

# FLORA

OF THE

## PRESIDENCY OF MADRAS

BY

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LATE OF THE INDIAN FOREST DEPARTMENT

PART V

*EBENACEAE TO SCROPHULARIACEAE*

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## INTRODUCTION TO PART V.

THIS Part has to end in the middle of the Family *Scrophulariaceæ*; the rest will come at the beginning of Part VI.

The Supplementary Note dealing with some points in Part IV which have seemed to require explanation appeared as No. IV in the 'Kew Bulletin' for 1921, p. 312.

J. S. GAMBLE.

Liss: January, 1923.

Seeds with ruminant albumen :—

Calyx-lobes of ♀ flowers 4–5, cordate, the margins wavy, forming in fruit a very shallow cup; leaves alternate or subopposite; ♂ flowers in short cymes densely tawny-tomentose, ♀ solitary; fruit globose :—

Leaves elliptic, narrowed at both ends, nerves and reticulations raised above, up to 6 in. long, 2·5 in. broad, but irregular, those of coppice shoots up to 15 in. by 6 in.; fruit pubescent when young, afterwards glabrous, with crustaceous pericarp; seeds oblong, compressed, ·6–·7 in. long ..... 1. *Melanoxylon*.

Leaves broadly ovate, rounded at base, obtuse or slightly acute at apex, nerves and reticulations of mature ones prominently impressed above, up to 8 in. long, 3–4 in. broad; fruit glabrous, the pericarp leathery; seeds shortly oblong, slightly compressed, ·5 in. long

2. *tomentosa*.

Calyx-lobes of ♀ flowers 4, having the tube enlarged in fruit in a large woody cup, the lobes reflexed, wavy; ♂ flowers in clusters, ♀ 1–3 together; fruit ovoid-globose, 1·5 in. in diam.; leaves large, coriaceous, oblong-lanceolate, acuminate, up to 12 in. long, 3–6 in. wide, the transverse nervules prominent and subparallel

3. *insignis*.

Calyx-lobes of ♀ flowers 4, rounded, reflexed and accrescent in fruit, not wavy; of ♂ very small; ♂ flowers in cymes about ·5 in. long, ♀ solitary (sometimes apparently racemose, by the absence of leaves); fruit globose, ·5 in. in diam.; seeds boat-shaped; leaves elliptic, black when dry, shining, acute or acuminate, up to 7 in. long, 3·5 in. broad ..... 4. *sylvatica*.

Calyx-lobes of ♀ flowers 5, ovate, the margins strongly reflexed, accrescent in fruit, not wavy, of ♂ small, acute :—

♂ flowers as well as ♀ in close axillary fascicles, densely tawny-tomentose; fruit ovoid, pointed, ·75 in. long, seeds oblong, shining, wrinkled, ·5 in. long; leaves elliptic oblong, shortly and obtusely acuminate, coriaceous, the nerves inconspicuous, 3–8 in. long, 1·5–3 in. broad ..... 5. *Candolleana*.

♂ flowers in few-flowered pedunculate cymes, ♀ solitary, pedunculate, both nearly glabrous; fruit globose, 1 in. in diam.; seeds ovoid, shining, transversely striate; leaves narrowly elliptic-oblong, obtusely acute at apex, narrowed at base, coriaceous, shining, up to 3·5 in. long, 1·5 in. broad ..... 6. *affinis*.

Seeds with the albumen not ruminant :—

Calyx only shortly lobed, often truncate in fruit :—

Calyx-lobes of ♂ and ♀ similar, short, obtuse and ciliate :—

Calyx-lobes of ♀ not enlarged in fruit, but still lobed; branchlets

pubescent; leaves elliptic or lanceolate, obtusely acuminate, membranous, rounded at base, up to 4 in. long, 1.5 in. broad, nerves not prominent, 6-8 pairs, petiole .1-2 in. long; fruit globose or ovoid .....7. *humilis*.

Calyx-lobes of ♀ enlarged in a truncate cup; branchlets glabrous; leaves ovate, obtusely acuminate, chartaceous, the base narrowed or broadly obtuse or subcordate, up to 5 in. long, 3 in. broad, nerves about 6-8 pairs spreading, petiole .3-5 in. long; fruit oblong-ellipsoid .....8. *ocarpa*.

Calyx-lobes of ♂ very short, of ♀ much enlarged in fruit, coriaceous and folded; branchlets appressed pubescent; leaves lanceolate, the apex abruptly but obtusely produced, the base acute, coriaceous, minutely reticulate, up to 3 in. long, 1 in. broad, petiole .2-3 in. long; fruit globose, pubescent

9. *Barberi*.

Calyx deeply lobed:—

Fruit ovoid-conical, fulvous hirsute; calyx-lobes nearly free, ♂ and ♀ similar, recurved in fruit; branchlets fulvous-hirsute; leaves elliptic or elliptic-oblong, acute, membranous, rounded or cordate at base, fulvous-hirsute beneath, up to 5 in. long, 2 in. broad, petiole .15 in. long .....10. *pruriens*.

Fruit globose or ovoid:—

Flowers peduncled, ♂ in cymes, ♀ solitary; calyx-lobes accrescent, large and foliaceous in fruit, ovate-cordate:—

Cymes of ♂ flowers lax with slender peduncles and pedicels, flowers 4-merous; anthers 12-16, elongate apiculate, in pairs on a disk surrounding the rudimentary ovary; leaves narrowly lanceolate, obtusely acuminate, minutely reticulate, coriaceous, up to 4 in. long, 1 in. broad .....11. *foliolosa*.

Cymes of ♂ flowers stout curved, prominently bracteate; flowers 5-merous; anthers 20, linear, acute, in pairs on the corolla; leaves oblong or oblong-lanceolate, obtusely acuminate, subcoriaceous, minutely reticulate, up to 9 in. long, 3 in. broad .....12. *paniculata*.

Flowers short-peduncled, in close cymes or fascicles:—

Corolla tubular, often salver-shaped:—

Stamens glabrous, anthers many, usually in groups of 3 or more; fruiting calyx-tube forming a woody cup with the lobes beneath recurved:—

Calyx glabrous except for marginal ciliae in ♂; leaves elliptic, obtuse at apex or sometimes emarginate, obtusely attenuate at base, coriaceous, shining, up to 4 in. long,

- 2 in. broad, reticulation minute and prominent; anther-connective crested or apiculate .....13. *Ebenum*.
- Calyx pubescent and ciliate; leaves elliptic-oblong, acuminate, somewhat rounded at base, membranous to chartaceous, up to 6 in. long, 2·25 in. broad, not minutely reticulate, lowest pair of main nerves usually opposite and from the base; anthers with the connective not produced .....14. *assimilis*.
- Stamens with the filaments villous, anthers 16, in pairs; leaves lanceolate or oblong-lanceolate, acuminate, attenuate at base, the margins reflexed, coriaceous, up to 6 in. long, 1-2 in. broad, nerves obscure; calyx-lobes with recurved margins .....15. *nilagirica*.
- Corolla campanulate or urceolate; stamens 16, in two rows the inner smaller :—
- Fruiting calyx large, flattened, coriaceous, foliaceous :—
- Leaves ovate or elliptic, 2-6 in. long, 1-3 in. broad, obtuse or subacute at apex, obtuse or sometimes nearly cordate at base, at first pubescent then glabrous; anthers awned; staminodes in ♀ 4; fruit globose, 1-1·5 in. in diam., reddish-brown .....16. *montana*.
- Leaves oblong-lanceolate, 1·5-3 in. long, ·5-·75 in. broad, obtuse at apex, rounded or cordate at base, softly pubescent on both sides; anthers not awned; staminodes in ♀ 12; fruit globose, ·5-1 in. in diam., yellow...17. *cordifolia*.
- Fruiting calyx small, little enlarged, submembranous :—
- Leaves elliptic or obovate, thinly coriaceous, obtuse or subacute at both ends, 1-2·5 in. long, ·5-1 in. broad, slightly pubescent above, fulvous hairy beneath; anthers acute; staminodes in ♀ 8; fruit globose, ·3 in. in diam.
18. *Chloroxylon*.
- Leaves elliptic-ovate, acute at both ends, ·75-2 in. long, ·5-1 in. broad, glabrous above, pubescent beneath; anthers ovate, at first dehiscent at the apex, later further down; staminodes in ♀ 0; fruit oblong, ·3-·7 in. long
19. *microphylla*.
- Fruiting calyx slightly enlarged, thickened and reflexed in fruit; both ♂ and ♀ flowers clustered on the branchlets, tubular-campanulate, short; leaves elliptic, obtuse, coriaceous, up to 5 in. long, 2·5 in. broad, nerves prominent, irregular; fruit globose, ·7 in. in diam., the reflexed calyx fulvous tomentose .....20. *ovalifolia*.

Corolla ovoid-urceolate ; stamens very many, usually about 40, anthers linear, the connective villous also the short filaments ; fruiting calyx much enlarged, spreading or reflexed ; leaves oblong, very coriaceous, glabrous, the main nerves oblique, reticulation prominent, up to 12 in. long, 3 in. broad ; fruit globose, often 3 in. in diam., reddish-velvety . . . . 21. *peregrina*. Flowers sessile, 5-merous, both ♂ and ♀ in close clusters in the axils of the leaves or of the scars of fallen leaves, surrounded by many bracts, all fulvous-tomentose ; stamens 10-12, the anthers lanceolate acuminate ; staminodes in ♀ 5 ; leaves oblong or lanceolate, acuminate, rounded and then decurrent at base, coriaceous, up to 8 in. long, 3.5 broad, the nerves obscure

22. *sulcata*.

Flowers 5-merous, ♂ in short axillary cymes, ♀ in short thick-peduncled and -pedicelled cymose often very dense clusters on old wood ; stamens 12-18 ; staminodes in ♀ 10 ; leaves oblong-lanceolate, long acuminate, cuneate at base, glabrous, coriaceous, up to 6 in. long, 2 in. broad, main nerves 6-8 pairs, transverse nervules subparallel ; fruit globose, very large, 3 in. in diam.

23. *Bourdillonii*.

Calyx spathaceous, irregularly lobed ; leaves ovate- or lanceolate-oblong, up to 11 in. long, 4 in. broad, coriaceous, shining, minutely and conspicuously reticulate . . . . . 24. *Toposia*.

1. *DIOSPYROS MELANOXYLON*, Roxb. Cor. Pl. t. 46 ; F. B. I. iii. 564. *D. dubia*, Wall. ; Wt. Ic. t. 1223. *D. exsculpta*, Bedd. Fl. t. 66 (except calyx of ♀). *D. Wightiana*, Wall. ; Bedd. Fl. t. 67. *D. Tupru*, Buch.-Ham. ; F. B. I. iii. 563.

N. Circars, scarce ; Deccan and Carnatic, common, in all deciduous forests, on dry rocky hills and on waste lands, in the hills up to 3,000 ft.

A moderate-sized deciduous tree, the young leaves and branchlets and the ♂ inflorescence tawny-tomentose. Bark greyish-black, cleft in rectangular plates showing the black inner bark in the clefts ; wood hard reddish-brown with an irregular black heartwood. This ebony is however not much used, as pieces of it are not obtainable of any large size. The fruit is edible. Vern. *Tel.* Tumi, tumki ; *Mar.* Tendu.

2. *DIOSPYROS TOMENTOSA*, Roxb. ; F. B. I. iii. 564 ; Wt. Ic. tt. 182, 183.

N. Circars down to the Godavari, in deciduous forests.

A large tree in good forests, a small one in scrub jungle, reproducing itself on cultivated lands from root-suckers, the leaves large and thick. Bark greyish-black, cleft in regular scales, the inner bark quite black; wood very hard, dark reddish-brown with an irregular black heartwood, occasionally streaked with purple or brown. The ebony is, however, not much utilised though large trees give good pieces. It is chiefly used for small articles of ornament. The fruit is edible. Vern. *Hind.* Tendu; *Ur.* Kendhu.

3. *DIOSPYROS INSIGNIS*, Thw.; F. B. I. iii. 565; Bedd. Ic. t. 130. W. Gháts, Anamalais and hills of Travancore at low elevations in the evergreen forests.

A lofty tree with yellowish-white flowers and large fruit in a curious woody cup.

4. *DIOSPYROS SYLVATICA*, Roxb. Cor. Pl. t. 47; F. B. I. iii. 559; Bedd. Ic. t. 121.

N. Circars, in forests, down to the Godavari; W. Gháts, in evergreen forests in all Districts on the W. side, up to 5,000 ft.

A moderate-sized tree with small ♂ flowers having a short urceolate corolla-tube, prominent ♀ calyx-lobes and a small fruit. Bark thin, blackish-grey; wood grey with black streaks and irregular black patches. Vern.—*Ur.* Kanchia, Kaluchia; *Tel.* Tella gada; *Kan.* Kaka suroli.

5. *DIOSPYROS CANDOLLEANA*, Wt. Ic. tt. 1221, 1222; F. B. I. iii. 566. *D. canarica*, Bedd. Ic. t. 134.

N. Circars, Mahendragiri Hill in Ganjam, at 4,500 ft.; W. Gháts, in evergreen forests from S. Canara to Travancore, up to 1,500 ft.

A moderate-sized tree with pale yellow flowers, the ♂ corollas elongate, the fruit green. Bark smooth, greenish-black; wood light pink with grey streaks, no ebony. Vern. *Mal.* Kari; *Mar.* Karamara.

6. *DIOSPYROS AFFINIS*, Thw.; F. B. I. iii. 566; Bedd. Ic. t. 127. W. Gháts, hills of Tinnevely (Beddome).

A moderate-sized tree with yellowish-white flowers. Bark black, peeling off in irregular patches; wood with small black heartwood streaked with brown.

7. *DIOSPYROS HUMILIS*, Bourd. in Journ. Bomb. Nat. Hist.

Soc. xii. 352, t. 4. *D. orixensis*, Wt.; F. B. I. iii. 571, *not of* Willd.

W. Gháts, evergreen forests of Travancore and Tinnevely, about 2,000 ft.

A small tree reaching 30 ft. in height with white flowers and green fruit 5–75 in. in diam. The anthers are small and rounded. Bark black, mottled green and dark grey; wood hard, dull greyish-brown streaked with black, and with black patches. Vern. *Tam.* Vellei thuvarei; *Mal.* Meruvalan.

8. *DIOSPYROS OOCARPA*, Thw.; F. B. I. iii. 560.

Bababudan Hills of Mysore (Law); W. Gháts, Anamalais and hills of Travancore up to 2,000 ft., in evergreen forests. A small or moderate-sized tree with shining leaves, black when dry, very small flowers, and an ellipsoid oblong fruit, about 1 in. long, cylindric when young. Bark yellowish; wood greyish-brown with an irregular purplish-black streaked heartwood. Vern. *Mal.* Vellei karunkali.

9. *DIOSPYROS BARBERI*, Ramas. in Journ. As. Soc. Beng. x. 2 (1914), 47, tt. 3, 4.

Hills of Tinnevely and Travancore, in evergreen forests, at 2,000–4,000 ft.

A small tree with ♂ flowers in short cymes, ♀ solitary with large leathery folded foliaceous calyx-lobes.

10. *DIOSPYROS PRURIENS*, Dalz.; F. B. I. iii. 553; Bedd. Ic. t. 129.

W. Gháts, evergreen forests of S. Canara, Wynaad, Anamalais and hills of Tinnevely, up to about 3,000 ft.

A small tree with softly hirsute branchlets, leaves and calyx, the fruit ovoid conical up to 1 in. long and clothed with fulvous stinging hairs.

11. *DIOSPYROS FOLIOLOSA*, Wall.; F. B. I. iii. 556. *D. calycina*, Bedd. Fl. t. 68, Ic. t. 123.

W. Gháts, forests of Tinnevely and S. Travancore, up to 3,000 ft.

A moderate-sized tree, conspicuous in fruit from the large foliaceous calyx-lobes, flowers bright yellow. Fruit yellow when dry, about 1 in. in diam., the seeds almost ruminant. Bark dark brown, smooth; wood yellowish-white, clouded with grey and black, hard. Vern. *Tam.* Vellei thuvarei.

12. *DIOSPYROS PANICULATA*, Dalz.; F. B. I. iii. 570; Bedd. Ic. t. 125.

W. Ghâts, evergreen forests of Malabar and Travancore, up to 3,000 ft.

A handsome tree of moderate size with greenish white ♂ flowers in pedunculate prominently bracteate cymes, the ♀ solitary recurved, the corolla tawny-villous; the fruit ovoid, green, 1 in. long. Bark black, rough; wood soft, white and grey in irregular patches with narrow stripes of black. Vern. *Tam.* Karun thuvarei; *Mal.* Kari, Kari-vella, Illakatta.

13. *DIOSPYROS EBENUM*, Koenig; F. B. I. iii. 558; Wt. Ic. t. 188; Bedd. Fl. t. 65.

Deccan and Carnatic, in dry evergreen forests, extending W. to N. Coimbatore and S. to Tinnevely. Ebony.

A large or moderate-sized tree with greenish-yellow flowers and subglobose fruit 75 in. in diam. seated on a woody cup. Bark dark grey, finely cracked longitudinally; wood very hard, sapwood grey, heartwood jet black, the ebony wood of India but very little utilised except for small articles and inlaying. A "Royal timber" in Travancore. Vern. *Tel.* Nalluti; *Tam.* Acha, Tumbi, Karun kali; *Kan.* Karemara.

14. *DIOSPYROS ASSIMILIS*, Bedd. in Madras For. Rep. 1866-7, p. 20, t. 1; F. B. I. iii. 558. *D. nigricans*, Dalz.; Bedd. Ic. t. 124.

N. Circars, Palkonda Hills of Vizagapatam (Gamble); W. Ghâts, S. Canara to Travancore, at 1,000-3,000 ft., in evergreen forests.

A large evergreen tree with pale yellow flowers and globose fruit. Bark black, thin, much cracked; wood hard, sapwood greyish-white, heartwood jet black streaked with grey and brown, much valued in Travancore and considered a "Royal timber" like that of *D. Ebenum* (Bourdillon). Vern. *Tam.* Karunthali; *Mal.* Karu, Mushtimbi.

15. *DIOSPYROS NILAGIRICA*, Bedd. Ic. t. 136; F. B. I. iii. 566.

W. Ghâts. W. slopes of Nilgiris, 3,000-4,500 ft. (Beddome), Anamalais and to the hills of Travancore, 3,000-5,000 ft., common about Peermerd.

A moderate-sized evergreen tree with yellowish-white 4-



merous flowers and smooth globose green fruit, 1 in. in diam. Bark black; wood brownish-yellow, moderately hard. Vern. *Tam.* Karu.

16. *DIOSPYROS MONTANA*, Roxb. Cor. Pl. t. 48; F. B. I. iii. 555; Wt. Ic. t. 1225.

N. Circars, Deccan and Carnatic in deciduous forest, westwards to the E. slopes of the Gháts, at low levels. Common, but nowhere very abundant.

A small or moderate-sized, sometimes thorny, deciduous tree with greenish flowers and reddish-brown fruit. Bark thin, grey or greyish-black; wood grey tinged with yellow or brown, with darker patches, moderately hard, very little used. Vern. *Hind.* Tendu; *Ur.* Kosse kuli; *Tel.* Yerragoda.

17. *DIOSPYROS CORDIFOLIA*, Rox. Cor. Pl. t. 50; Wt. Ill. t. 148, *D. montana*, var. *cordifolia*, C. B. Clarke; F. B. I. iii, 555.

N. Circars, Deccan and Carnatic, westwards to the dry slopes of the Gháts, and up to 2,000 ft., in dry deciduous or evergreen forests.

A small, thorny, branching deciduous tree with small white flowers and yellow fruit. Bark light greyish-brown; wood reddish or yellowish-white, moderately hard. Vern. *Tel.* Vackana.

18. *DIOSPYROS CHLOROXYLON*, Roxb. Cor. Pl. t. 49; F. B. I. iii. 560. *D. capitulata*, Wt. Ic. tt. 1224, 1588 bis.

N. Circars, Deccan and Carnatic, in dry evergreen forests, especially on laterite, common.

A large much-branched shrub, often thorny, in dry localities with small leaves, in better soils a small tree with larger leaves. Flowers, especially ♂, very small; fruit globose, 2-3 in. in diam., edible. Bark dark brown, peeling off in small scales; wood yellowish-grey, moderately hard, a good fuel. Vern. *Ur.* Kosai; *Tel.* Illinda, Nella ulimira.

19. *DIOSPYROS MICROPHYLLA*, Bedd. Ic. t. 133; F. B. I. iii. 559. W. Gháts, evergreen forests of S. Canara, Malabar and Travancore, also of the Anamalais, up to 3,000 ft.

A large tree with black cylindric stem flecked with white, the young branches with long yellow hairs, the leaves small, the flowers minute, white, 4-5-merous. Wood

reddish-grey, hard and close-grained, apparently not used.  
Vern. *Tam.* Chinna thuvarei; *Mal.* Thovara kari.

20. *DIOSPYROS OVALIFOLIA*, Wt. Ic. t. 1227; F. B. I. iii. 557.

Deccan and Carnatic in most hilly regions in Nellore, Cuddapah, Kurnool, Trichinopoly, westwards to the drier slopes of the Gháts and to S. Travancore, in dry forests at low levels.

A small evergreen tree with whitish flowers on the branchlets said to have a heartwood streaked with black. Vern. *Tam.* Vedukka nari.

21. *DIOSPYROS PEREGRINA*, Gürke in Engl. und Prantl. Naturl. Pflzm. iv. i. 164. *D. Embryopteris*, Pers.; F. B. I. iii. 556; Bedd. Fl. t. 69. *Embryopteris glutenifera*, Roxb. Cor. Pl. t. 70; Wt. Ic. tt. 843, 844.

N. Circars, in hill forests, chiefly along streams; W. Coast, on river banks and backwaters, extending into the valleys of the Gháts; often cultivated.

A branching evergreen tree with large coriaceous leaves which are bright red when young, yellowish flowers and a large red velvety fruit with a viscid pulp used for paying the seams of boats. Bark dark grey, smooth; wood grey with darker streaks. Vern. *Hind.* Gáb; *Ur.* Gusva kendhu; *Tel.* Tumika; *Tam.* Tumbika; *Mal.* Paniccha.

Var. *atrata*, Thw. Buds and flowers covered with close black hairs. Leaves smaller. Evergreen forests of Travancore at about 4,000 ft. (Bourdillon).

22. *DIOSPYROS SULCATA*, Bourd. For. Trees Trav. 255.

W. Gháts, evergreen forests of Travancore at low elevations (Bourdillon).

A small tree with large leaves and flowers in sessile clusters with many bracts; fruit truncate-conical, 1 in. broad, .25 in. long, at first rusty-tomentose, deeply grooved with 8-10 grooves. Bark blackish-grey, smooth; wood brownish pink with occasional lines of black. Vern. *Mal.* Kari.

23. *DIOSPYROS BOURDILLONI*, Brandis Ind. Trees, 435, 713.

W. Gháts, Anamalais and hills of Tinnevely and Travancore, in evergreen forests up to 2,500 ft.

A large tree with a black rough fluted stem and thick drooping foliage; flowers white; fruiting calyx cup-like, with short pointed lobes. Bark black; wood yellowish-

grey with irregular rings of black and brown. Vern. *Tam.* Karun chatthi; *Mal.* Kari, Kodal, Therikka.

24. *DIOSPYROS TOPOSIA*, Buch.-Ham.; F. B. I. iii. 556; Bedd. Ic. t. 122 (poor!).

Evergreen forests of Tinnevely and Travancore, up to 3,000 ft.

A large tree with large closely reticulate leaves, pale yellow 4-merous flowers and a large ovoid green pubescent fruit. Said, in Ceylon, to have a small black heartwood.

*Diospyros philippensis*, Gürke, *D. discolor*, Willd., is a tree with large oblong coriaceous leaves and large globose brown-hairy-edible fruit, which is frequently met with in gardens. It is a native of the Philippine Islands.

### Family XCVI. SYMPLOCACEAE.

Trees or shrubs. *Leaves* alternate, simple, sessile or shortly petioled; stipules 0. *Flowers* hermaphrodite, regular, axillary or terminal, solitary or in simple or compound spikes or racemes; bracts usually solitary at the base of each pedicel, bracteoles 1-3, both usually early caducous. *Calyx*-tube adnate to the ovary, lobes 5, imbricate. *Petals* 5 in 1 series or more in 2 series, usually free or shortly connate at the base, sometimes connate in a tube, imbricate. *Stamens* usually numerous, many-seriate, adnate to the corolla-tube or the petals, most usually in groups; filaments filiform or flattened; anthers short, dehiscing longitudinally. *Ovary* inferior, usually 3-, rarely 2- or 4-, celled; ovules 2-4 in each cell, pendulous from the inner angle; style filiform; stigma capitate or slightly lobed. *Fruit* a cylindric or subglobose drupe, crowned by the calyx-lobes; stone usually woody, 1-3-seeded. *Seeds* oblong, testa thin, albumen fleshy; embryo straight or curved, the cotyledons very short.

*Symplocos*, Linn.

### CHARACTERS OF THE FAMILY.

Filaments more or less pentadelphous; corolla-tube divided nearly to the base:—

Stamens few, about 12, in pairs or 3-4 together or solitary, as long as the corolla; flowers in very short 3-6-flowered pubescent racemes; leaves elliptic, shortly acute at apex, cuneate at base, subcoriaceous,

entire or crenate-serrate, up to about 4 in. long, 1.25 in. broad, shortly-petioled .....1. *oligandra*.  
Stamens many, usually about 40, in several rows in a ring or in bundles at the base of the corolla :—

Drupe ampulliform, globose, ribbed, .25 in. in diam., embryo curved ; flowers in axillary usually 3-branched spikes up to about 3 in. long ; leaves variable, coriaceous or chartaceous, elliptic or lanceolate, acute or acuminate, crenate or serrate, usually yellow when dry, the midrib impressed, up to 7 in. long, 2.5 broad

2. *spicata*.

Drupe ovoid-oblong, not ampulliform ; embryo straight :—

Midrib of leaf impressed on the upper surface :—

Inflorescence paniculate, the branches racemose ; leaves elliptic, caudate-acuminate, rounded at base, minutely serrulate, glabrous, about 5-nerved, up to 3.5 in. long, 1.5 in. broad.

3. *Candolleana*.

Inflorescence simple :—

Inflorescence 4—many-flowered :—

Drupe large, about 1 in. long or longer, smooth :—

Endocarp of drupe thick, crustaceous, stone with many shallow furrows ; leaves lanceolate or oblanceolate, long acuminate, closely serrate, yellowish when dry, up to 8 in. long, 2.5 in. broad, the main nerves regular, about 10 pairs ; branchlets and racemes rusty-pubescent .....4. *macrocarpa*.

Endocarp of drupe leathery, stone deeply 5–6 furrowed ; leaves elliptic-ovate, or -obovate, long acuminate, crenate-serrate, up to 5 in. long, 2 in. broad, green when dry, the main nerves 5–8 pairs ; branchlets glabrous

5. *kanarana*.

Drupe small, under 1 in. long, cylindric ovoid or oblong :—

Drupe villous, .5 in. long ; branchlets, leaves beneath and inflorescence densely rusty-villous ; leaves coriaceous, elliptic, acuminate, crenulate, the margins recurved when old, up to 6 in. long, 3 in. broad, yellow when dry, the main nerves prominent, about 10–12 pairs .....6. *Gardneriana*.

Drupe glabrous :—

Leaves submembranous, bright green :—

Leaves cuneate at base :—

Racemes up to 2 in. long with very slender hispid rhachis and pedicels ; flowers large, calyx-lobes

rounded ; leaves lanceolate, long-acuminate, up to 4 in. long, 1.5 in. broad, shortly and distantly serrate .....7. *acuminata*.

Racemes scarcely over 1 in. long with rather stout villous rhachis and short pedicels ; flowers small, calyx-lobes acute ; leaves lanceolate or oblanceolate, long- and sometimes abruptly-acuminate, up to 8 in. long, 2 in. broad, shortly but sharply serrate but sometimes nearly entire ; drupe ovoid-oblong, .5 in. long .....8. *rosea*.

Leaves rounded or cordate at base, oblong-oblanceolate, acute or acuminate at apex, up to 5 in. long, 1.5 in. broad, nearly quite entire ; racemes very short and dense, prominently bracteate ; calyx-lobes ovate, tawny villous ; drupe oblong, .6 in. long, contracted near the tip, the fruiting calyx lobes prominent

9. *Barberi*.

Leaves coriaceous :—

All parts quite glabrous ; leaves obovate, obtuse, somewhat decurrent at base, entire or serrate when young, up to 3 in. long, 1.75 in. broad, main nerves about 6 pairs ; spikes about 1.5 in. long with large flowers, the bracts ovate, caducous ; drupe oblong, .5 in. long .....10. *obtusata*.

Inflorescence fulvous-villous :—

Branchlets when young and leaf-midribs beneath hispid ; leaves elliptic or oblong, acuminate, prominently serrate, up to 5 in. long, 1.5 in. broad but longer and broader when young ; main nerves 8–12 pairs, reticulation conspicuous ; spikes 1–1.5 in. long with large flowers, the bracts caducous ; drupe cylindric, .5 in. long ....11. *foliosa*. Branchlets and leaves glabrous ; leaves elliptic, acute or acuminate, crenate-serrate, shining above, the margin often recurved, up to 6 in. long, 2.5 in. broad, main nerves 6–10 pairs ; spikes 2–5 in. long, the bracts ovate, caducous ; drupe ovoid, .4–.5 in. long .....12. *Beddomei*.

Inflorescence few- under 4-flowered :—

Leaves coriaceous, small :—

Flowers 1–4 in close pubescent spikes about .5 in. long ; leaves elliptic, ovate or obovate, obtuse or slightly

acute, minutely serrulate, the margin recurved, yellow when dry, up to 2·5 in. long, 1 in. broad, main nerves 5–6 pairs, prominent; drupe ovoid-oblong, ·5 in. long, the calyx teeth prominent .....13. *microphylla*.

Flowers solitary :—

Flower on a slender recurved peduncle up to ·5 in. long; leaves elliptic, obtuse or acute, serrulate, glabrous, up to 1·75 in. long, 1 in. broad, the main nerves 4–6 pairs, not prominent; drupe narrow, oblong, ·5–·75 in. long .....14. *anamallayana*.

Flower sessile or very shortly peduncled; leaves elliptic or lanceolate, acute or acuminate, entire or minutely toothed, up to 1·75 in. long, ·75 in. broad, main nerves not prominent .....15. *monantha*.

Leaves membranous, fairly large :—

Leaves oblong-lanceolate, long-acuminate, rounded or subcordate at base, brown hirsute on both surfaces and on the branchlets, sharply serrate, up to 6 in. long, 2 in. broad, main nerves oblique, 7–8 pairs; flowers large, about 3–4 in slender racemes .....16. *pulchra*.

Leaves lanceolate, long-acuminate, cuneate at base, pale brown-hirsute on the nerves and the branchlets, minutely serrate, up to 5 in. long, 1·5 in. broad, main nerves not oblique, 7–9 pairs; flowers solitary, small, subsessile, many-bracteate; drupe oblong, villous, up to ·5 in. long .....17. *villosa*.

Midrib of leaf raised on the upper surface, leaves elliptic, long-acuminate, cuneate at base, glabrous, shining, coriaceous, up to 5 in. long, 2 in. broad; branchlets angular; racemes ·5 in. long, few-flowered; drupe ovoid, glabrous, ·4 in. long, the calyx-lobes short .....18. *theaeifolia*.

Filaments adnate to the corolla-tube; corolla-tube elongate; flowers solitary :—

Flower peduncled, the peduncles 1–3 together, axillary or lateral, pendulous; calyx-lobes rounded, ciliate; corolla ·5 in. long, lobes spreading in flower; leaves elliptic-obovate, obtuse, coriaceous, glabrous, up to 4 in. long, 2 in. broad; drupe oblong, ·6 in. long, glabrous .....19. *pendula*.

Flower sessile or subsessile, erect, axillary; calyx-lobes very short, rounded, ciliate; corolla ·5 in. long, lobes suberect; leaves obovate, obtuse, coriaceous, glabrous, cuneate at base, up to 2 in. long, ·5–·75 in. broad; drupe oblong-obovoid, ·6 in. long, glabrous .....20. *sessilis*.

1. *SYMPLOCOS OLIGANDRA*, Bedd. Ic. t. 272; F. B. I. iii. 574.  
W. Gháts, hills of Travancore and Tinnevely, at 3,000–5,000 ft. (Beddome).  
A small or medium-sized tree, characterised by the few stamens.
2. *SYMPLOCOS SPICATA*, Roxb.; F. B. I. iii. 573, Var. *laurina*; Wt. III. t. 150.  
E. Gháts, Hills of Vizagapatam, about 4,000 ft. (A. W. Lushington); Carnatic, Shevaroy Hills and Kollimalai Hills of Trichinopoly; W. Gháts in all Districts, in evergreen Shola forests, above 3,000 ft.  
A small tree with white flowers. Bark thin, smooth, light grey; wood white, soft, even-grained, only used for fuel. Vern. *Hind.* Lodh; *Tam.* Kambli vetti; *Badaga* Booth-gani.
3. *SYMPLOCOS CANDOLLEANA*, Brand Monog. 49.  
W. Gháts, Anamalai Hills at 2,500 ft. (Beddome).  
A very large tree (Beddome), but very little known.
4. *SYMPLOCOS MACROCARPA*, Wight; F. B. I. iii. 582.  
W. Gháts, evergreen forests of Travancore and Tinnevely, at 2,000–3,000 ft.  
A much-branched, moderate-sized tree with white flowers and large white drupe. Bark smooth; wood white, soft. Vern. *Tam.* Paralei; *Mal.* Malam parala.
5. *SYMPLOCOS KANARANA*, Talb. in Journ. Bomb. Nat. Hist. Soc. xi. 238, t. 9.  
W. Gháts, Anamalais and hills of Travancore and Tinnevely, in evergreen forests up to 2,000 ft.  
A moderate-sized tree with yellow drupe, the flowers not known.
6. *SYMPLOCOS GARDNERIANA*, Wt. Ic. t. 1231; F. B. I. iii. 582.  
W. Gháts, Bababudan Hills of Mysore, at 6,000 ft. (Talbot), Nilgiris, Anamalais and hills of Tinnevely and Travancore above 3,000 ft. in evergreen Shola forests.  
A tree with white flowers and purple (Bourdillon) fruit.  
Var. *Hohenackeri*, Gamble. *S. Hohenackeri*, C. B. Clarke; F. B. I. iii. 582. *S. Kurgensis*, C. B. Clarke; F. B. I. iii. 576  
Calyx-tube glabrous.  
W. Gháts, Mercara in Coorg (Hohenacker).

7. SYMPLOCOS ACUMINATA, Bedd. Ic. t. 117; F. B. I. iii. 583.  
*S. tenella*, Brand Monog. 54.

W. Gháts, from Wynaad to Travancore and Tinnevely, at about 5,000 ft.

A graceful little tree with white flowers.

8. SYMPLOCOS ROSEA, Bedd.; F. B. I. iii. 583; Bedd. Ic. t. 115.

W. Gháts, Anamalais and hills of Tinnevely, at 2,000–4,000 ft., in evergreen forests.

A small tree or large shrub with tawny-villous branchlets, pink flowers and reddish drupe.

Var. *glabrior*, C. B. Clarke. Leaves rather thicker, more shining, less serrate, abruptly acuminate at apex; calyx-tube glabrous.

W. Gháts, Wynaad and hills of Travancore at 1,000–3,000 ft., a shrub.

9. SYMPLOCOS BARBERI, Gamble in Kew Bull. 1921, 219.

W. Gháts, hills of Tinnevely (Beddome, Barber).

A small tree.

10. SYMPLOCOS OBTUSA, Wall.; F. B. I. iii. 583; Wt. Ic. t. 1233, Ill. t. 151 b.

W. Gháts, Sholas of Nilgiris and Pulneys above 6,000 ft., most common at high elevations like Doddabetta.

A glabrous tree with white flowers and shining leaves yellowish when dry.

11. SYMPLOCOS FOLIOSA, Wt. Ic. t. 1234; F. B. I. iii. 582.  
*S. nervosa*, Wt. Ic. t. 1235 not of A. DC.

W. Gháts, Sholas of Nilgiris and Pulneys above 5,000 ft., common; hills of Travancore (Bourdillon).

A moderate-sized or large tree with characteristic reticulate serrate leaves and white flowers. Wood white, soft and even grained, only used for fuel. Pulney specimens have longer and more acuminate leaves but do not differ otherwise. Young plants and shoots have the branchlets and leaves strigosely hairy and the serratures more marked. Vern. *Tam.* Pal velloday.

12. SYMPLOCOS BEDDOMEI, C. B. Clarke; F. B. I. iii. 582.

W. Gháts, S. Canara, Malabar, Mysore and Coorg, at 2,000–4,000 ft.

A moderate-sized tree with white fragrant flowers and dark blue drupe turning yellow when dry.



13. *SYMPLOCOS MICROPHYLLA*, Wt. Ic. t. 1232; F. B. I. iii. 581.  
W. Gháts, Nilgiris about Avalanché and Sispara above 7,000 ft., in Shola woods.  
A branching glabrous shrub about 6 ft. high.
14. *SYMPLOCOS ANAMALLAYANA*, Bedd. Ic. t. 116; F. B. I. iii. 581.  
W. Gháts, Anamalai Hills above 5,000 ft., in Shola woods (Beddome, Fischer).  
A small tree.
15. *SYMPLOCOS MONANTHA*, Wt. Ic. t. 1236; F. B. I. iii. 581.  
W. Gháts, Sivagiri and other hills of Tinnevely.  
A branching leafy shrub.
16. *SYMPLOCOS PULCHRA*, Wt. Ic. t. 1230, Spic-neilgh. t. 143; F. B. I. iii. 583.  
W. Gháts, Sispara in Nilgiris, at 4,000–5,000 ft., on stream banks.  
A diffuse shrub with large white flowers and long tawny hairs to the leaves and branchlets.
17. *SYMPLOCOS VILLOSA*, Brand Monog. 63.  
W. Gháts, evergreen forests about Peermerd in Travancore at 3,000–4,000 ft.  
A small much-branched tree with small white flowers.
18. *SYMPLOCOS THEAEFOLIA*, D. Don Prodr. Fl. Nep. 145; F. B. I. iii. 575.  
N. Circars, Madgol Hills of Vizagapatam at Rangalu and Gomangi, 3,000–4,000 ft. (A. W. Lushington).  
A small glabrous tree with bright shining leaves and very short inflorescence.
19. *SYMPLOCOS PENDULA*, Wt. Ic. t. 1237; F. B. I. iii. 587.  
W. Gháts, Anamalais, Pulneys and hills of Travancore, at 4,000–7,000 ft., in evergreen forests.  
A small or moderate-sized tree with pink flowers, the drupes black when ripe.
20. *SYMPLOCOS SESSILIS*, C. B. Clarke; F. B. I. iii. 587.  
W. Gháts, hills of Travancore and Tinnevely at 4,000–5,000 ft., in evergreen forests.  
A small or moderate-sized tree with white or pinkish flowers and black drupe.

Family ~~XUSH~~ OLEACEAE

Trees or erect or climbing shrubs, unarmed. *Leaves* opposite, very rarely alternate, simple 3-foliolate or pinnate, entire or toothed; *stipules* 0. *Flowers* hermaphrodite, often dimorphous, sometimes polygamous or dioecious, regular, usually in trichotomous terminal or axillary cymes or panicles, rarely fascicled or racemose. *Calyx* small, free, campanulate, truncate or lobed. *Corolla* usually gamopetalous, lobes 4-9 or 0, imbricate or induplicate valvate; tube long or short. *Stamens* 2 (in Indian species), inserted on the corolla-tube, or, if petals free or 0, hypogynous; filaments usually short, anthers dehiscing laterally or subextrorsely. *Ovary* free, 2-celled; ovules 1-2 in each cell attached to the inner angle near the apex or base; style short or long; stigma simple or 2-lobed. *Fruit* a loculicidal capsule, or indehiscent, or a succulent berry or drupe. *Seeds* solitary or 2 in each cell, erect or pendulous; testa usually thin; albumen fleshy horny or 0; embryo straight; radicle inferior or superior.

Corolla-lobes imbricate :—

Seeds erect, radicle inferior :—

Shrubs, usually climbing; fruit of 2 berry-like carpels, one sometimes wanting ..... 1. *Jasminum*.

Erect shrub or small tree; fruit a compressed bipartite capsule

2. *Nyctanthes*.

Seeds pendulous, winged, radicle superior; tree with a woody pyri-form loculicidally dehiscent capsule ..... 3. *Schrebera*.

Corolla-lobes valvate :—

Erect trees or shrubs, leaves penninerved, radicle superior :—

Flowers in axillary panicles :—

Corolla of distinct petals, free or connate in pairs .. 4. *Linociera*.

Corolla tubular or 0 ..... 5. *Olea*.

Flowers in terminal panicles; corolla funnel-shaped. . 6. *Ligustrum*.

Scandent shrubs, leaves with prominent ribs; radicle inferior

7. *Myxopyrum*.

1. *Jasminum*, Linn.

Erect or climbing shrubs. *Leaves* opposite, rarely alternate, simple trifoliolate or imparipinnate. *Flowers* usually handsome, often sweet-scented, in terminal or axillary cymes, rarely solitary; bracts linear and small or ovate, sometimes petaloid; bracteoles usually linear. *Calyx*-tube funnel-shaped or campanulate; lobes

4-9, usually linear. *Corolla*-tube narrow, more or less elongate ; lobes 4-10, spreading, imbricate in bud. *Stamens* 2, usually included in the corolla-tube ; anthers oblong, connective usually produced. *Ovary* 2-celled ; ovules 2 in each cell, attached near the base ; style filiform, long or short ; stigma usually bifid. *Fruit* a didymous berry or simple by the suppression of one carpel ; carpels globose ellipsoid or elongate. *Seed* in each carpel 1, rarely 2, erect ; testa thin ; albumen 0 ; cotyledons plano-convex ; radicle inferior.

Leaves simple :—

Calyx pubescent :—

Calyx-lobes linear subulate :—

Calyx-lobes .25 in. long or longer :—

Erect or somewhat climbing ; calyx-lobes curled, especially in fruit ; leaves variable, usually ovate, obtuse acute or even acuminate, membranous ; carpels globose, black . . 1. *Sambac*.

Climbing shrubs :—

Bracts ovate, green, often absent ; calyx-lobes .3-.5 in. long ; corolla-lobes about 8, elliptic-oblong, acute ; leaves ovate, acute, cordate at base, pubescent or tomentose, up to 2.5 in. long, 1.5 in. broad . . . . . 2. *pubescens*.

Bracts lanceolate, white ; calyx-lobes .2-.3 in. long ; corolla lobes 5-7, oblong, obtuse ; leaves elliptic-lanceolate, acuminate, rounded or cordate at base, villous or subglabrous, up to 4 in. long, 1.5-2 in. broad . . . . . 3. *Rottlerianum*.

Bracts subulate, filiform ; calyx-lobes .25 in. long ; corolla lobes about 6, narrowly oblong, acute or acuminate ; leaves broadly ovate, abruptly, rarely gradually, acuminate, truncate or rounded or slightly cordate at base, up to 5 in. long, 4 in. broad . . . . . 4. *malabaricum*.

Calyx-lobes under .25 in. long ; corolla-lobes oblong, acute :—

Suberect or climbing ; cymes lax, trichotomous, the pedicels long, slender ; calyx-lobes .1 in. long, subclavate, erect ; leaves broadly ovate, acute, truncate rounded or subcordate at base, usually nearly glabrous but sometimes tomentose, up to 4 in. long, 3 in. broad . . . . . 5. *arborescens*.

Climbing ; cymes close, subcapitate, the pedicels very short or 0 ; calyx-lobes .1-.15 in. long, recurved or curled ; leaves ovate-lanceolate, acuminate, rounded or cordate at base, nearly glabrous, up to 4 in. long, 2 in. broad . . . . . 6. *scandens*.

Calyx-lobes very short, triangular, villous as are the lax cymes ;

corolla-lobes acute; leaves elliptic-ovate or ovate, acute, rounded or attenuate at base, softly grey-tomentose on both sides, up to 5 in. long, 2·5 in. broad .....7. *Roxburghianum*.

Calyx glabrous or nearly so:—

Calyx-lobes linear, subulate:—

Calyx-lobes ·25 in. long or longer:—

Climbing shrubs:—

Cymes many-flowered, trichotomous; corolla-tube long, lobes oblong, acute; leaves large, ovate-lanceolate, long-acuminate, subcordate at base, glabrous, up to 6 in. long, 3 in. broad, prominently nerved especially from near the base .....8. *cordifolium*.

Cymes 1–3-, usually 1-flowered, subsessile; corolla-tube short, lobes linear; leaves small, ovate, acute, obtuse or rounded at base, nearly glabrous, up to 1·25 in. long, ·75 in. broad, the nerves obscure .....9. *sessiliflorum*.

Erect shrubs, sometimes scandent; calyx-lobes up to ·35 in. long, sometimes under ·25 in., often minutely puberulous; cymes 1–3-flowered, the corolla-tube up to 1 in. long, lobes ·7 in., acute; leaves ovate, elliptic or lanceolate, acute, shining, coriaceous, nerves prominent .....10. *rigidum*.

Calyx-lobes less than ·25 in. long:—

Calyx-lobes about ·2 in. long, often ciliate; cymes lax, few-flowered, subpaniculate, pedicels slender, up to 1 in. long; corolla-tube slender, elongate, lobes very narrow; leaves membranous, ovate or elliptic, acuminate, cuneate at base, nearly glabrous, up to 4 in. long, 1·5 in. broad ....11. *Ritchiei*.

Calyx-lobes ·1–·2 in. long; cymes 1–3-flowered with slender pedicels ·5–·75 in. long; corolla-tube ·5–·75 in. long, lobes lanceolate, acuminate, ·5 in. long; leaves small, ovate, acute, rounded at base, glabrous, up to 1·5 in. long, ·75 in. broad

12. *angustifolium*.

Calyx-lobes ·1 in. long or less; cymes several-flowered, trichotomous, the pedicels slender, about ·3 in. long; corolla-tube ·5 in. long, the lobes narrowly oblong, about as long; leaves narrowly lanceolate, long-acuminate, cuneate at base, up to 3·5 in. long, ·75 in. broad .....13. *Wightii*.

Calyx-lobes minute, triangular, sometimes almost none; cymes terminal, trichotomous, paniculate, the pedicels short and slender; corolla-tube ·2–·3 in. long, slender, lobes about the same, narrow, linear; leaves ovate-lanceolate, scarcely acute, often almost rounded at base, up to 2·5 in. long, 1 in. broad ..14. *trichotomum*.

Leaves compound :—

Leaves trifoliate :—

Leaves with the two lower leaflets very small and frequently wanting; calyx-lobes very small, ovate :—

Branchlets and leaves grey-pubescent; cymes compound, many-flowered, trichotomous, paniculate, the pedicels slender and short; corolla-tube .5 in. long, lobes .25 in. long, elliptic; terminal leaflet ovate, obtusely acute, mucronate, rounded at base, up to 1.5 in. long, .75–1 in. broad, the side leaflets when present scarcely .3 in. long .....15. *auriculatum*.

Branchlets and leaves fulvous-tomentose; cymes sessile, subcapitate, few-flowered, the pedicels very short; corolla-tube .7–1 in. long, lobes .3 in. long, elliptic; terminal leaflet ovate, obtuse or acute, mucronate, cordate or rounded at base, up to 3 in. long, 1–1.5 in. broad, the side leaflets when present up to .5 in. long .....16. *brevilobum*.

Leaves with all three leaflets similar and present, the lateral lobes little smaller than the terminal; calyx-lobes minute :—

Leaves opposite, glabrous, leaflets elliptic or ovate, acute to caudate-acuminate at apex, rounded or obtuse or truncate at base, the terminal one up to 5 in. long, 2 in. broad; cymes lax, elongate, paniculate; corolla-tube .7–1 in. long, lobes .5 in., elliptic; anthers apiculate .....17. *flexile*.

Leaves opposite or alternate, glabrous, leaflets broadly ovate or deltoid, obtuse or very shortly acute at apex, rounded or truncate at base, the terminal up to 2 in. long, 1.5 in. broad; cymes trichotomous, the end branches corymbose; corolla-tube .75 in. long, .3 in. broad, oblong; anthers acute .....18. *calophyllum*.

Leaves imparipinnate :—

Leaves opposite; corolla white, reddish beneath, lobes spreading, flowers in terminal corymbose panicles; calyx-lobes long and linear .....19. *grandiflorum*.

Leaves alternate; corolla yellow, lobes recurved, flowers in short few-flowered cymes opposite the leaves; calyx-lobes very short .....20. *bignoniaceum*.

1. *JASMINUM SAMBAC*, Ait.; F. B. I. iii. 591; Wt. Ic. t. 704.

All Districts, doubtfully really wild but common near villages as an escape from cultivation. Arabian Jasmine. An erect or sometimes climbing small shrub with pubescent branchlets and fragrant white flowers. Cultivated plants have often double flowers, largely used for garlands. Vern. *Hind*. Mogra; *Tam*. Kodi muli.

Var. *Heyneanum*, C. B. Clarke, a twining form with small ovate acuminate leaves and shorter calyx-lobes. W. Gháts, Pulney Hills, etc.

2. *JASMINUM PUBESCENS*, Willd.; F. B. I. iii. 592. *J. hirsutum*, Willd.; Wt. Ic. t. 702. *J. bracteatum*, Roxb.; Wt. Ic. t. 1248. W. Gháts, in most Districts, up to 5,000 ft., but scarce, often cultivated.

A climbing shrub with white flowers in dense capitate cymes and globose black carpels. Vern. *Hind.* Kundá.

3. *JASMINUM ROTTLEIANUM*, Wall.; F. B. I. iii. 593; Wt. Ic. t. 1249.

W. Gháts, in all Districts, up to 5,000 ft.

A large extensively climbing shrub, usually very tawny villous but sometimes nearly glabrous. Flowers and bracts white, the cymes close and terminal, the carpels ellipsoid, black.

4. *JASMINUM MALABARICUM*, Wt. Ic. t. 1250; F. B. I. iii. 594.

W. Coast and W. Gháts in S. Canara, Mysore, Malabar and W. Nilgiris up to about 4,000 ft.

A large climbing shrub with white fragrant flowers in loose trichotomous terminal cymes, the carpels ellipsoid.

Var. *Lawii*, C. B. Clarke. Leaves gradually acuminate, calyx-lobes shorter and corolla-lobes narrower. Taliparamba in Malabar (Barber).

5. *JASMINUM ARBORESCENS*, Roxb.; F. B. I. iii. 594; Wt. Ic. t. 699. *J. latifolium*, Roxb.; Wt. Ic. t. 703.

N. Circars, hills of Ganjam and Vizagapatam, up to 3,000 ft.

A large suberect or climbing shrub with white fragrant flowers and black ellipsoid usually solitary carpels. The leaves are sometimes grey-tomentose on both surfaces.

6. *JASMINUM SCANDENS*, Vahl; F. B. I. iii. 595.

N. Circars, hills of Ganjam and Vizagapatam, up to 4,500 ft. (Barber, A. W. Lushington).

A climbing shrub with white flowers said to be sometimes tinged with pink, the carpels ellipsoid, usually solitary.

7. *JASMINUM ROXBURGHIANUM*, Wall.; F. B. I. iii. 595.

Deccan, Ramandrúg Hills in Bellary, at 2,000 ft., Bababudan hills of Mysore (Law).

A villous climbing shrub, the carpels usually solitary, black, ellipsoid.

8. *JASMINUM CORDIFOLIUM*, Wall.; F. B. I. iii. 596. *J. erectiflorum*, A. DC.; Wt. Ic. t. 1251.

W. Gháts, Coimbatore and Nilgiris, up to 5,000 ft., hills of Tinnevely.

A large climbing shrub with spirally twisted stems, white flowers and ellipsoid carpels.

9. *JASMINUM SESSILIFLORUM*, Vahl; F. B. I. iii. 597.

Carnatic, from Chingleput and S. Arcot to the E. slopes of the W. Gháts, southwards to the Tinnevely Hills.

A branching climber with small leaves, white flowers and globose carpels.

10. *JASMINUM RIGIDUM*, Zenk. Pl. Ind. Coimb. t. 6; F. B. I. iii. 598; Wt. Ic. t. 1247.

Deccan and Carnatic, in plains and hills, up to 5,000 ft., westwards to the E. slopes of the W. Gháts, common.

A rigid shrub with shining leaves, white flowers and black subglobose carpels. Vern. *Tel.* Uti, Pedda malli.

11. *JASMINUM RITCHIEI*, C. B. Clarke; F. B. I. iii. 598.

W. Gháts, hills of Mysore, Nilgiris, Wynaad, in evergreen forests at low levels; Shevaroy Hills.

A branched climbing shrub with slender white flowers and globose carpels.

12. *JASMINUM ANGUSTIFOLIUM*, Vahl; F. B. I. iii. 598; Wt. Ic. t. 698.

Circars, Deccan and Carnatic, on eastern side, down to S. Travancore.

A wiry climbing shrub with white flowers and ellipsoid carpels.

13. *JASMINUM WIGHTII*, C. B. Clarke; F. B. I. iii. 598.

Bolampatti Valley of Coimbatore (Wight).

A wiry climber with very flexuous branches.

14. *JASMINUM TRICHOTOMUM*, Heyne; F. B. I. iii. 599.

W. Deccan, Coimbatore Hills, up to 2,000 ft.; Carnatic, in Tanjore; Paulghatcheri (Cleghorn).

A rather stiff climbing shrub.

15. *JASMINUM AURICULATUM*, Vahl; F. B. I. iii. 600; Wt. Ic. t. 700. *J. affine*, Wt. Ic. t. 1255. *J. ovalifolium*, Wt. Ic. t. 1296.

Circars, Deccan and Carnatic, in all Districts, south to S. Travancore, westwards to the dry slopes of the W. Gháts, sometimes cultivated.

A climbing shrub with white flowers and globose black carpels.

16. *JASMINUM BREVILOBUM*, A. DC. ; F. B. I. iii. 600.

W. Gháts, Nilgiris and Pulneys above 3,000 ft., in Shola forest.

A large climbing shrub with spirally twisted stems up to 1 ft. in diameter and a curious wood-structure. Flowers white, carpels black, globose.

17. *JASMINUM FLEXILE*, Vahl ; F. B. I. iii. 601 ; Wt. Ic. t. 1253.

W. Coast and W. Gháts, in all Districts, up to 5,000 ft.

A climbing shrub with white fragrant flowers and ellipsoid carpels.

Var. *travancorense*, Gamble. *J. travancorense*, Klein, in Wall. Cat. 2881, the terminal leaflet shining, not truncate at base, elliptic-oblong, the nerves, about 8 pairs, more prominent and prominently arched, the apex caudate.

W. Coast, S. Canara to Travancore at low elevations.

18. *JASMINUM CALOPHYLLUM*, Wall. ; F. B. I. iii. 602. *J. courtallense*, Wt. Ic. t. 1252.

