

✓ FLORA  
OF THE  
PRESIDENCY OF MADRAS

BY  
C. E. C. FISCHER  
LATE OF THE INDIAN FOREST DEPARTMENT

PART VIII  
ULMACEAE TO XYRIDACEAE.

PUBLISHED UNDER THE AUTHORITY OF THE  
SECRETARY OF STATE FOR INDIA IN COUNCIL

London

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## INTRODUCTION TO PART VIII.

IN the introduction to Part VII it was my sad duty to record the death of Mr. J. S. Gamble, C.I.E., F.R.S., the author of Parts I—VII of the 'Flora of Madras.' The publication of Part VIII by another author requires a few words of explanation.

The Secretary of State for India in Council, realising the importance of having the Flora completed, requested me to find someone competent to carry on Mr. Gamble's work, and I was fortunately able to recommend that the task should be entrusted to Mr. C. E. C. Fischer, late of the Indian Forest Service, and now Assistant for India on the Staff of the Royal Botanic Gardens, Kew.

The present part comprises the Natural Families *Ulmaceae* to *Xyridaceae*, and follows the style of the earlier parts written by Mr. Gamble, with whom Mr. Fischer had the opportunity of working at Kew in connection with Part VII.

ARTHUR W. HILL.

ROYAL BOTANIC GARDENS, KEW;  
May, 1928.

# FLORA OF MADRAS.

## Family CXXXVI. ULMACEAE.

Trees or shrubs. *Leaves* simple, alternate, bifarious, gland-dotted; stipules lateral or intrapetiolar. *Flowers* usually bisexual or polygamous, small, in axillary clusters or cymes, the ♀ sometimes solitary. *Perianth*-calycine, usually 4-5-merous, polyphyllous or gamophyllous. *Stamens* as many or twice as many as the perianth-lobes; anthers erect in bud, dehiscing laterally. *Ovary* of 2 carpels, rarely 2-celled; ovules 1 in each cell, pendulous; stigmas 2, bifid, the branches stigmatic on the inner sides; pistillode in ♂ usually present. *Fruit* indehiscent, a nut drupe or samara. *Seed* with thin testa; albumen 0 or scanty; embryo straight or curved; cotyledons flat or folded.

Flowers in clusters appearing before the leaves; fruit a samara

1. *Holoptelea*.

Flowers on the young shoots persistent; fruit a drupe:—

Flowers polygamous; perianth-lobes imbricate:—

Stipules free ..... 2. *Celtis*.

Stipules sheathing the bud, caducous ..... 3. *Gironniera*.

Flowers usually dioecious; perianth-lobes induplicate-valvate

4. *Trema*.

### 1. *Holoptelea*, Planch.

Deciduous tree. *Leaves* alternate, distichous, entire, pinninerved; stipules lateral, scarious. *Flowers* polygamous or hermaphrodite, in fascicles at the scars of the previous year's shoots, which are scaly but leafless. *Perianth* simple, calycine, 4-8-partite; lobes imbricate, often unequal. *Stamens* 4-8; filaments erect; anthers hairy. *Ovary* stipitate, compressed; ovule solitary, pendulous; style short, bifid, the arms stigmatose. *Fruit* dry, indehiscent, samaroid, flat, the wing ovate, reticulate, membranous. *Seed* flat; albumen 0; cotyledons longitudinally folded; radicle small, superior.



**HOLOPTELEA INTEGRIFOLIA**, Planch.; F. B. I. v. 481; Wt. Ic. t. 1968. *Ulmus integrifolia*, Roxb. Cor. Pl. t. 78; Bedd. Fl. t. 310.

N. Circars, in deciduous forests, common; occasional in forests in the hills of the Deccan and E. slopes of W. Gháts; low levels in Travancore.

A large deciduous tree. Bark whitish-grey with an offensive smell when freshly cut; wood light yellowish-grey, moderately hard, little used except as fuel. Vern. *Hind.* Papri; *Ur.* Daurango; *Tel.* Thapasi, Nauli; *Tam.* Aya, Ayil, Tam-bachi; *Mal.* Aval; *Kan.* Thavasai.

## 2. *Celtis*, Linn.

Trees or shrubs, sometimes evergreen. *Leaves* entire or serrate, 3-ribbed at base; stipules lateral, free. *Flowers* small polygamous, cymose, ♂ and ♀ usually at the base of the shoots, ♀ in upper axils. *Calyx*-lobes 4 or 5, imbricate. *Petals* 0. *Stamens* 4 or 5, inserted round a woolly torus. *Ovary* sessile; ovule pendulous; style-arms simple or lobed. *Fruit* a small ovoid or globose drupe; endocarp hard, smooth or rugose. *Seed* with membranous testa; albumen scanty or 0; embryo curved; cotyledons broad, inflexed flat or replicate, surrounding the upcurved radicle.

Leaves with one or more strong primary nerves above the basal ribs, membranous, very oblique, usually sharply serrate nearly to the base, acutely acuminate or caudate.....1. *tetrandra*.

Leaves without strong primary nerves above the basal ribs:—

Twigs reddish-brown, lenticellate; mature leaves chartaceous or subcoriaceous, reticulations coarse, indistinct; pubescence ferruginous; sepals eciliate.....2. *cinnamomea*.

Twigs grey-brown, not lenticellate; mature leaves rigidly coriaceous, reticulations fine, distinct; pubescence grey; sepals ciliate

## 3. *Wightii*.

1. **CELTIS TETRANDRA**, Roxb.; F. B. I. v. 482. *C. serotina*, Planch. Wt. Ic. t. 1970.

All forest Districts from 2,500–7,500 ft. The Nilgiri Elm. A handsome medium-sized tree. Bark grey; wood greyish-white, not hard; not used in South India. Vern. *Tel.* Jabjabal; *Tam.* Kuviya; *Bad.* Aduva; *P l.* Oma.

2. *CELTIS CINNAMOMEA*, Lindl.; F. B. I. v. 482. *C. trinervia*, Bedd. Fl. t. 312 (not of Roxb.).

All forest Districts from 500–4,500 ft.; common in dry forests and also at low elevations in evergreen forests; Rampa (Gamble).

A small tree. Bark pale green, covered with small lenticels; wood dull white with a small dark hard core, with a disgusting smell when freshly cut; not used except medicinally. Vern. Tel. Koti-bíra, Yemika-bíra, Kaki-mushti; Tam. Kalluviri, Pínari, Kodalimuriki; Mal. Butha.

3. *CELTIS WIGHTII*, Planch.; F. B. I. v. 483; Wt. Ic. t. 1969.

In the same localities as the last species; very similar to it and not easily distinguished from it. The same vernacular names apply.

### 3. *Gironniera*, Gaud.

Evergreen, unarmed trees or shrubs. Leaves alternate, penninerved, entire; stipules sheathing the buds, deciduous. Flowers dioecious, in axillary cymes or the ♀ solitary. Perianth simple, calycine, 5-partite, obtuse in ♂, narrower and acute in ♀. Stamens 5, filaments erect. Pistillode a tuft of hairs. Ovary glabrous; style central with 2 filiform, brown-tomentose arms. Drupe ovoid, slightly compressed, stoutly beaked, about .75 in. long including the beak. Seed subglobose; albumen 0, scanty or copious; embryo contorted.

*GIRONNIERA RETICULATA*, Thw.; F. B. I. v. 486; Bedd. Fl. t. 313.

E. and W. Gháts up to 3,000 ft. Coorg, Mysore (Meebold), hills of Vellore and Trichinopoly (Barber) and of Tinnevely and Travancore (Beddome). Not common.

A very large timber tree with buttressed base. Wood red-brown, hard, heavy, valuable for engineering (Beddome), planking, rafters, etc. Vern. Tam. Koditani.

### 4. *Trema*, Lour.

Small trees. Leaves alternate, serrate, oblique and 3-ribbed at

calycine, 4-5-partite, induplicate-valvate or subimbricate, minute in the males. *Stamens* 4-5, erect in bud; pistillode small. *Ovary* sessile; style central with 2 linear arms. *Drupe* ovoid or subglobose, usually tipped by the style. *Seed* small, testa membranous; albumen fleshy; cotyledons narrow; radicle ascending.

*TREMA ORIENTALIS*, Bl.; F. B. I. v. 484. *Celtis orientalis*, L.; Wt. Ic. t. 602 and 603. *Sponia Wightii*, Planch.; Wt. Ic. t. 1971; Bedd. Fl. t. 311.

Common in all districts in dry and evergreen forests from near sea-level to 8,000 ft. The Charcoal Tree.

A small rapid-growing tree, quickly appearing in forest clearings. Bark greyish-brown with numerous lenticels; wood light reddish-grey, soft, excellent for charcoal for gunpowder, otherwise useless. The tree is useful for the rapid reclothing of cut-over areas and as a shade-plant. Vern. *Ur.* Jivani; *Tel.* Gada-nelli; *Tam.* Ambaratthi, Oman, Mudalei, Mini, Yerralai; *Mal.* Ratthi, Arni, Amathalai; *Kan.* Gurklu; *Bad.* Womai.

#### Family CXXXVII. CANNABINACEAE.

Shrubs or herbs, sometimes climbing, often aromatic. *Leaves* opposite and alternate, palmately nerved or palmately compound; stipules free, persistent. *Flowers* dioecious, axillary, males cymose or paniced, females in small cymes or heads with large bracts. *Perianth* inferior, 5-sepalous, imbricate in the males, reduced and entire in the females. *Stamens* 5, erect in bud. *Pistillode* 0. *Ovary* sessile, 1-celled, 1-ovuled; stigmas 2, large, feathery. *Fruit* an achene. *Seed* pendulous; embryo curved or spiral.

#### *Cannabis*, Tourn.

Erect herbs. *Leaves* usually opposite below and alternate above, upper palmately 3-1 foliate, passing into bracts, lower 3-8 foliate, serrate. ♂ *flowers* in short pendulous cymose panicles; ♀ crowded with leafy bracts, perianth 0 or hyaline. *Style* arms 2, filiform, caducous. *Achene* compressed, crustaceous. *Seed* flattened, albumen unilateral.

*CANNABIS SATIVA*, Linn.; F. B. I. v. 487.

Not indigenous but occasionally cultivated. *Pulneys* (Bourne). The Hemp Plant.

A large aromatic resinous herb. Not grown for its fibre in tropical regions but as the source of the drugs *Ganja* and *Bhang*. Vern. *Hind.* Ganja, Bhang, Charas, Siddhi; *Tel.* Ganjari-chettu, Ganja-chettu, Bangi-aku; *Tam.* Ganja-chedi; *Mal.* Kancháva-chetti; *Kan.* Bhangígida.

### Family CXXXVIII. MORACEAE.

Trees, shrubs or herbs, often with milky juice. *Leaves* usually alternate, rarely opposite, simple, frequently dotted (cystoliths); stipules deciduous, often sheathing and leaving an annular scar. *Flowers* small, monoecious or dioecious, usually cymose but sometimes becoming capitate or spiciform, the ♀ sometimes solitary. *Perianth* single, calycine, usually 4-merous, free or connate, often accrescent in fruit. *Stamens* isomerous and opposite the sepals or reduced in number. *Ovary* superior, 1-celled; styles 1 or 2, simple or 2-partite; ovule solitary, pendulous. *Fruit* an achene or drupe or sub-2-valvate, often aggregate into fleshy pseudocarps or anthocarps. *Embryo* usually curved; cotyledons often unequal, the larger enfolding the smaller.

Thorny trees or shrubs :—

Leaves more or less toothed; base narrowed, emarginate, upper surface minutely pustular; ♀ flowers solitary with accrescent, foliaceous sepals; fruit simple, ultimately valvate

#### 1. *Phyllochlamys*.

Leaves quite entire; base not emarginate, usually narrowed into the petiole, not pustular; ♀ flowers capitate, sepals connate into a fleshy head; fruit a fleshy anthocarp with several immersed achenes

#### 2. *Plecospermum*.\*

Thornless trees, shrubs or herbs :—

Plants with milky juice :—

♂ flowers in pedunculate heads; stamens inflexed in bud, anthers reversed ..... 3. *Streblus*.

♂ flowers on the interior or exterior surface of a receptacle; stamens and anthers straight in bud :—

All the flowers crowded on the inner surface of a fleshy receptacle with a small mouth more or less completely closed.



- ♂ flowers crowded on the upper surface of a disciform receptacle, ♀ solitary .....5. **Antiaris.**  
 All the flowers crowded around an oblong or globose receptacle .....6. **Artocarpus.**

Plants with watery juice :—

- Trees; flowers spicate or subcapitate; ♀ perianth fleshy.. **Morus.**  
 Herbs; flowers crowded on the upper surface of a flat receptacle; ♀ sunk in the receptacle .....7. **Dorstenia.**

### 1. *Phyllochlamys*, Bureau.

Thorny small trees or shrubs with milky juice. *Leaves* alternate, usually toothed, penninerved. *Flowers* dioecious, axillary, ♂ sessile in short bracteate spikes or heads; ♀ solitary, long-peduncled. *Perianth* of 3-4 sepals, imbricate, accrescent and foliaceous in ♀. *Stamens* 4. *Pistillode* dilated at the apex. *Ovary* 1-celled, 1-ovuled; style 2-partite. *Fruit* obliquely ovoid or globose, included in the persistent perianth; pericarp sub-fleshy below, thin above and finally 2-valved. *Seed* oblique, testa membranous; albumen 0; embryo large, subglobose, one cotyledon larger and enfolding the other.

*PHYLLOCHLAMYS SPINOSA*, Bur.; F. B. I. v. 488. *Epicarporus spinosus*, Wt. Ic. 1962 (upper and right-hand figures).

Circars; Cuddapah (Beddome); Coromandel (Macé); Courtallam (Wight, Beddome); Travancore (M. Rama Rao). Not common.

A small evergreen gnarled tree or large shrub; spines terminating the branchlets, strong, sometimes leafy. Vern. Tel. Sukali.

### 2. *Plecosperrum*, Tréc.

Thorny small trees or shrubs with milky juice. *Leaves* quite entire, penninerved. *Flowers* dioecious, both sexes in axillary, 1-3-nate, pedunculate heads. *Perianths* of ♂ 4-lobed, concave, imbricate, of ♀ fleshy, 4-toothed, connate into a fleshy head. *Stamens* 4. *Pistillode* minute, hairy. *Ovary* straight, sunk deep in the fleshy head with the long, simple style protruding. *Fruit*

**PLECOSPERMUM SPINOSUM**, Tréc.; F. B. I. v. 491; Wt. Ic. t. 1963.

Common in the drier districts, and in the Nilgiri, Anamalai and N. Coimbatore Hills up to about 4,000 ft.

A large rambling shrub often climbing by means of its thorns, which are stout, long and straight or shorter and deflexed or slightly curved. Bark thin, orange-coloured; wood greyish-white with a small, very hard, bright orange-yellow heart-wood which gives a yellow dye. Vern. *Ur.* Bana-bana; *Tel.* Koriti, Kodiari, Daya-mulla; *Tam.* Achingudi, Daiyal; *Kan.* Bendaka.

### 3. *Streblus*, Lour.

Trees or shrubs with milky juice. *Leaves* alternate, penninerved or sub-3-ribbed, usually very scabrid; stipules small, ensiform. *Flowers* dioecious, rarely monoecious, axillary, ♂ in peduncled heads or spikes, ♀ solitary or 2-4 together, peduncled, bracteate at the base. *Perianth* of 4 imbricate sepals. *Stamens* 5. *Pistillode* dilated at the apex. *Ovary* straight, embraced by the sepals; style central with 2 very long arms. *Fruit* subglobose, pericarp thinly coriaceous, enclosed in the fleshy, persistent perianth. *Seed* globose; testa membranous; albumen 0; embryo globose, one cotyledon larger than and enfolding the other.

**STREBLUS ASPER** Lour.; F. B. I. v. 489. *Epicarpurus orientalis*, Bl.; Wt. Ic. t. 1961.

Common in all but the wettest tracts up to about 2,000 ft.

A small, often gnarled, evergreen tree with usually small, wedge-shaped leaves. Bark soft, light grey, irregularly ribbed; wood white, moderately hard, tough and elastic; very difficult to cut and little employed. The rough leaves are used to polish ivory and wood. Vern. *Ur.* Sahada; *Tel.* Pakki; *Tam.* Pura, Pirasu; *Mal.* Pareukeu, Parava; *Kan.* Mitli, Punjai.

### 4. *Ficus*, Linn.

Trees and shrubs, sometimes scandent, often epiphytic in early life. Juice always more or less milky. *Leaves* alternate, rarely

apical mouth which is more or less completely closed by small imbricating bracts, of four kinds: ♂, ♀, gall and neuter, which may all occur in a species or one or both of the last two may be wanting; variously arranged in the same or separate receptacles, often mixed with scales or hairs; when androgynous the fewer ♂ are usually segregated near the mouth. *Perianth* of ♂ 2-6-fid or partite, imbricate, of ♀ as in the male or reduced. *Stamens* usually 1 or 2, rarely 3-6, erect in bud. *Ovary* straight or oblique; style excentric; ovule solitary, pendulous; *Gall-flowers* similar to ♀ but the ovary containing the larva or pupa of an insect; neuter perianth usually 3-fid, without trace of sexual organs. *Fruit* an achene or fleshy, small, included in the accrescent, fleshy syncarp. *Albumen* scanty; embryo curved, cotyledons equal or unequal.

Leaves all alternate :—

Leaves neither scabrid nor hispid above :—

Erect trees though often epiphytic at first :—

Leaves with not more than 16 pairs of primary nerves :—

Receptacles sessile (rarely shortly pedunculate in 6. *Tjakela*, 7. *infectoria*, 10 *Arnottiana*) :—

Leaves not caudate :—

Leaves pubescent or tomentose below, at least when young :—

Leaves persistently grey-tomentose below with a gland at the base of the midrib (sometimes concealed by the tomentum), elliptic-ovate, obovate or subrotund; apex rounded or bluntly apiculate; base rounded, emarginate or cordate, 2-7.5 in. long, 1.5-5 in. broad, 3-7-ribbed; primary nerves 5-8 pairs; receptacles in axillary pairs, subglobose, tomentose, .25-.5 in. in diam. . . . . 1. *tomentosa*.

Leaves glabrescent, glandless :—

Leaves obtuse, elliptic to broadly ovate, base rounded, subcordate or slightly narrowed, 4-8.5 in. long, 2-5.5 in. broad, 3-7-ribbed, primary nerves 4-6 pairs; receptacles in axillary pairs, globose, puberulous, about .5 in. in diam. with 3 large rounded basal bracts, red when ripe

2. *b*

Leaves shortly abruptly ac<sup>u</sup>minate, ovate-elliptic; base rounded, emar

cordate, 4-9.5 in. long, 2.5-6.5 in. broad, 3-5-ribbed; primary nerves 9-13 pairs, very prominent below, regular, parallel; receptacles in axillary pairs, oblong to subovate, about 1 in. long, nearly glabrous and orange-red when ripe.

3. *mysorensis*.

Leaves glabrous :—

Petioles rarely over .5 in. long; leaves elliptic, ovate to obovate-rotund; apex rounded, slightly emarginate or bluntly apiculate; base narrowed, 1.5-4 in. long, .75-3 in. broad, 3-ribbed; primary nerves 5-6 pairs, appearing numerous because not much stronger than the secondary; receptacles in axillary pairs, depressed-globose, glabrous, about .3 in. in diam., yellowish or reddish when ripe.

4. *retusa*.

Petioles 1 in. or more long :—

Basal bracts minute, scarious; leaves coriaceous, broadly ovate or ovate-lanceolate; apex acute or shortly bluntly cuspidate; base narrowed or rounded, 2-5.5 in. long, 1.3-3 in. broad; margin thick, cartilaginous, 3-ribbed; primary nerves 6-10 pairs (indistinct in fresh leaves), petioles 1.5-3 in. long; receptacles in axillary pairs, globose, about .5 in. in diam., smooth, purple when ripe . . . . . 5. *Tsiela*.

Basal bracts patent, not scarious :—

Receptacles 2-6 together on short tubercles in the axils of present or fallen leaves, basal bracts bifid; leaves coriaceous, very glossy above, oval or ovate; apex rounded, shortly abruptly acuminate; base rounded, rarely narrowed, 4-10 in. long, 1.75-5 in. broad, 3-5-ribbed, primary nerves 6-10 pairs, petioles 1.75-3 in. long; receptacles depressed-globose, .2 in. in diam., whitish-yellow and dotted when ripe, rarely very shortly peduncled . . . . . 6. *Tjakela*.

Receptacles in axillary pairs, not on tubercles, basal bracts entire; leaves membranous, not or hardly glossy, ovate or oblong-ovate; apex rather abruptly shortly acuminate; base usually rounded, emarginate or subcordate, 3-6 in.

long, 1·5–3·5 in. broad, 3-ribbed; primary nerves 5–7 pairs; petioles 1·1–2·75 in. long; receptacles globose, ·25 in. in diam., whitish flushed with red and dotted when ripe

7. *infectoria*.

Leaves caudate :—

Petioles 1·25 in. or less long; leaves narrowed at base, narrow-elliptic to broad-ovate; apex shortly, acutely caudate, 2–5 in. long, ·5–2·5 in. broad, the caudicle up to ·6 in. long and often curved, 3–5-ribbed, primary nerves 6–9 pairs, fairly prominent, petioles ·5–1·25 in. long; receptacles in axillary pairs, obovoid, smooth up to ·25 in. in diam. .... 8. *Talboti*.

Petioles 2 in. or more long; leaves broad at base :—

Cusp of leaf 1–3·5 in. long; base usually truncate; primary nerves usually 8 pairs; coriaceous, ovate-rotund; apex narrow and caudate; cusp linear or linear-lanceolate, often curved; base sometimes rounded, very rarely narrowed, up to 11 in. long including the cusp, up to 6·5 in. broad, 5–7-ribbed; margins usually strongly waved; petioles slender, 2–5 in. long; receptacles in axillary pairs, depressed globose, smooth, ·5 in. in diam., with 3 broad, spreading basal bracts, dark purple when ripe

9. *religiosa*.

Cusp of leaf ·5–1 in. long; base usually deeply cordate; primary nerves 5–7 pairs, broadly ovate; apex finely caudate; base seldom emarginate or truncate, never narrowed, up to 9 in. long, 3·5 in. broad, 7-ribbed; margins subundulate; petioles 2–3·5 in. long; receptacles sessile or very shortly peduncled in pairs or clusters on tubercles usually in the axils of fallen leaves, depressed-globose, ·25–·5 in. in diam., purple with greenish dots when ripe .... 10. *Arnottiana*.

Receptacles distinctly peduncled :—

Receptacles axillary on the twigs :—

Petioles less than 1 in. long; leaves elliptic to oblanceolate; apex narrowed or rounded and narrowly, acutely



pairs; receptacles in pairs, without basal bracts, subglobose, smooth or slightly verrucose, glabrous, .25-1 in. in diam., peduncle up to .6 in. long....11. *nervosa*.

Petioles more than 1 in. long:—

Receptacles solitary; leaves more or less scabrid below, rigid, coriaceous, elliptic to broad-ovate; apex rounded or shortly bluntly acuminate; base broad, rounded (rarely narrowed, and then the leaf is nearly obovate), 4-9 in. long, 3-4.5 in. broad, 3-5-ribbed; primary nerves 5-12 pairs; margins slightly recurved; petioles 1-2.5 in. long; receptacles pubescent-scabrid, subglobose, narrowed into a short stalk, about 1 in. in diam., with 3 broad-ovate basal bracts, yellow when ripe; peduncles about .8 in. long .....12. *callosa*.

Receptacles twin; leaves not at all scabrid:—

Leaves minutely white-pubescent below, ovate-elliptic to broad-ovate; apex acute or acuminate; base more or less deeply cordate, up to 12 in. long and 9 in. broad, 3-7-ribbed; primary nerves 10-13 pairs, prominent below; petioles up to 4 in. long; receptacles obovoid, pubescent, about .5 in. in diam., with 3 broadly triangular, densely hairy, sometimes bifid, spreading basal bracts

13. *Dalhousiae*.

Leaves glabrous below:—

Basal bracts 3, free or connate at base, persistent; leaves ovate, abruptly acuminate; base broad, truncate to slightly emarginate, or sometimes rounded and then suddenly contracted into the petiole, 6-12 in. long, 3-5 in. broad, 3-ribbed; primary nerves about 12 pairs, nearly horizontal; margin somewhat sinuate; petioles stout, 2-4.5 in. long; receptacles ovoid or slightly obovoid with several vertical ridges; umbilicus prominent, 1 in. long; peduncles stout, .2-.75 in. long .....14. *Beddomei*.

Basal bracts 2, connate at base, caducous, leaving an annulus; leaves coriaceous,



Petioles .4-1 in. long; stipules deciduous, about .5 in. long; leaves thinly coriaceous, ovate-elliptic, bluntly acuminate; base rounded or subacute, 2-4.5 in. long, 1-2 in. broad, 3-ribbed; receptacles sessile in axillary pairs, globose or ovoid, smooth, about .33 in. in diam., blood-red when ripe..... *Benjamina*.

Scandent shrubs:—

Leaves lanceolate; apex acuminate, base acute, 4.5-8 in. long, 1.5-2.5 in. broad, 3-ribbed, primary nerves 10-12 pairs, margins subundulate, petioles .5-1 in. long; receptacles in axillary pairs, globose, glabrous, .25-.5 in. in diam.; basal bracts 3, deciduous, peduncles about .25 in. long

19. *travancorica*.

Leaves broadly ovate:—

Twigs nearly glabrous; leaves membranous, broadly ovate, sometimes inequilateral; apex shortly acuminate; base rounded or very shallowly cordate, pubescent or subglabrous below, 4-7 in. long, 2.5-4.5 in. broad, 3-5-ribbed; primary nerves 3-4 pairs; petiole glabrescent, .75-2.5 in. long; receptacles fascicled on the naked branches below the leaves, globose, pubescent or nearly glabrous, 1-2.5 in. in diam., without basal bracts, spotted when ripe; peduncles about .33 in. long, with several bracteoles at the base

20. *macrocarpa*.

Twigs tomentose; leaves subcoriaceous, broadly ovate to rotund-ovate; apex usually shortly, abruptly caudate, base usually shallowly cordate, usually thinly tomentose below, 3.75-6.75 in. long, 2.5-5 in. broad, 3-5-ribbed; primary nerves 3-4 pairs; petioles rusty-tomentose, .75-2 in. long; receptacles in fascicles on tubercles on the branches or stem, subglobose, pubescent, 1-2 in. in diam., blotched; basal bracts 3, broadly ovate, caducous; peduncles stout, rusty-tomentose, up to .5 in. long..... 21. *guttata*.

Leaves more or less scabrid or hispid above (smooth in var. *cuspidifera* of 22. *gibbosa*):—

Leaves not semi-sagittate:—

Leaves acute or cuneate at base, very rarely rounded, usually inequilateral with one side more or less gibbous, elliptic-ovate to lanceolate or oblanceolate, very rarely nearly orbicular; apex obtuse, acute or cuspidate, minutely hispid below

tacles shortly peduncled in pairs or fascicled on the twigs, subglobose, scabrid, 2-3 in. in diam., yellow when ripe

22. *gibbosa*.

Leaves not acute or cuneate at base :—

Weak shrubs, often creeping; leafy twigs pithy and more or less hollow; leaves very variable, entire or 2-many-lobed, outline from narrow-lanceolate to rotund-ovate; apex rounded or more or less acuminate, base rounded or cordate; both surfaces scabrous or the lower (sometimes the upper also), tomentose, 2-6.5 in. long, .5-2.5 in. broad, 3-5-ribbed; primary nerves 4-8 pairs, margins irregularly and coarsely toothed or repand; receptacles axillary, solitary, rarely twin, globose to elongate pear-shaped, umbilicus always prominent, more or less scabrid-hispid, .5-1 in. long, dark-orange when ripe; peduncles .5-1 in. long ..... 23. *heterophylla*.

Erect shrubs or small trees; twigs soon woody and solid :—

All parts very scabrid; leaves elliptic, ovate or obovate, rarely 3-5-lobed, often inequilateral; apex rounded or acuminate; base rounded, rarely narrowed; upper surface with short, stiff hairs from bulbous bases, 2.5-7.5 in. long, 1.25-3.25 in. broad, 3-ribbed; primary nerves 3-5 pairs, prominent below, as are the ultimate reticulations; petioles .5-3.5 in. long; receptacles axillary, solitary, globose with a prominent umbilicus, scabrous-hispid, .5-.75 in. in diam., yellow or purple with yellowish dots when ripe; peduncles 2-4 in. long.. 24. *asperrima*.

Shoots softly tomentose; leaves subscabrid-tomentose, orbicular-ovate, entire or obtusely 3-5-lobed, acute or apiculate, 1.5-5 in. in diam., 3-ribbed; primary nerves 3-6 pairs; petiole 1-2 in. long; receptacles axillary, solitary, subglobose to pyriform; base constricted, .5-1 in. in diam., yellow when ripe; peduncles .5-1 in. long ..... 25. *palmata*.

Leaves semi-sagittate, one side with a large 3-4-ribbed lobe, the other cuneate or with a small 1-2-ribbed lobe, elliptic to oblong-lanceolate; apex acuminate, 4-9 in. long, 1.5-3.5 in. broad; primary nerves 9-14 pairs; petioles scabrid, 2-6 in. long; receptacles shortly peduncled in pairs on usually leafless branch-

Leaves opposite, very rarely alternate, membranous, elliptic-ovate, oblong, obovate or obovate-oblong; sometimes inequilateral; apex acute, acuminate or cuspidate; base cuneate, rounded or emarginate, both surfaces hispid-pubescent, up to 14 in. long and 6 in. broad, 3-5-ribbed; primary nerves 5-6 pairs, some at least branching about halfway to the margin; secondary nerves regular and straight, petioles .5-2.5 in. long; receptacles fascicled on the stem or leafy branchlets, obovoid or turbinate, sometimes with scattered bracts on the sides, hispid, .5-1 in. in diam., yellowish when ripe; peduncles up to .6 in. long .....27. *hispidia*.

1. **FICUS TOMENTOSA**, Roxb.; F.B.I. v. 501; King Ann. Calc. i. t. 18 and 81g; Wt. Ic. t. 647.

In all districts from sea-level to 5,000 ft., usually in dry rocky places. Rampa Hills (Narayanswami).

A small or fairly large tree throwing out small aërial roots from the branches; often epiphytic. Bark greenish-white; wood white, useless. Vern. Tel. Jivi, Juvi, Kaljuvi; Tam. Ichchi, Kal-ichchi; Mal. Kal-al; Kan. Kallatti.

2. **FICUS BENGALENSIS**, Linn.; F.B.I. v. 499; King Ann. Calc. i. t. 13 and 81c. *Urostigma bengalense* Gasp.; Wt. Ic. t. 1989.

In all districts from sea-level to 4,000 ft. in deciduous and semi-evergreen forest. Much planted in avenues and for shade, for which purposes it is admirably suited. The Banyan.

A very large tree throwing out numerous large aërial roots from the main trunk and large branches, which descend to the soil and form supports, and are then capable of separate existence when severed from the parent tree. Held in reverence by the Hindus. Bark greyish-white; wood greyish-white, moderately hard, without heartwood, durable under water and used for well-curbs, also for tent and yoke poles. Vern. Hind. Bor, Bar, Ber; Ur. Boru; Tel. Mari, Pedda-mari; Tam. and Mal. Ala, Per-al; Kan. Alada.

3. **FICUS MYSORENSIS**, Heyne; F.B.I. v. 500; King Ann. Calc. i. t. 14 and 81d.

From Central Mysore southwards in moderately wet forests from 500-2,500 ft. Schlechter (Barber, Meisner). Attenuated



occasionally epiphytic. Sometimes planted in avenues. Wood soft, useless. Vern. *Tam.* Kal-ala, Sonnai-ala; *Kan.* Goni-mara.

Var. *pubescens*, Roth, has smaller leaves with fewer primary nerves, denser tomentum, which is a deep ferruginous red on the younger parts. In the same localities as the type but less

4. **FICUS RETUSA**, Linn.; F. B. I. v. 511; King Ann. Calc. i. t. 61 and 84p.

In all districts from sea-level to about 4,000 ft. Sometimes planted in avenues. Rampa Hills (V. Narayanswami), Ganjam (Barber).

A large, evergreen tree with few aërial roots; sometimes epiphytic. Bark brown, fairly smooth; wood light reddish-grey, moderately hard, one of the best of the fig woods. Vern. *Tel.* Juvi, Konda-juvi, Yerra-juvi; *Tam.* Pon-ichchi, Kal-ichchi, Kal-atthi; *Mal.* Ittiyal; *Kan.* Pilala, Kirugoli.

Var. *nitida*, Thunb.; F. B. I. v. 511; King Ann. Calc. i. t. 62; *Ficus nitida*, Roxb.; Wt. Ic. t. 642, is a similar tree with the leaves narrowed at the base. The range of the type.

5. **FICUS TSIELA**, Roxb.; F. B. I. v. 515; King Ann. Calc. i. t. 73, 74 and 84z2; Wt. Ic. t. 668; Bedd. Fl. t. 314.

From Kurnool southwards, in deciduous and evergreen forests from 1,000–3,500 ft. Frequently planted in avenues, and for shade.

A large, spreading tree with few or no aërial roots; often epiphytic. Bark greenish-grey, smooth; wood grey, soft to moderately hard. Vern. *Ur.* Jori; *Tel.* Pedda-juvi; *Tam.* Kal-ichchi; *Mal.* Kirgali; *Kan.* Billibasari.

6. **FICUS TIAKELA**, Burm.; F. B. I. v. 514; King Ann. Calc. i. t. 70 and 84x.

In the forests of the West Coast from sea-level to about 4,000 ft., extending to the Javadi Hills (Barber). Sometimes planted as a shade tree in coffee plantations.

A very tall tree without aërial roots. Bark dark-brown, rather rough; wood brown, soft. Vern. *Mal.* Kar-al; *Kan.* Karibasari.

7. **FICUS INFECTORIA**, Roxb.; F. B. I. v. 515; King Ann.

common wild, but frequently planted near and in villages. A large deciduous tree without aërial roots; frequently epiphytic. Bark greenish-grey, smooth; wood grey, moderately hard. Vern. *Hind.* Pakri; *Ur.* Pakodo; *Tel.* Jati, juvi; *Tam.* Malai-ichchi; *Mal.* Cherla; *Kan.* Basari.

Var. *Lambertiana*, Miq.; F. B. I. v. 516; King Ann. Calc. i. t. 76, has leaves with bases broad, rounded, emarginate or subcordate, rarely narrowed; receptacles 3-4 in. in diam. on pubescent peduncles 2-3 in. long.

Var. *Wightiana*, Wall.; F. B. I. v. 516; King Ann. Calc. i. t. 77, has smaller leaves narrowed at the base; receptacles large in proportion to the leaves, on glabrous or pubescent peduncles about 2 in. long.

8. *FICUS TALBOTI*, King Ann. Calc. i. 51, t. 63 and 84q; F. B. I. v. 512.

In the evergreen forests of the W. Gháts from 500-4,500 ft. Not common.

A large, evergreen tree with few or no aërial roots; usually epiphytic in youth. Bark green, very smooth; wood very white when fresh, turning yellow; useless. Vern. *Tam.* Itthi, Kal-ithi.

9. *FICUS RELIGIOSA*, Linn.; F. B. I. v. 513; King Ann. Calc. i. t. 67A and 84u; Bedd. Fl. t. 314. *Urostigma religiosum*, Gasp.; Wt. Ic. t. 1967.

Not wild in Southern India, except, possibly, in the North East bordering on the Central Provinces, but widely planted on village sites and in avenues. The Pipul Tree. A large tree with few or no aërial roots; often epiphytic. Venerated by the Hindus. Bark grey, smooth; wood whitish, moderately hard, used for packing-cases. Vern. *Hind.* Pipal; *Ur.* Jori, Usto; *Tel.* Rai, Ragi, Ravi; *Tam.* Arasa, Arasu; *Mal.* Arasu, Arei-al; *Kan.* Arali.

10. *FICUS ARNOTTIANA*, Miq.; F. B. I. v. 513; King Ann. Calc. i. t. 68 and 84v.

In all districts in rocky places in the hills, up to 4,500 ft. A small tree or large shrub without aërial roots. Bark pale, smooth; wood white, useless. Vern. *Tel.* Kondaravi; *Tam.* Kal-arasu; *Mal.* Ama-kanniyan; *Kan.* Kadarasai.

11. *FICUS NERVOSA*, Roth; F. B. I. v. 512; King Ann. Calc. i. t. 65. *Ficus angustifolia*, Roxb.; Wt. Ic. t. 660.

In the hills of most districts except the driest, from 200-4,500 ft. Rampa Hills (Gamble), Vizagapatam Hills (A. W. Lushington). Usually found near streams.

A moderate-sized to large tree. Bark brown mottled white; wood white, soft. Vern. *Tam.* Nir-al; *Mal.* Eechamaram.

Var. *minor*, King, with all parts smaller and more puberulous. Nilgiri Hills (Gamble).

12. *FICUS CALLOSA*, Willd.; F. B. I. v. 516; King Ann. Calc. i. t. 84v2 and 85-

In evergreen and secondary forests in the W. Gháts from sea-level to 2,500 ft.

A large tree with verrucose, canescent twigs. Bark grey, smooth; wood white, useless. Vern. *Tam.* Koli-al.

13. *FICUS DALHOUSIAE*, Miq.; F. B. I. v. 499; King Ann. Calc. i. t. 11 and 81a.

In hill forests from Cuddapah southwards from near sea-level to 4,500 ft.

A small tree usually growing in rocky ravines. Vern. *Tam.* Pei-al, Kal-al; *Mal.* Kalalai.

14. *FICUS BEDDOMEI*, King Ann. Calc. i. 26, t. 24 and 81m; F. B. I. v. 502.

In the evergreen forests of the W. Gháts from 1,000-5,000 ft. Nilgiris (Gamble), Anamalais (Barber, Fischer), Travancore (Bourdillon), Tinnevely (Beddome).

A large tree, often epiphytic in youth. Bark pale-brown, smooth; wood white, useless. Vern. *Mal.* Thavatta-al.

- 15. *FICUS ANGLADEI*, C. Fischer in Kew Bull. 1925, 332.

In the lower Pulney Hills at about 2,700 ft. (Anglade, Saulière). A tree.

16. *FICUS GLOMERATA*, Roxb. Cor. Pl. ii, t. 123; F. B. I. v. 535; King Ann. Calc. i. t. 218A; Wt. Ic. t. 667; Brand. For. Fl. t. 49.

Common in all districts from sea-level to about 6,000 ft. in evergreen forests, and near streams in deciduous forests.

Vern. *Ur.* Dimiri; *Tel.* Atti; *Tam.* Atthi; *Mal.* Atthi, Atthi-al; *Kan.* Atti.

17. *FICUS POMIFERA*, Wall.; F. B. I. v. 535; King Ann. Calc. i. t. 215.

Rampa Hills in the Godavari District at 2,000 ft. (Gamble). Not hitherto found elsewhere in Southern India.

A medium-sized tree. Bark grey; wood soft, spongy.

18. *FICUS COMOSA*, Roxb. Cor. Pl. ii, t. 125; Wt. Ic. t. 658. *Ficus Benjamina*, Linn., var. *comosa*, Kurz; F. B. I. v. 508; King Ann. Calc. i. t. 52B.

Vantala in the Vizagapatam Hills at 4,000 ft. (A. W. Lushington). Not found wild, hitherto, elsewhere in Southern India, but sometimes planted.

A large, handsome tree. Bark grey, smooth; wood grey, moderately hard.

19. *FICUS TRAVANCORICA*, King Ann. Calc. i. 28, t. 26 and 82o; F. B. I. v. 503.

In the hill tracts of N. Travancore and the Anamalais (Barber), in the Coimbatore District from 3,000–5,000 ft., in evergreen forest.

A straggling or scandent shrub (middle-sized tree, *vide* Meebold).

20. *FICUS MACROCARPA*, Wight; F. B. I. v. 534; King Ann. Calc. i. t. 208. *Pogonotrophe macrocarpa*, Miq.; Wt. Ic. t. 1965.

In the evergreen forests of the Nilgiri and Pulney Hills from 4,000–5,000 ft.

A scandent shrub.

21. *FICUS GUTTATA*, Kurz; F. B. I. v. 534; King Ann. Calc. i. t. 209. *Covellia guttata*, Wt. Ic. t. 1966.

In evergreen forest in the W. Gháts from 3,500–7,200 ft.

A scandent shrub, often creeping over rocks. Very like the last.

22. *FICUS GIBBOSA*, Bl., var. *PARASITICA*, Koen.; F. B. I. v. 497; King Ann. Calc. i. t. 2ba. *Ficus ampelos*, Roxb.; Wt. Ic. t. 652.

Common in all districts from sea-level to about 6,000 ft.

wood brownish-grey, soft, useless. Vern. *Ur.* Korotosani; *Tel.* Konda-juvi, Pakki; *Tam.* Kal-itthi, Kal-perukam; *Mal.* Itthi, Kal-itthi; *Kan.* Goddumitle.

Var. *cuspidifera*, Miq.; King Ann. Calc. i. t. 2a, with the leaves elongate and gradually narrowed to the apex; less scabrid, sometimes quite smooth on both surfaces. Range of the type.

Var. *tuberculata*, Roxb.; King Ann. Calc. i. t. 2bb. *Ficus tuberculata*, Roxb.; Wt. Ic. t. 651; with narrower leaves which are sometimes irregularly serrate. Rare.

23. *FICUS HETEROPHYLLA*, Linn. f.; F. B. I. v. 518; King Ann. Calc. i. t. 94. *Ficus repens*, Roxb.; Wt. Ic. t. 636. *Ficus scabrella*, Roxb.; Wt. Ic. t. 661.

In all districts from sea-level to about 3,000 ft., usually near water.

A weak, very variable shrub, creeping or erect. Vern. *Ur.* Gonthe-sahada; *Tel.* Buroi; *Tam.* Kodi-atthi.

24. *FICUS ASPERRIMA*, Roxb.; F. B. I. v. 522; King Ann. Calc. i. t. 100; Wt. Ic. t. 633.

In all hilly tracts up to 4,500 ft., and down to sea-level on the West Coast. The Sand-paper Tree.

A small or medium-sized tree without aerial roots. Bark pale, smooth; wood whitish, soft, useless; leaves used as sand-paper in sandalwood carving. Vern. *Ur.* Korotosano; *Tel.* Karakaboddu; *Tam.* Irambarattam, Maram-thinni-Atthi; *Mal.* Theragam; *Kan.* Garagatti.

25. *FICUS PALMATA*, Forsk.; F. B. I. v. 530; King Ann. Calc. i. t. 185. *Ficus virgata*, Roxb.; Wt. Ic. t. 649.

Simli in the Vizagapatam Hills at 3,000 ft. (A. W. Lushington); not reported from elsewhere in Southern India.

A bush or small tree. Bark grey, smooth; wood white, even-grained, moderately hard.

26. *FICUS CUNIA*, Ham.; F. B. I. v. 523; King Ann. Calc. i. t. 126; Wt. Ic. t. 648; *Ficus conglomerata*, Roxb.; Wt. Ic. t. 669.

In the hills of the Godavari and Ganjam Districts



rough; wood greyish-brown, moderately hard, useless.

Vern. *Ur.* Godima; *Tel.* Bommamari.

27. *FICUS HISPIDA*, Linn. f.; F. B. I. v. 522; King Ann. Calc. i. t. 154 and 155. *Ficus oppositifolia*, Roxb. Cor. Pl. ii. t. 124; Wt. Ic. t. 638. *Ficus demonum*, Koen.; Wt. Ic. t. 641.

Common in all districts in evergreen forests and elsewhere in damp localities from sea-level to about 4,000 ft.

A small, weak tree, generally with hollow internodes, all parts very hispid; without aërial roots. Bark grey, rough; wood dirty-grey, soft, useless. Vern. *Hind.* Kagsha; *Ur.* Bhai-dimiri; *Tel.* Brammadi, Boddamari, Bemmadu, Bommamedi; *Tam.* Pei-atthi, Chona-atthi, Pollaparakam; *Mal.* Erumanakku, Parakam; *Kan.* Kad-Atthi.

- Ficus elastica*, Roxb.; F. B. I. v. 508; King Ann. Calc. i. t. 54; Wt. Ic. t. 663.

A large tree occasionally planted. The sap yields indian-rubber. The Rubber Fig.

- Ficus Benjamina*, Linn.; F. B. I. v. 508; King Ann. Calc. i. t. 52A and 83h.

A large, handsome tree with numerous aërial roots. Often planted in avenues and as an ornamental tree. The Java Fig.

- Ficus pumila*, Linn.; King Ann. Calc. i. t. 158, is a scandent or creeping shrub with dimorphic leaves, grown ornamentally on walls.

### 5. Antiaris, Leschen.

Gigantic trees. Leaves alternate, bifarious, penninerved; stipules small, connate, caducous. Flowers monoecious; ♂ crowded on the surface of an axillary, pedunculate receptacle, surrounded by confluent, imbricating bracts, with 3-4 spatulate, imbricate sepals; ♀ minute, solitary in an involucre of many confluent bracts, without perianth. Stamens 3-8. Pistillode 0. Ovary adnate to the involucre; ovule pendulous; style-arms 2, subulate, recurved. Fruit fleshy, the pericarp confluent with the receptacle. Seed exalbuminous, testa hard; embryo subglobose; cotyledons equal; radicle small, superior.

Evergreen forests of the West Coast up to 2,000 ft. The Upas Tree.

The largest tree of South India, attaining 250 ft. in height (Beddome). Bark brownish-grey, smooth, inner bark fibrous, making good cordage and also used in sections for making into sacks; wood white, soft, perishable. The milky juice is poisonous, but not so virulent in the Indian examples as in the Malayan. Vern. *Tam.* Aranthelli, Mara-uri; *Mal.* Arei-anjili, Aranjelli.

#### 6. *Artocarpus*, Forst.

Trees. *Leaves* alternate, coriaceous, entire, lobed or pinnatifid, penninerved. *Flowers* monoecious, crowded on globose, oblong or cylindrical, solitary, usually axillary receptacles. *Perianth* in ♂ 2-4-lobed or -partite, in ♀ tubular and confluent below with the receptacle. *Stamen* 1. *Pistillode* 0. *Ovary* straight; ovule pendulous; style exserted; stigma undivided. *Fruit* a large, fleshy, globose or oblong receptacle covered with the enlarged fleshy anthocarps, which are smooth, tubercled or spiny according as they are completely or partially connate and have flat or attenuate apices. *Seed* with a membranous testa; exalbuminous; embryo straight or incurved; cotyledons fleshy, equal or unequal; radicle short, superior.

Quite glabrous; leaves oblong to obovate-oblong, base acute, entire (of young plants occasionally 3-lobed), dark-green and glossy above; lateral nerves 7-8 pairs, 4-5-7 in. long, 2-3-5 in. wide; stipules 2-3 in. long, spathaceous; fruit tubercled, oblong or cylindric, 12-24 in. long

##### 1. *integrifolia*.

Branchlets, leaves below and stipules pubescent or hairy; leaves not acute at base, entire (of young plants often more or less pinnatifid), not dark green nor glossy above; lateral nerves 8-12 pairs; stipules not spathaceous:—

Evergreen; young parts strigose with tawny hairs; leaves broadly ovate, obovate or elliptic, subacute or very shortly acuminate, base rounded or somewhat narrowed; tawny hairy on the midrib above and the nerves below, 5-12 in. long, 3-6 in. wide; stipules yellow-hairy; fruit spinous, oblong or cylindrical, 2-3 in. long

##### 2. *hirsuta*.

Deciduous; young parts densely grey- or rusty-tomentose; leaves ovate or oblong, shortly, finely acuminate or cuspidate; base

truncate or subcordate, densely grey-downy below and on the midrib above, 4-12 in. long, 2-8 in. wide; stipules small, grey-pubescent; fruit smooth, globose, 2-3 in. in diam. . . . . 3. *Lakoocha*.

1. *ARTOCARPUS INTEGRIFOLIA*, Linn.; F. B. I. v. 541; Wt. Ic. t. 678; Roxb. Cor. Pl. t. 250.

Evergreen forests of the W. Gháts from 1,500-4,000 ft.; cultivated nearly everywhere. The Jack Tree.

A large evergreen tree. Bark black mottled green, smooth (deeply cleft when old); sapwood pale, heartwood bright yellow, darkening on exposure, moderately hard, does not warp or split, easily worked, used for carpentry. Vern. *Hind.* Kanthal; *Ur.* and *Tel.* Panása; *Tam.* and *Mal.* Pila, Pilavu; *Kan.* Alasa.

2. *ARTOCARPUS HIRSUTA*, Lamk.; F. B. I. v. 541; Wt. Ic. t. 1957; Bedd. Fl. t. 308; King Ann. Calc. ii. t. 5.

Evergreen forests of the West Coast from sea-level to 3,500 ft.; Coorg, Mysore (Meebold), Wynaad, Anamalais to Travancore.

A very large evergreen tree. Bark grey, smooth; sapwood white; heartwood yellowish-brown, moderately hard, durable; seasons and polishes well, does not warp nor crack, not eaten by white ants; valuable for panelling, flooring and boat-building. Vern. *Tam.* Anjili, Pepla, Katupila, Tellai-kori mara; *Mal.* Aini, Ayani; *Kan.* Halasu.

3. *ARTOCARPUS LAKOOCHA*, Roxb.; F. B. I. v. 543; Wt. Ic. t. 681; King Ann. Calc. ii. t. 13.

Hill forests up to 3,500 ft.; Coorg, Mysore, West Coast, Ganjam (Gamble), Vizagapatam Hills (A. W. Lushington).

A large deciduous tree. Bark rough, dark-grey or purplish; sapwood large, white, soft and perishable; heartwood yellowish-brown, fairly hard, not eaten by white ants, used for house- and boat-building. Fruit edible, sometimes cultivated for that reason; wood and fruit yield a yellow dye. Vern. *Hind.* Dahu, Lakuch; *Tel.* Nakkarenu; *Mal.* Chima, Thitti-pilavu; *Kan.* Wonta.

## 7. *Dorstenia*, Linn.

Herbs or small shrubs. Leaves alternate or radical, entire or

simple or lobed receptacle. *Perianth* of ♂ more or less connate and adnate to the receptacle, obscurely 2-lobed or toothed, of ♀ deeply immersed in the receptacle, mouth almost closed. *Stamens* 1-3, inflexed in bud. *Pistillode* 0. *Ovary* included; ovule pendulous; style excentric or lateral, with 2 subulate arms. *Fruit* a minute, crustaceous achene. *Albumen* 0; cotyledons subequal, contorted, embracing the upcurved radicle.

**DORSTENIA INDICA**, Wight; F. B. I. v. 494; Wt. Ic. t. 1964.

In the hills from the Nilgiris and Shevaroy's southwards; in cool and damp localities, from 1,800-6,000 ft.

A succulent herb 4-18 in. high. Leaves lanceolate, undulate to serrate, variable in size; receptacles peltate, obconic, with 5-12 linear arms.

*Morus alba*, Linn., the mulberry, is cultivated for its fruit, and with *M. indica*, Linn., for leaves for feeding silk-worms, in several localities. The two species are not easily separated, the chief points of distinction being the obovate ♀ sepals and the styles connate below in *M. indica*.

### Family CXXXIX. URTICACEAE.

Herbs, shrubs or small trees, some with stinging hairs. Leaves opposite or alternate, 3-ribbed or penninerved, entire or lobed. Flowers small, greenish, monoecious or dioecious, in open or capitate cymes or spikes or aggregated on a fleshy receptacle, sometimes involucrate. *Perianth* of 4-5 (rarely 2-3) free or united sepals, usually united in ♀ and sometimes accrescent and fleshy in fruit. *Stamens* as many as the sepals, usually inflexed in bud with reversed anthers, later elastically reflexed. *Pistillode* usually present, various. *Ovary* superior, 1-celled; style simple or 0; stigma papillose, plumose or penicillate; ovule single, basal, erect. *Fruit* a drupe or an achene, usually enclosed in and often adnate to the perianth. *Seed* with a membranous testa; embryo straight.

Plants with stinging hairs, at least on the inflorescence :—

Flowers clustered on cymes or spikes :—

Slender annual flexuous herbs; stipules small or 0; stinging hairs weak; flower clusters small ..... 1. **Fleurya**.

