

FLORA  
OF THE  
PRESIDENCY OF MADRAS

BY  
J. S. GAMBLE, C.I.E., M.A., F.R.S., F.L.S.  
LATE OF THE INDIAN FOREST DEPARTMENT

PART VII  
*NYCTAGINACEAE TO EUPHORBIACEAE.*

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

London

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## INTRODUCTION TO PART VII.

SINCE the issue of Part VI supplementary notes on Parts I, III, V and VI have appeared as No. V of "Notes on the Flora of Madras" in the 'Kew Bulletin' for 1924, p. 235.

It is with great regret that I have to record the death of Mr. J. S. Gamble on October 16th. Mr. Gamble had corrected all the proofs and had seen the final revises of all but the last two sheets through the press before his death.

ARTHUR W. HILL.

ROYAL BOTANIC GARDENS, KEW;  
November, 1925.

# 'FLORA OF MADRAS.

## IV. MONOCHLAMYDEAE.

*Sepals* distinct, herbaceous, rarely petaloid, imbricate or valvate, or connate in a tube with imbricate or valvate lobes. *Petals* usually 0, very rarely 1-seriate and like the sepals, more rarely 1-seriate and truly coralline, inserted on the disk or adnate to the ovary. *Torus* small, or raised and stalk-like. *Stamens* few, rarely numerous, inserted on the torus or rarely on the base of the perianth. *Carpels* 1 or more, free or connate.

### Family CXVII. NYCTAGINACEAE.

Herbs, shrubs or trees. *Leaves* usually opposite, entire; stipules 0. *Flowers* hermaphrodite, rarely unisexual, regular, sometimes dimorphous; inflorescence various, the flowers often involucrate. *Perianth* monophyllous, petaloid, usually small; tube persistent, campanulate funnel-shaped or salver-shaped, enveloping the fruit; limb 3-5-lobed, persistent or deciduous, the lobes plicate in bud. *Stamens* 1-30, hypogynous, sometimes unilateral; filaments usually unequal, inflexed in bud; anthers included or exserted, dorsifixed, didymous. *Ovary* free, 1-celled; style filiform, involute in bud; stigma small; ovule solitary, basal, erect. *Fruit* indehiscent, enclosed in the hardened perianth-tube. *Seed* erect; testa thin, adherent; albumen soft or floury; embryo curved or straight and with folded cotyledons; radicle inferior.

Erect or diffuse herbs; embryo hooked, the radicle long; limb of perianth funnel-shaped, 5-lobed on the margin, the lobes plicate; flowers paniculate or umbellate ..... 1. **Boerhaavia.**

Trees or shrubs, sometimes climbing; embryo straight, the radicle short; limb of perianth 5-10-lobed, of ♂ flower funnel-shaped, of ♀ tubular, lobes induplicate-valvate; flowers in corymbose cymes

2. **Alstonia.**

#### 1. **Boerhaavia, Linn.**

Erect or diffuse herbs, often divaricately branched. *Leaves* opposite, often in unequal pairs. *Flowers* small, in panicles umbels or heads, articulated with the pedicels; bracteoles small.

HHHH

often deciduous, rarely involucre. *Perianth-tube* long or short, ovoid below, narrowed above the ovary; limb funnel-shaped or campanulate, 5-lobed. *Stamens* 1-5, connate below around the ovary, exserted; filaments capillary, unequal; anthers didymous. *Ovary* oblique, stipitate; ovule erect; stigma peltate. *Fruit* small, enclosed in the ovoid turbinate or clavate, truncate, ribbed or angled, viscidly glandular perianth-tube. *Seed* with adherent testa; embryo hooked, cotyledons thin, broad, the outer the larger, enclosing the soft floury albumen; radicle long.

Fruit glandular on the ribs, not at the crown:—

Flowers sessile or very nearly so, in panicles of subcapitate umbels with lanceolate minute bracteoles; perianth very short, urceolate; fruit clavate, 5-ribbed, viscidly glandular:—

Leaves thick, in unequal pairs, ovate oblong or suborbicular, acute or obtuse, rounded or subcordate at base, glabrous above, white beneath, somewhat undulate on the margin, up to 2 in. long, 1-25 in. broad, petiole slender, up to 1 in. long, nerves 3-4 pairs ..... 1. *diffusa*.

Leaves coriaceous, in equal or unequal pairs, ovate or ovate-oblong, obtuse, rounded at base, scabrid on both surfaces, crispate-undulate on the margins, up to 1 in. long, .75 in. broad, petiole up to .25 in. long, nerves 5-6 pairs, prominent when dry

..... 2. *crispa*.

Flowers on capillary pedicels in umbels with linear lanceolate bracteoles; perianth .25 in. long with slender tube and funnel-shaped limb; fruit clavate with large glands; leaves thick, triangular-ovate, acute, rounded or cordate at base, glabrous above, pubescent beneath, repand sinuate, up to 3 in. long, 1.5 in. broad, petiole to .5 in. .... 3. *repanda*.

Fruit with large stalked globose glands on the crown, clavate; flowers in long-pedunculate racemes, in few-flowered whorls on a slender rhachis; pedicels filiform, perianth-tube slender, limb funnel-shaped; leaves thick, broadly ovate or suborbicular, obtuse, mucronate, cordate at base, glabrous, the margins sinuate, up to 2.25 in. long and broad, petiole to .75 in. .... 4. *verticillata*.

1. *BOERHAAVIA DIFFUSA*, Linn. *B. repens*, Linn.; F. B. I. iv.

709. *B. procumbens*, Roxb.; Wt. Ic. t. 874.

All plains Districts, also to some height in the hills, a weed of waste lands and road-sides.

A diffuse herb with stout rootstock and many erect or procumbent branches, the flowers red, the fruit very

viscid, easily detached and so adherent to clothes or fur of animals. It is very variable according to soil and climate.

2. *BOERHAAVIA CRISPA*, Heyne in Wall. Cat. 6771; F. B. I. iv. 709.

Deccan, in dry Districts (Heyne).

A stout very scabrid herb, with long peduncles.

3. *BOERHAAVIA REPANDA*, Willd.; F. B. I. iv. 709; Wt. Ic. 1766.

Deccan, in dry Districts.

A diffuse herb with pink flowers, often found climbing among bushes, the fruit with conspicuous viscid glands.

4. *BOERHAAVIA VERTICILLATA*, Poir.; F. B. I. iv. 710. *stellata*, Wt. Ic. t. 875.

Deccan and Carnatic, in dry Districts, often on black cotton soil.

A diffuse herb with long branches, white flowers and fruit with curious glands round the top.

## 2. *Pisonia*, Linn.

Trees or shrubs, unarmed or with axillary spines. Leaves opposite or alternate, entire. Flowers small, usually dioecious in paniculate, subsessile or pedunculate cymes, bract and bracteoles small. Male flowers: perianth campanulate, the lobes 5-lobed, the lobes induplicate-valvate; stamens 6-10, exserted, filaments connate below in a tube or ring, anthers oblong, didymous. Female flowers: perianth tubular, usually enlarged at base; ovary sessile, elongate, style included or exserted, stigma capitellate, peltate or fimbriate. Fruit enclosed in coriaceous, oblong linear or clavate, perianth-base, compressed, 5-angled, usually with rows of viscid stipitate glands; utricle membranous. Seed with a hyaline testa adnate to the pericarp, embryo straight; albumen soft, enclosed in the cotyledons, radicle inferior.

- PISONIA ACULEATA*, Linn.; F. B. I. iv. 711; Wt. Ic. t. 1764.

N. Circars, Ganjam to Godavari, on the Coast, in forests, lands, hedges and bushes, common, less so southwards as to Striharikota. Occasionally found inland, as in Anamalai at 1,200 ft. (Fischer).

A large thorny climbing shrub with opposite coriaceous elliptic or ovate leaves up to 3 in. long, the flowers in dense corymbose cymes greenish-white. Wood of peculiar and interesting structure. The plant makes a good hedge, green or dry. Inland specimens are sometimes without thorns. Vern. *Ur. Hati-ankusa*.

*P. morindifolia*, R. Br.; Wt. Ic. t. 1765, is the Tree Lettuce, a small tree of the Beach forests of the Andaman Islands, frequently found in gardens in Madras and other places near the sea on both coasts and noticeable for its very pale green leaves.

*Mirabilis Jalapa*, Linn., the Marvel of Peru, is a large herbaceous plant with showy flowers of various colours, crimson yellow white or striped, frequently grown in gardens and often seen run wild.

*Bougainvillea spectabilis*, Willd., and *B. glabra*, Choisy., are large thorny climbing Brazilian shrubs very common in gardens. They have small pale yellow flowers with large and conspicuous magenta or purple bracts. A variety (*B. lateritia*) has the bracts brick-red and the leaves nearly tomentose.

#### Family CXVIII. AMARANTACEAE.

Herbs, rarely shrubs, erect or climbing. Leaves opposite or alternate; stipules 0. Flowers usually hermaphrodite, rarely polygamous or dioecious, small, usually in terminal and axillary, simple or paniced, spikes cymes or clusters; bracts hyaline or scarious; bracteoles 2, scarious. Perianth dry, calycine, persistent, usually of 5 free or slightly connate hyaline or scarious imbricate segments. Stamens 1-5, opposite the perianth segments; filaments free or connate below in a membranous hypogynous cup, often alternating with membranous staminodes; anthers dorsifixed, 1- or 2-celled. Ovary 1-celled, ovoid ellipsoid or globose; ovules 1 or more, amphitropous, erect or suspended from basal funicles; style sometimes simple with capitellate stigma, sometimes 2-3-fid with acute stigmas or styles 2 or 3 papillose-stigmatic on the lower face. Fruit a membranous utricle, rarely a berry or a capsule, breaking irregularly or circumscissily. Seed erect or inverted, orbicular ovate or reniform, compressed; testa crustaceous; tegmen, if present, membranous; embryo horseshoe-shaped or annular, surrounding a floury albumen.

Anthers 2-celled :—

Leaves alternate :—

Seeds several, utricle circumscissile . . . . . 1. **Celosia.**

Seeds solitary, erect :—

Flowers hermaphrodite :—

Flowers paniced ; fruit an indehiscent utricle . . . 2. **Banalia.**

Flowers capitate ; fruit a circumscissile utricle . . 3. **Allmania.**

Flowers spicate ; fruit indehiscent, crustaceous, rugose

4. **Digera.**

Flowers unisexual ; fruit an indehiscent or circumscissile utricle . . . . . 5. **Amarantus.**

Leaves opposite ; ovule and seed solitary, suspended from a basal funicle :—

Flowers clustered, 1-3 perfect surrounded by others imperfect with hooked bristles or awns :—

Stamens with interposed staminodes . . . . . 6. **Cyathula.**

Staminodes 0 . . . . . 7. **Pupalia.**

Flowers all perfect :—

Staminodes 0 :—

Perianth-segments ribbed ; stamens 5 :—

Flower-spikes axillary . . . . . 8. **Psilotrichum.**

Flower-spikes paniced . . . . . 9. **Psilostachys.**

Perianth-segments hyaline ; stamens 1 or 2

10. **Nothosaerva.**

Stamens with interposed staminodes ; perianth-segments, bracts and bracteoles hardened, spinescent . . 11. **Achyranthes.**

Leaves alternate or fascicled, or with opposite and alternate mixed ; stamens with interposed staminodes . . . . . 12. **Aerva.**

Anthers 1-celled ; leaves opposite ; flowers in small clusters

13. **Alternanthera.**

### 1. **Celosia**, Linn.

Herbs, usually annual, the stems sometimes woody below. Leaves alternate. Flowers hermaphrodite, in terminal or axillary, often dense, often interrupted spikes, sessile or shortly pedicelled, white or coloured ; bracts and bracteoles scarious, shining. Perianth-lobes 5, calycine, slightly connate below, scarious, oblong or lanceolate. Stamens 5 ; filaments slender, connate below in a membranous hypogynous cup ; anthers 2-celled. Ovary 1-celled, ovoid or subglobose ; ovules 2 or more on long funicles from the base of the ovary ; style 3 or short 5



long, sometimes elongating in fruit; stigma simple. *Fruit* a utricle dehiscing in circumscissile fashion near the middle, membranous or sometimes corky or coriaceous. *Seeds* 2 or more, erect, lenticular; testa crustaceous, black, often shining; embryo annular, surrounding the floury albumen; cotyledons linear.

Flowers in dense stout imbricate spikes 1-6 in. long, the perianth often pink at first, but becoming later shining white, its lobes about .25 in. long; leaves variable, linear or linear-lanceolate, rarely ovate or lanceolate, sometimes reaching 6 in. long and 1.5 in. broad

1. *argentea*.

Flowers in small clusters in slender interrupted spikes:—

Perianth-lobes .1 in. long; utricle gradually narrowed at apex, with style and 2 recurved stigmas; leaves ovate or lanceolate, acuminate, narrowed at base, up to 3 in. long, 2 in. broad, petiole to 1.5 in. long.....2. *pulchella*.

Perianth-lobes about .075 in. long; utricle with a thickened head at apex, the 2 stigmas short and slender, recurved; leaves ovate, obtuse or subacute, rounded at base, up to 1.5 in. long, 1 in. broad, petiole to .75 in. ....3. *polygonoides*.

1. *CELOSIA ARGENTEA*, Linn.; F. B. I. iv. 714; Wt. Ic. t. 1767.

All plains Districts, chiefly on cultivated land or among grasses, up to 4,000 ft. in the hills, common but not really indigenous.

An erect glabrous annual up to 3 ft. high, the long shining flower-heads conspicuous.

2. *CELOSIA PULCHELLA*, Moq.; F. B. I. iv. 715; Wt. Ic. t. 1768.

Deccan, Horsleykonda in Chittoor, 4,000 ft. (Gamble); W. Gháts, Nilgiris, Pulneys and hills of Tinnevely and Travancore, at 3,000-6,000 ft.

A slender diffuse herb, the branches glabrous.

3. *CELOSIA POLYGONOIDES*, Retz.; F. B. I. iv. 715.

Deccan and Carnatic, on sandy soils.

A diffuse herb with many branches from a stout rootstock.

*C. cristata*, Linn., the Cockscomb plant, commonly cultivated in gardens and sometimes found as an escape, is easily recognized by the curious monstrous fasciated growth of its inflorescence, which may be red or yellow usually. It is very closely allied to *C. argentea*, and may be a variety of that species.

2. *Banalia*, Moq.

An erect glabrous branching herb. *Leaves* alternate, membranous. *Flowers* hermaphrodite, in clusters in axillary or terminal spikes, usually forming pale chaffy thyrsoïd panicles; bracts hyaline, also the 2 bracteoles. *Perianth*-segments 5, calycine, oblong, scarious, membranous, 3-nerved. *Stamens* 5, the filaments united below in a cup; anthers 2-celled. *Ovary* ovoid, compressed; style erect; stigmas 2, recurved, papillose; ovule 1, pendulous on a slender funicle. *Fruit* a subglobose, indehiscent utricle. *Seed* orbicular, the testa black, crustaceous.

BANALIA THYRSIFLORA, Moq.; F. B. I. iv. 716; Wt. Ic. t. 1774.

W. Ghâts, from Wynaad southwards, at 2,000–6,000 ft.

A slender tall herb with conspicuous white or cream-coloured thyrsoïd panicles; leaves rhomboid-ovate or ovate-lanceolate, acuminate, up to 4 in. long, 2 in. broad.

3. *Allmania*, R. Br.

Erect or diffuse herbs. *Leaves* alternate, entire. *Flowers* hermaphrodite; in small dichasia, usually of 3, the centre one sessile with 1 or no bracteoles, the side ones pedicellate with 1 bract and 2 bracteoles; these dichasia are collected in terminal or axillary globose or oblong heads; bracts and bracteoles narrow, scarious, usually hispid, with filiform tips. *Perianth* calycine, of 5 nearly free oblong lanceolate scarious lobes. *Stamens* 5, the filaments connate in a membranous hypogynous cup, anthers 2-celled. *Ovary* ovoid, narrowed in a straight style; ovule 1, erect; stigma 2-lobed. *Fruit* a subglobose or ovoid membranous utricle, circumscissily dehiscent. *Seed* erect, subglobose, in a cup-shaped arillus; testa black, shining, crustaceous; embryo annular, surrounding copious albumen; cotyledons linear; radicle inferior.

Flower-heads usually sessile, brown, globose; prostrate diffuse or rarely erect herbs with extremely variable leaves . . . . . 1. *nodiflora*.  
Flower-heads more or less peduncled, white, oblong or ovoid, rarely globose; erect pale herbs with usually narrow spatulate leaves up to 5 in. long . . . . . 2. *longepedunculata*.

1. ALLMANIA NODIFLORA, R. Br.; F. B. I. ix. 716 (var. *Roxburghii*, Hook. f.).

Circars and Carnatic, in coast Districts.

A straggling many-branched herb with stout root-stock and, obovate spatulate apiculate leaves, the flower-heads usually 5 in. in diam. Closely allied and often difficult to distinguish are the following varieties, established in the 'F. B. I.'

Var. *procumbens*, Hook. f. *Chamissoa nodiflora*, Wt. Ic. t. 1770, prostrate with long prostrate branches, small, variable, linear to orbicular leaves and small flower-heads. Coast of the Carnatic, on sand.

Var. *aspera*, Hook. f. *Chamissoa aspera*, Wt. Ic. t. 1772, erect but diffuse and hispidly hairy, the leaves linear-oblong or lanceolate, the flower-heads larger, often 75 in. in diam. Deccan Districts, west to the E. slopes of the Gháts, less common in Circars or Carnatic, in fields.

Var. *dichotoma*, Hook. f. *Chamissoa dichotoma*, Moq.; Wt. Ic. t. 1771, erect dichotomous and nearly glabrous with elliptic or ovate apiculate leaves. Carnatic, from Salem and Nellore southwards.

Var. *angustifolia*, Hook. f. Erect, sometimes tall and slender, with linear or linear-oblong leaves often up to 3 in. long, and rather large sometimes peduncled flower-heads. N. Circars, Deccan, Carnatic and E. slopes of the W. Gháts up to 6,000 ft.

2. **ALLMANIA LONGEPEDUNCULATA**, Gamble n. comb. *A. nodiflora*, R. Br., var. *longepedunculata*, Trimen. *A. albida*, R. Br.; F. B. I. iv. 717. *Chamissoa albida*, Wt. Ic. t. 1769.

Circars, Deccan and Carnatic, but chiefly near the coast.

A tall erect herbaceous plant with pale (even when dry) leaves and white flower-heads often with rather long peduncles.

#### 4. *Digera*, Forsk.

An annual herb. Leaves alternate, entire, petioled. Flowers hermaphrodite, in axillary peduncled spikes, ternate, the 2 outer reduced to crested scales, the central perfect; bracts and bracteoles persistent. Perianth calycine, submembranous; segments 5, oblong, erect, the 2 outer larger. Stamens 5, hypogynous; filaments free, filiform; anthers 2-celled. Ovary 1-celled, compressed truncate; style filiform; stigmas 2, short, recurved.

*Fruit* a subglobose, crustaceous, rugose nut enclosed in the perianth. *Seed* globose, erect; testa thin, adhering to the albumen; embryo annular; cotyledons linear.

*DIGERA ARVENSIS*, Forsk.; F. B. I. iv. 717. *Desmochloeta muricata*, DC.; Wt. Ic. t. 732.

Deccan and Carnatic, a weed of roadsides and waste places. A slender herb with prostrate branches, the leaves variable, ovate elliptic or lanceolate, acute or obtuse, up to 3 in. long and nearly 2 in. broad, the petioles slender, often 1 in. long.

### 5. *Amarantus*, Linn.

Erect or decumbent annual herbs. *Leaves* alternate. *Flowers* small, monoecious, in axillary clusters or dense terminal thyrsoid panicles; bracts herbaceous, often persistent; bracteoles 2. *Perianth* calycine, of 2-5 membranous lobes, the ♂ usually ovate-lanceolate, awned, the ♀ oblong or obovate, usually mucronate and often smaller. *Stamens* 2-5, as many as the perianth-lobes; filaments free; anthers 2-celled. *Ovary* ovoid, compressed, 1-celled; ovule solitary, erect; styles short or 0; stigmas 2-3. *Fruit* an orbicular or ovoid compressed utricle, membranous and usually circumscissile, or coriaceous and indehiscent. *Seed* erect, orbicular, compressed; testa crustaceous; embryo annular, enclosing the floury albumen; cotyledons linear; radicle inferior.

Bracteoles awned or setaceous, equalling or exceeding the perianth-lobes; utricle dehiscent, circumscissile:—

Stamens and perianth-lobes 5 each:—

Leaf-axils with spines; leaves ovate or oblong, obtuse; bracts bristle-tipped; flower-clusters in dense or lax panicles, the axils often with spines ..... 1. *spinosus*.

Leaf-axils not spinous; leaves elliptic or ovate-lanceolate; bracts acicular; flowers in thyrses:—

Leaves acute or acuminate; bracts recurved, exceeding the oblong-lanceolate acuminate perianth-lobes.... 2. *paniculatus*.

Leaves obtuse, rarely acute; bracts hardly recurved, scarcely exceeding the ovate or obovate mucronate perianth-lobes

3. *caudatus*.

Stamens and perianth-lobes 3 each:—

Erect plants, the flowers clustered in lower axils and also gradually joined in a long terminal spiciform panicle; leaves large but variable, long-petioled; perianth-lobes awned:—

Stigmas short and straight; awns of perianth-lobes long and tapering; leaves ovate, acute, cuneate at base, up to 5 in. long, 3 in. broad, petiole to 3 in., sometimes lanceolate or linear-lanceolate ..... 4. *gangeticus*.

Stigmas long and feathery; awns of perianth-lobes short, shorter in ♂ than in ♀, but the ♂ flowers generally larger; leaves elliptic-lanceolate, acuminate, cuneate and decurrent at base, up to 6 in. long, 2 in. broad, petiole to 2 in. ... 5. *Caturus*.

Diffuse, no terminal spike; stigmas short; awns of perianth-lobes short and abrupt; leaves ovate-elliptic or deltoid-ovate, emarginate, up to 1.5 in. long, 1 in. broad, the petiole to 1 in.

6. *mangostanus*.

Bracteoles acute or slightly awned, shorter than the perianth-lobes; utricle rugose; stamens and perianth-lobes 3 each:—

Utricle prominently rugose, indehiscent, acute; flowers in axillary and terminal paniced slender spikes; leaves ovate or deltoid, obtuse and often emarginate at apex, truncate or cuneate at base, up to 3 in. long, 2 in. broad, petiole to 2 in. .... 7. *viridis*.

Utricle ovoid, slightly rugose or waved, usually circumscissile; flowers in axillary clusters; leaves obovate, obtuse, rarely retuse, usually mucronate, cuneate at base, dotted, up to 1 in. long, .5 in. broad, petiole to .5 in. .... 8. *polygamus*.

1. *AMARANTUS SPINOSUS*, Linn.; F. B. I. iv. 718; Wt. Ic. t. 513.

All plains Districts, in waste places, fields and gardens and on roadsides; a common and troublesome weed.

An erect spinous herb with hard often reddish stems.

The leaves are sometimes eaten as spinach. Vern. *Hind.*

Kanta nutiya; *Tam.* Mulluk kirai.

2. *AMARANTUS PANICULATUS*, Linn.; F. B. I. iv. 718. *A. frumentaceus*, Buch.-Ham.; Wt. Ic. t. 720.

Deccan and other hilly regions, cultivated and run wild.

A tall annual herb grown for its seeds, which may be white red or black: the leaves give a good spinach though difficult to pick. Vern. *Tam.* Púngi kirai.

3. *AMARANTUS CAUDATUS*, Linn.; F. B. I. iv. 719.

Hills of Deccan and W. Gháts, cultivated only, chiefly in gardens, perhaps also sometimes found run wild. Loves-bleeding.

A tall herb with long heavy drooping thyrses of crimson flowers.



4. *AMARANTUS GANGETICUS*, Linn.; F. B. I. iv. 719. *A. oleraceus*, Roxb.; Wt. Ic. t. 715.

Most plains Districts, cultivated and run wild.

An erect leafy herb, grown as a spinach (ság). Vern. *Hind.*

Lal ság.

- Var. *tristis*, Prain. *A. tristis*, Roxb.; Wt. Ic. t. 713.

Many branches from near the base and more frequently cut and used. Cultivated.

5. *AMARANTUS CATURUS*, Heyne; F. B. I. iv. 720.

Deccan, without locality (Heyne).

An erect well-marked plant with thin leaves and long very slender flower-spikes. The utricle may perhaps not be dehiscent circumscissily; it has an elongated neck and slender plumose styles.

6. *AMARANTUS MANGOSTANUS*, Linn.; F. B. I. iv. 720.

Deccan and Carnatic, in most Districts, a weed of roadsides and waste lands, not common.

A diffusely-branched slender herb.

7. *AMARANTUS VIRIDIS*, Linn.; F. B. I. iv. 720. *A. fasciatus*, Roxb.; Wt. Ic. t. 717. *Euxolus caudatus*, Moq.; Wt. Ic. t. 1773.

All plains Districts, a weed of waste places and cultivated land.

An erect glabrous annual, the leaves much used as spinach.

8. *AMARANTUS POLYGAMUS*, Linn.; F. B. I. iv. 721. *A. polygonoides*, Roxb.; Wt. Ic. tt. 512, 719.

All plains Districts, a common weed of waste or cultivated land.

A small annual usually prostrate herb, the leaves often collected and used as spinach.

## 6. Cyathula, Lour.

Herbs or undershrubs. *Leaves* opposite, petioled, entire. *Flowers* small, hermaphrodite, in large or small, bracteate and bracteolate, fascicles with 1-2 perfect flowers and others imperfect, the fascicles in heads, racemes or spikes. *Perianth* of perfect flowers calycine, scarious, 5-lobed, the lobes acuminate or with hooked awns; of imperfect flowers reduced to hooked rigid awns. *Stamens* 5, the filaments connate below in a

hypogynous membranous cup, with intervening lacerate or 2-3-fid staminodes; anthers 2-celled. Ovary obovoid, 1-celled; ovule solitary, pendulous from a long basal funicle; style simple, filiform; stigma capitellate. Fruit an ovoid membranous utricle enclosed in the perianth, its apex areolate. Seed oblong, inverse; testa coriaceous; embryo annular; cotyledons linear, flat; radicle erect.

CYATHULA PROSTRATA, Blume; F. B. I. iv. 722. *Desmochloa prostrata*, DC.; Wt. Ic. t. 733.

Deccan, in Mysore and the Ceded Districts to Coimbatore, up to 3,000 ft.; W. Coast and W. Gháts, S. Canara to Travancore, up to 3,000 ft.

A slender herb, prostrate below and rooting at the nodes, the branches ascending, ending in slender racemes of fascicles of pale violet flowers, the leaves rhomboid or ovate, subacute, up to 2.5 in. long, 1.5 in. broad.

#### 7. *Pupalia*, Juss.

Herbs or undershrubs. Leaves opposite, entire, petioled. Flowers green, hermaphrodite, fascicled in clusters with 1-2 perfect flowers, the rest imperfect, the clusters rather distant in simple or paniced spikes; bracts and bracteoles scarious, awned. Perianth of perfect flowers calycine, of 5 nearly equal lanceolate acuminate 3-5-nerved lobes, of imperfect flowers reduced to stellately spreading hooked bristles. Stamens 5; filaments slender, subulate, shortly combined at the base; anthers 2-celled; staminodes 0. Ovary ovoid, 1-celled; ovule 1, pendulous from a long basal funicle; style simple; stigma capitate. Fruit an ovoid membranous utricle, enclosed in the perianth, the top areolate. Seed inverse, lenticular, rostellate; testa thinly crustaceous; tegmen membranous; embryo annular; cotyledons linear, flat; radicle ascending.

Leaves ovate or elliptic, up to 4 in. long:—

Herbaceous, glabrous or nearly so, annual or biennial; leaves ovate or elliptic-lanceolate, acuminate, up to 4 in. long, 2 in. broad, petioles to .75 in.; hooked bristles purple ..... 1. *atropurpurea*.  
Shrubby, tomentose, perennial; leaves elliptic or ovate, acute or obtuse, often shortly apiculate, base usually rounded, up to 4.5 in. long, 2 in. broad, petioles to .5 in.; hooked bristles yellow

2. *lappacea*

Leaves orbicular or broadly obovate, retuse, thick, .75-1.25 in. in diam., decurrent at base to a short petiole; hooked bristles brown.

3. *orbiculata*.

1. *PUPALIA ATROPURPUREA*, Moq.; F. B. I. iv. 723. *Desmochaeta atropurpurea*, DC.; Wt. Ic. t. 731.

N. Circars, common; Deccan, in Coimbatore and to the E. slopes of the Gháts, less so.

A slender herb with long branches, the flower-clusters with loose brownish wool.

2. *PUPALIA LAPPACEA*, Moq.; F. B. I. iv. 724.

N. Circars, Deccan and Carnatic, westwards to the E. slopes of the Gháts.

A large straggling undershrub, the flower-clusters very white woolly.

Var. *velutina*, Hook. f. Densely nearly white-tomentose or velvety, the leaves smaller and usually orbicular—without locality (Wight).

3. *PUPALIA ORBICULATA*, Wt. Ic. t. 1783; F. B. I. iv. 724.

Coromandel Coast, especially near Madras, a sand-binding plant (see H. Cleghorn in 'Madr. Journ.' i.) of the sea beach.

An extensively spreading prostrate plant from a stout woody rootstock, the hooked bristles finally becoming as it were pinnate, the wool loose and white.

#### 8. *Psilotrichum*, Blume.

Herbs or undershrubs. *Leaves* opposite, entire, petioled. *Flowers* white or greenish, hermaphrodite, in axillary, solitary or panicled, spikes or clusters; bracts small, persistent; bracteoles 2, small. *Perianth* calycine, of 5 slightly connate segments, the outer gibbous below, the inner rather smaller. *Stamens* 5; filaments subulate, shortly connate at the base; anthers 2-celled; staminodes 0. *Ovary* oblong or subglobose; ovule 1, pendulous from a long basal funicle; style simple, slender; stigma capitellate or bifid. *Fruit* a globose or compressed utricle, enclosed in the hardened perianth. *Seed* inverse, lenticular; testa coriaceous or crustaceous; embryo annular, enclosing the floury albumen; cotyledons flat; radicle ascending.

Spikes few, in upper axils, .5-1 in. long; perianth .25 in. long, deeply grooved, pubescent; bracts lanceolate, bracteoles ovate, both awned;



leaves ovate-lanceolate, or lanceolate-acuminate, narrowed at base, glabrous, up to 3 in. long, 1 in. broad ..... 1. *nudum*.  
 Spikes many, in most axils under .5 in. long; perianth .15 in. long, ribbed, with silky wool; bracts ovate acuminate, bracteoles broadly ovate, both awned and villous; leaves ovate or elliptic, acute, rounded at base, glabrous or pubescent to even tomentose, up to 1.5 in. long, nearly 1 in. broad ..... 2. *calceolatum*.  
 Spikes 1-3 together, terminal, .5-.75 in. long; perianth .15 in. long, smoothly pubescent, not ribbed, segments mucronate; bracts ovate, mucronate, villous, bracteoles ovate, awned, glabrous; leaves ovate-lanceolate, acute, narrowed at base, scaberulous-villous, 1-1.5 in. long, .5-.75 in. broad ..... 3. *scleranthum*.

1. *PSILOTRICHUM NUDUM*, Moq.; F. B. I. iv. 724.

Carnatic, chiefly South, about Courtallum (Wight).

A many-branched undershrub.

2. *PSILOTRICHUM CALCEOLATUM*, Moq.; F. B. I. iv. 725.

*P. nudum*, Wt. Ic. t. 1775.

Deccan and Carnatic, especially on W. side from Coimbatore to Tinnevely, in hill forests at low levels.

An erect or somewhat climbing undershrub, with many branches.

3. *PSILOTRICHUM SCLERANTHUM*, Thw.; F. B. I. iv. 725.

Travancore (Wight in 'Hb. Edinb.').

A small undershrub with whitish flowers, a Ceylon plant.

9. *Psilostachys*, Hochst.

Slender dichotomous herbs. *Leaves* opposite, petioled. *Flowers* minute, hermaphrodite, in slender spikes, trichotomous at the ends of the filiform branches of a lax panicle. *Perianth* calycine, 5-partite, the 2 or 3 outer lobes strongly 3-nerved, broader than the inner. *Stamens* 5, free; anthers 2-celled; staminodes 0. *Ovary* subglobose or ovoid, 1-celled; ovule solitary; styles slender; stigma capitellate. *Fruit* an indehiscent membranous utricle. *Seed* inverse; testa coriaceous; embryo hooked; cotyledons linear, broader than the ascending radicle.

*PSILOSTACHYS SERICEA*, Hook. f.; F. B. I. iv. 726. *Achyranthes sericea*, Koenig; Wt. Ic. t. 726.

Locality unknown (Koenig); Coromandel Coast, at Coconada (Gamble), at Kistnapatam, Nellore (Fischer), on the sea coast. |

A very pretty slender erect silky herb with broadly ovate leaves up to 1 in. long, .75 in. broad. Bombay (Kathiawar) specimens seem to be more silvery silky than the E. coast ones.

**10. Nothosaerva, Wight.**

An annual herb with opposite spreading branches. *Leaves* opposite. *Flowers* very minute, woolly, hermaphrodite, in axillary, solitary or clustered spikes; bracts hyaline, persistent, bracteoles 2 hyaline. *Perianth* calycine, of 3-5 lobes, the lobes hyaline, obtuse, 1-nerved. *Stamens* usually 2, free? anthers 2-celled; staminodes 0. *Ovary* oblong, compressed; ovule solitary, pendulous from a long funicle; style short; stigma capitellate. *Fruit* a membranous oblong compressed utricle, enclosed in the perianth. *Seed* inverse, lenticular; testa crustaceous; embryo hooked, surrounding floury albumen; cotyledons linear; radicle superior.

NOTHOSAERVA BRACHIATA, Wt. Ic. t. 1776 bis (next No. 1921); F. B. I. iv. 726. *Pseudanthus brachiatus*, Wt. Ic. t. 1776 (*excl. analysis*).

Deccan and Carnatic, in most Districts.

An erect slender herb with very minute white flowers in fascicles of short close spikes, and membranous, ovate elliptic or lanceolate, leaves, usually acute, narrowed at base, up to 1.5 in. long.

**11. Achyranthes, Linn.**

Herbs, sometimes woody below. *Leaves* opposite, entire, petioled. *Flowers* hermaphrodite, in slender simple and paniced spikes, soon deflexed; bracts membranous, spinescent, persistent; bracteoles 2, spinescent. *Perianth* calycine, of 4-5 rigid, lanceolate, aristate segments somewhat connate below, ultimately ribbed and hardened. *Stamens* 2-5; filaments filiform, connate at the membranous base and alternating with as many quadrate staminodes which are toothed lacerate or with a toothed scale at the back; anthers 2-celled. *Ovary* oblong, subcompressed, 1-celled; ovule solitary, pendulous from a long basal funicle; style filiform; stigma capitellate. *Fruit* an oblong or ovoid utricle, rounded or areolate at apex, when ripe usually disarticulating above the bract. *Seed* inverse, oblong; testa coriaceous tegmen membranous; embryo annular, surrounding the floury albumen; cotyledons oblong, again incurved; radicle erect.

Aquatic plant; perianth in fruit much hardened, 3 in. long, the outer segment longer than the rest; bracteoles orbicular; staminodes with a fimbriate dorsal appendage; leaves elliptic-lanceolate, acuminate, pubescent, up to 6 in. long, 1 in. broad . . . . . 1. *aquatica*.

Dry ground plants; perianth in fruit somewhat hardened, under .25 in. long, the segments subequal; bracteoles spinous with hyaline wings:—

Wings of the bracteoles broad, nearly half as long as the spine; staminodes truncate, fimbriate, with or without dorsal appendages; leaves very variable . . . . . 2. *aspera*.

Wings of the bracteoles merely auricles at the base; staminodes truncate, toothed but not fimbriate; leaves variable, elliptic lanceolate or linear, membranous, glabrous or pubescent . . . . 3. *bidentata*.

1. *ACHYRANTHES AQUATICA*, R. Br.; F. B. I. iv. 730. *Centrostachys aquatica*, Wall.; Wt. Ic. t. 1780.

N. Circars, on the margins of rivers and ponds in Ganjam.

A tall rather fleshy water plant, rooting in mud, the stems thick and angular, the spikes sometimes reaching 18 in. long.

2. *ACHYRANTHES ASPERA*, Linn.; F. B. I. IV. 730; Wt. Ic. t. 1777.

All plains Districts, on roadsides and in waste places.

An erect herb reaching 3 ft. in height, with velvety tomentose, orbicular obovate or elliptic, usually obtuse, thick leaves, reaching 4 in. long, 3 in. broad, the slender spikes often reaching 18 in. in fruit, the disarticulating fruit easily adhering to animals or clothing, as in the other species, and so being carried away to be sown elsewhere.

Var. *rubro-fusca*, Hook. f. *A. rubro-fusca*, Wt. Ic. t. 1778. Leaves elliptic-ovate, acute, brown when dry, reddish, with the stems, when fresh. Nilgiri Hills.

Var. *porphyristachya*, Hook. f. Leaves elliptic, acuminate, glabrous or pubescent, membranous, the spikes slender and elongate, the perianth quite .25 in. long, the staminodes with appendages tufted at the back. Nilgiri and Pulney Hills.

3. *ACHYRANTHES BIDENTATA*, Blume; F. B. I. iv. 730; Wt. Ic. t. 1779.

W. Gháts, Nilgiris, Anamalais, Pulneys and hills of Malabar, also Bababudan Hills of Mysore, above 4,000 ft.

An erect herb, the leaves very variable, passing from ovate-

lanceolate acuminate, pubescent, about 2 in. long, to lanceolate and finally linear, in some cases up to 8 in. long, 1.5 in. broad and nearly or quite glabrous.

## 12. Aerva, Forsk.

Herbs or undershrubs, erect prostrate or climbing. *Leaves* alternate, or opposite or fascicled. *Flowers* hermaphrodite or polygamous; small or minute, in simple or paniced spikes; bracts and 2 bracteoles small. *Perianth* calycine, membranous, 5- rarely 4-lobed, the lobes equal or the outer wider, all or the inner only woolly. *Stamens* 5, rarely 4; filaments subulate, connate with interposed linear staminodes in a hypogynous cup; anthers 2-celled. *Ovary* ovoid or subglobose, 1-celled; ovule pendulous from a long basal funicle; style simple; stigma capitellate or 2-fid. *Fruit* a membranous utricle or a circumscissile capsule with coriaceous apex. *Seed* inverse; testa coriaceous; embryo annular, surrounding the floury albumen; cotyledons linear; radicle superior.

Perianth-lobes 5 :—

Spikes axillary or in terminal panicles; leaves opposite or alternate.

Erect; leaves alternate, linear oblong or spatulate, obtuse or acute, densely tomentose, up to 2.5 in. long, about .5 in. broad; flowers dioecious, in densely white-woolly spikes 1-6 in. long forming leafless terminal panicles; stigmas 2, as long as the style

1. *tomentosa*.

Climbing; leaves alternate and opposite, elliptic-ovate or lanceolate, acute, mucronate, pubescent, up to 4 in. long, 2 in. broad; flowers hermaphrodite, in ovoid or cylindric white-woolly spikes .25-1 in. long, and often in pairs, forming a lax panicle; stigmas very short, capitate.....2. *scandens*.

Spikes all axillary; leaves alternate :—

Erect or prostrate; leaves elliptic obovate or orbicular, obtuse or acute, pubescent above and white-woolly beneath, up to 1 in. long; flowers hermaphrodite or bisexual, minute, in small dense greenish-white heads or spikes, under .5 in. long, often clustered; stigmas 2 .....3. *lanata*.

Bushy, prostrate below, then ascending; leaves orbicular or obovate, obtuse, thick, pubescent above, densely white- or slightly tawny-tomentose beneath, up to 2 in. long, 1.5 in. broad; flowers hermaphrodite, small, in small dense yellowish-white spikes .25 in. long, clustered; stigmas 2, short.....4. *Wightii*.

Perianth-lobes 4; spikes cylindrical, peduncled, .5-1 in. long, at the ends of short lateral branches, the flowers bisexual; leaves narrowly linear, opposite or fascicled at the nodes of the branchlets, .25-.75 in. long; utricle circumscissile ..... 5. *Monsoniae*.

1. *AERVA TOMENTOSA*, Forsk. *Ae. javanica*, Wt. Ic. t. 876; F. B. I. iv. 727.

Deccan and Carnatic, common.

A very white tomentose conspicuous undershrub. The male flowers seem to be very rare indeed. Perianth-lobes obtuse.

2. *AERVA SCANDENS*, Wall.; F. B. I. iv. 727; Wt. Ic. t. 724 (*exc. utricle and seed*).

N. Circars, Ganjam to Godavari, up to 5,000 ft.; Bababudan Hills of Mysore, at 4,000 ft., on waste land and climbing among bushes.

A straggling undershrub with long branches and silvery-white flower-spikes. Perianth-lobes acuminate.

3. *AERVA LANATA*, Juss.; F. B. I. iv. 728; Wt. Ic. t. 723 (*not good*). *A. floribunda*, Wt. Ic. t. 1776 (analysis only), t. 1776 bis A (next t. 1921.)

All plains Districts, and up to about 3,000 ft. in the Hills.

A many-branched undershrub with small flower-spikes and leaves.

4. *AERYA WIGHTII*, Hook. f.; F. B. I. iv. 728.

W. Gháts, hills about Courtallum and Naterikal, in Tinnevely (Wight, Hb. Madr.)

A many-branched bushy undershrub from a stout root-stock, the leaves thick, the perianth-lobes acuminate and aristate.

5. *AERVA MONSONIAE*, Mart.; F. B. I. iv. 728; Wt. Ic. t. 725.

Deccan and Carnatic, in dry sandy places, both near the Coast and inland, common.

A rather conspicuous and striking plant with a long tap-root, many prostrate or ascending branches and pale pink spikes of crowded flowers reaching up to 1 to 1.5 in. in length.

### 13. *Alternanthera*, Forsk.

Herbs, usually prostrate. Leaves opposite. Flowers hermaphrodite, small, white, in axillary often clustered heads, bract

and 2 bracteoles scarious. *Perianth* calycine, segments 5, unequal, the 2 lateral innermost, concave. *Stamens* 2-5; filaments short, connate in a short cup, with or without intervening staminodes; anthers 1-celled. *Ovary* orbicular or ovoid; ovule solitary, pendulous from a long basal funicle; style short; stigma capitellate. *Fruit* a compressed, ovoid orbicular or obcordate, utricle, the margins thickened or winged. *Seed* inverse, lenticular; testa crustaceous; embryo annular, surrounding the floury albumen; cotyledons narrow; radicle superior.

ALTERNANTHERA TRIANDRA, Lamk. *A. sessilis*, R. Br.; F. B. I. iv. 731; Wt. Ic. t. 727.

All Districts, in wet places, both in the plains and in the hills to over 7,000 ft. It may be found in salt or brackish water as in fresh (Alcock in Ganjam, also Hooper).

A prostrate herb with lanceolate oblanceolate or linear-oblong leaves 5-2 in. long, small white flowers in axillary clusters, 3 stamens and a broadly obcordate utricle.

*Gomphrena globosa*, Linn.; F. B. I. iv. 732; Wt. Ic. t. 1784, is the Globe Amaranth, a tall branched annual with large globose yellowish white or crimson heads of flowers, largely grown in gardens and often found as an escape. It probably came from America. Another species, provisionally identified as *G. decumbens*, Jacq. of Central America, is found on roadsides about Madras and is reported to be spreading rapidly. *Telanthera ficoidea*, Moq., is a small S. American prostrate plant resembling *Alternanthera* and used in garden-borders as its leaves turn a crimson colour. It is commonly called *Alternanthera amabilis*.

#### Family CXIX. CHENOPODIACEAE.

Herbs or shrubs, sometimes mealy, sometimes fleshy. *Leaves* usually alternate, simple, exstipulate. *Flowers* small, usually green, hermaphrodite or unisexual, usually regular, often dimorphic; bracts 1 or 0; bracteoles 0 or 2. *Perianth* simple, calycine, of 3-5 simple or connate segments, imbricate in bud. *Stamens*, usually 5, opposite the perianth-segments, perigynous or hypogynous, free or connate at the base; anthers 2-celled. *Ovary* ovoid globose or depressed, 1-celled; ovule solitary, basal or lateral, campylotropous; style terminal; stigma capitate



2-3-lobed or stigmas 2-5 free or slightly united. *Fruit* a small utricle, rarely a circumscissile capsule, enclosed in the enlarged sometimes fleshy perianth. *Seed* horizontal or vertical with crustaceous coriaceous or membranous testa; albumen floury, fleshy or 0; embryo curved, annular or spiral.

Stems not twining; bracteoles free from the perianth; anthers erect or incurved in bud :—

Embryo annular or horse-shoe-shaped :—

Stems leafy, not jointed :—

Fruiting perianth not winged; albumen copious :—

Flowers all similar, usually hermaphrodite...1. **Chenopodium.**

Flowers dimorphic, the ♂ ebracteolate with 3-5 perianth-segments, the ♀ 2-bracteolate without perianth

2. **Atriplex.**

Fruiting perianth with transverse wings; albumen scanty

3. **Kochia.**

Stems jointed, fleshy; leaves 0 :—

Flowers in the scales of cone-like spikes; albumen fleshy

4. **Arthrocnemum.**

Flowers in cavities of successive joints; albumen 0

5. **Salicornia.**

Embryo spiral, albumen 0 :—

Perianth-segments not winged .....6. **Suaeda.**

Perianth-segments transversely winged .....7. **Haloxylon.**

Stems twining; bracteoles 2, adnate to the face of the perianth; anthers versatile; embryo spiral.....8. **Basella.**

### 1. **Chenopodium**, Linn.

Erect or prostrate herbs. *Leaves* alternate, entire, lobed or toothed. *Flowers* minute, hermaphrodite, in axillary clusters or cymes; bracts and bracteoles none. *Perianth* usually 5-lobed, the lobes concave, incurved. *Stamens* 5 or fewer, hypogynous or almost perigynous; anthers 2-celled. *Disk* 0 or annular. *Ovary* depressed-globose, rarely ovoid; ovule solitary, sessile; stigmas 2-5, sometimes united below in a style. *Fruit* a membranous utricle, enclosed in the perianth. *Seed* usually horizontal; testa crustaceous or coriaceous; embryo nearly or quite annular, surrounding the floury albumen.

An erect scentless herb, green or grey with white granular mealiness; the stems usually striped green or purple; flowers in clusters in

panicled spikes; stigmas 2; seeds smooth, shining, somewhat keeled; leaves rhomboid deltoid or lanceolate, entire or lobed.....1. *album*.

A low rather foetid herb, green or with slight granular mealiness; the stems green; flowers in axillary spikes in spreading cymes; stigmas 2; seeds smooth, dull, sharply keeled; leaves rhomboid or deltoid ovate, sharply toothed .....2. *murale*.

A tall strongly aromatic glandular herb; pale green; the stems striate, glandular-pubescent; flowers in slender, axillary or terminal, simple or panicled spikes; stigmas 5; seeds smooth, the margins rounded; leaves oblong-lanceolate, sinuate-dentate, the upper entire

3. *ambrosioides*.

1. CHENOPODIUM ALBUM, Linn.; F. B. I. v. 3.

Most plains Districts, also in the Hills, a weed of roadsides, waste lands and cultivated ground. White Goose-foot.

A tall herb sometimes reaching 10 ft., clammy to the touch.

2. CHENOPODIUM MURALE, Linn.; F. B. I. v. 4.

Deccan, in Mysore and Coimbatore, probably an introduced weed, but not common.

A low herb, up to about 15 in. high.

3. CHENOPODIUM AMBROSIODES, Linn.; F. B. I. v. 4; Wt. Ic. t. 1786.

Deccan and W. Gháts, up to 7,000 ft., in waste places and on cultivated land, probably not indigenous.

A tall aromatic often gregarious herb with very slender flowering spikes.

2. Atriplex, Linn.

Herbs or shrubs, usually mealy. *Leaves* alternate, rarely opposite. *Flowers* small, monoecious or dioecious, in axillary sessile clusters or in simple or panicled spikes; bracts 0, bractcoles in ♂ flowers 0, in ♀ 2, flat, accrescent, dilated in fruit and forming a 2-valved covering to it. *Perianth* in ♂ flower 3-5-partite, calycine, the lobes oblong or obovate, obtuse; in ♀ flowers 0. *Stamens* 3-5, inserted at the base of the perianth; filaments free or connate below; anthers didymous. *Ovary* ovoid or depressed-globose; ovule oblique or vertical; stigmas 2, subulate or filiform, connate below. *Fruit* a membranous utricle, rarely adnate to the seed, enclosed in the enlarged bracteoles.



*Seed* erect or inverted, suspended from a long funicle or rarely horizontal; embryo annular, surrounding the floury albumen.

*ATRIPLEX REPENS*, Roth; F. B. I. v. 7. *Obione Koenigii*, Moq. Wt. Ic. t. 1790.

E. Coast, from Nellore southwards, on sandy sea-shores.

An undershrub with thick rootstock and long procumbent branches rooting at the nodes, the leaves small, ovate or ovate-oblong, rounded at apex, entire, completely covered with minute white shining scales, up to .75 in. long; bracteoles in fruit thick and usually with warty protuberances on the back.

*A. hortensis*, Linn.; F. B. I. v. 6. *A. heterantha*, Wt. Ic. t. 1787, is a stout annual often tinged with red, the leaves ovate-lanceolate, the fruiting bracteoles orbicular and reticulate. It is sometimes cultivated as a spinach.

### 3. *Kochia*, Roth.

Herbs or undershrubs, usually villous or pubescent. *Leaves* alternate, sessile, narrow, entire. *Flowers* minute, axillary, solitary or in clusters, hermaphrodite and ♀, rarely only ♂; bracts 0. *Perianth* subglobose; lobes 5, incurved, closing over the utricle, girt by 5 free or confluent wings. *Stamens* 5, usually exserted; anthers ovate. *Ovary* depressed-globose; style slender; stigmas 2 or 3, capillary. *Fruit* a membranous depressed utricle. *Seed* ovoid or orbicular, horizontal; testa membranous; embryo annular, the albumen scanty.

*KOCHIA INDICA*, Wt. Ic. t. 1791; F. B. I. v. 11.

Deccan, in Coimbatore, on salt soils (Wight).

A tall erect branching annual, the small leaves linear-lanceolate, the flowers in much soft brown wool especially round the perianth with its ovate scarious wings.

### 4. *Arthrocnemum*, Moq.

Fleshy jointed branching shrubs or herbs. *Leaves* 0. *Flowers* very small, hermaphrodite or monoecious (?) in cylindric cone-like spikes, in clusters of 3 sunk in the hollows of the joints. *Perianth* calycine, usually 3-4-gonous, minutely toothed at apex, at length spongy. *Stamens* 1-3 (rarely seen, cf. Roxb.). *Ovary* ovoid; ovule 1 suspended on a basal funicle; style short; stigmas 2, subulate. *Fruit* an ovoid utricle, membranous or

crustaceous; enclosed in the spongy perianth. Seed vertical, ovoid; testa membranous; embryo comma-shaped, partly enclosing the albumen, cotyledons very small, radicle inferior.

Stems prostrate, the branches erect, stout; fruiting spikes  $\frac{3}{4}$ – $\frac{5}{8}$  in. in diam., .5–1.5 in. long; utricle crustaceous ..... 1. *Indicum*.

Stems erect, the branches ascending, slender; fruiting spikes .1–.15 in. in diam., .5–1 in. long; utricle membranous .... 2. *fruticosum*.

1. *ARTHROCNEMUM INDICUM*, Moq.; F. B. I. v. 12. *Salicornia indica*, Willd.; Wt. Ic. t. 737.

E. and W. Coasts, in salt marshes.

A prostrate glaucous-green fleshy undershrub with numerous branches.

2. *ARTHROCNEMUM FRUTICOSUM*, Moq.

Var. *glaucum*, Moq. *A. ? glaucum*, Ung. Sternb.; F. B. I. v. 12.

E. Coast, from Madras (at Sadras, Lawson) to Tuticorin (Wight), in salt marshes.

A tall erect many-branched shrub.

#### 5. *Salicornia*, Linn.

Fleshy, jointed, branched shrubs or herbs. Leaves 0. Flowers minute, hermaphrodite, ternate, in the axils of scaly bracts sunk in superposed and decussately opposite cavities of the internodes, forming cylindric spikes; bracteoles 2. Perianth calycine, obpyramidal. Stamen 1, anther oblong. Ovary ovoid, narrowed to the tip; ovule sessile; stigmas 2, subulate. Fruit an ovoid membranous utricle, enclosed in the spongy perianth. Seed erect, compressed; testa hispid; albumen 0; embryo conduplicate; radicle inferior, parallel to the cotyledons.

*SALICORNIA BRACHIATA*, Roxb.; F. B. I. v. 12; Wt. Ic. t. 738.

E. Coast, Chilka Lake in Ganjam. Coasts of Nellore, Chingleput, Tanjore and Tinnevely, in salt marshes.

An erect undershrub, the joints of the branches longer than in those of *Arthrocnemum* and resembling those of some species of *Viscum*. The flower-spikes are very slender.