W. Gháts, Nilgiris, Anamalais and hills of Tinnevely, up to 4,000 ft.

A slender climber with white flowers and subglobose carpels.

19. *JASMINUM GRANDIFLORUM*, Linn. ; F. B. I. iii. 603 ; Wt. Ic. t. 1257.

N. Circars, Mahendragiri in Ganjam (Fischer), hills of Vizagapatam (A. W. Lushington); W. Gháts, Nilgiris. Pulneys and hills of Tinnevely above 5,000 ft., probably introduced and run wild, often cultivated.

A climbing shrub with fragrant flowers. Vern. *Hind. Chambel*.

20. *JASMINUM BIGNONIACEUM*, Wall. ; Fyson Hilt. Fl. 276, *J. humile*, Linn. ; F. B. I. iii. 602 in part. *J. revolutum*, Sims, var. *peninsulare*, A. DC. ; Wt. Ic. t. 1258.

W. Gháts, Nilgiris, Pulneys and hills of Malabar and Travancore, above 5,000 ft.

An erect shrub with angular branchlets, small leaflets, few rather large bright yellow flowers and black globose carpels.



2. *Nyctanthes*, Linn.

Shrubs or small trees. *Leaves* opposite, ovate, entire or toothed. *Flowers* in small sessile bracteate heads disposed in terminal trichotomous cymes. *Calyx* ovoid-cylindric, sub-truncate, finally splitting or deciduous. *Corolla* salver-shaped; tube cylindric, orange; lobes 4-8, contorted in bud, spreading, white. *Stamens* 2, subsessile near the top of the corolla-tube. *Ovary* 2-celled; ovule 1 in each cell, erect, basal; style cylindric; stigma shortly bifid. *Fruit* an orbicular capsule, compressed parallel to the septum, separating when ripe into 2 1-seeded cells. *Seed* erect, flattened, testa thin; albumen 0; cotyledons flat; radicle inferior.

NYCTANTHES ARBOR-TRISTIS, Linn.; F. B. I. iii. 603; Bedd. Fl. t. 240.

N. Circars, in deciduous forests down to the Godavari, elsewhere doubtfully wild but commonly cultivated.

A bushy shrub or small tree rough with stiff hairs. The yellow corolla-tubes give an orange dye and the flowers, which come out in the evening and fall off in the morning, are used in garlands, while the rough leaves may be used for polishing wood. Bark rough, light brown; wood pale red or yellowish-brown, close-grained. Vern. *Hind.* Harsinghar; *Ur.* Godokodika; *Tel.* Poghada; *Tam.* Manjhapu.

3. *Schrebera*, Roxb.

Trees. *Leaves* opposite, imparipinnate, leaflets opposite. *Flowers* in terminal 2-3-chotomous compound cymes; bracts small. *Calyx* campanulate, truncate or unequally 4-7-toothed. *Corolla* salver-shaped; tube cylindric; lobes 4-7, imbricate in bud, then spreading. *Stamens* 2, near the top of the corolla-tube; filaments short. *Ovary* 2-celled; ovules 3-4 in each cell, pendulous from its apex; style cylindric; stigma shortly bifid. *Fruit* a woody obovoid, loculicidally 2-valved capsule. *Seeds* pendulous; testa winged; albumen 0; cotyledons fleshy, flattened, with wavy longitudinal plaits; radicle superior.

SCHREBERA SWIETENIOIDES, Roxb.; Cor. Pl. t. 101; F. B. I. iii. 604; Wt. Ill. t. 162; Bedd. Fl. t. 248.

N. Circars and Deccan, in deciduous forest, especially in Ganjam, Godavari and Kurnool; Forest of Mudumalai in S.E. Wynaad.

A moderate-sized tree reaching about 50 ft. in height, the flower yellowish-brown covered with brown glands, the capsule about 2 in. long, the leaflets 7-9, glabrous or villous beneath. Bark grey, thick; wood brownish-grey, hard and close-grained, resembling boxwood in texture. Vern. *Hind.* Moka; *Ur.* Jantia, Nemiburo; *Tel.* Makkam; *Tam.* Mogalinga.

#### 4. *Linociera*, Swartz.

Shrubs or trees. *Leaves* opposite, entire. *Flowers* in axillary or lateral rarely terminal panicles or cymes; bracts small. *Calyx* small, 4-lobed. *Corolla* of 4 long or short petals, nearly free or connate in pairs, induplicate-valvate in bud. *Stamens* 2; filaments short, attached at the base of the petals; anthers dehiscing on the margin, connective broad. *Ovary* 2-celled; ovules 2 in each cell, pendulous from its apex; style short; stigma bifid or entire. *Fruit* a globose ellipsoid or oblong drupe; exocarp thin, endocarp bony or crustaceous. *Seed* usually solitary, pendulous; testa thin; albumen fleshy or 0, if fleshy the cotyledons flattened, radicle superior.

Seeds albuminous; flowers in clusters in few-branched cymes, the corolla-lobes .25 in. long; drupe ellipsoid:—

Calyx-lobes ovate, grey-pubescent; leaves elliptic or elliptic-oblong, obtuse or with a short abrupt acumen, cuneate at base, up to 5 in. long, 2 in. broad, main nerves about 10 pairs joining in loops; ovary pubescent .....1. *malabarica*.

Calyx-lobes rounded, nearly glabrous but ciliate; leaves elliptic, caudate-acuminate at apex, somewhat rounded at base, up to 4 in. long, 1.75 in. broad, main nerves about 8 pairs joining in loops at about .1 in. from the margin; ovary glabrous .....2. *Wightii*.

Seeds exalbuminous; flowers in panicles, the corolla-lobes less than .25 in. long:—

Panicles short, 1-1.25 in. long; calyx-lobes small, ciliate; corolla-lobes .15 in. long; leaves obovate, obtusely acute or emarginate, cuneate at base, margins recurved, up to 3 in. long, 1.5 in. broad; ovary glabrous .....3. *zeylanica*.

Panicles more than 1.25 in. long:—

Drupe ellipsoid, .3-.6 in. long; panicles up to 5 in. long; corolla-lobes .1-.15 in. long; leaves elliptic or elliptic-oblong or lanceolate, acuminate at both ends, shining, up to 7 in. long, 2.5 in. broad, more in young plants or shoots, main nerves prominent, regular, about 10-12 pairs, .3-.5 in. apart on the midrib .....4. *intermedia*.

Drupe oblong, '6-'8 in. long; panicles about 3-4 in. long; corolla-lobes '1 in. long; leaves oblong or elliptic-oblong or slightly oblanceolate, shortly acute at apex, acuminate at base, rather dull, up to 8 in. long, 2·5 in. broad, main nerves about 8 pairs, '6-1 in. apart on the midrib .....5. *macrophylla*.

Seeds not known; flowers in short axillary racemes or clusters, about '5 in. long, glabrous; leaves elliptic-oblong, thick, drying red-brown, shortly abruptly acuminate at apex, up to 7·5 in long, 2·5 in. broad, the main nerves about 10 distant pairs, prominent and prominently joining in loops .....6. *courtallensis*.

1. LINOCIERA MALABARICA, Wall.; F. B. I. iii. 607; Wt. Ic. t. 1246. *Chionanthus malabarica*, Bedd. Fl. t. 239, *fig. in corner*.

N. Circars, Palkonda hills of Vizagapatam, at 2,000 ft. (Gamble); Carnatic, Melpat and Javadis in S. Arcot (Barber, Fischer); W. Gháts, in all Districts, in evergreen forests up to 4,000 ft.

A small or moderate-sized tree with white or yellowish-white flowers.

2. LINOCIERA WIGHTII, C. B. Clarke; F. B. I. iii. 608. *Olea linocieroides*, Wt. Ic. t. 1241.

W. Gháts, hills of Travancore and Tinnevely, in evergreen forest, at low levels.

A small tree with white flowers.

3. LINOCIERA ZEYLANICA, Gamble n. comb. *L. purpurea*, Vahl; F. B. I. iii. 608.

Deccan and Carnatic, Ballipalle forests of Cuddapah at 1,000 ft., Nellore forests, Kambakam hills of Chingleput; W. Gháts, hills of S. Tinnevely and Travancore at 1,000-2,000 ft.

A small tree with red (?) flowers. Wood white or yellowish-white, hard and close-grained like boxwood. Vern. *Tel.* Punisi, Panagam.

4. LINOCIERA INTERMEDIA, Wt. Ic. t. 1245; F. B. I. iii. 609. *Chionanthus intermedia*, Bedd. Fl. t. 239 (*leaves bad*).

N. Circars, hill forest, up to 4,500 ft. on Mahendragiri, etc., south to the Godavari, west to Jeypore; Carnatic, Shevaroy Hills, Kollimalai hills of Trichinopoly; W. Gháts, from Mysore and Coimbatore southwards, up to 5,000 ft., on E. side.

A large tree with white flowers. Bark light yellowish-brown; wood white, moderately hard, close-grained.

5. *LINOCIERA MACROPHYLLA*, Wall.; F. B. I. iii. 610.

N. Circars, Ganjam to Godavari, in forest, especially about Surada at 1,500 ft.; Pulney Hills (Bourne) ?; hills of Travancore at 4,000 ft. in moist forest (Bourdillon).

A tree with white flowers and oblong drupes, the leaves distinct by the distant nerves. The Travancore specimens have smaller leaves than those from the north, but seem otherwise to belong to the same species.

6. *LINOCIERA COURTALLENSIS*, Bourd. Trav. Trees 260. *L. leprocarpa*, Thw. var. *courtallensis*, C. B. Clarke; F. B. I. iii. 609. *Chionanthus courtallensis*, Bedd.

W. Gháts, about Courtallum in Tinnevely; Peermerd and Cardamom Hills of Travancore at 3,000-5,000 ft. in ever-green forests.

A medium-sized tree with white flowers and a brownish-purple ovoid drupe 1 in. long (Bourdillon).

### 5. *Olea*, Linn.

Shrubs or trees. *Leaves* opposite, entire or toothed. *Flowers* small, hermaphrodite dioecious or polygamous, in axillary or lateral rarely terminal panicles; bracts small. *Calyx* small, 4-lobed. *Corolla* rotate or campanulate; lobes 4, valvate, often induplicate. *Stamens* 2, on the corolla-tube or subhypogynous; filaments short, connective broad, anthers dehiscing marginally. *Ovary* 2-celled; ovules 2 in each cell; style short; stigma capitate or bifid. *Fruit* an ellipsoid or subglobose drupe; exocarp fleshy, endocarp bony or crustaceous. *Seed* usually solitary, pendulous; testa thin; albumen fleshy; cotyledons flat; radicle superior.

Flowers hermaphrodite; corolla deeply lobed, the lobes spreading, flattened; leaves rhomboid lanceolate elliptic or ovate, acuminate, usually very abruptly, at apex, cuneate at base, glandular in the nerve-axils, chartaceous, up to 4 in. long, 2 in. broad ..... 1. *glandulifera*. Flowers polygamo-dioecious; corolla campanulate, the lobes short, their margins induplicate-valvate; leaves coriaceous:—

Leaves variable in shape, usually elliptic-lanceolate, entire or serrate, acute or acuminate, acute at base, up to 5 in. long, 2 in. broad, the main nerves 8-12 pairs ..... 2. *dioica*.

Leaves broadly elliptic, suddenly shortly acuminate, entire, drying reddish-brown, the margins recurved, up to 3.5 in. long, 1.5 in. broad

3. *polygama*.

1. *OLEA GLANDULIFERA*, Wall.; F. B. I. iii. 612; Wt. Ic. t. 1238; Bedd. Fl. t. 238. *O. Bournei*, Fyson in Kew Bull. 1914, 186.

N. Circars, hills of Ganjam and Vizagapatam, up to 4,500 ft. on Mahendragiri; Deccan, Bababudan Hills of Mysore at 5,000 ft.; W. Gháts in almost all districts, in Shola forests above 4,000 ft.

A moderate-sized tree with white flowers and an ovoid drupe. The South Indian trees (*O. Bournei*) have more rounded leaves with fewer main nerves than those of N. India, but otherwise seem to be the same. Bark grey; wood reddish-grey, hard. Vern. *Badaga*, Kunthay.

2. *OLEA DIOICA*, Roxb.; F. B. I. iii. 612; Wt. Ill. t. 151.

W. Gháts, all Districts, up to about 5,000 ft.; both in deciduous and evergreen forest.

A moderate-sized or large tree with creamy white flowers, variable leaves and an ovoid blue drupe. Bark brown, rough; wood pale brown, hard. Vern. *Tam.* Koli, Payar, Yedalei; *mal.* Edana.

3. *OLEA POLYGAMA*, Wt. Ic. tt. 1239, 1240; F. B. I. iii. 613.

W. Gháts, between Avalanché and Sispara, Nilgiris, about 7,000 ft., in Shola forest.

A small tree with many pretty white flowers, the drupe unknown.

#### 6. *Ligustrum*, Linn.

Shrubs or trees; branchlets often lenticellate. *Leaves* opposite, entire. *Flowers* white, in terminal often thyrsoid panicles, the lower nodes often bracteate. *Calyx* small, truncate or shortly 4-toothed. *Corolla* funnel-shaped, the tube short or long; lobes 4, induplicate-valvate. *Stamens* 2, on the corolla-tube; anthers oblong or rounded, included or exserted. *Ovary* 2-celled, ovules 2 in each cell, pendulous; style rather long; stigma subclavate. *Fruit* a 1-3-seeded drupe, endocarp chartaceous or thin. *Seeds* pendulous; testa thin; albumen fleshy; radicle short, superior.

Panicles loose, puberulous, up to 12 in. long with rather short slender distant bracteate branches; leaves elliptic or lanceolate, long and sharply

acuminate, up to 4 in. long, 2 in. broad; drupes obovoid, up to .25 in. long; flowers small, corolla-tube about as long as the calyx 1. *Walkeri*. Panicles large, pubescent, often 8 in. long and broad with stout thick branches; leaves ovate-lanceolate, acuminate, up to 5 in. long, 2 in. broad; drupe oblong, often curved, up to .5 in. long; flowers rather small, corolla-tube as long as the calyx ..... 2. *Roxburghii*. Panicles short, broad, depressed above, up to 2.5 in. long, 4 in. broad, glabrous; leaves lanceolate, acuminate at both ends, long-petioled, up to 3 in. long, 1 in. broad; drupe ellipsoid, .4 in. long; flowers small, corolla-tube as long as the calyx ..... 3. *travancoricum*. Panicles stout, short, dense, glabrous or nearly so, scarcely 3 in. long; leaves ovate or elliptic, acute, up to 2 in. long, .75 in. broad; drupe ellipsoid, .25 in. long; flowers rather large, corolla-tube twice as long as the calyx ..... 4. *Perrottetii*. Panicles lax, short, glabrous, scarcely 1.5-2 in. long; leaves elliptic-lanceolate, acute or acuminate, up to 2.5 in. long, .75 in. broad; drupe ellipsoid, .25 in. long; flowers very small, corolla-tube scarcely as long as the calyx ..... 5. *Decaisnei*.

1. *LIGUSTRUM WALKERI*, Dcne; F. B. I. iii. 614.

W. Gháts in most Districts, up to 5,000 ft.; Shevaroy Hills and Kollimalai Hills (?).

A small tree with large bracteate panicles, large leaves and lenticellate branchlets.

2. *LIGUSTRUM ROXBURGHII*, C. B. Clarke; F. B. I. iii. 615.

*Olea robusta*, Wt. Ic. t. 1242.

W. Gháts, Nilgiris, Pulneys and hills of Coimbatore, at 4,000-6,000 ft. in Shola forest, especially about Coonoor and on other E. slopes.

A small or medium-sized tree with broad panicles, rather large leaves and lenticellate branchlets. Wood white, close-grained.

3. *LIGUSTRUM TRAVANCORICUM*, Gamble in Kew Bull., 1922, 119.

W. Gháts, hills of Travancore and Tinnevely, at about 4,500 ft. (Bourdillon).

A small tree with depressed panicles and long-acuminate, long-petioled coriaceous leaves.

4. *LIGUSTRUM PERROTTETII*, A. DC.; F. B. I. iii. 615; Wt. Ic.

t. 1244. *L. neilgherrense*, Wt. Ic. t. 1243; F. B. I. iii. 615.

W. Gháts, Nilgiri Hills, on the banks of streams at 6,000-

7,000 ft., common, Pulneys, Anamalais and hills of Tinnevely, more scarce.

A large shrub resembling the European Privet (*L. vulgare*, Linn.) but with larger flowers.

Var. *obovatum*, Gamble. *L. neilgherrense*, Wt. var. *obovata*, C. B. Clarke; F. B. I. iii. 615. Leaves obovate, obtuse, panicles larger. Bababudan hills of Mysore (Law).

5. *LIGUSTRUM DECAISNEI*, C. B. Clarke; F. B. I. iii. 616.

W. Gháts, hills of Coimbatore, Nilgiris, hills of Madura and Tinnevely, on Eastern slopes usually, up to 5,000 ft.

A shrub with rough branchlets, small leaves and flowers.

Var. *microphylla*, C. B. Clarke. *L. microphyllum*, Wt.; leaves lanceolate, narrow, acuminate; panicles rather longer.

W. Gháts, Sivagiri and Courtallum Hills of Tinnevely.

Var. *Beddomei*, Gamble. *L. microphyllum*, Bedd. Fl. Sylv. cliv; leaves very small, under 1 in. long, ovate, acute; panicles slender, with distant branches.

Coorg, about Kiggatnad (Beddome).

*Ligustrum lucidum*, Ait., is a Chinese species frequently found in gardens in the Hills.

### 7. *Myxopyrum*, Blume.

Large scandent shrubs; branches 4-angular. Leaves opposite, triplicostate, entire or serrulate. Flowers small, yellowish, in axillary or terminal trichotomous panicles; bracts minute or 0. Calyx-tube short; lobes 4. Corolla-tube urceolate; lobes 4, induplicate-valvate in bud. Stamens 2, on the base of the corolla-tube; filaments short; anthers ovate. Ovary 2-celled, ovules 1-2 in each cell; style very short; stigma 2-lobed. Fruit a 1-2-seeded subglobose berry; pericarp crustaceous. Seeds erect, testa membranous; albumen thick; cotyledons flat, ovate; radicle inferior.

*MYXOPYRUM SERRATULUM*, A. W. Hill in Kew Bull. 1910, 41. *M. smilacifolium*, Bl.; F. B. I. iii. 618 in part.

W. Gháts, Wynaad, Anamalai Hills and hills of Travancore, in evergreen forests, at 2,000-3,000 ft.

A large climbing shrub with serrulate lanceolate acuminate leaves which have prominent side ribs forming a looped nerve to which the few main nerves are joined.

## Family XCVIII. SALVADORACEAE.

Shrubs or trees, unarmed or spiny. *Leaves* opposite, entire; stipules minute or 0. *Flowers* small, hermaphrodite or dioecious, in paniced spikes or racemes. *Calyx* free, campanulate or ovoid, 3-5-lobed. *Corolla* shortly campanulate or the petals free; lobes 4, imbricate in blood. *Stamens* 4, on the corolla-tube or hypogynous, alternate with the corolla-lobes; anthers ovate. *Ovary* superior, 1-2-celled; ovules 1-2 in each cell; style short; stigma 2-fid or subentire. *Fruit* a berry or drupe, usually 1-seeded. *Seed* erect, globose; albumen 0; cotyledons fleshy, plano-convex.

Erect unarmed trees or shrubs; corolla gamopetalous; stamens on the corolla-tube; ovary 1-celled, 1-ovuled .....1. **Salvadora**.  
 Rambling shrubs with axillary spines; corolla of free petals; stamens free; ovary 2-, or falsely 4-celled, ovules 1-2 .....2. **Azima**.

1. **Salvadora**, Linn.

Shrubs or trees. *Leaves* opposite, entire. *Flowers* small, sessile or pedicelled, in paniced spikes or racemes; bracts minute. *Calyx* campanulate, 4-lobed. *Corolla* campanulate, tube short, lobes 4. *Stamens* 4, inserted at the base or middle of the corolla-tube. *Disk* of 4 small scales or glands or 0. *Ovary* 1-celled; ovule solitary; style very short or 0; stigma truncate. *Drupe* globose, supported by the persistent calyx and corolla; endocarp crustaceous. *Seed* erect, globose.

SALVADORA PERSICA, Linn.; F. B. I. iii. 619; Roxb. Cor. Pl. t. 26. *S. indica*, Wt. Ill. t. 181. *S. Wightiana*, Bedd. Fl. t. 247.

Circars, Deccan and Carnatic, in open places, especially on saline lands and often on black cotton soil. Tooth-brush tree.

A large evergreen shrub or small tree with short trunk, very small flowers and fruit and rather small ovate-oblong obtuse petioled greyish-green leaves. Bark thin, grey; wood white, soft. The twigs are used as tooth-cleaners. Vern. *Hind.* Jhal; *Tel.* Waragu-wenki; *Tam.* Opa.

2. **Azima**, Lamk.

Rambling shrubs with axillary spines. *Leaves* opposite, entire. *Flowers* dioecious, small, axillary, sessile or clustered on the



branches of a slightly branched panicle; bracts 0 or foliaceous; bracteoles linear. *Calyx* campanulate, in ♂ 4-fid, in ♀ irregularly 2-4-lobed. *Corolla* of 4 free narrow imbricatè petals. *Stamens* 4; filaments slender. *Ovary* 2-celled; ovules 1 or 2 in each cell, erect; stigma subsessile, large. *Fruit* a globose usually 1-seeded berry; endocarp membranous. *Seeds* 1-2, globose.

AZIMA TETRACANTHA, Lamk.; F. B. I. iii. 620; Wt. III. t. 152.

Circars, Deccan and Carnatic, especially near the coast, in hedges and thickets.

A straggling shrub with pale almost quadrangular branchlets, greyish-green shining leaves with 2-3 pairs of prominent nerves from the base, mucronate tips and straight spines from the axils. The white berries are eaten. Vern. *Tel.* Tella upi; *Tam.* Ichanka.

#### Family XCIX. APOCYNACEAE.

Trees or erect or climbing shrubs, rarely herbs. *Leaves* opposite or whorled, rarely alternate, entire; stipules 0. *Flowers* regular, hermaphrodite, in terminal or axillary cymes, often large and showy; bracts small. *Calyx* inferior; lobes 5, imbricate, often with glands within at the base. *Corolla* usually salver-shaped or funnel-shaped; lobes 5, rarely 4, contorted and often twisted in bud, overlapping to right or left. *Stamens* 5, rarely 4, alternate with the corolla-lobes, inserted in the corolla-tube or on its mouth; filaments usually short; anthers linear-oblong or sagittate, free or connivent in a cone and adherent to the stigma by the connective, anther cells dehiscing longitudinally, sometimes produced at the base in empty spurs. *Disk* 0 or annular or cupular or reduced to 2-5 scales or glands. *Ovary* 1-celled with 2 parietal placentas or 2-celled with axile placentas, or of 2 distinct or partially connate carpels; ovules 2 or few or many, rarely solitary; style simple or divided at the base; stigma usually ending in an entire or bifid apiculus. *Fruit* a dry or fleshy drupe berry or samara, or of 2 baccate or follicular mericarps. *Seeds* various, often compressed, sometimes winged, sometimes with a tuft of hairs (*coma*) at one or both ends; albumen hard, fleshy, or scanty or 0; embryo straight; cotyledons flat, concave convolute or contracted; radicle superior.

**Anthers included, free from the stigma, the cells rounded at the base :—**

Ovary of 2 wholly combined carpels, 1-2-celled ; seeds without wing or coma :—

Ovary 1-celled ; fruit 2-valved :—

Flowers small ; fruit a fleshy berry .....1. **Chilocarpus**.

Flowers large and showy ; fruit a spinescent capsule ..**Allamanda**.

Ovary 2-celled ; erect or climbing spinose shrubs .....2. **Carissa**.

Ovary of 2 distinct carpels, usually united by the style but sometimes at the base or throughout :—

Leaves alternate ; corolla large and showy, the lobes overlapping to left :—

Corolla funnel-shaped ; fruit indehiscent :—

Calyx glandular within ; flowers yellow ; leaves linear

**Thevetia**.

Calyx not glandular within ; flowers white ; leaves oblanceolate, fleshy .....3. **Cerbera**.

Corolla salver-shaped ; fruit of 2 dehiscent follicles ; calyx not glandular within ; flowers yellowish-white or -red ....**Plumeria**.

Leaves opposite or whorled ; corolla salver-shaped :—

Calyx not glandular within ; fruit of 2 1- or many-seeded drupes or follicles :—

Fruit indehiscent, drupaceous ; seeds few, without wings or coma :—

Corolla-lobes overlapping to the left :—

Leaves usually whorled ; erect shrubs ; fruit mericarps more or less united, sessile .....4. **Rauwolfia**.

Leaves opposite ; trees ; fruit mericarps stalked

5. **Hunteria**.

Corolla-lobes overlapping to the right ; trees or shrubs with opposite leaves ; fruit mericarps 1-2-seeded, free ..**Kopsia**.

Fruit dehiscent, of 2 slender many-seeded follicles, corolla-lobes overlapping to the left :—

Herbaceous plants with opposite leaves ; seeds truncate at both ends .....6. **Lochnera**.

Trees or shrubs with whorled leaves ; seeds ciliate at both ends .....7. **Alstonia**.

Calyx glandular within, fruit of 2 follicular mericarps :—

Follicles many-seeded, linear :—

Corolla-lobes overlapping to the left ; seeds winged at both ends ; climbing shrubs .....8. **Ellertonia**.

Corolla-lobes overlapping to the right ; seeds with a deciduous silky coma at the top ; trees .....9. **Holarrhena**.

Follicles few-seeded, baccate, stout and coriaceous; seeds arillate, without coma; erect trees or shrubs:—

Corolla-tube dilated at the base, lobes overlapping to the left; leaves with conspicuous horizontal impressed main nerves .....10. **Rejoua**.

Corolla-tube slightly dilated near the top, lobes overlapping to the left or right; leaves with slender oblique main nerves

11. **Ervatamia**.

Anthers included or exserted, conniving in a cone round and adherent to the stigma, the cells produced at base in an empty spur; fruit of 2 follicular mericarps with comose seeds:—

Anthers exserted:—

Climbing shrubs; coma of the seeds terminal:—

Filaments of the stamens long, spirally twisted ....12. **Parsonsia**.

Filaments of the stamens short, not spirally twisted 13. **Vallaris**.

Erect trees or shrubs; coma of the seeds basal; corolla with a corona of scales .....14. **Wrightia**.

Anthers included:—

Mouth of corolla with a ring of scales:—

Erect shrubs with whorled leaves and pink flowers; corolla lobes not tailed .....**Nerium**.

Spreading or climbing shrubs with opposite leaves; corolla-lobes tailed .....15. **Strophanthus**.

Mouth of corolla naked; leaves opposite; climbing shrubs:—

Corolla very large, white; leaves very large:—

Corolla campanulate or funnel-shaped.....16. **Beaumontia**.

Corolla salver-shaped, lobes sharply twisted to the left

17. **Chonemorpha**.

Corolla medium-sized, tube bearded within behind the anthers; calyx divided nearly to the base.....18. **Aganosma**.

Corolla small, the lobes overlapping to the right:—

Follicles stout, large, the seeds long-beaked....19. **Anodendron**.

Follicles very slender, narrow; tips of corolla-lobes deflected

20. **Ichnocarpus**.

### 1. *Chilocarpus*, Blume.

Climbing shrubs. *Leaves* opposite, petioled, the main nerves horizontal, close and usually joining in an intramarginal nerve. *Flowers* small, in axillary cymes. *Calyx* short, eglandular; lobes 5. *Corolla* hypocrateriform, contracted at the throat; lobes 5, short, overlapping to the left, twisted to the right. *Stamens* inserted on the tube, included; anthers lanceolate, acute. *Disk* 0. *Ovary*

1-celled with 2 parietal placentas; ovules many, 2-seriate; style short; stigma ovoid or conical. *Fruit* a fleshy berry, at length 2-valved, pericarp thick. *Seeds* embedded in pulp with fibrous and corky arils; albumen copious, equable or ruminant; cotyledons flat; radicle elongate.

CHILOCARPUS ATRO-VIRIDIS, Bl.; F. B. I. iii. 626. *C. malabaricus*, Bedd. Ic. t. 175.

W. Gháts in S. Canara, Malabar and Travancore, in evergreen forests up to 2,000 ft.

A large climber with milky juice and small whitish flowers and oblong abruptly acuminate shining leaves up to 5 in. long, 2 in. broad, the main nerves very many and parallel. The fruit is not known.

## 2. Carissa, Linn.

Much-branched spinous shrubs, erect or climbing. *Leaves* opposite, coriaceous, the spine-bearing pairs usually larger than the intermediate ones. *Flowers* in terminal and axillary pedunculate trichotomous cymes. *Calyx* 5-lobed, the lobes acute or acuminate. *Corolla* hypocrateriform; tube cylindric, dilated at top opposite the stamens, more or less pubescent within; lobes 5, usually overlapping to the right, about half the length of the tube. *Stamens* 5, on the corolla-tube, included; anthers lanceolate. *Ovary* 2-celled; ovules 1-4 in each cell, rarely more; style filiform; stigma fusiform or columnar, minutely 2-fid. *Fruit* an ellipsoid ovoid or globose berry, 2- or, by abortion, 1-celled. *Seeds* usually 2 or 4, peltately attached to the septum; albumen fleshy; cotyledons ovate; radicle inferior.

Corollas large, the tube over .6, usually over .75 in. long; berry 4-seeded :—

Spines straight, often 1.5 in. long, often forked at tip; leaves elliptic-oblong, obtuse or emarginate at apex, rounded or even subcordate at base, up to 3 in. long, 1.5 in. broad; cymes puberulous, the peduncles .25-1 in. long; berry .5-1 in. long, ellipsoid .....1. *Carandas*.

Spines curved, often 2 in. long, not forked; leaves ovate or elliptic-ovate or -lanceolate, acute or acuminate at apex, rounded or acute at base, up to 3.5 in. long, 2 in. broad; cymes puberulous or nearly glabrous, sessile; berry .75-1 in. long, ellipsoid .....2. *inermis*.

Corollas medium-sized, the tube .4-.6 or -.7 in. long; berry 4-seeded :—

Spines straight or very slightly curved; leaves broadly ovate or sub-orbicular, obtuse at apex, slightly cuneate at base, up to 2·5 in. long, 1·5 in. broad, the nerves about 5 pairs not prominent; cymes shortly peduncled, the corolla-lobes ciliate; berry globose, nearly ·5 in. diam. ....3. *congesta*.

Spines straight, stout, usually forked; leaves ovate or suborbicular, obtusely slightly acute and mucronate at apex, sometimes emarginate, rounded or slightly acute at base, up to 1·5 in. long, 1 in. broad, nerves about 6 pairs, prominent, the basal 2nd arched to meet the rest; cymes shortly peduncled; calyx-lobes long acuminate; berry ovoid

4. *spinarum*.

Corollas small, the tube less than ·4 in. long; cymes shortly peduncled:—

Seeds 4; spines long and straight, up to 1·5 in. long, sometimes forked; branchlets and leaves softly grey-tomentose, the leaves elliptic oblong, obtuse or acute at apex, slightly cuneate at base, up to 2 in. long, 1 in. broad, the nerves about 8 pairs, the lowest pair oblique and arched to meet the rest; calyx-lobes ovate, villous; berry globose, ·2 in. in diam. ....5. *hirsuta*.

Seeds 2; spines straight; leaves glabrous:—

Leaves ovate-rhomboid, acute or obtuse and mucronate at apex, cuneate at base, up to 2 in. long, 1·3 in. broad, the nerves about 4 pairs, indistinct; calyx-lobes acuminate, pubescent; berry ovoid, ·25 in. in diam. ....6. *gangetica*.

Leaves narrowly elliptic or oblong-lanceolate, acute at apex, cuneate at base, up to 2 in. long, ·5–·7 in. broad, the nerves about 6 pairs, not prominent, the lowest 1–2 pairs oblique; calyx lobes ovate, acute, ciliate; berry ovoid, ·25 in. in diam. ....7. *salicina*.

Leaves elliptic-ovate or -lanceolate, acute at both ends, mucronate, up to 1·5 in. long, ·5 in. broad, the nerves 2–3 pairs, oblique and indistinct; calyx-lobes small, lanceolate, ciliate; berry ellipsoid, ·3 in. in diam. ....8. *paucinervia*.

- I. *CARISSA CARANDAS*, Linn.; F. B. I. iii. 630; Roxb. Cor. Pl. t. 77; Wt. Ic. t. 426.

N. Circars, Deccan and Carnatic, in dry forests; often cultivated.

A large thorny shrub or small tree with white or pale rose-coloured flowers and red berry turning purple or black on ripening and good to eat, especially in tarts and preserves. Bark yellowish-brown; wood white with an irregular grey or orange-yellow streaked heartwood, used to make combs and spoons and as fuel. The thorny branches are used for

fencing. Vern. *Hind.* Karaunda; *Ur.* Kerendo kuli; *Tel.* Kalivi; *Tam.* Kalaaha, Kila.

2. *CARISSA INERMIS*, Vahl. *C. macrophylla*, Wall; F. B. I. iii. 631; *C. suavissima*, Bedd.; F. B. I. iii. 632.

N. Circars, hills of Vizagapatam (Barber); W. Gháts, in almost all Districts, in evergreen forests, up to 6,000 ft.

A large climbing shrub with white flowers and edible purple fruit, sometimes, perhaps, found as a bush. Bark brown, rough, peeling off in small flakes; wood white, soft.

3. *CARISSA CONGESTA*, Wt. Ic. t. 1289. *C. Carandas*, Linn. var. *congesta*, Bedd.; F. B. I. iii. 631.

W. Gháts, Mysore, Coorg and S. Canara.

An erect shrub with rather thin leaves and white flowers.

4. *CARISSA SPINARUM*, Linn. Mant. 559; F. B. I. iii. 631. *C. diffusa*, Roxb.; Wt. Ic. t. 427.

N. Circars and Carnatic, down to S. Travancore, in dry scrub forests, less common inland.

A large thorny shrub with zigzag branches. Wood like that of *C. Carandas*. Vern. *Hind.* Karaunda; *Tam.* Chiru kila.

Var. *microphylla*, Gamble. Smaller with smaller leaves, often scarcely 5-75 in. long and prominently nerved and smaller flowers, the corolla-tube sometimes less than 4 in.

Carnatic, from Madras southwards to S. Travancore, near the coast.

5. *CARISSA HIRSUTA*, Roth. *C. spinarum* var. *hirsuta*, Hook. f.; F. B. I. iii. 631. *C. villosa*, Roxb.; Wt. Ic. t. 437.

Deccan and Carnatic, in dry hilly country, up to 3,000 ft.: Nellore (Ramaswami), Anantapur (Gamble), Walliar, Ayamalai Hills (Wight), Coimbatore (Fischer).

A thorny shrub with white flowers and black-purple berry, the grey-tomentose branchlets and leaves very characteristic, but sometimes nearly glabrous.

6. *CARISSA GANGETICA*, Stapf in Herb. Kew.

N. Circars, Mahendragiri Hill in Ganjam at 4,500 ft. (Gamble, Fischer and Gage).

A thorny shrub.

7. *CARISSA SALICINA*, Lamk. Encycl. i. 554.

Deccan, Hassanur in Coimbatore (Herb. Madras).

A thorny shrub with narrow leaves, the spines simple. Perhaps only a rather larger-leaved form of the next.

8. *CARISSA PAUCINERVIA*, A. DC.; F. B. I. iii. 631; Wt. Ic. t. 1290.

Deccan, hills of Mysore, Salem and Coimbatore; W. Gháts, Nilgiri Hills at 4,000–6,000 ft. on E. side, common.

A diffuse bushy shrub with many sharp spines, white or slightly rose-coloured flowers and small dark purple edible berries.

### 3. *Cerbera*, Linn.

Small glabrous trees. *Leaves* alternate or scattered, long, main nerves slender, horizontal and parallel. *Flowers* large, white or red, in pseudoterminal cymes. *Calyx* 5-lobed, eglandular, lobes long. *Corolla* large, tube cylindric below, funnel-shaped above the throat with 5 villous scales; lobes 5, spreading, overlapping to the left. *Stamens* small, included; anthers lanceolate, apiculate, the cells rounded at base. *Disk* 0. *Ovary* of 2 distinct carpels; ovules 4 in each carpel, on both sides of a thick placenta. *Fruit* of 1, rarely 2, globose or ellipsoid drupes; pericarp very thick, fibrous and woody. *Seeds* broad, compressed, peltately attached to the enlarged placenta; albumen none; cotyledons thin; radicle very short.

*CERBERA MANGHAS*, Linn. *C. Odollam*, Gaertn.; F. B. I. iii. 638; Wt. Ic. t. 441.

E. and W. Coast, in salt swamps and backwaters.

A moderate-sized or small tree with lanceolate or oblanceolate bright green fleshy leaves, large white flowers and large green fruit with fibrous pericarp. Wood grey, very soft and spongy. Vern. *Tam.* Kada má, Kat arali; *Mal.* Othalam.

### 4. *Rauwolfia*, Linn.

Shrubs, glabrous or rarely pubescent. *Leaves* 3- to 4-nately whorled, rarely opposite, the main nerves slender and usually arched. *Flowers* in corymbose or umbellate cymes, the peduncles alternate with the terminal leaves or axillary. *Calyx* 5-lobed, eglandular. *Corolla*-tube cylindric, dilated opposite the stamens, the mouth constricted, the throat usually hairy within; lobes usually 5, overlapping to the left. *Stamens* 5, included, on the corolla-tube; filaments very short; anthers small, acute, the cells rounded at base. *Disk* cup-shaped or annular. *Ovary* of 2

distinct or connate carpels; ovules 2 in each carpel, collateral; style filiform; stigma calyptriform at the base, the tip bifid. *Fruit* of 2 connate or distinct drupes, each with a crustaceous 1-seeded pyrene. Seeds ovoid; testa thin; albumen fleshy; cotyledons flat; radicle superior.

Corolla-tube long and slender, about .5 in., narrow, dilated a little above the middle, lobes .15 in. long; calyx lobes short; cymes closely corymbose on single peduncles 2-5 in. long; drupes slightly connate, obliquely ovoid, .25 in. long, pyrenes slightly rugose; leaves in whorls of 3, thin, lanceolate, acute or acuminate, the main nerves rather distant, oblique

1. *serpentina*.

Corolla-tube about .25 in. long, broad, dilated at the top, lobes long, rounded; calyx-lobes long and slender; cymes rather lax, on peduncles about 1-2 in. long, several together; drupes distinct, ellipsoid, about .5 in. long, pyrenes very rugose; leaves oblanceolate, in whorls of 3-4, pale beneath, the main nerves many, subhorizontal, regular

2. *densiflora*.

Corolla-tube short and narrow, slender, dilated at top, lobes short; calyx-lobes very short:—

Cymes lax, few-flowered, on peduncles about 1.5 in. long, usually 2 together; drupes joined to the middle, ovate, acute, .2 in. long, pyrenes rugose; leaves elliptic-lanceolate or -oblanceolate, long-acuminate, usually in whorls of 3, the main nerves very slender, about 12 pairs

3. *micrantha*.

Cymes very lax, few-flowered, on single slender peduncles about 4 in. long, the divaricate branches also long and slender; drupes joined to the middle, ovate, acute, .3 in. long, pyrenes scarcely rugose; leaves oblanceolate, acuminate, very thin, in whorls of 3 of unequal size, the main nerves many, close and regular. . . . . 4. *Beddomei*.

Corolla-tube short, about .1 in. long, broad, lobes very short, rounded; calyx-lobes short, round, ciliate; drupes joined to the top, ovoid, .2 in. long, pyrenes rugose; leaves in whorls of about 4, very unequal in size, elliptic, acute . . . . . *canescens*.

1. *RAUWOLFIA SERPENTINA*, Benth. ex Kurz; F. B. I. iii. 632.

*Ophioxylon serpentinum*, Linn.; Wt. Ic. t. 849.

W. Gháts, in all Districts, in moist forest undergrowth, at low levels and up to 3,000 ft.

A herbaceous undershrub with red pedicels and calyx, white corolla and purplish-black fruit. The root is used in medicine. Vern. *Hind.* Chota chand; *Tel.* Patalgani; *Tam.* Chivan amelpodi.



2. *RAUWOLFIA DENSIFLORA*, Benth. ex Hook. f.; F. B. I. iii. 633. *Ophioxylon ceylanicum*, Wt. Ic. t. 1291. *O. neilgherrense*, Wt. Ic. t. 1292.

E. Gháts, Rumpá Hills of Godavari, 4,000 ft. (Gamble); W. Gháts, Nilgiris, Pulneys, Anamalais and hills of Tinnevely and Travancore, at 4,000–7,000 ft.

A rather large shrub, sometimes reaching 12 ft. in height with white or pink flowers and brownish-purple fruit.

3. *RAUWOLFIA MICRANTHA*, Hook. f.; F. B. I. iii. 633.

W. Gháts, Malabar (Wight) and Travancore (Rama Rao) near Kottayam.

A slender shrub, apparently very scarce.

4. *RAUWOLFIA BEDDOMEI*, Hook. f.; F. B. I. iii. 634. *Tabernaemontana verticillata*, Bedd. Fl. Sylv. clix.

W. Gháts, hills of Tinnevely and Travancore (Beddome).

A large dichotomously branched glabrous shrub with very slender inflorescence and pointed carpels.

*R. canescens*, Linn., is a small W. Indian shrub found in gardens and sometimes run wild in the neighbourhood of Madras. The fruits are red.

### 5. *Hunteria*, Roxb.

Glabrous trees. *Leaves* opposite, coriaceous, shining, with many slender main nerves. *Flowers* in short terminal axillary or subterminal cymes. *Calyx* small, 5-lobed, eglandular. *Corolla* salver-shaped, tube cylindric, slightly dilated near the top, lobes overlapping to the left. *Stamens* inserted at the dilation of the tube; anthers lanceolate, the cells rounded at base. *Disk* 0. *Ovary* of 2 carpels; ovules 2–4 to each carpel. *Fruit* of 2 stalked fleshy ovoid berries, each 1-seeded or 2-celled by the intruded placenta. *Seeds* ovoid or oblong; albumen fleshy; cotyledons ovate; radicle straight.

*HUNTERIA CORYMBOSA*, Roxb.; F. B. I. iii. 637; Wt. Ic. t. 428; Bedd. Fl. t. 265.

Var. *Roxburghiana*, Trim. *H. Roxburghiana*, Wt. Ic. t. 1294.

W. Gháts, evergreen forests of Travancore and Tinnevely at 1,000–2,000 ft.

A small tree with pale yellow flowers and narrow linear lanceolate shining leaves with many nearly parallel main

nerves meeting in an intramarginal nerve and up to 6 in. long, .75 in. broad. Bark light brown, thin; wood brownish yellow, hard and close-grained.

#### 6. *Lochnera*, Reichb.

Annual or perennial herbs or undershrubs. *Leaves* opposite, axillary glands numerous. *Flowers* axillary, solitary or in pairs, white or pink. *Calyx* 5-lobed, eglandular; lobes subulate. *Corolla* salver-shaped; tube slender, cylindric, inflated over the stamens below the constricted mouth; lobes overlapping to the left. *Stamens* on the corolla-tube; anthers lanceolate, acute. *Disk* of 2 linear glands. *Ovary* of 2 free carpels; ovules numerous, 2-seriate; style filiform; stigma depressed-capitate with a reflexed hyaline frill at base, the apiculus 2-lobed. *Fruit* of 2 half divaricate slender cylindric follicles. *Seeds* numerous, small; testa muriculate; albumen fleshy; cotyledons flat, shorter than the thick radicle.

*LOCHNERA PUSILLA*, K. Schum. *Vinca pusilla*, Murr.; F. B. I. iii. 640.

Plains Districts of the Circars, Deccan and Carnatic, up to 2,000 ft., a common weed, more scarce on W. Coast.

A branching glabrous annual with small white flowers, follicles about 2 in. long and lanceolate membranous leaves, the seeds oblong, black and muriculate in lines. Said to be poisonous to cattle (Lawson).

*L. rosea*, Reichb., is a common garden shrub with rose-coloured or white flowers and obovate shining leaves. It probably came from the W. Indies and is sometimes found run wild.

#### 7. *Alstonia*, R. Br.

Trees or shrubs, branches often in whorls. *Leaves* generally whorled, rarely opposite, often with numerous nearly horizontal parallel main nerves. *Flowers* in subterminal corymbose cymes. *Calyx*-tube short; lobes 5, eglandular. *Corolla* salver-shaped; tube cylindric, dilated opposite the stamens; lobes overlapping either to the right or left. *Stamens* usually near the top of the tube, included; anthers acute. *Disk* annular or lobed or 0, if lobed the lobes 2 alternate with the carpels. *Ovary* of 2 distinct

carpels; ovules many in each carpel, many-seriate; style filiform; stigma oblong or cylindric, bifid at apex. *Fruit* of 2 linear slender follicular mericarps. *Seeds* linear or oblong, flattened, peltately attached, furnished with tufts of long brown hairs at each end; testa thin, often papillose; albumen scanty; cotyledons oblong, flat; radicle superior.

A large tree, branches whorled; leaves 4-7 in a whorl, coriaceous, elliptic-oblong or obovate or oblanceolate, obtuse at apex, pale beneath; flowers in umbellate cymes, the corolla-tube short; follicles 1-2 ft. long; seeds papillose .....1. *scholaris*.

A shrub, branches opposite or whorled; leaves 3-6 in a whorl, membranous, narrowly oblong-lanceolate, acuminate at apex, slightly pale beneath; flowers in corymbose cymes, the corolla-tube long; follicles 3-5 in. long; seeds not papillose .....2. *venenata*.

1. *ALSTONIA SCHOLARIS*, R. Br.; F. B. I. iii. 642; Wt. Ic. t. 422; Bedd. Fl. t. 242.

N. Circars, not very common; Deccan, in deciduous forests; W. Gháts, in all Districts, both in deciduous and evergreen forests, up to 2,000 ft.

A large evergreen tree with greenish white flowers and long very narrow pendulous follicles. Bark dark grey, rough, lenticellate; wood white, soft, even-grained, used for boxes and temporary purposes, but not durable. Vern. *Hind.* Satiún; *Ur.* Chhatiana; *Tel.* Eda-kula; *Tam.* Mukampalei; *Mal.* Pála.

2. *ALSTONIA VENENATA*, R. Br.; F. B. I. iii. 642; Wt. Ic. t. 436.

N. Circars, hills of Ganjam and Godavari, up to 2,000 ft.; W. Gháts, hills of Coimbatore, Nilgiris, Anamalais, Pulneys and hills of Tinnevely, up to 6,000 ft.

A shrub with long white flowers and fusiform follicles stalked and beaked, the leaves long and very closely nerved. Bark thin, light brown; wood white, even-grained.

### 8. *Ellertonia*, Wight.

Glabrous climbing shrubs. *Leaves* opposite or 3-4-nately whorled. *Flowers* slender, in subterminal cymes. *Calyx* small, eglandular, lobes 5. *Corolla* salver-shaped; tube cylindric, slightly dilated over the stamens; throat naked, constricted;

lobes 5, narrow, overlapping to the left. *Stamens* in the middle of the tube, included; anthers lanceolate, apiculate, the cells obtuse at base. *Disk* 0. *Ovary* of 2 distinct carpels; ovules numerous in each carpel; style filiform; stigma oblong with a 2-fid apiculus. *Fruit* of 2 completely divaricate linear terete follicles. *Seeds* 2-seriate, flattened, peltately attached to the placenta, winged at both ends; testa membranous; albumen scanty; cotyledons thin, elliptic-oblong; radicle superior.

ELLERTONIA RHEEDII, Wt. Ic. t. 1295; F. B. I. iii. 641.

W. Gháts, evergreen forests from Coorg to Travancore and Tinnevely, up to 3,000 ft.

A climber with elliptic acuminate leaves about 3 in. long, slender flowers and divaricate follicles about 5 in. long, spotted outside and with seeds acuminate winged below, rounded above, in all nearly 1 in. long, 2 in. broad in the middle.

#### 9. *Holarrhena*, R. Br.

Trees or shrubs. *Leaves* opposite, membranous, glabrous or pubescent. *Flowers* white, in terminal or axillary corymbose cymes. *Calyx* 5-lobed, usually glandular within at the base; lobes narrow. *Corolla* salver-shaped; tube slender, cylindric, slightly dilated opposite to the stamens; lobes oblong or obovate, overlapping to the right. *Stamens* near the base of the tube, included; anthers lanceolate, mucronate, the cells rounded at the base. *Disk* none. *Ovary* of 2 distinct carpels; ovules many in each carpel; style short; stigma oblong-fusiform, the tip bifid. *Fruit* of 2 terete elongate follicular mericarps connected at the tip, then free. *Seeds* linear or oblong, concave within, tipped at the apex with a deciduous coma of long silky brown hairs; albumen scanty; cotyledons broad, complicate, radicle short, superior.

HOLARRHENA ANTIDYSENTERICA, Wall.; F. B. I. iii. 644; Brand. For. Fl. t. 40. *H. Codaga*, G. Don; Wt. Ic. t. 1297. *Chonemorpha* (?) *antidysenterica*, G. Don; Wt. Ic. t. 439.

All Forest Districts, in deciduous forests, up to 3,000 ft., common.

A small tree with white flowers, very long narrow pendulous follicles and large membranous, glabrous or pubescent, ovate to ovate-oblong or elliptic leaves. Bark thick, brown, rough;

wood white, soft, even grained, used for carving and turning in N. India, rarely in the South. Vern. *Hind.* Karchi; *Ur.* Kherwa; *Tel.* Pala, Kodaga; *Tam.* Vepali; *Mal.* Kodaga pala.

#### 10. *Rejoua*, Gaudich.

Small trees, with resinous exudations at the bases of the leaves, at the bifurcations of the inflorescence and on the flower buds. *Leaves* opposite, coriaceous, main nerves strong, horizontal, impressed. *Flowers* in stout long-peduncled cymes. *Calyx* thick; lobes 5, suborbicular with many glands at the base within. *Corolla* large, salver-shaped; tube cylindric, swollen at the base; lobes oblong, falcate, overlapping to the left. *Stamens* 5, half-way down the tube; anthers lanceolate, their base rounded. *Ovary* of 2 carpels; ovules numerous; style short; stigma bifid. *Fruit* of 1-2 large recurved follicular mericarps. *Seeds* many, buried in red pulp, without coma; albumen copious; cotyledons flat.

REJOUA DICHOTOMA, Gamble n. comb. *Tabernaemontana dichotoma*, Roxb.; F. B. I. iii. 645; Wt. Ic. t. 433.

W. Gháts, Malabar, at low levels.

A small tree with stout woody resinous branches, oblong or obovate coriaceous leaves with about 20 main nerves at right angles to the midrib and meeting in loops, impressed above. Flowers large, white with a yellow tube; follicles 4-5 in. long, 1-2 in. broad, orange-yellow.

#### 11. *Ervatamia*, Stapf.

Shrubs or small tree, usually glabrous. *Leaves* opposite; axillary stipules usually distinct; axillary glands small, often numerous. *Flowers* in terminal or axillary corymbose or umbelliform cymes, often in pairs; branches dichotomous. *Calyx* small; lobes 5, free or connate at the base, glandular inside. *Corolla* salver-shaped; tube cylindric, slightly dilated towards the naked mouth, opposite the stamens, villous below the dilation; lobes 5, overlapping to the left or right, much folded in bud. *Stamens* included; filaments short; anthers linear, acute or mucronate. *Disk* 0. *Ovary* of 2 carpels, distinct or slightly cohering; ovules numerous, many-seriate; style long, filiform; stigma clavate or oblong with a bifid apiculus. *Fruit* of 2 follicular mericarps, coriaceous when mature, obliquely ovoid to

lanceolate, usually curved and beaked, dehiscing along the ventral suture and often opening out flat. *Seeds* few to many, enveloped in an orange or red aril, grooved ventrally; testa crustaceous, furrowed; albumen copious, waxy; cotyledons flat, cordate; radicle cylindric.

Lobes of corolla overlapping to left, in bud ovate acute; corolla-tube .5-1 in. long, dilated below the middle; leaves obovate or oblanceolate, acuminate or caudate at apex, 3-6 in. long, main nerves 6-8; follicles spreading, oblong, acuminate, 3-6-seeded .....1. *coronaria*.

Lobes of corolla overlapping to right, in bud nearly globose:—

Corolla-tube slender and narrow, .6-8 in. long, dilated at or a little above the middle; calyx-lobes unequal, oblong, ciliate; follicles ovate, long beaked, 1-(?)-seeded; leaves elliptic-obovate, long and abruptly caudate acuminate at apex, up to 5 in. long, 2 in. broad, main nerves regular, about 10-12 pairs, arched .....2. *caudata*.

Corolla-tube thick, .8-1 in. long, dilated at top; calyx-lobes obtuse or emarginate, thick; follicles oblong, up to 1.5 in. long, usually with short recurved beaks; seeds about 5; leaves elliptic-oblong or lanceolate, shortly acuminate at apex, up to 8 in. long, 3 in. broad, main nerves regular, prominent, 12-16 pairs, arched .....3. *Heyneana*.

1. *ERVATAMIA CORONARIA*, Stapf in Fl. Trop. Afr. iv. 127. *Tabernaemontana coronaria*, R. Br.; F. B. I. iii. 646; Wt. Ic. t. 477.

N. Circars, hills of Vizagapatam at 2,500 ft. (A. W. Lushington), the slender-flowered wild form of N. India. The form commonly cultivated in gardens has a thick corolla-tube, and is often with double flowers.

A shrub reaching 6-8 ft. in height, with white scented flowers, the crustaceous seeds with a red fleshy aril. Vern. *Hind.* Togar.

2. *ERVATAMIA CAUDATA*, Gamble in Kew Bull. 1921, 310. W. Gháts, Anamalai Hills (Barber, Fischer); hills of Tinnevely (Wight, Barber, Hooper and Ramaswami), at 2,500-4,000 ft., in evergreen forest. A shrub with white flowers and (one specimen only seen) 1-seeded follicle.

3. *ERVATAMIA HEYNEANA*, T. Cooke Fl. Bomb. ii. 134. *Tabernaemontana Heyneana*, Wall.; F. B. I. iii. 646. W. Gháts, in Malabar and Travancore, in open forest, up to 3,000 ft.

A small deciduous tree with white flowers and orange-yellow follicles, the seed arils red. Bark grey; wood white and pale grey in streaks, smooth, moderately hard. Vern. Mar. Nág kuda.