Coarse perennial erect herbs or undershrubs; stipules large,

Plants without stinging hairs :—

Herbs or undershrubs :—

Flowers, at least ♀, aggregated on a fleshy receptacle :—

Normal leaves opposite ; receptacles long-peduncled

4. *Lecanthus*.

Normal leaves alternate ; receptacles sessile or short-peduncled (long-peduncled in two species of *Elatostemma*) :—

♂ and ♀ flowers aggregated on a fleshy receptacle

5. *Elatostemma*.

♂ flowers cymose, ♀ aggregated on a fleshy receptacle

6. *Procris*.

Flowers not aggregated on a fleshy receptacle :—

Flowers not enclosed in a campanulate involucre :—

Leaves stipulate :—

Flowers cymose ; cystoliths of leaves linear :—

Leaves opposite, serrate ..... 7. *Pilea*.

Leaves alternate, entire ..... 8. *Pellionia*.

Flowers in sessile clusters ; cystoliths of leaves punctiform :—

Leaves serrate ; stigma ovate, persistent

9. *Chamabaina*.

Leaves usually entire ; stigma filiform, deciduous

10. *Pouzolzia*.

Leaves exstipulate ..... 11. *Parietaria*.

Flowers enclosed in a campanulate involucre .... 12. *Droguetia*.

Small trees or large shrubs :—

Inflorescence in clusters on long spikes ; fruiting perianth dry

13. *Boehmeria*.

Inflorescence in clusters on short cymes or on panicles ; fruiting perianth more or less fleshy :—

Leaves not white-tomentose below ; stigma discoid, ciliate-fimbriate ..... 14. *Villebrunea*.

Leaves white-tomentose below ; stigma sessile, penicillate

15. *Debregeasia*.

# 1. *Fleurya*, Gaud.

Annual herbs with stinging hairs. Leaves alternate, toothed, 3-ribbed, with linear cystoliths ; stipules narrow, connate in pairs or 0. Flowers monoecious or dioecious, clustered on axillary, unisexual or androgynous, spikes or cymes. Perianth of ♂ of



ultimately hooked with sometimes 2 basal arms. *Achene* oblique, compressed, membranous, exserted. *Seed* nearly exalbuminous; cotyledons broad.

**FLEURYA INTERRUPTA**, Gaud.; F. B. I. v. 548; Wt. Ic. t. 1975. *Urtica interrupta*, Linn.; Wt. Ic. t. 692.

In the hills, mainly south of Mysore, from 500–6,000 ft. Rampa Hills (V. Narayanswami).

A nettle-like herb with ovate, acuminate, coarsely-toothed leaves. Fruiting spikes sometimes a foot long.

## 2. (*Girardinia*, Gaud.

Strong herbs or undershrubs with long stinging hairs. *Leaves* alternate, 3-ribbed, entire or lobed; stipules connate, foliaceous. *Flowers* monoecious or dioecious, clustered on simple or paniced spikes or heads, armed with numerous stinging hairs. *Perianth* of ♂ of 4–5 free, valvate sepals, of ♀ a 2–3-lobed, ventricose tube eventually split down one side. *Stamens* 4–5, inflexed in bud. *Pistillode* globose or cupular. *Ovary* straight, ovule erect; stigma subulate, papillose. *Achene* broad, compressed. *Seed* nearly exalbuminous; cotyledons broad.

Leaves entire or 3–7-lobed, margins inciso-serrate, acuminate, base narrowed, truncate or cordate, 3-ribbed, appressed hairy and with stout stinging hairs on the ribs and nerves; stipules 1.5–3 in. long, cordate at base; flowers dioecious in long simple or branched spikes, often very long in fruit ..... 1. *Leschenaultiana*.

Leaves 3–7-lobed, margins inciso-serrate, acuminate, base usually truncate or cordate, 3-ribbed, more or less appressed-hairy, with or without rather slender stinging hairs on the ribs and nerves; stipules 3–6 in. long, cordate or truncate at base; flowers monoecious, usually in simple spikes, ♀ usually aggregated in heads along the rachis ..... 2. *zeylanica*.

1. (**GIRARDINIA LESCHENAULTIANA**, Dcne.;) Wt. Ic. tt. 1976.

(*Girardinia heterophylla*, Dcne., var. *palmata*, Gaud.; F. B. I. v. 551.

Mountains of the W. Gháts from 4,000–7,000 ft. The

2. **GIRARDINIA ZEYLANICA**, Dcne. *Girardinia heterophylla*, Dcne., var. *zeylanica*, Dcne.; F. B. I. v. 551. *Urtica heterophylla*, Wt. Ic. t. 687.

Hills of Southern India and on the West Coast from 1,000–5,000 ft. The Nilgiri Nettle.

A stinging-nettle not easily distinguished from the last species.)

### 3. *Laportea*, Gaud.

Herbs, shrubs or trees with stinging (sometimes minute) hairs. *Leaves* alternate, entire or toothed, 3-ribbed or penninerved; stipules free or connate. *Flowers* monoecious or dioecious, in paniculate, usually unisexual, cymes or racemes. *Perianth* of ♂ of 4–5 subvalvate sepals, of ♀ of 4 subequal segments or one outer smaller or absent. *Stamens* 4–5, inflexed in bud. *Pistillode* clavate or subglobose. *Ovary* eventually oblique; ovule erect; style linear, papillose on one side. *Achene* oblique, compressed, membranous or fleshy, seated on the perianth. *Seed* nearly exalbuminous; cotyledons broad.

Herbs; leaves broadly ovate to elliptic, acuminate; base usually rounded, rarely narrowed, 3-ribbed, 2.5–8 in. long, 1.5–5 in. wide, coarsely toothed, smooth, pubescent or scabrous, variable in the amount of stinging hairs on both surfaces; ♂ cymes slender, mostly axillary, ♀ cymes stout, subterminal, the pedicels broadly winged

1. *terminalis*.

Soft stemmed shrubs or small trees; leaves narrow-lanceolate to broadly elliptic, shortly acuminate, base narrowed, rarely rounded, penninerved, 5–12 in. long, 2–5.5 in. wide, entire or crenulate in the upper half, glabrous or nearly so, shining above, the petioles sometimes with many stinging hairs; cymes axillary, pedicels of ♀ cylindric

2. *crenulata*.

1. **LAPORTEA TERMINALIS**, Wt. Ic. t. 1972; F. B. I. v. 549.

W. Gháts in evergreen forests, 5,000–7,000 ft.

A slender nettle. The sting is not very virulent.

2. **LAPORTEA CRENULATA**, Gaud.; F. B. I. v. 550; Bedd. Fl. t. 306. *Urtica crenulata*, Roxb.; Wt. Ic. t. 686.

W. Gháts from 1,000–5,000 ft. Rampa Hills, 2,500 ft.

thin; wood pale-brown, very soft, useless; the fibre yields a strong, useful cordage. The sting of the hairs is very painful and lasting, particularly during the flowering season, when it may bring on violent sneezing and fever. Vern. Tam. Otta-pilavu; Mal. Ana-choriya.

#### 4. *Lecanthus*, Wedd.

Herbs, more or less succulent; stems often decumbent and rooting at the base. *Leaves* in opposite, petioled, unequal pairs, subrotund, ovate or elliptic, acute; base 3-ribbed, narrowed, often oblique, serrate, or sometimes the small ones nearly entire, cystoliths linear; stipules small, scarious. *Flowers* monoecious or dioecious, crowded or solitary, axillary, long-peduncled, bracteate, saucer-shaped, unisexual or androgynous fleshy receptacles, the ♀ often mixed with sterile flowers. *Perianth* of ♂ of 4-5 (usually 4) free, equal, usually narrowly hooded sepals, of ♀ of 3-6 (usually 4) free unequal sepals, one larger than the others and usually more deeply and broadly hooded, of sterile flowers irregular, often with 8 segments in 2 series. *Stamens* 4-5 (usually 4). *Pistillode* 0. *Staminodes* in fertile ♀ 4, minute, quadrate. *Ovary* narrowly ellipsoid, shortly stipitate; stigma sessile, penicillate. *Achene* ellipsoid, muriculate. *Albumen* fleshy; cotyledons elliptic; radicle conical.

*LECANTHUS WIGHTII*, Wedd.; F. B. I. v. 559. *Elatostemma ovatum*, Wt. Ic. t. 1985.

In moist and shady places in the hills from 4,000-7,000 ft. Mahendragiri (Fischer), Mysore, Nilgiris, Anamalais (Fischer), Pulneys (Bourne).

A variable herb, 2-18 in. high. Leaves and capitula equally variable in size (up to 6 in. long and 5 in. diam. respectively). ♂ flowers with slender pedicels 3 times longer than the calyx, ♀ sessile and pedicelled up to the length of the longest sepal in the same capitulum.

#### 5. *Elatostemma*, Forst.

Herbs or undershrubs. *Leaves* alternate or sometimes with a small or minute leaf subopposite to the normal one, distichous.

lateral or intrapetiolar. *Flowers* minute, monoecious or dioecious, crowded on sessile or peduncled, 1-sexual, usually involucrate receptacles, the outer bracts often spurred, their bases free or more or less confluent into a fleshy circular or lobed disk, the florets often in clusters in the heads and mixed with bracteoles. *Perianth* of ♂ of 4-5 free sepals, 2 or more usually tuberculate or spurred on the back, of ♀ of 3-5 free, persistent sepals, usually minute or shorter than the ovary. *Stamens* 4-5, inflexed in bud. *Pistillode* minute. *Ovary* straight; ovule erect; stigma sessile, penicillate. *Achene* minute, ellipsoid or fusiform, usually ribbed. *Seed* usually exalbuminous; testa membranous; cotyledons ovate or semi-terete.

Normal leaves alternate without (very rarely with) subopposite small ones :—

♂ receptacles sessile or very shortly peduncled (unknown in 4. *cuneatum*) :—

Large herbs, usually over 1 ft. high; leaves acuminate or caudate:—

Leaves with large conspicuous cystoliths :—

Leaves sessile or shortly petioled, obliquely lanceolate, oblanceolate or oblong, caudate, coarsely sharply serrate from the base or just above; base inequilateral, narrowed or the lower side rounded, 1.3-6 in. long, .5-2.2 in. wide, glabrous or with scattered hairs above, more or less pilose on the nerves below; lateral ribs rather indistinct, the lower one arched, cystoliths abundant, obscure below; stipules lanceolate, acute, glabrous; receptacles sessile or very shortly peduncled, solitary or 2-3 in an axil. . . . . 1. *sessile*.

Leaves subsessile, very variable, linear, linear-lanceolate or obliquely lanceolate, acuminate or caudate; base acute, nearly equilateral, .8-7 in. long, .1-2 in. wide; margins entire (in the narrow forms) or coarsely, subacutely serrate in the upper half, the inner margin often toothed for a shorter distance than the outer, glabrous above, glabrous or hairy on the nerves below; lateral ribs distinct, the lower nearly straight; cystoliths crowded and conspicuous; stipules lanceolate, usually hairy; receptacles sessile, small, solitary or crowded in the axils . . . . . 2. *lineolatum*.

Leaves without cystoliths or cystoliths minute and inconspicuous, subsessile, obliquely oblong or oblong-lanceolate,

or subacute, ribs distinct, 1.5–6 in. long, .4–1.5 in. wide, quite glabrous; receptacles sessile, small, solitary ... 3. *acuminatum*. Dwarf herbs, 3–8 in. high, more or less pubescent; leaves sessile or shortly petioled, falcately cuneate or hatchet-shaped; apex rounded or subacute, base inequilateral, subauricled on the lower side, very rarely with a minute opposite leaf, the uppermost 3–5 leaves coarsely crenate above the middle, .5–1.3 in. long, .4–.75 in. wide, those below much smaller and often entire; cystoliths numerous on both sides; receptacles solitary; ♀ bracts confluent below into a fleshy disk, the tips produced beyond the florets, acute, ciliate ..... 4. *cuneatum*. ♂ receptacles long-peduncled; leaves sessile, subfalcately oblong-lanceolate, subcaudately acuminate, coarsely subserrately toothed from above the lower one-third, usually for a shorter distance on the upper margin; base inequilateral, subacute, sometimes subauricled, 2–7 in. long, .6–1 in. wide, the lowest much reduced; ribs distinct, rather broad; cystoliths numerous; stipules short, broad; receptacles solitary or twin; sometimes the 2 sexes from the same axil, ♂ with a long, succulent peduncle, 1–1.8 in. long, glabrous, up to .4 in. in diam. with rounded membranous bracts; ♀ sessile, much smaller, silvery ..... 5. *Wightii*. Normal leaves subtended by small filiform, linear, lanceolate or oblong, subopposite, usually deflexed, very small ones, very variable, sessile or shortly petioled, subfalcately lanceolate or ovate, acuminate or the lower rounded; base inequilateral, acute or subauricled on the lower side, .4–3.5 in. long, .2–1.3 in. wide, crenate-serrate in the upper half or sometimes with only 2 teeth on either side of the apical one; glabrous, ribs distinct, rather broad; cystoliths numerous above, obscure below; ♂ receptacles very long- or short-peduncled, the outer bracts usually horned; ♀ smaller, sessile ..... 6. *surculosum*.

1. *ELATOSTEMMA* *SESSILE*, Forst.; F. B. I. v. 563.

W. Gháts in evergreen woods, 5,000–7,000 ft.

A herb 1–2 ft. high, usually prostrate and rooting below.

Var. *cuspidata*, Wedd.; F. B. I. v. 564. *E. cuspidata*, Wight Ic. t. 1983 (not 2091, fig. 1). Leaves glabrous or setose above, pubescent on the nerves beneath.

Var. *pubescens*, Hook. f.; F. B. I. v. 564. Stem and leaves more or less subtrigonesely tomentose.

W. Gháts in evergreen forests from 1,800–7,500 ft. Vizagapatam Hills at 4,000 ft. (A. W. Lushington).

A herb or undershrub, very variable in foliage and habit.

Var. *falcigera*, Thw. Branchlets more or less fuscous or tawny-tomentose; leaves falcately linear-lanceolate, entire or with one or two teeth.

Var. *linearis*, Thw. Leaves linear, entire or with 1–2 large teeth, ribs and nerves obscure.

3. *ELATOSTEMMA ACUMINATUM*, Brongn.; F. B. I. v. 566.

Nilgiri and Anamalai (Beddome, Fischer) Hills at about 4,000 ft. Rare.

A much branched undershrub, woody below.

4. *ELATOSTEMMA CUNEATUM*, Wt. Ic. t. 2091, fig. 3; F. B. I. v. 568.

Rampa District at 2,000 ft. on Peddakonda near Maradumalli (V. Narayanswami). The only record for the area.

A small, slender herb.

5. *ELATOSTEMMA WIGHTII*, Hook. f.; F. B. I. v. 570.

At Avalanche in the Nilgiri Hills (Wight), Anamalai Hills (Beddome).

A succulent herb.

6. *ELATOSTEMMA SUBCULOSUM*, Wt. Ic. t. 2091, fig. 4; F. B. I. v. 572.

W. Gháts in evergreen forests, 5,000–7,000 ft.

A small rather succulent herb, often growing on rocks and tree-trunks in cool, shady places.

## 6. Procris, Juss.

Succulent herbs or shrubs. Leaves alternate or, as in *Elatostemma*, with a very small leaf opposite or subopposite to the normal one; base unequal, cystoliths linear. Flowers monoecious, axillary, mostly in the axils of fallen leaves, ♂ in small cymes or clusters, ♀ aggregated on a fleshy, peduncled receptacle. Perianth of ♂ 5-partite, lobes ovate, fleshy, of ♀ of 3–5 obovate, cucullate, fleshy sepals. Stamens 5. Staminodes 0. Pistillode rudimentary, globose or obovate. Ovary ovate; stigma sessile. Achene ovate or ellipsoid, subacute, striate. Embryo turkinate.



**PROCRIS WIGHTIANA**, Wall. *ex* Wedd. *P. laevigata*, Bl. in part; F. B. I. v. 575.

**W.** Gháts and hills of the Carnatic in evergreen forest and in cool moist places from 4,000–6,500 ft.

A succulent, branched herb. Normal leaves shortly petioled, lanceolate or oblanceolate, acuminate or caudate; base tapering, 2·5–7 in. long, ·6–1·5 in. wide, crenate-serrate from a little above the base or higher, rarely nearly entire, quite glabrous, primary nerves 5–7 pairs, distinct. ♀ réceptacles small, usually several in each axil.

### 7. *Pilea*, Lindl.

**Herbs.** *Leaves* in opposite equal or unequal pairs, 3-ribbed, serrate, usually with numerous, minute linear (in our species) cystoliths which look like appressed hairs when the leaf is dry; stipules connate, intrapetiolar. *Flowers* minute, monoecious or dioecious, in axillary, peduncled, dichotomous cymes; bracts small or 0. *Perianth* of ♂ of 2–4 free or connate sepals, often gibbous or spurred, of ♀ of 3 (rarely 4) unequal sepals, the dorsal longest, sometimes gibbous or spurred. *Stamens* 2–4. *Pistillode* minute, conic or oblong. *Staminodes* minute or 0. *Ovary* straight; ovule erect; stigma sessile, penicillate. *Achene* ovoid, oblong or suborbicular, compressed, smooth or granulate. *Seed* erect; albumen scanty; cotyledons broad.

Stipules caducous, small, ovate, acute; lateral ribs of nerves curved and more or less converging towards the apex:—

Lateral ribs of leaves evanescent before reaching the apex, primary nerves not numerous, nor regular and parallel; petioles glabrous; achenes smooth or very slightly granular:—

Leaves ovate or rotund-ovate, usually about 1 in. long (up to 2 in. long, 1·25 in. wide), acuminate; base subcordate, sharply, narrowly serrate to just below the apex; lateral ribs evanescent a short distance below the apex, quite glabrous, usually punctate below; petioles ·3–1·25 in. long; cymes peduncled, open; sepals spurred; achenes ovoid, apex narrowed, smooth

1. *Wightii*.

Leaves ovate-lanceolate to subrotund, 1–6 in. long, terminating

below; petioles 4-3.2 in. long; cymes peduncled, open, sepals rounded, not spurred; achenes suborbicular, apex rounded, smooth or slightly granular.....2. *Kingii*.

Leaves narrowly lanceolate to broadly ovate, sometimes falcate, acuminate or finely caudate, 2.25-10 in. long, .75-4.25 in. wide, sharply serrate; lateral ribs prolonged right into the apex; primary nerves numerous, regular, nearly straight, parallel between the ribs; petioles 1.3-5 in. long, often hairy at least just below the blade; cymes peduncled, open; achenes granular .....3. *trinervia*.

Stipules subpersistent, large, linear-oblong to oblong, 1 in. long or more; apex rounded; leaves elliptic, acuminate, 3-5 in. long, 1.5-2.5 in. wide; lateral ribs nearly straight, not converging towards the apex, crenate-serrate; petioles 1.3-1.75 in. long; peduncles short, cymes shorter than the petioles, aggregated; achenes smooth...4. *stipulosa*.

1. *PILEA WIGHTII*, Wedd.; F. B. I. v. 554. *P. radicans*, Wt. Ic. t. 1974.

Evergreen forests of the W. Gháts, 4,000-7,500 ft.

A flaccid herb.

2. *PILEA KINGII*; C. Fischer in Kew Bull. 1927, 76. *P. Wightii*; Wedd. var. *macrophylla*, Hook. f.; F. B. I. v. 555.

Evergreen forests of the W. Gháts, 5,000-7,000 ft.

A glabrous herb similar to the last species but more robust.

3. *PILEA TRINERVIA*, Wt. Ic. t. 1973; F. B. I. v. 557.

Evergreen forests of the W. Gháts, 2,000-8,000 ft. Kolli-malais of Trichinopoly District (Barber).

A robust succulent herb up to 7 ft. high with swollen internodes.

4. *PILEA STIPULOSA*, Miq.; F. B. I. v. 555.

Pulney Hills; Gundattu Shola (Bourne).

A stout herb at once recognized by the large stipules which, like the leaves, bear innumerable linear cystoliths, these, however, here are black (at least when dry).

*Pilea microphylla*, Liebm. *P. muscosa*, Lindl.; F. B. I. v. 551, the Gunpowder or Artillery Plant, is a small prostrate species with very small rotund or spatulate, entire leaves which is grown in borders in gardens and has run wild in many

8. *Pellionia*, Gaud.

Herbs. *Leaves* distichous, alternate or subopposite, but appearing alternate by the suppression or excessive reduction of one of each successive pair, inequilateral, entire or serrate, 3-ribbed or penninerved, with numerous linear cystoliths; stipules usually large. *Flowers* monoecious or dioecious, in open or contracted, sometimes capituliform, bracteate, peduncled, axillary cymes (not seated on a receptacle). *Perianth* of ♂ 5-partite, segments acute, with a membranous margin, mucronate on the back, of ♀ deeply 5-partite; segments equal or unequal, mucronate below the apex. *Stamens* 5. *Pistillode* conical. *Staminodes* 5, scale-like. *Ovary* elliptic. *Achene* broadly ovate, more or less compressed. *Seed* subexalbuminous; radicle conical.

PELLIONIA HEYNEANA, Wedd.; F. B. I. v. 561.

In evergreen woods in the W. Gháts, 1,500–6,000 ft.

A herb; stem woody and creeping below; the tips hairy. *Leaves* alternate or subopposite, with one of the pair very small, falcate, linear-lanceolate to broadly lanceolate, acuminate or caudate, base 3-ribbed, narrowed and unequally cordate, 2–9 in. long, .75–3.5 in. wide, quite glabrous or the ribs beneath pilose, quite entire; petiole short; stipules narrow-ensiform, aristate, up to .5 in. long. *Peduncles* short or long, glabrous or hairy.

9. *Chamabaina*, Wight.

Diffuse herbs. *Leaves* opposite, equal or nearly so, 3-ribbed, serrate; cystoliths punctiform; stipules paired, free, conspicuous, persistent, enclosing the young flower-clusters. *Flowers* monoecious (or dioecious?), in axillary, bracteolate clusters; ♂ shortly pedicelled in the upper axils, ♀ clusters dense. *Perianth* of ♂ valvately 4-lobed, lobes mucronate, hairy, of ♀ tubular, compressed, minutely 4-toothed, hirsute. *Stamens* 4. *Pistillode* rudimentary, clavate. *Ovary* included; ovule erect; stigma ovate, fimbriate, spreading. *Achene* compressed, ovate, acute, enclosed in the persistent perianth; pericarp crustaceous. *Seed* albuminous; cotyledons ovate.

CHAMABAINA GUSNIDATA, Wt. Ic. t. 1981. F. B. I. v. 580.

A small diffuse, pubescent herb. Leaves ovate to subrotund, acute, base rounded or acute, 3-1.25 in. long, .2-.7 in. wide, bluntly or acutely serrate; stipules scarious, 4 to each node.

10. *Pouzolzia*, Gaud.

Herbs or undershrubs. *Leaves* alternate, opposite or ternate, 3-ribbed, usually entire, often reduced in size upwards and passing into bracts; cystoliths punctiform; stipules free, often persistent. *Flowers* minute, usually monoecious, in 1-sexual or androgynous, usually sessile clusters in the axils of the leaves or the bracts, never spicate, but sometimes appearing so by the reduction of the upper leaves; bracteoles small; florets pedicelled. *Perianth* of ♂ 4-5 (rarely 3-) partite or -lobed, the lobes either concave or transversely plicate and abruptly inflexed making the bud truncate, of ♀ tubular, mouth contracted, 2-4-toothed. *Stamens* 4-5 (rarely 3). *Pistillode* clavate or oblong. *Ovary* included; ovule erect; stigma filiform, jointed to the top of the ovary, deciduous. *Achene* enclosed in, but usually free from, the winged or wingless, persistent perianth. *Seed* with a membranous testa; albumen very scanty or 0; cotyledons ovate.

The species are, for the most part, very variable in habit, foliage, flowers and indumentum, so that their classification into species and varieties is a matter of considerable difficulty.

♂ perianth lobes convex or gibbous, buds rounded or acute:—

Leaves opposite or alternate, linear, lanceolate, elliptic, ovate-lanceolate or broadly ovate, apex blunt or acute, base narrowed or rounded and then abruptly, shortly acute, hoary-pubescent, hirsute or glabrate, .4-3.5 in. long, .2-1.5 in. wide, primary nerves 1 pair, lateral ribs not forked; flowers usually strigose, ♂ 4- (rarely 5-) merous; fruit 2-4-winged or not .....1. *indica*.

Lateral ribs of leaves forked, ♂ flowers 5-merous:—

Leaves alternate, ovate-lanceolate to rotund-ovate, acute or acuminate, base narrowed or rounded, .6-5.5 in. long, .2-2.3 in. wide, glabrous or pubescent above, and if the latter also on the sub-prominent ribs and nerves, pubescent or villous below; petioles .1-3 in. long; flowers in sessile clusters in the axils,

base rounded, truncate or subcordate, .8-3 in. long, .4-1.8 in. wide, more or less pubescent above except on the impressed ribs and nerves, pubescent below, at least on the ribs and nerves; petioles up to .5 in. long; flowers axillary, cymose, hirsute; fruit smooth or strongly ribbed, not winged .....3. *cymosa*.

♂ perianth lobes plicate and abruptly inflexed at about the middle; buds truncate :—

Stems running out into terminal or axillary spikes :—

Spikes all axillary; leaves ternate, sessile, lanceolate, acuminate, base rounded or cordate, 2-7 in. long, .4-1.2 in. wide, glabrous; flowers in sessile clusters on solitary or binate, flexuous, bracteolate, scabrid-puberulous spikes up to 9 in. long; ♂ 4-merous, nearly glabrous; fruit winged or not .....4. *Meeboldii*.

Spikes terminal, sometimes also a few from the upper axils :—

Leaves ternate, opposite or alternate, linear to narrowly lanceolate, acute or acuminate; base rounded or narrowed, shortly petioled or sessile, up to 6 in. long, 1 in. wide, reduced upwards and merging into the floral bracts, glabrous or somewhat pubescent and usually hispidulous on the ribs below; flowers in the axils of leaves or bracts in sessile clusters; ♂ 5-merous, ciliate at the flexure, ♀ hirsute, fruit winged

.....5. *pentandra*.

Leaves ternate, opposite or alternate, very variable in shape, size and indumentum, up to 6 or 7 in. long, reduced upwards and merging into the floral bracts; flowers in sessile clusters in the axils of leaves or bracts; ♂ 3-4- (rarely 5-) merous; fruit winged or not .....6. *Wightii*.

Stem not running out into a bracteate spike, upper leaves not reduced to bracts or markedly smaller; leaves very variable, from ovate to narrow-lanceolate, usually acuminate, base acute, rounded or subcordate, 3-5-ribbed, up to 7 in. long and 2.5 in. wide; flowers in sessile, axillary clusters; ♂ 5- (rarely 4-) merous; fruit winged or not .....7. *Bennettiana*.

1. *POUZOLZIA INDICA*, Gaud.; F. B. I. v. 581; Wt. Ic. tt. 1980, fig. 1, 2100, fig. 40. *P. procumbens*, Wt. Ic. t. 2099, fig. 35. *P. diffusa*, Wt. Ic. t. 2099, fig. 36. *P. tetraptera*, Wt. Ic. t. 2100, fig. 42, excl. ♂ bud. *P. minor*, Wt. Ic. t. 2100, fig. 43. *P. pilosa*, Wt. Ic. t. 2101, fig. 46. *P.*

In all districts, sea-level to 6,000 ft.

A very variable, slender, erect or procumbent, hirsute or pubescent herb.

2. *POUZOLZIA AURICULATA*, Wt. Ic. tt. 1980, fig. 2, 2099, fig. 37; F. B. I. v. 582. *P. rostrata*, Wt. Ic. tt. 1980, fig. 3, 2099, fig. 34. *P. rotundifolia*, Wt. Ic. t. 2098, fig. 31, excl. ♂ bud. *P. elliptica*, Wt. Ic. t. 2098, fig. 32. *P. bicuspidata*, Wt. Ic. t. 2098, fig. 33, excl. ♂ bud. *P. Rheedii*, Wt. Ic. t. 2099, fig. 38. *P. scabrida*, Wt. Ic. t. 2100, fig. 41. *Urtica vesicaria*, Roxb.; Wt. Ic. t. 695.

In all districts, near sea-level to 6,500 ft.

A flaccid or stout, usually tall herb.

3. *POUZOLZIA CYMOSA*, Wt. Ic. t. 1979, fig. 2. *P. auriculata*, Wight, var. *cymosa*, Hook. f.; F. B. I. v. 582.

In the Nilgiri, N. Coimbatore, Shevaroy and Kollimalai Hills, 4,000–6,000 ft.

A herb.

4. *POUZOLZIA MEEBOLDII*; W. W. Smith et Ramas.

At Kavalay in Cochin (Meebold), Anamalais (Wight?), Peermade in Travancore (Venkoba Rao).

An erect undershrub.

5. *POUZOLZIA PENTANDRA*, Benn.; F. B. I. v. 583; Wt. Ic. t. 2096, fig. 20. *Urtica pentandra*, Roxb.; Wt. Ic. t. 696.

W. Gháts in Mysore (Meebold), S. Kanara, Nilgiri District, Palghat and N. Coimbatore (Fischer).

An erect, rigid herb, 2–3 ft. high. Apparently not common.

6. *POUZOLZIA WIGHTII*, Benn.; F. B. I. v. 584; Wt. Ic. t. 2093, fig. 8. *P. ternata*, Wt. Ic. t. 2093, fig. 7. *P. concinna*, Wt. Ic. t. 2093, fig. 9. *P. ambigua*, Wt. Ic. t. 2095, fig. 19. *P. trialata*, Wt. Ic. t. 2096, fig. 22. *P. longifolia*, Wt. Ic. t. 2093, fig. 6.

All districts, about 1,000–7,000 ft.

A very variable, usually tall and robust herb, with many varieties, of which only the following seem to be really distinguishable from the type.

Var. *nilghirensis*, Hook. f.; F. B. I. v. 584. *P. neilgherrensis*, Wt. Ic. t. 2097, fig. 26. *P. ovata*, Wt. Ic. t. 2096, fig. 24. *P.*



long, 3 in. wide, scabrid above, tomentose below; ♂ sepals hirsute above the flexure. Range of the type.

Var. *Wallichiana*, Hook. f.; F. B. I. v. 584. *P. Wallichiana*, Wt. Ic. t. 2096, fig. 23.

Very like the last, but leaves usually narrower; floral leaves closer and longer; ♂ sepals glabrous. A very doubtfully valid variety. I have seen only two specimens collected by Wight in the Iyamalai Hills near Coimbatore.

Var. *Lawsoniana*, Fischer.

Stem terete and glabrous, rhachis of spike more or less quadrangular and hirsute; cauline leaves subrotund to elliptic, mucronate or acuminate, 1-6 in. long, .75-2.25 in. wide, glabrous; petioles .1-5 in. long; floral leaves sessile, ovate-lanceolate to broadly cordate, glabrous; ♂ sepals glabrous.

Naduvattam in the Nilgiri Hills (Lawson, ex Herb. Gamble, No. 12933), Shevaroy (Bourne), Anamalais (Beddome), Pulneys (Saulière, Bourne, Barber), Travancore (Barber).

Var. *scabra* Fischer. *P. scabra*, Wt. Ic. t. 2097, fig. 29; F. B. I. v. 584. *P. aspera*, Wt. Ic. t. 2095, fig. 18.

Everywhere scabrid; spikes sometimes axillary as well as terminal and sometimes paniced. W. Gháts, 1,000-7,000 ft. Horsleykonda in the Chittoor District.

Var. *caudata* Fischer. *P. caudata*, Benn.; F. B. I. v. 585; Wt. Ic. t. 2097, fig. 27. *P. courtallensis*, Wt. Ic. t. 2093, fig. 10.

Stem slender, glabrous; cauline leaves lanceolate to ovate-lanceolate, acuminate, up to 6 in. long and 1.5 in. wide, sessile or nearly so, glabrous; spikes (sometimes paniced) slender, pubescent; bracts becoming very small, cordate, glabrous. ♂ sepals glabrous. W. Gháts.

7. *POUZOLZIA BENNETTIANA*, Wt. Ic. t. 1978; F. B. I. v. 585. *P. heterocarpa*, Wt. Ic. t. 2094, fig. 14.

W. Gháts.

An erect, variable herb with several fairly well-defined varieties.

Var. *macrophylla*, Hook. f.; F. B. I. v. 586.

Var. *tomentosa*, Hook. f.; F. B. I. v. 586. *P. tomentosa*, Wt. Ic. t. 2094, fig. 11.

Everywhere villously tomentose; leaves up to 2.5 in. long and .8 in. wide.

Nilgiri and Pulney Hills above 6,000 ft.

Var. *Gardneri*, Hook. f.; F. B. I. v. 586. *P. Gardneri*, Wt. Ic. t. 2092, fig. 5.

Shrubby, prostrate or decumbent, sparsely hairy; branches, leaves above and ribs below dark brown when dry; leaves ternate or opposite; ♂ sepals more or less hispid above the flexure.

Nilgiri and Pulney (Fischer) Hills at high elevations; Mahendragiri in Ganjam (Fischer) at 4,500 ft.

Var. *ovalifolia*, Hook. f.; F. B. I. v. 586. *P. ovalifolia*, Wt. Ic. t. 2092, fig. 3.

Stem prostrate, slender, glabrous; leaves elliptic-ovate, up to 3 in. long, petioled, scaberulous above, smooth below; ♂ sepals glabrous.

Nilgiri, Pulney (Bourne) and Sirumalai (Bourne) Hills.

Var. *quadrialata*, Hook. f.; F. B. I. v. 586. *P. quadrialata*, Wt. Ic. t. 2094, fig. 12.

Stem prostrate or decumbent, woody below, tomentose above; leaves softly pubescent above, tomentose below, up to 3 in. long; ♂ sepals tomentose or villous above the flexure.

Var. *mysorensis*, Hook. f.; F. B. I. v. 586. *P. mysorensis*, Wt. Ic. t. 2092, fig. 4, excluding the magnified leaves.

Stem slender, 4-angled; leaves flaccid, long-petioled; ribs prominent; ♂ sepals quite glabrous.

Var. *acuta* Fischer. *P. acuta*, Wt. Ic. t. 2092, fig. 2. *P. heterocarpa*, Wt. var. Ic. t. 2094, fig. 13.

Erect; stems sparsely pubescent upwards; leaves ternate or opposite, elliptic, long-acuminate, up to 4 in. long and 1.5 in. wide, sparsely pubescent; ♂ sepals ciliate on the flexures.

early fall of the stigma) of 3-4 valvate sepals, of ♀ tubular, 4-fid. *Stamens* 3-4, inflexed in bud. *Ovary* straight; ovule erect; stigma recurved, penicillate. *Achene* enclosed in the persistent perianth. *Seed* with copious albumen; cotyledons oblong.

**PARIETARIA DEBILIS**, Forst.; F. B. I. v. 593.

Nilgiri Hills in the sholas at high elevations.

A small, diffuse, flaccid, pubescent herb. Leaves broadly ovate or suborbicular, narrowed to a blunt apex, base rounded, .25-1 in. long; petioles .1-5 in. long. Flowers minute, in 3-7-flowered, axillary cymes.

## 12. *Droguetia*, Gaud.

Slender herbs. *Leaves* alternate or opposite, serrate, cystoliths punctiform; stipules lateral, free. *Flowers* in small, androgynous or 1-sexual, axillary, campanulate, scabrid involucre. *Perianth* of ♂ tubular-clavate, 3-5-fid, of ♀ 0. *Stamen* 1. *Pistillode* 0. *Ovary* straight, woolly; ovule erect; stigma filiform, hispid, persistent. *Achene* ovoid, compressed, woolly. *Seed* with scanty or no albumen; cotyledons broad.

**DROGUETIA DIFFUSA**, Wedd.; F. B. I. v. 593. *Forskohlia urticoides*, Wt. Ic. t. 1982.

Nilgiri, Pulney and Travancore (Meebold) Hills in shady places, 6,000-7,000 ft.

A small, diffuse herb. Leaves opposite, ovate, acuminate, coarsely serrate, .5-2.3 in. long, .3-1.3 in. wide, hispidly hairy above and on the ribs and nerves below; petioles .2-1 in. long. Flowers minute, in 1- or more-flowered axillary involucre.

## 13. *Boehmeria*, Jacq.

Shrubs or small trees. *Leaves* opposite or alternate, toothed, 3-ribbed, cystoliths punctiform; stipules usually free. *Flowers* monoecious or dioecious, in 1-sexual (rarely androgynous) clusters sessile in the axils or in axillary spikes, racemes or panicles. *Perianth* of ♂ valvately 3-5-lobed or -partite, of ♀ tubular,

first closely invested by the perianth, later free. Seed albuminous; cotyledons ovate.

Leaves alternate, equal or alternately large and small, narrowly or broadly ovate, acuminate or finely caudate, base rounded or subacute, rarely subcordate, crenulate or serrulate, with small, bluntish teeth, sometimes nearly entire, 2-8 in. long, 1-4 in. wide, glabrous or rarely with a few hairs above, pubescent below; petioles 1-4 in. long; flowers in small axillary clusters ..... 1. *malabarica*.

Leaves opposite, rarely alternate, subequal, very variable, suborbicular to ~~ovate~~, acuminate or finely caudate, base rounded or cordate, coarsely, triangularly, acutely serrate with large teeth, 3-10 in. long, 1-5-8 in. wide, more or less hairy above, with hairs often with bulbous bases, pubescent below (tomentose in one variety); petioles up to 7 in. long; flowers in clusters on long axillary spikes... 2. *platyphylla*.

1. **BOEHMERIA MALABARICA**, Wedd.; F. B. I. v. 575.

Evergreen forests of the W. Gháts, 1,000-4,000 ft.

A large shrub or small tree. Bark thin, greyish-brown.

2. **BOEHMERIA PLATYPHYLLA**, Don.; F. B. I. v. 578.

Hills of the Northern Circars, 2,000-4,000 ft. Darangabadi in Ganjam (Barber), Mahendragiri (Fischer), Rampa (Gamble, Narayanswami).

A spreading shrub.

Var. *tomentosa*, Wedd.; F. B. I. v. 578. Leaves softly tomentose or villous on both sides, the young shoots shaggy; spikes stout.

Endrika in the Vizagapatam Hills at 5,000 ft. (A. W. Lushington).

Var. *longissima*, Hook. f.; F. B. I. v. 579. *Splitgerbera macrostachya*, Wt. Ic. t. 1977.

Leaves ovate; spikes very long and fine, usually much longer than the leaves, up to 20 in. long, drooping.

Clusters and spikes rarely androgynous.

*B. nivea*, Hook. & Arn.; F. B. I. v. 576. *Urtica tenacissima* Roxb.; Wt. Ic. t. 688.

A shrub cultivated ornamentally or for its fibre. The Rhea Plant.

Leaves ovate or broadly ovate, acuminate, scabrid

14. *Villebrunea*, Gaud.

Trees or large shrubs. *Leaves* alternate, penninerved or 3-5-ribbed, entire or crenulate; cystoliths punctiform; stipules bifid. *Flowers* monoecious or dioecious, clustered, clusters axillary, sometimes in short cymes or panicles, bracts minute. *Perianth* of ♂ 3-5- (usually 4-) fid, of ♀ tubular, ovoid, narrowed to a minute, toothed mouth. *Stamens* 3-5, usually 4. *Pistillode* obovate-clavate, pilose below. *Ovary* adnate to the perianth; ovule erect; stigma discoid, ciliate-fimbriate. *Achene* free or adnate to the perianth, embraced below by the marcescent, fleshy bracteoles. *Seed* amply albuminous; cotyledons broad.

*VILLEBRUNEA INTEGRIFOLIA*, Gaud.; F. B. I. v. 589.

W. Gháts, 900-4,500 ft.

A small, evergreen tree. *Leaves* lanceolate or oblanceolate, acuminate or subcaudate, base narrowed, 2.5-10 in. long, .9-2.5 in. wide, penninerved, primary nerves 8-9 pairs, entire or somewhat crenulate, glabrous above, pubescent on the nerves below; petioles .25-1.25 in. long, usually pubescent. *Flowers* in globose clusters in shortly peduncled, dichotomous, hispid cymes, usually from the axils of fallen leaves.

15. *Debregeasia*, Gaud.

Trees or shrubs. *Leaves* alternate, 3-ribbed, serrate or entire, petioled, cystoliths punctiform; stipules connate, intrapetiolar, 2-fid. *Flowers* monoecious or dioecious, in dense, globose, paniced or spicate sessile clusters. *Perianth* of ♂ of 3-5, usually 4, valvate sepals, of ♀ tubular, ovoid or obovoid, mouth contracted and minutely toothed. *Stamens* 3-5, usually 4. *Pistillode* ellipsoid, glabrous or woolly at the base. *Ovary* straight, included; ovule erect; stigma sessile, penicillate. *Achene* at first adnate to the persistent, fleshy perianth. *Seed* with copious or scanty albumen; cotyledons short, broad.

Branchlets slender, pilose; leaves linear- to oblong-lanceolate, acute or acuminate, base rounded, 2-9 in. long, .4-2.5 in. wide, closely serrulate, rugose, pubescent or scabrid above, below white- or ashy-tomentose and lacunose and pilose on the ribs and nerves; petioles

rotund-ovate, apex suddenly and finely cuspidate, base rounded or subcordate, 4-9 in. in diam., quite entire, glabrescent and dark above, white or ashy tomentose below, primary nerves 3-4 pairs above the lateral ribs; petioles 1-7-9 in. long, thinly woolly or glabrous; flowers in larger heads in long-peduncled, paniced cymes from the axils of the terminal leaves; peduncles 2-4 in. long.....2. *ceylanica*.

1. **DEBREGEASIA VELUTINA**, Gaud.; F. B. I. v. 590. *Conocephalus niveus*, Wt. Ic. t. 1959.

W. Gháts, 1,000-6,000 ft.; fairly common.

A small tree, the branches rough with warty excrescences and the scars of fallen leaves. Bark greyish-brown; wood reddish-brown, used only for charcoal; the fibre useful for fishing-lines. Fruit yellow when ripe. Vern. Tam. Katunochchi.

2. **DEBREGEASIA CEYLANICA**, Hook. f.; F. B. I. v. 592.

Anamalai Hills of Coimbatore (Fischer) and hills of Travancore (Rama Rao, Venkoba Rao), 2,000-3,500 ft.

A small tree, very little known in South India.

#### Family CXL. CASUARINACEAE.

Trees or shrubs with cylindric, jointed branchlets. Leaves reduced to subulate scales, connate at the base to form short sheaths at the nodes. Flowers minute, monoecious or dioecious, ♂ in slender terminal spikes, ♀ in ovoid or globose bracteate and 2-bracteolate heads. Perianth of ♂ of 1-2 scarious sepals, of ♀ 0. Stamen 1, inflexed in bud; anther large. Ovary minute, 1-celled (or 2-celled with one suppressed); ovules 2, collateral; stigmas 2, long, filiform. Carpophore forming a cone with the achenes enclosed in the enlarged, coriaceous or woody bracteoles. Seed with a terminal wing, tipped by the style; albumen 0; embryo straight; cotyledons flat, equal; radicle very short, superior.

*Casuarina*, Forst.

The only genus with the characters of the family.

**CASUARINA EQUISETIFOLIA**, Forst.; F. B. I. v. 598.

Extensively planted on the sea-shore sands along both coasts and to a certain extent inland and up to about



peeling in vertical strips; wood yellowish-pink to reddish-brown, very hard; useful for scaffolding poles and an excellent fuel. Scales in whorls of 6-8, usually 7; teeth acute or setaceous; internodes rarely exceeding .25 in long, rather prominently ribbed. Valves of the cone pubescent outside. Vern. *Ur.* Jhabuko; *Tel.* Savuku, Chavukku; *Tam.* Chauku, Chavukku; *Mal.* Sampirani; *Kan.* Kasrike.

Other species, e.g. *C. quadrivalvis*, Labill., *C. suberosa*, Ott. & Diet., *C. glauca*, Sieb., have been planted in the Nilgiri Hills.

#### Family CXLI. SALICACEAE.

Trees or shrubs. *Leaves* alternate, simple, stipulate. *Flowers* dioecious (rarely monoecious), in close bracteate spikes (catkins), one flower to each bract, ebracteolate. *Perianth* 0. *Disk* cupular or of 1 or more scales or glands. *Stamens* 2 or more; filaments free or connate. *Ovary* sessile or stalked, 1-celled; ovules few-many, erect; style short or 0; stigmas short, notched or lobed. *Capsule* ovoid or lanceolate, 2-4-valved. *Seed* with a pencil of long, silky, deciduous hairs; albumen 0; cotyledons plano-convex; radicle short, inferior.

#### *Salix*, Linn.

Characters of the family. *Stamens* 2-12 (usually 2). *Disk* of 2 fleshy or glandular scales. *Ovules* 4-8.

*SALIX TETRASPERMA*, Roxb. Cor. Pl. t. 97; F. B. I. v. 626; Wt. Ic. t. 1954; Bedd. Fl. Syl. t. 302; Brand. For. Fl. t. 58. *S. ichnostachya*, Lindl.; F. B. I. v. 628; Wt. Ic. t. 1953.

\* In all Districts up to 8,000 ft.; usually near streams. The Indian Willow.

A small or fairly large tree. Bark rough with deep, vertical fissures, greyish-brown; wood red, soft, porous, not much used, makes good gunpowder-charcoal; the twigs are woven into baskets. Leaves linear- to ovate-lanceolate, acuminate, base narrowed or rounded, 2-6 in. long, .4-2.25 in. wide, entire or serrate; petioles up to 1 in. long. Flowers in lax or dense-flowered catkins, which are nearly glabrous, pubescent, villous or densely tomentose. Vern. *Hind.* Bains; *Ur.* Baisi; *Tam.* Vanji, Nirvanji; *Mal.* Vanji; *Kan.* Baiché.

## Family CXLII. CERATOPHYLLACEAE.

Slender, submerged water-herbs. *Leaves* whorled, dichotomously cleft into filiform minutely-toothed lobes; stipules 0. *Flowers* minute, monoecious, solitary, axillary, sessile. *Perianth* (or involucre) of both sexes of 6-12 narrow subvalvate, 2-fid segments. *Stamens* 12-30; filaments very short; anthers erect, extrorse, connective truncate or 2-3-toothed at the apex. *Ovary* sessile, ovoid, 1-celled; ovule 1, pendulous, straight; style subulate, stigmatic on one side. *Fruit* a small coriaceous, ovoid or ellipsoid, somewhat compressed nutlet terminating in the persistent long style and furnished on either side with a long subulate spur projecting from a little above the base, sometimes narrowly winged. *Seed* exalbuminous; embryo straight; cotyledons thick; radicle short, inferior.

*Ceratophyllum*, Linn.

The only genus, with the characters of the family.

CERATOPHYLLUM DEMERSUM, Linn.; F. B. I. v. 639. *C. tuberculatum*, Cham.; Wt. Ic. t. 1948, fig. 3. *C. muricatum*, Cham.; Wt. Ic. t. 1948, figs. 1 and 2. *C. missionis*, Wall.; Wt. Ic. t. 1948, fig. 4.

In all Districts, in still water.

A fragile alga-like herb 6 in.-3 ft. long. *Leaves* 5-1 in. long. *Fruit* up to 2 in. long, smooth, muricate or minutely tubercled.

## Family CXLIII. GNETACEAE.

Trees or shrubs, sometimes climbing; branches jointed at the nodes. *Leaves* opposite, large and green or minute and scale-like; stipules 0. *Flowers* monoecious or dioecious, in axillary or terminal bracteate spikes or cones. *Perianth* of ♂ tubular, entire or valvately 2-4-lobed or spathaceous, of ♀ 0. *Stamens* connate in a column; anthers 2-8, globose, 1-3 celled, sessile or subsessile on the apex of the column. *Ovule* naked, erect, with a styliiform tube with a discoid mouth. *Seed* dry or drupaceous; albumen copious or scanty; embryo straight; cotyledons

## Gnetum, Linn.

Evergreen trees or climbing shrubs. *Leaves* large, entire, penninerved. *Flowers* monoecious, whorled in the axils of cupular bracts in solitary or paniced spikes. *Perianth* of ♂ narrowly clavate, entire or valvately 2-fid. *Staminal column* adnate to the base of the perianth, apex exserted; anthers of 2 distinct cells, sessile, opening by terminal slits. *Ovule* ovoid or globose; styliform tube exserted, mouth often toothed or fimbriate. *Seed* drupaceous.

GNETUM SCANDENS, Roxb.; F. B. I. v. 642. *G. funiculare*, B. Sm.; Wt. Ic. t. 1955.

In the Gháts of both sides of the Peninsula, 500–5,000 ft. A large, robust climber. Bark thick, brown, rough with scales. Leaves ovate-oblong or elliptic, obtusely acuminate, shining, 3–7 in. long, 1.75–4 in. wide; petioles 3–5 in. long. Fruit ellipsoid, pointed or blunt, 1–1.5 in. long, reddish-orange when ripe. Vern. *Tam.* Ana-pendu.

## Family CXLIV. CONIFERAE.

Trees or shrubs; resin-canals in the wood frequent. *Leaves* usually alternate or fascicled, rarely opposite, usually rigid, linear or subulate, rarely broad. *Flowers* monoecious or dioecious, ♂ in deciduous catkins, ♀ solitary or in cones. *Perianth* absent in both sexes. ♂ of many 1- or more-celled anthers seated on the scales of the catkin, sessile or with connate filaments; ♀ of 1 or more naked sessile ovules seated on scales usually forming a cone, rarely solitary. *Seeds* often winged; albumen densely fleshy; embryo axile, straight; cotyledons 2 or more; radicle terete.

## Podocarpus, L'Hérit.

Evergreen trees or shrubs. *Leaves* opposite or alternate, linear or broad with a midrib or with many parallel nerves. ♂ *flowers* solitary, fascicled or spicate, with imbricate bracts; anthers sessile, spirally crowded, 2-celled, connective with an

ovoid, seated on the enlarged fleshy scale and bract; cotyledons 2.

**PODOCARPUS WALLICHIANA**, Presl. *P. latifolia*, Wall. Pl. As. Rar. t. 30; F. B. I. v. 649; Bedd. Fl. Syl. t. 257.

W. Gháts from the Nilgiris southwards, 3,000–5,000 ft.

A tall evergreen, glabrous tree. Bark smooth, mottled brown and white; wood grey, aromatic, moderately hard. Leaves opposite or subopposite, coriaceous, lanceolate, tapering at both ends, 3-7 in. long, .75-2 in. wide; petiole very short, flat. Seed solitary, ovoid, 1 in. long, seated on a fleshy receptacle. Vern. *Tam.* Nirambali, Narambali; *Kad.* Karunthumbi.

Several conifers have been successfully planted in the Nilgiri and Pulney Hills. *e.g.* *Cupressus torulosa*, Don, *Pinus radiata* (*insignis*), Don, *Cryptomeria japonica*, Don, *Callitris* (*Frenela*) *rhomboidea*, R. Br.

**Family CXLV. CYCADACEAE.**

Shrubs or small branchless but sometimes forked trees with a terminal crown of leaves, or stemless with the leaves arising from a tuberous simple or branched rootstock. *Leaves* in alternate series of short coriaceous scales and palm-like pinnate (rarely 2-3-pinnate) leaves with membranous or coriaceous leaflets, often spinous. *Flowers* dioecious, in both sexes naked on scales or modified leaves more or less arranged in cones. *Anthers* sessile and crowded on the undersides of fleshy flat or peltate scales, 1-celled. *Ovules* on the margins of carpellary leaves (*carpophylls*) crowded round the apex of the stem, or on flat or thickened peltate scales arranged in cones, large, sessile. *Seeds* large, drupaceous; albumen copious, fleshy or horny, with 1 or more embryonic cavities; embryo usually single by abortion, slender; radicle superior; cotyledons 2.

**Cycas, Linn.**

Shrubs or trees; trunk clothed with the woody bases of the petioles. *Leaves* pinnate, linear-oblong in outline; leaflets numerous linear-lanceolate, entire, lustrous, green above, paler beneath.

ellipsoid in groups of 3-5. *Carpophylls* numerous, crowded round the apex of the stem, at first appressed into an apparently terminal cone, later spreading, elongate, flattened, expanded apically into an entire, crenate or pectinate blade, densely woolly. *Ovules* 1-5 on either side of the carpophyll below the blade, distant, alternate in notches along the margins. *Seeds* ellipsoid or globose.