#### 6. *Suaeda*, Forsk.

Herbs or shrubs. Leaves fleshy, terete, rarely flattish. Flowers minute, axillary, usually hermaphrodite, rarely bisexual, bracteate and 2-bracteolate. Perianth short, calycine, globose or urceolate, 5-lobed or 5-partite, the lobes equal or unequal,

incurved. *Stamens* 5; filaments short; anthers rather large. *Disc* large or 0. *Ovary* ovoid or orbicular, sessile, adnate below to the perianth, rounded or truncate at the apex; ovule solitary, subsessile; style 0; stigmas subulate, papillose. *Fruit* a small membranous or spongy utricle included in the perianth. *Seed* erect, horizontal or oblique; testa coriaceous or crustaceous; albumen 0 or scanty; embryo slender, plano-spiral.

Perennial; seed usually erect:—

Flowers hermaphrodite, in dense globose clusters forming long spikes, leafless above; stigmas 3; bracteoles with pectinate margins; leaves semiterete, oblong or ellipsoid or linear-obovate, up to .5 in. long, .2 in broad.....1. *nudiflora*.

Flowers polygamous, in axillary clusters; stigmas 2-5; bracteoles with entire margins; leaves linear, obtuse or subacute, up to 1 in. long, .15 in broad.....2. *monoica*.

Annual; seed usually horizontal; flowers hermaphrodite, in small few-flowered clusters in lax elongate spikes; stigmas 3; bracteoles membranous, entire; leaves narrowly linear, semi-terete, up to 1 in. long, scarcely .1 in. broad.....3. *maritima*.

1. *SUAEDA NUDIFLORA*, Moq.; F. B. I. v. 14. *S. indica*, Moq.; Wt. Ic. t. 1796.

E. Coast, from the Chilka Lake southwards, on the sea coast, common.

A woody undershrub with many branches densely covered with flowers.

2. *SUAEDA MONOICA*, Forsk.; F. B. I. v. 13; Wt. Ic. t. 1792.

E. Coast, from the Kistna river southwards, on the sea coast.

A small erect bush, with many branches.

3. *SUAEDA MARITIMA*, Dumort.; F. B. I. v. 14; *Chenopodina indica*, Wt. Ic. t. 1793.

E. Coast from Madras southwards, on the sea coast, often near salt pans.

An erect slender annual.

#### 7. *Haloxylon*, Bunge.

Shrubs or small trees with opposite jointed branches. *Leaves* opposite, triangular and short or elongate and terete. *Flowers* hermaphrodite; solitary or opposite or 1-3 together in spikes in the axils of ovate bracts; bracteoles 2. *Perianth* calycine,

5-lobed, the lobes concave, accrescent, horizontally winged on the back. *Stamens* 5 or fewer, on the margin or base of a cupular disk with alternating lobes (? staminodes); filaments linear; anthers ellipsoid or hastate. *Fruit* a subglobose or depressed utricle, enclosed in the perianth; stigma 2-lobed or stigmas 3-4, recurved. *Seed* horizontal; testa membranous; albumen 0; embryo green, plano-spiral.

*HALOXYLON RECURVUM*, Bunge; F. B. I. v. 15. *Caroxylon indicum*, Wt. Ic. t. 1794.

Deccan, in Coimbatore (Wight).

A tall bushy plant reaching 3-4 ft. high, turning black when dry, the leaves small, fleshy, ovate, glabrous, the flowers rather large and with conspicuous wings to the perianth-lobes.

### 8. *Basella*, Linn.

Much branched twining fleshy herbs. *Leaves* alternate, entire. *Flowers* hermaphrodite, sessile, spicate; bracts minute, caducous, bracteoles 2, united in a 2-lipped cup, adnate to the perianth. *Perianth* calycine, fleshy, 5-lobed; lobes short, incurved, later accrescent and berry-like. *Stamens* 5, on the mouth of the perianth-tube; filaments short, erect in bud; anthers versatile. *Ovary* globose; ovule subsessile; styles 3; stigmas linear-clavate, papillose within. *Fruit* a globose utricle, enclosed in the fleshy perianth; pericarp thin, adnate to the seed. *Seed* erect, subglobose; testa crustaceous; albumen scanty; embryo plano-spiral, the cotyledons large, thin, convolute.

*BASELLA RUBRA*, Linn.; F. B. I. v. 20. *B. alba*, Linn.; Wt. Ic. t. 896.

All Districts, wild or cultivated. Indian Spinach.

A glabrous succulent climbing herb with small white or red flowers in spikes, the peduncles often becoming thickened.

Leaves broadly ovate, acute or acuminate, often cordate at base, up to 5 in. long, 3 in. broad. It is a useful vegetable and makes a good spinach. Vern. *Hind.* Poi; *Tel.* Batsalla.

*Beta vulgaris*, Linn., the Beet, and *Spinacia oleracea*, Linn., the Spinach, are vegetables commonly cultivated in gardens. The S. American *Boussingaultia baselloides*, H. B. & K., is an ornamental climber with white fragrant flowers, grown in Madras Gardens.

## Family CXX. POLYGONACEAE.

Herbs, rarely shrubs, very rarely trees, sometimes climbing. *Leaves* alternate, rarely opposite, entire or serrulate; stipules (ocreae) scarious or membranous, usually sheathing the stem. *Flowers* hermaphrodite, rarely polygamous, regular, solitary or in small bracteate clusters; pedicels usually articulate. *Perianth* simple, calycine or corolline, inferior; segments 3-6, free or connate, imbricate in bud. *Stamens* 5-8, rarely more or fewer, opposite the perianth-segments. *Disk* annular, glandular, or 0. *Ovary* free, sessile, 1-celled; ovule solitary, orthotropous, sessile or on a distinct funicle; styles 3 or 2, rarely 4; stigma capitate peltate or fimbriate. *Fruit* a small hard, usually trigonous or biconvex, nutlet, enclosed in the perianth. *Seed* erect; testa membranous; albumen floury, sometimes ruminant; embryo various; radicle superior.

Perianth 3-5-cleft; stigmas capitellate; fruit a compressed or trigonous nutlet.....1. **Polygonum.**

Perianth 6-cleft; stigmas fimbriate; fruit a triquetrous nutlet  
2. **Rumex.**

1. **Polygonum**, Linn.

Herbs or shrubs, rarely climbing. *Leaves* alternate, entire, rarely lobed; stipules membranous, connate in a tubular ocrea. *Flowers* hermaphrodite, small or minute, axillary or terminal; the clusters sessile or in spiciform capitate or paniced racemes; pedicels short, usually jointed under the perianth; bracts and bracteoles membranous, ocreate. *Perianth* green or coloured, 4-5- rarely 3-cleft, the 2 outer segments usually smallest. *Stamens* 5-8, rarely 1-4, perigynous; filaments filiform, often dilated at base or ~~ternate~~ alternate with the lobes of an annular or glandular disk. *Ovary* compressed or trigonous; styles 2 or 3, free or slightly connate; stigmas usually capitellate. *Fruit* a compressed or trigonous nutlet, more or less included in the persistent perianth; pericarp usually hard and often shining. *Seed* albuminous, embryo lateral or excentric; radicle long, cotyledons small.

Flowers in axillary clusters; ocreae tubular, hyaline, lacerate; leaves small, under 1 in. long, usually oblong obovate or linear..1. *plebejum*. Inflorescence terminal:—

Inflorescence of sessile or pedicellate flowers in branched spikes or racemes :—

Nutlets biconvex :—

Bracts hispid and ciliate ; ocreae .5–1 in. long, tubular, villous and strigose, truncate at mouth and rigidly bristle-ciliate ; racemes 1.5–3 in. long, paniculate ; leaves lanceolate, acuminate, silky pubescent, up to 8 in. long, 2 in. broad

2. *tomentosum*.

Bracts small, acute, with long cottony hairs, minutely ciliate on the margins ; ocreae up to 1 in. long, tubular, sparsely cottony, truncate at mouth ; racemes 1–2 in. long, paniculate, cottony ; leaves narrowly lanceolate, acuminate, densely white-cottony beneath, with prominent short nerves, up to 5 or more in. long. .... 3. *lanigerum*.

Bracts glabrous, ciliate or not :—

Bracts not ciliate on the margins ; ocreae .75–1.5 in. long, tubular, glabrous, truncate at mouth, closely embracing the stem till they get torn ; racemes slender, 2–4 in. long, paniculate ; leaves linear-lanceolate, long acuminate, usually glabrous and gland-dotted, up to 9 in. long, 1.25 in. broad ..... 4. *glabrum*.

Bracts stiff-ciliate on the margins ; ocreae .25–.5 in. long, tubular, sparsely long strigose-hairy and ciliate ; racemes few, .5–1 in. long, in panicles ; leaves linear- or oblong-lanceolate, glabrous except the strigose midrib beneath, up to 2 in. long, .25 in. broad ..... 5. *minus*.

Nutlets trigonous, sometimes also biconvex on the same plant :—

Racemes stout ; bracts closely imbricate, nearly glabrous but short-ciliate on the margins ; ocreae .5–1 in. long, tubular, strigose, with very long ciliae at the mouth ; leaves lanceolate or linear-lanceolate, acuminate, tapering at base, glabrous except the margins and midrib, up to 6 in. long, 1 in. broad

6. *barbatum*.

Racemes slender ; bracts more or less distant ; perianth glandular :—

Ocreae tubular, glabrous, shortly and sparsely ciliate at the mouth ; leaves lanceolate, acute, glabrous except the scabrid midrib beneath, up to 3 in. long, .75 in. broad ; nutlets both trigonous and plano-convex ..... 7. *Hydropiper*.

Ocreae tubular, strigosely hispid, long-ciliate at the mouth ; leaves lanceolate or elliptic lanceolate, acuminate, strigosely hairy beneath, up to 6 in. long, 1 in. broad .. 8. *flaccidum*.



Inflorescence capitate, the heads single or in corymbs:—

Heads pedunculate, small, sessile in the axil of an involueral leaf; bracts ovate-oblong, membranous; perianth 4-fid; nutlets biconvex or subtrigonal, minutely pitted in lines; leaves deltoid-ovate, entire, acute, truncate or subcordate at base and decurrent as wings to the amplexicaul petiole, up to 2.5 in. long, 1 in. broad; ocreae membranous, obliquely truncate, hairy at base ..... 9. *punctatum*.

Heads pedunculate, without an immediate involueral leaf:—

Stems without prickles at the nodes; heads small, about .25 in. in diam., much bracteate, perianth 5-fid:—

Heads usually in pairs on glandular hispid peduncles; bracts ovate, acute, glabrous, chaffy; nutlets flat or trigonal; leaves deltoid-ovate, acute, ciliate, truncate or subcordate at base and shortly decurrent, up to 3 in. long, 2 in. broad; ocreae tubular below, split at the mouth, truncate, strigose and strigosely ciliate ..... 10. *sphaerocephalum*.

Heads in corymbose terminal panicles, the peduncles glandular hairy; bracts ovate, acute, glabrous; nutlets trigonal; leaves elliptic or ovate, acute or shortly acuminate, the margins entire or crenulate, the petiole auricled, up to 6 in. long, 3 in. broad; ocreae long, membranous, obliquely cleft, acuminate, and often much split when old

11. *chinense*.

Stems more or less covered with retrorse prickles at the nodes, also on the midrib on the under-surface of the leaves; bracts ovate, acuminate, strigose and ciliate; heads elongate in short oblong racemes:—

Leaves oblong-lanceolate, acuminate, cordate or hastate at base, prominently prickly on the midrib beneath, up to 3 in. long, 1 in. broad; ocreae tubular, strigose and long ciliate, prickly at base ..... 12. *strigosum*.

Leaves linear or linear-lanceolate, acuminate, narrowed at base, not prominently but sparsely prickly on the midrib beneath, up to 6 in. long, 1 in. broad; ocreae tubular, oblique at mouth, glabrous, shortly ciliate, slightly prickly at base ..... 13. *peduncularé*.

1. *POLYGONUM PLEBEJUM*, R. Br.; F. B. I. v. 27. *P. indicum*, Heyne; Wt. Ic. t. 1808.

All plains Districts and up to 5,000 ft. in the hills.

A prostrate herb, usually from a woody rootstock, the

branches flat, the flowers pink, the leaves small, usually in this area, linear or obovate, up to 5 in. long (var. *indica*, Hook. f.) but often much smaller and sometimes longer and more linear.

Var. *Miqueliana*, Hook. f. Stems flexuous; leaves obovate, obtuse; flowers with long (15-2 in.) pedicels. S. Canara (Hohenacker). The var. *polyneura*, Hook. f., seems to be the same but with shorter pedicels, longer leaves and the ocreae larger and nerved. S. Canara (Hohenacker).

2. *POLYGONUM TOMENTOSUM*, Willd.; F. B. I. v. 30.

N. Circars, Deccan and Carnatic, in ditches and other wet places.

A stout thick herbaceous plant with prostrate stems rooting at the nodes, the branches erect, thick and very hairy, the flowers large and white, the nutlets large, thick, crustaceous and shining, dark brown.

3. *POLYGONUM LANIGERUM*, R. Br.; F. B. I. v. 35.

Deccan, Geddesala in Coimbatore at 4,000 ft. (Fischer).

A stout herb, procumbent and creeping below, the branches erect, the flowers small, red or white, the nuts flat and shining: at once recognized by the white cottony wool.

4. *POLYGONUM GLABRUM*, Willd.; F. B. I. v. 34; Wt. Ic. t. 1797.

N. Circars, Deccan and Carnatic, South to S. Travancore, also E. side of W. Gháts, up to 5,000 ft. in hilly country, in ditches and wet places.

An erect glabrous annual herb, reaching even 5 ft. in height, rooting from lower nodes, the flowers pink or white, the leaves very slender.

Var. *scabrinerve*, Hook. f. Leaves shorter, scabrid on the midrib beneath; racemes shorter and more closely paniced. W. Gháts, Pulney Hills at about 6,000 ft.

5. *POLYGONUM MINUS*, Huds.; F. B. I. v. 36. *P. strictum*, All.; Wt. Ic. t. 1800.

W. Gháts, Nilgiris and Pulneys, at 5,000-7,000 ft. in bogs and other wet places.

A low herb, creeping and rooting at the nodes, the racemes and leaves small, the small flowers pink.

6. *POLYGONUM BARBATUM*, Linn.; F. B. I. v. 37; Wt. Ic. t. 1798.



N. Circars, Deccan and Carnatic, in wet places.

An erect annual, conspicuous for the long fimbriate ciliae of the ocreae, the flowers white, the leaves lanceolate.

7. *POLYGONUM HYDROPIPER*, Linn.; F. B. I. v. 39.

W. Gháts, Anamalai and Pulney Hills, in wet places up to 6,000 ft.

A stout glabrous but often glandular annual with pink flowers.

8. *POLYGONUM FLACCIDUM*, Meissn.; F. B. I. v. 39. *P. Donii*, Wt. Ic. t. 1801.

N. Circars and Deccan, in wet places in hill forests, also

W. Gháts, Nilgiris and Pulneys, up to 6,000 ft.

A rather slender herb, with very long filiform flaccid racemes of usually pink flowers.

9. *POLYGONUM PUNCTATUM*, Buch.-Ham. *P. alatum*, Buch.-Ham.; F. B. I. v. 41. *P. nepalense*, Meissn.; Wt. Ic. t. 1804.

N. Circars, Mahendragiri Hill, Ganjam, 4,000 ft.; hills of the Deccan and Carnatic, usually above 4,000 ft.; W. Gháts, Nilgiris and Pulneys, above 4,000 ft., a weed in gardens and cultivated land.

A small, more or less procumbent annual, the flowers white or pink.

Var. *Metzianum*, Hook. f. Small and diffusely branched with small leaves and heads, the nutlet biconvex or trigonous. Coorg (Hohenacker), Pulney Hills, above 6,000 ft. (Saulière):

10. *POLYGONUM SPHAEROCEPHALUM*, Wall.; F. B. I. v. 43. *P. Wallichii*, Wt. Ic. t. 1805.

W. Gháts, Nilgiris, above 7,000 ft., especially on Doddabetta (Gamble, Lawson).

A somewhat creeping herb. The leaves are larger than in North Indian specimens.

11. *POLYGONUM CHINENSE*, Linn.; F. B. I. v. 44; Wt. Ic. t. 1806.

N. Circars, Mahendragiri Hill in Ganjam (Fischer); Deccan and Carnatic, in the hills, scarce; W. Gháts, in all Districts above 3,000 ft., common.

A rambling undershrub, semi-scandent over bushes, with white or pink flowers, variable in shape and size of leaf, the large elliptic ones (var. *ovalifolium*) perhaps the most common.

12. *POLYGONUM STRIGOSUM*, R. Br.; F.B.I. v. 47. *P. horridum*, Burch.-Ham.; Wt. Ic. t. 1803.

W. Gháts, Nilgiri and Pulney Hills—above 5,000 ft., in wet places.

A herbaceous plant with pink flowers, the nutlets trigonous, the stems at first decumbent and rooting, the branches erect.

13. *POLYGONUM PEDUNCULARE*, Wall.; F. B. I. v. 48; Wt. Ic. t. 1802 C.

W. Gháts, Pulney Hills.

A glabrous erect herb with lanceolate acute leaves up to 3 in. long, 1 in. broad, the heads very small, in slender dichotomous glandular cymes.

Var. *nilagiricum*, Hook. f. Leaves linear-oblong or oblong-lanceolate, up to 6 in. long, .75–1 in. broad, the stems glabrous, the heads rather large. Nilgiri Hills, at 6,000 ft. (C. B. Clarke).

Var. *robustum*, Hook. f. Leaves linear-lanceolate, acuminate at both ends, up to 6 in. long, .75 in. broad, the stems scabrid, the heads rather large (Wt. Ic. t. 1802 B).

Var. *angustissimum*, Hook. f. Leaves narrowly linear up to 5 in. long, .3 in. broad, the stems nearly smooth, the heads often subcylindric (Wt. Ic. t. 1802 A). Nilgiri Hills at 6,000 ft.

*P. molle*, D. Don, is a shrubby species of the E. Himalaya, cultivated and now run wild in the higher Nilgiri Hills.

## 2. *Rumex*, Linn.

Annual or perennial herbs, rarely shrubs. Leaves various, mostly radical or cauline, alternate; stipules hyaline, ocreate, often disappearing with age. Flowers hermaphrodite monoecious or dioecious, in axillary clusters or in whorls arranged in simple or paniced racemes; pedicels jointed; bracts ocreate; bracteoles 0. Perianth simple, calycine; segments 6, rarely 4, the inner accrescent, entire or toothed, the midrib often enlarged or tubercled. Stamens 6; filaments short; anthers oblong. Ovary trigonous; ovule solitary; styles 3; stigmas fimbriate. Fruit a small nut, enclosed in the usually enlarged inner perianth-segments, the angles acute. Seed erect; embryo lateral, nearly straight; cotyledons linear or oblong.

Flowers hermaphrodite; stout herbs; inner perianth-segments coriaceous in fruit:—

Inner perianth-segments lanceolate, acute, entire or with few teeth, a very conspicuous oblong tubercle on the back; leaves oblong-panduriform, obtuse, cordate at base, the margins waved or crisped, up to 8 in. long, 1.5 in. broad ..... 1. *nigricans*.

Inner perianth-segments orbicular-ovate, reticulate, the margins with many teeth with hooked tips, one or more with a rather small tubercle on the back; leaves oblong- or triangular-ovate, acute or obtuse, cordate at base, up to 14 in. long, 5 in. broad

2. *nepalensis*.

Flowers monoecious; fleshy herbs; inner perianth-segments membranous and reticulate in fruit; leaves elliptic or oblong, cordate or hastate at base ..... *vesicarius*.

Flowers dioecious; slender herbs; inner perianth-segments very small, oblong, closely appressed to the nut in fruit; leaves small, lanceolate or hastate ..... *Acetosella*.

1. *RUMEX NIGRICANS*, Hook. f.; F. B. I. v. 59.

N. Circars, on the Godavari (Gamble).

An erect stout annual herb reaching 1.5 ft. high, the stem grooved, the leaves with long slender petioles. The inflorescence is black when dry or nearly so.

2. *RUMEX NEPALENSIS*, Spreng.; F. B. I. v. 60; Wt. Ic. t. 1810.

W. Gháts, Nilgiri and Pulney Hills, above 6,000 ft.

A tall stout annual or perennial herb, sometimes with tuberous roots, the stems grooved, the leaves long-petioled.

*R. vesicarius*, Linn., is an annual herb, wild in the W. Himalayas elsewhere cultivated as a vegetable. It is at once recognized by the membranous pink or white reticulate inner fruiting perianth.

*R. Acetosella*, Linn., a European common herb, the Sheep Sorrel, introduced and now run wild in the Nilgiris.

*Eragrostis esculentum*, Moench., is the Buckwheat, occasionally grown as a grain crop in the hills. *Antigonon leptopus*, Hook. & Arn., is the Coral Creeper, a large handsome climbing shrub with pink flowers, native of S. America and commonly grown in Indian gardens. *Muehlenbeckia platyclados*, Meissn., is a glabrous erect shrub, native of the Solomon Islands and often grown in Indian gardens. It has smooth flattened leaf-like branches and small flowers in lateral fascicles.

Family CXXI. PODOSTEMONACEAE.

After J. C. Willis in the 'Annals of the Royal Botanic Gardens, Peradeniya, Ceylon,' vol. i, pp. 181 and 267 (1902), with plates.

Aquatic herbs, usually annual, submerged and closely attached to rocks, the flowers appearing and the seeds germinating at the close of the rainy season when exposed by the fall of the water-level. Primary axis early giving rise to a *thallus*—the part of the plant that creeps on the rocks or lies near to them. Secondary shoots appear from the thallus, and may be found as rosettes of leaves or as growing or branching leaf-bearing axes. *Leaves* very simple and delicate (easily lost), changing to bracts and finally ending in a *spathe* or cupule which encloses the young flower. *Flowers* hermaphrodite, small, regular and trimerous with a perianth or zygomorphic and bimerous without one. *Stamens* hypogynous, in regular flowers 3, alternate with the perianth-segments, in zygomorphic flowers usually 2, monadelphous and usually with 2 staminodes; anthers introrse, 2-celled. *Ovary* superior, 2-3-celled, with thick placenta and delicate septa; ovules numerous, anatropous; stigmas 2-3. *Fruit* a usually pedicellate capsule, ribbed or smooth, septifragal. *Seeds* usually numerous, minute (in *Farmeria* 2 or 4); testa mucilaginous; albumen 0; embryo straight.

Flowers regular; perianth of 3 segments; stamens 3:—

Thallus a thread-like creeping root; secondary shoots long, complexly branched, freely floating, bearing ramuli or moss-like shoots of limited growth; floral axis subtended by few leaves, sometimes slightly connate..... 1. **Tristicha**.

Thallus frondose, foliiferous, creeping, closely attached to rocks; secondary shoots of small rosettes of leaves..... upper side of thallus; floral shoots arising from axial cupules..... 2. **Lawia**.

Flowers zygomorphic, naked; stamens 1-3:—

Fruit ribbed, iso- or aniso-lobous, dehiscent, with many seeds; spathe erect, more or less cylindrical, opening at apex by several teeth:—

Thallus fucoid or dimorphic, usually freely floating; secondary shoots 1-flowered with scaly bracts; fruit isolobous ... 3. **Dicraea**.

Thallus thread- or ribbon-like, creeping; secondary shoots erect with several flowers; bracts ditheous, not scaly; fruit anisolobous ..... 4. **Podostemon**.

Fruit smooth, anisolobous, dehiscent, with many seeds; spathe erect, toothed or bifid:—

Thallus fucoid or attached and closely creeping; secondary shoots small, with distichous leaves.....5. **Griffithella**.

Thallus crustaceous, attached to rock; secondary shoots large, erect, with 4-ranked leaves; spathe bilobed at tip...6. **Willisia**.  
Fruit ribbed, iso- or aniso-lobous, dehiscent, or smooth aniso-lobous, dehiscent or indehiscent, with many or few seeds; spathes more or less prostrate, splitting along the upper side; thallus closely attached to rock:—

Thallus crustaceous or ribbon-like, exogenously lobed or branched; secondary shoots usually prostrate when floriferous, 1-flowered with small scaly bracts; seeds very many, fruit dehiscent, iso- or aniso-lobous, ribbed or smooth

7. **Hydrobryum**.

Thallus ribbon-like, endogenously branched; secondary shoots as in *Hydrobryum* but behind the branches of thallus; seeds 2-4, fruit dehiscent or not, ribbed or not.....8. **Farmeria**.

1. **Tristicha**, Dup.-Th.

Submerged herbs with the habit of *Fontinalis* and other aquatic mosses, the roots creeping, filamentous, attached by feet; secondary shoots very many, often more or less paired on opposite sides, floating freely in the water. When most developed often long, many-flowered and frequently branched, but often quite short, unbranched and 1-flowered or vegetative only, branches of 2 kinds, long ones with the structure of the main axis and short ones consisting of a delicate axis with very many small leaves often tristichous. Flowers terminal, on pedicels subtended by 2-3 large or several ordinary leaves, the upper ones often more or less united; pedicel and ovary with deciduous cortex, which shrivels after flowering, the small flowers usually emerging through the water at the beginning of the dry season.

**TRISTICHA RAMOSISSIMA**, Willis. *Terniola ramosissima*, Wedd.; F. B. I. 63. *Dalzellia ramosissima*, Wt. Ic. t. 1920, f. 1.

W. Ghâts, rivers of S. Canara, Malabar, Cochin and Travancore (Johnson, Bourdillon, etc.), also Anamalai Hills, up to 4,000 ft.

A floating plant with very long filiform much-branched stems, narrowly linear leaves in tufts round the single

pedicellate flower, which has 3 stamens and 3 long filamentous hairy stigmas. Branchlets not tristichous.

• 2. *Lawia*, Griff.

Herbs with frondose thalli, living on smooth rocks in rapids and waterfalls, submerged during the S.W. monsoon, flowering in the dry season when exposed. *Thallus* closely attached to the rock, suborbicular or stellate, attached by root-hairs, usually much branched with ribbon-like or flabelliform lobes. *Leaves* very numerous, simple, entire, usually acute, green or red, occurring either on the upper surface and edges of the thallus or in closely-packed rosettes on its older parts. *Flowers* terminal on the growing points of the margins of the thallus, rarely on the upper surface, solitary, on pedicels emerging from terminal axial leafy cupules; pedicel in flowering time 1-25 in. long, covered, as also the ovary, with a pellucid cellular cortex, which falls off after flowering, leaving an elastic pedicel up to 1.25 in. long, erect. *Stamens* 3, alternating with the perianth-segments; anthers 2-celled, opening longitudinally. *Capsule* ellipsoid or obovoid, 9-ribbed, 3-celled, septifragal, valves incurved after dehiscence.

\**LAWIA ZEYLANICA*, Tul. *Terniola zeylanica*, Tul.; F. B. I. v. 62. Var. *malabarica*, Willis.

W. Gháts, S. Canara, at Sullia and Beltangadi (Barber); Tambraparni River in Tinnevely (Barber).

A frondose plant with thallus closely adhering and branching the fruiting pedicel about 3 in. long, the fruit obovoid-elliptical.

3. *Dicraea*, Tul.

Submerged herbs with the habit of *Fucus* and other seaweeds. *Thallus* various, usually freely floating from an attached base, exogenously branched, with marginal ultimately 1-flowered secondary shoots; leaves usually subulate. *Flowers* zygomorphic, enclosed in spathes splitting irregularly at the tip and subtended by 2-8, usually 4, fleshy scaly bracts. *Stamens* 2 or 1, with staminodes on either side of the common axis. *Ovary* smooth, ripening to a 8- or rarely 8-12-ribbed isolobous fruit with very many seeds.

Thallus narrow, ribbon-like, flattened, attached at base, freely floating above, up to 1 ft. long; pedicels about .75 in. long. . . . 1. *dichotoma*.



Thallus broad, algiform, freely branched, creeping or floating from an attached base, up to 1.5 ft. long; pedicels up to 1.5 in. long

2. *stylosa*.

1. *DICRAEA DICHOTOMA*, Tul.; Wt. Ic. t. 1916, f. 2. *D. Wightii*, Tul.; Wt. Ic. t. 1916, f. 3. *D. longifolia*, Wt. Ic. t. 1916, f. 4. *D. rigida*, Wt. Ic. t. 1916, f. 5. *Podostemon dichotomus*, Gardn.; F. B. I. v. 64.

W. Gháts, Nilgiris and Malabar Hills, up to 8,000 ft., on rocks in rapids.

Thallus narrow, usually zigzag, the leaves filiform.

2. *DICRAEA STYLOSA*, Wt. Ic. t. 1917, f. 2. *D. algaeformis*, Bedd.; Trans. Linn. Soc. xxv. t. 24. *Podostemon stylosus*, Benth.; F. B. I. v. 64. *P. algaeformis*, Benth.; F. B. I. v. 65. W. Gháts, S. Canara to Travancore, Nilgiris and Anamalais, up to 5,000 ft. Thallus broad, seaweed-like, the bracts helmet-shaped.

4. *Podostemon*, Michx.

Herbs of eddies and rapids, in mountain streams. *Thallus* thread- or ribbon-like; secondary shoots ascending, several-flowered, with long subulate leaves and no scaly bracts. *Flowers* zygomorphic, naked, terminal with a tubular or funnel-shaped erect spathe rupturing irregularly at the tip. *Stamens* 2 or 1, monadelphous, with a staminode at each side of the common axis, and sometimes at the fork of the partial filaments. *Ovary* ellipsoid; stigmas 2, simple, subulate, with small papillae. *Fruit* unequally lobed, 8-ribbed, one valve persistent with 3 decurrent ribs, the other deciduous.

Stamens usually 2; flowers not cleistogamic; ovary not winged

1. *subulatus*.

Stamen 1; flowers cleistogamic; ovary with 6 broad wings

2. *Barberi*.

1. *PODOSTEMON SUBULATUS*, Gardn.; F. B. I. v. 65; Wt. Ic. t. 1918, 1.

W. Gháts, Anamalai Hills, on the Monica Estate at 3,500 ft. (Willis, Barber).

Easily recognized by the long slender subulate leaves, attached to the rocks in tufts and sheathing at base.

2. *PODOSTEMON BARBERI*, Willis.

W. Gháts, hills of S. Canara, at Beltangadi (Barber).

A little-known species, with broad thallus, closely attached to the rock, the spathe very long, the fruit pedicel <sup>up to</sup> 8 in. long.

5. *Griffithella*, Warming.

Minute herb attached to rocks in running streams. *Thallus* algiform, very polymorphous; secondary shoots marginal or on central parts, small with included axis in vegetative condition, ultimately slightly exserted. *Leaves* distichous. *Flowers* naked, zygomorphic, emerging from an erect or ascending tubular or funnel-shaped spathe irregularly split at the tip. *Stamens* 2, monadelphous; staminodes 2, at the sides of the filament-sheath. *Ovary* very oblique; stigmas 2, simple, subulate or more or less lobed, with small papillae. *Capsule* quite smooth, nearly spherical, unequally lobed, splitting obliquely into a larger persistent and smaller deciduous lobe.

*GRIFFITHELLA HOOKERIANA*, Warming. *Podostemon Hookerianus*, Wedd.; F. B. I. v. 65. *Mniopsis Hookeriana*, Tul.; Wt. Ic. t. 1918, f. 4.

W. Gháts, in S. Canara at Beltangadi and Sullia (Barber).

A curious lichen-like plant. The S. Canara plants belong to the var. *G. Willisiana*, Warming, characterized by a short spathe and toothed or fimbriate stigmas, the fruiting pedicels 1-6 in. long.

6. *Willisia*, Warming.

Small tufted herbs with erect imbricate shoots. *Thallus* small, crustaceous, fleshy, closely attached to the rock; secondary shoots crowded, erect, forming a dense tuft, the shoots with imbricate scaly leaves; in addition, during the vegetative season one or more shoots are found with leaves not imbricate but long and filiform and non-floriferous. *Leaves* of floriferous shoots decussate and triquetrous. *Flowers* naked, zygomorphic, sessile, terminal, the spathes bifid at tip. *Stamens* 2, monadelphous, with two staminodes. *Ovary* ellipsoid; stigmas 2, subulate, smooth. *Capsule* smooth, with a slight rib in the centre of each valve, anisolobous, one valve deciduous, the other persistent on a bifid stalk, when the non-vascular tissues fall away.



**WILLISIA SELAGINOIDES**, Warming. *Mniopsis selaginoides*, Bedd.; Trans. Linn. Soc. xxv. t. 28. *Podostemon selaginoides*, Benth.; F. B. I. v. 58.

W. Gháts, Anamalais to 3,500 ft. (Beddome, Wight, Barber, Willis).

A very curious species with shoots resembling *Lycopodium Selago*, attached in tufts to the thallus on rocks.

#### 7. **Hydrobryum**, Endl.

Small green herbaceous plants closely attached to rocks. *Thallus* crustaceous or branched; secondary shoots marginal with 3–8 bracts, usually prostrate. *Leaves* simple, subulate. *Flowers* zygomorphic, stalked or sessile, emerging from a boat-shaped spathe splitting mainly along the upper side. *Stamens* 2 or 1, equalling or exceeding the ovary, staminodes linear. *Ovary* subglobose, 2-celled; stigmas 2, rather large, subulate or lobed or dentate, sometimes obcuneate, entire or lacerate. *Fruit* small, sessile or stalked, smooth or 8–12-ribbed, isolobous or anisolobous with numerous seeds.

Fruit sessile, smooth, thallus branched.....1. *sessile*.

Fruit stalked, 8-ribbed:—

Thallus crustaceous, stamens short .....2. *olivaceum*.

Thallus crustaceous, stamens very long .....3. *Johnsonii*.

Thallus ribbon-like, branched, stamens of varying length

4. *lichenoides*.

#### 1. **HYDROBRYUM SESSILE**, Willis.

W. Gháts, streams of S. Canara, at Beltangadi (Barber).

A curious little plant with distichous bracts bearing the sessile fruit.

#### 2. **HYDROBRYUM OLIVACEUM**, Tul.; Wt. Ic. t. 1918, f. 2. *H. griseum*, Tul.; Wt. Ic. t. 1918, f. 3. *Podostemon olivaceus*, Gardn.; F. B. I. v. 66.

W. Gháts, Anamalai Hills, at 3,500 ft. (Barber, Willis), form *anamalaiense*; Nilgiris, Pykara River at 5,000–6,000 ft. (Gardner, Brandis, Willis), form *griseum*.

A common very small species “easily distinguishable by its crustaceous thallus and erect clearly-ribbed fruit.”

#### 3. **HYDROBRYUM JOHNSONII**, Willis. *Mniopsis Johnsonii*, Wt. Ic. t. 1918, f. 5. *Podostemon Johnsonii*, Wedd.; F. B. I. v. 66.

W. Gháts, mountain streams in Malabar (Johnson).

4. *HYDROBRYUM* LICHENOIDES, Kurz. *Podostemon acuminatus*, Wedd.; F. B. I. v. 66. *P. microcarpus*, Wedd.; F. S. I. v. 66. -

W. Gháts, streams of S. Canara (Barber), form *Kanarensis*; Anamalai Hills, at 3,500 ft. (Willis), form *Fentonii*.  
The most common, but also the most variable species.

### 8. *Farmeria*, Willis.

Dendritically-branching herbs, adherent to smooth rocks in eddies and rapids. *Thallus* ribbon-like, closely attached, regularly branched; secondary shoots as in *Hydrobryum* but behind the branches of thallus instead of in anterior axils. *Bracts* prostrate, thicker on upper side, usually about 6, scaly, with deciduous tips; spathe as in *Hydrobryum*, splitting on upper side. *Stamen* 1 usually. *Ovary* more or less globose, with thickened placenta and 2-4 ovules on the under-side; lower loculus more or less abortive; stigmas large, subulate. *Fruit* small, the upper lobe larger, 2-4-seeded.

*FARMERIA INDICA*, Willis.

W. Gháts, Tambraparni river, near Tinnevely (Barber).

A small species with thread-like thallus and ribbed, dehiscent, shortly stalked, 4-seeded fruits.

### Family CXXII. ARISTOLOCHIACEAE.

Herbs or shrubs, often climbing, usually with more or less unpleasant odour. *Leaves* alternate, petioled, entire or lobed; stipules 0. *Flowers* hermaphrodite, often large, usually lurid; terminal axillary or lateral, solitary racemose or cymose; bracts various, often 0. *Perianth* simple, corolline, superior, regular or irregular, 3-lobed or tubular and variously shaped; lobes valvate. *Stamens* 6 or more, adnate in 1 or 2 series to the style-column; anther-cells parallel, extrorse, opening dorsally. *Ovary* 4-6-celled; placenta parietal, free or meeting at the axis; ovules numerous, anatropous; style columnar, ending in stigmatic lobes. *Fruit* a capsule or berry. *Seeds* numerous, horizontal or pendulous; albumen fleshy, copious; embryo minute.

Shrubs; perianth regular, equally 3-lobed; capsule elongate; leaves ribbed and reticulate ..... 1. *Apama*.  
Trailing or climbing herbs or shrubs; perianth irregular, tubular with

an inflated base and 2-lipped limb; capsule septicidally 6-valved;  
leaves various ..... 2. *Aristolochia*.

### 1. *Apama*, Lamk.

Shrubs or undershrubs, often with stellate hairs. *Leaves* alternate, petiolate, 3-5-ribbed at the base, the ribs often extending beyond the middle, nerves and reticulation prominent. *Flowers* in axillary terminal or subradical bracteate cymes. *Perianth* shortly campanulate, 3-lobed, the lobes valvate. *Stamens* 6-12, 1-seriate, free or connate near the base; anthers extrorse, the cells parallel, the connective thick and sometimes produced. *Ovary* inferior, elongate, 4-celled; style-column thick; stigmas 3 or more, linear; ovules numerous, uniseriate in vertical rows from the axis, pendulous. *Fruit* an elongate, 4-gonous, septicidally 4-valved capsule. *Seeds* many, oblong, trigonous, rugose or pitted; albumen fleshy; embryo minute.

Leaf with the ribs next to the midrib prominent and reaching nearly three-quarters of the way up, nerves 3-4 pairs from the midrib; perianth-lobes suborbicular, slightly acute at apex; anthers in 3 groups of 3, the connectives shortly apiculate; style column short, the stigmas longer..... 1. *siliquosa*.

Leaf with the ribs next to the midrib like the nerves, scarcely reaching halfway up, nerves from the midrib 6-10 pairs, joining in arches; perianth-lobes obovate, abruptly apiculate; anthers free with slender filaments, the connective produced in a triangular apiculus; style-column long, the stigmas about as long ..... 2. *Barberi*.

1. *APAMA SILIQUOSA*, Lamk. *Bragantia Wallichii*, R. Br.; F. B. I. v. 73; Wt. Ic. t. 520.

W. Gháts, in all Districts, in evergreen forest undergrowth, up to 4,000 ft.

An erect shrub, with grey bark, the very reticulate distichous leaves oblong lanceolate or oblanceolate, long-acuminate, up to 9 in. long, 2.5 in. broad, the erect capsules up to 4 in. long.

2. *APAMA BARBERI*, Gamble in Kew Bull. 1924, 386.

W. Gháts, Kannikatti in Tinnevely (Barber).

A shrub with branches covered with long corky lenticels, the leaves lanceolate, acuminate, with shorter side ribs and many more nerves than the former species, up to 8 in. long, 2 in. broad.

2. *Aristolochia*, Linn.

Shrubs or perennial herbs, prostrate or climbing. *Leaves* alternate, entire or lobed, often with a stipule-like leaf of an undeveloped bud in the axil; petiole dilated at base. *Flowers* solitary or fasciated or racemose in the leaf-axils; bracts often rather large. *Perianth* very variable in shape, size and colour, the tube inflated below, then contracted in a cylindrical neck, then expanded in a dilated oblique usually 2-lipped limb. *Stamens* usually 6, adnate to and around the style-column; anther-cells 2, extrorse. *Ovary* inferior, more or less 6-celled; placenta parietal or intruded or connate in the axis; ovules very many, 2-seriate; style-column thick, divided above the anthers in a 3-6-lobed stigmatiferous disk. *Fruit* a septicidal capsule, 6-valved or splitting through the placentas. *Seeds* numerous, horizontal, often covered in part with the remains of the placenta; albumen fleshy; embryo minute, close to the hilum.

Stems prostrate; leaves glaucous, reniform or broadly ovate, cordate at base with a wide sinus, up to 3 in. in diam.; flowers solitary with a large orbicular bract, tube and limb 1-1.75 in. long; stigmatic lobes glandular hairy; seeds flattened but thickened, one side completely covered with round glands, .2 in. long.....1. *bracteata*.

Stems twining; leaves green; flowers in racemes with small bracts; seeds winged:—

Leaves very variable, linear to obovate-oblong or subpanduriform, rounded or slightly cordate at base, up to 6 in. long, 3 in. broad; tube and limb of perianth 1.5 in. long; stigmatic lobes incurved; seeds flattened, thin, broadly winged, glands only opposite the cotyledons, .3 in. long.....2. *indica*.

Leaves large, ovate, acute or acuminate, deeply cordate with a deep but narrow sinus, the upper lanceolate, up to 8 in. long, 4.5 in. broad; tube and limb of perianth 1-1.5 in. long; stigmatic lobes in a cone; seeds flattened, broadly winged, glands only in the middle, .3 in. long.....3. *Tagala*.

1. *ARISTOLOCHIA BRACTEATA*, Retz; F. B. I. v. 72

N. Circars, Deccan and Carnatic, on dry soils, especially black-cotton.

A perennial herb with greenish tube and dark purple lip to the perianth, which is linear with revolute margins, the capsule about .75 in. long, oblong-ellipsoid, 12-ribbed. A

nauseously bitter plant, used as an anthelmintic. Vern. *Hind.* Kiramar; *Ur.* Paniri.

2. *ARISTOLOCHIA INDICA*, Linn.; F. B. I. v. 75. *A. lanceolata*, Wall.; Wt. Ic. t. 1858.

All Districts, at low levels, on hedges and among bushes. A perennial twiner with greenish-white tube, the lip darker and oblong, the capsules 1.5–2 in. long, ribbed. A bitter plant like the former, said to be an antidote to snake-bite. Vern. *Hind.* Isharmal; *Tel.* Isara.

3. *ARISTOLOCHIA TAGALA*, Cham. *A. Roxburghiana*, Klotzsch; F. B. I. v. 75. *A. acuminata*, Roxb.; Wt. Ic. t. 771.

W. Gháts, S. Canara and Mysore to Tinnevely, at rather low levels and chiefly on the E. side.

A climbing shrub with greenish-yellow tube and purple-brown lip to the flowers, the capsule very variable in size, up to 2 in. long and long-stalked.

#### Family CXXIII. PIPERACEAE.

Herbs or shrubs, usually aromatic, the branches often swollen at the nodes. *Leaves* alternate opposite or whorled, often gland-dotted; stipules none or 2 connate or adnate to the petiole. *Flowers* minute, hermaphrodite or unisexual, bracteate, in axillary or terminal catkin-like spikes. *Perianth* 0. *Stamens* 1–10, hypogynous or connate with the ovary at its base; anthers often jointed on the filaments, the cells dehiscing longitudinally. *Ovary* usually 1-celled with a single terminal orthotropous ovule, sometimes of 3–4 carpels; stigmas sessile, simple or penicillate. *Fruit* an indehiscent berry in species with 1 cell, otherwise of separate cocci or follicles. *Seed* adherent to the endocarp, globose ovoid or oblong; testa thin; albumen floury; embryo in a cavity remote from the hilum; cotyledons minute or obsolete; radicle superior.

Flowers dioecious; spikes solitary; fruit an ovoid or globose fairly large berry; leaves usually with prominent ribs ..... 1. **Piper.**

Flowers hermaphrodite, very small:—

Spikes soft and thick, 3–7 together in umbels; berry trigonous, cuneiform; leaves often very large, orbicular-cordate... 2. **Heckeria.**

Spikes slender, solitary fascicled or paniced; berry very minute, dry, globose or ovoid; leaves usually small and succulent

3. **Peperomia.**



1. *Piper*, Linn. (in part).

Shrubs, rarely herbs, erect or scandent, often glandular and aromatic, the branches with swollen nodes. *Leaves* entire, often unequal-sided; stipules various. *Flowers* minute, dioecious, rarely hermaphrodite, each in the axil of a bract with or without lateral bracteoles, arranged in spikes often very closely congested and usually opposite the leaves. *Perianth* 0. *Stamens* 2-4, rarely more; filaments short; anthers 2-celled, the cells distinct. *Ovary* 1-celled; ovule solitary; style short or 0; stigmas 2-5. *Fruit* a small ovoid or globose 1-seeded berry. *Seeds* usually globose; testa thin; albumen floury; radicle superior.

Flowers in cups probably formed of connate bracts making receptacles alternate on rather fleshy spikes; leaves elliptic-ovate or lanceolate, 3-ribbed at base with another pair a little higher up, the nervules reticulate:—

Receptacles distant, stalked, recurved, the spikes glabrous, ♂ very long..... 1. *galeatum*.

Receptacles close, sessile, globose, the spikes minutely pubescent or downy..... 2. *trichostachyon*.

Flowers subtended by peltate orbicular bracts, ♂ with 2 stamens, ♀ with sessile stigmas, usually 3-5-lobed; berries partly sunk in the rhachis:—

Leaves with prominent ribs from the base or near it:—

— Fruiting spikes cylindric, thick; ♂ spikes narrow:—

Leaves glabrous:—

Fruiting spikes about .75 in. long, .25 in. thick; ♂ spikes 1-3 in. long; upper leaves ovate or ovate-oblong, acute, often unequally cordate at base, sessile and amplexicaul, lower leaves ovate, deeply and widely equally cordate, petioled, all 7-ribbed, glabrous..... 3. *longum*.

Fruiting spikes up to 5 in. long, .5 in. thick, ♂ spikes 3-6 in. long, very narrow; leaves ovate-oblong or ovate-cordate, petioled, 5-7-ribbed, glabrous..... *Betle*.

Leaves pubescent, especially on the nerves beneath and the lower surface when young, later nearly or quite glabrous, lanceolate, acuminate, very unequally cordate with incurved auricles at base, 7-nerved, rugose or bullate, up to 4 in. long, 2 in. broad, fruiting spikes .75 in. long, ♂ spikes slender, 1-1.5 in. long..... 4. *Hapnium*.

Fruiting spikes globose, .3-.5 in. in diam., ♂ spikes very slender,



2-3 in. long; leaves elliptic-ovate or lanceolate, obtusely caudate-acuminate, acute at base, 3-5-ribbed with another pair a little higher up, shortly petioled ..... 5. *brachystachyum*.

Fruiting spikes loose and often interrupted, ♂ spikes narrow, longate:—

Leaves somewhat coriaceous, ovate, acute or obtusely acuminate, obtuse or subcordate at base, sparsely hirsute, 5-7-ribbed from the base or close to it, up to 4 in. long, 2 in. broad; ♀ spikes very slender when young, 2 in. long ..... 6. *Hookeri*.

Leaves very coriaceous, elliptic-ovate or ovate-oblong, obtusely acute or rarely acuminate, obtuse or shortly cordate at base, 3-5-ribbed from the base with another pair about .25 in. above it and usually alternate; all ribs as well as transverse nerves and reticulation very prominent, margin often recurved, up to 4.5 in. long, 2.5 in. broad; ♂ spikes usually about 4 in. long, ♀ spikes stout, the fruit fleshy ..... 7. *Schmidtii*.

Leaves pinnately nerved, not ribbed, the nerves 5-6 pairs, lanceolate, long acuminate, unequally acute at base, glabrous, up to 6 in. long, 2 in. broad; stipules lanceolate, .5-.75 in. long; ♂ spikes 3-4 in. long, narrow, on slender peduncles up to 3 in. long, ♀ not known ..... 8. *Barberi*.

Flowers subtended by bracts adnate to the rachis:—

Bracts forming a short cup under the flowers (♂, ♀ or ♂) the bracteoles in ♀ in a hood-like ridge above; leaves coriaceous, broadly ovate (in ♂ often elliptic and narrow), acuminate, glabrous, 5-9-ribbed, 2-3 pairs of ribs basal, the others higher up, often impressed above, up to 9 in. long, 4.5 in. broad; ♂ spikes slender, usually 4-5 in. long, ♀ slender, up to 6 in. long, the berries large, .25 in. in diam. or more ..... 9. *nigrum*.

Bracts adnate to the rachis with decurrent free membranous margins, confluent in the ♀ with the bracteoles above the ovary, under-surface crisate-hairy:—

Leaves membranous:—

Leaves beneath, also branchlets and petioles, pubescent with crisped hairs; leaves variable in shape, usually ovate or elliptic-ovate, abruptly acuminate, rounded or cordate, often unequally, at base, 5-7-ribbed from the base, two upper pairs a little higher and extending to the tip, up to 5 in. long, 3.5 in. broad; ♂ spikes slender, 3 in., ♀ to 6 in. or more ..... 10. *hymenophyllum*.  
Leaves beneath covered with round silvery scales, above often bullate; leaves variable in size, elliptic or lanceolate, acuminate, acute and often oblique at base. 5-7-ribbed, the upper pair rather

higher up and reaching the tip, up to 6 in. long, 2.5 in. broad; ♂ spikes very slender, 4-6 in., ♀ to 6 in. ... 11. *argyrophyllum*. Leaves and branchlets quite glabrous, ovate or suborbicular, abruptly acuminate, rounded or cordate, sometimes obliquely, at base, 7-ribbed from the base or close to it, up to 4 in. long, 3.5 in. broad; the ♂ spikes extremely slender, to 6 in., ♀ elongate, up to 10 in. long ..... 12. *attenuatum*. Leaves coriaceous, glabrous, broadly ovate or orbicular, rarely elliptic, abruptly acute, rounded or cordate at base, 5-7-ribbed quite from the base or the upper 2 a little above it, the nerves transverse and reticulate, joining the ribs, up to 5 in. long, 3 in. broad; ♂ and ♀ spikes rather thick, 3-4 in. long, elongating in fruit, the globose berries rather close ..... 13. *Wightii*.

1. **PIPER GALEATUM**, Cas. DC.; F. B. I. v. 80. *Muldera Wightiana*, Wt. Ic. t. 1943 (*right-hand figure only*).

W. Gháts, Anamalai and Travancore Hills (Barber) and Courtallum Hills of Tinnevely (Wight) in dense forest undergrowth at low levels.

A woody climber with pale corky branches much thickened at the nodes, often attaching itself like the ivy by rootlets as well as climbing with hanging branches. When rooting, the leaves are larger, rounder and often cordate. The ripe berries are deep orange, 3 in. in diam. (Barber).

2. **PIPER TRICHOSTACHYON**, Cas. DC.; F. B. I. v. 80. *Muldera trichostachya*, Miq.; Wt. Ic. t. 1944.

W. Gháts, Mysore, Coorg up to 2,500 ft., Wynaad in Malabar (Barber); Sivagiri Hills of Tinnevely (Wight).

A very large woody climber, very similar to the last and similarly climbing and rooting, but the leaves usually more elliptic and smaller. The ripe berries are globose, yellow, and the ♂ cupules waxy white (Cooke).

3. **PIPER LONGUM**, Linn.; F. B. I. v. 83. *Chavica Roxburghii* Miq.; Wt. Ic. t. 1928.

W. Coast and W. Gháts, in evergreen forests in Malabar and Travancore, Anamalai Hills, at low levels; often cultivated. Long Pepper.

A slender undershrub, creeping and rooting below, the branches erect and subscandent. The small berries are red when ripe and afford a kind of pepper, and are also used in medicine. Vern. *Hind.* Pipalmal; *Tam.* Vettilai.

4. **PIPER HAPNIUM**, Buch.-Ham.; F. B. I. v. 86.  
 W. Gháts in the hills of Travancore and Tinnevely.  
 (Hamilton, Wight).  
 A slender climbing undershrub with warted puberulous branches rooting from lower joints, the leaves soft and wrinkled, their bases prominently incurved in rounded auricles.
5. **PIPER BRACHYSTACHYUM**, Wall.; F. B. I. v. 87. *Chavica sphaerostachya*, Miq.; Wt. Ic. t. 1931.  
 W. Gháts, Nilgiris, Anamalais, Pulneys and hills of Travancore, in Shola forest, above 5,000 ft.; Bababudan Hills of Mysore.  
 A much-branched woody climber, trailing up the branches of trees and over rocks and rooting like ivy. The slender rooting branches are tomentose and corky, and have quite small ovate leaves; those on the terete spreading branches may reach 6 in. long, 2 in. broad.
6. **PIPER HOOKERI**, Miq.; F. B. I. v. 88.  
 Bababudan Hills of Mysore (Cleghorn).  
 A climbing shrub, rooting ivy-like, with stout branches, the branchlets hirsute.
7. **PIPER SCHMIDTII**, Hook. f.; F. B. I. v. 89. *P. arborescens*?  
 Wt. Ic. t. 1940 (*right-hand figure only*).  
 W. Gháts, Nilgiri Hills, above 5,000 ft., in Shola forests (Schmidt, King and others).  
 A large and ornamental shrub, climbing on trees and covering their trunks and branches, the strongly reticulate nervation of the coriaceous leaves very conspicuous.
8. **PIPER BARBERI**, Gamble in Kew Bull. 1924, 387.  
 W. Gháts, hills of Tinnevely (Barber).  
 A very little-known species at once remarkable for the absence of ribs to the leaves which are pinnately nerved instead.
9. **PIPER NIGRUM**, Linn.; F. B. I. v. 90.  
 W. Gháts, in all Districts, at 1,500-5,000 ft., in evergreen forest; largely cultivated. Black or White pepper.  
 A stout glabrous climbing shrub, at first rooting at the nodes like ivy, the leaves small and cordate, gradually getting larger, later sending out strong flowering branches with large leaves and berries up to 25 in. diam. Dr.

Barber would apparently separate a form with big berries but it hardly seems even of varietal rank. It probably arose from chance cultivated seeds.