### 12. *Parsonsia*, R. Br.

Twining shrubs. *Leaves* opposite. *Flowers*, small, white, in terminal or axillary dichotomous cymes or thyrses. *Calyx* 5-lobed; tube with 5 scales within or eglandular. *Corolla* salver-shaped; tube short, cylindric or globose, the throat naked; lobes 5, overlapping to the right. *Stamens* inserted on the tube; filaments often spirally twisted; anthers half-exsert, oblong-lanceolate or linear, acute, conniving round the stigma and adhering to it, the cells spurred and empty below. *Disk* of 5 lobes or scales. *Ovary* 2-celled, cells many-ovuled; style filiform, the top dilated, truncate; stigma columnar or elongate-conic. *Fruit* of 2 follicular mericarps, long cohering, but at length separated from the 2 placentas. *Seeds* linear or fusiform, attenuated at the ends, with a coma of long silky hairs; testa striate; albumen scanty; cotyledons linear-oblong, flat; radicle superior.

*PARSONSIA SPIRALIS*, Wall.; F. B. I. iii. 650. *Heligme Rheedii*, Wt. Ic. t. 1303.

W. Coast, along backwaters in Travancore; W. Gháts, Hills of Coimbatore and Anamalais up to 3,000 ft.; Kollimalai hills of Trichinopoly.

A glabrous twining shrub with large subcoriaceous elliptic ovate or lanceolate acute leaves up to 6 in. long, 3 in. broad, sometimes slightly cordate at base, the flowers white.

### 13. *Vallisneria*, Burm.

Twining shrubs, rarely trees. *Leaves* opposite, minutely dotted. *Flowers* white, in axillary or supra-axillary dichotomous cymes, often reduced to fascicles. *Calyx* 5-lobed, glandular or not inside; lobes narrow. *Corolla* salver-shaped or sub-rotate, throat naked; lobes broad, spreading, overlapping to the right. *Stamens* inserted at the top of the tube of the corolla, exsert; filaments short; anthers connivent in a cone round the stigma and adherent to it, the connective with an often large dorsal gland; cells with rigid basal spurs. *Disk* annular or cupular, 5-lobed. *Ovary* of 2 carpels, connate at first, ovules many; style filiform;

stigma thick, annular at base, often 2-lobed at tip. *Fruit* of 2 follicles at first joined, at length separating with the placentas detached. *Seeds* 2-seriate, rounded below, attenuate above in a beak with a long white coma; testa rugose; albumen scanty; cotyledons thin or thick and fleshy, large; radicle cylindric, superior.

VALLARIS SOLANACEA, O. Kze. *V. Heynei*, Spreng.; F. B. I. iii. 650. *V. dichotoma*, Wall.; Wt. Ic. t. 438.

Deccan and Carnatic, in dry forests and hedges, also on W. Coast; sometimes cultivated.

A large twining straggling shrub with pretty large open white flowers and elliptic or lanceolate dotted leaves up to 4 in. long, 1.5 in. broad, the follicles 6 in. long, the seeds hollowed on the face. Bark yellowish-grey, wood white. Vern. *Hind.* Ramsar.

#### 14. Wrightia, R. Br.

Shrubs or small trees, branches slender. *Leaves* opposite. *Flowers* white yellow or red, in terminal or pseudo-axillary cymes. *Calyx* short, 5-lobed, with glands or scales within. *Corolla* salver-shaped; tube usually short, cylindric; throat with a corona in 1-2 series of erect, simple lobed or fimbriate scales, distinct or united in a ring; lobes overlapping to the left. *Stamens* inserted on the mouth of the tube; filaments short, dilated; anthers exsert, sagittate, connivent around and adhering to the stigma, cells spurred at the base. *Disk* 0. *Ovary* of 2 free or connate carpels, ovules many; style filiform; stigma ovoid with usually a toothed basal ring. *Fruit* of 2 connate or distinct follicular mericarps. *Seeds* linear, attenuate at the apex, the base with a deciduous coma; albumen scanty or 0; cotyledons broad, convolute; radicle short, superior.

Leaves glabrous or puberulous beneath; corona-scales fimbriate; follicles smooth, distinct, cohering at the apex only ..... 1. *tinctoria*.  
Leaves tomentose on both sides; corona-scales oblong, entire or lobed; follicles rough with white tubercles, connate throughout .... 2. *tomentosa*.

1. WRIGHTIA TINCTORIA, R. Br.; F. B. I. iii. 653; Wt. Ic. t. 444; Bedd. Fl. t. 241.

All Forest Districts, in deciduous forest, especially in the Deccan, less so in the Circars and W. Gháts, up to 4,000 ft. in the hills.



A small deciduous tree with white flowers and narrow follicles joined at the tips and with the long coma of the seeds at the base (in the somewhat similar *Holarrhena* they have it at the apex). Leaves variable, elliptic ovate or oblong, acuminate or caudate. Bark pale, smooth; wood white, even grained, useful for carving. The leaves give a blue dye. Vern. *Hind.* Dudhi; *Tel.* Tella pala; *Tam.* Nila palai; *Mal.* Aiya pala.

Var. *Rothii*, Hook. f. *W. Rothii*, G. Don; Wt. Ic. t. 1319. Branches, inflorescence and leaves beneath puberulous. Deciduous bracts often pink or lilac. Some Godavari specimens have large leaves tomentose beneath and follicles up to 18 in. long.

Dry forests of Hyderabad and the Ceded Districts, north to the Circars.

2. *WRIGHTIA TOMENTOSA*, Roem. & Sch.; F. B. I. iii. 653; Wt. Ic. t. 443. *W. Wallichii*, A. DC.; Wt. Ic. t. 1296.

All Forest Districts, in deciduous forest, chiefly in the Circars, Deccan and Carnatic, less common in the South, up to 4,000 ft. in the hills.

A small deciduous tree with yellowish flowers, the coronal scales orange, connate follicles and ovate or obovate tomentose leaves, the white coma of the seeds at the base. Bark grey, corky; wood white, moderately hard, even-grained, useful for carving. Vern. *Hind.* Dudhi; *Ur.* Pal kurwán; *Tel.* Tella pala; *Tam.* Pala; *Mal.* Mailam pala.

### 15. *Strophanthus*, DC.

Small trees or shrubs, often climbing. Leaves opposite. Flowers usually large, in terminal cymes, bracts prominent. Calyx 5-lobed, the tube usually glandular within. Corolla funnel-shaped, tube short, widening to a campanulate throat, with 10 free or connate corona scales; lobes overlapping to the right, produced in short or long often twisted tails. Stamens inserted at the top of the tube, included; filaments short; anthers sagittate, their tips filiform, connivent round and adnate to the stigma, the cells spurred at the base. Disk 0. Ovary of 2 distinct carpels, ovules many; style filiform, rugose; stigma columnar or conical, simple or 2-fid at apex. Fruit of 2 oblong or elongate spreading follicular mericarps. Seeds compressed, fusiform, narrowed to a feathery-

plumose point, base with a deciduous tuft of hairs; albumen scanty; cotyledons plano-convex.

Lobes of the corolla long and slender, up to about 2 in. in length, much longer than the tube; calyx-lobes subulate, .3 in. long; leaves elliptic-oblong, cuspidate-acuminate, up to 3.5 in. long, 1.5 in. broad, main nerves about 6 pairs, curved from the base ..... 1. *Wallichii*. Lobes of the corolla .25-.5 in. long, broad and obtuse at tip, about as long as the tube; calyx-lobes ovate, .1 in. long; leaves elliptic or elliptic obovate, acute, up to 3 in. long, 1.5 in. broad, main nerves 6-10 pairs, straight at first, curved only near the margin ..... 2. *Wightianus*.

1. STROPHANTHUS WALLICHII, A. DC.; F. B. I. iii. 655. *S. dichotomus*, Wall.; Wt. Ic. t. 59, not of DC.

N. Circars, in the mountains (*teste* Roxburgh).

A climbing shrub with ash-coloured bark with pink (Roxburgh) flowers and very long filiform anther-tails, the cymes loosely corymbose with many bracts.

2. STROPHANTHUS WIGHTIANUS, Wall.; F. B. I. iii. 656; Wt. Ic. t. 1301.

W. Coast, in Malabar and Travancore.

A climbing shrub with warted bark, closely corymbose cymes, anthers with rather short tails and thick woody follicles.

#### 16. *Beaumontia*, Wall.

† Large climbing shrubs. *Leaves* opposite. *Flowers* very large, white, in terminal cymes; bracts leafy. *Calyx* 5-lobed, glandular or not within; lobes foliaceous. *Corolla* funnel-shaped or campanulate, throat naked; lobes broad, overlapping to the right. *Stamens* inserted on the corolla-tube, included; filaments long, often spirally twisted; anthers horny, sagittate, conniving round and adhering to the stigma, the cells spurred at the base. *Disk* deeply 5-lobed. *Ovary* 2-celled; ovules many in each cell; style filiform; stigma oblong-fusiform. *Fruit* long, thick, woody, at length separating into 2 spreading follicular mericarps. *Seeds* compressed, lanceolate or oblong, attenuated at apex and surmounted by a coma; testa rugose; albumen thin; cotyledons thick, foliaceous; radicle short, superior.

BEAUMONTIA JERDONIANA, Wt. Ic. tt. 1314-15; F. B. I. iii. 661.

W. Gháts, Coorg and Wynaad.

A large climbing shrub with woody stem, large white funnel-shaped flowers and cylindric follicles 10 in. long.

*B. grandiflora*, Wall., a species from the E. Himalaya, is grown sometimes in gardens for its beautiful bell-shaped white flowers.

### 17. *Chonemorpha*, G. Don.

Stout climbing shrubs. *Leaves* opposite, large and broad. *Flowers* large, white, in lax terminal and pseudo-axillary bracteate panicle cymes. *Calyx* tubular, with a ring of glands at the base inside; lobes 5. *Corolla* salver-shaped; tube cylindric, slightly expanded at base and throat; lobes 5, broad, overlapping to the right, sharply twisted to the left. *Stamens* inserted on the corolla-tube, included; filaments short, broad, villous; anthers sagittate, acuminate, the cells shortly incurvedly spurred below. *Disk* thick, annular or cupular. *Ovary* of 2 distinct carpels; ovules many; style filiform, cleft below; stigma conoid or sub-clavate. *Fruit* of 2 long, straight, woody, parallel, follicular mericarps. *Seeds* ovoid, produced in a beak, surmounted by a long white silky coma; testa smooth; albumen scanty; cotyledons flat, thick, oblong, radicle short, superior.

CHONEMORPHA MACROPHYLLA, G. Don; F. B. I. iii. 661; Wt. Ic. t. 432; Bot. Mag. t. 7492.

W. Gháts, at low levels, and W. Coast, in moist forests.

A large climber with milky juice, large nearly orbicular leaves, fulvous tomentose beneath, very large fragrant white flowers, the corolla-lobes often 2 in. long and 1.5 in. broad, and follicles about a foot long.

### 18. *Aganosma*, G. Don.

Evergreen climbing shrubs. *Leaves* opposite. *Flowers* medium-sized or large, in terminal tomentose cymes; bracts many. *Calyx* divided nearly to the base in 5 narrow linear-lanceolate lobes, each with 2 small subulate glands at the base. *Corolla* salver-shaped; tube with lower part very short; upper part long, cylindric, with bearded longitudinal bands behind the anthers; lobes lanceolate linear-oblong or rounded, overlapping to the right. *Stamens* inserted at the base of the upper part of the corolla-tube, included; anthers sagittate, conniving over and

adherent to the stigma, the cells spurred at base. *Disk* cupular, 5-lobed. *Ovary* of 2 distinct, usually hirsute, carpels; ovules many; style straight; stigma columnar. *Fruit* of 2 short or long, terete or curved, follicular mericarps. *Seeds* ovate or oblong, flattened, glabrous, with a white silky coma at tip; albumen scanty; cotyledons oblong; radicle short, superior.

Cymes laxly corymbose; calyx-lobes linear-lanceolate, about .7 in. long, conspicuous; corolla rather large, lobes broadly falcate, .4 in. long, .25 in. broad; leaves ovate or elliptic, with 3 pairs of main nerves; follicles short, curved upwards, up to 8 in. long, glabrous but roughly scurfy; seeds hollowed near the top .....1. *dichotoma*.

Cymes densely corymbose; calyx-lobes linear, .3-.4 in. long; corolla rather small, lobes ovate acuminate, .15-.3 in. long; leaves elliptic or elliptic-lanceolate, acute or acuminate, sometimes (in dry regions) obtuse or even emarginate, with 5-8 pairs of main nerves; follicles straight, 6-9 in. long, tomentose at first, afterwards glabrous; seeds flat, slightly concave on one side .....2. *cymosa*.

1. AGANOSMA DICHOTOMA, K. Schum. *A. caryophyllata*, G. Don; F. B. I. iii. 662. *A. Blumei*, Wt. Ic. t. 1305, not of A. DC.

N. Circars, E. Deccan and Carnatic from Ganjam to the Rumpa Hills, Kondapalli in Kistna and the Nellore Veligondas.

A large climber with white corolla and red calyx lobes and leaves up to 4 in. long, tomentose at first, afterwards glabrescent.

2. AGANOSMA CYMOSA, G. Don; F. B. I. iii. 663. *A. elegans*, G. Don; Wt. Ic. t. 1304. *A. Doniana*, Wt. Ic. t. 1306. *Echites cymosa*, Roxb.; Wt. Ic. t. 395. *Toxocarpus eriocarpus*, Hook. f.; F. B. I. iv. 15?

Deccan, Carnatic and W. Ghâts, in forest Districts, up to 5,000 ft.

A large rambling climber with pale yellow flowers variable in size, and leaves also variable, up to 5 in. long but usually less.

#### 19. Anodendron, A. DC.

Glabrous climbing shrubs. *Leaves* opposite with distant nerves. *Flowers* small, in axillary or axillary and terminal spreading paniculate cymes; bracts small. *Calyx* small, 5-lobed, usually

without glands. *Corolla* salver-shaped; tube cylindric, little dilated opposite the stamens, the mouth contracted; lobes 5, overlapping to the right, twisted to the left. *Stamens* included, below the middle of the corolla-tube; anthers sagittate, connivent round and adherent to the stigma; cells shortly spurred at base. *Disk* cup-shaped. *Ovary* of 2 distinct carpels, sunk in the disk and dorsally adnate to it; ovules many; style short; stigma thick, conical. *Fruit* of 2 diverging, hard, acuminate, follicular mericarps. *Seeds* ovoid or oblong, compressed, beaked, tipped with a long silky coma; albumen scanty; cotyledons oblong, flat, leafy; radicle cylindric, superior.

*ANODENDRON PANICULATUM*, A. DC.; F. B. I. iii. 668; Wt. Ic. t. 1309, *fruit and seeds only*. *Echites paniculata*, Roxb.; Wt. Ic. t. 396.

N. Circars, in Ganjam (Barber); Deccan, in Mysore; W. Gháts from S. Canara and Coorg to Travancore, in the low country in dry open forests.

A very large climber with large panicles of small yellow flowers, elliptic or oblong abruptly acuminate leaves with 12-15 pairs of regular prominent main nerves, and follicles 6 in. long, the seeds long-beaked. Vern. *Mar. Lamtani*.

## 20. *Ichnocarpus*, R. Br.

Climbing shrubs with slender branches. *Leaves* opposite. *Flowers* small, in lax terminal and axillary paniculate cymes. *Calyx* 5-lobed, glandular or not within. *Corolla* salver-shaped, the throat contracted or villous, lobes overlapping to the right, the upper half deflexed in bud. *Stamens* inserted at or below the middle of the tube; filaments very short; anthers sagittate, conniving over and adhering to the stigma; cells spurred at the base. *Disk* free, with 5 erect disk glands. *Ovary* of 2 distinct carpels; ovules many; style short, the top obconic; stigma columnar. *Fruit* of 2 slender, spreading or divaricate, follicular mericarps. *Seeds* narrowed at the tip, crowned with a deciduous silky coma; albumen scanty; cotyledons long, flat; radicle short, superior.

*ICHNOCARPUS FRUTESCENS*, R. Br.; F. B. I. iii. 669; Wt. Ic. t. 420.

All Districts in the plains and lower hills, in forests, hedge-rows and open places, common.

A much-branched, extensively climbing, rusty-villous shrub with elliptic or lanceolate leaves up to 3 in. long, 1.5 in. broad, greenish-white flowers and slender follicles.

*Allamanda cathartica*, Linn., is a handsome climbing shrub from S. America, with large yellow flowers and whorled leaves, frequently grown in gardens in the plains, and sometimes, as along backwaters in Travancore, found run wild.

*Thevetia neriifolia*, Juss., is another S. American plant, an erect bush or small tree with large yellow flowers, linear alternate leaves and a rounded somewhat angular apple-like fruit, very common in gardens and occasionally found run wild near towns and villages.

*Plumeria acutifolia*, Poiret, is the Pagoda tree, probably also from tropical America, a common and conspicuous garden plant with thick fleshy branchlets and green oblong leaves, the flowers white with a pale yellow centre, very fragrant and used for garlands for the temples. *P. alba*, Linn., is also found in similar places in cultivation. It has large white flowers and thick reticulate leaves.

*Kopsia fruticosa*, A. DC., is a large evergreen shrub, native of Burma, common in gardens. It has pretty pink flowers and rather thin elliptic-lanceolate leaves.

*Nerium odorum*, Soland, the Indian Oleander, is a large shrub, common in rocky river beds in N. India, but not found wild, except perhaps as an escape, in Madras. It is often cultivated in gardens and has pink flowers, narrow linear coriaceous leaves and long follicles with brown coma to the seeds.

### Family C. ASCLEPIADACEAE.

Herbs or shrubs, usually twining, the stems usually woody, sometimes succulent. *Leaves* opposite or whorled, rarely alternate, sometimes wanting; stipules 0. *Flowers* hermaphrodite, regular, solitary or few or many together, usually in axillary, sometimes terminal, umbelliform cymes; bracts usually small or wanting. *Calyx* inferior, usually deeply 5-lobed, the lobes imbricate, usually with glandular scales at the base within. *Corolla* various, gamopetalous, 5-lobed; tube usually short (long in *Ceropegia*), often furnished within with processes forming a corolline corona; lobes imbricate, contorted or valvate, often

recurved, sometimes erect and connate at their tips. *Stamens* 5, inserted at or near the base of the corolla and alternating with its lobes; filaments free or more usually connate in a *staminal-column* with its apex united to the dilated part of the style; usually with more or less fleshy processes on the back forming a *staminal corona*; anthers 2-celled, the cell dehiscing by longitudinal or transverse slits, the tips often produced into inflexed membranes; pollen contents of each anther-cell granular or united into one or two *pollen-masses*; when granular each granule formed of about 4 grains loosely united and contained in a spoon- or trowel-like appendicle, attached by a *caudicle* to the *pollen-carrier* on the *style-apex*; when united, the pollen-masses of two adjacent but different anther cells either sessile on or connected by arm-like *caudicles* to one of the 5 usually horny *pollen-carriers* which rest on the angles of the *style-apex*. *Ovary* of 2 1-celled many-ovuled carpels, the styles united above and dilated in the style-apex bearing the pollen-carriers on its angles and beneath them the 5 stigmatic cavities. *Fruit* of 2 (or 1 by suppression) follicular mericarps, dehiscing by the ventral suture and usually liberating the placenta. *Seeds* usually flat, sometimes ovoid or cylindric, often marginal, crowned with a *coma* of long silky hairs; testa thin or thick, albumen usually thin; embryo large; cotyledons flat; radicle superior, usually cylindric.

Pollen-masses granular, loosely contained in the more or less spatulate appendicles, which are attached by a long or short caudicle to a gland which itself is attached to the angles of the style-apex (Tribe I. PERIFLOEAE):—

Corona-processes connate with the corolla:—

Corolla-tube shorter than the lobes:—

Corolla-lobes valvate .....1. *Hemidesmus*.

Corolla-lobes imbricate, overlapping to the right ..2. *Cryptolepis*.

Corolla-tube as long as or longer than the lobes .....*Cryptostegia*.

Corona-processes connate with the stamens:—

No glands between the stamens; corolla rotate:—

Shrubs with clustered narrow leaves; filaments short, slender

3. *Utleria*.

Climbers with opposite elliptic leaves; filaments very short, broad .....4. *Brachylepis*.

Glands present between the stamens:—

Corolla-lobes valvate in bud .....5. *Decalepis*.

Corolla-lobes imbricate in bud .....6. *Streptocaulon*.

Pollen-masses 4 or 2, minute, waxy, sessile on a minute, soft pollen-carrier (Tribe II. SECAMONEAE):—

Corolla-lobes imbricate in bud:—

Corolla-lobes small, overlapping to right or left; style-apex short, rounded, obtuse; leaves small, narrow, linear .....7. *Secamone*.

Corolla-lobes elongate, overlapping to the left; style-apex elongate, conical or clavate; leaves broad .....8. *Toxocarpus*.

Corolla-lobes valvate in bud, villous within, of 2 forms; style-apex with a broad top, produced above it; leaves broad ....9. *Genianthus*.  
Pollen-masses waxy, opaque, without pellucid margin, attached in pairs by caudicles to the dark-coloured horny pollen-carriers:—

Pollen-masses pendulous (Tribe III. CYNANCHEAE):—

Stem erect; corolla valvate in bud:—

Corona processes laterally compressed .....10. *Calotropis*.

Corona-processes hooded, with a protruding horn

11. *Asclepias*.

Stem twining; corolla-lobes more or less overlapping in bud:—

Corona single:—

Flowers large:—

Corolla thin, with a pubescent ring at its base; corona-processes dilated at base, acuminate at tip; follicles slender

12. *Oxystelma*.

Corolla thick, glabrous; corona annular, fleshy

13. *Holostemma*.

Flowers small; corolla rotate, or campanulate:—

Corona of 5 erect laterally compressed processes with an upcurved spur at base.....14. *Pentatropis*.

Corona annular or tubular, plicate, toothed or lobed

15. *Cynanchum*.

Corona double, the outer membranous, annular or cupular, the inner of processes attached to the staminal column:—

Leafy twiners; follicles softly echinate .....16. *Pergularia*.

Leafless fleshy stragglers; follicles smooth ..17. *Sarcostemma*.

Pollen-masses erect or horizontal, very rarely pendulous (Tribe IV. MARSDENIEAE):—

Corona single, corolline .....18. *Gymnema*.

Corona-processes adnate to the staminal column:—

Corolla-tubes overlapping:—

Corona of 5 distinct processes:—

Corona-lobes tubercle-like, radiating from the base of the staminal column and quite adnate to it; pollen-masses usually horizontal .....19. *Tylophora*.



Corona-lobes with the base adnate to the staminal column, free above; pollen-masses erect :—

Corona-lobes with a subulate process on the inner face  
20. *Telosma*.

Corona-lobes without a process on the inner face  
21. *Marsdenia*.

Corona-lobes scale-like, bifid at apex; style-apex with a rim ..... 22. *Cosmostigma*.

Corolla-tubes valvate :—

Corolla urceolate or disciform; corona cupular, fleshy, usually with an inner process ..... 23. *Oianthus*.

Corolla rotate :—

Leaves thin; corona spreading, usually with an inner process ..... 24. *Heterostemma*.

Leaves thick and fleshy; corona large, stellate .. 25. *Hoya*.

Pollen masses waxy, pellucid on one margin or at apex, attached in pairs by caudicles to the usually dark-coloured pollen-carriers; corolla-lobes valvate (Tribe V. *CEROPEGIEAE*) :—

Corona double; corolline of processes in the sinuses of the lobes, staminal annular ..... 26. *Leptadenia*.

Corona staminal, annular, single or double, usually with 5 processes which overlap the anthers :—

Leafy herbs with terete stems and branches :—

Corolla-tube campanulate-rotate, with narrow lobes; corona single, staminal, annular; slender plants with linear leaves.

27. *Brachystelma*.

Corolla-tube long, the lobes usually cohering at tip; corona double, staminal, outer annular, inner of incurved or erect processes; erect or twining herbs ..... 28. *Ceropegia*.

Leafless herbs with fleshy 4-angled stems and branches; corona double, the outer annular, the inner of inflexed processes.

29. *Caralluma*.

### 1. *Hemidesmus*, R. Br.

Twining undershrub. *Leaves* opposite or in whorls of 4. *Flowers* small, greenish-purple; in axillary opposite crowded sessile cymes. *Calyx* 5-partite; lobes acuminate, with 5 minute scales at their bases within. *Corolla* rotate, deeply 5-fid, with valvate fleshy lobes; corona-scales 5, thick, on the corolla-lobes and alternate with them. *Stamens* inserted at the base of the corolla-tube; filaments distinct or subconnate at the base;

anthers small, cohering at the apex, ending in inflexed appendages; pollen-masses cohering in pairs in each cell, granular, the caudicles of the pollen-carriers bearing cucullate or spreading appendices. *Ovary* of 2 many-ovuled carpels; styles distinct, style-apex 5-lobed, flat on top. *Fruit* of 2 slender divaricate terete follicular mericarps. *Seeds* oblong, flattened, ridged ventrally, ending in a long white silky coma; cotyledons oblong; radicle cylindric.

*HEMIDESMUS INDICUS*, R. Br.; F. B. I. iv. 4; W. & A. Contrib. 63; Wt. Ic. t. 594.

All plains Districts, in open forests, waste places and hedges, common.

A much-twining wiry shrub with polymorphous leaves varying from elliptic or almost orbicular and obtuse to long linear and narrow. The follicles are long and slender often up to 8 in. in length. Vern. *Tam.* Nannari; *Tel.* Sugandapala.

Var. *pubescens*, Hook f. *H. pubescens*, W. & A. Contrib. 63; Wt. Ic. t. 1320.

Branchlets, leaves beneath and inflorescence pubescent, the leaves variable as in the species.

N. Circars, Deccan and Carnatic from Vizagapatam to Madras.

## 2. *Cryptolepis*, R. Br.

Twining glabrous shrubs. *Leaves* opposite. *Flowers* in lax, slender, dichotomous, few-flowered, peduncled, terminal or axillary cymes; bracts and bracteoles small. *Calyx* deeply 5-fid with 5 scales within near the base. *Corolla*-tube short, cylindric or campanulate; lobes 5, linear, overlapping and twisted to the right in bud; corona-scales 5, linear or clavate, inserted near or above the middle of the tube. *Stamens* 5, attached near the base of the corolla-tube; filaments subconnate by broad bases; anthers short, adhering to the style-apex by their bases, the tips acuminate, connivent; pollen-masses cohering in pairs in each cell, granular, appendices of pollen-carriers oblong. *Ovary* of 2 many-ovuled carpels; styles distinct, style-apex shortly conical. *Fruit* of 2 divaricate, smooth, follicular mericarps. *Seeds* oblong, flattened, ending in a long white silky coma; cotyledons elliptic; radicle long.

Main nerves of the leaves many, nearly horizontal and parallel, meeting in an intra-marginal ring, the leaves elliptic or elliptic-oblong with an abrupt apiculus, up to 7 in. long, and even 4 in. broad; peduncles very short, corolla-lobes .3 in. long; follicles stout, 2-4 in. long, lanceolate

1. *Buchanani*.

Main nerves of the leaves not horizontal and parallel, usually curved upwards; peduncles long; follicles long and narrow:—

Leaves ovate, obtuse or acute and apiculate, up to 4 in. long, 1.5 in. broad, main nerves about 5-6 pairs; peduncles 1.5 in. long; corolla-lobes .4-.6 in. long; follicles linear lanceolate, .4 in. long, .3-.5 in. broad

2. *grandiflora*.

Leaves oblong or oblong-lanceolate, apiculate, obtuse or even cordate at base, up to 3 in. long, 1-1.5 in. broad, main nerves about 7 pairs; peduncles 1 in. long; corolla-lobes .4 in. long; follicles very slender, up to 8 in. long, .2 in. broad

3. *elegans*.

1. *CRYPTOLEPIS BUCHANANI*, Roem. & Sch.; F. B. I. iv. 5; Wt. Ic. t. 494.

N. Circars, Deccan, Carnatic and W. Coast, in deciduous forests and in hedges.

A large much-branched climber with white flowers and leaves nearly white beneath. Bark purplish-red, peeling off in papery flakes; wood white. Vern. *Hind.* Karanta; *Tel.* Adivi pala tiga.

2. *CRYPTOLEPIS GRANDIFLORA*, Wt. Ic. t. 831; F. B. I. iv. 5. Deccan, forests of the Ceded Districts; hills of the Carnatic, south to Tinnevely.

A slender climber with rather large flowers, narrow divaricate follicles and rather thick leaves, the reticulation impressed above.

3. *CRYPTOLEPIS ELEGANS*, Wall.; F. B. I. iv. 6. *C. pauciflora*, Wt. Ic. t. 493.

N. Circars, hills of Ganjam to Godavari (A. W. Lushington, Barber, etc.).

A slender wiry climber with thin leaves, yellow flowers and very narrow follicles often divaricate to lie in one straight line.

3. *Utleria*, Bedd.

A glabrous shrub. Leaves opposite, whorled or scattered, linear-lanceolate, subcrenulate, clustered at the ends of the thick branchlets. Flowers small, in terminal or axillary, long-peduncled,

glabrous, dichotomous cymes, among the leaves at the ends of the branchlets. *Calyx* very small; lobes 5, ovate, each with 2 minute glands. *Corolla* rotate; lobes 5, slightly overlapping and twisted to the right; corona-scales 5, small, rounded. *Stamens* inserted on the base of the corolla-tube; filaments short; anthers ovate, tip pointed, connivent over and adherent to the style-apex; pollen-masses in pairs in each cell, granular, the appendices of the pollen-carriers short, rounded. *Ovary* of 2 many-ovuled carpels; style-apex convex on the top. *Fruit* of 2 smooth lanceolate divaricate follicular mericarps. *Seeds* broadly ovate, thin, tipped with a white coma.

UTLERIA SALICIFOLIA, Bedd.; F. B. I. iv. 7; Hook. Ic. t. 1432.

W. Gháts, Anamalai Hills, at 3,000–5,000 ft. (Beddome, Fischer).

A shrub, up to 4·5 ft. high, growing among or in fissures of the rocks (Fischer), on open rocky ground, a small tree (Bedd.). Bark thick, grey, papery; wood white. The leaves are narrowly lanceolate, usually 3–4 in., sometimes up to 9 in. long, the mericarps 2 in. long, glabrous. Vern. *Kader Utleer* (Bedd.).

#### 4. *Brachylepis*, W. & A.

A climbing shrub with pubescent branches and villous inflorescence. *Leaves* opposite. *Flowers* small, in terminal or axillary dichotomous bracteate cymes. *Calyx* deeply 5-fid, with 5 small glands between the ovate lobes within. *Corolla* rotate, 5-lobed, the lobes slightly overlapping to the right; corona of five broad membranous scales. *Stamens* inserted on the throat of the corolla, with very short broad filaments; anthers attached to the style-apex and inflexed to enclose it; pollen-masses in pairs in each cell, granular, the appendices of the pollen-carriers minute, funnel-shaped. *Ovary* of 2 many-ovuled carpels; style-apex flat on the top. *Fruit* of 2 divaricate, acuminate, thick, smooth, follicular mericarps. *Seeds* ovate oblong, ridged ventrally, tipped with a long white coma, cotyledons elliptic, flat, radicle cylindric.

BRACHYLEPIS NERVOSA, W. & A. Contrib. 64; F. B. I. iv. 7; Wt. Ic. t. 1284, Spic. Neilgh. t. 156.

W. Gháts, Nilgiri Hills at 5,000–7,500 ft.

A wiry climber, the corolla green without purple within, the leaves thick, elliptic, acute or acuminate, with 8–10 pairs

of strong main nerves, the follicles narrow-lanceolate about 3 in. long, divaricate in a nearly straight line.

### 5. *Decalepis*, W. & A.

A glabrous twining shrub, the branches jointed. *Leaves* opposite. *Flowers* small, in axillary peduncled cymes. *Calyx* deeply 5-fid, eglandular. *Corolla* rotate; lobes 5, valvate, white-villous within; corona of 10 scales, alternately long and hooded and short triangular flat. *Stamens* at the base of the corolla, alternating with triangular glands; filaments distinct but cohering at the base with the glands between; anthers ovate, conniving over and adnate to the style-apex, the tips acute, inflexed; pollen-masses granular, in pairs, appendices of pollen-carriers shovel-shaped. *Ovary* of 2 many-ovuled carpels; styles distinct; style-apex convex, 5-grooved. *Fruit* of 2 thick lanceolate short follicular mericarps. *Seeds* shortly ovate, ridged, tipped with a white coma.

*DECALEPIS HAMILTONII*, W. & A. Contrib. 64; F. B. I. iv. 11; Wt. Ic. t. 1285.

Deccan, Horsleykonda, at 4,500 ft. (Gamble), Madanapalle in Chittoor at 3,000 ft., hills of N. Coimbatore (Fischer); Carnatic, Veligonda Hills of Nellore (Ramaswami), Kambakam Hills of Chingleput; W. Gháts, Anamalais (Wight, Barber).

A climber with orbicular or elliptic-obovate leaves, about 2 in. long, the main nerves about 6 pairs, arched; the follicles 2.5 in. long, .75 in. in diam.

### 6. *Streptocaulon*, W. & A.

Twining herbs or shrubs, usually tomentose. *Leaves* opposite. *Flowers* small, in lax sessile or peduncled trichotomous cymes in one axil of a pair of leaves. *Calyx* minute, 5-lobed, glandular within. *Corolla* rotate; lobes ovate, slightly overlapping to the right; corona-scales 5, filiform, adnate to the backs of the filaments. *Stamens* inserted at the base of the corolla; filaments very short alternating with minute glands; anthers conniving over and adherent to the style apex; pollen-masses in pairs in each cell, granular; appendices of pollen-carriers spathulate. *Ovary* of 2 distinct carpels; style-apex 5-angled, convex at top.

*Fruit* of 2 divaricate follicular mericarps. *Seeds* flattened, keeled ventrally, tips with a long white silky coma; cotyledons oblong, flat; radicle long.

STREPTOCAULON KLEINII, W. & A. in Wt. Contrib. 65; F. B. I. iv. 9.

S. India, locality not known (Wight).

A climber with panduriform leaves rugose above and densely white tomentose beneath, the cymes with peduncles about 1 in. long, few-flowered.

### 7. Secamone, R. Br.

Climbing or straggling shrubs or undershrubs. *Leaves* opposite. *Flowers* small or minute, in lax axillary, sessile or shortly peduncled, 2-3-chotomous cymes. *Calyx* 5-lobed, eglandular. *Corolla* small, rotate, 5-lobed, the lobes overlapping to right or left; corona-scales 5, adnate to the staminal column, compressed. *Stamens* inserted at the base of the corolla; filaments short, free or connate at base; anther-tips inflexed and connivent round the style-apex; pollen-masses small, in pairs in each cell, attached in fours to a minute pollen-carrier without caudicles. *Ovary* of 2 carpels, many-ovuled; style columnar, dilated, ending in a flattened ring and produced above it. *Fruit* of 2 divaricate follicular mericarps, smooth. *Seeds* oblong, flattened but ridged, ending in a long white silky coma; cotyledons linear-oblong; radicle nearly as long, cylindric.

SECAMONE EMETICA, R. Br.; F. B. I. iv. 13; Wt. Contrib. 60; Wt. Ic. t. 1283.

Deccan and Carnatic, in hilly regions from Nellore to Coimbatore, south to Tinnevely, up to 4,500 ft. on Horsleykonda. A wiry much-branched climbing shrub with minute flowers, narrow linear leaves, and slender follicles about 2-2.5 in. long. Bark brown, thick, corky and deeply cleft; wood white.

### 8. Toxocarpus, W. & A. in part.

Twining shrubs. *Leaves* opposite. *Flowers* small or moderate-sized, in axillary dichotomous paniculate or racemose cymes. *Calyx* very small, 5-lobed, with or without minute scales at the base within. *Corolla*-tube short, usually campanulate, 5-lobed, the lobes linear-oblong, overlapping to the left; corona-scales attached to the staminal tube, flattened, sometimes with an inner

flap. *Stamens* inserted at the base of the corolla; filaments connate; anthers small, minutely fimbriate at tip; pollen-masses very minute, pendulous, apparently in pairs attached to minute soft pollen-carriers, without caudicles. *Ovary* of 2 carpels; style slender, style-apex long and slender or clavate. *Fruit* of 2 divaricate follicular mericarps. *Seeds* oblong, flattened, tipped with a silky coma; cotyledons oblong; radicle cylindric.

Corona-scales shorter than the stamens, acute :—

- Corolla .2 in. long; leaves ovate, abruptly acute, thin, glabrous, up to 3 in. long, 2 in. broad, main nerves about 5 pairs . . . 1. *Roxburghii*.  
 Corolla .4 in. long; leaves elliptic or elliptic-obovate, abruptly acuminate, nearly glabrous, up to 4.5 in. long, 2 in. broad, main nerves 6-7 pairs . . . . . 2. *palghatensis*.

Corona-scales longer than the stamens, obtuse :—

- Corolla .35 in. long, the tube short, villous within; leaves lanceolate or elliptic-lanceolate, acuminate, cuneate at base, glabrous, 4 in. long, 1.5 in. broad, the main nerves 7 pairs . . . . . 3. *Beddomei*.  
 Corolla .5 in. long, the tube short, glabrous within; leaves ovate, acuminate, rounded at base, usually glandular-pubescent beneath, up to 3 in. long, 1.5 in. broad, main nerves 4-5 pairs; follicles very slender, acuminate, 6 in. long . . . . . 4. *Kleinii*.

1. *TOXOCARPUS ROXBURGHII*, W. & A. in Wt. Contrib. 61; F. B. I. iv. 14; Wt. Ic. t. 475.

N. Circars ? (Heyne).

A slender climber with pale yellow fragrant flowers (Roxb.).

2. *TOXOCARPUS PALGHATENSIS*, Gamble in Kew Bull. 1922, 119.  
 W. Gháts, Palghat Hills of Malabar at 3,500 ft. (Beddome).

A slender climber with smooth leaves and much nearly black furfuraceous tomentum on the younger parts.

3. *TOXOCARPUS BEDDOMEI*, Gamble in Kew Bull. 1922, 119.  
 W. Gháts, Atraimalai Hills of Tinnevely (Beddome).

A slender climber, the leaves smooth and pale when dry.

4. *TOXOCARPUS KLEINII*, W. & A. Contrib. 61; F. B. I. iv. 14; Wt. Ic. t. 886.

N. Circars, on the Godavari (Barber); Carnatic, hills of Trichinopoly; W. Gháts, Nilgiris, hills of Cochin.

A slender climbing shrub, the stem, inflorescence and under-surface of leaves rufous-villous, the follicles curved and long-beaked.

9. *Genianthus*, Hook. f.

Twining shrubs. *Leaves* opposite. *Flowers* small, in axillary usually di- or tri-chotomous cymes. *Calyx* very small, 5-lobed, with minute scales at the base within. *Corolla* rotate; tube short; lobes spreading or recurved, villous within, valvate in bud; corona-scales 5, flattened, attached to the staminal tube. *Stamens* in a column, the anthers erect, appendages short; pollen-masses 2 in each cell, granular, on a small pollen-carrier, without caudicles. *Ovary* of 2 carpels; style with a broad apex, usually produced above it. *Fruit* of 2 follicular mericarps, slender and usually curved. *Seeds* flattened, with a long silky coma.

GENIANTHUS LAURIFOLIUS, Hook. f.; F. B. I. iv. 16. *Toxocarpus laurifolius*, Wt.; W. & A. Contrib. 61; Wt. Ic. t. 598.

S. Canara, at Jahlsur (Barber).

A slender climbing shrub with broadly elliptic, shortly acuminate leaves with 6-7 pairs of curved main nerves, flowers of 2 forms, one with short recurved densely bearded corolla-lobes, the others with broader erect pubescent ones, the latter apparently the fertile ones, and terete slender follicles 3-5 in. long.

10. *Calotropis*, R. Br.

Large erect shrubs or small trees. *Leaves* opposite, broad. *Flowers* medium-sized, in umbellate or racemose lateral pedunculate cymes. *Calyx* 5-lobed; lobes broadly ovate, glandular within. *Corolla* broadly campanulate or subrotate, divided more than halfway down in 5 valvate lobes; corona scales 5, fleshy, adnate to and radiating from the large staminal column, with an up-curved involute spur or two obtuse auricles. *Stamens* inserted at the base of the corolla; anthers short, broad, somewhat horny at the angled wings; appendages short, broad, inflexed over the style-apex; anther-cells a shallow pouch; pollen-masses solitary, flattened, pendulous, attached by slender caudicles to the oblong pollen-carriers. *Ovary* of 2 distinct carpels; style slender with a depressed pentagonal style-apex. *Fruit* of 2 large, inflated, fleshy, thick follicular mericarps. *Seeds* ovate, plano-convex, the broad apex surmounted by a coma of long slender silky hairs.

Corolla-lobes spreading, pale lavender; corona-scales narrow, shorter than the staminal column, with pubescent back, the entire apex with 2 obtuse auricles below it, the spur upcurved involute. . . . . 1. *gigantea*.



Corolla-lobes erect, pink and purple spotted; corona-scales, equal to or longer than the staminal column, glabrous on the back, the apex bifid without auricles, the spur upcurved acute .....2. *procera*.

1. *CALOTROPIS GIGANTEA*, R. Br.; F. B. I. iv. 17; W. & A. Contrib. 53.

All plains Districts in waste places and on roadsides, often on black cotton soil.

A large milky shrub, very pale in colour, the branches and leaves and inflorescence covered with loose soft white wool, the large sessile leaves ovate or obovate, cordate at base, the flowers large and pale, the large fleshy follicles green and ventricose, the seeds with an abundant white milky coma. Bark yellowish-white; wood white and soft. The bark gives a strong fibre and the silky coma is used to stuff pillows. Vern. *Hind.* Mudár, Ak.; *Ur.* Uruk; *Tel.* Jilledu; *Tam.* Erukku, Yerikan; *Mal.* Yerikku.

2. *CALOTROPIS PROCERA*, R. Br.; F. B. I. iv. 18; Wt. Ic. t. 1278.

Most plains Districts, as the preceding, usually in drier localities.

A milky shrub, smaller in size than the preceding and like it except as regards the flowers. The uses are the same. Vern. *Hind.* Mudár, Ak.; *Tel.* Jilledu.

### 11. *Asclepias*, Linn.

Perennial herbs or shrubs, often with tuberous roots. *Leaves* opposite or whorled. *Flowers* moderate-sized, in umbellate cymes. *Calyx* deeply 5-partite, 5-10-glandular within at the base. *Corolla* rotate, deeply 5-lobed; lobes valvate or slightly overlapping, often reflexed; corona-scales 5, arising from the staminal column and adnate to it above, concave-cucullate with sometimes a horn protruding from within. *Stamens* adnate near the base of the corolla, the filaments connate in a tube; anthers with a membranous tip over the style-apex; pollen-masses pendulous, flattened, solitary, attached by often curved caudicles to the hard pollen-carriers. *Ovary* of 2 distinct carpels; styles free below, connected above; style-apex columnar, truncate or depressed at tip. *Fruit* of 2 smooth usually beaked and inflated follicular mericarps, often more or less covered with subulate hairs. *Seeds* flattened, winged, ending in a silky coma; cotyledons elliptic, radicle as long.

ASCLEPIAS CURASSAVICA, Linn. ; F. B. I. iv. 18.

Most plains Districts, in waste places and on roadsides ; a tropical American plant, run wild and now common ; often planted in gardens.

An erect herb with narrowly lanceolate leaves, bright orange-red flowers and beaked and stalked follicles about 3 in. long.

*A. physocarpa*, Schlect., is a shrubby plant found in gardens and sometimes run wild in the Nilgiri Hills. The large, usually obtuse, inflated follicles have sparse long setae on their sides.

## 12. Oxystelma, R. Br.

Glabrous twining herbs or undershrubs. *Leaves* opposite, narrow. *Flowers* large, in lax racemose or subumbellate cymes or solitary ; pedicels filiform. *Calyx* small, 5-partite, with a row of glands at the base within. *Corolla* broadly rotate, lobed half-way down and with a densely pubescent ring (corolline corona of some authors) at its base ; lobes triangular, ciliate, valvate at base, shortly overlapping to the right in bud ; corona-processes adnate to the staminal tube, the bases dilated, the tips acuminate. *Stamens* with the filaments connate in a tube ; anthers erect, with a short membranous inflexed appendage ; pollen-masses waxy, pendulous, elongate-clavate, attached in pairs by slender caudicles to the hard brown shortly oblong pollen-carriers. *Ovary* of 2 many-ovuled carpels ; style short, the apex truncate or convex. *Fruit* of 2 (1 usually absent) rather short, smooth or winged follicular mericarps. *Seeds* small, ovoid, winged on the margins, ending in a silky coma ; cotyledons suborbicular ; radicle short.

OXYSTELMA ESCULENTUM, R.Br. ; W. & A. Contrib. 54 ; F. B. I. iv. 17. *Periploca esculenta*, Roxb. Cor. Pl. t. 11.

N. Circars and Carnatic, in hedges and among bushes, usually near water ; less common in the Deccan, common in S. Travancore along water-courses.

A very pretty graceful twining herb with narrow linear-lanceolate leaves, widely open flowers with a white or rose corolla marked with purple veins, and lanceolate acuminate follicles rounded at base and winged. Vern. *Hind.* Kirni, Dudhi ; *Tel.* Dudhi pala.

13. *Holostemma*, R. Br.

Glabrous twining shrubs. *Leaves* opposite, cordate. *Flowers* large, purple, in few-flowered axillary cymes. *Calyx* 5-partite, eglandular. *Corolla* thick, subrotate, deeply 5-lobed, the lobes overlapping to the right; corona affixed to the base of the staminal column, annular, fleshy, truncate. *Stamens* adnate to the base of the corolla-tube, the filaments connate in a 10-winged column; anthers large, horny, shining, with membranous inflexed tips; pollen-masses pendulous, clavate, elongate, compressed, attached by long caudicles to the hard brown linear pollen-carriers. *Ovary* of 2 distinct carpels; style slender, style-apex oblong, 5-winged. *Fruit* of 1-2 thick lanceolate broad follicles. *Seeds* ovoid, flattened, winged, ending in a white silky coma.

*HOLOSTEMMA ANNULARE*, K. Schum.; *H. Rheedii*, Wall.; F. B. I. iv. 21; Wt. Contrib. 55, Ic. t. 597.

N. Circars, Deccan and Carnatic, in hedges and in open forests, especially in the hills, westwards to the lower slopes of the Gháts; coast of S. Travancore.

A large climber with large conspicuous flowers, the corolla purple within, pink or white without, ovate deeply cordate acuminate leaves and a thick follicle 3.5 in. long, the second one often suppressed.

14. *Pentatropis*, R. Br.

Slender twining herbs or undershrubs. *Leaves* opposite, small. *Flowers* small, purplish, in lateral or axillary umbellate cymes; pedicels filiform. *Calyx* 5-partite, usually glandular within; lobes acute. *Corolla* rotate, divided nearly to the base; lobes elongate, overlapping to the right, twisted to the left; corona of 5 laterally compressed scales adnate to the backs of the anthers and with an upcurved spur at the base. *Stamens* 5, in a short column from the base of the corolla; anthers with membranous tips; pollen-masses pendulous, not compressed, waxy, attached by short caudicles to the oblong pollen-carriers. *Ovary* of 2 distinct carpels, many-ovuled; style slender, style-apex 5-angled, shortly cylindric, tip flat. *Fruit* of 2 lanceolate, beaked, follicular mericarps. *Seeds* ovoid, flattened, margined, ending in a white silky coma.

PENTATROPIS MICROPHYLLA, W. & A. in Wt. Contrib. 52; F. B. I. iv. 19; Wt. Ic. t. 352.

Deccan and Carnatic, in hedges and open forest land.

A very slender climber with small purplish corollas pubescent within, small ovate obtuse mucronate leaves and beaked follicles about 2·5 in. long.

### 15. Cynanchum, Linn.

Erect or twining herbs or shrubs. *Leaves* opposite, often with a second pair, stipule-like and smaller, alternating from the same node. *Flowers* small, greenish or purplish, in axillary, umbellate or corymbose, sessile or peduncled cymes. *Calyx* 5-partite, usually with glands at the base within. *Corolla* rotate or campanulate, 5-partite, the lobes slightly overlapping to the right in bud; corona membranous, adnate to the base of the staminal column, annular cupular or tubular, toothed or lobed at the top. *Stamens* 5, adnate to the base of the corolla-tube; filaments connate in a short column, anthers hardened, the appendages membranous, erect or inflexed; pollen-masses oblong, pendulous, attached by short caudicles to the horny pollen-carriers. *Ovary* of 2 carpels; styles free below; style-apex 5-angled, truncate rounded or conical. *Fruit* of 2 smooth follicular mericarps, often winged. *Seeds* plano-convex, margined, ending in a silky coma; cotyledons ovate; radicle nearly as long.

Follicles not winged, long-beaked; leaves broadly cordate at base with a deep open sinus, the basal lobes rounded, otherwise ovate, acute or acuminate, up to 3 in. long, 2 in. broad; stipular leaflets rounded; corolla-lobes narrowly lanceolate, 1 in. long, spreading; corona tubular, plicate, with 5 lanceolate lobes and small teeth between them

1. *pauciflorum*.

Follicles winged, acute or acuminate:—

Leaves very shortly cordate at base with small rounded, sometimes overlapping lobes and small sinus, otherwise linear or elliptic- or ovate-oblong, apiculate, glaucous beneath, up to 4 in. long, 1·5 or even 2 in. broad; stipular leaves small, often wanting; corolla-lobes erect or spreading, oblong, 1·5 in. long; corona tubular, plicate, with 5 entire or toothed lobes with teeth between them . . . 2. *Callialata*. Leaves truncate or shortly cordate at base, the lobes if cordate rounded with a shallow sinus, otherwise variable in shape, ovate or lanceolate, acuminate, pale but not glaucous beneath, up to 3 in. long, 1·5 or

even 2 in. broad, the stipular leaves ovate apiculate; corolla-lobes reflexed ovate-oblong, .15 in. long; corona short, cupular, plicate, irregularly crenately lobed .....3. *alatum*.

1. *CYNANCHUM PAUCIFLORUM*, R. Br.; F. B. I. iv. 23; Wt. Contrib. 56, Ic. t. 354.

Carnatic and the Eastern slopes of the W. Gháts from the Pulneys southwards.

A herbaceous climber, glabrous, the flowers greenish tinged with pink.

2. *CYNANCHUM CALLIALATA*, Ham. in Wt. Contrib. 56; F. B. I. iv. 24; Wt. Ic. t. 1279.

N. Circars, hills of Ganjam and Vizagapatam; W. Gháts, in all Districts on W. side, up to 3,000 ft.; Shevaroy Hills of Salem (Bourne).

A herbaceous twining shrub, glabrous. The Circar specimens have mostly narrow leaves, and agree with *C. angustifolium*, W. & A. in Wt. Contrib. 57, which is hardly even a variety.

3. *CYNANCHUM ALATUM*, W. & A.; Wt. Contrib., 57, Ic. t. 1250 (but not so hairy); F. B. I. iv. 23.

W. Gháts, Nilgiris, Pulneys, Anamalais and hills of Tinnevely and Travancore up to 6,000 ft.

A slender twiner, branchlets and young leaves slightly pubescent.

#### 16. *Pergularia*, Linn (not of other authors).

Twining pubescent or tomentose undershrubs. *Leaves* opposite, cordate. *Flowers* medium-sized, greenish-white, in axillary racemose or corymbose pedunculate cymes; pedicels slender. *Calyx* 5-partite, 5-glandular, lobes acute. *Corolla*-tube short, campanulate or funnel-shaped; lobes 5, ovate, spreading, overlapping to the right in bud; corona double, the outer membranous, annular, 5-lobed, the lobes truncate or dentate, the inner of 5 erect, laterally compressed, lobes spurred at the base and produced above in long free often fimbriate tips curved over the style-apex. *Stamens* 5, adnate to the corolla-tube; filaments connate in a column; anther-appendages membranous, inflexed; pollen-masses waxy, pendulous, attached in pairs to the shining horny pollen-carriers without caudicles. *Ovary* of 2 distinct

carpels; styles slender; style-apex slightly convex at top. *Fruit* of 2 lanceolate, acuminate, smooth or softly echinate, often recurved follicles. *Seeds* ovate, minutely pubescent, margined, ending in a silky white coma; cotyledons suborbicular, radicle pointed.

*PERGULARIA EXTENSA*, N. E. Br. in Fl. Cap. iv. i. 758. *Daemia extensa*, R. Br.; F. B. I. iv. 20; Wt. Contrib. 59, Ic. t. 596.

N. Circars, Deccan and Carnatic, westwards to the E. slopes of the W. Gháts up to 3,000 ft., common.

A slender bad-smelling milky climber with hispid stems, greenish flowers, suborbicular cordate leaves and reflexed lanceolate follicles covered with soft spines. Vern. *Tam.* Belaparti.

### 17. *Sarcostemma*, R. Br.

Shrubs, with trailing leafless jointed stems and pendulous branches. *Flowers* small, in sessile terminal or lateral umbels. *Calyx* small, 5-partite, glandular or not within. *Corolla* rotate, deeply lobed; lobes 5, overlapping to the right in bud; corona double, the outer cupular, membranous, 5-10-lobed or -crenate, attached to the base of the staminal column, the inner of 5 erect fleshy compressed or rounded processes adnate to the stamens above and more or less to the outer corona below, rarely absent. *Stamens* adnate to the base of the corolla-tube; filaments forming a column; anthers with membranous inflexed appendages; pollen-masses slender, curved, pendulous, attached by usually short caudicles to the hard pollen-carriers. *Ovary* of 2 carpels; styles slender; style-apex 5-angled, rounded or conical or fusiform at top. *Fruit* of 2 straight smooth follicular mericarps. *Seeds* flat, usually margined, the margins sometimes toothed at base; cotyledons fleshy, elliptic or oblong; radicle short or long.

Umbels always terminal, pedicels glabrous or slightly pubescent; inner corona longer than the anthers; follicles .5 in. long or less, slightly divaricate; seeds small, .25 in. long or less, the wings usually toothed below, radicle as long as the cotyledons:—

- Style-apex rounded at top; follicles lanceolate, 4-5 in. long; seeds glabrous ..... 1. *brevistigma*.  
 Style-apex acuminate at top; follicles linear, 2.5-4 in. long; seeds pubescent ..... 2. *intermedium*.

Umbels usually lateral, pedicels crispate villous; inner corona shorter than the anthers; follicles up to 9 in. long, recurved; seeds large, 3-4 in. long, glabrous, broadly margined and not toothed, radicle very short, the cotyledons long .....3. *Brunonianum*.

1. *SARCOSTEMMA BREVISTIGMA*, W. & A. in Wt. Contrib. 59; F. B. I. iv. 26; Wt. Ic. t. 595.

N. Circars, Deccan and Carnatic, in stony places chiefly, up to 4,500 ft. on Horsleykonda.

A jointed shrub trailing over bushes and rocks, the succulent stems up to 25 in. in diam. Vern. *Hind.* Soma.

2. *SARCOSTEMMA INTERMEDIUM*, DCNE; F. B. I. iv. 27. *S. viminalis*, Wt. Contrib. 59, Ic. t. 1281, not of R. Br.

W. Deccan and Carnatic, Coimbatore to Tinnevely, in dry places.

A jointed shrub, similar to the last but rarer.