Small palm-like trees. Leaves 5-9 ft. long; petioles 1.5-2 ft. long with short distant spines at right angles to the petioles or slightly deflexed, to near the glabrous base; leaflets 6-12 in. long, .3-.5 in. wide, blunt or acute, not spinous-acuminate, margins flat; acumen of all the antheriferous scales upturned; blade of carpophyll ovate-lanceolate, long-acuminate, margins pectinate; ovules 3-5 on either side; seeds ovoid-oblong, 1-1.5 in. long ..... 1. *circinalis*.

Low shrubs, stem only a few inches high. Leaves about 3 ft. long; petioles about 6 in. long, the upper one-third with a few minute spines, base clothed with tufted tomentum; leaflets 4-7 in. long, about .15 in. wide, spinous-acuminate, margins strongly revolute; acumen of the antheriferous scales of the upper half of the cone strongly deflexed; blade of carpophyll usually narrow-lanceolate, long-acuminate; margins dentate-lobate; ovules 2 on either side; seeds globose, 1.5 in. in diam. .... 2. *Beddomei*.

1. *CYCAS CIRCINALIS*, Linn.; F. B. I. v. 656.

In all Districts in deciduous forests, sea-level to 4,000 ft.

A small evergreen palm-like tree up to 25 ft. high. Bark brown, smooth below, tessellated above by the small diamond-shaped scars of fallen leaves. The leaves are used for plaiting into mats. Vern. *Ur.* Oruna, Rengua; *Tel.* Per-ita, Pairi-ita; *Tam.* Madana-kaman, Katu-thuvai; *Mud.* Pei-ithu; *Mal.* Kalanga, Intha. *Kan.* Goddu-ichel.

2. *CYCAS BEDDOMEI*, Dyer in Trans. Linn. Soc. ii, 5, 85, t. 17; F. B. I. v. 658.

So far only found in the hills of the Cuddapah District, 1,000-3,000 ft.

A small shrub. Bark brown, exfoliating in rectangular scales exposing a yellow under-surface. Vern. *Tel.*

## MONOCOTYLEDONES.

## Family CXLVI. HYDROCHARITACEAE.

Aquatic herbs, usually submerged. *Leaves* undivided. *Flowers* monoecious or dioecious, rarely 2-sexual, enclosed in an entire or 2-leaved spathe; ♂ 1-many, ♀ solitary. *Calyx* of 3 green or petaloid sepals. *Petals* membranous or 0. *Stamens* 3-12; anthers 2-celled. *Ovary* inferior, 1-celled, placentæ parietal, intruded and sometimes almost meeting; ovules numerous; styles or style-arms 3-12. *Fruit* globose or ovoid, membranous or fleshy, rarely dehiscent. *Seeds* exalbuminous; embryo various.

Fresh-water herbs; leaves tufted, whorled, opposite or alternate:—

Stems branched, leafy:—

Leaves mostly whorled; perianth double, styles undivided

1. *Hydrilla*.

Leaves mostly alternate; perianth single; styles notched

2. *Lagarosiphon*.

Stemless or with stolons, leaves tufted, radical:—

Leaves without a distinct petiole, linear, grass-like; flowers very slender; spathe not winged:—

Perianth single; peduncle of ♀ spathe spirally coiled

3. *Vallisneria*.

Perianth double; peduncle not coiled.....4. *Blyxa*.

Leaves distinctly petioled, mostly broad, not grass-like; flowers

large and broad; spathe winged .....5. *Ottelia*.

Salt-water herbs; leaves 2 at each node from the axil of a scarious or hyaline scale .....6. *Halophila*.

### 1. *Hydrilla*, Rich.

Submerged leafy fresh- or brackish-water herbs. *Leaves* short, 3-4-nately whorled or the lower opposite entire or toothed. *Flowers* monoecious or dioecious. ♂ flowers minute, shortly pedicelled, solitary in a sessile subglobose muricate spathe. *Sepals* 3, ovate to orbicular, concave, green. *Petals* 3, oblong or cuneiform. *Stamens* 3, anthers large, reniform. *Pistillode* minute. ♀ flowers sessile, solitary in a cylindric 2-toothed spathe, produced into a long filiform neck above the ovary. *Sepals* and *petals* as in the ♂, but narrower. *Ovary* shorter than the spathe, 1-celled; ovules many, anatropous; styles 2-3, linear, entire; stigmas fimbriate. *Fruit* subulate, smooth or muricate. *Seeds* 2-3 minute oblong; testa shortly produced at



**HYDRILLA VERTICILLATA**, Royle; F. B. I. v. 659. *Serpicula verticillata*, Linn. f.; Roxb. Cor. Pl. t. 164.

In still waters in all Districts from the coast up to high levels.

A slender submerged weed up to 18 in. long, with fibrous roots.

## 2. *Lagarosiphon*, Harv.

Submerged fresh-water herbs. *Leaves* alternate or sometimes fascicled and subverticillate and the lower opposite, serrulate or entire. *Flowers* dioecious; ♂ minute, numerous in an axillary, sessile, ovoid, 2-fid spathe; ♀ solitary sessile in a narrow oblong spathe. *Sepals* 3, petaloid, broadly oblong, pink. *Petals* 3, rather shorter. *Stamens* 2 or 3, often with 2 or 3 staminodes added; filaments short, anthers ovate. *Pistillode* 0. *Staminodes* 0 in ♀. *Ovary* oblong, produced into a long filiform beak; ovules many, orthotropous; styles 3, notched, stout. *Fruit* ovoid, oblong or linear. *Seeds* numerous, testa with a mucous coat.

**LAGAROSIPHON ALTERNIFOLIA**, Druce. *L. Roxburghii*, Benth.; F. B. I. v. 659. *Vallisneria alternifolia*, Roxb.; Wt. Ill. t. 11.

In tanks in all Districts.

Very similar to the last species.

## 3. *Vallisneria*, Linn.

Submerged tufted, stemless, stoloniferous fresh-water herbs. *Leaves* very long, linear. *Flowers* dioecious; ♂ minute, very many together in a shortly peduncled, ovoid, 3-lobed spathe; ♀ solitary in a tubular 3-toothed spathe at the end of a very long filiform spirally coiled scape. *Sepals* 3. *Petals* 0. *Stamens* 1-3; anthers didymous. *Pistillode* 0. *Staminodes* in ♀ 3, 2-fid. *Ovary* narrow, not produced upwards; stigmas 3, broad, notched. *Fruit* linear, included in the spathe. *Seeds* numerous, oblong, testa membranous.

**VALLISNERIA SPIRALIS**, Linn.; F. B. I. v. 660; Wt. Ill. tt. 23 and 24.

A common weed rooting at the bottom of pools and tanks in all Districts.

## 4. *Blyxa*, Noronha ex Thouars.

Submerged stemless, tufted, scapigerous herbs. *Leaves* linear, acute, entire or minutely serrulate. *Flowers* dioecious or

spathe. *Sepals* 3, linear. *Petals* 3, linear, longer. *Stamens* 3-9, 1 or more rudimentary; *anthers* narrow, erect. *Pistillodes* 3, slender. *Staminodes* in ♀ 0 or minute. *Ovary* very slender, beaked; style very short; stigmas 3, filiform. *Fruit* linear, very slender, included in the narrow, ribbed spathe. *Seeds* numerous, oblong; testa membranous, smooth, tubercled or echinate, often tailed at both ends.

Leaves as broad at the base as in the middle or broader:—

Flowers dioecious; stamens 8. Leaves 8-24 in. long, .25-.5 in. wide. Fruit 2-4 in. long, about .15 in. wide. Seeds small, tubercled, shortly tailed at each end ..... 1. *octandra*.

Flowers 2-sexual; stamens 3:—

Leaves 6-48 in. long, .12-.5 in. wide. Fruit 2-3 in. long, about .1 in. wide. Seeds spinescent with a long tail at each end, sometimes .5 in. long, including the tails ..... 2. *echinosperma*.

Leaves 3-24 in. long, .2-.5 in. wide. Fruit 1.5-2 in. long, about .12 in. wide. Seeds smooth or obscurely tubercled, tailless

3. *ceylanica*.

Leaves narrowed from the middle downwards, 4-6 in. long, .12-.4 in. wide. Flowers dioecious. Fruit 1-2 in. long, .12 in. wide. Seeds echinate with a short tail at each end ..... 4. *Talboti*.

1. *BLYXA OCTANDRA*, Planch. *B. Roxburghii*, Rich.; F. B. I. v. 660. *Vallisneria octandra*, Roxb. Cor. Pl. t. 165.

In still waters in all Districts.

2. *BLYXA ECHINOSPERMA*, Hook. f.; F. B. I. v. 661.

In still water on the West Coast; S. Kanara (Barber), Cochin (Meebold).

3. *BLYXA CEYLANICA*, Hook. f.; F. B. I. v. 661.

In still water at Udumanparai, Anamalai Hills (Barber), Poombari Valley, Pulney Hills (Bourne).

4. *BLYXA TALBOTI*, Hook. f.; F. B. I. v. 661.

In still water: Sadras, S. Kanara (Fischer), N. Malabar (Barber).

5. *Ottelia*, Pers.

Submerged fresh-water herbs. Leaves radical, crowded, the submerged ones usually different from and narrower than the floating; length of petiole depending on the depth of the water. Flowers 2-sexual, solitary, sessile in a tubular, long-peduncled spathe. *Sepals* 3, linear. *Petals* 3, larger. *Stamens* 6-15 in

6-celled by the intrusion of the walls; ovules numerous, scattered on the placentæ and walls; styles 6-9, linear. *Fruit* oblong, enclosed in the spathe. *Seeds* numerous.

OTTELIA ALISMOIDES, Pers.; F. B. I. v. 662. *Damasonium indicum*, Willd.; Roxb. Cor. Pl. t. 185.

Common in tanks and sluggish streams in all Districts, sea-level to 3,500 ft.

A flaccid water-herb varying in height with the depth of the water. Leaves of 2 kinds: submerged shortly petioled and usually narrow or oblong and tapering to the base, the floating ones oblong or orbicular, cordate or rounded at the base and then narrowed into the angled petiole, up to 7 in. in diam., 7-11-nerved, margins undulate. Spathe 5-6-toothed, with 5-6 wavy crisped wings, attenuate or caudate at the base, 1-1.5 in. long, about .75 in. in diam. Petals obovate or orbicular with fleshy basal appendages, white. Ovary oblong, beaked; styles 2-fid. Fruit 6-valved. Seeds oblong with a pulpy testa. Vern. Tel. Nir-veneki.

#### 6. Halophila, Thouars.

Submerged marine plants. *Leaves* in pairs at each node from the axil of a scarious or hyaline scale. *Flowers* solitary or 2 together in a sessile spathe of 2 bracts from between the petioles. *Sepals* 3. *Petals* 0. *Stamens* 3; anthers nearly sessile, alternate with the sepals, linear-oblong. *Pistillode* 0. *Ovary* ovoid, long-beaked; ovules many on 2 parietal placentæ; styles 3, filiform, papillose all over. *Fruit* subglobose, beaked, included in the spathe. *Seeds* many, subglobose, testa membranous; embryo thick, with the spiral cotyledon in a cavity at the side.

HALOPHILA OVATA, Gaud.; F. B. I. v. 663.

Along the coast and in back-waters.

A slender, creeping herb. Leaves linear-oblong to ovate, penninerved, up to 3 in. long and .75 in. wide; petiole long, slender. ♂ flowers pedicelled; ♀ sessile. Sepals minute.

#### Family CXLVII. BURMANNIACEAE.

Small erect herbs. *Leaves* chiefly radical, linear, entire or reduced to scales or 0. *Flowers* 2-sexual, regular, solitary or spicate or racemose on one side of a forked cyme, each opposite

subsessile on the perianth. *Ovary* inferior, 3-celled or 1-celled with 3 parietal placentæ; ovules numerous; style 1, short; stigmas various. *Fruit* capsular, sometimes dehiscing irregularly. *Seeds* numerous, minute, testa reticulate; albumen scanty; embryo minute.

**Burmannia, Linn.**

Annual herbs. *Leaves* ensiform, acuminate, radical, often reduced to scales or 0. *Flowers* 1, few or many, unilateral on the branches of a forked cyme. *Calyx-tube* winged or angled, wings narrow or obcordate, 3-lobed. *Petals* smaller or 0. *Anthers* 3, sessile or subsessile, cells short, separated by a broad connective, dorsally crested. *Ovary* 3-celled; style 3-lobed.

Plant leafy, robust; radical leaves many, ensiform, acute, 1-3 in. long, .25-.5 in. wide; flowers .5-.75 in. long, secund on the branches of an erect, forked cyme.....1. *disticha*.

Plant leafless or nearly so, slender; radical leaves, when present, scale-like, .2-.7 in. long; flowers .25-.5 in. long, solitary or 2-6 together.....2. *cœlestis*.

1. **BURMANNIA DISTICHA**, Linn.; F. B. I. v. 664.

Vizagapatam District at Ventala, 4,500 ft. (A. W. Lushington).

Up to 18 in. high; leaves radical and clothing the stem, gradually reduced upwards to lanceolate bracts .65-1.5 in. long; flowers bright blue.

2. **BURMANNIA COELESTIS**, Don.; F. B. I. v. 665. *B. pusilla*, Thw.; F. B. I. v. 665. *B. candida*, Griff. MSS. ex Hook. f. F. B. I. v. 665.

Mahendragiri (Fischer) and on the West Coast from low elevations (Nedungayam in S. Malabar at 150 ft.—Fischer) up to about 7,000 ft. in the W. Ghâts from Mysore to Travancore.

A slender variable herb 3-15 in. high with 1-5 or 6 small blue flowers and with or without small ensiform radical leaves. The variation appears to be due greatly to the conditions under which it grows, especially the degree of moisture.

**Family CXLVIII. ORCHIDACEAE.**

Epiphytic or terrestrial herbs, rarely shrubby, sometimes scan-

from minute to large and showy, solitary or more usually spicate or racemose, sometimes paniced. *Perianth* superior, irregular, of 6 free or variously combined segments in 2 alternating whorls. *Calyx* of 3 similar or dissimilar sepals, 1 dorsal and 2 lateral, the latter often united and forming a basal sac or spur (*mentum*). *Petals* 3, the 2 lateral alike, the third (*lip*) dissimilar. *Stamens* and *style* united into a long or short column opposite the lip, the top sometimes produced towards the lip in a beak (*rostellum*). *Anther* usually single (2 in *Paphiopedilum*) on the front, top or back of the column, 2- or 4-celled, pollen-grains usually cohering in each cell into 1, 2 or 4 pairs of oblong, globose or pyriform, waxy or powdery masses (*pollinia*), which are free or adnate in pairs or fours, with or without a stalk (*caudicle*) to a gland. *Ovary* inferior, usually linear and twisted half a turn so that the lip appears inferior, 1-celled; ovules minute; stigma one or two viscid spots on the top or concave face of the column facing the lip and below the anther, sometimes stalked. *Capsule* usually opening by 3 or 6 longitudinal fissures, fruit rarely fleshy and indehiscent. *Seeds* very many, minute; testa lax, enclosing a homogeneous nucleus.

(This key is adapted for use only for the genera and species included in this flora.)

Epiphytic plants :—

Leaves equitant :—

Stem very short, leaves tufted; scape terminal; spike elongate, many-flowered ..... 1. **Oberonia**.

Stem elongate, leaves imbricating throughout; spike short, terminal and lateral, few-flowered ..... 37. **Podochilus**.

Leaves not equitant :—

Flowers 2 in. long or longer ..... 13. **Thunia**.

Flowers 1.5 in. long or shorter :—

Lip not spurred, though base sometimes saccate :—

Flowers with a *mentum* :—

*Mentum* formed by the lateral sepals and the foot of the column :—

Column short, straight, not winged :—

Rhizome long, annulate, stem nodose, bearing uninodal

Column rather long, incurved, more or less winged

8. **Chrysoglossum.**

Mentum formed by the lip and the foot of the column

26. **Kingiella.**

Flowers without a mentum :—

Column with a distinct foot :—

Lip clawed, jointed to the foot and more or less mobile :

Scape lateral, flowers not paniced :—

Sepals subequal .....6. **Bulbophyllum.**

Dorsal sepal much shorter than the lateral (rarely half as long) .....7. **Cirrhopetalum.**

Scape terminal, flowers paniced ....23. **Polystachya.**

Lip sessile, not jointed or mobile :—

Pseudobulbs discoid ; sepals connivent at the base, lateral, at least, connate .....9. **Porpax.**

Pseudobulbs not discoid ; sepals free .....10. **Eria.**

Column without a foot :—

Bracts imbricating, convolute, almost concealing the flowers .....17. **Pholidota.**

Bracts not imbricate nor concealing the flowers :—

Lip not lobed :—

Leaves flat :—

Scape terminal ; column long .....3. **Liparis.**

Scape lateral ; column very short ...38. **Thelasis.**

Leaves terete .....24. **Luisia.**

Lip more or less 3-lobed :—

Stem very short or 0 ; leaves basal or from the apex of a pseudobulb :—

Flowers paniced .....15. **Josephia.**

Flowers simply racemed :—

Apex of leaves entire .....16. **Coelogyne.**

Apex of leaves 2-lobed .....21. **Cymbidium.**

Stem elongate ; leaves distichous ....25. **Cottonia.**

Lip spurred :—

Lip with a single conical or saccate spur :—

Plant leafless, at least when flowering :—

Column with a distinct foot bearing the lateral sepals

28. **Chilochista.**

Column without a foot .....35. **Taeniophyllum.**



Spur vertically septate almost to the mouth

33. *Sarcanthus*

Spur not septate :—

Spur distant from the base of the lip

27. *Rhynchostylis*

Spur at the base of the lip :—

Mouth of the spur open :—

Sepals and petals distinctly narrowed to the base ..... 30. *Vanda*

Sepals and petals not distinctly narrowed to the base :—

Slender plants; leaves not thickly coriaceous; spur as long as or longer than the rest of the lip ..... 31. *Saccolabium*

Robust plants; leaves thickly coriaceous; spur shorter than the rest of the lip

32. *Acampe*

Mouth of the spur almost closed by a horizontal plate from the back wall ..... 34. *Cleisostoma*

Lip with 2 small collateral spurs ..... 36. *Diplocentrum*

Terrestrial plants :—

Leafy plants :—

Climbing, fleshy plants ..... 39. *Vanilla*

Not climbing plants :—

Flowers without spur or mentum :—

Inflorescence lateral from the stem :—

Racemes few-flowered, flowers gibbously jug-shaped, yellow and red; column short, foot long

12. *Acanthophippium*

Panicles many-flowered, flowers not gibbous nor jug-shaped, greenish-white; column long, foot short 40. *Corymborchis*

Inflorescence terminal on the stem or direct from the rhizome or pseudobulb :—

Lip superior :—

Spike glabrous :—

Column very short, entire ..... 2. *Microstylis*

Column long, margined or winged towards the apex

3. *Liparis*

Spike glandular-pubescent ..... 48. *Hetaerla*

Leaf single, often appearing after the flowers :—

Leaf narrow, flowers glandular-pubescent

11. **Pachystoma.**

Leaf cordate or orbicular, flowers glabrous

50. **Nervilia.**

Leaves 2 or more, appearing with the flowers :—

Flowers 1 in. long or longer :—

Flowers red, glabrous ; lip triangular-ovate, disk with 3-5 lamellae .....19. **Arundina.**

Flowers greenish, pubescent ; lip narrowly oblong below, lanceolate above, base warted, not lamellate .....53. **Epipactis.**

Flowers not more than .5 in. long :—

Lip entire :—

Scape from the rootstock, raceme decurved

22. **Geodorum.**

Scape terminating the leafy stem, raceme erect

47. **Goodyera.**

Lip lobed :—

Lip saccate at the base :—

Sepals connate to the middle in a tube

45. **Cheirostylis.**

Sepals free .....46. **Zeuxine.**

Lip not saccate at the base, T- or Y-shaped

59. **Disperis.**

Flowers spurred or with a mentum :—

Lip not large nor shoe-shaped :—

Spur 0 or single :—

Scape lateral :—

Spur longer than the sepals, lip adnate to the top of the column .....18. **Calanthe.**

Spur 0 or shorter than the sepals, lip adnate to the base of the column :—

Lateral sepals connate into a mentum with the base of the lip :—

Column 2-auricled or lobed about the middle

8. **Chrysoglossum.**

Column not auricled nor lobed .....14. **Tainia.**

Lateral sepals free, not connate with the lip

Lip inferior :—

Lip lobed :—

Root not tuberous :—

Lateral sepals free, spur exerted beyond the bases of the sepals .....42. **Anoechtochilus.**

Lateral sepals connate, concealing the small spur .....43. **Odontochilus.**

Root of 1 or 2 simple or lobed tubers :—

Sepals subequal and more or less connivent

55. **Peristylus.**

Sepals unequal, the lateral spreading or reflexed :—

Flowers less than 1·3 in. in diameter, stigmas distinctly stalked .....54. **Habenaria.**

Flowers 2 in. in diameter or more; stigma sessile .....56. **Platanthera.**

Lip entire, obcordate .....57. **Phyllomphax.**

Spurs 2 from the back of the superior lip....58. **Satyrion.**

Lip large, shoe-shaped .....60. **Paphiopedilum.**

Leafless plants without chlorophyll :—

Lip clawed .....49. **Aphyllorchis.**

Lip sessile :—

Lateral sepals connate .....51. **Didymoplexis.**

Lateral sepals free .....52. **Epipogon.**

### 1. **Oberonia**, Lindl.

Small tufted epiphytes. *Leaves* distichous, equitant, coriaceous or fleshy, usually ensiform. *Flowers* minute in dense or interrupted subcylindric spikes or racemes. *Sepals* subequal, ovate or oblong. *Petals* smaller. *Lip* sessile, concave, entire or 2-4-lobed, sometimes erose. *Column* very short. *Anther* terminal, incumbent; pollinia 4, waxy, cohering by a viscus.

Lip of corolla toothed. Leaves broadly ensiform, 3-8 in. long; spikes slender up to 12 in. long, flowers and capsules sessile; lip more or less quadrate, tip broadly 2-fid.....1. *iridifolia*, var. *denticulata*.  
Lip not toothed, subentire or 3-lobed :—

the rhachis; sepals and petals reflexed on the ovary; lip subquadrate with an obscure rounded auricle at each side of the base

2. *Proudlockii*.

Lip obcordate or 3-lobed :—

Side lobes of lip undeveloped :—

Lip twice as long as the sepals, obcordate with rounded lobes separated by a narrow sinus, side lobes absent. Leaves narrow-ensiform, acute or acuminate, 2–5.5 in. long; racemes slender, long; flowers pedicelled, usually whorled

3. *verticillata*.

Lip only slightly longer than the sepals, oblong with 2 short, narrow, acute lobes separated by a broad sinus; side lobes small, rounded or tooth-like. Leaves broadly ensiform, acute, 1–3 in. long; racemes rather stout; flowers shortly pedicelled, not whorled . . . . . 4. *Falconeri*.

Side lobes of lip broad or long :—

Leaves 6–18 in. long, coriaceous, acuminate; spike dense-flowered, shorter than the leaves; lip broad, rounded, midlobe obcordate . . . . . 5. *ensiformis*.

Leaves 1–2 in. long, acuminate; spike dense-flowered, 2–3 in. long; lip erose, lateral lobes rounded, midlobe 2-fid

6. *recurva*.

Petals linear :—

Lip quadrate, entire or obscurely lobed at the outer angles. Leaves linear-ensiform, obtuse, up to 6 in. long; scape about as long as the leaves, flattened, usually with a small adnate leaf about the middle; flowers shortly pedicelled, loosely imbricated

7. *zeylanica*.

Lip distinctly lobed :—

Scape adnate to the upper leaf :—

Lip orbicular with a 2-lobed apical auricle. Leaves ensiform, up to 12 in. long, acute; spike stout, flattened, flowers sessile, densely imbricated; lip with a concave disk

8. *Brunoniana*.

Lip with broad rounded lateral lobes and a short 2–3-fid midlobe. Leaves ensiform, up to 12 in. long; scape flat, very broad, adnate to the upper leaf to the top; flowers sessile, about .2 in. in diam. (the largest of the genus in India), densely imbricated . . . . . 9. *platycaulon*.

flowers sessile, densely imbricated; lip broadly 3-lobed, crenate, gland-dotted ..... 10. *Lindleyana*.

Midlobe of lip much longer than the lateral, narrow. Leaves linear-oblong or narrow-ensiform, acute, 1.5-5 in. long; scape terete, racemes slender, longer than the leaves; flowers shortly pedicelled, whorled or loosely imbricated; lateral lobes of lip large, oblong or rounded; midlobe narrow with diverging lobes, sometimes minutely toothed at the ends

11. *Wightiana*.

1. *OBERONIA IRIDIFOLIA*, Lindl. var. *DENTICULATA*, Hook. f.; F. B. I. v. 676. *O. denticulata*, Wt. Ic. t. 1625.  
W. Gháts; Rampa Hills (Gamble).  
Flowers dull-orange.
2. *OBERONIA PROUDLOCKII*, King & Pantl.  
Nilgiri Hills near Gudalur (Proudlock).  
Flowers reddish-brown.
3. *OBERONIA VERTICILLATA*, Wt. Ic. t. 1626; F. B. I. v. 677.  
W. Gháts; Salem Hills (Bourne).  
Sepals pale-green, petals and lip dull-orange.
4. *OBERONIA FALCONERI*, Hook. f.; F. B. I. v. 678; Duthie Ann. Calc. ix. 2. t. 94.  
Mysore Hills at 3,500 ft. (Meebold); Rampa Hills at 2,000 ft. (V. Narayanswami), Vizagapatam Hills at 2,400 ft. (A. W. Lushington).  
Flowers greenish-yellow.
5. *OBERONIA ENSIFORMIS*, Lindl.; F. B. I. v. 679; King & Pantl. Ann. Calc. viii. t. 9.  
W. Gháts; Rampa Hills (Gamble, V. Narayanswami), Vizagapatam Hills, 2,500-4,000 ft. (A. W. Lushington).  
Flowers orange-yellow.
6. *OBERONIA RECURVA*, Lindl.; F. B. I. v. 680.  
Travancore (M. Rama Rao).  
Flowers green.
7. *OBERONIA ZEYLANICA*, Hook. f.; F. B. I. v. 680.  
Anamalai Hills at 4,000 ft. (Fischer).  
Flowers pale.

9. OBERONIA PLATYCAULON, Wt. Ic. t. 1623; F. B. I. v. 682.  
Nilgiri and Pulney Hills.

Flowers whitish or pale-yellow.

10. OBERONIA LINDLEYANA, Wt. Ic. t. 1624; F. B. I. v. 681.  
W. Gháts.

Flowers straw-coloured, lip dull-orange.

11. OBERONIA WIGHTIANA, Lindl.; F. B. I. v. 683; Wt. Ic. t. 1627. *O. Arnottiana*, Wt. Ic. t. 1628.

W. Gháts.

Flowers pale yellowish-green.

## 2. Microstylis, Nutt.

Terrestrial or epiphytic herbs, pseudo-bulbous or not. *Leaves* 1 or more, continuous with their sheaths. *Flowers* small, in terminal racemes, resupinate. *Sepals* spreading or recurved. *Petals* as long as but narrower than the sepals. *Lip* adnate to the base of the column, usually flat, sides often produced upwards beyond the column. *Column* very short with short spreading apical arms. *Anther* subterminal; pollinia 4.

Sides of lip produced upwards into large acute or obtuse auricles, apex notched. Herb 3–12 in. high; stem 1–3 in. long; leaves several, ovate or lanceolate, acute, 2–6 in. long; bracts shorter than the ovary

1. *Wallichii*.

Sides of lip not produced upwards into auricles, apex pectinate:—

Lip obovate or reniform:—

Stem stout, 3–6 in. long; root without pseudobulb; leaves 3–5, petioled, broadly ovate or elliptic, acute, 3–7 in. long

2. *versicolor*.

Stem slender, short, root pseudobulbous; leaves 2, rarely 3, sessile or nearly so, ovate to lanceolate, acute or obtuse, 1–3 in.

long; racemes dense-flowered ..... 3. *densiflora*.

Lip widely fan-shaped. Stem stout or slender, 2–4 in. long; leaves 2–3, shortly petioled, broadly ovate or ovate-lanceolate, acute or acuminate, 1.5–4 in. long; flowers comparatively large; lip rather deeply pectinate ..... 4. *Stocksii*.

1. MICROSTYLIS WALLICHII, Lindl.; F. B. I. v. 686; Hook. f. Ann. Calc. v. t. 2; King & Pantl. Ann. Calc. viii. t. 18.



2. *MICROSTYLIS VERSICOLOR*, Lindl. *M. Rheedii*, Wt. Ic. t. 902; F. B. I. v. 690.

W. Gháts from 6,000 ft. upwards.

A terrestrial herb; flowers greenish-yellow or purplish.

3. *MICROSTYLIS DENSIFLORA*, Fischer *n. comb.* *M. versicolor*, Wt. Ic. t. 901; F. B. I. v. 691. *M. luteola*, Wt. Ic. t. 1632; F. B. I. v. 691.

W. Gháts at high elevations.

Very like *M. versicolor*, Lindl., but smaller and more slender and the root always bulbous.

4. *MICROSTYLIS STOCKSII*, Hook. f.; F. B. I. v. 691.

W. Gháts at high elevations.

A terrestrial herb; flowers yellow.

### 3. *Liparis*, L. C. Rich.

Terrestrial or epiphytic herbs, often pseudobulbous. *Leaves* 1 or more, often jointed on the sheath or pseudobulb. *Flowers* small or minute, in terminal racemes, resupinate. *Sepals* spreading, recurved or revolute, margins often revolute. *Petals* as long, very slender. *Lip* adnate to the base of the column, usually broad, deflexed from a very short base, or recurved. *Column* long, usually incurved, margined or winged towards the tip. *Anther* terminal; pollinia 4.

Leaves membranous, continuous with the sheath or pseudobulb:—

Stems slender, short:—

Lip broad, entire:—

Lip orbicular-obovate, column short, thick. Leaves 2, ovate or ovate-lanceolate, acute, 4 in. long, 3 in. wide; scape and raceme up to 12 in. long; bracts lanceolate, acuminate, as long as the pedicel; lip shortly clawed, margin crenulate; column short, thick, with long, narrow, obtuse wings 1. *platyphylla*.

Lip orbicular or orbicular-oblong; column long, slender, sigmoidally incurved:—

Leaves 2, ovate-lanceolate, acuminate, 1.5–2 in. long; scape and raceme 2–4 in. long; bracts lanceolate,  $\frac{2}{3}$  the length of the pedicel and ovary; lip with 2 minute calli, margin entire; column very obscurely winged . . . . . 2. *Wightiana*.

Leaves 2, ovate-lanceolate, acuminate, 1 in. long, .5 in. wide; scape and raceme slender, 2 in. long; bracts minute,  $\frac{1}{3}$  length of pedicel and ovary; column very slender, arcuate, minutely winged . . . . . 3. *Beddomei*.

Lip cuneate, 2-lobed; leaves 2-3, ovate, acute, 1 in. long, .5-.7 in. wide, they and the stem often purple; scape and raceme about 1.5 in. long; lip shortly clawed, with 2 basal tubercles, lobes oblong or lanceolate, obtuse; column slender, curved, with small obtuse wings ..... 4. *biloba*.

Stems stout, 2-5 in. long:—

Leaves 2-5, lanceolate or elliptic-lanceolate, acuminate, 2.5-5 in. long, .6-1.75 in. wide; stem slightly bulbous at the base; scape angular, with the raceme 4-10 in. long; flowers about .33 in. across; lip cuneately obovate or subquadrate, usually recurved, tip truncate or slightly obcordate with a minute apiculus, with 2 basal calli; column incurved with 2 small rounded wings

5. *nervosa*.

Leaves ovate or orbicular, lip not cuneate:—

Leaves 2-3, acute or acuminate, 2-7 in. long, 1.5-4 in. wide, base equilateral; scape and raceme 3-6 in. long; flowers about .25 in. across; lip orbicular, recurved, crenulate, base contracted, 2-tubercled; column incurved with hooked wings

6. *Walkeriae*.

Leaves 3-4, acute or acuminate, 2-7 in. long, 1.5-4.5 in. wide, base very oblique, one side rounded or auricled and the other acute; scape and raceme 4-9 in. long; flowers about .33 in. across, lip orbicular-obovate, recurved, crenulate, base contracted and with 2 large tubercles; column very slender, curved, with rounded wings ..... 7. *atropurpurea*.

Leaves usually coriaceous, jointed on the sheath or pseudobulb:—

Leaf solitary on the pseudobulb:—

Leaf linear-lanceolate, acute, 2-4 in. long, .2-.5 in. wide; scape and raceme 3-6 in. long; flowers about .12 in. across; lip broadly oblong, recurved, rounded, entire or notched, base 2-auricled; column short, stout, obscurely winged ..... 8. *pusilla*.

Leaf elliptic or linear-lanceolate, acute, .75-2 in. long, .15-.25 in. wide; scape and raceme 1-2 in. long, flowers .06 in. across; lip quadrately-oblong, recurved, truncate-crenate, base hardly auricled; column short, curved, obscurely winged .... 9. *Duthiei*.

Leaves 2-4:—

Leaves 2; lip as long as the lateral sepals or nearly so:—

Leaves narrowly obovate-oblong or oblanceolate, acute or acuminate, 4-12 in. long, .7-1.25 in. wide; scape and raceme 6-10

Leaves narrowly elliptic-lanceolate or oblanceolate, 2-5 in. long, .6-.9 in. wide; scape and raceme 4-6 in. long, with several filiform bracts on the scape; pedicels recurved; flowers about .15 in. across; lip orbicular-ovate, recurved, subacute, very obscurely 3-lobed; column short, incurved, unappendaged.

11. *viridiflora*.

Leaves 3-4; lip minute, much shorter than the sepals; pseudobulbs tufted, 0.5-1 in. long; leaves linear-lanceolate, acuminate, 1.3-5 in. long, .2-.4 in. wide; scape and raceme up to 9 in. long, with many bracts about .33 in. long on the scape; flowers .25-.35 in. across; lip broadly ovate-oblong, basal lobes rounded, 2-tubercled, tip broad, rounded; column broadly winged, wings with a capillary tail ..... 12. *resupinata*.

1. *LIPARIS PLATYPHYLLA*, Ridl.; F. B. I. v. 695.

Anamalai Hills, 3,500 ft. (Beddome).

A small terrestrial herb.

2. *LIPARIS WIGHTIANA*, Thw.; F. B. I. v. 695. *L. atropurpurea*, Wt. Ic. t. 904.

Pulney Hills, 6,000 ft. (Wight, Anglade); Travancore (Beddome); High Wavy Mountains (Blatter & Hallberg).

A small, delicate, pseudobulbous, terrestrial herb; flowers white, lip dull-purple, or whole flower purple.

3. *LIPARIS BEDDOMEI*, Ridl.; F. B. I. v. 695.

Shembaganur, Pulney Hills at 5,000 ft. (Beddome).

Lip green with a purple disk spot.

Very like and doubtfully separable from the last species.

4. *LIPARIS BILOBA*, Wt. Ic. t. 1633; F. B. I. v. 699.

Nilgiri Hills (Wight, King).

A small, pseudobulbous, terrestrial herb. The whole plant often purplish; flowers very dark purple.

5. *LIPARIS NERVOSA*, Lindl. *L. paradoxa*, Reichb. f.; F. B. I. v. 697 and vi. 181; King & Pantl. Ann. Calc. viii. t. 34.

Nilgiris and Anamalai Hills at 3,000 ft. (Beddome).

A pseudobulbous terrestrial herb 6-15 in. high; flowers green, tinged with pink or yellow-brown.

6. *LIPARIS WALKERIAE*, Grah.; F. B. I. v. 698.

7. *LIPARIS ATROPURPUREA*, Lindl.; F. B. I. v. 698. *L. olivacea*, Wt. Ic. t. 903. *L. Walkeriae*, Wt. Ic. t. 905.  
W. Gháts at high elevations.  
A pseudobulbous terrestrial herb; flowers dark vinous-purple.
8. *LIPARIS PUSILLA*, Ridl.; F. B. I. v. 701; King & Pantl. Ann. Calc. viii. t. 41.  
Anamalai Hills (Beddome); Peermade in Travancore at 4,500 ft. (Meebold).  
A small, pseudobulbous, epiphytic herb; flowers white.
9. *LIPARIS DUTHIEI*, Hook. f.; F. B. I. v. 701; King & Pantl. Ann. Calc. viii. t. 42.  
Nilgiri Hills (Proudlock).  
A very small, pseudobulbous, epiphytic herb: flowers yellowish.
10. *LIPARIS LONGIPES*, Lindl.; F. B. I. v. 703; Wt. Ic. t. 906; King & Pantl. Ann. Calc. viii. t. 37.  
Courtallam (Wight); Cochin (Johnson); Peermade at 4,500 ft. (Meebold); Shevaroy Hills (Bourne); Tinnevely Hills (Beddome); Coorg (Bourne).  
A pseudobulbous, epiphytic herb; flowers white, lip yellow.
11. *LIPARIS VIRIDIFLORA*, Lindl.; F. B. I. v. 704; King & Pantl. Ann. Calc. viii. t. 47. *L. elliptica*, Wt. Ic. t. 1735.  
Nilgiri Hills (Wight); Pulney Hills (Bourne); High Wavy Mountains (Blatter & Hallberg).  
A pseudobulbous, epiphytic herb; flowers white, yellowish or green.
12. *LIPARIS RESUPINATA*, Ridl.; F. B. I. v. 705; King & Pantl. Ann. Calc. viii. t. 48.  
Nilgiri Hills (Wight).  
A small epiphytic herb; flowers yellow.

#### 4. Desmotrichum, Blume.

Epiphytic herbs with annulate creeping rhizomes and pendulous nodose stems bearing narrowly fusiform uninodal pseudobulbs at irregular intervals. *Leaves* sessile, terminal on the pseudobulbs, solitary or paired. *Flowers* fugaceous, 1-3 together from near the base of the leaf. *Bracts* scarious. *Lateral sepals*

narrowed at the base, lobed; apex expanded, more or less fimbriate or sinuate.

DESMOTRICHUM FIMBRIATUM, Blume. *Dendrobium Macraei*

Lindl.; F. B. I. v. 714; Ann. Calc., King & Pantl. viii. t. 86.

W. Gháts.

Stems smooth and polished, up to 3 ft. long; pseudobulbs 1-2.5 in. long, shining; leaves linear-oblong, obtuse, 2-8 in. long; flowers .75-1 in. long, white or pinkish and speckled with red, the midlobe of the lip greenish-yellow.

### 5. *Dendrobium*, Swartz.

Epiphytic herbs. Stems elongate nodose or of pseudobulbs pseudobulbs basal or on the stem, uni- or pluri-nodal. Leaves sessile, never plicate; bases sheathing, arising from the top of the pseudobulb or from the nodes of the stem. Flowers solitary fascicled or in racemes from the top of the pseudobulbs or axillary, often large. Sepals subequal, the lateral adnate to the foot of the column to form a mentum. Petals similar. Lip sessile, contracted at the base, rarely clawed, adnate to and incumbent on the foot of the column; side lobes, if present embracing the column or spreading; terminal lobe various, its disk often lamellate. Column short, angled or 2-toothed at the top, foot usually long. Anther 2-celled; pollinia 4, free or nearly so, ovoid or oblong, compressed, waxy.

Stemless; leaves from the top of a uninodal pseudobulb:—

Pseudobulb ovoid, .5-.75 in. long; leaves usually 2, rather thick oblong-lanceolate, acute, 2-3 in. long, .25-.7 in. wide; flowers 4-10 in a raceme from the top of the pseudobulb; scape slender 1-3 in. long; bracts equalling the pedicel and ovary combined; lip suborbicular, 3-lobed, side lobes small, subacute, midlobe truncate or slightly emarginate, crenulate, disk 2-keeled; keels fleshy, apiculate ..... 1. *microbulbon*

Pseudobulb ovoid, .25-.5 in. long; leaves 2-4, elliptic-lanceolate obtuse or subacute, 1-2.5 in. long, .2-.5 in. wide; flowers 8-10 in a raceme; scape slender, 1.5-3 in. long from the top of the pseudobulb; bracts shorter than the pedicels; lip long-clawed, limb suborbicular, serrulate, side lobes small, midlobe rounded, disk with

Flowers in elongate, few- to many-flowered racemes :—

Racemes very slender, usually few-flowered :—

Rhizome small, stem flexuous; leaves linear-lanceolate, acute, 2–4 in. long; sheaths usually broad and lax; racemes mostly axillary, flexuous, usually longer than the leaves; flowers .5 in. long; side lobes of lip acute, midlobe rounded, crenate, disk with a channelled ridge ending in a fleshy callus

3. *Heyneanum*.

Rhizome slender, creeping; stem slender, straight; leaves narrowly linear, acute, 1–3 in. long; sheaths narrow, closely embracing the stem; racemes all terminal, usually straight and shorter than the leaves; flowers .3–.5 in. long; side lobes of lip small, spreading, midlobe oblong, crenate, disk flat

4. *graminifolium*.

Racemes stout, many-flowered :—

Leaves lanceolate or oblong-lanceolate, acute, 2–4 in. long, .25–.5 in. wide; flowering shoots leafless; racemes lateral and terminal; flowers .4–.6 in. long; bracts ovate, acute, scarious; lateral sepals oblong-lanceolate, subacute, dorsal oblanceolate, obtuse, mentum acute, .2 in. long, lip flat, side lobes small, rounded, midlobe large, subquadrate, disk with a channelled ridge, pubescent ..... 5. *ovatum*.

Leaves lanceolate, acute, 3–4 in. long, .5 in. wide; flowering shoots leafless; racemes lateral and terminal; flowers about 1 in. long; bracts very small, lanceolate, scarious; lateral sepals lanceolate, acute, slightly falcate, dorsal linear-lanceolate, acute, mentum acute, .33 in. long, lip flat, 3-lobed, side lobes obtuse, midlobe rhomboid-ovate, acute or apiculate, bearded at the base with yellow hairs ..... 6. *barbatulum*.

Flowers solitary, fascicled or in very short racemes :—

Flowers racemed :—

Stems pendulous, copiously branched, polished and shining, naked below; branchlets leafy; leaves narrowly linear-lanceolate, acute or subobtuse, 1–4.5 in. long, .2–.5 in. wide; racemes terminal, rarely reaching 1 in. long, 2–3-flowered; bracts very small, scarious; flowers .25 in. long, sepals oblong-lanceolate, subacute, mentum minute, lip oblong, side lobes 0 or very narrow, midlobe ovate, entire, subacute

7. *herbaceum*.



elliptic-oblong to elliptic-lanceolate, acute, apex minutely obliquely bifid, 1.5–3.5 in. long, .4–1 in. wide; sheaths glabrous; flowers .3–.4 in. long, crowded, capitate on a short lateral rhachis or in a subterminal raceme; peduncle short, sheathed; bracts as long as and sheathing the short pedicel and the ovary; sepals and petals subequal, concave, mentum urceolate, lip small, fleshy, concave, broad-triangular, 3-lobed, side lobes triangular, acute, erect, midlobe very small, truncate . . . . . 8. *bicameratum*.

Stems slender below, slightly swollen above; leaves coriaceous, linear-lanceolate to linear-oblong, acute or obtuse, more or less deeply cleft at the apex, 1–3 in. long, .2–.4 in. wide; sheaths (at least the upper) nigro-hirsute; flowers .7–1.3 in. long, 2–4, in short leaf-opposed racemes; peduncle not sheathed; bracts minute, much shorter than the filiform pedicel; sepals and petals linear-lanceolate, acute, mentum conical, half as long as the sepals, lip fleshy, as long as the sepals, linear-oblong, side lobes small, midlobe elongate, margins crisped . . . . . 9. *nutans*.

Stems many, pendulous, terete, usually slender; leaves membranous, linear-lanceolate to ovate-lanceolate, acute, 2–4 in. long, .4–.9 in. wide; flowers .7–1 in. long, in short 2–4-flowered lateral racemes; bracts small, ovate, scarious; pedicels long, slender; sepals and petals equal in length, acute, sepals oblong-lanceolate, petals linear-lanceolate, lip longer, ovate-oblong, long-clawed, finely pubescent, margins orenulate, side lobes small, rounded or nearly absent, midlobe quadrately ovate, obtuse . . . . . 10. *macrostachyum*.

Flowers fascicled or solitary :—

Flowers 2–4 from a leaf-opposed tubercle bursting through the sheath below the mouth; stem pendulous, slender, leafy above the base; leaves rigidly papery, linear; apex oblique, obtuse, 3–5 in. long, .2–.35 in. wide; sheaths tight, striate; flowers .3–.4 in. long, excluding the ovary; pedicels slender, bracts small, cupular; petals as long as, but broader than the sepals, lip tongue-shaped, entire, acute, undulate . . . . 11. *haemoglossum*.

Flowers not on tubercles :—

Lip narrower than long; stems subclavate, suberect, ribbed except the slender polished 1 or 2 lowest internodes; leaves

oblong, acute, petals ovate-lanceolate, acuminate, mentum long, conical, truncate, lip ovate-lanceolate, acute, sides incurved at the base, disk pubescent . . . . .12. *heterocarpum*.

Lip as broad as or broader than long :—

Stems slender, pendulous, leafy below the flowers, usually naked above; leaves lanceolate, acuminate, 2–4 in. long, .5–1.2 in. wide; flowers 2–3 on short peduncles from the node, 1–1.3 in. long; sepals oblong-lanceolate, subacute, petals broader, oblong, mentum conical, lip orbicular, cucullate, pubescent and ciliate, base tubular by the incurving sides . . . . .13. *aphyllum*.

Stems subclavate, compressed, rather thick, decumbent, leafy throughout; leaves ovate-lanceolate, acuminate, 2.5–7 in. long, .5–1.75 in. wide; flowers 2–3 from the leaf axils, 1–1.3 in. long; sepals ovate, subacute, petals obovate, mentum short, obtuse, lip rhombic, pubescent, erose, side lobes small, incurved, midlobe broadly triangular

14. *aqueum*.

1. **DENDROBIUM MICROBULBON**, A. Rich.; F. B. I. v. 716.

*D. kumile*, Wt. Ic. t. 1643.

W. Gháts.

A small epiphyte 2–4 in. high; sepals and petals white, lip pink with darker veins.

2. **DENDROBIUM NANUM**, Hook. f.; F. B. I. v. 717.

Hills of Mysore and Coorg (Bourne), Nilgiris, Anamalais at 7,500 ft. (Fischer), Shevaroy (Bourne), High Wavy Mountains (Blatter & Hallberg).

Very similar to the last species; “lip green, turning yellow with age, with 2 median pink-purple patches” (Bourne).

3. **DENDROBIUM HEYNEANUM**, Lindl.; F. B. I. v. 718; Wt. Ic. t. 909.

W. Gháts: Nilgiris, Bolampatti Hills at 4,800 ft. (Fischer), Courtallam (Wight), Tinnevely Hills (Barber).

Stem 4–8 in. high; flowers white.

4. **DENDROBIUM GRAMINIFOLIUM**, Wt. Ic. t. 1649; F. B. I. v. 718.

Anamalai (Beddome), Nilgiri (Wight), Travancore and

5. **DENDROBIUM OVATUM**, Krzl. *D. chlorops*, Lindl.; F. B. I. v. 719. *D. barbatulum*, Wt. Ic. t. 910.  
W. Gháts and the West Coast from 150–5,000 ft.  
4–20 in. high, the stem sometimes very stout; flowers cream-coloured, lip greenish.
6. **DENDROBIUM BARBATULUM**, Lindl.; F. B. I. v. 719.  
W. Gháts from Mysore to Travancore.  
6–15 in. high; flowers white, often suffused with pink.
7. **DENDROBIUM HERBACEUM**, Lindl.; F. B. I. v. 719. *D. ramosissimum*, Wt. Ic. t. 1648.  
W. Gháts from 2,000–4,000 ft.  
Stems 2–3 ft. long; flowers yellow.
8. **DENDROBIUM BICAMERATUM**, Lindl.; F. B. I. v. 729; King & Pantl. Ann. Calc. viii, t. 56.  
Mahendragiri in Ganjam at 4,500 ft. (Gamble).  
Stems 3–18 in. long; flowers yellow, marked with red.
9. **DENDROBIUM NUTANS**, Lindl.; F. B. I. v. 734; Hook. f. Ann. Calc. v. t. 18. *D. Jerdonianum*, Wt. Ic. t. 1644; F. B. I. v. 734.  
Throughout the W. Gháts, 2,000–6,000 ft.  
Stems 5–18 in. long; flowers yellow.  
Var. *rubrilaba*, Blatter. Flowers white; lip pink, spotted purple, mid-lobe very strongly crisped. High Wavy Mountains (Blatter and Hallberg).
10. **DENDROBIUM MACROSTACHYUM**, Lindl.; F. B. I. v. 735; Wt. Ic. t. 1647.  
W. Coast and W. Gháts, up to 7,000 ft.  
Leafy stems 1–2 ft. long, flowering stems often much longer; flowers pale-green or yellow often tinged with pink.
11. **DENDROBIUM HAEMOGLOSSUM**, Thw.; F. B. I. v. 727.  
Malabar (Jerdon), Wynaad. Rare.  
Stems 12–18 in. long; flowers yellow, tip tinged with dark red.
12. **DENDROBIUM HETEROCARPUM**, Wall.; F. B. I. v. 737. *D. aureum*, Lindl.; Wt. Ic. t. 1646.  
W. Gháts from 3,000–5,500 ft.  
Stems 9–18 in. long; flowers white, lip yellow, mid-lobe

Roxb.; F. B. I. v. 738; Wt. Ic. t. 908; King & Pantl. Ann. Calc. viii. t. 72. *Limodorum aphyllum*, Roxb.; Cor. Pl. t. 41.

Coromandel (Roxb.), Coorg (Lancaster).

Stems 2-3 ft. long; flowers pale-rose, the lip yellow.

14. *DENDROBIUM AQUEUM*, Lindl.; F. B. I. v. 739. *D. album*, Wt. Ic. t. 1645.

W. Gháts, 3,000-7,000 ft.

Stems 10-20 in. long; flowers white, the lip suffused with pale-yellow.

### 6. *Bulbophyllum*, Thouars.

Epiphytic herbs with 1- (rarely 2-) leaved pseudobulbs on a creeping (rarely lacking) rhizome. *Scapes* from the rhizome, usually close to the pseudobulb. *Flowers* solitary, capitate, umbellate, spicate or racemose. *Sepals* subequal or the lateral slightly longer than the dorsal, not cohering together, adnate to the foot of the column. *Petals* usually distinctly smaller than the dorsal sepal. *Lip* usually tongue-shaped, sessile or clawed, jointed on the foot, mobile, usually small and much recurved. *Column* short, often 2-aristate at the top. *Anther* 2-celled, pollinia 4 (rarely 2).

Flowers umbellate :—

Rhizome stout, pseudobulbs broadly ovoid, .5-.7 in. long; leaf elliptic-oblong, 1-3 in. long, obtuse, emarginate, narrowed into a short petiole; scape rather stout, sheaths 2-3; flowers 4-8, .6-.75 in. long; sepals lanceolate, acuminate, dorsal  $\frac{1}{3}$  shorter, petals elliptic-oblong, rounded, lip clawed, basal angles acute . . . . . 1. *albidum*.

Rhizome stout; pseudobulbs distant, quadrangular ovoid, .75-1 in. long; leaf linear-oblong, obtuse, 3-4 in. long; scape slender, 3-4 in. long, 4-5-flowered; sepals narrow-lanceolate, long acuminate, .5-.6 in. long, dorsal a little shorter, petals elliptic-oblong, about  $\frac{1}{2}$  as long as the dorsal sepal . . . . . 2. *mysorensae*.

Flowers racemose :—

Lip glabrous with recurved lateral basal auricles :—

Flowers 1 in. or more long; sheaths and bracts large, coloured.

Rhizome stout; pseudo-bulbs ovoid, 1-1.5 in. long; leaf oblong, obtuse, 2-7 in. long; scape stout, longer than the leaf; raceme

Flowers 4 in. or less long; sheaths and bracts small, hyaline. Rhizome stout, pseudobulbs ovoid, 1-2 in. long; leaf narrowly elliptic to broadly oblong, 2-6 in. long, rounded or subacute, base narrowed; scape stout, shorter or longer than the leaf; racemes many-flowered, erect; sepals oblong, dorsal broad-ovate, petals triangular-ovate, lip with entire or toothed auricles

4. *neilgherrense*.