10. *PIPER HYMENOPHYLLUM*, Miq.; F. B. I. v. 93; Wt. Ic. t. 1942.

W. Gháts, from Mysore and the Nilgiris southwards, in evergreen forests, at 1,500-5,000 ft.

A slender climber at first rooting at the nodes and having broad cordate leaves, afterwards spreading and branching, with narrower and often elliptic variable leaves, the berry small. Berries small, globose, or slightly oblong, 1-2 in. in diam.

11. *PIPER ARGYROPHYLLUM*, Miq.; F. B. I. v. 93; Wt. Ic. t. 1941.

W. Gháts, Coorg and Nilgiris southwards, in evergreen forest and Shola, 1,500-7,000 ft.

A slender climber similar to the last (in some cases more slender) and difficult sometimes to separate from it, for crisped hairs occur to some extent in this and white scales may sometimes be found in that as also in *P. Wightii*. Berries globose, 2-3 in. in diam. A small-leaved form (var. 2 or var. 5 of the F. B. I.) may perhaps have to be separated when better known.

12. *PIPER ATTENUATUM*, Buch.-Ham.; F. B. I. v. 92; Wt. Ic. t. 1933. *P. sylvestre*, Wt. Ic. t. 1937; F. B. I. v. 93. *P. trioicum*, Roxb.; Wt. Ic. tt. 1935, 1936.

N. Circars, forests of the hills of Vizagapatam and Godavari at 2,000-3,000 ft.; W. Gháts, Malabar and Nilgiris to Travancore and Tinnevely, in evergreen forests at low levels.

A slender climber with often somewhat zigzag branchlets and ovate-cordate leaves, the berries globose, very small. This seems to be the Circar species which Roxburgh cultivated at Samulcotta as true pepper.

13. *PIPER WIGHTII*, Miq.; F. B. I. v. 94; Wt. Ic. t. 1939.

W. Gháts, Nilgiris and Pulneys, above 5,000 ft., in Shola forests.

A stout climber with smooth stems at first rooting ivy-

prominently reticulate, the berries small with prominent stigmas. White scales, as in *P. argyrophyllum*, are often found on the under-surface of the leaves, but this is a much stouter plant.

*P. Betle*, Linn., is the Betel pepper, a perennial Malay creeper extensively cultivated in hot damp localities for its leaves (Pán) which are rolled up with portions of areca nut, lime, catechu, cardamoms and other ingredients, sold in shops and universally chewed. The plants are cultivated in special trellised gardens.

## 2. *Heckeria*, Kunth.

Shrubs, usually with succulent branches. *Leaves* large, long-petioled, orbicular or peltate, cordate at base, the petiole sheathing. *Flowers* very minute, hermaphrodite, in very close slender cylindrical spikes in pedunculate umbels in the axils of the leaves; bracts pedicelled, peltate. *Perianth* 0. *Stamens* 2-3, at the base of the ovary; anthers very small, 4-valvate. *Ovary* free; stigmas 3. *Fruit* a very small indehiscent, usually trigonous berry. *Seeds* adherent to the pericarp; albumen floury.

*HECKERIA SUBPELTATA*, Kunth. *Piper subpeltatum*, Willd.; F. B. I. v. 95. *Pothomorphe subpeltata*, Miq.; Wt. Ic. t. 1925.

W. Gháts, in all Districts, in evergreen forests, up to 3,000 ft.

A large herbaceous shrub, often 3-5 ft. high with orbicular acute, deeply cordate leaves palmately nerved and reticulate, up to 12 in. in diam., the spikes often 5-6 in. long, 3-7 together in the umbel, the fruits trigonous.

## 3. *Peperomia*, Ruiz & Pav.

Annual or perennial—usually succulent herbs. *Leaves* alternate, opposite or whorled, entire, pellucid-punctate; stipules 0. *Flowers* minute, hermaphrodite, sessile or sunk in the rhachis, erect, in terminal or leaf-opposed, solitary or paniced, rarely axillary spikes; bracts sessile, often peltately attached. *Perianth* 0. *Stamens* 2; filaments very short; anther-cells confluent. *Ovary* 1-celled, obtuse acute or beaked; ovule solitary, erect; stigma lateral or terminal, usually penicillate. *Fruit* a minute, indehiscent, almost dry nutlet, the pericarp very thin. *Seed* minute, testa membranous; albumen floury.

Leaves coriaceous, small, 2-3 in. in diam., rarely more, pale when dry, the ribs and nerves invisible :—

Leaves in whorls of 4, orbicular, nearly sessile, glabrous; spikes stout, .75-1.5 in. long, with pubescent rhachis, the peduncles about .5-.75 in. long, the nutlets ovoid, acute.....1. *reflexa*.

Leaves opposite or alternate, obtuse or emarginate, with slender petiole .2 in. long, minutely puberulous; spikes slender, .75 in. long, with glabrous rhachis, the peduncles scarcely .25 in. long, the nutlets ellipsoid.....2. *Heyneana*.

Leaves fleshy, opposite or alternate or both, the ribs and sometimes nerves visible :—

Leaves and stems glabrous or very nearly so :—

Leaves mostly alternate, prominently 5-ribbed from the base, elliptic-ovate, acute, cuneate at base, up to 3.5 in. long, 2 in. broad, the petiole to .75 in.; spikes very slender, up to 4 in. long, the peduncle to 1 in., the nutlets globose, scurfy and black-punctate.....3. *Thomsoni*.

Leaves mostly opposite or the upper whorled, lower ones often alternate, 3-ribbed :—

Leaves obovate, obtuse or emarginate, cuneate at base, up to 1.5 in. long, 1 in. broad, the petiole .2-.5 in.; spikes rather stout, up to 2 in. long, the peduncle to 1 in., the nutlets ovoid, minutely scaly.....4. *portulacoides*.

Leaves elliptic orbicular or obovate, obtuse, rounded at base, up to .75 in. in diam., the petiole to .25 in., the side ribs very obscure; spikes slender, up to 2 in. long, the peduncle short, the nutlets ovoid, minutely rugose and scurfy....5. *Wightiana*.

Leaves and stems pubescent with crisped hairs, leaves usually opposite, 3-5-ribbed from the base, but rather obscurely, elliptic-ovate or -obovate, rounded or slightly acute, up to 1.5 in. long, 1 in. broad, petiole to .5 in.; spikes slender, often in terminal panicles, up to 4 in. long, the peduncle .75 in., the nutlets globose, punctate .....6. *dindigulensis*.

Leaves very thin, membranous when dry, broadly ovate-deltoid, acute, 5-7-ribbed, opposite and alternate, about 1 in. in diam.; spikes very slender, opposite the leaves, the nutlets ribbed and reticulate.....7. *pellucida*.

1. *PEPEROMIA REFLEXA*, A. Dietr.; F. B. I. v. 99; Wt. Ic. t. 1923, 1.

N. Circars, in Ganjam and up to 4,000 ft. on Mahendragiri;

W. Gháts, in all Districts from the Coimbatore Hills and

Nilgiris southwards, usually above 4,000 ft.



A succulent tufted herb growing epiphytically on tree-trunks.

2. *PEPEROMIA HEYNEANA*, Miq.; F. B. I. v. 99.

Bababudan Hills of Mysore, at 6,000 ft. (Meebold), Ootacamund in Nilgiris (G. King).

A small epiphytic herb with emarginate leaves, sometimes up to 1 in. long, but usually much smaller.

3. *PEPEROMIA THOMSONI*, Hook. f.; F. B. I. v. 97. *P. dindigulensis*, Wt. Ic. t. 1921, not of Miq. (not good).

W. Gháts, Anamalai and Pulney Hills, at rather low levels.

A large-leaved (comparatively) succulent epiphyte rooting in moss on the branches of trees.

4. *PEPEROMIA PORTULACOIDES*, A. Dietr.; F. B. I. v. 98; Wt. Ic. t. 1922, 2. *P. courtallensis*, Miq.; Wt. Ic. t. 1923, 2.

W. Gháts, hills of Tinnevely and Travancore, Avalanché in Nilgiris, probably over 5,000 ft.

An erect glabrous succulent herb, growing on rocks and tree-trunks.

5. *PEPEROMIA WIGHTIANA*, Miq.; F. B. I. v. 98; Wt. Ic. t. 1924 (except pubescence).

W. Gháts, Nilgiris and Pulneys above 4,000 ft.

A small slender succulent herb, growing on moist rocks and on the branches of trees. The tips of the leaves are sometimes ciliate.

6. *PEPEROMIA DINDIGULENSIS*, Miq.; F. B. I. v. 98. *P. Heyneana*, Wt. Ic. t. 1922, 1, not of Miq.

N. Circars, Bison Hill, Godavari (Barber); Carnatic, Shevaroy Hills of Salem, Kollimalai Hills of Trichinopoly; W. Gháts, from Malabar southwards at about 2,000-4,000 ft.

An erect, rather large, succulent herb, growing on wet rocks or on tree branches, conspicuous by its pubescence.

7. *PEPEROMIA PELLUCIDA*, H. B. & K.

Madras, a weed in gardens; W. Coast, at Trevandrum, introduced and clearly run wild, a native of S. America.

A slender succulent herb with weak procumbent stems.

Family CXXIV, CHLORANTHACEAE.

Herbs, shrubs or trees, usually aromatic. Leaves opposite, usually toothed, the petioles often connate in a sheath; stipules

small, subulate, usually on the margin of the sheath. *Flowers* in terminal or pseudo-axillary spikes heads or panicles, unisexual or hermaphrodite from the ♂ and ♀ cohering supported by a bract; ♂ flowers without perianth, ♀ also or with a 3-toothed limb adnate to the ovary. *Stamens* 1 or 3, connate; filaments very short and thick; anthers 2-celled, or if 3, side ones 1-celled. *Ovary* 1-celled; ovule 1, orthotropous, pendulous; style very short. *Fruit* a small, ovoid or globose, drupe, exocarp fleshy, endocarp crustaceous. *Seed* pendulous; testa membranous; albumen copious, fleshy; embryo minute; cotyledons divaricate or scarcely distinct; radicle inferior.

### 1. *Chloranthus*, Swartz.

Perennial herbs or shrubs, the stems articulate at the nodes. *Flowers* in terminal simple or paniced spikes, hermaphrodite, the ♂ and ♀ connate on a bract; perianth 0. *Stamens* 1 or 3 confluent; if 3 the central anther 2-celled, the side ones 1-celled. *Ovary* with subsessile truncate stigma.

*CHLORANTHUS BRACHYSTACHYS*, Blume; F. B. I. v. 100.

*Sarcandra chloranthoides*, Gardn.; Wt. Ic. t. 1946.

W. Gháts, hills of Malabar, Bolumpatti Valley, Anamalais, Pulneys and Tinnevely at 2,000–5,000 ft., in moist forests.

A small bush reaching 4 ft. in height, the lanceolate leaves coarsely spinous-serrate, reaching 7 in. long, the single stamen with large thickened connective and filament, the berries globose, purplish-black.

### Family CXXV. MYRISTICACEAE.

Evergreen tree, often stellately tomentose. *Leaves* alternate, entire, often pellucid-punctate; stipules 0. *Flowers* small, dioecious, regular, in axillary or lateral panicles cymes umbels or fascicles, rarely in racemes; bracteolés persistent or caducous. *Perianth* gamophyllous, inferior, with 3, sometimes 2 or 4, lobes valvate in bud. *Androecium* in ♂ flowers of 3 or more extrorse anthers connate in a sessile or stipitate column, ring or disk; anthers 2-celled, linear or ovate. *Ovary* in ♀ flowers superior, free, 1-celled; ovule 1 basal, erect, anatropous; stigma capitate discoid or lobed. *Fruit* more or less fleshy, splitting usually into

albumen copious, hard, ruminant; embryo very small, basal; cotyledons divaricate, flat or crumpled; radicle short, inferior.

Anthers attached by their backs to a column formed of the connate filaments:—

Anther-column sessile, the apices of the anthers free

### 1. *Gymnacranthera*.

Anther-column stipitate and usually produced beyond the anthers which are completely attached to it.....2. *Myristica*.

Anthers attached by their bases stellately to a peltate usually stipitate column formed of the connate filaments .....3. *Knema*.

### 1. *Gymnacranthera*, Warb.

Trees. Leaves alternate, entire, evergreen, pergamaceous. Flowers small, dioecious, ♂ in fascicles in axillary panicles, ♀ in short axillary racemes, bracts deciduous. Perianth 3-4-lobed. Androecium sessile, the connectives combined in an oblong thick column; anthers 6-12, elongate, the lower parts adnate to the column by their backs, the apices free, often inflexed over the column. Ovary ovoid; stigmas sessile, connate, scarcely bilobed. Fruit globose or ovoid; pericarp thick, fleshy; arillus laciniate almost to the base. Seed conforms to the fruit; testa woody; albumen ruminant; cotyledons divaricate, connate at base.

*GYMNACRANTHERA CANARICA*, Warb. Monog. Myrist. 368. *Myristica canarica*, King, Ann. Calc. iii. 307, t. 138. *M. Farquhariana*, Wall.; F. B. I. v. 108 in part; Bedd. Fl. t. 270.

W. Gháts, from S. Canara southwards to Travancore, in evergreen forests at low levels about 1,000 ft. alt.

A very large evergreen tree with oblong leaves up to 10 in. long, 4 in. broad, glaucous beneath. The fruit is globose about 1 in. in diam. Bark smooth, brown; wood yellowish-grey, coarse, moderately hard, of little value. The seeds can be used in the making of candles, as they contain much fat.

Vern. Kan. Pindi; Mal. Undai pánu.

### 2. *Myristica*, Linn.

Trees. Leaves alternate, entire, evergreen, pergamaceous or chartaceous. Flowers small, dioecious, in cymes umbels or fascicles from the axils of the leaves or of the scars of fallen

3-lobed. *Androeceum* stalked, the filaments and connectives connate in a column usually produced beyond the anthers; anthers 12-30 elongate. *Ovary* ovoid; stigmas connate, 2-lobed. *Fruit* large, ovoid or oblong; pericarp thick, succulent, rarely leathery; arillus laciniate. *Seed* conform to the fruit; testa hard; albumen ruminant; cotyledons connate.

Flowers urceolate in paniced cymes, the peduncles slender; ♀ larger than ♂; leaves rather thin:—

Cymes few-flowered, at most 3-5 in ♂, fewer in ♀; perianth .2-.3 in. long, tawny-villous, the pedicels drooping, about .5 in. long; leaves elliptic-lanceolate, acuminate, 3-5 in. long, 1.5-2 in. broad, subglaucous beneath, nerves about 8 pairs; fruit broadly pyriform, up to 2 in. long, the pericarp yellow, the arillus red and much laciniate  
*fragrans.*

Cymes dichasioid, up to 20 in ♂ flowers, only 3 or 4 in ♀; perianth .2-.25 in. long, subglabrous, the pedicels about .25 in. long; leaves elliptic-oblong, subobtuse, 3-7 in. long, 1-3 in. broad, brown beneath, nerves about 10 pairs; fruit cylindrical, 2-3 in. long, .75 in. broad, villous, the arillus yellow.....1. *malabarica.*

Flowers ovoid, in short cymes or fascicles on thick woody peduncles; leaves thick and large with prominent nerves:—

Leaves beneath densely reddish tomentose, smooth and glabrous above, oblong or elliptic-oblong, acute at apex, rounded at base, 12-24 in. long, 4-6 in. broad, main nerves 20-26 pairs, impressed above, petiole stout, .5-1 in. long, channelled; flowers rather small, densely rusty tomentose, ♀ slightly larger but less numerous than ♂; fruit oblong up to 4 in. long, densely tomentose, the arillus orange-red and deeply much laciniate.....2. *magnifica.*

Leaves beneath glabrous and usually glaucous, smooth above:—

Leaf nerves and transverse nervules conspicuous, leaves 5-10 in. long, 2.5-4 in. broad; fruit globose, 2-2.5 in. in diam., the pericarp fleshy, the lacinae of the orange-red arillus with their ends separate.....3. *Beddonii.*

Leaf nerves only conspicuous, the rest faint, leaves oblong lanceolate up to 10 in. long, 4 in. broad; fruit lanceolate, 1.5-2.5 in. long, the pericarp fleshy, the lacinae of the arillus drawn together at their tips.....4. *contorta.*

W. Gháts, in evergreen forests from S. Canara southwards, at low levels up to 1,000 ft.

A tree reaching 50 ft. in height and a diam. of 1.5 ft. Bark greenish-black, smooth; wood yellowish-brown tinged with grey, moderately hard, not durable and of little use. Vern.

*Kan.* Kanagi; *Tam.* Patthiri; *Mal.* Ponnam pánu.

2. *MYRISTICA MAGNIFICA*, Bedd. Fl. t. 268; F. B. I. v. 104; King Ann. Calc. 119.

W. Gháts, Travancore and parts of Tinnevely and Canara (Bourdillon), especially common about Kolaturpoli, in swampy ground in evergreen forests.

A lofty tree reaching 90–100 ft. in height (Cooke), 120 ft. (Bourdillon), often buttressed and furnished with numerous aerial roots, which start from the trunk at 10–20 ft. above ground and spread along the ground, rising in loops above it. Bark purplish-black, smooth; wood yellowish-white, soft and perishable. Vern. *Mal.* Kottha pánu.

3. *MYRISTICA BEDDOMEI*, King Ann. Calc. 291, t. 118. *M. laurifolia*, Hook. f. & Th., var. *lanceolata*, Hook. f.; F. B. I. v. 103. *M. laurifolia*, Bedd. Ic. t. 267 fruit only (flowering branch is probably *M. malabarica*).

W. Gháts, in all Districts, in evergreen forests, up to 5,000 ft. Wild Nutmeg.

A large tree reaching 90 ft. in height, with a diameter of about 2.5 ft. Bark blackish-green, rather smooth; wood yellowish brown, moderately hard, perishable and of no great value. Vern. *Kan.* Jajikai; *Mar.* Jayaphal; *Tam.* Kathu jathikai; *Mal.* Pattha pánu.

4. *MYRISTICA CONTORTA*, Warb. Monog. Myrist. 507, t. 16 part.

W. Gháts in S. Canara and Malabar up to 3,000 ft., in evergreen forest; Lower Pulneys (Bourne).

A large tree, apparently only really separable from *M. Beddomei* by the fruit, and quite doubtfully distinct from it.

*M. fragrans*, Houtt., is the Nutmeg tree, native of the E. Moluccas and cultivated more or less throughout Malaya. In India it is only found as a specimen tree in a few localities, chiefly Botanic Gardens like Barliyar, where the climate is sufficiently hot and moist. The “nutmeg” is given by the large seed, and the arillus outside it gives the spice known as “mace.”

3. *Knema*, Lour.

Trees. *Leaves* alternate, evergreen, coriaceous or chartaceous. *Flowers* small, dioecious, ♂ in fascicles on thick peduncles from the axils of leaves or of the scars of fallen leaves, ♀ similar but fewer and rather longer; bracts deciduous; pedicels bractolate. *Perianth* 3-lobed. *Androecium* usually stalked; filaments and connectives connate in a peltate disk; anthers 8-20, free, attached stellately to the margin of the disk, dehiscing downwards. *Ovary* ovoid; style short, thick; stigmas 2, lacinate on the margins. *Fruit* ovoid or oblong; pericarp thick, fleshy, tomentose; arillus lacinate at the apex only. *Seed* conform to the fruit; albumen ruminant; cotyledons divaricate or sub-erect.

**KNEMA ATTENUATA**, Warb. *Myristica attenuata*, Wall.; F. B. I. v. 110; King Ann. Calc. t. 152. *M. corticosa*, Bedd. Fl. t. 271, not of Lour.

W. Gháts, from S. Canara southwards, in evergreen forests up to 2,000 ft.

A moderate-sized tree with oblong-lanceolate acuminate leaves up to 8 in. long, 2-3 in. broad, prominently and regularly nerved, glaucous and rusty pubescent beneath, the flowers stellately pubescent, the fruit ovoid, 1.5 in. long, the aril of a brilliant crimson. Bark greenish-black, smooth; wood pale brown, moderately hard, of little value. Vern. *Kan.* Rukt maru; *Tam.* Chora patthiri; *Mal.* Chora panu.

## Family CXXVI. LAURACEAE.

Erect aromatic trees or shrubs, or (*Cassytha*) leafless twining parasites, usually evergreen. *Leaves* alternate, rarely opposite or subopposite, entire, stipules 0. *Flowers* regular, small hermaphrodite or dioecious, in axillary or lateral cymes clusters racemes or panicles, sometimes in umbellules; bracts deciduous, often involucrate, sometimes 0. *Perianth* usually inferior; tube short, often enlarging in fruit; lobes usually 6, sometimes more, sometimes only 4, in 2 series, equal or unequal, deciduous or persistent in fruit, sometimes enlarged as are the pedicels. *Stamens* usually a multiple of the perianth-lobes, in 2-4 series on the tube; filaments of the inner rows usually, of the outer sometimes with a pair of glands attached or alongside; anthers



erect, 2-4-celled, the cells dehiscing by upcurved, at length deciduous, valvular lids, the 4th row of stamens often reduced to glands: in ♀ flowers the stamens replaced by staminodes, usually linear or clavate, the inner biglandular as in ♂. Ovary sessile at the base of the perianth-tube, 1-celled; ovule solitary, anatropous, pendulous from the top of the cell. Fruit a dry or fleshy berry or drupe, naked or enclosed in the perianth-tube or supported by the more or less enlarged perianth-tube and lobes, the pedicel frequently thickened. Seed pendulous; testa membranous; albumen 0; cotyledons plano-convex, fleshy; radicle minute, superior.

Trees or shrubs:—

Stamens of 3rd row, when present, with extrorse anthers:—

Anthers 2-celled:—

Fruit surrounded by the enlarged perianth-tube

1. *Cryptocarya*.

Fruit not surrounded by the enlarged perianth-tube:—

Fruiting perianth persistent ..... 2. *Apollonias*.

Fruiting perianth deciduous ..... 3. *Bellishmiedia*.

Anthers 4-celled:—

Leaves opposite or subopposite rarely alternate, usually 3- or more-ribbed; fruiting perianth enlarged into a cupule embracing the fruit ..... 4. *Cinnamomum*.

Leaves alternate:—

Fruiting perianth-tube enlarged, fruiting pedicels enlarged, thick and usually warted ..... 5. *Alseodaphne*.

Fruiting perianth-tube and pedicels hardly enlarged:—

Fruiting perianth-lobes reflexed ..... 6. *Machilus*.

Fruiting perianth-lobes erect, cup-like ..... 7. *Phoebe*.

Stamens of all rows with introrse anthers, the lower cells sometimes lateral:—

Fertile stamens 9; involucral bracts deciduous in flower; leaves usually subverticillate, 3-ribbed or 1-ribbed, penninerved

8. *Actinodaphne*.

Fertile stamens normally 9 or 12, frequently more, rarely less; involucral bracts persistent in flower; leaves alternate or subopposite, penninerved ..... 9. *Litsea*.

Fertile stamens 6; involucral bracts early deciduous; leaves alternate or subverticillate, 3-ribbed ..... 10. *Neolitsea*.

Leafless filiform twining parasites with suckers; stamens with 4-celled anthers, outer two rows introrse, inner row extrorse .... 11. *Cassytha*.

1. *Cryptocarya*, R. Br.

Evergreen trees or shrubs. *Leaves* usually alternate, penninerved or 3-ribbed, more or less coriaceous. *Flowers* small, hermaphrodite, in axillary or subterminal pedunculate panicles; bracts and bracteoles present but often early caducous. *Perianth*-tube turbinate or ovoid, ultimately narrowed at the top; lobes 6, in two rows, subequal. *Stamens* 9 perfect, those of the 1st row introrse opposite the 3 outer perianth lobes, those of the 2nd row introrse opposite the 3 inner lobes, within and alternate with the stamens, 6 stipitate glands, then those of the 3rd row extrorse opposite the stamens of the 1st row, then, slightly within these, 3 stipitate cordate staminodes opposite the stamens of the 2nd row; all stamens 2-celled, the connective often produced. *Ovary* sessile at the bottom of the perianth-tube and enclosed in it; style shortly exserted; stigma obtuse or capitate. *Fruit* drupaceous, hardened or fleshy, smooth or ribbed, enclosed in the accrescent perianth-tube; pericarp membranous or thinly crustaceous, more or less free from the perianth-tube. *Seed* with a membranous testa, often not separable from the pericarp; cotyledons thick, fleshy; radicle minute.

Leaves beneath with prominent nerves and transverse nervules, all fulvous-tomentose, the reticulation also villous, elliptic-obovate, abruptly sharp-acuminate, up to 8 in. long, 4 in. broad; flowers in short axillary fulvous panicles of cymes with prominent bracts and bracteoles, apparently persistent ..... 1. *anamalayana*.  
Leaves beneath glabrous except sometimes the midrib and nerves; bracts and bracteoles deciduous:—

Flowers in spreading terminal or axillary panicles:—

Leaves ovate or elliptic, obtuse or suddenly shortly acute at apex, rounded or even truncate at base, shining above, reddish-glaucous beneath, the nerves distant, impressed above, the transverse nervules also distant but distinct, reticulation not dotted-areolate, up to 5 in. long, 2.5 in. broad; panicles usually axillary, fulvous-pubescent, up to 5 in. long ..... 2. *Beddomei*.

Leaves elliptic or elliptic-oblong, glaucous beneath, the nerves prominent beneath, the transverse nervules indistinct, the reticulation dotted-areolate:—

Main nerves 9–12 pairs, leaf-apex abruptly and obtusely

Main nerves 6-8 pairs, leaf-apex obtuse or emarginate, sometimes slightly acute, base acute, 3-5 in. long, 1-2 in. broad; berry ovoid, 1.5 in. long, .75 in. broad, furrowed and often lenticellate . . . . . 4. *Lawsoni*.

Flowers in short congested axillary or terminal tawny-tomentose panicles :—

Leaves elliptic or ovate-oblong, obtuse or slightly acute at apex, rounded at base, smooth and dull above, glaucous beneath and reticulate, the nerves 5-7 pairs often pubescent; up to 4 in. long, 2.25 in. broad; berry ovoid, black, .5 in. long

5. *neilgherrensis*.

Leaves ovate obovate or oblong, sometimes almost orbicular, obtuse or emarginate at apex, obtuse at base, shining above, subglaucous beneath, the transverse nervules prominent, the nerves 5-8 pairs; sometimes tomentose, up to 4 in. long, 2.5 in. broad; berry oblong, 1 in. long, .3-.4 in. broad, smooth

6. *Stocksii*.

1. *CRYPTOCARYA ANAMALAYANA*, Gamble in Kew Bull. 1925, 126. *C. sp.*; F. B. I. v. 121.

W. Gháts, Anamalai Hills, at 3,000 ft. (Bedd., Barber).

A tree with rather thin leaves with prominent transverse nervules and fulvous tomentose branchlets and inflorescence.

2. *CRYPTOCARYA BEDDOMEI*, Gamble in Kew Bull. 1925, 127.

W. Gháts, S. Canara plains (Beddome); Udumanparai in Anamalais (Barber).

A tree with coriaceous leaves.

3. *CRYPTOCARYA BOURDILLONII*, Gamble in Kew Bull. 1925, 127. *C. Wightiana*, Hook. f.; F. B. I. iv. 120 in part, not of Thw.

W. Gháts, Kolaturpoli, Travancore, up to 500 ft. in evergreen wet forest (Bourdillon), S. Tinnevely (Beddome).

A tall tree, probably in part *C. Wightiana*, Bourd. Trav.

Trees 296. The main nerves are smooth or slightly raised above the midrib impressed, the transverse nervules subparallel. In young shoots the leaves may reach a large size, more than 12 in. long and 6 in. broad, with a thick petiole of 2 in.

4. *CRYPTOCARYA LAWSONI*, Gamble in Kew Bull. 1925, 127.

W. Gháts, Kundahs Sholas in Nilgiris above 5,000 ft.

(Lawson, Gamble); hills of Tinnevely (Beddome, Tadulingam).

A lofty tree in Tinnevely (Beddome); in Nilgiris a stout not very tall one. The main nerves are short and curved, smooth above, the midrib impressed, the transverse nervules merged in the reticulation.

5. *CRYPTOCARYA NEILGHERRENSIS*, Meissn. *C. Stocksii*, Hook. f.; F. B. I. v. 120 *in part*, not of Meissn.

W. Gháts, Nilgiris at about 6,000 ft. (Wight, Gamble), Anamalais at 2,500 ft. (Beddome), in Shola forest.

A large tree (Beddome). The midrib and main nerves of the leaves are impressed above, the branchlets tawny-pubescent and lenticellate.

6. *CRYPTOCARYA STOCKSII*, Meissn.; F. B. I. v. 120 *in part*.

W. Gháts, Canara to the Pulneys, Anamalais and hills of Travancore at about 4,000–5,000 ft.; Bababudan Hills of Mysore (Talbot).

A large or medium-sized tree with very coriaceous leaves and prominently lenticellate branches. The midrib and main nerves are much impressed above, and the margins often reflexed, the branchlets prominently lenticellate.

## 2. *Apollonias*, Nees.

Evergreen trees. *Leaves* scattered, chiefly near the ends of the branchlets, penninerved. *Flowers* very small, hermaphrodite, in axillary or subterminal racemes, the peduncles and pedicels slender. *Perianth*-tube short; lobes 6, in two rows, subequal. *Stamens* 9 perfect, those of the 1st and 2nd rows introrse, opposite the perianth-lobes, those of the 3rd row opposite the first and extrorse, with a pair of stalked glands at their bases, those of the 4th row reduced to ovate or cordate staminodes, all stamens 2-celled only. *Ovary* sessile, stigma depressed-capitate. *Fruit* drupaceous, globose or ovoid, seated on the slightly enlarged perianth lobes.

*APOLLONIAS ARNOTTII*, Nees; F. B. I. v. 121; Wt. Ic. t. 1819; Bedd. Fl. t. 291.

W. Gháts, forests of Tinnevely and Travancore (Wight, Barber, Lawson); Nilgiris (Gardner), in evergreen forest, at 2,500–5,000 ft., rare.

A moderate-sized tree with narrowly lanceolate long acuminate leaves, similar to those of *Phoebe lanceolata*, which has 4-celled anthers and stouter peduncles and pedicels.  
• Vern. Mal. Chenthanam.

### 3. *Beilschmiedia*, Nees.

Evergreen trees or shrubs. Leaves alternate or opposite, usually coriaceous, penni-nerved, venose-reticulate. Flowers small, hermaphrodite, axillary lateral or subterminal, in racemes or panicles. Perianth-tube short; lobes 6, subequal, deciduous. Stamens 9 perfect, those of the 1st and 2nd rows introrse, those of the 3rd row extrorse, staminodes of the 4th row cordate or ovoid, stipitate; glands 6, stipitate, nearly as large as the staminodes, between the 2nd and 3rd row of stamens; all anthers 2-celled. Ovary sessile, free from the perianth, attenuate into the style; stigma obtuse. Fruit an oblong ovoid or globose berry, the pedicels not or only slightly thickened. Seed with a membranous testa; cotyledons fleshy, often with a rudimentary dissepiment, sometimes ruminant.

Leaf buds small, pubescent, without coriaceous scales:—

Ovary glabrous; leaves usually alternate, elliptic- or oblong-lanceolate, obtuse or bluntly acuminate, cuneate at base, shining above, main nerves about 8-12 pairs, joined by a prominent areolate reticulation, up to 7 in. long, 2.5 in. broad; racemes axillary or lateral, pubescent, under 1 in. long, the bracts narrow, deciduous; berry oblong-obovoid up to 1-1.5 in. long . . . . . 1. *Roxburghiana*.

Ovary villous, leaves usually opposite, ovate lanceolate, obtusely acute, attenuate at base, dull above and below, main nerves 6-10 pairs, irregular, joined by a not very prominent reticulation, up to 7 in. long, 1.5-3 in. broad; racemes axillary and terminal, fulvous-villous, about 1 in. long and with prominent concave silky deciduous bracts; berry purple, cylindric, 1-1.5 in long, .75 in. in diam., the peduncle red . . . . . 2. *Bourdillonii*.

Leaf-buds elongate, perulate, the scales lanceolate; leaves usually opposite, elliptic-lanceolate, obtusely acute or acuminate, acute at base, shining, glabrous, main nerves 10-12, the reticulation prominent, raised and areolate, up to 6 in. long, 2.5 in. broad; panicles axillary and terminal, with slender peduncles and pedicels, not bracteate; berry ovoid, up to 1.25 in. long, in diam. .7 in. smooth, purple

3. *Wightii*.



1. *BEILSCHMIEDIA ROXBURGHIANA*, Nees; F. B. I. v. 121; Wt. Ic. t. 1828.

N. Circars, hills of E. Gháts on Mahendragiri, the Pal-kondas and in Rampa, from Ganjam to the Godavari, at 1,500–4,000 ft. (Gamble).

A large or moderate-sized tree with coriaceous leaves, the nerves and reticulation all prettily raised on the upper surface. Wood white, moderately hard, even-grained.

Vern. *Hind.* Konhaia.

2. *BEILSCHMIEDIA BOURDILLONI*, Brandis Ind. Trees 528. *B. fagifolia*, Bedd. Fl. t. 263, not of Nees.

W. Gháts, S. Canara to Travancore, in evergreen forests up to 1,500 ft.

A large tree, the rather soft leaves both opposite and alternate. Bark dark green; wood pale brown, hard and heavy, but not used. Vern. *Mal.* Mora Kutthi.

3. *BEILSCHMIEDIA WIGHTII*, Benth.; F. B. I. v. 124. *Haasia Wightii*, Nees; Wt. Ic. t. 1831; Bedd. Fl. t. 298.

W. Gháts, Anamalais, Pulneys and hills of Travancore, up to 4,000 ft. in evergreen forests.

A large tree with characteristic perulate buds and flowers in panicles 4 in. long, the ovary glabrous. Bark brown, rough; wood hard, greyish-white with a silvery grain.

#### 4. *Cinnamomum*, Blume.

Evergreen trees or shrubs, usually with aromatic bark. *Leaves* opposite or sometimes alternate, usually ribbed from near the base. *Flowers* small, hermaphrodite, in axillary lateral or sub-terminal cymes or panicles, in the latter case the branches usually ending in dichasia with the middle flower largest. *Perianth*-tube short, funnel-shaped, enlarged in fruit; lobes 6, subequal, persistent or partly truncate or deciduous in fruit. *Stamens* 9 perfect, those of the 1st and 2nd rows opposite the perianth-lobes introrse and eglandular, those of the 3rd row opposite the 1st row extrorse and bearing on the filaments 2 usually stipitate glands; staminodes of the 4th row opposite the 2nd row usually cordate and stipitate; anthers 4-celled. *Ovary* sessile at the bottom of the perianth-tube, narrowed into the



the lobes persistent deciduous or sometimes truncate near their middle. Seed conform to the fruit; testa membranous; cotyledons fleshy.

Leaves opposite or only sometimes alternate:—

Flowers few only, axillary, peduncles and pedicels slender, usually long:—

Flowers very small, under .1 in. long, glabrous, as are the stamens and ovary, in dichæioid cymes; stamens minute, the filaments very short; leaves elliptic-ovate or lanceolate, obtusely acuminate, 3-ribbed from about .2 in. above the base, minutely reticulate with many horizontal transverse nervules, up to 5 in. long, 2 in. broad ..... 1. *gracile*.

Flowers small, .15 in. long, grey-pubescent, in subumbellate cymes, the filaments villous; leaves linear-lanceolate, acuminate, acute at base, 3-ribbed from the base, glabrous, up to 4 in. long, 1.25 in. broad, but usually much narrower ..... 2. *riparium*.

Flowers .2 in. long, fulvous-tomentose, in rather short fulvous racemes, often reduced to threes, the filaments villous; leaves ovate, acute or acuminate, acute at base, 3-ribbed from about .2 in. above the base, tawny villous beneath when young, sparsely so when old, up to 3 in. long, 1.4 in. broad ..... 3. *travancoricum*.

Flowers many, in axillary or terminal panicles:—

Leaves glabrous:—

Panicles long, many-branched, with long peduncles and pedicels, the flower-buds globose, grey-pubescent, perianth .1-.2 in. long:—

Leaves large, oblong or elliptic-oblong or oblong-lanceolate, acute or acuminate, often sphacelate, 3-ribbed from at or a little above the base, the side ribs running almost to the apex, the transverse nervules horizontal and parallel, up to 18 in. long, 4.5 in. broad ..... 4. *iners*.

Leaves moderate-sized, ovate or elliptic-ovate or ovate-lanceolate, shining above:—

Leaves 3-5-ribbed from a little above the base, the chief side ribs ending about three-fourths up, nervules irregularly reticulate, the base usually rounded, up to 6 in. long, 3 in. broad ..... 5. *zeylanicum*.

Leaves 3-5-ribbed from about .3 in. above the base, ovate, obtuse at apex, attenuate at base into the long petiole, the ribs faint, the side ones ending about half-way up

Panicles short and compact, but long-peduncled, up to about 3 in. in length, fulvous tomentose, pedicels short, perianth .25 in. long; leaves broadly ovate, obtuse or acute, rounded or acute at base, often glaucous beneath, 3-5- sometimes 7-ribbed from .3 to .5 in. above the base, a few nerves both from the midrib and side ribs, reticulation areolate; up to 4 in. long, 3.5 in. broad .....7. *Wightii*.

Panicles long-peduncled, but comparatively few-flowered, up to 5 in. long in all, the flowers elongate, with the thickened perianth up to .5 in. long; leaves elliptic-ovate or oblong, obtuse, narrowed at base into the broad petiole, 3-5-ribbed, the 3 inner from nearly .5-1 in. above the base, reaching nearly to the apex, the middle two with nerves; up to nearly 9 in. long, 2.5-3.5 in. broad .....8. *macrocarpum*.

Leaves hairy, at any rate on the under surface:—

Flowers small, .2 in. long with pedicels, the buds globose, yellowish-tawny tomentose, in panicles up to 4 in. long; leaves elliptic-oblong or ovate-lanceolate, acute or acuminate, 3-nerved from at or a little above the base and the side ribs nearly to the apex, when young glaucous and yellowish-pubescent beneath, afterwards glabrous; up to 7 in. long, 2.5 in. broad, but mature leaves usually much smaller

9. *sulphuratum*.

Flowers rather large, .3 in. long, usually in threes on the branches of densely fulvous-tomentose panicles 1-4 in. long; leaves also when young densely fulvous-tomentose on both sides, less so when old, opposite or alternate, ovate or oblong, sometimes lanceolate or even orbicular, obtuse or acute, 3-5-ribbed from near the base, the side ribs to the apex, often joined to the centre ones by nerves; up to 5 in. long, 2 in. broad

10. *Perrottetii*.

Leaves all alternate, thinly coriaceous, ovate or orbicular, caudate-acuminate, acute or rounded at base, glabrous, 3-5-ribbed, the side ribs prolonged to the apex, 3-5 in. long, 1.5-3 in. broad, shortly petioled; flowers minute, in short axillary pedunculate pubescent cymes about 1 in. long .....11. *caudatum*.

1. CINNAMOMUM GRACILE, Hook. f.; F. B. P. v. 133.

W. Gháts, evergreen forests of Tinnevely and Travancore, at 2,500-5,000 ft.

2. *CINNAMOMUM RIPARIUM*, Gamble in Kew Bull. 1925, 128.  
W. Gháts, from below Coorg to the Anamalais and N. Travancore, on river banks in the low country (Bourdillon).  
A graceful little tree with bright blue shining ovoid berry, 5 in. long (*C. gracile*, Bourd. Trav. Trees 302, not of Hook. f.).
3. *CINNAMOMUM TRAVANCORICUM*, Gamble in Kew Bull. 1925, 128.  
W. Gháts, evergreen forests near Chimunji, Travancore, at 4,000 ft. and upwards (Bourdillon).  
A small or medium-sized tree reaching 30 ft. in height and 10 in. in diam. of trunk. Berry ovoid, purplish-blue, 5 in. long (*C. sulphuratum*, Bourd. Trav. Trees 302, not of Nees).
4. *CINNAMOMUM INERS*, Reinw; F. B. I. v. 130; Wt. Ic. tt. 122 bis, 130.  
W. Gháts from Mysore and Coorg to the Anamalais and Travancore, in evergreen forests, up to about 4,000 ft.; Carnatic, Shevaroy Hills of Salem and Kollimalai Hills of Trichinopoly.  
A large or medium-sized tree with coriaceous shining long leaves and ovoid berry, the fruiting perianth not ribbed.
5. *CINNAMOMUM ZEYLANICUM*, Blume; F. B. I. v. 131; Wt. Ic. t. 123.  
W. Gháts from S. Canara southwards, at low levels, sometimes cultivated. Cinnamon.  
A moderate-sized tree. Bark brown, rough; wood light red, moderately hard, somewhat scented but not used. When cultivated for its bark it is usually, as in Ceylon, grown in coppice, hence the shape of the leaves in specimens is rather variable. Berry ovoid, dark purple, the persistent perianth ribbed. Vern. *Hind.* Dalchini; *Tam.* Karruwa; *Tel.* Sanalinga; *Mal.* Karuva.
6. *CINNAMOMUM LITSEAEFOLIUM*, Thw.; F. B. I. v. 133.  
W. Gháts, hills of Tinnevely (Tadulingam), without locality (Beddome), Coimbatore (Brandis).  
A tree with long-petioled leaves obscurely ribbed and nerved.

Shola forests, above 6,000 ft., most common at the highest levels as about Ootacamund.

A stout tree with very coriaceous leaves and ovate-oblong berries supported by a truncate cup; these berries are frequently diseased and then become globose.

8. *CINNAMOMUM MACROCARPUM*, Hook. f.; F. B. I. v. 133.  
*C. iners*, Wt. Ic. t. 130?

W. Gháts, Sispara and other places in Nilgiris at about 6,000 ft. (Lawson, Gamble); Iyerpadi in Coimbatore (Barber).

A tree with coriaceous shining leaves and large globose-oblong berry reaching nearly 1 in. in length and supported by a large thickened cup and pedicel. The 4th row staminodes usually bear glands like the 3rd row stamens.

9. *CINNAMOMUM SULPHURATUM*, Nees; F. B. I. v. 132.

W. Gháts, Coorg and Mysore to N. Coimbatore, Nilgiris and Anamalais, in Shola forests at about 4,000–6,000 ft.

A tree with pale yellowish branches and leaves, the ellipsoid berry .5–.75 in. long, seated on the persistent perianth with spreading lobes. Specimens from high levels have usually shorter and more rounded leaves.

10. *CINNAMOMUM PERROTTETII*, Meissn.; F. B. I. v. 134.

W. Gháts, Nilgiri Hills, in Shola woods, above 6,000 ft.

A small tree or (perhaps) shrub with coriaceous leaves, often concave when old, much fulvous tomentose on leaves and branchlets. Berry ovoid, about .5 in. long, seated on the perianth cup with reflexed lobes.

11. *CINNAMOMUM CAUDATUM*, Nees; F. B. I. v. 134.

N. Circars, Mahendragiri Hill in Ganjam at 4,500 ft. (Gamble), hills of Vizagapatam, at 4,500 ft. (A. W. Lushington).

A small tree, the berries ovoid about .5 in. long, seated on the enlarged perianth-tube, the lobes recurved. The inner perianth-lobes are smaller than the outer.

*C. Camphora*, Nees, is the Camphor tree of Japan, sometimes cultivated in India, though scarce in Madras.

#### 5. *Alseodaphne*, Nees.

Evergreen trees. *Leaves* alternate, often crowded at the ends of the branchlets, penninerved. *Flowers* small, hermaphrodite,

in axillary or subterminal panicles. *Perianth*-tube short, continuous with the pedicel; lobes 6, subequal, or the 5 outer rather the smaller. *Stamens* 9 perfect, those of the 1st and 2nd rows opposite the perianth-lobes, introrse, those of the 3rd row opposite the 1st row, extrorse, with 2 rather large glands on the inner bases of the filaments, staminodes of the 4th row opposite the 2nd row, cordate, stipitate; anthers all 4-celled. *Ovary* ovoid or globose; style slender; stigma peltate. *Fruit* an ellipsoid or globose berry seated on the top of the enlarged thick fleshy often warted peduncle, the perianth-lobes scarcely enlarged and usually persistent. *Seed* conform to the fruit; cotyledons fleshy.

1. *ALSEODAPHNE SEMECARPIFOLIA*, Nees; F. B. I. v. 144; Wt. Ic. t. 1826.

W. Gháts, S. Canara and Malabar, in evergreen forests, at rather low levels.

A large or moderate-sized tree with many branches, the leaves elliptic-oblong or obovate, rounded or emarginate at apex, cuneate at base, often glaucous beneath, minutely reticulate, up to 6 in. long, 3 in. broad; peduncles in fruit rough; berry ellipsoid, smooth, .5-.75 in. long. Bark yellowish-brown; wood dark brown, moderately hard, said to be useful.

*Var. angustifolia*, Meissn. Leaves elliptic-oblong or lanceolate, glaucous beneath.

W. Gháts, lower Pulney Hills (Bourne).

*Var. parvifolia*, Hook. f.; Wt. Ic. t. 1827; Bedd. Fl. t. 297. Leaves obovate or oblanceolate, 2-3 in. long, very glaucous beneath and black when dry, the panicles short, the fruit large.

W. Gháts, Pulney Hills, Sirumalai hills of Madara and Hills of Travancore at about 4,000-5,000 ft.

## 6. *Machilus*, Nees.

Evergreen trees, leaf-buds perulate with imbricate scales. *Leaves* alternate, penninerved, reticulate. *Flowers* small or moderate-sized, hermaphrodite, in panicles from upper axils. *Perianth*-tube usually short; lobes 6, subequal or the outer slightly the smaller, persistent, spreading or reflexed in fruit. *Stamens* 9 perfect, those of the 1st and 2nd row opposite the

pair of stipitate glands at their base; staminodes of the 4th row opposite the 2nd row, cordate, stipitate; anthers 4-celled. Ovary sessile, style slender; stigma small or discoid. Fruit a globose or oblong berry seated on the scarcely enlarged perianth, whose lobes are reflexed, pedicel not enlarged. Seed conform to the fruit; testa thin.

*MACHILUS MACRANTHA*, Nees; F. B. I. v. 140; Wt. Ic. t. 1824; Bedd. Fl. t. 264. *M. glaucescens*, Wt. Ic. t. 1825.

N. Circars, hills of Vizagapatam, about 4,000 ft. (A. W. Lushington); Deccan, in hill country as at Nandidrúg, Mysore, and the forests of North Coimbatore; W. Gháts, in most Districts from S. Canara and Coorg to Nilgiris Anamalais, Pulneys and hills of Travancore, in evergreen forests up to 7,000 ft.

A large evergreen tree with flowers in subterminal panicles. Leaves variable in size from elliptic-oblong, rounded at both ends, to oblong-lanceolate acute, glaucous beneath. Flowers also in size variable as represented in Wight's two plates. Berry black, globose, 5-75 in. in diam. Bark pale brown; wood reddish-white darkening on exposure, rough, used for planking and other purposes. Vern. Tam. Kolla mávu; Kan. Kurma; Mal. Urávu; Badaga Kroma.

#### 7. Phoebe, Nees.

Evergreen shrubs or trees. Leaves alternate, often fascicled at the ends of the branchlets, penninerved; leaf-buds ovate or lanceolate with few scales. Flowers hermaphrodite or rarely polygamous, in axillary or subterminal panicles. Perianth-tube short; lobes 6, subequal, erect and accrescent in fruit and clasping its base. Stamens 9, perfect, those of the 1st and 2nd row introrse eglandular, the filaments slender, those of the 3rd row opposite the 1st row extrorse with 2 large stipitate glands at their base; staminodes of the 4th row opposite the 2nd row, cordate or sagittate, stipitate; anthers 4-celled. Ovary sessile, usually globose; style slender; stigma discoid. Fruit an ovoid ellipsoid or globose berry, seated on the erect and persistent enlarged perianth-lobes. Seed conform to the fruit; testa thin; cotyledons fleshy.



axils; leaves lanceolate, long acuminate, long cuneate at base, up to 10 in. long and about 2 in. broad; berry black, narrowly ellipsoid, glabrous, up to .5 in. long ..... 1. *lanceolata*.

Branchlets, leaves beneath and inflorescence minutely grey-puberulous; flowering peduncles very slender, 3-4 in. long, usually lateral from the branches below the uppermost axils; leaves oblanceolate, long-acuminate, cuneate often narrowly at base, up to 9 in. long, 3.5 in. broad, usually glaucous beneath, the nerves and transverse nervules distant; berry ovoid, .3 in. long ..... 2. *paniculata*.

Branchlets, leaves beneath and inflorescence rusty-tomentose; flowering peduncles 1-2 in. long, both axillary and lateral near the ends of the branchlets; leaves elliptic or obovate, acuminate, cuneate at base, up to 6 in. long, 2 in. broad, nerves rather close, transverse nervules close and prominently parallel; berry ovoid, .3 in. long

3. *Wightii*.

1. *PHOEBE LANCEOLATA*, Nees; F. B. I. v. 141; Wt. Ic. t. 1821.

W. Gháts, Wynaad, Nilgiris, Anamalais and hills of Travancore, in evergreen forests, at 3,000-5,000 ft., rather scarce.

A medium-sized tree, the young branches usually with yellowish-white bark. Wood greyish white with olive-brown heartwood, hard and close-grained.

2. *PHOEBE PANICULATA*, Nees  $\alpha$ ; F. B. I. v. 142 *in part*.

N. Circars, hills of Vizagapatam at 4,500 ft. (A. W. Lushington); Deccan, hills of N. Coimbatore; Carnatic, Kollimalai Hills of Trichinopoly; W. Gháts, Wynaad, Pulney and Sirumalai Hills of Madura, about 3,000-5,000 ft. A tree with nearly black branchlets.

3. *PHOEBE WIGHTII*, Meissn.; Bedd. Fl. t. 192. *P. paniculata*, Nees  $\beta$ ; F. B. I. v. 142 *in part*; Wt. Ic. t. 1820.

W. Gháts, Nilgiris, Anamalais and Pulneys, in Shola forests, above 5,000 ft.; Bababudan Hills of Mysore at 4,500 ft.; Kollimalai Hills of Trichinopoly.

A moderate-sized tree common in Nilgiri sholas. Bark thin-brown; wood brown, smooth, with brown medullary patches. -Vern. *Badaga*, Kumára.

8. *Actinodaphne*, Nees.

Evergreen trees or shrubs. Leaves subverticillate, rarely

dioecious, in axillary or lateral dense bracteate sessile or peduncled clusters or short racemes bearing bracteate umbellules of usually 5, the bracts imbricate, caducous, the pedicels lengthening after the fall of the bracts. *Perianth*-tube short; lobes 6, subequal. *Stamens* in ♂ flowers 9, those of the 1st and 2nd row opposite the perianth-lobes, those of the 3rd row opposite those of the 1st, the filaments 2-glandular; anthers all oblong, introrse, 4-celled, filaments slender. *Staminodes* in ♀ flowers also 9, those of the 1st and 2nd rows spatulate or linear, those of the 3rd row linear and 2-glandular. *Ovary* in ♀ flowers ovoid, attenuate into the style; stigma dilated; in ♂ flowers 0 or a pistillode. *Fruit* a berry resting on the enlarged hardened flat or concave perianth-tube, the lobes persistent or deciduous. *Seed* with thin testa; cotyledons thick, usually hemispheric.

Leaves comparatively small, usually under 6 in. long and at most 1.5 in. broad, coriaceous, more or less glaucous beneath, whorled, minutely reticulate :—

Leaves lanceolate, acuminate; ♀ flowers in sessile umbels; fruiting perianth with persistent lobes :—

Leaves up to 5 in. long, innovations fulvous-silky, midrib and petiole fulvous-tomentose, main nerves short, about 12–15 pairs

1. *salicina*.

Leaves up to 4 in. long, innovations dull rusty-tomentose, midrib, petiole and leaf margins when young fulvous-tomentose, main nerves 8–10 pairs, curved ..... 2. *lanata*.

Leaves elliptic or oblong, acute or obtuse at apex, acute at base, up to 2.5 in. long, 1 in. broad, innovations fulvous-villous or -silky but mature leaves glabrous; fruiting perianth with deciduous lobes

3. *campanulata*.

Leaves comparatively large, usually more than 6 in. long and 1.5 in. broad, chartaceous :—

Leaves with the lowest pair of main nerves usually opposite, sub-triple-nerved :—

Lowest pair extending two-thirds up the blade, other nerves from the midrib about 3–4 pairs, leaves elliptic, shortly acuminate, cuneate at base, fulvous-tomentose as are the branchlets, petioles and inflorescence, up to 5 in. long, 2 in. broad ..... 4. *Bourneae*.

Lowest pair only shortly prolonged, scarcely to one-third of the blade, other nerves about 10 pairs, leaves oblong-lanceolate, acute

Leaves penninerved, the lowest pair not opposite :—

Leaves oblong-lanceolate or -oblanceolate, acuminate at both ends, the nerves very oblique, in whorls of 7–10, up to 9 in. long, 2·5 in. broad, under-surface softly grey- or cinnamomeous-tomentose ; ♀ fruiting flowers in peduncled umbels . . . 6. *Bourdillonii*.

Leaves obovate, obtuse or obtusely acute at apex, long-cuneate at base, densely rufous-tomentose beneath and on midrib above, also on petiole, branchlets and ♀ inflorescence, up to 6 in. long, 2·5 in. broad, main nerves 8–9 pairs, often branched . . 7. *Lawsonii*.

Leaves elliptic-lanceolate, acuminate, attenuate at base, fulvous-villous beneath, up to 10 in. long, 3 in. broad :—

Leaves shining above, thickly villous beneath, the nerves and nervules not prominent ; ♀ fruiting flowers with patelliform shallow perianth-tube, the berry globose, 3 in. in diam.

