side.
- Racemes digitate; spikelets lanceolate . . . . . 26. DIGITARIA
- Racemes 2 digitate; spikelets ellipsoid-lanceolate alternate . . . . . 27. AXONOPUS
- Racemes scattered; rachis broad; spikelets round . . . . . 28. PASPALUM
- Racemes scattered; rachis broad; spikelets ovoid-globose . . . . . 29. PASPALIDIUM



- Racemes scattered; rachis narrow; spikelets lanceolate . . . . . 30. BRACHIARIA
- Racemes crowded; rachis narrow; spikelets ovate . . . . . 31. UROCHLOA
- Racemes numerous on a broad flat rachis . . . . . 32. STENOTAPHRUM
- Spikelets distant secund on unilateral racemes. Spikelets not awned, armed with hooked bristles . . . . . 33. PSEUDECHINOLENA
- Spikelets awned, hairy . . . . . 34. OPLISMENUS
- Spikelets densely crowded on unilateral racemes awned or not . . . . . 35. ECHINOCHLOA
- Inflorescence paniced lax; spikelets quaquaversal.
- Upper floret only fertile; glume III not indurate.
- Glume I reduced to a small black-edged cup . . . . . 36. ERIOCHLOA
- Glume I ovate or lanceolate; glume II fringed with hairs.
- Glume IV awned . . . . . 37. ALLOTEROPSIS
- Glume I ovate or lanceolate; glume II not hairy, no awns.
- Spikelets not subtended by bristle-like branches.
- Spikelets not gibbous.
- Panicles lax; no basal appendages in front of glume IV.
- Glumes not crested at tip; glume I shorter than II . . . . . 38. PANICUM
- Glumes not crested at tip; glumes I and II equal . . . . . 39. HEMIGYMNIA
- Glumes crested at tip . . . . . 40. ACRO CERAS
- Panicles dense spiciform; spikelets lanceolate acute . . . . . 41. HYMENACHNE
- Panicles lax, basal appendages in front of glume IV . . . . . 42. ICHNANTHUS
- Spikelets gibbous.
- Panicles spike-like cylindrical . . . . . 43. SACCIOLEPIS
- Panicles wide spreading . . . . . 44. CYRTOCOCCUM
- Spikelets subtended by bristle-like branches . . . . . 45. SETARIA
- Spikelets laterally compressed silky . . . . . 46. TRICHOLENA
- Prostrate grass; spikelets few secund in one row, grain enclosed in thickened rachis . . . . . 47. THUAREA
- Stiff creeping ascending grasses; panicles unisexual corymbose or capitate; females with very long pointed bracts . . . . . 48. SPINIFEX
- Small slender erect or sub-erect grasses resembling *Panicum*, but both florets fertile and glumes III and IV coriaceous indurate . . . . . 49. ISACHNE
- IV. ARUNDINELLEÆ. Slender grasses. Spikelets paniced. Florets 2, lower one awnless or barren; rachilla not continued beyond the upper floret. Glume I ovate. Glume II longer, lanceolate. Glume III as long as glume I. Glume IV smaller, oblong, with 2 short lobes; awn from between the lobes.
- Awn short . . . . . 50. ARUNDINELLA

V. AVENEÆ. Slender grasses. Spikelets paniced. Florets 2 to many. Glumes thin scarious; rachilla not produced beyond glume IV. Glumes III and IV awned, stiffer than I and II.

Panicles lax of few spikelets medium or small . 51. ERIACHNE

VI. ARUNDINEÆ. Tall stout reeds with large panicles. Florets 2 or many, enveloped in long hairs from the callus or back of glumes.

Glumes membranous awnless.

Rachilla with silky hairs . . . . . 52. PHRAGMITES

Glumes hairy on the back, rachilla glabrous . 53. THYSANOLENA

VII. AGROSTEÆ. Slender grasses. Inflorescence paniced or spiciform. Floret 1. Awn, if present, from the back of the glume.

Leaves ovate; spikelets minute in a dense brush-like head; no awns . 54. SPHEROCARYUM

Leaves linear; spikelets elongate in a strict spike, awned . . . . . 55. GARNOTIA

VIII. STIPEÆ. Slender grasses; rachilla not continuous before the floret. Floret 1. Glume IV hardened when mature enveloping the fruit. Awns from tip 3 (or 1 with three branches). Ligule a ring of hairs.

. 56. ARISTIDA

IX. ZOYSIÆ. Spikelets in spiciform panicles or racemes. Ripe spikelets falling entire. Floret 1.

Glumes awnless; raceme slender . . . . . 57. ZOYSIA

Glumes awned; awns long; panicle spiciform . 58. PEROTIS

X. SPOROBOLÆ. Slender paniced or spiciform paniced grasses. All glumes similar. Floret 1. No awns. Seed loose in the pericarp.

Only genus . . . . . 59. SPOROBOLUS

XI. ERAGROSTIDÆ. Slender grasses. Spikelets paniced, flat. Florets numerous, exserted from the glumes. Glumes distichous.

Grass 6 to 10 ft. tall; panicle dense; spikelets 5 in. long, awned . . . . . 60. MYRIOSTACHYA

Grasses 1 ft. tall.

Panicles lax; spikelets rather long pedicelled, 1 to 2 in. long, not awned . 61. ERAGROSTIS

Panicles strict, branches simple; spikelets nearly sessile, narrow . . . . . 62. LEPTOCHLOA

XII. CHLORIDÆ. Spikelets sessile or sub-sessile in 2-ranked, secund usually very dense spikes, rarely pedicelled and paniced (*Triraphis*). Spikes solitary or digitate. Glumes membranous to chartaceous; awns when present straight and fine.

Spikes of spikelets racemed . . . . . 63. DINEBRA

Spikes digitate.

Spikes slender, unawned spreading . . . . . 64. CYNODON

Spikes thick, fascicled awned . . . . . 65. CHLORIS

Spikes digitate; glumes stiff mucronate.

Spikes ending in a spikelet; glumes shortly mucronate . . . . . 66. ELEUSINE

Spikes ending in a sharp point; glumes strongly mucronate . . . . . 67. DACTYLOCTENIUM

Spikelets silky paniced; tall reed-like grass 68. TRIRAPHIS

XIII. ORYZEÆ. Slender swamp-grasses; spikelets paniced, all alike, compressed. Fertile floret 1, awnless or caudate-aristate. Glumes I and II minute or absent. Glume III oblong hard. Stamens 6.

Lower florets represented by 2 scales or bristles 69. ORYZA

Lower florets quite suppressed . . . . . 70. LEERSIA

XIV. CENTOTHECÆ. Slender grasses. Leaves broad lanceolate. Spikelets in narrow spike-like racemes, 1- to many-flowered adhesive. Glumes all similar. Fruiting 2 to many.

- Spikelets numerous; spikelets .1 in. long . . . . . 71. CENTOTHECA  
 Spikes few, opposite or whorled; spikelets  
 scattered, .3 in. long . . . . . 72. LOPHATHERUM

XV. FESTUCEÆ. Slender grasses. Leaves usually linear narrowed. Spikelets paniced, 2- or more-flowered. Flowering glumes 5- to many-nerved. Stipes short.

- Panicle lax, few-flowered; glumes keeled; awn-  
 less; annual . . . . . 73. POA

XVI. HORDEÆ. Spikelets sessile single (or clustered) in notches of a single spike. Florets 1 or 2, slender grasses; leaves usually narrow.

- Slender scashore grass; spikelets single in  
 slender spikes . . . . . 74. LEPTURUS

XVII. PHAREÆ. Broad-leaved forest grasses. Spikelets in terminal whorled racemes, distant, large unisexual. Fruit obovoid, adhesive.

- . . . . . 75. LEPTASPIS

XVIII. BAMBUSACEÆ. Arborescent or shrubby grasses sometimes scandent. Culms jointed hollow, with at first culm sheaths. Leaves linear to lanceolate. Inflorescence a panicle often compound, of spicate branches. Spikelets 1- to many-flowered. Empty glumes 1 or more. Flowering glumes similar. Palea large 2-keeled (rarely wanting). Lodicules 3 or more or 0. Stamens 3 or 6 or more. Ovary globose or long; style with 1 to 3 stigmas. Grain with a crustaceous or fleshy pericarp.

BAMBUSEÆ. Stamens 6; pericarp thin adnate to seed.

- Filaments free; big bamboos . . . . . 76. BAMBUSA

Filaments in a tube.

- Spikelets many-flowered; palea 2-keeled . . . . . 77. GIGANTOCHLOA

- Spikelets few-flowered; palea 0 or not  
 keeled . . . . . 78. OXYTENANTHERA

DENDROCALAMEÆ. Stamens 6. Pericarp detachable.

- Big bamboos; spikelets 2- to many-flowered;  
 panicle large; grain small . . . . . 79. DENDROCALAMUS

- Bush or shrub; spikelets 1-flowered; panicle  
 capitate; grain elongate beaked . . . . . 80. CEPHALOSTACHYUM

MELOCANNEÆ. Pericarp fleshy or crustaceous free. Stamens 6.

- Lodicules 0; spikelets very small; climbing  
 bamboos . . . . . 81. DINOCHLOA

- Lodicules 2 or more; erect plants shrubby or  
 arborescent; grain small, pericarp  
 hard . . . . . 82. SCHIZOSTACHYUM

- Stamens 6 or more; lodicules irregular; grain  
 large fleshy . . . . . 83. OCHLANDRA

## 1. COIX, Linn.

Tall annual or perennial grasses, with broad leaves and many axillary and terminal spikes. The lowest spikelet (female) enclosed in a bract which becomes hard, polished, white or light blue. Male spikelet in a raceme protruding from the female bract. Glumes 4. Glumes I and II lanceolate subequal, stiff or herbaceous, empty. Glumes III and IV thin hyaline. Stamens 3. Female spikelet

ovoid. Grain orbicular enclosed in the bony globose or ovoid bract. Species 2 or 3, Asiatic, but spread over the whole world as a weed.

Annual, 2 to 3 ft. tall; male spikes .25 in. long . (1) *C. lachryma-Jobi*  
Perennial 10 to 15 ft. tall; male spikes 3 in. long . (2) *C. gigantea*

(1) *C. lachryma-Jobi* *Linu. Sp. Pl.* 972; *Bot. Mag. t.* 2479; *Hook. fil. F.B.I.* vii. 100; *Ridl. Mat.* iii. 151.

Stems 2 to 4 ft. tall. Leaves 9 in. long, 1.5 in. wide. Panicle 3 in. long. Male raceme 1 in. long; spikelets .25 in. long, conic. Fruiting bract obovoid, 3 in. long, white or greyish blue. *Hab.* Common in waste ground in villages, but not wild, Singapore (Wallich); Penang (Porter in 1822). *Native names:* Jilai Batu; Mulai Tikus; Job's Tears.

var. *monilifer* *Watt.* Female spikelets 2 on a raceme; bracts small globose. *Hab.* Malacca (Griffith). *Distrib.* Tropical Asia alien in Africa, and America.

(2) *C. gigantea* *Roxb. Fl. Ind.* iii. 569. *C. lachryma-Jobi* var. *gigantea* *Stapf. in Hook. fil. F.B.I.* vii. 100.

A very stout grass 10 to 15 ft. tall, stems .5 to 1 in. through. Leaves 18 in. long, 1.5 in. wide, linear-oblong, long acuminate. Male racemes 3 in. long, nearly .5 in. wide, linear-oblong. Glumes I and II .25 in. long, .1 in. wide, lanceolate acute. Fruiting bract oblong-ovoid, bluish green. *Hab.* River banks, local, Perak, Kinta River (Kunstler). *Distrib.* India.

This seems to me quite specifically distinct from the typical cultivated or alien *C. lachryma-Jobi*, and is undoubtedly wild.

## 2. DIMERIA, Br.

Annual or perennial grasses, rather or quite slender with narrow linear leaves, and 1 to 6 slender terminal racemes; rachis not jointed. Spikelets very small, 1-flowered. Glumes 4. Glume I linear lanceolate. Glume II as long, broader compound. Glume III narrow shorter hyaline. Glume IV longer with (rarely without) a twisted awn. Species 12, tropical Asia to Japan.

Spikelets awned.

Robust plant over 2 ft. tall; racemes 4, over 6 in. long . . . . . (1) *D. fuscescens*

Slender plants; racemes few about 2 in. long.

Plant 1 ft. tall; racemes 2, slender, 2 in. long . . . . . (2) *D. ornithopoda*

Plant 1 ft. tall; raceme 1, under 2 in. long . . . . . (3) *D. Kurzii*

Spikelets not awned.

Racemes 2 or 3, slender, 2.5 in. long . . . . . (4) *D. glabra*

(1) *D. fuscescens* *Trin. Mem. Acad. Petersb. Ser. VI.* ii. 335; *Hack. Monogr. Androp.* 84; *Hook. fil. F.B.I.* vii. 105 var. *barbata*.

Perennial grass, tufted, 2 to 3 ft. tall. Leaves 8 to 9 in. long, .25 in. wide, linear acuminate, edges spinulose, sheaths and blade when long bearded with long white hairs. Culm slender, 8 in. long, glabrous. Racemes 4, terminal, 6 in. long, brown, slender; rachis straight, bearded. Spikelets .12 in. long. Glumes I and II narrow

acute acuminate, edges white-bearded. Glumes III and IV shorter, hyaline. Awn .5 in. long, more than twice as long as the spikelet. *Hab.* Open sandy country in the north; Perlis at Kanga. Setul Heath (Ridley). *Distrib.* India, Ceylon, Tenasserim.

The Malay form is much more hairy than the Indian one, the racemes and awns are much longer, and the rachis, except towards the tip, is quite straight, not flexuous.

(2) **D. ornithopoda** *Trin. Agrost.* 167, t. 14; *Hack. Monogr. Androp.* 81; *Hook. fil. F.B.I.* vii. 104; *Ridl. Mat.* iii.

Tufted grass 6 to 15 in. tall, very slender; rhizome short. Leaves linear acuminate, 1 to 2 in. long, very narrow, sprinkled with white hairs. Culms capillary, pink. Racemes 2, sub-opposite, very slender, 1.5 to 2 in. long; rachis flexuous. Spikelets very small, linear, brown-pink, sessile. Glume I linear glabrous or puberulous on the edge, pink; glume II as long, broader; glume III shorter linear hyaline; glume IV longer. Awn very fine, .2 in. long, three times as long as spikelet. *Hab.* Open dry grassy spots, often in grass plots, appearing sometimes abundantly and then disappearing entirely for some months, Singapore, Tanglin; Chan Chu Kang, Malacca (Hervey). Negri Sembilan, Seremban, Selangor. Penang, Waterfall Gardens (Burkill). Lankawi, Kwala Kwah (Haniff). *Distrib.* Indo-Malaya, Japan, Australia.

(3) **D. Kurzii** *Hook. fil. F.B.I.* vii. 103.

Small annual tufted grass. Leaves linear acuminate, .5 to 1 in. long, very narrow, glabrous. Culms very slender, 6 to 16 in. tall. Raceme solitary, purple, 1.5 in. long, very slender; rachis straight, broader than the spikelets, callus with white hairs. Spikelets very small and narrow. Glumes I and II linear fringed with white hairs. Awn hair-like, .25 in. long, lower third brown, twisted. *Hab.* Sandy open country, Setul Heath (Ridley). *Distrib.* Burma.

(4) **D. glabra** *Ridl.*

Tufted grass quite glabrous. Leaves narrow, 4 in. long, .05 in. wide, ligule very short. Culms slender, 8 to 12 in. long. Racemes two or three, 2.5 in. long, at first red, later pale; rachis minutely scabrid, undulate. Spikelets sessile, 1 in. long. Callus glabrous. Glume I narrow linear; glume II oblong keeled, edge broad, thin, white reddish; glume III shorter, oblong, glabrous. Awn 0. *Hab.* Singapore, Holland Road, edge of a swampy hollow (Burkill).

### 3. IMPERATA, Cyrillo.

Perennial grasses with a long, subterranean creeping rhizome. Leaves tufted, long, linear, acuminate. Culm tall. Panicle spiciform, simple or branched, woolly-silky. Spikelets small, binate, 1-, or 2-flowered, lower flower incomplete or absent. Glumes 4, lanceolate. Species 5 or 6, both hemispheres.

Panicle not branched; stamens 2 . . . . (1) **I. arundinacea**  
 Panicle branched; stamen 1 . . . . (2) **I. exaltata**

(1) **I. arundinacea** *Cyrillo Pl. Rar. Neap. Fasc. ii. 26, t. 11; Hook. fil. l.c. F.B.I. vii. 106; Duthie, Fodder Grasses, t. 15; Ridl. Mat. l.c. iii. 152.* *I. cylindrica* and *I. Koenigii Beauv. Agrost. 165.*

Rhizome very long, covered with scales. Culms 1 to 3 ft. long, slender, solid, nodes glabrous or bearded. Panicle 3 to 8 in. long, very narrow, branches very short. Spikelets covered with silky white hairs. Glumes I and II lanceolate acute, purple or green; glume III much shorter, oblong, toothed; glume IV ovate acute, toothed. Palea quadrate toothed. Anthers orange. Stigmas long, plumose, purple. *Hab.* Common all over the Peninsula and especially in former years, covering large tracts of country in Malacca and elsewhere. *Distrib.* All the tropics. *Native name:* Lalang. *Uses:* The leaves are used for thatching and litter, the silky spikelets for stuffing pillows, the rhizomes are exported to China as a medicine, and formerly a kind of beer was made of them in Singapore.

(2) **I. exaltata** *Brongn. Voy. Coq. Bot. 101; Hook. fil. l.c. F.B.I. vii. 107; Ridl. Mat. iii. 152.*

Culms 6 to 7 ft. tall, stouter than *I. arundinacea*. Leaves longer and broader. Panicle 14 in. long, distinctly branched at the base, silky-white. Spikelets lanceolate with longer, softer silky hairs. Stamen 1. *Hab.* Open sandy places, much less common than *I. arundinacea* and more sporadic, chiefly near the sea. Singapore, Selitar; Bajau. Johor, Batu Pahat; Tanjong Kupang. Dindings, Lumut. Selangor, Langat (Ridley). Kelantan, Kelumpang (Haniff). *Distrib.* Tenasserim, Malay islands and tropical America. *Native name:* Lalang Jawa.

#### 4. SACCHARUM, Linn.

Very large perennial grasses, with solid culms in a tuft and linear acuminate leaves. Panicles large on long peduncles; rachis fragile. Spikelets numerous in pairs, 1 sessile, 1 pedicelled, both similar, linear-oblong, bisexual. Glumes I and II equal, blunt or glume II mucronate empty hyaline; glume IV bisexual. Palea small hyaline nerveless. Stamens 3. Species 12, tropics of both worlds.

(1) **S. arundinaceum** *Retz. Obs. 4, p. 14; Hook. fil. F.B.I. vii. 119; Ridl. Mat. iii. 153.*

Culms 10 to 15 ft. tall, 1 in. through, solid. Leaves 3 to 5 ft. long, 2 to 3 in. wide, edges ciliate, midrib white. Panicle 1 to 2 ft. long, much branched, branches half whorled, softly-hairy. Spikelets lanceolate, white silky, with long white hairs on the callus. Glumes I and II lanceolate acuminate, reddish; glume III elliptic-lanceolate; glume IV mucronate. *Hab.* Common on river banks often forming dense thickets, the "Elephant Grass." Singapore, Kalang and Yeo Chu Kang. Pahang, abundant on the Pahang River

banks. Selangor, Batu Caves. Perak River. Kelantan River.  
*Distrib.* India, China. *Native name* : Tebrau.

*S. officinarum* Linn. the sugar-cane, is commonly cultivated, formerly extensively in Province Wellesley. *Native name* : Tebu.

### 5. SCLEROSTACHYUM, Stapf.

Tall grasses forming large clumps. Leaves long, broad. Panicles large on tall culms, not silky; rachis slender, fragile. Spikelets small, purple, both pedicelled, callus silky. Glumes stiff lanceolate blunt. No awns. Species 2, 1 Indian and Indo-Chinese, the other Malay Peninsula.

(1) *S. Ridleyi* Stapf. MSS. *Saccharum Ridleyi* Hack. *Oesterr. Bot. Zeitschr.* 1891; *Ridl. Mat.* iii. 153; *Hook. fil. F.B.I.* vii. 120.

A tall grass forming huge clumps. Leaves long, glabrous, .5 in. across, edges scabrid. Culms 8 ft. tall, .25 in. through, solid. Panicle 14 to 16 in. long, purple. Spikelets in pairs, lanceolate, shining, nodes of branches and base of spikelet covered with white hairs but shorter than the spikelet. Glume I lanceolate acute; glume II ciliate at tip; glumes III and IV shorter hyaline, ciliate at tip. Stamens 3, purple-red. Stigma purple. *Hab.* Very local but abundant on the Pahang River banks at Pekan, covering a considerable tract of low-lying country (Ridley).

### 6. MISCANTHUS, Anders.

Tall grasses, spikes long simple and branched, very slender, crowded at the end of a tall culm into a fan-shaped corymb. Rachis obscurely jointed. Spikelets very numerous in unequally peduncled pairs, 1-flowered, one or both awned. Callus with long white silky hairs. Glumes 4. Glume I chartaceous nearly flat; glume II similar, more convex; glume III hyaline ovate; glume IV hyaline, bifid, awned. Palea minute. Lodicules cuneate. Styles free, rather short. Grain linear-oblong, free. Species 6 or 7, Asia and Polynesia.

(1) *M. japonicus* Anders. *Oef. Vet. Acad. Stockh.* 1855, p. 156.

About 10 ft. tall. Culm .25 in. through. Leaves .25 to .5 in. wide. Panicle 1 ft. long. Spikelets numerous, rather distant, generally purplish, .25 in. long. Callus hairs as long as the spikelet, white. *Hab.* Local. Perak at Tapah and Telom (Ridley). *Distrib.* Japan, Malay islands.

### 7. SORGHUM, Pers.

Annual or perennial grasses, often very stout. Leaves often large, linear-acuminate. Panicles erect or nodding with numerous slender branches, often whorled. Spikelets in pairs, 1 sessile, and 1 pedicelled. Florets 2, lower one reduced to an empty valve, upper bisexual in the sessile, male or neuter if present in the pedicelled spikelet. Glumes I and II equal, coriaceous, boat-

shaped; glumes III and IV hyaline ciliate; glume IV oblong ovate, 2-toothed with a longer or shorter awn. Grain ovoid dorsally compressed or globose in cultivated forms. About 35 wild species distributed throughout the tropics and some forms extensively cultivated in Africa and also in India. *S. Durra*, Stapf., is occasionally cultivated by Malays, chiefly by Javanese and Buginese, but the grain is not very popular, being only used for cakes, and is said not to keep very well, being liable to be destroyed by beetles.

(1) *S. affine* Stapf. MSS. *Andropogon affinis* Presl. *Rel. Hænk.* i. 343 (not of *R. Br.*). *A. propinquus* Kunth. *Enum.* i. 502.

A tall stout grass 5 ft. tall or more. Leaves 2 ft. long, 1 in. wide, with a stout midrib, linear long-acuminate. Panicle lax, 1 ft. long, erect, 3 in. wide, branches very slender sub-whorled white silky at the base. Spikelets elliptic acute, 1 in. long, on very slender branchlets. Glumes I and II equal lanceolate acute silky on the back. No awns. *Hab.* River banks, Pahang, Sungei Jelei (Machado). *Distrib.* Amboina, Philippines.

### 8. POGONATHERUM, Beauv.

Tufted perennial grasses. Leaves linear acute; culms slender simple or branched, short. Racemes solitary terminal slender. Spikelets in pairs, 1 sessile, 1 shortly pedicelled. Glumes thin, membranous; glume I muticous; glume II longer awned, apex 2-toothed; glume III hyaline empty, or male with 2 stamens; glume IV bifid with a long awn. Stamens 1 or 2. Species 2 or 3 or possibly all one species. *Hab.* Tropical Asia, China and Japan.

(1) *P. saccharoideum*, Beauv. *Agrost.* 56, t. II, fig. 7. *var. monandra* Hack. *Monogr. Androp.* 193; *Ridl. Mat.* iii. 154. *P. crinitum* Trin. *Fund. Agrst.* 166; *Hook. fil. F.B.I.* vii. 141.

Stems simple, tufted from a short base, or branched, slender, 6 to 18 in. tall, leafy. Leaves .75 to 2 in. long, very narrow, base ciliate. Spikes .5 to 1 in. long. Spikelets .08 in. long, hairs from the base longer. Stamen 1, rarely 2. *Hab.* On rocks and banks, common, especially by mountain streams, Johor, Kwala Kahang (Kelsall). Pahang, Pekan; Tahan River. Selangor, Ginting Bidai. Negri Sembilan, Bukit Tangga. Malacca, Ayer Panas (Goodenough). Perak (Wray); Penang, Penara Bukit; Waterfall (Curtis). Kelantan River (Ridley); Kwala Aring (Yapp). *Distrib.* India, China, Malaya.

Cultivated as a pot plant under the name of Bamboo-grass by residents.

### 9. EREMOCHLOA, Buse.

Perennial grass. Leaves mostly basal, sub-equitant, linear. Raceme solitary on a tall culm. Spikelets 2-flowered, secund on the clavate internodes of a curved and flattened rachis, imbricating with a pedicelled or sessile abortive spikelet above. Awnless.



Glume I orbicular-ovate or lanceolate flat edges incurved pectinate with scabrid processes; glume II oblong-lanceolate, acuminate, thin, 3-nerved; glume III oblong, male; glume IV smaller. Species 9, tropical Asia and Australia.

(1) *E. malayana* *Ridl. Mat.* iii. 155.

Leaves distichous at base, linear acute flat, 15 in. long, 18 in. wide, hairy. Culms slender, 10 in. long, hairy. Racemes 2 in. long, with 12 to 25 spikelets. Nodes ciliate purple. Spikelets oblong blunt, .1 in. long, bristles on edge, strong, purple. Glume I strongly ribbed, appressed, hairy. *Hab.* Open sandy spots. Kedah, Peak; Yan. Setul, Sandy heaths (Ridley).

### 10. EULALIA, Kunth.

Creeping ascending or tufted grasses. Leaves narrow. Racemes 1 to 6, yellow-brown or purplish. Spikelets all alike in pairs, 1 sessile, 1 pedicelled. Florets 2, lower reduced to a scale or absent upper bisexual. Glumes equal membranous to coriaceous. Glume I flattened or shallow, concave, keeled; glume II 1- to 3-nerved; glume III muticous sometimes suppressed; glume IV awned. Species 25, Old World.

Tall erect plant; racemes 3 to 8, white; leaves long, flaccid

(1) *E. lanipes*

Erect slender plant; racemes 4, white-silky; leaves very narrow pungent

(2) *E. Milsumi*

Dwarf plant, long-creeping; racemes 4, golden-brown; leaves 3 in. long, narrow

(3) *E. Ridleyi*

Dwarf plant, shortly creeping; raceme solitary, golden brown; leaves short, 1 in. long, broader

(4) *E. præmorsa*

(1) *E. lanipes* *Ridl. Journ. F.M.S. Mus.* vii. 56.

Tufted plant, base of leaves white-woolly. Leaves linear acuminate, 20 in. long, .2 in. wide, base and ligule white silky. Culms 20 in. long. Racemes 3 to 8, densely white hairy; pedicels and outer glumes hairy. Glumes I and II lanceolate narrow thin; glume III lanceolate sparse hairy; glume IV narrow. Awn 7 in. long. Grain ellipsoid beaked. *Hab.* Mountains, Kedah Peak at 4000 ft. altitude (Robinson).

(2) *E. Milsumi* *Ridl.* (Fig. 222, p. 197.)

Tufted grass over 1 ft. tall, stems wiry slender. Leaves crowded above base, linear acuminate pungent, 3 in. long, .05 in. wide, glabrous except for a few long white hairs at the base and mouth of sheath, no ligule. Racemes 1 to 4, white silky, 3 in. long, crowded at the end of a long slender peduncle 6 in. long with 2 or 3 short, distant leaves; rachis of raceme terete, fringed with white silky hairs, joints tufted, silky white. Spikelets, 1 sessile, 1 articulate on a silky fringed pedicel. Glumes I to III lanceolate narrow white hairy, awned from below the tip. Glume IV very short hyaline bifid, lobes acuminate, awn .5 in. long. Stamens 3, yellow; stigmas

buff. *Hab.* Sandstone rocks at 1400 ft. altitude. Very local, Selangor, Klang Gates (Ridley, Kloss, and Milsum).

(3) **E. Ridleyi** Stapf. *MSS.* Pollinia *Ridleyi* Hack. *Oesterr. Bot. Zeitsch.* xl. i. 1891, p. 7; *Hook. fil. F.B.I.* vii. 114; *Ridl. Mat.* iii. 155.

Stem creeping ascending, 1 ft. long or more. Culms leafy. Leaves very narrow, 1.25 in. long, sub-distichous, glabrous. Racemes 2 to 4, appressed, terminal, 1 to 2 in. long. Spikelets appressed in pairs, rachis and pedicels covered with stiff brown hairs. Glume I oblong truncate, brown, toothed, tip ciliate; glume II cuneate

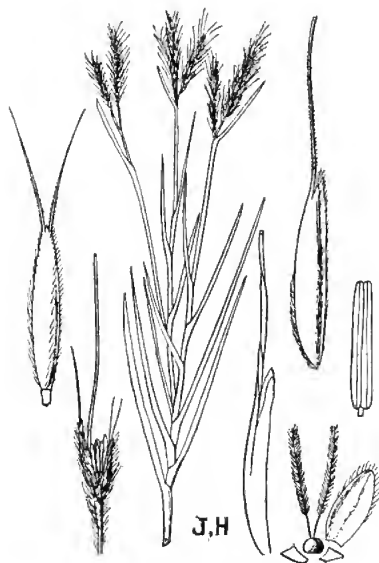


FIG. 222.—*Eulalia Milsumi*.

obovate toothed; glume III very small oblong; glume IV short lanceolate, awned. *Hab.* Sandhills on the east coast, local. Johor Jambu Larang (Feilding). Pahang, Sungei Meang and Rumpin rivers. Rahman, Kota Bharu (Yapp). *Distrib.* Borneo.

(4) **E. præmorsa** Stapf *MSS.* *Polytrias præmorsa* Hack. in *Engl. Pflanzenfam.* ii. 21, 24; *Monogr. Androp.* 189; *Ridl. Mat.* iii. 164.

Slender creeping ascending grass, 1 ft. tall or more, nodes glabrous. Leaves 1 in. long, .12 in. wide, ciliate, ligule very short, hyaline ciliate. Raceme solitary, 2.5 in. long. Spikelets paired, sessile and pedicelled, two or three at each node. Glume I yellow, long-haired, lanceolate, blunt, truncate; glume II narrower; glume III very short truncate; glume IV very small; awn .25 in. long, pale

brown. *Hab.* Grass plots and roadsides, abundant in cultivated areas, possibly introduced from Java. Singapore Gardens; Chaseriau Estate. Malacca town. Selangor, Kwala Lumpur near the Museum. Penang. *Distrib.* Indo-China, Java, Philippines.

### 11. POLLINIA, Trin.

Annual or perennial grasses with short broad flaccid leaves. Culms slender. Racemes usually several clustered at end of peduncle (rarely 2 or solitary) slender, very fragile, hairy or silky, rachis articulate. Spikelets in pairs, 1 sessile, 1 pedicelled, similar. Callus shortly or not bearded. Glume I flat or concave, edges incurved, keeled and winged above; glume II as large, ovate or lanceolate, keeled; glume III hyaline; glume IV bifid, awned. About 30 species, Indo-Malaya, Cochinchina, Australia.

Stems tall, racemes spreading pale or purple.

Leaves hairy . . . . .	(1) <i>P. grata</i>
Leaves glabrous . . . . .	(2) <i>P. ciliata</i>
Racemes appressed erect, callus glabrous . . . . .	(3) <i>P. rupestris</i>

(1) *P. grata* *Hack. Monogr. Androp.* 175; *Hook. fil. F.B.I.* vii. 115; *Ridl. Mat.* iii. 156.

Stems tall branched, fairly stout, 4 to 5 ft. tall, nodes glabrous. Leaves lanceolate acuminate, base narrow, hispid, 4 in. long, .3 in. wide. Racemes 6, terminal, 3 in. long, purple. Spikelets .12 in. long, hairs at base short, violet. Glume I oblong truncate toothed ciliate; glume II equal, mucronate; glume III as in I; glume IV short, with a long orange-coloured twisted awn. *Hab.* River banks and hills in the north. Penang Hill at 2500 ft. altitude, very abundant in dense masses, but not often in flower. Perlis at Tebing Tinggi. Kelantan, river banks (*Ridley*). *Distrib.* India, Java and China.

(2) *P. ciliata* *Trin. Mem. Acad. Petersb. Ser. VI. ii.* 306; *Hack. Monogr. Andropogon.* 176; *Hook. fil. F.B.I.* vii. 116; *Ridl. Mat.* iii. 156; *var. glabrata* *Ridl.*

Perennial grass with tall stems, base creeping, about 4 to 5 ft. tall. Leaves lanceolate acuminate flaccid, glabrous, except a few white hairs at base, 3 to 4 in. long, .25 to .75 in. wide. Racemes 3 to 8, crowded at tip, slender, pale, 3 in. long. Spikelets lanceolate narrow; rachis glabrous slender. Callus with few white hairs. Glume I lanceolate acute, scabrid on the edge; glume II longer, tip scabrid; glume III very small or 0; glume IV oblong, awned. Awn very fine, hair-like, .25 in. long, pale. *Hab.* Forests and forest edges. Selangor, Semangkok Pass, on the Tras route. Pahang, Telom. Perak, Temengoh (*Ridley*). *Distrib.* India, Burma.

This much resembles the Indian *P. ciliata*, but is much more glabrous, the rachis being quite glabrous. I am inclined to separate it as a species, but think it better to keep it as a variety.

(3) *P. rupestris* Ridl. *Journ. Roy. As. Soc. S. Br.* 44, p. 208; *Mat.* iii. 156.

Perennial, several feet tall, nodes ciliate. Leaves acuminate, 7 to 8 in. long, .5 in. wide, narrow at the base, glabrous above, hairy beneath, mouth of sheath hairy. Racemes several, erect, 4 in. long, stout, fragile. Callus not ciliate. Glume I ovate-lanceolate, boat-shaped, mucronate, keel ciliate; glume II similar, with strong bristles, reddish; glume III hyaline oblong. Palea narrower pubescent; glume IV with a long awn from between two linear acuminate points. *Hab.* Rare on rocks by the river in exposed spots. Johor at Batu Pahat (Ridley).

## 12. ISCHÆMUM, Linn.

Annual or perennial grass. Spikes in pairs, or fascicled, internodes of rachis thick, trigonous ventrally hollowed. Spikelets in pairs, 1 sessile, 1 pedicelled, the latter often different from the sessile spikelet. Glumes 4. Glume I chartaceous or stiffly coriaceous ovoid oblong or lanceolate, awnless, sides incurved, more or less winged on each side; glume II as long, lanceolate, sometimes awned; glume III nearly as long, membranous, palea narrower, 2-veined, stiff with broad inflexed flaps; glume IV deeply 2-cleft, awned, base of awn twisted. Pedicelled spikelet similar or not. Glume I semi-ovate, flat, broad-winged; glume IV oblong blunt or very shortly bifid, awnless. Species 50, South Europe, Asia, tropics and sub-tropics, Australia and Africa, rare in America.

Usually tall erect grasses; spikelets and pedicels glabrous; glume I stiff coriaceous.

Glume I oblong winged, stiff transversely rugose.

Weak plant; racemes slender, 3 in. long . . . (1) *I. rugosum*

Medium plant, stout; racemes 4 in. long; glume I smooth or slightly rugose on edges . . . . . (2) *I. imbricatum*

Stout grass; racemes 4 to 7 in. long, thick; glume I with 3 or 4 strong transverse ridges . . . . . (3) *I. magnum*

Stout grass; racemes 4 in. long; glume I quite smooth . . . . . (4) *I. læve*

Long creeping ascending grass; raceme coppery, 1 in. long.

Glumes smooth; pedicels minutely ciliate on edges only; awn very short . . . . . (5) *I. muticum*

Tall swampy or mountain grasses; pedicels long silky; glume I thin cartilaginous.

Leaves long flaccid, glabrous.

Leaf base narrowed . . . . . (6) *I. plumulosum*

Leaf base cordate . . . . . (7) *I. maculatum*

Leaves hairy, base cordate . . . . . (8) *I. Feildingianum*

Leaves short stiff hairy, 3 in. long . . . . . (9) *I. commelynifolium*

Slender creeping grasses; culms weak; leaves narrow; glumes thin.

Racemes 3 to 6 in. long.

Leaves glabrous; glume I not winged; awn spiral . . . . . (10) **I. fluviatile**

Leaves hairy or glabrescent; glume I not winged; awn not spiral . . . . . (11) **I. macrurum**

Leaves hairy; glume I winged, with a transverse depression . . . . . (12) **I. apricum**

Racemes 1 to 2 in. long.

Glume I lanceolate acuminate not winged; raceme 2 in. long . . . . . (13) **I. aristatum**

Glume I broadly winged at tip; raceme 1 in. long . . . . . (14) **I. timorense**

Raceme solitary . . . . . (15) **I. Beccarii**

(1) **I. rugosum** *Salisb. Ic. Stirp. Rar. i. t. 1; Hack. Monogr. Androp. 206; Hook. fl. F.B.I. vii. 127; Ridl. Mat. iii. 157.*

Annual grass; culms ciliate at nodes, about 2 ft. tall. Leaves linear acuminate with scattered hairs, 9 in. long, .25 in. wide; racemes appressed, 3 in. long, thick. Spikelets green or yellow, erect, appressed, the rachis with hairs at base. Glume I oblong hard coriaceous, tip membranous rounded, below transversely wrinkled; glume II thinner, lanceolate acute; glume III thin, lanceolate acuminate paleate; glume IV bifid, awn .25 in. long. *Hab.* Not very common, in waste ground. Singapore, Galang. Negri Sembilan, Bukit Tangga Pass. Selangor, Weld's Hill, Kwala Lumpur (Burkill). *Distrib.* India, China, Malaya. *Native name:* Rumput Ekor Chawi.

(2) **I. imbricatum** *Stapf. MSS. I. aristatum var. imbricatum Hack. Monogr. Androp. 203; Hook. fl. F.B.I. vii. 127 (not of Linn.).*

Perennial moderately stout grass, 1 to 4 ft. tall. Leaves glabrous or hairy, 4 to 10 in. long, .25 in. wide, base narrowed sessile, ligule rather long. Racemes one or two, 2 to 5 in. long, stout, internodes shorter than spikelets, fragile, white-silky. Spikelets glabrous, .12 to 3 in. long. Glume I of sessile spikelet, oblong, blunt rigid, smooth or with two or three marginal nodules; glume II acute; glume IV shorter. Awn short rarely twice as long as spikelet, dark at base, pale above. *Hab.* Sandy open country in the north. Setul heath. Perlis, Bukit Hangat Besih, Kanga (Ridley). *Distrib.* India.

This species appeared as a weed in the Botanic Gardens, Singapore, in 1905.

(3) **I. magnum** *Rendle, Journ. Bot. xxxii. (1894), p. 102; Hook. fl. l.c. F.B.I. vii. 128; Ridl. Mat. iii. 158.*

A large perennial grass 5 to 6 ft. tall, stout, nodes glabrous. Leaves 8 to 9 in. long, .5 in. wide, glabrous, base rounded; ligule bifid ciliate. Spikes two or three, erect, yellow, 4 to 7 in. long, thick. Spikelets .25 in. long; pedicel with a tuft of white hairs. Glume I oblong cartilaginous, tip thin ciliate, base transversely wrinkled or not; glume II coriaceous, incurved, as long; glume III lanceolate

acuminate, paleate; glume IV shorter, ovate-lanceolate, awned or not. Awn when present nearly twice as long as glume, base dark coloured. *Hab.* Local in the south of the Peninsula, and the islands south of Singapore as far as Labuan, near rivers and on the sea coast, often very abundant. Singapore, Blakan Mati; Serangoon. Johor, Tebing Tinggi. *Distrib.* Borneo, Siam.

Rendle describes the plant as awnless, but even specimens from Blakan Mati, the type locality, are awned.

(4) **I. læve** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 207; *Mat.* iii. 158.

Tall plant resembling *I. magnum*. Leaves 3 in. long, .25 in. wide, tip scabrid at edge. Racemes 2, erect, 4 in. long. Spikelets .25 in. long, joints and angles of rachis ciliate. Glume I narrow elliptic-oblong, sub-mucronate smooth, edge ciliate; glume II lanceolate, shorter, edge ciliate; glume III similar; glume IV shorter, lanceolate, with a short straight awn. *Hab.* Wet ditches. Singapore at Galang (Ridley).

Possibly a variety of *I. magnum*.

(5) **I. muticum** *Linn. Sp. Pl.* 1049; *Hook. fil. F.B.I.* vii. 132; *Ridl. Mat.* i. 159.

A long creeping, or sub-erect scandent grass, often many feet long and branching. Leaves lanceolate acute, base broad glabrous or hairy, 1.5 to 4 in. long, .25 to .5 in. wide; sheaths hairy. Racemes 2, erect thick, so appressed as to appear one, .5 to 2 in. long, glabrous, coppery, stout. Glume I lanceolate, stiffly cartilaginous acute, pale or white, veins elevate green, edge with a serrulate wing, tip 2-toothed; glume II similar, tip keeled, minutely serrulate; glume III ovate-lanceolate, thin, reddish; glume IV thin convolute; awn very short. Stigmas large, white. *Hab.* Common over the whole Peninsula, especially by the sea from Singapore to Perlis.

var. *repens* *Hack. Monogr. Androp.* 202. Low long-creeping, ascending branches 2 to 5 in. long. *Hab.* Sea shores and dry sandy spots.

var. *erectum*. Stems slender scandent or erect, over 1 ft. long. *Hab.* Thickets and mangrove swamps. *Distrib.* Indo-Malaya, China. *Native names:* Rumput Tembaga jantan; Rumput Terutus Tembaga. *Use:* Leaves applied to head for headache by Malays.

(6) **I. plumulosum** *Stapf. MSS.*

Grass over 4 ft. tall. Culm woody, rooting at the nodes at base for about 2 ft., nodes silky. Leaves lanceolate acuminate, about 5 in. long, .5 in. wide, glabrous, edge minutely denticulate, base narrowed, ligule short, broad truncate. Racemes 2, appressed, 2 in. long; pedicels long-silky on the edges. Spikelets .12 in. long. Glume I thinly coriaceous, lanceolate acuminate, narrowed at the base, purplish above, with 5 to 8 raised ribs, puberulous;

glume II very narrow lanceolate acuminate; glumes III and IV as long, lanceolate hyaline. Awn twice as long as glume I. Stamens 2, chestnut brown. *Hab.* River banks. Johor, Kota Tinggi (Ridley).

(7) ***I. maculatum*** *Stapf, MSS.*

A big grass several feet tall; culms not woody, rather slender, nodes glabrous. Leaves rather flaccid lanceolate, long acuminate, base cordate, edges spinulose, 9 in. long, .5 in. wide; ligule truncate. Racemes 2, not spreading, 4 in. long; pedicels shorter than the spikelets, white-silky hairy on nodes and edges. Spikelets .2 in. long. Glume I rather long and narrow, oblong cartilaginous below, scarious above, puberulous, a purplish patch below the tip; glume II narrower, as long as glume I; glumes III and IV shorter, lanceolate hyaline, edges ciliate. Awn twice as long as spikelet, base brown. *Hab.* Swamps in open country. Johor, road to Castlewood; Tebrau River; Panchur (Ridley).

(8) ***I. Feildingianum*** *Rendle, Journ. Bot. 1894, p. 101; Hook. fil. F.B.I. vii. 132.*

Stems tall, robust, branched above. Leaves hairy lanceolate, base cordate, 3 in. long, .25 to .5 in. wide; ligule short truncate; sheath hairy. Racemes 2, not spreading; pedicels and glume I, silky hairy. Glume I lanceolate, blunt or 2-toothed, narrowly winged towards tip; glume II a little longer; glume III ovate-oblong, blunt. Awn .5 in. long. *Hab.* Mountains, local. Malacca, Padang Batu, Mount Ophir (Ridley, Feilding).

(9) ***I. commelynifolium*** *Stapf, MSS.*

A rather stiff grass over 1 ft. tall. Leaves stiff sub-coriaceous lanceolate acuminate, base broad, hairy, 3 to 4 in. long, .5 in. wide; ligule very short, sheaths thickly hairy. Racemes 2, appressed, 2.75 in. long; pedicels and callus long-silky. Spikelets .18 in. long, glabrous. Glume I stiff smooth oblong-lanceolate sub-acute thin; glumes III and IV hyaline lanceolate narrow, nearly as long. Awn .25 in. long. *Hab.* Mountains. Kedah Peak (Ridley, Robinson).

(10) ***I. fluviatile*** *Ridl.*

Flaccid grass with slender weak culms 2 ft. long. Leaves glabrous linear long acuminate, 5 in. long, .2 in. wide; petiole 2 in. long, ligule short, oblong, glabrous. Peduncle slender, 4 in. long. Racemes 2, appressed, 3 in. long. Pedicels white, bearded on edge and at apex. Spikelets .15 in. long, 1 pedicelled. Glume I lanceolate acuminate bearded on the back with 2 pairs of low bosses near the base; glume II as long, lanceolate acuminate glabrous, thinner; glumes III and IV shorter; glume IV hyaline. Awn very slender, .5 in. long, upper part spirally twisted. Stamens 3, linear, red-brown. *Hab.* On rocks in the middle of the river. Kelantan, Kelumpang (Haniff).

The spiral twist in the awn gives the raceme a peculiar spotted appearance.

(11) **I. macrurum** Stapf. MSS.

Base of stems long creeping, ascending to 2 or 3 ft. high, slender, weak, nodes hairy. Leaves narrow thin, linear acuminate, hairy to glabrescent, 3 to 9 in. long, .1 to .2 in. wide; ligule a tuft of silky hairs; sheath hairy to glabrescent. Racemes 5 in. long, appressed. Spikelets .1 in. long. Glume I thinly coriaceous, lanceolate or oblong-lanceolate acute, vertically ribbed and purplish at the top, below smooth not winged, tip notched or entire; glume II about as long, lanceolate subulate; glumes III and IV shorter, lanceolate hyaline. Awn very slender hair-like, .3 in. long, base brown, twisted. Pedicelled spikelet; glumes I and II subulate; pedicel and callus moderately long, hairy. *Hab.* Roadsides. Singapore (Hullett). Negri Sembilan (Ridley).

(12) **I. apricum** Ridl.

Stem long creeping and rooting, throwing up slender branches 3 ft. tall, nodes white silky. Leaves linear acuminate, hairy on both sides, 5 in. long, 1 in. wide, base blunt, not narrowed; ligule papery truncate. Racemes 2, appressed, 3 in. long, peduncle not longer than terminal leaf. Pedicel and callus with rather few long white hairs. Glume I ovate-lanceolate, strongly winged at the tip, acuminate, striate above with 2 transverse wrinkles, long white hairs on the keel edge, at tip ciliate; glume II as long, lanceolate; glumes III and IV lanceolate hyaline; glume IV almost cartilaginous. Pedicelled flower similar to sessile, but glume I is not winged. Awn slender, hair-like, .25 in. long. *Hab.* Open spaces. Penang, Waterfall Gardens covering sunny slopes (Burkill, 4629, 4630).

(13) **I. aristatum** Linn. *Sp. Pl.* 1049. I. ciliare Retz. *Obs.* 6, p. 36; *Hook. fl. F.B.I.* vii. 133; *Ridl. Mat.* iii. 160.

A slender creeping grass, the erect part about 6 to 12 in. tall, nodes white ciliate, base of stem usually red. Leaves flaccid, lanceolate, softly hairy, edges scabrid, 1 to 1.5 in. long, .12 in. wide, ligule and sheath ciliate. Spikes 2, rarely 3, appressed then spreading, 1 to 2 in. long, green or purplish, hairy; rachis angles and pedicel bases covered with short white bristles. Glume I papery oblong toothed, with 2 longer median processes, green, winged; glume II longer, lanceolate, awned keel serrate; glume III lanceolate acuminate; glume IV thin bifid with long points; awn brown. *Hab.* Very common on waysides and grass plots. Whole Peninsula. *Distrib.* Indo-Malaya, China. *Native name:* Rumput Gerek Telinga.

The common form of this species is the var. *malacophyllum* Hack. *Monogy. Androp.* p. 939. It is very liable to the attacks of an *Ustilago*, *U. tonglinensis*, Tracy and Earle.

(14) **I. timorense** Kunth. *Rev. Gram.* i. 369, t. 98; *Hook. fl. F.B.I.* vii. 136; *Ridl. Mat.* iii. 160.

Stems decumbent, very slender, rising to 1 ft. tall, nodes silky ciliate. Leaves narrow lanceolate-linear acuminate, glabrous except



the hairy base and sheath, or altogether hairy, 1 to 4 in. long, .12 to .25 in. wide. Racemes 2, at first appressed, then spreading, 2.5 in. long, green, on a long slender peduncle. Spikelets .1 in. long. Glume I ovate or lanceolate acuminate, thinly cartilaginous, back hairy; glume II as long, shortly awned; glume III lanceolate thin; glume IV shortly bifid, awn short, very slender, .15 in. long. Pedicels and rachis with short white hairs. *Hab.* Common in grass plots and roadsides, whole Peninsula. *Distrib.* Indo-Malaya, Polynesia.

This also is often attacked by *Ustilago tonglinensis*, Tracy.

(15) **I. Beccarii** Hack. *Monogr.* 217; *Ridl. Mat.* iii. 160.

Perennial 2 to 3 ft. tall, slender, nodes glabrous. Leaves linear acuminate, 1 ft. long, .25 in. wide, glaucous beneath, sparsely hairy or glabrous. Raceme solitary, narrow, 2 in. long, green, erect, internodes of rachis and pedicels ciliate, sessile spikelets .3 in. long. Callus short-bearded. Glume I thin lanceolate, tip 2-toothed, teeth ciliate; nerves 5; glume II lanceolate concave, awnless; glume III lanceolate acuminate; glume IV oblong bifid, awn slender 1 in. long. *Hab.* Rare. Selangor, on the top of the limestone rocks at Batu Caves (Ridley). *Distrib.* Borneo.

This grass also appeared one year as a weed in the Botanic Gardens, Singapore.

### 13. CÆLORRACHIS, Brongn.

Robust broad-leaved grasses. Leaves linear acuminate, thin. Racemes solitary, on long slender pedicels, numerous; rachis jointed, fragile terete. Spikelets in pairs, awnless, sessile, sunk in a groove in joint, bisexual, 1- or 2-flowered. Glume I ovate-oblong coriaceous; glume II thinner acute; glume III hyaline; glume IV bisexual. Pedicelled spikelet less coriaceous. Species about 12, both hemispheres.

(1) **C. glandulosa** Stapf. *MSS.* *Rottboellia glandulosa* Trin. *Mem. Acad. Petersb. Ser.* 6, xi. 250; *Hack. Monogr. Androp.* 302; *Hook. fl. F.B.I.* vii. 157; *Ridl. Mat.* iii. 161.

A large stout tufted grass 3 to 8 ft. tall, branching, nodes bearded. Leaves 9 to 18 in. long, .75 to 1 in. wide, linear long acuminate, glabrous, edges scabrid, mouth of sheath often bearded. Racemes 3 or 4 in. long, fragile, slender sheaths; pedicels 6 in. long; joints of rachis nearly as long as spikelet, ribbed, pubescent, bases narrowed. Spikelets .25 in. long, yellow. Sessile one; glume I ovate-lanceolate, winged at top pubescent, edges incurved, tubercled at base; glume II boat-shaped, acute, smooth, keeled; glume III ovate. Pedicelled spikelet reduced to 1 lanceolate ribbed glume. *Hab.* River banks, not rare. Singapore, Bajau; Changi. Johor, Tanjong Surat (Kelsall); Kota Tinggi. Pahang, Pekan; Tahan River (Ridley). Malacca (Griffith). Selangor, Bukit Kudah. Perak, Thaiping (Wray); Bujong Malacca (Curtis). Province

Wellesley, Permatang Bertam. Penang, Balik Pulau (Curtis). Kelantan, river bank; Kwala Aring (Yapp). *Distrib.* Malay isles, Burma.

#### 14. MANISURIS, Sw.

Annual, much branched, grasses. Leaves broadly cordate at base. Racemes numerous axillary and terminal, solitary peduncled; rachis fragile. Spikelets very small in pairs, 1 sessile, globose bisexual with 4 glumes, 1 pedicelled ovate, 1 glume. Sessile spikelet; glume I hard globose pitted, with a large opening towards the rachis; glume II ovate, papery, filling the opening; glume III smaller, ovate; glume IV hyaline. Pedicelled spikelet flat. Glume I ovate sub-acute ribbed. Species 2, 1 in most tropical countries, the other Indian.

(1) *M. granularis* Linn. *fil. Nov. Gram.* 37, t. 7, figs. 4 to 7. Beauv. *Agrost.* t. 21, fig. 10; Hook. *fil. l.c. F.B.I.* vii. 159; *Ridl. Mat.* iii. 163.

Plant 12 to 13 in. tall, leafy. Leaves linear-lanceolate, hairy, 3 to 4 in. long, .25 in. wide. Racemes .5 to 1 in. long. Spikelets very small. *Hab.* Very rare. Pahang, at Pulau Tawar (Ridley). *Distrib.* Tropics generally.

#### 15. HÆMARTHRIA, R. Br.

Decumbent or ascending grasses; culms branched. Leaves linear. Racemes compressed, tips subulate. Spikelets in pairs, 1 sessile, 1 pedicelled pseudo-opposite, joints and pedicels fused into semi-cylindric internodes, not or late disarticulating; sessile spikelet 2-flowered, lower reduced to 1 glume, upper bisexual awnless. Glume coriaceous. Stamens 3. Pedicelled spikelet more elongate, acuminate, upper one mucronate or awned. Grain oblong. Species 8. Tropical Asia, 1 American also.

(1) *H. protensa* Steud. *Syn. Gram.* 359. *Rottboellia protensa* Hack. *Monogr. Androp.* 289; *Ridl. Mat.* iii. 162.

Stems leafy spongy, 18 in. tall. Leaves glabrous, 3 to 8 in. long, .25 in. wide, sheaths swollen, short, ligule white, bristly. Racemes numerous, solitary, in the leaf axils, rather thick and not fragile, 4 in. long. Spikelets .25 in. long. Sessile spikelet; glume I lanceolate, with a long scabrid point; glume II similar, with a long awn-like point; glume III much shorter. *Hab.* Rare, Kelantan on an island in the Kamposa River (Ridley). *Distrib.* India and Java.

#### 16. MNESITHEA, Kunth.

Perennial grasses. Leaves narrow. Racemes solitary, on long culms; rachis fragile, joints terete or thickened upwards. Spikelets in pairs, sessile, sunk in cavities of the joints, between them a narrow pedicel with the rudiments of a third spikelet. Sessile ones 1-flowered, unarmed. Glume I oblong-lanceolate

coriaceous, margins incurved; glume II thinner, lanceolate; glume III ovate, empty or paleate; glume IV bisexual. Species 3 or 4, tropical Asia.

- |  |                          |
|--|--------------------------|
| Leaves and culms glabrous; glume I not pitted . . .      | (1) <b>M. geminata</b>   |
| Leaves and culms glabrous; glume I deep pitted . . .     | (2) <b>M. cancellata</b> |
| Leaves and culms pubescent; glume I pitted ciliate . . . | (3) <b>M. pubescens</b>  |
| Leaves and culms pubescent; glume I not pitted . . .     | (4) <b>M. rupincola</b>  |

(1) **M. geminata** *Ridl. Mat.* iii. 163. *Rottboellia geminata* *Hack. Oesterr. Bot. Zeitschr.* 1891, p. 48; *Hook. fil. F.B.I.* vii. 159.

Slender grass, 3 ft. tall, nodes bearded. Leaves chiefly tufted at the base, 10 to 12 in. long, .25 in. wide, glabrous, mouth of sheath ciliate. Raceme slender, fragile, 2 in. long, on a long slender culm, joints of rachis short, thick dilate upwards, channelled one side. Glume I lanceolate acuminate as long as joint, hard base pubescent, .25 in. long; glume II thinner, lanceolate cuspidate; glume III shorter, ovate. *Hab.* Rare, open sandy country, Pahang at Pekan and Rumpin (Ridley). *Distrib.* Borneo.

(2) **M. cancellata** *Ridl. Rottboellia cancellata* *Ridl. Journ. Roy. As. Soc. S. Br.* 59, p. 228.

A wiry tufted grass over 2 ft. tall. Leaves linear acuminate, 6 to 8 in. long, .25 in. wide or less, glabrous, sheaths and ligule hairy. Racemes solitary, on long slender culm 1.5 in. long, slender, over 1 in. long; internodes of rachis excavate, glabrous. Spikelets 2, fertile, one as long as the internode. Glume I stiffly coriaceous ovate, subacute not winged, cancellate all over; glume II similar, but shorter; glume III oblong, very thin. Pedicelled spikelet of 3 glumes, 2 outer ones connate lanceolate. Glume I bifid. *Hab.* Sandy heaths, Setul (Ridley).

(3) **M. pubescens** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 207; *Mat.* iii. 163.

Stems 3 ft. tall, nodes ciliate. Leaves 6 to 12 in. long, .25 to .5 in. wide, pubescent. Racemes slender, on 4 in. long culms, solitary, 1.5 in. long, yellow; joints of rachis dilate upwards, bearded at base. Spikelets with a narrow linear pedicel between them longer than the internode. Glume I ovate-lanceolate acute, tip curved, base channelled with four or five grooves and numerous linear perforations from each of which rises a bristle; glumes II and III lanceolate. *Hab.* Rare, Johor on rocks at Minyak Buku near Batu Pahat (Ridley).

(4) **M. rupincola** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 116. *Rottboellia Helferi* *Hook. fil. F.B.I.* vii. 158.

Tufted grass 18 to 24 in. tall. Leaves linear, long, acuminate, 1 ft. long, .75 in. wide, hairy beneath and on edges, ligule short, hairy. Culms paired, slender, from upper axils, glabrous, 2 to 4 in. long. Racemes 3 in. long, slender, creamy-yellow; rachis joints short turbinate, tip silky hairy. Spikelets 2, one narrow

linear acuminate pubescent abortive, one fertile. Glume I ovate-lanceolate, smooth, cream, tipped green; glume II shorter ovate. *Hab.* Rare, Perak, on rocks in the Temengoh river (Ridley). *Distrib.* Tenasserim.

### 17. APLUDA, Linn.

A tall slender perennial leafy grass forming clumps. Stems decumbent, branched above. Leaves narrow, petioled linear, upper ones spathe-like mucronate. Spikelets numerous, very small, solitary or in threes on the ends of the branches, enclosed in a membranous petioled boat-shaped spathe. Spikelets 3, 1 sessile, 2-flowered bisexual, 1 pedicelled imperfect and 1 terminal male. Sessile spikelet on the bulbous base of the rachis. Glume I chartaceous lanceolate ribbed; glume II flattened ribbed; glume III ovate-lanceolate hyaline, male paleate; glume IV much smaller, bisexual, ovate, awned or not. Species 1, very variable, Indo-Malaya, China and Polynesia and Arabia and Mauritius.

(1) *A. varia* Hack. *Monogr. Androp.* 196. *var. intermedia* Ridl. *Mat.* iii. 164.

Stems 1 to 7 ft. tall. Leaves 6 to 9 in. long, .25 in. wide or less, glabrous. Spikes distant, .25 in. long. Spathes mucronate, pale green. Glume IV awned. *Hab.* Forming clumps on river banks, not common. Pahang, River near Pekan. Kedah, Alor Sta. Kelantan, Kota Bharu (Ridley). *Distrib.* Of variety, Philippines.

### 18. CHRYSOPOGON, Trin.

Perennial grasses with narrow leaves. Panicles lax of whorls of simple or divided branches. Spikelets in threes at the ends of branchlets, 1 sessile, 2 pedicelled. Flowers 2, lower, of one empty glume, upper bisexual in sessile one, male or neuter in pedicelled one. Sessile spikelets awned. Glumes I and II sub-equal; glume I coriaceous or chartaceous involute; glume II boat-shaped. Species about 18, chiefly Old World tropics, 1 West Indies.