Lip linear-oblong fringed with long hairs, without auricles. Rhizome slender; pseudobulbs subglobose, 4-5 in. in diam.; leaf sessile, ovate-lanceolate, acute or obtuse, 1.5-2 in. long, base rounded; scape slender, very much longer than the leaf; bracts small, narrow; flowers 6-10, about .5 in. long; sepals subequal, linear-lanceolate, ciliate, petals very small, fringed ..... 5. *tremulum*.

1. *BULBOPHYLLUM ALBIDUM*, Hook. f.; F. B. I. v. 757.  
*Cirrhopetalum albidum*, Wt. Ic. t. 1653.

W. Gháts.

Flowers cream-coloured, freckled with pale-brown.

2. *BULBOPHYLLUM MYSORENSE*, J. J. Smith.

Hills of Mysore.

Flowers nearly white, the lip purple.

3. *BULBOPHYLLUM FUSCO-PURPUREUM*, Wt. Ic. t. 1651;  
F. B. I. v. 760.

W. Gháts.

Flowers dark purple.

4. *BULBOPHYLLUM NEILGHERRENSE*, Wt. Ic. t. 1650; F. B. I.  
v. 761.

W. Gháts.

Flowers brownish-yellow or greenish-purple.

5. *BULBOPHYLLUM TREMULUM*, Wt. Ic. t. 1749 (excluding  
insertion of scape on the apex of the pseudobulb); F. B. I.  
v. 763.

Coorg (Jerdon), Agalhatti in Mysore at 3,500 ft. (Meebold),  
Nilgiri and Anamalai Hills (Beddome).

Flowers yellow passing to purple at the tips, lip purple.

7. *Cirrhopetalum*, Lindl.

markedly unequal, dorsal concave, ovate, acute, lateral rarely less than twice as long, acuminate, twisted to bring the outer margins together and usually coherent, at least towards the apex even though separated below, bases adnate to the sides of the column or its foot. *Petals* shorter or longer than the dorsal sepal. *Lip* short, tongue-shaped, recurved, jointed to the foot and very mobile. *Column* very short, 2-aristate at the top, foot upcurved.

Flowers umbelled, rarely reduced to 1 or 2 flowers :—

Dorsal sepal and petals fimbriate. Rhizome short; pseudobulbs clustered, ovoid, angular, about .5 in. long; leafless when flowering; leaf oblong-lanceolate, acute, 3–5 in. long, scape slender, 2.8 in. long, sheaths 2–3; flowers numerous; lateral sepals linear, acute, 1–1.25 in. long, cohering, dorsal .25 in. long, ovate with a long tail, petals .12 in. long ..... 1. *fimbriatum*.

Dorsal sepal and petals glabrous, quite entire :—

Umbel reduced to 2 flowers. Rhizome slender, pseudobulbs distant, ovoid, .6 in. long; leaf linear-oblong, 1.5–2 in. long; scape slender, shorter than the leaf; pedicels long; lateral sepals ovate-oblong, subacute, .66 in. long, at first cohering, later separate, dorsal sepal suborbicular, .22 in. long, petals oblong, obtuse, as long as the dorsal sepal ..... 2. *aureum*.

Umbel more than 2-flowered :—

Lateral sepals linear-lanceolate, acuminate, .75–1 in. long. Rhizome slender; pseudobulbs distant, ovoid, .75–1 in. long; leaf linear-oblong, obtuse, 3–4 in. long; scape slender, 2–4 in. long, many-flowered; dorsal sepal ovate, acute,  $\frac{1}{3}$  as long as the lateral, petals broadly oblong, shorter than the dorsal sepal ..... 3. *neilgherrense*.

Lateral sepals less than .6 in. long :—

Lateral sepals linear-oblong or falcate-lanceolate, .5 in. long, cohering throughout, puberulous near the base. Rhizome slender; pseudobulbs distant, ovoid, about .5 in. long; leaf linear-oblong, 1–3 in. long; scape very slender, 1–3 in. long; dorsal sepal broadly ovate,  $\frac{1}{3}$  as long as the lateral, petals broadly oblong ..... 4. *Gamblei*.

Lateral sepals linear-lanceolate, .4 in. long, cohering above, free below. Pseudobulb ovoid, .3–.4 in. long; dorsal sepal oblong, obtuse, nearly  $\frac{1}{2}$  as long as the lateral, petals orbicular, oblong, obtuse, minute ..... 5. *elegantulum*.

Flowers shortly racemed :—



Lateral sepals .5 in. long or less :—

Rhizome rather stout, pseudobulbs ovoid, .5–1 in. long; leaf oblong, obtuse or emarginate, 1–2.5 in. long; leaves with the flowers; scape slender, as long as or longer than the leaf, 6–8-flowered; sheaths 2–3; lateral sepals linear-lanceolate, acuminate, 2–3 times longer than the falcately ovate-lanceolate, long-acuminate dorsal, petals broadly oblong, obtuse,  $\frac{1}{2}$  as long as the dorsal sepal ..... 6. *acutiflorum*.

Rhizome slender; pseudobulbs crowded, subglobose or broadly ovoid, .5 in. long; leafless when flowering (leaf unknown); scape slender, 1–2.5 in. long, 6–10-flowered; sheaths 1–2; lateral sepals oblong, obtuse, in contact but not cohering, twice as long as the oblong, subacute dorsal, petals triangular, aristate, much shorter than the dorsal sepal ..... 7. *Proudlockii*.

Lateral sepals linear-lanceolate, cohering except at the base, 1–1.2 in. long. Rhizome very stout, slightly swollen at the nodes; pseudobulbs oblong or ovate-oblong, 1.75–2 in. long; leaf linear-oblong, obtuse, base attenuate, 5–6 in. long; scape 3–4 in. long, 6–7-flowered; dorsal sepal ovate-oblong, acute, minutely denticulate, .3 in. long, petals broadly ovate, subacute, erose, .15 in. long

8. *nodosum*.

1. *CIRRHOPETALUM FIMBRIATUM*, Lindl.; F. B. I. v. 774; Wt. Ic. t. 1655.

Coorg (Jerdon).

Flowers green or cream-coloured with darker lines and red cilia; lip red.

2. *CIRRHOPETALUM AUREUM*, Hook. f.; F. B. I. v. 777.

Wynaad (Jerdon).

Flowers golden-yellow.

3. *CIRRHOPETALUM NEILGHERRENSE*, Wt. Ic. t. 1654; F. B. I. v. 778.

Nilgiri (Wight, Gamble) and Anamalai Hills at 4,000–5,000 ft. (Beddome).

Flowers yellow, mottled with red.

4. *CIRRHOPETALUM GAMBLEI*, Hook. f.; F. B. I. v. 778. *C. Thomsoni*, Hook. f.; F. B. I. v. 778.

Nilgiri, Anamalai, Pulney Hills and High Wavy Mountains (Blatter & Hallberg).

5. *CIRRHOPETALUM ELEGANTULUM*, Rolfe.

Coorg.

Flowers yellow with maroon-purple stripes.

6. *CIRRHOPETALUM ACUTIFLORUM*, A. Rich.; F. B. I. v. 779.

W. Gháts.

Flowers greenish-white or cream-coloured.

7. *CIRRHOPETALUM PROUDLOCKII*, King. & Pantl.

Nilgiri Hills, Gudalur Ghát at 4,000 ft. (Proudlock).

Flowers pale straw-coloured.

8. *CIRRHOPETALUM NODOSUM*, Rolfe.

Nilgiri Hills.

Flowers reddish-brown, densely speckled in a darker tint.

8. *Chrysoglossum*, Blume.

Terrestrial or epiphytic herbs. *Pseudobulbs* narrow or 0, 1-leaved. *Leaves* elliptic-lanceolate, plaited. *Scapes* lateral on the rhizome, long, erect, sheathed. *Flowers* laxly racemed. *Sepals* subequal, lateral connate with the base of the lip into a mentum. *Petals* subequal to the sepals. *Lip* erect, broadly 3-lobed, sometimes auriculate at the base; disk 3-lamellate. *Column* incurved, margins 2-auricled or -lobed about the middle; foot short. *Anther* 2-celled; pollinia 2, free.

Terrestrial; rhizome stout; leaf 6-14 in. long, 1.5-4 in. wide, acuminate, tapering into a 1-5 in. petiole which thickens into a narrow pseudobulb, 1-3 in. long; scape and raceme usually longer than the leaf, up to 20 in. long, many-flowered; sheaths loose, .5-1 in. long; bracts .5 in. long; flowers .75-1 in. long; sepals and petals oblong, falcate, subacute ..... 1. *maculatum*.

Epiphytic; rhizome slender; leaf 7 in. long, 2 in. wide, narrowed into the 3-4-in.-long petiole, which thickens into a narrow 1-1.5-in.-long pseudobulb; scape and raceme as long as the leaf, about 12-flowered; sheaths 3, loose; bracts linear, .5 in. long, longer than the pedicel and ovary; flowers about .33 in. long; sepals and petals obovate-lanceolate to lanceolate, acute, the petals broader ..... 2. *Hallbergii*.

1. *CHRYSOGLOSSUM MACULATUM*, Hook. f.; F. B. I. vi. 784.

Pulney Hills (Bourne); Agastiamalai in Tinnevely

2. *CHRYSOGLOSSUM HALLBERGII*, Blatter in Journ. Bomb. Nat. Hist. Soc. xxxii, 518.

High Wavy Mountains (Blatter & Hallberg).

### 9. *Porpax*, Lindl.

Very small epiphytic herbs. *Pseudobulbs* subdiscoid or button-like, clothed with reticulate sheaths. *Leaves* 2, membranous. *Flowers* 1-3, subsessile on the top of the pseudobulb. *Sepals* connivent at the base, all connate into a tube or the dorsal free, lateral sepals oblique below and adnate to the long foot of the column. *Petals* small, free, usually shorter than the sepals. *Lip* sessile on the foot of the column, incumbent. *Column* short, wingless. *Pollinia* usually 8, attached in fours.

*Pseudobulbs* .75 in. in diam.; leaves caducous, broadly oblong, under 1 in. long; flowers solitary from between the leaves with sheaths and an orbicular parchment-like bract at the base, .4-.5 in. long; sepals all connate into a 3-lobed subcampanulate tube, petals included, spathulate, lip panduriform, crenulate, shortly clawed, with a basal, erect, tooth-like process ..... 1. *reticulata*.

*Pseudobulbs* .4-.6 in. in diam.; leaves persistent, suborbicular, .4-1.25 in. long, minutely ciliate; flowers 1-3 from between the leaves with many sheaths and a broad ciliate bract at the base, 2-lipped, .33 in. long; lateral sepals connate to above the middle, concave, pubescent, dorsal sepal nearly free, broadly oblong, petals linear-spathulate, very small, lip minute, shortly clawed, ovate-cordate, toothed, apiculate ..... 2. *Jerdoniana*.

1. *PORPAX RETICULATA*, Lindl. *Eria reticulata*, Benth.; F. B. I. v. 786. *Aggeianthus marchantioides*, Wt. Ic. t. 1737. Iyamalai Hills (Wight), Donipoya in South Malabar at 700 ft. (Fischer).

*Pseudobulbs* aggregated on wet rocks or on tree-trunks; flowers purple-brown.

2. *PORPAX JERDONIANA*, Reichb. *Eria Lichenora*, Lindl.; F. B. I. v. 787. *Lichenora Jerdoniana*, Wt. Ic. t. 1738.

Bababudan Hills (Law), Hills of Malabar (Jerdon), Travancore (Johann).

10. *Eria*, Lindl.

Epiphytic herbs, usually pseudobulbous. *Pseudobulbs* often elongate and stem-like. *Flowers* never very large nor bright coloured, 1 or 2 or racemed or spicate. *Sepals* free, adnate to the foot of the column to form a short or long and spur-like or saccate mentum. *Petals* subsimilar to the lateral sepals. *Lip* sessile on the foot, rarely shortly clawed, incumbent. *Column* short and straight or long and little curved. *Anther* imperfectly 4- or 8-celled; pollinia usually 8, pyriform.

*Pseudobulbs* simple, plant stemless or stems short, unjointed:—

Flowers solitary, .75–1 in. long. *Pseudobulbs* depressed-globose, enclosed in a net-like sac; leaves 2, oblong- or elliptic-lanceolate, acute, .75–3 in. long; scape slender, 1–1.75 in. long; bract below the flower suborbicular, strongly nerved, .33 in. long; lateral sepals falcate, acute, dorsal oblong-lanceolate, slightly longer, petals like the lateral sepals, lip as long as the lateral sepals, 3-lobed

1. *braccata*.

Flowers racemed:—

Small plants less than 4 in. high; leaves less than 3 in. long; scapes slender:—

*Pseudobulbs* globose or ovoid; flowers not secund, .1 in. or less long:—

Leafless when in flower (leaves unknown); scape capillary, flexuous, glabrous; bracts boat-shaped; lateral sepals decurved, bill-hook-shaped, obtuse, dorsal oblong, obtuse, slightly longer, petals linear-obovate, shorter than the lateral sepals, lip minute ..... 2. *exilis*.

Leafy when in flower; leaves oblong-lanceolate, acute, base attenuate, 1–2.5 in. long; scape not flexuous, brown-pubescent, as are the pedicels and ovaries; bracts oblong-lanceolate, acute; lateral sepals obliquely semi-ovate, subacute, dorsal lanceolate-oblong, subobtuse, petals linear-lanceolate, lip rhomboid-suborbicular ..... 3. *albiflora*.

*Pseudobulbs* depressed-ovoid; flowers secund, .25 in. or more long:—

Leaves 2, oblanceolate-oblong, subobtuse, 1–2.7 in. long; scape few-flowered, up to 5 in. long; bracts lanceolate; flowers secund, .2 in. long; sepals lanceolate, acute, dorsal

Leaves 2-3, elliptic-lanceolate, obtuse or acute, 1-2.5 in. long; scape 2-6-flowered, often flexuous, up to 5 in. long; bracts ovate; flowers .4-.6 in. long; sepals linear-lanceolate, acuminate, petals subsimilar, lip shortly clawed, ligulate

5. *nana*.

Larger plants exceeding 4 in. high; leaves 4-8 in. long; scapes comparatively stout:—

Pseudobulbs ovoid, thick, 2-4 in. long; leaves 3-5, linear, elliptic- or oblong-lanceolate, acute; scapes 2-4 on a pseudobulb, 2-4 in. long, many-flowered, with the pedicels and flowers externally more or less fuliginose-pilose; flowers .25-.3 in. long; lateral sepals and petals subequal, lanceolate, slightly falcate, dorsal sepal slightly longer, lip entire, ovate-subpanduriform, subacute ..... 6. *polystachya*.

Pseudobulbs thick, ovoid, 1-1.5 in. long; leaves 1-4, linear-to oblong-lanceolate, subacute or obtuse; scapes 4-5 in. long, many-flowered, slightly pubescent; flowers .5-.75 in. long, glabrous; sepals lanceolate, dorsal a little longer, petals linear-lanceolate, about as long as the lateral sepals, lip ovate-subcordate, acute ..... 7. *pubescens*.

Pseudobulbs pluri-articular or developed into a plurinodal stem:—

Internodes 1 in. or less long:—

Stem 3-6 in. high from a creeping rootstock, slender below, clavate above; internodes .5-1 in. long; leaves 2-3 from the apex of the stem, linear-oblong, 1.5-5 in. long, obtuse or subacute; scape from between the leaves, slender, 1-1.5 in. long, 1-3-flowered; pedicels slender with 2-3 oblong bracteoles; flowers .4-.5 in. long; sepals and petals subequal, lateral sepals triangular, slightly falcate, dorsal oblong, petals narrow-oblong, lip cuneately oblong, lobes obscure ..... 8. *pauciflora*.

Stem 2-3 ft. high, robust, terete; internodes about 1 in. long; leaves numerous from the upper nodes, narrowly elliptic-oblong, acuminate, 4-8 in. long; racemes axillary, as long as or longer than the leaves, many-flowered, rusty pubescent; bracts suborbicular, apiculate, .2 in. long; flowers .5-.6 in. long, rusty-pubescent outside; sepals subequal, broadly elliptic, the lateral falcate, spreading, petals narrower, lip ovate-oblong, obtuse, side lobes small ..... 9. *bambusifolia*.

Internodes 2 in. or more long. Stems tufted, up to 8 in. long; leaves 3, oblong-lanceolate, acute, about 7 in. long and 1.75 in. wide:

about .6 in long, dorsal sepal elliptic-oblong, lateral triangular-falcate from a broad base, petals falcate-oblong, lip much shorter than the sepals, broadly ovate, subequally 3-lobed, lobes slightly crisped, midlobe minutely white-puberulous

10. *pseudoclavicaulis*.

1. *ERIA BRACCATA*, Lindl.; F. B. I. v. 787. *E. reticosa*, Wt. Ic. t. 1637; F. B. I. v. 787.

W. Gháts from the Bababudan to the Nilgiri Hills at about 6,000 ft.; High Wavy Mountains (Blatter & Hallberg).

Flowers white, lip edged with purple, column yellow.

2. *ERIA EXILIS*, Hook. f.; F. B. I. v. 788.

Travancore (Johnson).

A very small, delicate herb.

3. *ERIA ALBIFLORA*, Rolfe.

Nilgiri Hills.

Flowers pure white.

4. *ERIA DALZELLII*, Lindl.; F. B. I. v. 789. *Dendrobium filiforme*, Wt. Ic. t. 1642 (central and top left-hand figs.).

W. Gháts.

Flowers white or yellowish.

Var. *fimbriata*, Hook. f.; F. B. I. v. 789.

Petals and sepals fringed with translucent gland-tipped hairs.

5. *ERIA NANA*, A. Rich.; F. B. I. v. 789. *Dendrobium filiforme*, Wt. Ic. t. 1642 (right-hand bottom fig.).

W. Gháts, 5,000–8,000 ft.

Flowers white.

6. *ERIA POLYSTACHYA*, A. Rich.; F. B. I. v. 792. *E. mysorensis*, Lindl.; F. B. I. v. 793. *E. pubescens*, Wt. Ic. t. 1635.

W. slopes of the Nilgiri Hills.

Flowers white.

7. *ERIA PUBESCENS*, Wt. Ic. t. 1634; F. B. I. v. 793.

W. slopes of the Nilgiri Hills (Wight, Barber).

Flowers white, tipped with pink.

8. *ERIA PAUCIFLORA*, Wt. c. It. 1636; F. B. I. v. 799.

Nilgiri, Anamalai (Davidson), Kollimalai (Barber),



9. *ERIA BAMBUSIFOLIA*, Lindl.; F. B. I. v. 805; King & Pantl., Ann. Calc. viii, t. 163.

Mahendragiri in Ganjam at 4,500 ft. (Gamble).

Flowers pale-brown with darker markings, lip with 3 pale-green ridges, column yellow.

10. *ERIA PSEUDOCLOAVICAULIS*, Blatter in Journ. Bomb. Nat. Hist. Soc. xxxii, 518.

High Wavy Mountains (Blatter & Hallberg).

Flowers white, tinged with pink.

#### 11. *Pachystoma*, Blume.

Terrestrial herbs; rhizome nodose. *Leaves* 1 or 2, long, narrow, appearing after flowering-time. *Scape* pale, with many sheaths. *Flowers* racemed, pendulous, moderate-sized. *Sepals* and *petals* subequal, lateral sepals adnate to the base of the column. *Lip* sessile at the base of the footless column. *Column* slender, clavate upwards. *Anther* dorsal, 4-celled; pollinia 8, pyriform.

*PACHYSTOMA SENILE*, Reichb. f.; F. B. I. v. 812; King & Pantl. Ann. Calc. viii. t. 140. *Apaturia Lindleyana*, Wt. Ic. t. 1662.

Western Gháts, 3,000-5,000 ft.

Leaf solitary; scape with raceme 8-30 in. long; sheaths 5-2 in. long; flowers about 5 in. long, glandular pubescent, white, greenish or pinkish; bracts scarious, longer than the flowers, strongly nerved.

#### 12. *Acanthophippium*, Blume.

Terrestrial herbs with 2-9-leaved pseudobulbs. *Leaves* petioled, broad, plicate. *Flowers* few, large, on short, lateral racemes. *Sepals* broad, cohering into a ventricose tube with recurved tips, lateral adnate to the foot of the column to form a large, saccate mentum. *Petals* erect, narrow, included. *Lip* small, stipitate on the foot of the column, inflexed, lateral lobes broad, mid-lobe recurved, entire, disk with a complex callus. *Column* short, stout; foot very long, inflexed. *Anther* 2-celled; pollinia 8, erect, cohering by a granular mass.

*ACANTHOPHIPPIUM BICOLOR* Lindl.; F. B. I. v. 815

A robust plant. Pseudobulb oblong-ovate, corrugated, 1–2 in. long, clothed in the remains of old leaves; stem 3–8 in. long; leaves 2 or 3, oblong-lanceolate, acuminate, tapering into a sheathing petiole, 6–18 in. long, 1.5–4.5 in. wide. *Scape* sheathed, 3–7-flowered; bracts ovate-lanceolate, 1 in. long; flowers 1.5 in. long, resembling broad gibbous-based jugs, yellow tipped or spotted with red; side lobes of lip hatchet-shaped, midlobe short, tongue-shaped, disk 3-keeled.

### 13. *Thunia*, Reichb. f.

Epiphytic or terrestrial herbs; stems not pseudobulbous, leafy with foliaceous sheaths below. *Leaves* distichous. *Flowers* in racemes terminating the stem, large; bracts large, scarious. *Sepals* erecto-patent, subequal, lanceolate, acute. *Petals* similar. *Lip* adnate to the base of the column, shortly spurred, side lobes short, embracing the column, midlobe fringed. *Anther* narrow, pendulous, incompletely 4-celled; pollinia 8, waxy, attached in fours to a granular membrane.

THUNIA VENOSA, Rolfe. *Phagus albus*, Lindl. in part; F. B. I. v. 818.

Travancore (Calder and Ramaswami).

An epiphytic herb, stem 6–18 in. long; leaves linear-ensiform, 3–9 in. long; raceme drooping, 3–5 in. long; flowers few, white, 1.5 in. long; lip 1.2 in. long, side lobes involute, crisped, midlobe spreading, waved, often ciliate, palate with 5 longitudinal rows of long, erect, flat, purple papillæ which sometimes unite into membranes, column long, winged, broadening to the denticulate apex.

### 14. *Tainia*, Blume.

Terrestrial herbs with 1-leaved pseudobulbs. *Flowers* racemose, small or medium-sized. *Sepals* narrow, the lateral falcate, adnate to the saccate base of the lip to form a ~~mentum~~ or inserted above it. *Lip* adnate only by its base to the base of the slender column, hastately 3-lobed, rarely entire, disk lamellate. *Anther* with a simple or 2-lobed boss or 2-horned; pollinia 4 or 8, free or united by a viscus.

TAINIA BICORNIS, Benth.; F. B. I. v. 820. *Ainia latifolia* Wt. & A. t. 914.

W. Gháts, rare.

Pseudobulb fusiform, 1-3 in. long. Leaf terminal on the pseudobulb, oblong-lanceolate to broadly elliptic, acuminate, base rounded, 4-7 in. long, 1.5-3.5 in. wide; petiole as long or longer; scape lateral, usually longer than the leaf; bracts lanceolate, acuminate, about .75 in. long; flowers about 1 in. long, purplish or greenish with a reddish flush, lip and column yellow; sepals linear-lanceolate, acute, petals subequal, side lobes of lip small midlobe, broad, retuse, disk 3-lamellate, the middle one short, almost confined to the midlobe.

### 15. *Josephia*, Wight.

Practically stemless, tufted, epiphytic herbs with stout root-fibres. *Leaves* radical, coriaceous. *Flowers* small, on the branches of paniced spikes. *Sepals* subequal, concave, connivent. *Petals* as long but narrower. *Lip* erect, fleshy, adnate to the base of the column, concave, side lobes small, incurved, midlobe small, entire, papillose, with a basal callus uniting the side lobes. *Column* erect, broad, nearly as long as the sepals, shortly 2-winged upwards; foot 0. *Anther* acuminate, 2-celled; pollinia 4, oblong, parallel, subcaudate, attached to the rostellum by a viscus.

Leaves linear-oblong or lanceolate, subacute or obtuse, 2-5 in. long, .8-1.2 in. wide; petioles .5-2 in. long, plicate, moderately wide; scapes 3-12 in. long, slender; flowers white, tinged with purple

#### 1. *lanceolata*.

Leaves broadly oblong or subrotund; apex rounded, 1.8-3.5 in. long, .9-1.5 in. wide; nearly sessile or petiole up to 1.5 in. long, plicate, wide; scapes 3-12 in. long, slender; flowers yellow with purple stripes

#### 2. *latifolia*.

1. *JOSEPHIA LANCEOLATA*, Wt. Ic. t. 1742; F. B. I. v. 823.

W. Gháts.

2. *JOSEPHIA LATIFOLIA*, Wt. Ic. t. 1743; F. B. I. v. 823.

W. Gháts.

The two are very doubtfully separable.

### 16. *Coelogyne*, Lindl.

racemed, rarely 1 or 2; bracts long, sheathing. *Sepals* subequal, lateral more or less saccate at the base. *Petals* narrower. *Lip* sessile at the base of the column, erect and embracing it, base concave or saccate. *Column* long, erect, winged, apex hooded, membranous; foot 0. *Anther* more or less 2-celled; pollinia 4, cohering in pairs by a granular viscus.

Flowers solitary. Pseudobulbs crowded, ovoid, with loose fibrous sheaths at the base, .6–1.2 in. long; leaves 2, linear to narrowly oblong, acuminate, narrowed into a short petiole, 3–7 in. long, .2–.5 in. wide; scape short, sheathed in large scarious imbricate bracts; flowers .6–.7 in. long; lip oblong, lateral lobes small, acute, midlobe ovate.

1. *uniflora*.

Flowers racemed:—

Sheaths of the scape not becoming foliaceous:—

Lip 2-keeled:—

*Sepals* .4 in. long, lip as long or longer. Pseudobulbs crowded, narrowly conical, 1–1.5 in. long; leaves 2, linear to linear-oblong, acute, tapering into a channelled petiole, 4–6 in. long, .4–.7 in. wide; scape short, tightly clasped at the base by the short sheaths; bracts large, persistent, scarious, ovate-lanceolate; lip with small, blunt side lobes, midlobe broadly obovate, rounded, apiculate or retuse, keels undulate . . . 2. *breviscapa*.

*Sepals* 1 in. long, lip shorter. Pseudobulbs ovoid, 1.25–3 in. long; leaves 2, oblong-lanceolate, acute, 6–8 in. long, 1–1.75 in. wide; bracts .75–1.25 in. long; lip with short triangular-ovate, blunt side lobes, midlobe elliptic, subobtuse, keels entire.

3. *Mossiae*.

Lip 3-keeled. Pseudobulbs ovoid, about 1 in. long; leaves 2, lanceolate, acute, 4–6 in. long, .6 in. wide, petiole short, channelled; bracts narrow; lip with narrowly ovate, subfalcate side lobes, midlobe suborbicular, retuse or apiculate, keels undulate.

4. *angustifolia*.

Inner sheaths of scape more or less foliaceous:—

Pseudobulbs crowded, subglobose, under 1 in. long, leaves 2, hardly coriaceous, elliptic lanceolate, acute, 1.5–4 in. long, .3–.5 in. wide; petiole channelled; scape slender, as long as or longer than the leaves, 2–3 flowered; bracts persistent, lanceolate, .5–.6 in. long; flowers .6–.7 in. long; lip with small oblong-falcate, obtuse side lobes, midlobe suborbicular; disk with 3

Midlobe of lip triangular-lanceolate, acute, keels 3–5, crenulate. Pseudobulbs crowded, ovoid, corrugated; leaves 2, lanceolate to broadly elliptic-oblong, acute, 1·5–5 in. long, ·5–1·4 in. wide; petiole channelled; bracts persistent, broadly lanceolate up to 1·3 in. long; sepals elliptic-lanceolate, acute....6. *nervosa*.

Midlobe of lip ovate-oblong or suborbicular, rounded, keels 3, entire, sometimes glandular towards the apex. Pseudobulbs crowded or distant, ovoid, curved, not corrugate; leaves 2, oblong to lanceolate, acute or subacute, 3·5–12 in. long, 1–2 in. wide; petiole stout, channelled; bracts persistent, ovate-lanceolate, up to 1·5 in. long; sepals elliptic-oblong, rounded

7. *glandulosa*.

1. COELOGYNE UNIFLORA, Lindl.; F. B. I. v. 842; King & Pantl. Ann. Calc. viii. t. 192.

Nilgiri Hills (Proudlock).

Flowers pale ochraceous.

2. COELOGYNE BREVISCAPA, Lindl.; F. B. I. v. 833 (*in part*).

Mysore (Meebold), Nilgiri Hills (Wight, G. Thomson).

Flowers white.

3. COELOGYNE MOSSIAE, Rolfe.

Nilgiri and Pulney (Fyson, Anglade) Hills; 7,000–8,000 ft.

Flowers white.

4. COELOGYNE ANGUSTIFOLIA, Wt. Ic. t. 1641. *C. breviscapa*, Hook. f. (*not Lindl.*) F. B. I. v. 833 (*in part*).

Nilgiri Hills (Wight, Bourne).

Flowers white, tinged with yellow.

5. COELOGYNE ODORATISSIMA, Lindl.; F. B. I. v. 834; Wt. Ic. t. 1640.

Nilgiri Hills, 7,000–8,000 ft.

Often aggregated in very large patches; flowers white, tinged with yellow.

Var. *angustifolia*, Lindl. Pseudobulbs and leaves more slender; midlobe of lip elliptic, long acuminate. Nilgiri Hills.

6. COELOGYNE NERVOSA, A. Rich. *C. corrugata*, Wt. Ic. t. 1639; F. B. I. v. 835.

W. Gháts from Mysore to Tinnevely, 3,000–7,000 ft.

Flowers white, lip yellowish.

7. COELOGYNE GLANDULOSA, Lindl.; F. B. I. v. 835. *C. nervosa*, Wt. Ic. t. 1638.

17. *Pholidota*, Lindl.

Epiphytic herbs; stem of single, often aggregated pseudobulbs or jointed and sometimes branching. *Leaves* in pairs or solitary. *Scape* terminal or from the base of the pseudobulb, usually drooping, often flexuous; bracts distichous, rigid. *Flowers* small, globose or subglobose. *Sepals* concave. *Petals* flat, broad or narrow. *Lip* sessile on the base of the column, erect, saccate, subentire or lobed. *Column* very short, apex hooded or winged; foot 0. *Anther* 2-celled, more or less globose; pollinia 4, waxy, subglobose or clavate, free or cohering in pairs by a viscus or membrane.

*PHOLIDOTA IMBRICATA*, Lindl.; F. B. I. v. 845; Wt. Ic. t. 907; King. & Pantl. Ann. Calc. viii. t. 201.

E. and W. Gháts, 2,000–3,500 ft.

A pendent herb; pseudobulbs aggregated, narrowly ovate-cylindric, 1–2.5 in. long; leaf solitary, elliptic-lanceolate or oblanceolate, 4–14 in. long, .8–2.1 in. wide, acute, tapering into a short, stout petiole, 3-ribbed; scape arising from the top of the pseudobulb; raceme drooping, with the scape up to 26 in. long; bracts persistent, convolute, subrotund, acute, pale-brown, striate, .33 in. long; flowers numerous, close-set, .25 in. long, white with a pinkish or yellowish-brown tinge; lateral sepals with a winged keel, dorsal orbicular, 3-nerved, petals linear-oblong, subacute, lip subequally 3-lobed, midlobe 2-lobulate with a broad sinus between.

18. *Calanthe*, Br.

Terrestrial herbs, often pseudobulbous with a short or tall, leafy stem. *Leaves* plaited. *Scape* axillary, terminal or lateral from a leafy pseudobulb. *Flowers* medium-sized, racemed. *Sepals* subequal, spreading, rarely connivent. *Petals* broad or narrow. *Lip* adnate to the top or base of the column, 3-lobed, midlobe often 2-fid, disk lamellate or tubercled, with or without a spur. *Column* long or short, obliquely truncate; foot 0. *Anther* conical or convex, 2-celled; pollinia 8, waxy, cohering in pairs by a granular viscus.

Stem short, stout; leaves elliptic-ovate to lanceolate, acuminate,



glabrescent; scape lateral, stout, with the lax-flowered raceme up to 3 ft. long, sparsely puberulous; bracts large, ovate-lanceolate, herbaceous, puberulous; flowers puberulous, .75–1 in. long; lip hardly exceeding the sepals, side lobes short, falcate-oblong, mid-lobe much larger, broadly or cuneately reniform, spur linear-subspathulate, longer than the sepals ..... 1. *Masuca*.

Stem short; leaves elliptic-ovate to lanceolate, acuminate, 8–14 in. long, 3–5 in. wide, quite glabrous, tapering into a usually long petiole; scape stout, with the dense-flowered raceme up to 2 ft. long, sparsely puberulous; bracts large, ovate-lanceolate, puberulous; flowers puberulous, .5–.8 in. long; lip longer than the sepals, side lobes large, oblong, obtuse, midlobe more or less deeply cleft into 2 oblong segments with an acute sinus, spur linear, slender, longer than the lip

2. *veratrifolia*.

1. *CALANTHE MASUCA*, Lindl.; F. B. I. v. 850; King and Pantl. Ann. Calc. viii. t. 234.

W. Gháts, 3,000–6,000 ft.

Flowers usually pale- or dark-purple, sometimes pale-rose or white with a purple lip; lip always bright coloured.

2. *CALANTHE VERATRIFOLIA*, Br.; F. B. I. v. 851. *C. Perrottetii*, A. Rich.; Wt. Ic. t. 1664–5.

W. Ghats, 6,000–8,000 ft.

Flowers white or pale-lilac. Very like *C. Masuca*, but smaller and more slender.

### 19. *Arundina*, Blume.

Terrestrial erect plants; stem simple, rigid, terete, sheathed. Leaves distichous, narrow and grass-like. Flowers large in terminal, erect, stiff, simple or branched racemes or panicles. Sepals free, spreading, lanceolate, acuminate, flat, many-nerved. Petals broader, many-nerved. Lip large, broad, sessile on the base of the column and embracing it. Column long, slender, narrowly winged; foot 0. Anther 4-celled; pollinia 8, in 2 superposed rows attached by fours to one membrane.

*ARUNDINA GRAMINIFOLIA*, Hochr. *A. bambusifolia*, Lindl.; F. B. I. v. 857; Wt. Ic. t. 1661; King. & Pantl. Ann. Calc.

height and 1 in. in diameter; leaves linear to linear-lanceolate, acute or acuminate, 5-10 in. long, 3-1 in. wide; flowers about 1.5 in. long, pinkish-purple; sepals lanceolate, petals shorter, rhomboid-elliptic, lip 3-lobed, mid-lobe more or less deeply bifid, crisped, with 3-5 lamellate nerves.

## 20. Eulophia, R. Br.

Quite glabrous terrestrial herbs; rhizome tuberous, rarely pseudobulbous. *Leaves* appearing with or after the flowers, usually plicate. *Scape* lateral, erect, sheathed. *Flowers* racemose, rarely paniced. *Sepals* and *petals* free, spreading, usually subequal. *Lip* adnate to the foot of the column, base saccate or spurred or forming a short mentum, lateral lobes erect, embracing the column, rarely 0, mid-lobe spreading or recurved, disk ridged or crested. *Column* short or long, top oblique, entire, rarely lobed, sometimes with winged or lobed margins; foot present or absent. *Anther* terminal, 2-celled; pollinia 2 or 4, sessile or attached by a short strap to a discoid gland.

Column not produced into a foot:—

Pseudobulbs large, emerging above ground:—

Leaves very narrow, grass-like, 1-ribbed; scapes often branched:—

Leaves 6-30 in. long, .2-.8 in. wide, midrib stout; scape 1-3 ft. or more long; flowers .5-.7 in. long; sepals linear-oblong, subacute or obtuse, petals elliptic, obtuse, lip obovate-oblong, as long as the sepals, side lobes small, disk with 5-crested nerves, spur short ..... 1. *epidendraea*.

Leaves 3-6 in. long, .2-.4 in. wide, midrib not very stout; scape 1-2 ft. long; flowers .4-.5 in. long; sepals lanceolate acuminate or elliptic-lanceolate acute, petals slightly broader, lip obovate-oblong, side lobes small, disk with 3-5 lamellate or crested nerves, fimbriate on the rounded lobe, spur short

2. *graminea*.

Leaves elliptic-lanceolate, acuminate, 3-ribbed, 6-10 in. long, 1.2-2.5 in. wide. Pseudobulbs fusiform, 2-6 in. long; scape stout, unbranched, with the raceme 2-3 ft. long; bracts linear-lanceolate; flowers .4-.5 in. long; sepals lanceolate acute, petals broader, lip broader than long, side lobes short, obtuse, midlobe revolute, rounded, disk 2-lamellate at the base, spur

Lip longer than broad, its nerves fringed :—

Stem 3–6 in. long, sheathed ; leaves 4–12 in. long, 1·5–2·5 in. wide ; scape 8–15 in. long, with loose ochreate sheaths below ; bracts conspicuous, linear acuminate, ·3–·5 in. long, flowers about ·5 in. long ; sepals linear-lanceolate, acute, petals broadly elliptic, lip broadly ovate, obtuse, side lobes 0

4. *ochreatea*.

Stem 4–6 in. long, sheathed ; leaves 6–12 in. long, 1–3·5 in. wide ; scape 1–3 ft. long, with large acuminate sheaths below ; bracts up to 1·75 in. long ; flowers ·7–1 in. long ; sepals linear-lanceolate, petals oblong-elliptic, shorter, obtuse or acute, lip obovate-oblong, side lobes small, rounded, midlobe oblong or obovate-oblong ..... 5. *herbacea*.

Lip broader than long ; leaves 4–12 in. long, ·5–1·5 in. wide ; scape 1–3 ft. long ; bracts ovate-lanceolate, acuminate ; flowers ·5–·6 in. long ; sepals and petals elliptic oblong, obtuse, side lobes of lip large, oblong, rounded, midlobe broadly subovate, or suborbicular, disk with 3 crested nerves ..... 6. *pratensis*.

Column produced into a foot :—

Root tuberous ; leaves elliptic-lanceolate, acute, 10–15 in. long ; scape 1–3 ft. long ; bracts lanceolate, acute ; flowers ·9–1 in. long ; sepals linear-oblong, acute, dorsal slightly narrower, petals oblong, obtuse, shorter and wider than the sepals, lip obovate-oblong, side lobes short, rounded, midlobe obovate-oblong, obtuse or retuse, crisped, disk with many crenulate or tubercled nerves ..... 7. *nuda*.

Root tuberous ; leaves oblong-lanceolate, acute ; scape rather slender, angular, sheathed, with the raceme 1–2 ft. long ; bracts ovate-ensiform ; flowers about 1 in. long ; sepals acute, dorsal narrowly oblanceolate, lateral falcate-lanceolate, petals wider, oblong, obtuse, mentum conical, subacute, lip with the mentum as long as the petals, as broad as long, side lobes large, triangular-falcate, obtuse or subacute, midlobe tongue-shaped, half as long as the whole lip, slightly concave, rounded, disk with 3 tubercled crests.

8. *Cullenii*.

1. *EULOPHIA EPIDENDRAEA*, Fischer, n. comb. *E. virens*, R. Br. ; F. B. I. vi. 1 ; Wt. Ic. t. 913. *Limodorum virens*, Steud. Con. Pl. ; t. 28.

2. *EULOPHIA GRAMINEA*, Lindl.; F. B. I. vi. 2; King & Pantl. Ann. Calc. viii. t. 238.

Travancore (Wight, Bourdillon), Chingleput (Gamble), Cuddapah Hills (Fischer), sea-level to 2,500 ft.

Very similar to the last in habit and coloration, but smaller in all respects.

3. *EULOPHIA MACROSTACHYA*, Lindl.; F. B. I. vi. 4; Wt. Ic. t. 1667-8.

Nilgiris and Courtallam (Wight).

Flowers green, lip yellow with red stripes, spur green.

4. *EULOPHIA OCHREATA*, Lindl.; F. B. I. vi. 2.

Vizagapatam Hills at 3,300 ft. (A. W. Lushington).

5. *EULOPHIA HERBACEA*, Lindl.; F. B. I. vi. 2; Duthie Ann. Calc. ix. t. 106.

Bababudan Hills of Mysore (Law).

Flowers white with purple nerves.

6. *EULOPHIA PRATENSIS*, Lindl.; F. B. I. vi. 4. *E. ramentacea*, Wt. Ic. t. 1666.

W. Gháts.

Flowers yellow.

7. *EULOPHIA NUDA*, Lindl.; F. B. I. vi. 5; Hook. f. Ann. Calc. v. t. 47; King & Pantl. Ann. Calc. viii. t. 243. *Cyrtopera fusca*, Wt. Ic. t. 1690.

W. Gháts, 2,000-7,000 ft.; Vizagapatam Hills at 3,800 ft. (A. W. Lushington.)

Flowers greenish-purple, yellow and white.

8. *EULOPHIA CULLENII*, Fischer n. comb. *Cyrtopera Cullenii*, Wt. Ic. t. 1754; F. B. I. vi. 7 (under *E. flava*, Hook. f.).

Travancore (Cullen), Anamalai and Pulney (Bourne, Sauvière and Anglade) Hills, 3,500-7,000 ft.

Flowers yellow (Wight) or purple (Anglade).

Var. *minor* with flowers 6 in. long. Pulney Hills at 6,000 ft. (Van Malderen).

## 21. Cymbidium, Swartz.

Epiphytic, rarely terrestrial herbs; stem short, rarely elongate and pseudobulbous; roots tufted. Leaves long, rarely short, narrow, coriaceous. Scape from the side of the stem, sheathed.

*Lip* sessile at the base of the column and embracing it with the erect side lobes, midlobe recurved, disk with 2 median ridges. *Column* long; foot 0. *Anther* 1- or imperfectly 2-celled; pollinia 2 deeply grooved or 4, sessile on a small or large, often strap-shaped gland.

Leaves linear-oblong, subacute, not notched, 24-30 in. long, .75-1 in. wide; scape and raceme 10-20 in. long, decurved from the base; flowers 1.25 in. across, ovary .5 in. long; lip as long as the sepals, side lobes narrow, midlobe oblong, obtuse, emarginate, much decurved, disk with 2 parallel continuous lamellae with clavate apices

1. *pendulum*.

Leaves linear-oblong, obtuse, shortly obliquely notched, 12-22 in. long, .75-1.5 in. wide; scape and raceme 8-20 in. long, erect below, decurved above; flowers 1.5 in. across, ovary nearly 1 in. long; lip as long as the sepals, side lobes narrow, midlobe ovate-oblong, much decurved, disk with 2 lamellae, broken and discontinuous near the middle

2. *aloifolium*.

1. CYMBIDIUM PENDULUM, Sw.; King & Pantl. Ann. Calc. viii. t. 251. *C. aloifolium*, Hook. f.; F. B. I. vi. 10 (in part). *Epidendrum pendulum*, Roxb. Cor. Pl. t. 44.

Hills of the Circars (Roxborough).

An epiphytic herb; flowers dark purple-brown, sepals and petals with yellow margins.

2. CYMBIDIUM ALOIFOLIUM, Sw.; F. B. I. vi. 10 (in part); Wt. Ic. t. 1687-8; King & Pantl. Ann. Calc. viii. t. 252. *C. bicolor*, Hook. f. F. B. I. vi. 11. *C. erectum*, Wt. Ic. t. 1753.

In all hilly tracts, 100-3,500 ft.

An epiphytic herb; flowers yellowish-red, or brownish-red.

## 22. Geodorum, Jackson.

Terrestrial herbs; rootstock tuberous. *Leaves* elliptic, acute, plicate. *Scape* from the rootstock, stout, erect, sheathed. *Flowers* crowded in decurved racemes; bracts narrow, membranous. *Sepals* and broader *petals* subequal in length, conniving or spreading. *Lip* sessile on the base or short foot of the column, entire, cymbiform, membranous, margins involute, disk with a basal forked callus and with or without ridges ending in calli. *Column* short, stout. *Anther* 2-celled, appendaged, after

GEODORUM DENSIFLORUM, Schlechter. *G. purpureum*, R. Br.; F. B. I. vi. 16. *G. dilatatum*, R. Br.; F. B. I. vi. 17; Wt. Ic. t. 912. *Limodorum recurvum*, Roxb. Cor. Pl. t. 39.

In all districts, 200–3,000 ft.

A stout herb; leaves petioled, 4–10 in. long, 2–5 in. wide; scape with raceme up to 2 ft. long; flowers 4 in. long, pale-purple or rose, the lip with darker markings; sepals linear-oblong, acute, lip ventricose at the base, subpandurate, apex rounded, emarginate or 2-fid, disk with a channelled ridge ending in raised calli or granulate.

### 23. Polystachya, Hooker.

Epiphytic herbs; caulescent or pseudobulbous. Leaves few, distichous. Scape terminal, sheathed. Flowers small, racemose or paniced. Sepals free, lateral triangular or triangular-ovate, adnate to the foot of the column. Petals much smaller, very narrow. Lip superior, clawed and jointed on the foot of the column, erect, 3-lobed, side lobes erect. Column short, broad; foot rather long. Anther 1- or sub 2-celled; pollinia 4, cohering or connate in pairs, attached to a very short strap or gland.

Pseudobulbs small; leaves 3–4, narrow-lanceolate, acute, 2–7 in. long, 3–1 in. wide; scape compressed; rhachis angular, glabrous or sparingly brown-pubescent; flowers 1 in. long; lateral sepals ovate-triangular, apiculate, lip suborbicular, side lobes obtuse, nearly as large as the semi-circular midlobe.....1. *Wightii*.

Pseudobulbs small; leaves 3–4, narrowly oblong or lanceolate, obtuse or subacute, 2–7 in. long, 5–1.1 in. wide; scape compressed; rhachis angular, glabrous or sparingly brown pubescent; flowers 1 in. long, lateral sepals broadly triangular-lanceolate from a broad base, acute or apiculate, lip broadly oblong, side lobes small, obtuse, midlobe much larger, tongue-shaped or broadly ovate-oblong, apex rounded or emarginate .....2. *purpurea*.

1. POLYSTACHYA WIGHTII, Reichb. f.; F. B. I. vi. 21. *P. luteola*, Wt. Ic. t. 1678.

W. Gháts, 2,000–4,500 ft. Not common.

Flowers yellow.



## 24. Luisia, Gaud.

Tufted epiphytic herbs; stems terete, rigid, sheathed, usually erect. *Leaves* fleshy, elongate, terete, obtuse. *Flowers* small, spicate on a short, stout extra-axillary rhachis; bracts short, thick, imbricating, persistent. *Sepals* subequal or the decurved dorsal smaller. *Petals* equal to or longer than the lateral sepals, spreading. *Lip* sessile on the base of the column, basal portion flat or saccate, apical decurved, broad, ridged. *Column* very short, truncate. *Anther* 2-celled; pollinia 2, ovoid or subglobose; caudicle strap-like.

Stem 6–12 in. long, slender or rather thick; leaves spreading, green, spotted with purple, 3.5–7 in. long, .06–.13 in. thick; flowers .2–.3 in. long; sepals and petals subequal, narrow, lip longer, quadrate and subsaccate at the base, the apical portion rhomboid-ovate, apex entire ..... 1. *teretifolia*.

Stem 12 in. or more long, slender; leaves spreading, green, 3–7 in. long, sometimes very slender; flowers .5 in. long; petals much longer than the sepals, narrow, lip about as long as the petals, narrowly pandurate, convex, base broad, flat, 2-auricled, apex with 2 divergent lobules ..... 2. *tenuifolia*.

1. *LUISIA TERETIFOLIA*, Gaud.; F. B. I. vi. 22; King & Pantl. Ann. Calc. viii. t. 271. *Cymbidium tenuifolium*, Wt. Ic. t. 1689.

W. Gháts, 3,000–4,000 ft.; Vizagapatam Hills at 4,000 ft. (A. W. Lushington).

Flowers greenish-yellow or pale-pink, lip purple.

2. *LUISIA TENUIFOLIA*, Bl.; F. B. I. vi. 24. *Cymbidium triste*, Wt. Ic. t. 911.

W. Gháts, Melpat in South Arcot (Barber), near sea-level to 4,000 ft.

Flowers yellowish with a purple tinge, lip dark purple with a white patch on either side, and pale purple lobes.

## 25. Cottonia, Wight.

Epiphytic herbs; stems leafy, emitting vermiform roots. *Leaves* coriaceous, narrow. *Flowers* in lateral short racemes; peduncles long, simple or branched. *Sepals* subequal, narrow, ...

subpandurate, 2-auricled at the base, side lobes indistinct, mid-lobe rounded, retuse. *Column* short; foot 0. *Anther* short, hemispheric, 2-celled; pollinia 2, pyriform, 2-cleft or 4 with the 2 smaller incumbent on the 2 larger; caudicle long, narrow; gland very small.

COTTONIA MACROSTACHYA, Wt. Ic. t. 1755; F. B. I. vi. 26.

Malabar near Tellicherry (Jerdon); Anamalais Hills at 2,600 ft. (Fischer); Travancore (Johnson, Calder and Ramaswami).

Stem stout, 4-8 in. long; internodes short; leaves strap-shaped, apex more or less unequally 2-lobed, 4-8 in. long, 3-8 in. wide, keeled below; scape slender, erect, up to 30 in. long, bracts minute; flowers somewhat like a humble-bee; sepals ovate-oblong, obtuse, about 25 in. long, petals oblanceolate, all greenish-yellow or orange veined with red, lip purple with a broad golden-villous margin; base with 3 calli, disk with a median pubescent callus.

## 26. Kingiella, Rolfe.

Epiphytic herbs; stems short, leafy. *Leaves* coriaceous, flat. *Scapes* lateral or axillary, simple or branched. *Sepals* and *petals* subequal or unequal, spreading. *Lip* with a saccate or spur-like mentum, 3-lobed, sessile on the foot of the column, side lobes usually with an awned plate, midlobe with a 2-awned plate. *Column* rather long, narrowly winged; foot usually long. *Anther* 2-celled; pollinia 2, sulcate or 2-partite; strap linear or spathulate; gland large or small.

KINGIELLA DECUMBENS, Rolfe. *Doritis Wightii*, Benth.; F. B. I. vi. 32; Hook. f. Ann. Calc. v. t. 59; King & Pantl. Ann. Calc. viii. t. 265.

Circars (Heyne); Quilon (Wight).

A pendulous herb; stem stout, hardly 1 in. long; leaves 1-4, oblong, usually slightly oblanceolate, obtuse; margins subundulate, 3-8 in. long, 1-2 in. wide; scape from the stem below the leaves, up to 16 in. long, slender; flowers small, pale-ochraceous marked with purple; sepals and petals subequal in length, obtuse, the petals broader, lip with a saccate mentum, side lobes large, oblong, obtuse, with a broad plate

27. *Rhynchosylis*, Blume.

Epiphytic herbs; stem stout, often woody, leafy. *Leaves* very thick, linear or oblong, apex 2-lobed. *Flowers* in erect or pendulous, many-flowered, cylindric, simple or branched racemes. *Sepals* broad, obtuse, spreading. *Petals* similar, smaller. *Lip* adnate to the foot of the column, spur forming a sac, often pubescent within, side lobes 0, epichyle dilated, erect or recurved on the outer rim of the spur. *Column* short, stout; foot short or 0. *Anther* rounded; pollinia 2; caudicle long, slender; gland oblong, small.

Stem 3-8 in. long, woody; leaves linear, deeply channelled, 6-20 in. long, .5-2 in. wide, apex subequally acutely 2-lobed or lobes very unequal, one rounded or acute, the other truncate; racemes simple, as long as the leaves; flowers .6 in. long; spur saccate, laterally flattened, parallel to the pedicel, epichyle flat, widened and cuneate or emarginate at the apex ..... 1. *retusa*.

Stem short; leaves oblong, flat, slightly keeled, 1.5-3 in. long, .6-1 in. wide; apex subequally bluntly 2-lobed; racemes simple or branched, 3-6 in. long; flowers .12 in. long; spur pouch-like, at right angles to the pedicel, epichyle narrow, channelled above and thickened into a vertical cone at the apex ..... 2. *latifolia*.