3. *SARCOSTEMMA BRUNONIANUM*, W. & A. in Wt. Contrib. 59; F. B. I. iv. 27; Wt. Ic. t. 1282; Bot. Mag. t. 6002.

W. Deccan, Coimbatore to the lower slopes of the Nilgiris and Pulneys, in dry forest lands.

A slender trailing plant with large follicles and seeds, the flowers white or yellow (Bot. Mag.)

### 18. *Gymnema*, R. Br.

Twining shrubs or undershrubs. *Leaves* opposite. *Flowers* small, in crowded axillary or lateral umbellate cymes. *Calyx* 5-partite, with or without glands within at the base. *Corolla* subrotate campanulate or urceolate; lobes subvalvate or narrowly overlapping to the right; corona 0 or of fleshy processes adnate to the tube and sometimes produced beyond it between the lobes. *Staminal-column* arising from the base of the corolla; anthers erect with short membranous appendages; pollen-masses erect, attached to the horny pollen-carriers by very short caudicles. *Ovary* of 2 carpels; styles free to near the top; style-apex large, conical clavate or capitate, exserted beyond the anthers. *Fruit* of 2 (or 1) smooth follicular mericarps. *Seeds* ovate, margined, ending in a silky coma; cotyledons elliptic; radicle cylindric.

Flowers very small; calyx-lobes short, ovate; corona of 5 fleshy processes exserted in the sinuses of the lobes and decurrent in villous ridges on the tube :—

Corolla .1 in long; corona ridges long, the apical processes small; leaves thin, ovate elliptic or almost lanceolate, acute or shortly acuminate at apex, cuneate rounded or sometimes cordate at base, pubescent or subglabrous, up to 2.5 in. long, 1.5 in. broad; follicles slender, up to 3 in. long; seeds .4 in. long, broadly margined .....1. *sylvestre*.

Corolla .15 in. long; corona ridges short, the apical processes large and thick; leaves thick, ovate, often broadly, acute at apex, rounded or cordate at base, densely rusty tomentose, up to 3 in. long, 2 in. broad; follicles slender, up to 2.5 in. long; seeds .3-.35 in. long, narrowly margined .....2. *hirsutum*.

Flowers larger; calyx-lobes linear-oblong; corona of villous ridges on the tube, but without fleshy processes in the sinuses of the lobes:—

Leaves membranous when dry, nearly glabrous, more or less ovate, acuminate at apex and cordate at base:—

Leaves broadly ovate or elliptic-ovate, abruptly acuminate, the base rounded or cordate, up to 7 in. long, 2.5-4 in. broad; umbels many-flowered, pedicels slender, .5 in. long; corolla .3-.35 in. long .....3. *tingens*.

Leaves ovate, gradually acuminate, the base shallowly cordate, up to 4 in. long, 2-2.5 in. broad, the lowest two pairs of nerves from the base; umbels few-flowered, pedicels slender, .2 in. long; corolla .2 in. long .....4. *elegans*.

Leaves subcoriaceous, oblong or ovate-oblong or oblong-lanceolate, obtusely acuminate, rounded at base, 3-4 in. long, about 1 in. broad; umbels many-flowered, the rather stout pedicels .3 in. long; corolla .2-.3 in. long .....5. *montanum*.

1. GYMNEMA SYLVESTRE, R. Br.; F. B. I. iv. 29; Wt. Contrib. 44, Ic. t. 349.

N. Circars, Deccan and Carnatic, in dry forests, up to about 2,000 ft. in the hills.

A large climber with small yellowish flowers. The leaves of this and the next species have the curious property of neutralising the taste of sugar. Vern. *Mar. Kavali*.

2. GYMNEMA HIRSUTUM, W. & A. in Wt. Contrib. 44; F. B. I. iv. 29; Wt. Ic. t. 1272. *G. Decaisneanum*, Wt. Ic. t. 1271.

W. Gháts, Nilgiris at 5,000-7,000 ft., common, hills of Travancore and Tinnevely at rather lower levels; hills of N. Coimbatore.

A large climber with spirally twisted stems and yellow flowers. Bark rough, brown; wood white, of irregular structure.



3. *GYMNEMA TINGENS*, W. & A. in Wt. Contrib. 45; F. B. I. iv. 31. *G. tingens* var. *cordifolia*, Wt. Ic. t. 593. *Asclepias tingens*, Roxb. Cor. Pl. t. 239.

W. Gháts, Anamalai Hills at 4,000 ft. (Beddome).

A gigantic climber (Beddome), with pale yellow flowers, the follicles (in N. India) up to 7 in. long and nearly 1 in. broad.

4. *GYMNEMA ELEGANS*, W. & A. in Wt. Contrib. 46; F. B. I. iv. 32; Wt. Ic. t. 830.

Hills of S. Carnatic, from Salem to Tinnevely (*vide* Wight).

A rather slender climber with white flowers and lanceolate follicles 3 in. long, 5 in. broad.

5. *GYMNEMA MONTANUM*, Hook. f.; F. B. I. iv. 31. *G. tingens* var. *ovalifolia*, Wt. Ic. t. 592 (not good).

W. Gháts, Nilgiri and Anamalai Hills, at 4,000–7,000 ft.

A lovely creeper (Beddome) with pale yellow flowers and follicles 3 in. long and about 25–35 in. broad (Cooke).

#### 19. *Tylophora*, R. Br.

Erect or twining perennial herbs or undershrubs. *Leaves* opposite. *Flowers* small, in axillary or lateral simple or branched umbelliform cymes of flower-clusters or short racemes scattered along them. *Calyx* 5-partite, glandular within; lobes ovate or lanceolate. *Corolla* rotate or rotate-campanulate, deeply 5-lobed, the lobes slightly overlapping to the right; corona of 5 small fleshy tubercular processes adnate to the lower part of the staminal-column. *Staminal-column* arising from the base of the corolla; anthers erect, small, with small inflexed membranous appendages; pollen-masses minute, usually horizontal, attached by their middle or near their base by very slender usually short caudicles to the pollen-carriers. *Ovary* of 2 carpels; style-apex pentagonal or 5-lobed, flattened or convex, rarely exserted. *Fruit* of 2 (or, by abortion, 1) follicular mericarps, smooth, usually acuminate. *Seeds* flattened, ovoid, margined, ending in a silky coma; cotyledons elliptic; radicle cylindric.

Stems erect or suberect, sometimes more or less climbing in the branchlets:—

Pollen-carriers very minute, caudicles short; anther-appendages inconspicuous; leaves ovate or lanceolate, long-petioled, up to 2 in. long, 1 in. broad:—

Corolla-lobes very small, .05 in. long, lanceolate ; corona-processes globose .....1. *fasciculata*.

Corolla-lobes ovate-lanceolate, acuminate, .15 in. long ; corona processes ovoid, pointed .....2. *macrantha*.

Pollen-carriers elongate, narrow, caudicles long and very slender ; corona-processes ovoid, obtusely acute, shorter than the conspicuously appendaged anthers ; leaves ovate or lanceolate, acuminate, up to 2.5 in. long, 1.5 in. broad .....3. *Iphisia*.

Stems always long and climbing :—

Stems, leaves and inflorescence glabrous ; corona-processes subglobose, not pointed :—

Cymes elongate, divaricate, many-branched, up to 6 in. long and broad, corona-processes very minutely puberulous ; leaves large, fleshy, elliptic or elliptic-ovate, apiculate, up to 6 in. long, 4 in. broad, the main nerves spreading, 7–8 pairs .....4. *zeylanica*.

Cymes short, sessile or peduncled, few-branched, usually umbellate ; corona-processes glabrous :—

Leaves coriaceous, elliptic, elliptic-oblong or -lanceolate, acute or apiculate, with 5–6 pairs of prominent main nerves, up to 4 in. long, 1.5 in. broad ; flowers very minute, in sessile or shortly peduncled umbels with capillary pedicels .....5. *cappariidifolia*.

Leaves fleshy when fresh, chartaceous when dry, ovate-elliptic or -oblong or -lanceolate, acute or apiculate, the main nerves indistinct, up to 2.5 in. long, 1 in. broad, petiole short ; flowers minute, in shortly peduncled few-flowered cymes with capillary pedicels .....6. *tenuis*.

Leaves membranous, triangular-ovate, acute or acuminate, the main nerves indistinct, up to 4 in. long, 2 in. broad, petiole long ; flowers small, in rather long peduncled few-flowered cymes with capillary pedicels .....7. *pauciflora*.

Stems, leaves and inflorescence more or less pubescent :—

Corona-processes sub-globose, not pointed at apex ; calyx-lobes hirsute :—

Stems trailing flat along the ground from a woody rootstock ; leaves coriaceous, orbicular or broadly ovate, rounded or slightly acute, sometimes emarginate at apex, rounded or cordate at base, very shortly petioled, up to about 2.5 in. in diam. ; flowers in many-flowered umbellate cymes, the long pedicels filiform

8. *rotundifolia*.

Stems climbing, not trailing on the ground, densely softly tomentose, also the leaves ; leaves elliptic-oblong or ovate, acute or abruptly apiculate, rounded or sometimes cordate at base,

shortly petioled, up to 3 in. long, 2 in. broad, but usually narrower; flowers minute in elongate spikes, often 3 in. long, of small, distant umbels, the pedicels short and filiform. ..9. *mollissima*. Corona-processes gibbous below, the apex with a free acuminate point; stems and leaves usually pubescent sometimes nearly or quite glabrous; leaves ovate or elliptic-oblong, acute or apiculate, rounded or cordate at base, up to 4 in. long, 2.25 in. broad; flowers rather large, in umbellate or racemose pedunculate cymes

10. *asthmatica*.

Corona-processes compressed, curved to an acuminate point; stems and leaves nearly glabrous, the leaves ovate cordate apiculate, about .7 in. long, .5 in. broad; flowers small, solitary, on capillary peduncles .....11. *cordifolia*.

1. *TYLOPHORA FASCICULATA*, Ham. in Wt. Contrib. 50; F. B. I. iv. 40; Wt. Ic. t. 848.

N. Circars, Deccan and Carnatic, usually at low levels, among grass.

A slender erect undershrub with thick fascicled roots, the upper branches often twining to some extent, the flowers minute with filiform pedicels. Follicles lanceolate, 1.5-2 in. long, .5 in. broad, seeds orbicular.

2. *TYLOPHORA MACRANTHA*, Hook. f.; F. B. I. iv. 40.

N. Circars, hills of Vizagapatam (Barber); Deccan, hilly country from Kurnool to N. Coimbatore; W. Gháts, Nilgiris, Pulneys and hills of Tinnevely, at 3,000-5,000 ft. in grass.

A slender erect undershrub with thick fascicled roots, the upper branches twining more or less, similar to No. 1 but with larger flowers and thicker pedicels.

3. *TYLOPHORA IPHISIA*, Dcne; F. B. I. iv. 40; Wt. Ic. t. 1276. *Iphisia multiflora*, W. & A. in Wt. Contrib. 52.

W. Gháts, Nilgiri Hills, at 6,000-7,000 ft.

A somewhat stout undershrub, erect at first, then climbing, the flowers dark purple, the follicles lanceolate acuminate, flattened, up to 3.5 in. long, the seeds oblong.

4. *TYLOPHORA ZEYLANICA*, Dcne; F. B. I. iv. 42.

W. Gháts, forests of Travancore, at 2,000 ft. (Beddome).

A superb and very large creeper (Beddome) with deep purple flowers, the follicles slender, up to 6 in. long, the seeds oblong-obovate.

5. *TYLOPHORA CAPPARIDIFOLIA*, W. & A. in Wt. Contrib. 51; F. B. I. iv. 41.  
W. Gháts, from the Nilgiris to the hills of Tinnevely.  
A much twining undershrub, the follicles slenderly lanceolate and long beaked, up to 4 in. long.
6. *TYLOPHORA TENUIS*, Blume; F. B. I. iv. 42. *T. carnos*a, Wall.; Wt. Contrib. 49, Ic. t. 351. *T. tenuissima*, W. & A., in Wt. Contrib. 49, Ic. t. 588.  
W. Gháts, Pulney Hills and hills of Tinnevely, up to 7,000 ft.; W. Coast, along backwaters in Travancore.  
A slender twining undershrub, the follicles linear-lanceolate, 2-3 in. long.
7. *TYLOPHORA PAUCIFLORA*, W. & A. in Wt. Contrib. 49; F. B. I. iv. 41; Wt. Ic. t. 1274.  
Deccan, in S. Canara, Mysore and N. Coimbatore; W. Gháts, Pulney Hills and hills of Travancore and Tinnevely, up to about 3,000 ft.  
A small climber with pale branches, the flowers apparently purplish.
8. *TYLOPHORA ROTUNDIFOLIA*, Ham. in Wt. Contrib. 50; F. B. I. iv. 43.  
N. Circars, Ganjam to Godavari, especially in Sal forest undergrowth; W. Gháts, Anamalais at 5,000 ft. (Bed-dome).  
A curious plant, the follicles broadly ovate-fusiform, hard, about 2 in. long, the seeds nearly orbicular.
9. *TYLOPHORA MOLLISSIMA*, Wt. Contrib. 49; F. B. I. iv. 43; Wt. Ic. t. 1275.  
W. Gháts, Pulney and Sirumalai Hills of Madura, up to 7,000 ft.  
A slender climber, twining among bushes, the follicles narrowly lanceolate, 2-2.5 in. long, the seeds ovate-oblong with a rather short coma.
10. *TYLOPHORA ASTHMATICA*, W. & A. in Wt. Contrib. 51; F. B. I. iv. 44; Wt. Ic. t. 1277.  
All plains Districts, common in hedges and open forests, up to about 3,000 ft. in hilly country.  
A much-branching climber with long fleshy roots, variable leaves, greenish-yellow or greenish-purple flowers and lanceolate sharp-pointed follicles 3-4 in. long, the seeds

ovate. The roots and leaves have been used as a substitute for Ipecacuanha (see Roxb., etc.). Vern. *Hind.* Antamul; *Tel.* Kaka palla.

11. *TYLOPHORA CORDIFOLIA*, Thw.; F. B. I. iv. 44.

Travancore, at Shencotta (M. Rama Rao).

A very slender small-leaved twining plant with dark purple corolla and slender follicles.

20. *Telosma*, Coville.

Twining undershrubs. *Leaves* opposite, usually cordate, membranous. *Flowers* rather large, yellow or greenish, in axillary umbelliform cymes. *Calyx* 5-partite, minutely glandular within; lobes lanceolate. *Corolla* somewhat salver-shaped, the tube swollen below, sometimes constricted at the throat; lobes oblong or linear, overlapping to the right, spreading in flower; corona-processes adnate to the back of the staminal column, erect, free above and sometimes 2-lamellate. *Staminal-column* arising from near the base of the corolla-tube; anthers with membranous tips; pollen-masses erect, waxy, attached to the pollen-carriers by short caudicles. *Ovary* of 2 carpels, style short; style-apex umbonate or capitate. *Fruit* of 2 lanceolate terete rather turgid follicular mericarps. *Seeds* ovate, concave, ending in a silky coma.

*TELOSMA PALLIDA*, Craib in Kew Bull. 1911, 418. *Pergularia pallida*, W. & A. in Wt. Contrib. 42; F. B. I. iv. 38; Wt. Ic. t. 585.

N. Circars, Simhachelam Hill, Vizagapatam (W. Elliot); Deccan, Hyderabad (J. Campbell), forests of Kurnool (Rangachari), Sandur Hills of Bellary (Gamble), foot of the Anamalai Hills (Beddome).

A slender climber with pale yellow nearly scentless flowers, a very membranous corona with rounded outer and lanceolate inner lamellae, long clavate pollen-masses, ovate-cordate acuminate leaves and long follicles.

*Telosma minor*, Craib, is a sweet-scented climber often grown in gardens in S. India and apparently sometimes found run wild, native of the Himalaya. It has greenish-yellow flowers, a corona which is spurred behind, short thick pollen-masses and ovate-cordate leaves with the basal lobes overlapping. The follicles are sometimes 6 in. long, linear-lanceolate, curved near the tip.

## 21. Marsdenia, R. Br.

Twining rarely erect shrubs. *Leaves* opposite. *Flowers* small or of moderate size, in terminal or axillary umbellate or corymbose cymes or panicles. *Calyx* 5-partite, usually with glands within at the base. *Corolla* campanulate urceolate or rotate, the lobes overlapping to the right in bud; corona-processes 5, membranous or hard or fleshy, adnate at the base to the staminal-column, free above. *Staminal-column* arising from the base of the corolla-tube; anthers erect, with membranous appendages more or less incumbent over the style-apex; pollen-masses erect, oblong, waxy, attached by usually short caudicles to the hard pollen-carriers. *Ovary* of 2 carpels; style short; style-apex large, convex or conical or depressed. *Fruit* of 2 (more usually 1 only, by abortion) lanceolate or dagger-shaped, acuminate follicular mericarps. *Seeds* ovate, flattened, margined, ending in a silky coma; cotyledons flat, ovate; radicle rather short.

Flowers in much corymbosely branching cymes; corona of erect slender hard processes bifid at apex; corolla villous without, glabrous within except for tufts of long hairs at the base, lobes reflexed and with incurved margins; leaves large, velvety, broadly ovate or orbicular, acuminate, cordate, up to 6 in. long, 4.5 in. broad ..... 1. *tenacissima*. Flowers in few-branched, few-flowered cymes; corona of 2 membranous buttresses at base and a lanceolate tip; corolla glabrous, the lobes often emarginate; leaves membranous, glabrous, ovate or orbicular, acuminate, cordate, up to 5 in. long, 4 in. broad ..... 2. *Brunoniana*. Flowers in umbellate, long-peduncled cymes with many green flowers on long pedicels; corona of large rounded fleshy lobes and a small apiculus behind the anther-tip; corolla rotate, glabrous; leaves broadly ovate or suborbicular, abruptly acuminate, cordate or truncate or rounded at base, glandular above the petiole, up to 6 in. long, 4.5 in. broad ..... 3. *volubilis*.

1. *MARSDENIA TENACISSIMA*, W. & A. in Wt. Contrib. 41; F. B. I. iv. 35; Wt. Ic. t. 590. *Asclepias tenacissima*, Roxb. Cor. Pl. t. 240.

W. Gháts, Lower Pulneys, at 3,000 ft. (Rodriguez).

A stout climbing shrub with large follicles 4-6 in. long. Bark thick, yellowish grey; wood white. It gives a very strong silky fibre, used in Northern India for fishing lines and other purposes. Vern. *Hind.* Tongus, Jitti.

2. *MARSDENIA BRUNONIANA*, W. & A. in Wt. Contrib. 36; F. B. I. iv. 36; Wt. Ic. t. 356.

Carnatic ? near Columala (Kollimalais ?) (Wight).

A twining shrub.

3. *MARSDENIA VOLUBILIS*, T. Cooke Fl. Bomb. ii. 166. *Dregea volubilis*, Benth.; F. B. I. iv. 46. *Hoya viridiflora*, R. Br.; Wt. Contrib. 39, Ic. t. 586.

All Plains Districts and in the Hills up to 5,000 ft. in dry regions, common.

A large climbing shrub with green flowers and large woody follicles, blunt at the apex, 4 in. long and nearly 1 in. in breadth. Bark brown, rough, corky; wood white, soft. The stems give a strong fibre. Vern. *Hind.* Nak-chikni; *Mar.* Hirandoli, Ambri; *Tam.* Kurincha.

## 22. *Cosmostigma*, R. Br.

A twining glabrous shrub. *Leaves* opposite, membranous, ovate or cordate. *Flowers* small, in axillary or lateral racemose cymes with rather long peduncles. *Calyx* 5-partite; lobes ciliate; glands in pairs between the lobes. *Corolla* rotate, deeply 5-fid, the lobes slightly overlapping to the right; corona-processes erect, membranous, adnate to the base of the staminal-column and shorter than the anthers, truncate bifid trifid or slightly toothed. *Staminal-column* very short, anthers with a round inflexed membranous appendicle; pollen-masses erect, clavate, attached to the hard pollen-carriers by long slender twisted caudicles. *Ovary* of 2 carpels; style thick; style-apex broad, flat, 5-angled with a wavy rim. *Fruit* of 2 (or 1) large, lanceolate, blunt, smooth, follicular mericarps. *Seeds* ovate, margined, ending in a silky coma; cotyledons flat, elliptic.

*COSMOSTIGMA RACEMOSUM*, Wt. Contrib. 42; F. B. I. iv. 46; Wt. Ic. t. 591. *C. acuminatum*, Wt. Ic. t. 1270.

Deccan, in the hills of the Ceded Districts (Wight); Carnatic, Kollimalai Hills of Trichinopoly; W. Gháts, Nilgiris; Coast of S. Travancore.

A climber with small greenish flowers with brown dots, the leaves acute or acuminate, up to 4 in. long, 3 in. broad.

23. *Oianthus*, Benth.

Twining undershrubs. *Leaves* opposite, usually ribbed from the base. *Flowers* in axillary few-flowered cymes. *Calyx* 5-partite; lobes small. *Corolla* ovoid-urceolate or disciform, contracted at the mouth; lobes 5, short, broad, valvate; corona adnate to the staminal column, cupular, spreading, fleshy, with an inner erect process. *Staminal-column* arising from the base of the corolla, minute, short, depressed; anthers with short inflexed appendages; pollen-masses ovoid ascending, attached by very short caudicles to the hard pollen-carriers. *Style-apex* broadly conical, 5-angular, not exerted beyond the anthers.

*OIANTHUS BEDDOMEI*, Hook. f. Ic. Pl. t. 1466; F. B. I. iv. 49. Wynaad, in the Beigoor forests (Beddome, fig. only).

A twining plant with curious cushion-like much depressed flowers in axillary bracteolate cymes, broadly ovate acuminate subcordate leaves up to 5 in. long, 2.5 in. broad, and pubescent branches and petioles.

24. *Heterostemma*, W. & A.

Twining undershrubs. *Leaves* opposite, with a minute gland near the base on the upper surface, usually 3-5-ribbed from the base. *Flowers* small, in axillary umbellate or racemose cymes, shortly peduncled. *Calyx* 5-partite, minutely glandular within. *Corolla* rotate, the lobes broad, triangular, valvate; corona of 5 spreading lobes, usually with an erect process on the upper side. *Staminal-column* small, depressed; anthers minute, ending in a small membranous appendage; pollen-masses small, compressed, subquadrate or ovoid, attached by very short caudicles to the hard pollen-carriers. *Ovary* of 2 carpels; style-apex sessile, truncate, 5-angled. *Fruit* of 2 slender terete follicular mericarps, often reflexed. *Seeds* ovate, broadly margined, ending in a silky coma.

*HETEROSTEMMA TANJORENSE*, W. & A. in Wt. Contrib. 42; F. B. I. iv. 47; Wt. Ic. t. 348.

N. Circars, Rampa Hills of Godavari (Ramaswami); Deccan, in Coimbatore (Meebold); S. Carnatic, in sandy places near the sea at Point Calimere in Tanjore (Wight).

A slender twiner, with broadly ovate leaves, obtuse or



cordate at base, and up to 4 in. long, 2 in. broad; the linear follicles 4 in. long, reflexed, hooked at apex.

### 25. *Hoya*, R. Br.

Twining pendulous or rarely erect or rambling and rooting often epiphytic shrubs. *Leaves* opposite, thick and fleshy or coriaceous. *Flowers* in axillary lateral or terminal umbels. *Calyx* small, 5-partite, with 5 glandular scales. *Corolla* rotate, fleshy or waxy; lobes 5, often convex and spreading and reflexed, valvate in bud; corona of 5 fleshy membranous or horny processes adnate to the staminal column, stellately spreading or ascending, often concave on the upper surface, infolded to overlap on the lower, the inner margin usually produced in a spur which is erect or incumbent on the anther. *Staminal-column* usually short, arising from the base of the corolla; anthers conniving over the style apex with a membranous appendage; pollen-masses erect, waxy, usually flattened and sometimes with thickened outer edge, attached by distinct caudicles to the horny pollen-carriers. *Ovary* of 2 distinct carpels; style-apex 5-angled, the tip flattened or slightly apiculate. *Fruit* of 2 or 1 follicular mericarps, usually slender with a thin pericarp, rarely turgid with a thick one. *Seeds* small, ovate or oblong, ending in a long coma; cotyledons thick; radicle cylindric.

Leaves narrow; flowers very few in the umbels, usually 1-3 only:—

Leaves linear gradually dilated from the base to the obcordate tip, .15 in. broad, about 2 in. long, the midrib conspicuous; flower pedicels .5-.75 in. long; corolla white, shining, .5-.75 in. in diam.; corona processes pink, acutely spurred .....1. *retusa*.  
Leaves linear-lanceolate, obtuse, 1-2 in. long, .25 in. broad, the midrib strong; flower pedicels .75-1 in. long; corolla white, .75 in. in diam., the margins crispate-pubescent; corona processes purple, the spur recurved .....2. *pauciflora*.

Leaves ovate or elliptic; flowers in many-flowered umbels:—

Corolla glabrous or minutely puberulous within:—

Leaves elliptic or elliptic-lanceolate, abruptly and rather long acuminate at apex, the margins recurved, up to 3.5 in. long, 1.5 in. broad, the main nerves (when dry) nearly horizontal, meeting in an intramarginal looped nerve, pedicels 1 in. long; corona-processes concave above; pollen masses slender, spathulate ....3. *Wightii*.  
Leaves elliptic or elliptic-ovate or lanceolate, obtuse or acute at

apex, the margins not recurved, up to 4 in. long, 1.5 in. broad, the main nerves (when dry) oblique, inconspicuous, pedicels .5 in. long; corona-processes concave above with raised edges; pollen masses thickened on the outer margins ..... 4. *ovalifolia*. Corolla densely silky-villous within; leaves ovate, acute, the margins recurved, up to 2.5 in. long, 1 in. broad, main nerves obscure; pedicels nearly 1 in. long; corona-processes apparently flat above. . 5. *pendula*.

1. HOYA RETUSA, Dalz.; F. B. I. iv. 56.

S. Canara, at Gundiar (Meebold).

A pendulous slender epiphyte.

2. HOYA PAUCIFLORA, Wt. Ic. t. 1269; F. B. I. iv. 56.

W. Gháts, Sispara in Nilgiris (Lawson), Atapadi Hills of Malabar, at 4,200 ft. (Fischer), hills of Cochin, Tinnevely and Travancore, at 3,000–4,000 ft. (Wight, etc.).

A slender climber, apparently epiphytic and rooting, the follicles very slender, up to 6 in. long.

3. HOYA WIGHTII, Hook. f.; F. B. I. iv. 59. *H. pendula*, W. & A. in Wt. Contrib. 36 (excl. syn.).

W. Gháts, hills of Coimbatore, Nilgiris, Anamalais and hills of Tinnevely, at 4,000–6,000 ft.

A stout climber, apparently epiphytic and rooting, the corolla white or greenish, the corona purple, the follicles very slender, up to 4 in. long.

4. HOYA OVALIFOLIA, W. & A. in Wt. Contrib. 37; F. B. I. iv. 60; Wt. Ic. t. 847 (not good).

W. Gháts, from S. Canara southwards, not common.

A glabrous, probably epiphytic, trailer, with pale straw-coloured corolla.

5. HOYA PENDULA, Wt. Ic. t. 474; F. B. I. iv. 61.

N. Circars (*fide* Roxburgh); Nilgiri Hills (Wight).

A slender twining epiphyte with white silky-villous corolla.

Specimens in leaf only received from Mr. A. W. Lushington from the hills of Vizagapatam, 3,500 ft. seem to belong to the N. Indian species *H. longifolia*, Wall. and *H. parasitica*, Wall.

## 26. Leptadenia, R. Br.

Shrubs, climbing or erect and then with stiff rush-like stems. Leaves opposite, variable, sometimes absent. Flowers small, in umbellate, lateral or axillary, sessile or pedunculate, many-

flowered cymes. *Calyx* 5-lobed to the middle or beyond, eglandular. *Corolla* deeply 5-lobed, rotate or with a short campanulate tube; lobes 5, valvate in bud, the margins recurved, pubescent or bearded within; corona double, the outer corolline of 5 fleshy processes at the sinuses of the corolla-lobes, the inner staminal of a raised undulate fleshy ring at the base of the staminal column. *Staminal-column* arising from the base of the corolla; anthers incumbent on the style-apex with no or minute appendages; pollen-masses suberect or erect, with a pellucid apex, attached by short caudicles to the pollen-carriers. *Ovary* of 2 carpels; style-apex conical, 5-angled, the tip often bifid. *Fruit* of usually one thick smooth follicle. *Seeds* small, oblong, winged, ending in a silky coma.

**LEPTADENIA RETICULATA**, W. & A. in Wt. Contrib. 47; F. B. I. iv. 63; Wt. Ic. t. 350. *L. imberbis*, Wt. Contrib. 48.

N. Circars, Deccan and Carnatic, westward to the E. slopes of the Ghâts, up to about 3,000 ft., chiefly in hedges.

A climbing shrub with pale leaves, yellowish flowers and thick sub-woody follicle with a curved obtuse beak. Bark yellowish-brown, rough, thick; wood white, fibrous. Vern. *Mar. Kharkhoda*.

## 27. *Brachystelma*, R. Br.

Erect or twining slender herbs from a tuberous root. *Leaves* opposite or verticillate, very narrowly linear. *Flowers* small, in axillary umbelliform sessile or peduncled cymes; pedicels filiform. *Calyx* 5-partite; lobes linear or lanceolate, glandular within. *Corolla* campanulate-rotate, deeply 5-lobed, the lobes sometimes adherent at the tips, valvate or slightly overlapping to the right in bud, narrowly linear, glabrous or villous; corona adherent to the staminal tube, annular, shortly lobed or with 5 subulate teeth. *Staminal-column* very short, anthers erect, not appendiculate; pollen-masses erect, globose-ellipsoid, with a pellucid margin or upper angle, attached by very short caudicles to the hard pollen-carriers. *Ovary* of 2 carpels; style-apex nearly flat. *Fruit* of 2 very slender smooth follicular mericarps. *Seeds* ending in a silky coma.

Stem erect:—

Corona shortly toothed without subulate processes; stem short,

6-9 in. long ; corolla-lobes linear from a broad base, glabrous, .2-.3 in. long ; leaves linear, up to 3.5 in. long, .1 in. broad ; umbels terminal, sessile or pedunculate with few flowers ..... 1. *glabrum*.  
Corona with 5 subulate processes, undulate or toothed between them :—

Corolla-lobes with purple hairs :—

Corolla-lobes narrowly triangular, .3-.5 in. long ; corona-processes .1 in. ; leaves linear, up to 4 in. long and extremely narrow ; cymes sessile or shortly peduncled, 3-flowered..... 2. *Bourneae*.

Corolla-lobes linear, .2 in. long, keeled down the middle ; corona-processes .1-.15 in. long ; leaves almost filiform, 3-4 in. long, .1 in. broad ; umbels sessile, 3-5-flowered ..... 3. *maculatum*.

Corolla-lobes densely white-villous within, linear, .5-.7 in. long ; corona-processes .1-.15 in. long ; leaves linear, 3 in. long, extremely narrow ; umbels 5- or more-flowered ..... 4. *Rangacharii*.

**Stem twining ; corona undulately lobed :—**

Corolla-lobes not adherent at the tips, linear-lanceolate from a broad base, the margins incurved, white-villous within, .4 in. long ; leaves very slender, up to 5 in. long ; peduncles short, 3-4-flowered

5. *volubile*.

Corolla-lobes adherent at the tips, very slender, .75-1 in. long, glabrous, pale without ; leaves linear, up to 4 in. long, .25 in. broad ; peduncles short, 3-flowered ..... 6. *brevitubulatum*.

1. *BRACHYSTELMA GLABRUM*, Hook. f. ; F. B. I. iv. 65.

Deccan, hills of the Cuddapah District (Beddome).

A short slender herb, glabrous, the flower small, terminal.

2. *BRACHYSTELMA BOURNEAE*, Gamble in Kew Bull. 1922, 120.

W. Gháts, Eastern slopes of the Pulney Hills, at low levels (Bourne).

A tall, very slender herb, the corolla greenish-white with dark green spots, the hairs on the lobes and the corona purple, the tubers thick, fusiform.

3. *BRACHYSTELMA MACULATUM*, Hook. f. ; F. B. I. iv. 65.

"Canara and Mysore" (Law) ; Dimbhum in Coimbatore (Rangachari).

A tall slender herb, the corolla-tube spotted, the lobes with stiff purplish hairs, the tubers fusiform.

4. *BRACHYSTELMA RANGACHARII*, Gamble in Kew Bull. 1922, 120.

Deccan, Hassanur in Coimbatore (Rangachari).

A tall, very slender herb, the corolla apparently pale and very white villous within, the tubers oblong.

5. *BRACHYSTELMA VOLUBILE*, Hook. f.; F. B. I. iv. 65.

Deccan, hills of the Cuddapah District; at about 2,000 ft. (Beddome).

A very slender twining herb.

6. *BRACHYSTELMA BREVITUBULATUM*, Gamble n. comb. *Ceropegia brevitubulata*, Bedd. Ic. t. 174. *Brachystelma Beddomei*, Hook. f.; F. B. I. iv. 66.

Deccan, dry rocky hills above Amerdy, Vellore, about 1,000 ft. (Beddome).

A slender twining herb, the corolla-lobes greenish-yellow outside, deep purple within, cohering at their tips, the follicles very slender, 4-5 in. long.

28. *Ceropegia*, Linn.

Perennial herbs, erect or twining; rootstock a tuber or a fascicle of thick fleshy roots. *Leaves* opposite, sometimes minute or 0. *Flowers* usually moderate-sized or large, solitary in pairs or in axillary umbellate or racemose cymes, variously coloured; bracteoles often many. *Calyx* 5-partite, with 5 glandular scales within; lobes narrow. *Corolla* tubular, the tube usually more or less inflated at the base, then elongate, straight or curved, often funnel-shaped, 5-lobed; lobes valvate in bud, more or less connate at their tips; corona double, arising from the staminal column, the outer annular or cupular, entire or 5-10-toothed or of 5 bifid lobes more or less adnate to the inner of 5 short or long processes opposite to the anthers and incumbent on them or erect. *Staminal-column* short, included in the base of the tube; anthers short, erect, without appendages; pollen-masses erect or sub-horizontal, waxy, with one pellucid margin, attached to the pollen-carriers by short caudicles. *Ovary* of 2 carpels; style-apex truncate or shortly conical. *Fruit* of 2 lanceolate or linear, smooth, acuminate follicular mericarps. *Seeds* usually oblong, margined, ending in a silky coma; cotyledons small or large, sometimes smaller than the thick radicle.

Stem erect, from a tuberous root; leaves linear; calyx-lobes very slender :—

Leaves rarely 1-2 in. long, usually less, crowded on a very short stem close to the ground; flowers solitary, scarcely .75 in. long, the tube of the corolla narrow from an inflated base, the lobes .2 in. long, meeting at the tips; outer corona-lobes bifid; inner linear . . 1. *pusilla*.

Leaves usually 2-6 in. long, opposite on a stem 4-9 in. high; flowers solitary 1-1.5 in. long, the corolla-tube subcylindric, not inflated, the lobes about as long as the tube, narrowed downwards and having at the base a ring of purple-tipped hairs; outer corona-lobes bifid, ciliate, inner linear-spathulate .....2. *fimbriifera*.

Leaves 4-8 in. long, very narrow, often curved and twisted at tip, opposite on a slender stem up to 1 ft. long; flowers solitary, 1.5-2 in. long, corolla-tube with the base slightly inflated, then cylindric, the slender lobes spirally contorted; outer corona-lobes acute, glabrous, inner filiform .....3. *spiralis*.

Stem twining, from a tuberous or fibrous fleshy root:—

Leaves fleshy, root tuberous:—

Leaves very small or 0, when present sessile, lanceolate, acute, .5-.75 in. long; flowers in 3-5-flowered umbellate pedunculate cymes, the corolla 1.5-2 in. long, tube with base slightly inflated, then funnel-shaped, lobes about as long as the tube, connate at tip; outer corona-lobes deeply bifid, ciliate, inner linear-spathulate, hooked at tip .....4. *juncea*.

Leaves very variable, linear lanceolate ovate or orbicular, rarely over 1-1.5 in. long or broad; flowers in 3-7-flowered pedunculate cymes, the corolla .5-.75 in. long, tube with base inflated then cylindric, lobes short; outer corona-lobes minute, inner linear

5. *bulbosa*.

Leaves membranous:—

Corolla-lobes broad, forming a hemispheric or broadly conical dome over the broadly funnel-shaped mouth of the curved tube:—

Corolla-lobes with long soft ciliae at the mouth, base of tube inflated, globose or oblong and gibbous, length of corolla 1.5-2 in.; outer corona-lobes subulate, nearly as long as the inner processes; leaves ovate or lanceolate, acuminate, up to 4 in. long, 1.5 in. broad .....6. *elegans*.

Corolla-lobes without ciliae at the mouth; outer corona-lobes subulate, shorter than the inner processes:—

Leaves ovate, acuminate, somewhat abruptly, at apex, rounded or cordate at base, up to 2.5 in. long, 2 in. broad; corolla-tube inflated and globose at base, then slender, then broadly funnel-shaped, corolla 1-1.5 in. long in all .....7. *mysorensis*.

Leaves lanceolate, long acuminate at apex, acute at base, up to 3 in. long, 1 in. broad; corolla-tube inflated and oblong at base, then slender, then funnel-shaped, corolla 2-2.5 in. long in all .....8. *Walkeræ*.

Corolla-lobes narrow, shorter than the neck of the tube, forming a conical ovoid or beaked crown over the not much dilated mouth of the tube :—

Leaves and peduncles glabrous :—

Crown in bud long-beaked by the connivent upper parts of the lobes, which are free later; corolla-tube inflated and prominently veined at base, then cylindric, whole length 1-1·5 in.; outer corona-lobes very short, inner processes linear-clavate, connate at tip; leaves variable, ovate orbicular or lanceolate, apiculate, up to 4 in. long, 2 in. broad .....9. *tuberosa*. Crown in bud very shortly beaked by the connivent tips of the corolla-lobes, afterwards opened in a short dome, the lobes sometimes finally free :—

Corollas about 1 in. long, the flowers erect in umbelliform cymes on pendulous peduncles ·75 in. long, the tube inflated below, then cylindric, the lobes ciliate within; outer corona-lobes very small, inner processes spathulate; leaves elliptic-ovate or -lanceolate, acuminate, apiculate, up to 4 in. long, 1·5 in. broad .....10. *Candelabrum*.

Corollas about ·5 in. long, the flowers in 4-7-flowered axillary cymes on short peduncles, under ·5 in. long, the tube slightly inflated below, then funnel-shaped, the crown short; outer corona-lobes minute, inner long, filiform; leaves linear-lanceolate, long-acuminate, 3-4 in. long, ·2-·3 in. broad, broadest near the base .....11. *acuminata*.

Crown in bud not beaked, the broad lobes arched and connate only by their tips, free later; corollas usually curved :—

Corollas ·75-1·25 in. long, tube inflated at base, then narrowly cylindric, then funnel-shaped, the lobes ·2 in. long; outer corona-lobes very small and thin, inner processes erect, spathulate; leaves ovate- or elliptic-lanceolate, sometimes linear-lanceolate, acuminate, up to 5 in. long, 2 in. broad

12. *intermedia*.

Corollas 2-2·5 in. long, tube inflated at base, then narrowed, then funnel-shaped, the lobes about ·6 in. long; outer corona-lobes thin, triangular, ciliate, inner processes subulate clavate, slightly longer; leaves elliptic-ovate or -lanceolate, acuminate, up to 5 in. long, 2·5 in. broad....13. *Thwaitesii*.

Leaves and peduncles hispid-pubescent :—

Peduncles 1-5 in. long, stout, hispid, bearing very many-flowered umbelliform often branching cymes, the corolla slender, up to 1 in. long, the base of the tube slightly inflated,

the lobes joining in a short oblong head; outer corona-lobes short ciliate, inner processes slender, hooked; leaves linear-ovate or -lanceolate, up to 3 in. long, .75 in. broad

14. *ciliata*.

Peduncles .5-1 in. long, stout, few-flowered; corolla 1-1.5 in. long, tube slightly inflated below, funnel-shaped above, the lobes up to .5 in. long; outer corona-lobes 2-fid, ciliate, inner processes spathulate; leaves from narrowly linear to ovate-lanceolate, acuminate, obtuse or cordate at base, up to 4 in. long, 1.5 in. broad (much longer and narrower in var.)

15. *hirsuta*.

Corolla-lobes about as long as or longer than the neck of the tube:—

Corolla-tube much inflated at base, curved and broadly funnel-shaped upwards, the lobes narrow; corona-lobes short, ciliate, processes erect, linear:—

Leaves oblong-ovate or linear-lanceolate, acuminate, under 1.5 in. broad:—

Inflated base of corolla-tube broad, gradually narrowed into the neck; leaves linear-lanceolate, under 1 in. broad

16. *Decaisneana*.

Inflated base of corolla-tube broad, suddenly narrowed into the neck; leaves ovate-lanceolate, over 1 in. broad

17. *brevicollis*.

Leaves ovate or ovate-cordate, acuminate, up to 5 in. long, 2 in. broad; corolla-tube not much inflated, narrowed into the neck, the lobes long and linear . . . . . 18. *Stocksii*.

Corolla-tube not or only slightly inflated at base, narrow above and straight:—

Corolla small, pale; flowers in fascicles on an elongate peduncled raceme:—

Corolla .5 in. long or little more, the lobes about as long as the base and neck of the tube; outer corona-lobes short, obtuse, ciliate, inner processes linear, erect; leaves linear, up to 6 in. long, .2 in. broad . . . . . 19. *ensifolia*.

Corolla 1 in. long, the lobes about as long as the base and neck of the tube; outer corona-lobes very short, ciliate, inner processes long, spathulate; leaves ovate- or linear-lanceolate, up to 4 in. long, 1 in. broad . . . 20. *albiflora*.

Corolla dark purple, 3 in. long, slender, the tube slightly inflated at base, then narrowly funnel-shaped, the slender lobes about as long as the whole tube, villous within; outer corona-lobes



short, notched, ciliate, inner processes clavate; leaves linear-lanceolate, long acuminate, up to 6 in. long, .5 in. broad

21. *Beddomei*.

1. *CEROPEGIA PUSILLA*, W. & A. in Wt. Contrib. 31; F. B. I. iv. 66; Wt. Ic. t. 1261.

W. Gháts, Nilgiris, on the grassy downs above 7,000 ft.

A minute herb with a depressed tuber about 1 in. in diam. said to be eaten and to be sought for as food by wild pigs. The corollas are pale in colour with purple stripes shading into pink on the tube and lobes. Follicles fusiform, 1.5 in. long.

2. *CEROPEGIA FIMBRIIFERA*, Bedd. Ic. t. 172; F. B. I. iv. 66.

W. Gháts, Anamalais, in rocky grassy places near Tuna-cadavu at 3,000-4,000 ft. (Beddome).

A slender erect herb with a depressed tuber. The corollas have the tube greenish without, striped with deep purple within, and the lobes pale greenish purple, the fringe deep purple.

3. *CEROPEGIA SPIRALIS*, Wt. Ic. t. 1267; F. B. I. iv. 66.

Deccan, hills of the Cuddapah District, probably at about 2,000-3,000 ft.

A slender erect, or slightly twining herb with a depressed tuber and grass-like leaves. The corollas apparently have the base greenish outside, purplish within, the mouth purple and the twisted lobes also dark-coloured. Follicles very slender about 5 in. long.

4. *CEROPEGIA JUNCEA*, Roxb. Cor. Pl. t. 10; F. B. I. iv. 68; Wt. Contrib. 30.

N. Circars, Deccan and Carnatic and S. Travancore in dry forests.

A fleshy twining plant with branched fibres from the tuberous root, which is edible. The flowers are greenish, speckled and veined with pink and purple, the follicles narrow, up to 5 in. long, long beaked, seeds with the radicle twice as long as the cotyledons. Wight remarks that he has found it growing among the branches of *Euphorbia Tirucalli*. Vern. Tel. Bella gada; Mar. Kanvel.

5. *CEROPEGIA BULBOSA*, Roxb. Cor. Pl. t. 7; F. B. I. iv. 67; Wt. Contrib. 32; Wt. Ic. t. 845.

Deccan and Carnatic, in dry localities, and especially near the coast; S. Canara and Malabar.

A fleshy twining herb with a round depressed tuber. The small flowers are greenish, the lobes purple within; the follicles very slender, 3 in. long, the radicle as long as the cotyledons and divided. The leaves and tubers are edible. Vern. *Tal. Manchi manda*.

Var. *Lushii*, Hook. f. *C. Lushii*, Grah. in Bot. Mag. t. 3300. Leaves very narrowly linear, 2-4 in. long.

Deccan, hills of Cuddapah (Beddome).

6. *CEROPEGIA ELEGANS*, Wall.; F. B. I. iv. 68; Wt. Contrib. 31, Ic. t. 1265, Spic. Neilg. t. 155.

W. Gháts, Nilgiri and Pulney Hills, at 3,000-6,000 ft.

A very pretty slender twiner, the corolla pale blue or green, spotted with purple, the tips of the lobes and the ciliae deep purple; the follicles are very slender, reaching 7-8 in. in length.

7. *CEROPEGIA MYSORENSIS*, Wt. Ic. t. 846; F. B. I. iv. 69.

Deccan, Mysore and Coimbatore, up to 3,000 ft.; hills of Tinnevely.

A slender twiner, the corolla pale green below, bluish above, and spotted with red on the funnel, the tips of the lobes deep purple to nearly black. Follicles very slender, about 6 in. long.

8. *CEROPEGIA WALKERAE*, Wt. Ic. t. 1266; F. B. I. iv. 69.

W. Gháts, in Wynaad, at about 3,000 ft.; Coorg? (Bourne).

A very slender twiner, the corolla pale blue with minute purple spots, a little like those of *C. elegans* but without the ciliae, and the dome of the corolla less depressed.

9. *CEROPEGIA TUBEROSA*, Roxb. Cor. Pl. t. 9.; F. B. I. iv. 70; Wt. Contrib. 32, Ic. t. 353.

N. Circars, Deccan and Carnatic to the lower slopes of the Gháts, up to about 3,000 ft., common.

A glabrous twiner with tuberous roots giving out fleshy fibrous ones. The corolla is pale green, yellowish inside, purple at the tips of the lobes, and the follicles are very slender, up to 5 in. long, the seeds 'strongly margined.

10. *CEROPEGIA CANDELABRUM*, Linn.; F. B. I. iv. 70. *C. Elliottii*, Hook. f.; F. B. I. iv. 70.

N. Circars, Simhachelam Hill, Vizagapatam (W. Elliot);

W. Gháts, hills of Coimbatore, Nilgiris, and hills of Travancore W. Coast, S. Canara to Travancore.

A slender climber with corollas apparently green below, the tips purplish, the veins prominent; follicles linear, very slender. Rheede, Hort. Mal. ix. t. 16, a striking picture, shows umbels with all the flowers in bloom at the same time, which is unlikely.

11. *CEROPEGIA ACUMINATA*, Roxb. Cor. Pl. t. 8; F. B. I. iv. 70; Wt. Contrib. 32. *C. discreta*, N. E. Br. in Kew Bull. 1909, 262?

Eastern Coast, cultivated in Madras (Bourne), Coimbatore?

A slender twiner growing from a flattened tuber, the corollas very small, pale, almost white, with purplish tips to the lobes. Follicles curved, 3 in. long, slender. Roxburgh says that all parts are edible. Vern. *Tel.* Commoo manda.

12. *CEROPEGIA INTERMEDIA*, Wt. Ic. t. 1263; F. B. I. iv. 71.

W. Gháts, from Wynaad to the Anamalais, Pulneys and hills of Travancore and Tinnevely, at 2,000–3,000 ft.

A slender twiner from a fibrous rootstock, the corollas pale purplish below, the lobes darker, the follicles very slender and straight, 5–6 in. long.

Var. *Wightii*, Hook. f.; leaves linear lanceolate, usually under 5 in. broad, the follicles rather shorter.

Pulney Hills and hills of Tinnevely (Wight, Bourne).

13. *CEROPEGIA THWAITESII*, Hook. Bot. Mag. t. 4758; F. B. I. iv. 71.

W. Gháts. Pulney Hills and hills of Tinnevely and Travancore, 2,500–7,000 ft.

A rather stout twiner, the corolla pale green with purple blotches on the tube, also a purple band across the lobes and white and green above it. Follicles very long and slender, almost up to 12 in., the tips hooked; the seeds are long, the radicle thick, nearly as long as the oblong cotyledons.

14. *CEROPEGIA CILIATA*, Wt. Ic. t. 1262; Spic. Neilg. t. 154; F. B. I. iv. 72.

W. Gháts, Nilgiris at 6,000–7,000 ft., common, less so in the Anamalais and hills of Tinnevely.

A slender hispid twiner from a round, rather flattened

tuber, the corolla pale green outside, purplish within, the lobes dark green or lead-coloured; follicles short, slender.

15. *CEROPEGIA HIRSUTA*, W. & A. in Wt. Contrib. 30; F. B. I. iv. 71. *C. vincaefolia*, Hook. Bot. Mag. t. 3740.

N. Circars, in Ganjam (Fischer); Rampa Hills of Godavari (Narayanswami); W. Gháts, Nilgiri Hills (Wight), Anamalais (Beddome).

A hispid climber with tuberous roots, the corolla greenish with small purple spots, the lobes red-purple; calyx lobes long and slender; follicles narrow, 4 in. long. The leaves are very variable, running from broadly ovate to linear (in the var.).

Var. *stenophylla*, Hook. f. Leaves very narrowly linear, up to 6 in. long, 2 in. broad; corolla more purple spotted, the cone of the lobes crowned by pale and purple bands olive-green above; inner corona-processes clavate; tuber rather small, flattened-globose.

W. Gháts, Anamalais and Pulneys at 3,000–5,000 ft.

16. *CEROPEGIA DECAISNEANA*, Wt. Ic. t. 1259, Spic. Neilg. t. 152; F. B. I. iv. 73.

W. Gháts, on the Sispara Ghát, Nilgiris (Wight, Gardner).

A slender climber with tuberous root and narrow leaves, the large corolla much inflated, green with pale purple spots all over, the corona orange, tipped with purple; follicles very slender.

17. *CEROPEGIA BREVICOLLIS*, Hook. f.; F. B. I. iv. 74.

W. Gháts, Anamalai Hills at 2,000–3,000 ft.

A slender climber with irregularly purple-spotted corolla, very short in the neck of the tube; follicles nearly 1 ft. long, very slender.

18. *CEROPEGIA STOCKSII*, Hook. f.; F. B. I. iv. 74.

W. Gháts, Wynad, Anamalais and hills of Travancore at 2,000–4,000 ft., in moist forests.

A rather large climber with corollas green shaded with purple and with purple spots on the funnel part of the tube; follicles very slender, nearly 1 ft. long.

19. *CEROPEGIA ENSIFOLIA*, Bedd. Ic. t. 173; F. B. I. iv. 75.

W. Gháts, Anamalai Hills, in rocky places, 3,000–3,500 ft. (Beddome).

A slender twiner with subglobose tubers, very narrow leaves, greenish-white corollas and slender follicles 6-7 in. long.

20. *CEROPEGIA ALBIFLORA*, Hook. f.; F. B. I. iv. 75.

W. Gháts, hills of Travancore near Peermerd, 3,500 ft. (Beddome).

A slender twiner with long-peduncled inflorescence, white corollas and more or less lanceolate leaves with very oblique nerves.

21. *CEROPEGIA BEDDOMEI*, Hook. f.; F. B. I. iv. 75.

W. Gháts, hills of Travancore, on the Peermerd Ghát, 2,500 ft. (Beddome), hills of Cochin (Johnstone).

A slender twiner with slender flowers, dark purple without, mottled with pale reticulations within the lobes.

29. *Caralluma*, R. Br. (ampl.).

Perennial herbs with angular fleshy stems, usually with many branches. *Leaves* minute, deciduous, on the angles of the stems, often spine-like. *Flowers* in few-flowered fascicles at the upper nodes or in terminal umbels, subsessile or pedicellate. *Calyx* 5-partite; lobes narrow, glabrous. *Corolla* rotate or broadly campanulate; lobes 5, valvate in bud; corona double, the outer annular or cupular, with 5 2-cuspidate lobes, the inner adnate to the outer, elongate and inflexed over the anthers. *Staminal-column* short, arising from the base of the corolla; anthers not appendaged; pollen-masses erect, suborbicular, compressed, pellucid on the inner margin or at the apex, attached by short slender caudicles to the pollen-carriers. *Ovary* of 2 carpels; style-apex truncate, 5-angled. *Fruit* of 2 linear or linear-lanceolate, smooth, follicular mericarps. *Seeds* oblong, flattened, broadly margined, ending in a silky coma; cotyledons small, much shorter than the large fleshy radicle.

Flowers solitary or in pairs, lateral on elongate branchlets; corolla-lobes narrow :—

Corolla-lobes glabrous, without fringes, lanceolate, acute; flower-bearing branchlets very slender, hardened; coma of the seeds white

1. *adscendens*.

Corolla-lobes fringed with long soft deciduous purple hairs, lanceolate, apiculate, usually folded; flower-bearing branchlets narrow, fleshy; coma often straw-coloured ..... 2. *attenuata*.

Flowers in terminal umbels; corolla-lobes broad :—

Umbels many-flowered :—

Corolla glabrous :—

Corolla within red or purple, streaked within concentrically with many minute red, purple and yellow fine lines.....3. *umbellata*.

Corolla within dark red, not streaked, outside greenish

4. *campanulata*.

Corolla ciliate on the margin only .....5. *diffusa*.

Corolla with long scattered hairs on the face and margin

6. *lasiantha*.

Umbels few-flowered, the corolla pale, fringed on the margins

7. *indica*.

Umbels reduced to a single flower; corolla fringed or villous with purple hairs .....8. *pauciflora*.

1. CARALLUMA ADSCENDENS, R. Br.; F. B. I. iv. 76; Wt. Contrib. 33. *Stapelia adscendens*, Roxb. Cor. Pl. t. 30.

N. Circars, Deccan and Carnatic, in arid places, among bushes, scarce.

A fleshy herb, sometimes eaten, the corolla yellowish, with dark purple tips to the lobes, the follicles slender, 4-5 in. long. Vern. Tel. Kar allum.

2. CARALLUMA ATTENUATA, Wt. Ic. t. 1268; F. B. I. iv. 76. *C. fimbriata*, Hook. f.; F. B. I. iv. 77, not of Wall.

N. Circars, Deccan and Carnatic, up to 2,000 ft. in the hills and on dry slopes of the Gháts, among shrubs, common.

A fleshy herb, said to be edible, the corolla banded white or green and purple on the tube and lower part of the lobes, the upper part dark purple and with purple fringes, the follicles linear-lanceolate, 4-6 in. long.