8. *hirsuta*.

Leaves somewhat shining above, sparsely villous beneath between the nerves, the nerves and nervules very prominent ; ♀ fruiting flowers with cup-shaped perianth-tube, the berry small (immature) . . . . . 9. *Tadulingami*.

1. *ACTINODAPHNE SALICINA*, Meissn. ; F. B. I. v. 148.

W. Gháts, Sispara in Nilgiris, at 5,000–6,500 ft., in Shola forests.

A tree with narrow slender leaves, the ♂ flowers, and fruit so far not yet known.

2. *ACTINODAPHNE LANATA*, Meissn. ; F. B. I. v. 149.

W. Gháts, Nilgiri Hills (Wight, Gamble), at about 5,000–6,000 ft. in Shola forests.

A tree with lanceolate leaves and a black globose berry about 3 in. in diam., the ♂ flowers not yet known.

3. *ACTINODAPHNE CAMPANULATA*, Hook. f. ; F. B. I. v. 148.

*A. salicina*, Bedd. Fl. t. 295, not of Meissn.

W. Gháts, hills of Tinnevely, at 4,000 ft. (Beddome, Hooper and Ramaswami).

A medium-sized tree (Bedd.), apparently a shrub (Hook. f.), with a globose berry about 25 in. in diam.

Var. *obtusa*, Gamble. Leaves narrower, about 7 in. broad, oblong, obtuse at apex, nearly black when dry. An elegant

4. **ACTINODAPHNE BOURNEAE**, Gamble in Kew Bull. 1925, 128.  
W. Gháts, Sholas of the Pulneys Hills about Kodaikanal,  
6,000 ft. (Bourne).  
A small tree.
5. **ACTINODAPHNE MADRASPATANA**, Bedd. ex. Hook. f.;  
F. B. I. v. 149. *A. Hookeri*, Meissn., var. *longifolia*. *A.*  
*Hookeri*, Bedd. Fl. t. 296, at any rate as for description.  
Deccan, Seshachalam Hills of Cuddapah at 3,000 ft.  
(Wight, Gamble, Fischer); Kambakam Hills of Chingleput  
at 2,000-2,400 ft. (Fischer); Pulicat Hills (W. Elliot).  
A tree with long leaves very white beneath, close to *A.*  
*angustifolia*, Nees, of Bengal and Assam (Haines in 'Bot.  
Bihar and Orissa'), but distinct in fruit and in leaf-  
venation. Sir W. Elliot's specimen has a leaf 10 in. long,  
4 in. broad.
6. **ACTINODAPHNE BOURDILLONII**, Gamble in Kew Bull.  
1925, 129.  
W. Gháts, in most Districts from S. Canara to Nilgiris,  
Anamalais and hills of Travancore, up to 6,000 ft.  
A small tree reaching 30 ft. in height, the young leaves  
quite white (Bourdillon), the wood of no value. The ♂  
flowers are in large clusters with concave bracts, usually,  
like the ♀, pedunculate from the scars of fallen leaves.
7. **ACTINODAPHNE LAWSONII**, Gamble in Kew Bull. 1925, 129.  
W. Gháts, in S.E. Wynaad, about 4,000 ft. (Lawson).  
Apparently a small tree. A specimen of C. B. Clarke's  
from Coonoor is probably this and has larger and rather  
thinner leaves.
8. **ACTINODAPHNE HIRSUTA**, Hook. f.; F. B. I. v. 152. *A.*  
*Hookeri*, Bedd. Fl. t. 296, figure only?  
W. Gháts, Wynaad, Anamalais and hills of Travancore,  
in evergreen forests up to 3,000 ft.  
A large tree reaching 60 ft. in height and a diameter of  
18 in., the innovations very fulvous-silky.
9. **ACTINODAPHNE TADULINGAMI**, Gamble in Kew Bull. 1925,  
130.  
W. Gháts, Canara to Anamalais, Travancore and Tinne-  
velly in evergreen forests up to 2,000 ft.

9. *Litsea*, Lamk.

Evergreen, rarely deciduous trees or shrubs. *Leaves* alternate or sometimes opposite, penninerved. *Flowers* dioecious, in umbellules of several together, usually 4-6 but in some cases up to 15, supported by 4-6 or more concave involueral bracts; the umbellules sessile or peduncled in axillary or lateral clusters or in racemes, rarely solitary. *Perianth*-tube in ♂ flowers 0 or very small, in ♀ flowers funnel-shaped; lobes normally 6, sometimes more, sometimes 0 or very early caducous, equal or unequal. *Stamens* in ♂ flowers normally 9 or 12, in four rows, those of rows 1 and 2 usually eglandular, those of row 3 and row 4 when present with 2-glandular filaments; all stamens with 4 cells, the cells introrse or the lower pair lateral; ovary 0 or rudimentary. *Staminodes* in ♀ flowers as the stamens of the ♂ but those of the outer rows clavate or linear, those of the inner rows subulate and 2-glandular; ovary enclosed in the perianth-tube or free; style thick, often curved; stigma dilated, irregularly lobed. *Fruit* a globose ovoid ellipsoid or oblong berry, seated on the enlarged perianth-tube with the more or less thickened pedicel; pericarp usually succulent. *Seed* with thin testa and fleshy cotyledons.

*Perianth*-lobes incomplete or 0; stamens often many:—

Umbellules solitary, many-flowered, peduncled, with large bracts; leaves elliptic or obovate, acute or acuminate, rounded or narrowed at base, nearly glabrous above, fulvous-tomentose or -pubescent beneath, up to 10 in. long, 3-4 in. broad, the main nerves 10-15 pairs; berry depressed globose, black, .4 in. in diam. 1. *deccanensis*. Umbellules in pedunculate umbels or corymbs, bracts medium-sized; leaves variable, lanceolate elliptic or oblong even ovate or obovate, usually obtuse, obtuse or acute at base, glabrous above except on midrib, glabrous to grey-pubescent beneath, very minutely reticulate, up to 9 in. long, 4 in. broad, the main nerves 8-12 pairs; berry globose, purple, .25 in. in diam. . . . . 2. *chinensis*. Umbellules solitary or in clusters, peduncled, the bracts medium-sized; leaves elliptic oblong or obovate, obtuse or acute, glabrous, prominently scrobiculate, up to 6 in. long, 1.5 in. broad, the main nerves 6-8 pairs; berry globose, .25 in. in diam. . . . . 3. *ligustrina*.

*Perianth*-lobes complete:—

Leaves glabrous beneath or nearly so :—

Umbellules, ♂ solitary peduncled, ♀ in few-flowered peduncled racemes, all glabrous, small; leaves membranous, elliptic-oblong, abruptly acuminate, narrowed at base, glaucous beneath, up to 5 in. long, 2 in. broad, main nerves 6–12 pairs, slender

4. *venulosa*

Umbellules long-peduncled, in sessile or short-peduncled umbels, minutely puberulous; leaves subcoriaceous, elliptic-oblong or lanceolate, acute, narrowed at base, glaucous and finely reticulate beneath, up to 10 in. long, 3 in. broad, main nerves about 12 pairs, irregular ..... 5. *laeta*.

Umbellules subsessile, in axillary or lateral clusters :—

Leaves subcoriaceous, elliptic-obovate or lanceolate, shortly acute, narrow at base, very minutely puberulous beneath, up to 6 in. long, 1.5 in. broad, the main nerves 6–7 pairs, obscure

6. *coriacea*.

Leaves oblong-lanceolate, acuminate, narrowed at base, glabrous or very minutely puberulous and reticulate beneath, up to 7 in. long, 1.5 in. broad, the main nerves about 10–12 pairs ..... 7. *laevigata*.

Leaves narrowly linear-lanceolate, acuminate at both ends, glabrous and reticulate beneath, up to 4.5 in. long, 1 in. broad, the main nerves 6–7 pairs ..... 8. *mysorensis*.

Umbellules in racemes :—

Leaves black when dry, coriaceous, quite glabrous as are the racemes, long- (7.5 in.), petioled, elliptic, obtusely acute or acuminate, narrowed at base, up to 5 in. long, 2 in. broad, main nerves 9–12 pairs, scarcely visible ..... 9. *nigrescens*.

Leaves reddish-brown beneath when dry, greenish above :—

Leaves very coriaceous, quite glabrous, thick-petioled, elliptic, elliptic-oblong or lanceolate, obtuse or acute at apex, narrowed or rounded at base, up to 6 in. long, 2.5 in. broad, main nerves 8–12 pairs, not prominent; berry depressed globose, 1 in. in diam. on a short flattened undulate perianth-tube, the pedicel very thick ..... 10. *oleoides*.

Leaves coriaceous, glabrous, elliptic- or lanceolate-oblong, acute or acuminate, narrowed at base, up to 8 in. long, 2.5 in. broad, main nerves 8–12 pairs prominent; berry ellipsoid, .5 in. long, seated on the cup-shaped perianth-tube

11. *Stocksii*.



2 in. broad, main nerves 10-12 pairs, prominent; berry (not ripe) ovoid, seated on the obconic perianth-tube

12. *glabrata*.

Leaves white-glaucous beneath when dry:—

Leaves elliptic-obovate or lanceolate-oblong, obtuse or acute, narrowed at base, glabrous, or pubescent only on the nerves when young, up to 7 in. long, 2.5 in. broad, but usually smaller, the 7-10 pairs of main nerves very faint; berry ellipsoid, nearly .5 in. long, seated on the cup-shaped perianth-tube with thick pedicels ... *Stocksii* var. *glabrescens*.

Leaves linear-oblong or lanceolate, obtuse or acute, up to 3.5 in. long, .75 in. broad, the main nerves 8-10 pairs rather close and prominent ..... 13. *Beddomei*.

Leaves pubescent or tomentose beneath:—

Umbellules in sessile or subsessile axillary or lateral clusters:—

Leaves alternate:—

Leaves chartaceous, elliptic or elliptic-oblong or -obovate, obtuse or slightly acute at apex, rounded at base, softly fulvous-pubescent beneath, up to 8 in. long, 4 in. broad, main nerves 8-12 pairs, transverse nervules parallel; berry ovoid or ellipsoid, .3 in. long, on a small recurved flattened perianth-tube ..... 14. *polyantha*.

Leaves coriaceous, elliptic-oblong or -obovate, obtuse, slightly acute at base, roughly fulvous-pubescent beneath, up to 9 in. long, 4.5 in. broad, main nerves 10-12 pairs, transverse nervules parallel and conspicuous; berry ellipsoid, 1 in. long, .6 in. broad, on a deep obconic warted cup .5 in. long ..... 15. *insignis*.

Leaves subcoriaceous, obovate or obovate-oblong, obtuse and abruptly acute at apex, cuneate at base, minutely fulvous-pubescent beneath, up to 9 in. long, 4 in. broad, main nerves 12-18 pairs, closer towards the base; berry oblong, .5 in. long, on a cup-shaped 2-4-cleft glabrous, usually sessile perianth-tube ..... 16. *Bourdillonii*.

Leaves usually opposite at the ends of the branchlets, alternate lower down, membranous, oblong or obovate, acuminate, fulvous pubescent beneath, especially on the nerves, up to 7 in. long, 2 in. broad, main nerves 8-12, looped to join near the margin, berry globose, on a cup-shaped, shortly lobed perianth-tube ..... 17. *travancorica*.

Umbellules in racemes:

obtuse or rarely acute, fulvous-pubescent beneath, especially on the nerves, sometimes nearly glabrous, up to 4 in. long, 2 in. broad, main nerves 4-8 pairs prominent, the transverse nervules obscure; berry ovoid, 4-5 in. long, seated on the cup-shaped perianth-tube, the pedicel thickened

18. *Wightiana*.

Leaves large, elliptic- or obovate-oblong, acute or acuminate, densely fulvous-tomentose beneath, up to 10 in. long, 4 in. broad, main nerves 10-15 pairs, prominent as are the transverse nervules; berry oblong, 5-75 in. long, seated on the turbinate perianth-tube with thick pedicel.....19. *floribunda*.

1. *LITSEA DECCANENSIS*, Gamble n. comb. *L. tomentosa*, Heyne; F. B. I. v. 157. *Tetranthera tomentosa*, Roxb.; Wt. Ic. t. 1834.

Deccan, in the hills of Cuddapah, Mysore and Chittoor at about 2,000-4,000 ft.; Carnatic, hills of S. Arcot, Salem and Trichinopoly; W. Gháts, in all Districts, in rather dry forests at 3,000-6,000 ft.

A moderate-sized tree with soft grey or tawny branchlets and leaves. The wood is said to be yellowish and likely to be useful. Vern. *Mar.* Chikua; *Tel.* Naramamidi; *Tam.* Perumbandali.

2. *LITSEA CHINENSIS*, Lamk. *L. sebifera*, Pers.; F. B. I. v. 157. *Tetranthera apetala*, Roxb. Cor. Pl. t. 147.

N. Circars, from Ganjam to the Godavari, in hill forests; Deccan, in the hills of Nellore (Ramaswami) and Cuddapah (Gamble), very scarce in the forests of the W. Gháts.

A moderate-sized tree with thin leaves of variable size, shape and pubescence. Bark brown; wood greyish-brown, moderately hard. Vern. *Hind.* Maida; *Tel.* Narra alagi.

3. *LITSEA LIGUSTRINA*, Hook. f.; F. B. I. v. 158. *Tetranthera ligustrina* Nees; Wt. Ic. t. 1835.

Deccan, hills of N. Coimbatore, 2,000-5,000 ft.; W. Gháts, Nilgiris, Pulneys and hills of Tinnevely, especially Nilgiris on E. side, at 3,000-6,000 ft.

A small tree, with glabrous very reticulate leaves.

4. *LITSEA VENULOSA*, Hook. f.; F. B. I. v. 161.

W. Gháts, hills of Tinnevely about Courtallum, 3,000-4,000 ft. (Wight, Beddome).

A straggling evergreen shrub.

## 5. LITSEA LAETA, Wall.; F. B. I. v. 169.

N. Circars, Mahendragiri in Ganjam, at 4,000 ft. (Gamble),  
Rampa Hills at 2,500 ft. (Gamble).

A small tree, the berry globose, seated on a turbinate  
enlarged perianth-tube nearly 5 in. in diam.

## 6. LITSEA CORIACEA, Hook. f.; F. B. I. v. 163.

W. Gháts, S. Canara, Coorg, Wynaad, Anamalais and  
evergreen forests of Travancore, up to 4,000 ft.

A small tree with leaves often green above, dull grey  
beneath when dry, the branchlets puberulous. the  
umbellules grey-silky in bud, the berry small, ovoid, in a  
cup-shaped perianth-tube. Vern. Tam. Panni thali; Mal.  
Maravetti thali.

7. LITSEA LAEVIGATA, Gamble n. comb. *Tetranthera attenuata*  
var. *laevigata*, Nees, Syst. Laur. 677.

W. Gháts, in the Tinnevelly Hills about Courtallum  
(Wight); hills of Mysore at 2,000 ft. (Meebold).

A tree with leaves when dry green above, reddish brown  
beneath, the branchlets pale, the umbellule bracts grey  
silky, the berry oblong in a small obconic perianth-  
tube.

## 8. LITSEA MYSORENSIS, Gamble in Kew Bull. 1925, 130.

W. Gháts, hills of Mysore at 3,000–4,000 ft. (Meebold),  
Wynaad (Beddome).

A small or medium-sized tree with very small sessile  
clusters of umbellules.

9. LITSEA NIGRESCENS, Gamble n. comb. *Tetranthera Pana-*  
*manja*, Wt. Ic. t. 1836, not of Buch.-Ham.

W. Gháts, hills of Tinnevelly and Travancore, at low  
levels (Wight, Bourdillon).

A moderate-sized tree, the racemes 1.5 in. long, the fruit  
not known.

## 10. LITSEA OLEOIDES, Hook. f.; F. B. I. v. 175.

W. Gháts, Nilgiris, Anamalais and hills of Travancore,  
above 4,000 ft. in evergreen forests, especially common in  
S. Nilgiri sholas towards Sispara.

A large tree with thick leaves, the racemes fulvous pubes-  
cent, about 2 in. long. The uppermost leaves are some-  
times opposite.

## 11. LITSEA STOCKSII, Hook. f.; F. B. I. v. 176.

W. Gháts, Nilgiris, Anamalais and hills of Travancore, at 2,000–6,000 ft. in evergreen forests.

A small tree, the racemes usually short and few-flowered, silky pubescent.

Var. *glabrescens*, Hook. f. Leaves very white beneath.

W. Gháts, in Nilgiris, on W. side, Naduvatom to Sispara, at 4,000–6,000 ft.

A small tree.

12. *LITSEA GLABRATA*, Hook. f.; F. B. I. v. 178.

W. Gháts, Nilgiris and Pulneys, above 6,000 ft., in Shola forest; Bababudan Hills of Mysore at 5,000 ft. (Meebold).

A tree.

13. *LITSEA BEDDOMEI*, Hook. f.; F. B. I. v. 177.

W. Gháts, hills of Tinnevely and Travancore about 4,000 ft., in evergreen forests (Beddome, Bourdillon, Barber).

A small tree with small leaves and short flower-racemes.

14. *LITSEA POLYANTHA*, Juss.; F. B. I. v. 162. *Tetranthera monopetala*, Roxb. Cor. Pl. t. 148; Brand. For. Fl. t. 45.

N. Circars, hills of Ganjam and Vizagapatam, at 3,000–4,000 ft. (A. W. Lushington); hills of Godavari (Gamble, Herb-Madr.), usually in shady places and ravines.

A moderate-sized evergreen tree with soft leaves when young, the not very conspicuous transverse nervules 1 in. apart. Bark dark grey, smooth, scaly; wood olive-grey, soft, not much used. Vern. *Hind.* Maida; *Ur.* Mosonea.

15. *LITSEA INSIGNIS*, Gamble in Kew Bull. 1925, 130.

W. Gháts, Anamalai Hills (Barber), hills of Travancore, at low levels up to 1,000 ft. (Bourdillon) in evergreen forests.

A lofty tree with yellowish flowers in great quantity on the old wood, leaving tubercles. The leaves are thick and the parallel transverse nervules 2 in. apart, the fruit and its cup very large.

16. *LITSEA BOURDILLONII*, Gamble in Kew Bull. 1925, 131.

W. Gháts, Anamalais and hills of Travancore, at 2,500–6,000 ft. in evergreen forests.

A moderate-sized or large tree with the flowers, both ♂ and ♀, in dense tufts on the branchlets, axillary or lateral. The usually close main nerves of the obovate leaves are characteristic.

17. *LITSEA TRAVANCORICA*, Gamble in Kew Bull. 1925, 132.

W. Gháts, hills of Travancore, in evergreen forests (Lawson, Venkoba Row).

A tree.

18. *LITSEA WIGHTIANA*, Hook. f.; F. B. I. v. 117 in part. *Cylicodaphne Wightiana*, Nees; Wt. Ic. t. 1833.

W. Gháts, Nilgiri Hills, above 6,000 ft., in Shola forests, common; hills of Travancore and Tinnevely, above 4,000 ft., in evergreen forests, less so.

A large evergreen tree with tawny branchlets and foliage. Bark light brown, smooth, with somewhat horizontal lenticels; wood yellowish brown, hard; apparently only used for fuel. Vern. *Badaga* Keynjee.

Var. *tomentosa*, Meissn. Leaves oblong-lanceolate, acuminate, narrower and with more (up to 10) pairs of main nerves, the berry larger, the cup deeper.

W. Gháts, Anamalais and Pulney Hills, above 6,000 ft., common; Nilgiris scarce.

19. *LITSEA FLORIBUNDA*, Gamble n. comb. *L. Wightiana*, Hook. f.; F. B. I. v. 177 in part. *Cylicodaphne floribunda*, Bl. in Mus. Bot. Lugd. Bat. i. 387. *Tetranthera Wightiana*, Bedd. Fl. t. 293.

W. Gháts, in all Districts, at 2,000–6,000 ft., in evergreen forests; Bababudan Hills and hills of W. Mysore and Coimbatore, on Nilgiris chiefly on E. slopes up to Coonoor and Kotagiri.

A large or moderate-sized tree, the ♂ racemes often 3–4 in. long.

#### 10. *Neolitsea*, Merr.

Evergreen trees. Leaves alternate opposite or in whorls, triple-ribbed, usually areolate-reticulate; buds perulate. Flowers dioecious, in 3–7-flowered umbellules arranged in clusters or short racemes in the axils of the upper leaves or on the branchlets between the nodes, the clusters with small bracts at their bases; involucre bracts 4, deciduous, pedicels elongating. Perianth-lobes 4. Stamens in ♂ flowers 6, those of the 2 outer rows eglandular, those of the 2 inner biglandular opposite the 1st row; anther-cells all introrse or the lower lateral. Staminodes of ♀ flowers 6, arranged as the stamens, usually linear or linear-clavate. Ovary ovoid; style thick; stigma usually peltate

in ♂ flowers 0 or a small pistillode. *Fruit* a globose or ellipsoid berry seated on the somewhat enlarged perianth-tube and somewhat elongate pedicel; pericarp smooth. *Seed* conform to the fruit, cotyledons hemispheric.

Fruiting perianth very small compared with the berry, about 1 in. in diam. :—

Berry oblong, .3–.4 in. in diam., on a crenate perianth-tube scarcely .1 in. in diam.; leaves subcoriaceous, glabrous, glaucous beneath, elliptic or oblong-lanceolate, obtusely acute, up to 4 in. long, 1–1.5 in. broad, nerves from the midrib 2–4 pairs....1. *zeylanica*.

Berry globose, .5 in. in diam., on a very small entire perianth-tube; leaves very coriaceous, thickly fulvous-villous when young on the ribs and nerves beneath, very white-glaucous, ovate, acuminate, up to 7 in. long, 3 in. broad, nerves from the midrib 3–5 pairs, outside the side ribs about 5–6, all prominent, the transverse nervules parallel .....2. *Fischeri*.

Fruiting perianth rather large compared with the berry, .25 in. :—

Fruiting perianth cup-shaped, entire; berry globose, .3–.4 in. in diam.; leaves coriaceous, glabrous, sometimes glaucous beneath, elliptic-ovate or even orbiculate, shortly acute, up to 5 in. long, 3 in. broad, minutely but prominently scrobiculate; nerves from the midrib 2–3 pairs, obscure .....3. *scrobiculata*.

Fruiting perianth patelliform, entire; berry globose, about .25 in. in diam.; leaves chartaceous or subcoriaceous, glabrous, very glaucous beneath when young, ovate or lanceolate, acuminate, up to 7 in. long, 3 in. broad, areolate, nerves from the midrib 2–3 pairs, faint .....4. *foliosa* var. *caesia*.

1. NEOLITSEA ZEYLANICA, Merr. *Litsea zeylanica*, Nees; F. B. I. v. 178 *in part*; Wt. Ic. tt. 132, 1844; Bedd. Fl. t. 294; *L. oblonga*, Nees; Wt. Ic. t. 1845.

N. Circars, Mahendragiri in Ganjam, at 4,000 ft.; Deccan, hills of Mysore and Coimbatore; W. Gháts, in all Districts, in evergreen and Shola forests, above 2,000 ft.

A small or moderate-sized tree. Bark thick, smooth, grey; wood light brown to yellow, moderately hard, said to have the scent of Sweet Briar (Bedd.).

2. NEOLITSEA FISCHERI, Gamble in Kew Bull. 1925, 132.

W. Gháts, Anamalais and hills of Cochin and Travancore, above 6,000 ft., in evergreen forest.

A large tree with large tawny perulate buds and golden



fulvous young leaves and shoots. The old leaves are large and very coriaceous with prominent ribs, nerves and transverse nervules. It somewhat resembles *Actinodaphne Hookeri* var. *dasypoda* but the fruit is different.

- ✓ 3. *NEOLITSEA SCROBICULATA*, Gamble n. comb. *Litsea scrobiculata*, Meissn. in DC. Prodr. xv. i. 223.

W. Gháts, Nilgiris, about 6,000 ft.; hills of Tinnexelly.

A tree reaching 50 ft. in height, the leaves long-petioled.

- ✓ 4. *NEOLITSEA FOLIOSA*, Gamble n. comb. *Litsea foliosa*, Nees in Syst. Laur. 622.

Var. *caesia*, Meissn. in DC. Prodr. xv. i. 222.

N. Circars, hills of Vizagapatam, Rampa Hills of Godavari, about 2,000 ft.; Deccan, Seshachalam Hills of Cuddapah, hills of Mysore and Coimbatore; Carnatic, Javadi Hills of S. Arcot; W. Gháts, hills of S. Travancore, all at low levels and up to 5,000 ft. at most.

A tree with long-petioled, usually long-acuminate very glaucous leaves.

#### 11. *Cassytha*, Linn.

Filiform twining parasites, adhering to their host by suckers. *Leaves* consisting of minute scales or 0. *Flowers* small, hermaphrodite, spicate capitate or racemose; bracteoles 3. *Perianth*-tube short and globose or turbinate and as long as the lobes; lobes 6, the 3 outer smaller. Perfect *stamens* 9 or 6, 2-celled; those of the 1st row opposite the outer perianth-lobes introrse, those of the 2nd row opposite the inner, also introrse, sometimes reduced to staminodes; those of the 3rd row opposite the 1st row extrorse, the filaments with a pair of glands at the base; within these and opposite the 2nd row, 3 sessile or stipitate staminodes. *Ovary* globose, free in flower but included in the perianth-tube, which closely covers it in fruit; style short; stigma small or capitate. *Fruit* a drupe enclosed in the enlarged inflated perianth-tube, crowned by the remains of the lobes and stamens; pericarp of 2 layers, the outer thin, the inner thick and hard. *Seed* conform to the drupe; testa thin; cotyledons fleshy, at length confluent.

Stems fairly stout about 1 in. thick where attached to the host, very long and twining cord-like; flowers sessile, in spikes 5-2 in. long; drupe globose ..... 1. *filiformis*.

Stems very slender, thread-like; flowers sessile, in very small peduncled heads; drupe oblong ovoid, bluntly 6-angled.....2. *capillaris*.

1. *CASSYTHA FILIFORMIS*, Linn.; F. B. I. v. 188; Wt. Ic. t. 1847.

All plains Districts, on bushes, especially near the coast.

Common on various species of young trees and bushes.

2. *CASSYTHA CAPILLARIS*, Meissn.; F. B. I. v. 188.

Tinnevely District, at Kannikatti (Barber), also in Ceylon.

A rare species, found by Barber on *Apama Barberi*.

*Persea gratissima*, Gaertn., the Avocado Pear, of the West Indies, is sometimes found in cultivation for its pleasant fruit.

#### Family CXXVII. HERNANDIACEAE.

Trees or climbing shrubs. *Leaves* alternate, simple or pinnate, entire or lobed; stipules 0. *Flowers* hermaphrodite, monoecious or polygamous, regular, usually small, white or greenish. *Perianth* superior; lobes free or shortly united below in two valvate 3-5-merous whorls or in one imbricate 4-8-merous whorl. *Stamens* 3-5 in one whorl; anthers 2-celled, dehiscing introrsely or laterally by 2 valves; staminodes glandular, in 1 or 2 whorls outside the stamens or absent. *Ovary* inferior, 1-celled; ovule solitary, pendulous, anatropous. *Fruit* dry, often longitudinally ribbed, sometimes with 2-4 longitudinal wings or with 2 terminal wings formed by accrescent perianth-lobes, or else wingless and enclosed in an inflated cupule. *Seed* solitary; albumen 0; cotyledons large, more or less lobed and twisted.

#### Gyrocarpus, Jacq.

A tall tree with thick branches. *Leaves* alternate, large, long-petioled, entire or lobed, clustered towards the ends of the branches. *Flowers* small, unisexual, ♂ very numerous, ♀ few, also a few hermaphrodite mixed, in large dense ebracteate cymes. *Perianth* in ♂ flowers, 4-7-partite, in ♀ 2-lobed, the lobes enlarged in fruit. *Stamens* 4-7, inserted at the bottom of the perianth, alternating with as many clavate staminodes; anthers 2-celled, dehiscing by valves. *Ovary* 1-celled; ovule 1, pendulous from the apex of the cell; stigma sessile. *Fruit* drupe-like, crowned with the long wing-like persistent perianth-lobes. *Seed* solitary; cotyledons large, convolute.

**GYROCARPUS AMERICANUS**, Jacq. *G. Jacquini*, Roxb. Cor. Pl. t. 1; Bedd. Fl. t. 196; F. B. I. ii. 461.

N. Circars, especially in Godavari and Kistna, in forests of the E. Gháts; Deccan and Carnatic, in deciduous forests, extending West to the E. slopes of the W. Gháts.

A large deciduous tree with large soft leaves often deeply lobed. Bark thin, greyish-white with a silvery lustre; wood soft, grey, in considerable demand for making catamarans, also for boxes, trays and toys. Vern. *Hind. Zaitun*; *Ur. Pitella*; *Tel. Tanaku*.

### Family CXXVIII. PROTEACEAE.

Trees or shrubs, rarely herbs. *Leaves* alternate, rarely opposite or verticillate, entire toothed or pinnatisect; stipules 0. *Flowers* capitate spicate racemose or rarely solitary, hermaphrodite, regular or irregular; bracts small, caducous or nearly obsolete, sometimes imbricate, hardened in fruit forming a cone; bracteoles 0-2. *Perianth* inferior; lobes 4, at first valvately connate in a tube with gibbous base, at length more or less separating with recurved tips. *Stamens* 4, on and opposite to the perianth-lobes; anthers erect, the connective continuous with the filaments, cells 2 introrse, dehiscing longitudinally. *Disk* of 4 hypogynous scales, sometimes 0. *Ovary* superior, sessile or stipitate, 1-celled, often oblique; style terminal, thickened at tip; stigma terminal or lateral; ovules solitary or in pairs or many, biseriate. *Fruit* a nut or drupe indehiscent or ultimately opening on the inner edge or at the tip, or a follicle or capsule with often coriaceous valves. *Seeds* solitary or in pairs or few; testa membranous or coriaceous, sometimes winged; albumen 0; cotyledons compressed or fleshy, often unequal; radicle short, inferior or lateral.

#### *Helicia*, Lour.

Trees or large shrubs. *Leaves* alternate, entire toothed or pinnatisect. *Flowers* in terminal and axillary racemes, hermaphrodite, regular, usually in pairs; bracts small, caducous; bracteoles minute. *Perianth*-tube slender; limb narrow, ovate or oblong, lobes revolute in flower. *Stamens* 4; anthers oblong, connective produced in an apiculus. *Disk* of 4 hypogynous scales, free or connate. *Ovary* sessile; style slender; stigma

terminal; ovules 2, basal or lateral, attached below the middle. *Fruit* a subglobose hard nut. *Seeds* 1-2, subglobose or hemispheric; testa rugose or veined; cotyledons fleshy.

Leaves petioled, acute at base, elliptic-oblongate, acuminate, coarsely dentate, up to 7 in. long, 3 in. broad; flowers in bud .5-7 in. long.....1. *nilagirica*.

Leaves subsessile, rounded at base, obovate-oblong, obtusely acute, entire or distantly serrate, up to 9 in. long, 3 in. broad, shining above and reticulate; flowers in bud .7-1 in. long .....2. *travancorica*.

1. *HELICIA NILAGIRICA*, Bedd.; F. B. I. v. 190.

W. Gháts, Walaghát in Malabar at 3,000 ft. (Beddome); Devála in S.E. Wynaad at 3,000 ft. (Gamble), in evergreen forests.

A small tree with chartaceous leaves and globose purple fruit .5 in. in diam.

2. *HELICIA TRAVANCORICA*, Bedd.; F. B. I. v. 191. *H. robusta*, Bedd. Fl. t. 301, not of Wall.

W. Gháts, hills of Tinnevely and Travancore, at 4,000 ft. on the banks of streams (Bedd.).

A handsome tree of good size with coriaceous leaves and greenish-yellow flowers, the fruit globose, .75 in. in diam.

Several species of chiefly Australian Proteaceous shrubs are in cultivation in the Botanic Gardens in the Nilgiris. *Grevillea robusta*, A. Cunn., the Silk Oak, a moderate-sized handsome tree of Australia, has been much cultivated in S. India, both in the forests for its handsome prettily grained wood, and in tea estates as a shade plant. It is so far acclimatized that it reproduces itself naturally from seed.

Family CXXIX. THYMELAEACEAE.

Shrubs or trees with tough fibrous bark, rarely herbs. *Leaves* alternate or opposite, simple, entire. *Flowers* usually hermaphrodite, in axillary or terminal heads umbels clusters or racemes; bracts various, often forming an involucre. *Perianth* regular, tubular or campanulate, often corolline, 4-5-lobed, the lobes imbricate in bud, often with scales at their bases within. *Stamens* as many or twice as many as the lobes of the perianth, those opposite the lobes usually attached above the alternate ones; filaments short; anthers erect, 2-celled, dehiscing longitudinally. *Disk* hypogynous, annular cupular or of scales,

sometimes 0. *Ovary* superior, 1-2-celled; ovule 1 in each cell, anatropous, pendulous from the apex of the cell; style short or long, terminal or excentric; stigma usually capitate. *Fruit* a small berry drupe of capsule. *Seed* solitary or one in each cell, pendulous or lateral; testa crustaceous, rarely membranous; albumen fleshy or 0; cotyledons fleshy, usually thick; radicle short, superior.

*Ovary* 1-celled, 1-ovuled; fruit indehiscent; flowers in close bracteate heads; stamens 10 ..... 1. **Lasiosiphon.**

*Ovary* 2-celled, cells 1-ovuled; fruit a loculicidal capsule; flowers in small ebracteate umbels; stamens 5 ..... 2. **Gyrinops.**

### 1. **Lasiosiphon**, Fresen.

Silky shrubs. *Leaves* opposite or alternate and scattered. *Flowers* hermaphrodite, in dense heads with broad bracts. *Perianth*-tube cylindric, circumsciss above the ovary; lobes 5, spreading; scales above the stamens 5, alternate with the perianth-lobes. *Stamens* 10 in 2 rows, the upper or all shortly exerted; anthers oblong or linear. *Disk* 0 or short, annulate. *Ovary* sessile, 1-celled; style filiform; stigma capitate. *Fruit* small, dry, included in the base of the perianth, pericarp membranous. *Seed* conform to the pericarp; testa crustaceous; albumen scanty or 0.

**LASIOSIPHON ERIOCEPHALUS**, Dcne.; F. B. I. v. 197. *Gnidia eriocephala*, Meissn.; Wt. Ic. t. 1859.

W. Gháts, in all Districts, at 4,000-7,000 ft. in open forests.

A small tree or large shrub with linear-oblong leaves and bright yellow flowers in dense terminal white silky heads surrounded by an involucre of silky bracts. Bark grey, smooth, the inner bark fibrous; wood white or yellowish-white, hard. Vern. Tam. Nacchi nár; Mal. Nanju.

Var. *sisparensis*. *Gnidia sisparensis*, Meissn.; Wt. Ic. t. 1860. Leaves obovate obtuse subsessile; heads with fulvous hairs.

Sispara in Nilgiris (Gardner); Palghát Hills (Beddome); Mysore (Lobb.).

### 2. **Gyrinops**, Gaertn.

Small trees. *Leaves* alternate, shining, the lateral nerves very fine, numerous and parallel. *Flowers* hermaphrodite, in terminal



and axillary few-flowered umbels, ebracteate, bracteoles small. *Perianth*-tube slender; lobes 5, spreading; scales above the stamens connate in a ring. *Stamens* 5, in one row at the mouth of the perianth-tube and opposite the lobes; anthers subsessile. *Ovary* stalked, 2-celled; ovule 1 in each cell; style subulate; stigma ovoid. *Fruit* a stipitate compressed ovoid capsule; loculicidally 2-valved. *Seeds* ovoid, with a tail-like basal appendage; testa crustaceous; albumen 0.

GYRINOPS WALLA, Gaertn.; F. B. I. v. 199; Wt. Ic. t. 1850; Bedd. Fl. t. 303.

Tinnevely (Beddome), a Ceylon plant.

A small tree with yellowish foliage, the leaves oblong, obtusely acuminate, 2-4 in. long, about 1 in. broad, with close minute parallel nerves.

*Wikströmia viridiflora*, Meissn. is a Malay shrub, cultivated in gardens in Madras.

#### Family CXXX. ELAEAGNACEAE.

Trees or shrubs, often thorny, with numerous silvery or coppery scales on the branches inflorescence and under-surface of the leaves especially. *Leaves* alternate or opposite, entire; stipules 0. *Flowers* small, regular, hermaphrodite or dioecious, solitary or in axillary fascicles spikes or racemes; bracts small, deciduous. *Perianth* in hermaphrodite or ♀ flowers tubular, constricted above the ovary, persistent below, deciduous above, limb 2-4-lobed; in ♂ flowers reduced to a 2-4-lobed limb. *Stamens* in hermaphrodite flowers adnate to the throat of the perianth-tube, as many as the lobes and alternate with them, in ♂ flowers to perianth-base, twice as many as the lobes; filaments free; anthers oblong, 2-celled, the cells dehiscing longitudinally. *Ovary* free, 1-celled; style filiform; stigma lateral; ovule 1, basal, erect, anatropous. *Fruit* a nut, closely covered by the thickened perianth-base, pericarp membranous. *Seed* erect; testa hard; albumen scanty or 0; cotyledons thick, fleshy; radicle inferior.

#### Elaeagnus, Linn.

Trees or shrubs, often thorny, with silvery or stellate scales. *Flowers* hermaphrodite, axillary, solitary or in fascicles or racemes. *Perianth*-tube campanulate or funnel-shaped, narrowed



above the ovary; lobes 4, valvate, deciduous. *Stamens* 4, on the mouth of the perianth, on a ring, alternate with the lobes. *Ovary* 1-celled; style linear; stigma lateral. *Fruit* a nut enclosed in the thickened perianth-base. *Seed* with hard shining testa.

Scales very shining, silvery only; flowers small, the perianth-tube narrowly cylindric, the clusters few-flowered only; leaves thin, elliptic-lanceolate, up to 3 in. long, 1.5 in. broad, acute at apex, 5-6-nerved; drupe small, ellipsoid-oblong, 3-6 in. long, the putamen grooved.....1. *indica*.

Scales shining or dull, silvery and coppery, usually mixed; clusters many-flowered:—

Leaves rather large, up to 8 in. long, 3 in. broad, thin, elliptic or elliptic-oblong or obovate, acute or acuminate at apex, 5-6-nerved; perianth-tube urceolate, 2-3 in. long; drupe large, oblong, 5-1 in. long, the putamen grooved.....2. *conferta*.

Leaves medium-sized, 2-3 in. long, 1.5-2 in. broad, thick, ovate or ovate-oblong or orbicular, obtuse or rarely acute at apex, usually rounded at base, 3-4-nerved; perianth-tube broadly urceolate, 2-3 in. long; drupe oblong-ellipsoid, 5-7.5 in. long....3. *Kologa*.

1. *ELAEAGNUS INDICA*, Servettaz in Bull. Herb. Boiss., ser. 2, viii. 393.

Deccan, hills of N. Coimbatore, to 3,500 ft.; Carnatic, hills of S. Arcot, Salem and Madura, west to E. slopes of W. Gháts.

A slender straggling shrub.

2. *ELAEAGNUS CONFERTA*, Roxb. *E. latifolia*, Linn.; F. B. I. v. 202 in part only; Brand. For. Fl. t. 46.

N. Circars, hills of Vizagapatam (A. W. Lushington); W. Coast and W. Gháts, at low levels, but occasionally up to 5,000 ft.

A large often thorny straggling shrub with red edible fruit.

3. *ELAEAGNUS KOLOGA*, Schlecht. in DC. Prodr. xiv. 611. *E. latifolia*, Linn.; F. B. I. v. 202, in part only; Wt. Ic. t. 1856.

W. Gháts, Nilgiris and Pulneys above 5,000 ft., margins of Shola woods and open scrub forests; Bababudari Hills of Mysore.

A large sometimes thorny straggling or climbing shrub with orange-red edible fruit. Vern. Tam. Kolungai.

## Family CXXXI. LORANTHACEAE.

Evergreen shrubs, rarely herbs, usually parasitic on the branches of trees; stems much branched, often jointed. *Leaves* opposite or sometimes alternate, coriaceous, entire, sometimes reduced to scales or 0; stipules 0. *Flowers* regular or zygomorphic, hermaphrodite or unisexual, sometimes large and brightly coloured, sometimes inconspicuous, in racemes spikes heads or fascicles, usually bracteate and often with 2 or more bracteoles. *Calyx* adnate to the ovary; limb annular or cupular, entire or shortly toothed, sometimes 0. *Petals* or perianth-segments 3-8, valvate, free or more or less connate in a tube. *Stamens* as many as and opposite to the petals and more or less adnate to them; filaments slender or 0; anthers basifixed or dorsifixed, opening by longitudinal slits or by rows of cells or by pores. *Ovary* inferior, 1-celled; usually without distinct placenta; style short or long; stigma simple. *Fruit* a 1-seeded berry or drupe with fleshy pericarp and often viscid mesocarp. *Seed* solitary without distinct testa; albumen fleshy or none; embryo straight, usually fleshy; radicle superior.

*Calyx* present, though the limb is sometimes reduced to a rim only; flowers hermaphrodite, anthers basifixed :—

*Calyx*-tube supported by a bract, no bracteoles.....1. *Loranthus*.

*Calyx*-tube supported by a bract and two bracteoles..2. *Elytranthe*.

*Calyx* obsolete or represented by a rim; flowers unisexual :—

Anthers 2-celled, opening longitudinally; plants without leaves

3. *Korthalsella*.

Anthers opening by many pores, combined with the perianth-lobes; plants with or without leaves .....4. *Viscum*.

1. *Loranthus*, Linn. (restricted).

Parasitic shrubs with many branches. *Leaves* opposite or alternate or both, usually thick and fleshy or coriaceous, entire. *Flowers* hermaphrodite, usually coloured, in racemes spikes cymes or fascicles, in the axils of leaves or of the scars of fallen leaves, rarely terminal; bract usually small, supporting the base of the calyx-tube; bracteoles 0. *Calyx*-tube adnate to the ovary, the limb short, truncate or toothed. *Corolla* polypetalous or gamopetalous, regular or zygomorphic; lobes 4-6, valvate, free or more or less connate in a tube, erect or reflexed, the tube often split down one side. *Stamens* as many as the corolla-lobes

and adnate to them; filaments usually slender; anthers basifixed, usually linear, opening by longitudinal cells, sometimes septate.

*Disk* 0. *Ovary* 1-celled; style filiform, sometimes geniculate; stigma entire, obtuse or capitate. *Fruit* baccate, globose ovoid ellipsoid or oblong, crowned by the persistent calyx-limb. *Seed* albuminous, adnate to the pericarp, usually surrounded by glutinous pulp; testa 0; embryo straight; radicle superior.

Corolla lobes free:—

Flowers in spikes, on excavations in a thickened rhachis; leaves coriaceous, opposite or alternate, the innovations mealy-pubescent:—

Leaves lanceolate, obtusely acuminate at apex, narrowed at base, up to 3 in. long, 1 in. broad, petiole .2–.3 in. long; spikes 1–2 in. long; flowers in bud .25 in. .... 1. *Hookerianus*.

Leaves elliptic orbicular or obovate, obtuse at apex, slightly narrowed at base, up to 1.5 in. long, .5–1 in. broad, petiole .1–.2 in. long; spikes 1–1.5 in. long; flowers in bud .4 in. .... 2. *Wightii*.

Flowers in racemes, solitary or fascicled on the nodes of old branchlets; leaves coriaceous, opposite or alternate:—

Branchlets, leaves and inflorescence glabrous:—

Flowers in bud .15–.25 in. long, straight, terete, in slender racemes 1–3 in. long; leaves elliptic ovate or orbicular, obtuse, narrowed at base, up to 4 in. long, 2.5 in. broad, petiole .2–.4 in. long ..... 3. *Wallichianus*.

Flowers in bud .5–.75 in. long, straight or curved, angular, in rather stout often solitary racemes up to 4 in. long; leaves broadly ovate or elliptic, obtuse, usually rounded cordate or sometimes auricled at base, up to 6 in. or more long, 3.5 in. broad, petiole stout, .5–.7 in. long ..... 4. *intermedius*.

Branchlets and inflorescence, sometimes the leaves more or less, furfuraceous pubescent; flowers in bud .5–1 in. long, curved, angular, in racemes 2–4 in. long; leaves ovate, obtuse or obtusely acute, acute or rounded or auricled at base, up to 5 in. long, 2.5 in. broad, petiole to 1 in. long ..... 5. *obtusatus*.

Corolla gamopetalous:—

Corolla-lobes 4; flowers in bud narrow, clavate at tip and acute, densely covered with mealy golden tomentum, in axillary fascicles or short cymes, the tube .5–1 in. long, split down one side:—

Leaves ovate, orbicular or elliptic, obtuse, rounded at base, nearly glabrous above, more or less rusty tomentose beneath, up to 3 in. long, 1.5 in. broad; petiole short, sometimes 0

6. *buddleioides*.

Leaves ovate, covered, more or less, on both surfaces, with white or tawny flocculent tomentum :—

Leaves coriaceous, obtuse or slightly acute at apex, cordate at base, up to 4 in. long, 2.5 in. broad, petiole .75 in. long

7. *cordifolius*.

Leaves subcoriaceous, bluntly acute or obtuse at apex, narrowed or rounded at base, up to 3.5 in. long, 2.5 in. broad, petiole .5–1 in. long . . . . . 8. *pulverulentus*.

Corolla-lobes 5 :—

Corolla densely tomentose :—

Bracts large, up to .5 in. long ; calyx-teeth distinct ; corolla-tube .75–1 in. long, curved, somewhat inflated at the middle, grey-tomentose without ; leaves alternate, orbicular or obovate, obtuse, up to 1 in. in diam., sometimes much less, softly white grey or tawny tomentose . . . . . 9. *bracteatus*.

Bracts small, ovate :—

Calyx-teeth short, triangular, regular ; corolla-tube curved, split half-way, inflated below, .4–.6 in. long, densely rusty-floccose-woolly ; leaves alternate, obovate, obtuse, cuneate at base, black above when dry, densely rusty-floccose below, up to 2.5 in. long, 1 in. broad, nerves 3 pairs, prominent

10. *tomentosus*.

Calyx-teeth long and irregularly lobed ; corolla-tube curved, split half-way, gibbously inflated below the middle, .5–.75 in. long, rusty-villous ; leaves obovate, obtuse, cuneate at base, blackish green above when dry, thinly grey- or tawny-pubescent beneath or glabrous, up to 3 in. long, 1.5 in. broad, 3-nerved at base ; berry oblong . . . . . 11. *recurvus*.

Corolla at first stellate-pubescent, afterwards nearly or quite glabrous :—

Bract boat-shaped, longer than the calyx ; calyx very white-lanate, shortly and evenly toothed ; corolla-tube slender, inflated at the middle, .75 in. long ; leaves obovate, obtuse, cuneate at base, grey-lanate, up to 1 in. long, .4 in. broad

12. *courtallensis*.

Bract ovate, shorter than the calyx ; calyx-lobes irregular and again toothed ; corolla-tube slender, straight or very slightly inflated above, finally glabrous without, .75–1.25 in. long ; leaves obovate, obtuse or retuse, cuneate at base, 3-nerved, up to 1.5 in. long, .75 in. broad, glabrous and black when dry . . . . . 13. *cuneatus*.

Corolla glabrous without, with very rare exceptions :—

Flowers in racemes :—

Branchlets terete :—

Racemes 1-4 in. long, solitary or fascicled, usually up-curved with upcurved flowers varying in length from 1-2.5 in. ; bract concave ; calyx entire, truncate ; leaves thickly coriaceous, opposite or alternate, varying from elliptic or oblong to orbicular cordate or to linear, and up to 7 in. long, 4 in. broad ; berry ovoid-oblong

14. *longiflorus*.

Racemes about 1 in. long, many-flowered, the flowers 1-1.5 in. long ; bract short, cup-shaped ; calyx cupular, obtusely unequally 5-lobed ; leaves very coriaceous, large, opposite or alternate, obtuse, elliptic-oblong or orbicular, up to 4 in. long, 2 in. broad.....15. *sarcophyllus*.

Branchlets trigonous ; racemes 1-1.5 in. long, the flowers .5-.75 in. long ; bract cup-shaped, very oblique ; calyx cupular, spreading, truncate ; leaves very coriaceous, large, broadly elliptic ovate or orbicular, obtuse or acute, up to 6 in. in diam. ....16. *trigonus*.

Flowers in axillary fascicles or cymes :—

Flowers sessile, fascicled at the nodes of the branches ; corolla 1 in. long, the lobes spirally twisted ; bract very small ; calyx-limb cupular, entire ; leaves very coriaceous, opposite, sessile, ovate elliptic or orbicular, obtuse, acute at base, up to 4.5 in. long, 2 in. broad, 3-5-ribbed ; berry globose.....17. *elasticus*.

Flowers solitary or in very short peduncled cymes, chiefly in the axils of fallen leaves ; corolla 1 in. long, cleft to the middle, one or two divisions to the base, lobes recurved ; bract small ; calyx obscurely toothed ; leaves very coriaceous, opposite, variable, usually elliptic-oblong lanceolate or obovate, obtuse, narrowed at base, up to 6 in. long, 4 in. broad, nerves few and irregular ; berry obovoid

18. *neelgherrensis*.

Flowers in axillary or lateral peduncled umbellate cymes, corolla 1-1.5 in. long, very straight, erect ; bracts cup-like but one-sided ; calyx-lobes triangular ; leaves coriaceous, opposite or alternate, oblong-lanceolate, acute, cuneate at base, up to 3 in. long, 1.25 in. broad, the nerves obscure ; berry oblong .....19. *memecylifolius*.

Flowers in groups of about 5, the bracts forming a large bell-



shaped involucre, the groups 2-3 together in the axils of the leaves or of the scars of fallen leaves; calyx-tube tomentose, limb shortly 5-toothed; corolla slender, 1.5-2 in. long, constricted slightly below the limb; leaves thinly coriaceous, opposite or alternate, orbicular or oblong, rounded at base, up to 5 in. long, 3 in. broad ..... 20. *lageniferus*.

1. **LORANTHUS HOOKERIANUS**, W. & A. 381; F. B. I. v. 207.  
W. Gháts, Nilgiris, Anamalai Hills, and hills of Tinnevely, up to 4,000 ft.  
A rather slender parasitic shrub, the branches speckled with minute tubercles. Has been found on *Mallotus philippinensis* (Fischer).
2. **LORANTHUS WIGHTII**, Hook. f.; F. B. I. v. 207.  
W. Gháts, Courtallum and Chokampatti hills of Tinnevely, about 3,500 ft. (Wight, Beddome).  
A slender parasitic shrub with speckled nodose branchlets.
3. **LORANTHUS WALLICHIANUS**, Schultes; F. B. I. v. 205; W. & A. 381; Wt. Ic. t. 143.  
W. Gháts, in all Districts from S. Canara southwards, up to about 4,000 ft.  
A rather stout parasitic shrub with pale brown terete branchlets and pale red flowers. Found by Fischer on *Helicteres* and *Memecylon*.
4. **LORANTHUS INTERMEDIUS**, Wight; Hook. f. in F. B. I. v. 205.  
W. Gháts, Nilgiris, Pulneys and hills of Travancore, at 3,000-6,000 ft.  
A stout parasitic shrub, the flowers red, common in Nilgiri Sholas and often on *Cinnamomum Wightii* (Barber) and *Machilus macrantha* (Fischer).
5. **LORANTHUS OBTUSATUS**, Wall.; F. B. I. v. 205; W. & A. 381; Bidie Report on Neelgh. Loranth. t. iii.  
W. Gháts, in most Districts, especially at high levels in Nilgiris, Pulneys, etc., at above 5,000 ft.  
A large parasitic shrub with red and orange flowers, often found on *Rhododendron*, *Symplocos*, *Daphniphyllum* and many other Shola trees, also on *Acacia Melanoxydon* in the plantations.
6. **LORANTHUS BUDDLEIODES**, Desv.; W. & A. 382. *L. Scurrula*, Roxb. Cor. Pl. t. 140; F. B. I. v. 208, not of Linn.



- N. Circars, Mahendragiri Hill in Ganjam, 4,500 ft. (Fischer and Gage), Rampa Hills (V. Narayanswami); Deccan, hills of Mysore, Bellary and Coimbatore; W. Gháts, chiefly on W. and E. slopes, up to 6,000 ft.
- A parasitic shrub found growing on various different kinds of tree; flowers greenish-yellow.
7. *LORANTHUS CORDIFOLIUS*, Wall.; F. B. I. v. 209.  
Deccan, in hills country, Chittoor to Coimbatore, 2,000–3,000 ft.; W. Gháts, Nilgiris, at 2,000–5,000 ft.  
A large parasitic shrub, conspicuous from the thick fascicles of orange-tawny flowers and white or pale brown young leaves and shoots.
8. *LORANTHUS PULVERULENTUS*, Wall.; F. B. I. v. 211.  
N. Circars, forests of the E. Gháts, Ganjam to Rampa, at 1,000–2,500 ft. (Gamble, Barber).  
A stout parasitic shrub, found on deciduous trees chiefly.
9. *LORANTHUS BRACTEATUS*, Heyne; F. B. I. v. 213. *L. tomentosus*, W. & A. 385; Wt. Ic. t. 378.  
N. Circars, Deccan and Carnatic, in forests of Vizagapatam, Nellore, S. Arcot, Cuddapah and Kurnool, up to 2,000 ft. westwards to the E. slopes of W. Gháts.  
A small parasitic shrub, the flowers in cymes or umbels of 3–5, greenish, striped, on various species of deciduous tree.
10. *LORANTHUS TOMENTOSUS*, Heyne; F. B. I. v. 212; Bidie t. viii.  
Deccan, hills of Mysore and N. Coimbatore, 3,000–5,000 ft.; W. Gháts in S. Canara (Hohenacker), Coorg, Wynaad, at 3,000–4,000 ft. (Gamble), and southwards.  
A small parasitic shrub, the branchlets nearly black; found in Coorg on *Neolitsea zeylanica*, also by Fischer on various other kinds of tree.
11. *LORANTHUS RECURVUS*, Wall.; F. B. I. v. 213; W. & A. 383. *L. Candolleanus*, W. & A. 385; Wt. Ic. t. 305.  
W. Gháts, Nilgiri Hills, in Shola woods above 6,000 ft.  
A parasitic shrub with smooth grey bark, ovoid-oblong fruits, yellow flowers and characteristic calyx, reported as growing in the Nilgiri Sholas and plantations on *Acacia Melanoxydon*, *Viburnum*, *Glochidion*, etc.
12. *LORANTHUS COURTALLENIS*, Gamble, n. comb. *L. bracteatus*, Heyne, var. *angustifolia*, Hook. f.; F. B. I. v. 213.