1. *RHYNCHOSTYLIS RETUSA*, Bl.; F. B. I. vi. 32; King & Pantl. Ann. Calc. viii. t. 284. *Saccolabium guttatum*, Wt. Ic. t. 1745-6.

Circars (Heyne, A. W. Lushington); Walaiyar (Wight); Malabar Coast (Barber).

Flowers pale pink spotted with darker pink, lip dark pink.

2. *RHYNCHOSTYLIS LATIFOLIA*, Fischer in Kew Bull. 1927. 358. Mysore at Cardamonai (Barber).

28. *Chilochista*, Lindl.

Epiphytic herbs; stem very short, leafless, scaly; roots slender, long. *Racemes* erect. *Sepals* and *petals* similar, broad, spreading, the lateral sepals inserted on the apical portion of the foot; petals usually running down the foot. *Lip* movable on the foot, 3-lobed, spur saccate, side-lobes erect, midlobe very short,

**CHILOCHISTA PUSILLA**, Schlechter. *C. usneoides*, Wt. Ic. t. 1741. *Sarcochilus Wightii*, Hook. f.; F. B. I. vi. 37.

Cochin (Johnson); Nilgiris (Jerdon).

A small herb; roots green; scape and raceme 1.5–3 in. long; flowers about .2 in. long, white or creamy; ovary puberulous, spur short, broadly conical.

### 29. Aerides, Lour.

Epiphytic herbs; stem leafy, often woody. *Leaves* coriaceous, flat and channelled or terete. *Flowers* generally numerous, showy; in dense or lax spikes, racemes or panicles. *Sepals* and *petals* similar, lateral sepals and sometimes the petals adnate to the foot of the column. *Lip* more or less elastically inserted at the end of the foot, spurred, side lobes small or large, rarely 0, midlobe usually larger than the side lobes or smaller and incurved between them, spur usually curved forward and with calli within. *Column* short; foot usually long. *Anther* 2-celled, beaked or not; pollinia 2, globose, sulcate; caudicles long or short.

Leaves terete, acute, 2–6 in. long, .1–.2 in. diam. Stems rather slender, elongate; flowers few on a short, stout peduncle, .75 in. long; sepals obovate-oblong, obtuse, petals shorter and broader, side lobes of lip erect, about as long as the shortly cuneiform, fleshy, ridged midlobe, spur narrow, straight or slightly recurved

1. *cylindricum*.

Leaves flat, keeled:—

Side lobes of lip much narrower than the midlobe:—

Lip more than .5 in. long, horizontal or inflexed:—

Stems 1–3 in. long, very stout; leaves linear-oblong, channelled, apex unequally bluntly 2-lobed, 3–10 in. long, .5–1.2 in. wide; flowers in usually paniced racemes longer than the leaves; bracts minute; sepals obovate, .4 in. long, petals as long, narrower, lip quadrate-oblong, .6–.8 in. long, side lobes small, rounded, midlobe retuse, spur rather large, strongly incurved..... 2. *maculosum*.

Stems 2–10 in. long, stout; leaves oblong or linear-oblong, apex unequally bluntly 2-lobed, 2.5–8 in. long, .6–1.75 in. wide; flowers usually in simple (sometimes branched) racemes

long, ovate, subobtus, somewhat 3-lobed, margin crenulate, with 2 fleshy calli at the base closing the mouth of the spur, spur strongly incurved, the apex often concealed beneath the reflexed edges of the lip .....3. *crispum*.

Lip about .3 in. long, deflexed. Stem 1-7 in. long, stout; leaves linear to linear-oblong, apex unequally bluntly 2-lobed, 2.5-10 in. long, .25-1 in. wide; flowers in simple or branched racemes, shorter or longer than the leaves; bracts minute; sepals suborbicular, petals narrower, side lobes of lip small, midlobe ovate, disk with 2 large basal calli, spur cylindric, obtuse, incurved .....4. *ringens*.

Side lobes of the lip broad, midlobe narrowly lanceolate, acute, erose, incurved between the side lobes. Stem 3-12 in. long, stout; leaves linear-oblong or oblong-lanceolate, apex unequally bluntly 2-lobed, 5-10 in. long, .7-1.5 in. wide; flowers in usually simple racemes, as long as or longer than the leaves; bracts rather large; lateral sepals suborbicular, longer and wider than the dorsal sepal and the petals, lip about .5 in. long, longer than the lateral sepals, spur subacute, strongly incurved .....5. *odoratum*.

1. *AERIDES CYLINDRICUM*, Lindl.; F. B. I. vi. 44; Wt. Ic. t. 1744.

W. Gháts.

Flowers white or tinged with red, lip reddish, midlobe yellowish at the base (Wight).

2. *AERIDES MACULOSUM*, Lindl.; F. B. I. vi. 45. *Saccolabium speciosum*, Wt. Ic. tt. 1674-5.

W. Gháts, Ramandrug at 3,500 ft. (Gamble).

Flowers rose-coloured, lip darker.

3. *AERIDES CRISPUM*, Lindl.; F. B. I. vi. 45. *A. Lindleyanum*, Wt. Ic. tt. 1677.

Nilgiri and Pulney Hills, 3,000-6,000 ft.

Flowers sweet-smelling; pinkish white shaded with darker pink.

4. *AERIDES RINGENS*, Fischer n. comb. *A. radicosum*, A. Rich.; F. B. I. vi. 46. *A. lineare*, Hook. f.; F. B. I. vi. 47. *Saccolabium Wightianum*, Lindl.; Wt. Ic. t. 917. *S. rubrum*, Wt. Ic. t. 1673. *S. paniculatum*, Wt. Ic. t. 1676.

W. Gháts, 800-8,000 ft.

5. *AERIDES ODORATUM*, Lour.; F. B. I. vi. 47; King & Pantl. Ann. Calc. viii. t. 282.

Circars (Heyne); Vizagapatam (Barber); Rampa Hills at 2,000 ft. (Narayanswami).

Flowers very fragrant; white spotted with pink.

### 30. *Vanda*, R. Br.

Epiphytic herbs or shrubs; stems often very long and scandent, leafy. *Leaves* very coriaceous or fleshy, flat, keeled or terete. *Flowers* in simple lax or dense racemes, usually showy and rather large. *Sepals* and *petals* subequal, spreading or incurved, narrowed to the base. *Lip* usually saccate or spurred, side lobes large or small, rarely 0, adnate to the foot of the column or to the sides of the sac or spur, midlobe fleshy, disk usually ridged or lamellate. *Column* short, stout; foot very short or 0. *Anther* 2-celled; rostellum small; pollinia 2, didymous, subglobose or obovoid; caudicle short or long and geniculate; gland usually large.

Leaves terete, slender, 3.5–8 in. long. Stem slender up to 8 ft. long; peduncles axillary, suberect, long; raceme 2–6-flowered; flowers 2.5–4 in. in diam.; sepals broadly oblong or obovate, blunt, lateral often with a short spur outside, below the apex, petals larger, subrotund, lip longer than the lateral sepals and with them adnate to the very short foot, side lobes large, elliptic, midlobe clawed, obovate, more or less deeply bifid, spur funnel-shaped . . . . . 1. *teres*.

Leaves flat or keeled, not terete :—

Leaves less than 10 in. long :—

Flowers less than 1 in. in diam. Stems stout, 3–6 in. long; leaves conduplicate, keeled, linear, apex unequally obtusely (rarely acutely) 2-lobed, 3–6 in. long, .4–.7 in. wide; scapes few-flowered, axillary from the existing or fallen leaves, as long as or often longer than the leaves; bracts small; sepals broadly obovate, spreading, petals spathulate-oblong, lip adnate to the foot of the column, spur narrowly funnel-shaped, slightly curved at the lip, side lobes erect from the edges of the spur, midlobe obovoid, tip dilated, crenulate, truncate or retuse, disk 2-ridged; capsules 1–1.5 in. long . . . . . 2. *parviflora*.

Flowers more than 1 in. in diam.; capsules more than 1.5 in. long :—



oblique and entire or emarginate, 2-4 in. long, .5-1.25 in. wide; scape leaf-opposed, robust, with the few to many-flowered raceme up to 20 in. long, erect; bracts persistent, ovate-cordate, acute, .3-.4 in. long; flowers 1.25 in. in diam.; sepals and petals flat, spathulately oblong, obtuse, lip clawed, as long as the sepals, side lobes small, oblong, midlobe triangular-ovate, obtuse, somewhat 3-lobed, decurrent on the short, conical, acute spur; capsules 1.5-2 in. long

### 3. *spathulata*.

Stem 1-2 ft. long, scandent; leaves conduplicate, keeled, linear-oblong, apex praemorse, 3-toothed, all teeth acute or 2-rounded, 3-8 in. long, .5-1.2 in. wide; scapes axillary, stout, with the raceme up to 10 in. long, 6-10-flowered; bracts suborbicular, 0.12 in. long; flowers 1.5-2 in. in diam.; sepals obovate, spreading, petals shorter, side lobes of lip erect, ovate, acute, midlobe twice as long, pandurate, dilated at the apex, lip 2-lobed, disk with fleshy ridges, spur straight, conical, obtuse; capsules 3-4 in. long....4. *tessellata*.

Leaves narrowly ligulate, unequally, acutely 2-lobed, more than 1 ft. long; scapes few-flowered; side lobes of lip subquadrate, midlobe broadly ovate, obtusely 2-lobed, disk with 2 thick ridges, pilose at the base of the ridges and side lobes, spur conical, column slender for the genus .....5. *Wightii*.

1. *VANDA TERES*, Lindl.; F. B. I. vi. 49; King & Pantl. Ann. Calc. t. 285.

Vizagapatam Hills at 3,300 ft. (A. W. Lushington).

Flowers white or rose, lip yellow or reddish-brown, spotted and lined with red and purplish-brown.

2. *VANDA PARVIFLORA*, Lindl.; F. B. I. vi. 50; Wt. Ic. t. 1669; King & Pantl. Ann. Calc. viii. t. 286.

In all Districts in hilly tracts, 1,000-4,000 ft.

Flowers yellow, midlobe of lip lilac or whitish with lilac lines.

3. *VANDA SPATHULATA*, Spreng.; F. B. I. vi. 50; Wt. Ic. t. 915.

In most districts, about sea-level (Sriharikota in Nellore [Fischer]) to 3,000 ft.; usually in rather dry tracts.

Often starting terrestrially, and later attaching itself to

4. *VANDA TESSELLATA*, Hook. *V. Roxburghii*, R. Br.; F. B. I. vi. 52; Wt. Ic. t. 916; Duthie Ann. Calc. ix. t. 116. *Epidendrum tessellatum*, Roxb. Cor. Pl. t. 42.

In all districts, about sea-level to 2,000 ft.

Sepals and petals tessellated yellow with brown lines and white margins, lip bluish dotted with purple. Vern. Tel. Saga.

5. *VANDA WIGHTII*, Reichb. f.; F. B. I. vi. 54.

Nilgiri Hills (Wight).

A little-known species.

### 31. *Saccolabium*, Blume.

Epiphytic herbs; stems leafy. Leaves long, linear, sometimes terete. Flowers solitary or in simple or branched, few to many-flowered racemes, small or moderate-sized. Sepals and petals free, spreading, recurved or incurved. Lip spurred, 3-lobed, rarely entire, side lobes short, erect, midlobe fleshy, spur saccate, naked within, or with calli on the front wall only. Column short and broad; foot 0 or indistinct. Anther 1- or imperfectly 2-celled; pollinia 2, entire or 2-partite.

Leaves very slender, terete, 2-8 in. long. Stem slender, 3-18 in. long; racemes lateral, up to 3 in. long; bracts lanceolate, minute; sepals linear, petals orbicular, all shorter than the cylindric, obtuse spur, limb of lip ovate, acute, deflexed, side lobes erect, rounded

1. *filiforme*.

Leaves flat:—

Spur of lip 2-3 times longer than the sepals. Stem 2-8 in. long; leaves linear-lanceolate, acuminate, narrowed at the base, 2-4 in. long, .3 in. wide, straight or falcate; racemes slender, simple, 3-6 in. long; bracts minute; flowers .2 in. long; sepals oblong, obtuse, dorsal concave, petals slightly smaller, spur straight, slender, tubular acuminate, mouth oblique, side lobes of lip 0, midlobe minute, acute ..... 2. *gracile*.

Spur of lip shorter than the lateral sepals:—

Stem 1-7 in. long, slender; leaves linear, subacute, 1-1.5 in. long, .2 in. wide; racemes simple or branched, longer than the leaves; bracts minute, lanceolate, longer than the pedicel and ovary; flowers .06-.1 in. long sepals ovate, petals linear,

or subacutely 2-lobed, 2-10 in. long, .25-.6 in. wide; racemes lateral, short, stout; bracts broadly ovate; flowers .2-.3 in. long; sepals and petals oblong or obovate, strongly incurved, side lobes of lip very small, midlobe broadly ovate, concave, fimbriately erose ..... 4. *pulchellum*.

1. **SACCOLABIUM FILIFORME**, Lindl.; F. B. I. vi. 56. *Sarcanthus filiformis*, Wt. Ic. t. 1684. *S. roseus*, Wt. Ic. t. 1685.

Nilgiri (Wight), Anamalai (Cotton), Pulney (Bourne, Saulière) Hills, 3,000-8,000 ft., and High Wavy Mountains (Blatter & Hallberg).

Flowers rose or orange-yellow streaked with crimson, or brick-red with an orange lip (Blatter).

2. **SACCOLABIUM GRACILE**, Lindl.; F. B. I. vi. 57.

Anamalai Hills; High Wavy Mountains (Blatter & Hallberg). Rare.

Flowers white.

3. **SACCOLABIUM JERDONIANUM**, Reichb. f.; F. B. I. vi. 59.

*Taeniophyllum Jerdonianum*, Wt. Ic. t. 1756.

Malabar (Jerdon); Travancore, Udambanshola at 5,000 ft. (Meebold); Tinnevelly at Naterikal (Barber).

Rare.

4. **SACCOLABIUM PULCHELLUM**, Fischer n. comb. *S. nilagiri-cum*, Hook. f.; F. B. I. vi. 60. *Vanda pulchella*, Wt. Ic. t. 1671.

Nilgiri Hills and Quilon (Wight); Travancore (Johnson); Pulney Hills at 6,000 ft. (Anglade, Bourne); Tinnevelly Hills (Barber); High Wavy Mountains (Blatter & Hallberg).

Flowers green or yellowish passing into white, dashed with purple.

### 32. *Acampe*, Lindl.

Epiphytic herbs; stems usually long and stout. Leaves thickly coriaceous, keeled, distichous, apex oblique. Flowers corymbose, often paniced, fleshy. Sepals and petals flat, subsimilar, the lateral sepals adnate to the usually small spur, dorsal sepal often slightly larger than the lateral. Lip upcurved, saccate or spurred, adnate to the column, often tubercled or

Stem 12-18 in. long, stout; leaves strap-shaped; apex unequally bluntly 2-lobed, 4-9 in. long, .6-1.4 in. wide; peduncles supra-axillary, stout, with several cupular sheaths; flowers .3 in. long, paniced; panicles 1.5-5 in. long; sepals elliptic or obovate-oblong, petals obovate; side lobes of lip small, rounded; midlobe ovate, obtuse, papillose; spur a short rounded sac. . . . . 1. *Wightiana*.

Stem short, very stout; leaves narrowly strap-shaped, apex unequally 2-lobed with usually a mucro between, 6-8 in. long; scape 1.5-2 in. long; flowers crowded, .4 in. long; sepals and petals oblong, spur saccate or shortly conical, hairy within, side lobes of lip very small, midlobe rhomboid with acute angles, papillose above . . . . 2. *congesta*.

1. *ACAMPE WIGHTIANA*, Lindl. *Saccolabium Wightianum*, Hook. f.; F. B. I. vi. 62. *S. praemorsum*, Hook. f. vi. 62. *Vanda Wightiana*, Wt. Ic. t. 1670. *Epidendrum praemorsum*, Roxb.; Cor. Pl. t. 43.

W. Gháts (Wight); Circars (Roxburgh); Godavari District at Kota (Narayanswami).

Flowers yellow, barred with red; lip white with red stripes.

2. *ACAMPE CONGESTA*, Lindl. *Saccolabium congestum*, Hook. f.; F. B. I. vi. 63. *S. papillosum*, Wt. Ic. t. 1672.

Malabar (Wight).

Flowers white, tinged with yellow and purple.

### 33. *Sarcanthus*, Lindl.

Epiphytic herbs; stems usually elongate. *Leaves* fleshy, terete or flat. *Flowers* small in extra-axillary racemes or panicles. *Sepals* subequal. *Petals* rather smaller. *Lip* adnate to the base of the column or its foot, spur funnel-shaped, sometimes dilated near the mouth, divided by a longitudinal septum into 2 loculi for part of its length, usually with calli on both walls, side lobes small, midlobe small, triangular or hastate. *Column* short, stout; foot 0, short or long. *Anther* depressed, 2-celled; pollinia 2, bifid.

*SARCANTHUS PENINSULARIS*, Dalz.; F. B. I. vi. 67. *S. pauciflorus*, Wt. Ic. t. 1747.

W. Gháts.

Stem slender, pendulous, leafy, 10-12 in. long; leaves linear,

margins, lip white or yellowish, the side lobes often purple, sepals elliptic, obtuse, 16 in. long, petals smaller, spathulate, side lobes of lip small, acute, midlobe incurved, acute, spur conical, subacute, dilated above.

#### 34. *Cleisostoma*, Blume.

Epiphytic herbs; stems usually elongate, leafy. *Leaves* fleshy, flat or terete. *Flowers* in extra-axillary racemes or panicles. *Sepals* and *petals* subequal, rather small, spreading. *Lip* adnate to the foot of the column, usually upcurved, 3-lobed, or the side lobes indistinct, spurred, spur conical or saccate with a callus plate within on the back wall, side lobes of lip erect, midlobe spreading or recurved. *Column* short; foot very short. *Anther* 2-celled; pollinia 2.

Stem 1-2 ft. long, rather slender; leaves scattered, oblong, apex rounded, entire or notched, base cordate, 1-2 in. long, 4-6 in. wide; flowers 3 in. long, on a short, stout, leaf-opposed peduncle; sheaths cupular; bracts cymbiform; sepals and petals oblanceolate, obtuse, side lobes of lip rather large, crenulate, midlobe sub-3-lobed, with a fleshy callus or with 2 ridges on the disk .....1. *tenerum*.

Stem 1-2 in. long; leaves distichous, imbricate, linear, apex unequally bluntly 2-lobed, slightly narrowed at the base, 3-9 in. long, 6-1 in. wide; racemes rather stout, simple or branched, 2-5 in. long, sheaths cupular; bracts minute, lanceolate, acuminate; flowers 16 in. long; sepals and petals obovate, obtuse, side lobes of lip indistinct, midlobe orbicular-ovate, spur saccate, slightly inflated at the apex, with a callus plate on the back wall .....2. *Mannii*.

1. *CLEISOSTOMA TENERUM*, Hook. f.; F. B. I. vi. 73. *Oeceoclades tenera*, Wt. Ic. t. 1683.

Nilgiris: Sispara Ghát at 5,000 ft. (Gamble); Pulney Hills: Kodaikanal at 7,000 ft. (Anglade, Bourne); High Wavy Mountains (Blatter & Hallberg).

Flowers yellow or green with red nerves, lip white.

2. *CLEISOSTOMA MANNII*, Reichb. f.; F. B. I. vi. 74; Hook. f. Ann. Calc. v. t. 86.

Vizagapatam: Palkonda Hills at 1,500 ft. (Gamble).

Flowers yellow flushed with red.

#### 35. *Taeniophyllum*, Blume.

*Sepals* and *petals* subequal, free or united at the base. *Lip* sessile, saccate or spurred, side lobes small, broad, midlobe more or less fleshy, spur naked within. *Column* very short, broad; foot 0. *Anther* 2-celled; pollinia 4; strap short or long; gland small or fairly large.

TAENIOPHYLLUM SCABERULUM, Hook. f.; F. B. I. vi. 77.

Travancore at Kottayam (Johnson). Very rare.

Roots filiform; peduncle .5 in. long, scaberulous; bracts broadly ovate; flowers under .1 in. long; sepals, petals and lip united at the base, lip deeply saccate with a minute incurved lobe.

### 36. *Diplocentrum*, Lindl.

Epiphytic herbs; stem short, leafy. *Leaves* distichous, narrow, fleshy, subterete or complicate. *Scapes* lateral, simple or branched. *Flowers* rather small, in subspiciform racemes. *Sepals* and *petals* similar, the lateral sepals usually somewhat larger. *Lip* sessile, jointed on the base of the column, spreading, entire, with 2 short spurs, epichyle fleshy. *Column* very short, truncate, 2-auricled; foot 0. *Anther* 2-celled; pollinia 2, ovoid, sulcate or 2-partite; caudicle broad; gland broad.

Stem 2-6 in. long; leaves linear, keeled, apex unequally bluntly 2-lobed, 3-6 in. long, .2-.35 in. wide; panicles 5-10 in. long; lateral sepals ovate, slightly falcate, lip with 2 short narrowly conical incurved parallel spurs, epichyle oblong, rounded, disk with a median thick fleshy ridge forking near the apex.....1. *recurvum*.

Stem 2-6 in. long; leaves linear, apex unequally bluntly 2-lobed, 2-6 in. long, .2-.6 in. wide; panicles 5-10 in. long; lateral sepals broadly ovate, lip with 2 very short saccate-oblong, straight, slightly divergent spurs, epichyle lanceolate truncate, disk naked, somewhat thickened at base on either side .....2. *congestum*.

1. DIPLOCENTRUM RECURVUM, Lindl.; F. B. I. vi. 78; Wt. Ic. t. 1680. *D. longifolium*, Wt. Ic. t. 1681.

Hills of South India from Horsleykonda (Gamble, Fischer) and Nundidroog to Tinnevely and Travancore.

Flowers pink and brownish tinged with pink.

2. DIPLOCENTRUM CONGESTUM, Wt. Ic. t. 1682; F. B. I. vi. 78.



37. *Podochilus*, Blume.

Small epiphytic herbs; stems tufted. *Leaves* many, distichous, small, flat or equitant and laterally compressed. *Peduncles* terminal or leaf-opposed. *Flowers* small or minute, racemed or spicate. *Lateral sepals* adnate to the foot of the column and forming a mentum. *Petals* free, broad or narrow. *Lip* jointed to the foot, clawed or not, entire or somewhat 3-lobed, erect with a basal appendage. *Column* short; foot well developed; rostellum bifid or 2-partite. *Anther* erect; pollinia 4; caudicle widened upwards; gland small.

*PODOCHILUS FALCATUS*, Lindl.; F. B. I. vi. 80. *P. malabaricus*, Wt. Ic. t. 1748, fig. 2; F. B. I. vi. 80.

Wynaad (Drew, Barber); Malabar (Jerdon); Kavalay in Cochin at 2,000 ft. (Meebold); Travancore (Johnson).

Stem 3-12 in. long, fleshy; leaves broadly ensiform, obtuse, 5 in. long, imbricating and covering all the stem except the base; spikes slender, terminal, or terminal and lateral up to 1.5 in. long; bracts ovate-lanceolate, acuminate; flowers 5-12, white tipped with pink; lateral sepals ovate-lanceolate, dorsal, and petals lanceolate, mentum small, lip ovate-lanceolate, constricted in the middle, obtuse.

38. *Thelasis*, Blume.

Small epiphytic herbs; pseudobulbous with 1 or 2 leaves or with short compressed stems and several leaves. *Leaves* jointed on the sheath. *Scape* from the base of the pseudobulb or lateral on the stem, with 1-3 sheaths. *Flowers* very small, spicate. *Sepals* and *petals* similar, the latter smaller. *Lip* sessile on the base of the column, entire. *Column* very short; foot 0. *Anther* 2-4-celled; pollinia 8 in 2 groups of 4, minute, globose; caudicles long, filiform; gland small.

*THELASIS PYGMAEA*, Lindl.; F. B. I. vi. 86; King & Pantl. Ann. Calc. viii. t. 331. *Euproboscis pygmaea*, Griff.; Wt. Ic. t. 1732.

Malabar (Jerdon); Anamalai Hills: Karanir at 1,900 ft. (Fischer).

acuminate; flowers hardly 1 in. long, greenish; dorsal sepal ovate-lanceolate, lateral linear-oblong, lip ovate, acute, contracted towards the tip.

### 39. *Vanilla*, Swartz.

Stout, terrestrial, climbing, branched herbs; branches emitting adventitious roots; leafy or leafless. *Leaves* when present coriaceous or fleshy. *Racemes* usually axillary, subsessile or peduncled. *Flowers* large. *Sepals* and *petals* subequal, spreading. *Lip* adnate by a claw to the base of the column and embracing it in its concave limb, entire or 3-lobed. *Column* elongate; foot 0. *Anther* incumbent, cells separate; pollen granular. *Capsule* long, fleshy, 1-celled.

Stem very thick; internodes 3-4 in. long; abortive leaves lanceolate, acuminate, .5-1.5 in. long; bracts ovate, acute, .25-.4 in. long; flowers 2 in. long; sepals and petals oblong-lanceolate, subobtusate, petals slightly the wider, undulate, lip entire, ovate-oblong, subacute, undulate, disk with 2 median puberulous lines ..... 1. *Walkeria*.

Stem thick; internodes 2-4 in. long; leafless; bracts broadly ovate, subacute, about .2 in. long; flowers 1 in. or less long; sepals and petals oblong-lanceolate, subacute, lip 3-lobed, side lobes broad, rounded, midlobe rotund-ovate, subacute, disk with a median hirsute line and two densely retrorsely barbate crests .. 2. *Wightiana*.

#### 1. *VANILLA WALKERIAE*, Wt. Ic. t. 932; F. B. I. vi. 90.

Travancore near Quilon (Wight); Jirganhalli in North Coimbatore at 3,000 ft. (Fischer).

Flowers white. Vern. Kan. Gundunallai.

#### 2. *VANILLA WIGHTIANA*, Lindl.; F. B. I. vi. 90. *V. aphylla*, Wt. Ic. t. 931.

Travancore (Wight, Calder and Ramaswami).

Flowers white.

### 40. *Corymborchis*, Thouars.

Tall terrestrial, rigid, leafy herbs. *Leaves* broad, plaited. *Flowers* in axillary, sessile, spreading panicles. *Sepals* and *petals* subequal, linear or spatulate, at first cohering in a tube with spreading tips. *Lip* erect from the base of the column, linear, channelled, tip expanded and recurved. *Column* elongate.

rostellum, 2-celled; pollinia 2, clavate; caudicle subulate; gland peltate.

**CORYMBORCHIS VERATRIFOLIA**, Bl. *Corymbis veratrifolia*, Reichb. f.; F. B. I. vi. 91; King & Pantl. Ann. Calc. viii. t. 354.

Nilgiris (Thomson); Courtallam (Wight); Tinnevely District at Kannikatti (Barber); Cuddapa District (Beddome).

Stem up to 4 ft. high; leaves elliptic-lanceolate, caudate-acuminate, nearly sessile on the sheaths, 12-18 in. long, 3-4 in. wide; panicles 4-6 in. long; flowers 1-1.25 in. long, greenish-white; sepals and petals linear-ob lanceolate, lip linear with the end expanded into an orbicular, apiculate recurved lobe.

#### 41. *Tropidia*, Lindl.

Terrestrial leafy herbs; stems often branched. *Leaves* membranous, sessile, subplicate. *Flowers* small, in axillary or terminal, sessile or peduncled spikes. *Sepals* and *petals* subequal, the lateral sepals more or less connate. *Lip* sessile on the base of the column and parallel to it, cymbiform or spurred, entire, tip acute or reflexed, disk lamellate. *Column* rather short; foot 0; rostellum long, at length 2-fid. *Anther* short, erect, 2-celled; pollinia 2, clavate, 2-cleft; caudicle short or long; gland small.

**TROPIDIA ANGULOSA**, Bl.; F. B. I. vi. 92; King & Pantl. Ann. Calc. viii. t. 365. *Govindooia nervosa*, Wt. Ic. t. 2090.

Bababudan Hills (Law); Courtallum (Wight).

Stem 8-12 in. long, sheathed below the leaves; leaves 2-3, elliptic to broadly ovate, acuminate, base rounded or cordate, 3-6 in. long, 1.5-3 in. wide; peduncles terminal, slender in flower, up to 2 in. long; spikes many-flowered, 1-2 in. long; bracts linear, slender, spreading, .4-.75 in. long; flowers .5-.75 in. long, white; lateral sepals lanceolate, acuminate, connate nearly to the apex, forming a mentum and enclosing the lip and spur, dorsal sepal narrower, petals ovate-lanceolate, lip oblong, obtuse, spur cylindric.

#### 42. *Anoechtochilus*, Blume.

erect spikes. *Sepals* and *petals* free, the dorsal sepal forming a hood with the petals, the lateral spreading. *Lip* adnate to the base of the column, base spurred, side lobes small, midlobe contracted above the spur into an entire, toothed or pectinate claw, apex expanded into 2-4 wing-like lobes, spur exserted beyond the bases of the lateral sepals with 2 calli within. *Column* short, with 2 appendages in front which plunge into the spur; foot 0. *Anther* 2-celled; pollinia 2; caudicle long or short.

**ANOECHTOCHILUS ELATIOR**, Lindl.; F. B. I. vi. 95.

W. Ghâts in or near evergreen forests, 3,000-6,000 ft.

Stem up to 8 in. long; leaves orbicular-ovate, acute, base rounded, 1-3 in. long, often velvety dark-green with golden nerves; petiole above the loose short sheath, 3-5 in. long; scape slender, glandular pubescent, as are the spike, bracts, pedicels and ovaries, up to 12 in. long, with 2-3 lanceolate sheaths; spike short, 2-12-flowered; bracts ovate-lanceolate, 5 in. long; flowers pink; lip as long as the sepals, claw fimbriate, terminal lobes oblong, shorter than the claw, spur funnel-shaped, acute; appendage of column large, didymous, hatchet-shaped.

#### 48. *Odontochilus*, Blume.

Terrestrial leafy herbs; stem creeping below. *Leaves* petioled. *Flowers* terminal, solitary, or on a few- to many-flowered spike. Dorsal *sepal* forming a hood with the petals, lateral more or less connate at the base and concealing the spur. *Lip* adnate to the base of the column, contracted beyond the spur or sac into a claw, apex lobed. *Column* short; foot 0. *Anther* 2-celled, pointed; pollinia 2, rarely 4.

**ODONTOCHILUS ROTUNDIFOLIUS**, Blatt. in Journ. Bomb. Nat. Hist. Soc. xxxii, 520.

High Wavy Mountains in evergreen forest (Blatter & Hallberg).

Stem nodose, 6 in. high, hairy with hairs from bulbous bases; leaves few, almost orbicular, mucronate, up to 4 in. in diam.; petiole about as long, amplexicaul; flower solitary, about 4 in. long; sepals erect, oblong, petals shorter, oblong,

44. *Spiranthes*, L. C. Rich.

Terrestrial herbs; roots fibrous or tuberous; stems erect, leafy, or the flowering leafless. *Leaves* usually narrow. *Flowers* small, in erect, secund, often twisted, many-flowered spikes. *Sepals* subequal, free, the lateral gibbous at the base, and inserted obliquely on the ovary, more or less cohering with the similar petals in an erect hood. *Lip* erect, sessile or clawed, entire or 3-lobed, base concave, disk bearing calli or lamellæ. *Column* short, terete, base often decurrent on the ovary; foot 0. *Anther* erect, 2-celled; pollinia 2, 2-partite, pendulous.

*SPIRANTHES SINENSIS*, Ames. *S. australis*, Lindl.; F. B. I. vi. 102; Wt. Ic. t. 1724 (middle and right-hand figures); King & Pantl. Ann. Calc. viii. t. 369.

In the hills, 5,000–8,000 ft., in open dry grass-lands and in swampy places.

6–18 in. high; leaves 4–5, usually clustered near the base of the stem, linear-lanceolate to oblanceolate, obtuse or acute, 1.5–5 in. long, .2–.5 in. wide, shortly sheathing, sometimes distinctly petioled; flowers 1–2 in. long, white or pink, in glandular-pubescent spikes 1.5–9 in. long; rhachis spirally twisted; sepals ovate-oblong, petals linear, lip sessile, 3-lobed, dilated at base and apex, base subsaccate, 2-glandular, apex subquadrate, truncate, retuse, crenulate.

Var. *Wightiana*, Lindl.; F. B. I. vi. 102; Wt. Ic. t. 1724 (left-hand figure). Stout, sheaths many, almost imbricating; flowers in a dense cylindric spike.

Nilgiri Hills.

45. *Chelrostylis*, Blume.

Small leafy terrestrial herbs; stems decumbent and succulent at the base. *Leaves* membranous, petioled. *Flowers* small, few, racemed. *Sepals* united to the middle into a ventricose tube. *Petals* shorter, narrow. *Lip* inserted at the base of the column, erect, base saccate or cymbiform, sac with contained calli or setae, epichyle shortly clawed, apex dilated, 2-lobed, margin entire, toothed or fimbriate. *Column* short, with 2 appendages in front; foot 0; rostellum 2-cleft. *Anther* erect, 2-celled;

Nilgiri and Pulney Hills at 6,000 ft. and upwards, growing in the humus of shady woods.

A delicate plant 4-9 in. high, probably saprophytic; leaves 4-5, thin, ovate or subrotund, acute, base rounded or subcordate, 3-ribbed, .5-1 in. long, brown tinged with red; sheaths hyaline, truncate, inflated; scape slender, glandular-pubescent; sheaths few, loose, acuminate; racemes short; flowers white, glandular-pubescent, less than .5 in. long; sepals ovate-oblong, petals linear-oblong, lip with a short saccate claw, limb spreading, suborbicular, deeply 2-lobed, the lobes sub 5-fid.

#### 46. Zeuxine, Lindl.

Terrestrial herbs; stems creeping below. *Leaves* membranous. *Flowers* small in terminal racemes or spikes. *Sepals* subequal, lateral, free, enfolding the base of the lip, dorsal concave, cohering with the petals in a hood. *Lip* adnate to the base of the column, saccate or cymbiform, with a sessile or clawed entire or 2-lobed limb. *Column* short, with or without 2 processes in front; foot 0. *Anther* membranous, cells 2, contiguous; pollinia 2, pyriform with a common caudicle; gland oblong.

*Leaves* linear, acuminate, clasping, .5-3 in. long, .08-.25 in. wide, sessile or truncate on the sheaths. *Stem* passing into the peduncle; leaves many passing gradually into linear bracts; racemes dense-flowered, .5-3 in. long; lateral sepals obliquely ovate-oblong, dorsal ovate, petals falcately oblong, lip not longer than the sepals, claw dilated, limb semiorbicular, sac small. . . . . 1. *strateumatica*.

*Leaves* ovate:—

*Stem* short; leaves few, ovate or ovate-oblong, acute, base rounded, .8-1.75 in. long, .3-.6 in. wide, shortly petioled; sheaths short, hyaline, inflated; scape with few-flowered glandular-pubescent spike 4-10 in. long, slender, pubescent; sheaths 2-3, distant, lanceolate; sepals oblong, pubescent, lip twice as long as the sepals, basal sac with 2 spurs within, claw gradually dilated into the deeply 2-lobed, obovate-cuneate limb, lobes crenulate or coarsely toothed . . . . . 2. *longilabris*.

*Stem* short; leaves few, ovate or ovate-lanceolate, acute, base rounded, .9-1.75 in. long, .5-.75 in. wide; petiole short; sheaths



as long as the pubescent ovary; dorsal sepal saccate at base, lateral slightly shorter, ovate-lanceolate, lip slightly longer than the dorsal sepal, basal sac naked within, limb sessile, of 2 orbicular entire wings separated by a shallow apical sinus . . . . . 3. *Blatteri*.

1. ZEUXINE STRATEUMATICA, Sohltr. *Z. sulcata*, Lindl.; F. B. I. vi. 106; King & Pantl. Ann. Calc. viii. t. 381. *Z. brevifolia*, Wt. Ic. t. 1725. *F. robusta*, Wt. Ic. t. 1726. Ganjam (Barber); Mysore (Jerdon); Walaiyar at 800 ft. (Fischer).

Stem 2-12 in. long; flowers white.

2. ZEUXINE LONGILABRIS, Benth.; F. B. I. vi. 107. *Monochilus affine*, Lindl.; Wt. Ic. t. 1728.

W. Gháts from the low country (Bourdillon) to 4,000 ft. (Fischer). High Wavy Mountains (Blatter & Hallberg).

Stem under 2 in. long; flowers white or (Blatter) olive with lip white and column orange.

3. ZEUXINE BLATTERI, Fischer in K.B. 1928 ined.

High Wavy Mountains in damp forest (Blatter & Hallberg).

Stem 3-6 in. long, rooting; sepals greenish with pale tips, petals pale pink, sac of lip orange, the limb white.

#### 47. Goodyera, R. Br.

Terrestrial leafy herbs; roots fibrous, stem creeping below. Leaves petioled, often coloured. Flowers small, in terminal, sometimes twisted spikes. Sepals subequal, dorsal erect, concave, forming a hood with the narrow petals, lateral sepals free, erect or spreading. Lip inferior, sessile on the base of the column, base cymbiform or saccate, often setose within, limb entire, narrowed or acute at the apex. Column usually short, top cupular; foot 0. Anther 2-celled, cells distinct; pollinia 2, granular, pendulous; caudicle present or absent.

GOODYERA PROCERA, Hook.; F. B. I. vi. 111; Wt. Ic. t. 1729; King & Pantl. Ann. Calc. viii. t. 378.

West Coast and W. Gháts; Seshachalam Hills in the Cuddapah District at 2,500 ft. (Fischer).

Plant up to 30 in. high leaves lanceolate, acute or obtuse, base narrowed, 1.5-8 in. long, 1.2-5 in. wide, petiole short.

the white, fragrant flowers; sepals broadly ovate, petals spathulate, lip saccate, ~~and~~ softly setose within, and with 2 large calli, limb recurved, truncate.

48. Hetaeria, Blume.

Leafy terrestrial herbs; stem creeping below. *Leaves* petioled. *Flowers* small, in terminal, many-flowered spikes, not inverted. *Sepals* free, the dorsal forming a hood with the narrower petals, the lateral embracing the base of the lip. *Lip* superior, adnate to the sides of the column, base cymbiform or subovate, warted within, limb usually small. *Column* short, with 2 parallel processes below; rostellum 2-toothed; foot 0. *Anther* short, 2-celled; pollinia 2, 2-lobed.

HETAERIA OVALIFOLIA, Benth.; F. B. I. vi. 115. *Goodyera ovalifolia*, Wt. Ic. t. 1730.

Courtallam in dense forest (Wight).

Whole plant 1-2 ft. high; leaves membranous, broadly elliptic, acute, base rounded, 3- or 5-ribbed, 2-4 in. long, .75-2 in. wide, often tinged with purple; petiole .5-8 in. long; sheath short, loose; scape pubescent; sheaths several, lanceolate, acuminate; spike slender, 3-4.5 in. long; rhachis, pedicels and ovaries glandular-pubescent; bracts linear-lanceolate, acuminate, .25-.3 in. long; flowers white tinged with pink; sepals broadly ovate, petals obovate-oblong, lip saccate, obtusely 3-toothed, nerves with toothed calli near the base.

49. Aphyllorchis, Blume.

Terrestrial leafless herbs; stem simple, sheathed. *Flowers* moderate-sized, in terminal lax racemes or spikes. *Sepals* and *petals* subequal, the latter narrower. *Lip* sessile or shortly clawed on the base of the column, oblong, entire or 3-lobed. *Column* rather long; foot 0. *Anther* 2-celled, cells contiguous; pollinia 2, 2-lobed.

APHYLLORCHIS MONTANA, Reichb. f.; F. B. I. vi. 116; King & Pantl. Ann. Calc. viii. t. 349.

Mysore at Cadamanay (Barber); Anamalai Hills: Karian-shola in dense evergreen forest at 2,500 ft. (Fischer).

upwards; racemes 4-8 in. long; flowers about .75 in. long, straw-coloured with purple tips; sepals and petals linear-oblong, obtuse, lip narrowly obovate-oblong, narrowed towards the obtuse apex, side lobes rounded at base, claw subsaccate, short, broad, with 2 linear calli.

**50. *Nervilia*, Comm. ex Gaud.**

Terrestrial tuberous 1-leaved herbs. *Leaf* appearing after the flowers, broadly cordate to orbicular, plicate. *Flowers* solitary or few to many, racemose. *Sepals* and *petals* subequal, narrow. *Lip* inferior, adnate to the base of the column, sessile or almost clawed, entire, 2-fid or 3-lobed, sometimes slightly saccate at the base. *Column* elongate, broadening upwards; foot 0. *Anther* substipitate; pollinia 2, 2-fid, or 4, powdery; caudicle and gland absent.

**Scape 1-3-flowered:—**

Lip entire, apex emarginate, base slightly saccate. Leaf lying flat on the ground, broadly ovate or suborbicular, obtuse, acute or shortly acuminate, base cordate, many-ribbed, 2-4 in. long, dark-green mottled with purplish-brown, more or less coarsely hairy; scape 3-6 in. long; sheaths 2-3, tubular; flowers 2 or 3, about .65 in. long; sepals and petals linear-lanceolate, acuminate

1. *plicata*.

Lip obovate, obtuse, 3-lobed about the middle, midlobe emarginate, crisped, not saccate. Leaf unknown; flowers 2, about .9 in. long; sepals and petals narrowly oblanceolate, acuminate . . . . 2. *biflora*.

**Scape many-flowered:—**

Leaf orbicular, apex cuneate, base cordate, 7-9 ribbed, margin entire, 1.5-2.5 in. diam.; sepals and petals oblong-lanceolate, acuminate, about .6 in. long, lip 3-lobed about the middle, not saccate, side lobes small, rounded, midlobe ovate-oblong, sub-obtuse, crenulate, glabrous . . . . . 3. *carinata*.

Leaf orbicular or subreniform, cuspidate, base cordate, 13- or more-ribbed, margin waved, almost coarsely dentate, 4-10 in. diam.; petiole 4-8 in. long; flowers about .66 in. long; sepals linear-lanceolate, acute, petals narrower, obtuse, lip 3-lobed about the middle, side lobes obtuse, midlobe ovate, acute, crisped, hairy

4. *Araguana*.

Chikkenballi at 3,000 ft. (Meebold); Travancore (Calder & Ramaswami).

Sepals and petals yellowish-green, lip lilac with a yellow median line and a basal green spot.

2. *NERVILIA BIFLORA*, Schltr. *Pogonia biflora*, Wt. Ic. t. 1758; F. B. I. vi. 119. Wynaad (Jerdon).

Sepals and petals white, lip pale pink.

3. *NERVILIA CARINATA*, Schltr. *Pogonia carinata*, Lindl.; F. B. I. vi. 121; Hook. f. Ann. Calc. v. t. 94; Duthie Ann. Calc. ix. t. 124.

Mysore (Stocks); Pulney Hills (Bourne); Cochin (Wight).

Sepals and petals pale green, lip pale greenish-yellow with purple veins and spots.

4. *NERVILIA ARAGOANA*, Gaud. *Pogonia flabelliformis*, Lindl.; F. B. I. vi. 121; Duthie Ann. Calc. ix. t. 125. *P. carinata*, Wt. Ic. t. 1720.

Rampa Hills (Ramaswami); Pulney Hills (Bourne); Travancore (Calder & Ramaswami).

Sepals and petals pale green veined with purple, lip white, veined with purple, tinged with yellow near the base.

#### 51. *Didymoplexis*, Griffith.

Slender saprophytic, leafless, tuberous, terrestrial herbs; rhizome fleshy. Scape simple, flexuous; raceme few-flowered; pedicels greatly elongated in fruit. Sepals and petals connate into a 2-lipped tube, the dorsal sepal and the petals forming a 3-lobed upper lip, the lateral sepals a 2-lobed or entire lower lip and forming a mentum with the foot of the column. Lip inserted on the foot of the column, short, broad, entire, base and disk with small calli. Column long, broadened upwards into 2 narrow wings and 2-toothed; foot distinct. Anther low, shortly stipitate; pollinia 4, reniform; caudicle and gland absent.

- DIDYMOPLEXIS PALLENS*, Griff.; F. B. I. vi. 122; King & Pantl. Ann. Calc. viii. t. 346. *Apetalon minutum*, Wt. Ic. t. 1758.

Coorg at Sultan's Battery (Jerdon). Rare.

Stem 4-6 in. long; sheaths loose; raceme terminal, 4-8-flowered; flowers dull yellowish-white, .33 in. diam.; lip

52. *Epipogum*, Gmelin.

Saprophytic, leafless, brownish, terrestrial herbs; roots tuberous or coralloid; stem erect, sheathed. *Flowers* laxly racemed. *Sepals* and *petals* subequal, narrow, free, erect or spreading. *Lip* sessile at the base of the column, broad, entire or 3-lobed, spurred, disk with rows of papillæ. *Column* short; foot 0. *Anther* thick, dorsally 2-celled; pollinia 2, each with a long, filiform caudicle; gland small.

EPIPOGUM NUTANS, Reichb. f.; F. B. I. vi. 124; King & Pantl. Ann. Calc. viii. t. 335. *Podanthera pallida*, Wt. Ic. t. 1759.

Coorg (Jerdon, Barber); Bolampatti Hills at 4,500 ft. (Fischer); Anamalai Hills (Barber); Pulney Hills at 5,000 ft. (Anglade).

10-24 in. high; root an oblong tuber; stem whitish- or pale-brown; sheaths short, inflated, truncate; raceme terminal, few- to many-flowered; bracts large, membranous, oblong, acute; flowers pale yellow or pinkish-white, speckled and stained with pink; sepals and petals narrowly lanceolate, 5-7 in. long, lip entire; disk with 2 or 3 glandular ridges.

53. *Epipactis*, Adans.

Terrestrial, leafy herbs. *Leaves* sessile, plaited. *Flowers* racemose; bracts large, leafy. *Sepals* and *petals* broad, acuminate, strongly nerved. *Lip* sessile on the base of the column, hypochile concave or saccate, epichile contracted at the base, entire. *Column* long or short; foot 0. *Anther* erect, obtuse, 2-celled, cells contiguous; pollinia 2, 2-partite; gland globose.

EPIPACTIS CONSIMILIS, Wall.; F. B. I. vi. 126; King & Pantl. Ann. Calc. viii. t. 364.

Nilgiri Hills at Deva Shola (Lawson). Rare.

Stem 1-2 ft. high; leaves elliptic or lanceolate, obtuse or acuminate, 3-7 in. long, 1-2 in. wide, smaller upwards and passing into the large foliaceous bracts; rhachis of lax-flowered raceme pubescent; flowers, sometimes appearing solitary owing to the leaf-like appearance of the bracts, 1-1.5 in. diam.; lateral sepals falcate ovate, acute, lip

broadly lanceolate, acuminate. Sepals and petals lavender with white hairs without, green striped with brown within, hypochile purple, epichile pale brown, the apex white.

#### 54. *Habenaria*, Willd.

Terrestrial, erect, usually leafy, unbranched herbs; roots of simple or lobed tubers and fleshy radical fibres. *Leaves* 2-many, not plaited, radical or cauline, scattered or clustered. *Flowers* 1-very many, usually terminal in spikes or racemes. *Sepals* unequal, the lateral often much larger, deflexed, dorsal oblong or ovate, more or less arched. *Petals* simple and subequal to the sepals or 2- (rarely 3-) lobed or -partite, segments often filiform. *Lip* entire, 3-lobed or 3-partite. *Spur* long, sometimes very long. *Column* erect, short; foot 0. *Anther* 2-celled, cells parallel or diverging, forming with the sides of the rostellum channels or tubes for the caudicles of the pollinia; pollinia 2, granular, with long or short caudicles and exserted, naked glands. *Stigma* 2-lobed or extended into 2 short or elongate, often clavate, papillose processes.

Petals 2-lobed or -partite :—

Stem leafy upwards :—

Petals entire at the base, 2-lobed above :—

Petals bearded, lip longer than the sepals :—

Plant 10-18 in. high; leaves 5-6 in the middle third of the stem, erect, ovate to narrow-lanceolate, acuminate, 1-3.5 in. long, .3-.8 in. wide; raceme few-flowered; bracts foliaceous, sheathing; flowers about .8 in. long (excluding the spur and ovary); sepals ovate, acute or acuminate, lateral falcate, petals broader, pubescent, upper lobe much the longer, tips filiform, sinus not very deep, rounded, lip scabrid-pilose, linear at base, then 3-furcate, segments subulate, spur as long as the ovary ..... 1. *barbata*.

Plant 10-18 in. high; leaves 3-5 in the middle third of the stem, erect, ovate- or elliptic-lanceolate, acute or acuminate, 1.5-3.5 in. long, .5-.9 in. wide; raceme 5-10-flowered; bracts sheathing; flowers about 1.3 in. long (excluding the spur and ovary); sepals ovate-lanceolate, acuminate or caudate, petals longer, villose, lobes linear, elongate di-



Petals glabrous, lip not longer than the sepals. Stem 1-2 ft. high; leaves erect, linear-lanceolate, setaceously acuminate, 1-4 in. long, 2-4 in. wide; raceme few- and distant-flowered; bracts large, cymbiform, setaceously acuminate; flowers subsessile; lateral sepals broadly ovate, obtuse, petals longer than the dorsal sepal, upper lobe filiform, twice as long as the subulate lower, lip 3-lobed, lobes broad, fleshy, obtuse, lateral divergent, spur clavate at the apex, slightly shorter than the ovary ..... 3. *acuminata*.

Petals 2-partite almost to the base:—

Stem 10-18 in. high; leaves oblong- or lanceolate-elliptic, acute, narrowed to the base, 2.5-8 in. long, 1-2 in. wide; racemes up to 1 ft. long, many-flowered; bracts sheathing, much shorter than the beaked ovary; lateral sepals ovate-falcate, acute, lobes of the petals elongate-filiform, divaricate, lip 3-partite, segments elongate-filiform, lateral much the longer, all the filiform appendages fantastically contorted, spur much curved, shorter than the ovary, tip slightly clavate, subacute; anther-cells very large ..... 4. *multicaudata*.

Stem 10-18 in. high; leaves ovate-lanceolate, 1-4.5 in. long, .5-1.3 in. wide, acute or acuminate, base narrowed; raceme cylindric, many-flowered, up to 6 in. long; bracts foliaceous, sheathing, as long as the whole flower; sepals ovate, acute, lateral narrower, subfalcate, lobes of petals erect, the lower filiform, lip 3-partite, linear, spur about as long as the ovary ..... 5. *digitata*.

Stem leafy only at or near the base:—

Plant 3-10 in. high; leaves 1 or 2, sessile, broadly ovate or sub-orbicular, obtuse or acute, base cordate, .5-2.5 in. long; scape usually naked, 1-4-flowered; bracts ovate, much shorter than the shortly pedicelled ovary; sepals ovate, lateral oblique, acute, upper segment of the petals suborbicular, lower elongate-filiform, lip 3-partite, segments subequal, lateral filiform, median linear-lanceolate, spur slender, curved, clavate at the tip, longer than the ovary ..... 6. *grandiflora*.

Plant 2-10 in. high; leaves usually 3 or more, linear to linear-oblong, rarely ovate, narrowed to the sheath, sometimes complicate, 1-4.5 in. long, .2-1 in. wide; scape naked or with 1-2 sheaths, 1-4-flowered; bracts much shorter than the long-

median shorter and broader, spur slender, curved, much longer than the ovary.....7. *rariflora*.

Petals entire :—

Bracts much smaller than the leaves, not concealing the buds :—

Midlobe of the lip entire, lobes not tailed :—

Side lobes of lip broad, midlobe narrower :—

Lip not or hardly longer than the lateral sepals :—

Side lobes of lip longer than or nearly as long as the midlobe, toothed or fimbriate :—

Spur not longer than the ovary :—

Sepals and petals puberulous :—

Stem 3–8 in. high, rather stout; leaves several in the lower third elliptic to broadly ovate, acute, apiculate, base broad, 1.2–3 in. long, .4–1.1 in. wide, decreasing upwards into loose, lanceolate, acuminate sheaths; raceme dense-flowered, 1.5–3 in. long; flowers scurfily pubescent within; lateral sepals obliquely ovate, petals shorter, broader, gibbous, lip cuneately obovate, midlobe linear, side lobes broad, fimbriate, spur shorter than the ovary

8. *cephalotes*.