3. CARALLUMA UMBELLATA, Haw. Syn. Pl. Succ. 47. *Boucerosia umbellata*, W. & A. in Wt. Contrib. 34, Ic. t. 495; F. B. I. iv. 77. *Stapelia umbellata*, Roxb. Cor. Pl. t. 241.

N. Circars, Deccan and Carnatic, up to 4,000 ft. in hilly regions, on dry and arid lands, rather common.

An erect branching succulent herb, with large and striking flowers, the follicles slender, hooked.

4. CARALLUMA CAMPANULATA, N. & E. Br. in Gard. Chron. 1892, ii. 369; Bot. Mag. t. 7274. *Boucerosia umbellata*, W. & A. var. *campanulata*, Hook. f.; F. B. I. iv. 77. *B. campanulata*, Wt. Ic. t. 1289.

S. Deccan and Carnatic to the E. slopes of the Ghâts, apparently scarcer:

An erect branching succulent with striking flowers, impossible to distinguish from the last in dried specimens, but good drawings exist.

5. *CARALLUMA DIFFUSA*, N. E. Br. *Boucerosia diffusa*, Wt. Ic. t. 1599; F. B. I. iv. 78.

Deccan, arid rocky hills in Coimbatore at about 2,000 ft.

A diffuse procumbent fleshy herb with many ascending branches, the corolla dark purplish-brown with many very fine whitish concentric lines, the follicles slender, nearly 6 in. long.

6. *CARALLUMA LASIANTHA*, N. E. Br. *Boucerosia lasiantha*. Wt. Ic. t. 1286.

Deccan, hills of the Chittoor District (Wight, etc.), dry lands near Gooty.

A many-branched fleshy herb, the corolla very villous.

7. *CARALLUMA INDICA*, N. E. Br. *Hutchinia indica*, W. & A. in Wt. Contrib. 35. *Boucerosia Hutchinia*, Dcne; F. B. I. iv. 78. E. Coast, Nellore (Wight), S. Arcot (Lawson).

A small fleshy herb with many slender stems scarcely 2 in. in diam., acute leaves and pale greenish-white corolla, outwardly tinged with purple and with purplish hairs and fringes.

8. *CARALLUMA PAUCIFLORA*, N. E. Br. *Boucerosia pauciflora*, Wt.; F. B. I. iv. 78.

S. Carnatic, in Tinnevely and S. Travancore.

A small diffuse fleshy herb with slender stems, minute recurved leaves and a pale corolla minutely banded with slender purple concentric lines within, whitish without.

*Cryptostegia grandiflora*, R. Br., is a stout climbing shrub with large rose-coloured showy flowers, which, a native of tropical Africa, is much grown in gardens and has become more or less naturalised. It gives a fairly good caoutchouc, which is not, however, an article of commerce.

#### Family. CI. LOGANIACEAE.

Trees, erect or climbing shrubs or herbs. *Leaves* opposite, rarely ternate, entire; stipules present or reduced to a transverse

line. *Flowers* usually regular, hermaphrodite, in terminal or axillary simple or compound cymes, sometimes solitary. *Calyx* small inferior, lobes 4-5. *Corolla* gamopetalous, 4-5-lobed, the lobes imbricate or valvate. *Stamens* 4-5, inserted on the corolla-tube, alternate with the lobes; anthers 2-celled, introrse. *Ovary* free, usually 2-celled; ovules 1-many in each cell; style simple; stigma capitate or bifid. *Fruit* a septicidal capsule or indehiscent berry. *Seeds* various; albumen fleshy or cartilaginous; embryo straight.

Ovary with many ovules in each cell:—

Herbs; corolla valvate; capsule didymous:—

Cymes 2- or 3-chotomous; flowers 5-merous .....1. *Mitreola*.

Flowers solitary or clustered, 4-merous .....2. *Mitrasacme*.

Shrubs, often scandent, or trees:—

Fruit dehiscent, capsular, 2-celled; corolla-lobes imbricate

3. *Buddleia*.

Fruit indehiscent:—

Corolla-lobes contorted in aestivation; leaves succulent

4. *Fagraea*.

Corolla-lobes valvate in aestivation; leaves usually coriaceous.

3- or more-ribbed .....5. *Strychnos*.

Ovary with 1 ovule in each cell; corolla rotate; climbers ..6. *Gardneria*.

### 1. *Mitreola*, Linn.

Herbs. *Leaves* opposite, membranous; stipules small or reduced to a transverse line. *Flowers* small, white, in 2-3-chotomous terminal or axillary peduncled cymes, often unilateral on the cyme-branches. *Calyx* 5-partite; lobes lanceolate. *Corolla* urceolate; lobes 5, short, valvate. *Stamens* 5, included; filaments short; anthers ovate cordate. *Ovary* 2-celled; ovules many in each cell, on peltate placentas; styles 2, short, connate under a small pilose stigma, at length divergent. *Fruit* a laterally compressed, truncate or 2-horned capsule, the carpels at first separating, then dehiscing along the inner face. *Seeds* very many, minute, globose or elongate; albumen fleshy; embryo linear; cotyledons small; radicle terete.

*MITREOLA OLDENLANDIODES*, Wall.; F. B. I. iv. 79.

N. Circars, in Ganjam, open places in Sal forest.

An annual herb reaching 6-18 in. in height, the leaves elliptic-ovate or -lanceolate, up to 3 in. long, 1 in. broad, the long unilateral cyme-branches characteristic.



2. *Mitrasacme*, Labill.

Small slender herbs. *Leaves* opposite; petioles joined in a small sheath. *Flowers* small, white or yellowish, terminal or axillary, solitary clustered or in irregular umbels. *Calyx* campanulate, 4-fid. *Corolla* campanulate; lobes 4, valvate. *Stamens* 4, inserted near the base of the corolla-tube, usually included. *Ovary* 2-celled; ovules many in each cell, on peltate placentas; styles 2, at first connate, afterwards free under the capitate or 2-lobed stigma. *Fruit* a subglobose capsule, usually compressed contrary to the septum, truncate or 2-horned at apex; carpels at first separating, then dehiscing down the inner face. *Seeds* numerous, minute, subglobose; testa smooth, sometimes reticulate; albumen fleshy; embryo straight.

Stems and leaves glabrous; leaves linear or lanceolate; flowers axillary, fasciated 1–3 together on filiform pedicels; corolla very small, about 1 in. long; seeds with reticulate testa ..... 1. *alsinoides*.  
 Stems and leaves hirsute; leaves elliptic-ovate; flowers in terminal lax few-flowered umbels, pedicels filiform; corolla 2–25 in. long; seeds with smooth or punctate testa ..... 2. *polymorpha*.

1. *MITRASACME ALSINOIDES*, R. Br.; F. B. I. iv. 80. *M. indica*, Wt. Ic. t. 1601 (1).

Deccan and Carnatic; W. Coast; S. Canara to Travancore.

A very slender annual herb, under 6 in. high.

2. *MITRASACME POLYMORPHA*, R. Br.; F. B. I. iv. 80. *M. malaccensis*, Wt. Ic. t. 1601 (2).

W. Coast, in S. Canara (Hohenacker).

A very slender annual herb, the leaves chiefly at or near the base.

3. *Buddleia*, Linn.

Trees, shrubs or herbs. *Leaves* opposite, entire, or toothed, united by a stipular line. *Flowers* in usually dense, globose or corymbose cymes, axillary or in a terminal thyrsoïd panicle. *Calyx* campanulate, 4-lobed. *Corolla* urceolate or cylindric; lobes 4, short, imbricate in bud. *Stamens* 4, on the corolla-tube; anthers subsessile, ovate or oblong, cells parallel. *Ovary* 2-celled; ovules many in each cell, many-seriate; style filiform; stigma capitate, terminal or decurrent on two sides. *Fruit* a septicidally 2-valved capsule. *Seeds* very many, oblong or fusiform; testa

appressed or largely reticulate, often expanded in wings or tails; albumen fleshy; embryo straight.

BUDDLEIA ASIATICA, Lour.; F. B. I. iv. 82. *B. discolor*, Roth.; Wt. Ic. t. 894.

All forest Districts in hilly country, up to 4,000 ft., chiefly in second-growth forests, on roadsides and near villages, also on river lands and in ravines; often cultivated in gardens.

A large evergreen shrub with white fragrant flowers in terminal panicles and lanceolate leaves white-tomentose beneath. Bark thin, grey; wood grey, moderately hard. Vern. *Hind.* Nimda.

#### 4. Fagraea, Thunb.

Glabrous trees or shrubs, often epiphytic, sometimes scandent. *Leaves* opposite, coriaceous, entire; petioles dilated at the base or united by a stipular sheath. *Flowers* large or small, white yellowish or rarely pink, in bracteate terminal or axillary cymes, grouped in corymbs, racemes or elongate panicles. *Calyx* deeply 5-fid, the lobes thick, broad, imbricate, persistent. *Corolla*-tube long, tubular or funnel-shaped; lobes 5, broad, twisted and slightly overlapping to the right in bud. *Stamens* 5, adnate to the corolla-tube, exserted; filaments slender; anthers oblong or ovate with parallel cells. *Ovary* 2-celled or 1-celled above; ovules very many in each cell; style slender; stigma capitate. *Fruit* a 1-2-celled many-seeded pulpy berry. *Seeds* embedded in the pulp; testa crustaceous; albumen horny; embryo small, straight.

Corolla-tube over 3 in. long, dilated only near the top ... 1. *zeylanica*.  
Corolla-tube under 2 in. long, funnel-shaped above ..... 2. *obovata*.

#### 1. FAGRAEA ZEYLANICA, Thunb.; F. B. I. iv. 83.

W. Coast, open forests of Travancore, up to 2,000 ft., Tinnevely.

A small tree generally epiphytic when young, afterwards reaching 30 ft. in height, the flowers cream-coloured, the berry ovoid up to 2 in. long, the leaves obovate up to 10 in. long. Vern. *Mal.* Vallerei.

#### 2. FAGRAEA OBOVATA, Wall.; F. B. I. iv. 83. *F. coromandelina*, Wt. Ic. t. 1316; Bedd. Fl. t. 244. *F. malabarica*, Wt. Ic. t. 1317.

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

A small tree, generally epiphytic when young, afterwards up to 30 ft. high, with cream-coloured large flowers, ovoid smooth berry and obovate spatulate obtuse fleshy leaves. Bark grey, smooth; wood grey, soft. Vern. *Kan.* Ginnuna; *Mal.* Omal.

### 5. *Strychnos*, Linn.

Trees or climbing shrubs with usually short clavate circinate tendrils, in some of the axils, the adjacent leaf being then often suppressed. Leaves opposite, usually coriaceous, with 3-5 or more ribs starting from or a little above the base; main nerves transverse joining the midrib and upper side ribs, less conspicuous. Flowers white or yellowish, in terminal or axillary cymes; bracts and bracteoles small. Calyx 5- or 4-lobed. Corolla salver-shaped; tube cylindric; lobes 5 or 4, valvate. Stamens 5 or 4 adnate to the corolla-tube; filaments short; anthers ovate or oblong, cells parallel. Ovary 2-celled, or 1-celled above; ovules many in each cell; style long or short; stigma capitate or obscurely 2-lobed. Fruit a berry, globose, indehiscent, with a hardened pericarp. Seeds many, or 1-2, embedded in a fleshy pulp; globose or compressed, the hilum ventral; albumen horny; embryo short, the cotyledons foliaceous; radicle terete, short.

### ANALYSIS AND DESCRIPTIONS AFTER A. W. HILL IN KEW BULL. 1917, 121.

Corolla-tube short, lobes longer than the tube, glabrous or woolly-tomentose on the throat, tendrils bifid, curved and thickened :—

Leaves ovate-lanceolate, acuminate, up to 5 in. long, 2·5 in. broad, glabrous, chartaceous, 3-ribbed from a little above the base, with a slender very faint pair close to the margin, transverse nerves many, sub-parallel, under surface copper-coloured; cymes axillary, about 8 in long, few-flowered; corolla-lobes with small tufts of hairs within

#### 1. *aenea*.

Leaves ovate or elliptic-ovate, sometimes orbicular and cordate, cuspidate, shining, coriaceous, up to 2·5 in. long, 1·25 in. broad, minutely pubescent, triple-ribbed, transverse nerves inconspicuous; cymes paniculate, about 1 in. long, the corolla-lobes woolly within

#### 2. *bicirrhusa*.

Corolla-tube and lobes about equal in length, the throat with woolly tomentum :—

Tree, without tendrils; leaves elliptic, acute, up to 6 in. long, 2·5 in. broad, chartaceous, quintuple-ribbed, the upper pair of ribs 3–7 in. above the lower, transverse nerves about 4 pairs, joining the second pair of ribs to the midrib; cymes about 1 in. in diam. from the top of previous year's wood: ovary and style glabrous .....3. *potatorum*. Climbing shrubs with bifid thickened tendrils; ovary and style hirsute :—

Leaves ovate-elliptic, acute or acuminate, up to 4 in. long, 2 in. broad, shining, coriaceous, 3-ribbed or sub-triple-ribbed, transverse nerves many, not very distinct; cymes rather over 1 in. long, from old wood .....4. *colubrina*.

Leaves ovate or elliptic-ovate, acute, up to 4 in. long, 2 in. broad, shining, subcoriaceous, triple-ribbed, the nerves and reticulation raised; cymes under 1 in. long, in axillary clusters with slender pedicels .....5. *lenticellata*.

Corolla-tube and lobes about equal in length, the lobes with a line of erect hairs within; anthers bearded at the base; ovary and style glabrous; leaves ovate, ovate-lanceolate or narrowly lanceolate, acuminate, up to 5 in. long, 2 in. broad, coriaceous, triple-ribbed, transverse nerves many; cymes axillary, short and dense.....6. *Dalzellii*.

Corolla-tube elongate, much longer than the lobes :—

Tree, without tendrils; leaves broadly ovate or orbicular, obtuse or acute, coriaceous, glabrous, up to 6 in. long, 4 in. broad, 5-ribbed, transverse nerves irregular; cymes terminal, 1-2 in. in diam., many-flowered; corolla-tube only slightly hairy near the base within 7. *Nux-vomica*.

Climbing shrub with single curved, not bifid tendrils; leaves elliptic or ovate, abruptly acuminate, shining, coriaceous, glabrous, up to 5 in. long, 2 in. broad, triple-ribbed with a small marginal looped pair, transverse nerves prominent, irregular; cymes terminal, about 1·5 in. broad, many-flowered; corolla-tube long, slightly pilose within

8. *cinnamomifolia* var. *Wightii*.

1. STRYCHNOS AENEA, A. W. Hill. *S. Rheedii*, Brandis Ind. Trees 474, not of F. B. I.

W. Gháts, Anamalais and hills of Travancore at 2,000–4,000 ft., in evergreen forest.

A large climbing shrub with prominently reticulate leaves, the fruit said to be spherical, about 2 in. in diam.

2. STRYCHNOS BICIERRHOSA, Lesch. *S. colubrina*, C. B. Clarke in F. B. I. iv. 87, in part.

S. Carnatic, in Tanjore (Leschenault).

A climbing shrub with smooth minutely pubescent stems.

3. *STRYCHNOS POTATORUM*, Linn. f. ; F. B. I. iv. 90 ; Roxb. Cor. Pl. t. 5 ; Wt. Ill. t. 156.

N. Circars, Deccan and Carnatic to S. Travancore, in deciduous forests and up to 4,000 ft. in the hills. The Clearing Nut.

A medium-sized tree which may reach 50 ft. in height. The fruit is a globose 1-2-seeded berry 5-7 in. in diam., and the seeds are used to clear muddy water. Bark brownish-black, corky, deeply cracked ; wood white turning yellowish-grey, hard, close-grained and of curious structure, but is little used. Vern. *Hind.* Nirmali ; *Ur.* Kotaki ; *Tel.* Chilla ; *Tam.* Tattan Kottei.

4. *STRYCHNOS COLUBRINA*, Linn. ; F. B. I. iv. 87 *in part only*. S. *Beddomei*, C. B. Clarke ; F. B. I. iv. 88 *in part*.

Carnatic, Veligonda hills of Nellore (Ramaswami) ; W. Coast, S. Canara to Travancore, to the lower forests of the W. Gháts.

A large climbing shrub with smooth bark and 1-3 seeded, berry 7 in. in diam. with crustaceous pericarp.

5. *STRYCHNOS LENTICELLATA*, A. W. Hill.

E. Deccan and Carnatic to S. Travancore, in hilly country and deciduous forest.

A climbing shrub with lenticellate stems, the crustaceous berry 75 in. in diam. with 1-2 orbicular flattened seeds. Vern. *Tam.* Cheru mulagu.

6. *STRYCHNOS DALZELLII*, C. B. Clarke ; F. B. I. iv. 87.

Bababudan Hills of Mysore (Law).

A large climber with ovate leaves, the crustaceous berry 6 in. in diam. with several discoid seeds.

*Var. lanceolaris*, A. W. Hill, leaves narrowly lanceolate, scarcely 1 in. broad. Coorg and Wynaad (Beddome).

7. *STRYCHNOS NUX-VOMICA*, Linn. ; F. B. I. iv. 90 ; Roxb. Cor. Pl. t. 4 ; Bedd. Fl. t. 243.

N. Circars, Deccan and Carnatic, also W. Coast, in deciduous forest and up to 4,000 ft. in hilly country ; common on laterite and in sandy coast forests as at Strihari Kota. The *Nux vomica* or Strychnine tree.

A moderate-sized or large deciduous tree with greenish-

white flowers having the scent of fenugreek and orange-red berries up to 2 in. in diam. with 3-4 flat seeds. These seeds contain strychnine and are collected and exported largely. Bark thin, dark-grey or yellowish-grey; wood white, turning yellowish-grey, hard, close-grained and of curious structure, used for various purposes. Vern. *Hind.* Kuchila; *Ur.* Kachila; *Tel.* Mushti; *Tam.* Yetti; *Mal.* Kanjerám.

8. *STRYCHNOS CINNAMOMIFOLIA*, Thw.; F. B. I. iv. 89 *in part*.  
Var. *Wightii*, A. W. Hill. *S. Bourdillonii*, Brandis Ind. Trees 474.

Deccan, forests of Kurnool and Mysore; W. Gháts, S. Canara to Travancore in evergreen forests, up to 3,000 ft. A very large climbing shrub with simple tendrils, the berry very large, 4 in. in diam. (Bourdillon), the seeds ovoid, flattened, 1 in. long. The seeds give an alkaloid, chiefly brucine.

#### 6. *Gardneria*, Wall.

Large climbing shrubs, glabrous. *Leaves* opposite, entire, the petioles connected by a stipular line. *Flowers* in axillary pedunculate cymes; bracts in pairs, bracteoles on the pedicels. *Calyx* small, deeply 4-5-lobed. *Corolla* rotate, lobes 4-5, thick, valvate in bud. *Stamens* 4-5, inserted on the corolla-tube; filaments very short; anthers oblong, subconnate, erect, the cells longitudinal. *Ovary* 2-celled; ovules 1 in each cell; style subulate; stigma shortly 2-lobed. *Fruit* a globose 2-seeded berry, the pericarp fleshy. *Seed* hemispheric, cup-shaped, with a deep inner cavity filled with the pulpy placenta; testa coriaceous; albumen fleshy; embryo small, the cotyledons flat; radicle inferior.

*GARDNERIA OVATA*, Wall.; F. B. I. iv. 93. *G. Wallichii*, Wt. Ic. t. 1313.

W. Gháts, Nilgiris, Anamalais, Pulneys and hills of Travancore at 4,000-7,000 ft.; hills of Mysore.

A large climber with spirally twisting stem, the leaves elliptic acute, up to 3 in. long, the yellow flowers in trichotomous cymes of about 1-5, the berry scarlet. Bark dark brown, wood in wedges of porous tissue, radiating from the centre.

## Family CII. GENTIANACEAE.

Herbs, usually glabrous and bitter, rarely shrubs. *Leaves* opposite, rarely alternate, entire, exstipulate. *Flowers* usually regular and hermaphrodite, in terminal cymes or clusters, or axillary and clustered or solitary, rarely bracteate. *Calyx* inferior, 4-7-lobed or -partite, the lobes usually imbricate in bud. *Corolla*-tube campanulate, funnel-shaped or cylindric; lobes 4-7, twisted to the right or (in *Limnanthemum*) induplicate-valvate. *Stamens* as many as the corolla-lobes and alternate with them, inserted in the corolla-tube or at its mouth; filaments linear, sometimes dilated below; anthers dehiscing longitudinally, sometimes by apical pores. *Disk* annular, or of 5 glands or none. *Ovary* of 2 carpels, 1-2-celled; ovules usually numerous; style simple; stigma entire or 2-lobed. *Fruit* a membranous capsule, septicidally 2-valved, rarely a fleshy berry. *Seeds* many, small, sometimes winged, testa membranous or crustaceous; albumen copious; embryo small.

Terrestrial herbs; leaves opposite; corolla-lobes contorted in bud:—

Ovary 2-celled; style filiform; flowers blue purple or white

1. *Exacum*.

Ovary 1-celled:—

Corolla-lobes without pits, depressions or spurs at the base:—

Corolla regular:—

Style linear:—

Flowers white, in sessile axillary clusters . . 2. *Enicostemma*.

Flowers pink or white, in dichotomous cymes . . 3. *Erythraea*.

Style short or none, flowers usually blue . . . . . 4. *Gentiana*.

Corolla irregular:—

Flowers yellow; stigma subentire . . . . . 5. *Hoppea*.

Flowers pink or white; stigma deeply 2-lobed . . . 6. *Canseora*.

Corolla-lobes with pits depressions or spurs at the base:—

Corolla-lobes with 1-2 glandular nectaries near the base

7. *Swertia*.

Corolla-lobes with pits prolonged behind into spurs . . 8. *Halenia*.

Aquatic herbs; leaves alternate; corolla-lobes induplicate-valvate in bud . . . . . 9. *Limnanthemum*.

1. *Exacum*, Linn.

Herbs, sometimes subshrubby and much branched. *Leaves* opposite, entire, usually 3- or more-ribbed. *Flowers* in terminal

and axillary usually leafy dichasioid cymes. *Calyx* deeply 4-5-lobed, the lobes keeled winged or flat on the back. *Corolla* rotate, usually blue purple or white; tube short, globose; lobes 4-5, overlapping to the right in bud. *Stamens* 4-5, inserted on the throat of the corolla; filaments short, anthers usually oblong, dehiscing by terminal pores at length extended downwards. *Ovary* 2-celled; ovules many in each cell on large fleshy placentas adnate to the septum; style long; stigma small, subcapitate. *Fruit* a globose septicidally 2-valved capsule. *Seeds* many, minute, sub-cuboid, the testa granular.

Corolla large, lobes at least .25 in. long :—

Flowers tetramerous; stems 4-angled, often slightly winged :—

Corolla-lobes .75-1.5 in. long; calyx-lobes ovate, gradually acuminate, with a narrow dorsal wing; anthers .4 in. long, straight; leaves ovate, acute, 5- or 7-ribbed, up to 5 in. long, 1.5 in. broad; bracts broadly ovate, acute .....1. *Perrottetii*.

Corolla-lobes .75-1 in. long; calyx-lobes ovate, abruptly cuspidate acuminate with a broad rounded dorsal wing; anthers nearly .5 in. long, curved; leaves ovate or oblong-lanceolate, acuminate, 5-ribbed, up to 5 in. long, 2 in. broad; bracts narrowly lanceolate acuminate .....2. *bicolor*.

Corolla-lobes .75 in. long; calyx-lobes ovate-lanceolate, long and setaceous-acuminate with a narrow dorsal wing; anthers .3 in. long, straight; leaves lanceolate acuminate, 5-ribbed, up to 4 in. long, .75 in. broad; bracts narrowly lanceolate ....3. *tetragonum*.

Flowers pentamerous :—

Stems 4-winged or 4-angled, the wings sometimes nearly obsolete towards the base :—

Tall sub-shrubby herb; cymes spreading, the pedicels recurved especially in fruit; corolla-lobes .75 in. long, apiculate; calyx-lobes lanceolate, setaceous-acuminate, with a broad rounded dorsal wing; anthers .2-.3 in. long, not attenuate, with a round gland at the top of the connective behind; leaves membranous, ovate-lanceolate, acuminate, 3- or 5-ribbed, up to 4 in. long, 1.25 in. broad; bracts linear-lanceolate .....4. *Wightianum*. Low bushy perennial much-branched herbs; leaves small, fleshy, with thin margins, 3-ribbed; pedicels erect; anthers not glandular at the back :—

Flowers about 3, corymbose at the ends of leafy branches, pedicels .4-.6 in. long; calyx-lobes narrowly lanceolate, .4 in. long, the dorsal wing attenuate at base; corolla-lobes obovate,



·35 in. long; leaves lanceolate acuminate up to 3 in. long, ·5 in. broad, the tips often recurved .....5. *courtaillense*. Flowers solitary near the top of leafy branches, pedicels 1-2 in. long; calyx-lobes lanceolate, ·4 in. long, the dorsal wing semicordate at base; corolla-lobes obovate, ·5 in. long; leaves spatulate, incurved and plicate, very close, up to ·75 in. long, ·2 in. broad, the tips reflexed, the side ribs very obscure

6. *travancoricum*.

Flowers solitary in the upper leafy axils, the peduncles bracteolate; corolla-lobes elliptic-obovate, apiculate, ·7 in. long; calyx-lobes acuminate-semicordate at base, strongly nerved; leaves ovate or suborbicular, acute, rounded or cordate at base, sessile and stem-clasping, up to 2·5 in. long, 2 in. broad, the margin slightly thickened, 3-ribbed .....7. *atropurpureum*.

Stems terete, only the upper parts slightly angled; calyx-lobes narrowly winged, the wings sometimes only a thickened ridge; leaves thickly coriaceous, broadly ovate, acute, sessile and stem-clasping, the margins thickened, up to 2·5 in. long, 1·5 in. broad, 5-ribbed; flowers large, in terminal leafy and bracteate corymbs; corolla-lobes obovate, narrowed below, apiculate, 1 in. long

8. *anamallayanum*.

Corolla small, lobes less than ·3 in. long; flowers tetramerous; stems 4-angled :—

Calyx-lobes with a dorsal wing :—

Dorsal wing of the calyx-lobes narrow; pedicels short, under ·5 in. long; corolla-lobes elliptic, acute, up to ·3 in. long; anthers ·15 in. long; leaves subsessile, elliptic or lanceolate, up to 2·5 in. long, ·5 in. broad, usually 3-ribbed.....9. *pedunculatum*.

Dorsal wing of the calyx-lobes broad, prominently nerved, cordate at base; pedicels long, the middle one often 1-2 in.; corolla-lobes lanceolate, ·2-·25 in. long; anthers ·1 in. long; leaves petioled, ovate, acute, up to 2·5 in. long, 1 in. broad, usually 5-ribbed

10. *petiolare*.

Calyx-lobes without a dorsal wing; anthers under ·1 in. long :—

Flowers subsessile; calyx-lobes ovate, indistinctly 3-nerved; corolla-lobes ovate, ·3 in. long; leaves small, sessile, obscurely 3-ribbed, up to ·25 in. long .....11. *sessile*.

Flowers peduncled, the peduncles up to 2 in. long; calyx-lobes ovate, strongly nerved; corolla-lobes elliptic, up to ·3 in. long; leaves orbicular-ovate, up to ·25 in. in diam. ....12. *Lawii*.

1. *EXACUM PERROTTETII*, Griseb.; F. B. I. iv. 95; Wt. Ic. t. 1322.

N. Circars, Mahendragiri Hill in Ganjam 4,000–4,500 ft. (Fischer and Gage); Deccan, hills of Mysore; Carnatic, Shevaroy Hills of Salem at 4,500 ft. (Beddome); W. Gháts, Nilgiris, chiefly about Coonoor and Kotagiri, at 6,000 ft., in grass.

An erect herb, reaching 2 ft. high, sometimes more, the flowers rose-coloured or blue, very handsome.

2. *EXACUM BICOLOR*, Roxb.; F. B. I. iv. 96; Wt. Ic. t. 1321.

N. Circars, Sukmamri Hill in Godavari, 3,000 ft. (Gamble); Deccan, in Mysore and Coimbatore, in hilly country; W. Gháts, most Districts, at 4,000–6,000 ft., in grassy pastures.

An erect herb, about 2 ft. high, the corolla-lobes generally white in the lower, bright blue in the upper half. The size of the leaves is variable according to locality and soil.

3. *EXACUM TETRAGONUM*, Roxb.; F. B. I. iv. 95.

N. Circars, Rampa Hills of Godavari (V. Narayanswami).

An erect herb about 2 ft. high with azure blue flowers.

4. *EXACUM WIGHTIANUM*, Arn.; F. B. I. iv. 97; Wt. Ic. t. 840.

W. Gháts, Nilgiris, Pulneys and hills of Travancore, at 5,000–7,000 ft.

An erect herb up to 3 ft. high, the corolla bright blue, the flowers and especially the capsule prominently curved downwards.

5. *EXACUM COURTALLENSE*, Arn.; F. B. I. iv. 97; Wt. Ic. t. 1323.

W. Gháts, Courtallum in Tinnevely (Wight).

A very pretty bushy perennial herb with many deep blue flowers and fleshy leaves.

Var. *laviflorum*, Gamble. Flowers in lax leafy cymes, leaves longer and more acuminate, calyx-lobes much nerved, especially in fruit.

Travancore Hills (Beddome).

6. *EXACUM TRAVANCORICUM*, Bedd. Ic. t. 118. *E. courtallense*, Arn. var. *travancorica*, C. B. Clarke; F. B. I. iv. 97.

W. Gháts, hills of Travancore at 4,500 ft. (Beddome), Agastiamalai Peak (Barber), in grassy places and on rocks. An erect perennial herb with solitary cobalt-blue flowers on long peduncles near the ends of small closely packed

fleshy leaves, the whole forming a globular bush about 8 in. high.

7. *EXACUM ATROPURPUREUM*, Bedd. Ic. t. 119; F. B. I. iv. 97.  
W. Gháts, hills of Tinnevely and Travancore, at 3,000–5,000 ft., in grass land.

An erect herb with very deep blue flowers and ovate leaves in distichous pairs.

Var. *palghatense*, Gamble. Stems winged on the angles; flowers in elongate terminal corymbs, the upper pairs of leaves becoming small and bract-like, the calyx-lobes much narrower.

Palghát Hills at 6,000 ft. (Beddome), Poonachi, Anamalais, at 5,000 ft. (Barber).

8. *EXACUM ANAMALLAYANUM*, Bedd. Ic. t. 154. *E. atropurpureum*, Bedd. var. *anamallayanum*, C. B. Clarke; F. B. I. iv. 97. *E. Saulierei*, Dunn in Kew Bull. 1914, 30.

W. Gháts, Anamalais and Pulney Hills, at 6,000–7,000 ft.

A shrubby perennial herb reaching 2–3 ft. high with deep blue (the deepest ultramarine, *Bedd.*) flowers and leathery leaves, said by Beddome to be the “most lovely species of the genus.”

9. *EXACUM PEDUNCULATUM*, Linn.; F. B. I. iv. 97; Wt. Ic. t. 336.  
All plains Districts and up to about 3,000 ft. in the hills, in grass lands and moist places.

An erect annual reaching 12–18 in. high, with blue or lilac flowers.

10. *EXACUM PETIOLARE*, Griseb.; F. B. I. iv. 98; Wt. Ic. t. 1324 (2).

W. Gháts, hills of Mysore, Nilgiris, Anamalais and Cochin, at 1,500–4,000 ft.

An erect slender annual, up to 12 in. high, with white or pale blue flowers.

11. *EXACUM SESSILE*, Linn.; F. B. I. iv. 98; Wt. Ic. t. 1324 (1).  
W. Coast and W. Gháts, in most Districts up to 4,000 ft.  
A small annual herb with blue flowers reaching about 6 in. in height. Hill specimens are much more slender than those from near the coast.

12. *EXACUM LAWII*, C. B. Clarke; F. B. I. iv. 98.

Bababudan hills of Mysore (Law).

A small erect slender herb with rather large purplish blue flowers.

Small specimens collected by C. E. C. Fischer in the Anamalai Hills at 4,000 ft. seem to belong to *E. pumilum*, Griseb.; F. B. I. iv. 98; Wt. Ic. t. 1324 (3).

## 2. *Enicostemma*, Blume.

Erect or procumbent branching herbs. *Leaves* opposite, sessile. *Flowers* small, in sessile axillary clusters. *Calyx* deeply 5-lobed. *Corolla*-tube long, tubular below, funnel-shaped above; lobes 5, small, overlapping to the right in bud. *Stamens* 5, inserted at the middle of the corolla-tube; filaments filiform with a small double-hooded scale at the base; anthers erect, acute, included. *Ovary* 1-celled, placentas little intruded; ovules many; style short; stigma capitate. *Fruit* an ellipsoid capsule, septicidally 2-valved, the valves separating. *Seeds* many, subglobose, reticulate.

*ENICOSTEMMA LITTORALE*, Blume; F. B. I. iv. 101. *Adenema hyssopifolium*, G. Don; Wt. Ic. t. 600.

All plains Districts and to 1,500 ft. in the hills, chiefly however near the sea, often on black cotton soil.

A perennial herb from a thick rootstock, with many erect or procumbent branches, bearing narrow linear or linear-oblong leaves, very variable, 3-ribbed, up to 2·3 in. long and about ·5 in. broad. Flowers white, in dense clusters on the stem. An infusion of the plant is used as a tonic like gentian. Vern. *Tam. Vellaragu*.

## 3. *Erythraea*, Renealm.

Annual or perennial erect branching herbs. *Leaves* opposite, sessile. *Flowers* pink or white or sometimes yellow, in dichotomous often corymbose cymes. *Calyx* tubular, 4- or 5-lobed, the lobes keeled. *Corolla*-tube long or short, lobes 5, rarely 4, spreading. *Stamens* 5, rarely 4, inserted near the throat of the corolla-tube; filaments short, linear; anthers oblong, often spirally twisted, exserted. *Ovary* 1-celled, the placentas much intruded; ovules many; style linear; stigma 2-lobed. *Fruit* an oblong capsule almost 2-celled, septicidally 2-valved. *Seeds* minute, reticulate.

*ERYTHRAEA ROXBURGHII*, G. Don; F. B. I. iv. 102; Wt. Ic. t. 1325.

Most plains Districts, in cultivated fields and on grass lands. An erect herb reaching 8 in. in height, the flowers rose-

coloured or white (Wight), the radical leaves spathulate, the stem ones linear, the flowers in good specimens in long-pedicelled dichasia, the capsules often .3 in. long.

#### 4. *Gentiana*, Linn.

Annual or perennial herbs, sometimes woody below. *Leaves* opposite, often connate at base. *Flowers* blue, yellow or white, axillary or terminal, usually sessile. *Calyx* tubular, terete or rarely keeled, sometimes spathaceous; lobes 5 or 4. *Corolla* tubular campanulate funnel-shaped or subrotate; lobes 5-4, often with folds between the lobes. *Stamens* 5 or 4, attached at or below the middle of the tube, included; filaments linear, somewhat flattened below; anthers oblong or ovate. *Ovary* 1-celled, placentas slightly intruded; ovules many; style usually short; stigma bilobed. *Fruit* a stalked or sessile, oblong or ellipsoid capsule, dehiscing septicidally. *Seeds* many, small, the testa reticulate.

Stems short; basal leaves in rosette and near above it much larger than the stem leaves, ovate or spathulate, often reaching 1-1.5 in. long, stem leaves gradually smaller, often very small, usually lanceolate, recurved; capsule-stalk not longer than the calyx-lobes, .25 in. long

##### 1. *pedicellata* var. *Wightii*.

Stems elongate; basal leaves not larger than the stem leaves, often even smaller, usually under .3 in. long, both ovate or obovate; capsule-stalk longer than the calyx-lobes, often .5 in. long

##### 2. *quadrifaria* var. *zeylanica*.

1. *GENTIANA PEDICELLATA*, Wall. *G. quadrifaria*, C. B. Clarke; F. B. I. iv. 111 *in part*.

Var. *Wightii*, Kusnezow Acta Hort. Petrop. xv. 401. *G. pedicellata*, Wt. Ic. t. 1328, Spic. Neilg. t. 164.

W. Gháts, Nilgiris, Anamalai and Pulney Hills and hills of Tinnevely, above 6,000 ft., in pasture lands.

A tufted herb with bright pale blue flowers.

2. *GENTIANA QUADRIFARIA*, Bl.; F. B. I. iv. 111 *in part*.

Var. *zeylanica*, Kusnezow Acta Hort. Petrop. xv. 403.

Bababudan Hills of Mysore, about 6,000 ft.

An erect herb, little branching, with blue flowers.

#### 5. *Hoppea*, Willd.

Small, much-branched glabrous herbs. *Leaves* opposite, small, sessile. *Flowers* sessile or short-pedicelled, in 2-3-chotomous

cymes, small. *Calyx* campanulate, membranous; lobes 4, lanceolate. *Corolla* tubular; lobes 4, more or less unequal. *Stamens* inserted in the throat of the corolla, 1 perfect, 3 barren or wanting; filament linear, short; anther ovate, with parallel cells. *Ovary* 1-celled, placentas little intruded; style short, stigma 2-lobed. *Fruit* a globose or ellipsoid capsule, septicidally 2-valved. *Seeds* very many, minute, obscurely reticulate.

Stem 4-angled; calyx-lobes scarious with green marginal nerves; corolla shorter than the calyx; capsule globose .....1. *dichotoma*.  
Stem 4-winged; calyx-lobes scarious with slender marginal nerves; corolla longer than the calyx; capsule ellipsoid .....2. *fastigiata*.

1. *HOPPEA DICHOTOMA*, Willd.; F. B. I. iv. 100.

N. Circars and Deccan in grass, as far south as Salem and Chingleput.

A small herb, up to about 6 in. high, with pale yellow flowers.

2. *HOPPEA FASTIGIATA*, C. B. Clarke; F. B. I. iv. 100.

N. Circars, in Ganjam (Gamble); Deccan, in Mysore; W. Coast from S. Canara to Travancore.

A small herb, up to about 6 in. high, with pale yellow flowers.

6. *Canscora*, Lamk.

Annual dichotomously branched herbs. *Leaves* opposite, sessile, petiolate or perfoliate. *Flowers* pink or white, in lax terminal dichasioid cymes, or axillary or spicate; bracts leafy or subulate, sometimes perfoliate. *Calyx* tubular, 4-toothed; tube terete and striate, keeled or winged. *Corolla*-tube cylindric, usually very thin and membranous; lobes 4, more or less unequal, imbricate and overlapping to the right in bud. *Stamens* 4, inserted on the corolla-tube, 1 or 2 with longer filaments and larger fertile anthers, 3 or 2 with shorter filaments which are usually sterile. *Ovary* 1-celled, placentas slightly intruded; ovules many; style filiform; stigma deeply 2-lobed. *Fruit* a cylindric membranous capsule, septicidally 2-valved. *Seeds* very small, angular, brown, reticulate.

Bracts at the branches of the inflorescence not perfoliate:—

*Calyx* not winged:—

Stems 4-angled, leaves, lower elliptic petioled, upper ovate-lanceolate, passing gradually into ovate acute, sometimes nearly linear, sessile,

membranous bracts at the bifurcations of the inflorescence ; pedicels filiform, usually under '5 in. long ; calyx-teeth setaceous 1. *diffusa*.  
Stems 4-winged :—

Pedicels slender, at least '5 in. long, angular :—

Pedicels not enlarged below the calyx ; lower leaves oblong-lanceolate or -elliptic, attenuate at base, upper ovate-lanceolate ; panicles many-flowered .....2. *decurrens*.

Pedicels more or less enlarged below the calyx ; lower leaves ovate obtuse, upper ovate acute ; panicles few-flowered

3. *pauciflora*.

Pedicels of central flower 0, of others short and winged or 0 ; stem-wings prominent, continued into the inflorescence ; leaves ovate, obtuse or subacute, sessile, up to '75 in. long, '4 in. broad

4. *sessiliflora*.

Calyx prominently winged, the wings narrow, reticulate ; stems narrowly 4-winged, also the pedicels, the wings broader at the top ; leaves ovate or lanceolate, acute, sessile, up to 2 in. long, '75 in. broad, prominently 3-nerved .....5. *decussata*.

Bracts at the branches of the inflorescence perfoliate :—

Calyx prominently winged, the wings broad and reticulate ; stems 4-winged, the wings of the short pedicels gradually widening to those of the calyx ; leaves lanceolate, acute or acuminate, sessile, up to 1'5 in. long, '6 in. broad .....6. *perfoliata*.

Calyx not winged, striate ; stems narrowly 4-winged, the pedicels filiform ; leaves lanceolate, acute, sessile, up to 1'25 in. long, '5 in. broad .....7. *Wallichii*.

1. *CANS CORA DIFFUSA*, R. Br. ; F. B. I. iv. 103. *C. Lawii*, Wt. Ic. t. 1327 (1). *Pladera virgata*, Roxb. ; Hook. Bot. Misc. iii. 88, t. 25.

All Forest Districts, in ravines, on wet banks, sides of watercourses, etc., common.

A very pretty slender annual herb with pink flowers and leaf-like bracts to the forks of the branches of the panicle.

2. *CANS CORA DECURRENS*, Dalz. ; F. B. I. iv. 103.

N. Circars, hills of Godavari ; Deccan, in hilly country, Kurnool to Coimbatore ; W. Coast and W. Gháts, at low levels, often in rice-fields.

A slender erect herb with pink or sometimes white flowers.

3. *CANS CORA PAUCIFLORA*, Dalz. ; F. B. I. iv. 103.

W. Coast, S. Canara to Travancore, in grassy places (Dalzell).

A slender erect herb, scarcely separable from *C. decurrens*. at any rate in dry specimens.

4. *CANSCORA SESSILIFLORA*, Roem. & Sch.; F. B. I. iv. 104.

N. Circars and Carnatic, westwards to the foot of the Madura Hills, in moist places.

An erect herb reaching 18 in. in height, but usually much less, the flowers rose-coloured.

5. *CANSCORA DECUSSATA*, Roem. & Sch.; F. B. I. iv. 104.

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

An erect herb reaching 20 in. in height, the flowers white.

6. *CANSCORA PERFOLIATA*, Lamk.; F. B. I. iv. 104. *C. grandiflora*, Wt. Ic. t. 1326.

W. Gháts, from S. Canara and Mysore to the Anamalais and the hills of Travancore, up to 3,500 ft., on the western side.

An erect herb reaching 18 in. in height, the flowers rose-coloured.

7. *CANSCORA WALLICHII*, C. B. Clarke, F. B. I. iv. 105. *C. perfoliata*, Wt. Ic. t. 1327 (2), *not of* Linn.

Carnatic, Kambakam Drúg in Chingleput (Bourne); W. Gháts, Nilgiris to Travancore, in grass lands, up to 5,000 ft.

An erect herb reaching 16 in. in height, the flowers rose-coloured.

#### 7. *Swertia*, Linn.

Annual or perennial herbs. *Leaves* usually opposite. *Flowers* blue lurid or white, sometimes with yellow nectaries, in terminal paniced or corymbose cymes. *Calyx* deeply 4-5-partite; tube 0 or very short; lobes linear or lanceolate, sometimes ovate. *Corolla* rotate; lobes 4-5, overlapping and twisted to the right in bud, each lobe (or the tube below it) having near the base 1 or 2 glandular nectaries naked or covered by a thin scale. *Stamens* 4-5 inserted at the base of the corolla, free or slightly joined in a ring; filaments linear, often dilated downwards; anthers oblong, versatile. *Ovary* 1-celled, the placentas slightly intruded; ovules many; style short or 0; stigma bilobed. *Fruit* a sessile, ovate or oblong, 2-valved capsule. *Seeds* usually many, small; testa reticulate.

Nectaries 2 near the base of each corolla-lobe; stigma sessile, broad; small herbs under 10 in. in height.....l. *minor*.



Nectary 1 near the base of each corolla-lobe, a pit with or without a covering scale; style short or 0; herbs exceeding 10 in. in height:—

Inflorescence elongate, paniculate:—

Corolla-lobes obtuse, sometimes apiculate, .2–.3 in. long, nectary a pit with fimbriate margin covered with a large ciliate scale; style 0; leaves lanceolate or linear-lanceolate, up to about 3 in. long, .5 in. broad ..... 2. *angustifolia* var. *pulchella*.

Corolla-lobes acuminate, .4–.5 in. long, nectary a round pit with long-ciliate edges; style very short; leaves elliptic-lanceolate, acuminate, up to 3 in. long, 1 in. broad ..... 3. *trichotoma*.

Inflorescence corymbose:—

Flower cymules at the ends of the inflorescence branches dense:—

Nectary near the base of the corolla-lobe covered with a fimbriate scale; corolla-lobes elliptic-obovate, usually apiculate, .3–.4 in. long; calyx-lobes narrowly lanceolate; leaves elliptic or spatulate or linear-oblong, almost obtuse, up to 1.5 in. long, .5–.75 in. broad ..... 4. *corymbosa*.

Nectary not covered with a scale, the margins fringed; corolla-lobes elliptic, obtuse or mucronate only, .25 in. long; calyx-lobes ovate; leaves broadly ovate to nearly orbicular, obtuse, up to 1 in. long, .75 in. broad ..... 5. *Beddomei*.

Flower cymules at the ends of the inflorescence branches lax; nectary large, ciliate, covered with a fimbriate scale; corolla-lobes obovate, mucronate, .4 in. long; calyx-lobes narrowly lanceolate; leaves deltoid-ovate, up to 2 in. long, .7 in. broad ..... 6. *Lawii*.

1. *SWERTIA MINOR*, Knobl. Bot. Cent.-Blatt lx. 321. *Pleurogyne* ? *minor*, Benth.; F. B. I. iv. 120. *Ophelia minor*, Griesb.; Wt. Ic. t. 1332.

W. Ghâts, Nilgiris, above 6,000 ft., in wet places on grass lands.

A small erect herb with white or blue flowers, small ovate sessile leaves and flowers in leafy fastigiate paniced cymes, the nectaries with usually ciliate scales.

2. *SWERTIA ANGUSTIFOLIA*, Buch.-Ham.; F. B. I. iv. 125.

- Var. *pulchella*, Burkill in Journ. As. Soc. Beng. (New Series) ii. 8. 375. *S. pulchella*, Ham.; F. B. I. iv. 125. *S. affinis*, C. B. Clarke; F. B. I. iv. 126. *Ophelia elegans*, Wt. Ic. t. 331.

N. Circars, hills of Ganjam to Godavari, to 4,500 ft. on Mahendragiri; Deccan, hills of Kurnool; W. Ghâts, from the Nilgiris southwards, at 2,000–6,000 ft.

An erect herb reaching 3 ft. in height, the flowers white with blue spots. Said to afford a medicinal bitter.

3. SWERTIA TRICHOTOMA, Wall. ; F. B. I. iv. 126.

W. Gháts, Nilgiris, above 7,000 ft.

A tall leafy herb with pale blue flowers, the corolla- and long calyx-lobes prominently acuminate or caudate, the upper cyme-branches often in umbels.

4. SWERTIA CORYMBOSA, Wt. ; F. B. I. iv. 126. *Ophelia corymbosa*, Wt. Ic. t. 1329, Spic. Neilg. t. 165.

W. Gháts, hills of Mysore, Coimbatore, Nilgiris and Malabar, above 5,000 ft.

An erect herb reaching about 20 in. in height, with long branches, the flowers white or pale blue with blue nerves. Sometimes the upper pedicels are in umbels.

Var. *Grisebachiana*, C. B. Clarke. *Ophelia Grisebachiana*, Wt. Ic. t. 1330.

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

Leaves linear-oblong, nearly spatulate when young ; flowers rather larger and corolla-lobes more acuminate.

5. SWERTIA BEDDOMEI, C. B. Clarke ; F. B. I. iv. 127.

W. Gháts, S. Canara to Travancore (Beddome) ; Nilgiris at Sispara 6,700 ft. (Lawson, Gamble).

An erect herb with rather small flowers in a close flat-topped corymb, the leaves distichous, the calyx-lobes ovate, acute.

6. SWERTIA LAWII, Burkill. *S. corymbosa* var. *Lawii*, C. B. Clarke ; F. B. I. iv. 126.

W. Gháts, Brahmagiri and Bababudan Hills of Mysore, about 4,000 ft.

A tall herb reaching 2-3 ft. high with white flowers with blue nerves.

### 8. Halenia, Borkh.

Erect herbs, annual or perennial. *Leaves* opposite, usually ribbed. *Flowers* in axillary leafy cymes, the end one often umbelliform, the whole making a lax panicle. *Calyx* 4-5-partite, the lobes sometimes with small glands at the base within. *Corolla* campanulate, 4-5-lobed, pitted near the base, within the pits produced in curved spurs which protrude between the calyx-lobes. *Stamens* 4-5, attached near the base of the corolla ; filaments

linear; anthers ovate. *Ovary* 1-celled; ovules many, attached to the sutures; style slender; stigmas 2, oblong or linear. *Fruit* a capsule, dehiscing septicidally in the upper part. *Seeds* ellipsoid, smooth, albuminous; embryo minute with minute cotyledons.

*HALENIA PERROTTETII*, Griseb.; F. B. I. iv. 130; Wt. Ill. t. 157, Ic. t. 1334.

W. Gháts, Nilgiris and Pulneys, above 6,000 ft., on the margins of sholas and in long grass.

An erect herb reaching 2-3 ft. in height with pale blue (white with purple edges, *Bourne*) flowers and ovate 5-ribbed leaves.

### 9. *Limnanthemum*, S. P. Gmel.

Aquatic herbs, floating or creeping; stems erect or runner-like or resembling petioles. *Leaves* alternate or subopposite, orbicular elliptic or ovate, deeply cordate, entire or obscurely sinuate. *Flowers* white or yellow, on peduncles clustered at the nodes or on the apparent petioles close below the leaf-blades. *Calyx* 4-7-partite, the lobes oblong or lanceolate. *Corolla* subrotate; tube sometimes glandular opposite the lobes; lobes 4-7, induplicate-valvate in bud, ciliate fimbriate or folded. *Stamens* 4-7, adnate to the corolla-tube; filaments short, anthers hastate-oblong, versatile. *Ovary* 1-celled; placentas 2, parietal; style short or long; stigma 2-lobed. *Fruit* a globose ovoid or ellipsoid capsule, indehiscent or bursting irregularly. *Seeds* many, discoid, smooth or tuberculate, sometimes winged, albuminous; cotyledons very small, radicle cylindric.

Stems petiole-like with a single floating leaf at the end node and there rooting; leaves orbicular, deeply cordate; flowers white, yellow towards the base within:—

Corolla-lobes entire, with a longitudinal fold down the middle and glands below it on the tube, white; seeds few, rather large with prominent small tubercles .....1. *cristatum*.

Corolla-lobes long fimbriate, not folded down the middle, white with yellow centre; seeds very many, small, smooth, or with a few small tubercles .....2. *indicum*.

Stems with spatulate-orbicular radical leaves, and petiole-like orbicular cordate, membranous cauline ones, floating, not rooting at the nodes; corolla white, small, with 4-5 fimbriate lobes; seeds minutely tuberculate, lenticular .....3. *parvifolium*.

Stems with several nodes and alternate leaves, all orbicular and deeply cordate; corolla yellow with lobes fimbriate on the margin; seeds puberulous and minutely reticulate, almost spherical . . 4. *aurantiacum*.

1. *LIMNANTHEMUM CRISTATUM*, Griseb.; F. B. I. iv. 131.

*Menyanthes cristata*, Roxb. Cor. Pl. t. 105. .

All plains Districts, in tanks and ponds and ditches, common.

A rather small plant, the orbicular deeply cordate, often purplish floating leaves up to 4 in. in diam., the pedicels short, the seeds few only, less than 10, rather large, usually about 7, the tubercles slightly glochidiate.

2. *LIMNANTHEMUM INDICUM*, Thw.; F. B. I. iv. 131.

All plains Districts, in tanks and ponds and ditches, less common.

A large plant, the orbicular floating leaves up to 12 in. in diam., the pedicels long, the seeds usually very many and small.

3. *LIMNANTHEMUM PARVIFOLIUM*, Griseb.; F. B. I. iv. 132.

W. Coast, backwaters at Quilon, Travancore (Wight).

A delicate plant with many radical leaves and very long slender stems with small floating leaves under 1 in. in diam.; seeds not many.

4. *LIMNANTHEMUM AURANTIAECUM*, Dalz.; F. B. I. iv. 132.

Deccan, in Mysore (Meebold); W. Coast. .

A straggling plant with elongate stems bearing leaves and flowers at intervals; the minutely puberulous seeds are characteristic as well as the yellow flowers.

### Family CIII. HYDROPHYLLACEAE.

Annual or perennial herbs, rarely shrubs. *Leaves* radical or alternate, rarely opposite, exstipulate. *Flowers* regular, hermaphrodite, usually in scorpioid cymes, sometimes in spikes or racemes. *Calyx* inferior, 5-partite. *Corolla* 5-lobed, the lobes imbricate, rarely contorted. *Stamens* 5, inserted on the corolla-tube and alternate with its lobes; filaments filiform; anthers ovate-oblong or linear, versatile. *Disk* hypogynous, inconspicuous or 0. *Ovary* superior, 1-2-celled; ovules 2-many in each cell; styles 1 or 2; stigmas capitate. *Fruit* a globose or ovoid,

loculicidal or septicidal, 2-valved capsule or dehiscing irregularly. *Seeds* minute, albumen fleshy; embryo minute.

#### Hydrolea, Linn.

Herbs, rarely undershrubs. *Leaves* alternate, entire. *Flowers* blue, in short terminal racemes or cymes. *Calyx* 5-partite, lobes lanceolate. *Corolla* rotate or campanulate, 5-lobed. *Stamens* 5; filaments filiform, sometimes dilated at base; anthers sagittate. *Ovary* 2-celled, with fleshy placentas adnate to the dissepiment; ovules many; styles 2, distinct; stigmas capitate. *Fruit* a globose or ovoid septicidal capsule. *Seeds* minute, irregularly wrinkled.

HYDROLEA ZEYLANICA, Vahl; F. B. I. iv. 133; Wt. Ic. t. 601.

All plains Districts, in wet places, rice-fields and on the margins of tanks and watercourses, common.

An annual herb, rooting at the nodes, with bright blue flowers and lanceolate leaves, the calyx glandular pubescent, the capsule thin and transparent.

#### Family CIV. BORAGINACEAE.

Herbs, shrubs or trees, rarely climbers, often hispid or scabrous. *Leaves* alternate, rarely opposite; stipules 0. *Flowers* regular, hermaphrodite or rarely polygamous, usually in scorpioid cymes, sometimes in 3-chotomous panicles, rarely solitary and axillary; bracts leafy, small or 0. *Calyx* inferior, 5- rarely 6-8-lobed, usually persistent and often accrescent in fruit. *Corolla* gamopetalous, usually 5-lobed, often with scales in the throat; lobes imbricate in bud, rarely twisted. *Stamens* as many as the corolla-lobes, alternate with them, on the corolla-tube; anthers ovate oblong or linear, the cells dehiscing introrsely or laterally. *Ovary* superior, 2-celled with 2 ovules in each cell or 4-celled with 1 ovule; style terminal or gynobasic, simple or forked; stigmas capitate or 2-lobed; ovules suberect from the inner angle of each cell. *Fruit* a drupe or dividing into 2-4 nutlets. *Seeds* erect or oblique; testa membranous; albumen fleshy or 0; embryo straight or curved; radicle superior.