W. Gháts, Pulney Hills and hills of Tinnevely about Courtallum, (Wight, Barber).

A slender twiggy parasitic shrub.

13. LORANTHUS CUNEATUS, Heyne; F. B. I. v. 214; W. & A. 385; Bidie t. ix.

N. Circars and Deccan, in hilly country; W. Gháts, in most Districts, at various levels, common.

A bushy shrub with grey bark and prominent nodes, parasitic on a great variety of trees and shrubs, indigenous and introduced (like *Acacia Melanoxylon*). The corolla is greenish-yellow outside, orange within, the stigma red, also the fruits.

14. LORANTHUS LONGIFLORUS, Desv.; F. B. I. v. 214; W. & A. 384; Wt. Ic. t. 302. *L. bicolor*, Roxb. Cor. Pl. t. 139.

All plains Districts, chiefly in deciduous forests, common.

A large parasitic shrub with handsome and conspicuous racemes of scarlet orange or pink flowers succeeded by pink berries. It is found on a great number of different hosts.

Var. *falcatus*, Kurz. Leaves linear or falcate, up to 6 in. long, the flowers rather short.

Plains Districts, chiefly in the dry country, frequently on *Acacia* and its neighbours.

Var. *amplexifolius*. Leaves large, orbicular or shortly oblong, obtuse cordate and amplexicaul at base, the flowers often long and the racemes frequently terminal. *L. amplexifolius*, DC.; Bidie t. vii.

W. Gháts, chiefly in hilly regions up to 6,000 ft., in most Districts.

Var. *pubescens*, Hook. f. Leaves rather small, oblong, racemes with the flowers minutely pubescent.

W. Coast and lower hills of W. Gháts.

15. LORANTHUS SARCOPHYLLUS, Wall; W. & A. 384; F. B. I. v. 217.

W. Gháts, Nilgiris and hills of Madura (Wight).

A very stout parasitic shrub, much resembling *L. longiflorus* but recognized by the calyx-lobes. Said to grow on *Ficus*.

16. LORANTHUS TRIGONUS, W. & A. 386; F. B. I. v. 219.

W. Gháts and W. Coast from S. Canara southwards,

- Coorg, Nilgiris and Pulneys up to 3,000 ft.; Bababudan Hills of Mysore, at 3,500 ft. (Meebold).

A large very thick and fleshy parasitic shrub with warted branches and trigonous branchlets, found on the Banyan fig (Gamble) and other trees.

17. *LORANTHUS ELASTICUS*, Desv.; F. B. I. v. 216; W. & A. 386; Wt. Ic. t. 343. *L. Euphorbiae*, Wt. Ic. t. 1063.

Deccan, in Mysore; Carnatic, Kambakam Hill in Chingleput, 2,000 ft., Melpat in S. Arcot, Kollimalai Hills of Trichinopoly; W. Coast, S. Canara to Travancore also at low levels in W. Gháts.

A dichotomously branching parasitic shrub with striped green and white flowers, red stamens and a pink berry. It is not uncommon on the mango, orange, nutmeg, *Samadera*, *Thespesia*, and other trees of hot low-level country. The smaller-leaved *L. Euphorbiae* is found on the tree *Euphorbia*, *E. tortilis* and *E. antiquorum*, in Coimbatore, and is perhaps distinct.

18. *LORANTHUS NEELGHERRENSIS*, W. & A. 382; F. B. I. v. 216; Wt. Ic. t. 1020; Bidie tt. iv. v. x.

W. Gháts, Nilgiris, Anamalais and Pulneys, at high levels above 4,000 ft.

A large woody parasitic shrub with crimson-scarlet flowers, orange inside the tube, the berry red, also the young leaves. It is common on many shola trees and also very frequent on the introduced Australian *Acacias*.

Var. *Clarkei*, Hook. f. Flowers small with short corolla-lobes. Nilgiri Hills at 7,000 ft. (C. B. Clarke).

19. *LORANTHUS MEMECYLIFOLIUS*, W. & A. 383; F. B. I. v. 217.

W. Gháts, Nilgiri Hills, above 5,000 ft.

A stout glabrous parasitic shrub with scarlet corolla. It occurs on various shola trees, *Rhododendron*, *Rapanea*, *Daphniphyllum*, etc.

20. *LORANTHUS LAGENIFERUS*, Wt. Ic. t. 306; F. B. I. v. 218.

W. Coast, S. Canara, Mysore and Malabar, apparently in deciduous forests (Wight, Rangachari).

A large parasitic shrub, the involucre reddish, the corolla green or green and red. Dr. Cooke gives it as found on *Holarrhena* and *Adina*.

## 2. Elytranthe, Blume (amplified).

Parasitic shrubs. Leaves opposite or subopposite, more or less coriaceous, entire. Flowers few, in spikes racemes or pairs with 1 bract and 2 bracteoles which may be free or combined in a cup. Calyx-tube cylindric, the limb small, truncate. Corolla-tube usually entire, more or less cylindric or funnel-shaped; lobes 5 or 6, usually 6, equal, reflexed in flower. Stamens 5-6, anthers basifixed, often septate. Ovary enclosed in the calyx-tube; style slender; stigma usually capitate. Fruit and seed as in *Loranthus*.

Corolla 1-2 in. long, cleft to nearly half-way down, usually curved; leaves ovate-oblong or lanceolate, up to 5 in. long, 2 in. broad

1. *loniceroides*.

Corolla under 1 in. long, cleft to below the middle, hardly curved; leaves elliptic-lanceolate, up to 4 in. long, 1.5 in. broad. 2. *capitellata*.

In both species the bract and bracteoles are orbicular, the latter combined in a cup, the anthers septate, very slender.

1. ELYTRANTHE LONICEROIDES, Engler. *Loranthus loniceroides*, Linn.; F. B. I. v. 221; Wt. Ic. t. 203; Bidie t. vi. except anthers and ovary.

W. Gháts, in Mysore, Nilgiris, Anamalais and Pulneys, chiefly at levels above 5,000 ft.; a form in Coimbatore below 3,000 ft. has smaller leaves.

A large parasitic shrub with variegated corolla, the tube scarlet or pink below changing to yellow, the lobes green. The berry is green tipped with the cylindric calyx-limb. The large-leaved hill form is abundant on Australian Acacias, but also occurs on various Shola trees; the small-leaved one is chiefly found on *Terminalia*, *Anogeissus* and various species of fig.

2. ELYTRANTHE CAPITELLATA, Engler. *Loranthus capitellatus*, W. & A. 382; F. B. I. v. 221.

Deccan and Carnatic, in hilly country, westwards to the lower hills of the W. Gháts, up to about 3,000 ft.

A parasitic shrub with variegated corolla, the tube white changing to red and above to green, with purple lines. It is found on various plains trees like the mango, figs, etc.

## 3. Korthalsella, van Tiegh.

Leafless parasitic small shrubs, the branches jointed, furnished with bracteate scales at the joints, the joints all in the same plane. *Flowers* in the axils of the scales, monoecious, surrounded by tufts of hair, ♂ and ♀ with 3 perianth-lobes which are persistent after flowering in ♀. *Anthers* 3, 2-celled, the cells opening introrsely by longitudinal slits, but the anthers being connected at their margins, the pollen issues from a central aperture. *Ovary* obovoid; placenta central; stigma small. *Fruit* an<sup>o</sup> obovoid fleshy berry with viscid mesocarp, embryo basal. *Seed* albuminous.

KORTHALSELLA JAPONICA, Engler. *Viscum japonicum*, Thunb.; F. B. I. v. 226. *V. moniliforme*, W. & A. 380; Wt. Ic. t. 1018, and Spic. Neelg. t. 87.

W. Gháts, Nilgiri, Anamalai and Pulney Hills, above 5,000 ft. A small densely tufted parasitic undershrub with obovate keeled flattened joints and minute flowers. It is found on Shola trees, especially on *Rhododendron*, *Vaccinium*, *Eurya* and *Ilex*.

Var. *coralloides*: *Viscum moniliforme*, W. & A., var. *coralloides*, Wt. Ic. t. 1019; is really only a smaller form with narrower joints.

4. *Viscum*, Linn.

Parasitic shrubs, growing on trees; branches usually 2-3-chotomous, jointed, the internodes terete, angular or flattened. *Leaves* opposite, flat and thick or reduced to small scales. *Flowers* usually monoecious, small, fascicled or solitary or more often in triads, in the axils of the leaves or at the nodes of the branches, rarely terminal; bracts small; bracteoles 2, free or connate in a cup. *Perianth*-tube in ♂ solid, in ♀ adnate to the ovary; lobes usually 4, sometimes 3, short, ovate or triangular. *Stamens* as many as the perianth-lobes and adnate to them, dehiscing introrsely by numerous pores. *Ovary* inferior, 1-celled; ovules solitary or paired; stigma sessile or subsessile. *Fruit* a succulent berry with soft viscid mesocarp. *Seed* adnate to the pericarp; albumen copious, solid; embryo terete enclosed in the albumen, solitary or 2 to each seed.

## Leafy shrubs :—

## Leaves always present and persistent :—

Leaves acuminate at apex, obliquely ovate or lanceolate, often falcately curved, narrowed at base, 3-5-ribbed, 1.5-4 in. long, .5-1 in. broad; bracteoles apiculate; lateral flowers of triads usually ♀, central ♂ or wanting; berry oblong....1. *monoicum*.

## Leaves obtuse at apex; bracteoles not apiculate :—

Berry globose, very minutely papillose; leaves obovate elliptic or oblong, petioled, obtuse or slightly acute, attenuate at base, 3- rarely 5-ribbed, 1-2 in. long, .4-1.5 in. broad; lateral flowers of triads usually ♂, central sometimes all ♀...2. *orientale*.

## Berry oblong :—

Berry smooth; leaves elliptic, waved at the margin, obtuse or very slightly acute, shortly petioled, 1-2 in. long, .4-1 in. broad; 3-5-ribbed; flower-triads clustered, the flowers all or lateral ♀, inner ♂, the ♀ elongate, the ♂ often with 3 perianth-lobes only .....3. *orbiculatum*.

Berry, especially when young, covered with little warts; leaves obovate or oblong, obtuse or slightly acute, attenuate at base to a short petiole, .5-1.5 in. long, .4-7 in. broad, 3- rarely 5-ribbed; flowers fascicled, in peduncled triads, the lateral usually ♂ .....4. *verruculosum*.

## Leaves apparently deciduous, sometimes wanting altogether :—

Leaves usually present, broadly orbicular-obovate, emarginate and usually mucronate at apex, cuneate and decurrent at base, about 1-1.25 in. in diam., obscurely 3- or pedately 5-ribbed; middle flower of triad usually ♂; berry ovoid, rough, white or pale green .....5. *capitellatum*.

Leaves usually absent, when present only on lower branches, obovate, about 1 in. long, 3-ribbed; outer flowers of triads usually ♂; berry very small, subglobose .....6. *ramosissimum*.

Leaves few and sparse, yellow when dry like the angular branchlets, oblanceolate, up to 1.5 in. long, about .3 in. broad, 3-ribbed; outer flowers of triads ♂ .....7. *mysorense*.

## Leafless shrubs :—

Internodes of the branchlets tetragonous, uniform; flowers minute, in triads, sessile, solitary or whorled at the nodes, the ♂ flowers usually lateral, the ♀ central; berry minute, globose, .1 in. in diam.

8. *angulatum*.

Internodes of the branchlets flattened, broadening gradually from the base to the top; each at right angles to its neighbours, but twisted near the base, so that all seem to be in one plane; flowers



in axillary fascicles of 1-3, the central flower of a triad usually ♀; berry globose, up to .15 in. in diam., glassy white..9. *articulatum*.

1. *VISCUM MONOICUM*, Roxb.; F. B. I. v. 224; W. & A. 379 (under *V. orientale*).

N. Circars, hills of Ganjam and Vizagapatam, up to 3,500 ft. (Barber, A. W. Lushington); W. Gháts, Pulney Hills in Poombarai valley (Bourne), Nilgiris (G. Thomson).

A parasitic shrub with rather thin leaves and usually yellowish berry.

2. *VISCUM ORIENTALE*, Willd.; F. B. I. v. 224; W. & A. 379.

N. Circars and Carnatic, especially Coast Districts, but also westwards to lower hills of W. Gháts in Coimbatore.

A rather large shrub, parasitic on many kinds of tree, *Albizzia*, *Pongamia*, *Wrightia*, etc., berry purple.

3. *VISCUM ORBICULATUM*, Wt. Ic. t. 1016; Spic. Neilg. t. 86; F. B. I. v. 224.

W. Gháts, Nilgiri Hills, above 5,000 ft.

A small bushy shrub with angular grooved branches, found by Wight on *Vaccinium Leschenaultii*.

4. *VISCUM VERRUCULOSUM*, W. & A. 379; F. B. I. v. 224.

Deccan, hills of N. Coimbatore; W. Gháts, Nilgiris, Anamalais and hills of Tinnevely and Travancore, up to 6,000 ft.

A parasitic shrub with usually terete branches.

5. *VISCUM CAPITELLATUM*, Sm.; F. B. I. v. 225; W. & A. 380.

Carnatic, Coast of S. Arcot (Lawson); Deccan, N. Coimbatore Hills (Fischer); W. Gháts, S. E. Wynaad at 3,000 ft. (Gamble).

A small parasitic shrub with stout usually terete branches, found in two forms, the leafy one ( $\alpha$  of W. & A.) with obtuse broad obovate leaves, perhaps *V. trilobatum*, Talbot, the other with few obovate spathulate leaves ( $\beta$  of W. & A.) and usually more floriferous. It has been found on various trees, *Rhizophora*, *Salvadora*, etc., also on *Loranthus longiflorus*, especially var. *falcatulus*.

6. *VISCUM LAMOSISSIMUM*, Wall.; W. & A. 380; F. B. I. v. 225.

Deccan, in Mysore and Coimbatore; W. Gháts, Nilgiris to hills of Tinnevely up to 6,000 ft.

A many and slenderly branched parasitic shrub, almost broom-like, with terete branches and branchlets. It is found on various trees, *Acacia*, *Rhus*, *Santalum*, *Ficus*, also on *Loranthi*.

7. *VISCUM MYSORENSE*, Gamble in Kew Bull. 1925, 329.

Deccan, Arsikere in Mysore, about 2,000 ft. (Meebold).

A parasitic shrub, yellow when dry, the internodes of the branchlets angular or flattened.

8. *VISCUM ANGULATUM*, Heyne ex DC.; F. B. I. v. 225.

*V. ramosissimum*, Wt. Ic. t. 1017, except ♂ flowers.

W. Gháts, in most Districts on the lower hills up to 4,000 ft., chiefly on N. and E. sides; forests of N. Coimbatore.

A leafless slender parasitic shrub, found on various species of chiefly deciduous trees.

9. *VISCUM ARTICULATUM*, Burm.; F. B. I. v. 226. *V. attenuatum*, DC.; W. & A. 380.

N. Circars and Carnatic from the Godavari southwards, westwards to the lower hills of W. Gháts.

A slenderly-branched parasitic shrub, the internodes scarcely 3 in. in maximum diameter, longitudinally striate. The ♂ flowers are very small and scarce, the ♀ very often solitary, the berry 1 in. in diam. Found on many species, chiefly of deciduous trees.

Var. *dichotomum*, Kurz. Much stouter and more common, but not easily separated in some cases, the internodes up to 5 in. broad and very prominently striate; flowers larger and usually in triads; berry about 15 in. in diameter.

N. Circars, Deccan and Carnatic in most Districts, on many species of tree.

#### Family CXXXII. SANTALACEAE.

Trees, shrubs or herbs, many being parasitic or semiparasitic on the branches or roots of other plants. *Leaves* alternate or opposite, entire, sometimes scale-like or 0; stipules 0. *Flowers* hermaphrodite or unisexual, regular, small, solitary or in simple or compound cymes; bracts usually small; bracteoles 2, sometimes 1 or both obsolete. *Perianth* superior or partly inferior, 3-8-lobed or -toothed, the lobes often with a tuft of hairs behind the anthers. *Stamens* as many as and opposite to the perianth-

lobes, attached to or above the perianth-base; anthers 2-celled. *Disk* epigynous or perigynous. *Ovary* 1-celled, inferior; ovules 2-3, adnate to or pendulous from a central column; style short; stigma entire or 3-6-lobed. *Fruit* a nut or drupe. *Seed* globose or ovoid, smooth rugose or sulcate; testa thin or wanting; albumen copious, fleshy; embryo usually terete; radicle superior.

Herbs; perianth semi-superior, the tube adnate to the base of the ovary and usually produced above it; fruit a small nut....1. **Thesium**. Trees or shrubs; perianth superior, the tube adnate to the ovary, not produced above it; fruit a drupe:—

Not spinous; anther-cells distinct, parallel; drupes small:—

Leaves opposite; stamens with interposed processes; flowers hermaphrodite, the perianth-lobes usually 4.....2. **Santalum**.

Leaves alternate; stamens without interposed processes; flowers polygamous, the perianth-lobes usually 3.....3. **Osyris**.

Often spinous; anther-cells divergent or confluent; leaves alternate, drupe large.....4. **Scleropyrum**.

### 1. **Thesium**, Linn.

Slender perennial herbs, usually parasitic on roots. *Leaves* alternate, narrow, decurrent. *Flowers* minute, greenish, solitary and axillary or in 2-chotomous cymes, hermaphrodite. *Perianth* adnate to the ovary, the tube produced above it; lobes 5, rarely 4. *Stamens* 5 or 4, inserted at the base of the perianth-lobes, included. *Ovary* inferior; ovules 2-3, pendulous from a basal often flexuous column; style cylindric or very short; stigma capitate or lobed. *Fruit* a dry nut, often ribbed. *Seed* conform to the nut; embryo terete, straight or oblique; cotyledons small; radicle as long as or longer than the cotyledons.

**THESIUM WIGHTIANUM**, Wall.; F. B. I. v. 230; Wt. Ic. t. 1853, *except the anthers*.

W. Gháts, Nilgiris and Pulneys and Atapadi Hills of Malabar, above 6,000 ft., on the downs among grass.

A slender plant with many straggling branches often procumbent at the base, narrow linear leaves, small solitary flowers, and a small hard globose nut.

### 2. **Santalum**, Linn.

rarely alternate, glabrous. *Flowers* hermaphrodite, axillary or in terminal 3-chotomous paniculate cymes; bracts minute. *Perianth*-tube campanulate or ovoid, adnate to the base of the ovary; lobes 4, rarely 5, valvate, with a tuft of hairs on the face. *Stamens* 4 or 5, adnate to the bases of the perianth-lobes, alternating with the fleshy scales of the disks; filaments short; anthers ovate, the cells distinct, parallel. *Disk* of the scales between the stamens. *Ovary* at first free, later semi-inferior; ovules 2-3, pendulous from below the top of a long acuminate central column; style elongate; stigma 2-3-lobed. *Fruit* a subglobose drupe, annulate on the top by the deciduous perianth, endocarp rugose. *Seed* subglobose; albumen copious; embryo terete, slender; radicle longer than the cotyledons.

SANTALUM ALBUM, Linn.; F. B. I. v. 231; Bedd. Fl. t. 256.

*Sirium myrtifolium*, Roxb. Cor. Pl. t. 2.

N. Circars, in Vizagapatam, scarce; Carnatic, hills of S. Arcot, Salem and southwards; Deccan, in all Districts but especially in Mysore, Coimbatore and plains N. of Nilgiris, up to 3,000 ft.; W. Gháts, on E. slopes in Mysore, Coorg and Nilgiris; in dry open scrub forests and hedgerows. Sandal. A small evergreen usually semiparasitic glabrous tree with elliptic-ovate leaves up to 3 in. long, 1.5 in. broad, glaucous beneath, the flowers brownish-purple, the drupe black when ripe. Bark dark grey, rough; wood hard and close-grained, sapwood white, scentless, heartwood yellowish-brown, strongly scented and in great demand for carvings, the distillation of oil, export to China, etc., and in burial ceremonies. For an account of the parasitism and growth of the tree, the "spike" disease, etc., see Troup, Silv. Ind. Trees iii. 749. Vern. *Hind.* Chandan; *Tam.* Srigandam; *Tel.* Chandanum.

### 3. *Osyris*, Linn.

Shrubs with angular branchlets. *Leaves* alternate, entire; stipules 0. *Flowers* small, axillary, polygamous (♂ and ♀), the ♂ flowers in clusters, the ♀ often solitary. *Perianth*-tube solid in the ♂ flowers, adnate to the ovary in the ♀; lobes 3-4, triangular, valvate, with a tuft of hair on the face. *Stamens* 3 or 4, inserted

perianth-tube; ovules 2-4, pendulous from a short central placenta; style short; stigma 3-4-lobed. *Fruit* a globose or ovoid drupe. *Seed* globose, solitary; embryo small, in the centre of copious fleshy albumen.

*OSYRIS ARBOREA*, Wall.; F. B. I. v. 232. *O. Wightiana*, Wall.; Wt. Ic. t. 1853.

N, Circars, Mahendragiri Hill in Ganjam, at 4,500 ft. (Gamble); Deccan, in hills in Mysore, on Horsleykonda, Chittoor, 4,000 ft.; Carnatic, Shevaroy Hills of Salem; W. Gháts, in most Districts, above 3,000 ft.

An evergreen shrub with coriaceous elliptic-lanceolate even orbicular leaves mucronate at apex, very small flowers and small hard yellow drupe. Bark greyish-brown, rough; wood red, close-grained. Vern. *Mar. Popli*.

#### 4. *Scleropyrum*, Arnott.

Trees with axillary spines. *Leaves* alternate, coriaceous. *Flowers* polygamous, in short catkin-like spikes at the leafless nodes of the branchlets. *Perianth*-tube of ♂ flowers solid, of ♀ or ♂ flowers adnate to the ovary; lobes 4-5, valvate or sub-imbricate, with a tuft of hair behind the stamens. *Stamens* 4-5, inserted at the base of the lobes; filaments bifid, the anther-cells on separate branches, dehiscing transversely. *Disk* annular, undulate. *Ovary* inferior; ovules 3, pendulous from the top of a central column; style short; stigma large, peltate. *Fruit* a pyriform drupe on a thickened pedicel, crowned by the remains of the perianth-lobes; exocarp thick, fleshy, endocarp hard. *Seed* 1, globose; albumen copious; embryo terete, central; cotyledons oblong.

*SCLEROPYRUM WALLICHIANUM*, Arn.; F. B. I. v. 234; Wt. Ic. t. 241. *Pyrularia Wallichiana*, A. DC.; Bedd. Fl. t. 304.

W. Gháts, S. Canara to Travancore, in evergreen forests, up to 3,000 ft.; Coorg and Wynaad, 3,000-5,000 ft.

A small tree with thick, sharp, conical spines, small reddish flowers and large red drupe, the leaves ovate-oblong, up to 7 in. long, 3 in. broad, 3-5-ribbed at base.

which the flowering stems burst irregularly and are usually stout and scaly. *Flowers* monoecious or dioecious, crowded in large globose or elongate stoutly-peduncled heads, the ♂ and ♀ flowers very dissimilar; the ♂ of 3-8 valvate perianth-lobes, fairly large, sometimes 0; the ♀ without perianth and very minute or confluent with the ovary, often mixed with clavate bodies. *Stamens* as many as the perianth-lobes and opposite to them or the filaments connate in a column or tube; anthers free or connate, 2-many-celled, opening by pores or valves or bursting irregularly. *Ovary* 1-3-celled, ovule 1 in each cell usually pendulous; styles 1-2 or 0, stigmas simple or capitellate. *Fruit* minute, 1-seeded. *Seed* usually adherent to the pericarp, testa thin or 0, albumen granular and oily; embryo very minute.

### Balanophora, Forst.

Glabrous fleshy herbs with a tuberous rootstock warted with lenticels abounding in a waxy secretion. *Peduncles* bursting through the rootstock, which forms a ring or sheath at their base. *Flowers*: ♂ with a perianth of 2-6 valvate lobes, stamens 2-∞, the filaments 0 or connate in a column, the anthers (in our species) horse-shoe-shaped; ♀ without perianth, ovary ellipsoid, 1-celled; style long, slender; stigma simple, many minute flowers surrounding a clavate body. *Fruit* minute, crustaceous. *Seed* globose; albumen oily; embryo of 2-3 cells only.

*Heads* in ♂ cylindric, in ♀ ovoid; perianth-lobes usually 4, oblong, acute, reflexed; staminal column elongate.....1. **dioica.**

*Heads* in ♂ obovoid or subglobose, in ♀ globose, often very large; perianth-lobes usually 4, short, obtuse, erect; staminal column short  
2. **indica.**

1. **BALANOPHORA DIOICA**, R. Br.; F. B. I. v. 237.

N. Circars, hills of Vizagapatam (Gamble).

As the ♂ flowers only are available, the identification is uncertain.

2. **BALANOPHORA INDICA**, Wall.; F. B. I. v. 237.

W. Gháts, in the hills from Nilgiris to Travancore, up to 5,000 ft.

A thick rather common parasite, often very large,



## Family CXXXIV. BUXACEAE.

Trees or shrubs, rarely herbs. *Leaves* opposite or alternate, usually coriaceous and evergreen; stipules 0. *Flowers* unisexual, usually monoecious, in axillary or rarely terminal spikes or racemes, the ♂ and ♀ usually adjoining each other but the ♀ sometimes distinct; bracteate and bracteolate. *Perianth* calyciform, the lobes free and imbricate. *Stamens* as many as and usually opposite to the perianth-lobes; filaments erect, broad; anthers dorsifixed, the cells dehiscing longitudinally. *Ovary* 2-3-celled, rarely more, the cells 1-2-ovuled, the ovules with dorsal raphe; styles 2-3, short, usually recurved. *Fruit* a 2-3-celled capsule, or an indehiscent berry. *Seeds* 2-3 in each cell, often reduced to 1; testa crustaceous, smooth; albumen copious; cotyledons fleshy, flattened; radicle superior.

*Leaves* opposite; ♀ flowers in the spikes usually above the ♂; fruit capsular, dehiscent ..... **Buxus.**

*Leaves* alternate; ♀ flowers in the spikes usually below the ♂, often separate and single; fruit a berry, indehiscent.....1. **Sarcococca.**

**Sarcococca, Lindl.**

Glabrous evergreen shrubs. *Leaves* alternate, entire, penni- or tripli-nerved. *Flowers* in short axillary racemes, monoecious, the ♀ below the ♂; bract 1; bracteoles few in ♂, more numerous and decussate in ♀. *Perianth*-lobes 4 in ♂, 4-6 in ♀ in opposite pairs. *Stamens* 4, opposite the perianth-lobes; filaments thick; anthers adnate to their tops, cells introrse. *Ovary* 2-3-celled; ovules 2 in each cell, the raphe dorsal; styles 2, recurved, the inner faces furrowed and papillose. *Fruit* an indehiscent coriaceous or fleshy berry, the endocarp hard. *Seeds* 1-2; testa membranous; albumen fleshy; cotyledons flat, cordate.

*Leaves* usually distinctly tripli-nerved, from about .5 in. above the base, lanceolate, long-acuminate at apex, acute at base, up to 6 in. long, 2.5 in. broad; racemes up to 1 in. long .....1. *trinervia.*  
*Leaves* less distinctly tripli-nerved from nearer the base, ovate to ovate-elliptic, shortly and suddenly acuminate at apex, rounded and

1. *SARCOCOCCA TRINERVIA*, Wt. Ic. t. 1877. *S. saligna* var. *densiflora*, Muell. Arg. *S. pruniformis*, Lindl.; F. B. I. v. 266 in part.

N. Circars, Mahendragiri Hill in Ganjam, 4,500 ft. (Gamble), Daringabadi (Barber), hills of Vizagapatam (A. W. Lushington); W. Gháts, from Nilgiris southwards, usually at 4,000–7,000 ft., sometimes at low levels, S. Canara (Beddome), usually in forest undergrowth.

A large evergreen shrub. Bark light brown; wood white, close-grained, like boxwood, sometimes used for walking-sticks.

2. *SARCOCOCCA BREVIFOLIA*, Stapf in Herb. Kew. *S. saligna* var. *brevifolia*, Muell. Arg.

W. Gháts, Nilgiris, on Doddabetta 8,000 ft., in Shola undergrowth.

An evergreen shrub.

The Box, *Buxus sempervirens*, Linn., is commonly used for hedges on the Cinchona Estates in Nilgiris.

#### Family CXXXV. EUPHORBIACEAE.

Herbs, shrubs or trees, rarely climbers, often with milky juice. *Leaves* alternate or opposite, simple or rarely compound, usually stipulate, often glandular. *Flowers* usually small, often minute, monoecious or dioecious, the inflorescence variable. *Perianth* usually calycine, rarely petaloid, sometimes of both calyx and corolla, sometimes wanting in one or both sexes. *Calyx* inferior, valvate or imbricate, often different in the sexes. *Petals* when present free, sometimes scale-like, sometimes absent or different in the sexes. *Stamens* various, definite or indefinite; filaments free or connate; anthers 2-celled, the cells parallel or divaricate, dehiscing longitudinally or sometimes transversely. *Disk* various, usually annular, entire or lobed, or of free scales or 0. *Ovary* usually sessile, rarely stipitate, usually 3-celled; ovules in each cell 1 or 2, pendulous from the inner angle; style usually as many as the cells, free or more or less connate, erect or spreading, the inner faces usually stigmatic. *Fruit* usually capsular of 2-valved cocci separating from a persistent axis, sometimes indehiscent or drupaceous, 1–3-celled. *Seeds* attached laterally near to or above the middle of the cell with or without

Cells of the ovary 2-ovuled except in 1:— (1-26)

Inflorescence of many pedicelled bracteolate stamens as ♂ flowers surrounding a single pedicelled ♀, the whole contained in a 4-5-lobed involucre:—

Involucre regular or nearly so.....1. **Euphorbia.**

Involucre obliquely zygomorphous .....**Pedilanthus.**

Flowers distinct, not contained in an involucre:—

Leaves simple, alternate:— (2-24)

Petals present, small:— (2-4)

Calyx valvate; filaments combined in a column:—

Fruit a drupe with 2 pyrenes; ovary 2-celled...2. **Bridelia.**

Fruit a capsule; ovary 3-celled .....3. **Cleistanthus.**

Calyx imbricate; stamens free.....4. **Actephila.**

Petals wanting; calyx-lobes imbricate in bud:— (5-24)

Disk present, usually conspicuous and of glands:— (5-15)

Flowers, at any rate ♂, in clusters:— (5-14)

Fruit a dry capsule of 3 2-valved cocci:— (5-11)

Calyx-lobes 6 in both ♂ and ♀:— (5-7)

Stamens 3, the filaments connate:—

Stamens small, not apiculate; styles short, bifid, sunk in the top of the ovary .....5. **Agyneia.**

Stamens elongate, apiculate; styles combined in a terminal column.....6. **Pseudoglochidion.**

Stamens 6, the filaments free .....7. **Chorisandra.**

Calyx-lobes 5 in both ♂ and ♀:—

Stamens 5, the filaments connate...8. **Neopeltandra.**

Stamens 3, the filaments connate wholly, in part, or sometimes not at all.....9. **Phyllanthus.**

Calyx-lobes 4 in ♂, 6 in ♀; stamens 2 or 4, the filaments connate .....10. **Reidia.**

Calyx-lobes 4 in both ♂ and ♀; stamens 4, the filaments free .....11. **Prosorus.**

Fruit a berry:— (12-13)

Fruit small, fleshy, with 6-12 crustaceous seeds; ovules superposed; calyx-lobes 5 ....12. **Kirganelia.**

Fruit large, of 3-6 hard cocci in a fleshy epicarp:—

Calyx-lobes 5-6; stamens 3, the filaments connate

13. **Emblica.**

Calyx-lobes 4; stamens 4, the filaments free...14. **Cleca.**

Fruit dry or fleshy with 6 cocci; stamens 5, the

Flowers in spikes or racemes, often paniced; ovary 1-celled .....15. **Antidesma**.

Disk central, orbicular; stamens 4 to many:—

Ovary 1-celled; drupe 1-seeded.....16. **Hemiphyllia**.

Ovary 2-4-celled; drupe 2-4-seeded ....17. **Cyclostemon**.

Disk combined with the calyx-lobes, the 3 stamens in a column:—

Anthers sessile on the angle of the column; calyx of both ♂ and ♀ spreading .....18. **Sauropus**.

Anthers adnate to the column; calyx of ♂ turbinate, of ♀ spreading .....19. **Breynia**.

Disk wanting:— (20-24)

Stamens connate by their connectives in a column; styles also connate in a column; flowers in clusters

20. **Glochidion**.

Stamens free or rarely connate by their filaments:— (21-24)

Flowers in spikes or racemes:—

Fruit capsular:—

Seeds without an aril; stamens 1-5; ♂ flowers in catkin-like spikes, ♀ in clusters .....21. **Aporosa**.

Seeds with an aril; stamens 4-8; flowers in racemose spikes often in fascicles on the trunk

22. **Baccaurea**.

Fruit a drupe with woody endocarp; flowers in axillary racemes; stamens 5 or more.....23. **Daphniphyllum**.

Flowers: ♂ in clusters, ♀ subsolitary; stamens 2-3 central.....24. **Putranjiva**.

Leaves simple, whorled; calyx-lobes 5-6 .....25. **Mischodon**.

Leaves trifoliolate; calyx-lobes 5; flowers in panicles of racemes

26. **Bischofia**.

Cells of the ovary 1-ovuled:— (27-57)

Filaments inflexed in bud; ♂ calyx imbricate valvate or nearly open; pistillode 0; indumentum scaly or stellate .....27. **Croton**.

Filaments erect, rarely inflexed, but then pistillode conspicuous:— (28-56)

Calyx in ♂ valvate:— (28-45)

Petals present in ♂ flowers:— (28-30)

Calyx 5-lobed, closed in bud then regularly valvate; herbs or undershrubs very stellate-hairy.....28. **Chrozophora**.

Calyx irregularly valvate: trees or shrubs:—

Lepidote or stellate-pilose; fruit drupaceous, indehiscent

30. **Aleurites.**

Petals in ♂ flowers 0 :— (31–45)

Partial inflorescence not involucrate :— (31–44)

Filaments free or shortly connate :— (31–44)

Filaments not branched :— (31–41)

Styles free or only slightly connate :— (31–40)

Anthers not vermiculiform or linear :— (31–39)

Anther-cells pendulous or adnate :— (31–37)

Anthers 2-celled :— (31–35)

Stamens numerous :—

Fruit indehiscent; styles linear

31. **Trewia.**

Fruit a capsule; styles plumose

32. **Mallotus.**

Stamens 2–9 :—

Filaments inflexed ..... 33. **Symphyllia.**

Filaments straight, dilated

34. **Coelodepas.**

Filaments slender ..... 35. **Alchornea.**

Anthers 4-celled or 2-celled and 4-valved :—

Connective produced; capsule large

36. **Cleidion.**

Connective not produced; capsule small

37. **Macaranga.**

Anther-cells discrete, ascending, divaricate

Racemes uniformly floriferous; cocci dehiscing  
loculicidally ..... 38. **Claoxylon.**

Racemes interrupted; cocci dehiscing loculi-  
and septicidally ..... 39. **Micrococca.**

Anthers vermiculiform or linear; styles laciniate

40. **Acalypha.**

Styles connate; calyx of ♀ accrescent; stinging  
climbers ..... 41. **Tragia.**

Filaments much branched; staminal bundles indefinite :—

Leaves entire, penninerved :—

Calyx-lobes of ♀ soon deciduous .... 42. **Homonoia.**

Calyx-lobes of ♀ enlarged after flowering

43. **Laslococca.**

Leaves palmatilobed ..... 44. **Ricinus.**

Filaments connate in a column

Hevea

Calyx in ♂ imbricate :— (46-54)

Petals present in ♂ flowers :— (46-52)

Petals free :— (46-51)

Stamens numerous :— (46-50)

Flowers glomerate-spicate or racemose :— (46-48)

Calyx not or scarcely enlarged in fruit :—

Flowers in ♀ with petals .....46. **Ostodes.**

Flowers in ♀ with no or very minute petals -

• **Codiaeum.**

Calyx enlarged under the fruit :—

Flowers in ♀ with petals .....47. **Dimorphocalyx.**

Flowers in ♀ apetalous .....48. **Blachia.**

Flowers paniculate, the panicles branching dichasially :—

Leaves palmatinerved .....49. **Jatropha.**

Leaves penninerved .....50. **Tritaxis.**

Stamens 3-8, usually 3 .....51. **Trigonostemon.**

Petals connate; leaves palmatinerved; fruit a drupe

52. **Givotia.**

Petals in ♂ flowers 0 :—

Leaves usually deeply lobed; ♂ calyx large, coloured

**Manihot.** /

Leaves not lobed; ♂ calyx small, not coloured :—

Disk of ♂ outside the stamens; leaves not punctate

53. **Baliospermum.**

Disk-glands large or only peripheric; leaves pellucid-punctate .....54. **Gelonium.**

Calyx of ♂ open or slightly imbricate, usually much reduced; disk 0 :—

Calyx of ♂ 3-lobed; stamens 3 or 2 :—

Seeds carunculate; herbs .....55. **Sebastiania.**

Seeds not carunculate; trees .....56. **Excoecaria.**

Calyx of ♂ 2-3-lobed; stamens 2-3; seeds not carunculate

57. **Sapium.**

# 1. Euphorbia, Linn.

Herbs, shrubs or small trees of various habit and with copious milky, usually acrid, juice. *Leaves* alternate or opposite, usually entire, often (in the fleshy species) caducous or much reduced; stipules various. *Flowers* monoecious, combined in an inflores-



in a sheath, sometimes 0; the whole enclosed in a 4-5-lobed turbinate or campanulate *involucre*, having also between the lobes at their sinuses thick *glands*, which have sometimes horns and sometimes a petaloid spreading limb. *Perianth* 0 or of minute scales. *Stamen* in ♂ florets solitary, the filament jointed on a pedicel; anther 2-celled, erect, the cells usually subglobose, opening longitudinally. *Floret* of ♀ a 3-celled ovary on an often decurved pedicel; ovule solitary in each cell; styles 3, free or connate; stigmas simple or 2-fid. *Fruit* a capsule of 3 2-valved *cocci* separating elastically from a persistent axis, and dehiscing ventrally or both ventrally and dorsally. *Seeds* albuminous; testa more or less crustaceous, often with a caruncle; cotyledons flat; radicle superior.

Herbs, prostrate or ascending; leaves opposite; glands of involucre 4-5, usually with a petaloid limb:—

Erect and dichotomously branching; limb of gland more or less conspicuous, petaloid:—

Floral leaves distichous, imbricate, enclosing the involucre which are solitary or 2-3 only:—

Limb of gland entire or sinuate; leaves cordate, usually unequally, at base, minutely areolate-reticulate, serrulate:—

Limb of gland scarcely .05 in. long; plants nearly or quite glabrous; leaves elliptic-oblong, obtuse:—

Cocci obtusely keeled, hirsute or glabrous; seeds obtusely 4-angled, transversely furrowed or glabrous; limb white

1. *pycnostegia*.

Cocci keeled and angled at base, nearly glabrous; seeds ovoid, papillose; limb pink . . . . . 2. *zorniioides*.

Limb of gland .1 in. long, pink; plant with soft spreading hairs; leaves elliptic or orbicular, obtuse, the floral much imbricate; cocci rounded, hirsute; seeds 4-angled, transversely furrowed . . . . . 3. *elegans*.

Limb of gland pectinately laciniate; seeds transversely furrowed:—

Limb of gland glabrous or nearly so; leaves very small; cocci hirsute; seeds brown . . . . . 4. *fimbriata*.

Limb of gland with long hairs; leaves about .5-.75 in. long, obliquely ovate-cordate, obtuse, serrulate; cocci rounded, hirsute; seeds white . . . . . 5. *cristata*.

minute; leaves membranous, elliptic or oblong, obtuse, distantly serrulate, up to .75 in. long; cocci glabrous, keeled; seeds with 3-4 parallel furrows .....6. *longistyla*.

Limb of gland entire, not multifid:—

Cocci with 2 dorsal wings; seeds obtusely 4-angled, papillose; involucre in small cymes, the limb of the gland rounded, white; leaves linear-oblong, mucronate, up to 1 in. long, .25 in. broad .....7. *notoptera*.

Cocci not winged:—

Involucres in subcorymbose terminal cymes; limb of gland broadly rounded, pink or white; leaves linear-oblong, coriaceous; obtusely acute, unequally cordate at base, up to 1 in. long, .2 in. broad; cocci glabrous, keeled

8. *linearifolia*.

Involucres in terminal and axillary cymes:—

Dwarf glabrous seashore shrub with fleshy branches and leaves, the latter elliptic, obtuse, unequally rounded at base, up to 1 in. long, .5 in. broad; cymes corymbose, spreading, much bracteate; glands oblong, the limb very small or 0; cocci glabrous; seeds globose, smooth

9. *Atoto*.

Erect slender inland herbs; not fleshy; seeds with shallow furrows:—

Cymes not capitate; plant nearly glabrous; leaves thin, glaucous, elliptic oblong or obovate, obtuse, serrulate, up to 1 in. long, .5 in. broad; limb of gland small, retuse, white or pink; cocci hispid; seeds reddish-glaucous .....10. *hypericifolia*.

Cymes capitate, often in pairs; plants with hispid often yellowish hairs; leaves obliquely elliptic or lanceolate, acute, serrulate, up to 1.5 in. long, .5-.75 in. broad, pale beneath; limb of stalked gland minute or 0; cocci appressed pubescent; seeds reddish .....11. *hirta*.

Erect herbs, also with many prostrate or spreading branches:—

Limb of gland pink, the 2 upper large obliquely oblong, obtuse or notched, the 2 lower small; leaves green, obliquely obovate or linear-spathulate, crenulate at tip, up to .5 in. long, .25 in. broad; cocci

Limb of gland white, all subequal, rounded, sometimes 0; leaves green, but often with a red spot, elliptic oblong or obovate, obtuse, oblique at base, up to .5 in. long, .2 in. broad; cocci keeled, glabrous or slightly pubescent; seeds smooth...13. *corrigioloides*.

Prostrate herbs with very small leaves; involucre solitary or in small axillary cymes; limb of gland minute or 0:—

Stems hispidly hairy; capsules pubescent or hirsute; leaves areolate-reticulate:—

Cocci rounded or only slightly obtusely keeled, covered with appressed stiff hairs; seeds 4-angled with faint furrows; leaves oblong or ovate, crenulate at tip, obliquely subcordate at base, up to .25 in. long, the nerves obscure...14. *thymifolia*.

Cocci prominently keeled, with stiff spreading hairs on the keels; seeds 4-angled, with deep furrows; leaves elliptic or obovate, crenulate, oblique at base, up to .3 in. long, 3-nerved, the nerves all prominent .....15. *prostrata*.

Stem and capsules glabrous, the latter obtusely keeled; seeds obtusely 4-angled, glabrous, sometimes faintly furrowed; leaves elliptic or obovate, rounded or emarginate, oblique at base, rarely over .15 in. long, the nerves obscure ....16. *microphylla*.

Shrubs or trees or plants with thickened underground stem, the branches often angular and with stipular spines; glands of involucre without a petaloid limb:—

Stems not developed above ground, stout and cylindric, 6–18 in. or more long; leaves radical, obovate, cuneate, early deciduous; scapes erect, dichotomous, bracteate; involucre hemispheric, the lobes lacerate-multifid; glands 5, oblong; capsule glabrous; seeds ovoid, smooth .....17. *acaulis*.

Stems well developed above ground:—

Branches spreading, unarmed, cylindric; leaves 0 or small and linear-oblong, deciduous; involucre pedicelled, clustered in the axils of the branchlets; glands peltate; cocci subglobose, smooth, .3 in. long; seeds ovoid, smooth .....18. *Tirucalli*.

Branches thick, fleshy, armed with stipular spines:—

Main stems practically none but many branches from the base up to even 7 ft. high, 2 in. in diam., terete, smooth; spines in pairs from large conical tubercles, in spirals, the spines .25–.5 in. long, red, sharp, often with 2 smaller ones above; leaves small, fleshy, suborbicular, .3–.5 in. long, deciduous; glands oblong;

Main stem present, thick and tree-like :—

Leaves large, oblanceolate, usually at least 6 in. long; involucre usually in threes on a short fleshy peduncle, the lobes fimbriate, the glands transversely oblong :—

Branches cylindric with pairs of straight spines inserted on flat corky bases, arranged in vertical lines; leaves obtuse ..... 20. *Nivulia*.

Branches more or less angular with small pairs of spines on small corky bases, arranged in spiral lines; leaves shortly acute ..... 21. *neriifolia*.

Leaves small, usually very early deciduous; branches angular :—

Styles simple :—

Branchlets 3-winged with straight spines in pairs; leaves obovate, spathulate, mucronate, up to 2 in. long, .75 in. broad; bracteoles sheathing, laciniate

22. *trigona*.

Branchlets 5-winged with narrow sharp spines; leaves oblanceolate, acute, mucronate, up to 2 in. long, .5 in. broad; bracteoles slender, fimbriate at tip

23. *Cattimandoo*.

Styles bifid at apex :—

Branchlets thick and broad 3-5-winged, with sharp spines; leaves few, very small; glands fleshy, thick, spongily pitted, bracteoles sheathing, deeply laciniate

24. *antiquorum*.

Branchlets rather slender, much twisted, 3-5-winged, with sharp spines, the wings thin, foliaceous; leaves minute, ovate; glands large, hard and thin, glabrous; bracteoles sheathing, fimbriate at tip ..... 25. *tortilis*.

Herbs with erect stems umbellately branched above, the lower leaves or sometimes all alternate, the upper opposite; glands of involucre without a petaloid limb :—

Glands of the involucre 2-horned; capsule smooth; seeds carunculate :—

Seeds with a white leprous tuberculate testa; leaves linear or linear-lanceolate, 1-1.5 in. long, .1-2 in. broad, the floral leaves shorter and broader in proportion; lobes of the involucre short, ovate, ciliolate ..... 26. *dracunculoides*.

floral leaves broadly ovate-cordate, acute, mucronate; lobes of the involucre long, subquadrate, ciliate .....27. *Rothiana*.

Glands of the involucre not horned:—

Glands peltate; cocci rounded, smooth; leaves oblanceolate, acute, serrate, the upper larger, up to 1.5 in. long, those near the involucre ovate to cordate; lobes of the involucre narrow, ciliate, longer than the glands .....28. *peltata*.

Glands oblong; capsules smooth, the cocci rounded; seeds reticulate, carunculate; leaves obovate or spatulate, obtuse, serrulate, the floral larger, up to 2 in. long; lobes of the involucre fimbriate .....29. *helioscopia*.

1. *EUPHORBIA PYCNOSTEGIA*, Boiss.; F. B. I. v. 246.

W. Gháts, hills of S. Canara and Malabar.

A slender branching herb, glabrous except the floral internodes and capsule, the leaves up to 1.5 in. long, .5 in. broad, floral leaves smaller, ovate; cocci hirsute.

Var. *laxa*, Boiss. Floral heads more open, cocci glabrous, also seeds.

Bababudan Hills of Mysore, at 5,000 ft. (Talbot, Meebold).

2. *EUPHORBIA ZORNIoidES*, Boiss.; F. B. I. v. 246.

Bababudan Hills of Mysore at 3,500 ft. (Meebold); Anamalais (Beddome).

A slender glabrous herb, with woody stem, the leaves narrow, mucronate, floral leaves small, ovate, gradually smaller upwards, ciliate on the edges.

3. *EUPHORBIA ELEGANS*, Spr.; F. B. I. v. 146.

N. Circars and Deccan from Godavari to Kurnool, in shady places in deciduous forest.

An erect herb or undershrub with conspicuous floral leaves and pink flowers, the leaves scarcely 1 in. long.

4. *EUPHORBIA FIMBRIATA*, Heyne in Roth Nov. Sp. Pl. 227.

*E. cristata*, Hook. f. in F. B. I. v. 247 in part.

Deccan, Sakrabilé in Mysore (Barber); Tinnevelly Gháts (Beddome).

A dwarf undershrub with thick rootstock and many short branchlets, the involucre very villous.

5. *EUPHORBIA CRISTATA*, Heyne; F. B. I. v. 247.

Deccan and Carnatic, from the Kistna river southwards, west to the E. slopes of the Gháts, in forest undergrowth,

6. **EUPHORBIA LONGISTYLA**, Boiss.; F. B. I. v. 247.  
Deccan, in the Ceded Districts, up to 2,000 ft. (Heyne, Wight, Gamble).  
An erect delicate herb reaching 10 in. in height, with slender root and numerous filiform branches, the long styles conspicuous.
7. **EUPHORBIA NOTOPTERA**, Boiss.; F. B. I. v. 247.  
W. Coast in rice-fields and other cultivated land, on laterite soil in S. Canara (Fischer).  
A slender erect herb with narrow, usually deflexed leaves.
8. **EUPHORBIA LINEARIFOLIA**, Roth; F. B. I. v. 249.  
Deccan, at Cumbum in Kurnool (Bourne) also, but without geographical locality (Heyne and Wight).  
A glabrous glaucous herb with thick rootstock and branches. Roth says that the limb is pink with a red spot.
9. **EUPHORBIA ATOTO**, Forst.; F. B. I. v. 248.  
W. Coast, in S. Canara, Malabar and Travancore, on the sea-coast.  
A fleshy shrub with long stout rootstock and stout much-branched stems.
10. **EUPHORBIA HYPERICIFOLIA**, Linn.; F. B. I. v. 249.  
N. Circars, Deccan and Carnatic, west to the E. slopes of the Gháts, up to 3,000 ft., common.  
A slender herb reaching 1-2 ft. high.
11. **EUPHORBIA HIRTA**, Linn. *E. pilulifera*, Linn.; F. B. I. v. 250.  
All plains Districts, especially on roadsides and waste land, common.  
A straggling ascending hispid herb reaching 1-2 ft. high.
12. **EUPHORBIA ROSEA**, Retz; F. B. I. v. 251.  
N. Circars, coast of Ganjam; S. Deccan and Carnatic, on sandy soils, especially near the coast.  
A herb with long rootstock and many prostrate branches, the styles long and conspicuous. The coast form (*E. auricularia*, Boiss.) has the two upper limbs of the glands shorter and broader and the leaves more rounded and fleshy.



A herb with stout rootstock and many branches which are often long and trailing with leaves in distinct pairs, often conspicuous with a red blotch.

14. *EUPHORBIA THYMIFOLIA*, Linn.; F. B. I. v. 252.

All plains Districts and on hills in Deccan and Carnatic at low elevations, often a roadside and garden weed.

• An annual prostrate herb.

15. *EUPHORBIA PROSTRATA*, Ait.; F. B. I. v. 266.

Deccan and Carnatic, occasionally, usually probably as a weed in gardens. An introduced plant, native of W. Indies.

A prostrate herb.

16. *EUPHORBIA MICROPHYLLA*, Heyne; F. B. I. v. 252.

Circars, Deccan and Carnatic, especially near the sea and on river banks.

A glabrous herb with prostrate branches, spreading star-like from the root.

Var. *nilagirica*. *E. nilagirica*, Miq.; F. B. I. v. 265. A rather larger plant with larger leaves and more sharply keeled cocci.

Nilgiri Hills (Hohenacker), probably at low levels in dry places.

17. *EUPHORBIA ACAULIS*, Roxb. *E. fusiformis*, Buch.-Ham. in Don Prodr. 62; F. B. I. v. 257.

Bababudan Hills of Mysore (Law).

A dwarf unarmed glabrous herb, flowering in the hot season, the leaves up to 9 in. or more long, the tuber often very large, even to 2 ft.

18. *EUPHORBIA TIRUCALLI*, Linn.; F. B. I. v. 254.

Most plains Districts, naturalized and cultivated as a hedge plant, native of tropical Africa. Milk Bush.

A large shrub or small tree. Flowers very small, the bracteoles among the ♂ laciniate at tip; bark greenish-brown; wood white or grey, moderately hard, said to give a good powder charcoal. Vern. *Hind.* Sehnd; *Tam.*, *Mal.*

• Tiru Kalli.

19. *EUPHORBIA CADUCIFOLIA*, Haines in Ind. For. xl. 154; Fischer in Kew Bull. 1925, 341.

Deccan, hills of Palnád in Guntur, hills of Kurnool and Cuddapah, among rocks (Fischer).

20. *EUPHORBIA NIVULIA*, Buch.-Ham.; F. B. I. v. 255; Wt. Ic. t. 1862.