Stem up to 8 in. high, rather stout; leaves 3–4 in the lower third, lanceolate, acute, 1.5–2 in. long, decreasing into a few acute sheaths below the flowers; raceme about 2 in. long, lax-flowered; bracts lanceolate, acuminate, as long as the ovary; sepals ovate, acute, petals lanceolate, acute, crenulate-denticulate, lateral lobes of lip angulate, fimbriolate, median ligulate-lanceolate, slightly longer, spur subclavate, slightly shorter than the ovary.....9. *denticulata*.

Sepals and petals quite glabrous. Stem 4–8 in. high, slender; leaves 3–5, near the base, linear to linear-oblong, acute or acuminate, 2–4 in. long .2–.5 in. wide; racemes 2–4 in. long, few- and lax-flowered, usually flexuous; sheaths clasping; flowers glabrous; lateral sepals ovate-oblong, sub-falcate, acute, lip as broad as long, midlobe linear-lanceolate, side lobes cuneate-rhomboid, obliquely

Spur much longer than the ovary :—

Ovary under 1 in. long, curved :—

Stem short, rather slender; sheaths lanceolate; leaves often subradical, elliptic to oblong-lanceolate, acute, 1–4 in. long, .3–.6 in. wide; spike few- and lax-flowered; bracts lanceolate, usually shorter than the ovary; lip triangular-cuneate, side lobes lanceolate, deeply toothed on the outer margin, midlobe ligulate ..... 11. *Richardiana*.

Stem short, rather stout; sheaths ovate; leaves ovate-lanceolate, acute, 2–3 in. long, .5–1 in. wide; spike many- and dense-flowered; bracts broad, sheathing, as long as the ovary; lip obcordate, side lobes semi-ovate, fimbriate, midlobe ligulate, usually short ..... 12. *fimbriata*.

Ovary over 1 in. long, straight, long-beaked. Stem 4–16 in. high; leaves cauline, linear-oblong or lanceolate, obtuse, acute or acuminate, 2–6 in. long, .4–1 in. wide; spike 2–8-flowered; bracts shorter than the ovary; lateral sepals ovate, subacute, petals lanceolate or linear-oblong, lip 3-partite, side lobes recurved-cuneate, apex obliquely truncate, orenate or fimbriate, midlobe linear, slightly shorter, spur twice as long as the sessile ovary, stout, apex clavate ..... 13. *longicornu*.

Side lobes of the lip much shorter than the midlobe, entire. Leaves 3–6, appressed to the earth, sessile, broadly elliptic or orbicular, rounded or acute, 1.5–5 in. long; scape 4–18 in. long, stout; sheaths many, lanceolate, acuminate; spike dense-flowered; bracts much shorter than the long-beaked ovary; sepals broadly-oblong, petals linear, side lobes of lip small, rounded, midlobe lanceolate, spur slender, clavate at the tip, longer than the ovary ..... 14. *platyphylla*.

Lip distinctly longer than the lateral sepals :—

Lip not exceeding .5 in. Leaves radical, horizontal, lanceolate- to oblong-elliptic, acute or obtuse, 1.5–6 in. long, .6–1.5 in. wide; scape 4–20 in. long; sheaths scarious,

semi-ovate, entire or crenulate, midlobe linear, spur slender, as long as or a little longer than the ovary

15. *plantaginea*.

Lip .7 in. or more long, spur very much longer than the ovary:—

Plant 8–30 in. high; leaves subradical, oblong to elliptic-lanceolate, acute, 1.5–6 in. long, .4–1.3 in. wide; scape with several large, convolute, acuminate sheaths; flowers 1–4; bracts convolute, sheathing the pedicels with the ovaries usually entirely exserted; lateral sepals obliquely ovate, petals linear-oblong, lip .8–1.1 in. long, puberulous, side lobes divaricate, cuneate, apex obliquely truncate, crenate or denticulate, midlobe linear, spur long, slender above, thickened from the middle to the subacute apex, reaching 5.5 in. long.

16. *longicalcarata*.

Plant 4–18 in. high; leaves subradical or cauline, linear- to elliptic-lanceolate, obtuse or acute, 1.5–5 in. long, .4–1 in. wide; scape with several lanceolate, finely acuminate sheaths; flowers 1–7; bracts lanceolate finely acuminate, shorter than the sessile, beaked ovary; lateral sepals ovate, petals lanceolate, acute, lip .7–.9 in. long, glabrous, side lobes rhomboid-cuneate, apex oblique, fimbriate, midlobe linear, spur long, very variable, slender or rather stout, thickened to the blunt apex, reaching 5 in. long . . . . . 17. *decipiens*.

Side lobes of lip filiform or linear, midlobe as broad or broader:—

Stem 2–3 ft. high, sheathed below, leafy above; sheaths below the spike bract-like, lanceolate, caudate; leaves oblong or oblong-lanceolate, finely acuminate, 2.5–6 in. long, .7–1.3 in. wide; spike 4–8 in. long, many-flowered; bracts 1–1.5 in. long, linear-lanceolate, setaceously acuminate, exceeding the body of the ovary without the beak; lateral sepals very gibbous, hatchet-shaped, shortly beaked, nearly .5 in. long, with several arched nerves, dorsal orbicular, hooded, shortly beaked, lip linear at base, then 3-lobed, side lobes filiform, midlobe shorter, linear, spur long, slender, incurved; beak of ovary slender, as long as or longer than the body . . . . . 18. *commelinifolia*.

Bracts not cucullate; flowers not or hardly secund. Stem 6-18 in. high; leaves linear to elliptic, acuminate, very narrowly margined, 1-5 in. long, .3-.8 in. wide; spike cylindric, many-flowered, up to 4 in. long; bracts lanceolate, as long as or longer than the ovary; perianth puberulous, sepals broadly oblong, petals triangular-ovate, lip as long as the sepals, wedge-shaped, basal half entire, 3-lobed beyond the middle, lobes linear-lanceolate, outer margins of lateral lobes usually denticulate, spur as long as or slightly longer than the incurved, shortly beaked ovary. . . . 19. *elliptica*.

Bracts cucullate; flowers secund. Plant 4-15 in. high; leaves subimbricate sheathing, ovate to linear, acute, .75-2.5 in. long; spike 2-4 in. long; bracts cymbiform, acuminate, sheathing the flowers, lower 1 in. long, smaller upwards; sepals subequal, obtuse, petals as long, narrower, lip as long, 3-partite, side lobes linear, obtuse, usually shorter than the broader midlobe, spur subclavate, as long as or shorter than the beakless ovary . . . . . 20. *Heyneana*.

Leaves radical or clustered at the middle or near the base of the stem :—

Leaves 3 or more, clustered at the middle or near the base of the stem :—

Leaves clustered near the middle of the stem, narrowed to the base :—

Robust plants attaining over 3 ft. in height; sheaths above the leaves many, erect, lanceolate; leaves elliptic-lanceolate to oblanceolate, acute or acuminate, 3-10 in. long, .7-2.5 in. wide; spike cylindric, up to 12 in. long, bracts linear-lanceolate, setaceously acuminate, as long as or longer than the ovary; sepals subequal, ovate-oblong, obtuse, petals as long, lip much longer, side lobes narrow, longer than the linear, obtuse midlobe, spur slender, incurved, usually shorter than the ovary

21. *affinis*.

Slender or robust plants 1-2 ft. high; sheaths above the leaves few, lanceolate, acuminate; leaves elliptic-lanceolate to oblanceolate, acute or acuminate

acuminate, usually shorter than the ovary; sepals subequal, lateral ovate, obtuse, petals as large, lip as long as or slightly longer than the sepals, side lobes linear-oblong, incurved, as long as or shorter than the ovate-oblong fleshy midlobe, spur slender, incurved, rather longer than the ovary, apex thickened, acute .....22. *ovalifolia*.

Leaves clustered near the base of the stem, not narrowed to the base:—

Plant 3–12 in. high, rather stout; leaves oblong or linear-oblong, obtuse or acute, 1.75–5 in. long, .4–1.1 in. wide; margins yellow, sheaths lanceolate, acuminate, margined; spike 2–6 in. long, many-flowered; bracts lanceolate, ciliolate, finely acuminate, as long as or longer than the ovary; sepals subequal, lateral oblong-lanceolate, .25 in. long, petals ovate-falcate, lip longer than the sepals, side lobes linear, slender, longer than the linear, obtuse midlobe, spur stout, as long as or shorter than the curved ovary, apex inflated .....23. *marginata*.

Plant 3–15 in. high, slender; leaves linear to linear-lanceolate, acute or acuminate, not margined, 1–4 in. long, .2–.5 in. wide; sheaths small, linear, acuminate; spike slender, 2–5 in. long, dense- or lax-flowered; bracts ovate-lanceolate, acute, eciliolate, much shorter than the ovary; lateral sepals broadly oblong, .15 in. long, dorsal and broadly obliquely ovate petals shorter, lip slightly longer than the sepals, lobes slender, subequal, spur slender, as long as the ovary, slightly thickened below .....24. *viridiflora*.

Leaves 2, rarely 3, radical:—

Plant 6–21 in. high; stem with many ovate-lanceolate, acuminate, imbricate or subimbricate sheaths; leaves fleshy, broadly ovate to orbicular, sometimes broader than long, rounded or acute, base cordate, 1–4.5 in. long; spike 2–12 in. long, many-flowered; bracts ovate, acuminate, as long as the ovary; sepals subequal, lateral ovate-oblong, obtuse, lip as long as the



- Plant 3-10 in. high; stem slender with distant, short, lanceolate, acute or acuminate sheaths; leaves appressed to the ground, orbicular, rounded or acute, base cordate, .75-2 in. in diam, the pair unequal in size; spike 1.5-4 in. long; bracts ovate, acuminate, shorter than the ovary; sepals ovate, acute, petals linear, subfalcate, acute, as long as the lateral sepals, lip longer than the sepals, lobes filiform, lateral longer, usually spreading, spur about as long as the ovary, inflated, acute .....26. *diphylla*.

Midlobe of the lip 2-lobed, all the lobes with long filiform tails.

- Plant 2-21 in. high, leafy near the base; leaves oblong-lanceolate, acute, narrowed to the base, 1.5-6 in. long, .4-1.5 in. wide; spike dense-flowered, 2-4 in. long; bracts ovate-lanceolate, acuminate, about half as long as the ovary; lateral sepals obliquely ovate, dorsal and linear petals shorter, lip 3 times as long as the lateral sepals, side lobes cuneiform, midlobe flabelliform, the 2 segments semi-ovate, with a small mucro in the sinus, outer margin of all 4 segments toothed with the inner angle of each caudate, spur slender, incurved, apex clavate, longer than the beaked ovary .....27. *crinifera*.

- Bracts large, foliaceous, imbricating, almost concealing the flowers. Plant 8-30 in. high, very stout; leaves imbricating, ovate or ovate-lanceolate, acute, amplexicaul, 1-3.5 in. long, .5-1 in. wide, gradually passing into the broadly ovate, cymbiform bracts; spike 3-8 in. long; bracts longer than and completely concealing the ovary and spur; sepals erect, ovate-oblong, obtuse, concave, .5-.7 in. long, petals as long, linear, obtuse, lip as long, coriaceous, 3-lobed, cuneately obovate, obtuse, claw geniculate, side lobes linear-oblong, obtuse, incurved, shorter than the triangular-ovate midlobe, spur subclavate, about as long as the ovary ....28. *Perrottetiana*.

1. *HABENARIA BARBATA*, Wight; F. B. I. vi. 133. *Ate virens*, Lindl.; Wt. Ic. t. 928.

W. Gháts; Venkatagiri Drug in Cuddapah.

Flowers white.

2. *HABENARIA ELWESII*, Hook. f.

Nilgiris (Proudlock); Mysore at Cadamany near Saklasapur

Anamalai Hills at 5,000 ft. and Peermade in Travancore at 4,000 ft. (Beddome).

Sepals and petals yellowish-green, lip purple, petals sometimes purple.

4. *HABENARIA MULTICAUDATA*, Sedgw.

Nilgiri Hills; Anamalai Hills in Karianshola at 2,200 ft. (Beddome, Fischer).

Flowers greenish-white, lip and spur brownish.

5. *HABENARIA DIGITATA*, Lindl.; F. B. I. vi. 134; Hook. f. Ann. Calc. v. t. 95. *H. trinervia*, Wt. Ic. t. 1701.

Hill tracts from the Godavari District and Mysore to Tinnevely, 2,000–6,000 ft.

Flowers green.

Var. *foliosa*, Hook. f.; F. B. I. vi. 135. *H. foliosa*, A. Rich.; Wt. Ic. t. 1700. Smaller; leaves shorter and broader, imbricating; raceme dense-flowered; segments of lip filiform; bracts shorter.

Nilgiri Hills at 7,000–8,000 ft.

Var. *travancorica*, Fischer. *H. travancorica*, Hook. f.; F. B. I. vi. 135. Leaves ovate-oblong; flowers much smaller; sepals pubescent within.

Pulney Hills, 4,000–7,000 ft.

Var. *Gibsoni*, Fischer. *H. Gibsoni*, Hook. f.; F. B. I. vi. 135. More robust; leaves longer and narrower; flowers much larger, fewer; no ligule in the mouth of the spur.

Mysore (Law).

6. *HABENARIA GRANDIFLORA*, Lindl.; F. B. I. vi. 136.

Bababudan (Law) and Shevaroy (Perrottet) Hills.

Flowers white.

7. *HABENARIA RARIFLORA*, A. Rich.; F. B. I. vi. 136; Wt. Ic. t. 924.

W. Gháts, 2,000–6,000 ft.; Horsleykonda at 4,100 ft. (Fischer); Kollimalai Hills (Barber).

Flowers white.

8. *HABENARIA CEPHALOTES*, Lindl.; F. B. I. vi. 139; Wt. Ic. t. 1711.

Nilgiri Hills at high elevations.

Flowers white.

10. *HABENARIA SUAVEOLENS*, Dalz.; F. B. I. vi. 140.  
Bababudan Hills (Law).  
Flowers white, fragrant.
11. *HABENARIA RICHARDIANA*, Wt. Ic. t. 1713; F. B. I. vi. 139.  
Nilgiri and Anamalai Hills.  
Flowers white.
12. *HABENARIA FIMBRIATA*, Wt. Ic. t. 1712. *H. polyodon*,  
Hook. f.; F. B. I. vi. 139.  
Nilgiri Hills (Wight, Gamble), 5,000–7,000 ft.  
Flowers white.
13. *HABENARIA LONGICORNU*, Lindl.; F. B. I. vi. 139. *H.*  
*montana*, A. Rich.; Wt. Ic. t. 927, fig. 1, and t. 1714, centre  
fig. only.  
W. Gháts from Mysore to Travancore, 3,000–6,500 ft.;  
Horsleykonda at 4,100 ft. (Fischer); Kollimalai Hills  
(Barber).  
Flowers white.
14. *HABENARIA PLATYPHYLLA*, Spreng.; F. B. I. vi. 140; Wt.  
Ic. t. 1709. *Orchis plantaginea*, Roxb. Cor. Pl. t. 37.  
In all Districts, near sea-level to 3,500 ft.  
Flowers white.
15. *HABENARIA PLANTAGINEA*, Lindl.; F. B. I. vi. 141; Wt.  
Ic. t. 1710; Duthie Ann. Calc. ix. t. 132.  
In all Districts, 800–4,000 ft.  
Flowers white.
16. *HABENARIA LONGICALCARATA*, A. Rich.; F. B. I. vi. 141;  
Wt. Ic. t. 925.  
Throughout the W. Gháts; Ramandrug in the Bellary  
District (A. W. Lushington).  
Flowers white, spur green.
17. *HABENARIA DECIPiens*, Wight; F. B. I. iv. 197. *H. longi-*  
*calcarata*, Hook. f. (not of A. Rich.) in part; F. B. I. vi. 141.  
*H. montana*, Wt. Ic. t. 927 and t. 1714, all but the centre fig.  
W. Gháts from the Nilgiri to the Tinnevely Hills,  
4,000–7,000 ft., Shevaroy Hills (Bourne).  
Flowers white.
18. *HABENARIA COMMELINIFOLIA*, Wall.; F. B. I. vi. 143;

19. *HABENARIA ELLIPTICA*, Wt. Ic. t. 1706; F. B. I. vi. 147.  
Pulney Hills, 7,000–8,000 ft.  
Flowers greenish-white.
20. *HABENARIA HEYNEANA*, Lindl.; F. B. I. vi. 148; Wt. Ic. t. 923. *H. subpubens*, A. Rich.; F. B. I. vi. 148.  
W. Gháts in grasslands, 5,500–8,000 ft.; Shevaroy Hills (Bourne).  
Flowers greenish-yellow.
21. *HABENARIA AFFINIS*, Wt. Ic. t. 1707; F. B. I. vi. 149.  
Nilgiri and Anamalai Hills; Rampa Hills (V. Narayanswami), 2,000–4,000 ft.  
Flowers green.
22. *HABENARIA OVALIFOLIA*, Wt. Ic. t. 1708; F. B. I. vi. 149.  
W. Gháts, 2,000–4,000 ft.  
Flowers pale-green.
23. *HABENARIA MARGINATA*, Coleb.; F. B. I. vi. 150; Duthie Ann. Calc. ix. t. 136.  
W. Gháts 1,500–3,000 ft.; Nallamalai Hills at 1,500 ft. (Fischer).  
Flowers yellow.
24. *HABENARIA VIRIDIFLORA*, R. Br.; F. B. I. vi. 150; Wt. Ic. t. 1705.  
Low country, often in rice-fields.  
Flowers green.
25. *HABENARIA CRASSIFOLIA*, A. Rich.; F. B. I. vi. 151.  
*Platanthera brachyphylla*, Lindl.; Wt. Ic. t. 1694.  
Nilgiri and Pulney Hills, 6,000–7,000 ft.  
Flowers greenish-white, spur green.
26. *HABENARIA DIPHYLLA*, Dalz.; F. B. I. vi. 151; Duthie Ann. Calc. ix. t. 137. *H. Jerdoniana*, Wt. Ic. t. 1715.  
W. Coast from Kanara to Travancore at low elevations.  
Flowers greenish-white.
27. *HABENARIA CRINIFERA*, Lindl.; F. B. I. vi. 142; Wt. Ic. t. 926.  
W. Gháts below 4,000 ft.  
Flowers white.
28. *HABENARIA PERROTTETIANA*, A. Rich.; F. B. I. vi. 164.

55. *Peristylus*, Blume.

Terrestrial erect, usually leafy, unbranched herbs; roots of simple or lobed tubers and fleshy, radical fibres. *Leaves* not plaited. *Flowers* usually small, in terminal spikes or racemes. *Sepals* and *petals* subequal, more or less connivent, the dorsal sepal forming a hood with the petals, the lateral sepals usually erect. *Lip* entire or 3-lobed. *Spur* usually very short, often scrotiform. *Column* very short; foot 0. *Anther* erect, 2-celled, cells parallel, adnate to the column and not forming channels or tubes for the caudicles; pollinia 2; caudicles short; glands naked, exserted. *Stigma* sessile.

*Leaves* scattered or imbricate on the stem, not clustered :—

*Spur* equalling or longer than the sepals :—

Plant 8–24 in. high, usually rather stout; leaves lanceolate or ovate-lanceolate, acute or acuminate, 1–3 in. long, .2–.75 in. wide; spike 2–10 in. long, usually dense-flowered; lateral sepals linear, obtuse, petals as long, elliptic, obtuse, lip with a concave claw, side lobes filiform, recurved over the flower, longer than the sepals and the linear or triangular obtuse midlobe, spur stout, clavate, incurved ..... 1. *Richardianus*.

Plant 4–20 in. high, usually slender; leaves confined to the lower half or two-thirds of the stem, reduced to small sheaths above, lanceolate or linear-lanceolate, obtuse, acute or acuminate, 1–4 in. long, .15–.7 in. wide; spike narrow, 1–6 in. long, lax-flowered; lateral sepals linear, obtuse, petals triangular-ovate or oblong, obtuse, lip excavate at base, side lobes subulate, as long as or slightly longer than the sepals, spreading, longer than the broader, obtuse midlobe, spur slender, straight, not thickened below ..... 2. *stenostachyus*.

*Spur* much shorter than the sepals :—

*Lip* 3-partite nearly to the base, side lobes filiform :—

Plant 4–12 in. high; stem with a few loose, subcucullate sheaths below; leaves ovate to lanceolate, acute or acuminate, .9–2.3 in. long, .2–.6 in. wide; bracts ovate-lanceolate, as long as or longer than the flowers; lateral sepals linear, obtuse, petals as long, oblong-lanceolate, obtuse, lip to end of the midlobe

Plant 6-24 in. high; stem leafy to the base or only in the upper half with loose sheaths below; leaves ovate to elliptic-lanceolate, acute or acuminate, .8-3 in. long, .3-.7 in. wide; bracts lanceolate, acuminate, usually shorter than the flowers; sepals linear-lanceolate, petals as long, ovate-oblong, lip to end of midlobe shorter than the sepals, side lobes filiform, much longer than the ligulate, obtuse midlobe, spur saccate, obtuse

4. *lancifolius*.

Lip entire in the lower half, 3-cleft beyond the middle. Plant 6-18 in. high; stem leafy, often flexuous; leaves elliptic to linear-lanceolate, obtuse, acute or acuminate, 1-2.75 in. long, .2-.6 in. wide; spike slender, 2-10 in. long, spirally twisted; flowers secund; bracts narrowly lanceolate, finely acuminate, equalling or exceeding the very small flowers; lateral sepals linear, obtuse, falcate, petals as long, linear or ovate-oblong, lip rather longer than broad, lobes linear, lateral acute, spreading, narrower than the obtuse midlobe, spur very small, globose . . . 5. *spiralis*.

Leaves clustered about the middle of the stem:—

Side lobes of lip filiform. Plant 7-18 in. high, very slender; stem above the leaves naked or with very few slender short sheaths; leaves thinly membranous, 3-6, elliptic-ovate to narrowly lanceolate, acute or acuminate, narrowed into the loose sheath, 1.3-4 in. long, .4-1.1 in. wide; spike very slender, 2-6 in. long; flowers distant; bracts lanceolate, as long as or shorter than the ovaries; sepals linear, obtuse, petals as long, oblong, lip much longer than the sepals, midlobe ligulate, obtuse, spur clavate, equalling or shorter than the sepals . . . . . 6. *aristatus*.

Side lobes of lip not filiform:—

Spur equalling or exceeding the sepals, clavate. Plant 6-18 in. high; stem slender, with several loose sheaths below the leaves; leaves broadly obovate or elliptic or lanceolate, obtuse, acute or acuminate, narrowed to the sheath and usually shortly petiolate, 2-6 in. long, .5-1.6 in. wide; spike narrow, twisted, 2-6 in. long; bracts ovate-lanceolate, acuminate, shorter or longer than the ovary; flowers very small; sepals oblong, obtuse, petals obliquely ovate, obtuse, lip longer than the sepals, obtusely 3-fid, lobes shallow or deep, subequal, linear-oblong

7. *Stocksii*.

Spur shorter than the sepals, globose or subglobose:—

Plant 1-3 ft. high; stem usually very stout; leaves oblong- or



dense-flowered; bracts linear-lanceolate, equalling or exceeding the ovaries; sepals linear to ovate-oblong, obtuse, petals gibbously ovate, lip as long as the sepals, 3-lobed, lobes various, spur minute ..... 8. *goodyeroides*.

Plant 12-30 in. high; stem rather stout; leaves linear to oblong-lanceolate, acute, base narrowed into the sheath, 4-9 in. long, 1-1-3-6 in. wide; spike narrow, 4-9 in. long, many-flowered; bracts lanceolate, acuminate, as long as or longer than the very small flowers; sepals oblong, obtuse, petals obliquely orbicular, lip shorter than the sepals, broad, entire or very shortly 3-lobed, spur very small ..... 9. *plantagineus*.

1. **PERISTYLUS RICHARDIANUS**, Wt. Ic. t. 1697. *Habenaria bicornuta*, Hook. f.; F. B. I. vi. 156.  
Nilgiri and Pulney Hills, 5,500-7,500 ft.  
Flowers greenish-white.
2. **PERISTYLUS STENOSTACHYUS**, Krzl. *Habenaria stenostachya*, Benth.; F. B. I. vi. 156. *H. peristylodes*, Wt. Ic. t. 1702.  
Bababudan and Pulney Hills; High Wavy Mountains (Blatter & Hallberg).  
Flowers white.
3. **PERISTYLUS BRACHYPHYLLUS**, A. Rich. *Habenaria malabarica*, Hook. f.; F. B. I. vi. 159.  
Bababudan and Nilgiri Hills.
4. **PERISTYLUS LANCIFOLIUS**, A. Rich. *P. robustior*, Wt. Ic. t. 1699. *Habenaria robustior*, Hook. f.; F. B. I. vi. 160.  
W. Gháts, 6,000-7,000 ft.  
Flowers white or pinkish-white.
5. **PERISTYLUS SPIRALIS**, A. Rich.; Wt. Ic. t. 1696. *Habenaria torta*, Hook. f.; F. B. I. vi. 159.  
Bababudan and Nilgiri Hills, 5,000-7,500 ft.; Travancore (Johnson).  
Flowers greenish-white.
6. **PERISTYLUS ARISTATUS**, Lindl. *P. exilis*, Wt. Ic. t. 1698. *Habenaria aristata*, Hook. f.; F. B. I. vi. 158; King & Pentl. Ann. Cal. iii. t. 400.

7. **PERISTYLUS STOCKSII**, Krzl. *Habenaria Stocksii*, Hook. f.; F. B. I. vi. 158.  
Mysore (Stocks).  
Flowers yellowish.
8. **PERISTYLUS GOODYEROIDES**, Lindl. *Habenaria goodyeroides*, Don.; F. B. I. vi. 161; King & Pantl. Ann. Calc. viii. t. 430.  
W. Ghâts, 2,000–4,000 ft.  
Flowers greenish-white.
9. **PERISTYLUS PLANTAGINEUS**, Lindl.; Wt. Ic. t. 921. *Habenaria Wightii*, Trim.; F. B. I. vi. 162. Rampa Hills (V. Narayanswami); Anamalai Hills, 2,000–2,300 ft. (Fischer); Travancore (M. Rama Rao); Malabar.  
Flowers white.

#### 56. *Platanthera*, L. C. Rich.

Terrestrial, erect, unbranched, leafy herbs; roots of ovoid-globose, rarely lobed tubers. *Leaves* not plaited. *Flowers* small or large in lax or dense terminal spikes or racemes. *Sepals* unequal, lateral spreading or reflexed, dorsal forming a hood with the narrower petals. *Lip* entire or 3-lobed, spur short or long. *Column* very short, with a warty protuberance on either side; foot 0. *Anther* erect, 2-celled, cells parallel or divergent, adnate to the sides of the rostellum, broad; pollinia 2, granular, widely separated; caudicles short or long, glands naked, exserted. *Stigmas* sessile or subsessile, more or less confluent, often pulvinate.

**PLATANTHERA SUSANNAE**, Lindl.; Wt. Ic. t. 920. *Habenaria Susannae*, R. Br.; F. B. I. vi. 137; Duthie Ann. Calc. ix. t. 129.

Widely distributed from Ganjam to the South, 300–6,000 ft., but never common or gregarious.

A stout herb 1.5–4 ft. high; leafy up to the inflorescence; leaves ovate-oblong to oblong-lanceolate, acute or acuminate, 2–8 in. long, 1.3–2.6 in. wide, decreasing into the large leafy bracts; flowers 3–6, white, fragrant, 2–3 in. in diam.; lateral sepals obliquely subquadrately oblong, dorsal shorter, broadly rhomboid, petals linear, acute, lip as long as the lateral sepals, side lobes cuneately flabellate, deeply nec-

57. *Phyllomphax*, Schlechter.

Terrestrial erect, unbranched, leafy herbs; roots tuberous. *Leaves* not plaited. *Flowers* medium-sized, in the axils of sheathing leaves. *Sepals* and *petals* subequal, petals entire. *Lip* broad, entire, petaloid, spur short, conical. *Column* short; foot 0; rostellum more or less 2-toothed. *Anther* erect, 2-celled; pollinia 2, granular. *Stigmas* sessile, concave.

PHYLLOMPHAX OBCORDATA, Schltr. *Habenaria galeandra*, Benth.; F. B. I. vi. 163. *Platanthera iantha*, Wt. Ic. t. 1692. *P. affinis*, Wt. Ic. t. 1693.

W. Gháts, 6,000–8,000 ft.; common in grass-lands.

Plant 5–15 in. high, very variable, slender or robust; leafy throughout, or leaves reduced to sheaths below the middle; leaves broadly ovate to lanceolate, acute, amplexicaul, .6–2.3 in. long, .2–1.1 in. wide, usually imbricating but sometimes scattered; bracts leaf-like and but little smaller; flowers white with the lip spotted with purple or the whole flower pale to deep lilac, more or less puberulous; sepals and petals erect, arching over the column, lateral sepals somewhat gibbous, lip much larger, obcordate, truncate or emarginate and with or without a terminal cusp, margins more or less crenulate.

There are 3 or 4 varieties, but they run into one another. The best defined is—

Var. *ianta*, Hook. f. (not of Wight), with much larger flowers, and the lip usually deeply emarginate without a cusp.

58. *Satyrium*, Swartz.

Terrestrial, erect, leafy, unbranched herbs; roots tuberous. *Leaves* not plaited. *Sepals* and *petals* subequal, free, spreading or deflexed. *Lip* superior, sessile at the base of the column, erect, hooded, broad, 2-spurred or -saccate behind. *Column* erect, terete; foot 0. *Anther* dorsal, cells subparallel; pollinia 2, caudicles recurved; glands large, naked. *Stigma* terminal, broad, concave, or forming with the rostellum a 2-lipped body.

SATYRIUM NEPALENSE, Don.; F. B. I. vi. 168; King & Pantl.

In hilly tracts from the Bababudan Hills southwards, 4,000–8,000 ft., in grassy, often marshy land.

Plant 6–30 in. high; stem usually stout, sheathed above; leaves few, very variable, lanceolate, ovate, oblong or sub-orbicular, acute, 2–8 in. long, .8–4.4 in. wide; spikes usually dense- and many-flowered, 1–8 in. long; bracts much larger than the flowers, oblong or lanceolate; flowers white to dark pink fragrant; lip broadly oblong, concave, strongly keeled behind, variable in size in relation to the sepals and petals, spurs variable in length and thickness, about as long as the ovary.

There are several not very well defined varieties.

#### 59. Disperis, Swartz.

Small, terrestrial, unbranched herbs; roots tuberous. *Leaves* 1 or more, sessile, cordate. *Flowers* solitary or in few-flowered racemes, terminal. *Sepals* dissimilar, dorsal very narrow, cohering with the petals into a subglobose hood, lateral spreading or deflexed, free or connate at the base, often subsaccate. *Lip* adnate to the column to above the anther. *Column* short, terete below; foot 0. *Anther* oblong, completely 2-celled; pollinia 2, coarsely granular, cuneiform; caudicles rather long, usually twisted; glands large, naked. *Stigmas* on a transverse hyaline membrane, the ends of which form tubular, usually twisted processes sheathing the caudicles and glands.

Plant 2–15 in. high; stem slender or rather stout, usually flaccid, with 1 or 2 basal sheaths; leaves 1–3, ovate to suborbicular, acute, base amplexicaul, .3–1.6 in. long; flowers 1–4; bracts like the leaves, but smaller; lateral sepals oblong, united at the base, concave, each with a fovea near the base, petals demi-lunate, lip T- or Y-shaped, the vertical limb incurved with a dilated conical tip, arms falcately recurved over the anther; caudicles and their tubes twisted

##### 1. *neilgherrensis*.

Plant 2–4 in. high; stem slender, with a single basal sheath; leaf solitary, rarely 2, rotund-cordate, subacute, amplexicaul, .3–.7 in. long; flowers 1–3; bracts like the leaves, but smaller; lateral sepals spreading, broadly falcate-ovate, not concave, each with a small saccate spur near the base, petals broadly demi-lunate, lip with the midlobe 3-lobed, side lobes channelled below, strongly recurved.

1. **DISPERIS NEILGHERRENSIS**, Wt. Ic. t. 1719; F. B. I. vi. 169. *D. zeylanica*, Trim.; F. B. I. vi. 169.

W. Gháts; 4,500–8,400 ft.

Flowers white or reddish with crimson spots.

2. **DISPERIS MONOPHYLLA**, Blatter in Journ. Bomb. Nat. Hist. Soc. 1928 ined.

High Wavy Mountains (Blatter & Hallberg).

Flowers greenish, white at base, veins purple.

#### 60. *Paphiopedilum*, Pfitzer.

Terrestrial, rarely epiphytic herbs. *Leaves* coriaceous, plicate before expansion, oblong or lorate, keeled below, sulcate above. *Flowers* solitary or few, terminal, large. *Sepals* and *petals* free or lateral connate. *Lip* sessile, side lobes small, spreading or inflexed, midlobe large, saccate, inflated oblong or helmet-shaped. *Column* short, stout; foot 0. *Anthers* 2, subglobose; *pollinia* 2, granular. *Stigma* disciform, deflexed, concealed with the anthers beneath a large disciform staminode.

**PAPHIOPEDILUM DRURYI**, Pfitz. *Cypripedium Drurii*, Bedd. Ic. Pl. Ind. Or. t. 112; F. B. I. vi. 172.

Travancore Hills, 5,000–6,000 ft.

Terrestrial herb with thick succulent root-fibres; leaves radical, thickly coriaceous, ligulate, apex oblique, subacute, 7–12 in. long, about 1.5 in. wide; scape 7–12 in. long, purple-pubescent; bract sheathing, ovate acute, about one-third the length of the ovary; flower solitary, about 3 in. in diam., yellowish-green streaked and blotched with reddish-purple, warts and hairs black; dorsal sepal broadly ovate, ciliolate, arched, petals linear-oblong, warted and hirsute towards the base, lip helmet-shaped, as long as the petals.

#### Family CXLIX. ZINGIBERACEAE.

Perennial herbs, often very large; usually with fleshy rhizomes and thick roots. *Leaves* usually vaginate, the sheaths usually ligulate. *Flowers* moderate- to large-sized, often showy, usually zygomorphic and bracteate, trimerous. *Calyx* tubular or spathaceous, 3-lobed or -toothed, often colourless. *Corolla* funnel-shaped below, 3-lobed above, the dorsal segment usually somewhat

perfect, the other two combined in a petaliferous lip usually embracing the fertile one; the outer whorl absent or represented by 1, 2 or 3 staminodes more or less petaloid or reduced to teeth. *Anther* of fertile stamen 2-celled, introrse; connective often produced or variously appendaged. *Ovary* inferior, usually 3-, rarely 1-2- or more -celled; style long and delicate, often lying in a groove in the stamen; stigma usually funnel-shaped. *Ovules* numerous. *Fruit* usually capsular but sometimes dehiscent late, or indehiscent or breaking up irregularly. *Seeds* more or less arillate, sometimes aromatic, ellipsoid or variously angled; perisperm large and mealy enclosing the endosperm. *Embryo* straight, cylindric or clavate.

Ovary 1-celled, placentas 3, parietal ..... 1. **Globba.**

Ovary 3-celled, placentas axile :—

Lateral staminodes large and broad :—

Connective of anther spurred at the base; spike crowned by a coma; corolla-tube funnel-shaped..... 2. **Cureuma.**

Connective of anther not spurred; spike not crowned by a coma; corolla-tube long and slender :—

Stem absent or very short; filament of anther short, its connective broad and crested ..... 3. **Kaempferia.**

Stem tall, leafy; filament of anther long, its connective narrow and not crested ..... 4. **Hedychium.**

Lateral staminodes small and narrow or absent :—

Flowers in dense cone-like spikes :—

Leafy stem straight; filament of anther narrow, free from the connective, anther terminal :—

Filament of anther arcuate, its cells diverging above, connective dilated and crested or 2-lobed, not produced into a beak ..... 5. **Amomum.**

Filament of anther straight, its cells parallel, connective not crested, produced into a long beak ..... 6. **Zingiber.**

Leafy stem spirally twisted; filament of anther adnate to the connective, broad and petaloid, anther adnate to its middle

7. **Costus.**

Flowers in lax spikes, racemes or panicles :—

Scapes leafless, arising direct from the rootstock 8. **Elettaria.**

Inflorescence terminal on the leafy stem..... 9. **Alpinia.**

# 1. Globba, Linn.

Erect herbs, rhizome creeping. *Leaves* oblong oblong-lanceo-



panicles, the buds sometimes replaced by bulbils. *Calyx* funnel-shaped, 3-lobed. *Corolla*-tube slender, longer than the calyx, lobes ovate, subequal. Lateral *staminodes* petaloid, lip deflexed. *Stamen* with a long 2-appendaged filament; anther oblong, connective produced beyond the cells, simple, winged or spurred. *Ovary* 1-celled; placentas 3, parietal; style filiform, lying in the groove of the anther, stigma turbinate. *Fruit* a globose or subglobose, tardily dehiscent capsule. *Seeds* ovoid, often tomentose, aril small, white, lacerate.

Anther not winged; bracts deciduous:—

Stems 1–3 ft. high; leaves oblong or elliptic-oblong, subcaudate, glabrous, 8–10 in. long, 2–4 in. wide; panicles narrow, lowest branches 3-flowered, bulbils never present; corolla-tube about twice the length of the calyx, petals broadly ovate, longer than the staminodes, lip obovate as long as the petals, shallowly 2-lobed; ovary and capsule verrucose .....1. *orixensis*.

Stems 1–3 ft. high; leaves linear- to elliptic- or oblong-lanceolate, usually conspicuously and finely caudate, pubescent below, 5–12 in. long, 1–3 in. wide, panicles narrow, lowest branches 4–6-flowered, a few bulbils sometimes present in the lower axils; calyx, corolla and the back of the anthers covered with darker globose glands, corolla-tube thrice the length of the calyx, petals ovate, shorter than the lanceolate staminodes, lip twice the length of the corolla, very deeply bifid, segments narrow; ovary and capsule smooth 2. *ophioglossa*.

Anther furnished with spreading bifid wings; bracts persistent; stem 1–2 ft. high; leaves oblong to elliptic-lanceolate, caudate, pubescent below, 3–10 in. long, 1–2.5 in. wide; spikes simple, the flowers in the axils of oblong, acute bracts 5–1 in. long, usually replaced by bulbils in the lower axils; calyx, corolla and the back of the anther covered with globose darker glands, corolla-tube thrice the length of the calyx, petals shorter than the oblong staminodes, lip small, deeply bifid; ovary and capsule smooth .....3. *bulbifera*.

1. *GLOBBA ORIXENSIS*, Roxb.; F. B. I. vi. 201; Roxb. Cor. Pl. t. 229.

Hills of the Northern Circars (Roxburgh); Mohiri Hills, Ganjam (Fischer).

Flowers orange-yellow.

2. *GLOBBA OPHIOGLOSSA*, Wt. Ic. t. 2002; F. B. I. vi. 202.

3. *GLOBBA BULBIFERA*, Roxb.; F. B. I. vi. 206; *G. marantina*, Wt. Ic. t. 2001.

In all districts in damp woods, 300–4,000 ft.

Flowers yellow.

## 2. *Curcuma*, Linn.

Stemless herbs; rootstock tuberous, often with accessory stipitate tubers. *Leaves* usually oblong or broadly lanceolate, rarely narrow, often very large. *Flowers* in a dense, bracteate, strobiliform spike terminating in a coma of larger, usually coloured, sterile bracts, the fertile bracts forming pouches enclosing 2–7 bracteate flowers that develop in succession; peduncle clothed in appressed bracts. *Calyx* short, cylindric, usually minutely toothed. *Corolla* funnel-shaped, lobes 3, ovate or narrowly oblong, the upper one longer and hooded. Lateral *staminodes* petaloid, oblong, connate with the short, broad filament of the fertile stamen. *Lip* broad, entire or 2-lobed. *Anther* not crested, cells contiguous, usually spurred at the base. *Ovary* 3-celled; ovules many, axile; style filiform; stigma 2-lipped, lips ciliate. *Fruit* a tardily dehiscent, globose, 3-valved capsule. *Seeds* ovoid or oblong, usually arillate.

Flowering spike lateral, apart from and appearing usually before the leaves :—

Plant small, with the leaves rarely attaining 18 in. in height, often only 2 in. high before the leaves appear; rootstock small, white inside, root-fibres numerous, terminating in small tubers; leaves lanceolate or oblong-lanceolate, shortly petioled, 6–10 in. long, 1.5–2.5 in. wide; spike dense; fertile bracts oblong-lanceolate, acute, 1–1.5 in. long, pale yellowish-green; coma dense, pink; flowers bright yellow; lip broadly ovate or suborbicular

### 1. *neilgherrensis*.

Larger plants attaining 3 ft. in height in leaf; rootstock large of large palmately branched tubers, yellow inside :—

Fleshy fibres ending in smaller tubers in addition to the large ones; leaves oblong-lanceolate, finely acuminate, 1–2 ft. long; petioles long; fertile bracts ovate, recurved, cymbiform, 1.5 in. long, green tinged with red, of the coma crimson or purple; flowers yellow; lip suborbicular, obscurely 3-lobed, .5 in. wide

or longer; bracts ovate, recurved, cymbiform, obtuse, fertile pale-green, of the coma more or less tinged with red or pink; flowers pink; lip yellow, obovate, subentire or obscurely 3-lobed

3. *aromatica*.

Flowering spike rising in the centre of a previously formed tuft of leaves:—

Rootstock small with small almond-like tubers, white inside, at the ends of fleshy fibres, no sessile tubers:—

Flowers yellow; leaves lanceolate-oblong, acuminate, tapering to the base, with the petiole reaching over 2 ft. long, 4–6 in. wide; fertile bracts obovate-lanceolate, acute, green with a pink tip, 1.25–1.75 in. long; of the coma oblong-lanceolate, lower purple-edged, upper more or less uniformly mauve-purple

4. *pseudomontana*.

Flowers purple; leaves broadly elliptic, deltoid-acuminate, base rounded or subcordate, 6–12 in. long, 3–5 in. wide; petioles as long; fertile bracts ovate, obtuse, saccate, 1 in. long, purple; of the coma numerous, oblong, purple; lip obovate, 2-fid, margins crisped . . . . . 5. *decipiens*.

Rootstock large, tubers sessile, cylindric, yellow inside:—

Tubers aromatic:—

Tubers pale-yellow within; leafy tuft 2–3 ft. high; leaves oblong-lanceolate, tapering at both ends, up to 18 in. long and 6 in. wide; petiole as long; fertile bracts about 1 in. long, pale-green; of coma tinged with pink; flowers white or pale-yellow; lip semi-elliptic 3-lobed, midlobe emarginate

6. *Amada*.

Tubers bright-yellow within; leafy tuft 4–5 ft. high; leaves oblong, caudate-acuminate, tapering to the base, up to 18 in. long and 8 in. wide; fertile bracts about 1.5 in. long, pale-green; of the coma tinged with pink; flowers pale-yellow; lip obovate subentire . . . . . 7. *longa*.

Tubers not aromatic, pale-yellow within; leafy tuft 2–3 ft. high; leaves oblong, acute, tapering to the base, up to 12 in. long and 8 in. wide; petiole about as long; fertile bracts about 1.5 in. long, pale green; of coma pink; flowers pale-yellow; lip sub-orbicular, entire, slightly notched, margins undulate 8. *montana*.

Cultivated in all districts. Vern. *Tel.* Kuchur, Kichchili-gaddala; *Tam.* Kichchilik-kishangu; *Mal.* Kach-churikishanna.

3. *CURCUMA AROMATICA*, Salisb.; F. B. I. vi. 210; Wt. Ic. t. 2005.

Wild on the W. Coast, frequently cultivated elsewhere. The Wild Turmeric. Vern. *Tel.* Kasturi-pasupa; *Tam.* Kasturi-manjal; *Mal.* Kattu-mannar; *Kan.* Kasturi-arishina.

4. *CURCUMA PSEUDOMONTANA*, Grah. *C. montana*, Rose.; F. B. I. vi. 214 in part.

Tekkadi forests of the Anamalai Hills at 2,000 ft. (Fischer).

5. *CURCUMA DECIPIENS*, Dalz.; F. B. I. vi. 215.  
W. Gháts.

6. *CURCUMA AMADA*, Roxb.; F. B. I. vi. 213.

Cultivated. The Mango-ginger plant. Vern. *Tel.* Mamidi-allam.

7. *CURCUMA LONGA*, Linn.; F. B. I. vi. 214.

Cultivated. The Turmeric. Vern. *Tel.* Pasupu; *Tam.* Manjal; *Mal.* Mannal, Marinalu; *Kan.* Arishina.

8. *CURCUMA MONTANA*, Rose.; F. B. I. vi. 214 in part; Roxb. Cor. Pl. t. 151.  
Circars (Roxb.).

### 3. Kaempferia, Linn.

Herbs, rootstock often tuberous; stems 0 or very short. Leaves few. Flowers spicate, scape radical or terminating a leafy stem. Calyx short, cylindric, usually splitting down one side. Corolla-tube long, lobes 3, equal. Staminalodes broad, petaloid. Stamen short, arcuate; anther 2-celled, on a wide connective produced above into a petaloid crest, not spurred. Lip broad, usually 2-fid. Ovary 3-celled; ovules many, axile; style long, filiform; stigma turbinate. Fruit an oblong capsule. Seeds subglobose, aril small, lacerate.

Stemless; leaves 2, spread flat on the ground, orbicular to rotund-ovate, 2.5-6 in. long, 2-6 in. wide; petioles short, channelled;

obovate; deeply 2-lobed; connective of anther produced into a quadrate, 2-lobed appendage.....1. *Galanga*.  
 Stemless; leaves few, erect, oblong, acuminate, up to 12 in. long and 4 in. wide, variegated green above, tinged with purple below; flowers appearing before the leaves on a short, crowded, radical spike; bracts oblong acute, outer short, inner 2-3 in. long; calyx nearly as long as the corolla-tube, minutely toothed, corolla-tube 2-3 in. long, lobes linear, nearly as long as the tube; staminodes oblong, acute, 1.5-2 in. long; lip shorter, 2-fid, segments suborbicular; crest of anther deeply 2-fid .....2. *rotunda*.

1. *KAEMPFERIA GALANGA*, Linn.; F. B. I. vi. 219; Wt. Ic. t. 899.

W. coast at low elevations (Wight).

Flowers fragrant; white with a purple or lilac spot on each side of the lip.

2. *KAEMPFERIA ROTUNDA*, Linn.; F. B. I. vi. 222; Wt. Ic. t. 2029.

W. coast near Trevandrum (Wight). Often cultivated and doubtfully wild.

Flowers fragrant; white, the lip purple or lilac.

#### 4. *Hedychium*, Koenig.

Herbs, often very tall, rootstock tuberous; stem leafy. *Leaves* distichous, oblong or lanceolate. *Flowers* in terminal, often contracted and more or less strobiliform spikes; bracts coriaceous, 1- or more-flowered. *Calyx* tubular, more or less 3-toothed, often split down one side. *Corolla*-tube long, slender, segments equal, linear. *Lateral staminodes* petaloid. *Filament of stamen* slender; *anther*-cells contiguous, connective not produced or appendaged. *Lip* large, bifid. *Ovary* 3-celled; ovules many, axile; style long, filiform; stigma subglobose. *Fruit* a globose, 3-valved capsule. *Seeds* many, small, aril lacerate.

Lip broad, lobes rounded:—

Lip orbicular-obcordate, base suddenly narrowed. Robust plant 3-6 ft. high; leaves linear- to oblong-lanceolate, acuminate, up to 18 in. long and 4 in. wide, usually appressed-silky below, ligule large; spike usually dense-flowered, sometimes lax; bracts usually imbricate, 3-4-flowered, ovate, obtuse, usually glabrous or nearly

Lip obcordate, narrowed to the base into a distinct claw. Robust plant up to 8 ft. high; leaves lanceolate, up to 14 in. long and 3 in. wide, caudate, glabrous or pubescent along the midrib below and at the mouth of the sheath, ligule large; spike dense-flowered; bracts imbricate, 3-4-flowered, large, oblong, obtuse, more or less villous at the apex and pubescent on the back; calyx as long as or slightly longer than the bract, apex puberulous, corolla-tube up to 3 in. long; staminodes narrowly oblanceolate, often notched at the apex; stamen longer than the lip .....2. *flavescens*.

Lip narrow, deeply lobed, lobes acuminate. Robust plant up to 6 ft. high; leaves elliptic-oblong or oblong-lanceolate, up to 18 in. long and 5 in. wide, finely acuminate or caudate, silky-pubescent below; ligule short; spike long, lax-flowered; bracts 1-flowered, oblong or oblong-lanceolate, subacute, glabrous; calyx twice as long as the bract, up to 1.5 in. long, corolla-tube less than twice as long as the calyx; staminodes narrow; anther as long as or shorter than the lip .....3. *venustum*.

1. *HEDYCHIUM CORONARIUM*, Koen.; F. B. I. vi. 225; Wt. Ic. t. 2010.

In moist localities in the hills, 2,000-5,000 ft.

Flowers fragrant, pure-white or tinged with yellow.

2. *HEDYCHIUM FLAVESCENS*, Carey; Wt. Ic. t. 2008/9.

*H. coronarium*, Koen. var. *flavescens*, Carey. F. B. I. vi. 226.

Hills of the W. Gháts; Kollimalais; Bison Hill in the Godavari District (Barber).

Flowers sulphur-yellow. Vern. Kan. Hallushulli-gidda.

Var. *chrysoleucum*. Lip narrower; flowers white with yellow bases.

3. *HEDYCHIUM VENUSTUM*, Wt. Ic. t. 2012; F. B. I. vi. 226.

*H. cernuum*, Wt. Ic. t. 2011.

W. Gháts, 3,000-5,000 ft.

Flowers white.

## 5. *Amomum*, Linn.

Herbs, sometimes very tall; rootstock perennial, stem leafy. Leaves usually oblong-lanceolate. Spikes usually produced directly from the rootstock, very rarely terminating the stem; bracts imbricate. Calyx cylindric, 3-toothed. Corolla-tube



with a short arcuate filament; anther-cells divaricate, sometimes hairy, often with a petaloid crest. Ovary 3-celled; ovules many, axile; style filiform; stigma small, subglobose or infundibuliform or large and dorsally gibbous. Fruit indehiscent or bursting irregularly, rarely baccate, smooth, winged or echinate, sometimes beaked. Seeds globose, truncate, angular or ellipsoid.

Anther not crested. Leafy stem up to 10 ft. high; leaves sessile or shortly petioled, oblong- to linear-lanceolate, acuminate, up to 3 ft. long and 7 in. wide, glabrous or minutely puberulous below, especially on the midrib; ligule linear-oblong, about 1 in. long; peduncle erect from the rootstock, up to 3 ft. long, its bracts oblong or linear oblong, up to 9 in. long, obtuse; spike globose, apex truncate; floral bracts bright red, outer up to 3 in. long, overtopping the flowers, inner shorter; fruit triangular-ovoid, smooth ..... 1. *involucratum*.

Anther crested:—

Spike 1-3-flowered, ellipsoid; peduncle rarely .8 in. long. Leafy stem up to 4.5 ft. high; leaves long-petioled, oblong-lanceolate or lanceolate, shortly acuminate, base attenuate, up to 20 in. long and 5 in. wide, silvery-silky below; ligule .13 in. long, 2-lobed; bracts about 1.2 in. long, oblong, retuse; calyx longer, lobes of corolla oblong, obtuse; lip orbicular, clawed; anther-crest sublunulate; capsule globose, smooth, about 1 in. in diam. .... 2. *hypoleucum*.

Spike many-flowered:—

Leaves silky-tomentose beneath. Leafy stem 4-5 ft. high; leaves lanceolate or linear-lanceolate, acuminate, base attenuate, up to 2 ft. long and 4 in. wide; petioles 1-7 in. long; ligule linear, subacute, 1-1.5 in. long; exterior bracts few, oblong, glabrous, 1-1.6 in. long; calyx hardly more than half as long, corolla lobes linear-oblong; lip obovate; anther-crest small, orbicular; ovary glabrous; capsule 9-ribbed, echinate

3. *microstephanum*.