Ovary entire or slightly 4-lobed; style terminal:—

Style twice bipartite; calyx with short teeth accrescent in fruit;

drupe 1-4-celled; albumen 0; 'cotyledons plicate longitudinally; trees or shrubs .....1. **Cordia**.

Style once forked or styles 2 :—

Style usually bipartite; drupe with 2 2-seeded or 4 1-seeded pyrenes; trees or shrubs .....2. **Ehretia**.

Styles 2; drupe of 4 1-seeded pyrenes; prostrate herbs

3. **Coldenia**.

Style 1, simple; drupe of 4 1-seeded pyrenes; virgate shrub

4. **Rotula**.

Style depressed-conical at the apex or with a horizontal ring below the stigma :—

Style short, shortly 2-lobed; pyrenes 2 2-seeded; shrubs, often scandent .....5. **Tournefortia**.

Style elongated, dilated above, usually in a ring; pyrenes 4 1-seeded; herbs or undershrubs .....6. **Heliotropium**.

Ovary deeply 4-lobed; fruit of usually 4 nutlets, attached to a carpophore :—

Style subterminal; carpophore pyramidal, excavated to hold the nutlets; anthers connivent in a cone, the connectives produced; fruiting calyx enlarged; herbs .....7. **Trichodesma**.

Style gynobasic; carpophore conical; nutlets glochidiate :—

Nutlets not or slightly margined, flattened around the carpophore

8. **Cynoglossum**.

Nutlets prominently margined, the margins recurved, conically attached to the carpophore .....9. **Paracaryum**.

### 1. **Cordia**, Linn.

Trees or shrubs, sometimes subscandent. *Leaves* alternate or subopposite, petioled, entire or toothed. *Flowers* polygamous, ♂ and ♀ in dichotomous corymbose cymes or clusters; bracts 0. *Calyx* tubular or campanulate, accrescent in fruit; teeth short, often irregular or obscure. *Corolla* funnel- or salver-shaped or campanulate, usually white; lobes 4-8, spreading or reflexed, imbricate. *Stamens* as many as the corolla-lobes, adnate to the tube; the filaments often hairy at the base; anthers sagittate or hastate, usually exserted. *Ovary* 4-celled, ovules solitary in each cell; style terminal, simple below, then 2-partite, the branches again bipartite; stigmas capitate or clavate. *Fruit* an ovoid or ellipsoid drupe with viscid pulp, putamen 1-4-celled but only 1 cell usually with a fertile seed. *Seeds* exalbuminous; cotyledons plicate; radicle short.

Flowers white :—

Corolla small, tube hardly as long as the calyx :—

Leaves alternate or occasionally subopposite, usually with at least the basal pair of nerves opposite :—

Filaments villous at the base :—

Margins of the fruiting calyx not recurved :—

Fruiting calyx not ribbed; leaves usually without conspicuous cystoliths on the upper surface, penninerved but the lowest pair usually opposite; ♂ flowers usually larger than ♀; drupe ovoid :—

Leaves not tomentose beneath, sometimes villous, especially in the axils of the nerves, variable in shape but usually ovate to suborbicular, shortly and obtusely acute at apex, obtuse or cuneate at base, often repand-crenate, up to 5 in. in diam., the petiole 1.5 in.; flowers moderate sized in lax cymes, usually shortly peduncled, 1–2 in.

1. *obliqua*.

Leaves softly fulvous or white-tomentose beneath, ovate-orbicular, truncate or cordate at base, obtuse or slightly acute at apex, up to 6 in. in diam., the petiole 2 in.; flowers rather large in lax cymes, usually long-peduncled, up to 4 in. ....

2. *Wallichii*.

Fruiting calyx ribbed :—

Leaves large, ovate, cordate, obtuse, crenate-dentate, at first smooth above, later very rough and wrinkled with impressed nerves and with prominent cystoliths, densely tomentose beneath with white or tawny wool, up to 6 in. in diam.; flowers rather large, especially the ♂, in rather short terminal or axillary corymbs; drupe ovoid, acute, half enclosed in the ribbed cup-shaped calyx

3. *Macleodii*.

Leaves small, ovate, subacute at apex, rounded at base, repand, up to 2 in. long, 1 in. broad, when young closely grey-tomentose; flowers in few-flowered small terminal corymbs; drupe ovoid, rostrate-acuminate, .75 in. long, seated on the cup-shaped ribbed calyx ....

4. *domestica*.

Margin of the fruiting calyx strongly recurved, the calyx ribbed, the drupe large, up to 1 in. long; leaves variable, ovate rhomboid or broadly oblong, obtuse but often abruptly apiculate at apex, cuneate at base, upper surface with white cystoliths, lower fulvous or grey-tomentose, up to 8 in. long, 4 in. broad, the petiole 2 in.; flowers in lax usually subterminal

fulvous-tomentose cymes, the ♂ rather larger; the calyx tubular .....5. *evolution*.

Filaments glabrous at the base; leaves ovate, obtuse or acute at apex, usually rounded at base, often subopposite, upper surface scabrous with prominent whitish points, lower villous or tomentose, sometimes nearly glabrous, up to 4 in. long, 2 in. broad; flowers in short-peduncled close corymbs, the calyx-tube cylindric; drupe ovoid acute, variable in size ...6. *monoica*.

Leaves usually subopposite, the basal pair of nerves not opposite:—

Leaves oblanceolate-oblong, obtuse, entire or undulate, upper surface dotted with white cystoliths, up to 4 in. long, 1.5 in. broad; flowers small, in lax terminal or axillary pedunculate cymes usually tetrandrous; drupe ovoid, acute, up to .5 in. long .....7. *Rothii*.

Leaves elliptic-obovate, obtuse or emarginate, entire or subcrenate, upper surface scabrous hispid; flowers small, in few-flowered subsessile corymbs; drupe ovoid, acuminate, up to .5 in. long

8. *Perrottetii*.

Corolla rather large, the tube longer than the calyx; leaves ovate, acuminate, entire to serrate, the basal pair of nerves opposite, up to 6 in. long, 3 in. broad, without cystoliths, nearly glabrous; flowers in lax long-peduncled terminal corymbs, the calyx-tube cylindric, .3 in. long .....9. *octandra*.

Flowers large, orange or orange-scarlet, the corolla-tube longer than the calyx; leaves large, ovate or elliptic, rough .... *Sebestena* and *subcordata*.

1. *CORDIA OBLIQUA*, Willd.; Hutch. in Kew Bull. 1918, 221; F. B. I. iv. 137, *excl. var.* *C. Mywa*, Roxb.; F. B. I. iv. 136, *not of* Linn; Wt. Ill. t. 169.

All Forest Districts, in deciduous forest, common; sometimes cultivated.

A moderate-sized deciduous tree with white flowers, leaves very variable in size, and a yellow or pink ovoid glossy berry supported by the accrescent calyx and containing a mucilaginous transparent edible pulp. Bark thick, grey or brown; wood greyish-brown, moderately hard, used for various purposes. Vern. *Hind.* Lasora; *Ur.* Gondi; Tel. Iriki, Nakkeri; *Tam.* Vidi; *Can.* Challe; *Mal.* Virusham.

2. *CORDIA WALLICHII*, G. Don; Bedd. Fl. t. 245. *C. obliqua*, Willd., var. *Wallichii*, C. B. Clarke; F. B. I. iv. 137. *C. obliqua*, Wt. Ic. t. 1378.



W. Deccan and W. Gháts, in deciduous forests, often with teak.

A moderate-sized tree with a useful wood.

3. *CORDIA MACLEODII*, Hook. f. and Th.; F. B. I. iv. 139; Brand. For. Fl. t. 41.

Deccan and Carnatic, in hilly deciduous forest up to 4,000 ft.

A deciduous tree reaching 40 ft. in height. Bark thick, grey, corky; wood light brown, mottled, very hard and handsome, useful for furniture and other ornamental work.

Vern. Hind. Dhengan; *Ur.* Baurlo; *Tel.* Pedda batava.

4. *CORDIA DOMESTICA*, Roth. *C. Myxa* var. *domestica*, C. B. Clarke; F. B. I. iv. 137. *C. fulvosa*, Wt. Ic. t. 1380.

Kambakam Hills of Chingleput (Herb. Madras 8979).

Apparently a shrub or small tree, but well-marked by the small white-pubescent leaves, the narrow corolla-lobes, ribbed calyx and long-pointed fruit.

5. *CORDIA EVOLUTION*, Gamble n. comb. *C. fulvosa*, C. B. Clarke in F. B. I. iv. 140 with var. *evolution*, not of Wt.

Deccan, Marnhalli in Mysore (Meebold); Carnatic, Melpat in S. Arcot (Barber).

A small tree with a low spreading crown, 12–15 ft. high, usually with much fulvous tomentum, and large drupe.

6. *CORDIA MONOICA*, Roxb. Cor. Pl. t. 58; F. B. I. iv. 137.

Deccan and Carnatic, in hilly country chiefly, W. to the E. slopes of the Gháts.

A small tree or shrub with white flowers and a yellow fruit, the leaves variable in shape and amount of tomentum.

Vern. *Tel.* Panugeri.

7. *CORDIA ROTHII*, Roem. & Sch.; F. B. I. iv. 138; Wt. Ic. t. 1379.

Deccan and Carnatic, in dry deciduous forests.

A small tree with white flowers and yellow or reddish-brown fruit. Bark grey or brownish-grey, with deep longitudinal furrows; wood hard, brown, streaked, useful for agricultural work and furniture. Vern. *Hind.* Gondi; *Tam.* Narvilli.

8. *CORDIA PERROTTETII*, Wt. Ic. t. 1381; F. B. I. iv. 138.

Deccan, chiefly on black-cotton soil as in Bellary.

A small tree.

9. *CORDIA OCTANDRA*, DC.; F. B. I. iv. 140. *C. serrata*, Roxb.; Wt. Ic. t. 469.

Travancore, in dry forest at about 1,000 ft.

A small tree with usually 8 stamens. Bark pale brown; wood whitish-brown, soft, used for agricultural implements.

Vern. *Tam.* Potta virasu.

*Cordia Sebestena*, Linn. is a small tree, occasionally found in cultivation in gardens in the plains; it is a native of the W. Indies. *C. subcordata*, Lamk., is also found in Madras gardens; it is a coast plant of the Andaman Islands and Malay Peninsula, also with large orange-red flowers.

## 2. *Ehretia*, Linn.

Trees or shrubs. *Leaves* alternate. *Flowers* small, usually white, in terminal or axillary, corymbose or paniced, cymes, rarely solitary. *Calyx* small, 5-partite. *Corolla* with a short cylindric tube; lobes 5, spreading or reflexed, imbricate. *Stamens* 5, inserted on the corolla-tube, usually exserted; filaments filiform; anthers ovate or oblong. *Ovary* 2-celled with 2 ovules in each cell, or 4-celled with 1 ovule; style terminal, bifid or 2-partite or styles 2; stigma small, capitate. *Fruit* a small subglobose drupe with 4 1-celled or 2 2-celled or 1 4-celled pyrenes, 1 or more of the pyrenes or seeds frequently suppressed. *Seeds* straight, testa thin, albumen scanty; cotyledons oblong, small.

Style single, bifid less than half-way down; calyx-lobes small, oblong ovate or lanceolate, glabrous or pubescent:—

Leaves serrate, elliptic or ovate, acuminate, nearly glabrous, up to 7 in. long, 3 in. broad; flowers in subsessile fascicles on the branches of axillary or terminal panicles; calyx-lobes obtuse; drupe with 2 2-celled pyrenes without cavity ..... 1. *acuminata*.  
Leaves entire; drupe with 4 pyrenes or less, the pyrenes with a cavity:—

Leaves usually more than 3 in. long, 2 in. broad:—

Flowers in axillary lateral or terminal lax cymes of unilateral spikes or racemes:—

Leaves unsymmetric, pale when dry, variable in shape, usually elliptic or elliptic-obovate, obtuse or obtusely acute at apex, cuneate at base, with about 7 pairs of strong main nerves, up to 8 in. long, 4.5 in. broad, innovations rusty-pubescent

2. *laevis*.

Leaves symmetric, dark brown to nearly black when dry, elongate-elliptic, acuminate at apex, attenuate at base, with about 6-8 pairs of strong main nerves, up to 6 in. long, 2-3 in. broad, innovations puberulous .....3. *canarensis*.

Flowers in usually terminal, sometimes axillary, hispid-pubescent corymbose cymes; leaves elliptic or ovate, obtuse or subacute, hispid-pubescent beneath, up to 4 in. long, 2 in. broad, main nerves 6-7 pairs, close and regular; drupe rather large

4. *aspera*.

Leaves usually less than 3 in. long, 2 in. broad; flowers in rather close terminal or axillary corymbs:—

Leaves elliptic or obovate, obtuse at apex but sometimes minutely apiculate, nearly glabrous, up to 2.5 in. long, 1.25 in. broad, the main nerves 4-5 pairs; corymbs lax, the flowers rather large; calyx .1 in. long, lanceolate, nearly or quite glabrous, as long as the corolla-tube .....5. *ovalifolia*.

Leaves elliptic-lanceolate or -oblanceolate; acute at apex, long attenuate at base, glabrous, up to 2 in. long, .75 in. broad, main nerves 4-6 pairs, oblique; corymbs mostly terminal and rather dense, the flowers small; calyx about .5 in. long, shorter than the corolla-tube .....6. *Wightiana*.

Leaves ovate, scabrous-pubescent, as are the branchlets and inflorescence, obtuse at apex with a small apiculus, narrowed or rounded at base, up to 2 in. long, 1 in. broad, the main nerves irregular, about 4 pairs; corymbs small, few-flowered; calyx-lobes lanceolate, scabrous, as long as the corolla-tube

7. *pubescens*.

Styles 2 or 1 slender and bifid to near the base; calyx-lobes large, spatulate, with white bristles; leaves fascicled, coriaceous, obovate, cuneate at base, rounded and often 3-5-lobed at apex, densely covered on the upper surface with large white glands each with a bristle, up to 1 in. long, .3 in. broad; corolla campanulate with obtuse spreading lobes; filaments slender; drupe with 1 4-5-celled pyrene .....8. *microphylla*.

1. *EHRETIA ACUMINATA*, R. Br.; F. B. I. iv. 141. *E. serrata*, Roxb.; Wt. Ill. t. 170.

N. Circars, hills of Vizagapatam, at 3,000-3,500 ft. (A. W. Lushington).

A moderate-sized tree with white flowers. Bark grey, longitudinally fissured; wood light brown, moderately hard, resembling that of the ash, useful. Vern. *Hind. Panyan*.

2. *EHRETIA LAEVIS*, Roxb. Cor. Pl. t. 55; F. B. I. iv. 141; Brand. For. Fl. t. 42.

N. Circars and Deccan, in deciduous forests, in the hills to about 2,000 ft., more scarce in the Carnatic.

A moderate-sized or small deciduous tree with pale grey branches, white flowers in conspicuous cymes often terminal and orange-scarlet fruit turning black. Bark grey; wood greyish-white, even-grained and tough. Vern. *Hind.* Chamror; *Ur.* Mosonea; *Tel.* Paldatam.

3. *EHRETIA CANARENSIS*, Miq. in Pl. Hohenack. No. 285. *E. laevis*, Roxb., var. *canarensis*, C. B. Clarke; F. B. I. iv. 141. *E. laevis*, Wt. Ic. t. 1382; Bedd. Fl. t. 246, *not of* Roxb. W. Gháts, in all Districts, up to about 3,000 ft.

A small tree with brownish-grey branches and white flowers, in small usually axillary cymes. Wood greyish or brownish-white. Vern. *Mal.* Chavandi.

4. *EHRETIA ASPERA*, Willd. Phyt. 4. t. 2. fig. 1; Roxb. Cor. Pl. t. 55. *E. laevis*, Roxb., var. *aspera*, C. B. Clarke; F. B. I. iv. 142.

Carnatic, in dry places near Negapatam, west to Coimbatore, north to Vizagapatam.

A small tree with brown branches and hispid-pubescent leaves and inflorescence. Vern. *Tel.* Tella juvi.

5. *EHRETIA OVALIFOLIA*, Wt. Ic. t. 1383; F. B. I. iv. 143.

W. Gháts, E. side, from Coimbatore southwards, at low levels.

A small branching tree with pale brown branches, white flowers and red drupes.

6. *EHRETIA WIGHTIANA*, Wall.; F. B. I. iv. 143; Wt. Ic. t. 1384.

W. Gháts, hills of Tinnevely about Courtallum.

A shrub with slender pale brown branchlets and white flowers.

7. *EHRETIA PUBESCENS*, Benth. in Royle Ill. 306. *Ehretia laevis*, Roxb., var. *pubescens*, C. B. Clarke; F. B. I. iv. 142.

Deccan, hills of Cuddapah and Nellore up to 3,000 ft., E. slopes of the Anamalais.

Apparently a shrub with stout pale brown branchlets.

8. *EHRETIA MICROPHYLLA*, Lamk. *E. buxifolia*, Roxb. Cor. Pl. t. 57; F. B. I. iv. 144.

N. Circars, Deccan and Carnatic, eastwards to the slopes of the W. Gháts, southwards to S. Travancore, common in dry scrub forests.

A small shrub reaching 3-4 ft. high, with fascicled very coriaceous small leaves and a scarlet globose drupe. Vern. *Tel. Bupana buri*.

### 3. *Coldenia*, Linn.

Prostrate scabrid herbs. *Leaves* alternate, small, crisped. *Flowers* white or yellow, axillary, sessile or nearly so, the upper sometimes in a one-sided leafy spike. *Calyx* 4-5-partite; lobes lanceolate or linear. *Corolla*-tube short; lobes 4-5, imbricate in bud. *Stamens* 4-5, on the corolla-tube, included; anthers ovate. *Ovary* 2-celled with 2 ovules in each cell, or imperfectly 4-celled; styles 2, distinct from the base or slightly cohering upwards; stigmas capitate. *Fruit* a nearly dry drupe of 4 subconnate 1-seeded pyrenes. *Seeds* with thin testa; albumen scanty or 0; cotyledons flat.

*COLDENIA PROCUMBENS*, Linn.; F. B I. iv. 144.

All plains Districts, on moist ground on the margins of tanks, etc., and in rice-fields, but in the dry season chiefly if not solely.

A procumbent herb with trailing stems lying flat on the ground, the young parts very white-silky, the leaves obovate-oblong, crenate, up to 1.5 in. long at the main nodes, much smaller on the branchlets and very shaggy, the nerves impressed deeply; the pyrenes rounded on the back, combined in a sharp-pointed pyramid.

### 4. *Rotula*, Lour.

A shrub with virgate branches. *Leaves* small, alternate or fascicled, entire or obscurely toothed. *Flowers* small, few, on short lateral branchlets, between the leaves, sometimes laxly racemose; bracts 2. *Calyx* 5-partite; lobes lanceolate, acuminate, imbricate. *Corolla*-tube short, campanulate; lobes 5, oblong, imbricate in bud. *Stamens* 5, on the corolla-tube; anthers oblong or ovate. *Ovary* ovoid, 2-celled with 2 ovules or 4-celled with 1 ovule in each cell; style filiform, simple; stigma capitate. *Fruit* a drupe with 4 crustaceous 1-seeded pyrenes.

*Seeds* oblong; testa membranous; albumen scanty; cotyledons ovate.

ROTULA AQUATICA, Lour.; Robins. in Philipp. J. Sc. iv. 693. *Rhabdia lycioides*, Mart.; F. B. I. iv. 145. *Ehretia cuneata*, Wt. Ic. t. 1385.

Most Districts, on the banks and rocks on the margins of rivers and streams, often where occasionally submerged in floods.

A small branching shrub, often villous, the branches rooting, the leaves small and narrow, spathulate, up to 1 in. long, often tomentose beneath, the flowers purple, the fruit red or orange.

### 5. Tournefortia, Linn.

Trees or shrubs, often climbing more or less. *Leaves* alternate, entire. *Flowers* numerous, in terminal, rarely lateral or extra-axillary, dichotomous scorpioid cymes, white or greenish-yellow. *Calyx* of 5 ovate or lanceolate sepals. *Corolla*-tube usually cylindric; lobes 4 or 5, short, spreading. *Stamens* 4 or 5, included in the corolla-tube; filaments short; anthers oblong. *Ovary* 4-celled, ovule 1 in each cell, pendulous; style terminal, short and ending in a shortly 2-lobed stigma. *Fruit* a small ovoid scarcely fleshy drupe, separating into 2 or 4 pyrenes. *Seed* straight or curved, albuminous; testa thin; cotyledons oblong.

Leaves oblong-lanceolate, long-acuminate, the nerves oblique:—

Leaves cuneate or unequal at base, under surface green, dark brown when dry, up to about 6 in. long, 1·5 in. broad, main nerves about 7 pairs .....1. *Heyneana*.

Leaves usually rounded at base, under surface pale, with brownish-purple reticulation, up to 6 in. long, 2 in. broad, main nerves about 8 pairs .....2. *reticosa*.

Leaves ovate or ovate-oblong, shortly acuminate, subcordate at base, the under-surface dark brown, up to about 6 in. long, 2·5 in. broad .....3. *Wightii*.

### 1. TOURNEFORTIA HEYNEANA, Wall.; F. B. I. iv. 145.

W. Ghâts, Nilgiri and Anamalai Hills, about 3,000 ft.

A subscandent shrub with the flowers uniserial on the cyme-branches, the corolla-tube 3 in. long.

### 2. TOURNEFORTIA RETICOSA, Wt. Ic. t. 1386; F. B. I. iv. 146.

W. Gháts, Coorg, Wynaad and hills of Travancore at 3,000–4,500 ft.

A subscaudent shrub similar to the last but the leaves more prominently reticulately nerved beneath, the drupes ovoid with 2 pyrenes, each with 2 seeds.

3. *TOURNEFORTIA WIGHTII*, C. B. Clarke; F. B. I. iv. 146.

W. Gháts, Anamalai Hills, at 4,500 ft.

A subscaudent shrub similar to the others but more pubescent and with broader leaves having less oblique nerves.

6. *Heliotropium*, Linn.

Annual or perennial herbs or undershrubs, usually villous or scabrous. *Leaves* alternate. *Flowers* small, white or pale purple, in usually terminal dichotomous cymes, the branches often in long spikes or racemes and scorpioid; bracts small or 0, sometimes leafy with the cymes axillary. *Calyx* 5-lobed; lobes lanceolate or linear. *Corolla*-tube cylindric; lobes 5, imbricate or induplicate, usually spreading in flower. *Stamens* 5, on the corolla-tube, included; filaments short; anthers ovate or lanceolate, sometimes connected by the tips of the apiculate connectives. *Ovary* completely or imperfectly 4-celled; ovules solitary in each cell; style terminal, short or rather long, ending in a flat or conical disk surmounted by the entire or rarely bifid short stigma. *Fruit* dry, indehiscent, 2- or 4-lobed, at length splitting into 4 usually distinct nutlets. *Seeds* straight or curved; albumen usually scanty; cotyledons plano-convex, radicle short.

Lobes of the corolla cordate-acuminate; anthers with the produced connective bifid or trifid at apex; stigma elongate, white-penicillate at apex; leaves lanceolate, 1–2 in. long, .2–.5 in. broad, with stiff hairs from bulbous bases; nutlets margined, rounded and tuberculate on the back .....1. *subulatum*.  
Lobes of the corolla broad, very shortly pointed, plicate in bud and usually incurved:—

*Calyx* in fruit closely enveloping the nutlets, very woolly; anthers lanceolate, near the top of the tube; stigma conical or cylindric with penicillate apex; leaves elliptic or ovate, obtuse, softly white-woolly, up to 1 in. long, the nerves impressed; nutlets usually margined, rounded and tuberculate on the back .....2. *supinum*.

Calyx in fruit not closely enveloping the nutlets, usually with narrow lobes :—

Stamens separate, usually acuminate :—

Nutlets all separating; stigma sessile or nearly so :—

Leaves obovate-spathulate, obtuse, densely softly white-silky, .5–1.5 in. long, .3–.5 in. broad, petioled; stigma elongate conical, minutely pubescent; nutlets densely pubescent, acute at apex.....3. *ovalifolium*.

Leaves linear or linear-spathulate or lanceolate, glabrous, fleshy, up to 1.5 in. long; stigma conical, apex bifid; nutlets glabrous, smooth on the back, the margins corky

4. *curassavicum*.

Nutlets combined in pairs, separating later, beaked angled and with an empty cavity; stigma obtuse, above the lobed ring; leaves ovate, obtuse, narrowed or cordate at base, often unequal, undulate, usually decurrent on the long petiole, up to 4 in. long, 3–4 in. broad, hispid-pubescent .....5. *indicum*.

Stamens joined together by their tips, afterwards separating and apiculate; stigma conical above the umbrella-shaped ring, stalked by the style :—

Flowers in elongate racemes; erect herbs :—

Bracts small, linear; leaves linear or narrowly oblong, up to 1 in. long, .1 in. broad; stems nearly glabrous; nutlets globose, sparingly hirsute .....6. *zeylanicum*.

Bracts rather large, lanceolate, veined; leaves linear-lanceolate, up to 1.5 in. long, .25 in. broad, softly strigose-hirsute; stems also softly hirsute; nutlets globose, glabrous except near the apex .....7. *bracteatum*.

Flowers in spikes or racemes, bracteate; much-branched, low, sometimes procumbent undershrubs :—

Bracts inconspicuous; branches and leaves very white-strigose hispid; flower-spikes up to 3 in. long; leaves narrowly oblong-lanceolate, up to .6 in. long, the margins reflexed; nutlets ovoid, with minute grey hairs .....8. *brevifolium*.

Bracts conspicuous :—

Branches stout, divaricating, covered with white appressed strigose hairs; leaves linear-oblong, also white-strigose, the margins reflexed, up to .6 in. long, .15 in. broad; flower-spikes 1–2 in. long, the bracts ovate; nutlets depressed, densely white strigose-hirsute .....9. *Rottleri*.

Branches twiggy, radiating from the rootstock, procumbent or slightly ascending, appressed hirsute; leaves ovate lan-



ceolate or linear-lanceolate, strigosely hirsute, the margins flat, .25-.75 in. long; flower-spikes very short but sometimes up to 1 in. long; nutlets subglobose, bristly, usually depressed  
10. *scabrum*.

1. *HELIOTROPIUM SUBULATUM*, Hochst.; Duthie Fl. Gang. Pl. ii. 91. *H. zeylanicum*, C. B. Clarke; F. B. I. iv. 148, not of Lamk.; Wt. Ic. t. 892. *Tournefortia zeylanica*, Wt. Ill. t. 170.

Deccan and Carnatic, often on black cotton soil.

An erect scabrous hispid annual with flowers in long usually unilateral spikes.

2. *HELIOTROPIUM SUPINUM*, Linn.; F. B. I. iv. 149; Wt. Ic. t. 1387.

Deccan and Carnatic, often on black cotton soil, also on dry rice-fields and other cultivated lands.

A prostrate softly white villous annual herb, the very small flowers in short one-sided simple or branched woolly spikes. The branches are sometimes ascending (var. *malabarica*, C. B. Clarke).

3. *HELIOTROPIUM OVALIFOLIUM*, Forsk.; F. B. I. iv. 150. *H. coromandelianum*, Retz; Wt. Ic. t. 1388.

All plains Districts, on waste lands, fallow fields and roadsides, common.

A large erect or decumbent softly white villous herb, often with long branches from a thick root-stock. Flowers white, in long slender ebracteate pairs of spikes, the calyx persistent after the nutlets fall.

4. *HELIOTROPIUM CURASSAVICUM*, Linn.

Coromandel Coast, on salt backwaters as at Madras, Vizagapatam and Tuticorin, common, introduced probably from the W. Indies.

A glaucous fleshy herb with small white flowers, yellow in the centre, in rather short pairs of unilateral spikes.

5. *HELIOTROPIUM INDICUM*, Linn.; F. B. I. iv. 152. *Tiaridium indicum*, Wt. Ill. t. 171.

All plains Districts, on roadsides and in waste places, common.

A coarse annual herb reaching 2 ft. in height, with pale violet small flowers in long spikes, the leaves large.

6. *HELIOTROPIUM ZEYLANICUM*, Lamk., Duthie Fl. Gang. Pl.

- ii. 93, not of F. B. I. *H. paniculatum*, R. Br.; F. B. I. iv. 151. *H. linifolium*, Lehm.; Wt. Ic. t. 1391.

N. Circars, Deccan and Carnatic.

An erect herb with stout rootstock and long twiggy branches bearing conspicuously long slender racemes of distant flowers, especially in fruit, the flowers rather large, the limb white, the tube yellow, the leaves very narrow.

7. *HELIOTROPIUM BRACTEATUM*, R. Br.; F. B. I. iv. 151. *H. laxiflorum*, Roth.

N. Circars, Deccan and Carnatic, on dry rocky hills, in Cuddapah at Guramkonda up to 3,000 ft.; Kambakam Drûg in Chingleput.

A slender erect herb reaching 2 ft. in height, softly strigosely hirsute, the racemes with rather large bracts.

8. *HELIOTROPIUM BREVIFOLIUM*, Wall. *H. strigosum* var. *brevifolia*, C. B. Clarke; F. B. I. iv. 151.

Deccan and Carnatic, up to 5,000 ft. in hilly country.

A much-branched undershrub with narrow very white strigose leaves.

9. *HELIOTROPIUM ROTTLEI*, Lehm.; F. B. I. iv. 151; Wt. Ic. t. 1392.

Deccan, about Coimbatore, usually on black cotton soil.

A stiff undershrub, much spreading and covering many feet of surface (Wight), all parts, including the flowers, very white.

10. *HELIOTROPIUM SCABRUM*, Retz.; F. B. I. iv. 152; Wt. Ic. t. 1389. *H. marifolium*, Retz.; F. B. I. iv. 152 in part.

All plains Districts, on sandy lands, waste places, roadsides, etc., common.

A much branched woody herb growing in tufts, the branches often procumbent, rarely ascending, flowers white, crowded among the upper leaves.

- Var. *Wallichii*. *H. marifolium* var. *Wallichii*, C. B. Clarke, F. B. I. iv. 152; Wt. Ic. t. 1390.

Branches more ascending and with longer spikes of flower; leaves narrower, elliptic-oblong. All plains Districts, with the type.

*Heliotropium peruvianum*, Linn., the Cherry Pie of English gardens, is commonly found in gardens in S. India, especially in the hills, where it grows into a shrub and has fragrant lilac-blue flowers.

7. *Trichodesma*, R. Br.

Coarse erect usually hispid herbs. *Leaves* opposite or alternate, entire, the upper face often covered with prominent white tubercles each with a hair. *Flowers* solitary on axillary pedicels, but passing into terminal racemes by the gradual reduction of the floral leaves. *Calyx* deeply 5-lobed, enlarged in fruit; lobes triangular-lanceolate. *Corolla*-tube cylindric or campanulate; throat naked but sometimes with glandular spots; lobes 5, twisted to the left, often mucronate or apiculate. *Stamens* 5, on the corolla-tube; filaments short; anthers elongate-lanceolate, connivent in a cone, the connective produced and its tips sometimes twisted. *Ovary* 4-celled; ovules solitary in the cells; style slender; stigma small. *Fruit* pyramidal, with a central quadrangular carpophore with 4 bays each with an ovoid oblong nutlet adnate to the torus, the nutlets smooth or tuberculate, often margined and sometimes glochidiate. *Seeds* suborbicular or obovoid, exalbuminous; cotyledons plano-convex, fleshy; radicle short.

Calyx-lobes hastate at base; corolla-tube as long as the lobes, which are rounded and slenderly abruptly apiculate and recurved in flower; glandular spots on the throat 2 to each lobe; stamens closely connivent, densely shortly hirsute, the tips with spirally twisted hair-like points; nutlets smooth on the outer, rugosely regularly pitted on the inner face; leaves variable, lanceolate or ovate or oblong, cordate or hastate, villous and hispid, up to about 2 in. long, .5 in. broad . . . 1. *indicum*. Calyx-lobes cordate or slightly hastate at base; corolla-tube much longer than the short cordate obtuse or apiculate lobes, not recurved in flower; glandular spots to 2 lobes only; stamens separating, the tips pointed, not twisted, shorter than the long tufted hairs of the connective; nutlets smooth on the outer face, the inner ridged in the middle and with a few pits on the margin; leaves oblong, cordate, up to 4 in. long, 2 in. broad, prominently hispid but not villous . . . 2. *amplexicaule*. Calyx-lobes rounded at base, softly villous; corolla-tube rather longer than the lobes, which are broadly obovate with an abrupt slender twisted apiculus, and recurved in flower, no glandular spots; stamens connivent but easily separating, densely villous on the back, the tips with spirally twisted ribbon-like points; nutlets smooth on the outer face, the inner spotted or slightly rugose; leaves oblong-lanceolate, up to 8 in. long, 3 in. broad, prominently hispid

3. *zeylanicum*.

1. *TRICHODESMA INDICUM*, R. Br.; F. B. I. iv. 153; Wt. Ill. t. 172.

All plains Districts by roadsides and on stony dry waste land, often on black cotton soil, common; ascending low elevations in the Hills.

An erect annual grey-villous hispid herb reaching 18 in. in height, with pale blue flowers, sometimes pink or white.

2. *TRICHODESMA AMPLEXICAULE*, DC.; Sedgw. in Rec. Bot. Surv. Ind. vi. 347, *not of* Roth; F. B. I. iv. 153.

Deccan, in Hyderabad, Bellary and Mysore.

An erect hispid herb with broader leaves than No. 1 and not villous. Sometimes the calyx approaches that of *T. indicum*, but the corolla and stamens are those of *T. amplexicaule*.

3. *TRICHODESMA ZEYLANICUM*, R. Br.; F. B. I. iv. 154.

All dry Districts, up to 4,000 ft. in the Hills, common.

A large annual herb with light blue flowers in terminal paniculate cymes with long drooping pedicels, and many reduced leaves.

### 8. *Cynoglossum*, Linn.

Erect biennial or perennial herbs. *Leaves* alternate, the radical petioled, the cauline sessile. *Flowers* in elongated sparingly branched or loosely paniculate racemes, purple or blue, ultimately distant; bracts 0. *Calyx* 5-lobed, spreading in fruit, sometimes enlarged. *Corolla*-tube short with 5 obtuse or emarginate scales in the throat; lobes 5 spreading, obtuse, imbricate in bud. *Stamens* 5, inserted on the corolla-tube, included; filaments short; anthers ovate. *Ovary* 4-lobed from a nearly flat receptacle; ovules horizontal, attached to the inner angle of the cell; style gynobasic from between the bases of the lobes, short or long, persistent; stigma small. *Fruit* a depressed pyramid of 4 nutlets adnate to a conic-based carpophore, their bases produced downwards, the outer faces convex or flattened, margined or not, glochidiate. *Seeds* straight or little curved; cotyledons flattened; radicle short.

Stems and branches of inflorescence softly appressed grey-pubescent, the young racemes tawny-villous; leaves thick, oblong-lanceolate, prominently nerved, the nerves joining in arches; flowers pink in bud, then blue, rather large, nearly 25 in. long; nutlets margined with a row of prickles, others on the faces.....1. *furcatum*.

Stems and branches of inflorescence with strigose villous hairs usually with bulbous bases; leaves thin, elliptic-lanceolate, the nerves distant and not prominent; flowers pale lilac or light blue, small, scarcely .15 in. long; nutlets not prominently margined, covered with glochidiate prickles ..... 2. *denticulatum* var. *zeylanicum*.

1. *CYNOGLOSSUM FURCATUM*, Wall.; F. B. I. iv. 155; Wt. Ic. t. 1395.

W. Gháts, from S. Canara and Mysore southwards, above 4,000 ft.; Shevaroy, Kollimalai and other hills of the Carnatic.

An erect annual reaching 3 ft. in height, with the inflorescence branching sparingly and prominently furcately in long racemes.

2. *CYNOGLOSSUM DENTICULATUM*, A. DC.; F. B. I. iv. 157.

Var. *zeylanicum*, C. B. Clarke.

N. Circars, Deccan and Carnatic, in hilly country, 1,000-6,000 ft.; W. Gháts, on the E. side and towards the south.

An erect annual reaching about 2 ft. in height, the inflorescence with many branches in long slender racemes, the basal leaves often very long-petioled.

### 9. *Paracaryum*, Boiss.

Erect or decumbent biennial or perennial herbs. *Leaves* alternate. *Flowers* in elongate, sparingly branched, usually ebracteate often paniculate racemes, violet or blue. *Calyx* 5-lobed, spreading in fruit, not much enlarged. *Corolla*-tube short with 5 rather large obtuse or emarginate scales in the throat; lobes 5, spreading, obtuse, imbricate in bud. *Stamens* 5, inserted on the corolla-tube; filaments slender; anthers oblong, included or slightly exserted. *Ovary* 4-lobed from a flat receptacle; ovules attached to the inner angle; style short or long; stigma small. *Fruit* a pyramid of 4 nutlets attached to a conical or columnar carpophore, their apices not or slightly produced, their bases rounded, glochidiate; margins membranous and inflexed glochidiate, enclosing the flattened slightly hispid surface. *Seeds* straight, margined; cotyledons flattened; radicle small.

Flowers pale blue with a darker centre, corolla .25 in. long, anthers included in the tube; inflorescence branches slender; nutlets rather sparingly glochidiate, the ring formed by the racemed margins triangular

in shape; radical leaves very long petioled, blade up to 6 in. long, cordate, cauline ovate, membranous, the nerves obscure . . 1. *coelestinum*. Flowers dark blue, uniform, corolla .5 in. long, anthers slightly exsert from the tube; inflorescence branches thick and rather short; nutlets much glochidiate, the ring circular; radical leaves long-petioled, blade up to 8 in. long, deeply cordate, cauline ovate, cordate, thick, the nerves conspicuous . . . . . 2. *malabaricum*.

1. *PARACARYUM COELESTINUM*, Benth.; F. B. I. iv. 160.

*Echinospermum coelestinum*, Wt. Ic. t. 1394.

Bababudan Hills of Mysore (Law).

An erect branching nearly glabrous herb reaching 5 ft. in height, the stems red (Cooke).

2. *PARACARYUM MALABARICUM*, C. B. Clarke; F. B. I. iv. 160.

Canara and Mysore (Law).

An erect stout branching tomentose herb reaching 3 ft. in height, the stems green (Cooke).

### Family CV. CONVOLVULACEAE.

Herbs or shrubs, usually twining, rarely trees. *Leaves* alternate or in parasitic species 0; stipules 0. *Flowers* regular, hermaphrodite, in pedunculate axillary bracteate cymes, rarely solitary. *Calyx* free, often persistent, of 5 sepals which are often unequal and sometimes accrescent. *Corolla* campanulate or funnel-shaped or subrotate; limb entire, shortly lobed, often plicate in bud. *Stamens* 5, on the corolla-tube; filaments usually slender, sometimes enlarged at base; anthers linear or oblong, dorsifixed, dehiscent longitudinally. *Disk* usually annular. *Ovary* superior, 1-4-celled; ovules 2, less commonly 1 or 4, in each cell; style filiform, simple or forked; stigma capitate or 2-lobed or stigmas 2. *Fruit* a berry or capsule dehiscent by 2 valves or circumsciss or irregularly. *Seeds* 4-2, rarely 1, erect; albumen scanty or 0; cotyledons generally plaited, often 2-lobed, rarely flat, not apparent in *Cuscuta*; radicle next the hilum.

Erect or climbing plants with leaves, not parasitic :—

Pollen grains spinulose :—

Fruit indehiscent, woody mealy or fleshy :—

Corolla salver-shaped; stigmas 2, their lobes linear-oblong

- 1. *Rivea*.

Corolla funnel-shaped ; stigma biglobose :—

Sepals large, accrescent and completely enclosing the fruit

2. *Stictocardia*.

Sepals small, ovate or oblong, not enlarging to enclose the fruit :—

Ovary 4-celled . . . . . 3. *Argyreia*.

Ovary 2-celled . . . . . 4. *Lettsomia*.

Fruit dehiscent or if indehiscent thin and fragile-walled :—

Stamens arising directly from the corolla-tube :—

Corolla usually campanulate ; sepals not aristate ; stamens not exserted . . . . . 5. *Ipomaea*.

Corolla usually salver-shaped ; sepals aristate :—

Flowers small, red, rather irregular . . . . . 6. *Quamoclit*.

Flowers large, white or purple, regular . . . . . 7. *Calonyction*.

Stamens arising from the backs of 5 scales at the base of the corolla-tube ; corolla small, urceolate ; fruit 4-valved . . . . . 8. *Lepistemon*.

Pollen grains not spinulose :—

Fruit dehiscent, or, if not, small, with thin fragile walls ; style or styles present ; leaves usually thin :—

Sepals much enlarged in fruit ; flowers in racemes or panicles ; capsule 1-seeded, indehiscent, rarely 2-valved ; style entire or 2-lobed . . . . . 9. *Porana*.

Sepals not or slightly enlarged in fruit ; capsule dehiscing valvately or circumsciss or irregularly :—

Styles 2, free or partly united below :—

Capsule sessile in the middle of a large flat bract

10. *Neuropeltis*.

Capsule not sessile on a bract :—

Corolla-lobes imbricate ; flowers usually solitary, axillary ; styles 2, quite free ; stamens exserted . . . . . 11. *Cressa*.

Corolla-lobes induplicate-contorted ; flowers cymose ; stamens not exserted :—

Capsule 4-valved ; styles free, each 2-branched ; stigmas on the inner face of the style arms . . . 12. *Evolvulus*.

Capsule irregularly dehiscent ; styles usually partly united below, not branched above ; stigmas 2, capitate

13. *Breweria*.

Styles entire ; stigmas usually 2-lobed :—

Ovary 1-celled ; capsule 4-valved, 3-seeded ; stigma-lobes short, oblong . . . . . 14. *Hewittia*.

Ovary 2-, sometimes 4-celled :—

Outer sepals larger than inner and decurrent on the peduncle ; stigma-lobes globose . . . . . 15. *Aniseia*.

Outer sepals not larger than the inner and not decurrent :—

Stigma lobes elongate :—

Stems erect or prostrate, rarely twining; stigma-lobes oblong or linear; capsule 4-valved

16. *Convolvulus*.

Stems twining, rarely prostrate; stigma-lobes elliptic; capsule usually 8-valved ..... 17. *Jacquemontia*.

Stigma biglobose :—

Capsule 4-valved; stems not usually winged

18. *Merremia*.

Capsule dehiscent circumsciss or irregular; stems winged ..... 19. *Operculina*.

Fruit indehiscent, woody or fleshy, rather large; style short or 0; stigma 5–10-rayed; corolla-lobes obcordate; leaves coriaceous

20. *Erycibe*.

Parasitic leafless twining herbs; corolla-lobes imbricate; embryo spiral

21. *Cuscuta*.

### 1. *Rivea*, Choisy.

Erect and straggling or climbing shrubs. *Leaves* cordate, apiculate, more or less silky-pubescent beneath; petiole long. *Flowers* axillary, on 1–3- or sometimes more-flowered peduncles; bracts 2–3, narrow. *Calyx* of 5 ovate or oblong subequal sepals. *Corolla* large, white, salver-shaped; tube narrow, cylindric; lobes of the limb rounded, plicate. *Disk* annular. *Stamens* included, near the middle of the tube; filaments slender, villous at the base; anthers narrow oblong; pollen grains spinulose. *Ovary* 4-celled with 4 ovules; style filiform; stigmas 2, linear-oblong, rugose. *Fruit* subglobose, dry, indehiscent or breaking up irregularly, often 1-celled by the absorption of the septa. *Seeds* 4 or fewer, glabrous, surrounded by mealy pulp; cotyledons much folded; radicle thick.

Peduncles usually 1-flowered; corolla usually glabrous without; sepals ovate obtuse; leaves usually about 2 in. long, 3 in. broad, sparsely grey-silky beneath, the basal sinus shallow ..... 1. *hypocrateriformis*.

Peduncles usually 3- or more-flowered; corolla white-silky without; sepals oblong or lanceolate, acute; leaves about 3 in. long, 4 in. broad, densely white silky-tomentose beneath when young, the basal sinus deep ..... 2. *ornata*.

1. *RIVEA HYPOCRATERIFORMIS*, Choisy; F. B. I. iv. 184.

N. Circars, Deccan and Carnatic, especially near the sea,



in hedges and dry open forests. Clove-scented creeper or Midnapore creeper.

A climbing shrub with large white flowers which open at sunset and close at sunrise and are very fragrant. Bark thin, grey; wood soft, in concentric rings.

2. *RIVEA ORNATA*, Choisy; F. B. I. iv. 183; Wt. Ic. t. 1356.

Deccan and Carnatic, in dry forests, scarce.

A climbing or straggling shrub with large white flowers, night-opening and fragrant, the fruit yellowish brown, dry, the leaves with pits on the back above the petiole.

2. *Stictocardia*, Hallier f.

Climbing shrubs. *Leaves* cordate, long-petioled. *Flowers* axillary on 1-3-flowered peduncles; bracts small, caducous. *Calyx* of 5 orbicular herbaceous subequal sepals, in fruit much enlarged, imbricate, mucilaginous, enclosing the fruit in an apple-like case. *Corolla* widely funnel-shaped, 5-lobed, the limbs plicate, nearly glabrous without. *Stamens* 5, included, filaments villous at base; anthers oblong, straight; pollen-grains spinulose. *Ovary* 4-celled, 4-ovuled; style filiform; stigma 2-globose. *Fruit* thin-walled, dry, indehiscent, closely enveloped in the accrescent calyx. *Seeds* 4, minutely villous.

*STICTOCARDIA TILIAEFOLIA*, Hallier f. in Engl. Jahrb. xviii. 159. *Argyreia tiliaefolia*, Wt. Ic. t. 1358; F. B. I. iv. 184.

W. Coast, S. Canara to Cochin; Carnatic, near Coimbatore about 1,300 ft. (Wight, Fischer), Cumbum Hills of Madura (Beddome).

A diffuse climber with large handsome rose-purple flowers, the leaves up to 5 in. in diam., apiculate, obtuse or sometimes emarginate.

3. *Argyreia*, Lour.

Climbing, sometimes erect shrubs. *Leaves* ovate-cordate to lanceolate, usually pubescent tomentose strigose or silky beneath. *Flowers* axillary, in cymes often many-flowered, often capitate; bracts usually conspicuous. *Calyx* of 5 herbaceous sepals, leathery and little enlarged in fruit, often red within. *Corolla* tubular funnel-shaped, large and showy, red or purple; limb plicate, the parts exposed in bud more or less hirsute, lobes short. *Stamens* 5, included; filaments often enlarged and villous at base; anthers

oblong, straight; pollen-grains spinulose. *Disk* annular. *Ovary* 4-celled; ovules 4; style filiform; stigma 2-globose. *Fruit* a dry or fleshy berry. *Seeds* 4 or fewer, embedded in mealy pulp.

**Climbing shrubs:—**

Leaves glabrous on the upper surface:—

Leaves ovate-oblong to oblong, acute at apex, rounded or cuneate at base, appressed strigose beneath, up to 8·5 in. long, 4 in. broad, the main nerves oblique; cymes few-flowered on stout peduncles; bracts narrowly oblong, ·5–·75 in. long; outer sepals ovate-oblong, inner smaller lanceolate, all strigosely hirsute; berry ·5 in. in diam.

1. *Daltoni*.

Leaves broadly ovate, rounded or cordate at base:—

Sepals ovate or orbicular, obtuse:—

Sepals thick, ·5–·7 in. long, densely white-tomentose without; bracts ovate-lanceolate, caudate acuminate, up to 1·5 in. long, thin; leaves broadly ovate-cordate, acute at apex, densely silky-white-tomentose beneath, up to 10 in. or more in diam.

2. *speciosa*.

Sepals rather thin, subequal, ·2–·3 in. long, with sparse strigose hairs without; bracts linear- or oblong-lanceolate, ·5–1 in. long, sparsely hairy; leaves broadly ovate, cordate or nearly rounded at base, acuminate at apex, up to 6 in. in diam., sparingly strigose beneath .....3. *populifolia*.

Sepals lanceolate, acute or acuminate:—

Sepals unequal, the 2 outer longer and often caudate, about ·75 in. long, the 3 inner acuminate, shorter, all sparsely stiff strigose on the back and tips; bracts linear-oblong, about 1 in. long, villous; leaves ovate or deltoid, acute or acuminate at apex, rounded truncate or cordate at base, up to 7 in. long, 4 in. broad, sparsely strigose beneath .....4. *involutrata*.

Sepals subequal, with scarious margins, acuminate, ·4 in. long, strigose on the back; bracts oblong-lanceolate or oblanceolate, ·75–1·25 in. long, tawny-villous; leaves broadly ovate, usually obtuse or sometimes emarginate at apex, truncate or slightly cordate at base, densely tawny tomentose beneath, up to 6 in. in diam. ....5. *bracteata*.

Leaves hairy on the upper surface:—

Bracts orbicular, persistent, softly pubescent, ·5 in. in diam.; sepals also orbicular or broadly obovate, pubescent, the 2 inner narrower than the others; leaves broadly ovate, shortly acuminate, cordate at base with rounded lobes, pubescent on both sides, up to 4 in. in diam. ....6. *cymosa*.

Bracts linear or oblong :—

Sepals unequal, narrow, linear-oblong or -lanceolate :—

Two outer sepals linear-oblong, '6 in. long, inner 3 lanceolate-acuminate, '4 in. long; bracts large, tawny-silky, 1-1.5 in. long, nerved; leaves ovate, shortly acute, rounded or slightly cordate at base, sparsely hispid above, densely silky beneath, up to 4 in. long, 2.5 in. broad .....7. *sericea*.

Sepals lanceolate acuminate, outer ones '6 in. long, inner less; bracts narrowly oblong, very white-silky, '5-1 in. long, not nerved; leaves ovate, acute, slightly cordate at base, strigose-hispid above, silky beneath, up to 3.5 in. long, 1-1.5 in. broad

8. *Choisyana*.

Sepals nearly equal, usually ovate or lanceolate :—

Sepals acuminate or acute, exposed parts strigose :—

Sepals ovate-lanceolate, acuminate, '3-'4 in. long; bracts narrowly linear-oblong, sometimes subspathulate, up to 1 in. long, strigose-hirsute; leaves broadly ovate, acute, rounded or slightly cordate at base, both sides roughly but sparsely fulvous-strigose, the hairs bulbous-basal, up to 7 in. long, 6 in. broad .....9. *pilosa*.

Sepals ovate, the outer acute, the inner obtuse, '2 in. long; bracts linear-oblong, '7 in. long; leaves elliptic-ovate, acute, rounded or rhomboid at base, upper side sparsely strigose, lower more densely silvery hairy, up to 5 in. long, 2.5 in. broad .....10. *Lawia*.

Sepals ovate, obtuse :—

Sepals, especially exposed parts, strigosely hirsute :—

Branchlets and leaves beneath very softly white-tomentose, upper surface more sparsely so, leaves elliptic-ovate, obtusely acute or sometimes emarginate, up to 3 in. long, 2 in. broad; bracts oblong, silky, caducous, '5-'7.5 in. long .....11. *pomacea*.

Branchlets and leaves densely covered with golden brown strigose hairs; leaves broadly ovate, abruptly acute, cordate, but not deeply, at base, up to 6 in. in diam.; bracts oblong, persistent, up to 1 in. long or more

12. *nellygherrya*.

Branchlets sparsely, leaves more densely, covered with grey or slightly golden hairs, strigose above, tomentose beneath; leaves broadly ovate, abruptly acuminate, cordate at base, up to 5 in. or more in diam. and usually broader than long; sepals often subglabrous; bracts

linear or linear-oblong, persistent, prominent and often petioled, 1-2 in. long ..... 13. *hirsuta*.  
 Sepals glabrous except for a very few strigose bulbous-based hairs; branchlets pilose; leaves broadly ovate, acute or acuminate, rounded or very slightly cordate at base, sparsely pilose above, fulvous strigose beneath, up to 8 in. long, 5 in. broad; bracts linear, strigose, up to .75 in. long

14. *conoorensis*.

Erect shrubs, sometimes slightly climbing :—

Sepals .15-.2 in. long, usually obtuse; leaves obovate or elliptic, obtuse or emarginate at apex, and apiculate, cuneate at base, nearly glabrous above, grey silky-villous beneath, up to 4 in. long, 2 in. broad, nerves rather distant ..... 15. *cuneata*.

Sepals .2-.25 in. long, acute; leaves elliptic, acuminate, attenuate at base, glabrous above, densely white-silky beneath and shining, up to 4 in. long, nearly 2 in. broad, nerves close and parallel

16. *fulgens*.

1. ARGYREIA DALTONI, C. B. Clarke; F. B. I. iv. 190.

N. Circars, Ganjam to Godavari, in open forests.

A large climber with red-purple corollas up to 2 in. long.

2. ARGYREIA SPECIOSA, Sweet; F. B. I. iv. 185; Wt. Ic. t. 851.

N. Circars, Deccan and Carnatic to the E. slopes of the W. Ghâts and up to 3,000 ft.; often cultivated and found run wild near villages. The Elephant Creeper.

A very large climbing shrub with stout white-tomentose stems, long-peduncled cymes, large purple corollas silky-pubescent without and a nearly dry fruit. Vern. *Hind.* Samundar-sok.

3. ARGYREIA POPULIFOLIA, Choisy; F. B. I. iv. 187.

W. Coast, S. Canara to Travancore.

A rather slender climber with rose-purple corollas, slightly villous without.

4. ARGYREIA INVOLUCRATA, C. B. Clarke; F. B. I. iv. 187.

N. Circars, Rampa Hills at 2,500 ft. (V. Narainswami); Bababudan Hills of Mysore (Law); Shevaroy Hills (Bourne).

A large twining shrub, the corollas pinkish-grey (Narainswami), the bracts conspicuously persistent.

5. ARGYREIA BRACTEATA, Choisy; F. B. I. iv. 188.

Deccan, common in the Ceded Districts, up to 4,500 ft. on

Horsleykonda (Gamble), hills of Salem and Coimbatore; Carnatic, outer hills of Tinnevely.

A climbing shrub with red-purple corollas, the large bracts conspicuous and persistent.

6. *ARGYREIA CYMOSA*, Sweet; F. B. I. iv. 190; Wt. Ic. t. 839.

N. Circars and Carnatic, in coast Districts, in hedges and low scrub.

A climbing not very shrubby plant with pale pink corollas and rather large soft fruit.

7. *ARGYREIA SERICEA*, Dalz.; F. B. I. iv. 188.

W. Gháts, Nilgiris to hills of Tinnevely, scarce.

A large silky twiner, with pink corollas 2.5 in. long.

8. *ARGYREIA CHOISYANA*, Wt.; F. B. I. iv. 190. *Batatas Choisyana*, Wt. Ic. t. 491.