- |   |                          |
|---|--------------------------|
| Culms 9 in. tall; panicle ascending; spikelets small;<br>awn .5 in. long          | (1) <i>C. aciculatus</i> |
| Culms 18 in. tall; panicle lax; spikelets large; awn<br>2 in. long                | (2) <i>C. Wightianus</i> |
| Culms 2 to 3 ft. tall; panicle short; spikelets .25 in.<br>long; awn .75 in. long | (3) <i>C. collinus</i>   |

(1) *C. aciculatus* Trin. *Fund. Agrost.* 188. *Andropogon aciculatus* Retz. *Obs.* v. 22; *Ridl. Mat.* iii. 167.

Perennial grass with a prostrate creeping stem. Leaves mostly basal, linear, obtuse, 3 in. long, .12 in. wide. Culms 9 in. tall, slender; panicle narrow, 2 to 3 in. long, branches whorled. Racemes erect, purple, narrow lanceolate, .25 in. long. Spikelets 2 pedicelled, 1 sessile. Sessile spikelet; glume I lanceolate acute

pubescent and spiny on the keel; glume II thinner, white, keel spiny; glume III linear-oblong; glume IV lanceolate-linear with a scabrid awn  $\cdot 13$  to  $\cdot 3$  in. long. Pedicelled spikelets longer and narrower. *Hab.* A common turf grass, roadsides, etc. all over the Peninsula. Usually called "Love grass" by residents on account of its adhesive spikelets. *Distrib.* Tropical Asia and Australia.

(2) *C. Wightianus* *Thw. Enum. Pl. Zeyl.* 366. *Andropogon Wightianus Steud. Syn. Glum.* 395; *Hook. fil. F.B.I.* vii. 191; *Ridl. Mat.* iii. 167. *A. aristulatus Hochst. Syn. Glum.* 397.

Stem stout woody creeping, culms slender, 18 in. tall. Leaves stiff linear subacute, 3 in. long,  $\cdot 13$  in. wide, glabrous, mouth of sheath ciliate. Panicle narrow, 4 in. long, branches ascending; callus and pedicels red-bearded on the edge. Sessile spikelets brown, nearly  $\cdot 25$  in. long without the awn. Glume I lanceolate acuminate, bifid, tip hairy; glume II lanceolate awned; glume III linear-oblong; glume IV oblong; awn 2 in. long, dark at base, bristly. Pedicelled spikelets longer, pale. Glume I pubescent, awned; glume II lanceolate awned; glume III oblong ciliate; glume IV very narrow, awn-like; awn 2 in. long. *Hab.* Local in sandy spots, Pahang, Pekan. Kelantan Heaths near Kota Bharu. Tringganu (Yapp). Setul heath (Ridley). *Distrib.* India, Indo-China.

(3) *C. collinus* *Ridl.*

Grass 3 to 4 ft. tall, branched. Leaves linear acuminate, scabrid, minutely thorny on edges and nerves at tip. Panicle shortly protruding from topmost leaf-sheath, 3 in. long; rachis slender, minutely hairy. Pedicels hairy on edge and callus, with a short tuft of brownish hairs. Spikelets  $\cdot 25$  in. long. Glume I lanceolate narrow, shortly hairy, awn slender, about as long; glume II similar but with long white hairs on edge; glume III very thin sparsely long-hairy. Awn  $\cdot 75$  in. long, base dark brown, above sparsely pale pubescent. *Hab.* Setul, Bukit Wangi (Haniff).

### 19. VETIVERIA, Thouars.

(1) *V. odorata* *Virey. Journ. Pharm. Soc. I.* xiii. 499. *V. zizanioides Stapf. Kew Bulletin*, 1906, p. 346. *Andropogon muricatus Retz. Obs.* iii. 43.

The Kuskus or Vetiver, probably of African origin, occurs occasionally in gardens. A big grass forming thick clumps of narrow erect leaves, with tough aromatic roots. Culms several feet tall. Panicle 6 to 8 in. long or more, branches slender, whorled, ascending. Spikelets muricate, numerous.

### 20. AMPHILOPHIS, Nash.

Perennial grasses. Panicles of shortly peduncled digitate racemes. Spikelets small, binate, 1 sessile, 1 pedicelled, similar; rachis fragile, joints and pedicels filiform. Flowers in sessile

spikelets, 2, lower one reduced to an empty glume, upper bisexual. Pedicelled ones, lower female or neuter, upper neuter or suppressed. Sessile spikelet; glumes I and II equal, thinly chartaceous; glume I 2-keeled; glume II boat-shaped, 3-nerved; glume IV awned. Pedicelled spikelet awnless. Species 25 or more. Tropical Africa and Asia.

Tall slender plant; inflorescence branched, lax . . . (1) **A. glabra**  
Short plant; racemes crowded digitate; glume I pitted . . . (2) **A. pertusa**

(1) **A. glabra** Stapf. *Fl. Trop. Africa* ix. 172. *Andropogon intermedius* Br. *Prodr.* 20; *Hook. fil. F.B.I.* vii. 175; *Ridl. Mat.* iii. 166. *var. paupera* Stapf.

A perennial ascending grass about 3 ft. tall, glabrous. Culms slender. Leaves tufted at base, linear acuminate, 6 in. long, under 1 in. wide. Panicle narrow, of few branches, slender, ascending. Racemes few, usually about 10, slender, grey. Pedicels ciliate with white hairs. Spikelets small, lanceolate. Glume I lanceolate truncate; glume II thinner, sub-acute; glume III shorter; lanceolate; glume IV reduced to a pale awn .5 in. long. Pedicelled spikelets narrow linear-lanceolate, of 3 glumes only. *Hab.* Roadsides and heathy country, not common. Pahang, Pekan. Malacca (Griffith). Selangor, Kuala Selangor. Kedah, Gurun to Alor Sta (Burkill). Perlis, Kanga. *Distrib.* Indo-Malaya, Polynesia.

The Kedah plant has glume I pitted.

(2) **A. pertusa** Stapf. *Fl. Trop. Afr.* ix. 175. *Andropogon pertusus* Willd. *Sp. Pl.* iv. 922; *Hook. fil. F.B.I.* vii. 173.

Tufted grass, nodes bearded. Leaves linear, 2 to 12 in. long, .08 to .12 in. wide. Racemes 3 to 7, purplish, 2 in. long or less, crowded silky; rachis fragile, joints and pedicels silky. Sessile spikelets .14 in. long, oblong-lanceolate, with a large pit towards the tip. *Hab.* Malacca (Hervey), very rare, possibly introduced. *Distrib.* Europe, Africa, Asia, Australia.

## 21. DICHANTHIUM, Willem.

Perennial, rarely annual, grasses. Culms slender, simple or branched. Leaves narrow. Racemes solitary (or as many as 4 together). Spikelets 2, 1 sessile, 1 pedicelled, similar in shape, different in sex. Sessile spikelet with 2 flowers, one reduced to a single glume, the upper one hermaphrodite. Pedicelled spikelet with 1 male or neuter flower. Sessile spikelets dorsally compressed, awned, callus bearded. Glumes I and II equal, chartaceous. Glume I keeled margins incurved; glume II boat-shaped; glume III hyaline; glume IV reduced to an awn. Lodicules 2. Stamens 3. Grain oblong blunt, dorsally compressed. Species 8, tropics and sub-tropics of Old World.

(1) **D. caricosum** *Stapp. MSS.* *Andropogon caricosus* *Linn. Sp. Pl. ed. ii.* 1480; *Hook. fil. F.B.I.* vii. 196.

Usually a weak branched grass about 1 ft. tall; culms slender. Leaves linear acuminate, glabrous or sparsely hairy, 3 in. long, .1 in. wide, nodes with a few sparse hairs. Racemes solitary (rarely several together), slender, 2 in. long, .1 in. thick, pale green, enclosed at first in a sheathing leaf, eventually with a slender peduncle 3 in. long; spikelets flattened, hairy on the edges, glaucous, green. Glume I, broad obovate, ribbed, hairy. Awn .25 in. long, slender, brownish. *Hab.* Kedah, Kota Sarang Semut (Haniff 13,160). *Distrib.* Indo-China, Siam, Cochinchina, New Caledonia, Teneriffe, Mauritius.

## 22. SCHIZACHYRIUM, Nees.

Annual or perennial grasses. Culms slender. Racemes solitary, at the ends of branches of culm, the branches gathered into a narrow lax spathed false panicle, joints and pedicels somewhat stout. Spikelets in pairs, 1 sessile with 2 flowers, upper one bisexual, lower an empty glume, 1 pedicelled upper flower male or neuter. Glumes I and II more or less convex, 2-keeled, bi-mucronate; glume IV awned and bidentate. Grain sub-terete linear; Species 50, tropics.

Annual slender branched herb . . . . . (1) **S. brevifolium**

Large tufted perennial grass; leaves 6 in. long or more,  
linear glaucous . . . . . (2) **S. semiberbe**

(1) **S. brevifolium** *Nees, Agrost. Braz.* 332. *Andropogon brevifolius* *Sw. Prodr. Ind. Occ.* i. 209; *Kunth. Rev. Gram.* ii. 563, t. 196; *Hack. Monogr. Androp.* 363; *Hook. fil. F.B.I.* vii. 165; *Ridl. Mat.* iii. 165.

Annual grass, slender, erect, branched, leafy, 6 to 24 in. tall. Leaves linear-oblong blunt, .5 to .75 in. long, .12 in. wide, glabrous. Racemes very slender, solitary, on a slender peduncle from a spathe-like leaf, 1 in. long or more, glabrous, joints and pedicels clavate, mouths cupular toothed. Sessile spikelet linear. Glume I lanceolate bifid or entire; glume II similar, thinner. Pedicelled spikelet a linear spathulate glume with a long awn. *Hab.* Local in dry rocky spots and grassy fields. Pahang, in open grassy fields at Pulau Tawar. Negri Sembilan, Tampin. Penang at Batu Feringhi, in dry rocky spots (Ridley). *Distrib.* Tropics generally.

(2) **S. semiberbe** *Nees, Fl. Afr.* 334. *Andropogon hirtiflorus* *Kunth. Rev. Gram.* ii. 596; *Ridl. Mat.* iii. 166. *A. pseudograyia* *Steud., Syn. Gram.* i. 365; *Hack. Monogr. Androp.* 370.

A large glaucous tufted grass forming tussocks. Culms 3 ft. tall or more, stiff. Leaves tufted at base and on stems, linear acuminate, 3 to 6 in. long, .12 in. wide. Racemes solitary on long peduncles, slender, 3 in. long, joints ciliate, top excavate. Spikelets .5 in. long. Glume I lanceolate rigid scabrous, bifid, purple;

glume II keeled keel ciliate; glume III very thin; glume IV oblong truncate with a long yellowish-brown awn. Pedicelled spikelet lanceolate mucronate on a stout ciliate peduncle. *Hab.* Very local in sandy spots near the sea, forming large tussocks. Changi in a sandy wood; Blakan Mati island; Gelang (Ridley). *Distrib.* Africa, tropical Asia and America.

### 23. CYMBOPOGON, Spreng.

Perennial densely tufted grasses, forming tussocks, usually aromatic. Panicles tall, frequently compound and contracted. Spikelets in pairs, 1 sessile and 1 pedicelled; rachis articulate fragile, bearing many-jointed paired racemes, with a spathe at each pair of racemes. Florets 2, lower one an empty glume, upper one bisexual in sessile spikelet, male or neuter in the pedicelled one. Glumes I and II equal chartaceous keeled; glumes III and IV hyaline; glume IV bifid, awned. Grain oblong. Species 36, Old World tropics.

(1) *C. nardus* Rendle. *Andropogon Nardus Linn.* The Citronella grass; Sereh Wangi cultivated largely for the oil since 1872. Perhaps a native of Ceylon.

(2) *C. citratus* Stapf. *Andropogon citratus, DC.* Lemon-grass; Sereh Makan. Cultivated in all native gardens, being used in curry. Also cultivated in Singapore and elsewhere for its oil. Origin uncertain, but probably some of the Eastern Malay islands. It very rarely, if ever, flowers (see on these oil-grasses Stapf. *Kew Bulletin* 1906, p. 297).

*Cymbopogon* sp. On Rawei island, Pulau Adang group. I found what appeared to be a species of this genus in great abundance on banks over the sea. The inflorescence, however, was attacked by a fungus, *Epichloe*, and it was impossible to determine the species. The leaves were broad like those of Citronella grass, and the plant was faintly but distinctly scented. It was undoubtedly indigenous.

### 24. THEMEDA, Forsk.

Very tall or short perennial grasses, with long narrow leaves. Racemes many, in crowded fascicles enclosed in spathes. Spikelets 6 to 11, the lowest awnless, male or barren forming an involucre surrounding 1 or more sessile bisexual or female spikelets, usually awned, linear-oblong. Glume I lanceolate acuminate, coriaceous; glume II shorter or as long, keeled; glume III oblong; glume IV short, long-awned. No palea. Species 10, Old World tropics.

- |  |                           |
|--|---------------------------|
| Annual dwarf grass, spikes in fan-shaped nodding heads                                       | (1) <i>Th. arguens</i>    |
| Perennial grass; culms 10 ft. tall or more; panicle very large; involucre spikelets glabrous | (2) <i>Th. villosa</i>    |
| Perennial grass; culms 3 ft. tall; panicle lax, smaller; involucre spikelets yellow, hairy   | (3) <i>Th. subserican</i> |



(1) **Th. arguens** *Hack. Monogr. Androp.* 659. *Anthistiria arguens Willd. Sp. Pl.* iv. 901; *Ridl. Mat.* iii. 160.

Annual grass 6 to 50 in. tall, usually slender. Leaves 6 to 16 in. long, .25 in. wide or less, glabrous, rough. Racemes in fan-shaped nodding heads. Outer spathes narrow acuminate, 3 to 5 in. long, bluish-green to dark red, hairy. Inner spathes .5 to 1 in. long. Involucral spikelets 2 to 4, green, 1 in. long. Glume I narrow hairy; glume IV oblong bifid. Awn long pale. Bisexual spikelets solitary with a brown bearded callus. Glumes I and II convolute, truncate, brown; glume IV a straight brown scabrid, awn 3 in. long. *Hab.* Dry open spots, coconut plantations, etc., not very common, but sometimes covering considerable areas. Singapore, Malacca, Negri Sembilan and Penang. *Distrib.* Andamans, Malay islands and Australia. *Native names:* Rumput Mesai Adam; Rumput Jangut Adam (Adam's beard); Rumput Sarang Pipit (Finch-nest).

(2) **Th. villosa** *Durand and Jackson, Index Kewensis, Suppl.* i. 424. *Th. gigantea var. villosa Hack. Monogr. Androp.* 675. *Anthistiria gigantea var. villosa Hook. fil. F.B.I.* vii. 217.

A very large grass forming big tussocks. Culms stout, 8 to 16 ft. tall. Leaves 4 to 8 ft. long, .5 to 1 in. wide, edges serrulate. Panicle compound, 3 to 4 ft. tall, nodding. Racemes on slender peduncles from a red spathe. Involucral spikelets about 6. Bisexual spikelets 1 to 3. Involucral spikelet, glume I, lanceolate setaceous, green. Bisexual spikelet cylindric-lanceolate, .4 in. long, dark brown, densely hairy. Glume I very hard, lanceolate, brown, hairy; glume IV linear lanceolate. Awn 1 in. long. *Hab.* Common in open country, river banks, etc., sometimes covering large areas. Singapore, Balestier plain. Johor, Genuang. Malacca, Pulau Besar; Panchur. Pahang River, Pulau Tawar. Selangor, Batu Caves. Perak, Temengoh. Province Wellesley, Bukit Mertajam (Curtis). Kedah, Yan. Tomoh (Machado). Jalor. Biserat (Gwynne Vaughan). Setul. *Distrib.* Indo-Malaya, China, Australia. *Native name:* Timpayong.

(3) **Th. subsericans** *Ridl.* *Anthistiria gigantea var. arundinacea sub-var. subsericans Hack. Monogr. Androp.* 674; *Ridl. Mat.* iii. 169.

Panicle lax, about 3 ft. tall, leafy. Leaves linear acuminate, narrow. Branches of panicles glabrous. Racemes 3 in. long. Involucral spikelets covered with long golden hairs. Bisexual spikelets one or two, densely brown hairy, .5 in. long. Awn 1.5 in. long, brown. *Hab.* Rare. Open country, roadsides, Pahang, Pekan (Haviland). Perak Tapah (Ridley). Kelantan, Kwala Aring (Yapp). *Distrib.* India.

## 25. HETEROPOGON, Beauv.

Medium-sized grasses. Leaves usually short. Culms tall. Racemes solitary, of many nodes. All pairs of spikelets alike,

lowest pairs male or neuter. Sessile spikelets sub-cylindric. Glume I oblong; glume II blunt keeled; glume III hyaline; glume IV long-awned; pedicelled spikelets male or neuter, unlike the sessile ones and covering them. Species 4, tropical Africa and Asia to Mediterranean.

(1) **H. contortus** Beauv. in Roem. and Schult. Syst. ii. 836. *Andropogon contortus* Linn. Sp. Pl. 1045; Ridl. Mat. iii. 167.

Perennial grass; stems tufted, erect or decumbent, 1 to 5 ft. tall, leafy chiefly at base, glabrous or scaberulous. Leaves linear, 3 to 5 in. long, obtuse glabrous except the ciliated mouth of the sheath. Racemes solitary, terminal, 1 to 3 in. long. Spikelets closely imbricating, lower 2 to 6 sessile male or barren. Glume I oblong lanceolate, hairy; glume II lanceolate acuminate, edge ciliate; glume III oblanceolate. Upper sessile spikelets female, 1.5 in. long, cylindric, brown. Callus red-bearded. Glume I linear oblong truncate hispid; glume II linear obtuse, dark brown; glume III oblong truncate; glume IV an awn 3 in. long, base white, above brown, hispid, spirally twisted. Pedicelled spikelets pale, longer than the sessile ones. *Hab.* Sandy open places. Rather rare, Pahang, Pekan. Malacca, Pulau Besar. Penang near Batu Feringhi. *Distrib.* All warm countries.

## 26. DIGITARIA, Rich.

Slender grasses, often creeping ascending. Leaves linear, acuminate to lanceolate. Racemes digitate at the top of a slender culm. Rachis flattened, more or less winged. Spikelets lanceolate or ellipsoid, usually slightly flattened; pedicels short. Glume I usually quite absent; glume II membranous, lanceolate or elliptic; glume III usually larger than glume II, prominently nerved. Species over 100, all warm countries.

Spikelets lanceolate, pale green or purplish, glabrous.

Robust plant; racemes numerous, 6 in. long . . . (1) **D. marginata**

Slender weak plant; racemes 2 or 3, lax, 4 in. long . . . (2) **D. pertenuis**

Spikelets ellipsoid, white-silky hairy; racemes 3 or 4.

Glabrous, low creeping ascending plant; leaves lanceolate, grain pale . . . (3) **D. longiflora**

Glabrous tall tufted plant; grain black . . . (4) **D. chinensis**

Hairy dwarf plants.

Prostrate ascending plant; leaves lanceolate . . . (5) **D. cœspitosa**

Stems erect, very slender; leaves narrow linear . . . (6) **D. pusilla**

Spikelets lanceolate, strongly fringed with white hairs; pedicels long; robust plant . . . (7) **D. barbata**

(1) **D. marginata** Link, Hort. Berol. i. 229; Stapf. Fl. Trop. Africa ix. 439. *Paspalum sanguinale* Lam. Ill. i. 176; Hook. fil. F.B.I. vii. 13; Ridl. Mat. iii. 125.

Annual or perennial grass, usually creeping at base, with slender ascending culms 8 to 24 in. tall. Leaves linear-lanceolate acuminate, flaccid, usually glabrous; sheaths hairy or not. Racemes slender, pale, 3 to 13 crowded at the end of the culm, 4 to 6 in.

long; rachis narrow flat. Spikelets small, solitary or paired, stalked, lanceolate or oblong, glabrous or minutely pubescent. Glume I 3- to 5-nerved, lanceolate; glume II 5-nerved; glume III smooth. *Hab.* Roadsides and waste ground and seashores, very common and variable, whole Peninsula. *Distrib.* All countries warm enough for it.

The chief varieties occurring here are:—

A. var. *commutatum* Hook. *fil. l.c.* 15. A tall stout, nearly glabrous form with rather large leaves. Racemes many, 3 to 6 in. long, crowded, and sometimes whorled. Spikelets rather broad, sub-glabrous. *Hab.* Singapore (Hullett).

B. var. *ciliare* Hook. *fil. l.c.* 15. A tall slender form with 2 to 6 slender racemes; rachis narrowly winged. Glumes I and II strongly ciliate on the edges. *Hab.* Malacca Hill (Ridley).

C. var. *pruriens* Hook. *fil. l.c.* Rhizome short creeping, often forming close tufts of stems. Leaves usually short, edge thickened often undulate sub-globose; sheaths white hairy. Racemes 3 to 13 together, 3 to 6 in. long. Spikelets not ciliate, lanceolate acute narrow. Glume I nearly as long as glume II, which is very narrow and 3-nerved. *Hab.* Waste ground and seashores, the seashore form condensed and tufted; our commonest form. Singapore, Tanglin; Tanjong Katong. Malacca (Griffith, Cuming, Murton). Selangor, Salak South (Seimund); Damansara Road, Kwala Lumpur; Batu Caves (Ridley).

D. var. *debile* Hook. *fil. l.c.* A dwarf plant 6 to 12 in. tall, slender, tufted. Leaves short, .5 to 1 in. long. Racemes 2 or 3, slender, 1.5 to 3.5 in. long; rachis narrowly winged. Spikelets lanceolate acuminate, very narrow, glabrous. *Hab.* Sandy and poor soils, Singapore and Malacca.

(2) **D. pertenuis** Buse in *Miq. Pl. Jungh.* 381.

Very slender creeping ascending grass, creeping stems 1 ft. long, ascending part 9 to 12 in. long. Leaves thin lanceolate-linear acuminate, 3 in. long, .12 in. wide, sparsely white hairy or glabrous. Racemes 3, very slender, 3 in. long, quite glabrous. Spikelets lanceolate, narrow, .12 in. long. *Hab.* Waste ground. Singapore, Garden weed (Ridley); Tana Merah Besar (Burkill). Penang Gardens. *Distrib.* Bangka.

(3) **D. longiflora** Pers. *Syn.* i. 85; *Stapf. Fl. Trop. Africa*, ix. 469. *Paspalum longiflorum* Retz. *Obs.* iv. 15; *Hook. fil. F.B.I.* vii. 17 (in part); *Ridl. Mat.* iii. 126.

A small creeping ascending species, creeping part of stem about 8 in. long, ascending culms 7 to 12 in. tall. Leaves lanceolate acuminate, rather stiff, glabrous, .6 in. long, .1 in. wide. Racemes 2 or 3, slender, 1.25 to 2 in. long; rachis very narrow, slightly winged. Spikelets elliptic-oblong, whitish from their appressed pubescence. Glume I absent or mere trace of it; glume II broad oblong, nearly as long as the spikelet. Grain ellipsoid, white.

*Hab.* Not rare, in cultivated ground. Singapore, Tanglin; Jurong Road (Burkill). Selangor. Penang, Ginting Pass (Burkill). *Distrib.* Tropical Asia and Africa.

(4) *D. chinensis* Hornem. *Hort. Hafn. Supp.* 8.

Stems tufted with culms 18 in. tall. Leaves glabrous, linear-lanceolate acuminate, 2 to 3.5 in. long, .1 in. wide, base rounded. Culms slender, with 2 to 4 slender racemes 3 in. long. Spikelets small, elliptic-oblong, pedicelled, whitish. Glume I absent; glume II finely striate, oblong-lanceolate, pubescent, with 3 prominent ribs. Grain oblong acute black. *Hab.* Waste ground, paths, etc. Not rare. Singapore, Tanglin; Tana Merah Besar (Burkill). Selangor, Batu Caves (a very slender drawn-out form with narrow leaves). Perak, Birch's Hill at 4000 ft. altitude (Burkill), Penang Hill (Burkill). *Distrib.* India, Malay isles, China.

(5) *D. cæspitosa* Ridl.

Small tufted and creeping ascending grass, 3 to 12 in. tall. Leaves grey-green, lanceolate acuminate, with numerous white hairs from enlarged bases, 1 in. long, hardly .1 in. wide, sheaths short, hairy. Culms very slender, 4 to 6 in. tall. Racemes very slender, 3; rachis narrow, winged. Spikelets very small, oblong, woolly; pedicels distinct scabrid. Glume I thin lanceolate silky-woolly hairy, white; glume II longer and broader, ribbed; glume III smooth, glabrous. Styles pink. *Hab.* Open places, Singapore, Tanglin, grass plots in the gardens (Ridley). Johor, summit of Gunung Pulai (Burkill). Selangor, Salak South Road near Kwala Lumpur (Seimund).

The Gunung Pulai plant has slender culms 1 ft. all.

(6) *D. pusilla* Ridl.

Stems very slender creeping, branched, branches bearing tufts of leafy branchlets with culms 6 in. tall. Leaves narrow-linear acuminate, 1.5 in. long, .05 in. wide, with the sheaths very hairy. Culms very slender, glabrous, with 2 slender racemes .75 in. long; rachis hardly flattened, very narrowly winged, sinuous. Spikelets very small, pale, ellipsoid, hardly flattened, on slender pedicels as long or longer than themselves. Glume I absent; glume II white, elliptic, with 3 ribs, shortly white-hairy. Grain dark brown. *Hab.* Sandy heaths, Setul (Ridley). *Distrib.* Borneo, Banjarmasin (Motley).

(7) *D. barbata* Willd. *Enum. Hort. Berol.* 91. *Paspalum heteranthum* Hook. *fil. F.B.I.* vii. 16; *Ridl. Mat.* iii. 126.

A stout creeping ascending plant, stems 1 ft. tall or more, leafy. Leaves narrow lanceolate acuminate, 4 in. long, .1 in. wide, glabrous. Culms long; racemes 3 to 7 straight or flexuous, 6 in. long; rachis trigonous, not winged. Spikelets distant in pairs, on stout rather long pedicels as long as the spikelets, .1 in. long or longer; lower spikelet lanceolate, glabrous; upper one with glumes

I and II longer than glume III and strongly white-bearded. *Hab.* Sand-hills of the east coast. Johor, Jambu Larang (Feilding). Pahang along the Pahang and Rumpin rivers (Ridley). *Distrib.* Java and China.

## 27. AXONOPUS, Beauv.

Creeping grass with broad lanceolate-linear leaves and broadly flattened sheaths. Culms slender. Racemes 2, digitate, slender; rachis narrow, flat. Spikelets lanceolate, alternate, in one row, very shortly pedicelled. Glume I absent. Species about 20, South American, 1 widely spread in Asia as a weed.

(1) **A. compressus** Beauv. *Agrost.* 154. *Paspalum* platycaulon Poir. *Encycl.* iv. 34; *Ridl. Mat.* iii. 125.

Glabrous bright green grass, tufted. Leaves broad, undulate, linear to lanceolate, blunt, base round, 2 to 8 in. long, .2 to .5 in. wide, edges and base minutely hairy. Culms two from each axil, slender, 1 ft. tall or more. Racemes 2, rarely 3, very slender, 2.75 in. long; rachis very narrow undulate, not winged, flat. Spikelets ellipsoid-lanceolate, glabrous, sub-sessile, alternate. Glumes thin. *Hab.* Roadsides, Singapore, Tanglin. Selangor, Kwala Lumpur (Ridley). *Distrib.* South America, now introduced into Java, Australia and the Mascarene islands.

For many years the only patch of this grass known to me was on the Cluny road, Tanglin, but having utilised this for edging beds in the garden, it rapidly spread over the whole island of Singapore and into the Malay States.

## 28. PASPALUM, Linn.

Herbs. Leaves narrow. Inflorescence of several spike-like racemes remote. Spikelets 1-flowered, flat, elliptic to orbicular, sub-sessile, on a flattened or winged rachis in 2 or more rows, articulate on the pedicel. Glumes 3. Glume I suppressed, glumes II and III membranous thin sub-equal, more coriaceous. Stamens 3. Styles short, plumose, 2. Species over 300, all warm regions.

Tufted grasses; leaves from base; spikes rather broad.

Spikelets in more than 2 rows.

White bristles on mouth of sheath; spikelets orbicular glabrous . . . . . (1) **P. longifolium**

No white bristles; spikelets smaller elliptic hairy . . . . . (2) **P. platycoleum**

Spikelets in 2 rows, no white bristles.

Plant quite glabrous . . . . . (3) **P. orbiculare**

Plant with the basal leaves hairy . . . . . (4) **P. Commersonii**

Stems leafy creeping ascending.

Leaves broad thin; spikes 2, very slender, 3 in. long . . . . . (5) **P. conjugatum**

Leaves narrow; spikes 2, terminal, 1 in. long . . . . . (6) **P. distichum**

(1) **P. longifolium** Roxb. *Hort. Beng.* 280; *Trin. Sp. Gram. Ic.* 138.

Fairly robust grass, about 2 ft. tall. Leaves linear, long acuminate, 1 ft. long, .15 in. wide, edge minutely denticulate. Sheaths rather narrow, mouth of sheath with a few long white bristles. Panicle above the highest fully developed leaf, 8 in. long with 4 to 6 distant purple racemes, with white bristles at the base from the sheath below. Racemes 1.5 in. long, flattened; rachis narrow, .1 in. wide, edges white-hairy. Spikelets in 4 rows, elliptic-orbicular, purple or green, glabrous or nearly so, with a strong central nerve and one intramarginal obscure on each edge of the outer glume. Stigmas plumose, purple. *Hab.* Open country, Singapore (Cuming, Hullett); Holland Road (Burkill). Selangor, Kwala Lumpur; South Salak Road (Seimund). Perak, Thaiping (Wray). Penang (Curtis). *Distrib.* India.

(2) **P. platycoleum** Ridl.

A robust plant. Leaves quite glabrous, narrow linear acuminate, with a long point about 8 in. long, .1 in. wide at base, sheaths very broad, lower ones nearly 1 in. wide when spread open and 4.75 in. long. Peduncle slender, spikes 5 to 8, narrow, rachis linear, .1 in. wide, edges hairy. Spikelets in 4 rows, small, hairy, .04 in. long, elliptic, narrowed at both ends, outer glumes hairy, central nerve very inconspicuous, intramarginal obscure. Stigmas purple, plumose. *Hab.* Damp spots, Selangor, Port Swettenham (Burkill 4509). *Distrib.* Siam, Bangson, wet paddy fields (Haniff). Java (Zollinger 192 in Herb. Kew).

Steudel bases his *P. cognatum* (Syn. Glum. 28, No. 172) on a specimen from Java (Zollinger 192), but his description does not agree in the least with the specimen under that number in Herb. Kew; thus he describes the spikelets as glabrous, whereas in this plant they are unusually hairy. The very broad leaf-sheaths and stout culm and small hairy spikelets are characteristic of this plant.

(3) **P. orbiculare** Forst. *fil. Prod.* 7.

A tufted plant, about 2 ft. tall. Leaves linear, rather stiff, edge entire acuminate, quite glabrous, 8 to 12 in. long, .15 in. wide. Panicle slender, of 2 to 4 racemes, 2.25 to 3 in. long, edge of narrow rachis quite smooth. Spikelets in 2 rows, pale, sub-orbicular; nerves 1 central and 2 faint intramarginal ones. Stigmas brown. *Hab.* Common in open country and along roadsides, Singapore, Tanglin; Tana Merah Besar and Holland Road (Burkill). Malacca (Griffith). Negri Sembilan, Bukit Tangga Pass. Selangor, Kwala Lumpur. Penang, Waterfall Gardens (Burkill). Tringganu (Yapp). *Distrib.* Indo-Malaya, Australia, Polynesia. *Native names* for this and preceding species: Rumput Tulong Sentadok; Rumput Hijau; Rumput Patah Siku.

This species is less robust than *P. platycoleum* and with fewer spikelets on the raceme.

(4) **P. Commersonii** Lam. *Ill.* i. 175, t. 43, fig. 1. *P. scrobiculatum* Linn. var. *Commersonii* Stapf *Fl. Trop. Africa*, ix. 573.

Tufted plant 6 in. to 3 ft. tall. Leaves lanceolate-linear acuminate, 3 to 9 in. long, .25 in. wide, quite glabrous, edge entire above the basal ones and sheaths of base hairy. Culm 6 to 8 in. long. Racemes usually 2, with 2 rows of spikelets, 2.5 in. long. Spikelets pale, ellipsoid, .05 in. long. Outer glume sometimes pitted along the edge; nerves 3. *Hab.* Damp spots, not common, Singapore (Motley). Pahang, Kwala Tahan (Seimund). Negri Sembilan, Bukit Tangga Pass. Selangor, Weld's Hill, Kwala Lumpur (Burkill). *Distrib.* Tropics generally.

Stapf includes under his "variety" all the spontaneous forms of *P. scrobiculatum*, Linn., which species was based on the cultivated plant of India, var. *frumentaceum*, Stapf. This cultivated plant I do not remember to have ever seen in the Peninsula.

(5) **P. conjugatum** Berg. *Act. Holm.* vii. 129, t. 8; *Hook. fil. F.B.I.* vii. 11; *Ridl. Mat.* iii. 124.

A stoloniferous grass, stolons very long and stout. Culms 1 to 2 ft. tall, leafy, slender. Leaves bright green, 6 in. long, .5 in. wide, linear lanceolate, edge ciliate. Racemes 2, very slender, divaricating, 4 in. long; rachis narrow; spikelets in 2 rows, orbicular. Glumes II and III thin, white, edged green, orbicular with long white hairs on the edge. Glume IV, pale coriaceous. *Hab.* Common in cultivated districts and along paths in forest; probably introduced from South America and dispersed by its adhesive spikelets. *Distrib.* All tropical regions. *Names:* "Buffalo grass," Rumpot Kerbau.

(6) **P. distichum** Linn. *Amoen. Acad.* v. 391; *Hook. fil. F.B.I.* vii. 12; *Ridl. Mat.* iii. 124.

Stems creeping and ascending in tidal mud, about 1 ft. tall, pale-coloured, leafy. Leaves linear acuminate, distichous, 3 to 4 in. long, .12 in. across. Racemes 2, glabrous, 1 to 2 in. long. Spikelets yellowish, lanceolate, in 2 rows, .24 in. long or less. Glumes II and III thin lanceolate; glume IV more coriaceous. *Hab.* Common on both coasts in tidal saline mud. Singapore (Kurz). Malacca (Griffith). Penang. *Distrib.* All warm countries.

## 29. PASPALIDIUM, Stapf.

Tall stout aquatic grasses with long narrow leaves. Racemes numerous, distant, sessile on the long terminal part of the culm; rachis flat. Spikelets globose or ovoid, in 2 rows. Glume I very small round; glume II shorter than IV; glume III ovate acute, 3-nerved; glume IV as long, both thin membranous. Grain granulate. Species 20, all warm countries.

(1) **P. punctatum** Stapf. *MSS.* Panicum punctatum *Burm. Fl. Ind.* 26; *Hook. fil. F.B.I.* vii. 29; *Ridl. Mat.* iii. 132.

A stout grass, 2 to 4 ft. tall, glabrous. Leaves linear acuminate.

ate, 1 ft. long, .5 in. wide, scabrid; sheaths large swollen; ligule a ring of hairs. Racemes 12 to 20 on a culm, 1 in. long, pale. Spikelets about 30 on a raceme, ovoid. *Hab.* Rare, in wet grassy fields by rivers, Johor, Sempang Kiri River (Ridley). *Distrib.* Indo-Malaya.

### 30. BRACHIARIA, Griseb.

Ascending, often stout, grasses. Racemes usually solitary, scattered on the culm, or numerous crowded towards the end of the culm; rachis filiform triquetrous or slightly flattened, undulate. Spikelets in pairs, lanceolate pedicelled. Glume I short; glume II longer, 5- to 7-nerved; glumes III and IV oblong, firmer in texture. Species about 80, both hemispheres, but mostly African.

Glabrous, slender grass; racemes few, distant . . . (1) *B. distachya*  
Hairy, robust grass; raceme numerous, crowded at top (2) *B. mutica*

(1) *B. distachya* Stapf. *MSS.* Panicum distachyum Linn. *Mant.* i. 138; *Hook. fl. F.B.I.* vi. 37; *Lam. Ill. t.* 43, fig. 2; *Ridl. Mat.* iii. 133. *P. subquadriparum* Trin. *Gram. Pan.* 145; *Sp. Gram. Ic. t.* 186.

A tall rather slender tough grass, with long subterranean stolons, 3 ft. tall. Leaves linear or lanceolate, glabrous or hairy, 3 to 5 in. long. Racemes 2 to 4, distant, 1.5 in. long. Spikelets small ellipsoid, pale, in one or two rows sessile or short-stalked on a narrow rachis. Glume I ovate sub-acute, half as long as glumes II and III, which are sub-equal, lanceolate acute, ribbed; glume IV shorter, coriaceous, strongly punctate and wrinkled, ellipsoid. *Hab.* Common in sandy open ground, often a troublesome weed. Singapore, Tanglin (Hullett). Pahang, Selangor. Perak, Gunung Pondok Pass (Burkill). Province Wellesley, Telok Ayer Tawar. *Distrib.* India, Malaya, China, Australia.

(2) *B. mutica* Stapf. *Fl. Trop. Africa* ix. 526. Panicum muticum Forsk. *Fl. Aeg. Arab.* 20. *P. numidianum* Lam. *Ill.* i. 172.

Tall and stout grass over 3 ft. tall. Leaves linear acuminate, 6 to 8 in. long, .2 in. wide, base broad, hairy as are the sheaths, or occasionally glabrous. Racemes many in strongly grown plants, 1.5 in. long. Spikelets pale or purple, very numerous, crowded. Rachis undulate stout, slightly flattened. *Hab.* Cultivated and waste ground in wet spots, formerly cultivated as horse-fodder here as in most parts of the tropics under the name of Para Grass, or Numidian Grass, and often occurring as an escape from cultivation or in abandoned ground, Singapore, Bukit Timah road by the Gardens; Gelang, Selangor, Petaling road swamp near Kwala Lumpur (Ridley). Kedah, Kota Serang Semut (Haniff). *Distrib.* All tropics, probably a native of South America and West Africa.

### 31. UROCHLOA, Beauv.

Leaves linear-lanceolate, base broad, ligule a ciliate rim. Racemes simple (or nearly so), crowded, rachis narrow, flat (or



triquetrous). Spikelets close set in 2 or several rows, on one side of rachis, shortly pedicelled, broadly ovate or elliptic. Florets 2, lower one male or barren. Glume I small semilunar; glumes II and III ovate acute ribbed; glume IV obovate, apiculate. Lodicules 2, broad cuneate. Stamens 3. Stigmas plumose. Grain enclosed by the hardened glumes. Species 18, chiefly Asia and Africa; 1 all tropics, a weed.

(1) **U. reptans** Stapf. *Fl. Trop. Africa* xi. 601. *Panicum reptans* Linn. *Syst. Nat.* (Ed. x), 870. *P. prostratum* Hook. *fil. F.B.I.* vii. 33.

Stem creeping, branched, branches ascending 1 ft. or more. Leaves triangular-lanceolate or ovate-lanceolate, acute, subcordate, base usually ciliate, 1 in. long, .1 to .2 in. wide at base, sheaths .5 in. long, edges ciliate. Panicle 1.5 in. long, of about 10 crowded racemes .5 in. long, rachis narrowly strap-shaped. Spikelets small, ovate-elliptic, acute, shortly pedicelled with one or two bristles from the pedicel as long as the spikelet. Glumes green or purplish, conspicuously ribbed. *Hab.* Selangor, Port Swettenham (Burkill). *Distrib.* Indo-Malaya, Africa, and America.

A weed of cultivation.

### 32. STENOTAPHRUM, Trin.

Broad-leaved creeping grasses with flattened stems and distichous leaves. Racemes flat on a broad green rachis. Spikelets on short pedicels, partly sunk in the rachis, ovate acute, in 2 rows. Glume I very small; glumes II and III lanceolate; glume IV coriaceous, as large. Species 7, tropics of both worlds.

(1) **S. Helferi** Munro in Hook. *fil. F.B.I.* vii. 91; *Ridl. Mat.* iii. 146.

Glabrous plant, stems decumbent, 1 to 2 ft. long. Leaves linear or lanceolate-linear acute, 4 to 6 in. long, .3 in. wide; sheaths flat, 2 in. long or less. Rachis 1 to 6 in. long, .25 in. wide. Spikelets in 6 to 10 short racemes .25 in. long, partly sunk in the rachis, 2 to 6 spikelets in a raceme. Glume I small ovate, blunt; glume II broad ovate-lanceolate, 7-nerved; glume III as long, 5-nerved. *Hab.* Rather damp sandy spots, local, Malacca, Batang Malaka (Burkill). Perak, Plus River (Wray); Padang Rengas (Ridley). Province Wellesley, Permatang Bertam. Kedah (Kunster). Kelantan, near Kota Bharu (Ridley). *Distrib.* Tenasserim, Cochinchina.

### 33. PSEUDECHINOLÆNA, Stapf.

Slender ascending grass with thin broad leaves, lanceolate. Panicle slender with 4 or 5 slender distant branches. Spikelets laterally compressed, secund remote, shortly pedicelled. Glume I lanceolate acuminate 3-nerved; glume II boat-shaped, 7-nerved,

armed with hooked bristles; glume III broad ovate blunt, male; glume IV shorter, boat-shaped. Species 1, India, Africa, Java, South America.

(1) **P. polystachya** Stapf. *Fl. Trop. Africa* ix. 405. *Panicum uncinatum* Radde, *Agrost. Braz.* 41; *Hook. fil. F.B.I.* vii. 58. *Echinolæna polystachya* H.B.K. *Nov. Gen. and Sp. Pl.* i. 119, t. 679.

Grass ascending to 18 in. tall. Leaves 2 to 4 in. long, .25 in. wide, base oblique, sheath ciliate. Panicle 1 to 3 in. long, branches 2 to 6, about 1 to 2 in. long. Spikelets .2 in. long, about 4 on a branch. *Hab.* Rare and local on banks in woods. Pahang, Ulu Sungei Merapoh (Nur). Selangor, Menuang Gasing (Kloss). Perak, Temengoh (Ridley).

### 34. OPLISMENUS, Beauv.

Slender creeping ascending grasses with thin ovate or lanceolate leaves generally softly hairy. Racemes distant on a simple or branched inflorescence; rachis slender, not flattened. Spikelets oblong distant, secund on one side of the rachis. Glume I with a long straight awn; glume II awnless or awned; glume III awned shortly; glume IV lanceolate acute. Species 15, all warm parts of the world.

Small plant; leaves .5 to 1.25 in. long; ascending culms 6 in. long; racemes .3 in. long

(1) **O. Burmanni**

Taller plant; leaves 2 to 4 in. long; culms 15 in. tall; racemes 1.5 to 3 in. long

(2) **O. compositus**

(1) **O. Burmanni** Beauv. *Agrost.* 54; *Hook. fil. F.B.I.* vii. 66; *Ridl. Mat.* iii. 145.

Creeping plant, with erect culms 6 in. tall. Leaves sparsely white-hairy, ovate-lanceolate to lanceolate, .5 to 1.25 in. long, .25 in. wide. Racemes 4 or 5, white hairy, .25 to .5 in. long. Spikelets crowded imbricate. Glume I lanceolate, awn white scabrid; glume II as long, awn more than twice as long as spikelet; glume III awn shorter; glume IV smooth lanceolate acute. *Hab.* Sandy dry spots, local. Penang, Sepoy lines and near Waterfall Gardens (Curtis); Bagan Lepas under Coconuts (Burkill). *Distrib.* Tropics of Old World.

(2) **O. compositus** Beauv. *Agrost.* 24; *Hook. fil. F.B.I.* vii. 66; *Ridl. Mat.* iii. 145.

Creeping, ascending plant, 1 to 2 ft. tall, glabrous or hairy. Leaves lanceolate acuminate, base broad, thin, 3 to 5 in. long .25 to 1 in. wide, many-veined, often quite glabrous. Racemes 5 or 6, distant below, pubescent or hairy; rachis angled. Spikelets solitary, or two or three fascicled, distant secund, hairy. Glume I lanceolate awned; glume II longer or shorter, ovate; awn .3 in. long; glume III longer broader, acuminate or blunt, glabrous or hairy; glume IV lanceolate acuminate. *Hab.* On banks and dry

rocky spots in shade; common. Johor, Pulau Tinggi (Feilding). Pahang, mouth of Pahang River. Malacca. Selangor, Batu Caves. Penang, Waterfall Gardens (Burkill); Penara Bukit (Curtis). Lankawi islands, Burau (Robinson). Kelantan, Kwala Lebir (Ridley); Kwala Aring (Yapp). *Distrib.* Tropics generally.

A rather variable plant. One form Penang (Curtis) and Lankawi is tall with long distant spikes, and nearly or quite glabrous leaves.

### 35. ECHINOCHLOA, Beauv.

Annual grasses. Racemes numerous crowded or separate. Spikelets secund in 3 or 4 rows on one side of a more or less flattened sinuous rachis, globose or ovoid. Glume I very short round; glume II ovate cuspidate or acuminate or awned. Species 20 to 25, warm regions of both hemispheres.

Inflorescence dense of many racemes; spikelets usually awned; robust plant

Racemes fewer remote, not awned, not robust . . . (1) **E. Crus-Galli**

. . . (2) **E. colona**

(1) **E. Crus-Galli** Beauv. *Agrost.* 161. *Panicum* Crus-Galli Linn. *Sp. Pl.* 56; *Hook. fil. F.B.I.* vii. 30; *Ridl. Mat.* iii. 132.

A large coarse glabrous grass, 1 to 3 ft. tall. Leaves broad linear acuminate, dark green, 9 to 12 in. long, .25 in. wide. Inflorescence dense, 6 in. long, of numerous racemes .5 to 1.25 in. long, bristly at the nodes. Spikelets numerous, crowded, green or purplish. Glume I short blunt round; glume II ovate oblong cuspidate; glume III like glume II but longer, cuspidate or awned; glume IV elliptic. *Hab.* Waste ground, sporadic in the Peninsula, but not common. Singapore (Hullett). Johor, Pengerang (Kelsall); Sempang Kanan, Batu Pahat. Pahang, Temerloh. Selangor, Bukit Kudah. Port Swettenham (Nur). Penang, Balik Pulau; Bagian Jennal (Curtis). Kelantan, Kamposa. *Distrib.* All warm countries.

A very variable plant, some forms strongly awned (var. *longiseta*), others with the glume merely cuspidate.

Nearly all the specimens above quoted were the var. *longiseta*.

(2) **E. colona** Link, *Hort. Berol.* ii. 209. *Panicum* colonum Linn. *Syst. Veg.* 870, and *Sp. Pl.* (ed. ii) 84; *Hook. fil. F.B.I.* vii. 32; *Ridl. Mat.* iii. 132.

Tufted grass 6 to 18 in. tall, glabrous. Leaves linear acuminate, 1 to 3 in. long, .1 in. wide. Racemes 6 to 8, distant, .5 in. long; rachis scabrid. Spikelets crowded, white, green or purple, .05 in. long, sub-globose hairy. Glume I ovate acute to sub-cuspidate; glumes II and III elliptic-ovate, acute or cuspidate; glume IV oblong acute, nearly as long. *Hab.* A weed in waste ground and on seashores. Common all over the Peninsula. Singapore, Tanglin; Jurong Road (Burkill). Johor, Bukit Murdom (Kelsall); Johor Bharu (Feilding). Malacca Town. Pahang, along the Pahang

River. Selangor, Rawang (Kloss); Kwala Lumpur; Ginting Sempah (Hume). Penang, Waterfall Gardens (Curtis). *Distrib.* All warm countries.

var. *frumentaceum* Roxb. Cultivated as a grain in India, occasionally occurs in cultivations. It is called Padi Burong by the Malays (a name also applied to a form of rice).

### 36. ERIOCHLOA, H. B. K.

Annual or perennial grasses. Leaves thin, ligule a ring of hairs. Racemes paniced, branches of panicle and rachis slender, slightly flattened. Spikelets ovate-lanceolate acute, silky, articulate on slender pedicels, usually in pairs; pedicels thickened at the tip. Glume I a minute cup-shaped rim on the top of the pedicel; glume II lanceolate membranous; glume III resembling II; glume IV equal to it. Species 25; warm parts of the world.

(1) *E. annulata* Kunth. *Enum. Rev. Gram.* i. 30. *E. polystachya* Dulac. *Ill. Indig. Grasses Ind.* t. 41; *Hook. fil. F.B.I.* vii. 29; *Ridl. Mat.* iii. 127 (not of H. B. K.).

A tall, rather weak leafy grass, 2 ft. tall, geniculate. Leaves 6 to 8 in. long, 1 in. wide, sparsely hairy. Panicle 2 to 6 in. long, branches numerous, spreading. Spikelets 125 in. long, lanceolate acute, white silky; when paired, lower pedicel short, upper longer than spikelet. Glumes II and III silky, green or purplish. *Hab.* Waste ground, not very abundant. Johor, Batu Pahat. Malacca, Bulau Jawa (Griffith). Selangor, Petaling; Old Fort, Kwala Selangor. Dindings. Perak, Sitiawan (Ridley). *Distrib.* Tropical Asia and Africa, a weed in Cuba and St. Helena.

### 37. ALLOTEROPSIS, Presl.

Slender perennial grasses. Panicle of a few slender branches. Spikelets 2-flowered, awned, ovate to elliptic. Glume I short ovate or lanceolate; glume II larger lanceolate; glume III narrower thinner, shorter; glume IV sub-coriaceous, awned. Species 5. Warm parts of the Old World.

(1) *A. cimicina* Stapf. *Fl. Trop. Africa* ix. 487. *Coridochloa cimicina* Nees, *Edinb. Phil. Journ.* xv. 381. *Axonopus cimicinus* Beauv. *Agrost.* 12; *Ridl. Mat.* iii. 145.

Culms tufted, 1 to 4 ft. tall, decumbent and geniculate at base. Leaves ovate-lanceolate, amplexicaul, 1.5 to 3 in. long, .2 to .75 in. wide, edges ciliate, ligule a ring of hairs, sheaths ciliate. Panicle of sub-whorled branches, slender, 4 in. long. Rachis angled slender. Glume I lanceolate half as long as glume III; glume II lanceolate, fringed on both sides with long pinkish bristles. Awn short slender pale. *Hab.* Waste ground, usually in damp spots. Singapore, Tanglin, Botanic Gardens; Indigo fields behind Tyershall (Hullett); Tana Merah Besar (Burkill). Penang, Waterfall Gardens (Burkill); Telok Bahang (Curtis). *Distrib.* Indo-Malaya and China.

This grass when dry has a pleasant smell of new-mown hay.

## 38. PANICUM, Linn.

Annuals or perennials. Leaves linear-lanceolate or ovate. Panicles lax, spreading, with fine branches. Spikelets scattered, one floret bisexual, lower one male or neuter. Glumes herbaceous, membranous. Glume I shorter than glume II; glume III subequal to glume II and bearing the floret; glume IV oblong-ovate or lanceolate, bisexual. Species 400, tropics and sub-tropics generally.

Annuals; leaves glabrous.

- Spikelets minute . . . . . (1) **P. humile**  
 Spikelets large . . . . . (2) **P. psilopodium**  
 Annual; leaves hairy; spikelets small . . . . . (3) **P. cæsium**

Perennials.

- Leaves very narrow linear; panicle strict;  
 rhizome long, subterranean . . . . . (4) **P. repens**  
 Leaves narrow linear acuminate, aquatic;  
 panicle strict; leaves long, .25 in. wide;  
 rhizome floating . . . . . (5) **P. proliferum**  
 Panicle long of very numerous dense strict  
 racemes . . . . . (6) **P. auritum**  
 Panicle diffuse.  
 Spikelets very small, numerous; leaves .25 in.  
 wide . . . . . (7) **P. perakense**  
 Spikelets larger, few, distant; leaves .12 in.  
 wide . . . . . (8) **P. elegantissimum**  
 Spikelets large scattered, herbaceous; leaves  
 .5 in. wide . . . . . (9) **P. maximum**  
 Spikelets small, very numerous, crowded;  
 stem woody long climbing; leaves .75 in.  
 wide . . . . . (10) **P. sarmentosum**  
 Leaves broad lanceolate, base cordate.  
 Panicle wide spreading; spikelets few . . . . . (11) **P. montanum**  
 Leaves ovate amplexicaul.  
 Stems elongate, glabrous or hairy; sheaths  
 1 in. long; panicle diffuse . . . . . (12) **P. ovalifolium**  
 Stems short very hairy; sheaths .2 in. long;  
 panicle compact . . . . . (13) **P. hirtifolium**

(1) **P. humile** *Nees in Steud. Syn. Gram.* 84; *Hook. fil. F.B.I.* vii. 48; *Ridl. Mat.* iii. 136. **P. tenellum** *Griff. Notulæ*, iv. 21;  *Ic. Pl. As. t.* 139, fig. 194 (not of *Roxburgh*).

An annual tufted glabrous grass, 18 in. tall. Leaves linear acuminate, 3 in. long, .12 in. wide. Panicles broad lax terminal, branches filiform. Spikelets long-pedicelled, solitary minute, purple. Glume I ovate mucronate or acuminate; glume II longer, 3-nerved; glume III rather longer than glume I; glume IV shorter, ellipsoid. *Hab.* Rare, in dry open spots. Pahang at Pulau Tawar. Province Wellesley, Tasek Gelugur. Kelantan, Kota Bharu (Ridley). *Distrib.* India and Borneo.

(2) **P. psilopodium** *Trin. Gram. Pan.* 217; *Hook. fil. F.B.I.* vii. 47; *Ridl. Mat.* iii. 139.

Annual grass 1 to 2 ft. tall; stems simple or branched, leafy to the panicle. Leaves narrow, glabrous, except the sheath some-

times hairy, 3 to 8 in. long, .25 in. wide. Panicle 2 to 8 in. long; pedicels as long as spikelets. Spikelets pale green or whitish, ellipsoid-ovate acute, .08 to .1 in. long. Glume I ovate broad, 3- to 5-nerved, half as long as glume III; glume II ovate acuminate, 9- to 11-nerved, as long as glume III; glume IV oblong blunt. *Hab.* Waste ground. Rare. Selangor. Once collected at Port Swettenham by Bishop Hose, certainly introduced. *Distrib.* India and Ceylon.

(3) *P. cæsius* Hook. *Kew Journ.* ii. (1850) 97; *Hook. fil. F.B.I.* vii. 48. *P. luzonense* Presl. *Rel. Haenk.* i. 308; *Ridl. Mat.* iii. 136.

An annual grass, 6 in. to 2 ft. tall, hairy; stems simple or branched, leafy to the panicle. Leaves linear acuminate, base broad, 3 to 4 in. long, .25 in. wide, hairy on both sides and on the sheath. Panicle 6 to 12 in. long, with many spreading capillary ciliate branches. Spikelets ellipsoid acute, .05 in. long, outer glumes purple. Glume I ovate blunt, half as long as glume III; glume II oblong, shorter than glume III; glume IV shorter, oblong, shining, coriaceous. *Hab.* Waste ground, paths, etc., common. Singapore, Tanglin; Balestier plain. Johor, Sempang Kanan, Batu Pahat; Tebrau River; Castlewood. Malacca (Griffith). Pahang, Pekan. Perak, Blanja (Wray). Penang, Waterfall Gardens (Curtis). Perlis, Kanga. Kelantan, Kwala Aring (Yapp); Sungei Ketah (Foxworthy). *Distrib.* Indo-Malaya.

(4) *P. repens* Linn. *Sp. Pl. Ed.* ii. 87; *Hook. fil. F.B.I.* vii. 49; *Ridl. Mat.* iii. 139. *P. ischæmoides* Retz. *Obs.* iv. 17.

Rhizome subterranean long-creeping, throwing up stems, sometimes swollen at base, 1 to 2 ft. tall. Leaves distichous, 6 to 12 in. long, .1 to .25 in. wide, narrowly linear, glaucous, glabrous or hairy, lower sheaths loose. Panicle strict narrow, 3 to 6 in. long. Spikelets pale, .1 in. long. Glume I very short, orbicular, only one-sixth the length of glume III; glume II sub-equal to glume III, ovate acute; glume IV elliptic-ovate. *Hab.* Sea coasts, but frequently found inland in sandy spots. Singapore, Tanglin; Changi. Johor, Sungei Tebrau. Pahang, Pekan. Malacca, Tanjong Kling; Ching-Dindings, Lumut. Province Wellesley, Permatang Bertam. Kelantan, Kamposa (Ridley). *Distrib.* Both hemispheres, tropical and sub-tropical coasts.

(5) *P. proliferum* Lam. *Encycl.* iv. 747; *Hook. fil. F.B.I.* vii. 50; *Ridl. Mat.* iii. 139. *P. paludosum* Roxb. *Fl. Ind.* i. 367; *Griff. Notulæ*, 37;  *Ic. Pl. As. t.* 139, fig. 127.

An aquatic floating grass with stout fleshy stems, ascending about 12 in. tall, leafy to the panicle. Leaves broad flaccid, linear acuminate, glabrous, 6 to 7 in. long, .45 in. wide. Panicle 6 to 7 in. long, strict, branches rather slender, sometimes spreading. Spikelets pale green, lanceolate acute, .12 in. long. Glume I ovate blunt, one-fourth the length of glume III; glumes II and III acuminate

ribbed; glume IV shorter, elliptic blunt. *Hab.* Pools in swamps, rare. Pahang, Pekan (Ridley). *Distrib.* Tropics generally.

(6) **P. auritum** Presl. in Nees, *Agrostologia Brazil*. 176; Hook. fil. *F.B.I.* vii. 40; *Ridl. Mat.* iii. 135.

A stout grass 3 to 6 ft. tall and sometimes .5 in. through at base. Leaves linear-lanceolate, long-acuminate, base cordate, 6 to 10 in. long, .25 to 1.25 in. wide, glabrous or hairy beneath, edge scabrid. Panicle 6 to 18 in. long, of very numerous strict appressed racemes 1 to 2.75 in. long, densely floriferous. Spikelets light brown, on very short pedicels, ellipsoid or fusiform, blunt. Glume I short ovate blunt, one-third the length of glume III; glumes II and III ovate oblong, blunt, ribbed; glume IV lanceolate acuminate, smooth. *Hab.* Marshes and river banks. Common. Singapore, Reservoir; Changi; Ang Mo Kio. Johor, Kwala Sembrong (Kelsall); Kluang (Holtum). Malacca (Griffith, Cuming); Alor Gajah Road (Ridley). Pahang, Pekan; Tahan River; Khol near Tembeling. Selangor, Batu Caves; Klang (Burkill). Perak, Thaiping Waterfall; Jenah (Wray); Goping (Kunstler). Tanjong Malim (Burkill). Province Wellesley, Krian. Penang (Porter); Waterfall Gardens (Curtis). Kelantan, Kwala Relai (Haniff). *Distrib.* Indo-Malaya, China.

(7) **P. perakense** Merrill, *Phil. Journ. Sc. Bot.* xi. 52. *P. humidorum* var. *perakense* Hook. fil. *F.B.I.* vii. 53; *Ridl. Mat.* iii. 137.

A slender grass 3 to 10 ft. tall. Leaves narrow linear acuminate, base sub-cordate, glabrous, 6 in. long, .25 in. wide. Panicle 9 to 12 in. long, wide, spreading with filiform branches. Spikelets very small, ellipsoid blunt, purple, numerous. Glume I ovate blunt, two-thirds the length of glume III; glumes II and III elliptic blunt, 5-nerved; glume IV ovate smooth. *Hab.* Rare in rivers and water meadows. A very beautiful grass. Johor, Hadji Senawi, Sem-pang Kiri River; Tebing Tinggi (Ridley). Perak, Larut (Kunstler).

(8) **P. elegantissimum** Hook. fil. *F.B.I.* vii. 52; *Ridl. Mat.* iii. 139.

A perennial tufted grass 2 or 3 ft. tall. Stems slender. Leaves numerous from near base, linear acuminate, hairy, 12 to 18 in. long, .12 in. wide. Panicle lax, spreading, 9 in. long, branches very slender, scabrid, filiform. Spikelets solitary or in pairs, few, scattered, ellipsoid acute, purple at tips, .1 in. long. Glume I ovate acuminate keeled ribbed, half as long as glume III; glume II similar but nearly twice as long; glume III longer; glume IV elliptic blunt, shining, crustaceous, white. *Hab.* Rare. Dindings; on the top of the hill overlooking the sea, Lumut. Setul heaths (Ridley). *Distrib.* Burma.

(9) **P. maximum** Jacq.  *Ic. Pl. Rar.* i. t. 13. *P. jumentorum* Pers. *Syn.* i. 83.