N. Circars and Deccan to Mysore and Coimbatore, on rocky hills in dry open forests; often also cultivated.

A tree with straight trunk reaching 10–30 ft., the branches whorled. Wood white, soft, even-grained. The milky juice is used in medicine. Vern. *Tam.* Kalli; *Kan.* Yelli Kalli.

21. *EUPHORBIA NERIIFOLIA*, Linn.; F. B. I. v. 255.

Cultivated and sometimes run wild, chiefly in Northern Districts.

A small tree 6–15 ft. high with whorled branches.

22. *EUPHORBIA TRIGONA*, Haw.; F. B. I. v. 256 *in part*; Wt. Ic. t. 1863.

Deccan, on dry rocky hills.

A small tree with thick trunk reaching 6–7 ft., the involucre in dichasioid cymes of 3, the middle one with ♀ flowers, the others usually only ♂. The cocci are more or less compressed, the seeds smooth.

23. *EUPHORBIA CATTIMANDOO*, W. Elliot in Wt. Ic. t. 1993. *E. trigona*, Haw.; F. B. I. v. 256 *in part*.

N. Circars, dry hills about Vizagapatam (W. Elliot); Deccan, hills of Kistna and Kurnool.

An erect shrub or small tree, giving an abundant milk which hardens to a kind of gutta-percha.

24. *EUPHORBIA ANTIQUORUM*, Linn.; F. B. I. v. 255; Wt. Ic. t. 897.

Low hills and rocky ground in most dry Districts, also commonly cultivated as a hedge plant.

A small tree, reaching 25 ft. high, the involucre in short cymes of 3, the cocci compressed. Vern. *Hind.* Tidhara-Sehnd; *Tam.* Sadura-Kalli.

25. *EUPHORBIA TORTILIS*, Rottl. ex Wt. Ic. t. 898; F. B. I. v. 256. *Tel.* Pedda-jamadu.

Carnatic, from Nellore to Tinnevely, on dry hills.

An erect shrub with thin-winged branchlets bearing involucre in cymes of 3.

26. *EUPHORBIA DRACUNCULOIDES*, Lamk.; F. B. I. v. 262.

N. Circars and Deccan, on dry waste lands and in culti-

27. *EUPHORBIA RETHIANA*, Spr.; F. B. I. v. 263; Wt. Ic. t. 1864.

N. Circars, Mahendragiri Hill in Ganjam, 4,000 ft. (Fischer); Deccan, hills of Mysore and Coimbatore; W. Gháts, in all Districts, at 4,000–7,000 ft., usually in damp places.

An erect glabrous glaucous herb, the flowering branches whorled with conspicuous floral leaves.

Var. *pubescens*, Boiss. Branchlets and leaves softly pubescent. Coorg (Hohenacker).

28. *EUPHORBIA PELTATA*, Roxb.; F. B. I. v. 262.

Interior of the Coromandel Coast (Roxburgh), see Fl. Ind. and Icon. 1248 in Herb. Kew.

A small annual erect herb.

29. *EUPHORBIA HELIOSCOPIA*, Linn.; F. B. I. v. 262.

Nilgiri Hills, introduced and run wild, native of Europe and temperate Asia. Sun Spurge.

An erect annual herb.

*Euphorbia pulcherrima*, Willd., the Poinsettia, is a well-known ornamental garden shrub with bright crimson or occasionally yellow or white floral leaves. *E. heterophylla*, Linn., is an annual herb from Tropical America, which is often found as a weed in Indian gardens. It has narrow floral leaves, green near the apex and nearly reddish at base. *E. splendens*, Boj., is a small prickly very much branched shrub with showy crimson flowers, common in gardens in the plains. It is a native of Madagascar.

## 2. *Bridelia*, Willd.

Shrubs or trees, sometimes climbing; stems often spinose. Leaves alternate, entire, usually with prominent nerves and transverse nervules; stipules early deciduous. Flowers small, monoecious or dioecious, in axillary or spicate clusters, sessile or shortly pedicelled; bracts small, scale-like. Calyx of 5 valvate lobes. Petals 5, small, alternate with the calyx-lobes, in ♂ usually stalked, cucullate and dentate, in ♀ spatulate. Disk flat, the ♂ with an annular rim, the ♀ with an inner corona, erect and enclosing the ovary. Stamens 5, on an erect gono-

cell; styles 2, free or shortly united, forked or subentire. *Fruit* a drupe, with 1-2 usually single-seeded pyrenes. *Seed* with usually fleshy albumen; cotyledons thin, usually broad and truncate or emarginate; radicle superior.

Trees or shrubs; fruits globose or didymous, the pyrenes more or less furrowed; stipules narrow:—

Main nerves strong, straight, parallel, joining a marginal thickened one, more than 15 pairs, cross-nervules also many and parallel:—

Flowers in clusters in spikes, monoecious, the ♀ much larger than the ♂; leaves chartaceous, elliptic oblong or obovate, acute obtuse or even retuse at apex, usually obtuse at base, glabrous or puberulous beneath, up to 9 in. long, 4 in. broad, main nerves often forked near the margin; drupe black, globose, about .25 in. in diam., the pyrene furrows curved and deep ..... 1. *retusa*.

Flowers in clusters in the leaf-axils, pedicelled or not, dioecious; leaves coriaceous, the main nerves close and regular; stipules long-acuminate, deciduous:—

Leaves elliptic-oblong, obtuse or emarginate at apex, obtuse or cordate at base, brown-tomentose beneath, up to 5 in. long, 2.5 in. broad; drupe black, depressed globose, .25 in. in diam., the pyrene furrows deep, the ridges branching from the middle one and curved ..... 2. *Roxburghiana*.

Leaves oblong, acute or obtusely acute at apex, usually acute at base, glabrous and cinereous-glaucous beneath, up to 3.5 in. long, 1.25 in. broad; drupe globose, .3 in. in diam., the pyrene furrows rather shallow, the ridges curved

3. *cinerascens*.

Main nerves not markedly straight or parallel, often branched, but always eventually joining a marginal thickened one, less than 15 pairs, cross-nervules also more or less parallel; flowers monoecious, very small:—

Leaves oblong-lanceolate or -oblanceolate, acute at apex, acute or obtuse at base, glaucous and pubescent beneath, up to 4 in. long, 1.5 in. broad; drupe globose, black, .2 in. in diam., the pyrene furrows deep, the ridges radiating from a prominent central one

4. *tomentosa*.

Leaves rhombic-obovate or sometimes -oblanceolate, acute at apex, long-cuneate at base, usually glabrous, up to 4.5 in. long, 2.5 in. broad; drupe globose, .25 in. in diam., the pyrene furrows

Climbers; fruits oblong, the pyrenes smooth; flowers in long axillary or terminal spikes with small leaves and zig-zag rachises, usually monoecious, but the ♂ and ♀ on separate spikes:—

Disk of the ♀ flowers with a ring of bristles at the base within, the calyx enlarged in fruit; leaves elliptic-ovate or -obovate, acute at apex, rounded at base, fulvous tomentose beneath, up to 4 in. long, 2 in. broad, the main nerves 10–12 pairs, parallel, joining a marginal one, the transverse nervules also regular and parallel; drupe black, .5 in. long ..... 6. *stipularis*.

Disk of the ♀ flowers without a ring of bristles at the base within, the calyx not enlarged in fruit; leaves elliptic, obtuse at apex, rounded or cordate at base, fulvous-pubescent beneath, up to 5 in. long, 2.5 in. broad, the main nerves 7–10 pairs, parallel, joining a marginal one, the transverse nervules also more or less parallel; drupe black, .3 in. long ..... 7. *scandens*.

1. *BRIDELIA RETUSA*, Spreng.; F. B. I. v. 268 in part; Bedd. Fl. t. 260; Brand. For. Fl. t. 55. *Cluytia spinosa*, Roxb. Cor. Pl. t. 172.

All Forest Districts, especially in the N. Circars and in deciduous forests, though usually by streams and in ravines, in the hills up to 3,500 ft.

A small or moderate-sized tree, with conical thorns on the stems and branches when young. Bark grey or brown; wood grey to olive-brown, with a pretty silver grain, useful and durable. Vern. *Hind.* Kaj, Kassi; *Ur.* Kosi; *Tel.* Koramaddi, Verri Karaka; *Tam.* Mulu Maruthu; *Mal.* Mukkayini; *Kan.* Asana.

2. *BRIDELIA ROXBURGHIANA*, Gehrm. in Engl. Jahrb. xli, Beibl. 95, 30. *B. retusa*, Spr., var. *Roxburghiana*, Hook. f.; F. B. I. v. 268.

W. Ghâts, in all Districts of the hills up to 5,000 ft., especially on the E. side; hills of Mysore and N. Coimbatore; Shevaroy Hills of Salem.

A large tree, probably thorny when young, the branches with shining bark, the branchlets fulvous-tomentose.

3. *BRIDELIA CINERASCENS*, Gehrm. l. c. *B. retusa*, Spr., var. *glauca*, Hook. f.; F. B. I. v. 268.

Deccan, Palkonda Hills of Cuddapah (Fischer), Veligonda Hills of Nellore (M. S. Ramaswami), Kamoham Hill

A moderate-sized tree, apparently thorny when young, the flowers greenish-yellow, the drupe purple-black.

4. *BRIDELIA TOMENTOSA*, Blume; F. B. I. v. 271.

N. Circars, in forest, Ganjam (Gamble); Palkonda Hills of Vizagapatam (Sir W. Elliot); Annavaram in Godavari (K. Rangachari).

A large shrub or small tree with nearly black slender branchlets, the leaves with about 10-12 pairs of curved parallel unbranched main nerves.

5. *BRIDELIA MONTANA*, Willd.; F. B. I. 269 *in part only*; Roxb. Cor. Pl. t. 171. *B. Hamiltoniana*, Wall.; F. B. I. v. 271.

N. Circars, Ganjam to Kistna in dry-forests; Deccan, hills of Cuddapah and Kurnool, up to 3,000 ft.

A large much-branching shrub or small tree, the leaves rather thin and large, and the stem tree-like in moister or more shady places, the leaves thick and small and often yellowish and the stems bushy in open dry ones, the main nerves very oblique, 6 to 10 pairs, usually branched near the margin. Vern. Tel. Pantenga.

6. *BRIDELIA STIPULARIS*, Blume; F. B. I. v. 270, *in part*. *Cluytia scandens*, Roxb. Cor. Pl. t. 173, *not good*.

N. Circars, Palkonda Hills of Vizagapatam (J. Campbell, Gamble), Lamsingi Hills (A. W. Lushington, Rangachari).

A large climbing shrub, with fulvous-tomentose branches, often thorny when young, the leaves on flowering shoots small but often wanting.

7. *BRIDELIA SCANDENS*, Gehrm. *B. stipularis*, Hook. f.; F. B. I. v. 270 *in part*, *not of* Blume.

W. Ghats, S. Canara and Mysore to Travancore, up to 3,000 ft.

A large climbing shrub with thorny stems and branches, the flowering spikes often long and distichous with small leaves.

### 3. *Cleistanthus*, Hook f.

Trees or shrubs. Leaves alternate, bifarious, entire. Flowers monoecious, small, in axillary clusters or spikes of clusters.



the calyx-lobes, minute. Disk in ♂ flat or pulvinate, in ♀ with an inner corona, more or less enclosing the ovary. Stamens 5 or 6, on an erect gonophore, the filaments rising from it and enclosing a lobed pistillode; anther-cells parallel. Ovary 3-celled, usually with long hairs; ovules 2 in each cell; styles 3, free, bifid. Fruit a sessile or stipitate capsule with 3 2-valved cocci. Seed without aril or caruncle; albumen copious or scanty; cotyledons thin or fleshy, often folded.

Capsule large, .75–1 in. in diam., hard and woody, dark brown, shining; seed globose; calyx-lobes lanceolate, .25 in. long; petals minute, linear; leaves elliptic obovate or orbicular, often retuse at apex, up to 4.5 in. long, 3 in. wide; ovary glabrous.....1. *collinus*.

Capsule small, less than .5 in. in diam.; ovary villous:—

Flowers in clusters in axillary spikes; seed heart-shaped; calyx-lobes .1 in. long; petals minute, obovate; leaves ovate or lanceolate, acuminate at apex, acute or rounded at base, glabrous, up to 3.5 in. long, 1.5 in. broad .....2. *patulus*.

Flowers in axillary clusters:—

Branches slender; calyx-lobes .1 in. long; petals minute, ovate; leaves lanceolate, long-acuminate, glabrous, up to 4.5 in. long, 1.5 in. broad, the main nerves irregular, branched and reticulate, stipules very small .....3. *travancorensis*.

Branches rather thick, rufous-villous; calyx-lobes 1.25 in. long; petals spatulate; leaves oblanceolate, acuminate, glaucous and thinly pubescent beneath, up to 6 in. long, 1.75 in. broad, main nerves arched, 6–10 pairs, stipules linear-lanceolate, .2 in. long .....4. *malabaricus*.

1. *CLEISTANTHUS COLLINUS*, Benth.; F. B. I. v. 274. *Cluytia collina*, Roxb. Cor. Pl. t. 169.

N. Circars, common; Carnatic, in most Districts, in dry forests; Deccan especially Hyderabad; Malabar (Bournes).

A small deciduous tree. Bark dark brown, rough; wood dark reddish-brown, hard and strong, valuable for house-posts and fences. The outer crust of the capsule is poisonous and used to kill fish. Vern. *Hind.* Garrar; *Ur.*

•Korada; *Tel.* Korei, Wodesha; *Tam.* Wodayu, Wodan.

2. *CLEISTANTHUS PATULUS*, Muell. Arg.; F. B. I. v. 279, *Amanoa indica*, Wt. Ic. t. 1911.

(Beddome); Carnatic, Kambakam Hills in Chingleput, hills of Tinnevely (Rangachari), chiefly in ravines or dry evergreen forest.

A small or moderate-sized tree with horizontal branches. Bark thin; wood "colour of dry rose leaves" (Roxb.), hard and close-grained. The seeds have very thin albumen and large fleshy truncate cotyledons.

3. *CLEISTANTHUS TRAVANCORENSIS*, Jablonszky in Engl. Pflanzenreich iv. 147. viii. 21.

W. Gháts, evergreen forests of Travancore at 2,500 ft. (Bourdillon).

A small tree.

4. *CLEISTANTHUS MALABARICUS*, Muell. Arg.; F. B. I. v. 276.

W. Gháts, evergreen forests from the Gairsoppa Falls (Talbot) to Travancore (*vide* Bourdillon in 'Trees Trav.'), at 1,000–3,000 ft.

A large shrub or small tree with fulvous-hairy capsules.

#### 4. *Actephila*, Blume.

Trees or shrubs. *Leaves* alternate, usually large, entire; stipules deciduous. *Flowers* monoecious or dioecious, ♂ in axillary clusters, short-pedicelled, ♀ solitary or few together, long-pedicelled, bracts small. *Calyx*-lobes 5, imbricate, in ♂ small and rounded, in ♀ longer and oblong or lanceolate, often unequal. *Petals* small, inserted under the disk, in ♂ oblong, in ♀ rounded. *Disk* broad, entire or lobed. *Stamens* 3–6 inserted on the disk, filaments shortly combined at the base in a gonophore enclosing a 3-cleft pistillode. *Ovary* sessile, 3-lobed; ovules 2 in each cell; styles short, free or connate at the base, entire or bifid. *Fruit* a hard septicidal capsule of 3 cocci. *Seeds* usually solitary in the cocci, 3-gonous, rounded on the outer face, flat on the 2 inner; testa loose and fragile, often with an inner ope membranous; albumen 0 or very scanty; cotyledons fleshy, unequal, the interior one smaller.

*ACTEPHILA EXCELSA*, Muell. Arg.; F. B. I. v. 282. *A. neilgherensis*, Wt. Ic. t. 1910.

W. Gháts, most Districts, in evergreen forests, and Shola woods, up to 6,000 ft.; Bababudan Hills of Mysore.

A small tree reaching a height of 25 ft., with greyish-brown bark. Leaves somewhat coriaceous, shining, variable,

lanceolate obovate or oblanceolate, acute, glabrous, up to 7 in. long, 3 in. broad; capsules depressed globose up to 1.5 in. in diameter. The Mysore specimens agree best with Dalzell's type; the rest are all Wight's *neilgherrensis*, possibly distinct.

#### 5. *Agyneia*, Vent.

Glabrous herbs; stems often angular or compressed. *Leaves* small, alternate, entire; stipules acuminate. *Flowers* minute, monoecious, ♂ in axillary clusters, ♀ larger, solitary; bracts numerous, stipule-like. *Calyx*-lobes 6, ♂ gland-dotted and white-margined, hooded on the bark, ♀ acute, dotted but hardly margined. *Petals* 0. *Disk* in ♂ 6-lobed, in ♀ 0. *Stamens* 3, central, connate, the filaments combined in a gonophore column; cells parallel, extrorse. *Ovary* ovoid, 3-celled, truncate; ovules 2 in each cell; styles 3, very short, bifid, sunk in the top of the ovary. *Fruit* a capsule, splitting into 3 2-valved cocci. *Seeds* 6, slender, curved, with an elongated hilum; testa double, outer white, corky, inner membranous; albumen fleshy; embryo curved, the cotyledons flat.

AGYNEIA BACCIFORMIS, A. Juss.; F. B. I. v. 285; Wt. Ic. t. 1893.

East Coast, in grassy pastures near the sea.

An annual or biennial herb with straggling branches and small oblong elliptic or obovate leaves about .5 in. long, the capsules ovoid obtuse .25 in. long.

#### 6. *Pseudoglochidion*, Gamble.

Evergreen trees or shrubs. *Leaves* alternate, bifarious, entire, very shortly petioled. *Flowers* small, dioecious, in axillary clusters. *Calyx* in ♂ flowers of 6 biseriate imbricate lobes; in ♀ also 6-lobed, but smaller. *Petals* 0. *Disk* in ♂ flowers conspicuous, of 6 fimbriate glands, in ♀ annular, crenate. *Stamens* 3, erect, slightly joined by their connectives or free, the filaments connate in a short column; anthers extrorse, the cells dehiscing longitudinally; the connective produced in an apiculus. *Ovary* ovoid, 3-celled; ovules 2 in each cell; styles connate in a cylindric column, minutely 6-toothed at apex. *Capsule* 3-4-celled;

PSEUDOGLOCHIDION ANAMALAYANUM, Gamble in Kew Bull. 1925, 330.

W. Gháts, Anamalai Hills, about 4,000 ft. (Barber, Fischer).

A small tree reaching a height of 15 to 20 ft., the leaves lanceolate, up to 3.5 in. long, 1.25 in. broad, regularly nerved, glaucous beneath, the capsule 3-4-lobed, glabrous and 3-4 in. broad.

#### 7. Chorisandra, Wight.

Shrub, branchlets pale and rough. Leaves membranous, glabrous, pinnately arranged on short slender branchlets; stipules minute. Flowers dioecious or monoecious, minute, ♂ in dense axillary fascicles with short filiform pedicels; ♀ also axillary, with long slender pedicels. Calyx-lobes 6, smaller and more rounded in ♂ than in ♀. Disk flattened, with 6 depressed lobes alternating with the calyx-lobes. Stamens 6, erect, with long free slender filaments; anthers short, the cells dehiscing longitudinally. Ovary 3-celled; ovules 2 in each cell, pendulous from the middle of the axis; style short, 3-lobed, the lobes bifid with recurved branches. Fruit a 3-celled papery capsule, splitting into 6 valves, but often only 3-seeded. Seeds small; testa loose; cotyledons small in rough albumen.

CHORISANDRA PINNATA, Wt. Ic. t. 1994.

N. Circars, Deccan and Carnatic, from Vizagapatam southwards to Madras, westwards to Cuddapah and Kurnool. It is common and more or less gregarious on laterite soils, especially in hollows to the W. of the Pulicat Lake.

A low branching shrub with very pale rough bark, hard wood and small ovate or elliptic very thin and easily detached leaflets.

#### 8. Neopeltandra, Gamble.

Slender undershrubs. Leaves alternate, membranous; stipules small, ciliate, caducous. Flowers axillary, monoecious, ♂ in short racemes covered with imbricating ciliate bracts, ♀ from below them, solitary, long-pedicelled. Calyx-lobes 5, imbricate. Disk saucer-like, broad, lining the inside of the calyx. Stamens 5, the filaments connate below in a column, free above and spreading; anthers 2-celled, dehiscing longitudinally. Pistillode 0. Ovary

into two. *Seeds* 2 or usually only 1 in each cell; testa crustaceous, prominently pitted; albumen fleshy; cotyledons flat, elliptic, leafy, the radicle as long and curved.

Leaves ovate or elliptic-lanceolate, long and sharply acuminate, acute or rounded at base, up to 6 in. long, 2 in. broad, main nerves 6-8 pairs; ♂ flowers with ovate ciliate bracts, ♀ solitary with pedicel about 1 in. elongating to 3 in. in fruit; capsules .25 in. broad; seed curved .65 in. long, obscurely pitted ..... 1. *longipes*.

Leaves elliptic or ovate, acute at apex, rounded or acute at base, up to 2.5 in. long, 1.5-2 in. broad, main nerves 4-6 pairs, slender; ♂ flowers with lanceolate bracts; ♀ solitary, pedicels about .5 in., longer in fruit; capsule .1-.15 in. broad; seed slightly curved, .05 in. long, strongly pitted ..... 2. *suberosa*.

1. *NEOPELTANDRA LONGIPES*, Gamble. *Phyllanthus longipes*, Muell. Arg.; F. B. I. v. 287. *Peltandra longipes*, Wt. Ic. t. 1891.

W. Gháts, hills from Coimbatore to Anamalais and hills of Tinnevely in evergreen forests up to 6,000 ft.

A slender undershrub with white bark and very thin leaves.

2. *NEOPELTANDRA SUBEROSA*, Gamble. *Phyllanthus suberosus*, Wt. in Wall. Cat. 7910; F. B. I. v. 287.

Hills of the N. Circars, in Vizagapatam and Godavari; Deccan, Veligonda Hills of Nellore (Ramaswami); W. Gháts, Bolampatti Hills of Coimbatore (Fischer), Pulney Hills (Bourne).

A very slender undershrub with pale bark, the leaves very membranous and variable in size.

#### 9. *Phyllanthus*, Linn. (modified).

Herbs or shrubs. Leaves small, alternate, distichous, the branchlets resembling pinnate leaves; stipules narrow. Flowers very small, monoecious, in axillary clusters or solitary, bracteate. Calyx lobes 5-6, imbricate. Petals 0. Disk in ♂ of small glands, in ♀ of glands or annular. Stamens 3, more or less free or the filaments combined in a column; anthers oblong or didymous, dehiscing vertically or transversely. Ovary 3-celled; styles 3,

Anthers erect, the cells dehiscing vertically, the filaments united in a column :—

Shrubs ; seeds foveolate :—

Leaf branchlets 2-6 in. long ; leaves oblong, obtuse or apiculate, .4-.75 in. long, main nerves 6-8 pairs ; styles spreading ; seed-pits conspicuous ..... 1. *polyphyllus*.

Leaf branchlets 1-3 in. long, or little more ; leaves elliptic-oblong, obtuse, apiculate, .2-.3 in. long, main nerves obscure ; styles short ; seed-pits very minute ..... 2. *Lawii*.

Herbs or small undershrubs :—

Capsules smooth, the seeds with concentric lines of minute tubercles, and minute cross-bars :—

Leaves glabrous, subcoriaceous, obovate or oblanceolate, cuneate, rounded or retuse at apex, mucronate, glaucous, up to 1.25 in. long ; stipules lanceolate, peltate ; ♂ flowers minute, fascicled, ♀ solitary, on filiform pedicels ; anthers subsessile ..... 3. *maderaspatensis*.

Leaves glabrous, membranous, elliptic or ovate, acute, up to 1.25 in. long ; stipules lanceolate, decurrent ; ♂ flowers minute, fascicled, ♀ solitary, on thickened pedicels ; anthers free above ..... 4. *Rheedii*.

Capsules verrucose, the seeds prominently transversely ridged and with faint cross-bars ; leaves glabrous or hispid on the margins, chartaceous, oblong, apiculate, up to .75 in. long ; stipules subulate ; ♂ flowers very minute, ♀ larger, sessile ; anthers sessile ..... 5. *urinaria*.

Anthers subglobose, the cells dehiscing transversely or on a slant :—

Stipules peltate, subsagittate ; capsule more or less verrucose, seeds minutely tubercled ; disk of ♂ of large flat glands ; filaments free :—

Disk of ♀ saucer-shaped, thin, wavy ; style lobes recurved, flattened on the ovary :—

Leaves elliptic, obtuse, apiculate, the margins thickened, the nerves 4-5 prominent, joining in arches, .2-.4 in. long, .1-.2 in. broad ; ♂ flowers subsessile, ♀ pedicelled ; capsule glandular ..... 6. *Narayanswamii*.

Leaves linear-oblong, obtuse or acute at apex, apiculate, the margins thickened, the nerves invisible, .5-.75 in. long, .1-.3 in. broad ; ♂ flowers very minute, subsessile ; ♀ more numerous



of lower stems elliptic-oblong, up to .75 in. long, .4 in. broad, the nerves about 5 pairs, faint, glaucous beneath; ♂ flowers many, in fascicles, ♀ few, both on filiform pedicels

8. *Gardneriana*.

Disk of ♀ cushion-shaped, thick; style lobes erect, spreading; leaves elliptic or elliptic-oblong, obtuse, up to 2 in. long, 1 in. broad, the nerves about 7 pairs, glaucous beneath, glabrous or hispid; ♂ flowers fascicled, shortly pedicelled, ♀ long-pedicelled

9. *Macraei*.

Stipules not peltate, lanceolate; seeds with regular lines of very minute tubercles joined by minute cross-bars; filaments connate in a column:—

Leaves coriaceous or fleshy, orbicular or obovate, obtuse or apiculate, scarcely .25 in. in diam.; disk of ♂ of minute glands, of ♀ cushion-shaped; style-arms recurved with short lobes

10. *rotundifolius*.

Leaves membranous, usually glaucous beneath:—

Leaves usually broadly obtuse at apex, very variable in size but usually under .5 in. long, elliptic-obovate or -oblong, prominently distichous so that the branchlets resemble pinnate leaves; anthers transversely dehiscent; disk of ♂ of minute glands, of ♀ saucer-shaped with erect lobes; styles recurved

11. *Niruri*.

Leaves usually acute, sometimes rounded, at apex, elliptic or obovate, up to at most .75 in. long:—

Stipules lanceolate, long-acuminate; flowers rather large, the calyx-lobes with prominent scarious margins; disk of ♂ flowers with star-like glands, of ♀ saucer-shaped, crenulate or lobed; staminal column long, anther-slits transverse; styles erect, shortly bifid.....12. *debilis*.

Stipules ovate, acute or acuminate, small; flowers very small, the calyx-lobes with obscure scarious margins; disk of ♂ flowers with peltate glands, of ♀ cushion-like, broadly lobed; staminal column slender, anthers reniform; styles erect with slender lobes .....13. *Missionis*.

1. *PHYLLANTHUS POLYPHYLLUS*, Willd.; F. B. I. v. 290; Wt. Ic. t. 1895, fig. 2.

Deccan., hill forests of Kurnool, Cuddapah, Chittoor and Nellore, Kambakam Hill in Chingleput: Carnatic, Iyandi

A shrub or small tree somewhat resembling *Emblica officinalis* in leaf but quite different in fruit.

2. *PHYLLANTHUS LAWII*, Grah.; F. B. I. v. 290.

N. Circars, in Godavari and Kistna; Carnatic, hills of Salem; W. Gháts, Wynaad to Travancore, gregarious on the banks and in the beds of rocky rivers.

A straggling shrub with long purplish branches armed with stipular tubercles bearing small thorns, the flowers pink. Vern. *Mal. Uri*.

3. *PHYLLANTHUS MADERASPATENSIS*, Linn.; F. B. I. v. 292; Wt. Ic. t. 1895, fig. 3.

N. Circars, Deccan and Carnatic on dry lands, especially black cotton soils and near the sea coast.

An erect or decumbent herb, sometimes nearly an undershrub.

4. *PHYLLANTHUS RHEEDII*, Wt. Ic. t. 1895, fig. 1 (*poor*); F. B. I. v. 293.

W. Gháts, most Districts from S. Canara to Nilgiris, Anamalais, and the hills of Tinnevely above 5,000 ft.

A slender branching erect herb, the calyx-lobes usually white-margined.

5. *PHYLLANTHUS URINARIA*, Linn.; F. B. I. v. 293. *P. leprocarpus*, Wt. Ic. t. 1895, fig. 4.

All plains Districts, in forest undergrowth and among grasses, up to 3,000 ft.

An annual or perennial erect herb, with more or less sensitive leaflets, which are sometimes pink when young.

6. *PHYLLANTHUS NARAYANSWAMII*, Gamble in Kew Bull. 1925, 329.

N. Circars, Rampa Hills of Godavari, at 4,500 ft. (V. Narayanswami), perhaps on rocks.

A small wiry undershrub with many branchlets from a stout rootstock.

7. *PHYLLANTHUS SIMPLEX*, Retz.; F. B. I. v. 295. *Macraea oblongifolia*, Wt. Ic. t. 1902, fig. 1.

N. Circars and Carnatic from the Chilka Lake to Madras; Deccan, in N. Coimbatore, on hot dry soils, up to 3,000 ft.

8. *PHYLLANTHUS GARDNERIANUS*, Baill. *P. simplex*, var. *Gardneriana*, F. B. I. v. 295. *Macraea Gardneriana*, Wt. Ic. t. 1902, fig. 3. *M. ovalifolia*, Wt. Ic. t. 1902, fig. 4.

W. Gháts, in all Districts from S. Canara to Tinnevely, but especially common in Nilgiris, Anamalais and Pulneys, above 5,000 ft.

A slender undershrub with woody rootstock and long branches, the leaves smaller in size upwards, plants of dry hill tops often dwarfed and with very small leaves.

9. *PHYLLANTHUS MACRAEI*, Muell. Arg.; F. B. I. v. 296. *Macraea Rheedii*, Wt. Ic. t. 1901.

W. Gháts, Sholas of the Pulney Hills at 5,000–7,000 ft. (Bourne, etc.); Agastiamalai Peak, Tinnevely (Barber). A shrub, apparently reaching 2–3 ft. in height, with long weak flattened branchlets and capsules prominently warted when wet, leaf margins sometimes ciliate.

Var. *hispidus*. Branchlets and leaves softly hispid, the latter usually cordate at base.

Pulney Hills, on the outer edges of woods (Wight), Levinge's Path, 7,000 ft. (Munch).

10. *PHYLLANTHUS ROTUNDIFOLIUS*, Klein; F. B. I. v. 299.

N. Circars and Carnatic, sands on the sea-coast.

A prostrate or slightly ascending fleshy herb with stout rootstock and long trailing branches.

11. *PHYLLANTHUS NIRURI*, Linn.; F. B. I. v. 298; Wt. Ic. t. 1894.

All plains Districts, a weed of gardens and cultivated land.

A branching annual herb reaching 12–18 in. high. It is often used in native medicine. Vern. *Hind.* Jar-amlá.

12. *PHYLLANTHUS DEBILIS*, Herb. Ham.; F. B. I. v. 299.

N. Circars and Carnatic, in shady places in the hill forests, West to the E. slopes of the Gháts.

An erect slender herb or undershrub with many very slender branchlets.

13. *PHYLLANTHUS MISSIONIS*, Hook. f.; F. B. I. v. 297.

W. Gháts, on E. slopes, Coimbatore to Tinnevely, at low levels.

An erect undershrub with rather distant leaves.

## 10. Reidia, Wight.

Shrubs or undershrubs, usually with erect stems bearing many spreading branchlets towards the top. *Leaves* alternate, usually membranous; stipules small, often many and persistent. *Flowers* monoecious, axillary, ♂ and ♀ in fascicles, the ♂ with rather short filiform pedicels, the ♀ with longer pedicels widening upwards; bracts very small, often numerous and imbricate. *Calyx*-lobes in ♂ 4, in ♀ 6, persistent and sometimes enlarging in fruit. *Corolla* 0. *Disk* in ♂ of 4 glands alternate with the calyx-lobes, in ♀ of 6 glands combined in a fleshy ring or cup. *Stamens* 2, or 4, the filaments united in a column around a pistillode; anthers dehiscing horizontally. *Ovary* 3-celled, 2 ovules in each cell; styles 3, deeply 2-fid. *Fruit* a capsule of 3 thinly crustaceous 2-valved cocci. *Seeds* triangular, glabrous or appressed hairy; cotyledons oblong.

*Calyx*-lobes of ♂ dentate or lacerate :—

*Calyx*-lobes of ♂ narrow, deeply lacerate, of ♀ less cut; ♂ flowers very small on short pedicels rising from a tuft of imbricate bracts, several together in clusters on the lower part of the branchlets, ♀ flowers larger, at the ends of the branchlets; leaves ovate-lanceolate, acute, unequal at base, up to 2 in. long, glaucous beneath

1. *Gageana*.

*Calyx*-lobes of ♂ suborbicular, lacerate, of ♀ less so; flowers few, in axillary clusters, but usually ♂ in lower, ♀ in upper axils; disk of ♀ cup-shaped; leaves ovate, acute, somewhat unequal at base, reticulate, up to 3 in. long, 1.25 in. broad . . . . . 2. *fimbriata*.

*Calyx*-lobes of ♂ orbicular-ovate, dentate, of ♀ slightly toothed; flowers few, ♂ in lower axils, ♀ near the ends of the branches; disk of ♀ cushion-shaped; fruit large, about 1 in. in diam.; leaves ovate-lanceolate, acuminate, unequal-sided, glaucous beneath, up to 2.5 in. long, 1.5 in. broad . . . . . 3. *megacarpa*.

*Calyx*-lobes of ♂ not dentate or lacerate :—

Leaves large, at least 1 in. long; flowers usually fascicled :—

*Calyx*-lobes of ♀ greatly enlarged in fruit and closely imbricate; disk in ♂ annular, in ♀ saucer-shaped; leaves elliptic or elliptic-oblong, acute or obtuse, rounded at base, equal-sided, up to 2.5 in. long, 1 in. broad . . . . . 4. *macrocalyx*.

*Calyx*-lobes of ♀ larger than those of ♂ but less enlarged in fruit.

Flowers of both ♂ and ♀ axillary to the leaves, the ♀ rather

4-lobed, in ♀ flat; leaves ovate, acute, obtuse at base, glaucous beneath, up to 2 in. long, 1.25 in. broad .....5. *Beddomei*. Flowers in leaf axils and also on long terminal leafless branchlets with linear bracts and stipules; calyx-lobes orbicular, disk tubercled; leaves triangular-ovate, acuminate, rounded at base, nearly equal-sided, reticulately nerved, up to 2 in. long, 1 in. broad.....6. *Bailloniana*.

Leaves small, under 1 in. long; branchlets prominently rough with many stipules; flowers solitary:—

Capsule glabrous; calyx-lobes of ♂ ovate, of ♀ oblong, reflexed after flowering; disk-lobes of ♂ small and distinct, of ♀ a small ring; leaves obliquely unequally obovate, acute at base, glaucous beneath, up to .75 in. long .....7. *longiflora*.

Capsule densely covered with soft branched hairs:—

Calyx-lobes ovate acuminate ciliate; disk-glands truncate, dotted; leaves obliquely ovate-oblong, apiculate, pale beneath, softly villous, up to 1 in. long, .5 in. broad .....8. *floribunda*.

Calyx-lobes broadly ovate, short, glabrous, with few pellucid dots; disk-glands truncate, dotted; leaves obliquely ovate-falcate, long-apiculate, pale beneath, up to .4 in. long, .2 in. broad .....9. *stipulacea*.

1. *REIDIA GAGEANA*, Gamble in Kew Bull. 1925, 331.

W. Gháts, hills of Travancore and Tinnevely, in evergreen forest at about 2,000 ft. (Lawson, Beddome).

An undershrub, remarkable for the densely clustered ♂ flower with much lacerate calyx-lobes in ♂, less so in ♀, the ends of the branchlets leafless, but many-stipular.

2. *REIDIA FIMBRIATA*, Wt. Ic. t. 1904, fig. 1. *Phyllanthus fimbriatus*, Muell. Arg.; F. B. I. v. 302.

W. Gháts, Sispara Ghát in Nilgiris, at 4,000 ft. (Beddome, Gamble).

A glabrous shrub, the capsule nearly .25 in. in diam.

3. *REIDIA MEGACARPA*, Gamble in Kew Bull. 1925, 332.

W. Gháts, Devala in S.E. Wynaad at 3,000 ft. (Gamble).

A glabrous undershrub with large pale-coloured capsule, soon splitting, the seeds appressed-hairy.

4. *REIDIA MACROCALYX*, Gamble, n. comb. *Phyllanthus macrocalyx*, Muell. Arg.; F. B. I. v. 301. *R. latifolia*, Wt. Ic. t. 1904, fig. 2?

Bababudan Hills, Mysore (Law.); Sivagiri Hills, Tinnevely (Wight).

A much-branched undershrub.

5. REIDIA BEDDOMEI, Gamble in Kew Bull. 1925, 331.

Chokampatti Hills of Tinnevely, at 5,000 ft. (Beddome); hills of Travancore (Bourdillon).

A glabrous undershrub.

6. REIDIA BAILLONIANA, Gamble, n. comb. *Phyllanthus Baillonianus*, Muell. Arg.; F. B. I. v. 300.

W. Gháts, hills of Tinnevely.

A shrub reaching 3-4 ft. in height, the leaves often marbled with white and purple, the fruit 25 in. long.

7. REIDIA LONGIFLORA, Gamble, n. comb. *Phyllanthus longiflorus*, Heyne; F. B. I. v. 302. *R. ovalifolia*, Wt. Ic. t. 1904, fig. 3 (not good).

W. Gháts, hills of Travancore and Tinnevely about 2,000 ft.

A small bush about 2 ft. high with pretty pink flowers (Bourdillon).

8. REIDIA FLORIBUNDA, Wt. Ic. t. 1903. *Phyllanthus Wightianus*, Muell. Arg.; F. B. I. v. 303.

Carnatic, Melpat in S. Arcot, Shevaroy Hills, Kollimalai Hills; W. Gháts on E. side of Nilgiris and Pulneys, at about 2,000-4,000 ft.

A branching shrub, the branchlets rough with scars and stipules, the flowers red, the leaves with a pink tinge.

9. REIDIA STIPULACEA, Gamble in Kew Bull. 1925, 332.

W. Gháts, Anamalai and Pulney Hills, in thick undergrowth.

A straggling shrub with very rough branchlets having long and persistent brown stipules.

# 11. Prosorus, Dalz.

Trees. Leaves alternate, thin, deciduous. Flowers dioecious, small, ♂ numerous, in axillary fascicles with capillary pedicels, ♀ solitary or few together, axillary, pedicels long and stouter. Calyx-lobes 4 in both sexes. Disk annular, fleshy. Stamens 4, with free filaments, anthers oblong, extrorse, the cells dehiscing longitudinally. Ovary 3-celled; ovules 2 in each cell; styles



short, bifid, the branches recurved. *Fruit* a globose capsule with thin epicarp, 6-seeded. *Seeds* irregularly trigonous, arillate, blue; albumen coarse; cotyledons small, flat.

*PROSORUS INDICUS*, Dalz. *Phyllanthus indicus*, Muell. Arg.; F. B. I. v. 305.

W. Gháts, Anamalai Hills (Beddome), hills of Tinnevely (Wight), Coorg and Wynaad (*vide* Beddome).

A small deciduous tree with membranous distichous elliptic or ovate acute leaves up to 6 in. long, 3 in. broad.

## 12. *Kirganella*, Baill.

Shrubs, usually climbing or straggling. *Leaves* alternate, small or moderate-sized, distichous, thin; stipules lanceolate. *Flowers* monoecious, ♂ and ♀ mixed, in axillary clusters, sometimes in pairs or solitary, the clusters sometimes appearing racemose from the absence of leaves; pedicels filiform. *Calyx*-lobes 5, imbricate, the 3 inner often the larger. *Petals* 0. *Disk* in ♂ or ♀ of 5 fleshy glands. *Stamens* 5, in 2 series, the outer with free filaments, the inner 2 or 3 with the filaments connate in a column; anthers dehiscing longitudinally. *Ovary* 5-12-celled; ovules 2 superposed in each cell; stigmas as many or half as many as the cells, minute, sessile, 2-lobed. *Fruit* a fleshy 5-12-celled berry, the seeds superposed. *Seeds* trigonous; testa crustaceous, albumen fleshy; cotyledons flat, truncate.

*KIRGANELLA RETICULATA*, Baill. *Phyllanthus reticulatus*, Poir.; F. B. I. v. 288. *Anisonema multiflorum*, Wt. Ic. t. 1899.

All plains Districts, especially in hedges or waste places near villages and in thickets along streams.

A straggling shrub with slender branches, small elliptic obovate or orbicular or spatulate thin leaves and a purple fleshy berry about 2 in. in diam. Bark brown, thin; wood reddish-white, hard. Vern. *Hind.* Panjuli; *Tel.* Nella purududu, Phulsar; *Tam.* Pula, Pullanti.

## 13. *Emblica*, Gaertn.

small, monoecious, in axillary fascicles, ♂ and ♀ mixed or frequently ♀ in lower and ♂ in upper axils of present or fallen leaves. *Calyx*-lobes 5-6, oblong. *Petals* 6. *Disk* in ♂ 0 or of minute glands alternate with the calyx-lobes, in ♀ cupular, the margin lacerate. *Stamens* 3, the filaments connate in a column, the anthers cohering by the connectives, which end in an apiculus, cells distinct dehiscing longitudinally. *Ovary* 3-celled; ovules 2 in each cell; styles connate at base with broad recurved twice-branched arms. *Fruit* depressed-globose, fleshy, with 3 bony 2-valved cocci. *Seeds* 6, trigonous; albumen fleshy; cotyledons flat, broad, cordate or truncate.

Leaves on the branchlets very many, 100 or more sometimes, linear oblong, apiculate, .3-.75 in. long, about .1 in. broad; glands in ♂ very small; style-arms in ♀ thick and twice bifid, sometimes broad, spreading.....1. *officinalis*.

Leaves on the branchlets many, up to about 50, elliptic-oblong, rounded or retuse at apex, .3-.9 in. long, .2-.3 in. broad; glands in ♂ larger; style-arms in ♀ slender, usually twice bifid, recurved

2. *Fischeri*.

1. **EMBLICA OFFICINALIS**, Gaertn; Wt. Ic. t. 1896. *Phyllanthus emblica*, Linn.; F. B. I. v. 288; Bedd. Fl. t. 258; Brand. For. Fl. t. 52.

N. Circars, Deccan and Carnatic, in dry deciduous forests and up to 4,000 ft. as on Mahendragiri; also in W. Gháts, occasional on dry slopes. Emblic Myrabolam.

A small or moderate-sized deciduous tree, the branchlets and rhachises villous. Bark light grey, exfoliating; wood red, hard and close-grained, useful for poles, implements and furniture, and good under water. The fleshy fruits are .5-1 in. in diam., and are used for tanning and sometimes eaten. Vern. *Hind.* Aonla; *Ur.* Oura, ounla; *Tel.* Usiriki; *Tam.* Nelli.

2. **EMBLICA FISCHERI**, Gamble in Kew Bull.

Carnatic, Kambakam Hills of Chingleput, Veligonda Hills of Nellore (M. Ramaswami); Deccan, hills of N. Coimbatore (Fischer); W. Gháts, Anamalai Hills to 3,000 ft. (Barber).

14. *Fluggea*, Willd.

Shrubs, unarmed or thorny, branchlets angular. *Leaves* alternate, entire, distichous. *Flowers* dioecious, minute, pedicelled, axillary, ♂ in clusters, ♀ subsolitary. *Calyx*-lobes 5, imbricate, subpetaloid. *Petals* 0. *Disk* in ♂ of 5 or less glands alternate with the stamens; in ♀ annular flat, toothed. *Stamens* 5, rarely less, the filaments free, exserted; anthers erect, the cells dehiscing longitudinally. *Ovary* 1-3-celled; styles free, recurved, usually 2-fid; pistillode in ♂ erect 2-3-fid. *Fruit* globose, coriaceous or outside fleshy, separating into distinct 2-valved cocci. *Seeds* triquetrous; testa crustaceous; albumen scanty; embryo curved, the cotyledons flat.

Unarmed; leaves 1-3 in. long, 1-5 in. broad, elliptic or obovate, rounded at apex; main nerves 5-7 pairs; fruits usually dry and very small, but some larger and with a fleshy pericarp ..... 1. *virosa*.  
Branchlets ending in spines; leaves .5-1 in. long, rarely more, obovate or orbicular, sometimes emarginate, glaucous, reticulate; fruit dry, globose, white, .25 in. in diam. .... 2. *Leucopyrus*.

1. *FLUGGEA VIROSA*, Baill. *F. microcarpa*, Bl.; F. B. I. v. 328.

All dry Districts, in deciduous forest and second-growth areas, in the hills to 4,000 ft.

A small tree or large shrub, the leaves very variable in size and shape. Bark smooth, thin, reddish-brown; wood red, hard, close-grained, useful for agricultural tools. Vern. *Hind.* Dalme.

2. *FLUGGEA LEUCOPYRUS*, Willd.; F. B. I. v. 328; Wt. Ic. t. 1875.

All dry Districts, in open places, especially near the coast, rising in the hills to 3,000 ft.

A large stiff straggling shrub, the ends of the branchlets sharply spinous, the fruits white. Wood hard and close-grained. Vern. *Hind.* Hartho; *Tel.* Tella purugudu; *Tam.* Madpulantti.

15. *Antidesma*, Linn.

Small trees or shrubs. *Leaves* alternate, entire; stipules narrow. *Flowers* dioecious, very small, in slender, axillary or

the disk; filaments exsert; connective broad, lunate, the anther-cells ending its wings, dehiscence transverse. *Disk* annular or cushion-like. *Ovary* 1-celled; ovules 2 in each cell; stigmas 2-4, usually short; pistillode in ♂ clavate or globose or 0. *Fruit* a small more or less compressed drupe, crowned by the lateral or terminal stigmas. *Seed* small; albumen fleshy; cotyledons broad, flat.

Stamens inserted in hollows of the disk :—

Stamens 3-5, usually 3 :—

Spikes of ♂ flowers slender, of ♀ short, the clusters close; leaves coriaceous, shining, ovate, obtusely acuminate, mucronate, up to 5 in. long, 2 in. broad, but often much smaller, main nerves about 10 pairs joined in arches and reticulate . . . . . 1. *zeylanicum*.

Racemes of ♂ flowers long, of ♀ long, the clusters distant; leaves chartaceous, shining above, elliptic-oblong, acuminate, mucronate, up to 9 in. long, 3 in. broad, main nerves 7-8 pairs, oblique, prominent, looped and with transverse nervules . . . . . 2. *Menasu*.

Stamens 2; flowers in slender racemes; leaves thin, dull, elliptic or obovate, acute, up to 4 in. long, 2 in. broad, main nerves 5-8 pairs, faint . . . . . 3. *diandrum*.

Stamens inserted within the disk :—

Disk of 5 free lobes, pubescent; stamens 4-7; flowers in villous paniced spikes; leaves orbicular obovate or oblong, obtuse or emarginate, up to 3 in. in diam., softly fulvous-tomentose, main nerves 5-7 pairs . . . . . 4. *Ghaesembilla*.

Disk lobed, surrounding the 3-5 stamens and a central truncate pistillode; ♂ flowers in rather thick glabrous spikes, the ♀ racemed; leaves elliptic oblong or obovate, acute or acuminate, usually shining, up to 7 in. long, 2.5 in. broad, main nerves about 8 pairs, curved and looped . . . . . 5. *Bunius*.

1. *ANTIDESMA ZEYLANICUM*, Lamk. *A. Alexiteria*, Linn. in part; F. B. I. v. 359.

Carnatic, Kambakam Hill in Chingleput, at 2,000 ft. (Fischer); W. Gháts, W. Nilgiris to the hills of Travancore and Tinnevely, in evergreen forests.

A small tree reaching 25 ft. high, the small drupe red.

2. *ANTIDESMA MENASU*, Miq.; F. B. I. v. 364.

A small branching tree with a red edible drupe. Wood darkish-red (Bourdillon). Vern. *Mal.* Puthara vál.

3. *ANTIDESMA DIANDRUM*, Roth; F. B. I. v. 361. *A. lanceolarium*, Wall.; Wt. Ic. t. 766 (not typical). *Stilago diandra*, Roxb. Cor. Pl. t. 166.

N. Circars, Deccan and Carnatic in deciduous forests at low levels, to South Travancore; W. Gháts, on lower eastern slopes, scarce in Malabar.

A small deciduous tree with thin leaves pleasantly acid and purplish-red edible fruits. Bark smooth, grey; wood pinkish-grey, hard and close-grained. Vern. *Hind.* Amári; *Ur.* Nuniári; *Tel.* Pellagumudu.

4. *ANTIDESMA GHAESEMBILLA*, Gaertn.; F. B. I. v. 357. *A. paniculatum*, Roxb.; Wt. Ic. t. 820. *A. pubescens*, Roxb. Cor Pl. t. 167; Wt. Ic. t. 821.

N. Circars, Deccan and Carnatic, in deciduous forests at low elevations; W. Coast, in Travancore and Malabar.

A small deciduous tree with a red-purple edible small drupe. Bark grey or pale brown; wood red, the heartwood darker. Vern. *Hind.* Umtoa; *Ur.* Nuniári; *Tel.* Polari, pulsar, Kathupulitsi.

5. *ANTIDESMA BUNIUS*, Spr.; F. B. I. v. 358; Wt. Ic. t. 819.

N. Circars, hills of Vizagapatam, at 4,500 ft. (A. W. Lushington); W. Gháts, Pulney Hills and hills of Tinnevely.

A small evergreen tree with reddish drupe.

## 16. *Hemicyclia*, W. & A.

Trees or shrubs. Leaves evergreen, alternate, entire or slightly toothed, usually unequal at base. Flowers dioecious, ♂ in clusters in the axils of the leaves or on the branchlets below them, ♀ usually solitary, pedicels in ♀ longer than in ♂, often lengthened in fruit. Calyx-lobes usually 4, sometimes 5, imbricate, the inner usually the larger. Petals 0. Stamens 4-24, inserted round the disk, filaments free; anthers erect, the cells parallel. Disk flat or saucer-shaped, often crenate on the margins. Ovary obliquely ovoid, 1-, rarely 2-celled; ovules 2 in each cell; stigma 1, sessile or on a short style, broadly reniform or semi-orbicular, flat or

endocarp. Seed usually solitary, arillate; albumen fleshy, embryo straight; cotyledons broad, flat.

Stamens 6-12 :—

Leaves obtuse, very coriaceous, glabrous, elliptic, rounded or cordate at base, entire or sometimes repand-toothed, nerves very obscure, up to 3 in. long, 2 in. broad; calyx-lobes small, ciliate; stigma orbicular, peltate, crenulate; fruit 3 in. in diam., globose, red ..... 1. *sepiaria*.

Leaves acute or acuminate, coriaceous :—

Leaves entire, nerves prominent and reticulate; calyx-lobes densely fulvous-tomentose; stigma mushroom-shaped :—

Pedicels slender, of ♂ up to 5 in., of ♀ longer, in fruit 1-2 in.; leaves glabrous, elliptic or lanceolate, abruptly and obtusely acuminate at apex, slightly unequal at base, main nerves 10-12 pairs, up to 5 in. long, 2.5 in. broad; clusters about 5-6 flowers; fruit obovoid, .75-1 in. long ..... 2. *elata*.

Pedicels short, about .25 in., tawny-villous; clusters about 3-4 flowers :—

Leaves elliptic-oblong, obtusely acute, unequal at base, up to 6 in. long, nearly 2 in. broad, main nerves about 10-15 pairs ..... 3. *venusta*.

Leaves lanceolate, obtusely acuminate, the point often twisted, the base slightly unequal, up to 3.5 in. long, 1.5 in. broad, main nerves about 8 pairs with fine reticulation; fruit obovoid or ellipsoid, .7 in. long, its pedicel .5 in. .... 4. *Wightii*.

Leaves crenate-serrate, glabrous, ovate-lanceolate, acuminate, slightly unequal at base, up to 3 in. long, 1.5 in. broad, main nerves 8-10 pairs, obscure; clusters up to 8 flowers, the pedicels slender, villous; calyx-lobes thin, ciliate; fruit ovoid, red, glabrous, .5 in. long ..... 5. *travancorica*.

Stamens about 24; leaves entire, ovate, obtusely and often retusely acuminate, unequal at base, minutely reticulate beneath, up to 2.5 in. long, 1.25 in. broad, main nerves 5-6; clusters about 4-6 flowers, the pedicels .25 in. long; calyx-lobes fulvous-pubescent

6. *Porteri*.

1. *HEMICYCLIA SEPIARIA*, W. & A.; F. B. I. v. 337; Wt. Ic. t. 1872 ♂.

N. Cincas, Decan and Carnatic, in dry evergreen Ind



- A small evergreen tree or branching shrub. Bark grey, thin, smooth; wood white with a greyish-brown heart-wood, very hard and close-grained, like boxwood, but apparently little used except for fuel. Vern. *Tel.* Bira; *Tam.* Virai; *Kan.* Hira.

2. *HEMICYCLIA ELATA*; Bedd. Fl. t. 279; F. B. I. v. 339.

W. Gháts, forests of the Wynaad at 2,000–4,000 ft.;

Anamalais and hills of Travancore and Tinnevely.

A lofty straight glabrous tree reaching 90–100 ft. in height (Bedd.), with shining leaves, the reticulated secondary

- nerves not very prominent. The wood is said to be strong and suitable for building. Bourdillon likens it to box.