Deccan, hills of the Ceded Districts—Kondaparthi (Wight), Cuddapah (Beddome).

A slender procumbent or twining herb with purple corollas 2 in. long, the upper leaves often not broader than .75 in. and oblong-lanceolate.

9. *ARGYREIA PILOSA*, Wt. & Arn.; F. B. I. iv. 189.

Bababudan Hills of Mysore (Law); Ramandrug Hills of Bellary at 3,500 ft. (Gamble).

A large hirsute twiner with dark red or purple corollas, 2 in. long, the cymes in prominently bracteate capitate heads.

10. *ARGYREIA LAWII*, C. B. Clarke; F. B. I. iv. 190.

Bababudan Hills of Mysore (Law).

A slender twiner with very white silky stems and long-peduncled few-flowered cymes, the corollas 2 in. long.

11. *ARGYREIA POMACEA*, Choisy; F. B. I. iv. 188. *Rivea pomacea*, Wt. Ic. t. 888.

W. Deccan, in the Coimbatore and Salem Districts; W. Gháts, Nilgiris, Anamalais and Pulneys on E. slopes.

A large climber with purple corollas 2 in. long in lax few-flowered corymbs, and yellowish-brown pulpy fruit, .7 in. long.

12. *ARGYREIA NELLYGHERRYA*, Choisy; F. B. I. iv. 189.

*Leschenaultii*, Choisy; F. B. I. iv. 188 (p).

W. Gháts, Nilgiri Hills, above 5,000 ft.

A large climber with, apparently, rose purple corollas, the

flowers in long-peduncled corymbs, the fruit .5 in. in diam., black when dry.

13. *ARGYREIA HIRSUTA*, Arn.; F. B. I. iv. 189. *Rivea hirsuta*, Wt. Ic. t. 891.

W. Gháts, hills of Mysore, Nilgiris and Pulneys, at 3,000–6,000 ft., very common in Nilgiris.

A large shaggy climber with large flowers, the corollas 3 in. long, pale purple, darker in the centre, the fruit orange-coloured when ripe.

14. *ARGYREIA COONOORENSIS*, Smith & Ramas. in Rec. Bot. Surv. Ind. vi. 30.

W. Gháts, Coonoor in Nilgiris, at 6,000 ft. (Meebold).

A large climber with a purple (?) corolla 2 in. long, the flowers in rather shortly and slenderly peduncled cymes.

15. *ARGYREIA CUNEATA*, Ker-Gawl.; F. B. I. iv. 191. *Rivea cuneata*, Wt. Ic. t. 890.

Deccan, in hilly country, usually at 3,000–4,500 ft.

A very pretty silky shrub with bright purple corollas, the cymes axillary, 3- or more-flowered, the fruit ellipsoid, pointed, yellowish-brown, dry.

16. *ARGYREIA FULGENS*, Choisy; F. B. I. iv. 191; Wt. Ic. t. 1357.

W. Gháts, Anamalais and hills of Travancore and Tinnevely, about 3,000 ft.

A silky silvery shrub with (apparently) dark purple corollas, the cymes in axillary dichasia of about 7 flowers, the berry crustaceous, .5 in. in diam.

#### 4. *Lettsomia*, Roxb.

Climbing shrubs. *Leaves* alternate, rounded rhomboid or cordate at base. *Flowers* in axillary peduncled corymbose or capitate cymes; bracts conspicuous. *Calyx* of 5 orbicular elliptic or oblong sepals, in fruit often thickened and enlarged. *Corolla* tubular funnel-shaped, usually pink, the limb plicate; lobes small. *Stamens* 5, included or exserted; filaments usually enlarged and villous at base; anthers oblong or linear; pollen-grains spinulose. *Disk* annular. *Ovary* 2-celled, 4-ovuled; style filiform; stigma 2-globose. *Fruit* a dry indehiscent berry. *Seeds* 4 or fewer, embedded in mealy pulp.

Corolla under 1 in. long; stamens exserted; leaves densely white-tomentose beneath; sepals in fruit red within; fruit red:—

Leaves ovate, cordate, obtuse or acute, sometimes emarginate, but apiculate, glabrous or strigose-villous on the upper surface, the tomentum of the lower very short; nerves impressed above, up to 4 in. in diam. ....1. *aggregata*.

Leaves broadly ovate, cordate, acute and apiculate, glabrous or slightly villous on the upper surface, white with spreading hairs beneath; nerves slightly raised above, up to 4 in. in diam., often broader than long .....2. *bella*.

Corolla more than 1 in. long; stamens included; bracts deciduous; sepals in fruit brown within:—

Corolla densely strigose without on parts exposed in bud; flowers in spreading corymbiform panicles densely strigose, the sepals ovate or orbicular, thick; leaves broadly ovate, cordate, acute or acuminate, sparsely hirsute, up to 5 in. in diam. sometimes small (var. *minor*)

3. *setosa*.

Corolla nearly or quite glabrous without; flowers in loose slender few-flowered corymbs, nearly glabrous, the sepals ovate or orbicular, usually glabrous; leaves elliptic or elliptic-lanceolate, subacute, rounded or rhomboid at base, glabrous or somewhat villous, the nerves often oblique, up to 4 in. long, 2.5 to 3 in. broad .....4. *elliptica*.

1. LETTSOMIA AGGREGATA, Roxb.; F. B. I. iv. 191; Wt. Ic. t. 1359. *L. mysorensis*, C. B. Clarke; F. B. I. iv. 192.

Deccan and Carnatic, in hilly country; W. Gháts, on E. slopes and also in S. Travancore.

An extensively climbing shrub with pink flowers and red fruit, the bracts very white and orbicular, the 2 outer sepals larger than the inner.

Var. *osyrensis*, C. B. Clarke, but not of Roth and Choisy. Leaves above strigose villous. Hills of the Carnatic.

2. LETTSOMIA BELLA, C. B. Clarke; F. B. I. iv. 192.

N. Circars, in Gamjam (Gamble).

A climbing shrub like the former species but with more spreading tomentum, the bracts smaller and oblong, and, like the sepals, covered densely with strigose hairs.

3. LETTSOMIA SETOSA, Roxb.; F. B. I. iv. 194; Wt. Ic. t. 1360. N. Circars, common, especially in Godavari, less so southwards except on the lower E. slopes of the Pulney Hills (Bourne, etc.).

A large climber with pink flowers and red berry, the inside of the tough fruiting calyx brown not red.

Var. *minor*, C. B. Clarke. Leaves small, scarcely 2 in. long, 1 in. broad, otherwise the same. Bababudan Hills of Mysore (Law).

4. *LETTSOMIA ELLIPTICA*, Wt. ; F. B. I. iv. 192.

Deccan and Carnatic, in hilly country, up to 3,000 ft. ; W. Ghâts, in all Districts at low levels and up to about 4,000 ft.

A rather bushy climber with pale purple flowers and orange fruit, very variable in the leaves and inflorescence especially as to hairiness and to the obliqueness of the nerves.

5. *Ipomaea*, Linn. (*in part*).

Twining or prostrate herbs, rarely shrubby or erect. *Leaves* alternate, entire or lobed or divided. *Flowers* axillary, solitary or in cymes ; bracts various. *Calyx* of 5 equal or unequal, ovate or linear, sepals, often enlarged in fruit. *Corolla* campanulate or funnel-shaped, the limb plicate, very slightly lobed. *Stamens* 5, usually included ; filaments filiform or dilated below, often unequal ; anthers straight or contorted ; pollen-grains spinulose. *Ovary* 2- (rarely 4-) celled ; ovules 4, rarely 6 ; style filiform ; stigma capitate, 2-globose. *Fruit* a 4-6-valved capsule, rarely indehiscent. *Seeds* usually 4 or 6, glabrous velvety or woolly ; cotyledons crumpled, bilobed.

Leaves entire :—

Sepals, especially the outer, cordate at base, unequal, ciliate, .5 in. long, lengthening in fruit ; corolla tubular, .6 in. long, the limb spreading ; leaves ovate-cordate, acute or acuminate, the basal sinus deep, up to 3 in. in diam., nearly glabrous ; seeds villous and with long silky hairs.....1. *calycina*.

Sepals not cordate at base :—

Sepals enlarged in fruit, outer lanceolate, inner linear, all acuminate and hirsute, .75 in. long in flower ; corolla funnel-shaped, the tube slender, glabrous or slightly pubescent, 2-3 in. long ; bracts lanceolate, in pairs below the calyx ; leaves ovate- or lanceolate-oblong, obtuse or acute, mucronate, subcordate at base, hispid, up to 2 in. long, .5-1 in. broad ; seeds puberulous, ciliate on the edges .....2. *barlerioides*.



Sepals not or only slightly enlarged in fruit :—

Flowers in sessile or nearly sessile heads, the corolla small, .5 in. long, campanulate ; bracts linear ; leaves ovate-triangular, acute, apiculate, cordate at base, villous, up to 3 in. long, 1.5 in. broad ; seeds glabrous, minutely pitted ..... 3. *hispida*.  
Flowers in pedunculate cymes or panicles :—

Sepals hispid :—

Flowers in short-peduncled few- (1-3-) flowered cymes with small linear bracts ; sepals ovate, with spreading hairs from bulbous bases ; corolla tubular, scarcely .5 in. long ; leaves reniform or ovate-cordate, obtuse, sometimes sinuate or slightly dentate, 1-1.5 in. in diam. ; seeds white-velvety

4. *rumicifolia*.

Flowers sessile, usually 3-6, enclosed in a perfoliate boat-shaped bract often 2.5 in. broad and .75 in. deep, very long-hairy within ; sepals very unequal, the outer obovate or spatulate, the inner linear, densely long-hairy ; corolla-tube cylindric, slender, up to 1 in. long, the limb patent ; leaves broadly ovate-cordate, acute and apiculate, up to 3 in. in diam. ; seeds glabrous except for a few villous hairs on the margins ..... 5. *pileata*.

Sepals glabrous, sometimes slightly pubescent (Nos. 9 and 11):—

Aquatic plants, more or less, prostrate and rooting in mud at the nodes or even floating on water :—

Sepals subequal, smooth, ovate, obtuse, .2-3 in. long ; corolla funnel-shaped, up to 2 in. long ; leaves variable, ovate or lanceolate or triangular, hastate or cordate at base, the basal lobes usually rounded, up to 5 in. long, 3 in. or less wide, long-petioled ; seeds minutely silky-puberulous ..... 6. *reptans*.  
Outer sepals shorter, .3 in. long, much wrinkled, inner longer, .5 in. long, slightly wrinkled, all ovate obtuse ; corolla funnel-shaped, up to 2 in. long ; leaves ovate-cordate or reniform, subobtuse to even deeply emarginate, up to 4 in. in diam. ; seeds glabrous ..... 7. *repens*.

Land plants, climbing :—

Slender climbers :—

Sepals obtuse, shortly apiculate, the 2 outer slightly shorter, .25 in. ; corolla funnel-shaped, 1.5 in. long, the mouth suddenly widened ; leaves variable, ovate-cordate with rounded basal lobes to hastate with acute lobes, acute at apex, up to 3 in. in diam. when hastate, indented

at the sides and only .5-1 in. broad; seeds .15 in., minutely tawny-velvety.....8. *sepiaria*.  
 Sepals acute, apiculate, the 2 outer shorter and slightly wrinkled, sometimes slightly pubescent, .15 in.; corolla funnel-shaped, about 1 in. long, the mouth widened; leaves broadly ovate, acuminate, deeply cordate, up to 3 in. in diam.; seeds .2 in., minutely dark brown-velvety .....9. *obscura*.

Stout straggling or climbing shrubs; seeds with long silky hairs:—

Sepals equal; orbicular, sometimes emarginate, .2 in. long; flowers in lax panicles; corolla tubular campanulate, .6 in. long or rather longer; leaves ovate or ovate-deltoid, obtusely acute and often slightly emarginate at apex, truncate or cordate at base, up to 5 in. long, 4 in. broad, prominently about 10-nerved; capsules ovoid, glabrous, .35 in. long; seeds black, the hairs white .....10. *staphylina*.

Sepals subequal, ovate-orbicular, sometimes emarginate, slightly puberulous, .5 in. long, enlarged in fruit; flowers in corymbose cymes; corolla campanulate, 3 in. long; leaves broadly ovate or suborbicular, acuminate, apiculate, cordate at base, up to 6 in. in diam., prominently about 14-nerved; capsules globose, glabrous, .5 in. long; seeds black, the hairs tawny ....11. *campanulata*.

Leaves lobed:—

Leaves emarginately more or less deeply 2-lobed, prostrate herbs of the sea-shore; sepals oblong, obtuse, apiculate, the outer smaller than the inner, .3-5 in. long, glabrous; corolla tubular-funnel-shaped, up to 2.5 in. long; leaves thick, fleshy, parallel-nerved, up to 2 in. long, 3.5 in. broad; seeds with golden-brown pubescence, .3 in. in diam.

12. *Pes-caprae*.

Leaves palmately 3-lobed, sometimes reduced to entire:—

Leaves green beneath, ovate-cordate, the lobes ovate-acuminate, sparsely hairy; calyx-lobes linear or linear-lanceolate, glabrous or strigose-hispid on the base and margins, up to 1 in. long; corolla tubular funnel-shaped, up to 2 in. long; seeds glabrous

13. *hederacea*.

Leaves white-woolly beneath:—

Flowers in lax cymes, with stem-clasping bracts and bracteoles, the peduncles and pedicels slender, the whole inflorescence strigose-hirsute; sepals lanceolate acuminate, strongly ciliate, .5 in. long,

longer in fruit ; corolla funnel-shaped, .75 in. long ; leaves ovate cordate, from deeply lobed to entire, up to about 5 in. in diam. ; seeds grey-velvety, also with few cottony hairs ....14. *pilosa*. Flowers in long-peduncled yellow-strigose capitate heads with oblong-lanceolate bracts up to 1 in. long ; sepals linear-lanceolate, subequal, fulvous-hirsute, .5-.75 in. long, not longer in fruit ; corolla tubular funnel-shaped, 1-1.25 in. long ; leaves ovate cordate, from deeply lobed to entire but always sinuate, up to 4 in. in diam. ; seeds minutely puberulous .....15. *Wightii*.

Leaves palmatifidly 3-9- (usually 5- or 7-) lobed but variable, sometimes entire, occasionally more or less pedate :—

Flowers in pedunculate capitate heads ; leaves rather small and softly hirsute, suborbicular in outline ; capsule papery, glabrous ; seeds softly grey-velvety, the hairs in small tufts :—

Leaves from ovate-cordate, entire, 1-2 in. in diam., to 3-7-lobed, the lobes ovate, acute, narrowed at base ; outer bracts broadly ovate-cordate, strigose, .75 in. long, inner smaller ; sepals unequal, the outer spatulate, inner linear-lanceolate ; corolla small, campanulate, .7 in. long .....16. *bracteata*. Leaves from entire or dentate to deeply 5-9-lobed, up to 5 in. in diam., the lobes ovate-acuminate, narrowed at base, outer bracts ovate-oblong, hirsute, .75-1 in. long, inner smaller ; sepals unequal, the outer oblong-lanceolate, inner lanceolate-acuminate, all strigose ; corolla tubular-campanulate, about 1 in. long

17. *Pes-tigridis*.

Flowers in pedunculate corymbose panicles ; leaves large and glabrous, broadly ovate in outline, usually 5-7-lobed :—

Sepals orbicular, obtuse, glabrous, .3-.4 in. long ; corolla widely campanulate, glabrous, 2-3 in. long ; leaves 4-6 in. in diam., the lobes ovate lanceolate acuminate ; seeds with many long tawny cottony hairs reaching .25 in. long .....18. *paniculata*. Sepals elliptic-oblong, obtuse or slightly acute, .7-1 in. long, glabrous ; corolla tubular-campanulate, 2 in. long ; leaves 3-5 in. in diam., the lobes lanceolate acuminate ; seeds glabrous

19. *Kentrocaulos*.

Leaves digitate, of 5-7 linear or lanceolate leaflets mucronate at tip and 1.5 in. long ; sepals elliptic, glabrous, .3-.4 in. long, scarious on the margins ; corolla campanulate, 1.5 in. long ; seeds glabrous, shining, glandular, crested .....20. *quinata*.

Leaves pedate, sometimes only palmate or digitate :—

Leaflets toothed, the leaves small, petioles with small stipule-like leaves at their base :—

Leaves normally pedately 5-foliolate, the side-lobes small, the mid-lobe up to 1.5 in. long, spathulate, all serrate; flowers usually solitary, small; sepals lanceolate, cuspidate, rugose on the back, .2 in. long; corolla tubular, .3-.5 in. long; capsule glabrous, papery; seeds puberulous .....21. *dissecta*.

Leaves pedately 5-7-foliolate, the mid-lobe obovate, about 1 in. long, .5 in. broad, the side lobes similar but rather smaller, all coarsely serrate, sometimes very narrow; flowers 1-3 but usually solitary on long peduncles; sepals elliptic, mucronate, slightly rugose, .2-.3 in. long; corolla 3 in. long, the tube long and very slender; capsule glabrous, papery; seeds shortly silky

22. *laciniata*.

Leaflets entire, the leaves fairly large :—

Leaves palmately pedate, 5-7-lobed, the mid-lobe slightly the largest, elliptic-lanceolate, acute, mucronate, up to 2.5 in. long, 1 in. broad, the others smaller and more obtuse, petioles with stipular leaves at their base; sepals ovate, obtuse, .25 in. long; corolla large, funnel-shaped, up to 2 in. long; capsule ovoid; seeds tawny-pubescent, the margins with long white silky hairs

23. *cairica*.

Leaves pinnatifidly pedate or doubly tripartite, usually 9-lobed, the lobes elliptic or lanceolate, mucronate, up to 2.5 in. long, .75 in. broad, petioles with stipular leaves at their base; sepals ovate obtuse or emarginate, slightly pouched at base, .3 in. long; corolla-tube cylindric, limb widely spreading, in all 2 in. long; seeds tawny-velvety, the margins with long silky tawny hairs

24. *dasysperma*.

1. *IPOMAEA CALYCINA*, C. B. Clarke; F. B. I. iv. 201. *Aniseia calycina*, Chois.; Wt. Ic. t. 833.

W. Gháts, Wynaad, hills of Coimbatore, at 1,000-3,000 ft.

A slender twiner with pink flowers in slender few-flowered cymes.

2. *IPOMAEA BARLERIODES*, Benth. & Hook. f.; F. B. I. iv. 201.

N. Circars, Mahendragiri in Ganjam, Madgol Hills of Vizagapatam, at 3,000-4,000 ft.; W. Gháts, Mysore and Coimbatore to Tinnevely Hills, chiefly E. side, at about 4,000 ft.

A trailing hispidly tawny hairy plant of grassy places with large purple corolla.

3. *IPOMAEA HISPIDA*, Roem. & Sch. *I. eriocarpa*, R. Br.; F. B. I. iv. 204. *I. sessiliflora*, Roth; Wt. Ic. t. 169.

All Districts in the plains and up to 4,000 ft. in the hills, in dry localities.

A slender twining villous plant with small pink flowers.

4. *IPOMAEA RUMICIFOLIA*, Choisy; F. B. I. iv. 207.

Deccan and Carnatic, usually on black cotton soil.

A trailing annual herb with yellowish or white flowers.

5. *IPOMAEA PILEATA*, Roxb.; F. B. I. iv. 203; Wt. Ic. t. 1363.

W. Coast, from S. Canara to Travancore; W. Gháts, Anamalais and hills of Cochin, to about 2,000 ft.

A well-marked annual twining herb with bright pink corolla and conspicuous very softly long hairy involueral bracts.

6. *IPOMAEA REPTANS*, Poir. *I. aquatica*, Forsk.; F. B. I. iv. 210.

All plains Districts, on the margins of tanks and in other wet places, often floating on the surface, often planted.

An annual or biennial pretty water plant with hollow stems, pink corolla darker in the throat and few-flowered cymes. The young shoots, leaves and roots are eaten. Vern. *Hind. Kalmi*.

7. *IPOMAEA REPENS*, Lam. *I. Beladamboe*, Roem. & Sch.; F. B. I. iv. 209. *I. rugosa*, Choisy; Wt. Ic. t. 887.

Plains Districts, especially near the coast, trailing and rooting in wet places, on the margins of tanks and backwaters.

A rather thick glabrous plant with purple or white flowers in rather many-flowered cymes. In Tinnevely specimens the leaves are sometimes very large, deeply lobed both at base and apex.

8. *IPOMAEA SEPIARIA*, Koen.; F. B. I. iv. 209; Wt. Ic. t. 838.

All plains Districts and to some altitude in the hills, in hedges and by tanks, especially near the coast.

A twining perennial with usually villous stems, the flowers pink with purple tube, the leaves variable, the peduncles and pedicels often thickened in fruit.

9. *IPOMAEA OBSCURA*, Ker-Gawl.; F. B. I. iv. 207.

All plains Districts, in grass and hedges.

A twining or trailing annual, the flowers yellow or white with a purple tube, the leaves thin, cordate, sometimes pubescent (var. *gemella*, C. B. Clarke), but more often glabrous.

10. *IPOMAEA STAPHYLINA*, Roem. & Sch.; F. B. I. iv. 210. *I. racemosa*, Roth; Wt. Ill. t. 168.

All forest Districts from Vizianagram southwards, chiefly in hilly country and up to 4,000 ft.

A large straggling or climbing shrub with white flowers purple in the tube.

11. *IPOMAEA CAMPANULATA*, Linn.; F. B. I. iv. 211; Wt. Ic. t. 1375.

Hills of the Deccan and E. slopes of the W. Gháts, south to Tinnevely and S. Travancore, up to 3,000 ft.

A large climber with white or pale rose-coloured flowers, purple in the tube.

12. *IPOMAEA PES-CAPRAE*, Sweet. *I. biloba*, Forsk.; F. B. I. iv. 212.

Both coasts, on sandy shores and sandy river banks, common. Goat's Foot Creeper.

An extensively creeping and sand-binding plant with a thick long rootstock, handsome purple-red flowers and curious bilobed leaves. Very useful in checking blown sand (see H. Cleghorn in Madr. Journ. i. t. 3). Vern. *Hind.* Dopate luta; *Ur.* Kansarinata; *Mal.* Schovanna.

13. *IPOMAEA HEDERACEA*, Jacq.; F. B. I. iv. 199.

Deccan and Carnatic, to the E. slopes of the W. Gháts and up to 3,500 ft., probably introduced and run wild, often cultivated.

A slender climber with retrorsely villous stems, flowers with blue or pink corollas and long sepals. The leaves are sometimes nearly or quite entire, ovate- or orbicular-cordate (var. *integrifolia*, Chois.).

14. *IPOMAEA PILOSA*, Sweet; F. B. I. iv. 213; Wt. Ic. t. 837.

Deccan and Carnatic, from Anantapur to Tinnevely, at the E. foot of the W. Gháts.

An annual climber, very softly hirsute, the flowers rose pink.

15. *IPOMAEA WIGHTII*, Chois.; F. B. I. iv. 203; Wt. Ic. t. 1364.

N. Circars, hills of Ganjam and Vizagapatam, about 3,000 ft.; W. Gháts, Wynaad and Coimbatore, Nilgiris, Anamalais, Pulneys and hills of Travancore and Tinnevely, 3,000–6,000 ft.

A climbing strigose undershrub with pink-purple flowers.

16. *IPOMAEA BRACTEATA*, Wt. Ic. t. 1374; F. B. I. iv. 203.  
 W. Gháts, Anamalais and hills of Cochin and Travancore, up to 2,000 ft.  
 A slender climber, typically with ovate-cordate leaves but more often with lobed ones (var. *lobata*, C. B. Clarke). The corollas are bluish-purple with a darker eye (Fischer).
17. *IPOMAEA PES-TIGRIDIS*, Linn.; F. B. I. iv. 204; Wt. Ic. t. 836.  
 All Districts from the N. Circars southwards, especially the dry ones, common on hedges and bushes.  
 A very hairy climber with white or pink flowers and curiously lobed leaves, cut to about 5 in. from the top of the petiole, in a rounded sinus.
18. *IPOMAEA PANICULATA*, R. Br. *I. digitata*, Linn.; F. B. I. iv. 202.  
 Deccan, probably cultivated and run wild only; W. Coast, from S. Canara to Travancore.  
 A large perennial climber with pink or red-purple flowers in long-peduncled corymbs of 10-20, fewer in end axils.
19. *IPOMAEA KENTROCAULOS*, C. B. Clarke; F. B. I. iv. 213.  
 E. and W. Coasts, scarce.  
 A stout climber with flowers in few-flowered cymes.
20. *IPOMAEA QUINATA*, R. Br.; F. B. I. iv. 214.  
 Hills of Coimbatore, at Tattakarai Ghát, 2,400 ft. (Fischer).  
 A slender prostrate twiner with white or purplish flowers.
21. *IPOMAEA DISSECTA*, Willd.; F. B. I. iv. 200.  
 E. Coast from Masulipatam southwards, on coast sands.  
 A prostrate perennial herb with small white flowers.
22. *IPOMAEA LACINIATA*, C. B. Clarke; F. B. I. iv. 200.  
 Bababudan Hills of Mysore (Law); Mahendragiri Hill in Tinnevely.  
 A slender creeper with long-tubed large white flowers. The Tinnevely specimens are of the form with very narrow lobes to the leaves.
23. *IPOMAEA CAIRICA*, Sweet. *I. pulchella*, Roth; Wt. Ic. t. 156. *I. palmata*, Forsk.; F. B. I. iv. 214.  
 Deccan, in various places, probably run wild; much cultivated in gardens. The Railway Creeper.  
 A beautiful climber with large purple flowers.
24. *IPOMAEA DASYSPEERMA*, Jacq.; F. B. I. iv. 215; Bot. Mag. t. 8788.

Occasional about Madras, probably run wild or cultivated only.

A slender climber with flowers yellow with a purple centre.

Besides the species enumerated, some of which are really garden plants that have apparently run wild, a few others are to be found in cultivation. *I. Batatas*, Poir., is the Sweet Potato, in common cultivation as a vegetable. *I. Learii*, Paxt., is an American species allied to *I. hederacea* with large dark-blue flowers turning to red, often grown on walls and trellises. *I. purpurea*, Roth, also resembling *I. hederacea* and sometimes found run wild, has large flowers with deflexed pedicels, of various shades from white to pale blue or purple and is known as "Morning Glory." *I. carnea*, Jacq., is a straggling, shrubby, S. American species with a rose-purple corolla, common in Madras gardens.

#### 6. Quamoclit, Moench.

Annual twining glabrous herbs. *Leaves* cordate and angled or lobed, sometimes pinnately divided. *Flowers* axillary, in few-flowered cymes; bracts small. *Calyx* of 5 aristate sepals, subequal or the outer rather the smaller. *Corolla* salver-shaped, slightly irregular, the tube slender or slightly funnel-shaped, the limb spreading. *Stamens* 5, much exserted; filaments unequal. *Ovary* glabrous, 4-celled, with 4 ovules; style rather longer than the stamens; stigma 2-globose; pollen-grains spinulose. *Fruit* a 4-celled 1-valved capsule, the septa thin, persistent. *Seeds* 4, black, pubescent or glabrous.

Leaves ovate-cordate, acute, entire or lobed; calyx-lobes acuminate; corolla scarlet or orange; seeds pubescent .....1. *phoenicea*.  
Leaves deeply pinnately dissected, the segments linear; calyx-lobes elliptic; corolla dark red or white; seeds nearly glabrous ..2. *pinnata*.

1. QUAMOCLIT PHOENICEA, Choisy. *Ipomaea coccinea*, C. B. Clarke; F. B. I. iv. 199.

All plains Districts, run wild, introduced from S. America.  
A weak slender twiner.

2. QUAMOCLIT PINNATA, Boj. *Ipomaea Quamoclit*, Linn.; F. B. I. iv. 199.

All plains Districts, cultivated and run wild, introduced from Tropical America.



## 7. Calonyction, Choisy.

Large herbaceous climbers; stems often warted. *Leaves* large, cordate, entire or angled. *Flowers* solitary or in few-flowered axillary cymes; bracts caducous. *Calyx* of 5 herbaceous sepals, subequal or the outer smaller, usually aristate. *Corolla* large, glabrous, regular, salver-shaped, white or rose-purple; tube narrow, long, cylindric; limb plicate. *Stamens* 5, exserted; pollen-grains spinulose. *Ovary* 2-celled, 4-ovuled; style filiform; stigma 2-globose. *Fruit* a 4-valved capsule. *Seeds* 4, dull, glabrous.

Corolla white, tube about 3 in. long; stamens exserted; seeds yellow; stout plant .....1. *Bona-nox*.

Corolla rose-purple, tube 1-2 in. long; stamens included; seeds black; slender plant .....2. *muricatum*.

1. CALONYCTION BONA-NOX, Boj. *Ipomaea Bona-nox*, Linn.; F. B. I. iv. 197.

Most Districts, in hedges and ravines, wild and cultivated, but perhaps not truly indigenous, Moonflower.

A large climber with large cordate long apiculate leaves and large white flowers. The flowers, which are sweet-scented, open only at night and are succeeded by a capsule with 4 yellow seeds.

2. CALONYCTION MURICATUM, G. Don. *Ipomaea muricata*, Jacq.; F. B. I. iv. 197.

East Coast (Wight, Shuter), probably cultivated only; Rampa Hills of Godavari (Narayanswami).

A slender climber with cordate leaves. The purplish flowers, sometimes white streaked with pink, have thickened peduncles which are sometimes eaten.

## 8. Lepistemon, BC.

Climbing herbs with villous stems. *Leaves* cordate, often lobed. *Flowers* in very dense axillary cymes; bracts narrow, deciduous. *Calyx* of 5 subequal sepals, acute or obtuse. *Corolla* urceolate, the limb shortly 5-lobed. *Stamens* 5, included; filaments at the base arising from the backs of 5 subequal concave scales arched over the ovary; anthers ovate, pollen grains spinulose. *Disk* large, cupular. *Ovary* 2-celled, ovules 2 in each cell; style very short; stigma capitate. *Fruit* a 4-valved capsule. *Seeds* glabrous.

*LÆPISTEMON LEOCALYX*, Stapf in Kew Bull. 1895, 113.

W. Ghâts, hills of Travancore near Koni, in secondary forest (Bourdillon); Wynaad, at Nadugani (Lawson).

A villous climber with ovate deeply cordate long acuminate leaves up to 5 in. long, 4 in. broad, and yellow flowers, the calyx-lobes with a few hairs at the base only.

### 9. *Porana*, Burm.

Large climbing shrubs. *Leaves* alternate, entire, petioled. *Flowers* white blue or purple, in racemes often much paniced; bracts persistent. *Calyx* of 5 small sepals when in flower, when in fruit the outer or all much enlarged, spreading, prominently ribbed and nerved. *Corolla* campanulate or funnel-shaped, usually small, with a wide or narrow mouth; limb plicate, subentire or lobed. *Stamens* 5, usually included; filaments filiform; pollen grains not spinulose. *Ovary* 1- or 2-celled; ovules 2 or 4; style slender with a single 2-lobed or 2 capitate stigmas. *Fruit* a globose, oblong or obconic, membranous capsule, indehiscent or 2-valved. *Seed* 1, glabrous; cotyledons plicate.

*PORANA MALABARICA*, C. B. Clarke; F. B. I. iv. 223.

W. Ghâts, from the Bababudan Hills of Mysore to the Nilgiris, Anamalais, Pulneys and hills of Travancore, up to 6,000 ft.

An extensively ramified climber with slender branches, ovate-cordate long-acuminate leaves and white flowers in lax racemes, the papery fruiting sepals elliptic, about 5 in. long, 25 in. broad, with 5-7 prominent ribs and prominent reticulation.

*P. paniculata*, Roxb., a large species common in N. India, is occasionally cultivated in gardens. It has dense masses of white flowers which hang in festoons from its supports. It is sometimes called the Bridal Creeper. *P. volubilis*, Burm., a Malay species, is also common in gardens on both coasts of the Peninsula.

### 10. *Neuropeltis*, Wall.

Large climbing shrubs, the shoots and inflorescence rufous-pubescent. *Leaves* alternate, oblong, petioled. *Flowers* in racemes, axillary or subpaniculate towards the ends of the branches; bract under the calyx inconspicuous in flower, much

enlarged in fruit. *Calyx* of 5 subequal suborbicular sepals, scarcely enlarged in fruit. *Corolla* broadly campanulate, deeply 5-lobed, the lobes induplicate-valvate in bud. *Stamens* exserted or included; filaments filiform; anthers oblong. *Ovary* imperfectly 2-celled, 4-ovuled; styles 2, separate from the base, shortly linear; stigmas large, globose. *Fruit* a globose 4-valved 1-seeded capsule, sessile or shortly stalked in the middle of the flat enlarged bract. *Seed* globose, glabrous, albuminous, the cotyledons plicate.

NEUROPELTIS RACEMOSA, Wall.; F. B. I. iv. 225; Bedd. Ic. t. 291.

W. Gháts, Tambacheri Ghát in Malabar (Beddome).

A large climber with conspicuous peltate bracts in fruit, the leaves elliptic-oblong, up to 4.5 in. long, rufous-pubescent when young; afterwards nearly glabrous.

#### 11. *Cressa*, Linn.

Small erect branching undershrubs, grey-pubescent. *Leaves* small, entire. *Flowers* small, sessile in the upper axils or in terminal spikes or clusters. *Calyx* of 5 subequal imbricate sepals. *Corolla* small, funnel-shaped, the tube short; lobes 5, ovate, imbricate in bud. *Stamens* 5, exserted; filaments filiform. *Ovary* 2-celled, ovules 2 in each cell; styles 2, distinct; stigmas capitate. *Fruit* a 2-4-valved capsule 1-4-seeded. *Seeds* glabrous; cotyledons linear, plicate.

CRESSA CRETICA, Linn.; F. B. I. iv. 225.

Dry plains Districts, on sandy plains, fallow fields and black cotton soil.

A small dwarf shrub up to 15 in. high, very grey, the corolla white, the small leaves elliptic, acute.

#### 12. *Evolvulus*, Linn.

Small herbs or undershrubs, prostrate or erect, usually silky-pubescent. *Leaves* small, entire, often distichous. *Flowers* small, white blue or pink, solitary or in few-flowered pedunculate cymes. *Calyx* of 5 subequal sepals, not enlarging in fruit. *Corolla* rotate or funnel-shaped; limb plicate, subentire. *Stamens* 5, included or exserted; filaments filiform; anthers ovate or oblong. *Ovary* 2- rarely 1-celled; ovules 4; styles 2, distinct from the base, each cleft into 2 linear or subclavate branches, stigmatic on the inner

face. *Fruit* a 4-2-valved capsule. *Seeds* 4 or 2, rarely solitary, glabrous; cotyledons twice folded.

EVOLVULUS ALSINOIDES, Linn.; F. B. I. iv. 220.

All plains Districts, on open ground, by roadsides and in other dry grassy places, common.

A perennial herb with a woody root-stock and many spreading prostrate wiry branches, the flowers light blue, the leaves variable, lanceolate oblong ovate or even suborbicular, the hairiness also variable, in one form (*E. hirsutus*, Lamk.) fulvous-hirsute.

### 13. *Breweria*, R. Br.

Herbs or undershrubs or shrubs, erect or climbing. *Leaves* entire. *Flowers* in axillary peduncled heads or terminal close panicles or 1-3 together; bracts small. *Calyx* of 5 equal or unequal sepals, scarcely enlarged in fruit. *Corolla* campanulate or funnel-shaped; limb 5-plaited or shortly and broadly lobed. *Stamens* included; filaments filiform, often dilated at base. *Ovary* 2-celled; ovules 4; styles filiform, free from the base or united to about the middle and then equally or unequally 2-lobed; stigmas capitate. *Capsule* globose or ovoid, 4-valved, membranous or coriaceous. *Seeds* normally 4, often less, glabrous or nearly so.

Climbing shrub; leaves large, up to about 4 in. long, ovate-cordate, fulvous-tomentose; flowers large, in pedunculate rather stout cymes; styles united to nearly half their length .....1. *cordata*.

Erect rigid undershrub; leaves very small, under .5 in. long, oblong, nearly glabrous; flowers small, 1-3 together on slender pedicels or nearly sessile; styles distinct from the base .....2. *evolvuloides*.

1. BREWERIA CORDATA, Blume; F. B. I. iv. 223. *B. Roxburghii*, Wt. Ic. t. 1370.

N. Circars, forests of Godavari; W. Ghâts, Anamalais and hills of Travancore.

A large densely pubescent or tomentose climber with white flowers.

2. BREWERIA EVOLVULOIDES, Choisy; F. B. I. iv. 224. *Seddera evolvuloides*, Wt. Ic. t. 1369.

Carnatic, coast region of Tinnevely and S. Travancore.

An erect branching undershrub, with small white, usually solitary, axillary flowers.

14. *Hewittia*, W. & A.

A pubescent twining herb. *Leaves* ovate, cordate, entire angled or lobed. *Flowers* axillary, solitary or in few-flowered cymes; bracts 2, below the calyx; linear-lanceolate. *Calyx* of 5 unequal large sepals, the 3 outer large, ovate, decurrent, enlarged in fruit, the 2 inner smaller, lanceolate, unaltered. *Corolla* widely campanulate, yellow or white with a purple eye, silky pubescent without; limb plicate. *Stamens* 5, included; filaments linear, dilated at the base; pollen-grains smooth. *Ovary* with long white silky erect hairs, 1- or imperfectly 2-celled; ovules 4; style filiform; stigma of 2 ovate-oblong lobes. *Fruit* a globose, 4-valved, 1-celled, normally 3-seeded capsule. *Seeds* black, glabrous.

HEWITTIA BICOLOR, W. & A.; F. B. I. iv. 216; Wt. III. t. 168, Ic. t. 835.

N. Circars, Godavari; W. Coast, Malabar and Cochin.

A climber with angled or palmately lobed leaves up to about 4 in. long, a conspicuous calyx and very thin-walled capsule.

15. *Aniseia*, Choisy.

Twining herbs. *Leaves* ovate or oblong, often mucronulate. *Flowers* axillary, solitary or in few-flowered cymes. *Calyx* of 5 herbaceous sepals, the 3 outer large ovate, decurrent on the peduncle, enlarged in fruit, the 2 inner lanceolate, not enlarged in fruit. *Corolla* widely tubular campanulate or funnel-shaped; limb subentire. *Stamens* 5, included; filaments filiform. *Ovary* 2-celled, 4-ovuled; style filiform, stigma 2-globose. *Fruit* a 2-celled, 4-valved capsule. *Seeds* 4, black, smooth.

ANISEIA UNIFLORA, Choisy; Wt. Ic. t. 850. *Ipomaea uniflora*, Roem. & Sch.; F. B. I. iv. 201.

E. Coast, near Negapatam (Wight); W. Coast, in Travancore, margins of tanks and backwaters.

A prostrate herb, with many fibrous roots from the stems rooting in mud. *Leaves* long-petioled, elliptic-oblong, often emarginate and mucronate at apex, cuneate at base, up to 3 in. long, 1 in. broad; corolla white; calyx-lobes greenish-white.

16. *Convolvulus*, Linn.

Herbs or undershrubs, erect prostrate or twining, sometimes spinescent. *Leaves* entire, toothed or lobed. *Flowers* axillary,

solitary or in few-flowered cymes; bracts usually narrow. *Calyx* of 5 usually subequal sepals. *Corolla* campanulate or funnel-shaped; limb plicate, nearly entire. *Stamens* included; filaments usually unequal. *Ovary* 2-celled; ovules 4; style filiform; stigmas 2, linear or oblong, distinct. *Fruit* a globose capsule, 2-celled, 4-valved or breaking irregularly. *Seeds* normally 4, glabrous, smooth or minutely tuberculate.

Erect undershrub, silky-villous with tawny hairs; flowers 1-3 in a lax raceme; sepals ovate, acuminate; corolla tubular, under .5 in. long, villous on parts exposed in bud, shortly 5-lobed; leaves linear, narrow, up to 2 in. long.....1. *Rottlerianus*.

Twining herbs :—

Glabrous or slightly pubescent; peduncles 1-3-flowered; sepals obtuse, nearly glabrous; corolla broadly funnel-shaped, about 1 in. broad; leaves linear- or triangular-oblong, hastate at base, up to 2 in. long

2. *arvensis*.

More or less rusty-pubescent; peduncles 1-5-flowered, sepals acuminate, pubescent; corolla small, tubular-funnel-shaped, about .5 in. broad; leaves triangular-hastate or cordate, deeply lobed and toothed, up to 3 in. long, 1.5 in. broad .....3. *flavus*.

1. *CONVOLVULUS ROTTLERIANUS*, Choisy; F. B. I. iv. 219.

Deccan, in Western Districts, Bellary to Coimbatore, in dry grass lands.

A perennial, up to about 2-3 ft. high.

2. *CONVOLVULUS ARVENSIS*, Linn.; F. B. I. iv. 219.

Deccan and hills of W. Gháts, a weed of cultivation. Bindweed.

A trailing or twining herb with pink or white flowers.

3. *CONVOLVULUS FLAVUS*, Willd.; F. B. I. iv. 219. *C. rufescens*, Choisy; Wt. Ic. t. 1365.

W. Gháts, Nilgiris, hills of Coimbatore, Pulneys, at 3,000-6,000 ft.

A climbing plant with yellowish flowers.

### 17. *Jacquemontia*, Choisy.

Climbing herbs or undershrubs, usually pubescent. *Leaves* elliptic or cordate, entire or rarely toothed or lobed. *Flowers* in axillary compound umbellate or capitate cymes, rarely solitary; bracts small. *Calyx* of 5 equal or unequal sepals. *Corolla* small, tubular or funnel-shaped; limb plicate, the vertical bands ending

in 2 distinct nerves. *Stamens* 5, included. *Ovary* glabrous, 2-celled; ovules 4; style filiform; stigmatic lobes 2, linear or elliptic-oblong. *Fruit* a globose 8-valved rarely 4-valved, 2-celled capsule. *Seeds* normally 4, glabrous or minutely rugose, sometimes slightly winged marginally.

*JACQUEMONTIA PANICULATA*, Hallier f. *Convolvulus parviflorus*, Vahl; F. B. I. iv. 220.

Most plains Districts and up to 3,000 ft. in the hills.

A slender climber with pink or white flowers, ovate or cordate long-acuminate leaves up to about 2·5 in. in diam., and globose capsules with 4 seeds which are trigonous, slightly winged, and often minutely rugose.

*J. caerulea*, Choisy, is a pretty blue-flowered climber, common in gardens in the plains. It is an introduction from S. America.

### 18. *Merremia*, Dennst.

Herbs or shrubs, usually climbing, sometimes erect or prostrate. *Leaves* alternate, entire or lobed. *Flowers* axillary, solitary or in cymes and usually with long peduncles. *Calyx* of 5 subequal sepals, various in shape. *Corolla* campanulate or funnel-shaped, usually white or yellow, the vertical bands defined by violet lines; limb plicate, the margin slightly lobed. *Stamens* 5, unequal, included or exserted; filaments filiform, often villous at the base; anthers usually twisted; pollen with longitudinal folds, not spinulose. *Ovary* 2-4-celled; ovules 4; style filiform; stigma 2-globose. *Fruit* a 4-valved capsule; 1-4-celled, the style sometimes separating with a small operculum. *Seed* 4, dull, glabrous or rarely puberulous or with long hairs, cotyledons crumpled.

Corolla more or less hairy externally; seeds hairy :—

Seeds with long recurved spreading hairs; sepals 3 in. long; corolla villous near the apex, 1-1·5 in. long; cymes subumbellate; capsules globose; leaves ovate- or oblong-lanceolate, acute or acuminate, rounded or cordate or hastate at base, up to 3 in. long, 2 in. broad, glabrous or pubescent .....1. *umbellata*.  
Seeds minutely velvety, the margins almost villous; sepals 5-7 in. long; corolla densely shaggy without, 1·5-2 in. long; cymes subracemose; capsules ovoid; leaves broadly ovate, acute, truncate or subcordate at base, up to 4 in. in diam., glabrous .....2. *crispatula*.

Corolla glabrous externally :—

Corolla large, more than 1 in. long :—

Leaves palmately 5-lobed, occasionally 7-lobed, the lobes triangular-acuminate, the margins often dentate, more or less long-hairy, up to 6 in. in diam. ; flowers in pedunculate cymes of 1-7 ; sepals .5-.75 in. long, elliptic, obtuse ; corolla yellow, 1-2 in. long

3. *vitifolia*.

Leaves digitate, leaflets 5, lanceolate, acuminate at both ends, subsessile, up to 4 in. long, 1.5 in. broad, hirsute ; flowers in long-peduncled laxly dichotomous cymes with yellow strigose hairs ; sepals .7 in. long, elliptic-oblong, unequal, enlarged in fruit and very strigose ; corolla white, 1 in. long ..... 4. *aegyptia*. Leaves pedately 7-lobed, up to 8 in. in diam., the leaflets lanceolate, deeply and prominently toothed, glabrous ; flowers large, in long-peduncled few-flowered cymes ; sepals elliptic-ovate, acute, glabrous, 1 in. long, enlarged in fruit ; corolla 1.5 in. long ; seeds large, glabrous ..... 5. *dissecta*.

Corolla small, under 1 in. long :—

Sepals long-ciliate, the inner 3 larger and deeply emarginate, nearly .25 in. long, the outer 2 apiculate, shorter ; corolla campanulate, .25 in. long ; stems creeping and rooting at the nodes ; leaves reniform or ovate-cordate, toothed, usually broader than long but under 1 in. in diam. .... 6. *emarginata*. Sepals not ciliate, the inner ones not emarginate ; stems not rooting at the nodes :—

Flowers 1-3 together on axillary peduncles ; seeds glabrous :—

Peduncles short, under 1 in. long ; sepals elliptic, mucronate, glabrous ; corolla campanulate, about .4 in. long ; leaves variable, linear-hastate or oblong-obovate, the former usually acute, the latter obtuse and 3-toothed, all auricled at the base and toothed, up to 1 in. long ..... 7. *tridentata*.

Peduncles long, often 3 in. long ; sepals lanceolate acuminate, glabrous ; corolla campanulate, .6-.8 in. long ; leaves linear-oblong, hastate and toothed at base on the auricles, acute and mucronate at apex, up to 3 in. long, .5 in. broad

8. *hastata*.

Flowers in rather dense axillary dichasioid cymes ; sepals truncate and cucullate, obtuse or apiculate, spreading later and then enlarged and often wrinkled ; corolla campanulate, .35 in. long ; leaves ovate, sometimes 3-lobed, entire or coarsely toothed, acute and apiculate, deeply cordate at base, up to 3 in. long ; seeds pubescent. .... 9. *chryseides*.



1. **MERREMIA UMBELLATA**, Hallier f. *Ipomaea cymosa*, Roem. & Sch.; F. B. I. iv. 211.  
N. Circars, E. Ghát Hills to the Godavari, up to 4,000 ft.; Deccan, Kambakam Hill in Chingleput (leaves hastate); W. Gháts, in all Districts up to 4,000 ft.  
A very variable climber as regards hairiness and shape of leaves, the flowers white or cream-coloured.
2. **MERREMIA CRISPATULA**, Prain. *Ipomaea petaloidea*, Choisy; F. B. I. iv. 212.  
N. Circars, in Godavari (Gamble).  
A large climber with large leaves and yellow flowers.
3. **MERREMIA VITIFOLIA**, Hallier f. *Ipomaea vitifolia*, Sweet; F. B. I. iv. 213.  
All plains Districts and up to 3,000 ft. in the hills, common.  
A perennial twining plant with yellow flowers, globose capsules and glabrous seeds, the stems and leaves with deciduous hairs.
4. **MERREMIA AEGYPTIA**, T. Cooke Fl. Bomb. ii. 240 *in note*. *Ipomaea pentaphylla*, Jacq.; F. B. I. iv. 202. *Batatas pentaphylla*, Wt. Ic. t. 834.  
N. Circars, Deccan, Carnatic and W. Coast, occasional.  
An annual twining plant with white flowers, ovoid papery capsules and glabrous seeds.
5. **MERREMIA DISSECTA**, Hallier f. *Ipomaea sinuata*, Ortega; F. B. I. iv. 214.  
Deccan, Carnatic and W. Coast, in various places, a tropical American species now run wild.  
A twining plant with glabrous or hirsute stems and pretty flowers, white or pink with a purple throat.
6. **MERREMIA EMARGINATA**, Hallier f. *Ipomaea reniformis*, Choisy; F. B. I. iv. 206.  
N. Circars, Deccan and Carnatic, up to 3,000 ft. in the hills, in damp places and on black cotton soil.  
A creeping and rooting herb with yellow flowers and globose small capsule.
7. **MERREMIA TRIDENTATA**, Hallier f. *Ipomaea tridentata*, Roth; F. B. I. iv. 205.  
All plains Districts.  
A perennial herb with thick rootstock giving off many

elongate prostrate slender branches, the flowers pale yellow, the capsules globose.

8. *MERREMIA HASTATA*, Hallier f. *Ipomaea angustifolia*, C. B. Clarke; F. B. I. iv. 205, *not of* Jacq.

East and West Coast Districts, apparently scarce inland.

A biennial twining herb with thick rootstock giving off slender branches, the flowers creamy-yellow or white, the capsules depressed-globose.

9. *MERREMIA CHRYSSEIDES*, Hallier f. *Ipomaea chryseides*, Ker-Gawl.; F. B. I. iv. 206; Wt. Ic. t. 157.

All plains Districts and up to 3,000 ft. in the hills, common.

A branched climbing herb, often with rough stems and variable leaves, the flowers yellow.

### 19. Operculina, Silva Manso.

Large climbing herbs, stems petioles and peduncles often winged. *Leaves* large, entire or lobed, rarely peltate. *Flowers* large, axillary, solitary or in few-flowered cymes; bracts oblong, deciduous. *Calyx* of 5 large ovate glabrous sepals, enlarging and thickening in fruit, at length splitting irregularly from the tip. *Corolla* funnel-shaped, rarely campanulate, the tube with 5 vertical smooth bands. *Stamens* 5; filaments filiform, broadening at base; anthers large, at length twisted. *Ovary* glabrous, 2-celled, 4-ovuled; style filiform; stigma 2-globose. *Fruit* a capsule, the epicarp circumscissile above the middle, the cap. carrying away the style, sometimes irregularly splitting. *Seeds* large, often solitary, black, smooth; radicle large.

*OPERCULINA TURPETHUM*, Silva Manso, Enum. Subst. Braz. 16, 49. *Ipomaea Turpethum*, R. Br.; F. B. I. iv. 212.

N. Circars, common in Godavari; Deccan and Carnatic to S. Travancore, occasional.

A stout climber with white flowers and leaves very variable in shape, ovate or oblong, entire or lobed, truncate or cordate at base. In fruit the enlarged sepals and thickened pedicels are conspicuous.

### 20. Erycibe, Roxb.

Scandent or rambling shrubs; rarely trees. *Leaves* alternate, entire, coriaceous. *Flowers* small, in axillary or terminal racemose.

or paniced cymes; bracts small, lanceolate. *Calyx* 5-lobed, the lobes orbicular, coriaceous, appressed to the base of the fruit. *Corolla* white or yellowish, subrotate, the tube villous without; lobes 5, deeply obcordate and so seemingly 10, contorted in bud, margins entire or crenate. *Stamens* 5, on the corolla-throat; filaments short; anthers ovate-lanceolate. *Ovary* 1-celled, with 4 erect ovules; style 0; stigma subglobose, 5- or 10-ridged. *Fruit* an ovoid or ellipsoid fleshy berry. *Seed* solitary, glabrous; albumen scanty, irregularly intruded between the folds of fleshy plicate cotyledons; radicle large, inferior.

*Corolla* yellowish; leaves elliptic-oblong or obovate, abruptly sharply acuminate, base attenuate, up to 5 in. long, 2 in. broad, the petiole '3-5 in. long; cymes axillary or in terminal panicles; berry '5 in. long, ellipsoid .....1. *paniculata*.

*Corolla* white; leaves elliptic or obovate, sometimes almost orbicular, sometimes even lanceolate, abruptly and usually obtusely acuminate, base cuneate or rounded, up to 4 in. long, 2 in. broad, the petiole '25 in. long; cymes axillary and elongate or in terminal panicles; berry '5 in. long, ovoid .....2. *Wightiana*.

1. *ERYCIBE PANICULATA*, Roxb. Cor. Pl. t. 159; F. B. I. iv. 180; Wt. Ill. t. 180.

N. Circars, hills of Ganjam to Godavari, in forest ravines at low levels; occasional in Mysore and Malabar.

A large climbing shrub, the branches, inflorescence and young leaves with much rusty tomentum, the leaves dull above and not strongly reticulate beneath. Bark brown with large corky lenticels; wood soft, porous, of peculiar structure. Vern. *Ur. Katapergu*.

2. *ERYCIBE WIGHTIANA*, Grah.; Hallier f. Bull. Herb. Boiss. v. 737. *E. paniculata*, Roxb. var. *Wightiana*, C. B. Clarke; F. B. I. iv. 181.

W. Coast and W. Gháts, from S. Canara and Mysore southwards, up to about 4,000 ft.

A large climbing shrub, rusty-tomentose like the preceding, the flowers very fragrant, the leaves shining above, prominently reticulate beneath.

## 21. *Cuscuta*, Linn.

Leafless twining parasitic herbs, yellow or reddish. *Flowers* small, white or rose-coloured, sessile or shortly pedicelled, solitary

or in lateral fascicles or short racemes; bracts small or 0. *Calyx* of 5 (or 4) subequal sepals, free or connate at the base. *Corolla* ovoid globose or campanulate, usually with a ring of fimbriate or lobed scales near the base or below the stamens, sometimes wanting; lobes 5 (or 4) short, imbricate. *Stamens* as many as the corolla lobes, inserted on or below the throat of the corolla; filaments linear; anthers oblong, exsert. *Ovary* more or less completely 2-celled; ovules 4; styles 1 or 2; stigmas 2. *Fruit* a globose or ovoid, dry or succulent capsule, circumscissile or irregularly breaking up; seeds 4-2. *Seeds* glabrous, albumen fleshy; embryo slender, spiral, the cotyledons obscure.

Style 1, short, stout, stigmas 2, ovoid, acute, diverging; branches stout, fleshy; scales at the base of the corolla; capsule succulent . . . 1. *reflexa*.

Styles 2, distinct, elongate, stigmas capitate; branches filiform; capsule dry, papery :—

Scales on the corolla-tube 0; sepals ovate-acuminate; corolla-lobes long-acuminate; seeds with few minute lines . . . . . 2. *hyalina*.

Scales on the corolla-tube below the stamens fimbriate; sepals deltoid; corolla-lobes shortly acuminate; seeds very minutely rugose

3. *chinensis*.

1. *CUSCUTA REFLEXA*, Roxb. Cor. Pl. t. 104; F. B. I. iv. 225.

All plains Districts and up to 6,000 ft. in the hills of the Nilgiris and Pulneys.