Large tufted grass, usually glabrous. Leaves linear, long-

acuminate, 6 in. to 2 ft. long, .5 in. wide, scabrid on the edges. Panicle tall, at first compact, eventually wide spreading, 1 ft. long, 9 in. wide, branches slender. Spikelets oblong blunt, olive green, on pedicels mostly longer, .1 in. long. Glume I ovate round, one-fourth the length of the spikelet; glume II elliptic lanceolate apiculate; glume III as long; glume IV thinly crustaceous. *Hab.* Cultivated ground. Singapore. Selangor in thickets near Klang Gates.

The Guinea Grass, a native of Africa, is cultivated as a horse-fodder, but although usually considered one of the best fodders, it fell into disrepute owing to its having caused fatal colic when given in too large a quantity. It appears, however, to be safe when given in small quantities mixed with other grass and not wet.

(10) **P. sarmentosum** Roxb. *Fl. Ind.* i. 308; *Hook. fil. F.B.I.* vii. 54; *Ridl. Mat.* iii. 140.

A very tall growing scandent grass with much branched, woody solid culms from 6 to 50 ft. long. Leaves lanceolate-linear acuminate, glabrous or hairy, narrowed at base, 5 to 12 in. long, .25 to .5 in. wide. Panicle 7 to 12 in. long, dense. Spikelets small, brown, ellipsoid, blunt, on short peduncles, very numerous. Glume I ovate blunt, half as long as glume II, which equals glume III and is ribbed; glume IV shorter, oblong blunt. *Hab.* Thickets and open edges of woods, often forming great masses scrambling over bushes and ascending to tree-tops. Singapore (Wallich); Grange Road; Sumbawang; Changi (Ridley). Johor, Kota Tinggi; Gunong Pantai (Kunstler); Sungei Mati Road (Feilding). Pahang, Raub (Machado). Malacca, Machap (Derry). Selangor, Kampong Kerling; Rawang; Menuang Gasing (Kloss). Perak, Thaiping Waterfall; Gunong Pondok Pass (Burkill). Province Wellesley, Ara Kudah. Penang, Moniot's Road (Curtis). Tringganu, Bundi (Rostados). Setul (Ridley). *Distrib.* Indo-Malaya, China. *Native names:* Rumput Jangut Ali; Rumput Kulubong. *Use:* The roots chewed with betel nuts as an aphrodisiac.

(11) **P. montanum** Roxb. *Fl. Ind.* i. 313; *Hook. fil. F.B.I.* vii. 53; *Ridl. Mat.* iii. 139.

Erect grass. Culms slender, 2 ft. tall, often woody. Leaves lanceolate acuminate, base broad cordate, 3 to 5 in. long, .5 to .75 in. wide, sparingly hairy above, edges ciliate; nerves 10, conspicuous beneath. Panicle very lax, 6 to 8 in. long, with spreading capillary branches. Spikelets small, ellipsoid. Glume I lanceolate acuminate, nearly as long as glume III; glumes II and III subequal, ovate ribbed; glume IV as long, semi-oval. *Hab.* Local and rather rare in rocky woods, at 100 to 4000 ft. altitude. Selangor at Kwala Kubu; Semangkok Pass. Perak, Ipoh. Penang (Wallich); Waterfall Gardens. *Distrib.* Indo-Malaya, China.

(12) **P. ovalifolium** Poir. *Encycl.* iv. 279; *Beauv. Fl. D'Owar*, iii. 79, t. 110, fig. 1; *Hook. fil. F.B.I.* vii. 44; *Ridl. Mat.* iii. 141. Culms creeping ascending slender, 6 to 12 in. tall. Leaves



ovate amplexicaul cordate, .5 to 2 in. long, .5 to .75 in. wide, glabrous or hairy, mouth of sheath ciliate. Panicle sessile or nearly so, 2 to 4 in. long, lax, branches filiform sinuous. Spikelets .1 in. long, solitary, on slender pedicels, green or purple, hairy, elliptic, blunt, slightly gibbous. Glumes I and II ovate obtuse ribbed hairy; glume III flat blunt glabrous, a little longer; glume IV much shorter, ellipsoid, coriaceous. *Hab.* Common on banks and damp shady spots. Whole Peninsula. Singapore, Government Hill. Johor, Kota Tinggi; Kwala Kahang (Kelsall). Malacca (Griffith); Bukit Bruang; Sungei Hudang (Goodenough). Selangor, Rantau Panjang (Hume). Perak, Larut Hills (Kunstler); Bujong Malacca. Province Wellesley, Permatang Bertam. Penang, Waterfall Hill. *Distrib.* Indo-Malaya, Africa, China.

(13) *P. hirtifolium* *Ridl. Mat.* ii. 141.

Culms decumbent, ascending 6 to 8 in. tall, leafy to the panicle. Leaves ovate-lanceolate acute, amplexicaul very hairy, edges long white-ciliate, .50 in. long, .25 in. wide, sheaths ribbed, pilose short. Panicle 1 to 2 in. long, white-ciliate, branches spreading. Spikelets small gibbous lanceolate, green. Glume I lanceolate hairy; glume II as large, broader, ribbed, hairy ovate; glume III flat lanceolate, shorter; glume IV ovate blunt coriaceous, white. *Hab.* Rare. Selangor, at Semangkok Pass, edges of paths through the jungle (Ridley); Kwala Lumpur (Md. Nur).

Near *P. ovalifolium*, but much more condensed and hairy.

### 39. HEMIGYMNIA, Stapf.

Long half-scandent grasses with smooth slender geniculate culms. Leaves lanceolate or linear-lanceolate, papery. Panicle long narrow. Spikelets very numerous, oblong acute, dorsally compressed on very short racemes. Glumes I and II equal, very short, ovate or oblong, blunt; glume III lanceolate, ribbed. Species 3 or 4, Africa and Indo-Malaya.

Panicle lax; spikelets remote, green . . . . (1) *H. multinodis*  
Panicle strict, dense; spikelets brown . . . . (2) *H. fusca*

(1) *H. multinodis* *Stapf. Fl. Trop. Africa*, ix. 742. *Panicum nodosum* *Kunth. Enum. Pl.* i. 97; *Hook. fl. F.B.I.* vii. 43. *P. Arnottianum* *Nees in Steud. Syn. Glum.* 59.

A lax straggling grass. Leaves lanceolate acuminate, base broad, rounded, hairy on the edge and back when young, 3.5 in. long; sheaths hairy, hairs springing from minute pustules. Panicle 6 in. long, very lax, of 5 or more slender branches. Spikelets remote, pale green, lanceolate, .5 in. long. Glume I short ovate ribbed, glabrous; glume II ovate-elliptic, 5-nerved; glume III similar, 2-nerved. *Hab.* Singapore, Freshwater isle (Ridley 79). Perak, Grit (Burkill). *Distrib.* India, Philippines.

(2) *H. fusca* *Ridl.*

A slender perennial grass, creeping and ascending, 1 to 4 ft.

tall, branching, somewhat woody below. Leaves lanceolate or lanceolate-linear acuminate, base cordate, usually glabrous or with sheath edges hairy, 3 to 8 in. long, .25 in. wide. Panicle nodding, 4 to 10 in. long, branches numerous, not spreading, slender. Spikelets very numerous, brown, crowded in sessile racemes of 10 or fewer short pedicelled, .08 in. long, linear-oblong sub-acute. Glume I ovate lanceolate; glume II a little longer. *Hab.* Thickets among bushes. Common. Whole Peninsula. Singapore, Chan Chu Kang; Tanglin. Johor, Serom; Batu Pahat. Malacca (Griffith). Pahang, Pekan. Selangor, Rantau Panjang (Kloss); Batu Caves. Perak, Tanjong Malim (Burkill). Penang, Pulau Betong (Curtis); Penang Hill. *Distrib.* Kelantan, Kwala Aring (Yapp). *Native names:* Rumput Sarang Buaya; Rumput Mintabong.

#### 40. ACROCERAS, Stapf.

Perennial grasses with long creeping stems throwing up shoots to some height. Leaves lanceolate to linear. Panicles of distant slender branchlets. Spikelets glabrous, moderately large, ovate-oblong or oblong, falling entire from pedicels; lower floret male or neuter, upper one bisexual. Glumes membranous, pale green, with small deep green or black terminal crest forming a terete point. Glume I, ovate-lanceolate, 3-nerved; glume II oblong 5-nerved, longer; glume III similar. Species about 9, both hemispheres.

Tall scandent grass with wide spreading panicles . . . (1) **A. sparsum**

Dwarf prostrate grass, stems 6 in. tall; panicles of 1 to 3 not spreading spikes . . . (2) **A. Ridleyi**

(1) **A. sparsum** Stapf. MSS. *Panicum oryzoides* Ridl. *Mat.* iii. 138 (not of Sw.).

Culms creeping, then ascending 2 to 4 ft. tall, wiry, woody, glabrous. Leaves lanceolate or lanceolate-linear acuminate, edge thickened, scabrid, 4 to 7.5 in. long, .5 in. wide, base slightly narrowed, a few long cilia at base. Panicle 8 to 14 in. long, with distant scabrid branches about 4 to 6 in. long. Spikelets distant, .11 in. long, green or purplish. Glume I ovate ribbed; glumes II and III twice as long, strongly ribbed; glume IV white, smooth. *Hab.* Common in the Peninsula. Open woods, thickets, river banks, scrambling over bushes. Singapore (Wallich). Johor, Minyak Buku near Batu Pahat; Kwala Kahang (Kelsall); Kota Tinggi. Pahang, Kwala Tembeling (Ridley); Kwala Teku (Seimund). Malacca, Bukit Bruang; Pulau Besar. Selangor, Batu Caves; Kwala Lumpur; Klang Gates, river bank; Rawang. Dindings, Gunong Tungul. Perak, Goping (Kunstler). Penang Hill. Pulau Adang, Rawei Island. Kelantan, Sungei Ketah (Foxworthy). *Distrib.* Indo-Malaya.

(2) **A. Ridleyi** Stapf. MSS. *Panicum Ridleyi* Hack. in *Trans. Linn. Soc. ser. 2. Bot.* iii. 400. *P. latifolium* Hook. *fil. l.c. part, var. minor.* (Fig. 223, p. 230.)

A low weak creeping plant ascending 4 to 6 in. tall, glabrous

except leaf sheaths. Leaves thin lanceolate acuminate, base round, 2 in. long, .25 in. wide, sheaths .25 to .5 in. long, fringed with hairs on the edge. Panicle 1.5 to 2 in. long, of one or two branches .5 in. long, not spreading, with about 4 spikelets on each. Spikelets light green, ellipsoid, .1 in. long. Glumes membranous thin. Glume I ovate cuspidate; nerves faint, more than half as long as glume III; glume II ovate cuspidate; glume III as large, thinner; glume IV nerves very faint. *Hab.* Low swampy ground. Singapore, Economic Gardens. Pahang, Pekan and Kwala Berar, Pahang River

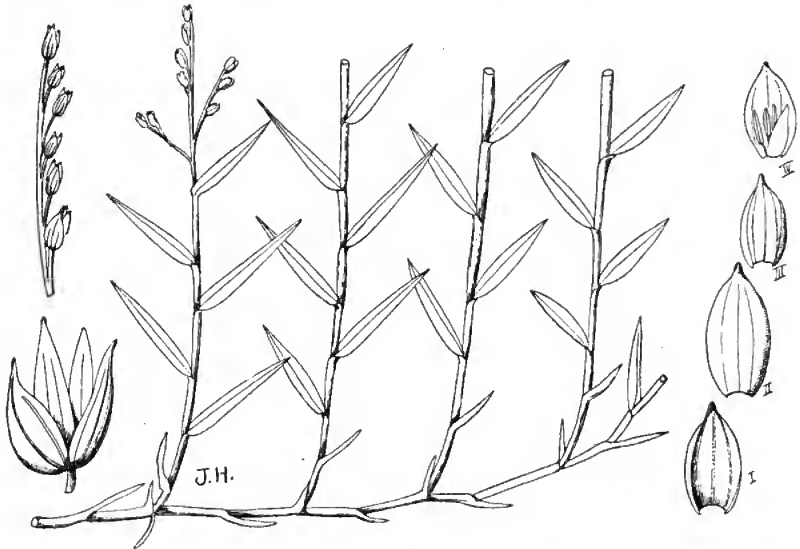


FIG. 223.—*Acroceras Ridleyi*.

(type of *P. Ridleyi*, Hack.). Province Wellesley, Telok Ayer Tawar (Ridley). *Distrib.* India, Java.

#### 41. HYMENACHNE, Beauv.

Tall marsh grass. Leaves long, amplexicaul at base. Panicle spiciform, the branches appressed to the rachis. Spikelets not gibbous, lanceolate-acuminate acute. Glumes thin, glume I ovate blunt, about a quarter the length of glume III; glume II lanceolate, long acuminate; glume III as long, narrower; glume IV broad lanceolate, short acute. Species 4, all the tropics.

(1) *H. myuros* Beauv. *Agrost.* 49, t. 10, fig. 8. *Panicum myurus* H.B.K. *Nov. Gen. and Sp.* i. 98; *Hook. fil. F.B.I.* vii. 39; *Ridl. Mat.* iii. 135.

A tall grass with a long spongy rooting rhizome often very thick; stems 2 to 6 ft. tall and sometimes .25 in. through. Leaves

long linear acuminate, base cordate, 4 to 14 in. long, .25 to 1 in. wide, ciliate at base and mouth and edge of sheath. Panicle erect dense cylindric, spike-like, 8 to 14 in. long, branches (lowest 1.5 to 2.5 in. long) closely appressed to rachis. Spikelets olive brown, .12 in. long, narrow acuminate. *Hab.* Grassy open swamps. Common. Singapore, Balestier plain (Hullett). Johor, River Bank Sempang Kiri near Batu Pahat (Ridley); Parit Jawa (Feilding). Pahang, Mahang, Pahang River (Ridley). Malacca (Cuming, Griffith). Sungei Ujong, Burunang (Cantley). Perak, Goping (Kunstler). Province Wellesley, Permatang Bertam. Penang (Curtis). *Distrib.* Indo-Malaya, China. *Native name:* Rumput Kumpai.

#### 42. ICHNANTHUS, Sw.

Annual or perennial grasses with broad leaves and panicles of 1- or 2-flowered spikelets. Spikelets ovate or lanceolate terete, articulate on pedicels. Glumes I, II and III persistent, sub-equal, nerved; glume III paleate; glume IV smaller, stipitate paleate, with 1 simple or bifid or 2 appendages on the stipes. Grain coriaceous acute, articulate at base of stipes. Species 20, tropics generally.

(1) *I. pallens* Munro, *Benth. Fl. Hongk.* 414; *Hook. fil. F.B.I.* vii. 60; *Ridl. Mat.* iii. 142. *Panicum pallens* Sw. *Prodr.* 23.

Culms slender ascending, 12 in. tall. Leaves lanceolate or ovate-acuminate, inæquilateral, base broad, hairy, 2 to 3 in. wide. Panicle 2 to 3 in. long, compact, branches ascending. Spikelets green, glabrous, lanceolate. Glume I lanceolate cuspidate, half as long as glumes II and III; glume II strongly nerved, hairy; glume IV obtuse elliptic. *Hab.* On banks in forests, not rare. Johor, Kota Tinggi. Pahang, Telom. Selangor, Batu Caves; Semangkok Pass; between Kajang and Sepan. Penang Hill. *Distrib.* Tropics of both worlds.

#### 43. SACCOLEPIS, Nash.

Usually tufted annual or perennial grasses. Leaves narrow-linear acuminate. Spikelets crowded in a dense spike-like panicle, oblong to ovate or elliptic, more or less oblique, usually turgid, lower floret male or barren, upper bisexual. Glume I shorter than glume II; glume II with a curved gibbous or saccate back, ribbed, concave; glume III as long, back straight. Species over 30, both hemispheres.

- |  |                           |
|--|---------------------------|
| Panicle .5 in. long; spikelets pale, very turgid . . . . .                   | (1) <i>S. turgida</i>     |
| Panicle .5 to .75 in. long; spikelets often purple, curved . . . . .         | (2) <i>S. indica</i>      |
| Panicle 3 in. long; spikelets purple, slightly gibbous, not curved . . . . . | (3) <i>S. angusta</i>     |
| Panicle 6 in. long; spikelets not gibbous or curved . . . . .                | (4) <i>S. myosuroides</i> |

(1) *S. turgida* Ridl.

Short tufted grass, 6 to 12 in. tall, glabrous. Leaves long.

acuminate linear narrow, 1 to 3 in. long, .1 in. wide. Culms slender. Panicle spiciform, .25 to .5 in. long, dense. Spikelets pale green, glabrous. Glume I ovate ribbed, half as long as glume III; glume II strongly gibbous, ribbed, lanceolate-ovate; glume III as long, not gibbous. *Hab.* Very common in grass plots, etc. Singapore, Tanglin. Johor, Tana Merah Road. Pahang, Pekan (Ridley). Malacca (Griffith); Selangor (Cantley). Selangor, Kwala Lumpur (Burkill). Penang (Wallich).

var. *repens*. *Ridl.* A long slender creeping form with a very slender rhizome 6 in. long or more, and slender erect weak stems 6 to 8 in. long. *Hab.* Penang, Waterfall Gardens (King, Burkill). *Distrib.* India, Java.

(2) **S. indica** Chase, *Proc. Biol. Wash.* i. 8. *Panicum indicum* *Linn. Mantiss.* ii. 184.

Tufted grass about 12 in. tall. Leaves linear-lanceolate acuminate, 2 in. long, .1 in. wide, glabrous. Culms slender. Panicle spiciform, cylindrical, .5 to .75 in. long. Spikelets curved, green or purple. Glume I short ovate acute; glume II boat-shaped, slightly gibbous, hairy on the tip; glume III not gibbous, hairy; glume IV half as long. *Hab.* Rare. Lankawi, Burau (Robinson). *Distrib.* India.

(3) **S. angusta** Stapf. *Fl. Trop. Afr.* ix. 763 (note). *Panicum angustum* *Trin. Sp. Gram. Ic. t.* 334.

Usually a slender weak plant 18 in. to 2 ft. tall. Leaves narrow linear acuminate, glabrous, 3 to 5 in. long, .1 in. wide. Panicle spiciform cylindrical, 3 in. long, .1 to .15 in. through. Spikelets slightly curved, purple, usually glabrous. Glume I ovate-lanceolate acute, half as long as glume III; glume II slightly gibbous, boat-shaped, strongly ribbed. *Hab.* Banks, often at high altitudes. Singapore, Ang, Mo Kio. Johor, Kwala Kahang (Kelsall). Pahang, Khol, Tembeling river; Sungei Jelei (Machado). Dindings, Lumut. Perak, Gunong Kerbau (Robinson), a very robust broad-leaved form 3 ft. tall; leaves .25 in. wide. *Distrib.* Indo-Malaya. *Native names*: Rumput Bijai; Rumput Humani.

The Pahang and Lumut plants had hairy spikelets.

(4) **S. myosuroides** *Ridl.* *Panicum myosuroides* *Br. Prod.* 189; *Hook. fil. F.B.I.* vii. 42. *Ridl. Mat.* iii. 134.

A slender grass 1 to 2 ft. tall. Leaves narrow linear acuminate, 4 to 8 in. long, .1 in. wide. Culms slender. Panicle spiciform, narrow cylindrical, 6 in. long. Spikelets purplish, not curved, ellipsoid. Glume I ovate ribbed blunt, hardly half as long as glume III; glume II elliptic-ovate blunt, not gibbous, 9-ribbed; glume III similar, as long. *Hab.* Wet marshy ground. Common. Singapore, Tanglin (Hullett); Kranji. Johor, Kwala Sembong (Kelsall); Tana Merah Road. Pahang, Pekan. Malacca, Selangor (Cantley). Perak, Teluk Anson (Kunstler). Penang, Pulau Betong

(Curtis). Kelantan, Kwala Aring (Yapp). *Distrib.* Indo-Malaya. *Native names*: Rumput Bijan; Rumput Humani.

Hullett collected in Singapore a form in which the panicle is broken up into short racemes, the lowest and longest 1 in. long.

#### 44. CYRTOCOCCUM, Stapf.

Perennial grasses, with lax or somewhat dense panicles of very small spikelets laterally compressed, dark brown, gibbous. Glume I small ovate; glume II twice as large, ovate, boat-shaped, strongly ribbed; glume III ovate ribbed, as long as glume IV. Grain strongly gibbous. Species 6, tropical Africa and Asia.

Panicle dense, of many spikelets on short pedicels . . . (1) **C. oxyphyllum**  
Panicle lax, branches filiform; spikelets few on long pedicels.

Dwarf plant; panicle 1 to 1.5 in. long . . . . (2) **C. carinatum**  
Tall plant; panicle 9 in. long, 6 in. wide . . . . (3) **C. accrescens**

(1) **C. oxyphyllum** Stapf. *MSS.* *Panicum pilipes* Nees and Arn. in *Miq. Pl. Junghuhn*, iii. 276; *Hook. fil. F.B.I.* vii. 57; *Ridl. Mat.* iii. 141.

Long creeping grass ascending to 1 or 2 ft. tall. Leaves linear-lanceolate acuminate, 4 to 6 in. long, nearly .5 in. wide, base narrowed, glabrous except the ciliate ligule. Panicles 3 in. long, compact, branches .5 to 1.25 in. long, moderately stout, angled. Spikelets dark brown, small. Glume I ovate blunt; glume II ovate blunt, twice as large, ribbed; glume III as large. Grain semi-ovoid, gibbous. *Hab.* Common by wayside in shady spots. Singapore, Bukit Timah Road. Johor, Tebing Tinggi; Pulau Aur. Pahang, Tahan River (Ridley). Lubok Tamang, Bertam River (Henderson). Malacca, Sungei Hudang; Pulau Besar. Sungei Ujong, Bukit Sulu (Cantley). Selangor, Menuang Gasing (Kloss); Klang Gates (Hume). Dindings, Lumut. Perak, Gunong Bal, Gunong Kerbau (Haniff); Goping and Larut (Kunstler); Relau Tujoh (Wray). Tapah (Burkill). Province Wellesley, Tasek Gelugur. *Distrib.* Indo-Malaya, Australia-Polynesia. *Native names*: Rumput Mutubong; Rumput Kurubong Padi.

(2) **C. carinatum** Stapf. *MSS.*

Dwarf creeping grass with slender prostrate stems ascending 4 to 6 in. tall, glabrous. Leaves lanceolate acuminate, .5 to 1.5 in. long, .1 in. wide, finely striate, glabrous or sparsely hairy on the under or both sides, sheaths sparsely hairy on edge. Panicle strict or later spreading, .5 to 2 in. long, branches and pedicels filiform, short. Spikelets brown, minute, glabrous, pyriform, gibbous. Glume I very small ovate, half as long as glume II; glume II narrower than glume III, boat-shaped; glume III ribbed. Grain semi-ovate, yellow. *Hab.* Shady spots beneath trees, not very common. Malacca (Hervey); Flagstaff Hill (Griffith). Selangor, Weld's Hill, Kwala Lumpur (Burkill). *Distrib.* Indo-China, Malaya.

(3) **C. accrescens** *Stapf. MSS.* *Panicum accrescens Trin. Sp. Gram. Ic. t. 88.* *P. patens Ridl. Mat. iii. 142.*

Creeping and rooting grass ascending, glabrous or hairy. Leaves thin lanceolate acuminate, 2 to 6 in. long, .5 in. wide, base broad. Panicle 6 to 9 in. long, wide, spreading with capillary branches and branchlets; pedicels capillary, .1 in. long. Spikelets minute pyriform, purple brown. Glume I about half as long as glume II semi-ovate, boat-shaped; glume III broader, blunt. Grain semi-ovate, gibbous, yellow. *Hab.* Common on shady rides in or on the edge of forests. Singapore, Chan Chu Kang; Bukit Timah (Hullett); Tanglin. Johor, Kwala Kahang (Kelsall). Malacca (Griffith); Ayer Moleh (Ridley); Hulu Rejang (Derry). Pahang, Tahan Woods (Ridley). Lubok Tamang, Bertam River (Henderson). Sungei Ujong, Port Dickson. Selangor, Klang (Fox), leaves hairy all over; Ulu Langat (Kloss). Dindings, Lumut. Perak, Larut (Kunstler), glumes hairy at tips. Penang Hill (Curtis). Kelantan, Sungei Lebeh (Yapp). *Distrib.* India, Malaya, Polynesia, China. *Native name:* Rumput Telor Ikan.

#### 45. SETARIA, Beauv.

Annual grasses; panicles spiciform. Spikelets 1- (rarely 2-) flowered, in clusters, oblong to ovate, on short pedicels with a persistent involucl of scabrid bristles (barren branchlets). Glume I half as long as glume III, ovate; glume II ovate longer; glume III neuter (rarely male); glume IV coriaceous convex, bisexual. Stamens 3. Grain free. Species about 100, warm and temperate regions.

Panicle large nodding . . . . .	(1) <b>S. italica</b>
Panicle erect spiciform . . . . .	(2) <b>S. rubiginosa</b>
Panicle very large spreading; leaves broad plicate . . . . .	(3) <b>S. plicata</b>

(1) **S. italica** *Beauv. Agrost. 51; Hook. fil. F.B.I. vii. 78; Ridl. Mat. iii. 144.*

Grass 2 to 5 ft. tall, stout. Leaves 18 in. long, 1 in. across. Panicle very thick, nodding cylindric or compound, 8 in. long.

The Italian Millet, known as Iskoi by the Malays, is cultivated to a small extent, and occurs as an escape by the Pahang River and on the Sungei Chenei.

(2) **S. rubiginosa** *Miq. Fl. Nederl. Ind. iii. 467. S. glauca Griff. Notulæ, 44; Ic. Pl. t. 149, fig. 1; Hook. fil. F.B.I. vii. 79 part; Ridl. Mat. iii. 144 (not of Beauv.).*

A tufted annual, 1 to 2 ft. tall, slender, glabrous. Leaves narrow linear, 6 in. long, .12 in. wide. Panicle narrow cylindric, .5 to 5 in. long, orange, more rarely purplish or green, bristles 6 to 12 to a spikelet, orange, .15 in. long. Spikelets ovoid, greenish, half as long. *Hab.* Common sporadically in waste ground, by rice-fields, and on waysides, a weed. Singapore (Hullett); Tanglin. Johor, Castlewood; Sungei Tebrau. Pahang, Pekan (Evans).

Malacca, Sungei Baru; Chenana Putih (Cantley). Selangor, Rantau Panjang. Perak, Thaiping (Wray). Penang, rice-fields (Curtis). Setul. *Distrib.* Tropical Asia. *Native name*: Rumpul Julong Julong.

(3) **S. plicata** *Cooke Fl. Bombay*, ii. 919. *Panicum plicatum* *Lam. Encycl.* iv. 736; *Griff. Nomencl.* iii. 24; *Is. Pl. As. t.* 139, fig. 229; *Hook. fil. F.B.I.* vii. 55; *Ridl. Mat.* iii. 136.

A large perennial grass. Culms ascending 2 to 8 ft. tall, solid. Leaves lanceolate-acuminate plicate scabrid, 12 in. long, 4 in. across, sheaths covered with pungent hairs. Panicle nodding, compound, 18 in. long, lax, with slender branches over 6 in. long. Spikelets ovate acuminate, 12 in. long, glabrous. Bristles few, pale. Glume I, ovate blunt; glume II twice as long, ovate acuminate; glume III lanceolate-ovate, acuminate. *Hab.* In rocky woods, local but often very abundant. Johor, Pulau Aur (Feilding). Pahang, Tahan River. Sungei Ujong, Pantai (Cantley). Selangor, Batu Caves; Bukit Kutu. Perak (Wray). Kelantan, Chaning; Kwala Aring (Yapp). *Distrib.* Indo-Malaya, China. *Native name*: Akar Pimpan.

#### 46. TRICHOLENA, Schrad.

Perennial or annual grasses, slender. Inflorescence hairy or villous paniced. Spikelets oblong, laterally compressed, deciduous from capillary pedicels. Lower floret male or barren, upper bisexual. Glumes very unequal or dissimilar. Glume I very small; glume II semi-ovate; glume III as in glume II, all covered with long soft hair; glume IV much smaller. Lodicules 2. Stamens 3. Grain oblong ellipsoid. Species 10 to 12, Old World.

(1) **T. rosea** *Nees, Cat. Sem. Hort. Vratisl.* 1835; *Stapf. in Flora Capensis*, vii. p. 443.

Slender tufted grass about 3 ft. tall. Culms, lower leaves and sheaths sparsely hairy. Leaves narrow linear acuminate, 4.5 in. long, .12 in. wide. Culms often branched, slender, glabrous above. Panicles 5 in. long, very slender, branches 1 in. long. Spikelets pink, hairy, 12 in. long, hairs erect, coppery articulations with long pink or white hairs (spikelets and hairs dry white). *Hab.* Selangor, Batu Caves, on limestone rocks in the quarries (Ridley, 1920). Perak, Thaiping Hills (Burkill). *Distrib.* Africa.

This plant was introduced by Mr. Stanley Arden to the Batu Tiga Gardens about 1901. It has now thoroughly established itself at the Batu Caves and on the Thaiping Hills.

#### 47. THUAREA, Pers.

A slender prostrate branched grass in sea sand. Leaves flat lanceolate acute. Spikes short terminal, enclosed in a leaf sheath. Spikelets few secund in one row, basal 1 to 2 female, terminal 2 to 6 male; rachis flat, eventually dilated, enclosing the fruit. Glume I small; glume II ovate-lanceolate empty; glumes III and IV lanceolate. Grain enclosed in the thickened rachis forming



an obconic beaked nut. Species 1. Madagascar, Ceylon, Nicobars, Malaya, Polynesia.

(1) *Th. sarmentosa* Pers. Syn. 1, 110; Beauv. Agrost. 127, t. 22, fig. 9; Hook. fil. F.B.I. vii. 91; Ridl. Mat. iii. 146.

Stems several feet long, quite prostrate, branches 3 in. long. Leaves .2 to .75 in. long, .2 to .25 in. wide, very bright green. Spikes .5 to 1 in. long. Fruit .25 in. long. *Hab.* In sea sand creeping and forming a mat, Singapore, Galang. Johor, Jambu Larang (Feilding). Pahang, East Coast rivers. Province Wellesley, Teluk Ayer Tawar. Kedah, Yan. Lankawi. Pulau Adang. Kelantan, River mouth (Ridley); Pulau Redang (Yapp).

#### 48. SPINIFEX, Linn.

Stiff, bushy or creeping grasses. Leaves long, stiff, narrow, glaucous pungent. Male panicle of 3 corymbs with membranous bracts at base. Spikelets sessile or sub-sessile, 2-flowered, not awned. Glumes I and II lanceolate, equal, empty. Glumes III and IV longer acuminate triandrous. Female inflorescence of one or two large heads of radiating bracts, very long pointed. Glumes as in male but larger; glume III empty or triandrous; glume IV female; styles 2. Species 4. All Australian but one.

(1) *S. squarrosus* Linn. Mant. ii. 300; Hook. fil. F.B.I. vii. 63; Ridl. Mat. iii. 147. Lamarck, Ill. t. 840.

Stems glaucous, about 12 in. long. Leaves 3 to 7 in. long, recurved. Male corymbs (terminal) 3 in. long, 4 in. wide. Spikelets nearly .5 in. long, pubescent. Female heads with very slender acuminate bracts, 6 in. long. Spikelets glabrous. *Hab.* Sandbanks along the shore on the east coast. Johor, Jambu Larang (Feilding). Pahang, Cherating and Pahang River mouths. Tringanu (Yapp). Kelantan, Kota Bharu. *Distrib.* India, Siam, Ceylon, Java, China.

The fruiting heads of this plant become detached when ripe, and are blown along the sand on the points of the bracts in a very curious way.

#### 49. ISACHNE, Br.

Perennial grasses with lanceolate leaves. Panicles of small sub-globose or pyriform spikelets, usually whitish, not articulate with the pedicels. Both flowers fertile or occasionally the lower one male only. Glumes 4, sometimes all separately deciduous. Glumes I and II convex thin ovate or elliptic sub-equal; glumes III and IV coriaceous indurate, smooth, yellow or white. These grasses resemble in habit some of the small-flowered *Panicums*, but the peculiar indurated glumes readily distinguish them. Species 30 or more, Asiatic.

Glumes I and II longer than glume IV.

Glume II longer than glume I, both softly hairy;  
leaves thin

Glumes I and II equal, glabrous; leaves rigid coriaceous

- (1) *I. semitalis*  
(2) *I. saxicola*

Glumes I and II about as long as glume IV.

Glumes III and IV equal and similar.

Panicle wide spreading; leaves 4 to 8 in. long . . . (3) *I. albens*

Panicle denser; leaves 2 in. long . . . (4) *I. javana*

Panicle dense; leaves broad hairy; spikelets pubescent . . . (5) *I. sylvestris*

Panicle small, wide; leaves ovate, 1 in. long, remote . . . (6) *I. rigida*

Glume III larger than glume IV, ovate flat; plant tall slender . . . (7) *I. australis*

Glume III shorter than glume IV; dwarf plant . . . (8) *I. miliacea*

(1) *I. semitalis* Ridl. *I. Kunthiana* Ridl. *Mat.* iii. 128 (not of Wight).

A slender creeping grass ascending to 9 in. tall. Leaves broad lanceolate, acuminate sub-acute, base very shortly narrowed, hairy, sheaths strongly white bearded on the edge, .5 to 1.25 in. long, .15 to .25 in. wide. Panicle 1 in. long, with few short branches .25 in. long or less, at first erect, later spreading. Spikelets .05 in. long, green. Glume I lanceolate; glume II longer, ovate-lanceolate, both closely ribbed and softly hairy; glumes III and IV much shorter, smooth ellipsoid, tips pubescent. *Hab.* In damp open spots in forests, along open streams and pathways. Not rare. Singapore, Selitar; Tanglin; Bukit Mandai. Johor, third mile from town. Selangor, Rantau Panjang (Kloss); Rawang. Dindings, Gunong Tungul (Ridley). *Distrib.* Borneo.

This species was referred by Hooker *F.B.I.* vii. 21 to *I. Kunthiana*, Wight, but it differs in the unequal size of glumes I and II and in their being much more closely ribbed and softly hairy. In *I. Kunthiana*, Wight, they are bristly, the bristles arising from a swollen base.

(2) *I. saxicola* Ridl. *I. javana* var. *saxicola* Ridl. *F.M.S. Mus.* vi. 196.

A tufted rigid plant, glabrous or hairy, 6 in. tall. Leaves coriaceous stiff, lanceolate acute, finely ribbed, no distinct midrib, edges at base at least when young white-ciliate, .5 to 1 in. long, .12 to 2 in. wide; sheaths .25 in. long. Panicle 2 to 3 in. long, of about 4 to 6 erect branches, glabrous. Spikelets 4 to 7 on a branch, sub-sessile, .08 in. long. Glumes I and II equal lanceolate, glabrous, obscurely 4-ribbed, green or purple; glumes III and IV semi-ellipsoid, pubescent, shorter. *Hab.* High mountains in cracks of rocks in streams at 6000 ft. altitude. Pahang, Gunong Tahan (Ridley).

var. *denticulata* Ridl. a stouter and taller plant, 9 in. tall. Leaves and sheaths very hairy, base of leaves on edges ciliate, the cilia rising from short processes on the leaf edge, and when fallen leaving the edge toothed. *Hab.* Perak, Gunong Kerbau (Robinson).

(3) *I. albens* Trin. *Sp. Gram. Ic. t.* 25; *Hook. F.B.I.* vii. 22; *Ridl. Mat.* iii. 128.

Culms solitary, erect, sometimes branched, geniculate, 1 to 2 ft. tall. Leaves linear-lanceolate acuminate, thin, base blunt, striate, midrib prominent, glabrous, 4 to 8 in. long, .5 in. wide.

Panicle 9 to 10 in. long, of very many spreading capillary branches frequently rebranched. Spikelets pale, and very small, ellipsoid. Glumes I and II elliptic-ovate blunt, white, smooth, glabrous; glumes III and IV very nearly as long, white, smooth. *Hab.* Mountains at 4000 to 5000 ft. altitude in exposed spots. Pahang, Gunong Tahan, at 4000 to 5000 ft. altitude. Selangor, Semangkok Pass (Ridley) to Fraser Hill (Burkill). Perak, Thaiping Hills on Gunong Hijau at 4600 ft. altitude (Wray, Curtis). *Distrib.* India, China, Malay isles.

(4) ***I. javana*** *Nees in Miq. Pl. Jungh.* 376; *Hook. fil. F.B.I.* vii. 24; *Ridl. Mat.* iii. 128.

Culms erect, solitary or 2 to 3 together, stiff, rather stout, 1 to 3 ft. tall. Leaves lanceolate acuminate, base cordate rigid striate, midrib narrow, edge thickened, 1.5 to 2 in. long, .25 to .3 in. wide, glabrous or hairy beneath, mouth and edge of sheaths ciliate. Panicle pyramidal, eventually spreading, of many capillary branches. Spikelets ellipsoid, blunt, pale, .05 in. long. Glumes I and II elliptic blunt, faintly ribbed, tips pubescent; glumes III and IV as long, ellipsoid, tips pubescent. *Hab.* Damp spots on mountains at from 3000 to 5000 ft. altitude. Malacca, Mount Ophir (Lobb, Hullett). Pahang, Gunong Tahan (Ridley). Perak, Gunong Terbakar, Cameron's Highlands (Henderson); Gunong Bubu (Wray); Gunong Batu Putih (Kunstler); Gunong Kerbau (Robinson); Gunong Inas (Yapp). Kelantan, Gunong Bintang (Kloss). *Distrib.* Burma, Borneo, Java.

(5) ***I. sylvestris*** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 206; *Mat.* iii. 129.

Culms stout, ascending, 9 in. tall. Leaves herbaceous, lanceolate acuminate, base broad, glabrous above, shortly rough hairy beneath, 3 in. long, .5 in. wide, edge thickened, sheaths hairy with long hairs from tubercles. Panicle 6 in. long, 3 in. wide, of numerous capillary branches and branchlets bearing one or two spikelets. Spikelets .06 in. long, ovoid-ellipsoid, shortly or long pedicelled. Glumes I and II elliptic, with few ribs, purple hairy; glumes III and IV elliptic as long, white, tip pubescent. *Hab.* In lowland woods, rare. Dindings at Telok Sera (Ridley).

(6) ***I. rigida*** *Nees in Steudl. Syn. Gram.* 75; *Hook. fil. F.B.I.* vii. 24.

Culms wiry slender, often branched at the top, 12 to 16 in. tall, fluted. Leaves remote, ovate to ovate-lanceolate acute, stiff nearly pungent, base cordate, edges serrulate, bristly, .5 to 1 in. long, .1 to .2 in. wide, sheaths shorter, .25 in. long. Panicle 1 to 2 in. long, branches spreading, .5 to .75 in. wide. Spikelets few, white, globose. Glumes I and II oblong blunt, glabrous or silky hairy; glumes III and IV semi-ellipsoid, as long. *Hab.* Sandy spots local. Kedah Peak at 3000 ft. altitude (Robinson). Setul Heath (Ridley). *Distrib.* Tenasserim, Nicobars, Borneo, Java.

(7) **I. australis** R. Br. *Prod.* 196; *Hook. fil. F.B.I.* vii. 24; *Ridl. Mat.* iii. 129.

Culms erect, rather slender, 8 in. to 4 ft. tall. Leaves rather thin, lanceolate striate, no distinct midrib, edges at base and sheath ciliate, 1.25 to 3 in. long, .25 in. wide. Panicle lax, pyramidal, 3 to 6 in. long, branches slender, spreading, about 1 in. long. Spikelets pear-shaped or globose, whitish, glabrous. Glumes I and II thin elliptic blunt, nearly equal; glume II slightly longer, glabrous or hairy at the tips; nerves inconspicuous; glume III longer, flat. *Hab.* Very common in open grass swamps. Whole Peninsula, Singapore, Tanglin; Changi. Johor, Bukit Murdom (Kelsall). Pahang, Pekan. Malacca (Cuming, Griffith); Ayer Panas. Perak, Thaiping (Wray); Kwala Kangsa; Grit (Burkill); Penang, Waterfall Gardens (Burkill). *Distrib.* Indo-Malaya, Australia, New Zealand. *Native name:* Rumput Minyak. *Use:* A highly valued fodder grass.

(8) **I. miliacea** Roth. *Nov. Pl.* 58; *Hook. fil. F.B.I.* vii. 25; *Ridl. Mat.* iii. 129.

Creeping ascending slender weak grass. Leaves ovate-lanceolate or lanceolate acute, base broad, hairy or glabrous, striate, no distinct midrib, .5 to 1.5 in. long, .2 in. wide, sheaths hairy on the edge. Panicle 1.5 to 2 in. long, branches slender, spreading, .25 in. long or less. Spikelets small, .05 in. long, usually glabrous. Glumes I and II thin elliptic blunt, obscurely nerved; glumes III and IV slightly longer, smooth; glume III shorter than glume IV. *Hab.* Damp spots in forest, on paths, abundant where it occurs, but not generally common, Singapore, Selitar; Bukit Timah. Pahang, Kwala Luit, Pahang River. Malacca, Sungei Hudang (Goodenough). Perlis, Kanga (a very small form with glumes III and IV pubescent). *Distrib.* Indo-Malaya, Australia, China.

## 50. ARUNDINELLA, Raddi.

Perennial grasses. Leaves narrow. Spikelets paniced, not jointed on pedicels, 1- or 2-flowered. Glumes 4. Glume I ovate acute or acuminate, rather shorter than glume II, which is lanceolate-acuminate or sub-aristate; glume III as long as glume I, oblong truncate, triandrous or neuter; glume IV much smaller, bisexual, oblong, membranous becoming subcoriaceous, with an awn, terminal geniculate, twisted at base. Styles 2; stigmas long. Grain free. Species about 30, tropics.

(1) **A. setosa** Trin. *Diss.* ii. 63; *Hook. fil. F.B.I.* vii. 70.

Grass 3 to 4 ft. tall. Leaves narrow linear acuminate, edges scabrid. Panicle over 1 ft. long, branches slender erect, many-flowered. Spikelets .1 in. long, brownish. Glumes I and II aristate-acuminate; glume III lanceolate blunt, truncate, shorter than glume I; glume IV half as long, awn very slender, .15 in. long.

*Hab.* Setul, Wang Bukit (Haniff). *Distrib.* India, Cambodia, China, Malaya.

### 51. ERIACHNE, Br.

Tufted wiry grasses with very narrow convolute leaves. Panicles lax. Spikelets few, 2-flowered, on long pedicels not articulate with them; rachilla jointed at base, not produced beyond glume IV. Glumes I and II equal, keeled, empty; glumes III and IV narrow stiff; usually awned. Stamens 2 or 3. Grain free within the glumes. Species about 24, all Australian except these 2.

Spikelets 1 in. long; glumes III and IV and palea awned (1) *E. trisetata*

Spikelets .25 in. long; palea not awned . . . . . (2) *E. pallescens*

(1) *E. trisetata* Nees in *Steud. Syn. Glum.* 237; *Hook. fil. F.B.I.* vii. 269; *Ridl. Mat.* iii. 172.

Stems 18 to 24 in. tall, slender. Leaves 4 to 6 in. long, mouth of sheath ciliate. Panicles 6 in. long. Spikelets with awns 1 in. long. Glume I lanceolate sub-aristate pubescent purple; glumes II, III and IV yellow, hard, silky pubescent, long awned. Palea awned. *Hab.* Sandy heaths and open spots, rare. Pahang at Pekan. Malacca at Pengkalan Bukit and Sungei Baru. Negri Sembilan, Port Dickson (Milsun). *Distrib.* Tenasserim and Ceylon.

(2) *E. pallescens* R. Br. *Prodr.* 184; *Hook. fil. F.B.I.* vii. 269; *Ridl. Mat.* iii. 172.

A tufted grass, 6 to 24 in. tall. Leaves glabrous, except sheathing leaves and mouth of sheath hairy. Panicles narrow or lax and spreading. Spikelets .25 in. long, purplish, hairy or glabrescent. Glumes III and IV villous, awns rather longer than glumes. Palea lanceolate with very short points, unawned. *Hab.* Common in dry exposed rocky or sandy spots. Singapore, Galang, etc., and islands in the south. Pahang, Pekan. Selangor Road, to Ginting Bidai; Klang Gates. Setul. *Distrib.* Chittagong, Nicobars, Cochinchina, Borneo to Australia.

### 52. PHRAGMITES, Trin.

Tall reeds with long narrow leaves. Panicle large decomposed. Spikes 3- to 7-flowered, jointed on the pedicels; rachilla jointed between the flowering glumes, white-silky. Glumes glabrous, membranous, pale to purple. Glumes I and II unequal, lanceolate, 3-nerved; glume III much longer, lanceolate acute, male or barren. Flowering glumes much narrower, subulate. Species 1, almost the whole world.

(1) *Ph. communis* Trin. *Fund. Agrost.* 134. *P. Karka* Trin. ex *Steud. Nom. Ed.* iii. 324; *Hook. fil. F.B.I.* vii. 304; *Ridl. Mat.* iii. 175. *Arundo Roxburghii* Kunth. *Enum. Rev. Gram.* i. 79; *Griff. Notulæ*, iii. 47;  *Ic. Pl. As. t.* 139, fig. 243.

Stems 10 to 12 ft. tall, .25 to .5 in. through. Leaves linear

acuminate, bases broad, 18 in. long, 1 in. wide or narrower. Panicle over 1 ft. long, pale or brownish purple. Spikelets .5 in. long. *Hab.* Common on river banks. Johor, Bukit Murdom (Kelsall); Sempang Kiri, Batu Pahat. Pahang River at Pulau Chengei and Pulau Tawar. Malacca, Merlimau (Derry); Panchur (Goodenough). Selangor, Kwala Lumpur. Penang, Ayer Hitam (Curtis). Lankawi islands, Dayong Bunting (Robinson). Setul. Perlis, Kanga. Kelantan, Kwala Aring (Yapp). Jalor, Biserat (Gwynne Vaughan). *Native name*: Gudabong.

I cannot distinguish the Asiatic form *P. Karha*, Trin., from the common temperate-region reed *P. communis*, Trin.

### 53. THYSANOLÆNA, Nees.

A large tufted reed, culms solid. Leaves broad lanceolate. Panicle very large, lax pendent; branches numerous, slender, bearing very numerous short spikes. Spikelets dense, sub-secund, pedicelled, purple. Glumes I and II short ovate sub-equal; glume III lanceolate acuminate, thrice as long; glume IV shorter, lanceolate, covered with long white hairs. Stamens 2 or 3. Grain minute, free. Species 1, Indo-Malaya.

(1) *Th. agrostis* Nees, *Edinburgh Phil. Journ.* xviii. 180; *Hook. fil. F.B.I.* vii. 61; *Ridl. Mat.* iii. 143. *T. acarifera* Arn. and Nees, *Nov. Act. Cur.* xix.; *Supp.* i. 181.

Culms stiff, 8 to 12 ft. tall. Leaves rigid, 18 to 24 in. long, 3 to 4 in. wide, sheaths 1 to 1.25 in. long. Panicle 2 ft. long. Spikes .5 in. long. Spikelets .01 in. long, hairy. Glumes I and II round, very short; glumes III and IV lanceolate, hairy, purple, withering light brown. *Hab.* Abundant on dry banks in the hills, at 1000 ft. altitude and upwards. Negri Sembilan, Bukit Tangga. Selangor, Semangkok Pass (Machado). Perak, Hermitage Hill. Penang Hill (Curtis and all collectors). Lankawi, Dayong Bunting (Robinson). *Native name*: Buluh Tubaro.

### 54. SPHÆROCARYUM, Nees.

A dwarf creeping and ascending grass with leafy stems. Leaves ovate-cordate amplexicaul. Spikelets minute, in a close obpyramidal panicle of very slender branches; rachilla not prolonged beyond glume III, jointed at base. Glumes 3. Glumes I and II short; glume I rounded; glume II longer, oblong, glabrous; glume III hairy, ovate; palea as long, hairy. Stamens 3. Seed ovoid free. Species 1, Indo-China, Cambodia.

(1) *S. elegans* Nees, *Steud. Nom.* ii. 260; *Hook. fil. F.B.I.* vii. 246; *Ridl. Mat.* iii. 170.

Stems slender, 3 to 6 in. long. Leaves .25 to .5 in. long, .1 to .3 in. wide, base of sheaths ciliate, blade glabrous or hairy on edges. Panicle .75 to 1 in. long, branches numerous, capillary;

spikelets pale green, ovoid. *Hab.* In wet muddy spots in grassy paths in woods or forests. Singapore, Ang Mo Kio; Kranji. Johor, Kota Tinggi. Malacca (Koenig); Bukit Bruang (Derry); Ayer Panas. Selangor, Semangkok Pass. Dindings, Lumut. Perak, Maxwell's Hill, at 4000 ft. altitude (Burkill). Penang, Waterfall (Ridley).

This plant has quite the habit of a small *Isachne*, but with quite different spikelets. The Peninsula form is smaller in all parts than the Indian one.

### 55. GARNOTIA, Brongn.

Tufted grasses. Leaves flat or convolute. Spikelets in slender panicles of racemes, usually strict, solitary or paired, jointed on pedicels; rachilla not produced beyond the flowering glumes. Floret 1. Glumes narrow lanceolate; glumes I and II 3-nerved, acuminate or awned; glume III broader, with a long geniculate awn from the top in the notch. Grain linear. Species about 20, Asia, Polynesia.

(1) *G. stricta* Brongn. in *Duperr. Voy. Bot.* 132, t. 21; *Hook. fil. F.B.I.* vii. 243.

Tufted grass 6 to 15 in. tall. Leaves 3 in. long, very narrow-linear. Panicle narrow, 3 to 6 in. long. Racemes appressed, .5 to 1 in. long. Spikelets pale green, .1 to .12 in. long. Glumes I and II acuminate; glume II sometimes awned; glume III awned. Awn .5 in. long. *Hab.* Growing in cracks of rocks in streams in the mountains. Pahang, Telom River at 4000 ft. altitude (Ridley). Kwala Teku, Tahan River (Seimund). Perak, Gunong Inas, Sira Rimau (Yapp). Kedah Peak (Robinson). *Distrib.* India to Sandwich isles.

Our form here is the var. *brevi-aristata*, Stapf., with no awns to glumes I and II, and very narrow leaves.

### 56. ARISTIDA, Linn.

Annual or perennial grass. Spikelets paniced, 1-flowered, rachilla articulate at base. Glumes 3. Glumes I and II empty, very narrow, keeled, persistent; glume III narrow rigid cylindrical convolute acuminate, tip produced into a long tripartite awn, twisted below the branches. Grain narrow, free. Species about 100, all warm dry countries.

(1) *A. adscensionis* Linn. *Sp. Pl.* 82; *Hook. fil. F.B.I.* vii. 224.

A stiff wiry grass about 3 ft. tall; culms slender. Leaves very narrow scattered on culm, about 1 ft. long. Panicle dense, 6 in. long, contracted, sub-simple or compound, branches very short with fascicles of spikelets. Spikelets pale green, about .25 in. long, very narrow. Awn-branches very fine, 1 in. long. *Hab.* Rare. Setul on heaths (Ridley). *Distrib.* Most warm countries.

## 57. ZOYSIA, Willd.

A small tufted glabrous grass, culms leafy, branched. Leaves subulate pungent. Panicle slender, spiciform. Spikelets very small, 1-flowered, lanceolate or ovoid, pedicelled. Glume I coriaceous-lanceolate involute; glume II shorter and narrower, thin; glumes III and IV absent. Stamens 3. Species 1, Mauritius, tropical Asia and Australia.

(1) **Z. pungens** Willd. *Ges. Natur. fr. Neue Schrifte*, iii. 441; *Hook. fil. F.B.I.* vii. 99; *Ridl. Mat.* iii. 149.

Culms wiry, often matted, 3 to 12 in. long. Leaves .5 to 1.5 in. long. Panicle .5 to 1 in. long. Glume I pale green, edges darker, or violet, pubescent. *Hab.* Very common, especially in sandy spots, often forming a dense turf variable according to locality, taller and softer in wet places. Singapore, Balestier plain; Tanjong Ru. Johor, Hulu Sedili (Kelsall). Malacca, Tanjong Kling and town. Pahang, Kwala Pahang (Ridley).

## 58. PEROTIS, Ait.

A short creeping grass with broad lanceolate leaves. Spikelets in a single terminal spike, shortly pedicelled or sub-sessile, 1-flowered. Glumes I and II empty, tapering into long awns; glume III minute paleate; glume IV absent. Species 1, tropical Africa, Asia and Australia.

(1) **P. latifolia** Ait. *Hort. Kew*, i. 85; *Beauv. Agrost. t.* 4, fig. 9; *Hook. fil. F.B.I.* vii. 98; *Ridl. Mat.* iii. 149. P. rara R. Br. *Prodr.* 172.

Stems 3 to 12 in. tall. Leaves .25 to .75 in. long, .12 to .13 in. wide, base broad, ciliate, tip acute. Spike 3 to 5 in. tall. Spikelets purple, nearly .5 in. long with the awns. *Hab.* Sandy places chiefly near the sea. Singapore, Changi. Pahang, Kwala Pahang. Malacca, Bukit Sabukor. Penang, Tanjong Bunga (Curtis). Kelantan, Kota Bharu. Tringganu (Yapp).

## 59. SPOROBOLUS, Br.

Perennial, rarely annual, grasses. Leaves narrow. Spikelets very small, 1- (rarely 2-) flowered, in spreading or compact panicles. Glumes I and II unequal; glume III longer or shorter, 1-nerved; glume IV absent. Stamens 2 or 3. Grain loose within the glume and palea; pericarp deciduous. Species about 80, mostly tropical.

Perennials; glumes I and II much shorter than glume III.

- |  |                          |
|--|--------------------------|
| Stem slender, wiry; panicle pyramidal . . . . .                        | (1) <b>S. diander</b>    |
| Stem stout; branches of peduncle appressed; spikelets larger . . . . . | (2) <b>S. indicus</b>    |
| Annual; glume II longer than glume III; spike dense. . . . .           | (3) <b>S. piliferus</b>  |
| Annual; glume II as long as glume III; spike spreading . . . . .       | (4) <b>S. pulchellus</b> |



(1) **S. diander** Beauv. *Agrost.* 25; *Jacq. Eclog. Gram. t.* 28; *Griff. Notulæ*, iii. 46;  *Ic. Pl. As. t.* 149, fig. 2; *Hook. fil. F.B.I.* vii. 247; *Ridl. Mat.* iii. 170.

A tufted grass forming tussocks. Culms 1 to 2 ft. tall, slender, very tough. Leaves very narrow, 6 in. long. Panicle narrowly pyramidal or dense, 8 to 12 in. long, branches very slender, capillary. Spikelets lanceolate, green, .05 in. long, sessile, short-pedicelled. Glumes I and II sub-equal oblong truncate erose; glume III much longer, lanceolate acuminate. Grain oblong truncate, flattened, brown. *Hab.* Very common on the roadsides and dry spots. Whole Peninsula. Singapore, Kalang; Reservoir. Johor, Tana Runto. Malacca, Ayer Panas (Cantley). Negri Sembilan, Tampin. Selangor, Kwala Lumpur. Dindings, Lumut. Perak, Gunong Pondok Pass (Burkill). Penang Gardens. *Distrib.* Tropical Asia and Australia. *Native name*: Rumput Tuloh Belalang.

(2) **S. indicus** R. Br. *Prodr.* 170; *Hook. fil. F.B.I.* vii. 247; *Ridl. Mat.* iii. 171.

A tussock grass. Culms 2 to 3 ft. tall, fairly stout, tough. Leaves usually long, 8 to 24 in. long, rarely .3 in. wide. Panicle 18 in. long or more, compact narrow; branches densely covered with spikelets, pale, .06 to .08 in. long. Glumes I and II obtuse or glume II acute; glume III lanceolate acute. *Hab.* Dry open spots, much less common than *S. diander*. Singapore near Mount Faber. Johor, Jambu Larang (Feilding). Pahang, Pekan. Malacca, Pengkalan Bukit. Dindings, Lumut. Penang Gardens. *Distrib.* All warm countries.

A more robust plant than *S. diander*, forming large tussocks, with longer panicles and larger, paler, more crowded spikelets.

(3) **S. piliferus** Kunth. *Enum. Pl.* i. 211; *Hook. fil. F.B.I.* vii. 171. *Vilfa pilifera* Trin. *Diss.* i. 157; *Sp. Gram. Ic. t.* 58.

Annual grass, 3 to 12 in. tall. Leaves chiefly at the base, hairy, serrulate, 1 to 4 in. long. Panicle linear, branches very short, 1 to 3 in. long. Spikelets .05 in. long, brown. Glume I lanceolate; glume II oblong-lanceolate; glume III oblong, twice as long as glume I. *Hab.* Very rare. Once collected by D. F. Hervey in Malacca. *Distrib.* India.

(4) **S. pulchellus** Br. *Prodr.* 170; *Hook. fil. F.B.I.* vii. 252.

Annual grass 6 to 12 in. tall. Leaves narrow lanceolate acuminate, distantly spinulose, ciliate on the edges, 2 to 5 in. long, .1 in. wide at the rounded base; ligule 0. Panicle 4 to 6 in. long. Peduncle slender, 6 in. long, in distant whorls, capillary, few-flowered. Glumes greenish hyaline. Spikelets .05 in. long. Glume I half as long as glume II, narrow acuminate; glume III as long as glume II, ovate acuminate. Grain oblong, brown. *Hab.* Terutau, Telok Wau (Robinson, 6398). *Distrib.* India and Australia.

## 60. MYRIOSTACHYA, Hook. fil.

A tall perennial grass with long linear leaves. Panicle dense, of very numerous short solitary or fascicled branches. Spikelets 4- to 20-flowered, pale on scabrid pedicels jointed at the base. Glumes I and II short ovate-lanceolate, keeled and awned. Flowering glumes coriaceous ovate cuspidate keeled. Palea nearly as long. Species 1. India, Ceylon and Malay Peninsula.

(1) *M. Wightiana* Hook. fil. *F.B.I.* vii. 327. var. *longispicula* Ridl. *Mat.* iii. 180. *Eragrostis Wightiana* Benth. *l.c. Pl.* xiv. 62, t. 1381.

Stems 6 to 10 ft. tall, rather stout. Leaves 2 ft. long, .25 in. wide, smooth. Panicle 1 ft. long, branches 1.25 in. long. Spikelets .25 to .5 in. long. Flowers 8 to 20; rachilla flexuous. Glumes I and II short with longer awns. Flowering glumes hardly awned. Palea boat-shaped. *Hab.* Rare and local in sea mud. Penang, Telok Bahang. Province Wellesley near Prai. *Native name:* Rumput Laut.

## 61. ERAGROSTIS, Beauv.

Annual or perennial glabrous grasses of no great size, with narrow leaves and a lax or dense panicle of many-flowered spikelets laterally compressed, ovate, oblong or linear; rachilla produced articulate or not between the glumes. Glumes many distichous, thin, unawned; glumes I and II empty. The flowering glumes 3-veined; callus 0. Species about 100, whole world in warm regions.

§ 1. *Cataclastos*. Rachilla of spikelets articulate, breaking up from above downwards.

Small weak plants.

Spikelets very small, .05 in. long; glume II twice as long as glume I (1) *E. tenella*

Spikelets .1 in. long, brown, viscid; glumes I and II nearly equal (2) *E. viscosa*

Tall stiff plant 2 to 3 ft. tall; glumes I and II ovate boat-shaped, sub-equal (3) *E. interrupta*

§ 2. *Pteroessa*. Rachilla persistent. Glumes falling from the base upwards.

Annuals; spikelets ovate or oblong.

Glumes with prominent nerves; palea caducous (4) *E. amabilis*

Glumes with inconspicuous nerves; palea persistent (5) *E. malayana*

Annual; spikes linear (6) *E. pilosa*

Tall perennials.

Flowering glumes pale green, sides flat (7) *E. elongata*

Flowering glumes dark grey, sides convex (8) *E. elegantula*

(1) *E. tenella* Roem. and Schult. *Syst.* ii. 576; *Stapf. in Hook. fil. Fl. Brit. Ind.* vii. 315; *Ridl. Mat.* iii. 179. *E. plumosa* Link, *Enum. Hort. Berol.* i. 192.

Perennial grass very variable, usually slender, many-culmed, 6 to 12 in. tall. Leaves linear or lanceolate-linear, mouth of sheath ciliate. Panicle 2 to 3 in. long, spreading branches .25 to 1 in. long.