3. *HEMICYCLIA VENUSTA*, Thw.; F. B. I. v. 339. *Astylis venusta*, Wt. Ic. t. 1992.

W. Gháts, W. slopes of Nilgiris in Ochterlony Valley (Wight) and on Sispara Ghát (Beddome) about 3,000–5,000 ft.

A shrub or small tree with many often drooping branches, the reticulated nervation irregular but not very prominent.

4. *HEMICYCLIA WIGHTII*, Hook. f.; F. B. I. v. 339.

W. Gháts, Anamalai and Ayamalai Hills and hills of Travancore at 3,000–5,000 ft., in evergreen forests.

A small or moderate-sized tree reaching 40 ft. in height. Stem fluted; bark white, smooth, thin; wood pale grey, hard and close-grained, but liable to split, used for posts. Vern. *Tam.* Vellelambu; *Mal.* Vella Kasavu.

5. *HEMICYCLIA TRAVANCORICA*, Bourd. Trav. Trees, 329.

W. Gháts, evergreen forests of S. Travancore near Ariyankavu at 1,000 ft. (Bourdillon) in evergreen forests.

A medium-sized graceful tree. Bark pale brown, smooth; wood greyish-white, hard and close-grained. Vern. *Tam.* Vellei pillai.

6. *HEMICYCLIA PORTERI*, Gamble in Hook. Ic. t. 2701.

Carnatic, Warsanad Valley, Madura, near streams at 2,000 ft. (Porter). Cegilwood.

A small evergreen tree, the flowers larger. Bark grey,

17. *Cyclostemon*, Blume.

Trees. *Leaves* alternate, entire or toothed, base often unequal-sided. *Flowers* dioecious, in axillary or lateral clusters, the lateral ones often on tubercles on old wood. *Sepals* 4-6, imbricate, the buds globose. *Petals* 0. *Stamens* few or many, inserted round a rather broad disk; anthers with parallel cells. *Disk* annular or saucer-shaped, sometimes with reflexed marginal lobes, often ribbed. *Ovary* 2-4-celled; ovules 2 in each cell; style short or elongate; stigmas dilated, spreading or connate and peltate. *Fruit* a subglobose ovoid or oblong indehiscent drupe, the pericarp crustaceous, endocarp granular; cocci 2-4, usually 2. *Seed* usually solitary in the cells; testa thin; albumen thick, fleshy; cotyledons broad and flat.

Flowers axillary; disk glabrous with 7-10 stamens round it; ♂ flowers in clusters, ♀ solitary, the ovary fulvous-tomentose; leaves subcoriaceous, elliptic or elliptic-oblong, obtuse or obtusely acute, up to 6 in. long, 2.5 in. broad, main nerves 12-15 pairs, reticulate between ..... 1. *assamicus*.

Flowers sometimes axillary, but usually in clusters on old wood:—

Disk small, fulvous-villous; stamens many:—

Flowers sessile or very nearly so, calyx fulvous-villous; drupe about 1 in. in diam.; leaves and branchlets glabrous; leaves coriaceous, oblong, abruptly acuminate at apex, entire or distantly serrate, up to 9 in. long, 3 in. broad, main nerves about 10 pairs joined by prominent reticulation..... 2. *macrophyllus*.

Flowers pedicelled, the pedicels .25 in. long; leaves on nerves beneath and branchlets fulvous-villous; calyx tomentose; leaves subcoriaceous oblong, abruptly obtusely acuminate at apex, entire or distantly serrate, up to 9 in. long, 3 in. broad, main nerves about 9 pairs joined by not prominent reticulation

..... 3. *malabaricus*.

Disk large, glabrous, radiately ribbed and with inflexed marginal lobes; ♂ flowers pedicelled, ♀ nearly sessile; calyx glabrous except the ciliate margins; drupe 1.5-2 in. in diam.; leaves coriaceous, glabrous, oblong or elliptic-oblong, abruptly obtusely acuminate, entire or distantly serrate, up to 8 in. long, 3 in. broad, main nerves 8-10 pairs, reticulation prominent ..... 4. *confertiflorus*.

Palkonda Hills in Vizagapatam, at 2,000 ft. (Gamble), in moist places.

A small branching evergreen tree with shining leaves and scarlet fruit 5-75 in. long.

2. *CYCLOSTEMON MACROPHYLLUS*, Bl.; F. B. I. v. 340; Bedd. Fl. t. 278.

W. Gháts, Coorg and Wynaad to the Anamalais and hills of Tinnevelly and Travancore, at 2,000-4,000 ft., in evergreen forests.

A large evergreen tree with fluted stem and rough yellow fleshy fruit 1 in. in diam. Bark grey; wood yellowish-brown, hard. Vern. *Mal.* Mala payin.

3. *CYCLOSTEMON MALABARICUS*, Bedd.; F. B. I. v. 341; Bedd. Ic. t. 183.

W. Gháts, hills of Tinnevelly and Travancore, at 3,000-5,000 ft., in evergreen forests, at higher elevations than the last.

A medium-sized tree with very oblong leaves and a tomentose fruit 1 in. in diam.

4. *CYCLOSTEMON CONFERTIFLORUS*, Hook. f.; F. B. I. v. 341.

W. Gháts, Chenat Nair Forest, Malabar (Lobo), northwards to Kanara, southwards to Travancore (Bourdillon), in evergreen forest.

A large tree with a large yellow fruit, the stigmas of the ♀ 2, large and semicircular.

### 18. *Sauropus*, Blume.

Shrubs or undershrubs. *Leaves* alternate, distichous, membranous, entire; stipules minute. *Flowers* monoecious, minute, axillary, pedicelled, clustered or solitary. *Calyx* 6-lobed, ♂ disciform, urceolate or turbinate, the bases of the lobes with thickened folds sometimes reflexed; ♀ larger and accrescent. *Petals* 0. *Disk* 0. *Stamens* 3, the filaments combined in a trigonous column, the anthers seated on the angles, the cells linear. *Ovary* ovoid or globose, 3-celled, rounded or concave at the apex; ovules 2 in each cell; styles 3, on the angles of the top of the ovary, the arms curved. *Fruit* a globose or depressed fleshy or coriaceous capsule, 6-valved or rupturing irregularly.

Apex of the ovary with 3 style-bearing produced angles; leaves triangular lanceolate from a broad base, up to 5 in. long, 2 in. broad, glaucous beneath, with 6-7 main nerves; fruit white, .5-.75 in. in diam. .... 1. *androgynus*.

Apex of the ovary broad, the margin crenulate, the style-bearing angles widely separate:—

Calyx-lobes narrowly triangular, acute, the folds reflexed; leaves elliptic or suborbicular, about .5-1 in. in diam., glabrous; fruit globose, .3 in. in diam. .... 2. *quadrangularis*.

Calyx-lobes cuneate, retusely 2-lobed, the folds narrow; leaves elliptic or orbicular, acute or obtuse, .5-.75 in. in diam., hispid-pubescent; fruit depressed-globose, .25 in. in diam. ... 3. *pubescens*.

1. SAUROPUS ANDROGYNUS, Merr. *S. albicans*, Bl.; F. B. I. v. 332. *S. indicus*, Wt. Ic. t. 1952, fig. 2.

W. Gháts, from the Wynad southwards, in evergreen forest, at 2,000-4,000 ft.

An erect shrub reaching 4 ft. in height.

2. SAUROPUS QUADRANGULARIS, Muell. Arg.; F. B. I. v. 335. *Ceratogynum rhamnoides*, Wt. Ic. t. 1900 (not good).

N. Circars, in Vizagapatam and Godavari, on cultivated land (Roxb.), also in the hills; W. Gháts, in most Districts at low levels.

A small shrub, with many twiggy branchlets.

3. SAUROPUS PUBESCENS, Hook. f.; F. B. I. v. 335.

Hills of Vizagapatam, up to 4,000 ft. (A. W. Lushington, Barber).

A small shrub, similar to the last but pubescent. The branches are sometimes compressed and winged.

### 19. Breynia, Forst.

Shrubs or small trees. Leaves small, alternate, entire, petioled, often distichous. Flowers monoecious, minute, axillary. Calyx in ♂ turbinate or hemispheric, truncate, lobes 5-6, with the rounded glands of the tube behind them; in ♀ campanulate or rotate, 6-lobed, sometimes accrescent in fruit. Petals 0. Disk 0. Stamens 3, the filaments connate in a column, the cells linear parallel, distinct. Ovary globose or truncate or depressed at top, 3-celled; either styles 3 sessile or connate in a short column, or stigmas 3 sunk in the apex of the ovary. Fruit globose or

depressed, more or less succulent, indehiscent or with a 6-valved pericarp enclosing cocci. *Seeds* with membranous testa; albumen fleshy; cotyledons broad; radicle long.

Calyx of ♀ enlarged in fruit, the fruit itself depressed-globose, orange, dehiscent, .5-.75 in. in diam.; styles slender, bifid; leaves membranous, broadly elliptic, obtuse, .5-1 in. long ..... 1. *patens*.

Calyx of ♀ very little enlarged in fruit, the fruit globose, red, .25-.5 in. in diam.; styles very short; leaves membranous, elliptic or ovate, obtuse or acute, up to 2 in. long, nearly 1 in. broad, but usually much smaller ..... 2. *ramnoides*.

1. BREYNIA PATENS, Rolfe; F. B. I. v. 329. *Melanthesa turbinata*, Wt. Ic. t. 1897. *M. obliqua*, Wt. Ic. t. 1898, fig. 2.

Carnatic, hills of Chingleput, S. Arcot and Trichinopoly; W. Gháts, in dry forest localities at low levels up to 4,000 ft.

A shrub reaching about 4 ft. high.

2. BREYNIA RHAMNOIDES, Muell. Arg.; F. B. I. v. 330. *Melanthesa ramnoides*, Wt. Ic. t. 1898, fig. 1.

N. Circars, Deccan and Carnatic, in deciduous forests, chiefly in open places; W. Gháts, Malabar and Travancore, less common.

A large shrub reaching 10 ft. in height, 20 ft. (Bourdillon). Vern. Tel. Yellari; Tam. Manipulnati.

## 20. Glochidion, Forst.

Evergreen trees or shrubs. *Leaves* alternate, bifarious, entire, shortly petioled. *Flowers* small, monoecious or dioecious, in axillary clusters. *Calyx* in ♂ of 6 lobes, in 2 series, imbricate, spreading; in ♀ shortly tubular with 6 often unequal lobes. *Petals* 0. *Disk* 0. *Stamens* 3-8, connate by their connectives in a column, the connectives produced in usually free tips; anthers with linear cells, extrorse. *Ovary* 3-15-celled; ovules 2 in each cell; styles connate in a column lobed at the tip, the column sometimes short but usually gradually lengthening; pistillode in ♂ usually 0 or very small behind the anthers. *Fruit* a capsule

style; the cocci crustaceous or coriaceous, the epicarp separable or not. Seeds hemispheric or laterally compressed; testa crustaceous; albumen fleshy; cotyledons flat.

Anthers 4 or more :—

Style a broad shallow cone hollowed at the apex, pubescent at base without; leaves coriaceous, orbicular, obtuse, 2-3 in. in diam.

1. *littorale*.

Style conical, cleft at the tip; flowers in shortly peduncled umbels or fascicles; fruit globose, sometimes beaked; stipules falcate, acuminate :—

Leaves beneath and branches and inflorescence finely grey-pubescent; leaves elliptic or ovate-oblong, shortly acute at apex, unequal and often subcordate at base, up to 6 in. long, 3 in. broad, main nerves 6-8 pairs; style pubescent; capsules 2-3 in. long, conical, beaked ..... 2. *tomentosum*.

Leaves and branches and inflorescence glabrous; leaves ovate lanceolate or oblong, shortly acute at apex, unequal and rounded or cordate at base, up to 8 in. long, 3 in. broad, main nerves 8-12 pairs; style glabrous; capsules 3-4 in. long, often beaked, later depressed ..... 3. *zeylanicum*.

Anthers 3 :—

Branchlets, inflorescence and leaves more or less pubescent :—

All parts prominently velvety pubescent; leaves elliptic ovate or lanceolate, obtuse or subacute, 2-5 in. long, 1-2 in. broad (larger in shoots), main nerves 6-8 pairs; stamen connective acute at apex; style cylindric, villous, 4-6-lobed; capsules 3-5 in. in diam., depressed, the seeds red ..... 4. *velutinum*.

Branchlets, inflorescence and leaf midribs tawny, crispate pubescent; leaves subcoriaceous, ovate, obtusely acuminate at apex, narrowed at base, with 5-6 very oblique prominent nerves, up to 4 in. long, 1-5 in. broad; style columnar, elongate; capsule 6-lobed, depressed at apex, crowned by the style-column

5. *arboreum*.

Branchlets and inflorescence softly fulvous-tomentose, the leaves beneath sparsely pubescent; leaves oblong, obtuse or obtusely acuminate, 4-5 in. long, 1-25 in. broad, main nerves 6-8 pairs, arched; style short, depressed globose; capsule 6-lobed, smooth, 25 in. diam. .... 6. *Johnstonei*.

Branchlets slender, fulvous-puberulous; leaves chartaceous,



long, 2 in. broad; style thick, elongate and widening upwards with triangular lobes .....7. *siaparense*.

Branchlets slender, sparsely puberulous; leaves chartaceous, lanceolate, acuminate, unequal at base, glabrous, reticulate; main nerves 8-10 pairs, up to 5 in. long, 1.5 in. broad; style thick, widening upwards; capsule glabrous, .5 in. broad, tipped by the slender columnar style .....8. *pauciflorum*.

Branchlets and leaves glabrous, sometimes the flowers only very slightly puberulous:—

Leaves chartaceous, elliptic or oblong, obtuse or acute, the base unequal, reticulate, main nerves 6-8 pairs, up to 4 in. long, 1-1.25 in. broad; style very stout, short, truncate; capsule .4 in. broad, tipped with the short thick style ..9. *neilgherrense*.

Leaves submembranous, ovate, ovate-lanceolate or ovate-oblong, obtuse or shortly acuminate, reticulate, main nerves 6-8 pairs, up to 4 in. long, 1.5 in. broad; style very short, widening at the lobes; capsule .4 in. broad, tipped with the short thick style

10. *fagifolium*.

Leaves lanceolate or oblong-lanceolate, acuminate at both ends, rather unequal at base, up to 5 in. long, 1.5 in. broad; style conical.....11. *ellipticum*.

Leaves chartaceous, elliptic or elliptic-oblong, abruptly acuminate at apex, acute or obtuse at base, main nerves 7-10, prominent, up to 5 in. long, 2 in. broad; style very small, conical; capsule .3 in. in diam., depressed ..12. *malabaricum*.

Leaves ovate or obovate, shortly acute at apex, unequal at base, main nerves 5-6 pairs, reticulation prominent, up to 4 in. long, 1.5 in. broad; style columnar eventually .....13. *Bourdillonii*.

1. *GLOCHIDION LITTORALE*, Blume; F. B. I. v. 308.

W. Coast, Malabar (Beddome, Wight).

A small tree.

2. *GLOCHIDION TOMENTOSUM*, Dalz.; F. B. I. v. 309.

W. Gháts in S. Canara, Coorg, Mysore, more scarce in Malabar and Travancore, up to 4,000 ft., in grass land.

A small tree with rather large leaves and somewhat angular branchlets, the stipules generally erect.

3. *GLOCHIDION ZEYLANICUM*, A. Juss.; F. B. I. v. 310.

N. Circars, hills of Godavari; Carnatic, Kambakam Hills in Chingleput; W. Gháts, from Mysore southwards, in evergreen forests up to 3,000 ft., common along streams and in swampy places (Bourdillon).

A small tree, reaching 30 ft. in height, the flowers yellow, the capsules orange, the stipules reflexed. As also with *G. tomentosum*, the old leaves when dry are whitish above, almost bullate and very brittle. The variety *G. canarianum*, Miq. (Hohenacker), has rather smaller leaves and a round, prominently-beaked capsule.

4. *GLOCHIDION VELUTINUM*, Wt. Ic. t. 1907, fig. 2; F. B. I. v. 322.

N. Circars, Ganjam to Godavari, up to 4,500 ft. on Mahendragiri (Fischer and Gage); Carnatic, Shevaroy Hills of Salem (Perrottet); W. Gháts, Nilgiris, Anamalais, Pulneys and hills of Travancore, up to 6,000 ft.

A small tree. Bark brown, rough; wood red, hard, not used.

5. *GLOCHIDION ARBOREUM*, Wt. Ic. t. 1907, fig. 1; F. B. I. v. 316.

W. Gháts, Sivagiri Hills of Tinnevely.

A small tree, the inflorescence branchlets zigzag, the ♀ pedicels elongate in fruit.

6. *GLOCHIDION JOHNSTONEI*, Hook. f.; F. B. I. v. 314.

W. Coast and W. Gháts, in Cochin (Johnstone); Mysore, at 2,000 ft. (Meebold).

Apparently a small tree with long angular branchlets.

7. *GLOCHIDION SISPARENSE*, Gamble, n. comb. *G. arboreum*, Hook. f.; F. B. I. v. 316 in part, not of Wt.

W. Gháts, Sispara in Nilgiris at 5,000 ft. (Wight, Lawson, Gamble).

A tree with glabrous leaves and few and distant flowers, the lobed calyx pubescent.

8. *GLOCHIDION PAUCIFLORUM*, Gamble, n. comb. *G. arboreum* var. *pauciflorum*, Hook. f. in Hb. Kew.

W. Gháts, Sholas of the Nilgiri and Pulney Hills, about 5,000-7,000 ft.

A rather common tree, very near the last and also with few-flowered clusters, but with narrower more reticulate leaves and large capsule, the leaves nearly black when dry.

9. *GLOCHIDION NEILGHERRENSE*, Wt. Ic. ii. 29; F. B. I. v. 316; Bedd. Fl. t. 277.

A moderate-sized tree with many-flowered clusters in zigzag branches, the leaves usually black when dry or the upper side greenish. Bark reddish-brown, thin, peeling off in flakes; wood red, moderately hard. Vern. *Badaga Hanikay*.

10. *GLOCHIDION FAGIFOLIUM*, Hook. f.; F. B. I. v. 312.

W. Gháts, Nilgiris, in Shola forests on the downs about 7,000 ft.

A tree, the thin leaves prominently reticulate and often greenish-brown when dry.

11. *GLOCHIDION ELLIPTICUM*, Wt. Ic. t. 1906; F. B. I. v. 321.

*G. Hohenackeri*, Bedd.; F. B. I. v. 314.

W. Gháts, all Districts, in evergreen forests, up to about 4,000 ft.

A moderate-sized tree.

Var. *Ralphii*. *G. Ralphii*, Hook. f.; F. B. I. v. 314. Branchlets very slender; leaves smaller, scarcely 2.5 in. long, .75 in. broad; flowers, especially ♀, very small. S. Tinnevely, at 3,500 ft. (Beddome).

12. *GLOCHIDION MALABARICUM*, Bedd.; F. B. I. v. 319.

W. Gháts, Coorg to Travancore, at low levels; Pulney Hills (?) (Bourne).

A small tree, the leaves with prominent curved and arching nerves.

13. *GLOCHIDION BOURDILLONII*, Gamble in Kew Bull. 1925, 330. *G. rigidum*, Bourd. Trav. Trees 334.

W. Gháts, evergreen forests at low levels up to 4,000 ft., in ravines and near streams (Bourdillon).

A small evergreen tree, the leaves reticulate.

21. *Aporosa*, Blume.

Trees. Leaves alternate, entire or rarely sinuate-toothed; stipules small. Flowers dioecious, ♂ minute, in axillary solitary or clustered catkin-like spikes, ♀ in short bracteate spikes. Calyx-lobes 3-6, usually 4, membranous, the ♀ larger than in ♂. Petals 0. Stamens 1-5, central; filaments capillary, anthers didymous. Disk 0. Ovary 2-, rarely 3-celled; ovules 2 in each cell; stigmas small, plumose, spreading and recurved; pistillode

thick and spongy or fleshy, endocarp thin, often separable; cells glabrous or hairy within. Seeds oblong or suborbicular, usually plano-convex; albumen fleshy; cotyledons broad, flat.

Capsule smooth or rugose when dry, glabrous or hairy:—

Capsule glabrous:—

Capsule globose, pedicelled, .4 in. in diam.; ♂ catkins up to 2 in. long; leaves elliptic-oblong, acuminate, rounded or acute at base, up to 7 in. long, 3 in. broad .....1. *Lindleyana*.

Capsule fusiform, beaked, up to .75 in. long, ♂ catkins stout, up to 1 in. long; leaves obovate or orbicular, obtuse or retuse, cuneate at base, up to 5 in. long, 3 in. broad .....2. *fusiformis*.

Capsule sparsely villous, ovoid, .5 in. long; ♂ catkins very short scarcely .5 in. long; leaves lanceolate, caudate acuminate, acute at base, up to 4 in. long, 1.5 in. broad .....3. *acuminata*.

Capsule ovoid, covered with long soft processes and rugose, beaked, up to 1 in. long; ♂ catkins .75 in. long, prominently bracteate; leaves oblong, long and often caudately acuminate, rounded at base, pubescent on the nerves, up to 6 in. long, 2 in. broad

4. *Bourdillonii*.

1. *APOROSA LINDLEYANA*, Baill.; F. B. I. v. 349; Bedd. Fl. t. 286. *Scepa Lindleyana*, Wt. Ic. t. 361.

W. Gháts, from S. Canara and Mysore to Anamalais and Travancore Hills, in evergreen forests up to 3,000 ft.

A small or medium-sized evergreen tree with coriaceous leaves. Bark brown, smooth; wood brown, rough, said to be useful. Vern. Kan. Sulla, sali; Tam. Vittil; Mal. Vetti.

2. *APOROSA FUSIFORMIS*, Thw.; F. B. I. v. 351.

W. Gháts, hills of Travancore, in evergreen forest at 2,000–3,000 ft. (Bourdillon).

A small tree with very coriaceous leaves in Ceylon, rather less so in Madras.

3. *APOROSA ACUMINATA*, Thw.; F. B. I. v. 348.

W. Gháts, Anamalais and hills of Travancore, in evergreen forests up to 3,000 ft.

A small tree, sometimes a shrub.

4. *APOROSA BOURDILLONII*, Stapf in Hook. Ic. t. 2204.

W. Gháts, evergreen forests of N. Travancore at low levels.

22. *Baccaurea*, Lour.

Trees. *Leaves* alternate, entire or rarely crenate-serrate, pinninerved, stipules caducous. *Flowers* dioecious, rarely monoecious, in simple or compound spikes or racemes. *Calyx*-lobes 4-5, usually unequal, imbricate. *Petals* 0. *Stamens* 4-8; filaments short, free; anthers small, didymous. *Disk* 0. *Ovary* ovoid or globose, 2-5-celled; ovules 2 in each cell; stigmas 2-5, small, sessile, free or connate in a short style; pistillode in ♂ flowers pubescent, orbicular, sessile or stipitate. *Fruit* an ovoid globose obovoid or fusiform 2-4-celled capsule, late dehiscing; pericarp thick or thin, coriaceous, crustaceous, or woody. *Seeds* broad, compressed; testa with a thick aril-like covering; albumen hard or fleshy; cotyledons flat.

*BACCAUREA COURTALLENSIS*, Muell. Arg.; F. B. I. v. 367. *B. sapdia*, Bedd. Fl. t. 280. *Pierardia macrostachys*, Wt. Ic. tt. 1912, 1913.

W. Gháts, from S. Canara southwards, in evergreen forest, up to 3,000 ft.

An evergreen tree remarkable for the flowers growing in long racemose spikes, in tufts on tubercles on the stems and branches, often "in great profusion, the whole trunk appearing as a crimson mass (Bedd.)." *Leaves* oblanceolate, acuminate, up to 7 in. long, 3 in. broad. *Fruit* crimson, about 1 in. in diam., edible. *Bark* pale brown, rough; *wood* yellowish-white. *Vern.* *Kan.* Koli kuki; *Mal.* Mutta Thuri.

23. *Daphniphyllum*, Blume.

Trees, branches stout, the leaves near the tops. *Leaves* alternate, entire, long-petioled, usually glaucous beneath. *Flowers* dioecious, sometimes monoecious in axillary racemes. *Calyx*-lobes 3-8, small. *Petals* 0. *Stamens* 5-12, free; anthers large, the cells parallel, dehiscing laterally, connective apiculate. *Disk* 0. *Ovary* imperfectly 2-celled; ovules 2 in each cell; stigmas thick, undivided; pistillode in ♂. *Fruit* an ovoid or oblong

**DAPHNIPHYLLUM NEILGHERRENSE**, Rosenth. *D. glaucescens*, Muell. Arg., not of Bl.; F. B. I. v. 353. *D. Roxburghii*, Baill.; Bedd. Fl. t. 288. *Goughia neilgherrensis*, Wt. Ic. tt. 1878, 1879.

W. Gháts, Shola forests of the Nilgiris and southwards, above 5,000 ft.; Bababudan Hills of Mysore.

A medium-sized evergreen tree with elliptic or obovate-oblong obtuse leaves, usually glaucous beneath, reaching 5 in. by 3 in., the petioles 2 in., the drupe 5 in. long, greenish-red. Bark brown, somewhat corky; wood grey, even-grained, only used as fuel. Vern. *Badaga* Nir kocki; Nir chappay.

#### 24. Putranjiva, Wall.

Trees. Leaves alternate, evergreen, entire or serrulate, reticulate. Flowers monoecious or dioecious, axillary, ♂ in clusters, ♀ subsolitary. Calyx-lobes 3-6, imbricate. Petals 0. Stamens 2-4 in the centre of the flower, filaments free or connate; anthers erect, the cells parallel. Disk 0. Ovary ovoid, 2-3-celled; ovules 2 in each cell; styles 2-3, spreading, dilated into broad fleshy stigmas. Fruit an ovoid or globose drupe with hard endocarp. Seed solitary, ovoid; testa crustaceous; albumen fleshy; cotyledons obovate, cordate, flat.

**PUTRANJIVA ROXBURGHII**, Wall.; F. B. I. v. 336; Wt. Ic. t. 1876; Bedd. Fl. t. 275; Brand. For. Fl. t. 53.

N. Circars, Deccan and Carnatic, also in suitable places in Malabar, usually on river banks and in shady valleys, up to about 2,000 ft.

A moderate-sized evergreen tree with coriaceous, elliptic-oblong, serrulate leaves up to 4 in. long, 1.5 in. broad. Bark dark grey with horizontal lenticels; wood grey, moderately hard, close-grained, useful for small purposes. The nuts are strung in necklaces and rosaries. Vern. *Hind.* Jia puta, putranjiva; *Ur.* Paishandia; *Tel.* Kadrajuvi; *Tam.* Karupala.

#### 25. Mischodon, Thw.

Tree. Leaves whorled, coriaceous, entire, penninerved.



usually 6, exserted, the filaments free, villous, as are the anthers, which dehiscence longitudinally. *Disk* in ♂ 0, in ♀ annular. *Ovary* 3-4-celled; ovules 2 in each cell; stigmas 3-4, large, sessile, flat; pistillode in ♂ 3-lobed. *Fruit* a capsule of 3 2-valved cocci. *Seeds* 1-2 in each coccus, testa crustaceous, shining; albumen fleshy; cotyledons broad, flat.

*MISCHODON ZEYLANICUS*, Thw.; F. B. I. v. 344; Bedd. Fl. t. 290.

W. Gháts, Anamalai Hills (Beddome), hills of Tinnevely; common in Ceylon.

A large tree with bluntly tetragonous branchlets, and linear-oblong leaves reaching 8 in. long and 2.5 in. broad, but usually narrower, the young ones bright red. The capsules are large, .75 in. in diam. Trimen says the timber is excellent. Vern. *Tam.* Tampanai.

## 26. *Bischofia*, Blume.

Large tree. *Leaves* alternate, 3-foliolate, often crenate. *Flowers* dioecious, minute, in axillary or lateral paniced racemes; ♂ scattered or clustered, ♀ scattered longer-pedicellate. *Calyx*-lobes 5, ♀ concave, obtuse, enclosing the anthers but later reflexed, ♀ ovate, caducous. *Petals* 0. *Stamens* 5, filaments short, anthers large with parallel cells; staminodes in ♀ small or 0. *Disk* 0. *Ovary* 3-4-celled; ovules 2 in each cell; styles long, linear, stigmatic on the inner face; pistillode in ♂ a flat disk on short stalk. *Fruit* a globose fleshy berry with 3-4-cells lined with a parchment-like 2-valved endocarp. *Seeds* oblong-trigonal; testa crustaceous; albumen fleshy; cotyledons flat, ovate.

*BISCHOFIA JAVANICA*, Bl.; F. B. I. v. 344; Bedd. Fl. t. 259.

*Microelus Roeperianus* W. & A.; Wt. Ic. t. 1880.

N. Circars, Deccan and Carnatic, in hilly country, in ravines up to 4,000 ft., W. Gháts, in evergreen forests, in all Districts.

A large deciduous tree, the large leaflets elliptic-ovate crenate up to 5 in. long. Bark rough, brown; wood red, smooth, moderately hard, useful for planking and other

## 27. Croton, Linn.

Trees or shrubs, rarely herbs. *Leaves* alternate, rarely opposite or whorled, usually 2-glandular at the base; stipules linear. *Flowers* usually monoecious, solitary or clustered on the rachis of a terminal raceme; bracts small. *Calyx* 5- (rarely 4- or 6-) partite, the lobes imbricate or valvate. *Petals* 5 (rarely 4 or 6), in ♂ usually smaller than the calyx-lobes, in ♀ very small or 0. *Disk* annular or of glands opposite the calyx-lobes. *Stamens* many, inserted on the villous receptacle; filaments free, inflexed in bud, then erect; anther-cells parallel. *Ovary* 3- (rarely 2-4-) celled; ovule solitary in each cell; styles long, 2-4-cleft, slender; pistillode in ♂ 0. *Fruit* a capsule 3-valved or of 3 deciduous 2-valved cocci. *Seeds* 3, smooth, carunculate; testa crustaceous; albumen copious; cotyledons flat.

Ovary covered with stellate scales or tomentum :—

Inflorescence scaly :—

Leaves covered on under-surface, often also above, with stellate silvery or yellowish scales :—

Leaves entire :—

Leaves elliptic-, ovate-, or linear-lanceolate, long-acuminate, shortly triple-ribbed, up to 8 in. long, 2.5 in. broad; petiole up to 1.5 in. long; stamens many, filaments glabrous; capsule .5 in. long ..... 1. *reticulatus*.

Leaves ovate or rhombic-ovate, acuminate, cuneate at base; up to 6 in. long, 3 in. broad, petiole to 5 in. long; stamens 10-12, filaments villous; capsule about 1 in. long

2. *malabaricus*.

Leaves crenate, ovate or orbicular, obtuse or slightly acute, cordate at base, tawny or silvery scaly on both surfaces, 3-5-ribbed, up to 4.5 in. long, 3 in. broad, petiole up to 1 in.; stamens 10-12, filaments glabrous; capsule to .5 in. long

3. *scabiosus*.

Leaves glabrous when old, scaly when quite young, oblong-lanceolate, acute, narrowed at base, crenate-serrate, up to 10 in. long, 3.5 in. broad, petiole to 2 in.; stamens 12, filaments villous below; capsule about .25 in. long ..... 4. *oblongifolius*.

Inflorescence stellate-tomentose; leaves 3-5-ribbed at base, base and margin with stalked glands :—

crenulate and glandular, nearly glabrous, but scaly on the nerves beneath, up to 4.5 in. long, 3 in. broad, petiole to 6.5 in., tawny-tomentose, racemes slender, the flowers mostly solitary, stamens about 30 ..... 5. *aromaticus*.

Leaves chartaceous, ovate or lanceolate, acuminate, rounded at base, subentire, fulvous stellate-tomentose beneath, up to 6 in. long, 2.5 in. broad, petiole to 2 in.; racemes elongate, stamens about 20 ..... 6. *lacciferus*.

Capsule .75-1 in. long, globose or oblong; leaves ovate or orbicular cordate, acute or acuminate, irregularly crenate-serrate, scabrous above, stellate-tomentose beneath, up to about 4 in. diam.; racemes slender, flowers in fascicles ..... 7. *caudatus*.

Inflorescence glabrous or nearly so; leaves 3-5-ribbed at base:—

Side ribs of leaves inconspicuous; leaves membranous, elliptic-ovate or oblong, acute, stellate-hairy only when quite young, entire or serrulate, up to 3.5 in. long, 1.5 in. broad, petiole to 1 in.; racemes slender, to 3 in. long; capsule .25 in. in diam., nearly glabrous, smooth ..... 8. *Klotzschianus*.

Side ribs of leaves prominent; leaves membranous, ovate, acuminate serrate, glabrous, up to 6 in. broad, 3 in. broad, petiole to 2 in.; racemes 3 in. long; capsule .75-1 in., obovoid, smooth ..... *Tiglium*.

Ovary glabrous; sepals much enlarged in fruit; leaves chartaceous, prominently 3-5-ribbed at base, ovate, long-acuminate, glabrous when old, up to 5 in. long, 2 in. broad; racemes short; capsule .7 in. in diam., rugose, glabrous ..... 9. *Lawianus*.

1. CROTON RETICULATUS, Heyne; F. B. I. v. 386; Bedd. Ic. t. 233.

W. Gháts, S. Canara to the Anamalais and Travancore and Tinnevely Hills, in evergreen forests at 3,000-5,000 ft. A shrub or small tree, the leaves with stalked glands at their base. Vern. *Mar. Panduray*.

2. CROTON MALABARICUS, Bedd. Ic. t. 181; F. B. I. v. 386.

W. Gháts in all Western Districts, in evergreen forests at 3,000-4,000 ft.

A medium-sized tree reaching 30 or even 60 ft. in height, the glands sessile, obscure. Vern. *Tam. Thavatta polavu*; *Mal. Kóla Vacchi*.

3. CROTON SCABIOSUS, Bedd. Fl. t. 283; F. B. I. v. 386.

Deccan, on dry stony hills in Cuddapah and Kurnool at 1,000-4,000 ft.

A small, often gregarious tree, the leaf-glands sessile. Bark dark brown, rough; wood yellowish white, hard and close-grained. Vern. Tel. Yerri chilla.

4. CROTON OBLONGIFOLIUS, Roxb.; F. B. I. v. 386.

N. Circars and Deccan, very scarce; W. Gháts, S. Canara to Nilgiris, in rather dry forests, not common, but usually in scrub near villages.

A small or medium-sized, deciduous, often gregarious tree, the leaves turning red before falling. Bark grey or brownish; wood yellowish white, moderately hard. Vern. Tel. Bhutankusam; Tam. Millakumari.

5. CROTON AROMATICUS, Linn.; F. B. I. v. 338 in part.

Carnatic? (Wight)—Mission Garden, Tranquebar (Wall. Cat. 7773c). A shrub with thin leaves, the capsule 3 in. in diam., glabrous except for scabrid hairs.

6. CROTON LACCIFERUS, Linn.; Wt. Ic. t. 1915. *C. aromaticus*, Linn.; F. B. I. v. 338 in part.

W. Gháts, in rather dry open and Shola forests of the Nilgiris, Anamalais and hills of Travancore and Tinnevely, usually at 4,000–7,000 ft., sometimes lower; Kollimalai Hills of Trichinopoly; Babubudan Hills of Mysore.

A shrub or small tree, slightly aromatic, the leaves turning red before falling, the capsule very scabrid, 4–5 in. in diam. Vern. Tam. Teppaddi.

7. CROTON CAUDATUS, Geisel; F. B. I. v. 388.

W. Gháts, Wynaad, Anamalais and hills of S. Travancore, up to 3,000 ft., scarce and usually near streams.

A subscandent shrub with long branchlets and large thick-shelled capsules.

8. CROTON KLOTZSCHIANUS, Thw.; F. B. I. v. 392. *Tigium Klotzschianum*, Wt. Ic. t. 1914.

Carnatic, Kambakam Hills of Chingleput; Deccan, hills of Cuddapah and Kurnool, in dry evergreen forest; W. Gháts, hills of Tinnevely at 1,000–3,000 ft. on E. side.

A shrub or small tree, most usually straggling among other bushes.

9. CROTON LAWIANUS, Nimmo; F. B. I. v. 394.

Babubudan Hills of Mysore (Law).

North Indian small tree, frequently found in cultivation in the Madras plains. It is the source of the powerful medicine Croton oil. *C. sparsiflorus*, Morong, is an introduced American weed, which, having first arrived in Bengal (Burkill in 'As. Soc. Pro.', 1910), has now wandered south along the Coromandel Coast even to Tinnevely (Rangachari).

## 28. Chrozophora, Neck.

Coarse herbs, less often undershrubs, usually clothed with stellate tomentum. *Leaves* alternate, petioled, sinuate-toothed or -lobed, plicate, rugose or bullate or nearly flat, often bi-glandular at the apex of the petiole. *Flowers* monoecious, in short dense racemes in the upper leaf-axils, the ♂ crowded near the top, subsessile, the ♀ below, pedicelled. *Calyx* 5-lobed, in the ♂ closed in bud, afterwards spreading, in the ♀ much narrower, nearly setaceous. *Petals* 5, alternate with and like the calyx-lobes, but smaller. *Disk* of 5 glands alternate with the petals. *Stamens* 5-15, the filaments connate, at least below, in a column; anther-cells oblong, parallel. *Ovary* 3-celled; ovule 1 in each cell; styles 3, each bifid; pistillode in ♂ 0. *Fruit* a 3-lobed capsule of 3 hispid tomentose or scaly 2-valved cocci. *Seeds* without caruncle, globose; testa shining; albumen fleshy; cotyledons flat.

Stems prostrate; racemes short; capsules .1-.2 in. in diam., nearly black with grey stellate tomentum, not tinctorial:—

Leaves not glandular at base, ovate or suborbicular, .5-1 in. in diam., usually strongly wrinkled and bullate, the large stellate hairs stalked; anthers short, under .1 in. long ..... 1. *prostrata*.

Leaves 2-glandular at base, ovate or lanceolate, 1 to nearly 2 in. long, only slightly bullate, the stellate hairs sessile; anthers longer, about .1 in. long ..... 2. *parvifolia*.

Stems erect; racemes elongate; capsules .3 in. in diam., reddish, with dense stellate tomentum, tinctorial when wetted; leaves broadly ovate-orbicular, 3-lobed, undulate crenate, with sessile stellate hairs, 2-4 in. in diam., petiole to 2 in.; anthers over .1 in. long

3. *Rottleri*.

1. CHROZOPHORA PROSTRATA, Dalz.: Prain in Kew Bull. 1918, 90. *C. plicata* 3; F. B. I. v. 410.

An annual herb with prostrate branches, yellow petals, orange stigmas and capsules not giving a colour when wetted.

2. *CHROZOPHORA PARVIFOLIA*, Klotzsch; Prain l.c. 91. *C. plicata* 2; F. B. I. v. 410.

N. Circars, banks of the Godavari (Barber); Carnatic, near Madras; Deccan, in Anantapur (Gamble).

A prostrate herb with rather thin leaves.

3. *CHROZOPHORA ROTTLEI*, Klotzsch; Prain l.c. 95. *C. plicata* 1; F. B. I. v. 410.

N. Circars, Deccan and Carnatic, West to the E. slopes of the Ghâts, in dry places, and on road-sides.

An erect herb or undershrub with large leaves, yellow petals and red stigmas, the capsules giving a blue colour when wetted.

#### 29. *Agrostistachys*, Dalz.

Shrubs or small trees. *Leaves* alternate, entire or serrate, penninerved. *Flowers* dioecious, in axillary or supra-axillary bracteate racemes or spikes, ♂ solitary or clustered within the bract, ♀ solitary. *Calyx* globose, splitting into 2-5 valvate lobes. *Petals* usually 5, shorter than the calyx-lobes in ♂, longer in ♀ but caducous. *Disk* large, of 5 glands alternate with the petals. *Stamens* 8-13 on a convex receptacle, filaments nearly free; anthers versatile, the cells pendulous from a thickened connective. *Ovary* 3-celled; ovule 1 in each cell; styles short, thick, spreading; pistillode in ♂ usually large. *Fruit* a capsule, of 3 2-valved cocci. *Seeds* globose; testa crustaceous; albumen fleshy; cotyledons flat.

Leaves strongly serrate, elliptic-oblong or lanceolate, acute at both ends, up to 15 in. long, 4 in. broad; ♂ racemes small, catkin-like, in axillary clusters; ♀ flowers solitary; stamens clustered within the disk.....1. *indica*.

Leaves entire, oblanceolate, very coriaceous, up to 15 in. long; flowers in elongate spiciform racemes; stamens 10, 5 within the disk, 5 outside it; capsule 5 in. broad.....2. *Meeboldii*.

1. *AGROSTISTACHYS INDICA*, Dalz.; F. B. I. v. 406; Beald. Ic. t. 241.



2. *AGROSTISTACHYS MEEBOLDII*, Pax and K. Hoffm., in Engl. Pflzreich. iv. 147, vi. 100. *A. longifolia*, Benth.; F. B. I. v. 407 in part. *Sarcoclinium longifolium*, Wt. Ic. tt. 1887, 1888. W. Gháts, in Wynaad, Anamalais and hills of Travancore and Tinnevely, in evergreen forest at 2,000–5,000 ft. A small tree with large thick leaves. Bark thin, dark; wood pale brown, moderately hard, not durable. Vern. Tam. Mancharei; Mal. Mulimpala.

### 30. *Aleurites*, Forst.

Trees, often stellately pubescent or lepidote. Leaves alternate, long-petioled, entire or lobed, digitately 3–7-nerved at the base; petiole 2-glandular at apex. Flowers monoecious or subdioecious, in lax terminal paniced cymes. Calyx subglobose in bud, bursting irregularly into 2–3 valvate lobes. Petals 5, elongate and conspicuous. Stamens many, on a conical receptacle, the outer 5 alternating with the small disk-glands; filaments free; anthers erect, adnate, the cells parallel. Disk of 5 small glands, obscure in ♀. Ovary 2–5-celled; ovule solitary in each cell; styles with 2 stout linear arms. Fruit a large drupe with a hard, 1–5-celled stone. Seed with a thick woody testa; albumen thick, hard; cotyledons broad, flat.

*ALEURITES MOLUCCANA*, Willd.; F. B. I. v. 384; Bedd. Fl. t. 276.

Introduced from Malaya, now found run wild in some places, especially the Wynaad; often planted. Belgaum Walnut. A handsome tree with large long-petioled leaves of various shapes, chiefly deltoid or rhomboid and often 3–7-lobed. The flowers are in large tomentose cymes with white petals and the drupe is fleshy, ovoid, pointed, giving edible kernels full of a drying oil.

### 31. *Trewia*, Linn.

Trees. Leaves opposite, entire, broadly ovate or orbicular; 3–5-ribbed at base. Flowers dioecious, appearing before the leaves, ♂ in drooping racemes, ♀ long-peduncled, solitary or racemose. Calyx in ♂ globose in bud, then splitting into 3–4

in each cell; styles 3-5, connate below, very long papillose. *Fruit* a 2-4-celled drupe, indehiscent or sometimes dehiscent, with usually fleshy pericarp and crustaceous endocarp. *Seeds* ovoid; testa hard; albumen fleshy; cotyledons broad, flat.

End branchlets usually cottony-tomentose; leaves cordate at base, rarely truncate; racemes in ♂ long, in ♀ with few flowers, usually 1 only; drupe with thick pericarp, indehiscent 1-1.5 in. in diam.

1. *nudiflora*.

End branchlets usually glabrous; leaves truncate at base, rarely slightly cordate, sometimes slightly cuneate; racemes in ♂ short, in ♀ many-flowered; drupe with thin loculicidally dehiscing pericarp, about .5 in. in diam. .... 2. *polycarpa*.

1. TREWIA NUDIFLORA, Linn.; F. B. I. v. 423; Wt. Ic. t. 1870 ♂

N. Circars, up to 3,000 ft. in the hills, and chiefly in wet places and along streams, rare elsewhere, and perhaps usually only cultivated.

A deciduous tree with large leaves rather like those of *Gmelina arborea*. Bark smooth, grey; wood white, soft, used for drums and for the carved images in Roman Catholic Churches (Bourdillon). Vern. *Hind.* Gambhar; *Ur.* Mondu.

2. TREWIA POLYCARPA, Benth.; F. B. I. v. 424. *T. nudiflora*, Wt. Ic. t. 1871 ♀; Bedd. Fl. t. 281.

W. Coast and W. Gháts, in Malabar and Travancore, at low levels, in wet places and along streams.

A tree reaching 50 ft. in height, with white wood, used as that of the former species. Vern. *Tam.* Ana thuvarei; *Mal.* Pambara Kumbil.

32. Mallotus, Lour.

Trees or shrubs. *Leaves* opposite or alternate, entire toothed or lobed, 3-7-ribbed or penninerved, sometimes peltate, often gland-dotted beneath, sometimes with glandular areas near the base above; stipules often present. *Flowers* dioecious or monoecious, in axillary or terminal simple or branched spikes or racemes, bracteate. *Calyx* in ♂ at first globose or ovoid, later separating into 3-5 valvate lobes; in ♀ spathaceous or valvately 3-5-lobed. *Petals* 0. *Disk* 0. *Stamens* 20-30 or more, central

filaments free; anthers parallel, separated by a wide connective. Ovary 2-4-celled; ovule 1 in each cell; styles free or connate below, above spreading and plumose or papillose; pistillode in ♂ 0. Fruit a capsule of 2-3 cocci, each 2-valved, smooth, tubercled or echinate with hard or soft spines, usually very glandular. Seed ovoid or globose; testa crustaceous; albumen fleshy; cotyledons flat.

Leaves nearly or quite as broad as long, usually deltoid, ribbed from the base:—

Climbing or straggling shrub; leaves broadly deltoid-ovate, entire or sinuate, 3-ribbed, about 3 in. long, softly stellate-pubescent and glandular; capsules 2-valved, fulvous-tomentose, .5 in. in diam.; seeds black ..... 1. *repandus*.

Tree with thick grey or tawny tomentose branches; leaves narrowly (broadly when young) peltate, broadly ovate, orbicular or deltoid, entire or shortly lobed, 3-5-ribbed, up to 10 in. in diam., densely white or fulvous stellate-tomentose; capsules 3-4-valved, .5 in. in diam., echinate with soft woolly spines and fulvous-tomentose; seeds black ..... 2. *albus*.

Leaves longer than broad:—

Leaves 3-ribbed at the base, very narrowly or not peltate:—

Leaves opposite, the petioles of the pairs unequal in length, ovate, acuminate, reticulate, entire or slightly sinuate, up to 10 in. long, 5 in. broad, pale when dry, and not glandular beneath; capsule 3-valved, .5 in. in diam., fulvous stellate-tomentose; seeds brown ..... 3. *distans*.

Leaves opposite and alternate, ovate-oblong or lanceolate, acute, the transverse nervules prominent, entire or slightly sinuate, up to 7 in. long, 2.5 in. broad, brown when dry, and yellow-glandular beneath; capsule 3-valved, .3 in. in diam., minutely pale brown stellate tomentose; seeds brown ..... 4. *ramnifolius*.

Leaves alternate, ovate or ovate-lanceolate, acuminate, the transverse nervules prominent, entire or shortly serrate, up to 8 in. long, 4.5 in. broad, greyish-pubescent to fulvous tomentose and red-glandular beneath; capsule 3-valved, .5 in. in diam., conspicuously red-glandular; seeds black ..... 5. *philippinensis*.

Leaves penninerved, or with sometimes a short opposite pair at the base:—

base, entire or distantly dentate, glabrous, up to 7 in. long, 2 in. broad; flowers in slender racemes ..... 6. *utrovirens*.

Leaves opposite, without a short opposite lowest pair of nerves :—

Capsules when mature with hard conical spines :—

Capsules .3 in. in diam., prominently yellow-glandular with few scattered spines; style-column elongate; leaves variable, elliptic-ovate or lanceolate, usually narrowed at both ends, up to 6 in. long, 2 in. broad, entire or sinuate

7. *stenanthus*.

Capsules .5 in. in diam., sparsely yellow-glandular with many regular spines roughly in lines on the back; style-column very short or 0; leaves rhombic-lanceolate or -oblanceolate, narrowed at both ends, up to 5 in. long, 1.5 in. broad, entire or sinuate-dentate ..... 8. *muricatus*.

Capsules .5 in. in diam., the cocci somewhat elongate, minutely pubescent and with spines short when mature, elongate and soft when young; style-column short; leaves lanceolate or oblanceolate, long, but bluntly acuminate, reticulate, up to 7 in. long, 2 in. broad, widely sinuate-dentate

9. *aureo-punctatus*.

Capsules when mature with subulate soft villous processes; leaves elliptic or slightly obovate, long and obtusely caudate-acuminate at apex, slightly attenuate at base, undulate, with prominent nerves and transverse nervules, up to 9 in. long, 3.5 in. broad. .... 10. *Beddomei*.

1. **MALLOTUS REPANDUS**, Muell. Arg.; F. B. I. v. 442.

N. Circars, Deccan and Carnatic to S. Travancore, at low levels, often in hedges and scrub forests and near the coast.

A large shrub, the trunk with long thorns, the ♂ flowers in panicles, the ♀ in racemes. Vern. *Hind.* Akús; *Tel.* Kanda veltu.

2. **MALLOTUS ALBUS**, Muell. Arg.; F. B. I. v. 429. *Rottlera peltata*, Wt. Ic. t. 1873.

Var. *occidentalis*, Hook. f.

W. Gháts, in all Districts, in evergreen and secondary forest up to 4,000 ft.; Shevaroy Hills of Salem; Kollimalai Hills of Trichinopoly.

A moderate-sized tree, the flowers in panicles. Bark thin, grey; wood white and soft, of no value. Vern. *Tam.* Mulla polavu; *Mal.* Vatta kumbil.

3. *MALLOTUS DISANS*, Muell. Arg.; F. B. I. v. 441; Bedd. Ic. t. 232.

W. Gháts, Anamalais and hills of Tinnevely about Courtallum.

A straggling shrub, the flowers in usually distant fascicles.

4. *MALLOTUS RHAMNIFOLIUS*, Muell. Arg.; F. B. I. v. 440.

W. Gháts, hills of Tinnevely and Travancore.

A shrub or small tree, resembling the next in leaf but at once distinguished by the capsule with nearly separate cocci and not red.

5. *MALLOTUS PHILIPPINENSIS*, Muell. Arg.; F. B. I. v. 442; Bedd. Fl. t. 289. *Rottlera tinctoria*, Roxb. Cor. Pl. t. 168.

All Forest Districts in N. Circars, Deccan and W. Gháts, also in hills of Carnatic, up to 5,000 ft., common, especially in deciduous forest and open scrub lands.

A small tree, much branching low down. Bark grey; wood grey to light red, smooth and close-grained, a good fuel. The chief product is the red powder (Kamela) on the capsules which affords a bright orange dye. Vern. *Hind.* Raini; *Ur.* Sinduri; *Tel.* Kumkuma; *Tam.* Kapli; *Mal.* Manjana.

Var. *tomentosus*. Leaves beneath densely fulvous-tomentose, acute to cuspidate-acuminate.

W. Deccan, hills of Bellary and N. Coimbatore to N. and E. slopes of Nilgiris, common on the Coonoor Ghát up to 6,000 ft., also in Pulneys.

6. *MALLOTUS ATROVIRENS*, Hook. f.; F. B. I. v. 440.

W. Gháts, forests of Cochin and Travancore, at low levels; Anamalais (Beddome).

A shrub (?), the capsules unknown.

7. *MALLOTUS STENANTHUS*, Muell. Arg.; F. B. I. v. 437.

W. Gháts, Anamalais and hills of Travancore and Tinnevely.

A small tree with rough branches and usually flattened branchlets, the leaves narrower and more acuminate at both ends than in Bombay specimens.

8. *MALLOTUS MURICATUS*, Bedd.; F. B. I. v. 436. *Claowylum muricatum*, Wt. Ic. t. 1886.

Deccan, Horsleykonda in Chittoor, at 3,500 ft. (Fischer); Carnatic, Kollimalai Hills of Trichinopoly (Rangachari);

W. Gháts, Anamalais and hills of Travancore and Tinnevely.

A tree with much compressed branchlets and leaves very variable in shape but more or less rhombic.

9. *MALLOTUS AUREO-PUNCTATUS*, Muell. Arg. *M. Lawii*, Hook. f.; F. B. I. v. 438 in part.

W. Gháts, in Cochin (Johnson), Rookwood Estate, Travancore, at 2,000 ft. (Lawson), hills of Tinnevely.

A small tree (Lawson).

10. *MALLOTUS BEDDOMEI*, Hook. f.; F. B. I. v. 438.

W. Gháts, Wynaad, Anamalais and hills of Travancore and Tinnevely, up to 5,000 ft.; Bolampatti Hills of Coimbatore at 4,300 ft. (Fischer).

A shrub (Meebold) with large leaves.

### 33. *Symphyllia*, Baill.

Trees. *Leaves* alternate, entire or toothed; stipules 2. *Flowers* monoecious, in terminal or axillary spiciform racemes, the ♂ very numerous, clustered, the ♀ few, at the base only. *Calyx* in ♂ at first globular, then breaking into 4-6 valvate lobes; in ♀ of 5-8 unequal linear lobes. *Petals* 0. *Disk* 0. *Stamens* as many as the calyx-lobes, exserted; filaments at first inflexed; anthers dorsifixed, the cells parallel, often glandular at base. *Ovary* 3-celled; ovule 1 in each cell; styles connate below, spreading and bifid above and again divided in plumose arms; pistillode in ♂ columnar. *Fruit* a 3-lobed capsule. *Seeds* globose; testa crustaceous; albumen fleshy; cotyledons flat.