Leaves glabrous or nearly so beneath:—

Lip elliptic, entire, emarginate, pubescent above; anther-crest quadrate, short, crenulate. Leafy stem up to 6 ft. high; leaves lanceolate or linear-lanceolate, finely acuminate or subcaudate, base acute, up to 16 in. long, 1-3 in. wide, subsessile or very shortly petioled; spikes oblong, dense-flowered; peduncle stout with many broadly ovate bracts .6-1 in. long

ovary glabrous muricate; capsule globose, densely echinate, 1.2 in. in diam., chestnut coloured . . . . . 4. *cannaecarpum*.  
 Lip broadly obovate, deeply 3-lobed, midlobe emarginate, glabrous; anther-crest lunate, rather large, entire. Leafy stem up to 5 ft. high; leaves elliptic- or oblong-lanceolate, finely acuminate or caudate, 7-16 in. long, 1-4 in. wide, shortly petioled; spikes at first subglobose and dense-flowered; peduncles up to 6 in. long, rather slender with many loose, pink, oblong bracts .6-1 in. long embracing it, rhachis silky; bracts of the spike glabrous, floral bracts thin, tubular, 2-3-lobed; calyx slightly longer; corolla-lobes ovate; ovary glabrous, warted; capsules subtrigonous-globose, apex slightly concave and smooth, about 1 in. in diam., sides densely echinate

5. *muricatum*.

1. *AMOMUM INVOLUCRATUM*, Benth.; F. B. I. vi. 233.

Anamalai Hills at 4,000 ft. (Fischer).

Flowers ochraceous, lip striped pink.

2. *AMOMUM HYPOLEUCUM*, Thw.; F. B. I. vi. 240.

Anamalai Hills, 1,800-3,500 ft. (Beddome).

Flowers white, lip with a yellow disk, tinged with red.

3. *AMOMUM MICROSTEPHANUM*, Baker; F. B. I. vi. 239.

Kalianapandal in the Anamalai Hills at 2,300 ft. (Fischer).

Flowers white.

4. *AMOMUM CANNAECARPUM*, Benth.; F. B. I. vi. 240. *Elettaria cannaecarpa*, Wt. Ic. t. 2007.

W. Gháts, 4,000-6,000 ft.

Flowers yellow.

5. *AMOMUM MURICATUM*, Beddome.

Anamalai Hills, 2,000-3,000 ft. (Beddome).

Flowers white to yellowish, lip yellow with a broad band of red spots, anther-crest yellow.

6. *Zingiber*, Adams.

Perennial herbs; rootstock horizontal, tuberous, usually aromatic; stem leafy. Leaves linear to oblong-lanceolate with stem-clasping sheaths. Flowers in spikes; scape radicle or terminating the leafy stem; bracts persistent, usually 1-flowered. Calyx cylindric, shortly 3-lobed. Corolla-tube cylindric; lobes

contiguous, produced into a narrow beak as long as the loculi. Ovary 3-celled; ovules many, axile; style filiform; stigma small, subglobose. Fruit an oblong, tardily dehiscent capsule. Seeds large, globose, arillate.

Spikes produced direct from the rootstock, short and dense; peduncle 0 or short:—

Ligule of leaf membranous, .75 in. or more long. Leafy stem 3–5 ft. high; leaves oblong or oblong-lanceolate, acuminate, sessile, up to 16 in. long and 3.5 in. wide, more or less pubescent below; spikes oblong, dense, about 3 in. long, shortly peduncled; bracts red, exterior ones broadly ovate, interior linear-lanceolate, more or less hairy; lip 3-lobed, midlobe oblong-cuneate, 3-lobulate, margins recurved, crisped, lateral lobes short, broad ..... 1. *roseum*.

Ligule of leaf coriaceous, less than .5 in. long:—

Leafy stem 4–5 ft. high; leaves nearly sessile, oblong-lanceolate, acuminate, 6–12 in. long, 2–3 in. wide, pubescent beneath; spikes ovate or subglobose, practically sessile; bracts linear-oblong or lanceolate, green streaked with red, inner 2-fid; lip 3-lobed, midlobe rotund-ovate or subovate, scarcely emarginate, lateral small, rounded; capsule ellipsoid, about .8 in. long

2. *Nimmonii*.

Leafy stem 4–6 ft. high; leaves lanceolate to oblong-lanceolate, acuminate, shortly petioled, 6–18 in. long, 1–4 in. wide, pubescent beneath; spikes oblong or subglobose, shortly peduncled; bracts green, outer ovate, inner lanceolate; lip 3-lobed, midlobe obovate, emarginate, lateral small, acute; capsule ellipsoid, 1 in. long ..... 3. *Wightianum*.

Spikes terminating elongate peduncles sheathed by scarious bracts:—

Leaves linear, sessile, gradually acuminate, 5–13 in. long, .4–1 in. wide, glabrous; spikes oblong-cylindric, 1.5–3 in. long, peduncles slender; sheathing scales glabrous, about 1 in. long; lip 3-lobed, midlobe oblong-obovate, lateral short, ovate, obtuse.... 4. *officinale*.

Leaves lanceolate or oblong-lanceolate, usually more than 1 in. wide:—

Leaves glabrous beneath or nearly so, oblong-lanceolate or oblanceolate, acuminate, sessile, 6–13 in. long, 2–3 in. wide; spikes oblong, peduncle 6–18 in. long; sheathing scales long, obtuse; bracts obovate-oblong or obovate, rounded, green in flower with a pale margin dotted with dark lines.

Leaves pubescent beneath :—

Leafy stem up to 20 in. high ; leaves sessile, linear- to oblong-lanceolate, acuminate, 5–12 in. long, 1–2.5 in. wide ; spike cylindric 6–12 in. long, peduncle about as long ; sheathing scales large, oblong ; bracts obovate, acute, reddish, about 1.25 in. long ; lip obovate, 3-lobed, midlobe rounded, emarginate, lateral small, obtuse ; capsules obovoid, .5 in. long, pubescent, red, seeds dark-purple with a large white aril

6. *macrostachyum*.

Leafy stem 4–6 ft. high, root yellowish inside, aromatic, tasting of camphor ; leaves subsessile, oblong-lanceolate, acute or acuminate, 6–14 in. long, 1–3 in. wide, sometimes almost hairy beneath ; sheathing scales numerous, pubescent or subvillous at least above and along the edges ; spikes dense, fusiform or oblong-ellipsoid, 3–6 in. long ; peduncles 4–12 in. long ; bracts broadly ovate, 1–1.5 in. long, subacute, bright red or greenish-red, pubescent, margins narrowly membranous ; lip 3-lobed, midlobe suborbicular, deeply 2-lobed, margins crisped, lateral small, oblong, acute or obtuse ; capsules subglobose, .66 in. long, seeds very many, small, purple ..... 7. *Casumunar*.

1. ZINGIBER ROSEUM, Rosc. ; F. B. I. vi. 244. *Amonum roseum*, Roxb. Cor. Pl. t. 126.

N. Circars (Roxburgh) ; Dummakonda in the Rampa Hills at 3,500 ft. (V. Narayanswami).

Flowers bright- or pale-red, lip whitish, sometimes with reddish markings. Vern. Tel. Bumma-kachikai.

2. ZINGIBER NIMMONII, Dalz. ; F. B. I. vi. 244.

Bababudan Hills (Law.).

Flowers reddish-yellow, lip yellow.

3. ZINGIBER WIGHTIANUM, Thw. ; F. B. I. vi. 244. *Z. squarrosus*, Wt. Ic. t. 2004.

W. Gháts, 2,000–3,000 ft., Bison Hill in the Godavari District (Barber).

Flowers pale-yellow. Vern. Mal. Malai-inchi.

4. ZINGIBER OFFICINALE, Rosc. ; F. B. I. vi. 246.

Wildly cultivated. Run wild in places in the W. Gháts. The Ginger plant.

Flowers greenish-yellow, lip dark purple, often spotted

*Ur.* Adroko; *Tel.* Allamu; *Tam.* Shukku, Inchi; *Mal.* Adrakam; *Kan.* Alla.

5. ZINGIBER ZERUMBET, Sm.; F. B. I. vi. 247.

W. Gháts, 2,000–3,000 ft. Also widely cultivated.

Flowers pale sulphur-yellow, lip darker. Vern. *Hind.* Maha-bari, Kachur.

6. ZINGIBER MACROSTACHYUM, Dalz.; F. B. I. vi. 247.

W. Gháts.

Flowers white or greenish-white, lip pale-yellow striped purple.

7. ZINGIBER CASUMUNAR, Roxb.; F. B. I. vi. 248.

W. and E. Gháts. Also widely cultivated.

Flowers whitish, lip yellowish-white. Vern. *Hind.* Ban-ada; *Ur.* Ban-oda; *Tel.* Karu-pasapu; *Mal.* Kat-inchi; *Kan.* Agalesunthi.

7. Costus, Linn.

Herbs with a tuberous, horizontal rootstock; stem long, leafy. *Leaves* oblong; sheaths broad. *Flowers* in dense globose or ovoid, usually terminal, spikes, rarely direct from the rootstock. *Calyx* short, funnel-shaped, teeth 3, ovate. *Corolla*-tube short or long, lobes large, oblong, subequal. *Lateral staminodes* 0 or minute. *Lip* large, obovate or orbicular, margins incurved. *Stamen* with a broad filament forming an oblong petaloid process with the connective; anther median on the process, with 2 linear, contiguous cells. *Ovary* 3-celled, ovules many, axile; style filiform; stigma with a crescent-shaped depression, margin ciliate. *Fruit* a globose or ovoid, tardily-dehiscing capsule. *Seeds* ovoid or subglobose, aril short.

COSTUS SPECIOSUS, Sm.; F. B. I. vi. 249; Wt. Ic. t. 2014.

In all Districts in moist localities; near sea-level to 3,000 ft. A succulent herb attaining 8–9 ft. in height; stems spirally twisted so that the leaves appear spirally arranged; leaves oblong, oblong-lanceolate or oblanceolate-oblong, acute or acuminate, often cuspidate, 5–12 in. long, 2–3 in. wide, glabrous above, silky-pubescent beneath; flowers white in very dense spikes; bracts ovate, .75–1.25 in. long, bright red; lip anorbicular 2 in. or more in diam. often with a yellow

8. *Elettaria*, Maton.

Perennial herbs; rootstock thick, horizontal; leafy stem tall. *Leaves* distichous. *Flowers* in elongate, flexuous panicles direct from the rootstock, shortly pedicelled; bracts 2-7-flowered; bracteoles membranous, tubular. *Calyx* membranous, tubular, shortly 3-lobed. *Corolla*-tube cylindric, midlobe oblong, convex, lateral narrower. Lateral *staminodes* represented by small, erect teeth. *Lip* oblong-obovate, base cuneate. *Stamen* with a short filament; anther not crested, its cells contiguous. *Ovary* 3-celled; ovules many, axile; style filiform; stigma small, funnel-shaped, ciliate. *Fruit* a subglobose, coriaceous, indehiscent capsule. *Seeds* obovoid, angular by compression, aromatic, aril 0.

ELETTARIA CARDAMOMUM, Maton; F. B. I. vi. 251. *Alpinia Cardamomum*, Roxb. Cor. Pl. t. 226.

W. Gháts, wild and cultivated; 2,500-4,500 ft. The Cardamom.

Leafy stem 6-10 ft. high; leaves linear-lanceolate, acuminate, sessile or very shortly petioled, glabrous above, softly pubescent beneath, 1-2 ft. long, 2-3 in. wide; panicles several, up to about 2 ft. long, erect or prostrate; bracts 6-7-flowered, linear-oblong, obtuse, about 1.5 in. long; calyx .5 in. long, corolla-tube white, shortly exserted, lobes .5 in. long; lip longer, white striped with violet; capsule sub-trigonous, about .4 in. long, striate. Vern. Tel. Elaki; Tam. Elam, Anchi; Mal. Elattari; Kan. Elakki.

Var. *major*, Thw.; F. B. I. vi. 251. More robust; leaves broader; bracts more distant, 2-4-flowered; capsule 1 in. or more long. In the same localities.

The seeds of both used as condiments and medicinally.

9. *Alpinia*, Linn.

Perennial herbs; rootstock horizontal; leafy stem tall. *Leaves* oblong or lanceolate. *Flowers* in usually terminal spikes, racemes or panicles; bracteoles large, sometimes enveloping the bud. *Calyx* laxly tubular, shortly 3-toothed. *Corolla*-tube cylindric, usually not exceeding the calyx, lobes oblong or linear-oblong, the upper one usually broader and more convex. Lateral *staminodes* 0 or minute. *Lip* spreading, often orbicular with



base of the claw. *Stamen* with a flattened filament; anther usually without crest, cells diverging at the apex. *Ovary* 3-celled; ovules few or many in each cell, axile; style filiform; stigma subglobose. *Fruit* dry or fleshy, globose, usually indehiscent. *Seeds* globose or angular by compression, often aromatic, aril membranous.

Flowers panicled; buds not enclosed in large bracteoles:—

Ovary glabrous. Leafy stem 6–7 ft. high; leaves oblong-lanceolate, glabrous, acuminate, up to 30 in. long and 6 in. wide, very shortly petioled, ligule short, rounded, ciliate; flowers in open panicles up to 13 in. long, rhachis puberulous; lip orbicular-spathulate, apex shortly 2-lobed, claw slender with 2 subulate glands at the base; capsule about .6 in. diam., orange-red

1. *Galanga*.

Ovary pilose:—

Leafy stem 3–6 ft. high; leaves linear- or lanceolate-oblong, acuminate, cuspidate, glabrous, 8–18 in. long, 2–4 in. wide; panicle copiously compound, 6–12 in. long, rhachis pubescent or tomentose, floral bracts small, ovate, cupular; flowers small; lip obovate-cuneate or suborbicular, emarginate, slightly over 1 in. long, claw with 2 linear-subulate glands at the base; capsule .66 in. diam., black ..... 2. *Allughas*.

Leafy stem 2–4 ft. high; leaves linear-lanceolate or linear, finely acuminate, 6–15 in. long, 1–2 in. wide; panicle narrow, dense-flowered, rarely more than 4 in. long, rhachis pubescent; floral bracts small, ovate; lip obovate or oblong, 1–1.5 in. long; capsule red ..... 3. *calcarata*.

Flowers in simple racemes; bud enclosed in large membranous bracteoles. Leafy stem 6–10 ft. high; leaves shortly petioled, narrowly oblong or oblong-lanceolate, acuminate, up to 3 ft. long and 8 in. wide, glabrous above, pubescent beneath, the margins often densely villous; raceme up to 1 ft. long, rhachis fulvous-hairy; bracts large, white, petaloid; flowers 2–2.5 in. long; lip ovate, 2 in. long; ovary densely pubescent; capsule 1 in. diam., yellow

4. *malaccensis*.

1. *ALPINIA GALANGA*, Sw.; F. B. I. vi. 253. *Alpinia Rheedii*; Wt. Ic. t. 2026.

W. Gháts. Often cultivated.

2. *ALPINIA ALLUGHAS*, Rosc.; F. B. I. vi. 253.

W. Gháts, up to 4,000 ft.

Flowers pink.

3. *ALPINIA CALCARATA*, Rosc.; F. B. I. vi. 254; Wt. Ic. t. 2028.

W. Gháts. Often cultivated.

Flowers white, lip variegated with red and yellow.

4. *ALPINIA MALACCENSIS*, Rosc.; F. B. I. vi. 255.

Vizagapatam Hills (A. W. Lushington); 3,000–7,000 ft.

Flowers white, lip yellow, variegated with red.

### Family CL. MARANTACEAE.

Perennial herbs or shrubs. *Leaves* distichous, closely parallel-penniveined, inequilateral, petioled, sheathed; ligule usually very small, rarely conspicuous or quite absent. *Flowers* very irregular and asymmetric, in spikes or panicles; bracts distichous; usually 2-flowered. *Sepals* 3, free, usually equal. *Corolla* tubular below, tube usually long, 3-lobed above. *Androecium* tubular below. *Staminodes* 3–5, the outer sometimes wanting; one of the inner 3 contracted above and furnished on one side with a hooded appendage (the *cucullum*), another broadened and often hardened (the *labellum*). *Perfect stamen* in the inner whorl, broad, petaloid with a 1-celled anther. *Ovary* inferior, 3-celled, or 1–2-celled by suppression; ovules solitary in each cell. *Fruit* dry or fleshy, dehiscent or indehiscent. *Seeds* 1–3, usually arillate.

Ovary 3-celled:—

Stems tall, leafy; flowers in dichotomously branched panicles terminal on the stem ..... 1. *Schumannianthus*.

Stemless herbs; flowers in dense ellipsoid or capitate spikes arising direct from the rootstock or borne laterally on a petiole:—

Spike radical, ellipsoid; bracts imbricate .... 2. *Stachyphrynium*.

Spike capitate, lateral from a petiole; bracts not imbricate

3. *Phrynium*.

Ovary 1-celled ..... *Maranta*.

1. *Schumannianthus*, Gagnepain.

ovate-lanceolate. *Staminal tube* elongate; exterior *staminodes* petaloid, obovate, interior smaller. *Anther* with a petaloid appendage. *Fruit* a 3-coccons (or 2-coccons by abortion) subpyriform capsule. *Seeds* subglobose.

SCHUMANNIANTHUS VIRGATUS, Rolfe. *Clinogyne virgata*, Benth.; F. B. I. vi. 258. *Maranta virgata*, Wall.; Wt. Ic. t. 2015.

W. Ghâts in evergreen forests, 300–4,000 ft.

Stems 6–12 ft. high, bamboo-like; joints knotted; leaves acuminate, often shortly cuspidate, base rounded, 4–20 in. long, 1·5–6 in. wide, glabrous except sometimes for a band of hairs on the sheath and the 5–1 in. long petiole; panicle effuse, up to 20 in. long and wide; bracts narrowly oblong, 1–3·5 in. long; flowers white, about 3 in. long, pedicel about as long; ovary villous; capsule 3–4 in. long. Vern. Tam. Periya-kuhai-valai.

## 2. *Stachyphrynium*, K. Schumann.

Stemless herbs; rootstock usually creeping. *Leaves* broad, radical; petioles long, sheathing, simulating stems. *Flowers* in simple, subsessile or peduncled spikes direct from the rootstock. *Sepals* narrow. *Corolla-tube* usually longer than the sepals, lobes oblong or lanceolate. Outer *staminodes* petaloid, obovate, clawed; labellum truncate or shortly toothed; cucullum short, unappendaged. *Stamen* petaloid, anther-cell adnate to its margin. *Ovary* 3-celled, 1 ovule in each cell. *Capsule* 3-seeded or 2-seeded by abortion. *Seeds* smooth, aril 2-lobed, lobes linear.

STACHYPHRYNIUM SPICATUM, K. Schum. *Phrynium spicatum*, Roxb.; F. B. I. vi. 259.

Yeddicarra forests in Malabar (Beddome). Rare.

Leaves 2–4, oblong, caudate-acuminate or cuspidate, base rounded, 5–10 in. long, 1·5–3 in. wide; petiole slender, much longer than the blade, callous below the blade, pilose; flowers white, in narrow spikes 1–1·5 in. long; bracts ovate, 5–7·5 in. long; staminal appendage rather large; fruit 3-seeded, seeds triquetrous, brown.

## 3. *Phrynium*, Willdenow.

on the petioles. *Sepals* subovate-oblong, equal. *Corolla*-tube usually slightly longer than the sepals, rarely shorter, lobes oblong. Exterior *staminodes* petaloid, obovate unequal; *labellum* usually very short; *cucullum* short, with a pendulous appendage. Perfect *stamen* with a small 1-celled anther, the filament adnate to the smaller exterior staminode. *Ovary* 3-celled. *Capsule* 3-celled and 3-seeded, or 1- or 2-seeded by abortion. Seeds subglobose.

• Inner bracts of the spike broad upwards, breaking up into fibrillae at the apex. Erect herbs 2-5 ft. high; leaf single or 2, oblong or oblong-lanceolate, cuspidate, base rounded or cuneate, 4-12 in. long, 2-8 in. wide; petioles 2-3 ft. long; spike sessile on the petiole above the middle, 1.5-2 in. in diam., outer bracts 2 or 3 at the base of the spike, large rigid with an incurved scarious tip; lobes of the corolla longer than the tube, ovary silky-hairy; capsule subturbinate-trigonous, .4 in. long, chestnut ..... 1. *capitatum*.

Inner bracts of the spike tapering to an entire, acute, hardened tip. Erect herbs 2-5 ft. high; leaf single or 2, oblong or ovate-oblong, cuspidate, base rounded or abruptly cuneate, 5-20 in. long, 3.5-8 in. wide; petiole with sheath much longer than the blade; spike sessile on the petiole well above the middle, often close to the blade, 1.5-2 in. in diam.; outer bracts at the base of the spike 5, oblong, spinulose-apiculate; lobes of the corolla shorter than the tube, ovary glabrous or apex puberulous; capsule broadly oblong .4-.5 in. long, pale

2. *parviflorum*.

1. *PHRYNIUM CAPITATUM*, Willd.; F. B. I. vi. 258; Wt. Ic. t. 2016.

W. Gháts at low elevations.

Flowers purple.

2. *PHRYNIUM PARVIFLORUM*, Roxb.; F. B. I. vi. 259.

Vizagapatam Hills at 3,500 ft. (A. W. Lushington); Bison Hill in the Godavari District (Barber).

Flowers white tipped with yellow.

*MARANTA ARUNDINACEA*, Linn., the Arrowroot, is occasionally cultivated. Vern. *Hind.* Tikhori; *Tel.* Palaguntha; *Tam.* Aruruttuk-kilangu, Kuva mavu; *Kan.* Tavaksha.

coloured. *Sepals* 3, free, imbricate, subequal or one smaller, herbaceous or petaloid. *Corolla* of 3 petals more or less tubular below, one always smaller. *Androecium* tubular below, partly adnate to the corolla-tube, of 1-5 members, one bearing a single anther-cell on the margin of a petaloid stamen, the staminodes petaloid, the one opposite the fertile stamen recurved (*labellum*), the others usually erect. *Ovary* inferior, 3-celled; ovules many; style flattened; stigma terminal. *Fruit* a globose or ellipsoid, 3-celled capsule.

#### **Canna, Linn.**

The only genus with the characters of the family.

**CANNA ORIENTALIS**, Rosc. *C. indica*, Linn., var. *orientalis*, Baker; F. B. I. vi. 260.

In most Districts but not common.

An erect herb up to 4 ft. high; flowers bright red, the labellum and style often yellow with red streaks, petals and staminodes linear or linear-lanceolate, acute; capsule globose or ellipsoid, echinate.

*Canna indica*, Linn., and its varieties are cultivated in gardens.

#### **Family CLII. MUSACEAE.**

Perennial herbs, shrubs or trees. *Leaves* distichous or spirally arranged, blade large or gigantic; petiole above the sheath large. *Flowers* in simple or paniced spikes, zygomorphic, usually hermaphrodite but sometimes monoecious, sessile or shortly, rarely long, petioled; bracts sometimes brightly coloured. Outer and inner *perianth* usually both petaloid, free or variously united. Fertile *stamens* 5, rarely 6, free, the 6th usually converted into a staminode; anthers linear, 2-celled. *Ovary* inferior, 3-celled; ovules 1-several in each cell, basal or axile; style simple; stigma simple or 3-6-lobed. *Fruit* baccate or capsular. *Seeds* hard, sometimes arillate.

#### **Musa, Linn.**

Erect herbs, shrubs or trees, the stems composed of convolute leaf-sheaths. *Leaves* spirally arranged, very large, oblong.

down one side, remaining petal opposite the split free, as long as the calyx, embracing the base of the stamens and style. *Stamens* 5 (rarely 6) perfect, 6th usually rudimentary or absent; filaments erect, stoutly filiform; anthers erect. *Ovary* many-ovuled; style filiform; stigma subglobose, 3-6-lobed. *Fruit* baccate, large, oblong. *Seeds* subglobose or angled by compression, embedded in pulp.

Plant 10-12 ft. high, stem 7-8 ft. in circumference at the base and narrowed to 3 ft. below the leaves, not stoloniferous, dying after flowering; leaves oblong, narrowed to the base, 5-10 ft. long, 2-3 ft. wide, petiole short; spikes ultimately drooping, up to 4 ft. long; bracts very many, orbicular, up to 1 ft. long, dull claret-brown, many-flowered; flowers in 2 dense rows; fruit oblong, 3 in. long, several in a cluster, edible but insipid; seeds subglobose or angled by compression, black or brown ..... 1. *superba*.

Plant 3-5 ft. high, 3-4 in. diam., stoloniferous, root perennial; leaves linear-oblong, up to 4.5 ft. long and 1 ft. wide, petiole 1-2 ft. long; spikes erect or somewhat bent over, up to 18 in. long; bracts few, lanceolate- to ovate-oblong, 3-6 in. long, bright lilac or pink, 3-4-flowered, the lowest 4 or 5 only fertile; fruit linear-oblong, 4-5-angled, 2-4 in a cluster, 3-4 in. long, inedible; seeds black, tuberculate ..... 2. *rosacea*.

1. *MUSA SUPERBA*, Roxb. Cor. Pl. t. 223; F. B. I. vi. 261; Wt. Ic. t. 2017.

W. Gháts, on rocky hill-sides, 1,000-5,000 ft.

The Wild Plantain.

2. *MUSA ROSACEA*, Jacq.; F. B. I. vi. 263.,  
Rampa Hills (Gamble).

*MUSA PARADISIACA*, Linn. *M. sapientum*, Linn.; F. B. I. vi. 262; Roxb. Cor. Pl. t. 275. The Plantain or Banana Tree; is extensively cultivated. *Musa textilis*, L. Née, Manilla Hemp, is occasionally cultivated for its fibre.

*Ravenala madagascarensis*, Sonn. The Traveller's Tree, with large plantain-like leaves forming a fan-like head, is grown ornamentally in gardens.



amplexicaul and sheathing. *Flowers* 2-sexual, usually from the centre of the rosette, terminal, sessile in heads, spikes, racemes or panicles; often with brilliantly coloured bracts below the flowers which pass into the floral bracts and sometimes with a terminal crown of foliage leaves above. *Sepals* 3, free or connate, herbaceous or coriaceous. *Petals* 3, free or half or wholly connate into a tube, often with 2 scales at the base within. *Stamens* 6, all free or connate or one whorl free and one whorl connate; anthers introrse. *Ovary* inferior, half inferior or superior, 3-celled; ovules usually many in each cell; style with 3 stigmas or stigmatic branches. *Fruit* baccate, sometimes combined into a syncarp, sometimes dehiscent. *Embryo* small, in a small pocket or fork of the mealy albumen.

There are no indigenous genera of this family but *Ananas sativus*, Schult., the Pine Apple, is cultivated in some localities. Vern. Tel. Anasa-pandu; Tam. Anashap-pazham; Mal. Annanas; Kan. Ananasu-hannu.

#### Family CLIV. HAEMODORACEAE.

Perennial herbs; rootstock short, tuberous. *Leaves* usually radical, distichous, narrow. *Flowers* 2-sexual, regular, in terminal spikes, racemes or panicles. *Perianth* petaloid, 2-seriate, lobes 6, free or more or less connate, imbricate or induplicate-valvate. *Stamens* 6 and opposite to the perianth-lobes or more or less adnate to them or fewer; anthers erect or versatile, 2-celled, opening by a slit, rarely by a pore. *Ovary* inferior, subinferior or superior, 3-celled, sometimes imperfectly so; ovules 1-several in the angle of each cell; style filiform, rarely short or wanting; stigma simple or notched. *Fruit* a superior or nearly superior capsule or an inferior berry. *Seeds* various; embryo small, partially enclosed in the fleshy albumen.

Filaments united into a ring closing the mouth of the perianth

1. *Peliosanthes*.

Filaments free, short ..... 2. *Ophiopogon*.

#### 1. *Peliosanthes*, Andr.

Rootstock horizontal. *Leaves* radical, linear or lanceolate,

sub-sessile. *Ovary* inferior, the top free, conical, 3-celled; ovules 2 or more in each cell; stigma subsessile, 3-lobed. *Fruit* a berry. *Seeds* few, bursting through the pericarp during ripening and resting on the base of the withered perianth; embryo in the base of the hard fleshy albumen.

Leaves narrowly elliptic-lanceolate or oblanceolate, acuminate, base tapering, glabrous, pale when dry 4-9 in. long, .6-1.6 in. wide; petiole slender, 2.5-12 in. long, pale when dry; raceme slender, rarely as long as the leaves and petioles; bracts ovate, .1-.25 in. long; flowers numerous, about .2 in. in diam.; berry subglobose, about .3 in. long .....1. *neilgherrensis*.

Leaves lanceolate or oblanceolate, acute or acuminate, base tapering, glabrous, dark when dry, 7-14 in. long, 1-5.3 in. wide; petiole rather stout, 9-20 in. long, dark when dry; raceme moderately slender, usually as long as the petioles; bracts ovate- or linear-lanceolate, .2-.5 in. long; flowers numerous, about .25 in. in diam.; berry subglobose, about .5 in. long .....2. *courtallensis*.

1. **PELIOSANTHES NEILGHERRENSIS**, Wt. Ic. t. 2052; F. B. I. vi. 266.

W. Gháts, from the Nilgiri Hills southwards, in dense evergreen forests, 2,000-6,500 ft.

Flowers greenish- to dark-purple; berries blue.

2. **PELIOSANTHES COURTALLENSIS**, Wt. Ic. t. 2051; F. B. I. vi. 266.

In the same situations as the last species.

Flowers blue-purple (Jerdon). Very similar to the last species and doubtfully separable though more robust.

## 2. *Ophiopogon*, Ker-Gawl.

Small, scapigerous herbs; stem short from a short rootstock or elongate and subscandent. *Leaves* radical, linear or lanceolate. *Scape* leafy or naked; bracts scarious. *Flowers* racemed, usually many-flowered. *Perianth* segments spreading. *Stamens* 6, on the bases of the perianth-segments; filaments erect; anthers basifixed. *Ovary* inferior, 3-celled, crown flat or depressed; ovules 2 in each cell, collateral, erect; style columnar; stigma 3-toothed. *Fruit* indehiscent. *Seeds* few, testa fleshy or

W. Gháts, 3,500–7,300 ft.; Sirumalais and Kollimalais (Jacob); Mahendragiri Hill in the Ganjam District at 4,500 ft. (Fischer and Gage); Vizagapatam District at Endrika, 3,000 ft. (A. W. Lushington).

Leaves narrowly linear, obtuse, acute or acuminate, tapering to the base, 4–24 in. long, 1–5 in. wide; flowers white, about 3 in. diam.; seeds subglobose.

Var. *pauciflorus*, Hook. f. F. B. I. vi. 269, with 5 or fewer flowers in the raceme.

Var. *gracilipes*, Hook. f.; F. B. I. vi. 269, with very narrow leaves tapering to an almost filamentous base.

### Family CLV. AMARYLLIDACEAE.

Perennial herbs, sometimes large, woody shrubs; rootstock a bulb, corm or tuber, rarely an erect stock. *Leaves* radical or clustered at the apex of a more or less well-developed caudex. *Scape* naked (in the Indian genera) or bracteate. *Flowers* few (in the Indian genera) and umbelled, rarely solitary or many and paniced, usually 2-sexual, regular or somewhat zygomorphic, often showy; bracts membranous or coloured, seldom herbaceous (in Indian genera), the outer 1–3 forming an involucre under the umbel. *Perianth* superior, tube 0, short or long, limb 6-lobed or -partite, sometimes with a corona at the mouth. *Stamens* 6, on the base of the perianth segments, rarely epigynous; filaments free or connate by the corona; anthers erect or versatile. *Ovary* inferior, 3-celled; ovules many, 2-seriate in the inner angles of the cells; style stout or slender; stigma simple or 3-cleft. *Fruit* usually loculicidally capsular, sometimes fleshy. *Seeds* few or many; albumen fleshy, enclosing the small embryo.

\* Leaves all radical from the rootstock, never on a well-developed caudex; flowers not paniced:—

Leaves rigid and usually plicate; scape short, sometimes subterranean; flowers rather small, usually yellow:—

Ovary not or hardly produced upwards into a rostrum:—

Leaves sessile, narrowly linear, not plicate; fruit circumsiss near the apex ..... 1. **Hypoxis.**

Leaves petioled, lanceolate or linear-lanceolate, rarely linear,

Leaves flat, usually succulent, never plicate; scape usually stout and elongate with 1-3 membranous involucre bracts at the apex; flowers in umbels, rarely solitary, usually showy, not yellow:—

Stamens not united by a membranous corona:—

Flower solitary.....Zephyranthes.

Flowers 2 or more .....4. Crinum.

Stamens united by a membranous corona .....5. Pancratium.

Leaves clustered at the top of a more or less well-developed caudex; flowers paniced on a gigantic, woody scape:—

Perianth shortly tubular below; stamens exserted; style filiform  
Agave.

Perianth divided to the base; stamens included; filaments and style swollen at the base or below the middle .....Furcraea.

### 1. Hypoxis, Linn.

Small herbs; rootstock tuberous or a coated corm. Leaves sessile, strongly nerved. Flowers solitary, racemed or umbelled. Perianth rotate, 6-partite, persistent. Stamens 6; filaments erect; anthers erect, dorsifixed. Ovary 3-celled; style short, columnar; stigmas 3, erect, stout, distinct or connate. Capsule circumsciss below the apex or 3-valved. Seeds subglobose, testa crustaceous, shining, beaked at the hilum.

HYPOXIS AUREA, Lour.; F. B. I. vi. 277.

Anamalai Hills at 3,000-4,000 ft. (Beddome); Pulney Hills at Kodaikanal (Bourne).

3-15 in. high; rootstock subglobose or elongate and erect, crowned with the fibrous remains of the old leaves; leaves sheathing below, acute, 4-14 in. long, 1-25 in. wide, pilose or glabrescent; scapes 1-4, filiform, 1-4 in. long, 1-2-flowered, glabrous or more or less pilose; flowers 3-5 in. long; the ovary quite evident below the acute, yellow perianth-lobes, ovary and perianth pilose without; capsule cylindric-turbinate, crowned by the enlarged perianth, circumsciss.

### 2. Molineria, Callo.

Perennial herbs; rootstock tuberous. Leaves petioled, lanceolate, plicate. Flowers sometimes polygamous, racemed or sometimes aggregated in dense corymbes. Perianth...

in each cell; style subulate; stigma capitate, oblong-trigonous. *Fruit* a berry crowned by the enlarged, persistent perianth. *Seeds* globose, black, opaque.

**MOLINERIA FINLAYSONIANA**, Baker. *Curculigo Finlaysoniana* Wall.; F. B. I. vi. 279. *Hypoxis latifolia*, Wt. Ic. t. 2044. *H. trichocarpa* and *H. leptostachya*, Wt. Ic. t. 2045. *H. pauciflora* and *H. brachystachya*, Wt. Ic. t. 2046.

W. Gháts, 400–6,000 ft.; Mahendragiri Hills in the Ganjam District at 4,500 ft. (Fischer and Gage).

Tuber elongate, oblong-cylindric; root-fibres numerous elongate; leaves lanceolate, acute to finely acuminate, base tapering, 5–20 in. long, 5–2 in. wide, pilose or glabrescent; petiole slender, widened at the base, 2.5–13 in. long, sometimes very short; flowers usually numerous in bracteate racemes, yellow, often the upper ♂ without or with a more or less developed style, perianth-lobes obtuse; filaments filiform; anthers deeply linear-hastate; rachis of scape linear-lanceolate bracts and ovary fulvous-pilose; berry cylindric or fusiform.

### 3. *Curculigo*, Gaertn.

Stemless herbs; rootstock more or less tuberous, sub-oblong thick, crowned with the remains of old leaves. *Leaves* radical, narrow, more or less pilose, sessile or petioled, prominently nerved and plicate. *Flowers* solitary or racemed on usually a very short scape among the leaves and often subterranean. *Perianth* superior, 6-partite of the base. *Stamens* 6, on the base of the perianth segments; filaments filiform; anthers linear or lanceolate, base sagittate, basifixed. *Ovary* inferior, hidden among the leaves, often subterranean, 3-celled, always produced upwards into a filiform rostrum which pushes the perianth above ground; ovules 12–24 in each cell; style columnar-filiform; stigmas 3, free or connate. *Fruit* indehiscent, more or less succulent. *Seeds* subglobose; testa black, shining, striate beaked at the hilum.

**CURCULIGO ORCHIOIDES**, Gaertn.; F. B. I. vi. 279; Roxb. Cor. Pl. t. 13; *C. malabarica* and *C. brevifolia*, Wt. Ic. t. 2043.



a short or long petiole, glabrous or more or less whitish pilose, 1.5-21 in. long, .2-1.5 in. wide, often viviparous at the tips; scape usually very short and hidden among the bases of the leaves underground, only the perianths rising not far above ground and appearing solitary; perianth about .5 in. long, more or less pilose; ovary usually below ground; produced into a filamentous pilose rostrum .5-1.6 in. long; fruit subulate to ovate, .5-1 in. long; seeds few to many. Vern. Tel. Nalla-tadi.

#### 4. Crinum, Linn.

Stout herbs; rootstock bulbous. Leaves fleshy, elongate, lorate or ensiform. Scape solid. Flowers large, in umbels subtended by 2 spathaceous bracts, bracteoles linear. Perianth funnel- or salver-shaped, tube long, straight or upcurved, lobes 6, linear to oblong. Stamens 6, on the throat of the perianth; filaments free, filiform, erect, spreading or declinate; anthers linear, dorsifixed, versatile. Ovary 3-celled; ovules few or many in each cell; style filiform; stigma minute. Fruit large, subglobose, breaking up irregularly. Seeds few, large, testa thick; albumen copious.

Perianth salver-shaped, erect, lobes linear:—

Bulb 2-4 in. in diam., narrowed into a neck 4-12 in. long; leaves linear-lanceolate, shortly acuminate, 20-30 in. long, 5-7 in. wide, margins smooth; scape 1.5-3 ft. long, up to 1 in. in diam. at the base, 15-50-flowered; bracts 3-4 in. long; pedicels .2-1 in. long; perianth-tube 3-4 in. long, slender, lobes about 2 in. long; filaments shorter than the perianth-lobes; fruit 1-2 in. in diam.

##### 1. asiaticum.

Bulb ovoid, 2-3 in. in diam., neck 2-6 in. long; leaves linear, deeply channelled, obtuse, 2-3 ft. long, .75-2 in. wide, margins smooth; scapes from the outer leaf-axils, 1-2.5 ft. long, 6-12-flowered; bracts 1.5-3 in. long; pedicels very short; perianth-tube 2.5-4 in. long, slender, lobes 3-4 in. long; filaments rather shorter than the perianth-lobes; fruit 1-1.5 in. in diam.

##### 2. defixum.

Perianth funnel-shaped, drooping, lobes lanceolate or oblanceolate, 3-4 in. long, .75-1 in. wide, appendaged at the cuspidate apex. Bulb subglobose, 5-6 in. in diam., neck 2-4 in. long; leaves



perianth-tube 3-6 in. long; filaments much shorter than the perianth-lobes; fruit 1.5-2.5 in. in diam. .... 3. *latifolium*.

1. *CRINUM ASIATICUM*, Linn.; F. B. I. vi. 280. *C. toxicarium*, Roxb.; Wt. Ic. t. 2021-22.

In all Districts, up to 4,000 ft. Often cultivated.

Flowers white, stamens reddish.

2. *CRINUM DEFIXUM*, Ker; F. B. I. vi. 281.

In all districts; along streams and backwaters, up to 3,000 ft.

Flowers white, stamens bright red.

- var. *ensifolium*, Baker; *C. ensifolium*, Roxb.; F. B. I. vi. 281.

Leaves ensiform, gradually acuminate.

3. *CRINUM LATIFOLIUM*, Linn.; F. B. I. vi. 283; Wt. Ic. t. 2019-20.

In all Districts, up to 6,000 ft.

Flowers white tinged with rose or purple.

#### 5. *Pancratiun*, Linn.

Herbs; rootstock a coated bulb. *Leaves* linear or lanceolate, often bifarious. *Flowers* large, solitary or umbelled on a solid scape, sessile or pedicelled, subtended by 1-4 membranous spathes; bracts linear, hyaline. *Perianth* funnel-shaped, tube short or long, lobes 6, narrow. *Stamens* 6, on the throat of the perianth; filaments filiform, united below by a coronal membrane into a toothed or lobed cup; anthers oblong or linear, dorsifixed, versatile. *Ovary* 3-celled; ovules many and 2-seriate in each cell; style filiform; stigma small, capitate. *Capsule* large, subglobose, triangular, loculicidal. *Seeds* many, angled; testa lax, black.

Scapes 2- or more-flowered:—

Filaments much longer than the teeth of the staminal-cup and the anthers. Bulb globose 1.5-2 in. in diam., neck short, long or 0; leaves thin, linear or linear-lanceolate; umbel 2-8-flowered; spathes 2; pedicels short; perianth-tube 1.5-3 in. long, lobes linear, .75-1 in. long; staminal cup with bifid teeth between the filaments .... 1. *triflorum*.

Filaments hardly longer than the teeth of the staminal-cup, shorter than the anthers. Bulb globose 1-2 in. in diam., neck short, long or 0; leaves thin, linear or linear-lanceolate; umbel 2-8-flowered; spathes 2; pedicels short; perianth-tube 1.5-3 in. long, lobes linear, .75-1 in. long; staminal cup with bifid teeth between the filaments .... 2. *triflorum*.

bifid; perianth-tube 2-4 in. long, lobes linear, 1 in. long; staminal-cup as long as the lobes, 12-toothed ..... 2. *parvum*.  
 Scape 1- (rarely 2-) flowered. Bulb globose, 1.5-2 in. in diam.; leaves narrowly lanceolate; scape shorter than the leaves; spathe single; perianth-tube 2-6 in. long, slender, lobes linear-lanceolate, 2 in. long; staminal-cup 1 in. long, 2-toothed between the filaments.  
 3. *longiflorum*.

1. *PANCRATIUM TRIFLORUM*, Roxb.; F. B. I. vi. 285. *P. verecundum*, Wt. Ic. t. 2023; F. B. I. vi. 286.

In all Districts, up to 2,000 ft.

Flowers pure white, fragrant.

2. *PANCRATIUM PARVUM*, Dalz.; F. B. I. vi. 286.

Bababudan Hills (Law).

Flowers white.

3. *PANCRATIUM LONGIFLORUM*, Roxb.; F. B. I. vi. 286.

Vizagapatam District (Barber).

Perianth-tube pale-green, lobes white.

*Zephyranthes carinata*, Herbert, The Pink Lily, is an escape from gardens in the Hills, and *Z. tubispatha*, Herbert; F. B. I. vi. 277, a similar escape in the plains.

The following have been planted for fibre or as hedge or ornamental plants: *Agave americana*, Linn.; F. B. I. vi. 277, *A. Vera-Cruz*, Mill., *A. Cantala*, Roxb., *A. sisalana*, Perr. (Sisal Hemp), *A. Wightii*, Drum. & Prain; Wt. Ic. t. 2024 under *A. vivipara*, and *A. sp.?*; also *Furcraea gigantea*, Vent., and another species. (For an account of these 2 genera as represented in India see 'Notes on Agave and Furcraea in India,' J. R. Drummond and D. Prain, Bengal Agric. Series, Bull. 8, 1905.)

#### Family CLVI. TACCACEAE.

Perennial herbs; rootstock tuberous or creeping. Leaves radical, entire and costate or pinnately lobed or lacinate and penninerved. Flowers 2-sexual, regular, umbelled on a naked scape with an involucre of 2-12 spathaceous bracts and long, filiform bracteoles. Perianth superior, urceolate or subcampanulate, 6-lobed in 2 series. Stamens 6, included, on the tube or the base of the perianth-lobes; filaments very short, dilated at the

within the hood. *Ovary* inferior, 1-celled; ovules many on 3 parietal placentas; style short, included; stigmas 3, often petaloid, broad and 2-lobed, inflexed like an umbrella over the style. *Fruit* baccate, or at length 3-valved, 3-6-ribbed. *Seeds* numerous, ovoid, striate; albumen hard; embryo minute.

**Tacca, Forst.**

Characters of the Family, fruit a berry.

**TACCA PINNATIFIDA**, Forst.; F. B. I. vi. 287.

Goomsur in Ganjam; Rampa Hill (Ramaswami); Bison Hill in the Godavari District (Barber) Nallamalais; Mysore at Ananthapura (Meebold). Sometimes cultivated.

Rootstock globose, up to 1 ft. in diam.; leaves circular in outline, 1-3 ft. in diam., 3-partite, the segments variously and unequally pinnate; petioles 1-3 ft. long; scape longer than the petioles, terete, hollow, striate; flowers 10-40, pedicelled, drooping; bracts 6-12, oblong-lanceolate, acuminate, about 1 in. long, greenish striped with purple; bracteoles 3-5 in. long; perianth fleshy, subglobose, 6-7 in. in diam., greenish, lobes margined with purple; berry subglobose, about 1 in. long, 6-ribbed, yellow.

**Family CLVII. DIOSCORIACEAE.**

Climbing, rarely erect, herbs or shrubs; rootstock tuberous or with a hard rhizome and tuberous roots. *Leaves* opposite or alternate (sometimes both on the same plant), simple, lobed or digitately 3-9-foliate, palmiribbed and reticulately veined; petioles often angular and twisted at the base. *Flowers* regular, small or minute, usually monoecious or dioecious, rarely hermaphrodite, in spikes, racemes or panicles. *Perianth* tubular, urceolate or rotate, 6-cleft, often shortly connate below. *Stamens* of ♂ 3 or 6, or 3 perfect with 3 alternating staminodes, inserted at the base of the perianth or on its lobes; anthers small. *Pistillode* sometimes present. *Staminodes* of ♀ 6, 3 or 0. *Ovary* inferior, 3-quetrous, usually 3-celled; ovules 2 superposed in each

Climbing plants ; flowers 1-sexual ; fruit a 3-winged capsule

1. *Dioscorea*.

Erect plants ; flowers 2-sexual ; fruit an unwinged berry

2. *Trichopus*.

1. *Dioscorea*, Linn.

Climbing herbs. *Flowers* 1-sexual, rarely abnormally 2-sexual. ♂ *perianth* with 6 short lobes. *Stamens* 6 or 3 alternating with staminodes. *Pistillode* thick and fleshy or 0. ♀ *perianth* with 6 free small segments. *Staminodes* 6, 3 or 0. *Ovary* inferior, 3-quetrous, 3-celled ; styles 3, short. *Fruit* a loculicidal, flattened, 3-winged capsule. *Seeds* always 2 in each cell, compressed, with a large membranous wing ; albumen compressed, fleshy or hard, 2-laminate ; embryo between the blades ; cotyledons suborbicular.

(The following key and most of the information on the species of *Dioscorea* have been generously supplied by Mr. J. H. Burkill, F.L.S. ; they have appeared in part in the 'Journ. As. Soc. Beng.' N.S. x (1914), 6.)

Stems twining to the left ; capsules reflexed upwards :—

Leaves simple :—

Tubers numerous, edible, stalked, protected by root-fibres generally bearing spines up to .5 in. long ; stem prickly ; leaves orbicular or reniform, acuminate or cuspidate, base cordate, 2-5 in. long ; petioles about as long ; ♂ spikes 6-18 in. long ; flowers erect, with a disk within the 6 perfect stamens ; capsule oblong, slightly narrowed below, apex retuse ; seeds broadly winged all round ..... 1. *esculenta*.

Tubers single or at most 2-3, without defined stalk, inedible or very inferior as food, root-fibres not spinous ; stem unarmed, bearing warted bulbils in the leaf-axils ; leaves broadly ovate to suborbicular, acuminate, cuspidate or caudate, base cordate, 2-8 in. long ; petioles usually somewhat shorter ; ♂ spikes very slender, 1-4 in. long, close or scattered on long, pendulous, axillary panicles ; flowers pendulous without disk within the 6 perfect stamens ; capsule quadrately oblong, slightly widened upwards, .6-1 in. long ; seeds winged at the base only

2. *bulbifera*.

Leaves compound, upper sometimes simple ; seeds winged at the base only :—

prickly, glabrous or finely pubescent; leaflets broadly cuneate-obovate, cuspidately caudate-acuminate, base tapering, the lateral very oblique, sometimes shortly 2-lobed, sometimes gibbous and broader than long, 3-13 in. long, 1-7-6 in. wide, glabrous or finely pubescent below; petiolules 1-75 in. long; ♂ flowers in dense cylindric spikes clustered along a more or less prickly long, pubescent or villous rhachis, ♀ in solitary, distant spikes; capsule quadrately oblong, ends truncately rounded, smooth, 2 in. long, 1 in. wide ..... 3. *hispida*.

Fertile stamens 3, staminodes 3:—

Many of the upper leaves simple, white tomentose. Tubers elongate; stems slender, often prickly towards the base, tomentose above; leaves mostly 3-foliate, occasionally 5-6-foliate below; petioles 1-5-5-5 in. long; leaflets variable, terminal elliptic or obovate, lateral often very gibbous, all acuminate, cuspidate or rounded, base acute, the simple leaves ovate- or orbicular-cordate, 1-5-7 in. long 1-4 in. wide; all densely white-tomentose below; ♂ spikes short, 1-3 together on a slender tomentose panicle, ♀ in simple or branched racemes up to 1 ft. long; capsules cuneately oblong, up to 1-1 in. long, downy, eventually glabrescent ..... 4. *tomentosa*.

Rarely a few of the uppermost leaves simple, rusty-hairy:—

Leaflets 3-5. Tubers oblong or very diverse in different varieties; stem slender, prickly towards the base, glabrous, often bearing axillary bulbils; petioles 2-5 in. long; the simple leaves orbicular or rotund-ovate, cuspidate; leaflets elliptic, lanceolate, ovate or obovate, abruptly cuspidate, base attenuate, lateral often gibbous, glabrous or rusty-pubescent below, 2-5-7 in. long, 1-4 in. wide; ♂ flowers in small racemes on long, slender axillary or terminal panicles, ♀ in slender, elongate, 1-3-nate racemes; capsules oblong, glabrous, up to 1 in. long ..... 5. *pentaphylla*.

Leaflets 5-7, rarely 3 near the tips, coarse. Tuber single, stem slender, sparsely prickly, hirsute, at length glabrescent; petioles up to 10 in. long; leaflets obovate or elliptic, acuminate, base acute, lateral asymmetric, smaller and wider in proportion, up to 10 in. long and 4 in. wide, pubescent below; ♂ flowers in 1-2-nate spikes on long racemes, spikes long, rusty-tomentose ..... 6. *Kalkapershadii*.

Stems neither winged nor conspicuously angled; axis of the ♂ spikes not zig-zag:—

Leaves coriaceous, elliptic, oblong or ovate, acuminate or cuspidate, base cuneate or rounded, 2–6 in. long, .75–2.75 in. wide; petioles .75–1.75 in. long; spikes simple, solitary or twin, slender; capsules subquadrate or rather broader than long, apex and base retuse, 1.5–2.2 in. wide .....7. *spicata*.

Leaves not coriaceous:—

Veins of leaves not prominent, though usually distinct:—

Bases of leaves acute or rounded, very rarely cordate. Tubers deep underground; stem slender, unarmed, not bulbiferous; leaves lanceolate to elliptic-oblong, ovate or suborbicular, acuminate or obtuse, with a well-defined cartilaginous margin, 2–5 in. long, .5–3.5 in. wide; petioles .6–1.6 in. long; ♂ spikes fascicled on a long, slender rhachis, ♀ flowers distant in solitary or fascicled spikes; capsules suborbicular or broader than long, apex retuse or sub-bilobed, .5–1 in. long, 1–1.5 in. wide ..8. *oppositifolia*.

Bases of leaves cordate or truncately cordate:—

♂ spikes simple, 1–4-nate. Stem slender, pale; leaves ovate, acuminate, 2–3.5 in. long, 1–2 in. wide; petioles .8–1.8 in. long; rhachis of ♂ spike capillary up to 3 in. long .....9. *Wightii*.

♂ spikes panicle, very rarely simple:—

Stem woody, often prickly below, arising from a hard woody knot 3–4 in. diam. which below gives forth 1–3 or sometimes more tubers; leaves ovate-hastate, sometimes nearly orbicular, those near the apex often with a rounded base, apex acuminate, up to 5 in. long, secondary nerves irregular; petioles long; capsules subquadrate or obcordate, .6–.8 in. long, 1–1.5 in. wide .....10. *glabra*.