Spikelets .05 in. long, pale green tinted violet. Glume I very short ovate; glume II twice as long. Flowering glumes 3 or 4, ovate obtuse. *Hab.* Waste ground, paths and gardens. Common, whole Peninsula. Singapore, Gardens; Changi; Pulau Ubin. Pahang Pekan, Malacca (Griffith); Tanjong Kling; Ayer Panas (Cantley). Selangor, Port Swettenham. Penang, Fort Cornwallis (Curtis). Kelantan, Kamposa. *Distrib.* India and Siam (Burkill). *Native name*: Rumpul Tulong Belalang.

(2) ***E. viscosa*** *Trin. Mem. Acad. Petersb. Ser. vi. 1. p. 297; Ridl. Mat. iii. 177.* *E. tenella* var. *viscosa* *Stapf. in Hook. fil. F.B.I. vii. 315.*

Small tufted grass, long rooted, viscid, culms geniculate ascending or erect, 6 to 9 in. tall. Leaves narrow, 1 to 3 in. long, sheath-mouth bearded. Panicle 1 to 2 in. long, dense, branches crowded. Spikelets about twice as big as those of *E. tenella*, brown, viscid. Glumes I and II nearly equal. Flowering glumes 4 to 16. *Hab.* Sandy places near the sea, local but abundant. Singapore, Changi. Province Wellesley, Teluk Ayer Tawar. Penang at Dato Kramat. *Distrib.* India, Java, Africa.

Very distinct from *E. tenella* in appearance, and undoubtedly wild here, which I doubt if *E. tenella* is.

(3) ***E. interrupta*** *Beauv. Agrost. 71* (not *Roem.* and *Schultes* nor *Trin.*); *Stapf. in Hook. fil. F.B.I. vii. 178; Ridl. Mat. iii. 178.* *E. nutans* *Nees in Steud. Nom. Ed. ii. 1, p. 563.* *E. diplachnoides* *Steud. Syn. Gram. 268.*

A perennial grass 2 to 3 ft. tall. Leaves 1 ft. long, .25 in. wide, linear acuminate. Panicle variable, stiff and interrupted or lax, over 1 ft. long, branches short 1.5 to 3 in. long separate or sub-whorled. Spikelets .12 in. long, brown, pedicelled; rachilla breaking up from top downwards. Glumes I and II ovate sub-equal. Flowering glumes 6 to 12, longer, ovate obtuse. *Hab.* Rare on sandy heaths. Pahang, Pekan, and Setul Heath (Ridley). *Distrib.* India and Africa.

The variety here is var. *diplachnoides*, *Stapf. l.c.*, with a long lax panicle of not-whorled branches.

(4) ***E. amabilis*** *Wight and Arn. in Hook. and Arn. Beechey's Voyage, 251; Stapf. in Hook. fil. vii. 317.* *E. utrioides* *Nees in Steud. Syn. Gram. 264.* (Fig. 224, p. 247.)

A pretty annual grass 6 to 18 in. tall, slender. Leaves linear acuminate, 2 to 4 in. long, .25 in. wide or less, flaccid, glabrous except for a few hairs on the sheath mouth. Panicle finally wide-spreading, branches separate. Spikelets flat, ovate to oblong, .12 to .5 in. long, pale to rose pink; rachilla persistent. Glumes falling off with the paleas from the base upwards. Flowering glumes 20 to 50, close-set, keeled, boat-shaped with two green raised ribs on each side. *Hab.* Very common in waste ground on paths and open

country, variable in colouring. Spikelets dark pink in sunny places, pale whitish in the shade. Whole Peninsula from Singapore to Kelantan and Penang. *Distrib.* Tropical Asia. *Native name:* Rumput Kulam Padang.

(5) *E. malayana* Stapf. in *Hook. fil. F.B.I. vii. 317*; *Ridl. Mat. iii. 178*.

Annual grass 7 to 18 in. tall, very closely resembling *E. amabilis* but the spikelets are always pale whitish, rather smaller, .1 in. long, ovate or linear-oblong, the sides convex with no raised ribs. Glumes I and II unequal. *Hab.* Waysides and waste ground. Probably not rare, but difficult to distinguish from *E. amabilis*, except by the absence of nerves on the glumes, not visible without a lens. Singapore and islands around. Malacca town (Hervey, Ridley). Pahang, Pekan. Selangor, Weld's Hill (Burkill). Perak, Thaiping (Wray). *Distrib.* Borneo and Bangka.

(6) *E. pilosa* Beauv. *Agrost. 71*; *Stapf. in Hook. fil. F.B.I. vii. 323*; *Ridl. Mat. iii. 179*.

A weak tufted annual 3 to 6 in. tall. Leaves 3 in. long or more, very narrow linear acuminate; sheath mouth long ciliate. Panicle variable, 3 to 6 in. long, very lax, branches filiform, 1 to 2 in. long, glabrous (rarely hairy) subwhorled. Spikelets .12 to .2 in. long, linear, grey, from 5- to 12-flowered; rachilla flexuous. Glumes I and II hyaline, deciduous. Flowering glumes ovate acute, keel scabrid. Palea narrow persistent, keels ciliate. *Hab.* A weed of cultivation, common. Singapore, Gardens. Johor (Feilding). Selangor, Batu Caves. Penang (Ridley). *Distrib.* Most warm countries.



FIG. 224.—*Eragrostis amabilis*.

(7) *E. elongata* Jacq. *Eclog. Gram.* 3, t. 3; *Stapf. in Hook. fil. F.B.I.* vii. 319; *Ridl. Mat.* iii. 179. *E. Browneana* Nees, *Nov. Act. Cur.* xix.; *Suppl.* i. 205.

A tall slender perennial 10 to 18 in. high. Leaves 1.5 to 3 in. long, very narrow, sheath-mouth ciliate. Panicle very variable, 3 to 6 in. long, branches usually simple, 1 in. long or less. Spikelets .12 in. long, shortly pedicelled. Glumes I and II lanceolate keeled sub-equal, tinted violet. Flowering glumes 10 to 25, ovate lanceolate, pale green, keel and a rib on each side dark green, tip violet. *Hab.* Common in waste ground and grass plots. Whole Peninsula from Singapore to Lankawi, Tringganu, and Setul. *Distrib.* Tropical Asia and Australasia. *Native name:* Rumput Kutu Kerbau (buffalo-tick grass).

A dwarf form 3 in. tall occurred on paths, at Klang Gates, Selangor (Burkill).

(8) *E. elegantula* Steud. *Syn. Gram.* 266; *Stapf. in Hook. fil. F.B.I.* vii. 318; *Ridl. Mat.* iii. 179.

A perennial grass, stiff, 2 to 4 ft. tall. Leaves acuminate linear, 3 to 7 in. long. Panicle nodding, 3 to 6 in. long; branches 2 in. long, usually sub-erect scabrid. Spikelets .25 in. long, dark grey. Glumes I and II sub-equal ovate keeled, scabrid. Flowering glumes ovate acute viscid, sides convex, side-nerves raised. *Hab.* Common in open spots, by streams and on heaths, Singapore, Chasseriau Estate. Malacca (Hervey). Selangor, Weld's Hill. Kwala Lumpur (Burkill). Pahang, mouth of river. Perak, Thaiping. Ipoh, Lahat Road (Burkill). Penang Gardens (Burkill). Kelantan, Kamposa. Setul Heath (Ridley). *Distrib.* India.

## 62. LEPTOCHLOA, Beauv.

Annual grasses. Leaves lanceolate or linear. Panicle of slender spike-like branches bearing numerous small spikes, shortly pedicelled or sessile. Spikelets 1- to many-flowered; rachilla slender, produced among the flowering glumes, articulate at base. Glumes 3 or more, thin. Glumes I and II unequal, lanceolate; glume III and others following 3-nerved. Species 12, tropics and sub-tropics of both hemispheres.

Slender plant; spikes 2 to 3 in. long; spikelets 2- or 3-flowered

(1) *L. polystachya*

More robust plant; spikes 2 to 4 in. long; spikelets 4- to 6-flowered

(2) *L. chinensis*

(1) *L. polystachya* Benth. *Fl. Austral.* vii. 617; *Hook. fil. F.B.I.* vii. 298. *L. filiformis* R. and S. *Syst.* ii. 580; *Hook. fil. F.B.I.* vii. 298.

Stem 2 to 3 ft. tall, geniculate. Leaves flaccid, 4 to 10 in. long, .25 in. wide, acuminate. Panicle 6 to 9 in. long. Spikes very slender, 3 in. long. Spikelets pale green, very small, 1- or 2-flowered. Glumes I and II unequal, ovate-lanceolate acute;

glume III shorter, broad ovate sub-acute. Grain oblong, deeply grooved on one side. *Hab.* Local in open ricefields in the north. Perlis, Kanga. Kedah, Alor Sta (Ridley). *Distrib.* South India and Ceylon.

(2) **L. chinensis** Nees, *Syll. Ratisb.* i. 4; *Agrost. Bras.* 432; *Hook. fil. F.B.I.* vii. 299; *Ridl. Mat.* iii. 175.

A weak plant; stem geniculate, 2 to 3 ft. tall, rather thick. Leaves linear acuminate, 6 to 18 in. long, .2 in. wide, glabrous. Panicle 6 to 10 in. long, branches 2 in. long, slender, sub-erect or spreading. Spikelets pedicelled, .1 in. long, flowers 4 to 6; rachilla flexuous. Glumes I and II lanceolate; glume III and following ovate obtuse, 3-nerved pubescent. *Hab.* In ditches and rice-fields, an aquatic grass, Singapore, Yo Chu Kang. Pahang, Pulau Tawar; Kwala Tembeling. Kelantan, Kamposa. Perak, Bagan Serai (Burkill). Penang, Bagian Jennal (Curtis). Setul heath. *Distrib.* India, Siam, China, Malaya and Australia.

### 63. DINEBRA, Jacq.

Annual grass. Leaves flat. Spikelets 2- or 3-flowered, crowded in two rows on one side of slender spreading spikes in a raceme; rachilla slender, jointed at the base and produced beyond the flowering glumes with an imperfect flower. Glumes 4; glumes I and II empty, much longer than glumes III and IV, lanceolate, awned, keeled; glume III small, broad ovate, 1-nerved. Grain ovoid. 1 species, Africa and India.

(1) **D. arabica** Jacq. *Fragm.* 77, t. 121, fig. 1; *Beauv. Agrost.* 98, t. 16, fig. 3; *Hook. fil. F.B.I.* vii. 297.

Whole plant about 7 to 18 in. tall, leafy. Raceme 3 to 5 in. long. Spikes .25 to 1 in. long. Spikelets 1, green or purplish, at first erect, after deflexed. *Hab.* Selangor, 2 specimens at Port Swettenham, no doubt introduced accidentally by Tamils (Burkill).

### 64. CYNODON, Pers.

Perennial creeping grasses, with narrow linear leaves and slender erect culms with 3 to 6 terminal spreading slender spikes. Spikelets very small, in one or two rows, not jointed at the base. Rachilla jointed at the base, not produced beyond glume III. Glumes 3, unawned. Glumes I and II short empty, a quarter of the length of glume III, thin nerved. Species 4, 1 cosmopolitan, the others Australian.

(1) **C. dactylon** Pers. *Syn.* i. 85; *Hook. fil. F.B.I.* vii. 288; *Ridl. Mat.* iii. 173.

Stems long-creeping. Leaves glaucous, .5 to 1.5 in. long. Spikelets .06 in. long, green or purple, imbricating. *Hab.* Dry sandy spots, seashores, coconut plantations, etc., abundant over the whole Peninsula. Singapore, Changi; Tanjong Katong. Pahang, Pulau Tawar; Pekan. Malacca Hill. Negri Sembilan,

Tampin. Selangor, Port Swettenham (Burkill). Penang, Sepoy lines (Curtis). *Distrib.* All tropical and sub-tropical countries.

### 65. CHLORIS, Sw.

Perennial grasses; leaves linear. Spikes 1 or several, fascicled, terminal; spikelets in one or two rows, 1-flowered; rachilla prolonged beyond glume III and bearing 2 empty glumes. Glumes 3. Glumes I and II the smallest. Species about 40, all parts of the world.

(1) *Ch. barbata* Sw. *Fl. Ind. Occ.* i. 200; *Hook. fil. F.B.I.* vii. 292; *Ridl. Mat.* iii. 173.

Stems creeping ascending to 1 ft. or more, geniculate. Leaves 3 to 8 in. long, edges and keel scabrid, tufted at the base. Spikes fascicled, 5 to 20, purple, 1.5 to 3 in. long; rachis scabrid. Spikelets crowded, .1 to .12 in. long without the awns. Glumes I and II lanceolate acute, purple or green; glume III ovate, edge ciliate, awn .25 to .3 in. long. Rachilla rather thick, prolonged with 2 semi-globose awned glumes. *Hab.* Docks and wharves, doubtless introduced but well established. Singapore Harbour. Johor, Sawmills. Selangor. Port Swettenham (Burkill). Province Wellesley, Batu Kawan. Penang, Fort Cornwallis (Burkill). *Distrib.* All the tropics.

### 66. ELEUSINE, Gaertn.

Annual or perennial grasses, with narrow linear leaves, and digitate or whorled terminal spikes, laterally compressed. Spikelets sessile secund in two or three rows, 3- to 12-flowered, all but the terminal ones perfect; rachilla continuous between the glumes. Glume I lanceolate; glume II ovate-lanceolate, awned or not. Species about 7, all warm countries.

(1) *E. indica* Gaertn. *Fruct.* i. 8; *Hook. fil. F.B.I.* vii. 293; *Ridl. Mat.* iii. 174.

Annual grass. Stems erect, 1 to 3 ft. tall or less, glabrous. Leaves up to 1 ft. long, and .25 in. wide. Spikes 5 to 10, whorled, light green, spreading or sub-erect, 3 to 6 in. long. Spikelets .4 to .8 in. long, 3- to 5-flowered. Glumes membranous, pale green with darker veins. Glume I oblong-ovate; glume II twice as big, acute, keeled. Grain oblong, pericarp loose, seed tubercled in waved ridges. *Hab.* Common in waste ground, etc., all over the Peninsula as it is all over the tropics. *Native name:* Rumput Sambau.

The cultivated form var. *coracana*, Gaertn., *Fruct.* i, 8, t. 1, a stouter and broader-leaved form, with spikes 6 in. long and .5 in. thick and globose grain, occurs occasionally in waste ground or near Tamil cultivation, at Kwala Lumpur and elsewhere.

### 67. DACTYLOCTENIUM, Willd.

Creeping grasses with ascending branches. Leaves linear. Spikes 2 to 5, digitate; spikelets very many in several rows; rachis

prolonged to a short point. Glume I boat-shaped; glume II ovate awned. Seed orbicular tubercled. Species several, chiefly Africa.

**D. ægyptiacum** Willd. *Enum. Hort. Berol.* 1029. Eleusine ægyptiaca Desf. *Fl. Atlant.* i. 85; *Hook. fil. F.B.I.* vii. 295; *Griff. Notulæ*, iii. 51; *IC. Pl. As. t.* 139; *Ridl. Mat.* iii. 174. *E. cruciata* Lam. *Ill.* i. 203, t. 48, fig. 2.

Stem elongate creeping, ascending portion 6 to 12 in. tall, geniculate slender. Leaves hairy, 3 in. long, .12 in. wide. Spikes 2 to 5 digitate, 1 in. long, thick, bearded at the base. Spikelets very many in several rows, .1 to .12 in. long, flattened, 3- or 4-flowered; rachis triangular. Glume I boat-shaped acute keeled; glume II ovate awned, awn as long as glume or shorter. Seed orbicular tubercled. *Hab.* In sandy spots especially near towns, not rare. Singapore, Gelang; Holland Road. Pahang River, Pekan; Leban Chondong, Rumpin River (Evans). Selangor, Kwala Lumpur. Province Wellesley, Telok Ayer Tawar. Penang Waterfall (Curtis). Tringganu (Yapp). *Distrib.* All warm countries.

### 68. TRIRAPHIS, R. Br.

Tall slender reed, with long linear leaves (or shorter wiry grasses). Panicle long lax decompound. Spikelets small laterally, compressed, pedicelled; rachilla short, bearded with a few hairs below the flowering glumes, jointed at the base above the barren glume and between the flowering glumes. Glumes I and II unequal lanceolate empty; glume III empty. Flowering glumes lanceolate subulate with two very short points on each side of the awn, back ciliate. Species several, chiefly Australian.

(1) **T. madagascariensis** Stapf. *MSS.* Neyraudia madagascariensis Hook. *fil. F.B.I.* vii. 305; *Ridl. Mat.* iii. 175. *Arundo madagascariensis* Kunth. *Rev. Gram.* i. 273.

Stems 6 to 12 ft. long, solid, .12 to .5 in. through. Leaves 1 to 2.5 ft. long, .5 in. wide, bases broad. Panicle nodding, 2.5 to 3 ft. long, branches very slender, 6 to 9 in. long. Spikelets long narrow, pale, 4- to 8-flowered. *Hab.* Damp rocky spots. Malacca. Selangor (Cantley). Negri Sembilan, Seremban. Perak, Thaiping Waterfall. Penang Hill, Ayer Hitam (Curtis). Lankawi isles. *Distrib.* Siam, Malay islands. *Native name*: Rumput Mata Burong Puding.

### 69. ORYZA, Linn.

Tall annual or perennial grasses. Leaves linear. Spikelets 1-flowered in racemes or loose panicles, disarticulating from the pedicels, laterally strongly compressed. Glumes 3. Glumes I and II minute or absent; glume III oblong hard keeled, 5-nerved, awned or awnless. Palea linear coriaceous, edges membranous. Stamens 6. Grain narrow-oblong compressed, closely invested or adnate to the glume. Species 5 or 6, tropical Asiatic.



Padi (*Oryza sativa*, Linn.), a native of India, is extensively cultivated here in many forms.

Glume III strongly ciliate; leaves narrow . . . . .	(1)	<b>O. fatua</b>
Glume III keeled not ciliate; leaves broad . . . . .	(2)	<b>O. Ridleyi</b>
Glume III armed with white cilia; leaves broad . . . . .	(3)	<b>O. latifolia</b>

(1) **O. fatua** *Koen. Trin. Mem. Acad. Petersb. Ser. 6, ii. 11, p. 177.*

Tall rather slender grass, with narrow leaves. Panicle about 6 in. long; spikelets few, rather distant, .18 in. long, peduncles shorter, slender. Glumes I and II very short lanceolate acuminate; glume III minutely granular, strongly spined along edges. Awn long, .25 in. long. *Hab.* Selangor, Klang (Burkill).

var. *longe-aristata*, a form with much less spiny glumes and awn 3 in. long. *Hab.* Malacca, Batu Berendam (Burkill).

These plants are perhaps the original wild form of *Oryza sativa*, L., but are more likely reversions of cultivated rice to the wild state. The long-awned form is the plant described as *Oryza sativa* in *Hook. fil. F.B.I. vii. 92*, wild in India.

(2) **O. Ridleyi** *Hook. fil. F.B.I. vii. 93; Ridl. Mat. iii. 148.*

A weak grass 3 to 4 ft. tall. Leaves linear acuminate, 6 to 14 in. long, .25 to 1 in. wide, glabrous; ligules ciliate. Panicle 6 to 12 in. long, nodding, with parallel, slender branches 4 to 6 in. long, alternate or sub-opposite. Spikelets .25 in. long exclusive of awn. Glumes I and II setaceous scabrid; glume III boat-shaped keeled spinulose, awn nearly as long. Palea keeled spinulose not awned. *Hab.* In waste meadows and wet shady spots by rivers. Johor, Tebing Tinggi and Kwala Sembong. Pahang, Pekan. Malacca, Chabau; Tebong, river bank (Ridley). Selangor, Kajang Road. Perak, Kwala Kangsa (Ridley). *Distrib.* Borneo.

(3) **O. latifolia** *Desv. Journ. Bot. i. (1813) 77; Ridl. Mat. iii. 148.*

Culms 2 to 3 ft. tall. Leaves 14 in. long, .5 in. wide, edges scabrid; ligule rather long, ciliate. Panicle 6 to 8 in. long, branches slender appressed. Spikelets elliptic-oblong, .1 to .12 in. long. Glumes I and II lanceolate setaceous scabrid; glume III boat-shaped granulate and covered with white processes, channelled on both sides; awn .5 in. long, scabrid. Palea similar but shortly cuspidate; *Hab.* Wet fields. Johor, Sempang Kiri and Parit Jawa. Perak, Kwala Dipang. Kedah, base of Gunong Geriang (Ridley). *Distrib.* Tropics of Africa, Asia, America. *Native name:* Padi Burong.

## 70. LEERSIA, Sw.

Tall slender marsh grasses with narrow herbaceous leaves. Panicle terminal lax of pale green spikelets articulate on thin pedicels. Glumes I and II absent; glume III boat-shaped, flat, coriaceous, with a ciliate keel, not awned. Stamens 6 (or fewer). Grain narrow, oblong. Species about 7, tropics and temperate regions.

(1) **L. hexandra** Sw. *Prodr. Veg. Ind. Occ.* 21; *Hook. fil. F.B.I.* vii. 94; *Ridl. Mat.* iii. 148. *Pseudoryza ciliata* Griff.  *Ic. Pl. As. t.* 144, fig. 1.

Culms 2 to 3 ft. tall, soft and slender. Leaves 2 to 6 in. long, .12 to .2 in. wide, linear acuminate, ligule rather long, rounded. Panicle 3 to 4 in. long, branches ascending, very slender, 1 in. long or less. Spikelets .12 in. long. Stamens 6. *Hab.* Very common in open swamps and water meadows. One of the best fodder grasses. Singapore, Tanglin; Holland Road. Johor, Batu Pahat. Pahang, Pekan. Malacca (Cuming, Griffith); Ayer Panas. Selangor, Kwala Lumpur (Ridley); Ampang (Hume). Perak, Kwala Dipang (Ridley); Tapah (Burkill). *Distrib.* All tropics.

### 71. CENTOTHECA, Desv.

A tall perennial grass with broad lanceolate acute leaves narrowed at the base; ligule short papery lacerate. Panicle lax with spreading branches. Spikelets secund, green, pedicellate. Glumes 4 or 5. Glumes I and II oblong-ovate empty; glumes III and IV (and V, when present) bisexual. Glume IV edged with strong white spines with swollen bases bisexual and paleate. Species 1 or 2, tropical Africa, Asia and Australasia.

(1) **C. lappacea** Desv. *Nov. Bull. Soc. Philom.* ii. (1810) 189; *Kunth. Rev. Gram.* i. 317, t. 70; *Hook. fil. F.B.I.* vii. 332; *Griff. Notulæ*, iii. 62;  *Ic. Pl. As. t.* 152, fig. 1; *Ridl. Mat.* iii. 181.

Stems 1 to 3 ft. tall, from a short root-stock. Leaves 3 to 7 in. long, .5 to 1 in. wide, glabrous or sparsely hairy. Panicle 6 to 12 in. long, branches 3 to 6 in. long. Spikelets .12 in. long. Glumes I and II green, edge white; glume III longer, mucronate, bisexual; glume V small or absent. *Hab.* Forest paths; common all over the Peninsula. The spikelets are carried about by adherence of the spines on glume IV to cloth and animals' fur. Singapore, Garden Jungle; Bukit Timah. Johor, Pulau Aur (Feilding). Malacca (Griffith), Pulau Besar; Ayer Panas. Pahang, Tahan river. Negri Sembilan, Bukit Tumiang (Cantley). Selangor, Rantau Panjang (Kloss). Perak, Larut (Kunstler). Penang (Wallich). Lankawi, Burau (Robinson). Kelantan Kwala Aring (Yapp). *Native names*: Rumpur Darah (blood grass); Rumpur Silat Kain (cloth-spoiling grass).

### 72. LOPHATHERUM, Brngn.

Tall, rather slender perennial forest grass with broad lanceolate leaves, petioled. Panicle of few branches; spikelets secund narrow lanceolate 1-flowered; rachilla not jointed at the base prolonged beyond the flowering glume bearing several empty awned flowers. Glumes I and II empty, longer awned or mucronate; styles connate at the base. Species 2, Indo-Malaya, China and Japan.

(1) **L. gracile** Brngn. *Duperr. Voy. Bot.* 50, t. 8; *Hook. fil. F.B.I.* vii. 331; *Ridl. Mat.* iii. 181.

Stems sometimes fairly stout and woody, 2 to 3 ft. tall, or

shorter and herbaceous. Leaves lanceolate acuminate, glabrous, 6 to 12 in. long, 1.25 to 2.5 in. wide, finely ribbed. Panicle 4 to 8 in. long, branches 2 to 3 in. long. Spikelets green, .25 in. long, ciliate at base. Glume I oblong obtuse ciliate at tip; glume II longer; glume III lanceolate, twice as long; awn short, upper glumes about 9, with scabrid awns. *Hab.* Common along forest paths, whole Peninsula from Singapore to Kedah from the plains to 5000 ft. altitude in the Thaiping Hills and Pahang. Dispersed by its spikelets, adhesive to cloth of natives and to fur of wild beasts. Singapore, Garden Jungle; Chan Chu Kang. Johor, Bukit Banang; Gunong Belumut (Holtum). Malacca, Mount Ophir. Pahang, Kwala Pahang; Gunong Berumban, Cameron Highlands (Henderson). Selangor, Rantau Panjang (Kloss). Perak, Thaiping Hills to 5000 ft. altitude. Kedah Peak. *Distrib.* China, Japan, India, Malay islands. *Native names:* Rumpit Kelurat; Rumpit Jarang; Rumpit Ubi Buluh.

### 73. POA, Linn.

Annual or perennial grasses. Leaves narrow linear acuminate. Culms slender. Panicles lax, spreading. Spikelets small, 2- to 6-flowered, laterally compressed; rachilla jointed at base and between the flowering glumes. Glumes 4 or more. Glumes I and II empty, keeled, 1- to 3-nerved. Flowering glumes 5- to 7-nerved. Palea shorter, 2-keeled. Lodicules 2. Stamens 3. Styles short. Stigma plumose. Grain free or adherent to palea, ovoid or oblong. Species 80 or more; temperate regions; rare in tropics.

(1) *P. annua* Linn. *Sp. Pl.* 68; *Eng. Bot.* 1141; *Hook. fil. F.B.I.* vii. 348.

Annual (or perennial) grass, 6 in. tall or more. Leaves narrow, flat linear acuminate, 1.5 to 3 in. long. Culms slender, with one or two leaves. Panicle 1 to 1.5 in. long, about .75 in. wide; branches few spreading, distant. Spikelets green, .08 in. long, of 3 to 7 flowers. Glumes I oblong-lanceolate, acute, 1-nerved; glume II longer, 3-nerved. Flowering glumes blunt. Grain oblong. *Hab.* In cultivated ground; Perak, Maxwell's Hill at 3750 ft. altitude (Ridley, Burkill). *Distrib.* Europe and Temperate Asia.

Introduced probably with imported plants; it has several times appeared about the gardens of Maxwell's Hill, often in abundance.

### 74. LEPTURUS, Br.

Annual or perennial grasses, slender. Spikes simple, straight or curved; rachis hollowed. Spikelets 1- or 2-flowered, sessile, solitary, imbedded in the hollows of the rachis. Glume I minute or absent; glume II longer than the flowering glumes, which are elliptic concave. Rachilla elongate, bearing an imperfect flower. Palea 2-keeled. Species 6, tropics and temperate regions of the world.

(1) *L. repens* R. Br. *Prod.* 207; *Brngn. Duperr. Voy. Bot.* 57, t. 16; *Hook. fil. F.B.I.* vii. 365; *Ridl. Mat.* iii. 182.

Perennial grass, creeping ascending stems, woody, 1 ft. tall. Leaves 3 to 6 in. long. Spikelets 2-flowered. Glume I absent; glume

II lanceolate acuminate, striate. *Hab.* Local in sea-sand along the east coast. Johor, Pulau Tinggi (Feilding). Pahang, Sungei Meang and Rumpin River (Ridley). *Distrib.* Ceylon, Malaya, Australia.

### 75. LEPTASPIS, Br.

Perennial forest grasses with broad elliptic or oblong petioled leaves. Panicles terminal, branches whorled, eventually spreading, with short alternate branchlets. Spikelets unisexual. Males solitary on tips of branches, very small. Glumes 3. Stamens 6. Female flowers 3 or 4 on each branchlet, below distant. Glumes I and II small, empty; glume III closed into a pear-shaped utricle open at the top containing a palea and pistil. Grain included in the enlarged pear-shaped adhesive utricle. Species 3 or 4, Old World tropics.

(1) *L. urceolata* Br. in *Benn. Pl. Jav.* 23, t. 6; *Hook. fil. F.B.I.* vii. 95; *Ridl. Mat.* iii. 150.

Rhizome creeping, often raised above the ground on stilt roots. Stem 1 to 3 ft. tall, base covered with sheathing leaves. Leaves 6 to 12 in. long, 2 to 3 in. across, elliptic to lanceolate acute, narrowed at base, stiff, dark green; petioles 1 in. long or more. Panicle 6 in. long, pubescent. Utricles pear-shaped, viscidly adhesive hairy, .25 in. long. *Hab.* In dense forests, whole Peninsula. Not rare, from Singapore to Penang, up to 2000 ft. altitude. Singapore, Bukit Timah; Chan Chu Kang; Pulau Ubin. Johor, Kwala Sembong (Kelsall); Batu Pahat. Malacca, Mount Ophir (Hullett); Ayer Panas (Griffith); Bukit Sadanen (Derry). Pahang, River at Pulau Jellam. Selangor, Kwala Lumpur. Perak, Bujong Malacca (Curtis), Tapah, and Changkat Serdang (Wray). Penang (Roxburgh); Balik Pulau. *Distrib.* Ceylon and Malay islands. *Native names:* Tampo Rulang; Tampo G'lang; Sayong Tikus; Rumput Babi.

### 76. BAMBUSA, Schreb.

Shrubby or arboreous grasses, usually tall. Culm-sheaths broad, limb often triangular. Leaves linear or lanceolate shortly petioled. Inflorescence a large or slender panicle with heads in spine-like branches, or panicles of spikes. Spikelets 1- to many-flowered. Empty glumes at base 1 to 4. Flowering glumes ovate lanceolate, uppermost imperfect. Lodicules 2 or 3 ciliate, rarely absent. Stamens 6 (rarely 3). Ovary oblong or obovate, tip hairy. Stigmas 2 or 3. Grain oblong to linear-oblong furrowed on one side. Species about 50, Indo-Malaya, Australia.

Culms very tall and stout, 3 to 4 in. through.

Culms rather distant; branchlets not spiny . . . (1) *B. vulgaris*

Culms crowded; branchlets with spines in threes . . . (2) *B. Blumeana*

Culms slender, up to 20 ft. tall, often sub-scandent.

Bush, sub-scandent; spikelets few, 2 in. long . . . (3) *B. Ridleyi*

Bush erect, sub-scandent or not; spikelets under 2 in. long.

Spikelets not in distant heads.

Leaves 3 in. long, .5 to 1 in. wide; stamens 6.

Culms 20 ft. tall; lodicules lanceolate ciliate . . . (4) *B. magica*

Culms 6 to 8 ft. tall; lodicules linear . . . . .	(5)	<b>B. nana</b>
Slender, sub-scandent; stamens 3. . . . .	(6)	<b>B. elegans</b>
Leaves 1·75 in. wide; panicle large of many spikelets . . . . .	(7)	<b>B. Wrayi</b>
Spikelets in distant heads, 25 in. long. . . . .	(8)	<b>B. pauciflora</b>
Inflorescence branched . . . . .	(9)	<b>B. Klossii</b>
Inflorescence simple . . . . .		

(1) **B. vulgaris** Schrad. in Wendl. Collect. Pl. ii. 26, t. 47; Gamble, Ann. Bot. Gard. Calc. vii. 43, pl. 40.

Culms rather distant, bright green, yellow or striped green and yellow, 20 to 50 ft. tall, 2 to 4 in. through, internodes 10 to 18 in. long, walls rather thin. Culm sheaths 6 to 10 in. long, 7 to 9 in. wide, top round concave, blade triangular acute, hairy on both sides with a hairy auricle on each side. Leaves linear-lanceolate, base round or narrowed, point long, twisted, scabrid, glabrous or when young hairy beneath, 6 to 10 in. long, 75 to 1·7 in. wide; petioles 2 in. long, sheaths hairy with a small callus above and rounded auricles with a few bristles, ligule short ciliate. Panicle large leafy compound, branches spicate with clusters of 3 to 10 spikelets; rachis scurfy, or at end hairy. Spikelets 6 to 8 in. long, oblong acute compressed. Empty glumes ovate acute ciliate at tip. Flowering glumes larger. Palea as long or longer, acute, 2-keeled, keels white, ciliate. Stamens exsert, purple. Ovary narrow-oblong, hairy. Style hairy; stigmas 3 plumose. *Hab.* Cultivated and run wild, or occurring in abandoned villages and such places, in all tropical countries. Its origin is unknown; Kurz says it is wild in Java. The variety *striata*, with yellow and green striped culms, is said to be of Chinese or Japanese origin. *Native names:* Buluh Pan; Buluh Minyak Has.

(2) **B. Blumeana** Schultes fil. Syst. Veg. vii. 2, 1343; Gamble, Ann. Bot. Gard. Calc. vii. 50, pl. 47. *B. spinosa* Bl. Bot. Zeit. 1825, p. 580; Ridl. Mat. iii. 183.

A tall dark green bamboo 30 to 60 ft. tall, 3 to 4 in. through, forming dense spiny clumps, branchlets stiff and thorny. Culm-sheaths 5 to 6 in. long, 3 to 4 in. wide, striate, with stiff tawny bristles. Leaves 5 to 6 together at ends of branches, linear-lanceolate, 3 to 6 in. long, 25 in. broad, base rounded; petiole very short, glabrous above, glaucous beneath; sheaths appressed hairy. Panicle large, terminal, branching with spicate branches bearing heads of many imperfect and few perfect spikelets, 1 to 1·5 in. long, compressed narrow. Empty glumes 2 or 3, ovate acute, fertile glumes 6 to 8, ovate acuminate. Palea broad, 2-keeled, keels ciliate, terminal empty glume 1 or 2. Grain ovate. *Hab.* In open sandy country, Pahang at Pekan. Perlis, Kanga (Ridley). *Distrib.* Malay islands. *Native name:* Buluh Duri (thorny bamboo).

I believe this bamboo is indigenous in these places, but it is also cultivated to some extent.

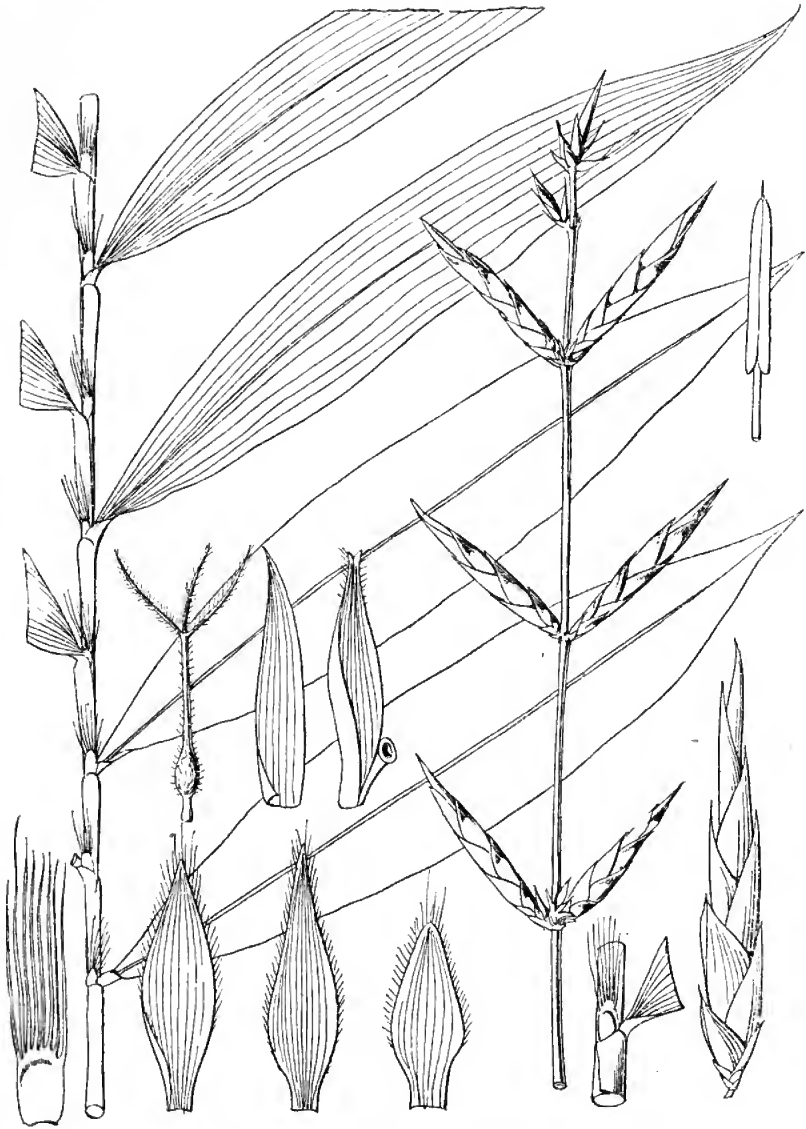


FIG. 225.—Bambusa Ridleyi.

(3) **B. Ridleyi** Gamble, *Ann. Bot. Gard. Calc.* vii. 35, pl. 32; *Hook. fil. F.B.I.* vii. 388; *Ridl. Mat.* iii. 184.

A tufted plant with slender culms half scandent, 9 to 15 ft. long, .25 in. through, internodes 18 in. long. Culm-sheaths 4.25 in.

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long, smooth, limb lanceolate acuminate, 3 in. long, mouth long ciliate. Leaves oblong-lanceolate acuminate, base narrowed, 10 in. long, .75 in. wide; ligule long bifid, .25 in. long, lobes rounded, edged with stiff bristles. Spikelets 1 to 2 in. long, a few together in distant whorls on leafy or nude branches. Glumes empty, 2 to 4, ovate mucronate, ribbed. Flowering glumes ovate-lanceolate, mucronate. Palea shorter, oblong acute, bifid. Lodicules 3, 2 lanceolate, 1 ovate. *Hab.* Rare and local. In dense forest in one spot on Bukit Timah Hill, Singapore (Ridley).

(4) **B. magica** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 208; *Mat.* iii. 184. *B. nana* *Gamble, Ann. Bot. Gard. Calc.* vii. 41 (in part) (not of *Roxburgh*).

Stems about 20 ft. tall, .5 in. through or less, smooth, branches tufted at the nodes, internodes 1 in. long. Leaves lanceolate acuminate, 3 in. long, .5 in. wide, base narrowed to a short petiole, sheath auricled with white cilia. Spikelets in short panicles, lanceolate, .75 in. long, .25 in. wide. Empty glume 1, lanceolate-ovate. Flowering glumes 7, lanceolate mucronate, edges ciliate. Lodicules 3, lanceolate ciliate. *Hab.* High hills, rare. Perak, Gunong Berumban (Wray). *Native name:* Buluh Perindu. *Use:* in love-charms by the natives (see Wray, *Journ. Roy. As. Soc. S. Br.* 21, p. 159).

(5) **B. nana** *Roxb. Hort. Beng.* 25; *Fl. Ind.* ii. 190; *Gamble, Ann. Bot. Gard. Calc.* vii. 40, pl. 38.

Shrubby bamboo with close-set slender stems 6 to 10 ft. tall, .5 in. through. Culm-sheaths 4 to 6 in. long, 2 to 3 in. broad, blade linear acuminate, 2 to 3 in. long hairy, or glabrous above, hairy beneath, edges ciliate. Leaves linear-lanceolate, 4 in. long, .5 in. wide; sheaths smooth with a prominent callus and auricles fringed with a few stiff bristles. Inflorescence of 4 or more slender branches in a whorl, the main branch rebranched, about 2.5 ft. long, spikelets cylindric, pale straw-colour, glabrous, .5 in. long, solitary or clustered, the terminal flower only perfect. Empty glumes none or rarely 1. Flowering glumes ovate acute. Palea shorter, 2-keeled ciliate at tip. Lodicules 3, unequal, linear. Stamens blunt or apiculate, yellow, free. Ovary obovate, pubescent. Style very short, divided into 3 long feathery stigmas. Grain elliptic hairy above, shortly beaked. *Hab.* Abandoned cultivations, largely used for hedges all over the peninsula and occasionally found persisting after disappearance of cultivation, Singapore, Penang Hill. It seldom flowers except in such spots. *Distrib.* China and Japan. Cultivated all over the East. *Native name:* Buluh China.

(6) **B. elegans** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 209; *Mat.* iii. 185.

A slender bamboo sub-scandent. Leaves lanceolate acuminate, 2 to 3 in. long, 1 in. wide; petioles very short; ligule oblong. Flowering branches slender, .12 in. through. Branchlets in whorls

of about 10, 1 ft. apart, with numerous dry oblong bracts at base. Spikes numerous; bracts oblong, outer one .36 in. long. Spikelets .5 in. long, basal of 5 empty glumes. Glume I and II of fertile flower; glume II lanceolate, edge ciliate, green, tipped purple; glume III male with 3 stamens. *Hab.* Mountains at about 4000 ft. altitude. Selangor, Semangkok. Perak, Gunong Berumbun (Ridley).

(7) **B. Wrayi** Stapf. *Kew Bulletin* 1893, p. 14; *Hook. Ic. Pl.* 2253; *F.B.I.* vii. 394; *Gamble, Ann. Bot. Gard. Calc.* vi. 49, pl. 46; *Ridl. Mat.* iii. 183.

A graceful and semi-scandent bamboo, 40 to 60 ft. tall, and 1 in. through at the base, internodes yellow, the third or fourth very long, up to 7 ft. Leaves linear-lanceolate 8 to 10 in. long, 1.75 in. wide, base rounded or narrowed to a petiole, acuminate. Leaf-sheaths glabrous ending in a shining callus auricled with a few stiff hairs; ligule truncate long-haired. Panicle large; spikelets in short spikes clustered at nodes or in short spike-branches; spikes subtended by an oblong truncate bract, a short-keeled bractlet, 2 imperfect and 1 fertile spikelet. Empty glumes ovate-lanceolate glabrous. Palea 2-keeled ciliate, with a rachilla .2 in. long, terminated by an imperfect flower from between the keels. Fruit oblong with a short cylindrical beak. *Hab.* Rare, Perak. On Gunong Inas at 4500 to 5500 ft. altitude (Wray and Yapp). *Native name*: Buluh Bersumpitan. *Use*: the Semang tribe make their blow-pipes (Sumpitan) from it.

(8) **B. pauciflora** Ridl.

Culms slender .4 in. through, smooth, sheaths narrow, over 6 in. long. Leaves lanceolate acuminate to a long point, glabrous, base broad, shortly narrowed to petiole, finely striate, 9 in. long, 1 in. wide; petioles thick, .1 in. long; ligule very short, glabrous, sheaths very slender. Flowering panicle very slender, peduncle and branches wiry. Branches 3 or 4 in a whorl, 6 to 9 in. long, whorls 9 in. apart. Spikes .4 in. long, about 8 in a cluster, clusters .5 to .8 in. apart; spikelets .25 in. long, glabrous. Glumes not flattened. Basal empty glumes 2, ovate lowest very short, upper one nearly twice as long including 2 spikelets. Glume I ovate acute, edges ciliate. Palea as long, lanceolate, narrower, keeled. Stamens 6, anthers linear apiculate. Lodicules 3, obovate spatulate fimbriate. Ovary oblong cylindrical, hairy. *Hab.* Pahang, Fraser Hill at 4000 ft. altitude (Mhd. Nur.). *Native name*: Buluh Padi.

(9) **B. Klossii** Ridl.

Leaves broad oblong-lanceolate acuminate, tip twisted scabrid, base broad, shortly narrowed to the petiole, 8 in. long, 1.25 in. wide; petioles .1 in. long; sheaths smooth; callus small, ligule very short, no bristles on mouth of sheath. Inflorescence simple, 18 in. long. Heads of spikelets 1 to 2 in. apart, .5 in. through; rachis pubescent. Bracts oblong-lanceolate, mucronate. Spikelets .25 in. long. Empty glumes lanceolate, acute mucronulate. Fertile glumes



lanceolate mucronulate, smooth, shining. Palea lanceolate keeled and ciliate. Lodicules very large obcuneate fimbriate. Stamens 6, filaments free; anthers linear acute, purple. Ovary oblong conic, glabrous. Style with 3 long white-plumed stigmas. *Hab.* Mountains, Kedah Peak, at 3000 ft. altitude (Robinson and Kloss 6069).

A very curious species, allied apparently to *B. Griffithiana*, Munro, of Burma, remarkable for its very large fimbriate lodicules. The spikelets are very young, and the uppermost flower is too young to make out.

### 77. GIGANTOCHLOA, Kurz.

Arborescent or climbing bamboos, generally very large. Culm sheaths broad auricled. Leaves large. Panicle compound, large with long branches, heads of few or many spikelets, sterile and fertile, mixed, distant. Empty glumes 2 or 3, ovate or lanceolate. Fertile glumes large and similar. Palea with 2 ciliate keels. Lodicule 0, or 1 to 3. Stamens 6; filaments connate into a tube at first thick, afterwards thin membranous and elongate. Ovary hairy; stigmas 1 to 3 hairy. Grain oblong or linear, grooved. Pericarp membranous. Species II, Burma and Malaya.

- |   |                             |
|---|-----------------------------|
| Spikelets ovate rounded small pubescent . . .   | (1) <i>G. verticillata</i>  |
| Spikelets oblong-ovate flattened velvety . . .  | (2) <i>G. Scortechinii</i>  |
| Spikelets narrow cylindric acute, .25 to .5 in. long,<br>glabrous except the hairy edges of the<br>glume. |                             |
| Ligule short.   |                             |
| Mouth of leaf-sheath ciliate; leaves broad . . .  | (3) <i>G. Wrayi</i>         |
| Mouth of leaf-sheath not ciliate.   |                             |
| Spikelets .5 in. long; leaves narrow . . .  | (4) <i>G. Kurzii</i>        |
| Spikelets .25 in. long; leaves broad . . .  | (5) <i>G. latifolia</i>     |
| Ligule very long . . .  | (6) <i>G. ligulata</i>      |
| Spikelets of two kinds, one long, broad, flat . . .   | (7) <i>G. heterostachya</i> |
| Spikelets all similar, broad, flat, 1 in. long . . .  | (8) <i>G. latispiculata</i> |

(1) *G. verticillata* Munro, *Trans. Linn. Soc.* xxvi. 124; *Gamble, Ann. Bot. Gard. Calc.* vii. 61, pl. 52; *Ridl. Mat.* iii. 186.

A lofty bamboo 60 to 80 ft. tall, 4 to 5 in. through, green or striped with yellow when young, internodes 18 in. long. Leaves oblong-lanceolate, base narrowed, 10 to 18 in. long, 1.5 to 2.5 in. wide, hairy beneath when young, later glabrous; sheaths hairy at first, glabrescent, top truncate; callus narrowed; auricles short rounded; ligule short. Panicle compressed, branches 2 ft. long or more with distant heads, small to 1 in. through, of ovate sub-acute spikelets .13 to .25 in. long, pubescent. Empty glumes 2 or 3, ovate broad acute. Flowering glumes ovate mucronate. Palea shorter, oblong, bi-mucronate, 2-keeled. Stamen-tube long membranous, anthers 6, tip hairy. Lodicules 1 to 3. Ovary very hairy. *Hab.* In old cultivated ground; not common, probably introduced. Singapore. Perak, Grit (Foxworthy). *Distrib.* Malay islands. *Native names*: Buluh Seremai; Buluh Semeliang.

(2) **G. Scortechinii** Gamble, *Ann. Bot. Gard. Calc.* vii. 62, pl. 53; *Hook. fil. F.B.I.* vii. 398; *Ridl. Mat.* iii. 186.

Stems 30 to 40 ft. tall, 2 to 4 in. through, internodes 1.5 ft. long. Culm-sheaths 6 to 8 in. long, covered with rather long scattered bristles mixed with short white ones. Leaves to 1 ft. long and 2 in. wide, oblong-lanceolate softly hairy pubescent beneath, with a few long stiff bristles, bases broad; petioles very short; sheaths with callus densely pubescent, auricles rounded, bristles few, white, stiff. Panicle large; branches 2 ft. long, stout; rachis pubescent. Spikelets few, cylindric, acute, 1 in. long, densely velvety hairy, in tufts, 1 to 4 in. apart. Empty glumes 2 or 3, ovate mucronate. Flowering glumes 3 to 5, longer. Palea shorter bifid, keels ciliate. Lodicule 0. Stamen-tube long. Grain ellipsoid, top truncate, hairy. *Hab.* Forests up to 2700 ft. altitude, often covering large areas and on river banks. Selangor, Batu Caves; Semangkok Pass; Bukit Hitam. Perak, Ulu Kerling (Kunstler); ten miles west of Grit (Burkill); Temengoh (Ridley). Kelantan, Tanjong Telok Lalu (Haniff). *Native names:* Buluh Rayah; Buluh Pah Hao.

(3) **G. Wrayi** Gamble, *Ann. Bot. Gard. Calc.* vii. 64, pl. 55; *Hook. fil. F.B.I.* vii. 399; *Ridl. Mat.* iii. 187.

Culms 3 in. through, glaucous scurfy. Leaves 12 to 15 in. long, 2 to 5 in. wide, oblong-lanceolate cuspidate, alternate rounded at base; apex setaceous, strigosely hairy beneath; midrib broad, petioles .2 to .3 in. long, sheaths smooth, callus narrow, auricles short, fringed with long stiff, white bristles; ligule short pubescent. Panicle compound, branches with heads of few fertile and several sterile flowers and numerous bracts. Rachis pubescent. Spikelets conic, somewhat flattened, .8 in. long. Empty glumes 2 or 3, oval mucronate fringed with stiff dark hairs. Flowering glumes longer, similar. Palea oblanceolate bifid, keels 2 or 0, not ciliate. Stamen-tube thick, finally membranous; anthers very long, tip setaceous hairy. Ovary hairy ovate. *Hab.* Rare. Perak, Bukit Gantang (Wray). *Native name:* Buluh Plang.

(4) **G. Kurzii** Gamble, *Ann. Bot. Gard. Calc.* vii. 65, pl. 56; *Hook. fil. F.B.I.* vii. 399; *Ridl. Mat.* iii. 187.

Culms 20 ft. tall, 1.5 to 4 in. through, walls very thick. Culm-sheaths glabrous, 6 in. long, 3 in. wide, edge bristly, limb longer, recurved lanceolate acuminate, decurrent in a narrow black band lining the top of the sheath and ending in a small round black auricle; ligule narrow. Leaves linear-lanceolate, 8 to 13 in. long, .5 to 1.5 in. wide, base narrowed to petiole .2 in. long, glabrous above, glaucous with scattered hairs beneath; midrib narrow, sheaths hairy when young. Panicle of rather stiff slender branches; spikelets few, occasionally more numerous in heads .5 to 1 in. apart, broad lanceolate acuminate, .5 in. long, .1 in. wide. Rachis smooth slender. Empty glumes 2 or 3, ovate, striate at top,

glabrous except a strong fringe of hairs on edge. Flowering glumes similar but longer; mucro longer. Palea linear blunt. Stamen-tube short, anthers hairy at top. Ovary stalked, long, conic, hairy; style simple, hairy, green, oblong, narrowed to the top rugose. *Hab.* Dindings at Lumut. Perak, Thaiping (Wray); Batu Gajah (Barnard); Grit (Foxworthy). Province Wellesley, Permatang Bertam (Ridley). Kedah, Langgar (Burkill). *Distrib.* Tenasserim and Siam. *Native names:* Bulah Akar; Buluh Mata Rusa (deer's eye bamboo); Buluh Seremai.

(5) *G. latifolia* Ridl.

Culms and culm-sheaths unknown. Leaves oblong-lanceolate acuminate, base broad, rounded; midrib prominent beneath, above smooth closely striate, beneath glaucous, 9 in. long, 2 in. wide; petioles under 1 in. long, stout, broad; sheaths smooth, edges hairy; ligule short with a short auricle; no bristles. Inflorescences simple, one or two together, 2.5 ft. long; rachis hairy at first, heads of spikelets 1 to 2 in. apart, .75 in. through, deciduous sheaths .75 in. long, smooth, limb narrow lanceolate acuminate, .25 in. long. Spikelets .25 in. long, .05 in. through, cylindric. Empty glumes ovate acute, white hairy on the edge. Fertile ones lanceolate to mucronate, edges hairy. Flower 1. Stamens 6, monadelphous, anthers linear acute, reddish, not ciliate at tip. Style slender, hairy. Ovary conic. *Hab.* Pahang, Kwala Teku, Tahan River (Seimund 368).

This plant resembles *G. Wrayi*, Gamble, to some extent; the leaves are about as broad, but there are no bristles on the sheath. The spikelets are shorter and much narrower, smooth shining and sparsely hairy on the glume edges.

(6) *G. ligulata* Gamble, *Ann. Bot. Gard. Calc.* vii. 67, pl. 58; *Hook. fl. F.B.I.* vii. 400; *Ridl. Mat.* iii. 188.

Leaves 16 in. long, 2 to 3 in. wide, oblong-lanceolate, base narrowed unequally; petioles flat, .2 to .3 in. long, glabrous; midrib broad; sheath smooth ending in a cushion-like callus; ligule 1 in. long, bifid, lobes acuminate. Panicle long, branches stout, 2 ft. long, heads of spikelets 1 in. through, .5 in. apart, smaller and denser towards the tip, with large straw-coloured bracts at base. Spikelets cylindric acuminate, .5 in. long, of 2 or 4 empty glumes ovate mucronate edged with black hairs and 3 or 4 flowering glumes rather longer. Palea shorter blunt or bi-mucronate. Lodicules 0. Ovary depressed hairy. *Hab.* Rather rare. River banks. Pahang, Pekan; Kwala Pahang. Perak, Kwala Wok (Wray); Ipoh; Tapah. *Distrib.* Siam. *Native names:* Buluh Telor; Buluh Mata Rusa.

(7) *G. heterostachya* Munro *Trans. Linn. Soc.* xxvi. 125; *Gamble, Ann. Bot. Gard. Calc.* vii. 66, pl. 57; *Hook. fl. F.B.I.* vii. 400; *Ridl. Mat.* iii. 188.

A graceful bamboo 30 ft. long; culms slender. Leaves linear-lanceolate, 4 to 11 in. long, .5 to 1 in. wide, base rounded to a petiole .1 in. long, apex setaceous, glabrous except for a few hairs

on the midrib; sheaths striate with a shining callus, auricles rounded glabrous; ligule as long as petiole, dentate glabrous, or long ciliate. Panicle long, branches slender of distant many-flowered heads 1 to 4 in. apart, 1.5 in. through, in the axils of chaffy bracts. Spikelets of two kinds, sterile, .5 to .75 in. long, of glumes sheathed one inside the other, fertile, 1 to 1.3 in. long, .1 in. across, oblong, flattened, glabrous, of 1 to 3 empty glumes ovate acute or mucronate, 4 or 5 fertile flowers similar, palea shorter obtuse, and 2 or 3 incomplete flowers. Ovary very hairy. *Hab.* Very rare. Malacca, collected only by Griffith at Ayer Panas and by Cantley without locality given. *Native name:* Buluh Tilan.

(8) *G. latispiculata* Gamble, *Ann. Bot. Gard. Calc.* vii. 67, pl. 59; *Hook. fil. F.B.I.* vii. 400; *Ridl. Mat.* iii. 189.

A tall bamboo 50 ft. high. Leaves broadly lanceolate, 12 to 14 in. long, 1 to 1.3 in. wide, base narrowed, decurrent to a very short petiole, glabrous, acuminate, sheaths smooth, callus narrow, ligule bifid. Panicle of slender branches 18 in. long, with distant heads of few large flattened spikelets 1 to 2 in. long, .25 in. wide. Empty glumes 2 or 3, ovate-lanceolate mucronate, glabrous. Flowering glumes similar but long-acuminate faintly ciliate or not on edge, hairy inside. Palea shorter than glume, with 2 ciliate keels. Stamens exsert, tube membranous. Ovary narrow ovoid pubescent. *Hab.* Very rare, only known from a specimen collected by Mr. Cantley's collector in Malacca. *Native name:* Buluh Tilan Minyak. *Use:* For making baskets.

## 78. OXYTENANTHERA, Munro.

Usually small arborescent or scandent bamboos. Culm sheaths usually narrow. Leaves small petioled. Panicle large with spicate heads of few or many spikelets. Spikelets narrow conical elongate, of 1 to 3 flowers. Empty glumes 1 to 3. Flowering glumes ovate elongate mucronate. Palea of lower flowers 2-keeled, of upper ones convolute, little or not keeled. Lodicules 0. Stamens monadelphous exsert, tube thickened, later membranous. Ovary ovoid. Grain elongate beaked. Species 9, Africa and India.

Glumes edged with black cilia . . . . .	(1) <i>O. nigrociliata</i>
Glumes edged with pale hairs.	
Slender plant; spikelets .25 in. long; glumes pubescent . . . . .	(2) <i>O. sinuata</i>
Big stout plant; spikelets .5 in. long; glumes glabrous . . . . .	(3) <i>O. auriculata</i>

(1) *O. nigrociliata* Munro, *Trans. Linn. Soc.* xxvi. 128; *Bedd. Fl. Sylv.* ccxxxiii; *Gamble, Ann. Bot. Gard. Calc.* vii. 69, pl. 60; *Hook. fil. F.B.I.* vii. 401.

A small slender bamboo 15 to 20 ft. tall, dark green, .5 to 4 in. through, walls thin, sheaths 6 in. long or more, brown-haired, edged with brown cilia, narrowed upwards, tip truncate, blade ovate-

lanceolate decurrent, with a bright green naked auricle. Leaves 6 to 12 in. long, 1 to 2 in. wide, lanceolate acuminate, tip twisted scabrid, glaucous beneath, ligule short. Panicle leafy, spikelets few in the whorls which are 1 to 3 in. apart; rachis hairy. Spikelets .75 to 1 in. long. Empty glumes 3 to 5, ovate mucronate, edged with black hairs. Flowering glumes lanceolate acuminate edged with black hairs. Palea narrow obtuse acute or bimucronate. Grain linear-oblong. *Hab.* Open country, not rare in the north. Singapore, in hedges (perhaps introduced). Perak, Tapah (Burkill). Province Wellesley, Permatang Bertam. Kedah, Alor Sta.; Nerang Road (Burkill). Perlis at Kanga. Setul heath, abundant. Kelantan, Sungei Ketei (Foxworthy). *Distrib.* India, Andamans, Malay islands.

In the Kedah plant bristles on the edges of the glumes are often pale, not black, otherwise the plant does not seem to differ. Gamble again notes in the Kew Herbarium that the Singapore plants differ in the auricles of the culm and leaf sheaths, and the anthers not penicillate, and suggests that it is a distinct species. I hardly like to separate it, however.

(2) *O. sinuata* Gamble, *Ann. Bot. Gard. Calc.* vii. 71, pl. 62; *Hook. fl. F.B.I.* vii. 401; *Ridl. Mat.* iii. 190.

Culms slender. Leaves 10 to 12 in. long, oblong-lanceolate acuminate, base rounded, nearly cordate, petioles .5 in. long, hairy, tip twisted, glabrous above, pubescent beneath; ligule short hairy. Panicle branches long, slender spicate, 2 ft. long or more; rachis hairy; spikelets in round heads, .5 in. through and 1 in. apart. Spikelets narrow conic, .25 in. long, pubescent. Empty glumes 2 or 3, ovate, mucronate, edge pale ciliate, flowering glumes longer. Palea blunt or bifid, 2-keeled ciliate. Stamens exsert. Ovary broadly ovoid hairy. *Hab.* South of the Peninsula, not very common. Johor, Gunong Pantai; Ulu Kahang (Kelsall); Sungei Ujong, Seremban (Cantley). *Native name*: Buluh Minyak. *Use*: For making baskets.

(3) *O. auriculata* Prain, *Beng. Plants*, 1234. *Bambusa auriculata* Kurz, *Journ. As. Soc. Beng.* xxxix. 86; Gamble, *Ann. Bot. Gard. Calc.* vii. 55, pl. 49.

"Culms 39 to 50 ft. tall, 2 to 2.25 in. through, scurfy when young. Culm sheaths 10 to 12 in. long, 9 to 10 in. wide, blade 6 to 9 in. long, triangular acute, base 4 in. wide." Leaves lanceolate acuminate, edge scabrid, base rounded or attenuate, 8 to "16" in. long, 1 to "2.25" in. wide, sheaths smooth, edges hairy when young, with a smooth callus and a small oblong round auricle. Inflorescence simple, 2 to 2.5 ft. long, with distant heads of spikelets 2 in. apart and 1 in. through; rachis when young hairy. Bracts ovate acute, hairy on the edge. Spikelets .5 in. long, cylindric. Flowers 2. Empty glumes ovate mucronate ribbed, glabrous edge with long pale hairs. Upper glumes longer, lanceolate acute, edge long, hairy. Palea keeled, ciliate on keel. Stamens in lower

flower 6, monadelphous, pale, acute. Style slender plumed. *Hab.* Open country. Kedah, Alor Sta (Ridley 14838). *Distrib.* Assam, Burma, Siam.