*SYMPHYLLIA MALLOTIFORMIS*, Muell. Arg. *Adenochlaena indica*, Hook. f.; F. B. I. v. 418. *Cephalocroton indicum*, Bedd. Fl. t. 261.

Deccan, hills of Cuddapah, along streams at about 3,000 ft. (Fischer); W. Gháts, from S. Canara and Coorg to Nilgiris, Anamalais and the hills of Travancore and Tinnevely, in evergreen forests, about 3,500 ft.

A tree with elliptic coriaceous shining entire leaves up to



34. *Coelodepas*, Hassk.

Trees. *Leaves* alternate, oblong, entire or toothed, penninerved. *Flowers* monoecious or dioecious, in axillary spikes or clusters, the ♂ elongate, slender. *Calyx* in ♂ globose, splitting into 3-4 valvate lobes; in ♀ cupular, often enlarged in fruit, 4-10-lobed, the lobes imbricate. *Petals* 0. *Disk* 0. *Stamens* 4-8, the filaments cuneately dilated from below upwards; anthers didymous. *Ovary* 3-celled; ovule 1 in each cell; styles flattened, spreading, lobed; pistillode in ♂ minute. *Fruit* a capsule of 3, 2-valved, stellately pubescent cocci. *Seeds* subglobose; testa crustaceous; albumen fleshy; cotyledons flat.

*COELODEPAS CALYCINUM*, Bedd. Fl. t. 320; F. B. I. v. 419.

W. Gháts, hills of Tinnevely near Papanassam (Beddome), Sivagiri Hills (Wight).

A small tree with oblong acuminate crenate leaves reaching 7 in. long, 2 in. broad; ♂ flowers in very slender interrupted spikes of clusters and ♀ flowers in short spikes. The capsule is minutely fulvous tomentose, 4 in. in diam. Wood very hard (Bedd.). Vern. *Tam.* Kattupira.

35. *Alchornea*, Sw.

Trees or shrubs. *Leaves* alternate, entire or toothed, ribbed, usually stipellate at the base and glandular above at the base. *Flowers* dioecious or rarely monoecious, small, in simple or paniced spikes or racemes; ♂ small, clustered, ♀ solitary to a bract. *Calyx* in ♂ globose, closed in bud, splitting into usually 4 valvate lobes; in ♀ the 3-6 lobes, usually 4, imbricate. *Petals* 0. *Disk* 0. *Ovary* 2-3-, rarely 4-celled; ovule 1 in each cell; styles distinct usually long and linear, simple or lobed; pistillode in ♂ 0. *Fruit* a capsule of 2-3 2-valved crustaceous cocci. *Seeds* subglobose, not strophiolate; testa crustaceous; albumen fleshy; cotyledons flat.

*ALCHORNEA MOLLIS*, Muell. Arg.; F. B. I. v. 420.

N. Circars, in the hills, in moist valleys (Roxburgh), at Ettrakonda in Godavari (V. Narayanswami).

A small tree with broadly ovate or suborbicular cuspidate-

which is quite likely especially with coppice shoots. The capsule is softly grey-pubescent. Vern. Tel. Badaki.

### 36. Cleidion, Blume.

Glabrous trees. *Leaves* alternate, toothed, penninerved. *Flowers* monoecious or dioecious, ♂ in long axillary racemes; ♀ single or in pairs on a long axillary peduncle; bracts very small. *Calyx* in ♂ globose at first, splitting into 2-4 valvate lobes; ♀ 3-5-lobed, the lobes imbricate. *Petals* 0. *Disk* 0. *Stamens* numerous, in a globose mass on a conical receptacle; filaments free; anthers dorsifixed, 4-celled or 2-celled, the cells transversely didymous on a broad connective. *Ovary* 2-4-celled; ovule 1 in each cell; styles connate below, with 2-3 long filiform arms; pistillode in ♂ 0. *Fruit* a capsule of 1-3 2-valved cocci. *Seeds* subglobose; testa coriaceous, sometimes with another membranous as well; albumen fleshy; cotyledons flat.

CLEIDION JAVANICUM, Blume; F. B. I. v. 444; Bedd. Fl. t. 272.

W. Gháts, in all Districts, in evergreen forests up to 3,000 ft., but not common.

A moderate-sized evergreen tree with elliptic acuminate long-petioled leaves up to 9 in. long, 4 in. broad, and capsules 1 in. in diam. Bark greenish-white, smooth; wood greyish-white, soft and not durable. Vern. Mal. Yellari.

### 37. Macaranga, Thouars.

Trees or shrubs. *Leaves* alternate, often large and peltate, entire or lobed, usually glandular beneath, 3-many-ribbed at the base; petioles often long and stipules large. *Flowers* usually dioecious, in axillary racemes or panicles, bracteate, the ♂ minute, in clusters, the ♀ one or few, to each bract; bract often large. *Calyx* in ♂ globose or obovoid, splitting into 3-5 valvate lobes; in ♀ 2-4-lobed. *Petals* 0. *Disk* 0. *Stamens* one or more central; filaments short, free; anthers 4-celled, or 2-celled and 4-valved. *Ovary* 2-6-celled, rarely by abortion 1-celled; ovule 1 in each cell; styles entire, short or long; pistillode in ♂ 0. *Fruit* a small capsule of 1 or more 2-valved cocci, some-

Leaves in all large and broadly peltate, orbicular-ovate, acuminate, entire or shortly toothed, with usually 9 radiating ribs at the base, the midrib with 7-12 pairs of nerves, the two next nerved on the outer side, the transverse nervules parallel :—

Panicle branches usually zigzag :—

Floral bracts small, usually with a large flat glandular appendage, the panicle branches shortly jointed; style lateral, subulate, stamens usually about 6-8 ..... 1. *indica*.

Floral bracts boat-shaped, toothed and acuminate, auricled at base, tomentose, the panicle branches with distant slender joints; stamens usually 4-6 ..... 2. *flexuosa*.

Panicle branches not zigzag; floral bracts broad and close, concealing the flowers, cup-like dentate and obtuse, very tomentose; style lateral, sessile, peltate, stamens 2-5, usually 3 ..... 3. *peltata*.

1. *MACARANGA INDICA*, Wt. Ic. t. 1883 and t. 1949 ii; F. B. I. v. 446; Bedd. Fl. t. 287, Fig. A.

W. Gháts, Nilgiris, hills of Malabar and Pulneys, at 3,000-6,000 ft. in second-growth forest chiefly.

A quick-growing tree with glaucous branchlets and large stipules, the leaves with round resinous yellow glands beneath, and usually softly tomentose. Bark grey, smooth; wood greyish-red, soft.

2. *MACARANGA FLEXUOSA*, Wt. Ic. t. 1949 iii.

W. Gháts, at Courtallum in Tinnevely (Wight).

A tree with glaucous branchlets and fulvous innovations, the leaves rather thin and greyish beneath with prominent large peltate glands.

3. *MACARANGA PELTATA*, Muell. Arg. *M. Roxburghii*, Wt. Ic. t. 1949 iv; F. B. I. v. 448. *M. tomentosa*, Wt. Ic. t. 1949 i; Bedd. Fl. t. 287. ● *Mappa ? peltata*, Wt. Ic. t. 817.

N. Circars, in hill valleys, especially in Rampa; Deccan, hills of Cuddapah; W. Gháts, in most Districts, in second-growth forest up to 3,000 ft.

A small resinous quick-growing tree with glaucous branchlets, large stipules and leaves glandular and more or less villous beneath. Bark pale, with lenticels; wood pale, brown, soft, of no value. Fl. pale.

38. *Claoxylon*, A. Juss. -

Trees or shrubs, the buds not perulate. *Leaves* alternate, petioled, entire or glandular-dentate; stipules minute, early caducous. *Flowers* dioecious, rarely monoecious, in elongate racemes, often fascicled; bracts in ♂ usually 1-many, in ♀ 1-flowered. *Calyx* in ♂ closed in bud, subglobose, splitting valvately in 2-4 lobes; in ♀ usually 3-lobed. *Petals* 0. *Disk* in ♂ 0, in ♀ of hypogynous glands, free or connate in a cup. *Stamens* 10 or many, usually 20-30; filaments short or long; anthers erect, the cells distinct, connate at the base; often many glands or ciliate scales between the filaments. *Ovary* 2-4-celled; ovule 1 in each cell; styles free or connate only at the base, sometimes fringed. *Fruit* a capsule of 2-3 cocci dehiscing loculicidally. *Seeds* globose, not carunculate, arillate or not; testa crustaceous; albumen fleshy; cotyledons flat.

*CLAOXYLON ANOMALUM*, Hook. f.; F. B. I. v. 412.

Evergreen forests of Tinnevely about Courtallum (Wight), about Strathmore in Travancore at 3,500 ft. (Bourdillon).

A shrub with soft branches, oblong-lanceolate acuminate leaves with long petioles, flowers in rather dense spikes having no scales between the stamens and a white-pubescent capsule.

39. *Micrococca*, Benth.

Herbs or undershrubs, the buds not perulate. *Leaves* alternate, the lower rarely opposite, membranous, dentate, petioled; stipules minute. *Flowers* dioecious or monoecious, minute, in distant clusters on axillary racemes, the clusters often catkin-like with many imbricate bracts; the racemes solitary or fascicled, usually unisexual and various in arrangement; ♂ flowers pedicelled. *Calyx* of ♂ closed in bud, apiculate, splitting into 3 lobes; of ♀ 3-4, large, imbricate. *Petals* 0. *Disk* in ♀ hypogynous, of linear glands. *Stamens* 3-30, central on a receptacle; filaments erect; anthers erect, the cells distinct obovoid, connate at base; glands or ciliate scales between the filaments. *Ovary* 3-celled; ovules 1 in each cell; styles free, plumose-laciniate. *Fruit* a capsule of 3 cocci dehiscing loculicidally and also septicidally.

Perennial undershrubs :—

Racemes elongate-filiform, about 4 in. long, glabrous or hispid, the flower-clusters distant; leaves glabrous, elliptic-lanceolate, coarsely dentate or entire, acuminate at both ends, up to 7 in. long, 1.5 in. broad, long-petioled ..... 1. *Beddomei*.

Racemes short, under 2 in. long, hairy, the flower-clusters fairly close; leaves sparsely softly white- or fulvous-silky, lanceolate, entire or crenate, acute at both ends, up to 3 in. long, 1 in. broad (in the var. larger), petioles short ..... 2. *Wightii*.

Annual herbs; racemes erect, androgynous, filiform, up to about 3 in. long, hispid; leaves ovate, acute, usually rounded at base, crenate, up to 2.5 in. long, 1.25 in. broad, the petioles slender

3. *Mercurialis*.

1. *MICROCOCCA BEDDOMEI*, Prain in Ann. Bot. xxv. 630. *Claoxylon Beddomei*, Hook. f.; F. B. I. v. 413. *C. indicum*, Bedd. Ic. t. 231, not of Hassk.

W. Gháts, Anamalais and hills of Travancore and Tinnevely, up to 6,000 ft.

An undershrub, nearly glabrous or sparsely hispid on the racemes and branchlets, the capsule glabrous or strigose-hispid.

2. *MICROCOCCA WIGHTII*, Prain l.c. *Claoxylon Wightii* Hook. f.; F. B. I. v. 413.

W. Gháts, hills of Tinnevely (Wight, Beddome).

A slender undershrub with narrow leaves up to 1 in. broad.

Var. *hirsutum*, Prain. *Claoxylon hirsutum*, Hook. f.; F. B. I. v. 413, leaves larger, densely yellowish-silky with long spreading soft hairs, as is the capsule. Hills of Tinnevely, Singampatti at the Snake falls 2,500 ft. (Beddome).

3. *MICROCOCCA MERCURIALIS*, Benth. *Claoxylon Mercurialis*, Thw.; F. B. I. v. 412.

Most plains, Districts, a weed of cultivated land and roadsides.

An annual herb, reaching 2 ft. in height, the capsule glabrous or sparsely hispid.

#### 40. *Acalypha*, Linn.

Herbs or shrubs. Leaves alternate, usually serrate or crenate, rarely entire, penninerved or 3-5-ribbed; petioles often long.

Flowers usually monoecious, in axillary or terminal spikes or racemes; ♂ very minute, sometimes separate, sometimes lower, more usually upper, with or without small bracts; ♀ bracteate, the bracts generally leafy and concave; bracteoles very small. *Calyx* in ♂ of 4 minute valvate membranous lobes, at first combined; in ♀ 3-4 minute imbricate lobes. *Petals* 0. *Disk* 0. *Stamens* many, often 8, on a convex receptacle; filaments short, free; anther-cells distinct, divaricate, often at length twisted or flexuous. *Ovary* 3-celled; ovule solitary in each cell; styles filiform, often very long and laciniate; pistillode in ♂ 0. *Fruit* a small capsule of 3 small, 2-valved, crustaceous cocci. *Seeds* subglobose; testa crustaceous; albumen fleshy; cotyledons flat.

Flowers of ♀ pedicelled, with minute bracts, in terminal lax panicles; those of ♂ in very slender axillary spikes; leaves membranous long-petioled, ovate, acuminate, rounded truncate or even cordate at base, strongly serrate, sparsely hairy, up to 4 in. long, 2.5 in. broad.

1. *paniculata*.

Flowers of ♀ sessile with fairly large or small bracts:—

Flowers of ♀ in terminal short spikes, of ♂ axillary, in slender spikes; bracts of ♀ broad and dentate, enclosing the capsule; leaves ovate, acute, rounded or cordate at base, crenate, pubescent, up to 2 in. long, 1.25 in. broad. .... 2. *alnifolia*.

Flowers of both ♂ and ♀ in axillary spikes, the ♂ uppermost and few:—

Bracts rather large, 2-3 in. long, leafy, dentate, folded, alternate on erect spikes; ♂ flowers minute, followed by a tuft of sterile flowers; leaves long-petioled, ovate or rhombic ovate, acute, cuneate at base, crenate-serrate, up to 3 in. long, 2 in. broad, glabrous ..... 3. *indica*.

Bracts moderate-sized, longer than the capsules, 1.5-3 in. long; spikes short, rarely 1 in. long.—

Bracts deeply 3-5-lobed, the 3 longer lobes strap-shaped, long-ciliate; leaves membranous, long-petioled, ovate, acuminate, cordate at base, crenate, hispid, up to 3 in. long, 1.5 in. broad; capsules hispid. .... 4. *brachystachya*.

Bracts campanulate, with many nerves ending in long subulate hispid teeth; leaves membranous, long-petioled, ovate, cuspidate-acuminate, rounded or cuneate at base, serrate, glan-



- Bracts folded, shortly toothed, the teeth with gland-tipped hairs, otherwise glabrous; leaves ovate or lanceolate, acute, crenate-serrate, hispid, up to 1.5 in. long, .75 in. broad; capsules hispid ..... 6. *malabarica*.  
 Bracts small, shorter than the capsules, .5 in. long, dentate, hispid; spikes elongate, more than 1 in. long; leaves membranous, long-petioled, ovate or lanceolate, acute, cuneate at base, crenate-serrate, up to 2.5 in. long and nearly as broad, but usually smaller; capsules hispid with glandular-based hairs ..... 7. *lanceolata*.  
 Flowers of ♀ few, sessile at the base of slender many-flowered ♂ spikes about 1 in. long; bracts folded, cuneate, villous and glandular, .15 in. long; leaves ovate, obtusely acuminate or acute, cuneate at base, crenate, glabrous, glandular beneath, up to 3 in. long, 1.5 in. broad; capsules tomentose with large yellow glands in the sinuses.  
 8. *fruticosa*.

1. *ACALYPHA PANICULATA*, Miq.; F. B. I. v. 415.  
 Carnatic, hills of S. Arcot; W. Gháts, in all Districts from the Wynaad southwards, in shady moist places up to 4,000 ft.  
 A small branching undershrub.
2. *ACALYPHA ALNIFOLIA*, Klein ex Willd.; F. B. I. v. 415.  
 Deccan and Carnatic, westwards to the E. slopes of the W. Gháts, up to about 3,000 ft.  
 A small shrub, the stems usually with long soft shining hairs, the stems and leaves sometimes grey-tomentose.
3. *ACALYPHA INDICA*, Linn.; F. B. I. v. 416; Wt. Ic. t. 877.  
 All plains Districts and in the lower hills, a weed of gardens, roadsides and cultivated land.  
 An erect annual herb. Vern. *Tam.* Kupamani.
4. *ACALYPHA BRACHYSTACHYA*, Hornem.; F. B. I. v. 416.  
 W. Gháts, Mysore, Nilgiris, Anamalais and Pulneys, usually above 3,000 ft. in shade of Shola forests.  
 A slender flaccid annual herb, 1 ft. or little more in height.
5. *ACALYPHA CILIATA*, Forsk.; F. B. I. v. 417.  
 Deccan, hills of Kurnool; W. Gháts, in all Districts, in forest undergrowth, at 1,000-4,000 ft.  
 An erect annual herb up to 2 ft. in height.
6. *ACALYPHA MALABARICA*, Muell. Arg.; F. B. I. v. 416.  
 S. Canara and Mysore.  
 A rather stout leafy annual herb, up to 1 ft. in height.

7. *ACALYPHA LANCEOLATA*, Willd. *A. fallax*, Muell. Arg.; F. B. I. v. 416.

• N. Circars, Deccan and Carnatic to S. Travancore, on waste land and in fields.

An annual herb, reaching 18 in. in height, the stems often clothed with long silky deciduous hairs, the leaves variable in shape.

8. *ACALYPHA FRUTICOSA*, Forsk.; F. B. I. v. 415.

Deccan and Carnatic, West to the E. slopes of the W. Gháts, in dry localities.

A strong-smelling shrub with many yellow waxy glands, much branching.

*A. Wilkesiana*, Muell. Arg., is a shrub from the Fiji Islands very commonly grown in gardens for its coloured highly ornamental leaves and flower-spikes.

#### 41. *Tragia*, Linn.

Perennial herbs, usually climbing, hispid with stinging hairs. *Leaves* alternate, simple or palmately 3-lobed, serrate, 3-5-ribbed at the base; stipules prominent at first, early deciduous. *Flowers* monoecious in terminal or leaf-opposed androgynous racemes, the ♂ uppermost, the ♀ below and few. *Calyx* in ♂ globose or obovoid, valvately 3-5-partite; in ♀ of 6 imbricate, usually pinnatifid, lobes, enlarged, hardened, and spreading stellately in fruit. *Petals* 0. *Disk* 0. *Stamens* 1-3, rarely more, usually 3; filaments free or connate; anthers with contiguous parallel cells. *Ovary* 3-celled; ovule 1 in each cell; styles united in a column, spreading above. *Fruit* a capsule of 3 2-valved cocci; endocarp crustaceous. *Seeds* globose; testa crustaceous; albumen fleshy; cotyledons broad, flat.

Leaves simple :—

Leaves not cordate at base, acute in uppermost or younger, rounded in lower or older ones, the large ones broadly ovate, abruptly acuminate, coarsely serrate, up to 4 in. long, 3 in. broad, longer and much narrower in the var.; fruiting calyx-lobes with narrow glabrous midrib and 4-6 pairs of short hispid teeth. . . 1. *involuta*.

Leaves cordate at base :—

Upper branchlets and leaves densely fulvous-tomentose, the leaves (at any rate young ones) pale on the lower surface; lower leaves ovate-cordate, acuminate, regularly serrate, up to 5 in. long, 3 in. broad; midrib of fruiting calyx-lobes hispid within, teeth fulvous-hispid.....2. *bicolor*.

Upper branchlets and leaves sparsely greyish hispid; lower leaves broadly ovate-cordate, membranous, nearly glabrous, serrate, up to 5 in. long, 3 in. broad; midrib of fruiting calyx-lobes glabrous within, the teeth slender, white-hispid

3. *hispid*.

Fruiting calyx-lobes broadly ovate with many small teeth, glabrous on the middle of both sides, densely white-strigose on the margins; leaves membranous, green, nearly glabrous, broadly ovate-cordate, acuminate, coarsely serrate, up to 6 in. long, 4 in. broad.....4. *Muelleriana*.

Leaves palmately 3-partite, the middle lobe the longest and sometimes alone, the lobes pinnatifid, hispid and grey, about 3 in. long; fruiting calyx-lobes rather narrow, with 8-10 straight teeth, sparsely white-strigose .....5. *cannabina*.

1. *TRAGIA INVOLUCRATA*, Linn.; F. B. I. v. 465.

N. Circars, Deccan and Carnatic to S. Travancore.

An evergreen climbing hispid herb with stinging bristles, variable in foliage, the leaves rather thick. Vern. *Hind. Barhanta*.

Var. *angustifolia*, Hook. f. Leaves long and narrow, up to 6 in. long, 5-75 in. broad; fruiting calyx-lobes with very short teeth.

Hills of N. Coimbatore at 4,000 ft. (Fischer); Pulney Hills (Bourne, van Malderen).

2. *TRAGIA BICOLOR*, Miq.; F. B. I. v. 465.

W. Gháts, Nilgiri and Pulney Hills, at 5,000-6,000 ft., in Shola forests.

A slender climbing stinging herb, hispid below, bright golden-tomentose on the innovations.

3. *TRAGIA HISPIDA*, Willd. *T. involucrata*, Linn.; F. B. I. v. 465 in part.

W. Coast, S. Canara and Malabar.

A slender climbing stinging herb.

4. *TRAGIA MUELLERIANA*, Pax and K. Hoffm. *T. involucrata*, Linn., var. *cordata*, Muell. Arg.; F. B. I. v. 465.

W. Gháts; Wynaad to the Hills of Cochin, at 3,000-5,000 ft. in evergreen forest.

A slender stinging climbing herb.

5. *TRAGIA CANNABINA*, Linn. f. *T. involucrata* var. *cannabina*, Muell. Arg.; F. B. I. v. 465.

N. Circars, Deccan and Carnatic, in hedges and on waste lands.

A hispid erect or climbing shrub with stinging hairs; the leaves variable, sometimes not tripartite, sometimes with long narrow lobes.

#### 42. Homonoia, Lour.

Rigid shrubs. Leaves alternate, glandular-scaly beneath; stipules slender, deciduous. Flowers dioecious, in axillary or lateral spikes, bract 1, bracteoles 2. Calyx in ♂ globose in bud, splitting valvately in 3 lobes; in ♀ of 5-8 small imbricate caducous lobes. Petals 6. Disk 0. Stamens very numerous, in a dense globose cluster of repeatedly branching filaments; anthers with 2 subglobose divaricate cells. Ovary 3-celled; ovule 1 in each cell; styles 3 spreading and very papillose. Fruit a capsule of 3 2-valved cocci. Seeds ovoid; testa crustaceous with an outer fleshy coat; albumen fleshy; cotyledons flat.

Leaves linear or linear-oblong, acute or rarely obtuse, entire or more or less serrulate towards the apex, glabrous above, very glandular-scaly beneath, up to 7 in. long, .5 in. broad; spikes in both ♂ and ♀ elongate.....1. *riparia*.

Leaves obovate or oblanceolate, emarginate, cuneate at base, serrate-dentate, glabrous above, sparsely glandular-scaly beneath, 1-1.5 in. long, .5-7 in. broad; spikes in both ♂ and ♀ short.....2. *retusa*.

1. *HOMONOIA RIPARIA*, Lour.; F. B. I. v. 455. *Adelia neriifolia*, Roth.; Wt. Ic. t. 1868.

All Districts, at lower levels, in the beds of rivers and streams, especially among rocks.

An evergreen shrub. Bark brown; wood grey or greyish-brown, moderately hard, close-grained. Vern. Tel. Taniki; Mal. Kat-allári.

2. *HOMONOIA RETUSA*, Muell. Arg.; F. B. I. v. 456. *Adelia*

- N. Circars from the Godavari southwards; Deccan and Carnatic in places, in river beds, not common.  
A small shrub.

#### 43. *Lasiococca*, Hook. f.

Small trees. *Leaves* alternate opposite or subverticillate, entire, penninerved, eglandular, shortly petioled; stipules deciduous. *Flowers* monoecious or dioecious, ♂ in racemes, ♀ solitary, axillary or lateral; bracts small. *Calyx* of ♂ flower globose, splitting valvately in 3 lobes; of ♀ of 5-7 unequal lobes, persistent and accrescent in fruit. *Petals* 0. *Disk* 0. *Stamens* numerous, in a much-branched column of filaments; anthers many, cells globose, divaricate with arching connectives. *Ovary* 3-celled; ovule 1 in each cell; styles 3, filiform, erect, with papillose stigmatic surfaces. *Fruit* a capsule of 3 cocci, deciduous from a 3-cornered columella, covered with bristles or conical tubercles. *Seeds* subglobose, smooth; testa crustaceous; albumen fleshy; cotyledons thin, subcordate.

LASIOCOCCA COMBERI, Haines in Kew Bull. 1920, 70.

N. Circars, hills of Vizagapatam, at 3,000-4,000 ft. (A. W. Lushington).

A small tree with obovate, or somewhat panduriform leaves obtusely abruptly acuminate at apex, narrowed and then cordate at base, up to 6 in. long, 2 in. broad. The ♀ flowers are long-peduncled and the capsules covered with conical tubercles ending in a hair.

#### 44. *Ricinus*, Linn.

A tall glabrous, glaucous annual shrub. *Leaves* alternate, palmately lobed with 7 or more serrate lobes. *Flowers* monoecious, in terminal paniculate racemes, the upper ♂, crowded, the lower ♀. *Calyx* in ♂ membranous, splitting into 3-5 valvate lobes; in ♀ spathaceous, caducous. *Petals* 0. *Disk* 0. *Stamens* very many, the filaments connate and repeatedly branched; anthers with distinct distant subglobose divergent cells. *Ovary* 3-celled; ovule 1 in each cell; styles entire 2-fid or 2-partite, papillose. *Fruit* a capsule of 3 2-valved cocci, prickly without. *Seeds* oblong; testa crustaceous, marbled; albumen fleshy.

**RICINUS COMMUNIS**, Linn.; F.B. I. v. 457.

Cultivated and found run wild in the fields and gardens, by roadsides and on waste land. Castor-oil plant.

Often almost a small tree with a thin greyish-brown bark and soft white wood. It is cultivated for the oil which is expressed from the seeds and used for burning, as a lubricant and in medicine. Vern. *Hind.* Arend; *Tam.* Sittamunuk; *Tel.* Amadam; *Kan.* Haralu.

#### 45. *Dalechampia*, Linn.

Shrubs or undershrubs, often climbing. *Leaves* alternate, entire or 3-5-lobed or foliolate. *Flowers* monoecious, in dense axillary peduncled heads, with a pair of large leafy usually coloured bracts; ♂ central with an involucre of smaller bracts and sometimes processes representing sterile flowers; ♀ lateral and basal also with an involucre of smaller bracts. *Calyx* in ♂ globose splitting into 4-6 valvate lobes; in ♀ of 5-12 fimbriate or lacerate imbricate lobes. *Petals* 0. *Disk* 0. *Stamens* many, 20-30, the filaments connate below in a column inserted on the convex receptacle; anthers with parallel cells. *Ovary* 3-4-celled; ovule 1 in each cell; styles connate in a stout thickened column with a terminal entire or slightly lobed stigma. *Fruit* a deeply lobed capsule splitting into 3-4 2-valved cocci, the valves hard. *Seeds* globose, not caruncled; testa crustaceous; albumen fleshy; cotyledons broad, flat.

*Leaves* 3-foliate, the leaflets sessile or very shortly petiolulate, the 2 lower with rounded and often lobed blades enlarged below, the mid-lobe ovate, acuminate, 2-3 in. long, all glabrous; outer bracts 3-lobed, about 1 in. long, inner also lobed; calyx of ♂ of 4 entire lobes, of ♀ of 8-12 nearly linear lobes with stalked marginal glands; anthers not apiculate . . . . . 1. *indica*.

*Leaves* 3-lobed, the 2 lower enlarged below, the midlobe ovate, acute, up to 4 in. long, all tomentose; outer bracts 3-fid, about 1.5 in. long, inner entire; calyx of ♂ of 6 entire lobes, of ♀ of 8-10 pinnatifid long strigose lobes; anthers apiculate . . . . . 2. *velutina*.

#### 1. *DALECHAMPIA INDICA*, Wt. Ic. t. 1882; F. B. I. v. 467.

Carnatic, from the Nellore Veligondas (Heyne) and the Kambakam Hills of Chingleput (Rangachari) southwards and westwards to the E. slopes of the W. Ghāts.



A slender twining undershrub with large yellow involucre bracts and slender short fruiting calyx, very glandular.

2. *DALECHAMPIA VELUTINA*, Wt. Ic. t. 1881; F. B. I. v. 467.

W. Gháts, Nilgiri Hills, above 5,000 ft. (Wight, King, Bidie, Fischer).

A slender twining undershrub with large bracts and conspicuously strigose fruiting calyx.

#### 46. *Ostodes*, Blume.

Trees or shrubs. *Leaves* alternate, entire or serrate, usually penninerved, stipular. *Flowers* dioecious or monoecious, in lax terminal and lateral paniced usually pendulous racemes, ♂ in fascicles, ♀ in separate racemes or solitary in ♂ ones. *Calyx* of 5 broad unequal imbricate lobes. *Petals* 5-6, larger, longer than calyx-lobes. *Disk* of 5 glands or annular. *Stamens* numerous, on a convex or columnar receptacle; filaments free; anthers dorsifixed, connective broad. *Ovary* 3-celled; ovule 1 in each cell; styles short, 2-cleft. *Fruit* a large subglobose 6-ribbed capsule, the exocarp separable from the hard endocarp, breaking up into 3 2-valved cocci. *Seeds* ovoid; testa crustaceous with a fleshy outer layer; albumen fleshy; cotyledons broad, flat.

*OSTODES ZEYLANICUS*, Muell. Arg.; F. B. I. v. 400; Bedd. Fl. t. 274.

W. Gháts, Wynaad, Anamalais, Atapadi Hills of Malabar and hills of Travancore, up to 3,000 ft.

A large tree with large long-petioled oblong or oblanceolate distantly serrate leaves, up to 12 in. long, 4 in. broad. Wood white, soft and perishable.

Var. *minor*, Thw. Leaves smaller, up to 7 in. long, fewer-nerved and nearly entire, the racemes shorter, the capsule smaller and tomentose.

W. Gháts, Wynaad (Lawson) to Travancore.

#### 47. *Dimorphocalyx*, Thw.

Glabrous trees. *Leaves* alternate, entire, penninerved, stipulate. *Flowers* dioecious, ♂ usually in axillary cymes or

large, of 5 oblong obtuse imbricate lobes, enlarged and spreading in fruit. *Petals* 5, erect, imbricate. *Disk* in ♂ of glands, in ♀ annular. *Stamens* 10–20, usually in 2 rows, on a short column; filaments thick; anthers dorsifixed, the cells adnate to the thick connective, parallel or divergent. *Ovary* 3-celled; ovule 1 in each cell; styles 2 connate at the base, bifid. *Fruit* a capsule of 3 2-valved crustaceous cocci surrounded at the base by the persistent calyx-lobes. *Seeds* ovoid; testa crustaceous; albumen fleshy; cotyledons flat.

**Fruiting calyx** obovate, obtuse, .25–.5 in. long, with a glandular pit on back near the tip; leaves elliptic or lanceolate, obtuse or acute, up to about 5 in. long, 2 in. broad; capsule .5 in. long, slightly hispid-villous, shortly lobed ..... 1. *glabellus*.

**Fruiting calyx** elliptic-oblong or lanceolate, emarginate, .5–1 in. long, the lobes unequal; leaves elliptic-oblong or lanceolate, usually long, but obtusely-acuminate, up to 7 in. long, 2.5 in. broad; capsule .5–.7 in. long, villous, scarcely lobed ..... 2. *Lawianus*.

1. **DIMORPHOCALYX GLABELLUS**, Thw.; F. B. I. v. 403; Trimen Fl. Ceyl. t. 84.

N. Circars, coast scrub near the sea, Vizagapatam (W. Elliot, Gamble); W. Gháts, Anamalais and hills of Tinnevely.

A small much-branched tree, the leaves reddish brown when dry and rather thin, the branchlets nearly white.

2. **DIMORPHOCALYX LAWIANUS**, Hook. f.; F. B. I. v. 404; *Trigonostemon Lawianus*, Bedd. Fl. t. 273.

W. Gháts, in all Districts, western side, in evergreen forests, up to 4,000 ft.

A small or moderate-sized tree with nearly white branchlets. Wood white, hard, close-grained.

#### 48. *Blachia*, Baill.

Glabrous shrubs or small trees. *Leaves* alternate or subopposite, petioled, entire, penninerved. *Flowers* monoecious or subdioecious, ♂ terminal, umbellate or racemose, on filiform pedicels, ♀ solitary or fascicled, on thickened pedicels. *Sepals* in ♂ 4–5, membranous, concave, imbricate; in ♀ lanceolate or oblong, in fruit sometimes accrescent, sometimes caducous. *Petals* in ♂ 4–5, small, rounded, hyaline; in ♀ 0. *Disk* in ♂ scale-like glands alternating with the petals; in ♀ annular.

*Stamens* 10-20, on 6 convex receptacle; filaments free; anther-cells on the margin of the connective, at length confluent. *Ovary* 3-4-celled; ovule 1 in each cell; styles distinct, filiform, 2-partite. *Fruit* a capsule of 3 2-valved cocci. *Seeds* oblong, estrophiolate; testa crustaceous, often mottled, shining; albumen fleshy; cotyledons broad, flat.

Flowers of ♂ in umbels:—

Calyx of ♀ scarcely enlarged in fruit, the lobes reflexed; leaves ovate or obovate, obtuse or cuspidate-acuminate, up to 3 in. long, 1.5 in. broad; capsule .4 in. long, not deeply lobed, smooth

1. *reflexa*.

Calyx of ♀ enlarged in fruit, the lobes erect; leaves ovate or obovate, acuminate, narrowed at base, up to 7 in. long, 3 in. broad; capsule .6 in. long, deeply lobed.....

2. *umbellata*.

Flowers of ♂ in racemes:—

Calyx of ♀ enlarged in fruit, the lobes spreading, leaves lanceolate or elliptic-rhomboid, acuminate, cuneate at base, up to 5 in. long, 2 in. broad; capsule .4 in. long, with shallow lobes....

3. *calycina*.

Calyx of ♀ deciduous after flowering; leaves oblong-lanceolate or -ovate, unequal-sided, up to 5 in. long, 2 in. broad; capsule .3-5 in. long, prominently lobed.....

4. *denudata*.

1. *BLACHIA REFLEXA*, Benth.; F. B. I. v. 402.

W. Gháts—"Nilgiris and Coorg" (G. Thomson), Travancore (Bourdillon) in evergreen forests, about 1,000 ft.

A shrub.

2. *BLACHIA UMBELLATA*, Baill.; F. B. I. v. 402.

W. Gháts, Coorg, Wynaad and hills of Travancore and Tinnevely, in evergreen forests, at 1,000-3,000 ft.

A shrub or small tree.

3. *BLACHIA CALYCINA*, Benth.; F. B. I. v. 402. *Croton umbellatum*, Wt. Ic. t. 1874.

W. Gháts, hills of Travancore and Tinnevely, in evergreen forests, at 1,000-2,000 ft.

A shrub.

4. *BLACHIA DENUDATA*, Benth.; F. B. I. v. 403.

W. Gháts, S. Canara (Beddome); Bababudan Hills of Mysore (Law).

A shrub or small tree, the specimens probably right but a little uncertain, as the leaves are so variable.

49. *Jatropha*, Linn.

Herbs, shrubs or trees, often glandular or prickly. *Leaves* alternate, entire or palmately-lobed or partite; stipules often ciliate. *Flowers* monoecious, in terminal cymes; the central flowers of the cyme or its forks usually ♀. *Calyx* of 5 often coloured imbricate lobes. *Petals* 5, contorted, free or connate, sometimes absent in ♀. *Disk* entire or of 5 glands. *Stamens* numerous; filaments connate or those of the outer series free; anthers erect, ovate or oblong, the cells parallel, contiguous. *Ovary* 2-4-celled; ovule solitary in each cell; styles connate below, 2-fid above, the lobes entire or again bifid. *Fruit* a capsule of 2-4 2-valved cocci; endocarp crustaceous or bony. *Seeds* ovoid or oblong; testa crustaceous; albumen fleshy; cotyledons broad, flat.

Petals free or nearly so :—

Leaves without glands, 3-lobed to below the middle, sometimes simple, sometimes 5-lobed, the lobes long and narrow, the base cuneate, length up to 8 in., stipules capillary; capsule 5-7 in. long, often pustulate ..... 1. *heterophylla*.

Leaves glandular, palmately 3-5-lobed to below the middle :—

Leaves serrate, each tooth ending in a gland-tipped bristle, lobes obovate, shortly acuminate; stipules very long with many filiform glandular-tipped divisions; capsule 4-5 in. long, rugose ..... 2. *glandulifera*.

Leaves entire, the margins with a close row of shortly stipitate viscid glands which occur, though longer and branched, on the petioles and short stipules, lobes obovate, shortly acute; capsule 4 in. long, reticulate-rugose ..... 3. *gossypifolia*.

Petals connate to the middle or above it :—

Glabrous, the leaves not peltate, orbicular-cordate, entire or 3-5-lobed or -angled, up to 6 in. in diam.; capsule subglobose or ellipsoid, about 1 in. long, rugose ..... 4. *Curcas*.

Branchlets and leaves beneath fulvous-tomentose, the leaves peltate, suborbicular, obtusely 5-7-lobed, up to about 6 in. in diam.; capsule globosely oblong, up to 1 in. long ..... 5. *Wightiana*.

1. *JATROPHA HETEROPHYLLA*, Heynê; F. B. I. v. 382.

Deccan, from Nellore and Cuddapah westwards to Coimbatore and the N. side of Nilgiris, on dry stony ground.

A small low glabrous shrub branching from a tuberous rootstock, the flowers greenish.

*JATROPHA GANDULIFERA*, Roxb.; F. B. I. v. 382.

Deccan and Carnatic, from the Kistna river southwards, often on black cotton soil.

A shrub with stout thick branches with a smooth papery pale bark, the flowers greenish-yellow.

*JATROPHA GOSSYPIFOLIA*, Linn.; F. B. I. v. 383.

All plains Districts, on roadsides and in waste places, a common weed, introduced from Brazil, and quite naturalized.

A small dark-coloured shrub with soft wood and reddish flowers. Vern. *Tam.* Atalai; *Tel.* Nela-amida.

l. *JATROPHA CURCAS*, Linn.; F. B. I. v. 383.

All plains Districts, about villages and in hedges, an American plant, cultivated and naturalized. Physic Nut.

A shrub or small tree with yellowish-green flowers. Bark greenish-white, smooth, peeling off in thin flakes; wood white, very soft. The seeds give a medicinal oil. Vern. *Hind.* Bagberenda; *Tel.* Nepalam; *Tam.* Kaat-amunak.

*JATROPHA WIGHTIANA*, Muell. Arg.; F. B. I. v. 383. *J. peltata*, Wt. Ic. t. 1169 (*J. villosa* in text).

W. Deccan, Mysore and Coimbatore, in dry stony scrub.

A low branching shrub with pale yellowish flowers.

*J. multifida*, Linn., the Coral Plant, is a glabrous shrub, native of America, which is commonly cultivated in gardens. It has handsome leaves of orbicular outline very much cut palmately into narrow lobes, while the peduncles and flowers are bright red. Some other species of the genus are also occasionally found in gardens in cultivation.

#### 50. *Tritaxis*, Baill.

Trees or shrubs. Leaves alternate, entire or toothed, penninerved. Flowers usually monoecious in terminal dichotomous cymes, the central flower of each cyme subsessile ♀, surrounded by many ♂ pedicelled. Calyx 5-lobed. Petals 5, longer than the calyx-lobes. Disk of 5 glands. Stamens in 2-3 whorls, the inner or all forming a central column; anthers of the outer whorl erect, of the inner horizontal, the cells parallel, introrse. Ovary 3-celled; ovule 1 in each cell; styles 2-fid. Fruit a capsule of 3 2-valved cocci.

TRITAXIS BEDDOMEI, Ben<sup>h</sup>; F. B. I. v. 34.

W. Gháts, hills of Tinnevely and Travancore (Beddome).

- A small tree with slender terete branches, thinly coriaceous leaves reaching 4 in. in length, and terminal branching cymes.

### 51. Trigonostemon, Blume.

Evergreen trees or shrubs. *Leaves* alternate, penninerved. *Flowers* monoecious, in axillary or terminal spikes, racemes or cymes. *Calyx* of 5 imbricate lobes. *Petals* 5, sometimes 0 in ♀. *Disk* of 5 glands, often united in a lobed cup. *Stamens* 3 or 5, connate in a short column with free spreading tips; anthers erect or horizontal, the cells united by their bases. *Ovary* 3-celled; ovule 1 in each cell; styles bifid or twice bifid, rarely entire. *Fruit* a capsule of 3 2-valved cocci. *Seeds* ovoid or globose; testa crustaceous, mottled; albumen fleshy; cotyledons broad, flat.

TRIGONOSTEMON NEMORALIS, Thw.; F. B. I. v. 398; Bedd. Ic. t. 182.

W. Gháts, Wynaad (Beddome), hills of Tinnevely, in evergreen forests, at 2,000–3,000 ft., often on river banks.

A shrub or small tree with elliptic-oblong or lanceolate sinuate-lobed leaves reaching 6 in. long, the young parts and inflorescence strigose-hairy, the flowers red.

### 52. Givotia, Griff.

A tree, conspicuously softly white-stellate-tomentose on branchlets, inflorescence and undersurface of leaves. *Leaves* alternate, broadly ovate or orbicular, cordate, coarsely dentate, palmately ribbed, long-petioled. *Flowers* dioecious, in axillary or subterminal racemose or paniculate cymes; pedicels jointed; bracts linear, conspicuous. *Calyx* of 5 oblong imbricate lobes. *Petals* 5, longer than the calyx-lobes, cohering in a campanulate corolla. *Disk* of ♂ of orbicular glands, of ♀ cupular. *Stamens* 13–25, on a villous receptacle; filaments erect, connate below; anthers ovate, dorsifixed, the cells parallel. *Ovary* 2–3-celled; ovule 1 in each cell; styles short, spreading, 2-fid. *Fruit* a subglobose drupe, 1-seeded. *Seed* globose or ellipsoid; testa bony; albumen fleshy; cotyledons flat.



*GIVOTIA ROTTBOFII*, Griff.; F. B. I. v. 395; Wt. Ic. t. 1889; Bedd. Fl. t. 285.

Deccan, hilly country in Hyderabad and the Ceded Districts to Coimbatore; hills of the Carnatic to S. Travancore; E. slopes of W. Ghats, in dry deciduous forests chiefly.

A moderate-sized tree conspicuous for its large leaves densely white-tomentose beneath reaching a diameter of up to 10 in. The flower-panicles are usually more fulvous-tomentose, with distant clusters, the drupe 1 in. long. Bark brown, smooth, peeling off in circular scales; wood white, very light and soft, used for carved images, toys, lacquered articles and catamarans. The seeds give an oil. Vern. Tel. Tella puliki; Tam. Vendalai.

### 53. *Baliospermum*, Blume.

Erect shrubs or undershrubs. *Leaves* alternate, minutely lobed, palminerved or penninerved, biglandular at base. *Flowers* small, monoecious or dioecious, in fascicles, panicles or racemes. *Calyx* in ♂ globose, opening in 4-5 membranous concave imbricate lobes; in ♀ of 5-6 lanceolate entire or toothed lobes sometimes accrescent in fruit. *Petals* 0. *Disk* in ♂ of 4-6 glands, in ♀ annular. *Stamens* numerous, 10-30, on a central receptacle; filaments slender, free; anthers terminal, the cells adnate to the broad connective. *Ovary* 3-celled; ovule 1 in each cell; styles stout, 2-fid or 2-partite with smooth stigmatic surfaces. *Fruit* a capsule of 3 2-valved crustaceous cocci. *Seeds* ovoid, caruncled; testa crustaceous; albumen fleshy; cotyledons flat.

*BALIOSPERMUM MONTANUM*, Muell. Arg. *B. axillare*, Blume; F. B. I. v. 461. *B. polyandrum*, Wt. Ic. t. 1885.

N. Circars, Deccan and W. Coast, in shady places, at low levels.

A stout leafy undershrub from 3-6 ft. high with leaves very variable in shape and size, the large ones ovate oblong or rounded, often 12 in. long and long-petioled, the small upper ones lanceolate. The seeds give a medicinal oil. Vern. Hind. Danti.

### 54. *Gelonium*, Roxb.

Evergreen, glabrous trees or shrubs, the branches with stipular lines at the nodes. *Leaves* alternate or sometimes opposite,

pellucid-punctate, entire or serrate, stipules connate, sheathing, caducous. *Flowers* small, dioecious, in axillary cymes or clusters. *Calyx* in ♂ of 5 concave orbicular imbricate lobes, in ♀ of 5-6 narrower lobes. *Petals* 0. *Disk* in ♂ 0, in ♀ cupular, the glands large, peripheric. *Stamens* 10-60, free, central on a convex receptacle, often mixed with rugose glands; filaments filiform; anthers oblong, dorsifixed, the cells parallel. *Ovary* 2-4-celled; ovule 1 in each cell; styles minute, reniform semilunate or bifid, depressed. *Fruit* a globose or obscurely lobed usually fleshy or crustaceous capsule. *Seeds* subglobose, arillate; testa crustaceous; albumen fleshy; cotyledons flat.

Flowers rather large, many, in cymes or clusters; leaves elliptic or elliptic-oblong, acute, up to 7 in. long; capsule rough, obscurely lobed, .5-.75 in. in diam. .... 1. *multiflorum*.

Flowers small, rather few, in fascicles; leaves obovate or oblanceolate, obtuse, up to 4 in. long, but usually less; capsules smooth, deeply lobed, keeled on the lobes, .2-.4 in. in diam. .... 2. *lanceolatum*.

1. GELONIUM MULTIFLORUM, A. Juss.; F. B. I. v. 459.

N. Circars, in evergreen forests and shady places; Travancore, but perhaps cultivated.

A small evergreen tree with coriaceous shining leaves.

Bark grey, wood yellowish-white, close-grained. Vern.

Ur. Khakra.

2. GELONIUM LANCEOLATUM, Willd.; F. B. I. v. 459; Wt. Ic. t. 1867.

N. Circars and Deccan, in hilly country; W. Gháts, Cochin and Travancore, at low levels, in evergreen forest.

A small evergreen tree with shining pale coriaceous leaves

Vern. Tel. Suragada; Tam. Kakaipalai.

55. Sebastiania, Spreng.

Herbs or shrubs. *Leaves* alternate, penninerved. *Flowers* minute, monoecious, in slender racemes, the ♂ 1-3 to each bract, the ♀ solitary or at the base of the raceme. *Calyx* of ♂ minute, membranous, unequally 5-lobed or partite, of ♀ 3-lobed or partite. *Petals* 0. *Disk* 0. *Stamens* 2-4; filaments short, free or nearly so; anther-cells distinct, contiguous, parallel. *Ovary* 3-celled; ovule 1 in each cell; styles free or connate at base,

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## FLORA OF MADRAS.

[*Sebastiania*.

entire, revolute or spreading. *Fruit* a capsule of 3 cocci separating from a columella. *Seeds* oblong or subglobose, carunculate; testa smooth, albumen fleshy; cotyledons flat.

SEBASTIANIA CHAMAELEA, Muell. Arg.; F. B. I. v. 475.

All plains Districts, a weed of cultivated land, and forest undergrowth.

A glabrous annual herb with linear leaves up to 3 in. long and a capsule with two rows of spines on the cocci.

## 56. Excoecaria, Linn.

Glabrous trees or shrubs with acrid milky juice. *Leaves* alternate or opposite, entire or subserrate. *Flowers* monoecious or dioecious, very small, in bracteate spikes or racemes, the ♂ 1-3 to each bract, 2-bracteolate, the ♀ at the base or in separate inflorescences; rhachis with large glands beneath or at the sides of the bracts. *Calyx* in ♂ of 3 small subequal lobes, in ♀ 3-fid or -partite. *Petals* 0. *Disk* 0. *Stamens* 3, filaments free, anthers didymous, the cells parallel. *Ovary* 3-celled; ovule 1 in each cell; styles 3, stout, spreading or recurved. *Fruit* a capsule of 3 cocci separating from a columella, the valves crustaceous, twisting elastically. *Seeds* subglobose, not carunculate; testa crustaceous; albumen fleshy; cotyledons flat.

Leaves alternate, ovate-elliptic or orbicular, shortly acuminate, entire or sinuate-crenate, glabrous, up to 3 in. long, 2 in. broad; ♂ spikes very catkin-like, slender, up to 5 in. long, filaments long; capsule deeply lobed, 3 in. in diam., smooth ..... 1. *Agallocha*.

Leaves opposite, serrate or crenulate; filaments short:—

Leaves chartaceous, lanceolate or oblanceolate, acuminate at both ends, up to 6 in. long, 1.5 in. broad, main nerves regular, 10-16 pairs; ♂ spikes slender, about 2 in. long, the bracteoles subulate; capsule deeply lobed, 5 in. in diam. .... 2. *crenulata*.

Leaves coriaceous, linear-oblong to oblong-lanceolate or oblanceolate, abruptly acuminate, up to 10 in. long, 3 in. broad, main nerves regular, 15-20 pairs; ♂ spikes stout, 2-6 in. long, the bracteoles broadly ovate; capsules shallowly lobed, up to 1 in. in diam. .... 3. *robusta*.

1. EXCOECARIA AGALLOCHA, Linn.; F. B. I. v. 472; Wt. Ic. t. 1865 B.

Tidal forests and swamps on both coasts.

An evergreen tree with a poisonous milky juice. Bark grey, smooth, shining, with prominent lenticels; wood white, very soft, but apparently little used. Vern. *Hind.* Gangwa; *Tel.* Thilla; *Tam.* Tilai; *Mal.* Komatti.

2. *EXCOECARIA CRENULATA*, Wt. Ic. t. 1865; F. B. I. v. 473.

W. Ghâts; Nilgiris, Anamalais and hills of Travancore and Tinnevely, in Shola forests above 5,000 ft.

A small evergreen tree or shrub.

3. *EXCOECARIA ROBUSTA*, Hook. f.; F. B. I. v. 474.

W. Ghâts, Coorg, Nilgiris, Anamalais and hills of Travancore and Tinnevely; Kollimalai Hills of Trichinopoly; in evergreen forests at 2,000–5,000 ft.

A shrub with stout branches.

*E. bicolor*, Hassk., is a pretty shrub, common in gardens, having the under-surface of the leaves red.

57. *Sapium*, P. Br.

Trees or shrubs with milky juice. Leaves alternate, entire or toothed, penninerved; petiole often 2-glandular at top. Flowers monoecious, in terminal, simple or paniced, spikes or racemes; ♂ several to each bract, ♀ solitary, lower down or separate. Petals 0. Disk 0. Stamens 2–3; filaments free; anther-cells distinct, parallel. Ovary 2–3-celled; ovule 1 in each cell; styles free or connate at the base, spreading or recurved. Fruit a crustaceous fleshy or pulpy rarely woody capsule, at length loculicidally 3-valved. Seeds globose, not carunculate, usually long-persistent on the columella; testa crustaceous; albumen fleshy; cotyledons flat.

Evergreen; ♂ and ♀ flowers on the same spike, the ♀ lowest, the styles long and slender; leaves lanceolate, acuminate, crenate-serrate, 3–5 in. long, 1–1.5 in. broad, main nerves very many and parallel; capsule large, depressed globose, 1–1.25 in. in diam., shining, very hard and woody.....1. *indicum*.

Deciduous; ♂ and ♀ flowers on separate spikes the styles very short; leaves crowded at the ends of the branchlets, elliptic-ovate or obovate, acute, attenuate at base, crenate-serrate, 6–9 in. long, 3 in. broad, main nerves 12–20 pairs; capsule fleshy, 3 in. in diam., ovoid

2. *insigne*.

1. *SAPIUM INDICUM*, Willd.; F. B. I. v. 471; Wt. Ic. t. 1950.

West Coast, along backwaters in Malabar and Travancore.

A small tree with acrid milky juice. Bark smooth, grey; wood white with small brown heartwood.

2. *SAPIUM INSIGNE*, Benth.; F. B. I. v. 471. *Falconeria malabarica*, Wt. Ic. t. 1866.

Deccan, hills of Kurnool, Cuddapah and Nellore, Kambakam Hill in Chingleput, W. Gháts and W. Coast, usually in rocky places, up to 6,000 ft.

A deciduous tree, usually small, but sometimes of a fair size, the branchlets thick and fleshy, the juice acrid and poisonous. Bark grey, smooth, shining; wood white or grey, soft and spongy. Vern. *Hind*. Lendwa.

*S. sebiferum*, Roxb., is the Chinese Tallow tree, occasionally found in cultivation. It is the white wax round the seeds that can be used for candles.

*Pedilanthus tithymaloides*, Poit, is a fleshy American shrub with red or orange flowers, often found in gardens or planted as a hedge plant. *Cicca disticha*, Linn., is the Star Gooseberry, a small tree allied to *Emblica*, whose fruits are cooked and eaten or made into preserves. The chief tree grown in plantations to produce india-rubber is *Hevea brasiliensis*, the Pará rubber tree of Brazil, while the less cultivated Ceará rubber is given by *Manihot Glaziovii*, Muell. Arg.

*Manihot utilissima*, Pohl, is the Cassava plant, occasionally cultivated for its tubers, which are edible, and from which also the starch known as Tapioca is prepared.

The common garden shrubs with curiously shaped and variegated leaves known as "Crotons" are species of the genus *Codiaeum*, especially *C. variegatum*, Linn., from the islands of the Pacific.