Stem woody, stout, often prickly below, the tubers growing out direct from the base of the stem; leaves suborbicular, broadly ovate or subreniform, abruptly acuminate or cuspidate, up to 6 in. long and 6.5 in. wide, secondary nerves regular and nearly parallel, petioles up to 5 in. long; capsules broadly obovate, apex emarginate, up to 1.5 in. wide ....11. *Wallichii*.



usually ovate or ovate-lanceolate, apex tapering to an acute point, base deeply to shallowly cordate, 7-9-ribbed, 1.5-4 in. long, .7-2 in. wide, veins rather regular, close and parallel; petioles .5-1.6 in. long; ♂ spikes 1-3-nate in the axils or on leafless axillary shoots; capsules suborbicular, slightly broader than long, 1-1.5 in. wide

12. *belophylla*.

Stem terete, glabrous, unarmed; leaves mostly alternate, elliptic or oblong, acuminate, mucronate, base narrowed or rounded, 3-ribbed, up to 5 in. long and 2.6 in. wide, veins irregular, distant; petioles up to 1.5 in. long; ♂ spikes short, fascicled in long panicles, ♀ spikes short, solitary, usually simple; capsules transversely oblong, apex retuse, 1-1.25 in. diam. .... 13. *intermedia*.

Stems winged or regularly angled; axis of ♂ spikes zig-zag:—

Whole plant reddish when dry; stems angled, sometimes subulate, unarmed; tubers long-stalked, deep underground; leaves ovate or lanceolate, acuminate, truncately to deeply cordate, 1.75-4.5 in. long, .75-2 in. wide, secondary nerves close, rather regular and subparallel, petioles 1-2.5 in. long; ♂ spikes short, 1-4-nate or subverticillate on slender axillary branchlets; capsules reniform, retuse, .8-1 in. long, 1-1.6 in. wide .... 14. *Hamiltonii*.

Plant not conspicuously reddish when dry; stems 4-5- (sometimes 6-8- at the base) winged, wings sometimes reduced to ribs, usually with scattered broad-based prickles; tubers shallow or deep underground, but without long stalks; leaves usually broadly ovate or subrotund, suddenly cuspidate, sometimes rounded, base cordate with a broad sinus, upper smaller and narrower, 2.5-8.5 in. long, 1.5-5 in. wide; petioles 1.5-4.5 in. long; rhachis of ♂ spike winged, ♂ spikes 1-3-nate or subverticillate on axillary branchlets; capsules broadly obcordate, 1-1.5 in. wide .... 15. *alata*.

Stems densely pubescent, unarmed, woody, directly producing a long cylindric tuber; leaves broadly ovate or suborbicular, acuminate or cuspidate, base cordate, 3-7-in. long, 2.25-4 in. wide, pubescent at least on the nerves below; petioles 1-2.25 in. long, pubescent; ♂ spikes pubescent, 1-3-nate on axillary panicles up to 14 in. long; capsules subcordate, .5-.7 in. long, 1 in. wide, rarely quite glabrous .... 16. *anguina*.

Cultivated on the E. and W. Coasts; probably nowhere truly wild but occurring as an escape. Very variable under cultivation when it often loses the spines on the roots. Vern. *Tel.* Tivvi tiga, Tippa tiga; *Tam.* Musilam valli kilangu, siruvalli kilangu; *Mal.* Mullu kilangu, Cheru kilangu.

2. *DIOSCOREA BULBIFERA*, Linn.; Wt. Ic. t. 878. *D. sativa*, Thunb. non Linn.; F. B. I. vi. 295.

Wild on the W. Coast, in Coimbatore and along the whole of the E. Coast Districts. Cultivated in many localities. Vern. *Hind.* Karukanda; *Tam.* Pannu kilangu; *Kan.* Heggenasu.

Var. *vera*, Pr. & Burk. Tubers and bulbils small, acrid (wild).

Var. *sativa*, Pr. & Burk. Tubers almost entirely absent, bulbils large and edible (cultivated).

3. *DIOSCOREA HISPIDA*, Dennst. *D. daemonia*, Roxb.; F. B. I. vi. 289; Wt. Ic. t. 811.

W. and E. Coast Districts, up to 1,000 ft.; Anamalai Hills (Wight, Beddome); Hyderabad State (Heyne).

One of the most important natural famine foods. Vern. *Tel.* Tella gini-geddala, Puli-dumpa; *Tam.* Pei-perendai; *Mal.* Podava-kilangu.

4. *DIOSCOREA TOMENTOSA*, Heyne; F. B. I. vi. 289.

In all Districts, up to 4,000 ft. Very common.

Flowers purplish. Vern. *Tel.* Burdi gaddi, Tegadumpa, Nalla tiga, Nadang, Adavi-denda-tiga; *Tam.* Nalveli-kilangu, Shaval-kilangu; *Mal.* Inthi-kachchil, Núli, Chávú, Píndi.

5. *DIOSCOREA PENTAPHYLLA*, Linn.; F. B. I. vi. 289; Wt. Ic. t. 814.

In all districts, up to 4,000 ft.

Flowers greenish, fragrant. Vern. *Tel.* Duka-pendalam, Moyakku-pendalam, Pendi-muka-tiga, Adavi-ginusu-tiga; *Tam.* Chedukundi, Vallai-kodi; *Mal.* Núran, Chaval, Korna-pídan.

Var. *Linnaei*, Pr. & Burk. Tuber elongate, white, edible; leaves shining.

Var. *communis*, Pr. & Burk. Tuber short, inedible; leaves rusty-pubescent.

6. *DIOSCOREA KALKAPERSHADII*, Pr. & Burk.

Shevaroy Hills (Perrottet).

Capsules unknown. Perhaps only a coarse variety of *D. pentaphylla*, L.

7. *DIOSCOREA SPICATA*, Roth; F. B. I. vi. 291.

Travancore and Tinnevely Hills, 3,000–5,000 ft.

Vern. *Mal.* Atthi-kilangu, Kavalai.

8. *DIOSCOREA OPPOSITIFOLIA*, Linn.; F. B. I. vi. 292; Wt. Ic. t. 813.

In all districts, 500–5,000 ft.

Vern. *Tel.* Yella-gadda; *Tam.* Kavala-kodi, Thavai-kachchu; *Mal.* Kanji; *Kan.* Bellarai.

Var. *Linnaei*, Pr. & Burk. Leaves lanceolate or ovate; axis of ♂ inflorescence usually brown-pubescent.

Var. *dukhunensis*, Pr. & Burk. Leaves ovate; axis of ♂ inflorescence glabrous or nearly so.

9. *DIOSCOREA WIGHTII*, Hook. f.; F. B. I. vi. 291.

Courtallam (Wight).

♀ flowers and capsules unknown.

10. *DIOSCOREA GLABRA*, Roxb.; F. B. I. vi. 294.

Godavari District (Barber).

11. *DIOSCOREA WALLICHII*, Hook. f.; F. B. I. vi. 295. *D. aculeata*, Linn.; F. B. I. vi. 296; Wt. Ic. t. 2060 (excluding the mature fruit).

W. Coast and Gháts; N. Circars; Mysore at Chickenballi at 3,000 ft. (Meebold).

Vern. *Tel.* Cheranga; *Mal.* Vara-kilanga, Katta-kilanga, Váli.

12. *DIOSCOREA BELOPHYLLA*, Voight.

W. Gháts, on the crests.

13. *DIOSCOREA INTERMEDIA*, Thw.; F. B. I. vi. 297.

Malabar (Barber); Travancore (Bourdillon).

14. *DIOSCOREA HAMILTONII*, Hook. f.; F. B. I. vi. 295.

W. Coast and Gháts, up to 4,000 ft.

Tubers eaten. Vern. *Mal.* Veünti.

Pendalam, Dukka-pendalam, Kavili-gadda; *Tam.* Mullu-valli, Siru-valli, Vettilai-valli, Atthi-kavali, Eyamichavali, Kappa-kavali, Kappan-kachchil; *Mal.* Kachchil-kilangu, Thamban; *Kan.* Tuna-genasu.

16. *DIOSCOREA ANGUINA*, Roxb.; F. B. I. vi. 293.

Rampa Hills at 2,500 ft. (Ramaswami, Narayanswami); Travancore (Calder and Ramaswami).

Tubers edible, but not much sought after.

2. *Trichopus*, Gaertn.

Small, erect, perennial herbs; stem short. *Leaves* terminal, 3-7-costate, petioled. *Flowers* small, bisexual, fascicled at the base of the leaves. *Perianth* campanulate, subequally 6-lobed. *Stamens* 6, on the base of the perianth-lobes; anthers subsessile, short and broad, connective produced. *Ovary* inferior, 3-celled; ovules 2-superposed in each cell; style very short; stigmas 3, short, reflexed, bifid. *Fruit* triquetrous, indehiscent. *Seeds* oblong, dorsally grooved; embryo minute in a cartilaginous albumen.

*TRICHOPUS ZEYLANICUS*, Gaertn.; F. B. I. vi. 297. *Trichopodium zeylanicum*, Bedd. Ic. Pl. Or. t. 290.

Tinnevely and Travancore Hills.

Stems several from a nodose rhizome, slender, 1-5 in. long; leaves ovate-lanceolate to broadly triangular-ovate, apex acute and minutely apiculate, obtuse or rounded, base more or less deeply cordate with a wide sinus, 2.5-5.5 in. long, 1.3-3 in. wide; petioles 1-2.75 in. wide; flowers 4 or 5 together; perianth dark-brown, lobes lanceolate, acute; pedicels slender, 1 in. long, lengthening and thickening below the ellipsoid, .5-.75 in. long fruit.

Family CLVIII. ROXBURGHACEAE.

Erect or climbing herbs; rootstock tuberous or creeping. *Leaves* alternate, opposite or whorled, simple, petioled, 3- or more-ribbed, cross-nervules parallel. *Flowers* regular, 2-sexual on axillary peduncles. *Perianth* superior or half-superior, in 2 whorls of 2 subequal, free or more or less connate segments each. *Stamens* 4, on the base of the perianth-segments or subhypogynous; anthers dorsifixed. *Ovary* 1-celled; ovules 2 or more.

stigmas 1-3, subsessile. *Fruit* a 2-valved capsule. *Seeds* oblong, testa coriaceous; embryo long, albumen hard.

**Stemona, Lour.**

Stem erect or twining; root tuberous. *Leaves* ovate or lanceolate, 3-13-ribbed. *Flowers* rather large, solitary or few subracemose. *Perianth* segments lanceolate, many-nerved. *Stamens* subhypogynous; filaments more or less connate into a ring; anthers erect, linear, connective produced into a very long linear appendage. *Ovary* free, compressed; ovules 2 or more, erect; stigma small, pointed. *Capsule* ovoid or oblong, compressed. *Seeds* ovoid or oblong, terete, grooved, beaked.

STEMONA TUBEROSA, Lour.; F. B. I. vi. 298. *Roxburghia gloriosoides*, Jones; Roxb. Cor. Pl. t. 32.

N. Circars as far south as Kambakkam Hill in the Chingleput District, 300-4,000 ft.

Stems twining; leaves membranous, opposite, rarely alternate, ovate, cuspidate to caudate, base truncately to deeply-caudate with rounded lobes, rarely abruptly cuneate, 7-13-ribbed, up to 10.5 in. long and 6 in. wide, cross-nervules straight, very close, petioles up to 3.5 in. long; flowers 1-3, 1-2 in. long, segments acuminate, greenish with purple nerves; stamens large, filaments red, stout, deeply grooved in front with crenulate margins, connective green; capsule ovoid-oblong, 1.5 in. long, 5-8-seeded. Vern. *Tel.* Kaniputiga, Ijedigadda.

Var. *minor*, Fischer. *S. minor*, Hook. f.; F. B. I. vi. 298. *Roxburghia gloriosoides*, Wt. Ic. t. 2061. All parts smaller; leaves not caudate, base narrowed or rounded, rarely more than 7-ribbed; flowers rarely exceeding 1 in. long, segments usually acute.

• **Family CLIX. LILIACEAE.**

Herbs, sometimes climbing, rarely shrubby or arboreous with secondary growth in thickness; roots fibrous or tuberous or a creeping rhizome, or bulbs or corms. *Leaves* various, cauline or radical, sometimes functionally replaced by cladodes, sometimes

ovary, herbaceous or petaloid, 6- (rarely 4- or 8-) merous in 2 series, imbricate, rarely valvate, in bud. *Stamens* 6, rarely 3 or less, hypogynous or on the perianth lobes; filaments free or connate; anthers oblong or linear, often versatile. *Ovary* superior, 3-celled; ovules 2 or more in the inner angles of each cell, anatropous, rarely orthotropous; style usually simple, rarely 3, usually long, rarely short or 0. *Fruit* a berry or capsule, usually 3-celled, rarely 1-celled. *Seeds* globose or flattened; embryo small, terete, surrounded by the horny or fleshy albumen.

**Leaves** minute, often spinescent scales, bearing axillary tufts of needle-like or slightly flattened cladodes .....1. **Asparagus.**

**Leaves** well developed :—

Climbing plants :—

Leaves not ending in a tendril; flowers small, whitish or greenish  
2. **Smilax.**

Leaves ending in a tendril; flowers large, yellow and red  
3. **Gloriosa.**

Erect undershrubs or herbs :—

**Leaves** very thick, cartilaginous or fleshy :—

Margins of leaves not spinous; perianth narrowly tubular, divided into linear segments for at least half its length, white or cream-coloured .....4. **Sansevieria.**

Margins of leaves spinous; perianth tubular, shortly toothed, reddish-yellow and green .....5. **Aloe.**

**Leaves** not very thick, neither cartilaginous nor fleshy :—

Undershrubs or stout herbs with a definite above-ground leafy stem :—

Flowers less than 2 in. long :—

Leaves sheathing at the base :—

Perianth segments connate below in a tube 6. **Dracaena.**

Perianth segments free to the base .....7. **Dianella.**

Leaves sessile or shortly petioled, not sheathing

8. **Disporum.**

Flowers trumpet-shaped; at least 5 in. long .....9. **Lilium.**

**Herbs** without distinct above-ground stems :—

Flowers in heads or umbels sheathed by 1 or more spathes

**Allium.**

Flowers racemose or fascicled in racemes :—



Rootstock a bulb or corm :—

Flowers several to many, racemose on a simple, naked scape :—

Flowers distant, usually appearing before the leaves, dingy-brown, .5 in. or more long, pedicels 1 in. long ; seeds compressed ..... 12. *Urginea*.

Flowers close, appearing with the leaves, greenish-purple, .25 in. or less long, pedicels under 1 in. long ; seeds subglobose ..... 13. *Scilla*.

Flowers solitary or few corymbose ; scape with a few leaves ..... 14. *Iphigenia*.

### 1. *Asparagus*, Linn.

Scandent or erect undershrubs, rarely herbs ; rootstock stout, creeping, sometimes bearing tubers. *Leaves* reduced to minute, often spinescent, scales which bear in their axils tufts of more or less leaf-like acicular, triquetrous or flattened cladodes. *Flowers* small or minute, 2- (rarely 1-) sexual, regular, axillary, solitary, fascicled, umbelled or racemed ; pedicels jointed. *Perianth* petaloid, campanulate, 6-partite. *Stamens* 6, on the bases of the perianth-segments ; filaments free ; anthers oblong. *Ovary* 3-celled, 3-gonous ; ovules 2 or more in each cell ; style 1, columnar ; stigmas 3. *Fruit* a globose, pulpy berry. *Seeds* 1-6, testa black, brittle ; embryo dorsal.

Flowers solitary, clustered or umbelled, not racemed :—

Leaves not spinescent. Stem slender, unarmed, terete, striate ; branchlets sulcate ; cladodes 3-6-nate, firm, up to 2 in. long ; flowers in dense clusters, pedicels up to .5 in. long, jointed below the middle ..... 1. *Rottleri*.

Leaves distinctly spinous :—

Stem erect, tall, smooth ; branchlets grooved ; spines straight, long ; cladodes 6-12-nate, triquetrous, acuminate, .16-.35 in. long ; flowers 1-2 together, pedicels jointed above the middle

2. *Fysoni*.

Stem scandent, slender, terete, smooth ; branchlets grooved ; spines short, recurved ; cladodes 6-15-nate, terete, mucronate, .16-.25 in. long ; flowers solitary or few and umbelled, pedicels jointed in the middle ..... 3. *asiaticus*.

Flowers racemed :

compressed, .5–1.5 in. long. Stem scandent, woody; branchlets angular; spines strong, long, straight or decurved; racemes solitary or fascicled, simple or branched, many- or few-flowered, 1–3 in. long; bracts minute; pedicels slender, jointed at the middle .....4. *racemosus*.

Cladodes 3–6-nate, stout, acuminate, spreading, .25–.35 in. long; bracts comparatively large. Otherwise as *racemosus*

5. *laevissimus*.

Cladodes flat, falcate-ensiform, 2–6-nate, acute or acuminate, .35–1 in. long. Stem subscandent, terete, smooth; branchlets angled; spines short; racemes often fascicled, 1–3 in. long; pedicels jointed at the middle .....6. *gonoclados*.

1. ASPARAGUS ROTTLEI, Baker; F. B. I. vi. 315.

Precise locality not known; probably South India (Rottler).

2. ASPARAGUS FYSONI, Macbride; *A. subulatus*, Steud.; F. B. I. vi. 315. *A. asiaticus*, Wt. Ic. t. 2055.

Nilgiri, Anamalai and Pulney Hills, 4,000–8,000 ft.

3. ASPARAGUS ASIATICUS, Linn.; F. B. I. vi. 316.

Bellary District (Beddome); also Rottler without precise locality.

4. ASPARAGUS RACEMOSUS, Willd.; F. B. I. vi. 316; Wt. Ic. t. 2056.

In all Districts, sea-level to 4,500 ft. Very common. Vern. *Ur.* Mohajolo; *Tel.* Pilli-gaddalu, Toalla-gaddalu; *Tam.* Ammai-kodi, Kadumulla, Nili-chedi.

5. ASPARAGUS LAEVISSIMUS, Steud.; F. B. I. vi. 317.

Nilgiri Hills at about 6,000 ft.

Hardly more than a variety of *A. racemosus*, Willd.

6. ASPARAGUS GONOCADOS, Baker; F. B. I. vi. 318.

W. Ghats, 4,000–6,000 ft.

## 2. Smilax, Linn.

Climbing shrubs (rarely erect herbs); stem often prickly. Leaves alternate, rarely opposite, 3–9-ribbed, reticularly veined; petioles usually short, generally bearing a tendril on either side above the base, often dilated into a narrow or broad sheath. Flowers dioecious, umbellate. Perianth of 6, free, subequal

*Staminodes* in ♀ 3 or 6, filiform. *Ovary* 3-celled, 3-gonous; ovules 1-2 in each cell, orthotropous, pendulous; style short or 0; stigmas 3, stout, recurved. *Fruit* a globose berry. *Seeds* solitary or more often 2, rarely 3, hemispheric; embryo small; albumen horny.

Umbels sessile on an axillary peduncle 2-6 in. long, sometimes forming a terminal panicle by the suppression of the upper leaves. Branches rather slender, armed or not; leaves ovate-deltoid, hastate-lanceolate or broadly cordate, sometimes a little broader than long, acute or acuminate, base more or less deeply cordate, 5-9-ribbed, margins and veins below sometimes prickly, 1.6-4.5 in. long, 1-3.2 in. wide; petioles .5-1 in. long, sometimes armed, hardly sheathed at the very base; tendrils from near the base .....1. *aspera*.

Umbels not sessile:—

Umbels 1-3 on an axillary peduncle; sheath of petiole narrow not auricled:—

Branches rather stout, more or less angled, armed or not; leaves very variable; lanceolate, elliptic, broadly oblong or orbicular, acute or abruptly cuspidate, base narrowed, rounded or cordate, 3-7 or 9-ribbed, up to 14 in. diam.; petioles up to 2 in. long

2. *zeylanica*.

Branches rather stout, terete, very sparsely or not armed; leaves broadly ovate or suborbicular, apex rounded or bluntly cuspidate, young sometimes acuminate, base rounded or shallowly cordate, 5-7-ribbed, up to 5 in. long; petioles up to 1.75 in. long

3. *Wightii*.

Umbels many, alternate or verticillate on an axillary peduncle. Branches stout, armed or not; leaves elliptic, ovate or very broadly oblong, apex rounded, sometimes retuse, or with a short hard cusp, base rounded or subcordate, 3-7-ribbed, 4-7 in. long, 2-6 in. wide; petioles up to 2 in. long, broadly sheathed for about half their length, the sheath auricled, often amplexicaul, at the base

4. *prolifera*.

1. *SMILAX ASPERA*, Linn.; F. B. I. vi. 306. *S. maculata*, Roxb., Wt. Ic. t. 2059.

W. Gháts, 4,000-7,000 ft.; Vizagapatam District at Ventala, 4,000 ft. (A. W. Lushington).

Leaves often blotched with white.

In all Districts, near sea-level to 6,000 ft. Vern. *Tel.* Kondagurvatica; *Tam.* Kattu-kodi.

3. *SMILAX WIGHTII*, A. DC.; F. B. I. vi. 310. *S. zeylanica*, Wt. Ic. tt. 2057-8.

Nilgiri and Anamalai Hills, 4,000-8,000 ft.

Doubtfully distinct from the last species.

4. *SMILAX PROLIFERA*; Roxb.; F. B. I. vi. 312.

In all Districts, from 2,500 ft. upwards. Vern. *Ur.* Mitri; *Kan.* Nirubetta.

### 3. *Gloriosa*, Linn.

Climbing herbs, stems leafy; rootstock tuberous, naked. *Leaves* alternate, opposite or ternately whorled, midrib prominent, tip elongate, spiral, functioning as a tendril. *Flowers* large, axillary, usually solitary; pedicels reflexed near the tip. *Perianth* petaloid, persistent; segments 6, free, spreading or reflexed, narrow, margins usually undulate. *Stamens* 6, hypogynous; filaments filiform; anthers linear, dorsifixed, versatile, extrorse. *Ovary* 3-celled; ovules many in each cell; style filiform, sharply deflexed; apex 3-fid, segments subulate, stigmatose within. *Fruit* a large, coriaceous, septicidal capsule. *Seeds* subglobose; testa spongy; embryo cylindric.

*GLORIOSA SUPERBA*, Linn.; F. B. I. vi. 358; Wt. Ic. t. 2047.

In all Districts; sea-level to 7,000 ft. Common, often climbing on hedge-row plants.

Stem herbaceous, up to 20 ft. long; tubers cylindric, large, simple or forked, white; leaves linear- to ovate-lanceolate, apex tapering, base rounded or cordate, 3-7.5 in. long (excluding the coiled, tendril-like tip), .5-2 in. wide, sessile or nearly so; pedicels rather stout, up to 7 in. long; perianth-segments linear, acute, margins crisply waved, tip to 3.5 in. long, at first greenish, then yellow, passing through orange and scarlet to crimson; capsules linear-oblong, up to 2.7 in. long. The Glory Lily. The tubers are poisonous. Vern. *Hind.* Karihari; *Ur.* Meheria-phulo, Agni-sikha; *Tel.* Adivi-nabhi, Kalappa-gadda, Potti-dumpa, Ganjeri; *Tam.* Kalap-paik-kilangu, Kannuvelli; *Mal.* Mettonni.

fleshy, flat or terete, nerves immersed. *Flowers* racemed on a stout scape. *Perianth*-tube slender, lobes 6, long, narrow. *Stamens* 6, on the perianth-tube; filaments filiform; anthers dorsifixed. *Ovary* attached by a broad base, 3-celled; ovules solitary in each cell, erect; style filiform; stigma simple. *Fruit* membranous, indehiscent, pericarp evanescent. *Seeds* 1-3, large, globose, fleshy, ripening outside the pericarp.

*SANSEVIERIA ROXBURGHIANA*, Schult. f.; F. B. I. vi. 271.

*S. zeylanica*, Roxb. Cor. Pl. t. 184.

In all Districts except the W. Coast; sea-level to 3,500 ft.

Stemless; rootstock creeping; leaves linear; deeply concave-channelled, rounded or obtusely keeled on the back, tapering to a stout, subulate point, 65-2 ft. long, green transversely marked with a number of darker bars, edges often whitish when old; scape 1-2.5 ft. high, raceme 1-1.5 ft. long; bracts membranous; flowers about 4 in a cluster, 6-8 in. long, white, pedicels jointed near the middle; seeds .25 in. diam. The Bowstring Hemp. Vern. *Hind.* Marúl; *Tel.* Chama-kada-nar, Sagal; *Tam.* Marul, Mottamanji.

#### 5. *Aloe*, Linn.

Dwarf plants, less often arboreous. *Leaves* fleshy, forming rosettes or 2-ranked, usually spinose-dentate. *Flowers* in terminal, simple or branched racemes. *Perianth*-segments united into a cylindric or campanulate, sometimes curved tube, the 6 tips usually free. *Stamens* 6, as long as or longer than the perianth; filaments inserted in a pit in the connective. *Fruit* a loculicidal capsule.

*ALOE VERA*, Linn.

Introduced and run wild, especially in hedge-rows, in the drier localities, up to 2,500 ft. The Barbados Aloes.

*Leaves* dense, aggregated, ensiform, 1-2 ft. long, 2-4 in. wide, with horny prickles on the margins; scape 2-3 ft. long; perianth reddish-yellow and green, cylindric, .75-1 in. long. Vern. *Tam.* Kathalai.

#### 6. *Dracaena*, Linn.

Shrubs, sometimes climbing, or small trees. *Leaves* alternate or crowded and subterminal, sessile or petioled, either with strong ribs or with many fine parallel nerves. *Flowers* in

terminal, rarely also axillary, racemes, panicles, heads or umbels; bracts small. *Perianth* tubular, campanulate or funnel-shaped, cleft into 6 narrow lobes. *Stamens* 6, at the base of the perianth; filaments filiform; anthers versatile. *Ovary* 3-celled; ovules solitary in each cell, erect; style filiform; stigma capitate. *Fruit* a globose, didymous or 3-lobed berry. *Seeds* globose or angular; testa thickened; embryo small; albumen horny.

*DRACAENA TERNIFLORA*, Roxb.; F. B. I. vi. 328. *D. terminalis*, Wt. Ic. t. 2054.

W. Gháts, 250–4,000 ft.: Rampa Hills, 2,000–3,000 ft. (Gamble, Narayanaswami).

A straggling shrub, stems slender, sometimes rooting near the base; leaves elliptic-lanceolate, acute or acuminate, narrowed to the base, 4–9 in. long, 1·4–2·5 in. wide; petioles 1–3 in. long, with widened, amplexicaul base; raceme sometimes branched, usually shorter than the leaves; flowers 1–3 together, 6–9 in. long, cleft about half way, white; pedicels short, jointed below the flower; berry red, 1–3-seeded; seeds 2–3 in. diam.

#### 7. *Dianella*, Lam.

Herbs, often stout, usually branched and stoloniferous. *Leaves* rigid, distichous, sometimes rosulate, often equitant. *Flowers* in cymose panicles, nodding; pedicels jointed at the top. *Perianth* marcescent, 6-partite; segments spreading. *Stamens* 6, hypogynous or the 3 inner on the bases of the perianth-segments; filaments much thickened; anthers basifixed, reflexed, opening by terminal pores or short slits. *Ovary* 3-celled; ovules 4–8 in each cell; style filiform; stigma minute. *Fruit* a globose berry. *Seeds* few, ovoid or compressed; testa black, shining; albumen fleshy.

*DIANELLA ENSIFOLIA*, Red.; F. B. I. vi. 337; Wt. Ic. t. 2053.

Anamalai, Pulney and Tinnevely Hills, 3,000–4,000 ft., in evergreen forest.

A stout herb up to 3 ft. high; leaves equitant, linear-ensiform, 1–3 ft. long, 7–1 in. wide; sheath acutely keeled, keel and margins smooth or scabrid; panicle 1–2 ft. long, scape slender, angled and sulcate; flowers white, greenish or



## 8. Disporum, Salisb.

Erect herbs, sometimes stout; stems angular, leafy; rootstock creeping. *Leaves* alternate or sometimes opposite, sessile or shortly petioled, strongly nerved, almost ribbed. *Flowers* in terminal or rarely also axillary, few-flowered umbels. *Perianth* petaloid, campanulate, deciduous, 6-partite, segments erect, their bases saccate or spurred. *Stamens* 6, hypogynous; filaments erect, usually flattened; anthers dorsifixed, extrorse. *Ovary* 3-celled; ovules 2-6 in each cell; style long or short; stigmas 3, short. *Fruit* a pisiform berry. *Seeds* few, subglobose; testa brown; albumen horny; embryo small.

Perianth-segments spurred at the base; segments lanceolate, acute, minutely ciliate. *Leaves* oblong-lanceolate, acuminate, base rounded, 2-4 in. long, .75-1.5 in. wide; flowers in sessile or shortly peduncled umbels, .5-.7 in. long, white, greenish or purplish .... 1. *calcaratum*.

Perianth segments not spurred at the base, saccate or subsaccate:—

Umbels usually peduncled, peduncles up to .6 in. long; fruiting pedicels 1-1.4 in. long. *Leaves* narrow- to ovate-lanceolate, acuminate, base rounded, sessile or shortly petioled, 2.5-4 in. long, .6-1.75 in. wide; perianth-segments spathulate or lanceolate, acute or acuminate, white or dull purple, .8-.9 in. long .. 2. *pullum*.

Umbels sessile, very rarely very shortly peduncled; fruiting pedicels .7-.9 in. long. *Leaves* ovate to suborbicular, acuminate, base rounded, 1.5-4.8 in. long, .75-2.7 in. wide; petioles .12-.3 in. long, rarely 0; flowers white, segments broadly oblong, acute or acuminate, .3-.6 in. long ..... 3. *Leschenaultianum*.

1. DISPORUM CALCARATUM, D. Don; F. B. I. vi. 359.

Vizagapatam District at Lochili, 4,000 ft. (A. W. Lushington).

2. DISPORUM PULLUM, Salisb.; F. B. I. vi. 360.

Vizagapatam District at Antala, 1,500 ft. (Gamble);

Godavari District at Ethakonda, 3,000 ft. (Narayanswami).

3. DISPORUM LESCHENAULTIANUM, D. Don; F. B. I. vi. 360;

Wt. Ic. t. 2048; *D. mysorense*, Wt. Ic. t. 2049.

W. Gháts, 3,000-7,500 ft.

Var. *angustifolium*. *Leaves* linear-lanceolate, caudate-acuminate base acute 3-5.5 in. long .5-1.2 in. wide

(All these are very closely allied and may be geographical races rather than separable species.)

### 9. *Lilium*, Linn.

Tall, unbranched, leafy herbs; root bulbous. *Leaves* few or many, often verticillate. *Flowers* usually very large, axillary or terminal, solitary or 2 or several umbelled or racemed. *Perianth* petaloid, funnel-shaped, 6-partite, usually narrowly nectariferous at the base. *Stamens* 6, hypogynous; filaments long, filamentous or slightly flattened; anthers dorsifixed, versatile. *Ovary* sessile, cylindric, 3-celled; ovules many in each cell, horizontal; style long; stigma globose, sub-3-lobed, rarely 3-fid. *Fruit* a coriaceous, erect, loculicidal, 3-valved, usually 6-angled capsule. *Seeds* vertically compressed; testa pale, membranous.

*LILIUM NEILGHERRENSE*, Wt. Ic. t. 2031-2; F. B. I. vi. 350.

*L. tubiflorum*, Wt. Ic. t. 2033-4. *L. Wallichianum*, Wt. Ic. t. 2035.

Mysore (Lobb); Nilgiri and Pulney Hills; Billigiri Rangan Hills (Fischer); Anamalai Hills (Fischer); Tinnevely Hills; 5,000-8,000 ft.

Stem up to 3 ft. high; leaves sessile, linear- to elliptic-lanceolate, acute, tip callous, strongly nerved, 2.5-6 in. long, .3-1.2 in. wide; flowers 1-3 together, terminal or in the upper axils, 6-10 in. long, white; apex of segments shortly callous, puberulous.

The Nilgiri Lily.

### 10. *Asphodelus*, Linn.

Annual or perennial herbs; root-fibres slender or fleshy. *Leaves* radical, linear, triquetrous or terete and fistular. *Flowers* in simple or paniced racemes, solitary in the axils of small scarious bracts. *Perianth* petaloid, segments 6, free or shortly connate below. *Stamens* 6, hypogynous; filaments dilated below and embracing the ovary; anthers versatile, dorsifixed, filament inserted in a pit. *Ovary* sessile, globose, 3-celled; ovules 2 in each cell, collateral; style filiform; stigma sub-3-lobed. *Fruit* a loculicidal, 3-valved capsule. *Seeds* 1-2 in each cell, triquetrous;

**ASPHODELUS TENUIFOLIUS**, Cav.; F. B. I. vi. 332. *A. parviflorus*, Wt. Ic. t. 2062.

A weed of fields and gardens. Rare in S. India. Bangalore (Bourne).

Annual; leaves terete, fistular, very slender, acute, 6–12 in. long, base sheathing, glabrous or minutely puberulous; scapes several, 1–2 ft. long, glabrous or sparsely minutely puberulous; flowers white, distant, 1.5–2 in. long; pedicels jointed at or below the middle; capsule 1.5–2 in. in diam., valves transversely wrinkled; seeds sharply 3-angled.

#### 11. *Chlorophytum*, Ker.

Perennial herbs; roots fascicled, often thick, fleshy and tuber-like. *Leaves* radical, clustered, linear or lorate, sometimes broad. *Flowers* racemose on simple or branched scapes, usually fascicled in the axils of small scarious or large membranous bracts. *Perianth* petaloid, white, marcescent, rarely deciduous; segments 6, free, 3–9-nerved. *Stamens* 6, all hypogynous or the 3 inner shortly adnate to their perianth-segments, included; filaments filiform, often widened above the middle; anthers versatile, linear or oblong, filaments inserted in a small dorsal pit. *Ovary* sessile or subsessile, globose, 3-celled; ovules 4 or more in each cell; style filiform; stigma small. *Fruit* a coriaceous or fleshy, truncate or emarginate, 3-winged or sharply 3-angled, loculicidal, 3-valved capsule. *Seeds* discoid; testa black; embryo rather large, often curved; albumen copious, hard.

Flowers in simple or shortly branched, dense-flowered racemes:—

Leaves narrow-lanceolate or oblanceolate, narrowed into a petiole:—

Scape 2–6 in. long. Collar rather stout; leaves oblanceolate, acuminate, 6–18 in. long (including the broad petiole), 1–2.2 in. wide; bracts longer than the small flowers; pedicels short, jointed near the tip; capsules elliptic-oblong, apex retuse, sharply triquetrous, .5 in. long ..... 1. *Heynei*.

Scape 1–2 ft. long:—

Anthers longer than the glabrous filaments. Leaves narrow, lanceolate or oblanceolate, acuminate, 6–24 in. long (including the petiole), 1–2.5 in. wide; scape naked, usually as long as the leaves; pedicels jointed usually below the middle; perianth-segments 3–5 in. long; capsules depressed-globose

oblanceolate, usually recurved, acuminate, 12-18 in. long, 1-2 in. wide; scape usually longer than the leaves with 2-3 sheaths; pedicels jointed usually above the middle; perianth-segments .25-.33 in. long; capsules globose, emarginate, .25-.3 in. diam. .... 3. *glaucum*.

Leaves linear or lorate, not or rarely narrowed into a petiole :—

Leaves falcate; filaments glabrous :—

Scape usually longer than the leaves; perianth-segments 7-9-nerved, .5-.66 in. long. Root-fibres long, cylindric, tuber-like; leaves sessile, usually ensiform, 8-24 in. long, .6-1.5 in. wide, margins usually crisped; scape 6-36 in. long; pedicels jointed at or below the middle; anthers as long as the filaments; capsules orbicular, retuse, .3-.5 in. long, 4-6-seeded

4. *tuberosum*.

Scape shorter than the leaves; perianth-segments 3-nerved, .3 in. long. Root-fibres short or long, fleshy or not; leaves ensiform, 6-12 in. long, .7-1 in. wide; pedicels jointed at or above the middle; anthers shorter than the filaments; capsules broadly obcordate, .25-.3 in. across, 2-5-seeded

5. *malabaricum*.

Leaves not falcate; filaments papillose. Root-fibres cylindric, often tuber-like; leaves linear, 7-18 in. long, .5-1 in. wide, slightly narrowed at the base; scape as long or longer, naked; pedicels jointed about the middle; perianth-segments 3-5-nerved, .33-.5 in. long; anthers longer than the filaments; capsules obcordate, .33 in. wide, 3-4-seeded .... 6. *attenuatum*.

Flowers in simple or branched racemes, remotely scattered, solitary or in pairs :—

Leaves elliptic-lanceolate, acute, 1-2 ft. long, 1-3.5 in. wide; scape tall, paniculately branched. Root-fibres tuber-like; flowers in distant pairs; pedicels jointed at about the middle; perianth-segments .33 in. long; capsules reniform, apex 2-lobed, .33 in. across, cells 1-seeded; seeds evenly orbicular in outline .... 7. *orchidastrum*.

Leaves subdistichous, grass-like, 6-24 in. long; .12-.5 in. wide; scape filiform, flexuous, 1-12 in. long; flowers distant; pedicels jointed at about the middle, slender; perianth-segments .15-.2 in. long; capsules subrotund to oblong, .25-.35 in. long, cells 1-4-seeded; seeds irregularly angled .... 8. *laxum*.

2. *CHLOROPHYTUM ARUNDINACEUM*, Baker; F. B. I. vi. 333.  
Godavari District (Bourne); Rampa Hills at 1,000 ft. (Narayanswami); Nilgiri Hills, Karkur Ghát.
3. *CHLOROPHYTUM GLAUCUM*, Dalz.; F. B. I. vi. 334.  
Bababudan Hills (Law). Rare.
4. *CHLOROPHYTUM TUBEROSUM*, Baker; F. B. I. vi. 334.  
*Phalangium tuberosum*, Wt. Ic. t. 2036.  
In all Districts, up to 4,500 ft. Vern. *Tel.* Kushelli.
5. *CHLOROPHYTUM MALABARICUM*, Baker; F. B. I. vi. 335.  
W. Gháts, 3,000–6,500 ft.
6. *CHLOROPHYTUM ATTENUATUM*, Baker; F. B. I. vi. 335.  
*Phalangium attenuatum*, Wt. Ic. t. 2037.  
W. Gháts, 1,400–7,000 ft.
7. *CHLOROPHYTUM ORCHIDASTRUM*, Lindl.; F. B. I. vi. 336.  
*Phalangium oligospermum*, Wt. Ic. t. 2038.  
W. Gháts, up to 3,000 ft.; Rampa Hills (Ramaswami).
8. *CHLOROPHYTUM LAXUM*, R. Br.; F. B. I. vi. 336. *Phalangium parviflorum*, Wt. Ic. t. 2039.  
W. Gháts, 800–6,000 ft.; Vizagapatam District at Endrika, 5,000 ft. (A. W. Lushington).

## 12. *Urginea*, Steinh.

Bulbous, scapigerous herbs. *Leaves* narrow. *Flowers* racemed, bracteate, often appearing before the leaves. *Perianth* petaloid, 6-partite, campanulate or tubular. *Stamens* 6, at the base of the perianth-segments, included; filaments filiform, sometimes flattened below; anthers linear or oblong, versatile. *Ovary* sessile, 3-celled; ovules numerous in each cell; style filiform, sometimes geniculate; stigma capitate, 3-grooved. *Fruit* an oblong, ellipsoid or globose, 3-quetrous, loculicidal, 3-valved capsule. *Seeds* numerous, flat; testa black, membranous; embryo rather large; albumen fleshy.

Flowers appearing usually before the leaves :—

Bulb ovoid, 2–4 in. long; leaves linear-lorate, acute, 6–18 in. long; .5–1.1 in. wide; scape erect, stout, brittle, 12–30 in. long; perianth-segments linear-oblong, .5–.75 in. long; pedicels .5–1 in. long; capsules ellipsoid, .5–.75 in. long.

inner 3 often puberulous; pedicels filiform, .4–1.5 in. long; capsules ellipsoid, .4–.5 in. long ..... 2. *coromandeliana*.  
 Flowers appearing with the leaves. Bulb ellipsoid, 1 in. diam.; leaves linear, 3–6 in. long, up to 2 in. wide, sometimes filiform; scape as long or longer; perianth segments linear-oblong, .2 in. long; pedicels .15–.25 in. long; capsules subglobose; .3 in. diam.

3. *congesta*.

1. *URGINEA INDICA*, Kunth; F. B. I. vi. 347.

Coimbatore District, 1,000–1,500 ft. (Fischer).

Flowers dingy-brown.

2. *URGINEA COROMANDELIANA*, Hook. f.; F. B. I. vi. 347.

*U. Wightiana*, Hook. f.; F. B. I. vi. 347. *U. indica*, Wt. Ic. t. 2063.

Central and Eastern Districts in fairly dry localities, sea-level to 3,500 ft.

Flowers dull-green and purplish.

3. *URGINEA CONGESTA*, Wt. Ic. t. 2064 (left-hand fig.); F. B. I. vi. 348.

Sea-coast (Wight).

Flowers white and purplish.

18. *Scilla*, Linn.

Scapigerous herbs; bulb tunicate. Leaves radical, linear, lorate or lanceolate. Flowers racemed, bracts small; pedicels inarticulate. Perianth petaloid, persistent, 6-partite, stellate or campanulate; segments often recurved. Stamens 6, perigynous; filaments usually filiform; anthers ovate or oblong, versatile. Ovary sessile or shortly stipitate, 3-celled; ovules 1–2–several in each cell; style filiform; stigma small, capitate. Fruit a globose or ovoid, membranous, loculicidal, 3-valved capsule. Seeds obovoid or globose, never flat, testa thin, black; embryo shorter than the firm albumen.

*SCILLA INDICA*, Baker; F. B. I. vi. 348. *Ledebouria hyacinthina*, Roth; Wt. Ic. t. 2040. *Barnardia indica*, Wt. Ic. t. 2041.

In all but the West Coast Districts, sea-level to 4,000 ft.

Bulb ovoid or globose, .5–1.5 in. diam., leaves linear, oblong



black, paler and glaucous below; scape 2-6 in. long; flowers greenish-purple, usually dense; perianth-segments linear-oblong, 15-25 in. long; capsules subglobose, 2-3 in. diam. Indian Squill. Vern. Tel. Adavi-tellagadda; Tam. Nariven-gayam.

#### 14. *Iphigenia*, Kunth.

Erect herbs; stem slender; root a tunicate corm. *Leaves* few, cauline, scattered, narrow. *Flowers* small, erect, solitary or few, corymbose. *Perianth* petaloid, 6-partite; segments stellately spreading or recurved, clawed, deciduous. *Stamens* 6, hypogynous; filaments short, flat; anthers oblong, versatile, introrsely attached. *Ovary* sessile, 3-celled; ovules numerous in each cell; styles 3, minute, connate at the base, stigmatose within. *Fruit* a loculicidal, 3-valved capsule. *Seeds* subglobose; testa thin, brown; embryo small; albumen fleshy.

*IPHIGENIA INDICA*, Kunth; F. B. I. vi. 357.

In all Districts except in the wettest localities, sea-level to 7,000 ft.

Corm subglobose, 4-75 in. diam.; stem 3-10 in. high; leaves sessile, linear, 3-9 in. long, filiform to 28 in. wide, acuminate; flowers dark-purple, sometimes almost black; perianth-segments linear-subulate to linear-spathulate; filaments sometimes papillose; capsule oblong-ellipsoid, 5-7 in. long.

Vern. Tam. Nirpanai.

*Allium Cepa*, Linn.; F. B. I. vi. 337, the Onion, *A. sativum*, Linn.; F. B. I. vi. 337, the Garlic and other species of the genus are cultivated for their edible bulbs.

*Yucca gloriosa*, Linn., Adam's Needle or the Egg Plant, is cultivated for its fibre for carpet and mat making.

#### Family CLX. PONTEDERIACEAE.

Fresh-water and marsh herbs, rooting in mud and erect or floating. *Leaves* erect or floating, parallel-nerved. *Flowers* 2-sexual, irregular, in spikes or racemes or subumbellate, arising from the sheath of the uppermost leaf; bracts sheathing, irregular. *Perianth* inferior, petaloid, unequally or subequally 6-fid or -partite. *Stamens* 1-6, inserted at the base of the

or lobed. *Fruit* a membranous, loculicidal, 3-valved capsule. *Seeds* small, ovoid or ellipsoid; embryo cylindric; albumen horny or floury.

Petioles not enlarged to form floats; perianth-segments free; one anther longer than the rest, its filament horned on one side

1. *Monochoria.*

Some, at least, of the petioles enlarged to form floats; perianth distinctly tubular below; anthers equal, filaments not horned

2. *Elchhornia.*

*1. Monochoria, Presl.*

Fresh-water and marsh herbs; rootstock short or creeping. *Leaves* radical and solitary at the top of the emerging stem or branches. *Perianth* campanulate, tube 0. *Stamens* 6, one usually longer than the rest with its filament horned on one side; anthers basifixed, dehiscing by a terminal, ultimately elongate slit. *Ovary* 3-celled; ovules many in each cell; style filiform; stigma minutely 3-lobed. *Capsules* oblong. *Seeds* many, ovoid, many-ribbed.

Rootstock elongate, creeping; leaves hastate, sagittate or cordate, nerves very close and numerous, acute or acuminate, 3-8 in. long, .75-6 in. wide; petioles up to 2 ft. long, of the floral leaves tumid above and embracing spathe-like the short, stout peduncle; flowers crowded, racemose or subumbellate; perianth-segments obovate, .66 in. long, large anther .2 in. long; pedicels .5-1.2 in. long

1. *hastaeifolia.*

Rootstock short, suberect; leaves ovate or subreniform, nerves not very close or very numerous, acute or acuminate, base rounded or cordate, 2-6 in. long, 1-6 in. wide; petioles up to 21 in. long, the flowering channelled above and embracing spathe-like the elongate peduncles; flowers spicately racemose; perianth-segments narrowly obovate, .5 in. long, large anther .12-.15 in. long; pedicels .4 in. or less long

2. *vaginalis.*

✓ 1. *MONOCHORIA HASTAEFOLIA*, Presl.; F. B. I. vi. 362. *Pontederia hastata*, Roxb. Cor. Pl. t. 111.

In the E. Districts, sometimes in brackish water, at low elevations.

Flowers brilliant purplish blue. Vern. Tel. Nir-tamara.

*Monochoria vaginalis*, Presl. F. B. I. vi. 362. *Pontederia*

Flowers blue, usually spotted with red. Vern. Tel. Nir-Kancha.

Var. *plantaginea*, Solms-Laub.; F. B. I. vi. 363. Smaller, often only 3-4 in. high; leaves linear or narrowly ovate, racemes few-flowered.

## 2. (*Eichhornia*, Kunth.

Water plants, rooting in mud or free floating and rooting at the nodes.) *Leaves* erect or floating, obovate, rotund or cordate, rarely lanceolate. *Flowers* in simple, rarely paniculate, subspicate racemes from the sheath of the leaf. *Perianth* funnel-shaped, tube short or long, limb irregular, often 2-lipped. *Stamens* 6, declinate, irregularly inserted, upper included; anthers subequal. *Ovary* sessile, 3-celled; ovules many in each cell; style filiform; stigma slightly swollen or shortly 3-6-lobed. *Capsule* ovoid-oblong or linear. *Seeds* ovoid, many-ribbed.

### (*EICHHORNIA CRASSIPES*, Solms.

A beautiful introduced American plant which is gradually spreading in waterways and lakes. It has become a very serious pest in Bengal and Burma. The Water Hyacinth. Leaves in a rosette, spoon- or paddle-shaped, apex rounded, 2-8 in. diam.; petioles usually turbinate swollen to form floats, up to 10 in. long; scape erect from the centre of the rosette, 6-10 in. long; flowers violet-blue, 1-1.3 in. long.)

## Family CLXI. XYRIDACEAE.

Erect tufted, reed-like, scapigerous herbs. *Leaves* radical, elongate, linear or subulate; sheaths short. *Scape* simple, usually naked. *Flowers* 2-sexual, sessile in the axis of rigid, brown imbricating bracts forming a terminal head or spike; bracts orbicular or obovate, coriaceous, persistent. *Perianth* inferior, 2-seriate. *Sepals* 3, deciduous, 2 lateral small, scarious, like bracteoles, narrow, arched, keeled or winged, dorsal sepaloid, broader, arching over the corolla, sometimes absent. *Petals* 3, marcescent, yellow, clawed, claws more or less connate into a tube below. *Stamens* 3 perfect, shorter than the petals and attached near their bases; anthers sagittate. *Staminodes* 3 alternating with the petals, filiform, sometimes 0. *Ovary* superior, free, 1- or incompletely 3-celled, placentæ 3, basal, confluent or parietal; ovules many on each placenta; style

3-fid; stigmas capitate or dilated. *Fruit* a loculicidal, 3-valved capsule, or splitting lid-like round the top. *Seeds* numerous, minute, linear or ellipsoid, strongly ribbed; embryo minute, albumen floury.

**Xyris, Linn.**

*Leaves* linear, caespitose or distichous. *Scape* naked or with a single leaf. *Flowers* in globose or ovoid, rarely hemispheric or shortly cylindric heads, opening one at a time; bracts usually obtuse and rigid. *Dorsal sepal* broad, more or less distinctly 3-nerved. *Corolla-tube* short or long, lobes ovate. *Staminodes* usually 3, rarely 0, between the corolla-lobes, shortly filiform, bearded or with an aborted anther.

Comparatively robust herbs, 10–38 in. high; leaves distinctly flat, 1 in. or more wide; scapes strongly ridged or flat and 2-edged:—

Leaves obtuse or acute, 5–12 in. long, .1–.27 in. wide, not margined or scabrid; scape usually longer, 6–20 in. long, terete, strongly ridged, not scabrid; heads subglobose or ellipsoid, .4–1 in. long; bracts orbicular or cuneately obovate, usually broader than long, dark red-brown, margins entire, glabrous and scarious; lateral sepals linear-spathulate, smooth .....1. *indica*.

Leaves often twisted, rigid, pungently acute, 5–20 in. long, .1–.25 in. wide, margined, margins usually minutely scabrid; scape longer, up to 38 in. long, flat and sharply 2-edged, edges minutely scabrid; heads ovoid or ellipsoid-cylindric, .4–.9 in. long; bracts orbicular, brown, margins minutely denticulate or ciliate; lateral sepals ovate-lanceolate, keel spinulose .....2. *anceps*.

Comparatively slender herbs, 2.5–14 in. high, rarely up to 22 in. high; leaves very narrow, rarely as much as .1 in. wide; scapes terete, not distinctly ribbed:—

Leaves 2–9 in. long, .03–.1 in., rarely up to .17 in. wide, acute, often pungent, not papillose; scape usually much longer, striate, sometimes flattish and slightly 2-ribbed, up to 22 in. long; heads globose or ovoid, .25–.3 in. long; bracts broadly oblong, obtuse, usually dorsally keeled towards the apex, dark-brown; lateral sepals oblanceolate, acuminate .....3. *schoenoides*.

Leaves 2–9 in. long, .03–.07 in. wide, acuminate, minutely papillose; scape as long or a little longer, rarely more than 12 in. long, finely striate, often minutely papillose; heads globose or ovoid, .2–.5 in. long; bracts orbicular, shining, chestnut-brown, the margins yellowish-brown, apex usually with an acute green tip; lateral sepals oblanceolate, acuminate, keeled, hyaline .....4. *pauciflora*.



1. *XYRIS INDICA*, Linn.; F. B. I. vi. 364.

In marshy localities on the W. Coast.

2. *XYRIS ANCEPS*, Lam.; F. B. I. vi. 364.

In swampy localities, Quilon (Wight, Rama Row)  
Malabar-Wynaad at Muthanga, 2,600 ft. (Fischer).

3. *XYRIS SCHOENOIDES*, Mart.; F. B. I. vi. 365.

In marshy localities, W. Gháts, 4,000-7,000 ft.; Vizag-  
patam District at Ventala, 4,500 ft. (A. W. Lushington)

4. *XYRIS PAUCIFLORA*, Willd.; F. B. I. vi. 365.

In marshy localities in all Districts, sea-level to 2,000 ft

(1525)