The passages in the above description in inverted commas are taken from Gamble's account. The plant is comparatively little known, and my specimens are the only ones I have seen with fully developed spikelets, but in all points it resembles the less developed Burmese and cultivated specimens.

### 79. DENDROCALAMUS, Nees.

Tall stout bamboos, nodes rough with abortive rootlets; sheaths broad, hairs dark brown or white. Leaves lanceolate. Panicles large; spikelets in globose distant heads, ovate, 2- to 5-flowered. Empty glumes 2 or 3, ovate acute; flowering glumes similar. Palea of lower flowers free, keeled, upper one rounded, glabrous. Ovary hairy; stigma simple. Grain small; pericarp crustaceous or coriaceous. Species 17, Indo-Malaya.

The whole plant perishes after flowering in this genus.

- |   |                           |
|---|---------------------------|
| Stems 8 to 10 in. through; spikelets ovate acute, 5 in. long                            | (1) <i>D. giganteus</i>   |
| Stems 2 to 3 in. through; spikelets small, in distant heads; panicle branches very long | (2) <i>D. flagellifer</i> |
| Spikelets in crowded heads small; branches short.                                       |                           |
| Leaves glabrous   | (3) <i>D. pendulus</i>    |
| Leaves pubescent beneath  | (4) <i>D. hirtellus</i>   |

(1) *D. giganteus* Munro, *Trans. Linn. Soc.* xxvi. 150; Gamble, *Ann. Bot. Gard. Calc.* vii. 87, pl. 76; *Ridl. Mat.* iii. 191.

Culms 100 ft. tall or less, 8 to 10 in. through, dark or grey green, thin-walled, covered with waxy white scurf when young; internodes 15 to 16 in. long; sheaths 20 in. long, hard, glabrous, limb 5 to 15 in. long, 3.5 in. wide, decurrent into stiff brown wavy auricles; ligule black. Leaves up to 20 in. long, 4 in. wide, suddenly acuminate, hairy beneath, broad, fimbriate. Panicles very large; spikes lax, of few spikelets 1 in. through; rachis hairy. Spikelets 5 in. long, pubescent, ovate, flattened. Empty glumes 1 or 2, ovate mucronate, flowering 3 to 6, thin minutely hairy. Palea of lower flowers blunt, upper ones acute bifid, 2-keeled. Stigma 1, purple. Grain oblong obtuse, hairy. *Hab.* Usually in hill woods at 2000 to 4000 ft. altitude. Malacca (Derry). Pahang, East Coast. Perak, Thaiping Hills at 4000 ft. altitude (Ridley). Penang (Wallich). *Distrib.* Tenasserim.

(2) *D. flagellifer* Munro, *Trans. Linn. Soc.* xxvi. 150; Gamble, *Ann. Bot. Gard. Calc.* vii. 91, pl. 80; *Ridl. Mat.* iii. 191.

Culms 20 to 60 ft. tall, 1.6 to 3 in. through, walls as much as 1 in. thick in old culms, dark green; sheaths 14 in. long, brown, furred; limb lanceolate acuminate, 16 in. long, 2 in. wide at base; mouth ciliate. Leaves oblong-lanceolate, 10 to 14 in. long, 1.5 to 2 in. wide. Panicle of long pendulous branches 2 to 6 ft. long; rachis pubescent. Spikelets in small heads, .75 in. apart, ovoid green,

·25 in. long, pubescent. Empty glumes I ovate small; II larger, boat-shaped. Flowering glumes 4, ovate truncate, or mucronate. Palea broad, bifid. Lodicules usually 0, sometimes 1 or 2, spatulate. Stamens 4 to 6. Ovary ovoid hairy; style simple, rarely trifid. *Hab.* In cultivated ground. Singapore, Ang Mo Kio; Tanglin (cultivated). Malacca, Bukit Sabukor (Derry). Penang, Batu Feringhi Road (Curtis). *Distrib.* Tenasserim. *Native name:* Buluh Betong. *Use:* Cultivated by the Chinese for the edible shoots and general use.

(3) **D. pendulus** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 210; *Mat.* iii. 192.

Culms 60 ft. tall or more, 3 in. through at the base, weak; branches long, pendulous, leafy, glaucescent when young, green when old, walls rather thick; internodes 9 in. long; sheaths 6 to 9 in. long, at first covered with white woolly fascicled hairs; limb narrow lanceolate acute, 4 in. long. Leaves lanceolate-oblong, 5 to 6 in. long, ·75 to 1 in. wide, base broad; petioles thick, ·13 in. long. Panicle of simple spikes of heads at the end of leafy branchlets, heads crowded ·5 in. long, with broad sheaths at base. Spikelets ·16 in. long, glabrous, oblong-cylindric, 1-flowered. Empty glumes 2, ovate. Flowering glumes longer, lanceolate. Palea 2-nerved, lanceolate. Lodicules 0. Stamens 6. Ovary short, conic, hairy. *Hab.* Dense forests along river banks, abundant where it occurs. Negri Sembilan, Ulu Bendol (Burkill). Selangor, Semangkok Pass; Ulu Gombak (Burkill). Perak at Jor; Temengoh River (Ridley).

(4) **D. hirtellus** *Ridl.*

A tall weak bamboo about 40 ft. long, 2 in. through, walls thin, internodes long. Leaves broad oblong acuminate with a long point, base broad rounded, glabrous above, softly pubescent beneath, 11 in. long, 1·5 in. wide; petioles thick, ·1 in. long, glabrous; ligule of few stiff bristles, sheath glabrous. Panicle branches pendulous, 3 ft. long. Spikelets in dense heads ·5 in. through and 1·5 in. apart. Bracts numerous, ovate acute, keeled. Empty glumes I lanceolate; II similar but longer, many-nerved. Flowering glumes III twice as long as glume I, mucronate; glume IV similar, longer. Palea shorter, lanceolate, 3-nerved, pale. Stamens 6; filaments free; anthers oblong mucous exsert; style simple, shortly plumed. *Hab.* Johor, forest at Genuang (Ridley).

## 80. CEPHALOSTACHYUM, Munro.

Shrubby bamboos; culms thin. Inflorescence a globose head (or panicle of heads), bracteate, fertile flowers mixed with imperfect ones or empty glumes. Spikelets 1-flowered. Empty glumes 2 or 3, usually awned. Flowering glume similar. Palea thin, 2-keeled. Lodicules 3. Stamens 6. Ovary ovoid; style long. Grain oblong beaked. Species 8, all the others North Indian.

(1) **C. malayense** *Ridl. Journ. Roy. As. Soc. S. Br.* 57, p. 118.

Culms slender. Leaves lanceolate to lanceolate linear acuminate, base broad, 7 to 8 in. long, 1 in. wide, edges denticulate, back pubescent; ligule short of 2 or 3 filaments. Capitulum 2 in. long, obconic, .1 in. through. Bracts 4 to 6, broad, sheath blades nearly full size. Spikelets acicular, dense surrounded by bracts with hairy edges 2 in. long. Glume I narrow lanceolate acuminate, tip hairy; glume II similar, enclosing an abortive flower. Flowering glumes 2, thin much longer, tips hairy. Grain oblong-cylindric; beak 1.75 in. long. *Hab.* Forests, rare, Perak at Temengoh (Ridley).

### 81. DINOCHLOA, Buse.

Long climbing bamboos with slender much branched stems. Culm-sheaths thick, wrinkled at base where a broad leathery ring remains after it has fallen; limb long. Leaves moderate. Panicle very long, slender, compound, of very small heads of minute spikes. Spikelets 1-flowered. Empty glumes 1 to 4, blunt, broad. Palea convolute, keeled. Stamens 6, free. Ovary ovate, glabrous. Fruit globose, pea-shaped or oblong; pericarp thin. Species 3, Burma, Andamans, Malay islands.

Empty glumes 3 . . . . . (1) **D. Tjankorreh**  
 Empty glumes 4 . . . . . (2) **D. montana**

(1) **D. Tjankorreh** *Buse in Miq. Pl. Jungh.* 388; *Munro, Trans. Linn. Soc.* xxvi. 153 pl. v; *Gamble, Ann. Bot. Gard. Calc.* vii. 112, pl. 98; *Ridl. Mat.* iii. 192.

Culms very long, less than 1 in. through; branches tufted at the nodes; sheaths not auricled, sprinkled with minute white bristles; limb ovate-lanceolate. Leaves lanceolate acuminate, 6 to 10 in. long, 1 to 1.5 in. wide, apex subulate; mouth of sheath long, white, ciliate. Panicle very long, branches wiry; rachis smooth; clusters of spikelets small, a few fertile spikelets and many empty glumes. Spikelets .1 in. long, ovate. Empty glumes 1 or 2, flowering glumes similar. Grain globose. *Hab.* In woods, not common, Dindings at Lumut. Perak, between Lenggong and Grit (Ridley). *Distrib.* Andamans, Borneo and Java.

(2) **D. montana** *Ridl. Journ. Roy. As. Soc. S. Br.* 44, p. 210; *Mat.* iii. 193.

Culms long and scrambling. Leaves lanceolate acuminate, 8 in. long, 1 in. wide, base unequal, sheaths striate. Culms minutely pubescent, not ciliate. Panicle long; rachis pubescent, heads of spikelets 2.5 in. apart. Spikelets .125 to .25 in. long, straw-coloured. Empty glumes 4, ovate obtuse, keeled. Flowering glume lanceolate. Palea oblong, 2-nerved, glabrous. Lodicules 6. Grain oblong beaked, narrowed at base, beak hairy. *Hab.* In dense forest forming compact masses at 3000 ft. altitude. Rare. Penang Hill (Ridley).



What seems to be another species grows at the foot of Gunong Pulai in Johor by the stream. The stem, 1 in. through, scabrid, twines round the trees, the leaf branches hanging down. The leaves are broad lanceolate with round bases 4.5 in. long, 1 in. wide. I could find no trace of inflorescence. Gamble suggests it is *D. Tjankorreh*, but the whole habit and form of leaf are different from this plant.

## 82. SCHIZOSTACHYUM, Nees.

Usually slender erect or climbing bamboos. Culms smooth and thin-walled; sheaths short, auricles small. Leaves broad or narrow, petioled. Panicle terminal, of spike-like branches bearing 1 or more heads of spikes. Spikelets slender, cylindric, acute. Empty glumes 1 to 3, narrow mucronate; rachilla elongate between them. Flowering glumes 1 or 2, convolute. Palea similar, not keeled. Lodicules 0 to 4. Stamens 6, free. Ovary narrow, pericarp produced into a beak containing the keel. Grain ovoid beaked, beak sloping; pericarp crustaceous. Species 17, 1 from Madagascar, the rest Malay Peninsula and islands and China.

A very beautiful species, with softly yellow culms and the leaves often marked with white, the culms close together and about 20 ft. tall, cultivated in gardens, is a variety of *S. brachycladum*, Kurz. from Borneo.

- |  |                               |
|--|-------------------------------|
| Heads of spikelets 1 or 2 on slender branches                      | (1) <i>S. tenue</i>           |
| Panicles simple of distant heads.                                  |                               |
| Slender bamboos.   |                               |
| Leaves .75 in. wide, base cuneate . . . . .                        | (2) <i>S. chilianthum</i>     |
| Leaves 2.25 in. wide, base cuneate . . . . .                       | (3) <i>S. Zollingeri</i>      |
| Leaves .75 in. wide, sub-cordate auricled . . . . .                | (4) <i>S. subcordatum</i>     |
| Stout bamboos 1 in. through; leaves broad.                         |                               |
| Spikelets .1 in. long, glabrous or nearly . . . . .                | (5) <i>S. longispiculatum</i> |
| Spikelets 1.5 in. long, hairy, very slender . . . . .              | (6) <i>S. aciculare</i>       |
| Spikelets 1 in. long; glumes hairy on edge . . . . .               | (7) <i>S. insulare</i>        |
| Spikelets 1 to 1.5 in. long; glumes ciliate on tip . . . . .       | (8) <i>S. latifolium</i>      |
| Very large bamboo 3 in. through; leaves stiff coriaceous . . . . . | (9) <i>S. grande</i>          |
| Panicles much-branched; stems slender, branched, whorled.          |                               |
| Spikelets .15 in. long; leaves narrow . . . . .                    | (10) <i>S. elegans</i>        |
| Spikelets .25 in. long, thick; leaves narrow . . . . .             | (11) <i>S. dumosum</i>        |
| Spikelets .5 in. long, slender; leaves broad . . . . .             | (12) <i>S. Blumei</i>         |

(1) *S. tenue* Gamble, *Ann. Bot. Gard. Calc.* vii. 114, pl. 100; *Hook. fil. F.B.I.* vii. 415; *Ridl. Mat.* iii. 194. *Melocanna gracilis* Kurz. in *Munro, Trans. Linn. Soc.* xxvi. 133.

A slender weak bush bamboo, 12 ft. tall; culm green, .5 in. through, branches whorled, sheaths oblong, glabrous, 3 in. long, mouth bearded, limb triangular acuminate, 2.5 in. long. Leaves narrow linear-lanceolate, 4 to 6 in. long, .3 to .75 in. across, apex subulate, base broad. Inflorescence a terminal spike of 1, rarely 2 or 3 heads with few narrow spikelets and 1 or more chaffy bracts .5 in. long. Empty glumes 1 or 2, ovate acuminate, 5- to 7-nerved,

mucronate. Flowering glumes longer. Palea longer, 2-keeled. Lodicules 3, ovate acute, hairy. Grain ovate, long-beaked, .5 in. long with the beak .25 in. long. *Hab.* River banks, not rare. Perhaps a form of *S. chilianthum*, Kurz. Singapore (Wallich). Johor, Kota Tinggi; Tebrau River; Pahang, Pahang River. Malacca, Ayer Panas (Ridley). Kemaman (Vaughan Stevens).

(2) *S. chilianthum* Kurz. *Ind. Forester*, i. 348; *Journ. As. Soc. Beng.* xxxix. ii. 88; *Gamble, Ann. Bot. Gard. Calc.* vii. 115, pl. 101; *Hook. fil. F.B.I.* vii. 416; *Ridl. Mat.* iii. 194. *Melocanna gracilis* Munro, *Trans. Linn. Soc.* xxvi. 133.

Culms slender, 15 to 20 ft. tall, .5 in. through; branches whorled at the lobes; sheaths 3 in. long, smooth truncate, brown, pubescent; mouth edge fringed with stiff pale bristles; limb triangular acuminate, 1.5 in. long. Leaves narrow lanceolate acuminate, 9 to 12 in. long, .5 to 1 in. wide. Heads of spikelets 4 to 12 in the spike, .5 to 1 in. apart. Spikelets .5 in. long. Empty glumes ovate mucronate, glabrous. Flowering glumes lanceolate acuminate, pubescent on edges or glabrous. *Hab.* River banks and open damp spots, Singapore (Wallich); Bukit Timah Road, Johor, Serom. Malacca, Batang Malaka (Derry). Selangor, Sepang Road. Perak. Mawar, Grit (Foxworthy); Sungei Kutim (Burkill). Province Wellesley, Krian. *Distrib.* Siam, Sumatra, Java. *Native names:* Buluh Akar; Buluh Rappen; Buluh Plang.

(3) *S. Zollingeri* Steud. *Syn. Glum.* 332; *Ridl. Mat.* iii. 195. *Melocanna Zollingeri* Munro, *Trans. Linn. Soc.* xxvi. 134.

Culms about 20 ft. tall; sheaths 4 in. long; limb triangular acute, 1 in. long. Leaves lanceolate acuminate, 6 in. to 1 ft. long, 1.75 in. wide, pubescent beneath, sheaths ciliate on mouth and edges. Panicle 8 in. long, of about 10 heads of spikelets .5 in. apart. Spikelets .5 in. long. Empty glumes ovate, keeled, edges ciliate. Fertile glumes longer, lanceolate mucronate, ciliate. Lodicules 3, ovate acuminate, strongly nerved, and edged with silky hairs. *Hab.* Roadsides and open country in the south. Singapore, Bukit Timah Road; Yeo Chu Kang. Muar, Bukit Muar (Feilding). Johor, Road to the Reservoir. Malacca (Cantley). Negri Sembilan, Pantai. Perak, Mawar, Grit (Burkill). *Distrib.* Java. *Native names:* Buluh Tulo; Buluh Plang.

I am not sure that this plant is really wild in all the above localities.

(4) *S. subcordatum* Ridl.

Stems slender. Leaves lanceolate acuminate, base broad, subcordate, auricles 5 to 6 in. long, .75 in. wide; midrib slender, petioles and ligules very short, no bristles. Panicles simple, in whorls 3 to 4 in. long, on the edge of short leafy shoots. Spikelets in 7 or 8 clusters .15 in. long. Bracts ovate, small. Glumes polished, lanceolate. Palea lanceolate, thin. Lodicules 0. *Hab.*

Mountains. Selangor, Semangkok Pass at 4000 ft. altitude (Ridley).

(5) **S. longispiculatum** Kurz *Journ. As. Soc. Beng.* xxxix. 89, pl. vi. fig. 1.

A slender stemmed bamboo. Culms .5 in. through; sheaths bristly at mouth, limb narrow, long. Leaves rather stiff, lanceolate, base rounded, tip rather suddenly acuminate, 9 in. long, 1.5 in. wide; petioles .1 in. long, channelled, mouth of sheath bristly. Inflorescence 6 in. long; spikes in more or less distant clusters; bracts 1 in. long, with a triangular lanceolate limb .5 in. long; spikelets 1 in. long, crowded. Glumes lanceolate mucronulate. Anthers not apiculate. Lodicules glabrous and glume-like. *Hab.* Pahang, Kwala Lipis. Selangor, Ginting Bidai. Dindings, Lumut. Perak, Tapah; Tanjong Malim. Kelantan River near Chaning; Kwala Krai (Haniff). *Distrib.* Java, Borneo.

(6) **S. aciculare** Gamble, *Ann. Bot. Gard. Calc.* vii. 117, pl. 104; *Ridl. Mat.* iii. 196.

A slender dwarf bamboo. Leaves oblong acuminate, 9 in. long, 1.25 in. wide, base round, tip ensiform, glabrous or pubescent; petioles .25 in. long; sheaths white, ciliate at mouth. Panicle simple, over 1 ft. long, glabrous, heads of spikelets 1 to 1.5 in. apart. Spikelets 1 in. long or more, cylindrical subulate, 1 fertile flower, 1 abortive, on a slender rachilla. Empty glumes ovate, mucronate pubescent. Flowering glumes linear, mucronate, hairy. Palea as long, convolute. Lodicules 1 to 4, lanceolate, glabrous. Ovary ovoid, long-beaked, glabrous. *Hab.* Open country and woods in the south. Malacca, Sungei Hudang. Negri Sembilan, Bukit Kupayong (Cantley); Kwala Pedas. *Distrib.* Sumatra.

(7) **S. insulare** Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 64.

A stout species 20 to 40 ft. tall, 3 in. through. Leaves lanceolate acuminate, with a long point, base narrowed denticulate, 1 ft. long, 1.5 in. wide; petioles .25 in. long; ligules of long bristles. Inflorescence over 1 ft. long; spikelets 5 or 6, crowded in tufts 1 in. apart; bracts at base lanceolate, .5 in. long, .25 in. wide; spikelets 1 in. long. Empty glumes 2, ovate mucronate. Flowering glumes lanceolate, bristly at tip. Palea lanceolate convolute. Stamens 4, connate. Ovary narrow, sub-cylindrical. Lodicules oblong rounded, brown pubescent. *Hab.* Rare. In forests on the island of Pulau Rawei, Pulau Adang islands (Ridley).

(8) **S. latifolium** Gamble, *Ann. Bot. Gard. Calc.* vii. 117, pl. 103; *Ridl. Mat.* iii. 196.

Leaves 9 to 12 in. long, 1.5 to 2.5 in. wide, oblong acuminate, base round, point subulate, base rounded; petioles .3 in. long; nerves inconspicuous, midrib stout, sheaths keeled, auricles bristly; ligule short, bristly. Panicle spicate, 6 to 12 ft. long, of cluster of spikelets with ovate-lanceolate bracts. Spikelets 1 to 1.4 in. long, acuminate, 1 fertile flower and 1 terminal imperfect one.

Empty glumes 2, oblong, flowering glumes much larger, ovate lanceolate, long mucronate, often ciliate on edges. Lodicules 3 or 4, ciliate. Stamens, anthers blunt, connective with a penicillate point. *Hab.* Singapore, Blakan Mati. Pahang, Kota Glanggi; Tanjung Antan. Malacca, Sungei Hudang (Ridley).

The Blakan Mati plant has strongly ribbed leaves and a few minor points of difference in the flowers from the type (Kota Glanggi).

(9) *S. grande* Ridl.

Culms 60 ft. tall, 3 in. through, internodes 2 to 3 ft. long, walls thin; sheaths over 1 ft. long, covered with white hairs in fascicles between the nerves. Leaves very stiff, oblong, rather abruptly acuminate, base round, shortly rounded into a broad petiole .5 in. long, .15 in. wide, blade 12 to 18 in. long, 3 to 3.5 in. wide; sheaths smooth, ligules large, not bristly. Panicle spicate, 1 ft. long. Spikes .5 to 1 in. apart. Bracts ovate, glabrous. Spikelets very slender, .4 in. long, glabrous. Glumes ribbed, shortly mucronate. Stamens not apiculate. *Hab.* Mountains, Selangor, Semangkok Pass and Ginting Bidai (Ridley). Kelantan, Kelumpur (Haniff). *Native name:* Buluh Telor.

(10) *S. elegans* Ridl.

Stems slender, smooth, .1 in. through, branches slender, whorled. Leaves thin, lanceolate acuminate, pubescent beneath, margins denticulate, base narrowed to the very short petiole, 6 in. long, .75 in. wide, ligule of few rather long bristles, sheath hairy. Panicles graceful, 15 in. long, slightly geniculate, branches 2 to 4 in. long. Spikelets .25 in. long, light green, 4 or 5 in a fascicle, with several ovate chaffy bracts at base; fascicles little over .25 in. apart. Glume I ovate; glume II longer, lanceolate, shortly mucronate; glume III still longer, mucronate; glume IV similar, but longer. Palea a little shorter, lanceolate, not keeled. Stamens 6; filaments free, anthers exsert oblong obtuse, violet. Ovary conic, stipitate, sub-triquetrous; style simple. Grain obliquely blunt, conic and stipitate. *Hab.* Lankawi islands, common (Haniff).

Cultivated by Mohammed Haniff in Penang Gardens and flowered in March 1915.

(11) *S. dumosum* Ridl. *Journ. Roy. As. Soc. S. Br.* 61, p. 64.

A slender erect bamboo 6 to 7 ft. tall, .15 in. through, internodes 6 in. long, smooth. Leaves lanceolate acuminate, base broad, 6 in. long; .75 to 1 in. wide; petioles .1 in. long, no ligules. Inflorescence 2 ft. long, with tufts of branches 6 in. or less from the nodes. Spikelets in tufts, .5 in. long, crowded. Bracts papery, ovate, .15 in. long. Spikelets .25 in. long, acuminate. Empty glumes ovate. Flowering glumes lanceolate. Stamens 3, connate. Ovary beaked with a long conic beak, hairy. *Hab.* On dry rocks on Pulau Rawei, Pulau Adang islands, forming dense thickets (Ridley).

(12) **S. Blumei** Nees, *Agrost. Braz.* 535; *Ruprecht Bamboo*, 43, t. xvi, xvii. fig. 4; *Munro, Trans. Linn. Soc.* xxvi. 136; *Gamble, Ann. Bot. Gard. Calc.* vii. 116, pl. 112; *Ridl. Mat.* iii. 195.

Culms up to 30 ft. tall, fragile; sheaths attenuate to mouth with white bristles at the mouth, limb erect. Leaves 9 to 10 in. long, 1 to 1.75 in. wide, oblong-lanceolate, base rounded or narrowed; petioles .25 in. long, tip subulate, hispid beneath. Panicles slender, simply, spicate or branched. Spikelets .5 in. long, cylindric acuminate crowded, subtended by chaffy bracts. Empty glumes oblong, 2, separated from each other by ciliate rachillæ. Flowering glumes longer. Palea 1 or 2. Ovary ellipsoid, long-beaked. Lodicules 0. *Hab.* Singapore, Selitar (Ridley) probably introduced from Java and other Malay islands. *Native name*: Buluh Juron.

### 83. OCHLANDRA, Thw.

Shrubby reed-like bamboos. Culm thin-walled, internodes long, sheaths thin, auricles small. Leaves broad. Inflorescence in terminal spikes or panicle. Spikelets, whorls fertile and sterile mixed, 1-flowered. Empty glumes 1 to 3. Flowering glumes similar. Palea membranous, not keeled. Lodicules 1 or several, conspicuous. Stamens 6 to 120, free or connate. Ovary narrow; style long; stigmas 4 to 6, plumose. Grain very large, ovoid, beaked with a fleshy pericarp. Species 7, Indo-Malaya.

(1) **O. Ridleyi** *Gamble, Ann. Bot. Gard. Calc.* vii. p. 127, pl. 115; *Ridl. Mat.* iii. 197.

About 20 ft. tall or less. Leaves 9 to 10 in. long, 1 to 1.5 in. wide, oblong-lanceolate; petioles .2 in. long, glabrous; sheaths short, glabrous except the ciliate auricles. Inflorescence spicate, heads crowded, sub-distichous; bracts ovate truncate, fimbriate, with an ovate limb. Spikelets 1 in. long, few, fertile. Empty glumes 1 or 2, ovate truncate mucronate, appressed, hairy. Flowering glumes 1 or 2, longer. Palea 2, not keeled, outer narrow bimucronate, tip hairy, inner shorter, tip rounded. Lodicules 6 to 10 lanceolate to spatulate ciliate. Stamens free or connate, 6, 3 longer, blunt, 3 short, acute. Ovary linear, in a 2- to 4-cleft perigynium. *Hab.* Singapore, Bukit Mandai (Ridley). *Johor, Bukit Muar* (Feilding). *Native name*: Buluh Kasap.

## GYMNOSPERMEÆ

## ORDER CLXIV. GNETACEÆ

Trees or shrubs, branches jointed. Leaves opposite. Flowers in spikes (or cones), unisexual. Males tubular or of 2 to 4 sepals. Anthers 2 to 8, sessile or sub-sessile, on a column of connate filaments. Female, ovule erect with 2 or 3 coats, one produced into a style-like tube with a round mouth. Seed drupaceous albuminous. Genera 3, very dissimilar in habit. Europe, Asia, Africa and 1 genus cosmopolitan in hot regions.

## 1. GNETUM, Linn.

Tall lianes or shrubs or trees. Leaves large, usually coriaceous. Flowers in whorls in axils or cup-shaped bracts and surrounded with hairs, in solitary paniced axillary spikes. Male flowers, perianth club-shaped tubular; stamen 1; anther 1-celled. Female flowers, no perianth. Ovule ovoid or globular, inner integument produced into a tube. Seed thinly drupaceous pink or red, rarely brown and dry. Species about 32, Africa, Asia, Polynesia, America.

Trees and shrubs erect.

Big tree . . . . . (1) *G. Gnemon*

Shrub; branches slender . . . . . (2) *G. Brunonianum*

Woody climbers.

Seeds sessile not stalked; spikes simple.

Seeds drupaceous, red, .5 in. long.

Spikes stout, very woolly . . . . . (3) *G. macrostachyum*

Spikes slender, not very woolly.

Spikes about 1 in. long.

Leaves narrow, 3 in. long, 1.5 in. wide (4) *G. campestre*

Leaves broader, 3 in. long, 2 in. wide;

stout climber . . . . . (5) *G. sylvestre*

Spike 1 ft. long, whorls distant . . . . . (6) *G. longispica*

Seed 1 in. long . . . . . (7) *G. penangense*

Seed 3 in. long, brown, corky . . . . . (8) *G. Wrayi*

Spikes branched; seed narrow at base . . . . . (9) *G. latifolium*

Seed distinctly stalked.

Stout woody lian; leaves coriaceous . . . . . (10) *G. Kingianum*

Slender climber; leaves thin membranous . . . . . (11) *G. tenuifolium*

(1) *G. Gnemon* Linn. *Mant.* 125.

A big tree with elliptic-lanceolate dark green leaves, 5 in. long, 2.75 in. wide. Spikes simple or paniced, about 2 in. long. Ovule 1 in. long. Seed ovoid. *Hab.* A number of trees in Penang and in a few gardens in Singapore. The Buah Maninjau of the Malays. *Distrib.* Malay islands. *Use.* The seeds are eaten like nuts.

(2) *G. Brunonianum* Griff. *Trans. Linn. Soc.* xxii. 308, *t.* 55, figs. 9-20, and 56, figs. 27-47; *Ridl. Journ. Roy. As. Soc. S. Br.* 60, p. 61.

A low slender shrub, 2 to 5 ft. tall. Leaves lanceolate, thinly coriaceous or oblong-lanceolate, acuminate light green 4 to 6 in. long, 1 to 2.25 in. wide; nerves 10 pairs, elevate inarching beneath; petioles .25 in. long. Male spikes in pairs, .25 to .5 in. long. Females longer, on a peduncle .75 in. long. Ripe seed ellipsoid, red, .5 in. long. *Hab.* Widely distributed in woods up to 5000 ft. altitude. Johor, Gunong Pantai. Pahang, Telom; Tahan river; Kwala Tembeling. Malacca (Griffith); Ayer Keroh; Mount Ophir; Bukit Bruang. Negri Sembilan, Tampin Hill (Robinson); Bukit Tangga at 2500 ft. altitude. Selangor, Sungei Bulu; Kwala



FIG. 226.—*Gnetum Brunonianum*.

Kubu. Perak, Taiping Hills and Goping (Kunstler); Gunong Kerbau (Robinson). Penang Hill. Kelantan, Kwala Lebir. *Distrib.* Mergui, Borneo. *Native names:* Poko Ekor Belangkas; Pantat Ulat.

Kunstler collected a form with very narrow lanceolate leaves 3 in. long by .75 in. wide and very conspicuous nerves, on Penang Hill.

(3) *G. macrostachyum* Hook. *fl. F.B.I.* v. 642; *Ridl. Journ. Roy. As. Soc. S. Br.* 60, p. 61.

A stout woody climber. Leaves rather stiff coriaceous, elliptic to elliptic-lanceolate, blunt or short cuspidate, 7 to 8 in. long, 3 to 4 in. wide, base round or narrowed; nerves slender, 4 to 6 pairs, reticulations visible; petioles .25 in. long. Male spikes cylindrical, 2 in. long, .2 in. through; peduncle .12 in. long. Bracts

cupular, saucer-shaped, close together, with a dense conspicuous ring of hairs between each. Female spikes cylindric, dense, 3 in. long, .4 in. through, densely woolly brown-hairy. Fruit spikes 4 to 6 in. long, .75 in. through, densely woolly hairy. Seeds oblong-ovate, .5 in. long. *Hab.* Lowland woods rather open places, not rare. Singapore, Siglap; Changi; Jurong. Malacca, Bukit Bruang; Mount Ophir (Maingay). Perak, Larut (Kunstler). Province Wellesley, Krian. Pulau Adang (Ridley). *Distrib.* South Siam.

(4) **G. campestre** Gamble, MSS. *G. microcarpum* var. *campestre* Ridl. *Journ. Roy. As. Soc. S. Br.* 60, p. 62.

Slender woody climber with narrow lanceolate leaves, thin coriaceous, narrowed to both ends, 2.5 to 3 in. long, .75 to 1.5 in. wide; petioles .1 in. long. Male spike .25 in. long, .2 in. through, cylindric, blunt, peduncled, slender. Female spike 1 to 2 in. long, whorls .1 in. apart, in fruit stouter and rather longer. Ripe ovule oblong, pink, .25 to .5 in. long. *Hab.* Open country in thickets and edges of woods. Singapore, Tanglin; Krangi, etc. Johor, Batu Pahat. Pahang, Kwala Pahang. Gunong Tahan 1500 ft. altitude (Haniff). Malacca (Griffith), Mount Ophir at 3000 ft. altitude; Ayer Panas (Goodenough). Perak, Ulu Bubong (Kunstler). Penang Hill (Curtis, etc.). Kedah Peak at 3000 ft. altitude (Robinson and Kloss).

These are the Peninsular plants referred to *G.?* *neglectum*, Bl., by Hook. fil. *F.B.I.* v. 642.

(5) **G. sylvestre** Gamble, MSS. *G. microcarpum* var. *sylvestre* Ridl. *Journ. Roy. As. Soc. S. Br.* 60, p. 62.

Tall moderately stout climber, .1 in. through. Leaves lanceolate cuspidate, acute coriaceous, base blunt or shortly narrowed, 5 in. long, 2 in. wide; nerves 5 or 6 pairs, rather inconspicuous. Male spikes in tufts on stem, simple, cylindric, .25 in. long. Female spikes 1.5 in. long, whorls of ovules .1 in. apart, fur much shorter than conic ovules. Seed .5 in. long, cylindric-elliptic, sessile, in spikes 2 to 3 in. long. *Hab.* Woods lowland, Singapore, Garden jungle; Selitar; Bajau; Pulau Tekong in woods (Ridley). *Native name*: Akar Jullah.

I have always considered this a jungle form of *G. campestre*, Gamble, and to be the plant intended by Blume for his *microcarpum*, *Rumphia*, iv. 6, t. 175. Gamble thinks it distinct.

(6) **G. longispica** Ridl. *Journ. Roy. As. Soc. S. Br.* 60, p. 63.

Woody climber .25 in. through. Leaves broad lanceolate or elliptic-lanceolate, very shortly narrowed both ends, 6 in. long, 3 in. wide; nerves 6 pairs, rather conspicuous; petioles .5 in. long. Female spikes 6 in. long, bracts .15 in. apart, in fruit 1 ft. long, bracts .25 in. apart. Ovules acuminate, almost covered with brown fur. Ripe ovules ellipsoid, .5 in. long, blunt, brick red.



*Hab.* Forests, rare, Johor, Kwala Batu Pahat (Kelsall). Selangor, Rawang Camphor forest. Perak, Ulu Kerling (Kunstler).

(7) *G. penangense* *Ridl. Journ. Roy. As. Soc. S. Br.* 60, p. 63.

Big climber, 50 ft. long. Leaves coriaceous elliptic to oblong cuspidate or ovate, base narrowed or round, 6 in. long, 3.5 to 4.5 in. wide; petioles stout, .6 in. long. Male spikes stout, cylindrical acute, sessile, in pairs, 2 in. long. Female spikes stout. Fruit spike 6 in. long, peduncle 1 in. long, whorls .25 in. apart. Ovules oblong, 1 in. long, blunt at both ends. *Hab.* Local in forests, Perak, Larut and Goping (Kunstler). Penang Hill (Curtis and Ridley). Kelantan near Chaning (Ridley).

(8) *G. Wrayi* *Gamble, Kew Bulletin*, 1915, p. 92. *G. edule* *Ridl. Journ. Roy. As. Soc. S. Br.* 60, p. 64 (not of *Blume*).

Stout climber up to 150 ft. long. Leaves elliptic acuminate, base round or slightly narrowed, stiffly coriaceous, 4 to 4.5 in. long, 1.5 to 2 in. wide; nerves faint, inconspicuous; petioles .2 in. long. Male spikes in axillary pairs, cylindrical, .5 in. long. Females over 1 in. long. Fruit oblong, corky, brown, narrowed to a blunt tip, 2 to 3 in. long, 1 to 1.5 in. through. *Hab.* Not common, in damp forests, Singapore, Toas; Chan Chu Kang. Pahang, Tahan River; Bukit Gol, Kuantan (Foxworthy). Kemaman (Vaughan Stevens). Perak, Relau Tujur and Simpang (Wray). Thaiping (Kunstler, Wray).

(9) *G. latifolium* *Bl. Rumphia*, iv. t. 174.

A moderate climber. Leaves coriaceous oblong-lanceolate acuminate, base cuneate, deep green, 5 to 6 in. long, 2 to 3 in. wide; nerves 8 pairs, prominent beneath, reticulations conspicuous; petioles .5 in. long. Male spikes cylindrical, rather slender, 1 to 1.5 in. long. Female spikes 2 or 3 on a tuft on trunk, branched, spreading, 6 in. long, branches 6 remote. Ovules not beaked. Fruit spike 1 ft. long, zigzag, rachis thickened. Seed fusiform, 2 in. long, base narrowed to a short stalk. *Hab.* Hill forests, Pahang, Telom. Perak, Thaiping Hills, Cottage (Ridley). *Distrib.* Malay isles.

(10) *G. Kingianum* *Gamble Kew Bulletin* 1915, p. 92. *G. funiculare* *Ridl. Journ. Roy. As. Soc. S. Br.* 60, p. 65 (not of *Blume*).

Stout liane, bark black, 2 in. through. Leaves thickly coriaceous, dark green, oblong to lanceolate-oblong or ovate-oblong cuspidate, 5 to 7 in. long, 2.5 to 3 in. wide; nerves 6 or 7 pairs, elevate; petioles .5 in. long. Male spikes stout, cylindrical, 1 in. long, panicled densely crowded on knots on the trunk; peduncles .5 in. long. Female inflorescence of opposite pairs of peduncled spikes, 1 in. long. Fruit spikes 6 in. long. Seed ellipsoid blunt, .5 in. long, red, on stalks .25 in. long. *Hab.* Common in forests; the ground often strewed with the male spikes. Singapore, Garden Jungle; Kranji. Johor, Batu Pahat. Pahang, Tahan. Malacca, Ayer Keroh; Selandor (Cantley). Negri Sembilan, Bukit Danan

(Cantley). Selangor, Ulu Gombak (Burn-Murdoch). Perak, Waterfall, Thaiping Hills (Wray, Kunstler). Penang, Hill (Curtis). *Native names*: Akar Tutubo; Akar Suburus.

This plant is very near Blume's *G. funiculare* if it is distinct from that species, as Gamble thinks it is.

(11) *G. tenuifolium* Ridl. *Journ. Roy. As. Soc. S. Br.* 60, p. 66.

Slender twiner. Leaves herbaceous oblong-lanceolate acuminate, base shortly narrowed, 4 to 7 in. long, 1 to 2.25 in. wide; nerves raised, 6 to 8 pairs; petioles .25 in. long. Male spikes one or two together, unbranched; peduncle 1 in. long; spike as long. Female spike solitary, 2 to 3 in. long; ovule-whorls .12 in. apart. Seed spikes 4 in. long. Seed ellipsoid acute, .5 in. long, on a pedicel .5 in. long. *Hab.* Forests, Malacca, Bukit Sadanen; Chabau; Selandor (Cantley). Negri Sembilan, Tampin Hill; Gunong Angsi. Selangor, Kwala Lumpur. Pahang, River bank (Ridley). Perak, Thaiping Hills. Dindings, Gunong Tungul. Penang Hill (Curtis); Balik Pulau. Kedah, Yan. Lankawi. *Distrib.* S. Siam (Kasum). *Native names*: Akar Putat; Akar Dagan; Akar Mantadu. *Use*: Fruit eaten by Sakai.

## ORDER CLXV. CONIFERÆ

Trees (or shrubs). Leaves coriaceous, rigid, usually alternate, ovate, linear, acicular or scale-like, usually sessile. Flowers unisexual, usually on different trees. Males in catkins of small scales bearing 2 or more anther-cells. Females of 1 or more sessile ovules, on a scale or on a fleshy peduncle (receptacle). Ovules naked. Seeds in cones (*Araucariæ*, *Abietinæ*) winged, attached at first to the scales, or (*Taxaceæ*) drupaceous on a fleshy receptacle. Genera 33, species about 300, whole world, but chiefly in temperate regions, very rare in the tropics and absent from Peninsular India and Ceylon.

### I. ARAUCARIÆ.

Female flowers in a cone of numerous scales.

Anther cells 5 or more; seed winged . . . . . 1. AGATHIS

### II. TAXACEÆ.

Female spike of 1 to 6 minute scales; seed drupaceous on a receptacle.

Ovule erect . . . . . 2. DACRYDIUM

Ovule reversed . . . . . 3. PODOCARPUS

### 1. AGATHIS, Salisb.

Lofty trees with whorled branches. Leaves coriaceous, ovate, finely nerved; no midrib. Male cones cylindrical, solitary peduncled, scales numerous, with 10 or 12 anther-cells. Female cone ovoid or more or less globose, of large scales spirally imbricate, broad-tipped. Ovuliferous-scale thin confluent with the scale. Ovule 1,

rarely 2. Ripe cone large, ovoid or globose. Scales hard, broad. Seed on the lower side ovate or oblong, broadly winged. Species several, Malaya to Polynesia.

Tall tree; leaves coriaceous, green; male spikes 2 in.

long (1) *A. loranthifolia*

Small tree; leaves rigid, coriaceous, yellow; male  
spikes 1.5 in. long (2) *A. flavescens*

(1) *A. loranthifolia* *Salisbury, Trans. Linn. Soc. viii. 312; Hook. fil. F.B.I. v. 650.*

A lofty straight tree 80 to 150 ft. tall, and 2 to 3 ft. through, very resiniferous. Leaves coriaceous, dark green, lanceolate to ovate blunt, base very shortly narrowed, decurrent on petiole, 2 to 3 in. long, 1 to 1.25 in. wide; petioles .25 in. long. Male spikes cylindrical, blunt, 2 to 3 in. long. Scales oblong-obovate, .25 in. long. Anther-cells 10 to 12 on a scale. Female spike 2 in. long. Cone sub-globose, scales cuneate rounded, top thickened. Seed oblong, .3 in. long, wings falcate, obtuse decurved.

(2) *A. flavescens* *Ridl. Journ. F.M.S. Mus. vi. 196; Kew Bulletin, 1914, p. 332.*

A tree about 40 ft. tall, and from 1 to 2 ft. through or even less, branches spreading, yellow. Leaves very thick, coriaceous, yellow, glaucous beneath, elliptic-obovate, tip round, base narrowed to the very short thick petioles .1 in. long, blade 2 to 2.5 in. long, .5 to 1 in. wide. Male spikes 1.5 in. long, .25 in. through, cylindrical. Scales 1.3 in. wide, .12 in. long, limb orbicular; anther-cells 5 or 6. Cone on a stout thickened peduncle 3 in. long, globose, 2.25 in. long, 2 in. through. Scales obovate-obreniform, upper edge recurved, thickened, 1.25 in. long, 1 in. wide. Seed oblong, ends rounded, .5 in. long, .25 in. wide, wings oblong rounded, .27 in. long. *Hab.* Mountains in small rocky woods, Pahang, Gunong Tahan at 4500 to 6000 ft. altitude (Robinson, Ridley).

While on the open rocky slopes the whole tree is of a conspicuous yellow colour, in the more shady woods of the Teku stream the leaves are green.

## 2. DACRYDIUM, Solander.

Trees medium to large size. Leaves short acicular or scale-like, sessile. Male cones very small, sessile, on the tips of the branches, scales minute lanceolate. Anther-cells 2. Female flowers solitary on the branch ends; bract ovate with a broader semi-orbicular-ovate scale. Ovule terminal erect, micropyle pointing upwards. Seeds small, drupaceous. Species about 16, New Zealand, New Caledonia, Chili and 1 Asiatic.

Leaves of 2 forms, on young plants and shoots

acicular, in adults scale-like, very small . . . (1) *D. elatum*

Leaves all acicular, .25 in. long on fertile branches . . . (2) *D. Beccarii*

Leaves flat linear falcate . . . . . (3) *D. falciforme*

(1) *D. elatum* Wall. *Cat.* 6045; in *Hook. Lond. Journ. Bot.* ii. 144, *t.* 2; *Bl. Rumphia*, iii. 221, *t.* 172c, fig. 2; *Hook. fil. F.B.I.* v. 648; *Ridl. Journ. Roy. As. Soc. S. Br.* 60, p. 55.

A big tree 30 to 80 ft. tall and 2 to 3 ft. through. Leaves of two kinds; those on young trees and on shoots of older ones acicular

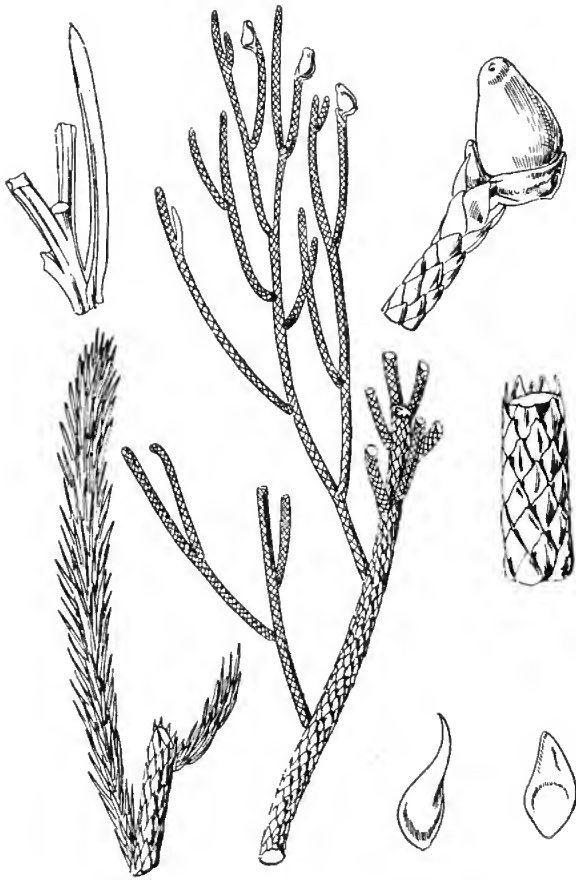


FIG. 227.—*Dacrydium elatum*.

angled and appressed to the stem,  $\cdot 4$  in. long; those on adult trees and on fertile branches lanceolate acute imbricate scales,  $\cdot 04$  in. long. Male cones on short branches terminal, cylindrical, yellowish green,  $\cdot 16$  in. long, scales ovate. Female flowers very small, terminal, on branch ends; ovule minute, ovoid. Seed bright red, subglobose. *Hab.* Common in forests or woods at about 2000 ft.

altitude and upwards. Pahang, Gunong Tahan (Robinson); Telom (Ridley); Gunong Lesong, Kwantan (J. G. Watson). Selangor, Gunong Ulu Kali; Mengkuang Lebah (Dennys), Perak, Gunong Bubu and Gunong Batu Putih (Wray); Gunong Inas (Yapp). Penang Hill (Wallich). Kedah Peak (Low). *Distrib.* Tonkin, Tenasserim, Sumatra, Borneo, Fiji. *Native name*: Ru bukit.

(2) **D. Beccarii** *Parl. in DC. Prodr.* xvi. 2, p. 494; *Pilger Pflanzenreich, Taxaceæ*, 52.

A dwarf bushy tree or a bush 15 ft. tall or less. Leaves all acicular, mucronate; .5 to .75 in. long in young shoots, .1 in. in fruiting shoots. Male spikes unknown. Female flowers axillary, one or two together; receptacle very short. Bracts sub-orbicular, rather large. Ovule conic to ellipsoid, acute or blunt, 1 ft. long. *Hab.* Mountains in open spots, Malacca (all collectors). Pahang, Gunong Tahan (Ridley). Selangor, Mengkuang Lebah (Dennys), Perak, Bujong Malacca (Curtis); Gunong Bubu (Wray). *Distrib.* Borneo.

The sterile branches of this plant resemble those of quite young *D. elatum*, but the leaves are longer and finer, and those on the fertile branches are distinctly longer and acicular, those of *D. elatum* being scale-like. The plant always grows in open spots, not like *D. elatum* in forests, and is very much smaller. I have sought in vain for male flowers.

(3) **D. falciforme** *Pilger, Pflanzenreich, Taxaceæ*, 45, fig. 4; *Ridl. Journ. Roy. As. Soc. S. Br.* 60, p. 56. *Podocarpus falciformis* *Parl. in DC. Prodr.* xvi. 2, p. 685.

Shrub or a small tree, usually 10 to 30 ft. tall. Leaves coriaceous flat, distichous, obliquely lanceolate acuminate, acute mucronate, base narrowed to a short winged petiole, midrib visible from the base halfway along the leaf, 1 to 2 in. long, .25 in. wide. Male cone cylindrical, 1 in. long, sub-terminal, scales small ovate acuminate. Female flowers on a very short branch. Scales triangular, keeled, numerous, imbricate. Ovule solitary, decurved. *Hab.* Mountains in open high forest, Pahang, Gunong Tahan. Selangor, Semangkok Pass (Ridley). *Distrib.* Lingga, Borneo, Philippines.

I have a record of this plant attaining the height of 80 ft. with a trunk diameter of 3 ft., but all I remember to have seen and all herbarium records give it as much smaller.

### 3. **PODOCARPUS**, L'Herit.

Trees. Leaves coriaceous, linear acuminate, in one species ovate, and in one or two forms acicular and linear, or scale-like alternate narrow, petiolate or sub-sessile, midrib usually prominent. Trees unisexual or bisexual. Male catkins of numerous lanceolate imbricate bracts. Anther-cells 2 on a clawed scale. Female flowers solitary, or several in a raceme. Bracts 1 or more, forming a fleshy peduncle (receptacle). Ovule adnate to a scale decurved, micropyle facing downwards. Seed moderately large, globose or

ovoid drupaceous, red or purple, or green on the thickened fleshy receptacle. Species 40, tropical or sub-temperate regions of both hemispheres.

Leaves all similar.

- Leaves broadly ovate . . . . . (1) **P. Blumei**  
 Leaves linear, spreading; fruit peduncled, rather large.  
 Male spikes solitary or paired; leaves linear lanceolate acute . . . . . (2) **P. neriifolius**  
 Male spikes numerous; leaves elliptic oblong blunt . . . . . (3) **P. polystachyus**  
 Leaves linear very coriaceous, strongly deflexed; fruit receptacle sessile . . . . . (4) **P. deflexus**  
 Leaves of 2 forms, on branches linear, terete appressed; on terminal shoots distichous, linear flattened.  
 Fruit minute . . . . . (5) **P. imbricatus**

(1) **P. Blumei** Endl. Syn. (1847); Pilger, *Pflanzenreich, Taxaceæ*, 60; Koorders and Valetton, *Baumarten t.* 588. *P. agathifolia* Bl. *Rumphia*, iii. 217, t. 173. *P. Wallichianus* Ridl. *Journ. Roy. As. Soc. S. Br.* 60, p. 57 (not of Presl.).

A tree 60 to 70 ft. tall. Leaves in distant pairs, opposite, ovate or lanceolate-ovate acuminate subacute, base narrowed, coriaceous, 4 to 7 in. long, 1.75 to 2.5 in. wide; petiole stout, .25 in. long. Male flowers in 3 to 5 cylindrical spikes, fasciated on a very short axillary peduncle. Anther scales ensiform, acute. Female flowers solitary on a cylindrical receptacle with a few short scale-like leaves. Seed oblong globose, green, .5 in. through. *Hab.* Dense lowland forests, sporadic. Singapore, Changi; Kranji. Johor, Mount Austin; Bukit Soga. Negri Sembilan, Gunong Angsi, Dindings, Gunong Tungul (Ridley). Perak, Kinta (Low). *Distrib.* Java to New Guinea.

The only specimen I have seen with inflorescence is Low's fruiting specimen. Indeed I have never seen anything but sporadic seedlings about 4 ft. tall scattered over the southern part of the Peninsula, with no adult tree in the vicinity. The species is certainly very closely allied to *P. Wallichianus*, Presl., of India and Burma, but differs in the stiffer coriaceous, more ovate leaves with a shorter point.

(2) **P. neriifolius** Don, in *Lambert's Pinetum* Ed. i. 21; Pilger, *Pflanzenreich, Taxaceæ*, 80, fig. 15, E-G.; Ridl. *Journ. Roy. As. Soc. S. Br.* 60, p. 57. *P. bracteata* Bl. *Enum. Pl. Jav.* 88; *Rumphia*, iii. 214.

A tree 30 to 100 ft. tall, 8 to 15 in. in diameter. Leaves thinly coriaceous, linear-lanceolate, spreading, acuminate acute, narrowed to the base, 4 to 4.5 in. long, .5 in. wide, midrib broad elevate on both sides; petioles .1 to .2 in. long. Male spikes one or two together, .5 to .75 in. long, on short peduncles with several short ovate thick scales at the base. Female spikes solitary or paired, axillary, receptacle .12 to .25 in. long, cylindrical, on a slender pedicel as long, with a few acute scale-leaves near the tip of the receptacle. Ovule ellipsoid or sub-globose. Seed .25 in. long. *Hab.* Hill forests at

1000 to 2000 ft. altitude, Johor, Banang, Batu Pahat (trees gigantic, Ridley); Gunong Belumut (Holtum). Malacca, Mount Ophir (Maingay, Ridley). Negri Sembilan, Tampin. Selangor, Bukit Hitam. Perak, Thaiping Hills by the Waterfall up to 1000 ft. altitude (Wray, Kunstler). Penang Hill and Balik Pulau (Curtis, Ridley). *Distrib.* Indo-Malaya, China.

The Mount Ophir plant has more coriaceous and narrower leaves than the other forms. I have only seen foliage of it.

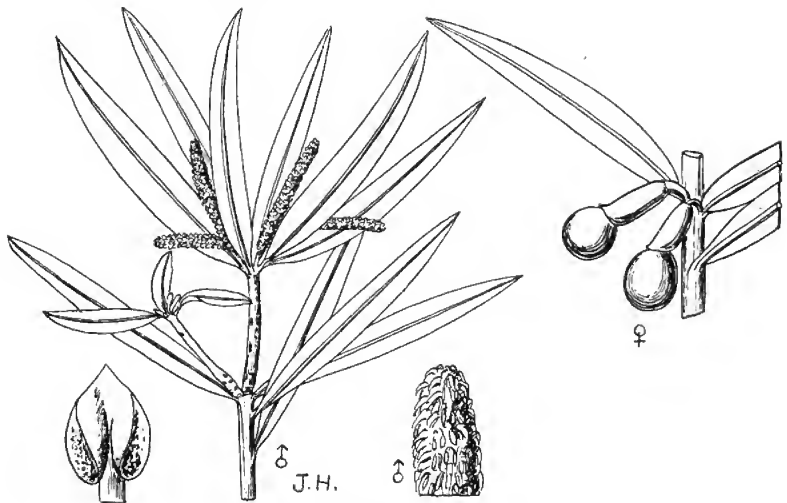


FIG. 228.—*Podocarpus polystachyus*.

(3) *P. polystachyus* R. Br. in *Mirb. Mem. Mus.* xii. 75, and in *Bennett in Horsf. Pl. Jav. rar.* 40; *Wall. Cat.* 6052; *Ridl. Journ. Roy. As. Soc. S. Br.* 60, p. 58.

A low dense bushy tree about 30 ft. tall. Leaves crowded, lanceolate-linear or elliptic-lanceolate, very shortly narrowed at each end, usually blunt at tip, sometimes acute, thickly coriaceous, dark green, midrib prominent, 3 in. long, .25 in. wide, subsessile, or petiole .1 in. long. Male spikes very numerous, crowded, in tufts, yellow, 1 to 1.5 in. long, .12 in. through. Anther-scale triangular-ovate acute or subacute. Female flowers on different trees solitary or several together in the axils, pedicels .1 in. long, receptacle swollen .25 in. long, cylindrical. Seed ellipsoid, .25 in. long, red. *Hab.* Sandy woods behind the mangroves near the sea, abundant, Singapore (Wallich); Kranji; Changi; Serangoon. Johor near the town. Pahang, Rumpin River; Kwala Pahang (Ridley). *Distrib.* Sumatra. *Native names:* S'tada; Sintada.

A curious form occurred at Changi with leaves 6 in. long, .5 in. wide, and very slender male spikes 1 to 2 in. long, the anther-cells remote.

(4) *P. deflexus* Ridl.

Tree 15 to 25 ft. tall, branches spreading at right angles to the stem, branchlets stout, marked with close leaf scars. Leaves crowded at the end of the branches, very coriaceous and strongly deflexed linear or lanceolate-linear, shortly blunt acuminate, narrowed to the base, no distinct petiole, midrib thick, elevate above, channelled beneath. Male flowers unknown. Female flowers solitary in the upper axils, receptacle sessile, very thick, obconic, .25 in. long. Seed obovoid, base narrowed, .4 in. long, pruinose. *Hab.* On open rock slopes at 5000 to 7000 ft. altitude, Pahang, Gunong Tahan (Robinson, Ridley).

This striking species is conspicuous from its strongly deflexed leaves crowded at the top of the branchlets, the lower ones having fallen off. It differs too from *P. nerifolius*, to which I at first referred it, in its sessile receptacle and larger glaucescent fruit.

(5) *P. imbricatus* Bl. *Enum. Pl. Jav.* 89; *Pilger, Pflanzenreich, Taxaceæ*, 56, fig. 7B. *P. cupressinus* R. Br. in *Bennett Horsf. Pl. Jav. Rar.* 35, t. 10; *Bl. Rumphia* iii. 218, t. 172; *Ridl. Journ. Roy. As. Soc. S. Br.* 60, p. 58.

A straggling erect tree about 60 to 100 ft. tall, 4 to 5 ft. in diameter; branchlets slender. Leaves of 2 forms: (1) on branches, linear terete decurrent mucronate, .12 in. long, dark green; (2) on terminal shoots, distichous, flattened linear mucronate, glaucous, green, .25 in. long. Leaves of seedlings often .5 in. long. Male cones cylindrical blunt, .36 in. long, on branchlets below the distichous leaves; peduncles .1 in. long. Anther-scales 40, lanceolate. Female flowers on different trees. Ovules very small solitary on the ends of short branches, receptacle yellow papillose. Seed very small, red. *Hab.* Hill forests at from 1000 ft. altitude upwards. Not rare. Johor, Gunong Pulai. Pahang, K'luang Terbang (Barnes). Selangor, Bukit Hitam (Kelsall); Semangkok Pass (Ridley). Perak, Gunong Batu Putih (Wray). Kedah Peak (Low). *Distrib.* Tenasserim, Hainan, Malay islands.

The tree in the forest is usually weak and straggling, though Wray gives it as 100 ft. tall and 4 to 5 ft. through. Trees in the Botanic Gardens in open ground were about 40 ft. tall and densely branched to near the ground.

## ORDER CLXVI. CYCADEÆ

Palm-like trees or shrubs. Stem thick, simple or forked and covered with old leaf bases. Leaves in a terminal crown, rigidly coriaceous, pinnate with narrow linear acute or lobed leaflets with circinate vernation as in ferns. Male flowers in a terminal cone of numerous scales bearing beneath numerous crowded 1-celled anthers. Female flowers on a different plant consisting of a terminal whorl of flat carpellary leaves usually pectinate lanceolate or flabellate (carpophylls). Ovules large, sessile, in notches of the carpellary



leaves. Seeds large drupaceous, egg-shaped, albuminous. Genera 9. Species about 80, all tropics and some temperate regions.

### 1. *CYCAS*, Linn.

Stems usually tall. Leaves pinnate with narrow-linear leaflets. Male cones large, scale long, acuminate. Female carpophylls lanceolate or fan-shaped, red-woolly. Species 12, tropical Africa and Asia, Polynesia.

Stem erect, brown, often branched; carpophylls narrow lanceolate

(1) *C. Rumphii*

Stem sub-erect, white, simple, base swollen; carpophylls obovate pectinate

(2) *C. siamensis*

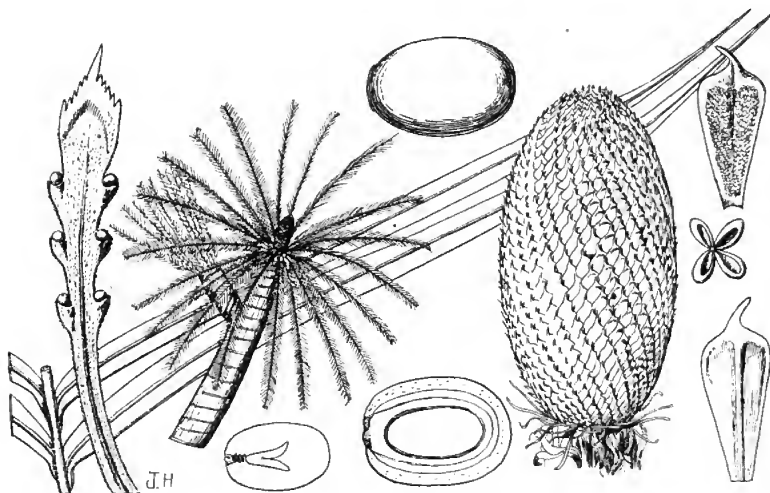


FIG. 229.—*Cycas Rumphii*.

(1) *C. Rumphii* *Miq. Bull. Sc. Phys. Neerl.* 839, 45; *Ann. Bot.* ii. 5 f, *A. and B.*; *Dyer in Hook. fil. F.B.I.* v. 657; *Ridl. Journ. Roy. As. Soc. S. Br.* 60, p. 67. *C. circinalis* *Roxb. Fl. Ind.* iii. 744; *Griff. Notulæ*, iv. 1,  *Ic. Pl. As. t.* 361 (not of *Linnaeus*).

Stem 4 to 20 ft. tall, 6 in. through, cylindric, not swollen at base, brown, often branched, with axillary buds, rough with the leaf bases. Leaves 6 ft. long, 2 ft. wide, petioles thorny, leaflets linear acute, .5 in. across, dark green, polished, coriaceous. Male cone 1 ft. tall, about 4 in. through, orange-colour, coarsely scented. Anther-scales .75 in. long, obcuneate, with a long acuminate spine. Female, carpophylls 9 in. long, .5 in. wide, linear at base, gradually dilate into a lanceolate limb shortly toothed, acuminate, orange-woolly; ovules 4 to 6 in the notches. Seed ellipsoid, orange, 1 in. through. *Hab.* Sea-coasts, and in forests, Singapore, Changi;

Pulau Tekong; Tampinis river. Malacca, Tabong (Griffith). Pahang, Pekan; Rumpin river (sea and river shores). Selangor, Raub track (Machado). Perak, Kamuning; Goping (Kunstler); Kenering (Wray). Kelantan, Kwala Lebir (Ridley) in forests, Adang islands, on sea shore. *Distrib.* Nicobars, Tenasserim, Malay islands to Australia. *Native names:* Pakis Laut; Paku Rajah; Paku Gala (Griffith). Classed by Malays with ferns (pakis, or paku), on account of the circinate veneration.

It is possible that the forest plant is a distinct species, but it very rarely flowers, propagating itself by the axillary buds (bulbils), which become detached and roll along the ground. The carpophylls of the Goping plant (the only fruits of the forest form I have seen) are strongly pectinate at the tip, with spines over 1 in. long.

(2) *C. siamensis* Miq. *Bot. Zeit.* 1863, p. 334; *Regel. Ill. Hort.* t. 433; *Dyer in Hook. fil. F.B.I.* v. 657.

Stem about 15 ft. long or less, and 6 in. through above, base abruptly swollen, trunk cylindric, smooth, white. Leaves 3 ft. long, 8 in. across, light green; leaflets 70 pairs, narrow linear acute, .25 in. wide, coriaceous; petioles 1 ft. long, thorny. Male cone; anther-scales .7 in. long with a slender point as long as the deltoid-clavate limb. Female carpophylls, with petioles 3 in. long, limb obovate pectinate with 30 processes 1 to 2 in. long, all orange woolly. *Hab.* On limestone rocks often high up on precipices, and sometimes lying horizontal on the face of the precipice. Terutau (Curtis). Setul. Perlis near Tebing Tinggi (Ridley). *Distrib.* Burma, Shan States, Cochin-China, Siam.

## SUPPLEMENT

This supplement includes a number of new additions to the Flora, obtained chiefly from Messrs. Burkill and Holttum, and their collectors Mohammed Haniff and Nur, too late for incorporation in their proper places in the Flora; also a certain number of species overlooked in the herbaria of this country, and various corrections and revisions of genera or species recently published, so as to make the work as up to date as possible.

There still remain in our forests a very large number of species at present uncollected, and unknown, as very large areas of the Malay Peninsula have never been visited by any botanist, but this work, as far as it goes, gives a fairly complete account of the lowland flora on both coasts, and a good deal of the extraordinarily rich mountain flora of the interior.

It is to be hoped that botanists will continue to collect and study plants over the large unexplored area.

## ORDER I. RANUNCULACEÆ.

*Vol. i. p. 3, after genus 2, Naravelia, insert:—*

## 3. ANEMONE, Linn.

Herbs. Leaves radical, petioled, lobed or dissect. Scapes with an involucre of two or three leaves. Flowers pedunculate. Sepals 4 or more, petaloid, white, yellow or blue. Petals none. Stamens indefinite. Ovaries indefinite. Achenes in a head; styles persistent hooked. Species about 50, whole world, chiefly in temperate regions.

(1) **A. sumatrana** *De Vries in Miq. Pl. Jungh. 76.*

Rhizome short, thick. Leaves tufted, 3-lobed, hairy, lobes ovate acuminate lobulate, lobules with a short process on each, lower lobe bilobed; all hairy on both sides, 1.5 in. long, 1 in. wide; petioles 6 in. long, hairy above; peduncle 6 to 12 in. long. Flowers white, 1 in. across; pedicels hairy, 1.25 to 2 in. long. Sepals 5, oblong sub-acute, .25 in. wide. Stamens half as long. Achenes small. *Hab.* Banks of streams in mountains. Pahang, Gunong Benom at 6300 to 7000 ft. altitude (I. H. N. Evans). *Distrib.* Sumatra. N. Siam.

## ORDER III. MAGNOLIACEÆ.

*Vol. i. p. 17, after sp. 5, Talauma longifolia Ridl., insert:—*

(6) **T. oblanceolata** *Ridl.*

Shrub or tree, branches stout, glabrous. Leaves thickly coriaceous, oblong-lanceolate, shortly blunt acuminate, base cuneate or acuminate, midrib little elevate above, prominent beneath;

nerves 14 pairs elevate on both sides, inarching; transverse nervules undulate, parallel, very numerous and equally conspicuous on both sides; 10 in. long, 3.25 in. wide; petioles 1.25 to 2.25 in. long, base for .5 in. thickened. Flower-bud ovoid-elliptic, glabrous, 1.25 in. long. Sepals oblong, minutely apiculate, densely minutely pustulate when dry. Petals oblong blunt. Stamens linear; anthers rather long acuminate. Pistils oblong, short acute. Young fruits 2 in. long; carpels with long acuminate points. *Hab.* Mountains: Pahang, Sempang Mines (Fraser Hill), Semangkok Pass at 4000 ft. altitude (Ridley 15,590). *Distrib.* Borneo, Banca.

One specimen of this plant in Herb. Kew, from Banca, collected by Teysmann, is named by the Buitenzorg botanists, *Talauma obovata*, Korth. The original specimen of Korthals was obtained at Pamatton in South Borneo. I have not seen it. Though Korthal's description is quite inadequate to identify the species by (*Nederl. Kruidk. Arch.* ii. ser. i. Verslag, 98), Miquel (*Ann. Mus. Bot. Lugd. Bat.* iv. 69) describes the plant as fully as possible. The description does not altogether suit this plant, differing in the leaves being pergamaceous obovate-oblong, acutely acuminate, 12 to 13 in., rarely 10 in. long, and 3 to 5 in. wide, the base of the flower being villous, the petals thick, oval and the anther-connective process short and blunt, so that I conclude that the true *T. obovata* is not the Banca plant. Craib in describing his *Talauma betongense* from Siam (*Kew Bull.* 1925, p. 7), says that the plant from the Semangkok Pass closely resembles that species. I have seen no specimen of his plant, but it seems to differ in some points. I therefore think it advisable to separate the Pahang species under the above name from both Craib's and Korthal's plant.

## ORDER VI. ANONACEÆ.

*Vol. i. p. 69, after sp. 14, Goniotalamus uvarioides King, insert:—*

(15) *G. pendulifolius* Ridl.

Shrub; branches 4, erect. Leaves coriaceous, pendent (young ones on the tips red), oblong sub-acute, base rounded; nerves 33 pairs inarching, slender elevate beneath; 18 in. long, 5.5 in. wide; petioles .5 in. long. Flowers solitary, axillary, pedicel .2 in. long. Sepals triangular-ovate, coriaceous acute, .5 in. long, .3 in. wide. Outer petals lanceolate acuminate, base shortly broadly clawed, coriaceous, 1.75 in. long, 6 in. wide; inner petals ovate-triangular, .5 in. long. Stamens linear with an ovate acuminate point. Pistils projecting, about 15; stigmas semicircular. Carpels 4, ellipsoid, shortly bluntly beaked, .75 in. long, narrowed into a thick pedicel .5 in. long. *Hab.* Pahang, 6 miles north of Bentong (Burkill 16501).

Nearest to *G. uvarioides* King, but the inner petals are very different, and the stamens longer.

## ORDER X. CAPPARIDACEÆ.

*Vol. i. p. 119, after sp. 1, Cleome viscosa Linn., insert:—*

(1A) *C. chelidonii* Linn. *fil. Suppl.* 300; *Hook. fil. F.B.I.* i. 170; *Burkill, Gardens Bulletin* iii. 280.

Glabrous annual herb 1 to 3 ft. tall. Leaves 5 to 9-foliolate; petioles 3 in. long; leaflets of lower leaves broadly lanceolate or obovate, narrowed to a long base, 1.5 to 1.75 in. long, .5 in. wide, of upper leaflets narrow linear, 1 in. long, .08 in. wide. Flowers racemose on long pedicels, .5 to 1 in. wide, rose pink. Petals sessile ovate. Capsule 2 to 4 in. long, tapering at each end. Seeds large, pale brown, muricate. *Hab.* Penang, Pulau Tikus and Province Wellesley, Prai dock (Curtis) *vide* Burkill l.c. *Distrib.* India and Siam.

Easily distinguished from *C. viscosa* by the absence of sticky hairs on the stem and its large pink flowers. I have seen no specimen from Penang; a plant sent from Prai dock (Curtis 2212) is certainly *C. viscosa*. Burkill states that the plant is used as a drug in the Chinese shops in Singapore, as is *C. viscosa*. It is probably an escape from gardens or drug stores.

## ORDER XIV. CARYOPHYLLACEÆ.

*Vol. i. p. 150, after genus 1, Drymaria, insert:—*

## 2. STELLARIA, Linn.

Herbs. Leaves opposite, ovate or lanceolate, sessile or petioled. Stipules absent. Flowers terminal or in axillary cymes, few, white. Sepals 5. Petals 5, bifid or absent. Stamens 8 to 10, hypogynous. Disc annular or lobed, sometimes very inconspicuous. Ovary unilocular, many-ovuled. Styles 3. Capsule ovoid or oblong, splitting into 3 or more valves. Seeds reniform-globose, often flattened pustular, brown. Species 70, chiefly temperate regions, rarer in the tropics.

Leaves ovate petioled, or sessile . . . . . (1) *S. media*  
 Leaves lanceolate sessile . . . . . (2) *S. uliginosa*

(1) *S. media* *Cyrill Char. Comm.* 36; *Sowerby Eng. Bot.* ii. 93, pl. 229; *Hook. fil. F.B.I.* i. 230.

A weak tufted or straggling herb, 4 to 6 in. tall or more; stems with a line of hairs. Leaves ovate acute or lanceolate, lower ones petioled, upper ones sessile glabrous, base round or narrowed into the petiole, .2 to .25 in. long, and nearly as wide; petioles .1 to .15 in. long. Flowers small, solitary in upper axils on hairy (or glabrous) filiform pedicels .5 in. long or less. Sepals oblong-lanceolate, blunt, bristly on the back, .15 in. long. Petals shorter, deeply bifid, white or absent. Stamens 5 to 10. Capsule longer than calyx, cylindrical ovoid, splitting into 5 oblong-linear, blunt lobes. Seeds brown, tubercled. *Hab.* Perak, Cottage grounds at 4500 ft. altitude

(Ridley). *Distrib.* North temperate regions but spread into India, Java, etc., as a weed of cultivation.

I found this, the Chickweed, abundantly in the cultivated grounds at the Cottage Bungalow in 1892, and noted it seemed thoroughly established there then, but it does not seem to have been collected there since. It was no doubt introduced in pot-plants or with seeds. The plant is very variable.

(2) *S. uliginosa* Murray *Prod. Gotting.* 55; *Sowerby Eng. Bot.* ii. p. 99, pl. 233.

A slender, creeping ascending herb 6 in. long or more, glabrous. Stem slightly 4-angled. Leaves lanceolate acuminate acute, sessile, narrowed to the base, .25 in. long, .12 in. wide. Flowers small, in cymes in upper axils, usually 2, pedicels unequal, the shorter one bearing a female flower, the longer one a male flower. Sepals 5, lanceolate acuminate, green with a scarious edge, glabrous, .1 in. long, free to base. Petals 5, slightly shorter, bifid, lobes lanceolate acute, or absent. Stamens in male flower 10. Ovary oblong with 3 very short styles. Capsule ovoid-oblong, shorter than the sepals, terminated by the minute stigmas, 3-valved, valves thin. Seeds 6 or fewer, orbicular reniform, strongly pustulate, slightly flattened, dark chestnut. *Hab.* Perak, Maxwell's Hill on banks (Burkill 12,815). *Distrib.* Europe, temperate Asia, India. No doubt accidentally introduced, but apparently established in the Peninsula. The specimens, which are very weak and small, are somewhat abnormal. The flowers are mainly unisexual, the cymes consisting of two flowers in the upper axils; the one on the longest pedicel is usually only male, the one on the shorter pedicel female only, usually apetalous and without stamens. The petals when present are deeply bifid into two lanceolate lobes.

#### ORDER XV. PORTULACACEÆ.

*Vol. i. p. 151, after sp. 2, Portulaca quadrifida* Linn., insert:—

(3) *P. pilosa* Linn. *Sp. Pl.* 445; *Dec. Prodr.* iii. 354; *Bot. Reg.* x. 792.

A matted plant with woody much-branched prostrate stem, branches densely long-hairy, hairs white (red when dry). Leaves sessile fleshy, flattened linear acuminate glabrous, .25 in. long, .05 in. wide. Flowers terminal axillary sessile solitary, bright mauve pink, .5 in. across, surrounded by subverticillate leaves and long hairs. Sepals lanceolate acuminate hairy. Petals narrow lanceolate acuminate. Capsule sessile, base cup-shaped, .1 in. long when dehiscent. Seeds irregularly rounded oblong, flattened, black. *Hab.* Sandy spots near cultivation, Muar, Bukit Kyara (Ridley). Selangor, Telok Gadong (Nur). *Distrib.* A native of Brazil and the West Indies, often cultivated in tropical gardens as a carpet-bedding plant, and established as an escape in various warm parts of the world.

## ORDER XVII. FLACOURTIACEÆ.

*Vol. i. p. 157, sp. 1, Erythrospermum Scortechinii King, note:—*

The flowers of this rare plant were not described. A specimen of what appears to be this plant in flower has since been sent from Ulu Petasih in Negri Sembilan, collected by Foxworthy's native collector. The leaves are younger, less rigid, and smaller than in Scortechini's Perak fruiting specimen. The racemes are slender, axillary with several sub-terminal 3 to 5 in. long. Flowers distant, .2 in. across, pedicels slender, spreading, 1 in. long. Bracts lanceolate acuminate minute. Sepals 5, lanceolate reflexed. Petals 5, lanceolate reflexed. Stamens 5; anthers lanceolate sagittate long, connective dilate at tip. Ovary ovoid, flattened, base narrowed; style cylindrical; stigma trilobed.

## ORDER XVIII. GUTTIFERÆ.

*Vol. i. p. 169, after sp. 2, Garcinia rostrata Benth., insert:—*

(2A) *G. Holttumi* Ridl. *Kew Bull.* 1924, p. 261.

Tree 15 to 20 ft. tall, branches slender. Leaves stiffly coriaceous lanceolate acuminate cuspidate, base narrowed, nerves quite invisible; 2.25 in. long, .75 in. wide; petioles .2 in. long. Cymes clustered in the upper axils, solitary or 2 or 3 on a short peduncle. Pedicels .1 in. long, stout. Male flowers about .1 in. across. Sepals 2, short ovate. Petals orbicular, 5, imbricate. Stamens in 5 oblong spathulate masses; anthers on both sides. Pistillode central slender with a discoid stigma. Female flowers and fruit unknown. *Hab.* Johor, Gunong Belumut at 3000 ft. altitude; a fairly common tree (*Holttum* 10,729).

Allied to *G. rostrata* Benth., but leaves narrower and much more coriaceous.

*Vol. i. p. 176, sp. 21, Garcinia monantha Ridl., note:—*

The male flowers of this species have now been obtained on Gunong Tahan by Mohammed Haniff. They are in short axillary cymes of 3 flowers, peduncle thick; .1 in. long. Sepals 2, short ovate. Petals 4, coriaceous ovate blunt, yellow, .2 in. long. Stamens in 4 bundles; filaments connate into 4 cylindrical stalks. Anthers very numerous, crowded at the apex, on both sides. Pistillode stout, cylindrical, as long as the stalks of the stamens. Stigma capitate, lobed.

*Vol. i. p. 190, after sp. 4, Kayea ferruginea Pierre, insert:—*

(4A) *K. daphnifolia* Ridl.

Tree, branchlets moderately slender, bark blackish brown. Leaves stiffly coriaceous, oblong-lanceolate acuminate, acute base acuminate shortly; nerves very indistinct and slender, about 18 pairs, very irregular, with some intermediate ones, reticulations minute, visible on both sides, 8 in. long, 2 in. wide; petioles rather

thick, black rugose, grooved above, .5 in. long. Flowers terminal, 2 or 3, large, .5 in. through; pedicels .12 in. long, thick. Outer sepals orbicular, coriaceous, longitudinally and transversely rugose, inner sepals shorter orbicular-ovate, smooth. Petals not seen. Stamens rather long. Style base thick, conic. *Hab.* Dindings (Derry).

This species is allied to *K. ferruginea*, Pierre, but differs in the long narrow leaves with nearly parallel edges, the fine and more numerous nerves and rugose outer sepals.

*Vol. i. p. 190, after sp. 7, Kayea Kunstleri King, insert:—*

var. *rosea*. Flowers pink, not white. Stipules larger ovate. *Hab.* Negri Sembilan, Tampin Hill (Burkill 3229).

#### ORDER XIX. TERNSTRŒMIACEÆ.

*Vol. i. p. 199, after sp. 6, Ternstroemia montana Ridl., insert:—*

(7) *T. micrantha* Choisy in *Zoll. Syst. Verz.* 142; *Reinwardtia elongata* Korth. *Verh.* 103, t. 12. fig. 2.

Glabrous shrub. Leaves coriaceous elliptic-lanceolate acuminate, base shortly narrowed; nerves about 6 pairs inarching within the margin very faint above and invisible beneath; 2 to 3 in. long, 1.25 to 1.5 in. wide; petioles .25 in. long. Flowers solitary or in axillary racemes, .15 in. wide, yellow; pedicels .2 in. wide. Sepals round, coriaceous. Petals oblong-ovate, tips rounded denticulate. Stamens very numerous, much shorter than the petals. Ovary globose. Fruit globose, .25 in. long, green, terminated by a short acute style. *Hab.* Pahang, Fraser Hill at 4000 ft. altitude (Mhd. Nur). *Distrib.* Borneo, Java, Sumatra.

*Vol. i. p. 206, after sp. 1, Pentaphylax malayana Ridl., insert:—*

(2) *P. arborea* Ridl.

Tree 30 to 40 ft. tall. Leaves alternate, thinly coriaceous, glabrous, lanceolate or ovate-lanceolate, base cuneate, apex bluntly acuminate, midrib prominent beneath; nerves 8 pairs, nervules irregularly branched; 1.5 to 2 in. long; petioles .1 in. long. Flowers solitary extra-axillary sessile. Sepals 5, rounded, entire, glabrous, imbricate. Petals and stamens not seen. Style cylindrical with 5 recurved short stigmatic arms. Capsule .1 in. long, oblong rounded dehiscent, 5-celled; ovules 2 in a cell pendulous from the apex. *Hab.* Pahang, Fraser Hill at 4000 ft. altitude (Nur 11,332).

I have seen no flowers of this species, which differs from *P. malayana* in being a tree with the thinner, larger lanceolate leaves with solitary flowers, and much smaller sepals.

#### ORDER XX. DIPTEROCARPACEÆ.

*Vol. i. p. 216, after sp. 5, Diptercarpus cornutus Dyer, insert:—*

(5A) *D. Lowii* Hook. *fl. Trans. Linn. Soc.* xxiii. 160. *D. undulatus* Vesque *Compt. rend.* 1874, p. 626.

Tree. Leaves stiffly coriaceous, ovate-oblong, shortly acuminate, glabrous, base broad rounded or retuse; nerves sunk above,



strongly elevate beneath, 14 to 20 pairs, midrib prominent, sunk above; 8 to 10 in. long, 4 to 5 in. wide; petioles stout, 1 to 1.75 in. long. Peduncle and bud-sheaths silky. Sepals oblong hairy. Petals (in bud) hairy. Fruit oblong-obovoid, 1.5 in. long, entirely covered with curved rounded transverse lamellæ in 5 vertical rows, hairy underneath, long wings linear-oblong blunt, main nerves 3, prominent, 6 in. long, 1.1 to 2 in. wide; short wings broad ovate convolute, 1 in. long. *Hab.* Johor, Gunong Belumut (Holttum). *Distrib.* Borneo.

The only flower seen is a very young bud.

*Vol. i. p. 241, sp. 5, Synaptea nitens Ridl., note :—*

Flowers have been obtained by Haniff on Mount Olivia, Penang, for the first time. Panicles 1 to 2 in. long with numerous short branches densely light rufous, woolly-tomentose. Pedicels .05 in. long, tomentose. Sepals ovate-lanceolate blunt, little longer, densely tomentose hairy, .1 in. long. Petals glabrous, linear blunt, narrowed above stamens, then dilate, .3 in. long. Stamens 15, filaments very short, connective rather broad, prolonged to a short point. Ovary sessile. Style columnar short dilate and grooved at tip; stigmas short erect, 5.

#### ORDER XXIV. STERCULIACEÆ.

*Vol. i. p. 269 after sp. 3, Sterculia lævis Wall., insert :—*

(3A) *S. neriifolia Ridl. Journ. Bot. 1924, p. 294.*

Small tree 10 to 12 ft. tall, glabrous, bark of branches pale, longitudinally rugose. Leaves mostly crowded at the ends of the branches, oblong-lanceolate, narrow, glabrous, shining, tip acuminate blunt, base long narrowed; nerves 17 pairs nearly horizontal, inarching within the margin, fine but prominent; 6.5 to 7 in. long, 1.2 in. wide; petioles slender thickened at the tip and base, 1 in. long. Raceme sub-terminal, 3 in. long, puberulous. Flowers on distant branchlets .05 in. long bearing 1 to 3 flowers; pedicels .1 in. long. Males, calyx tube cylindric-campanulate, .15 in. long, pale green and grey, nearly glabrous, lobes linear blunt nearly as long, free at tip, white-hairy on the edge. Stamen-column short erect, anthers in two rows of 5 each, lower row smaller than the upper one. Female flowers and fruit unknown. *Hab.* Negri Sembilan, Bukit Tangga (Burkill 11,826).

Allied to *S. lævis*, but with very narrow lanceolate leaves.

*Vol. i. p. 275, sp. 1, Scaphium linearicarpum Ridl., note :—*

The fruits described above were quite young. Ripe fruits of what is apparently this species have since been obtained by Mohammed Nur at the Semangkok Pass, Selangor. The carpel is thin and papery, lanceolate blunt, curved on the lower edge, but not gibbous as in *S. affine*, 9 in. long, 1.75 in. wide, pubescent hairy, nerves thickly hairy. Seed ellipsoid, rugose when dry, densely hairy, 1 in. long.

## ORDER XXV. TILIACEÆ.

*Vol. i. p. 298, sp. 1, Schoutenia Mastersii King, note :—*

This tree varies very much in the size and form of leaves, perhaps local variations. The typical Penang form has oblong leaves 3 in. long, 1 in. wide. This form occurs also in Malacca (Maingay). The Perak Hills form has much smaller leaves, the biggest and lowest on the spray is 1.5 in. long, and 1 in. wide, but most of the leaves are .5 in. long, .25 in. wide, and the fruiting calyx is smaller. This form might be called var. *microphylla*. It was collected in Perak by Kunstler 3381, and by Scortechini. A third variety comes from Gunung Tampin in Negri Sembilan, where it was collected by Burkill at 2300 ft. altitude (3176). This, var. *angustifolia*, has leaves oblong-linear, narrowed to a blunt point at the tip and with a shortly narrowed base, 1.5 in. long and .25 in. wide. The flowers are only .5 in. across while those of the typical plant are nearly 2 in. wide.

*Vol. i. p. 300, after sp. 2, Grewia paniculata Roxb., insert :—*

(2A) *G. sclerophylla* Roxb. in *G. Don Gen. Syst.* i. 550. *G. scabrophylla* Roxb. *Fl. Ind.* ii. 584; *Hook. fil. F.B.I.* i. 387.

Shrub. Branches densely covered with fulvous stellate hairs. Leaves oblong-ovate acute, base round sub-cordate, edges blunt-toothed, above sprinkled with stellate hairs, densely hairy on midrib and nerves, 6 pairs, beneath more hairy especially on midrib, nerves and nervules; 6 in. long, 3.5 in. wide; petioles .2 in. long, densely softly hairy. Cymes dense, peduncle short and pedicels densely fulvous hairy, .25 in. long. Buds oblong blunt. Sepals lanceolate-linear, densely hairy outside, .75 in. long, .1 in. wide. Petals obovate notched, white, half as long as sepals. Stamens very numerous, .5 in. long; filaments very slender; anthers small reniform. Ovary subglobose, densely covered with ascending stiff whitish hairs, gynophore cylindrical, .25 in. long, densely whitish hairy, base glabrous. Style glabrous, longer than the stamens. Stigma rather large, capitate. Drupe the size of a large cherry, stellate-hairy; pyrenes 4, 1-seeded. *Hab.* Perak, Grit (Haniff 12,470). *Distrib.* India, Burma.

*Vol. i. p. 300, after sp. 3, Grewia latifolia Mast., insert :—*

(3A) *G. latistipulata* Ridl. *Kew Bull.* 1924, p. 262.

Tree. Leaves coriaceous elliptic, quite glabrous, blunt, base broad rounded, nerves very prominent beneath, 12 pairs conspicuous above; 1 ft. long, 5 in. wide; petiole thick, .4 in. long. Stipules persistent oblong-ovate, tip rounded, coriaceous, .6 in. long, .4 in. wide. Panicle terminal, 3 in. long, branches short, .5 in. long with 4 or 5 involucre clusters, with a persistent stipule below. Involucre sub-sessile of 8 oblong blunt lobes tomentose on both sides, .25 in. long, containing 4 flowers shortly pedicelled. Sepals 5, hairy, linear-oblong, .25 in. long. Petals very short,

glabrous narrow oblong mucronate. Stamens about 20, shorter than sepals. Ovary conic hairy. Style glabrous. Disc hairy. *Hab.* Selangor, Klang (Burkill 7826). *Distrib.* Sumatra.

The Sumatran plant has narrower leaves and stipules.

This plant is allied to *G. latifolia*, Mast. but is glabrous and has large persistent stipules.

*Vol. i. p.* 303, after *sp.* 10, ***Grewia florida* Miq.**, insert :—

(11) ***G. polygama* Roxb.** *Fl. Ind.* ii. 588; *G. hirsuta* *Pierre* *Fl. For. Cochinch.* pl. 167; *Lecomte Flor. de Indochine* i. 534 (not of *Vahl.*).

var. *Curtisii* *Ridl.* Shrub with twiggy branches pubescent. Leaves thinly coriaceous, glabrous, minutely reticulate above or with sunk midrib pubescent, beneath pubescent or hairy, lanceolate acuminate, base rounded, often unequal-sided, edge serrulate; nerves 3 prominent beneath from base, two pairs above from the midrib all sunk above, transverse nervules parallel, elevate beneath; 3 to 4 in. long, .75 to 1 in. wide; petioles .1 in. long, pubescent. Inflorescence axillary, peduncle .1 in. long; branches as long, hairy or glabrescent. "Sepals 5, ovate, tomentose outside. Petals 5, half as long, oval-elliptic, lower half outside velvety. Nectary surrounded with a fringe of hairs. Stamens numerous; filaments velvety at base. Ovary hairy; style glabrous." Fruit 4-lobed, as long as wide, at first hairy, later shining, .5 in. wide. Pyrenes each 2-seeded. *Hab.* Lankawi (Curtis 2518); Gua Chirita (Haniff 7487). *Distrib.* Southern Siam, Cambodia.

I have seen no flowers of this, the description of them is from *Pierre*. The plants are much less hairy than the Indian type. A specimen from Laos (*Harmand*) differs only in the more serrate leaves.

#### ORDER XXIX. OXALIDACEÆ.

*Vol. i. p.* 332, after *sp.* 1, ***Connaropsis Griffithii* Planch.**, insert :—

(1A) ***C. rubescens* Ridl.** *Journ. Bot.* 1924, p. 295.

Leaves trifoliate; leaflets coriaceous ovate, shortly blunt acuminate cuspidate, base round, glabrous shining above; nerves about 7 pairs conspicuous beneath as are the reticulations; 2 in. long, 1 in. wide; petiolules .08 in. long; petiole 1 in. long. Panicles fascicled in axils 1 to 1.25 in. long, red, glabrous, branches very short. Flowers very small; pedicels slender; bracts very short linear. Buds globose. Sepals oblong rounded. Petals as long, ovate, rounded. All pubescent ciliate at tip and edges. Stamens 10, shorter than petals, inner row shorter, glabrous. Styles 5; stigmas small. *Hab.* Pahang, Tengah Temerloh (Foxworthy, No. 5170). *Native name:* Belimbing Akar.

The leaflets of this species resemble those of *C. monophylla*, but there are three on a leaf. The glabrous axillary fascicled panicles are very distinct.

## ORDER XXXI. RUTACEÆ.

*Vol. i. p. 346, after sp. 2, Tetractomia Roxburghii Hook. fil., insert:—*

(2A) **T. Holttumi** Ridl. *Journ. Bot.* 1924, p. 205.

Tree; bark rough, grey. Leaves crowded at branch tips, coriaceous, elliptic-ovate, base narrowed blunt, tip obtuse; nerves 5 pairs; midrib prominent beneath; 2.5 in. long, 1.75 in. wide; petioles .4 in. long. Panicles in upper axils shorter than the leaves, 2 in. long, peduncle 1 in. long, slender, branches slender 3 to 5. Flowers very small, .1 in. wide; pedicels short pubescent. Sepals 4, small ovate. Petals much larger, ovate subacute. Stamens nearly as long; filaments stout, narrowed up to a point from a lanceolate base. Staminodes on the petals minute, filaments flat. Anthers very small. Disc fairly prominent. Ovary deeply 4-lobed, lobes rounded on the back. Style cylindrical. Stigma pulvinate. *Hab.* Johor, Gunong Belumut at 3000 ft. altitude (Holttum).

Apparently most nearly allied to *T. philippinensis*, but the leaves are rounder and more obovate.

*Vol. i. p. 357, after sp. 2, Atalantia cuspidata Ridl., insert:—*

(2A) **A. polyandra** Ridl.

Unarmed glabrous bush, branchlets smooth with a ridge decurrent from the petiole. Leaves thinly coriaceous unifoliolate; leaflet lanceolate, bluntly acuminate, base narrowed; main nerves slender about 10 pairs, intermediate nerves nearly as thick, numerous irregular, all inarching; 4 to 6 in. long, 1.25 to 1.75 in. wide; petioles .25 to .75 in. long, winged above. Flowers few, usually 2 in an axil; pedicels .25 in. long. Calyx-lobes 5, ovate acute, short. Petals 5, linear-oblong blunt, .5 in. long. Stamens 24, connate in a tube, some shorter than the others, tube nearly .5 in. long, cylindrical. Anthers small ovoid. Disc fleshy cushion-shaped forming a gynophore. Ovary on the disc oblong glandular, 3-celled. Style short, stout, stigma oblong clubbed, 5-ribbed. Fruit globose with numerous large glands, 1.75 in. through (not ripe). *Hab.* Perak, Luboh Merboh, Kwala Kangsa (Haniff).

Near *A. Roxburghiana*, Hook. fil., but with more numerous stamens in a tube, and longer lanceolate leaves.

*Vol. i. p. 359, after sp. 2, Citrus medica* Linn., *insert:—*

**C. medica** var. *Limau Mata Kerbau.*

Branches spiny, spines 1 in. long. Leaves oblong, tip broad retuse, base slightly narrowed; nerves about 10 pairs; 5 in. long, 3 in. wide; petioles not winged, .25 in. long. Flowers 3 together, large. Calyx broad glandular, punctate, lobes short. Petals 1 in. long coriaceous glandular, punctate outside. Stamens shorter, very numerous. Fruit oblong-pyriform, 3 in. long, 2 in. wide when dry, rind .2 in. thick. *Hab.* Perak, Gunong Pondok (Haniff 10,332).

## ORDER XXXIII. OCHNACEÆ.

*Vol. i. p. 365, sp. 1, Gomphia sumatrana Jack., note:—*

The plant described by Jack from Sumatra proves to be quite different from the tree of the Malay Peninsula referred to by Hooker. fil. (F.B.I. i. 525), and by King and myself. The true *G. sumatrana*, Jack, has larger thinner and serrulate acuminate leaves, larger flowers and acute sepals, longer than the fruit. In the Malay Peninsula plant the leaves are thicker and smaller, and usually entire, and the sepals blunt and shorter than the fruit. I have therefore named our species *G. oblongifolia* Ridl. in Kew Bull. 1925, p. 79. The distribution *Sumatra* in Vol. i. 365, p. 41 must be omitted.

## ORDER XXXVII. OLACINEÆ.

*Vol. i. p. 430, sp. 1, Stemonurus secundiflorus Bl., insert:—*

The description and almost all the specimens quoted should be referred to *S. scorpioides*, Becc. Malesia, i. 113. *S. grandifolius*, Becc., which Beccari, rightly, I think, separates from Miquel's *Lasianthera secundiflora*, *Stemonurus secundiflorus*, Bl., a tree with small leaves and flowers, though, as Beccari notes, Miquel gives the leaves as attaining the length of 9 in., suggesting that he had combined the two species. However, his figure and specimen are all of the small-leaved tree. I give descriptions of both trees.

(1) *S. secundiflorus* Bl. *Bijdr.* 649; *Mus. Bot.* fig. xlvii.; *Becc. Malesia*, i. t. iv. 16, 17. *Lasianthera secundiflora* Miq. *Fl. Ind. Bat.* i. 792.

Tree 30 ft. tall. Leaves coriaceous, elliptic acuminate acute; nerves usually conspicuous; 3 to 5 in. long, .75 to 1.75 in. wide; petioles .25 to 1 in. long. Cymes 1 in. wide on peduncles .5 in. long. Flowers .1 in. long, secund. Petals oblong. Stamens, filaments short narrowed to base, sparsely hairy, terminal hair-tuft short, anther-cells elliptic divaricate below. Pistil conic acute. *Hab.* Forests, Johor, Sedenak (Ridley, 13,570). Dindings, Pangkor, Telok Sera (Curtis 912). *Distrib.* Borneo, Java.

(1A) *S. scorpioides* Becc. *Malesia*, i. 113. *S. grandifolius* Becc. *l.c.* 114.

Tree 40 to 70 ft. tall, 10 to 18 in. through. Leaves very coriaceous, oblong-elliptic, shortly pointed, 8 to 12 in. long, 3 to 5 in. wide; petioles stout, .75 in. long. Cymes 3 in. wide, peduncles thick, .75 in. long. Flowers secund, .2 in. long. Petals oblong, white. Stamens, filaments linear villous, not narrowed at the base, terminal tuft of hairs long; anther-cells linear parallel, not divaricate at base. Pistil long acuminate. Fruit ellipsoid acute, lower part brown, above green or white. *Hab.* Singapore, Selitar; Bukit Mandai; Kallang valley swamp (Burkill 7830). Johor, Kota Tinggi (Ridley). Perak, Larut (Kunstler); Assam Kumbang (Wray). *Distrib.* Borneo.

Beccari distinguishes his *S. grandifolius* by its large leaves and the two-coloured fruit with the line between the two colours sharply delimited. This is characteristic of *S. scorpioides* and Burkill's plant exactly matches Beccari's specimens of *S. grandifolius*.

*Vol. i. p. 431, after sp. 3, Stemonurus umbellatus Becc., insert :—*

(4) **S. corniculatus Ridl.** Platea corniculata Becc. Malesia, i. 117. *Cantleya johorica Ridl. Flora Malay Pen. i. 436.*

Tree 70 ft. tall, girth breast high, 5 ft. Leaves coriaceous elliptic, acuminate, base narrowed; nerves 10 pairs very indistinct; 2.7 in. long, 1.4 in. wide; petioles .3 in. long. Cymes axillary; rachis thick pubescent, gradually elongating with thick short branches seated in alveoli dichotomous. Flowers 3 to 5, terminal, sessile. Sepals imbricate, rounded, silky. Petals 5, glabrous oblong, apex acute incurved, very thinly coriaceous, .1 in. long. Stamens 5; filaments broad linear flat with curled white hairs below the anther and on the tip; anther-cells separate, reniform. Pistil cylindrical; stigma circular, depressed in the centre. *Hab.* Flat lowland country, Johor (Cantley). *Distrib.* Borneo, Sumatra. *Native name:* Daru-Daru (in Borneo, Bedaru). *Use:* Timber highly valued, hard, durable, close grained; used for house-building and ship timbers.

Specimens of what is clearly the tree described by me dubiously as a new genus *Cantleya* have been obtained by Mr. Foxworthy's collector near Kuching, Sarawak, Borneo. In the Johor specimen the perianths had fallen, and only the pistils were left. The above description is mainly on the Borneo specimens. Mr. Foxworthy adds that the bark is half an inch thick, and rough.

*Vol. i. p. 436, after genus 17, Erythropolium, insert :—*

**17A. SARCOSTIGMA, Wight and Arnott.**

Climbing shrubs. Leaves alternate, coriaceous petioled. Flowers minute in tufts on a long pendulous rachis. Male flowers; calyx minute, 4- or 5-lobed. Petals 5, free, valvate, oblong, eventually reflexed. Stamens 5, alternate with petals, free or adnate to petals. Anthers erect. Pistil rudimentary. Female flowers; perianth as in male. Staminodes 4 or 5. Ovary superior, 1-celled. Stigma sub-sessile conic or globose. Ovules 2. Drupe with persistent perianth at base, epicarp coriaceous velvety. Endocarp woody. Seed 1. Species 3 or 4, Asiatic.

Racemes simple : : : : : (1) **S. Kleinii**  
 Racemes paniced : : : : : (2) **S. paniculata**

(1) **S. Kleinii** *W. and A. in Edin. New Phil. Journ. xiv. 299; Miers Contrib. i. 103, t. 18; Wight Ic. t. 1854; Hook. fil. F.B.I. i. 594.*

Leaves thinly coriaceous, glabrous, strongly reticulate elliptic-lanceolate acuminate, base narrowed, 4 to 6 in. long, 2 to 2.25 in. wide; petioles thick, .25 to .5 in. long. Inflorescence 1 ft.

long, red velvety; clusters of flowers, small, distant. Flowers .12 in. wide. Calyx short, cup-shaped pilose, obscurely 4- or 5-lobed. Petals glabrous. Stamens in male as long as petals; filaments flat. Ovary in female ovoid; stigma conical. Drupe oblong, 1 to 1.5 in. long, orange red, red-hairy when young becoming glabrescent. *Hab.* Malacca (Maingay). Kelantan, Sungei Ketch on the cliffs (Foxworthy). *Distrib.* S. India.

(2) **S. paniculata** Pierre, in *Bull. Soc. Linn. Par.* ii. 1320.

A shrubby climber 10 to 15 ft. long. Leaves coriaceous, glabrous elliptic, main nerves 5 pairs prominent beneath, reticulations minute conspicuous; 8 in. long, 3 in. wide; petioles .75 in. long. Panicles 1 ft. long with many distant slender branches 3 in. long or more, pubescent. Flower clusters very small. Calyx cup-shaped. Petals oblong, blunt. Stamens as long, glabrous. Pistillode hairy. *Hab.* Perak, Larut in an open rocky creek 300 to 500 ft. altitude (Kunstler). *Distrib.* Cochin-China.

#### ORDER XXXVIII. ILCINEÆ.

*Vol. i. p.* 438, after *sp.* 1, **Ilex malaccensis** Loes., insert:—

(1A) **I. Kelsalli** Ridl. *Journ. Bot.* 1924, p. 295.

Tree, bark pale, thinly flaking with lenticels, in branches. Leaves coriaceous glabrous, oblong-elliptic acuminate cuspidate, base rounded or shortly narrowed, nerves slender, 5 pairs inarching, decurrent at base on the thick midrib, secondary nerves nearly as conspicuous; 6 in. long, 2.5 in. wide; petioles very thick, .2 in. long. Racemes axillary, 1 in. long; flowers sub-remote, heliotrope; pedicels .05 in. long. Bracts very small, ovate acute spreading. Sepals 6 round, edge ciliate. Petals 6, oblong-ovate. Stamens 6, filaments very short, attached to the petals at the base. Ovary broad conic with 3 short styles and 12 ridges on the disc, apparently 12-celled. *Hab.* Mountains, Johor (Kelsall). Pahang, Fraser Hill at 4000 to 4500 ft. altitude (Burkill 8693).

#### ORDER XXXIX. CELASTRINEÆ.

*Vol. i. p.* 445, after *sp.* 6, **Microtropis valida** Ridl., insert:—

(7) **M. peduncularis** Ridl. *Kew Bull.* 1894, p. 262.

Shrub 4 to 6 ft. tall. Leaves coriaceous elliptic cuspidate-acuminate; nerves 6 pairs, faint; 5 to 7 in. long, 2 to 2.5 in. wide; petioles thick, grooved above, .5 in. long. Cymes 1.5 in. long and as wide, on peduncles 1.25 in. long; branches angled. Bracts persistent ovate-lanceolate acute, .05 in. long. Flowers waxy, rich yellow, .1 in. wide. Sepals 4, round imbricate. Petals 4, free, longer, oblong-obovate, edges involute. Stamens 5, filaments very short, thick; anthers 2-celled. Style columnar truncate, longer than the stamens. *Hab.* Very dense jungle at 400 to 600 ft. altitude, Perak, Ulu Bubong (Kunstler).

This species is allied to *M. valida* Ridl., and like that tetramerous, but the flowers are much smaller and the petals free oblong. *Vol. i. p. 446, after sp. 1, Euonymus javanicus Bl., insert:—*

(1A) ***E. coriaceus* Ridl.**

Shrub, glabrous. Leaves elliptic acuminate, entire, base shortly cuneate, stiffly coriaceous; nerves faint, elevate on both sides, 6 pairs, anastomosing within the margin; 3.5 to 5 in. long, 1.5 in. wide; petioles rugose, .25 to .6 in. long. Flowers in axillary pairs, peduncle very short; pedicels .1 in. long. Sepals ovate rounded, broad. Petals obtuse fimbriate, greenish-yellow, .25 in. long, .1 in. wide at the tip. Stamens 5, filaments slender, half as long as petals. Ovary conoid. Capsule obtuse, .5 in. long, valves retuse at apex, woody, edges elevate. *Hab.* Mountains Kedah Peak at 3000 ft. altitude (Ridley, Robinson, Haniff).

The species is distinct from *E. javanicus*, Bl., in the stiffly coriaceous leaves and the short peduncled axillary flowers in pairs. *Vol. i. p. 446, after sp. 2, Euonymus Wrayi King, insert:—*

(2A) ***E. pahangensis* Ridl.**

Tree 15 to 20 ft. tall, glabrous. Leaves elliptic, thinly coriaceous, tip shortly blunt acuminate, base cuneate, margins obscurely crenate; nerves 5 pairs, very faint in adult leaves; 3.5 to 6 in. long, 1.5 to 2 in. wide; petioles .25 in. long. Panicles in terminal axils, 1 in. long in flower, lengthening to 3 in. long (peduncle 2 in. long) in fruit, and wide branched; branches 3 with 2 flowers on each. Bracts very small ovate acute. Sepals ovate blunt deflexed. Petals obovate fimbriate, .1 in. long, yellow or reddish-green. Ovary short, broad, conoid, ribbed when dry. Fruit (unripe) obovate, .25 in. long, .75 in. wide, lobes rounded, not retuse at the top. *Hab.* Pahang, Kwala Pahang (Burn-Murdoch); Telok Sesik, Kwantan (Burkill). Common in sea fences.

(2B) ***E. micropetalus* Ridl.**

Tree about 14 ft. tall. Leaves thin ovate cuspidate, base narrowed, margins obscurely crenulate; nerves 6 pairs, elevate beneath; 5 to 6 in. long, 3 in. wide; petioles .1 in. long. Flowers numerous on a very short thick peduncle .25 in. long, thickly covered with short pale bracts, pedicels slender, .4 in. long. Sepals broad ovate rounded, pinkish. Petals little longer, oblong with a few laciniae pale green, bases lurid. Stamens 5, filaments rather short, not as long as the petals; anthers oblong; style short cylindrical narrowed to the tip. *Hab.* Forests, Kelantan, Chaning (Ridley).

Remarkable for its thin leaves, which are red when young, and small, hardly lacinate petals.

*Vol. i. p. 455, after sp. 3, Hippocratea nigricaulis Ridl., insert:—*

(3A) ***H. obtusa* Ridl.**

Climber, glabrous. Leaves thin coriaceous elliptic, shortly acuminate blunt, base shortly cuneate, drying pale green, nerves



6 pairs prominent beneath, secondary nerves conspicuous but irregular, transverse nervules much broken up; 5 to 6 in. long, 2.5 in. wide; petioles thick, .25 in. long. Cymes axillary 2-branched, widely divaricate; peduncle .5 in. long; branches .75 in. long with 2 or 3 branchlets. Flowers yellowish, .1 in. wide; pedicels .1 in. long. Sepals 5, ovate broad-based, short. Petals 5, oblong, tip rounded, minutely denticulate, eventually recurved. Stamens 3; anthers just protruding from the large conic disc. Ovary conic enclosed in the disc; style short, cylindrical, just protruding. *Hab.* Pahang, Besaroh (Burkill 17,587).

This species seems nearest to *H. obtusifolia*, Roxb. of India. It differs from the other species in the oblong round-tipped petals and the large conic fleshy disc.

#### ORDER XL. RHAMNEÆ.

*Vol. i. p. 467, after sp. 2, Ventilago gladiata* Pierre, insert:—

(2A) **V. Kurzii** Ridl. *Apteron lanceolatum* Kurz, *Journ. As. Soc. xli. ii. 300.*

Woody climber, bark pale. Leaves coriaceous lanceolate acuminate, base narrowed or rounded, blunt, edge minutely serrulate; nerves 7 or 8 pairs elevate beneath, reticulations minute distinct; 4 in. long, 1.5 to 2 in. wide; petioles .1 in. long or less, pubescent. Panicles lax, 4 to 6 in. long, pubescent. Flowers in rather distant tufts small, shortly pedicelled, pedicels pubescent. "Sepals ovate sub-acute, hairy outside. Petals minute obtusate, apex broad retuse, side-lobes rounded. Stamens 5, filaments short, thick. Anthers deflexed oblong rounded. Pistil and disc hairy; stigma bilobed." Samara pubescent, 2.5 in. long, wing linear oblong blunt. Calyx half covering the fruit, hairy. *Hab.* Lankawi, Pulau Segari (Ridley). *Distrib.* Tenasserim.

My specimen is only in young fruit, but appears to agree in all points with the Tenasserim plant identified with Kurz's *Apteron lanceolatum*, of which all specimens are in flower, and from these I have taken the description of the flower (in inverted commas). Kurz mistook some insect galls for the young fruit.

*Vol. i. p. 468, after sp. 2, Smythea macrocarpa* Hemsl., insert:—

(3) **S. lancifolia** Ridl. *Journ. Bot. 1924, p. 295.*

Climber, rather slender, glabrous. Leaves thinly coriaceous, lanceolate cuspidate, blunt, base inæquilateral cuneate; nerves 5 to 7 pairs slender, transverse nervules and reticulations very fine; 4 in. long, 1.25 in. wide; petioles .05 in. long. Flowers very small, in axillary clusters of 4 or 5. Pedicels .08 in. long, pubescent. Buds flattened, 4-angled and ribbed, pubescent. Sepals triangular acute. Petals little longer, clawed, upper portion broad, obtusate, deeply 2-lobed, lobes rounded, with a small tooth in the notch. Stamens slightly shorter; filaments rather slender; anthers conic with two separate cells at base. Fruit

lanceolate blunt coriaceous, base narrowed and twisted, 3.5 in. long, .5 in. wide. *Hab.* Penang, Highlands (Burkill 9142); Batu Feringhi (Curtis 2780).

This was formerly referred to *S. macrocarpa*, Hemsl., only Curtis' flowering specimen being known, but Burkill sends fruit which shows it is quite distinct. The fruit wing is much narrower and has a curious twist at the base, the leaves are narrower and lanceolate, the petals deeply bifid.

#### ORDER XLI. SAPINDACEÆ.

*Vol. i. p. 493, after sp. 1, Lepisanthes Kunstleri King, insert:—*

(1A) **L. tetraphylla** Radlk. *Sitz. Math. Phys. Acad. Mun.* viii. 276. *Hemiglyrosa canescens* Thw. *Enum.* 56, 408; *Hook. fil. F.B.I.* i. 671.

Tree 20 to 30 ft. tall (or a shrub), bark pale. Leaves 5 to 22 in. long; leaflets 4 to 8, coriaceous, elliptic-oblong or ovate (rarely lanceolate), glabrous blunt (or acute), narrowed at base, 4 to 10 in. long, 2 to 5 in. wide; petiolules thick rugose, .1 in. long, petioles 1.5 in. long. Racemes simple or paniced, axillary, shorter than the leaves, silky pubescent. Flowers fascicled, white, .3 to .4 in. across, on short silky pedicels. Sepals 5, imbricate, two outer ones silky, red inside. Petals 4 or 5, four obovate tipped yellow, the fifth rudimentary. Stamens 8, unilateral, inserted at the base of the ovary within the disc. Ovary trigonous, 3-celled. Fruit sub-globose or 3-sided, tomentose, ochre coloured, 3-seeded. Seeds with a pulpy mesocarp. *Hab.* Terutau at Telok Apan (Haniff). *Distrib.* India, Ceylon, Burma, Siam.

*Vol. i. p. 494, after genus 7, Lepisanthes, insert:—*

#### 7A. PHENICIMON, Ridl.

Shrub, densely red-furfuraceous velvety. Leaves imparipinnate, large; leaflets alternate, 6, large subcoriaceous; petiolulate. Panicle racemiform with few short branches. Flowers in clusters, sessile, bracts small. Sepals 5, imbricate, rounded. Petals 5, twice as long, linear-oblong, no basal scales. Stamens 8, in two rows, inner row shorter; filaments flat, broad linear; anther cells parallel; connective produced into a short point at tip. Ovary sub-cylindric; style stout; stigma capitate with 3 decurved lobes. Fruit globose. Pericarp stiff. Seeds 3. *Hab.* Malay Peninsula.

Apparently most nearly allied to *Otophora*, but without the basal auricle of the leaf.

(1) **P. rubiginosus** Ridl.

Small shrub densely red-velvety. Leaves imparipinnate, 18 in. long; leaflets elliptic-lanceolate blunt cuspidate alternate, coriaceous, base unequally narrowed; nerves 18 pairs, prominent beneath, inarching some way from margin, midrib prominent; glabrous above, red scurfy beneath, 9 in. long, 4 in. wide, petiolules scurfy, .25 in. long. Panicle racemiform with 2 or 3 short branches

densely red-hairy, 8 in. long. Flowers crowded in distant fascicles, sessile. Sepals 5, imbricate round hairy. Petals 5, imbricate, oblong blunt, hairy, twice as long. Stamens 8; filaments broad; anther cells slightly divaricate at base, with a connectival apiculus, in 2 rows, the inner one not longer than the filament of the outer. Ovary superior. Style stout; stigma capitate, with 3 deflexed lobes. Fruit globose, .5 in. long. Seeds 3, flattened, ovoid, back rounded, inner face obscurely angled, .3 in. long, .25 in. wide, .1 in. thick. *Hab.* Negri Sembilan, Ulu Bendol (Holtum 9866); Gunong Angsi (Ridley).

*Vol. i. p. 496, sp. 9, Tristira penangensis Ridl., note:—*

A fruiting specimen of what appears to be this plant collected in the same locality by Curtis as the flowering specimen described above has more coriaceous shining leaflets, and an oblong globose fruit, 3 in. long, and as wide; pericarp woody, dark brown, covered with pale lenticels. It contains 2 seeds and is borne on a stout pedicel .5 in. long. A young fruit 1 in. long is covered with yellowish hair, the remains of the sepals persisting, and is crowned with a short style. The typical fruits of *Tristira* are *triquetrous* and the fruits above described are totally different.

#### ORDER XLV. ANACARDIACEÆ.

*Vol. i. p. 542, sp. 4, Semecarpus Curtisii King, note:—*

To the localities given Henderson in Gardens Bulletin iii. p. 290, adds Kedah, Alor Sta. (Burkill and Haniff), and p. 291, adds a variety, var. *brevipetiolata*, which differs from the type in the shorter petioles, .5 to 1 in. long, the glabrous disc of the male flower and the absence of white scales on the underside of the leaf, and slightly more pubescent panicle. He gives as localities for it, Negri Sembilan, Gunong Tampin (Holtum 9521, Burkill 3230); Bukit Kayu Arang, Tampin (Nur 1623) and Gunong Talan (Gaong Jalan as he writes it) (Alwins, Cantley's collector, 885). He notes that the Selangor plant seems to approach var. *brevipetiolata* in the pubescence on the panicle and the absence of the white scales beneath the leaf, but has the long petiole of the type. Had it not been for this intermediate form, he would have been inclined to separate the northern form specifically from the southern. I have not seen any of the specimens referred to which are preserved in the herbarium of the Singapore Gardens.

*Vol. i. p. 543, after sp. 4, Semecarpus Curtisii King, insert:—*

(4A) *S. heterophylla Bl. Mus. i. 187.*

A tree 20 to 40 ft. tall, branchlets pubescent, eventually glabrous. Leaves coriaceous, glabrous, oblong-elliptic, blunt or shortly apiculate, base narrowed slightly, margin thickened undulate, paler beneath; nerves conspicuous above, elevate beneath, 19 pairs parallel ascending, inarching near the margin, reticulations conspicuous above and beneath; 7 to 9 in. long, 3.5 to 4 in. long;

petioles 1 in. long. Panicle terminal lax, 1 ft. long, branches rather distant, 6 in. long, pubescent or sub-glabrous, branchlets .25 to 1 in. long or less. Flowers small pubescent crowded, very shortly pedicelled, green. Calyx-lobes ovate blunt pubescent. Petals little longer, oblong blunt, .08 in. long, pubescent. Stamens as long; filaments cylindrical; anthers oblong. Ovary thickly hairy, broad flat, rounded. Drupe half an inch long, cup wide, round. *Hab.* Singapore, Garden Jungle (Cantley in 1882). *Distrib.* Sumatra, Java, Timor Laut, New Guinea.

This has not been found again in the Malay Peninsula.

*Vol. i. p. 543, after sp. 5, Semecarpus lucens King, insert:—*

(6) **S. Prainii** *King Journ. As. Soc. Beng.* lxx. 511.

Tree 40 to 70 ft. tall, branchlets stout puberulous. Leaves glabrous, oblong-lanceolate to obovate-oblong, shortly abruptly acuminate, edges slightly undulate, base narrowed; nerves 18 to 24 pairs prominent beneath; 5 to 10 in. long, 1.5 to 3.25 in. wide; petioles .5 to .8 in. long. Panicle terminal, glabrous below, pubescent above, longer than the leaves, branches slender, much branched. Flowers crowded, sub-sessile, .1 in. wide. Calyx cupular puberulous, lobes broadly ovate blunt ciliate, spreading. Petals 5 imbricate, glabrous, broadly ovate acute. Stamens 5, shorter. Disc fleshy convex with a tuft of hairs in the middle. Ovary in male flower absent. Drupe obliquely obovoid compressed glabrous, .5 in. long, .65 in. wide; peduncle enlarged obconic, .35 in. long, glabrous. *Hab.* Perak (Kunstler 7442). *Distrib.* Andamans, Pungah.

I have not seen the specimen from Perak.

(7) **S. glabra** *Ridl.*

Small tree, glabrous. Leaves linear-oblong, cuspidate, base narrowed, margins undulate-crenulate, thickened; nerves 16 or 17 pairs conspicuous on both sides, secondary nerves nearly as large; reticulations conspicuous, midrib prominent beneath; 9 in. long, 3 in. wide; petioles thickened below, 1.25 in. long. Panicle terminal lax, 8 in. long, branches slender, 3 in. long or less, branchlets slender, .25 in. long. Flowers .05 in. long, very shortly pedicelled, glabrous. Calyx deeply lobed, lobes 5, ovate blunt. Petals oblong, much longer. Stamens 5; filaments thickened slightly in the middle. Ovary broad, flattened above, rounded, glabrous. Fruit unknown. *Hab.* Penang, Waterfall (Curtis 3594).

This is most nearly allied to *S. scabrida*, Bl., of Borneo, but the leaves are longer and distinctly cuspidate, the flowers smaller, panicle glabrous, and ovary glabrous.

#### ORDER XLVII. LEGUMINOSÆ.

*Vol. i. p. 559, sp. 1, Rothia trifoliata Pers., add locality:—*  
Penang, Fort Cornwallis (Burkill).

*Vol. i. p. 561, sp. 7, Crotalaria albida* Heyne, *add locality* :—  
Malacca, Tebong by aalang field (Burkill).

*Vol. i. p. 586, after sp. 1, Fordia pauciflora* Dunn, *insert* :—

(2) *F. ophirensis* Ridl.

Small tree or shrub. Leaves 8 to 10 in. long, glabrous, rachis striate; leaflets 8 pairs, lanceolate long-acuminate, tip blunt, base shortly narrowed acute, thinly coriaceous, smooth, grey when dry, midrib sunk above, elevate beneath; nerves 7 to 10 pairs, slender, faint, almost or quite invisible on the upper surface, forked and inarching beneath, reticulations minute; 3.5 in. long, .75 in. wide or less, no stipels, petiolules .1 in. long. Racemes in upper axils 3 in. long in fruit, pubescent in flower. Bracts at base of inflorescence coriaceous lanceolate acuminate, .15 in. long. Flowers few, about 10, pedicels short, stout in fruit, .1 in. long. Calyx entire with very short lobes. Pod woody oblong with an acute tip, light brown, 2-seeded, about 3 in. long and .25 in. across. Seeds ellipsoid, rounded at the tip, flattened, dark brown, .5 in. long, .3 in. wide, .08 in. thick. *Hab.* Malacca, Mount Ophir (Hullett 802).

Allied to *F. cauliflora* Dunn, of Hongkong, differing in the smooth grey leaves with very inconspicuous nerves, the absence of stipels, shorter racemes and smaller fruits.

I have only seen very young buds and fruit of this plant.

(3) *F. lanceolata* Ridl.

Shrub or treelet, glabrous. Leaves 1 ft. long, imparipinnate, extipellate; leaflets 7 pairs with 1 terminal, 1 elliptic-lanceolate to lanceolate long-acuminate, base cuneate, glabrous, thin sub-herbaceous; nerves 14 or 15 pairs branched at the tip; 9 in. long, 2 in. wide; petiolules very short, .05 in. long, thickened; petioles terete, 3 to 6 in. long. Panicles racemiform in the upper axils, 6 to 7 in. long; branches very short, .1 in. long, pubescent, thick. Bracts caducous lanceolate acuminate pubescent. Flowers unknown. Pod oblong, not stalked, puberulous, margins thickened, terminated by a short acute beak, 2-seeded, flattened, 2 in. long, 1 in. wide; pedicel .1 in. long, thick. *Hab.* Negri Sembilan, Senaling Inas Forest Reserve (Holtum 9755).

The only specimen I have seen is very incomplete, but I think it is a *Fordia* and is certainly distinct from anything known to me. *Vol. i. p. 586, after genus 24, Fordia, insert* :—

24A. *BURKILLIA*, Ridl.

Shrub. Leaves simple herbaceous, lanceolate or elliptic large, alternate, petiolate. Flowers small, numerous, in axillary racemes. Calyx campanulate unequally 5-toothed, two upper teeth very short, three lower ones longer setaceous. Corolla, standard round, broad, clawed, keel obcuneate, widely bilobed, lobes round. Stamens 10, diadelphous, five lower ones longer than the upper ones. Ovary cylindrical, 2-ovuled; style long, stigma capitate.

Pod long, flattened, narrowed to the base, dilate towards apex, 2-seeded, tip beaked. Species 1. Perak.

(1) **B. alba** Ridl.

Shrub 2 to 3 ft. tall, branches velvety-pubescent. Leaves unifoliolate sub-herbaceous, lanceolate or elliptic-lanceolate, caudate acuminate, base narrowed to the petiole, above glabrous, except on the sunk midrib and nerves, beneath nerves 11 pairs, inarching, and midrib shortly appressed hairy, reticulations small, elevate on both surfaces; 7 to 10 in. long, 2 to 3 in. wide, petioles slender hairy, .5 to 1.5 in. long. Stipules linear acuminate, .1 in. long. Racemes 1 or 2 in the axils, hairy, 1 in. long, many-flowered. Bracts lanceolate acuminate, hairy, longer than the short pedicels. Calyx campanulate, 5-toothed, teeth setaceous, upper three short, two lower long. Corolla .2 in. long, white. Standard obovate rounded, clawed, .15 in. wide. Keel spathulate lobed, rather broad. Wings narrower oblong spathulate. Stamens 10, glabrous; filaments filiform, diadelphous, five lower ones longer than the upper ones; anthers small oblong. Ovary cylindric hairy; ovules 2, style longer than stamens, hairy. Stigma very small. Pod 3 in. long, .5 in. wide, brown, smooth glabrous, flattened, upper margin straight, lower edge curved, base narrowed, upper portion dilate and upcurved at the tip to a sharp point. Seeds 2. *Hab.* Perak, Durian pit, common (Burkill 12,498).

This plant, allied to *Fordia*, differs in the calyx not being truncate, but unequally lobed, with 3 setaceous lobes and 2 lower, longer ones; also in having unifoliolate leaves, which, however, occurs also in some species of *Millettia* to which this shrub is also allied.

I am indebted to Mr. S. T. Dunn for assistance in working out this plant.

*Vol. i. p. 627, after sp. 3, Bauhinia calycina* Ridl., insert:—

(3A) **B. praesignis** Ridl.

Climber, stems stout, nearly .4 in. through, densely dark red-velvety. Leaves coriaceous ovate cordate, bilobed at the tip, lobes rounded above, glabrous; beneath with 10 very prominent nerves (slightly sunk above) densely ferruginous velvety, transverse nervules undulate inarching on outer edges, and reticulations all ferruginous velvety; 9 in. long, 6 in. wide; petioles red-velvety, 2 in. long, stout. Raceme 15 in. long, red ferruginous velvety. Bracts deciduous, broad oblong, tip rounded velvety, 1 in. long, .5 in. wide. Bracteoles oblong, .5 in. long, two to a flower. Pedicel 1 in. long. Calyx-tube 1 in. long, lobes coriaceous linear-lanceolate, nearly 2 in. long, .25 in. wide, red-velvety. Petals white, linear-lanceolate acuminate, base narrowed, silky outside, 1.4 in. long, .25 in. wide. Stamens 3, pink; filaments long; anthers linear-oblong. Pistil 1.5 in. long, stalked, densely red hairy. Stigma rounded. Pod 3 in. long, 2 in. wide, red-velvety. Seeds 4,

ovate-orbicular, flat, 1 in. long. *Hab.* Pahang, Bentong, Benus valley (Burkill 16,404).

This fine species is nearest to *B. calycina*, but with very much larger leaves and flowers. I suppose it to be a climber.

*Vol. i. p. 629, after sp. 10, Bauhinia cornifolia Bak., insert :—*

(10A) **B. breviflora** Ridl.

Climber, nearly glabrous, with stout tendrils. Leaves coriaceous, ovate to nearly orbicular, retuse, base broad, rounded subcordate; nerves 9, radiating from base, strongly elevate beneath, reticulations minute, conspicuous; 4 in. long and as wide; petioles 1.75 in. long, thickened at tip and base. Racemes axillary and crowded at the apex, 3.5 to 4 in. long, many flowered, scurfy puberulous. Bracts very small, ovate, pedicels 3 in. long, slender. Buds ovoid glabrous, ribbed. Sepals 4, coriaceous lanceolate blunt, channelled, glabrous, .25 in. long. Petals 5, sub-orbicular, clawed, tip round, keel silky, strongly veined, apparently cream-yellow, .3 in. long. Stamens 3, very short; filaments short, thick, silky hairy; anthers large oblong obtuse, cells large ellipsoid. Pistil short hairy, .25 in. long, stalked. Stigma large round. *Hab.* Pahang, Raub (Burkill 16,867).

The foliage of this plant resembles that of *B. cornifolia*, but it is much more glabrous, and the flowers, which appear to be cream-white, not orange-red, are smaller.

*Vol. i. p. 632, after sp. 18, Bauhinia Kingiana Prain, insert :—*

(18A) **B. Kochiana** Korth. *Kruidk. Nederl. Arch. p. 87, pl. 10.*

A glabrous climber with slender tendrils. Leaves subcoriaceous elliptic-oblong entire, cuspidate acuminate, base attenuate; nerves 3 from the base, sunk above, prominent beneath, with an intra-marginal one on each side into which the lateral nervules inarch; 6 in. long, 2.5 in. wide; petioles thickened at the top, .5 in. long. Corymbs lateral, and terminal, 1 in. long, on peduncles 1 to 4 in. long; pedicels slender, 3 in. long, shortly red pubescent. Flowers numerous, orange-pink. Buds oblong, ovoid acute. Bracts lanceolate acuminate pubescent minute caducous. Calyx-tube slender, .5 in. long, pubescent, lobes ovate sub-acute, pubescent outside, .25 in. long. Petals spathulate, .5 in. long, limb rounded, .5 in. wide, red hairy on the nerves outside. Stamens 3 fertile, glabrous, 5 sterile shorter. Ovary slender, stalked, red-hairy, .25 in. long; ovules 3 to 6. Style as long as the ovary. Stigma capitate. Pod stipitate oblong, upper edge straight, lower curved. Seeds discoid. *Hab.* Johor, north of Gunong Belumut (Holtum). *Distrib.* Sumatra.

#### ORDER XLVIII. ROSACEÆ.

*Vol. i. p. 676, after sp. 9, Pygeum Hookerianum insert :—*

(9A) **P. velutinosum** Ridl.

Shrub. Branches slender, softly velvety pubescent. Leaves

close-set, oblong-ovate, bluntly shortly cuspidate-acuminate, base rounded subcordate, above glabrous, smooth; nerves slender, sunk beneath midrib, and nerves elevate pubescent; 2 to 3 in. long, 1.25 to 1.5 in. wide; petioles .1 in. long, pubescent. Racemes axillary, densely hairy, of 5 to 7 flowers, .25 in. long. Bracts lanceolate hairy, nearly as long as pedicels; pedicels .08 in. long. Calyx campanulate, .06 in. long, densely hairy, lobes ovate-lanceolate, short. Stamens about 15, filaments very slender, glabrous, .15 in. long; anthers small oblong-ovoid. Style as long as stamens or longer. Stigma broad. Drupe transversely oblong, bilobed, .2 in. long, .3 in. wide. *Hab.* Pahang, Ulu Chineras, Kwala Lipis at 300 ft. altitude (Burkill 17,902); Gorge of Sungei Tras near Raub (Burkill 16,947).

"Flowers creamy white." This is allied to *P. Hookerianum*, but the leaves are rather smaller and the whole of the plant, except the upper surface of the leaves, densely velvety pubescent. *Vol. i. p. 681, after genus 8, Eriobotrya, insert:—*

### 9. MICROMELES, Decne.

Shrubs or small trees. Leaves lanceolate or ovate serrate. Flowers corymbose. Calyx 5-toothed, deciduous. Petals 5, oblong or sub-rhomboid, emarginate or entire, clawed. Stamens 15 to 20. Disc epigynous cupular or discoid, entire or lobed. Styles 2 or 3, free or joined in the lower half. Stigmas round or reniform. Ovaries 2, cells 2-ovuled. Fruit pear-shaped, small, with a raised ring on the top. Species 6 or 8, India, Burma.

(1) *M. malayensis* Ridl. *Journ. Bot.* 1924, p. 296.

A tree 40 to 50 ft. tall, glabrous. Leaves thin, broadly lanceolate acuminate acute, bases long narrowed, edges serrulate; nerves 6 to 8 pairs ending in teeth; 3.5 to 4 in. long, 1.75 to 2.25 in. wide; petioles slender, 1 in. long. Corymb terminal, 2 in. long and as wide, branches slender. Flowers numerous, .15 in. wide, white. Calyx-lobes ovate cuspidate. Petals oblong blunt, clawed. Stamens 15, on a raised ring at the mouth. Styles stout 3. Stigmas round. Ovules very small. *Hab.* Mountains. Pahang, Fraser Hill (Burkill).

### ORDER XLIX. SAXIFRAGACEÆ.

*Vol. i. p. 682, to sp. Weinmannia Blumei* Planch, add:—

*var. major* Ridl. Leaflets 2 or 3 pairs, lanceolate acuminate, 3 in. long, 1.5 in. wide, coarsely crenulate or nearly entire; petioles .5 in. long. Flowers rather larger. Stipules reniform, .5 to 1 in. across. *Hab.* Pahang, Gunong Tahan (Robinson, Ridley).

This is a very distinct-looking form in its larger and fewer leaflets, the typical form having much smaller leaflets and 4 to 5 pairs. I cannot fit it to any of Miquel's species. His species



*W. Horsfieldii*, a state of *Blumei*, occurs on Mount Ophir and Gunong Benom in Pahang. It has larger leaves than the ordinary specimens and more of them, but it grows with the small-leaved form.

ORDER LVIII. MYRTACEÆ.

*Vol. i. p. 728, sp. 21, Eugenia Foxworthyi Ridl., note:—*

This name I find was used previously for another species by Merrill, I therefore change it to *E. Foxworthiana* Ridl.

*Vol. i. p. 737, after sp. 56, Eugenia pseudo-glauca Ridl., insert:—*

(56A) *E. orites* Ridl.

Shrub or tree. Branches rather slender, rigid. Leaves stiffly coriaceous, elliptic-lanceolate, narrowed to a blunt tip, base longer, narrowed; nerves 4 to 6 pairs distant, rather conspicuous on both sides, intramarginal nerve some way from the edge, undulate, rising from the base, midrib prominent beneath, channelled above; 2 to 2.5 in. long, .75 to 1 in. wide; petioles .1 in. long, rather thick. Cymes terminal-axillary 2 or 3, not branched; rachis obscurely angled, 1.25 to 2 in. long, lower flowers in pairs, terminal ones in threes. Calyx campanulate, .2 in. long, limb spreading undulate-lobed, pseudo-stalk short but distinct. Petals free, obovate. Stamens as short, very slender, moderately numerous. Style short, no longer than stamens. *Hab.* Johor, Gunong Belumut (Holtum 10,722).

*Vol. i. p. 740, after sp. 65, Eugenia jasminifolia Ridl., insert:—*

(65A) *E. nitidula* Ridl.

Bark flaky red. Leaves stiffly coriaceous, paler beneath, ovate long-acuminate, blunt, sub-sessile; nerves invisible, midrib sunk above, prominent beneath; .5 to 1 in. long, .25 in. wide; petioles hardly any. Flowers in axillary and terminal tufts with numerous lanceolate acuminate persistent bracts. Calyx sessile, oblong ribbed, .1 in. long, lobes ovate sub-acute persistent. Petals calyptrate white. Stamens from the mouth of the tube, red, about 30. Style longer. *Hab.* Mountains. Pahang, Fraser Hill at 4000 to 4370 ft. altitude (Burkill and Holtum 8677). *Native name:* Kelat daun alus.

Near *E. jasminiflora* Ridl., but with much thicker and smaller leaves; flowers more numerous in the tuft and bracts longer and narrower.

*Vol. i. p. 741, after sp. 68, Eugenia penangiana Duthie, insert:—*

(68A) *E. johorensis* Ridl.

Tree or shrub, glabrous. Leaves elliptic-ovate acuminate, base shortly narrowed, rigidly coriaceous, shining above, midrib broad at the base narrowing upwards, flat; nerves very inconspicuous, invisible above, 13 pairs very fine; 3 in. long, 1.5 in. wide; petioles broad, .2 in. long. Cymes terminal 2 or 3 together, each 2- or 3-flowered, peduncles angled, .25 in. long. Calyx and pseudo-stalk funnel-shaped, .25 in. long, lobes 4, very short, rounded.

Petals not seen; stamens few. *Hab.* Tide-limit, Johor, 4 miles N.W. from Johor Bharu (Burkill 16,352).

This plant has very stiff, smooth leaves and flowers with the long pseudo-stalk of the *E. leptantha* section, gradually increasing in thickness from the base upwards. The petals and stamens are fallen in all the flowers, but I think the petals were calyprate, as no trace of these remains.

*Vol. i. p. 749, after sp. 97, Eugenia linocieroidea King, insert:—*

(97A) *E. alyxifolia* Ridl. *Journ. Bot.* 1924, 296.

Branches slender, obscurely 4-angled. Leaves coriaceous lanceolate-acuminate, blunt, base attenuate, margin thickened, above minutely dotted, beneath midrib prominent; nerves about 20 pairs, faint, parallel, no intramarginal nerve; 3 in. long, .75 in. wide; petioles .15 in. long. Cymes terminal, .5 in. long. Peduncles and branches stout, very short. Calyx-tube obconic truncate, under .1 in. long. Petals white, round, calyprate. Stamens few, about 20, short. *Hab.* Pahang, Fraser Hill at 4000 ft. altitude (Nur, comm. Burkill 11,213).

(97B) *E. gonicalyx* Ridl.

Tree 30 to 40 ft. tall. Leaves coriaceous elliptic, abruptly cuspidate, cusp .2 in. long, blunt, base shortly cuneate; nerves very numerous, parallel, intramarginal nerve distinct, near the edge; 2 in. long, 1 in. wide; petioles .1 in. long. Corymb dense, branches numerous, close, 4-angled, 2 in. long and about as wide. Calyx sessile, narrowed slightly to base, 4-angled, .25 in. long, lobes ovate rounded. Petals round, free, white. Stamens very numerous, .25 in. long. *Hab.* Mountains at 4000 ft. altitude, Pahang, Fraser Hill (Nur).

Allied to *E. linocieroidea*, King, but the leaves short broadly elliptic, flowers larger and calyx-tube strongly 4-winged. The corymb is also much bigger with much stouter branches.

*Vol. i. p. 750, after sp. 98, Eugenia cyrtophylloides Ridl., insert:—*

(98A) *E. Holttumi* Ridl. *Journ. Bot.* 1924, 296.

A tree; branchlets slender red scurfy, rough. Leaves thinly coriaceous, glabrous elliptic acuminate cuspidate blunt, base narrowed; nerves slender, about 20 pairs, visible on both sides (when dry) and meeting an undulating intramarginal nerve; 2 in. long, 1 in. wide; petioles .1 in. long. Corymbs axillary and terminal, 2 to 2.5 in. long, 1.25 in. wide, lax, spreading, peduncles and branches red scurfy. Flowers 3 to 5 in a cyme on very short slender pedicels. Bracts lanceolate subulate minute. Ovary campanulate, .1 in. long. Sepals 5, very small, subulate. Petals calyprate. Stamens numerous. Style persistent. *Hab.* Mountains. Pahang, Fraser Hill (Burkill and Holttum 7751).

This plant is remarkable for the rough red-scurfy papillose indumentum of the branchlets and corymbs, the scales of which are prolonged into minute points.

## ORDER LIX. MELASTOMACEÆ.

*Vol. i. p. 767, after sp. 2, Oxyspora hispida Ridl., insert :—*

(2A) *O. scabrida* Ridl. *Journ. Bot.* 1924, p. 297.

Leaves broadly ovate-lanceolate, acutely acuminate, base shortly cuneate, nerves 2 pairs, outer pair very slender near the margins, inner pair .5 in. distant from the margins, prominent, midrib prominent, all scurfy; underside of leaf copiously dotted, transverse nervules about 22 pairs; 11 in. long, 4 in. wide; petioles slightly scurfy, 2 in. long. Panicle lax, shortly stiffly hairy, 6 in. long, 9 in. wide. Calyx infundibuliform in flower sparsely hairy with very obscure lobes. Petals oblong-ovate acute. Stamens; large ones 4, anthers linear-oblong straight not acuminate blunt, base very shortly bilobed, no boss on the back, but the thick filament runs nearly to the top; small ones 3, filaments slender nearly as long as the large stamens; anthers much smaller linear versatile dorsifixed with a boss on the back. Style stout cylindrical. Capsule campanulate, strongly ribbed, sparsely or not hairy, .1 in. long, sepals hardly visible. *Hab.* Mountains. Pahang, Gunong Tahan at 4500 to 6000 ft. altitude (Haniff and Nur).

This is allied to *O. hispida* Ridl., but is not hairy, the nerves being only scurfy, and the capsule campanulate.

*Vol. i. p. 768, sp. 5, Oxyspora hirta Ridl., note :—*

Since the publication of Vol. i., the flowers of this species have been obtained on Gunong Tahan. The calyx is campanulate with large broad rounded sepals with a small boss on the tip at the end of the nerve. Petals fleshy oblong, broad, with a short acute point. Stamens, large ones 3, .5 in. long; anthers elongate curved, sagittate acuminate, .3 in. long; small ones 2; anthers short linear-oblong blunt, sagittate with a boss on the back on the tip of the filaments; style slender.

The flowers are rather large for the genus, being .5 in. across. The number of stamens, only 5, is unusual in the genus; as they are unequal, the affinity of the species is with the first three in the genus.

*Vol. i. p. 795, after sp. 1, Marumia nemorosa Bl., insert :—*

(1A) *M. rufolanata* Ridl.

Climber, densely ferruginous scurfy. Leaves ovate-oblong acute base, cordate, coriaceous, glabrous and shining above; nerves 2, strongly elevate, as is the costa, marginal nerves slender close to the margin, transverse nervules about 20 pairs, all densely red-scurfy beneath, under surface papillose with tufts of scurf; 3 to 5 in. long, 1.5 to 2.5 in. wide; petioles .2 in. long, thick red scurfy. Panicles axillary lax, 3 in. long, few branched, flowers in distant pairs; peduncle 2 in. long, all red scurfy; pedicels .25 to .5 in. long, stout scurfy. Bracts 2, spatulate, .25 in. long, papillose scurfy. Calyx urn-shaped, .5 in. long, lobes short, rounded, densely

papillose woolly, the lobes with rather long woolly processes especially prominent on the edge. Petals ovate, apparently white, centre of backs scurfy. Stamens, filaments filiform; anthers linear long with white filaments at base. Ovary ovoid acuminate to style with 8 ribs, hairy. Style cylindrical, glabrous at top; stigma small capitate. *Hab.* Pahang, Kwala Lipis at Ulu Chineras (Burkill 15,661).

In life, the veins are red at the back of the leaf and there is some red on the stems.

This is near *M. pachygyna*, Korth., but there are no stellate branched processes on the calyx, which is red-woolly, and in the flower the ovary is free to the base.

*Vol. i. p. 814, after sp. 12, Memecylon longifolium* Ridl., insert :—

(12A) *M. lancifolium* Ridl.

Small tree, glabrous. Leaves lanceolate long-acuminate, base cuneate coriaceous, drying black, midrib sunk above, elevate beneath, nerves very faint; about 15 pairs, 6 in. long, 1.5 in. wide; petioles thick, .3 in. long. Compound cymes axillary, in pairs, 1.25 in. wide; branches spreading. Bracts minute, lanceolate. Pedicels .1 in. long. Flowers very small, blue, .05 in. long. Calyx campanulate, lobes 4, short, round. Petals 4, ovate acute. Stamens 8, anthers rather large, curved; filaments very short. Style cylindrical conic, narrowing to a point, short. *Hab.* Singapore, Sungei Morai (Ridley 3840).

Allied to *M. subtrinervium*, Miq., differing in the more coriaceous dark leaves with very inconspicuous nerves, and smaller flowers.

#### ORDER LXII. SAMYDACEÆ.

*Vol. i. p. 832, after sp. 7, Casearia coriacea* Vent., insert :—

(7A) *C. minutiflora* Ridl. *Journ. Bot.* 1924, p. 297.

A small bush, bark of branches pale. Leaves alternate coriaceous shining, broadly lanceolate acute, base acuminate, glabrous; nerves slender, 4 pairs, reticulations as conspicuous; 2 in. long, .8 in. wide; petioles slender, .15 in. long. Flowers 1 or 2 in an axil, sub-sessile, very small, .1 in. long, green. Bracts ovate. Sepals 4, ovate cuspidate. Petals 4, ovate rounded ciliate. Stamens 8, alternating with 8 oblong woolly linear staminodes. Pistil cylindrical, dilate at base. Stigma capitate, circular. *Hab.* Pahang, Fraser Hill at 4000 to 4370 ft. altitude (Burkill and Holttum 8581).

This is nearest to *C. coriacea*, but with very small sessile flowers, and small shining leaves.

#### ORDER LXVI. BEGONIACEÆ.

*Vol. i. p. 855, after sp. 3, Begonia Rajah* Ridl., insert :—

(3A) *B. Foxworthyi* Burkill MSS.

Rhizome short and thick. Leaves tufted, round cordate, larger ones with a short point, basal lobes round; nerves 8 radiating from

base; thinly herbaceous, hairy on the nerves beneath, and edge, hairs red; 1.5 to 4.5 in. long and as wide; petioles 1.5 to 2.5 in. long, thickly red-hairy. Peduncles slender, 3 to 6 in. long, hairy; pedicels slender, 1 in. long. Bracts 2, lanceolate ovate, hairy, .25 in. long. Flowers 2 to 4 in a cyme. Bracteoles obovate, fimbriate, .1 in. long, nearly as long as the pedicel. Male flowers .25 in. wide, white. Sepals broad, rounded reniform. Petals apparently none. Anthers numerous, small oblong, blunt at both ends, sessile, on a short column. Female flowers not seen. Capsule 3-winged, .4 in. wide across the wings, .25 in. long; wings 2, triangular blunt, base broad, third wing half as long as the others, rounded. *Hab.* Kelantan, Kwala Kek (Foxworthy).

This plant is perhaps nearest to *B. Rajah*, Ridl.

#### ORDER LXXI. ARALIACEÆ.

*Vol. i. p. 888, after sp. 1, Brassaiopsis palmata Kurz., insert:—*

(1A) *B. speciosa* Decne. and Planch. *Rev. Hort. ser. iv. 10, 106.*  
*B. floribunda* Seem. *Journ. Bot. ii. 262.*

Small tree 6 to 15 ft. tall, stem thorny with short thick pale thorns. Leaves palmate with 8 leaflets, lanceolate-elliptic cuspidate or acuminate, rather stiff, margins sub-entire to obscurely denticulate, 6 in. long, 3 in. wide; nerves 7 pairs, slender; petiolules 3 in. long; petioles 8 to 14 in. long. Panicle lax, spreading, over a foot long and as wide, branches 6 in. long, umbels in flower about 1 in. across, base and pedicels red scurfy; pedicels .25 in. long. Calyx-lobes 5, short ovate acute hairy. Petals 5, oblong blunt, tip incurved, .1 in. long, yellow. Stamens 5, anthers oblong, rather large. Disc swollen rugose. Styles 2, cylindric connate. Fruit sub-globose, .25 in. long. Seeds 1 sub-globose or 2 hemispheric. *Hab.* Pahang, Fraser Hill at 4000 to 4370 ft. altitude (Burkill and Holttum 7882). *Distrib.* Assam, Siam, Sumatra, Java.

#### ORDER LXXII. CORNACEÆ.

*Vol. i. p. 892, after sp. 1, Alangium Lamarckii Thw., insert:—*

(1A) *A. rotundatum* Ridl.

Tree 50 ft. tall, branches puberulous; branchlets sub-quadrate. Leaves herbaceous, ovate abruptly acuminate, base rounded glabrous except the puberulous nerves 3 from the base, the outer ones with 3, the midrib with 4 lateral nerves; nervules transverse parallel, wavy; 4.5 in. long, 3.5 in. wide; petioles .75 in. long, puberulous. Cymes axillary, .75 in. long, with two or three branches. Flowers cream-colour, about 12, pedicellate. Calyx funnel-shaped, with a rounded 5-pointed limb, pubescent, .1 in. long. Petals 5, oblong-linear blunt, pubescent outside, .2 in. long. Stamens 8, filaments long linear, flat, densely long hairy; anthers short linear. Style cylindric, stout, glabrous. Stigma capitate lobed. *Hab.* Mountain forests. Perak, Maxwell's Hill (Burkill).

This plant is most nearly allied to *A. Kingianum*, Prain, and to *A. barbatum*, Br., of India. The ovate leaves are very remarkable.

## ORDER LXXIII. CAPRIFOLIACEÆ.

Vol. ii. p. 3, after genus 1, **Viburnum**, insert:—

2. **LONICERA**, Linn.

Climbing (or erect) shrubs. Leaves opposite, sessile or petioled. Flowers in cymes or heads. Calyx tube ovoid, 5-toothed. Corolla tubular funnel-shaped (or campanulate), tube often elongate, lobes 5, 2-lipped or irregular, white, yellow or pink. Stamens 5, filaments inserted on the corolla-tube; anthers oblong or linear and usually exsert. Ovary 2- or 3-celled; ovules numerous. Style filiform. Stigma capitate. Berry 2- or 3-celled. Species 100, whole world, chiefly the north temperate zone, rare in the tropics.

(1) **L. malayana** Henderson, *Journ. F.M.S. Mus.* xi. 187.

Branches golden hairy. Leaves oblong-elliptic, base broad, truncate, tip acuminate, glabrous above; nerves 5 or 6 pairs, reticulations beneath and edge golden hairy; 3 to 4 in. long, 1 to 2 in. wide; petioles 2 to 3 in. long. Peduncles axillary, 1.5 in. long, yellow hairy, 2-flowered. Bracts linear-lanceolate, .25 in. long. Bracteoles ovate, all hairy. Calyx-tube urceolate glabrous, teeth linear hairy. Corolla tube .25 in. long, yellow pubescent, lobes hairy inside, all white, fading yellow. Stamens long exsert glabrous. *Hab.* Scrambling over bushes by river. Pahang, Lubok Tamang at 3500 ft. altitude (Henderson).

I have not seen this species.

## ORDER LXXIV. RUBIACEÆ.

Vol. ii. p. 7, genus 2, **Sarcocephalus**, and 4, **Nauclea**, note:—

It has been pointed out by Merrill (*Journal Washington Acad. Sci.* 1915, p. 535) that Linnaeus' genus **Nauclea** was based on the tree later known as *Sarcocephalus orientalis* and that this and other species referred to the genus *Sarcocephalus* must be now placed under the genus *Nauclea* and he forms the following new combinations for the species occurring in the Malay Peninsula.

*Sarcocephalus hirsutus*, Havil., becomes *Nauclea hirsuta*, Merrill, *l.c.* p. 535.

*Sarcocephalus Junghuhnii*, Miq., becomes *Nauclea Junghuhnii*, Merrill, *l.c.* p. 536.

*Sarcocephalus subditus*, Miq., becomes *Nauclea subdita*, Merrill, *l.c.* p. 537.

*Sarcocephalus Maingayi*, Havil., is *Nauclea Maingayi*, Hook. *fil. F.B.I.*, iii. 27.

The plants described under the genus (4) **Nauclea** in this Flora vol. ii. p. 9, are transferred to the new genus **Neonauclea**, Merrill, in the same publication, so that:—

*Nauclea synkorynes*, Korth., becomes *Neonauclea synkorynes*, Merrill (*Journal Washington Acad. Sci.* 1915, p. 542).

*Nauclea peduncularis* Don. becomes *Neonauclea peduncularis*, Merrill, *l.c.* p. 544.

*Nauclea purpurascens*, Korth, becomes *Neonauclea purpurascens*, Ridl.

*Vol. ii. p. 23, sp. 1, Argostemma acuminatum* King, note :—

**A. inæquilaterum** Benn. *Pl. Jav. Rar.* p. 95, is the earliest name for this plant and should be substituted for it. Bennett's species was based upon a plant from Penang in Herb. D. Brown, ex Herb. Soc. Hort. This is in the herbarium of the Natural History Museum, and is evidently the plant collected by Dr. Wallich in Penang. It has not been found in Penang since.

*Vol. ii. p. 24, after sp. 4, Argostemma pictum* Wall., insert :—

(4A) **A. humile** Benn. *Pl. Jav. Rar.* p. 94.

A small glabrous herb, 2·5 in. tall. Leaves 2 pairs or more, unequal, one thin herbaceous lanceolate acuminate, narrowed to the base, sessile or very shortly petioled, glabrous; nerves 4 or 5 pairs; 2 in. long, ·5 to ·75 in. wide; small leaf, lanceolate sessile, ·25 in. long. Stipules small ovate-lanceolate. Peduncle very slender, 1 in. long. Flowers 4 to 7 in an umbel, pedicels slender puberulous, ·25 to ·3 in. long. Bracts lanceolate, ·25 in. long. Calyx very short campanulate, lobes rather large, broadly lanceolate. Corolla-tube very short, lobes lanceolate acuminate, ·3 in. long. Stamens short, not connate; filaments as long as the oblong blunt anthers, free. *Hab.* Penang (Jack in Herb. Wallich 8391).

This has never been met with again, but Hooker in *Fl. Brit. Ind.* vol. iii. 44, referred to it some Khasiya plants to which it has certainly some affinity, but which I think are distinct. It is quite unlike anything else in the Malayan region, and belongs to the Indian section of the genus. A ticket in Wallich's herbarium apparently in Jack's handwriting, labelled "*Sonerila sp. novissima*. The enclosed are ripe capsules which may probably grow" seems to show that Wallich's own label "Penang, Jack" is correct.

(4B) **A. bifolium** Ridl.

Stem very short. Leaves 2, spreading on the ground, sessile ovate acuminate, base round unequal, glabrous except for a few small hairs sprinkled on the upper side, larger leaf 4 in. long, 2 in. wide, the smaller one 2 in. long. Peduncle 3 in. long, with an umbel of 13 flowers. Bracts narrow lanceolate. Pedicels slender, ·4 in. long. Calyx campanulate, lobes oblong blunt. Corolla ·25 in. long, lobes narrow lanceolate-linear. Staminal column elliptic, as long or slightly longer, very shortly beaked. *Hab.* Perak, Maxwell's Hill, Thaiping Hills (Ridley).

I referred this formerly to *A. pictum*, Wall., but the leaves are quite sessile and more narrowed to the tip, and the flower quite different, the petals being very narrow and the stamencolumn elongate oblong.

*Vol. ii. p. 24, after sp. 5, Argostemma Yappii King, insert :—*

(5A) **A. acuminatissimum** Ridl.

Erect herb, stem fleshy, over 8 in. tall, glabrous. Leaves equal, thin, lanceolate, long-acuminate, narrowed to the base; nerves conspicuous, 8 pairs distant; 6 in. long, 1.5 in. wide; petioles .2 in. long. Stipules .2 in. long, ovate-oblong blunt. Peduncle 1 in. long. Cymes compound of several branches, .2 in. long, branches rebranched. Bracts narrow lanceolate acuminate, .1 in. long; pedicels slender, .5 in. long. Bracteoles narrow-linear lanceolate, .05 in. long. Calyx campanulate, .1 in. long, lobes ovate acute. Petals and stamens wanting. *Hab.* Perak, Jor (Burkill 14,213).

Allied to *A. Yappii*, King, but differing in the much thinner leaves, narrowed to a point 1.5 in. long, and only 8 pairs of nerves.

*Vol. ii. p. 26, sp. 13, Argostemma unifolium Benn., note :—*

The Kedah Peak plant collected by Robinson and Kloss (6116) differs from the typical *A. unifolium* in having the large leaf quite sessile and somewhat narrowed to the base, and the stem has below it 2 to 4 pairs of narrow lanceolate stipuliform leaves which do not occur in the typical form. It may be called *A. unifolium* var. *sessile*.

*Vol. ii. p. 27, after sp. 16, Argostemma elatostemma Hook. fil., insert :—*

(16A) **A. longistipula** Ridl.

Stem stout, woody, sometimes branched, 8 in. tall, hairy above. Leaves unequal, numerous, rather crowded, large ones lanceolate acuminate, narrowed towards the base, edge serrulate, inaequilateral; nerves 12 pairs prominent beneath as are the nervules, hairy above with a few long hairs on midrib and nerves; 3 in. long, .75 to 1 in. wide; petioles .1 in. long; small leaves ovate-lanceolate acuminate, .5 in. long, edges hairy. Stipules lanceolate acuminate, edges hairy, .75 in. long, .2 in. wide. Flowers 2 or 3 on short pedicels, .75 in. long, lengthening in fruit to 1 in. long. Peduncles .75 to 1 in. long, all hairy. Bracts linear acuminate, .1 in. long. Calyx-tube campanulate, lobes very narrow-linear. Corolla lobes linear-lanceolate acuminate, narrow, .5 in. long. Stamens in a cylindrical acuminate cone, nearly as long as the lobes. Capsule obovoid, .25 in. long, scabrid hairy. *Hab.* Forests, Johor, Ulu Madik near Gunong Belulut (Holtum 10,657). Negri Sembilan, Gunong Angsi (Winkler 1775, Nur 1,580).

Allied to *A. elatostemma*, but the leaves are lanceolate acuminate, the stipules large and lanceolate, the calyx-lobes longer and more acute, the corolla-lobes longer and narrower.

*Vol. ii. p. 29, sp. 23, Argostemma spinulosum C. B. Clarke, note :—*

This species appears to be in all respects identical with *A. longifolium* Bennett *Plantæ Javanicæ Rariores*, p. 97, collected in Sumatra



by Horsfield. Bennett's description is very incomplete, but the type in Herb. Brit. Mus. is a good one. Bennett's name antedates that of Clarke and should therefore be substituted for it.

*Vol. ii. p. 55, sp. 1, Xanthophytum capitatum* Ridl., note :—

This name has been anticipated by Valetton, so I change it to *X. capitellatum*, Ridl. Add also :—

(2) *X. biceps* Ridl.

Rhizome woody. Stem 8 in. tall, woody, shortly hairy. Leaves herbaceous, equal, ovate sub-acute, base shortly unequally narrowed; nerves 9 pairs; both surfaces sprinkled with pale multi-cellular hairs densely covering the nerves and midrib; 4 in. long, 2 in. wide; petioles 1 in. long, densely hairy. Stipules large, broadly ovate acute, .2 in. long and as wide. Flowers white, very small, in dense heads, .2 in. long, in pairs in the axils; peduncles very short, fleshy. Bracts lanceolate acute, densely hairy. Calyx short campanulate, lobes 5, lanceolate acute, densely hairy. Corolla-very short, lobes 5, ovate, all hairy. Stamens 5; filaments short, anthers as long, oblong blunt, in a circle in bud, blackish grey. Style cylindric, as long. Disc large, white, circular. *Hab.* Pahang, Ulu Tahan (Burkill 17,463).

This differs from *X. capitellatum*, Ridl., in the absence of the red hairs of that species, and the equal leaves and the heads in pairs.

*Vol. ii. p. 104, after sp. 5, Tarenna salicina* Ridl., insert :—

(5A) *T. lancifolia* Ridl.

Shrub, upper branchlets quadrangular, scabrid. Leaves lanceolate long-acuminate, narrowed to the base, glabrous above, hairy on midrib and nerves beneath, drying black; nerves ascending, 10 pairs, slender, midrib channelled above; 5 to 6 in. long, 1.5 to 2 in. wide; petioles slender hairy, .5 in. long. Stipules broad, ovate-lanceolate cuspidate, .1 in. long. Peduncle .25 to .5 in. long, hairy. Cyme-branches 3, secondary peduncles .5 to 1 in. long. Flowers about 6 on a branch; pedicels slender, .1 in. long. Calyx campanulate, .05 in. long, hairy, lobes 5, lanceolate acute, half as long. Corolla-tube .3 in. long, hairy, lobes 4, elliptic blunt imbricate, .2 in. long, hairy outside. Stamens 4, glabrous, anthers as long as petals, linear-oblong, filaments short, attached to corolla-tube mouth. Style stout, shorter than corolla. Stigma linear, broad, entire. Fruit globose, .25 in. through. Seeds 2, flattened, rounded. *Hab.* Mountains Pahang, Fraser Hill at 4000 ft. altitude (Burkill 8686); Kedah Peak at 2000 ft. altitude (Haniff).

*Vol. ii. p. 122, genus 51, Canthium*, note :—

Dr. Robyns points out that the 2 species described in vol. ii. pp. 123 and 124 as (1) *Canthium pauciflorum*, King and Gamble, and (6) *Canthium velutinum*, Ridl., do not belong to the genus *Canthium*, but are nearly allied to *Ancylanthus*, Desf., and *Temnocalyx*, Robyns, gen. nov. MSS. of Tropical Africa, but are distinct from either, and he suggests the name *Perakanthus* for them, as

the two species only occur in Perak. It is remarkable that there is as yet no plant with an affinity to these two from any part of Asia.

### 51A. PERAKANTHUS, Robyns.

Shrubs glabrous or hairy. Leaves paired, shortly petioled or subsessile, ovate or lanceolate. Stipules broad triangular. Flowers axillary, 1 or 2 together, shortly pedicelled. Calyx short truncate. Corolla long-tubed, glabrous or hairy, tube cylindric, straight or slightly curved, lobes 5, lanceolate short, valvate. Stamens shorter; filaments slender; anthers oblong. Style elongate, longer than corolla, stout. Stigma ovate-capitate. Ovary 2-celled, cells 1-ovuled. Berry large, globose or pyriform, 1- or 2-seeded. Species 2, Perak.

Glabrous, leaves ovate; flowers glabrous . . . (1) *P. pauciflorum*  
 Hairy all over . . . . . (2) *P. velutinum*

*Vol. ii. p. 124, after sp. 5, Canthium depressinerve Ridl., insert:—*

(5A) *C. hirtellum* Ridl. *Journ. Bot.* 1924, p. 297.

Shrub 6 to 8 ft. tall, branches hairy. Stipular thorns short or none. Leaves thin membranous elliptic-lanceolate acuminate cuspidate blunt, base attenuate, above sparsely hairy, midrib with appressed hairs, beneath more thickly hairy, midrib and nerves 7 pairs, roughly hairy. Cymes axillary, hairy, .2 in. long, crowded. Bracts very small lanceolate acute, hairy. Pedicels very short, hairy. Ovary broad short campanulate hairy. Sepals 5, ovate acute. Corolla .1 in. long, white, tube globose, lobes 5, as long, ovate subacute fleshy glabrous. Stamens 5, shorter than corolla; anthers short elliptic. Disc annular glabrous. Fruit globose when 1-seeded, bilobed when 2-seeded, .3 in. long (when dry). *Hab.* Negri Sembilan, Gunong Angsi (Mhd. Nur, com. Burkill 11,664.)

*Vol. ii. p. 126, after sp. 9, Canthium didymum Gaertn., insert:—*

(9A) *C. scabridum* Ridl. *Journ. Bot.* 1924, p. 297.

Unarmed shrub, branches slender, scaly-pubescent. Leaves membranous elliptic cuspidate sub-acute, base rounded or occasionally acute, above sparsely scabrid hairy, midrib and nerves with numerous short hairs, beneath more densely hairy, edges scabrid, hairy; nerves conspicuous, 6 pairs, inarching and closely hairy; 3.5 in. long, 1.25 in. wide; petioles .2 in. long, hairy. Stipules short, broad, ovate hairy. Cymes axillary hairy, as long as petioles, usually 2 in each axil, spreading, .3 in. across. Pedicels slender, .1 in. long. Calyx pubescent campanulate, with 5 short acute lobes. Corolla .1 in. long, tube globose, lobes 5, as long, ovate acute, with long deflexed white hairs in the mouth of the tube. Stamens 5, anthers large, not exsert; filaments attached to base of lobes, shorter than anthers. Style thick and hairy at the base, above

cylindric stout. Stigma oblong-conoid, blunt, vertically grooved.  
*Hab.* Johor, Kluang (Holtum 9433).

*Vol. ii. p. 177, after genus 67, Knoxia, insert :—*

68. **NERTERA**, Banks.

Small creeping herbs. Leaves herbaceous or fleshy. Flowers very small, axillary, sessile. Calyx-tube ovoid truncate or 4-toothed. Corolla tubular or funnel-shaped, 4-lobed. Stamens 4, inserted at base of corolla. Ovary bilocular; ovule 1 in a cell. Styles 2, elongate pilose. Berry globose fleshy, of 2 cocci, red or orange. Seeds 2, plano-convex. Species 14, New Zealand, tropical Asia (in mountains) and South America.

(1) **N. depressa** Banks and Solander in Gaertn. *Fruct.* i. 124, t. 26; *DC. Prodr.* iv. 451; *Hook. fil. Bot. Mag. t.* 5799.

A densely tufted low creeping herb 1 to 2 in. tall. Leaves ovate-deltoid, base broad retuse glabrous fleshy, dark green, .25 in. long, and as wide; petioles .1 in. long or more. Flowers sessile, solitary in the axils, pale green, .1 in. long. Berry as large as a pea, bright orange to red. *Hab.* High mountains on banks, Pahang, Gunong Tahan at 5000 to 7000 ft. altitude (Haniff). *Distrib.* New Zealand, Tristan d'acunha, Java, Borneo, Andes from Cape Horn to New Grenada.

The Pahang locality is the furthest west known in the Old World.

ORDER LXXX. VACCINIACEÆ.

*Vol. ii. p. 205, after sp. 3, Agapetes Wrayi Ridl., insert :—*

(4) **A. pubescens** Ridl. *Journ. Bot.* 1924, p. 298.

Epiphyte; branches and inflorescence pubescent. Leaves lanceolate long-acuminate, base rounded; nerves conspicuous above, slender, about 8 pairs, inarching within the margin, nervules broken up, all glabrous except the base of the midrib, beneath pubescent; 5 in. long, 1.5 in. wide; petioles thick, .1 in. long. Cymes axillary, of 3 or 4 flowers; peduncle .3 in. long; pedicels .5 in. long, all pubescent. Calyx-tube .1 in. long, sub-globose, pubescent, lobes lanceolate acuminate, as long, pubescent. Corolla-tube .25 in. long, cylindric, thick, lobes short, recurved, green. Stamens not exsert. *Hab.* Mountains, Pahang, Fraser Hill at 4000 to 4370 ft. altitude (Burkill and Holtum 7828).

Allied to and much resembling *A. perakensis* Ridl., but distinct in its pubescence, conspicuous leaf-nerves and slightly larger flowers.

ORDER LXXXVI. MYRSINÆÆ.

*Vol. ii. p. 246, after sp. 26, Ardisia montana King and Gamble, insert :—*

(26A) **A. iteophylla** Ridl. *Journ. Bot.* 1924, p. 298.

Shrub; young parts and inflorescence scurfy. Leaves thin coriaceous, narrow-lanceolate, bluntly acuminate, base equally narrowed beneath, minutely dotted brown scurfy; nerves incon-

spicuous, over 20 pairs; 4.5 in. long, 1 in. wide; petioles .5 in. long. Panicles terminal, scurfy-pubescent, 3 in. long. Bracts lanceolate blunt, .1 in. long. Pedicels .2 in. long. Sepals small oblong-lanceolate, densely glandular. Corolla .15 in. long, pink, rather narrow acuminate in bud, lobes narrow lanceolate acuminate. Stamens connate in a head, linear acuminate. Style longer than corolla, projecting in bud. *Hab.* Johor, Gunong Besidong at 1500 ft. altitude (Holttum).

This has the narrow willow-like leaves of *A. tahanica*, but in its scurfiness and the small sepals and acuminate corolla it is very distinct.

## ORDER LXXXVII. SAPOTACEÆ.

*Vol. ii. p. 265, genus 6, Bassia, note:—*

Macbride in *Contrib. from Gray's Herbarium, n.s. liii. p. 16* points out that the name *Bassia* Koen. in *Linn. Mantissa, ii. app. 551 (1771)* applied to the sapotaceous plant *Bassia latifolia*, was antedated by Allioni (1766), who used the name for a genus of *Chenopodiaceæ*, therefore he has replaced the name *Bassia* by that of *Madhuca*, Hamilton in *Gmelin Syst. ii. 1791*, the earliest available name for the genus. *Illipe*, Koenig in *Von Muell. Extra Trop. pl. eds. 181* is excluded as never having been published by Koenig. This entails the substitution of *Madhuca* for *Bassia*, and the alteration of the names of the species on p. 266, to p. 272 as follows (see also note on p. 342):—

- (1) *Bassia hirtiflora*, Ridl., becomes *Madhuca hirtiflora*, Lam.
- (2) *Bassia aristulata*, King and Gamble, becomes *Madhuca aristulata*, Lam.
- (3) *Bassia caudata*, Ridl., becomes *Madhuca caudata*, Lam.
- (4) *Bassia Kingiana*, Brace, becomes *Madhuca Kingiana*, Lam.
- (5) *Bassia Kunstleri*, King, becomes *Madhuca Kunstleri*, Lam.
- (6) *Bassia Watsoni*, Ridl., becomes *Madhuca Watsoni*, Lam.
- (7) *Bassia penicillata*, King and Gamble, becomes *Madhuca penicillata*, Lam.
- (8) *Bassia malaccensis*, King and Gamble, becomes *Madhuca malaccensis*, Lam.
- (9) *Bassia Curtisii*, King and Gamble, becomes *Madhuca Curtisii*, Lam.
- (10) *Bassia laurifolia*, King and Gamble, becomes *Madhuca laurifolia*, Lam.
- (11) *Bassia rupicola*, King and Gamble, becomes *Madhuca rupicola*, Lam.
- (12) *Bassia penangiana*, King and Gamble, becomes *Madhuca penangiana*, Lam.
- (13) *Bassia perakensis*, King and Gamble, becomes *Madhuca perakensis*, Lam.
- (14) *Bassia argentea*, Clarke, becomes *Madhuca sericea*, Lam.

(15) *Bassia Braceana*, King and Gamble, becomes *Madhuca Korthalsi*, Lam.

(16) *Bassia longistyla*, King and Gamble, becomes *Madhuca longistyla*, Lam.

(17) *Bassia cuprea*, King and Gamble, becomes *Madhuca cuprea*, Lam.

(18) *Bassia Motleyana* Clarke, becomes *Madhuca Motleyana*, McBride Contrib. Gray, Herbs. ns. liii. p. 18.

(19) *Bassia cuneata*, Bl., becomes *Madhuca cuneata*, Lam.

(20) *Bassia erythrophylla*, King and Gamble, becomes *Madhuca erythrophylla*, Lam.

(21) *Bassia elongata*, Miq., becomes *Madhuca elongata*, Lam.

#### ORDER LXXXVIII. EBENACEÆ.

Vol. ii. p. 279, after sp. 2, **Maba venosa** King and Gamble, insert:—

(2A) **M. racemosa** Ridl.

Treelet 10 to 15 ft. tall, branches pubescent. Leaves alternate elliptic, shortly acuminate acute, base round minutely cordate, above glabrous except the puberulous sunk midrib, beneath pubescent, midrib prominent and nerves 9 pairs hairy elevata; 7 to 8 in. long, 3 in. wide; petioles thick, .25 in. long. Flowers unknown. Fruit in short racemes, 1 to 1.5 in. long, lower ones branched, stout, woody, red-hairy. Pedicels stout, hairy, .3 in. long. Berry globose glabrous, green, .75 in. long, .6 in. through. Sepals 3, small, free to near base, pubescent ovate blunt, .09 in. long. Seeds 3, semi-oval, black, back rounded, inner face acutely angled, .5 in. long, .3 in. through. *Hab.* Negri Sembilan, Bukit Tangga (Nur 11,808).

Allied to *M. sumatrana*, Miq., but the leaves are very much larger and elliptic-cordate and the racemes stouter.

Vol. ii. p. 288, after sp. 17, **Diospyros clavigera** Clarke, insert:—

(17A) **D. Hendersoni** Ridl.

Shrub, glabrous. Leaves coriaceous lanceolate acuminate blunt, base attenuate; nerves elevata beneath, very faint above, 6 pairs, inarching .08 in from the margin, nervules invisible; 2.5 to 3.25 in. long, .75 to 1 in. wide; petioles .1 in. long. Flowers unknown. Fruit solitary oblong-globose, flattened at top, minutely puberulous, when young crowned by a short conic style, obscurely 4-ribbed, .6 in. long and as wide; sepals 4, oblong-ovate, connate at the base, .3 in. long. *Hab.* Mountains at 3800 ft. altitude, Pahang, Robinson Falls near Cameron Highlands (Henderson 11,138).

#### ORDER XCI. APOCYNACEÆ.

Vol. ii. p. 360, after sp. 2, **Ecdysanthera multiflora** King and Gamble, insert:—

(3) **E. rosea** Hook. and Arn. Bot. Beechey's Voyage 198.

Slender glabrous climber. Leaves opposite, rather thin elliptic caudate, shortly cuneate at the base, 2.5 in. long, .75 in. wide;

petioles slender, .25 in. long. Cyme lax trichotomous, terminal on a peduncle .75 in. long; branches distant, 1 in. long, slender. Bracts lanceolate, minute. Flowers small, pink, in cymules of 3; pedicels slender, .1 in. long. Sepals ovate blunt. Corolla .1 in. long, lobes short ovate rounded, mouth of tube papillose inside. Anthers linear-lanceolate blunt, basal spurs longer than filaments. Follicles 5 in. long, .25 in. through. Seed oblong, narrowed upwards, plume 1.5 in. long. *Hab.* Mountains at 4000 to 4370 ft. altitude, Pahang, Fraser Hill (Burkill and Holtum 8407). *Distrib.* China, Java, Borneo, Cambodia.

*Vol. ii. p. 366, after sp. 1, Trachelospermum Curtisii King and Gamble, insert:—*

(2) **T. obtusifolium** Ridl. *Journ. Bot.* 1924, p. 298.

Woody climber, branches blackish rugose. Leaves stiffly coriaceous, elliptic blunt, tip rounded, minutely cuspidate, edge thickened; nerves fine, 9 pairs, midrib strongly elevate; 2.5 to 3 in. long, 1.5 in. wide; petioles .25 in. long. Cyme compound, terminal, 1.75 in. long, 3 in. wide; peduncle 1.5 in. long; cymules 3, pedicels .25 in. long. Sepals ovate acute. Corolla light-yellow, tube short, thick, .25 in. long, mouth inside to top of anthers flocculent papillose, lobes oblong broad, rounded at tip, minutely denticulate. Stamens from the base of the tube, anthers lanceolate with 2 spurs at the base, longer than the filaments; apices acuminate mucronate. Disc low, annular, entire. Style very short. *Hab.* Mountains, Pahang, Fraser Hill at 4000 to 4370 ft. altitude. Flowers light yellow, fragrant (Burkill and Holtum 8898).

*Vol. ii. p. 369, after sp. 4, Microchites tenuifolia Ridl., insert:—*

(5) **M. tubulosa** Ridl.

Branches slender. Leaves lanceolate acuminate, base acute, rather thin; nerves 8 pairs; 3 in. long, 1 in. wide; petioles .15 in. long. Panicles of 2 or 3 fleshy racemes, covered with numerous short ovate bracts, 1 in. long, axillary. Flowers few on short fleshy pedicels with several ovate bracts. Sepals 5, ovate blunt. Corolla tube cylindrical, .2 in. long, hairy papillose within, lobes 4, contort, oblong blunt with one side prolonged to a large rounded lobe. Stamens 4 at base of tube connivent with the style; filaments short; anthers hastate apiculate, appendages acute. Disc of 4 ovate fleshy lobes as long as the ovary. Ovary broad truncate. Style conic at base. *Hab.* Mountains, Perak, Maxwell's Hill at 3200 ft. altitude (Burkill 12,785).

This species is remarkable for its much-reduced fleshy panicles and the tubular corolla.

#### ORDER XCII. ASCLEPIADACEÆ.

*Vol. ii. p. 392, after sp. 7, Tylophora squarrosa Ridl., insert:—*

(7A) **T. grandiflora** Ridl. *Journ. Bot.* 1924, p. 299.

Slender glabrous climber. Leaves opposite, thin ovate cuspidate,

base cordate, nerves 4 pairs, inarching, some way from the edge; 4 in. long, 1.5 in. wide; petioles 1 in. long. Peduncle slender, .75 in. long. Raceme .5 in. long, with about 8 flowers at the tip. Bracts minute lanceolate acute. Pedicels .3 in. long. Sepals small, lanceolate acute. Corolla campanulate with 5 ovate acute lobes, pale green, .5 in. across. Column very small; corona short, surrounding the base of the stamens, lobed. Stamens, filaments thick; anthers deflexed quadrate, no appendages, lower edges minutely 3-toothed. Stigma small, bilobed. Capsule elliptic blunt, glabrous, 3 in. long, over 1 in. wide when expanded. *Hab.* Pahang; between Fraser Hill and Tras Valley (Holtum 11,482).

This plant has far the largest flowers of any of the Malay Peninsular species.

#### ORDER XCIII. LOGANIACEÆ.

*Vol. ii. p. 416, after sp. 3, Fagræa carnosa Jack, insert:—*

(3A) *F. flavidula* Ridl.

A very large climber, branches conspicuously jointed. Leaves fleshy, coriaceous, lanceolate to elliptic, acuminate, base narrowed, nerves invisible, midrib elevate beneath; 3.5 in. long, 1.5 to 2.25 in. wide; petioles .5 in. long. Flowers solitary, terminal, pale yellow, sessile. Calyx 1.25 in. long, lobes oblong, rounded at tip. Corolla-tube cylindric, 4 in. long, slightly enlarged upwards; lobes oblong with rounded tips, 2 in. long, .5 in. wide. Stamens exsert; filaments slender, .5 in. long from mouth of corolla; anthers .15 in. long. Style longer. Stigma rather broad capitate. Fruit oblong, greyish blue. *Hab.* High mountains at 4800 ft. altitude, Pahang, no. 4 Camp, Cameron's Highlands (Henderson 11,673).

Allied to *F. rotundifolia* Ridl., but the leaves are acute, the calyx much smaller, the filaments shorter, anthers smaller, and the corolla-lobes longer.

*Vol. ii. p. 422, after sp. 3, Cyrtophyllum giganteum* Ridl.,  
*insert:—*

(4) *C. speciosum* Ridl., *Fagræa speciosa* Bl. *Rumphia* ii. 35, t. 81.

var. *montanum* Ridl. Small shrub. Leaves fleshy coriaceous elliptic acute, base narrowed, nerves 6 pairs, very faint most conspicuous above; 3.5 to 4.5 in. long, 1.75 to 2.5 in. wide; petioles stout, .25 in. long. Corymb of 3 branches, trichotomously branched, 3 in. long and as wide; flowers densely crowded, very numerous, lower bracts paired, linear acuminate, 1 in. long, upper ones .25 in. long, uppermost short ovate acute pedicels .1 in. long. Sepals imbricate ovate rounded. Corolla-tube .2 in. long, cylindric; lobes oblong rounded, .1 in. long. Stamens, filaments twice as long as lobes, exsert; anthers very small. Style shorter, clubbed. *Hab.* Open dry hill-tops at 4500 ft. altitude, Pahang, Gunong Terbakar in Cameron's Highlands (Henderson 10,992). *Distrib.* Java.

The typical *C. speciosum* is a big tree, but Blume says that in high mountain woods it becomes a low shrub, with more condensed inflorescence.

*Vol. ii. p. 430, after sp. 9, Gaertnera diversifolia Ridl., insert:—*

(9A) *G. latifolia* Ridl. *Journ. Bot.* 1924, p. 299.

Shrub, stem rather stout, internodes 2 in. long. Leaves herbaceous, dotted beneath, elliptic-oblanccolate, cuspidate, base long-narrowed, nerves 12 pairs, slender, slightly elevate; 9 to 10 in. long, 2.5 to 5 in. wide; petioles 1.5 in. long. Stipules connate at base, limbs triangular, .5 in. long. Racemes lateral, opposite, extra-axillary, slender, 4 in. long. Bracts lanceolate acuminate, paired, hardly connate at base, .1 in. long. Calyx of 5 short ovate lobes. Corolla .2 in. long, tubes as long as the oblong blunt lobes. Fruit globose, .25 in. long. *Hab.* Mountains, Pahang, Fraser Hill (Burkill and Holtum 8606).

This is distinct from *G. diversifolia* in its long petioled elliptic-oblanccolate leaves, longer flowers and bracts nearly free to base.

#### ORDER XCVI. BORAGINÆÆ.

*Vol. ii. p. 442, after genus 4, Ehretia, insert:—*

##### 4A. RHABDIA, Mart.

A hairy shrub. Leaves small alternate or clustered, oblong, entire or toothed, sub-coriaceous. Flowers in short racemes, terminal on short lateral branches. Sepals 5, lanceolate acuminate. Corolla pink, tube short campanulate, lobes 5, oblong blunt. Stamens 5 on the corolla tube; anthers oblong. Ovary 2-celled, cells 2-ovuled. Style slender, terminal. Stigma capitate or minutely trilobed. Berry small with 4 crustaceous 1-seeded pyrenes. Seeds oblong. Species 1, Africa, India, Siam, Borneo, Philippines, Brazil.

(1) *R. lycioides* Mart. *Nov. Gen. and Sp.* ii. 137, t. 195; *Hook. fil. F.B.I.* iv. 145. *R. viminea* Dalz. and Gibs. *Bombay Flora*, 170; *Hook. fil. Ic. Pl.* 823.

Shrub, creeping, 2 to 6 ft. tall, young parts with appressed silky hairs. Leaves oblong entire (or toothed), thick, sparsely hairy, subsessile apiculate, .5 to 1 in. long, .2 in. wide. Flowers usually on terminal shoots, .25 in. long and as wide, pink. Fruit smooth, yellow or brown, dry. *Hab.* Creeping on gravelly sand on river bank. Legeh, Tremangan (Gwynne-Vaughan).

#### ORDER C. SCROPHULARIACÆÆ.

*Vol. ii. p. 481, after sp. 6, Vandellia elata Benth., insert:—*

(6A) *V. urticifolia* Hance *Journ. Bot.* vi. 1868, p. 301.

Erect herb, branched, 8 in. tall, sparsely hairy. Leaves deltoid acute, base cuneate, edge coarsely dentate serrate, teeth broad, mucronulate sparsely short hairy; .5 in. long, .25 in. wide; petioles



winged to base, .2 in. long. Flowers 1 to 4 in a head, axillary and terminal. Pedicels .2 in. long. Bracts lanceolate or linear-lanceolate, hairy. Sepals linear acuminate, .1 in. long, hairy. Corolla blue, tube cylindric, as long as sepals, lobes short. Capsule oblong, mucronulate, as long as the petals or shorter. *Hab.* Malacca, Batu Berendam (Burkill). *Distrib.* Borneo, Philippines, Tonkin, China.

## ORDER CIII. GESNERACEÆ.

*Vol. ii. p. 500, after sp. 11, Æschynanthus parvifolia R.Br., insert:—*

(11A) *Æ. lanceolatus* Ridl. *Journ. Bot.* 1924, p. 299.

Stems very slender. Leaves in pairs, thinly coriaceous, paler beneath, linear-lanceolate acuminate, base blunt, .75 in. long, .2 in. wide; petioles very short. Flower solitary, sub-terminal; pedicel .1 in. long. Calyx tubular cylindric, .6 in. long, lobes short ovate, .05 in. long, very sparsely pubescent. Corolla red, sparsely pubescent, 2.75 in. long, base dilate, tube curved, trumpet-shaped, lobes ovate blunt, .25 in. long, edges hairy. Stamens exsert but shorter than lobes. *Hab.* Mountains, on tree trunks at 4000 to 4370 ft. altitude, Pahang, Fraser Hill (Burkill and Holttum 8418).

This is allied to *A. parvifolia*, Br., but the leaves are very much smaller, narrow-linear lanceolate and the calyx much shorter and hardly pubescent.

*Vol. ii. p. 500, after sp. 12, Æschynanthus radicans Jack, insert:—*

(12A) *Æ. lamponga* Miq. *Fl. Ned. Ind. Suppl.* 563.

var. *parvifolia* Ridl. Stems slender, creeping, rooting. Leaves sparsely hairy beneath, coriaceous ovate blunt, base minutely cordate, midrib conspicuous, elevate, nerves invisible; .5 to .75 in. long, .3 to .5 in. wide; petioles very short. Flowers 1 or 2 together, axillary; pedicels hairy, .2 in. long. Calyx large wide, trumpet-shaped, green, lobes broad, rounded hairy, 1 in. long, .6 in. wide at the mouth. Corolla red, 2 in. long, tube broad cylindric, thickly minutely pubescent, lobes rounded, .25 in. long. Stamens about as long as the corolla, one pair shorter; anthers oblong. *Hab.* Pahang, Kwala Teku (Seimund). *Native name:* Akar Melekat.

This differs from typical *A. lamponga*, Miq., of Sumatra in its very much smaller ovate cordate leaves.

*Vol. ii. p. 501, after genus 1, Æschynanthus, insert:—*

## IA. MICRÆSCHYNANTHUS, Ridl.

Epiphyte, creeping. Leaves opposite sub-sessile, fleshy, glabrous, round ovate acute. Flowers very small, 3 or 4 in very short axillary racemes. Sepals 5, lanceolate acuminate, glandular hairy. Corolla shorter, tube very short, lobes 5, rounded. Stamens 4, filaments very short, attached to tube; anthers large elliptic. Ovary cylindric, narrowed slightly above; stigma discoid with a transverse furrow. Species 1. Pahang.

(1) **M dischidioides** *Ridl.*

Stem rather slender, 4-angled, branched, internodes .5 to 1 in. long. Leaves paired, ovate acute, base round fleshy, purple beneath, nerves invisible; .5 in. long, .3 in. wide; petioles .05 in. long. Racemes shorter than pedicels. Sepals .05 in. long, lanceolate acuminate, connate at base, glandular, hairy. Corolla half as long, glabrous, tube very short, campanulate, lobes longer, equal, ovate rounded. Stamens equal, filaments very short; anthers twice as long, elliptic, rounded at both ends. Ovary cylindrical, shorter than anthers. *Hab.* On boughs of trees at 5500 ft. altitude, Pahang, Gunong Tahan (Ridley 16,122).

The affinity of this curious plant with the smallest flowers of any of the *Cyrtandraceæ* is evidently with *Æschynanthus*, which it resembles in its habit, opposite fleshy leaves, and long hairy sepals, but the corolla is reduced to a very short regular campanulate organ with 4 short equal stamens, in fact a corolla much like that of *Baëica*.

*Vol. ii. p. 530, to sp. 8, Parabœa salicina, add:—*

*P. salicina* var. *major*. Stem woody, 5 in. tall. Leaves densely crowded at the top, elliptic-lanceolate subacute, base narrowed blunt, margins irregularly dentate crenulate, above glabrous, beneath scurfy-pubescent on the 20 pairs of nerves, elevate, midrib elevate transversely wrinkled; 2 to 4 in. long, .75 to 1 in. wide; petioles 1 in. long or less, transversely rugose hairy. Cymes numerous, slender, spreading, pubescent, red, 3 in. long, dichotomously branched. Bracts linear blunt, very short, longer than the pedicels. Flowers nodding on very short pedicels, small, .1 in. long. Sepals linear, half as long as corolla. Corolla campanulate, lobes ovate acute. Stamens very small. Style long projecting. *Hab.* Kelantan, Kwala Aring (Yapp).

This differs from the Pahang plant in its broader leaves and paniced cymes.

## ORDER CVI. ACANTHACEÆ.

*Vol. ii. p. 564, after sp. 2, Ruellia prostrata* *Linn., insert:—*

(3) **R. amœna** *Nees in DC. Prodr. xi. 203.* *Stephanophyllum longifolium Pohl. Pl. Braz. ii. 85, t. 156.*

This Brazilian plant has appeared as an alien escaped from gardens in a few places. It is a herb about 1 ft. tall, glabrous. Leaves ovate-lanceolate acuminate bases, narrowed, herbaceous, 3 in. long, 1.5 in. wide. Flowers few in short terminal racemes or small panicles. Bracts setaceous. Calyx lobes .25 in. long, setaceous. Corolla bright red, 1.5 in. long, tube slender at base, then abruptly swollen, .5 in. through, lobes short ovate, .15 in. long. Capsule .5 in. long, dilate in seed-bearing portion. Seeds about 15, orbicular flat, smooth. *Hab.* Waste ground, banks, etc., near cultivation, Singapore, Penang Hill; often cultivated in gardens.

Vol. ii. p. 574, after sp. 9, ***Strobilanthes rufo-capitatus*** Clarke, insert:—

(9A) ***S. ruficapillis*** Ridl.

Tall creeping ascending herb, with long internodes; creeping stem, 1 ft. long or more, ascending portion 18 in. tall, hairy. Leaves subequal or very unequal, lower ones elliptic-lanceolate obtusely acuminate, base acutely acuminate, edges crenulate, 1.5 to 1.75 in. long, .5 to 1 in. wide, scabrid above, hairy beneath on the 4 pairs of nerves; petioles .25 in. long, hairy; upper leaves linear-lanceolate, 1.25 to 2.25 in. long, .1 to .3 in. wide; petioles .15 in. long. Inflorescence terminal, of one or two racemes, terminal one .75 in. long. Bracts linear, .5 in. long, very narrow, densely covered with long spreading red hairs. Sepals linear, hairy at the top with long red hairs, .3 in. long. Corolla (not seen) "white." Capsule .3 in. long, valves narrow, straight linear acute. Seeds 4. *Hab.* Pahang, Raub. (Burkill 17,151).

Allied to *S. rufo-capitatus*, Clarke, but the leaves are much smaller and narrower, and the inflorescence smaller.

#### ORDER CVIII. LABIATÆ.

Vol. ii. p. 654, after sp. 4, ***Gomphostemma oblongum*** Wall., insert:—

(4A) ***G. lactea*** Ridl. *Journ. Bot.* 1924, p. 300.

Stem woody, densely stellate-tomentose. Leaves ovate-elliptic, shortly acute, base rounded or very shortly narrowed, margin entire except for some very short obscure teeth chiefly at the tip, above stellate-hairy, beneath densely white stellate-tomentose; nerves about 8 pairs, elevate beneath, transverse nervules and reticulations equally elevate; 7 in. long, 3 in. wide; petioles thick white tomentose, 1 in. long. Flowers numerous, crowded in axillary tufts in the upper part of the stem. Pedicels .2 in. long. Bracts linear acute. Calyx infundibular, .3 in. long, white tomentose, lobes short, broad, acute, .1 in. long. Corolla creamy-white, 1 in. long, hairy, tube narrow cylindrical at base, broadly funnel-shaped above, upper lobes blunt. *Hab.* Pahang, Pinetree Hill near Fraser Hill at 4800 ft. altitude (Mohammed Nur 11,075).

This species is near *G. oblongum*, Wall., but the leaves are rounded at the base and are almost entire.

#### ORDER CXI. POLYGONACEÆ.

Vol. iii. p. 14, after sp. 9, ***Polygonum pedunculare*** Wall., insert:—

(10) ***P. capitatum*** Ham. in. *Don. Prodr.* 73; *Hook. fil. F.B.I.* v. 44.

A tufted wiry plant with prostrate creeping and rooting hairy branches about 6 to 8 in. long. Leaves herbaceous, hairy on both sides, ovate or rhomboid-ovate acute, narrowed shortly at base, 1 in. long, .5 in. wide; petioles 1 in. long with a short oblong blunt

auricle. Stipules thin, .2 in. long, red hairy on the edges. Flowers in heads, globose, becoming oblong, .25 in. long, on slender hairy peduncles 2 in. long. Basal bracts lanceolate, glabrous, with a green keel. Perianth lobes lanceolate acute, pink. Nut small trigonous. *Hab.* Perak, Thaiping Hills (Burkill 12,967). *Distrib.* Himalayas, Assam.

Probably an accidental introduction.

ORDER CXIV. NEPENTHACEÆ.

*Vol. iii. p. 24, after sp. 7, Nepenthes Macfarlanei* Hemsl., insert :—

(7A) *N. angustifolia* Mast. *Gard. Chron.* ii. 524; *Macfarlane, Pflanzenreich*, iv. iii. 59.

A long slender creeping plant, stem 3 to 5 ft. long, trigonous winged. Leaves sub-coriaceous linear-lanceolate sessile, base amplexicaul, tip narrowed to a long cirrus; 4 in. long, .5 in. wide, cirrus 3 in. long. Pitchers 6 or more together in whorls on the creeping bare part of the stem, 3 in. apart, cylindric dilate at base, 1.5 in. long, green, minutely spotted red; petioles 1 in. long or less; keels fimbriate with long hairs; peristome narrow, finely ribbed; operculum cordate-orbicular, glabrous outside, inside a few large scattered glands, .25 in. wide, spur short simple or 2- or 3-fid and ciliate. Flowers and fruit unknown. *Hab.* Rare, Selangor, Rantau Panjang (Kloss). *Distrib.* Borneo.

As this is only known from the vegetative organs, I am suspicious that it is a young prostrate form of one of the lowland species.

ORDER CXV. PIPERACEÆ.

*Vol. iii. p. 27, after sp. 6, Peperomia kotana* C.DC., insert :—

(7) *P. decumbens* C.DC. *Journ. Linn. Soc.* xlii. 128.

Creeping, ascending branched herb, 6 in. tall or more, stems slender, densely pubescent. Leaves alternate, fleshy, thin, densely hairy pubescent, elliptic, narrowed to the tip, base narrowed acuminate or occasionally rounded or leaves rhomboid, nerves 3, usually very inconspicuous or quite invisible; 1 to 1.25 in. long, .5 in. wide; petioles slender, .25 in. long, densely pubescent. Spikes few, subterminal, very slender, 2 in. long; peduncle .25 in. long. Bracts peltate, shortly stalked. Stamens, filaments fairly long; anthers elliptic. Ovary minute globose, glabrous, sunk in rhachis. Stigma very small. Drupe globose, rough, very small. *Hab.* Lankawi, Gunong Raya (Haniff and Nur 7188). *Distrib.* Borneo, on Mount Kinabalu.

This plant exactly resembles the Kinabalu plant, but is more densely hairy.

*Vol. iii. p. 31, after sp. 4, Piper pachyphyllum* Hook. fil., insert :—

(4A). *P. venosum* Ridl.

Scandent glabrous, internodes 1.5 to 3 in. long, longitudinally striate. Leaves coriaceous ovate acute, base rounded, inæquilateral,

nerves 5, prominent beneath, with a finer pair from the base, upper pair joined to the midrib  $\cdot 25$  in. from the base, transverse nervules distant, those from outer nerves inarching; 5 in. long, 3 in. wide; petioles  $\cdot 25$  in. long. Male spikes not seen. Female spikes in flower slender filiform, 1 in. long, in fruit 2 in. long; peduncle 1 in. long. Bracts cup-shaped, sunk in hairy rachis. Ovary oblong; stigmas 4, rather large, thick. Drupe oblong, sessile,  $\cdot 1$  in. long, crowned by stigmas. *Hab.* On a tree, Negri Sembilan, Gunong Angsi, West side (Burkill 11,510).

Allied to *P. pachyphyllum*, but with thinner leaves and conspicuous elevate nerves.

*Vol. iii. p. 39, after sp. 30, Piper lanatum, Roxb., insert:—*

(30A) **P. Lowong** *Bl. in Verh. Batav. Genootschap. i. 161; Enum. Pl. Javae fasc. i. 72. Cubeba Lowong Miq. Comm. Phyt. 33; Syst. Piperaceae, 296.*

Glabrous climber, branches slender, zigzag. Leaves rather fleshy, ovate acuminate, base rounded sometimes cordate, upper leaves more lanceolate and slightly narrowed to the base, nerves from base 5, secondary nerves from midrib 3 pairs inarching with the main nerves; 4 in. long, 3.5 in. wide; petioles  $\cdot 5$  in. long. Stipules opposite the leaves, lanceolate. Spikes, male unknown. Female cylindrical in fruit, 1 to 1.75 in. long, deflexed. Bracts oblong-blunt. Ovary oblong. Stigmas 4 or 5, recurved. Drupes red, ovate or ovate globose, shortly apiculate,  $\cdot 1$  in. long; pedicels as long. *Hab.* Perak, Temengoh (Ridley 14,498). Lankawi, Gunong Raya (Haniff). *Distrib.* Java.

This is nearly allied to *P. caninum*, but the leaves are larger and broadly rounded at the base. Miquel's variety *quintuplinervis*, based on Penang, Wallich, 6647 is *P. lanata*, Roxb.

*Vol. iii. p. 39, sp. 31, Piper febrifugum, C. DC., note:—*

Delete locality Perak, Ulu Batang Padang this plant being *P. subgrande*, Ridl., and add, Kluang forest (Holtum).

*Vol. iii. p. 40, after sp. 34, Piper chaba Hunter, insert:—*

(34A) **P. officinarum** *C. DC. Prodr. xvi. 356; P. Chaba Bl. in Verh. Bat. Genootsch. xi. 168; Enum Pl. Jav. i. 66 (not of Hunter nor Roxburgh).*

Shrubby scandent, branched, glabrous. Leaves membranous lanceolate acuminate, base narrowed blunt inæquilateral, nerves slender inconspicuous, 5 from the midrib; 4.5 in. long, 1.5 in. wide; petioles  $\cdot 15$  in. long. Male spikes cylindrical,  $\cdot 5$  in. long, on a peduncle  $\cdot 5$  in. long. Bracts peltate with red glands on the edge. Stamens 2. Female spikes 1.25 to 1.5 in. long, conic cylindrical or oval,  $\cdot 15$  in. thick. Stigmas 3, minute. Drupes red, fleshy, obovate, angular, projecting through the bracts and crowned by the remains of the stigmas. *Hab.* In coast scrub, Johor, Pulau Tinggi (Burkill 851). Malacca (Maingay and Griffith). *Distrib.* Java, Sumatra, Borneo, Philippines.

*Vol. iii. p. 41, after sp. 38, Piper boehmerianum Wall., insert :—*  
 (38A) **P. subgrande** Ridl.

Climber, branches rather stout, woody, swollen at the nodes, internodes 1 in. long. Leaves glabrous ovate-oblong to ovate acuminate, base rounded unequally bilobed, nerves 5 pairs, from the midrib, strongly elevate beneath and decurrent on the midrib, transverse nervules conspicuous; 9 in. long, 5 in. wide; petioles .25 in. long. Male spikes filiform, 11 in. long, .05 in. thick. Bracts peltate pedicellate, margins excised. Stamens 2 to 4; anthers large. Female spikes unknown. *Hab.* Dense forest Perak, Ulu Batang Padang (Ridley 14,013).

Allied to *P. majusculum*, Bl., but with narrower oblong leaves, short petiole and very slender male spike.

*Vol. iii. p. 43, after sp. 43, Piper rufispicum C.DC., insert :—*  
 (43A) **P. uncinulatum** Ridl. *Journ. Bot.* 1924, p. 300.

Shrubby glabrous apparently scandent. Leaves coriaceous ovate acute, base rounded, lobes slightly unequal round, nerves 6 from base, prominent, with 2 more obscure close to the edge, transverse nervules sub-parallel; 2 to 2.5 in. long, 1.75 to 2 in. wide; petioles 1 in. long. Male flowers not seen. Female spike 1.5 in. long, thick; peduncle .25 in. long. Bracts round, densely woolly on the edges. Ovary deep sunk. Style long, projecting. Stigmas 4 or 5 recurved. Fruit unknown. *Hab.* Pahang, Fraser Hill at 3000 ft. altitude (Holtum).

#### ORDER CXIX. LAURINEÆ.

*Vol. iii. p. 86, sp. 11, Beilschmiedia penangiana Gamble, note :—*

A specimen of what I take to be this species in fruit was obtained in Kelantan at Kwala Rek by Haniff and Nur, No. 10,182. The species was only known hitherto from Curtis' Penang specimen 1098, which is in flower. The Kelantan specimen is described as from a bush 10 to 15 ft. tall. The fruiting racemes are .5 in. long, the round boat-shaped bracts persistent on the peduncle. The fruit is ellipsoid, nearly .5 in. long (not quite ripe), borne on a thick pedicel .25 in. long, and surrounded at the base by the withered sepals.

*Vol. iii. p. 87, after sp. 2, Dehaasia cuneata Bl., insert :—*  
 (2A) **D. elliptica** Ridl.

Medium-sized tree. Leaves thinly coriaceous, drying black, slightly glaucescent beneath, elliptic sub-acute or blunt, base cuneate; nerves elevate beneath, 7 to 9 pairs, slender, reticulations wide; 6 to 6.5 in. long, 2.25 to 3 in. wide; petioles 1.5 in. long. Panicles terminal of numerous branches 3 to 4 in. long, forming a head 4 in. across, upper parts puberulous. Flowers small, .05 in. across, in cymes on the ends of short branchlets. Perianth lobes 6, pubescent, margins ciliate, outer whorl nearly as large as inner whorl, rounded. Stamens 9, 2-celled, oblong, hairy, first row less hairy

than row two, row three shorter with oblong glabrous glands, row four minute. Ovary ovoid, narrowed to a short style, glabrous; stigma orbicular. Drupe pyriform, 2 in. long when dry, swollen peduncle 1 in. long. *Hab.* Selangor, Kwala Lumpur, Lake club gardens (Foxworthy 4706); Klang, Bukit Cheraka (Foxworthy 3462).

A specimen of what appears to be this plant from the lake club gardens, Carcosa, has larger leaves, one 9 in. long, and 4 in. wide. The names Medang Kunyit and Medang burung are given for it, but these names are common to other species of *Laurineæ*.

*Vol. iii. p. 116, after sp. 7, Litsea firma* Hook. fil., insert :—

(7A) *L. terminalis* Ridl.

Shrub 4 to 5 ft. tall. Leaves coriaceous elliptic blunt acuminate, base blunt or shortly narrowed, above glabrous, finely reticulate, midrib sunk beneath, nerves 15 pairs and wider reticulations, elevate pubescent; 3 to 3.5 in. long, 1.25 to 1.75 in. wide; petioles .5 in. long, pubescent, hairy when young. Male flower heads 3, sessile, terminal, .25 in. wide. Bracts round silky hairy, oblong, edges long-hairy. Flowers about 5, pedicels silky hairy, lobes 3 lanceolate acute, one broader obovate, as long as petals, silky on the back. Stamens 9, filaments filiform glabrous; anthers 4-celled. Glands large reniform, stalked. *Hab.* Mountains at 5300 ft., altitude, Perak, Gunong Inas (Yapp 494).

This plant was not taken up by Gamble in the *Materials*, but he notes on the specimen that it is near *L. firma*, Hook. fil. It chiefly differs from that species in its sessile terminal flowers, shorter and broader leaves, and in the glabrous stamens.

*Vol. iii. p. 117, sp. 8, Litsea gracilis* Gamble, note :—

Add locality Pahang, Kwantan (Foxworthy's collector). *Native name* : Medang Ringan.

*Vol. iii. p. 134, sp. 2, Lindera selangorensis* Ridl., note :—

A specimen of this species in fruit was sent from Fraser Hill in Pahang, the northern end of the Semangkok Pass, by Burkill (11,003). The collector describes it here as a shrub. The drupes are oblong, rounded at the end, .3 in. long, borne on a short thick swollen peduncle .2 in. long, enlarged upwards and ending in a cup, one to three of these are borne on peduncles .75 to 1 in. long. The leaves in this specimen are rather larger than in most forms, being 7 in. long and nearly 3 in. across, with long cuspidate points.

(3) *L. Wrayi* Gamble. This has also been collected on Fraser Hill by Burkill.

#### ORDER CXXIV. LORANTHACEÆ.

*Vol. iii. p. 151, after sp. 1, Loranthus pulcher* DC., insert :—

(1A) *L. validus* Ridl.

Branches very stout. Leaves coriaceous lanceolate-oblong, base very shortly cuneate, nerves 4 pairs, obscure; 9 in. long, 2.5 in.

wide; petioles thick, 1.25 in. long. Spikes in fruit very stout, 18 in. long. Flowers numerous sub-whorled, sessile. Bract ovate acute. Calyx-tube thick cylindrical conoid, not ribbed, when dry .2 in. long. Corolla .5 in. long, lobed for half its length, lobes linear, reflexed in flower. Stamens nearly as long; filaments linear, dilate towards the tip; anthers oblong. Style little longer than corolla-tube. Fruit conic-cylindric, .2 in. long, smooth. *Hab.* Perak, Grit (Burkill 12,450).

Allied to *L. pulcher* and to *L. Lydenianus*, Zoll. of Java and Sumatra. The leaves are much larger than those of *L. pulcher*, and more resemble in texture those of *L. Lydenianus*, the flowers are twice as big as those of *L. pulcher* and as big as in *L. Lydenianus*, but they are sessile and the corolla is smooth and reddish, not dark and ribbed as in the other two species.

## ORDER CXXVIII. EUPHORBIAEÆ.

*Vol. iii. p. 181, sp. 2, Euphorbia synadenium* Ridl., *add locality* :—

Perak, Lubok Merbau (Nur).

*Vol. iii. p. 181, after sp. 4, Euphorbia Atoto* Forst., *insert* :—

(4A) *E. hypericifolia* Linn. *Hort. Cliff.* 198; *Hook. fil. F.B.I.* v. 249; *Exot. Flora*, i. t. 36.

Weedy herb 1 ft. tall, glabrous, erect. Leaves opposite, obliquely oblong blunt entire (or serrulate), base round, nerves 1 pair; .5 in. long, .1 in. wide; petioles very short. Cymes many-flowered, .25 in. long, axillary. Bracts subulate. Involucres minute, glands shortly stipitate, lobes longer; limb of involucre white or pale pink. Styles very short. Capsule subglobose. Cocci hardly keeled. *Hab.* Roadsides, Malacca (Ridley). Kedah, Alor Sta (Burkill). *Distrib.* Tropics generally except Australia and Polynesia. *Vol. iii. p. 246, after sp. 9, Baccaurea reticulata* Hook. *fil.*, *insert* :—

(9A) *B. velutina* Ridl. *Journ. Bot.* 1924, p. 300.

Tree 30 to 40 ft. tall, branches velvety. Leaves coriaceous ovate cuspidate, base round, quite glabrous except nerves elevated beneath and midrib velvety, transverse nervules distinct, sub-parallel; 7 in. long, 4 in. wide; petioles 1.75 to 2.5 in. long, velvety. Panicles 2.75 in. long, velvety all over. Bracts large ovate, basal one .2 in. long, floral bracts ovate blunt. Male flowers .1 in. long, deep yellow. Sepals ovate-oblong blunt, velvety hairy on both sides. Stamens glabrous, filaments very short, anther-cells elliptic-globose. Female flowers and fruit unknown. *Hab.* Mountain forests, Selangor, Semangkok Pass (Ridley, 15,692). Pahang, Fraser Hill at 4000 ft. altitude (Burkill 11,319) *Native name* : Tampoi Tungau.

Allied to *B. reticulata* but very much larger in all parts, and velvety all over.



Vol. iii. p. 251, after sp. 1. **Scortechinia Kingii** Hook. fil., insert:—

(2) **S. paniculata** Ridl.

Tree; leaves coriaceous oblong, base round with two glands very shortly acuminate, margins crenulate serrate, nerves elevate strongly beneath, inarching, 10 pairs; 6 to 9 in. long, 3 to 4 in. wide; petioles 2 in. long. Panicle terminal, 3 in. long, 4 in. wide, pubescent. Bracts ovate acute, minute, persistent. Flowers numerous, minute, .05 in. across; pedicels shorter. Sepals 5, ovate round, glabrous, imbricate. Stamens 5, shorter, filaments hairy; anthers globose, 4-lobed, glabrous, introrse. Ovary cylindrical, hairy; style short thick; stigma capitate, hairy, 2-lobed. *Hab.* Pahang, Sungei Yong, Kwala Lipis (Foxworthy's collector 4035). *Native name*: Perupoh jantan.

This species differs from *S. Kingii* Hook. fil., in its much larger leaves rounded at the base with two glands, as in the imperfectly known *S. nicobarica*, Kurz, of the Nicobars, and also in the terminal panicle. The stamens are 5 in number and short, but as the specimen has a distinctly developed ovary it appears to be a female plant.

The genus *Scortechinia* of 4 or 5 species, all rather imperfectly known, does not appear to belong to the *Euphorbiaceae*. The unisexuality and want of petals in the flowers, the 4-lobed anthers, and presence of glands at the base of the leaf being the only characters in common with that Order, but it is very difficult to place it in any other.

*Baliospermum malayanum* Hook. fil., p. 313, seems to belong to the same genus and resembles no other species of *Baliospermum*. I therefore transfer it to the genus under the name *Scortechinia malayana*, Ridl.

Vol. iii. p. 260, after sp. 2, **Croton argyratum** Bl., insert:—

(2A) **C. macrocarpa** Ridl.

Small tree 15 ft. tall, bark pale, branches densely covered with stellate hairs, 4-angled. Leaves thin herbaceous, oblanceolate cuspidate acute, base long-narrowed, glabrous above, sparsely hairy beneath, midrib and 13 pairs of straight parallel nerves hairy, edges glandular denticulate; 7 to 8 in. long, 2.5 to 3 in. wide; petioles 4 in. long, hairy. Raceme terminal, over 6 in. long, 4-angled, hairy. Flowers not seen. Fruit oblong triquetrous, angles rounded, top depressed, pubescent, .5 in. long and a little wider. Styles 3. Sepals ovate, glabrous; pedicel .25 in. long, hairy. *Hab.* Selangor, Telok forest reserve, Klang (Burkill 6519). Vol. iii. p. 261, to sp. 3, **Croton erythrostachys** Hook. fil., add locality:—

Negri Sembilan, Gunong Angsi at 2500 ft. altitude (Nur). The form here seems much bigger than the Mt. Ophir plant. It is described as 3 to 6 ft. tall, and has leaves 6 in. long and 3 in. wide, and racemes .5 in. long.

*Vol. iii. p. 274, sp. 3, Acalypha siamensis Gage, add :—*

*Syn. A. sphenophylla Pax and Hoffmann, Pflanzenreich, lv. 147, p. 110.*

*Vol. iii. p. 291, after sp. 17, Mallotus Griffithianus Hook. fil., insert :—*

*(17A) M. auriculatus Merrill, Philip. Journ. Sci. vii. c. 396; Pax. Pflanzenreich, Euphorb. Acalyph. 194.*

Shrub or tree; branches slender. Leaves alternate, thinly coriaceous, lanceolate cuspidate-acuminate, base narrowed, auriculate cordate, margin entire undulate, glabrous except the midrib and nerves, nerves 7 pairs, stiffly shortly hairy beneath; 5 in. long, 2.25 to 2.75 in. wide; petioles slender, hairy, 1 in. long. Male flowers unknown. Female racemes axillary slender, 3 in. long, hairy. Bracts linear acute reflexed; pedicels .05 in. long. Sepals in fruit 5, ovate-triangular acute. Ovary covered with soft spines, shortly covered with hairs. Capsule 2-coccos, .25 in. long, pubescent and covered with short straight spines, light brown. Seed pea-shaped, .2 in. through, smooth, chestnut brown. *Hab.* Pahang, Ulu, Chineras, Kwala Lipis (Burkill 15,668). *Distrib.* Philippines. *Vol. iii. p. 292, sp. 19, Mallotus philippinensis Muell Arg, add locality :—*

Perak, Padang Rengas (Burkill).

*Vol. iii. p. 304, after sp. 19, Macaranga Lowii King, insert :—*

*(19A) M. Brandisii King in Hook. fil. F.B.I. v. 453; Pax Pflanzenreich, lv. 147, p. 365.*

Small tree 20 ft. tall, glabrous. Leaves thinly coriaceous, alternate, elliptic-lanceolate caudate-acuminate, base very shortly narrowed or rounded, nerves 8 pairs, slender; 3 to 6 in. long, 1.5 to 2.5 in. wide; petioles slender, 1 in. long. Stipules setaceous bristly at the tip, .1 in. long. Male flowers unknown. Females two or more on a peduncle 1 to 4 in. long, axillary. Bracts .5 to 1.5 in. long, ovate to lanceolate, black dotted. Sepals 4, ovate. Capsule didymous, glandular, smooth, lobes globose or with a few bristles, .5 to .75 in. wide. Seeds globose smooth, brown. *Hab.* Kedah, Peak at 2500 to 3200 ft. altitude (Robinson 6129). *Distrib.* Tenasserim.

This species is nearest to *M. Lowii*, King.

*Vol. iii. p. 312, sp. 4, Gelonium tenuifolium Ridl., add locality :—*

Pahang between Mesoh and Bukit Jeladeh (Burkill).

A shrub 6 to 8 ft. tall, fruit dark green and yellow.

#### ORDER CXXIX. URTICACEÆ.

*Vol. iii. p. 340, sp. 46, Ficus cuspidata Reinw. dt., note :—*

The typical form of this plant with the entire leaves has been obtained on the Thaiping Hills, Perak at 3000 ft. altitude by Haniff. The plant is described as a shrub 6 to 8 ft. tall, the leaves quite entire, lanceolate, with a very long narrow cusp, 1 in. long, .05 in.

wide, the body of the leaf being 4.75 in. long. Besides Sumatra and Java, where it is common, it occurs in Borneo.

*Vol. iii. p. 342, after sp. 49, Ficus Miquelii Hook. fil., insert :—*

(49A) **F. staphylosyce** Ridl. *Journ. Bot.* 1924, p. 301.

Tree, branchlets with appressed hairs. Leaves thin lanceolate acuminate, tip cuspidate blunt, base long narrowed, nerves slender, 5 pairs, midrib beneath covered with appressed hairs; 4 in. long, 1.1 in. wide; petioles slender, .2 in. long. Figs in distant clusters on the stem on tubercles; peduncles slender, hairy, nearly 1 in. long, with 2 or more short ovate acute bracts near the top. Figs hairy, obovate, green, .3 in. long. Mouth bracts at exterior ovate acute, interior longer. Male flowers and gall flowers not seen. Female flowers, ovary oblique obovoid stalked, no perianth. Style lateral, hairy at the top. *Hab.* Negri Sembilan, Gunong Angsi at 2000 ft. altitude (Burkill 11,599).

Allied to *F. Miquelii* but the figs are very small, and the leaves very narrow.

*Vol. iii. p. 343, sp. 53, Ficus Scortechinii King, add locality :—*

Johor, Pulau Tinggi (Burkill).

*Vol. iii. p. 347, after sp. 65, Ficus diversifolia Bl., insert :—*

(65A) **F. Motleyana** Miq. in *Ann. Mus. Lugd. Bat.* iii. 288, 294; *King, Ann. Bot. Gard. Calc.* i. 2, 158, pl. 202.

Shrub 6 to 12 ft. tall, glabrous. Leaves sub-coriaceous oblong, lanceolate or oblanceolate, shortly pointed or quite round and broad at the tip; midrib simple or forked at the tip, when forked one side of the tip often prolonged into a point, nerves fine, about 4 pairs, not elevate; 2 to 4 in. long, 1 to 1.75 in. wide; petioles .25 in. long. Figs ovoid, in axillary pairs, pink, umbilicus prominent, base often narrowed; pedicels .25 in. long. Bracts 3, ovate. Male flowers in the upper half nearly sessile. Sepals 3, stamens 2, anthers broad, ovate. Gall flowers in lower half, pedicelled. Achene oblique ovoid-rhomboid becoming reniform when fully ripe. Style short. *Hab.* Mountains, Kelantan, summit of Gunong Sitong at 3000 ft. altitude (Foxworthy and Nur 12,209). *Distrib.* Borneo.

As King points out, this plant is very near *F. diversifolia*, Bl., of which it may be another form, and it is especially near the var. *lutescens*. In the upper part of the shoots the outer bark is thin and papery and light brown, and flakes off in transverse bars, a ridge runs down on each side of the stem from one leaf base to the lower one, with two more less elevate ones, making the stem nearly four-angled. These characters occur in all specimens of *F. Motleyana* I have seen but are absent from the typical forms of *F. diversifolia*.

*Vol. iii. p. 348, after sp. 70, Ficus patens Ridl., insert :—*

(70A) **F. toxicaria** Linn. *Mantiss.* 305; *Miq. Flor. Ned. Ind.* I. ii. 293, t. xx.

Low tree, branches thick, young shoots orange-hairy. Leaves

(young) 5- or 6-lobed, palmate, 6 in. long and as wide, hairy above, white silky-hairy beneath, nerves and nervules orange-hairy; (adult) ovate cordate entire serrulate thickly membranous, above glabrous, beneath white-felted; nerves one basal pair with about 6 nervules running to the edge, midrib thick, with 5 pairs of nerves; 9 in. long, 6 in. wide; petioles stout, 3 in. long. Figs globose, white-hairy, .5 to 1.5 in. through, sessile or on a stout densely hairy peduncle, with several ovate hairy bracts at base. Male flowers stalked, of 4 ovate sepals; anthers 2, sessile. Female flowers stalked, of 5 linear-lanceolate dark purple sepals. Ovary pyriform. Style lateral, large; stigma cup-shaped. *Hab.* Negri Sembilan, Triang (Foxworthy). *Native name* : Ara Laut. *Distrib.* Sumatra, Java.

*Vol. iii. p. 350, after sp. 79, Ficus pomifera Wall., insert :—*

(79A) **F. variegata** *Rl. Bijdr.* 459; *King, Ann. Bot. Gard. Calc. i. (2) 169.*

A bush 10 ft. tall, to a spreading tree 20 to 30 ft. tall; shoots hairy (or glabrous). Leaves thinly coriaceous, ovate or ovate-elliptic acuminate, base round or cordate, edges entire or crenulate denticulate; nerves 4 to 8 pairs, hairy beneath in young leaves as is the midrib, glabrous above; 4 to 7 in. long, 3 to 4 wide; petioles .75 to 2 in. long, hairy. Figs in fascicles, three or four together on branches or trunk, ochre bronze or green with white spots, eventually red with white spots and streaks, pyriform, 1 in. long and as thick, apex depressed. Umbilicus large. Main peduncle .5 in. long. Secondary peduncle 1.5 in. long. Bracts 2, ovate acute, below the fig. Male flowers near the mouth. Sepals 3 or 4, broad. Anthers 2, broadly ovate; filaments united at base. Gall-flowers in the same fig, perianth tubular 4- or 5-toothed. Ovary ovoid. Style lateral. Stigma large, funnel-shaped. Female flowers in separate figs. Sepals thin, lanceolate. Achene obovoid, minutely tuberculate. Style lateral. Stigma clubbed. *Hab.* Perak, Grit (Burkill). *Distrib.* Assam, Malay islands and Hongkong.

*Vol. iii. p. 354, after sp. 9, Artocarpus Maingayi King, insert :—*

(9A) **A. kemando** *Miq. Fl. Ind. Bat. Supp.* 418.

Tree, branches rather slender, covered when young with appressed hairs. Leaves thinly coriaceous, rather abruptly acuminate, tip blunt, base shortly narrowed, blunt, edges undulate, above glabrous, smooth, beneath minutely dotted, with 12 pairs of nerves inarching at the tips, elevate with the midrib appressed, hairy; 4 to 4.5 in. long, 2 to 2.5 in. wide; petioles .5 in. long, slender, appressed, hairy. Male spikes cylindric, 2 in. long, .15 in. through, puberulous. Peduncle .2 to .3 in. long, densely appressed, red-hairy. Female spikes oblong blunt pubescent. Pistils shortly conoid at the tips, .5 in. long, .3 in. wide, on a hairy peduncle .5 in. long, in fruit .75 in. long, .6 in. wide, conoid-oblong velvety. Seeds

·1 in. long. *Hab.* Pahang, Lubok Tandok, Temerloh (Foxworthy); Perak, Grit (Burkill). *Native name*: Pudu. *Distrib.* Sumatra, Borneo.

This form hardly differs from *A. Maingayi*, King, except in the rather thinner pointed leaves, and Beccari combines the two, but the leaves of typical *Maingayi* are conspicuously rounded. It would probably be best to make *A. Maingayi* a variety of *A. Kemandu*, Miq.

*Vol. iii. p. 354, Puda, last line, should be Pudu.*

#### ORDER CXXXIII. CUPULIFERÆ.

*Vol. iii. p. 373, sp. 3, Quercus turbinata Bl., note*:—

Additional specimens from Bukit Tangga, Negri Sembilan, collected by Nur, show the female flowers which have not been described. They are borne in the upper axils of the young velvety shoots, the male spikes, 1 in. long, are in the lower axils. The female flowers are 2 to 4 together densely clustered in a head on a short woolly peduncle. The styles, 3 or 4, are glabrous, short and thick and curved with thick reniform stigmas. I find 12 stamens in the male flowers, not 6 only as given by Gamble, but the flowers perhaps vary in this. The tree is described as being 40 to 50 ft. tall. The specimens quite resemble those of Penang, and allowing for slight variations, the *Q. turbinata* of Java, Sumatra and Borneo. The acorn cups in Wray's plant, the type of the var. *crassilamellata* Gamble, are certainly thicker and with rather broader rings than in the Javanese specimens, although the acorns are still young. The acorns in the Javanese specimens are oblong-ovoid, smooth, shining, brown, 1 in. long, and ·5 in. through.

*Vol. iii. p. 381, after sp. 16, Pasania Bennettii Gamble, insert*:—

(16A) *P. erythrocarpa* Ridl. *Journ. Bot.* 1924, p. 301.

Tree about 30 or 40 ft. tall, branches stout. Leaves stiffly coriaceous elliptic-lanceolate acuminate acute, base shortly cuneate; midrib strongly elevate on both sides, nerves 12 pairs, elevate beneath, nervules inconspicuous parallel; 9 in. long, 3 in. wide; petioles stout, ·5 in. long. Flowers not seen. Fruit spikes stout, 6 in. long; fruits closely clustered in threes when young, subglobose, sessile, thickly muriculate with short scale tips; in adult, cup round, dilated towards the base and narrowed in at the top, sessile, rough but rings 10 and scales inconspicuous, ·75 in. long and as wide, ·25 in. deep. Acorn oblong-conoid, tip blunt, dark red, minutely scurfy, nearly 1 in. long, ·5 in. wide at base, base excavate; umbo small. *Hab.* Negri Sembilan, Gunong Angsi near the bungalow at 2700 ft. altitude (Mohammed Nur, comm. Burkill 11,652).

This fine tree in some respects resembles *P. spicata*, but as the scales are united in inconspicuous rings belongs rather to the section *Cyclobalamus* and would be put next to *P. Bennettii*. In each cluster of flowers only one fruit is developed.

## ORDER CXXVI. ORCHIDEÆ.

*Vol. iv. p. 15, after sp. 10, Oberonia anceps Lindl., insert :—*

(10A) **O. fungum-olens** *Burkill, Gardens Bulletin, iii. 292, with figure.*

Caulicent, stems very numerous, pendent 5 to 10 in. long. Leaves about 15 to a stem, broad, thin lanceolate-oblong, tips rounded amplexicaul, 1.5 to 2 in. long, .5 in. wide. Spike dense cylindrical, 4 in. long; rhachis puberulous. Flowers small, in dense crowded whorls, dusky yellowish. Bracts lanceolate acute, longer than the ovary and pedicel. Sepals, upper ones sub-orbicular, minutely puberulous, lateral ones broadly ovate, blunt puberulous. Petals elliptic blunt, slightly smaller, glabrous. Lip obovate, bilobed, lobes sub-quadrate rounded, auricles erect, rounded at tips. Column minute, green, arms incurved. *Hab.* Perak. Base of the hills at Tanjong Malim; cultivated in the Singapore Botanic Gardens (Burkill).

*Vol. iv. p. 22, after sp. 11, Liparis lacerata Ridl., insert :—*

(22A) **L. bootanensis** *Griff. Notulæ, iii. 278; Itin. Notes 98; Ic. Pl. As. t. 287; Hook. fil. F.B.I. v. 700. L. lancifolia Hook. fil. Ic. Pl. 1855; F.B.I. v. 700.*

Pseudobulbs close-set, oblong, .5 to 1.5 in. long. Leaf solitary lanceolate acuminate, strongly 3-nerved, acute acuminate, narrowed gradually into petiole; 6 to 8 in. long, .5 to .75 in. wide; petioles .5 to 1 in. long. Raceme lax, 6 in. long; flowers distant, yellow, .25 in. wide. Bracts linear-lanceolate acuminate, .15 in. long. Pedicels slender, .25 in. long. Sepals linear-oblong blunt. Petals narrow linear. Lip obovate rounded entire, keels 2 on the claw, elevate thick. Column arched, rather long, wings decurved at the top. Capsule pear-shaped, .25 to .5 in. long. *Hab.* Lankawi, Gunong Raya (Haniff and Nur 7111). *Distrib.* Himalayas, Bootan, Siam.

*Vol. iv. p. 39, after sp. 18, Dendrobium flexile Ridl., insert :—*

(18A) **D. albicolor** *Ridl. Journ. Linn. Soc. 32, p. 250; Burkill, Gardens Bulletin iii. 294, with figures.*

Stems 8 in. long or less, often branched, bases bare of fallen leaves. Leaves thick, terete acute, dark green, 1 to 1.5 in. long. Flowers solitary, terminal, white; pedicels nearly 1.5 in. long. Upper sepal small oblong blunt, lateral ones much larger. Mentum as long, curved, blunt. Petals narrower, linear-oblong. Lip obcuneate emarginate, white, tinted yellow at base, edges crisped, central bar elevate. Column short, 1 ft. long, with or without pink spots. Stelidia erect. Anther ovoid. *Hab.* Penang, in great abundance on a Mango tree near the Waterfall Gardens (Burkill). *Distrib.* Pungah.

This is no doubt an escape from the Gardens, as Mr. Burkill suggests. Probably Mr. Curtis who had it in cultivation planted

it on a tree in the gardens and it was distributed by seed to the tree outside. As it seems to have established itself, I record it here. It has the largest flowers in the section.

*Vol. iv. p. 142, after sp. 3, Eulophia Keithii Ridl., insert:—*

(3A) *E. macrostachya* Lindl. *Gen. & Sp. Orch. Pl.* 183; *Bot. Reg. t. 1972*; *Bot. Mag. t. 6246*; *Hook. fil. F.B.I. v. 4*; *J. J. Smith Orch. Jav.* 224, pl. 146.

Pseudobulbs 3 to 5 in. long, elongate, conical. Leaves 2, from the top of the pseudobulb, 6 to 10 in. long, 3 in. wide, oblong-lanceolate acuminate, petioled. Scape lateral, 1 to 2.5 ft. tall, upper part 9 in. long, racemose; flowers scattered. Bracts lanceolate, .1 in. long; pedicel and ovary .5 in. long. Sepals lanceolate acuminate, light green or yellow. Petals similar, .25 in. long. Lip concave broad, yellow with red stripes, side-lobes blunt, curved, midlobe broad retuse with 2 rather large ovoid fleshy calli at the base; spur globose, bilobed. Column rather tall with a distinct foot. *Hab.* Woods; Perak, Jor (Haniff). *Distrib.* India, Ceylon, Sumatra, Java, Ternate.

Many years ago, about 1890, a number of plants of this orchid appeared in a secondary wood in the Gardens near the Director's house, but I believe that they originated from a plant I brought a few years before from Ceylon.

#### ORDER CXXXVII. ZINGIBERACEÆ.

*Vol. iv. p. 238, after sp. 12, Globba leucantha Miq., insert:—*

(12A) *G. flavidula* Ridl.

Leaves elliptic-oblong-lanceolate, gradually narrowed to base, with a long acuminate point, upper ones hairy on the midrib and back; lower ones quite glabrous, 7 to 13 in. long (cusp 1.5 in. long) 2.75 to 3.5 in. wide; petioles very short; ligules short ovate blunt hairy; sheath hairy. Panicle 8 in. long, base 3 in. nude, pubescent, branches 1 in. long. Flowers yellowish, solitary or paired. Floral bracts lanceolate acute, .1 in. long, caducous. Calyx campanulate, lobes 3, equal, acuminate, puberulous. Corolla-tube .1 in. long, puberulous, lobes oblong, hooded. Staminodes as long, thinner, oblong. Lip short, bifid, with blunt oblong lobes. Stamen, filament puberulous; anther oblong, spurs 2 from base spreading, linear, blunt. *Hab.* Pahang, Ulu Sungei Merapoh (Foxworthy and Nur 11,940).

Allied to *G. leucantha*, Miq., but the panicle is puberulous, the lip more deeply cut, and the calyx-lobes equal. The flowers are stated to be yellowish, an unusual character in this section.

*Vol. iv. p. 264, after sp. 8, Amomum uliginosum Koen., insert:—*

(8A) *A. rivale* Ridl.

Rhizome short, thick, covered with sheaths. Stem nearly .5 in. through at base; sheaths ribbed and cancellate. Leaves linear-oblong acuminate caudate, base cuneate, above glabrous closely striate, beneath softly hairy especially the prominent midrib;

13 in. long, 2 in. wide, setiform tail 1.5 in. long, sheath and short oblong blunt ligule softly hairy. Inflorescence obconic, 1.75 in. long, 1 in. through, on a peduncle 2 in. long, covered with oblong lanceolate blunt bracts, the upper ones striate edged with short woolly hairs. Sepals softly hairy. Corolla-tube .5 in. long, straight pubescent, lobes linear-oblong, blunt, silky outside, .4 in. long. Lip .5 in. long, base linear fleshy channelled, limb obovate-oblong entire, disc in centre papillose fleshy. Stamen, filament broad linear channelled; anther oblong, .2 in. long, crest 3-lobed, central lobe ovate acute, recurved, lateral ones short oblong erect. *Hab.* Pahang, Gorge of the Tras near Raub at 500 ft. altitude (Burkill 16,945a).

Allied to and resembling *A. uliginosum*, Koen., but differing in the softly hairy back of the leaves, the hairy-edged bracts, silky petals and the small anther crest with the central lobe ovate acute. *Vol. iv. p. 279, after sp. 2, Alpinia secundiflora Ridl., insert:—*

(2A) *A. mollissima* Ridl.

Leaves lanceolate acuminate with a sharp point, gradually narrowed to the base, densely softly hairy all over, midrib prominent, rounded at back; 15 in. long, 2 in. wide; petioles 1 in. long, hairy; ligule with 2 acute lobes, hairy, .25 in. long, sheaths hairy. Raceme .75 in. long, pubescent. Bracts linear, 1.5 in. long, hairy. Pedicels very short, hairy. Flowers 7 or more. Calyx tubular, with 3 sub-equal acute lobes, hairy, .5 in. long. Corolla-tube slender, dilate upwards, .6 in. long, glabrous, upper lobe linear, hairy at tip, .3 in. long, laterals very short, .1 in. long, blunt lanceolate, glabrous. Lip obcuneate-oblancoate, entire sub-acute, .6 in. long, .25 in. wide at upper end, glabrous. Stamen, filament hairy, .2 in. long; anther oblong, deeply marginate, hairy. Style little longer. Stigma funnel-shaped, hairy on the edge. *Hab.* Johor, Gunong Belumut, at 2300 ft. altitude (Holtum 10,838).

This plant is remarkable for the small size of the two lateral petals.

#### ORDER CXLV. DIOSCOREACEÆ.

*Vol. iv, p. 313, note:—*

#### PERIPETASMA, Ridl.

The specimens on which this genus was founded and erroneously referred by me to the order *Menispermaceæ*, vol. i. p. 103, have now proved to be the male flowers of the abnormal *Dioscorea stenomeriflora*, Prain and Burkill. This species is so aberrant that it would be advisable to separate it from the genus *Dioscorea* altogether, in which case the generic name *Peripetasma* would remain, and my description referred to its proper place and the *Dioscoreaceæ* between *Stenomeris* and *Dioscorea*. The fruit has unfortunately not been obtained, and the female flowers which I have seen are not sufficiently advanced or well preserved to decide on the number



of ovules. I think it advisable to give an amended account of the plant which should come in between *Stenomeris* and *Dioscorea* on page 313.

*Vol. iv. p. 313, after genus 2, Stenomeris, insert:—*

(2a) **PERIPETASMA**, *Ridl.*

A glabrous, half-woody climber. Leaves alternate, oblong cuspidate, thin or sub-coriaceous, base blunt or rounded; nerves 3 to 5 from base, lateral nerves from midrib, 7 or 8 pairs; petioles long, in males, shorter in females. Male inflorescence axillary, a panicle of very long racemes very numerous. Flowers scattered, pedicelled. Perianth lobes 6, lanceolate connate into a short tube. Stamens 6, shorter, incurved; anther-cells discrete sub-globose. Pistillode at base of tube, triquetrous. Female inflorescence of 1 to 3 axillary racemes. Flowers fewer and much larger than males, distant on short pedicels. Perianth-lobes fleshy, connate in a short tube. Ovary 3-winged; ovules 2 in a cell. Staminodes short; filaments fleshy, thick at the base, narrowed above; anthers abortive with the connective prolonged into a short horn. Style short and thick. Stigmas 3, forked, with a pair of fleshy curved arms to each. Fruit unknown.

(1) **P. polyanthum** *Ridl. Journ. Bot. 1920, p. 147; Flora Malay Pen. i. 103. Dioscorea stenomeriflora Prain & Burkill, Journ. As. Soc. Beng. n.s. x. 40; Knuth. Pflanzenreich, iv. 43, Dioscoreaceae p. 310, fig. 58 (bad); Ridl. Flora Malay Pen.; 319.*

Stem 20 to 80 ft. long, purple or green. Leaves in male thin papyraceous, 6 in. long, 2 in. wide, base blunt, narrowed entire; nerves 3 from base; petioles slender, 1.5 in. long; in female coriaceous, base cordate sagittate or rounded, entire, petioles from base 5; 3.5 to 10 in. long, 2 to 4 in. wide; petioles stout, .5 to 1 in. long. Male inflorescence panicle 1 to 3 in. long with 6 or more slender racemes 6 to 12 in. long. Flowers distant, greenish-yellow spotted, .1 in. long. Pedicels as long. Female racemes 1 to 3 in an axil, stouter, 6 in. long, yellow with red spots, tube short, 6-keeled, lobes 1 in. long. Staminodes shorter. Ovary .25 in. long, strongly 3-winged. *Hab.* Forests, Singapore, Changi, Selangor, Kwala Lumpur, Batu Tiga (*Ridley 11,934*) males. Perak, Larut Hills at 500 to 2000 ft. altitude (*Kunstler 4160, 5152, 6746*), females.

The foliage of the male plant is so different from that of the female that I should have thought they were distinct plants, but Prain and Burkill identify them as the males of the Perak plant. *Vol. iv. p. 317, sp. 11, Dioscorea Zollingeriana Ridl. (not of Kunth.) note:—*

*D. deflexa* Hook. fil., Knuth. in *Pflanzenreich*, iv. 43, *Dioscoreaceae*, points out that this name is antedated by Grisebach, and substitutes the name *D. Prainiana*, Knuth. for it, but *D. tenuifolia*, *Ridl.*, is the same plant as Hooker's *D. deflexa*, a form with thinner and probably younger leaves. This name therefore should be substituted

for *D. deflexa*, Hook. fil., and *D. Prainiana*, Knuth., added as a synonym.

*D. Zollingeriana*, Kunth, is said by Knuth to be a distinct species from *D. tenuifolia*.

*Vol. iv. p. 318, after sp. 14, Dioscorea Porteri Prain and Burkill, insert :—*

(14A) **D. Kingii** Knuth. *Pflanzenreich*, iv. 43; *Dioscoreaceæ*, p. 289.

Glabrous woody climber, stem smooth. Leaves opposite, stiffly coriaceous, oblong shortly acutely cuspidate, base blunt, shortly cuneate; nerves 7, the outer pair very slender and close to the edge, the other 5 prominent beneath, reticulations and nervules conspicuous on both sides; 4 in. long, 1.5 in. wide; petioles slender, 1.25 in. long. Male panicles 6 to 8 in. long. Spikes .75 to 1 in. long, in whorls of 5 to 8 about .75 to 1 in. apart. Flowers sessile, very small. Bracts triquetrous acute. Perianthlobes coriaceous. Stamens 6. Pistillode very minute. *Hab.* Penang at 2000 to 2500 ft. altitude, (Kunstler 1748).

Burkill notes that the leaves suggest *D. Porteri*, the inflorescence that of *D. orbiculata*.

*D. Nurii*, Knuth., and *D. Harrissii*, Knuth., *Pflanzenreich*, iv. 43, p. 352 (*Dioscoreaceæ*), are species based on leaf specimens only, collected in Penang. They are referred probably correctly by Burkill to *D. Kingii*, Knuth.

*Vol. iv. p. 319, after sp. 15, Dioscorea laurifolia Wall., insert :—*

(15A) **D. calcicola** Prain and Burkill, *Kew Bulletin*, 1925, p. 64.

Glabrous climber with slender stems. Leaves alternate or opposite, narrowly lanceolate acuminate, base cordate or rounded, 5-nerved, 4.5 to 5 in. long, .5 in. wide; petioles .5 to .75 in. long. Male flowers in compound axillary spikes, rachis angled, reddish. Sepals minute, acute. Petals shorter, obovate. Stamens 6, shorter than sepals. Female flowers similar but sepals and petals thicker. Capsules glomerate; .5 in. long, .75 in. wide, wings semicircular, on pedicels .25 in. long. Seeds thin ovate-oblong, .5 in. long, .25 in. wide. *Hab.* Kedah Peak (Haniff and Nur 5189). *Distrib.* Pungah, South Siam.

*Vol. iv. p. 319, to sp. 18, D. piscatorum Prain and Burkill, add :—*

*Kew Bull.*, 1925, p. 61, and locality-Perak, Jor (Burkill).

The flowers and fruit have not yet been obtained, so that the affinity of the plant is still doubtful.

#### ORDER CXLVII. LILIACEÆ.

*Vol. iv. p. 327, sp. 1, Chlorophytum orchidastrum Lindl.*

*note :—*

The type of this species was a West African plant to which was added later by Baker one or more Indian plants, including *C. Nimmonii* Dalz.

The plant described as *C. orchidastrum* by me, is distinct from that and apparently all other Asiatic species, and I hereby name it *Chlorophytum malayense* Ridl.

Burkill sends a fruiting specimen from Gunong Pondok in Perak, in which the leaves are more linear and long acuminate, 15 to 30 in. long and 1 to 1.5 in. wide with nerves 10 on each side of the midrib; the scape, 1 ft. tall, has 3 erect branches 5 to 6 in. long, with linear leafy bracts with a setaceous point at the base of each branch, the lowest 3 in. long and .2 in. wide at the base, the upper 2 shorter. Fruit orbicular, 3-lobed, retuse at the top, the lobes thickened at the edge on pedicels .25 to .3 in. long.

This differs in the more erect fruit spikes. The species bears some resemblance to an apparently undescribed species collected in Tonkin by Balansa, but in that plant the leaves are broader and dilated in the middle, narrowing at both ends.

## NOTE.

H. J. Lam. in *Bull. Jard. Bot. Buit.* viii. 1 (1925) publishes a long paper on Malayan Sapotaceæ received after the Supplement was in print. He separates *Bassia Motleyana* and *Payena sessilis* under the genus *Ganua* Dubard and separates *B. Motleyana* var. *Scortechinii* as a distinct species, *Ganua Scortechinii*, and adds *Ganua chrysocarpa* Dubard, a species collected at Taiping by De la Croix, and adds 2 new species of *Madhuca*, viz.

(1) *M. tomentosa* Lam. l.c. 177, pl. 40.

Leaves glabrous, oblong-ovate or ovate-lanceolate acute, base acutely acuminate, 4 to 5 in. long, 1.6 to 2.20 in. wide; petiole .5 to 1.2 in. long. Flowers in fascicles of 3 to 10; pedicels slender, puberulous. Sepals ovate acute, inner pair silky pubescent, edges scarios ciliate. Petals 8, narrow to mentose. Stamens 15 or 16; filaments flat, villous; anthers acuminate villous. *Hab.* Pahang, Temerloh (Hamid 4790). *Native name*: Nyato balok.

(2) *M. stenophylla* Lam. l.c. p. 179, fig. 50.

Leaves small, oblanceolate or obovate-lanceolate, base cuneate, minutely reticulate, base cuneate, 2 to 3.5 in. long, 1.5 to 1.75 in. wide; petioles .25 to .75 in. long. Fruit 1.3 to 1.5 long, .75 to 1 in. through; pericarp fleshy. Seed rounded at both ends. Calyx 4-lobed, lobes round, glabrous. *Hab.* Johor, Kaluang (Watson). *Distrib.* Sumatra.

(3) *M. chrysocarpa*, Ridl. *Ganua chrysocarpa* Dubard *Bull. Mus. Hist. Nat.* xiv. 407.

Leaves elliptic-oblong, 5 to 10 in. long, 1.5 to 1.6 in. wide, very coriaceous; petioles .6 to 1.5 in. long; nerves 30 to 40 pairs. Sepals 4. Corolla tube villous inside, lobes usually 7, round tips villous. Stamens 14 to 16, anthers oblong mucronate, bases cordate villous. Ovary 7-celled. Fruit golden pubescent, many seeded. Seed oblong. *Hab.* Perak, Taiping (E. de la Croix).

I have seen none of these specimens.

## NAMES OF PLANTS

THE same species of plant has among the Malays often more than one name. This is due to the fact that Malays of one locality have often a different name for a plant from those of another locality, and there are often variants also of the same name used indiscriminately. Different names are often used according to whether the speaker is thinking of the timber, the fruit or flowers, or of its resin or latex. Malays have often also a habit of turning a name round so that the second half of the word becomes the first part, as in the case of the Cashew-nut, *Gajus* (a modification of the word Cashew) being converted into *Janggus* (a phonetic form of *Jagus*). They have also a tendency to make a primitive name, for which they can find no meaning, into some word or words which conveys a meaning of some kind, thus the tree *Buchanania acuminata* is commonly known as *Otak hudang*, meaning prawn's brains, and it is explained that the reason it is so called is that the wood is red like the brains of a prawn. As a matter of fact the original name for the plant is *Katidang*; this was turned into *Katawa Hudang*, then, as this was unintelligible, *Katawa* was reversed into *Otak*, and an explanation given.

*Kayu manis*, literally sweet wood, is the name given to the spice cinnamon, though the Malays know it is a bark and not a wood, and so should be *Kulit* (bark) *manis*, if it was really meant for sweet-bark, but it appears that they first knew of it by the Arabic name *Kinamon*, *i.e.*, Chinese *amomum* (an old word for spice). This word being to them meaningless, was soon converted into *Kayu manis*, as that was translatable into sweet-wood.

To all the names of trees and erect shrubs given here is to be added the word *Poko* or tree, which comes first, *e.g.*, *Poko glam*. Climbers are called *Akar* (a word which also signifies a root). Small herbaceous grass-like plants, *Rumput*. *Lumut* (moss) is applied to a few flowering plants which have a moss-like appearance, *e.g.*, aquatic *Utricularias*. *Sakat* means epiphyte, and is often applied to orchids, though the Javanese word *Angrek* is commonly used for orchids nowadays. *Pakis* or *paku*, used for ferns, is said to refer to the nail-like circinate vernation (*Paku*, a nail), and is used for the Cycads which have a similar vernation. *Daun* signifies a leaf, and is used in a plant-name where the leaf is especially conspicuous

as Daun Low (*Hæmaria discolor*), Sir Hugh Low's leaf, because he was fond of cultivating the plant, or when the leaf is specially used as Daun Sapenoh (*Eurycles*), the leaves of which are commonly used in magic. *Bunga*, a flower, is used when the flower is especially attractive, as Bunga Kasut (*Paphiopedilum*). *Ubi*, a tuber, is used when the tuber is the most important part of the plant, as in Ubi Kentang, Potato, or Ubi Kayu (woody tuber), *i.e.*, Tapioca. *Kayu*, wood or timber, is used when the timber is especially the important part of the tree. *Bua*, fruit, is used when the fruit is conspicuous or valued; *Bua Kras*, literally, hard fruit, *Aleurites moluccanus*.

*Dammar* signifies resin, and is used in names of resinous trees, as *Dipterocarpeæ* and *Burseraceæ*. *Getah* means latex, and is commonly used without the additional use of the word *Poko* or *Akar*; thus it is common to talk of *Getah grip* to signify *Willughbeia firma*, or to say *Akar grip*, though it would probably be more correct to say *Akar Getah grip* when referring to the plant. The Malay plural is formed by repeating the singular, and in plant names it often implies that the plant in some way resembles the plant to which the singular name belongs; thus *Pisang* signifies a banana. *Pisang-pisang* is used for many *Anonaceæ* because the fruit resembles a cluster of bananas, and such a word is often shortened by contraction, as *Pepisang*, a short form of *Pisang-pisang*, *Gegrip* a contraction for *Grip-Grip*.

*Medang*, strictly speaking, corresponds to *Laurineæ*, but is applied to a number of trees which do not belong to this order, sometimes apparently because the timber is valuable and used as is that of the bigger *Laurineæ*, but there is a word *Mendong* also which means *Elæocarpus*, and this by error has become often transformed to *Medang*.

As a rule, in large or conspicuous genera the Malay names are applied to all of the genus, with often surprising accuracy, but sometimes the generic names are applied in a somewhat humorous way, as *Durian tupai* (*Commersonia echinata*), the squirrel's durian, because the bristly fruit suggests a small durian only fit for squirrels.

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