A stout-branched, yellow, much intertwining plant, parasitic on many species of shrubs or trees and sometimes almost completely covering them.

2. *CUSCUTA HYALINA*, Roth; F. B. I. iv. 226; *C. arabica*, Wt. Ic. t. 1371.

Deccan and Carnatic.

A very slender-stemmed parasite, recorded as growing on *Amaranthus*, *Polygonum*, *Tribulus*, *Trianthema*, etc.

3. *CUSCUTA CHINENSIS*, Lamk.; F. B. I. iv. 226; Wt. Ic. t. 1373. *C. hyalina*, Wt. Ic. t. 1372, not of Roth.

Carnatic.

A very slender-stemmed parasite, found on *Ipomæa Pes-capræ* and other plants, but apparently scarce.

### Family CVI. SOLANACEAE.

Herbs or shrubs erect or climbing or rarely small trees. *Leaves* alternate, often in unequal pairs, rarely clustered, never truly

opposite, entire lobed or pinnatifid; stipules 0. *Flowers* regular, hermaphrodite or rarely dioecious, in terminal or lateral axillary or extra-axillary cymes or on solitary or clustered pedicels; bracts and bracteoles 0. *Calyx* inferior, limb usually 5-lobed or -toothed, usually persistent, often accrescent in fruit. *Corolla* funnel-shaped campanulate or rotate, often plicate; lobes 5, rarely 10 or the limb subentire. *Stamens* 5, on the corolla-tube; anthers ovate or oblong, dehiscing by apical pores or longitudinally. *Ovary* 2-celled or imperfectly 1- or 4-celled, rarely 3-5-celled; ovules many, on prominent peltate placentas; style linear; stigma capitate or very shortly lobed. *Fruit* a berry or a circumsciss or valvate capsule, usually 2-celled, many-seeded. *Seeds* compressed discoid or subreniform; testa usually crustaceous; albumen fleshy; embryo peripheric with linear cotyledons or rarely straight.

**Fruit indehiscent, a berry :—**

Anthers connivent in a cone, longer than the filaments :—

Anthers dehiscing by apical pores or short slits; leaves entire lobed or pinnatifid .....1. **Solanum.**

Anthers dehiscing introrsely by longitudinal slits, the tips empty; leaves pinnatisect .....**Lycopersicum.**

Anthers not connivent in a cone, not longer than the filaments, dehiscing by lateral slits :—

Calyx in fruit small, the flowers solitary or in pairs ....**Capsicum.**

Calyx in fruit enlarged, overtopping the berry :—

Pedicels solitary; corolla broadly campanulate, the lobes plicate in bud; leaves pubescent or glabrous :—

Calyx in fruit inflated, shortly lobed .....2. **Physalis.**

Calyx in fruit deeply cleft, much enlarged, 5-angled ..**Nicandra.**

Pedicels clustered; corolla narrowly campanulate, the lobes valvate in bud; leaves and stems stellate-tomentose

3. **Withania.**

**Fruit capsular :—**

Flowers axillary, solitary; corolla-lobes plicate; embryo curved

4. **Datura.**

Flowers in terminal panicles; corolla-lobes induplicate-valvate; embryo straight .....**Nicotiana.**

### 1. **Solanum, Linn.**

Herbs or shrubs, sometimes subscandent, rarely small trees, unarmed or prickly. *Leaves* alternate or subopposite, entire

lobed or pinnatifid. *Flowers* in dichotomous or racemose, lateral or terminal cymes. *Calyx* 5-10-lobed, rarely 4-lobed or subentire, accrescent or not in fruit. *Corolla* rotate, rarely campanulate; tube short; limb plicate, usually 5-lobed. *Stamens* 5, rarely 4 or 6, attached to the throat of the corolla; filaments short; anthers oblong, often narrowed upwards, connivent in a cone, opening by terminal pores or short slits. *Ovary* 2-, rarely 3-4-celled; style columnar; stigma small. *Fruit* a globose or elongated berry. *Seeds* very many, small, usually discoid; testa crustaceous, often pitted; albumen fleshy; embryo peripheric, the cotyledons linear, radicle terete.

Unarmed :—

Roots mixed with tubers; stems herbaceous, faintly angular; leaves pinnatifid; flowers large, blue or white ..... *tuberosum*.

Roots not mixed with tubers :—

Annual herb; flowers white, in axillary or lateral umbellate cymes; leaves thin, glabrous, ovate-lanceolate, acute or acuminate, entire or sinuate-toothed; berry globose, .25 in. in diam., black but sometimes red or yellow, shining; seeds discoid, minutely pitted  
1. *nigrum*.

Perennial shrubs or undershrubs :—

Densely stellately tomentose; flowers in lateral or axillary though often apparently terminal cymes :—

Flower cymes corymbose, corolla white; calyx cup-shaped, .25 in. long, lobes short, deltoid; leaves velvety-tomentose, tawny beneath, elliptic-lanceolate, acuminate, up to 10 in. long, 5 in. broad, entire; berry yellow, globose, with few stellate hairs, .3 in. in diam.; seeds minutely papillose-scaly  
2. *verbasifolium*.

Flower cymes racemose, corolla purple; calyx .2 in. long, deeply lobed, lobes lanceolate, acuminate; leaves rather sparsely stellate-tomentose, ovate, subacute, rhomboid or slightly cordate at base, up to 4 in. long, 2.5 in. broad, entire or sinuately lobed; berry red, glabrous, globose, shining, .3 in. in diam.; seeds scaly ..... 3. *pubescens*.

Sparsely stellately pubescent or glabrous or pilose; corolla white :—

Flowers in extra-axillary pedunculate racemose cymes; calyx-lobes linear-lanceolate, acuminate, stellate-pubescent, .15-.2 in. long; corolla deeply lobed, the lobes oblong, .35 in. long, recurved; leaves elliptic-lanceolate, acute at both ends,

repand-sinuate, long-petioled, up to 5 in. long, 2 in. broad; seeds flat, .15-.2 in. long, slightly scaly .....4. *vagum*. Flowers axillary, solitary or in sessile umbels, seeds angular, reticulately pitted; leaves with usually unequal pairs:—

Calyx glabrous or nearly so, entire or with reflexed protuberances outside the margin or with 5 subulate teeth, saucer-shaped in fruit; branchlets usually quadrangular, often zigzag; leaves membranous, elliptic-lanceolate, long-acuminate, up to 9 in. long, 3 in. broad, slightly setose above or glabrous; berries yellow or red .....5. *laeve*. Calyx pilose with 5-10 short teeth, which are usually reflexed in fruit; branchlets usually round, sometimes zigzag; leaves membranous, elliptic-lanceolate, acuminate, up to 6 in. long, 2 in. broad, very pilose when young, sparsely so when old, often with few prominent acute teeth on the upper half; berries red .....6. *denticulatum*.

#### Armed with prickles:—

Erect herbs, shrubs or small trees:—

Leaves entire, not prickly, prickles only on the stem; leaves oblong, oblanceolate, abruptly acuminate, up to 12 in. long, 4 in. broad, glabrous above when mature, densely white-stellate-tomentose beneath; flowers in dense stellately-woolly lateral or subterminal corymbose cymes; calyx-lobes triangular; corolla pale blue-purple, small, .3 in. long; berry glabrous, .3 in. in diam.; seeds flat, minutely dotted .....7. *giganteum*. Leaves sinuately or pinnatifidly lobed:—

Lobes shallow, few:—

Corollas over 2 in. in diam., blue, the flowers in axillary umbels of 1-3 on very short peduncles, the long pedicels deflexed in fruit; stamens unequal (3 long, 2 short); leaves ovate, acute at apex, cordate at base, softly tawny pubescent, up to 4 in. long, 2 in. wide; prickles on stems, petioles and leaves few and small; berry globose, enclosed in accrescent calyx; seeds flat, reticulate  
8. *Wightii*.

Corollas under 2 in. in diam., the flowers in axillary or lateral racemes or corymbose cymes:—

Flowers white; calyx not enlarging in fruit; berry globose; style glabrous; seeds small, flat, nearly smooth:—

Berry large, 1-1.5 in. in diam., densely covered with yellowish needle-like hairs; cymes few-flowered; corolla .75 in. in diam., densely stellate-strigose without; leaves ovate or subrectangular in outline with large triangular

lobes, densely fulvous stellately woolly, up to 18 in. long, 12 in. broad; prickles many, on stems, petioles and leaf-nerves .....9. *ferox*. Berry small, .3 in. in diam., smooth; cymes corymbose, many-flowered; corolla .75 in. in diam., stellate-pubescent without; leaves ovate or subrectangular in outline, acute, often cordate at base, with few large triangular lobes, softly fulvous-tomentose, up to 9 in. long, 7 in. broad; prickles very few, on stem and petioles only

10. *torvum*.

Flowers blue; berry smooth; corolla sparsely pubescent; style stellately villous; seeds minutely pitted:—

Racemes few-flowered; calyx-lobes lanceolate, enlarging in fruit, in wild forms often prickly; leaves ovate, few-sinuate, unequal and acute or subcordate at base, up to 6 in. long, 4 in. broad in cultivated, 4 in. long, 2 in. broad in wild forms, softly stellately-pubescent; prickles few in cultivated, many in wild form, on stem, leaves and calyx

11. *Melongena*.

Racemes many-flowered; calyx-lobes triangular, often prickly, not enlarging in fruit; leaves variable, normally few-sinuate lobed but sometimes deeply lobed or pinnatifid, stellately woolly beneath, usually less so above, up to 6 in. long, 4 in. broad; prickles many, stout, curved, on stem and leaves; berry globose, .3 in. in diam.

12. *indicum*.

Lobes deep, many:—

Calyx-tube inflated in fruit, deeply cup-shaped, ultimately reflexed; flowers racemose, white or pale blue; leaves oblong-lanceolate in outline, deeply pinnatifid or twice pinnatifid, up to 8 in. long, 4 in. broad, softly stellate-pubescent; prickles very numerous, yellowish, straight and sharp, on stem, leaves and calyx; berry globose, 1 in. in diam., yellow, smooth; seeds large, pitted .....13. *sisymbriifolium*.

Calyx-lobes not or only slightly inflated in fruit, ovate or lanceolate, abruptly acute; flowers in few-flowered cymes, blue-purple; leaves ovate or elliptic, acute, pinnatifid half-way down, sometimes only sinuate, up to 4 in. long, 2 in. broad, sparsely stellate-pubescent to nearly glabrous; prickles very numerous, yellow, straight, often .5 in. long, on stems, leaves and calyx; berry globose, yellow or white with green blotches, .5-.75 in. in diam.; seeds small, smooth ..14. *xanthocarpum*.



Climbing undershrubs, the stems with very numerous short strong recurved prickles; leaves ovate in outline, sinuate or 3-5-lobed, obtuse, truncate or subcordate at base, up to 3 in. long, 1.5 in broad, nearly glabrous; cymes lateral with short peduncles and long pedicels, about 2-8-flowered; calyx-lobes ovate, acuminate, prickly; corolla large, white to purple; berry globose, scarlet, smooth, .3 in. in diam.; seeds flat, slightly pitted ..... 15. *trilobatum*.

1. *SOLANUM NIGRUM*, Linn.; F. B. I. iv. 229. *S. rubrum*, Roxb.; Wt. Ic. t. 344.

All Districts and at all elevations, a cosmopolitan weed of roadsides and cultivated land.

An erect annual herb.

2. *SOLANUM VERBASCIFOLIUM*, Linn.; F. B. I. iv. 230; Wt. Ic. t. 1398.

All Forest Districts, usually in ravines or shady places under big trees.

A large shrub or small tree up to 20 ft. high. Bark grey, smooth; wood soft, light yellow.

3. *SOLANUM PUBESCENS*, Willd.; F. B. I. iv. 230; Wt. Ic. t. 1402.

Deccan and Carnatic to the E. slopes of the W. Gháts in open scrub forest on arid soil, up to 3,000 ft.

A usually low, but occasionally large, shrub, up to 6 ft. high (15 ft. or more, *Wight*); the flowers in loose racemes.

4. *SOLANUM VAGUM*, Heyne; F. B. I. iv. 230.

W. Gháts, hills of Tinnevely, probably at 4,000-6,000 ft.

A glabrescent shrub with white flowers.

5. *SOLANUM LAEVE*, Dunal; F. B. I. iv. 231. *S. bigeminatum*, Nees; F. B. I. iv. 231.

N. Circars, Madgol Hills of Vizagapatam at 3,000 ft. (A. W. Lushington); W. Gháts, in all Districts in ever-green forests, up to 6,000 ft.

A straggling undershrub with variable calyx-teeth, always, however, saucer-shaped in fruit.

6. *SOLANUM DENTICULATUM*, Blume; F. B. I. iv. 231; Wt. Ic. t. 1397.

Hills of the Carnatic; W. Gháts, in Nilgiris and Pulneys up to 7,000 ft., chiefly in moist places.

A shrub reaching 6 ft. in height but weak and scarcely

woody. The leaves have sometimes prominent angular lobes (var. *Gouakai*, C. B. Clarke).

7. *SOLANUM GIGANTEUM*, Jacq.; F. B. I. iv. 233; Wt. Ic. t. 893.

N. Circars, hills of Vizagapatam to 4,000 ft. (A. W. Lushington); Deccan, in hilly country of Mysore and Coimbatore, to 5,000 ft.; W. Gháts, in almost all Districts, above 4,000 ft.

A large shrub or small tree, reaching a height of even 25 ft., easily known by the dense white stellate tomentum covering the whole plant except the upper surface of the leaves, the stem prickles conical, quite small. The berries are red.

8. *SOLANUM WIGHTII*, Nees; F. B. I. iv. 234; Wt. Ic. t. 841.

W. Gháts, E. side of Nilgiris at 4,000–6,000 ft.; hills of Coimbatore at 4,500 ft. (Fischer).

An erect herbaceous plant with handsome large blue flowers with angular lobes, the calyx-lobes lanceolate.

9. *SOLANUM FEROX*, Linn.; F. B. I. iv. 233; Wt. Ic. t. 1399 (var. *majus*).

W. Gháts, in most Districts, up to 4,000 ft., but not very common.

A stout straggling herbaceous plant up to 10 ft. high with very woolly stems and leaves and large orange hispid fruit. The leaves are often very large.

10. *SOLANUM TORVUM*, Swartz; F. B. I. iv. 234; Wt. Ic. t. 345.

Almost all Districts, in the hills up to about 3,000 ft., in waste places and by roadsides, common.

A shrub reaching about 12 ft. in height, very variable in shape and lobes of leaf according to climate and soil. Berries yellow, shining.

11. *SOLANUM MELONGENA*, Linn.; F. B. I. iv. 235; Wt. Ill. t. 166.

All Districts, usually in cultivation. The Egg-plant. Vern. *Hind.* Baigun, brinjal.

A well-known vegetable, the fruits often very large and purple.

Var. *insanum*, Prain. *Solanum insanum*, Willd.

All Districts, in waste places and by roadsides, a wild form.

A very prickly herb with smaller and more grey-pubescent stems and leaves and a globose yellow fruit under 1 in. in diam.

12. *SOLANUM INDICUM*, Linn.; F. B. I. iv. 234; Wt. Ic. t. 346.

All Districts in the plains and the lower hills, chiefly by roadsides, on rubbish heaps and in similar places.

A branching very prickly undershrub reaching 5 ft. in height, very variable in pubescence, size and shape of leaf and length of raceme. The berries are dark yellow.

Vern. *Hind.* Barhanta.

- Var. *multiflora*, C. B. Clarke. *S. ferox* var. *minus*, Wt. Ic. t. 1400.

A large form with very stellate-tomentose leaves and long racemes with many flowers recurved in fruit. The berries are yellow, rather small and shining and long.

W. Gháts, Nilgiri and Pulney Hills, about 6,000–7,000 ft.

13. *SOLANUM SISYMBRIIFOLIUM*, Lam.

W. Gháts, Nilgiris and Pulneys, at 5,000–7,000 ft.; hills of Coimbatore. A S. American plant now run wild in many places in India.

A viscid undershrub, the large flowers often 1–1.5 in. in diam. in lateral racemes.

14. *SOLANUM XANTHOCARPUM*, Schrad. & Wendl.; F. B. I. iv. 236. *S. Jacquini*, Willd.; Wt. Ic. t. 1401.

All Districts in the plains and low hills, a weed of roadsides and waste land.

A diffuse perennial conspicuous herb, the flowers often .75 in. in diam.

15. *SOLANUM TRILOBATUM*, Linn.; F. B. I. iv. 236; Wt. Ic. t. 854.

N. Circars, Deccan and Carnatic, especially near the coast.

A very prickly trailing or climbing undershrub.

*SOLANUM TUBEROSUM*, Linn., is the Potato, Vern. *Hind.* Alu, introduced from America and largely cultivated in the hills. Besides it and *S. Melongena*, the Brinjal, several species of the genus are cultivated in gardens and some are found run wild. *S. robustum*, Wendl., a large species resembling *S. ferox* but with the stems winged by the decurrent leaf-bases, is found about Coonoor in the Nilgiris. It is a S. American species and has

leaves and stems covered with dense golden tomentum. *S. aculeatissimum*, Jacq., is a very prickly Malay species found apparently run wild about Quilon in Travancore. *S. macrophyllum*, Hort. ex Dunal, is a Mexican shrub with large handsome purple flowers frequently found in gardens.

## 2. *Physalis*, Linn.

Annual or perennial herbs. *Leaves* alternate, entire sinuate or shortly lobed. *Flowers* solitary, axillary, pedicelled. *Calyx* campanulate, 5-fid, in fruit accrescent, then inflated, membranous, loosely enclosing the berry; teeth small, connivent. *Corolla* campanulate, lurid yellow, often with purple spots near the base. *Stamens* 5, attached near the base of the corolla; anthers oblong, shorter than the filaments, dehiscing longitudinally. *Ovary* 2-celled; ovules numerous; style linear; stigma obscurely 2-lobed. *Fruit* a globose berry, enveloped in the bladder-like calyx. *Seeds* many or few, compressed, smooth or rugose; embryo peripheric.

Corolla .5 in. across or more, with 5 purple spots near the base within; calyx more than 1 in. long, ovoid-conical; leaves ovate, sinuate or angular, usually entire, pubescent, up to 3 in. long, 2 in. broad; berry orange-yellow . . . . . 1. *peruviana*.

Corolla under .25 in. across, sometimes spotted; calyx under 1 in. long, ovoid or subglobose; leaves ovate, acute, sinuate or toothed, pubescent or nearly glabrous, up to 2.5 in. long, 1.5 in. broad; berry small, yellow.

2. *minima*.

### 1. *PHYSALIS PERUVIANA*, Linn.; F. B. I. iv. 238.

Hills of the Deccan and Carnatic, Bababudans, Shevaroyes, Kollimalais and Sirumalais; W. Gháts, Nilgiris and Pulneys, usually at 5,000–7,000 ft., in undergrowth of forests, especially plantations; introduced from America and run wild, often cultivated. Cape Gooseberry. Vern. *Hind*. Tipari.

### 2. *PHYSALIS MINIMA*, Linn.; F. B. I. iv. 238.

All Districts, a common weed of undergrowth, roadsides and waste places.

A herbaceous annual. The glabrous form with angular fruiting calyx is var. *indica*, C. B. Clarke. *P. angulata*, Linn., seems to differ very little from it. It is only a weed of cultivated ground.

3. *Withania*, Pauq.

Unarmed shrubs, often hoary-tomentose. *Leaves* alternate, entire. *Flowers* axillary, sometimes polygamo-dioecious, fascicled or solitary, sessile or shortly pedicelled. *Calyx* campanulate, 5-6-toothed, accrescent and subglobose in fruit. *Corolla* campanulate; lobes 3-6, short, valvate in bud. *Stamens* 5, attached near the base of the corolla; anthers dehiscing longitudinally. *Ovary* 2-celled, ovules many; style linear; stigma shortly bifid. *Fruit* a globose berry, enclosed in the enlarged calyx. *Seeds* very many, discoid, testa pitted; embryo peripheric.

WITHANIA SOMNIFERA, Dun.; F. B. I. iv. 239; Wt. Ic. t. 853.

Deccan, Ceded Districts Mysore and Coimbatore, in dry localities; occasional in E. Carnatic.

An erect branching undershrub reaching 5 ft. in height, all parts minutely stellate-tomentose. Leaves broadly ovate, up to 4 in. long and little less in breadth; flowers in axillary fascicles. The seeds are sometimes used as rennet. Vern.

*Hind.* Asgánd; *Tel.* Pennerugadda; *Tam.* Amkulang.

4. *Datura*, Linn.

Coarse rank shrubby herbs. *Leaves* large, entire, sinuate or deeply toothed. *Flowers* large, purple or white, solitary, erect or pendulous. *Calyx* long-tubular, herbaceous, 5-lobed, in fruit the upper part deciduous leaving the circumsciss base. *Corolla* long-tubular, funnel-shaped, the mouth wide; limb plaited, entirely or shortly 5- or 10-lobed. *Stamens* 5, attached near the base of the tube; filaments filiform; anthers included, linear, longitudinally dehiscing. *Ovary* 2- or spuriously 4-celled; style filiform; stigma 2-lobed. *Fruit* an ellipsoid spinescent 4-celled capsule, 4-valved or irregularly bursting near the apex. *Seeds* very many, compressed, rugose; embryo peripheric.

Capsule opening irregularly near the apex:—

Capsule covered with short spines or blunt tubercles; flowers white or white with purple outside; leaves ovate, acute, entire or coarsely toothed, with acute lobes, base very unequal-sided, up to 8 in. long, nearly glabrous ..... 1. *fastuosa*.

Capsule covered with long slender spines; flowers white tinged with green; the fruiting calyx very large; leaves ovate-lanceolate, acute,

base very unequal, up to about 4 in. long or more, minutely grey-tomentose ..... *Metel.*  
 Capsule deeply 4-valved, erect; flowers white; leaves ovate, many-toothed or sinuate, up to about 7 in. long..... *Stramonium.*

*DATURA FASTUOSA*, Linn.; F. B. I. iv. 242; Wt. Ic. t. 1396.

Almost all Districts, in gardens and on waste land and roadsides, apparently wild.

A large annual somewhat succulent herb with often zigzag stems, soft leaves and subglobose capsules seated on the short persistent saucer-like calyx base. Flowers usually white but purple outside and frequently double. Vern.

*Hind.* Dhatura.

Var. *alba*, C. B. Clarke, similar but with the flowers white, not often double, the capsule spines sharper. Same distribution.

*D. Metel*, Linn.; F. B. I. iv. 243, said to be the most poisonous species, is found about Madras and is at once recognized by the tomentum, the large persistent calyx and the sharp capsule-spines. *D. Stramonium*, Linn.; F. B. I. iv. 242; Wt. Ic. t. 852, is the Thorn Apple, occasionally found in the Hill country. The large shrubby species with beautiful white flowers so commonly found in gardens in the Hills is *D. arborea*, Linn., and the one with orange-scarlet flowers is *D. sanguinea*, Ruiz. & Pav. They were both introduced from S. America.

*Lycopersicum esculentum*, Mill., is the Tomato, commonly cultivated and occasionally found run wild.

*Capsicum annuum*, Linn., and *Capsicum frutescens*, Linn., are the plants which are cultivated so extensively as Chillies. They both were originally introduced from S. America and the latter species is now frequently found run wild. For the most usual varieties see Prain, 'Bengal Plants,' p. 747, and Cooke, 'Fl. Bomb.,' ii, 276.

*Nicandra physaloides*, Gaertn., is a S. American plant, sometimes cultivated but often found run wild or as a weed in gardens in the Hills. It has pretty blue flowers and a dry berry enclosed in the much enlarged heart-shaped calyx-lobes.

*Nicotiana Tabacum*, Linn., is the Tobacco plant, cultivated in most Districts but especially in Godavari, Kistna, Guntur and Coimbatore. The Family also contains several genera, such as

*Browallia*, *Brunfelsia*, *Cestrum* and *Petunia*, affording well-known garden ornamental plants. *Cyphomandra betacea*, Sendt., is the Tree Tomato, a S. American shrub cultivated for its fruit, excellent for stewing and tarts.

### Family CVII. SCROPHULARIACEAE.

Herbs or shrubs, rarely trees, often semi-parasitic. *Leaves* all or the lower only opposite, rarely all alternate or whorled; stipules 0. *Flowers* hermaphrodite, usually irregular; inflorescence centripetal or composite. *Calyx* inferior, usually persistent; lobes 5, rarely 4. *Corolla* hypogynous, more or less 2-lipped or sometimes personate, 4-5-lobed. *Stamens* usually 4, didynamous or subequal, with or without a staminode, rarely 5 or only 2; anthers various, 1- or 2-celled, the cells distinct or more or less confluent, sometimes imperfect. *Disk* annular cupular or glandular. *Ovary* 2-celled; ovules many, rarely few, in each cell; style simple; stigma capitate dilated, 2-lobed or 2-lamellate. *Fruit* a capsule, rarely a berry; placentas on a free central axis or attached to the margins of the valves. *Seeds* small, various in shape; albumen fleshy, rarely 0; embryo straight or curved.

Leaves all alternate; corolla subrotate, the tube short; large erect herbs:—

Stamens 5. . . . . 1. *Verbascum*.

Stamens 4. . . . . 2. *Celsia*.

Leaves, at least the lower, if not all, opposite; corolla-tube usually elongate:—

Corolla spurred in front at the base; capsule opening by pores

3. *Linaria*.

Corolla not spurred in front at the base; capsule opening by valves:—

Corolla-lobes subequal; anthers 1-celled; capsule septical

4. *Sutera*.

Corolla distinctly bilabiate:—

Stamens 4, included within the corolla-tube:—

Corolla-throat 2-lobed on the palate; anther-cells divaricate:—

Calyx 5-angled and 5-toothed; anther-cells confluent at the apex; leaves all opposite . . . . . 5. *Mimulus*.

Calyx widely campanulate with 5 leafy lobes; anther-cells distinct; lower leaves opposite, upper alternate

6. *Mazus*.

Corolla-throat not lobed on the palate; anther-cells distinct :—

Calyx widely campanulate; corolla-palate with two folds; anther-cells stipitate; capsule loculicidal... 7. *Lindenbergia*.

Calyx 5-partite; corolla-palate without folds; capsule both loculicidal and septicidal :—

Anther-cells stipitate :—

Stamens 4, 2 or all with one anther-cell imperfect; uppermost lobe of calyx much the largest 8. *Adenosma*.

Stamens with all cells perfect :—

Placentas separating in fruit or if joined in a column not winged; seeds terete ..... 9. *Stemodia*.

Placentas joined in a column winged by the remains of the septa; seeds angular ..... 10. *Limnophila*.

Anther-cells contiguous, not stipitate; three lobes of the calyx larger than the other two, which are very narrow

11. *Moniera*.

Stamens 2 perfect, the anterior pair reduced to staminodes, all inserted in the corolla-tube ..... 12. *Dopatrium*.

Stamens, if 4 the anterior (lower) pair, if 2 the staminodes, attached to the corolla-throat, the posterior or only perfect pair inserted within the corolla-tube; capsule septicidal :—

Stamens 4, all perfect :—

Calyx-lobes broad; stout erect herbs ..... 13. *Artanema*.

Calyx-lobes narrow; slender herbs, erect or trailing :—

Calyx winged or keeled, mouth oblique ..... 14. *Torenia*.

Calyx-lobes equal, not winged or keeled ... 15. *Vandellia*.

Two upper stamens only perfect, the lower pair reduced to staminodes ..... 16. *Ilysanthes*.

Corolla small, almost or quite uniform with subequal lobes; lower stamens perfect, upper 0 or reduced to staminodes :—

Calyx tubular, 5-lobed; leaves opposite :—

Anther-cells confluent; leaves narrow ..... 17. *Microcarpaea*.

Anthers 1-celled; leaves broad, fleshy ..... 18. *Peplidium*.

Calyx campanulate, 3-4-lobed; anther cells confluent at the tips; minute herbs with fascicled leaves ..... 19. *Glossostigma*.

Corolla-lobes flat, spreading :—

Corolla-lobes subequal, the throat bearded; stamens 4; capsule globose, septicidal ..... 20. *Scoparia*.

Corolla-lobes subequal, the 2 lateral the wider; stamens 2; capsule compressed, usually loculicidal ..... 21. *Veronica*.

Corolla-tube elongate, the lobes spreading; stamens 4, didynamous,



the anther-cells distinct, equal or one imperfect or wanting ; semi-parasitic herbs :—

Calyx tubular, ribbed, 5-lobed :—

Corolla-tube straight or nearly so, the lobes subequal

22. *Buchnera*.

Corolla-tube abruptly incurved near the middle, the 2 upper lobes the smaller ..... 23. *Striga*.

Corolla-tube broad ; calyx campanulate, oblique ; anthers 2-celled ..... 24. *Alectra*.

Corolla-tube straight or curved ; anthers 1-celled

25. *Rhamphicarpa*.

Corolla-tube straight ; anthers 2-celled :—

Anthers with one cell imperfect ..... 26. *Sopubia*.

Anthers 2-celled, the cells subequal, both perfect

27. *Micrargeria*.

Calyx spathaceous, split down the front :—

Corolla-lobes subequal, broad, spreading ; anthers 2-celled, one cell often imperfect ..... 28. *Centranthera*.

Corolla strongly 2-lipped, the upper lip erect, hooded ; anther-cells both perfect ..... 29. *Pedicularis*.

### 1. *Verbascum*, Linn.

Erect, tomentose or woolly, usually tall and biennial or perennial herbs. *Leaves* alternate, entire, sinuate or pinnatifid. *Flowers* usually yellow, rarely purple red or white, in simple or panicled terminal bracteate racemes or spikes. *Calyx* 5-lobed, usually deeply, the lobes imbricate. *Corolla* rotate ; lobes 5, the two posterior ones outside in bud. *Stamens* 5 ; filaments all or the 3 upper bearded ; anthers transverse or oblique, the cells confluent. *Ovary* rounded ; style dilated towards the stigmatose apex. *Fruit* a globose oblong or ovoid septicidal capsule, the valves separating from the axis. *Seeds* many, rugose ; embryo straight.

Viscid pubescent herbs ; leaves oblong-lanceolate or oblanceolate, the upper coarsely dentate, cordate and amplexicaul at base, the lower almost pinnatifid and auricled ; flowers bright yellow, purple at base, the filaments with purple woolly hairs ..... 1. *virgatum*.

Stellately grey-tomentose herbs ; leaves lanceolate-acuminate, decurrent along the stem at base, entire or slightly crenate ; flowers yellow in a densely woolly spike ; 3 of the filaments with white hairs, 2 longer glabrous ..... 2. *Thapsus*.

1. *VERBASCUM VIRGATUM*, With. ; F. B. I. iv. 250 ; Wt. Ic. t. 1404-5.

W. Gháts, Nilgiris and Pulneys, at high levels, introduced from Europe and run wild.

A tall erect herb, reaching sometimes 6 ft. in height.

2. *VERBASCUM THAPSUS*, Linn. ; F. B. I. iv. 250.

W. Gháts, Nilgiri Hills, about Ootacamund, introduced from Europe or N. India and now rapidly spreading (Bourne).

A tall handsome and conspicuous woolly herb, reaching to about 3 ft. in height.

### 2. *Celsia*, Linn.

Annual or biennial erect herbs. *Leaves* alternate, crenate sinuate dentate or pinnatifid. *Flowers* in terminal bracteate spikes or racemes, rarely branched. *Calyx* deeply 5-lobed. *Corolla* rotate, tube almost none; lobes 5, broad, somewhat unequal, the upper outermost in bud. *Stamens* 4, didynamous or subequal; filaments bearded; anthers transverse or oblique, with confluent tips. *Ovary* ovoid or globose, ovules many; style entire; stigma compressed, terminal. *Fruit* a globose or ovoid septicidal capsule; valves 2, each usually bifid. *Seeds* many, very small, transversely rugose.

*CELSIA COROMANDELIANA*, Vahl; F. B. I. iv. 251; Wt. Ic. t. 1406.

All plains Districts, chiefly as a weed on cultivated lands.

An erect, grey-pubescent annual with yellow flowers in a branching racemose inflorescence, the leaves lyrate-pinnatifid at base, gradually smaller up the stem.

### 3. *Linaria*, Juss.

Herbs. *Leaves* usually opposite or whorled below, alternate above. *Flowers* axillary, solitary or passing into terminal racemes or spikes with the floral leaves reduced to bracts; pedicels slender. *Calyx* 5-partite; lobes imbricate. *Corolla* 2-lipped and personate, the upper lip erect, 2-lobed, the lower spreading, 3-lobed, spurred at the base. *Stamens* 4, didynamous, ascending; anthers with distinct parallel cells. *Ovary* ovoid or globose, many-ovuled; style filiform; stigma minute. *Fruit* an

ovoid or globose 2-celled capsule, each cell or the anterior only opening by an apical pore. *Seeds* many, angled rugose and wingless or discoid and winged.

*LINARIA RAMOSISSIMA*, Wall. Pl. As. Rar. t. 153; F. B. I. iv. 251; Wt. Ill. t. 165.

Deccan, Bellary District; Bababudan Hills of Mysore; E. slopes of Anamalais, on walls and rocks and in stony places.

A glabrous or slightly pubescent perennial prostrate herb with very slender branches, variable but usually triangular-hastate lobed leaves and small yellow flowers.

#### 4. *Sutera*, Roth.

Herbs or small shrubs, often viscid. *Leaves* opposite or the upper alternate, subentire pinnatifid or toothed. *Flowers* axillary or in simple terminal racemes; bracts small, leafy. *Calyx* deeply 5-lobed, lobes narrow. *Corolla* tubular; tube slender, cylindric, straight or curved; lobes 5, the two upper outside in bud and rather smaller than the 3 lower. *Stamens* 4, didynamous, included; anthers confluent, 1-celled. *Ovary* with many ovules in each cell; style filiform; stigma slightly 2-lobed. *Fruit* an ovoid-oblong septicidal capsule, the valves bifid. *Seeds* many, minute, rugose.

*SUTERA GLANDULOSA*, Roth; F. B. I. iv. 258; Wt. Ic. t. 856.

N. Circars, Deccan and Carnatic, west to Coimbatore, south to near Madras, not common.

An annual erect branching herb with much cut pinnatifid leaves, and very small nearly white flowers.

#### 5. *Mimulus*, Linn.

Erect prostrate or creeping herbs. *Leaves* opposite. *Flowers* solitary, axillary. *Calyx* tubular, 5-angled, lobes 5, short. *Corolla* 2-lipped; upper lip 2-lobed, erect or reflexed; lower 3-lobed, spreading, the throat with usually a swollen 2-lobed palate. *Stamens* 4, didynamous; anther-cells divergent, sub-confluent. *Ovary* ovoid; style slender; stigma 2-lamellate. *Fruit* a compressed loculicidal capsule, the valves separating from the placentiferous dissepiment. *Seeds* many, minute, oblong.

**MIMULUS ORBICULARIS**, Benth. ; F. B. I. iv. 259.

N. Circars, Chilka Lake, Ganjam (D. Hooper).

A prostrate creeping and rooting herb with fleshy orbicular nerveless leaves about 1 in. in diam. on thick petioles, the long-pedunculate flowers with campanulate calyx and corollas about 4 in. long apparently pale blue, the seeds minutely puncticulate in lines.

#### 6. **Mazus**, Lour.

Small herbs, often with runners. *Leaves* opposite or rosulate below, above opposite or alternate. *Flowers* in terminal sub-second racemes ; bracts minute, bracteoles 0. *Calyx* campanulate, 5-lobed, the lobes leafy. *Corolla* 2-lipped, the tube short ; upper lip 2-lobed, erect ; lower much larger, spreading, 3-lobed ; throat with a two-lobed palate. *Stamens* 4, didynamous ; anther-cells divaricate. *Ovary* with many ovules ; style short ; stigma 2-lamellate. *Fruit* a small globose or compressed loculicidal capsule, the 2 valves entire. *Seeds* many, very minute, rugose.

**MAZUS RUGOSUS**, Lour. ; F. B. I. iv. 259.

N. Circars, in Ganjam (Barber) ; W. Gháts, in Coorg (Bourne) and Nilgiris (Lawson, Fischer) up to 7,000 ft.

A small herb without runners, the radical leaves in rosette. obovate-spathulate, crenate, the scapes usually leafless, the flowers pale blue or white streaked with blue, the leafy calyx-lobes conspicuous.

#### 7. **Lindenbergia**, Lehm.

Annual or perennial herbs ; branches erect or straggling. *Leaves* opposite or the upper alternate toothed. *Flowers* usually yellow, axillary or passing into terminal spikes or racemes ; bracts leafy, bracteoles 0. *Calyx* widely campanulate, 5-lobed. *Corolla* 2-lipped ; tube cylindric ; upper lip outermost, short, 2-lobed ; lower larger, 3-lobed, the palate with 2 folds. *Stamens* 4, didynamous, included ; anthers with separate stalked cells. *Ovary* with many ovules ; style filiform, clavate upwards ; stigma capitate. *Fruit* a loculicidal capsule, the 2 valves separating from the placentiferous dissepiment. *Seeds* very many, minute.

Perennial herb ; leaves rather thick, ovate, cuneate at base, coarsely serrate except at base, up to 2.5 in. long, 1.5 in. broad, or sometimes

larger; softly pubescent; flowers large, the corolla about 1 in. long; calyx campanulate, .3 in. long; capsule acute at tip and exsert

1. *grandiflora*.

Annual slender herb; leaves thin, ovate, cuneate at base, coarsely serrate except at base, up to 1.5 in. long, .75 in. broad, sometimes more, pubescent or glabrous; flowers small, the corolla about .5 in. long; calyx campanulate, .15 in. long; capsule acute, scarcely exsert

2. *urticaefolia*.

1. *LINDENBERGIA GRANDIFLORA*, Benth.; F. B. I. iv. 261; Bot. Mag. t. 7738.

N. Circars, Mahendragiri Hill in Ganjam, at 4,000 ft. (Gamble, Fischer), on banks in shady woods.

A slender glandular hairy fairly stout plant with bright yellow flowers.

2. *LINDENBERGIA URTICAEOFOLIA*, Link and Otto; F. B. I. iv. 262.

Shevaroy Hills of Salem (Wight), on walls and banks.

A very slender glandular rather flaccid herb with yellow flowers.

### 3. *Adenosma*, R. Br.

Annual, villous or glandular, aromatic herbs. *Leaves* opposite or whorled, serrate or crenate, rugose. *Flowers* axillary or in leafy spikes racemes or heads; bracteoles conspicuous or 0. *Calyx* deeply lobed, the uppermost lobe the largest, sometimes all enlarging in fruit. *Corolla* 2-lipped, the tube cylindric; upper lip erect, entire or notched, outermost in bud; lower spreading, 3-lobed. *Stamens* 4, didynamous; anther-cells separate, stipitate, one cell of each anterior stamen or of all stamens imperfect. *Ovary* with many ovules; style filiform below, dilated at the tip, winged upwards under the entire or 2-lamellate stigma. *Fruit* an ovoid ellipsoid or lanceolate capsule, both loculicidally and septicidally 4-valved. *Seeds* many, minute, scabrous-punctate, reticulate or pitted.

Flowers axillary; 3 outer sepals in fruit ovate lanceolate, reticulate, ciliate on the margins and midrib, 2 inner linear lanceolaté, narrow; leaves broadly ovate, crenate, up to 1 in. long, .75 in. broad, petiole .3 in.; seeds pitted in lines ..... 1. *subrepens*.  
Flowers axillary below, uppermost in leafy heads; 3 outer sepals in fruit lanceolate, one rather larger, hirsute, 2 inner subulate-lanceolate;

leaves ovate to ovate-oblong, crenulate, up to 1·25 in. long, ·6 in. broad, petiole ·1 in.; seeds minutely dotted in lines .....2. *malabaricum*. Flowers in dense terminal heads at the ends of opposite or whorled peduncles; all the sepals lanceolate, one slightly larger, ciliate; leaves ovate to ovate-oblong, coarsely crenate, up to 2 in. long, 1 in. broad, petiole 0·2 in.; seeds scabrous .....3. *capitatum*.

1. *ADENOSMA SUBREPENS*, Hook. f.; F. B. I. iv. 263.

Travancore, at Valur, 1,000 ft. (Meebold); Malabar (Wight).

A trailing herb, rooting at the nodes, the flowers bluish-purple.

2. *ADENOSMA MALABARICUM*, Hook. f.; F. B. I. iv. 264.

W. Coast, in Malabar (Wight).

An erect herb, up to about 1 ft. high.

3. *ADENOSMA CAPITATUM*, Hook. f.; F. B. I. iv. 264.

W. Coast and W. Gháts, S. Canara to Travancore, in rice fields.

An erect herb, up to 2 ft. high, with blue flowers.

9. *Stemodia*, Linn.

Herbs, sometimes woody below, glandular-pubescent, often aromatic. *Leaves* opposite or sometimes whorled, serrate. *Flowers* axillary, solitary, passing into terminal leafy spikes or close racemes; bracts leafy; bracteoles 1 or 2, small. *Calyx* deeply 5-lobed; lobes narrow, equal, or the upper a little larger. *Corolla* 2-lipped; tube cylindric, often villous within; upper lip 2-lobed, erect, entire or notched; lower 3-lobed, spreading. *Stamens* 4, didynamous, included; filaments filiform; anther-cells distinct, stalked, all perfect. *Ovary* with many ovules; style filiform; stigma 2-lobed. *Fruit* a globose or ovoid capsule; valves 2, septicidal, bifid, or valves 4, dehiscing both septicidally and loculicidally; placentas not winged. *Seeds* numerous, very minute, terete.

*STEMODIA VISCOSA*, Roxb.; F. B. I. iv. 265; Wt. Ic. t. 1408.

Most plains Districts, in wet ground and rice fields.

A many-branched aromatic viscid-pubescent herb with sessile more or less oblong usually cordate and amplexicaul leaves and violet corolla.

10. *Limnophila*, R. Br.

Marsh or water plants, glabrous or pubescent, aromatic. *Leaves* with transparent dots, opposite or whorled, toothed or

incised, or, if submerged, with capillaceo-multifid lobes. *Flowers* axillary, sessile or pedicelled, solitary or passing into terminal spikes or racemes; bracts leafy, bracteoles small or 0. *Calyx* 5-partite, the lobes subequal or the posterior larger. *Corolla* 2-lipped; tube cylindric; upper lip outermost, suberect, entire or 2-lobed; lower spreading, 3-lobed. *Stamens* 4, didynamous, included; anther-cells separate, stalked. *Ovary* with many ovules; style slender, deflexed at tip; stigma 2-lamellate. *Fruit* an ovoid or globose capsule, often acute, dehiscing both loculicidally and septicidally, the placentiferous dissepiment separating with the valves and usually winged with the remains of the septa. *Seeds* many, minute, angular, truncate.

Leaves pinnately nerved, not ribbed; no whorls of pinnatifid or multifid lower leaves; calyx usually striate:—

Flowers sessile in close axillary heads; leaves opposite, elliptic or ovate, up 3·5 in. long, petioled; calyx in fruit not striate but with a strong midrib to the acuminate lobes; capsule oblong, compressed

1. *Roxburghii*.

Flowers axillary, solitary or in spikes or racemes:—

Leaves all opposite, subsessile, elliptic-ovate or -obovate, crenate-serrate, the serratures often crustaceously thickened, punctate, up to 1 in. long, ·5 in. broad; flowers axillary, solitary or in spikes or racemes; calyx lobes lanceolate, acuminate, hirsute. 2. *conferta*. Leaves opposite or 3-4-nately whorled; flowers pedicelled; calyx-lobes lanceolate-acuminate:—

Leaves sessile, semi-amplexicaul at base, linear-oblong or lanceolate, serrulate, up to 2·5 in. long, ·5 in. broad; flowers in axillary or terminal many-flowered racemes, rarely solitary; calyx-lobes glabrate ..... 3. *gratissima*.

Leaves sessile or very shortly petioled, elliptic-oblong or -obovate, serrulate, up to 1·5 in. long, ·5 in. broad; flowers usually solitary, sometimes in short axillary racemes; calyx-lobes hirsute..... 4. *hirsuta*.

Leaves 3-5-ribbed from the base; lower leaves usually pinnatifid or multifid; calyx not striate:—

Flowers sessile or nearly so:—

Flowers solitary, axillary:—

Leaves all opposite, none pinnatifid or multifid, ovate-oblong or elliptic, semi-amplexicaul, crenate-serrate, up to 1 in. or rather more in length and ·5 in. broad; calyx-lobes ovate, acuminate

5. *hypericifolia*.

Upper leaves opposite, middle ones whorled, pinnatifid, lowest capillaceo-multifid; calyx-lobes glabrous, ovate, abruptly acuminate ..... 6. *heterophylla*.

Flowers in terminal or axillary often divaricately branched spikes, the upper leaves opposite or whorled, linear-oblong, crenulate, up to about 1.5 in. long, the lower capillaceo-multifid; calyx-lobes ovate, acuminate ..... 7. *polystachya*.

Flowers pedicelled, the lowest leaves always capillaceo-multifid:—

Stem 1-2 ft. high; corolla over .5 in. long; upper leaves conspicuous, oblong-lanceolate, serrate, sessile and semi-amplexicaul, up to 2 in. long, .5 in. broad, middle ones whorled, laciniate; calyx-lobes ovate abruptly acuminate, at first glandular, in fruit glabrous

8. *racemosa*.

Stem 3-8 in. high; corolla under .3 in. long; upper leaves frequently none, sometimes linear-oblong, up to .75 in. long, .2 in. broad, middle ones whorled, laciniate; calyx-lobes ovate, acuminate, pubescent ..... 9. *gratioloides*.

1. *LIMNOPHILA ROXBURGHII*, G. Don; F. B. I. iv. 265.

N. Circars, Rampa Hills of Godavari, at 3,000 ft. (V. Narayanswami), in wet places in shade.

An aromatic annual herb, creeping and rooting at the base, the flowers blue-purple with a yellow mouth.

2. *LIMNOPHILA CONFERTA*, Benth.; F. B. I. iv. 266.

W. Coast Districts, in wet places, rice fields, etc., to 2,000 ft. in the W. Gháts.

A very variable erect or prostrate or floating plant, rooting at the nodes, the flowers violet-pink.

3. *LIMNOPHILA GRATISSIMA*, Bl.; F. B. I. iv. 268.

W. Coast Districts, in wet places, margins of ponds and backwaters; W. Gháts, Anamalais at 2,000 ft. (Fischer).

A tall glabrous plant, decumbent at base and rooting at the lower nodes, then erect; flowers purple, usually in terminal panicles of racemes with small bracts.

4. *LIMNOPHILA HIRSUTA*, Benth.; F. B. I. iv. 268.

at Districts and lower hills of W. Gháts, in wet

sute plant, reaching 18 in. in height, usually very  
e, but occasionally (var. *glabra*, C. B. Clarke MS.  
from the E. Gháts) nearly glabrous and with always  
opposite leaves.



5. *LIMNOPHILA HYPERICIFOLIA*, Benth.; F. B. I. iv. 269; Wt. Ic. t. 1409.

W. Gháts, Nilgiris, Pulneys and hills of Travancore, at 3,000–7,000 ft., in bogs and other wet places.

A tall glabrous herb, reaching 2 ft. in height with rose-purple flowers.

6. *LIMNOPHILA HETEROPHYLLA*, Benth.; F. B. I. iv. 270.

S. Canara, Mysore and Tinnevely, apparently scarce, in rice fields and wet places.

A rather tall erect herb, with leaves of all three forms, the stems often from the nodes of a long under-water horizontal stem with many capillary leaves.

7. *LIMNOPHILA POLYSTACHYA*, Benth.; F. B. I. iv. 269; Wt. Ic. t. 860.

Carnatic in Tanjore (Wight) and other places, in rice fields and wet places, but scarce.

A water plant, with the upper parts erect and recognized by the racemes of small white flowers in terminal panicles.

8. *LIMNOPHILA RACEMOSA*, Benth.; F. B. I. iv. 271; Wt. Ic. t. 861. *Cyrella aquatica*, Roxb. Cor. Pl. t. 189.

N. Circars, Deccan and W. Coast, in rice fields and flooded land, common.

A water plant, often rising to 1 or 2 ft. above the surface, the flowers pale violet with reddish blotches on the lip, usually in long bracteate racemes.

9. *LIMNOPHILA GRATIOLOIDES*, R. Br.; F. B. I. iv. 271.

All plains Districts, in pools, swamps and rice fields.

A small much branched plant, glabrous or pubescent, smelling of turpentine, very variable, chiefly according to the amount of wetness of the locality, in mud or shallow water short and leafy, in deeper water elongate and with the capillaceo-multifid leaves developed (var. *elongata*, Benth.). Flowers white with a pink ring at the mouth of the corolla.

# 11. Moniera, B. Juss.

Glabrous herbs. *Leaves* often punctate, entire or toothed or multifid when submerged. *Flowers* axillary, solitary or racemose, yellow blue or white; bracteoles small or 0. *Calyx* 5-partite; lobes imbricate, the upper largest, the 2 innermost often

very narrow. *Corolla* 2-lipped, tube cylindric; upper lip outside in bud, emarginate or 2-lobed, lower 3-lobed. *Stamens* didynamous, included; anther-cells contiguous, distinct. *Ovary* with many ovules in each cell; style dilated at top; stigma entire or 2-lobed. *Capsule* globose or ovoid, 2-grooved, valves 2 or 4 separating from the entire placentiferous dissepiment. *Seeds* many, minute, often striate.

Creeping herb, rooting at the nodes, the numerous branches ascending; leaves obovate-oblong, about 5 in. long, obtuse; flowers solitary, pedicelled, capsule ovoid ..... 1. *cuneifolia*.  
Erect herbs, the stems often branched; leaves linear-lanceolate, up to 1.25 in. long, acute; capsule globose:—

Flowers solitary in the leaf axils, sessile; placentas separating, winged

2. *Hamiltoniana*.

Flowers 1–3 together in the axils, pedicelled; placentas combined, not winged ..... 3. *floribunda*.

1. *MONIERA CUNEIFOLIA*, Michx. *Herpestis Monniera*, H. B. & K.; F. B. I. iv. 272. *Gratiola Monniera*, Linn.; Roxb. Cor. Pl. t. 178.

All plains Districts, and in the hills to about 4,000 ft., in wet places, even in saltish water.

A somewhat succulent creeping herb with blue flowers.

2. *MONIERA HAMILTONIANA*, T. Cooke. *Herpestis Hamiltoniana*, Benth.; F. B. I. iv. 272.

W. Coast, S. Canara to Cochin, in wet places.

An erect rather thick herb, the stems terete, the flowers pink.

3. *MONIERA FLORIBUNDA*, T. Cooke. *Herpestis floribunda*, R. Br.; F. B. I. iv. 273.

Carnatic, in Nellore and Chingleput; S. Canara (Hohenacker).

An erect slender herb with subquadrangular stems and white corolla having purplish stripes on the upper lip. (Fischer).

## 12. *Dopatrium*, Buch.-Ham.

Annual slender glabrous marsh herbs. *Leaves* few, opposite, the lower pairs small, the upper minute, remote. *Flowers* small, solitary, axillary, violet; bracteoles 0. *Calyx* small, 5-partite, lobes narrow, imbricate. *Corolla* 2-lipped; tube slender, dilated.

to a broad throat; upper lip outside in bud, 2-lipped; lower 3-lobed, spreading. *Stamens* 2 upper perfect; filaments filiform; anthers with parallel distinct equal cells; lower pair reduced to minute staminodes. *Ovary* with many ovules; style short; stigma 2-lamellate. *Fruit* a small globose or oblong capsule, opening loculicidally, the valves placentiferous. *Seeds* many, very small, reticulately pitted or tuberculate.

Capsule linear-oblong, the fruiting pedicel deflexed; stem usually branched from the base, the many slender branches erect, up to about 6 in. high, the radical leaves few, subrosulate, obovate, at most .5 in. long, the cauline minute, linear; corolla .3 in. long. . . . . 1. *nudicaule*. Capsule globose :—

Fruiting pedicels 0 or under .5 in. and capillary, erect; stems much branched from the base with fleshy erect branches up to 12 in. high, the radical leaves elliptic oblong or obovate, up to 1 in. long, the cauline small, larger below but gradually smaller upwards; corolla very small, .2 in. long . . . . . 2. *junceum*.

Fruiting pedicels capillary, up to 1 in. long, horizontally spreading; stems erect, usually single or at most 2–3 from the base, fleshy, up to 18 in. high, lower leaves obovate-oblong or spatulate, up to 2 in. long, .5 in. broad, cauline very small and distant; corolla .5 in. long

3. *lobelioides*.

1. *DOPATRIUM NUDICAULE*, Buch.-Ham.; F. B. I. iv. 274.

Carnatic, Nellore to Tinnevely, on damp ground near the coast.

A slender erect herb.

2. *DOPATRIUM JUNCHEUM*, Buch.-Ham.; F. B. I. iv. 274.

All plains Districts and up to 4,000 ft. in the hills, in wet places, ponds and rice fields.

An erect very slender fleshy herb with pink flowers.

3. *DOPATRIUM LOBELIODES*, Benth.; F. B. I. iv. 274; Wt. Ic. t. 859.

Carnatic, near Madras, in tanks and wet places.

A rather tall slender fleshy herb with comparatively large flowers.

13. *Artanema*, D. Don.

Erect herbs, the stems tetragonal, scabrid on the angles. *Leaves* opposite, entire or serrate. *Flowers* large, blue or purple, in terminal bracteate but ebracteolate racemes, the bracts foliaceous. *Calyx* 5-partite, the lobes broad, imbricate, acuminate.

*Corolla* 2-lipped; tube broad; upper lip erect, broad, emarginate, lower 3-lobed, spreading. *Stamens* 4, didynamous, perfect, the 2 upper with short filaments included in the tube, the 2 lower with long arched filaments broadly appendiculate at the base, arching to become connivent under the upper lip; anther-cells connivent at their tips. *Ovary* many-ovuled; style slender; stigma 2-lamellate. *Fruit* a globose capsule, dehiscing septicidally, the valves separating from the broadly-winged placentiferous axis. *Seeds* many, small, truncate, papillose.

ARTANEMA SESAMOIDES, Benth.; F. B. I. iv. 274; Wt. Ic. t. 1410.

W. Coast, in Malabar and Travancore, rising to about 3,000 ft. in the Wynaad and Coorg.

A stout erect herb or undershrub, 2-3 ft. high, with large violet-purple flowers and lanceolate-acuminate usually serrate leaves up to 4 in. long.

#### 14. *Torenia*, Linn.

Herbs, glabrous or pubescent, usually trailing and rooting. *Leaves* opposite, entire crenate or serrate. *Flowers* axillary or in terminal or pseudo-axillary umbels or racemes; bracteoles 0. *Calyx* usually 2-lipped, oblique at the mouth, 3-5-lobed, the back of the lobes or of some of them winged or keeled. *Corolla* 2-lipped; tube cylindric, somewhat curved, dilated upwards; the upper outer lip erect, concave, notched or 2-fid, the lower larger, 3-lobed, spreading. *Stamens* 4, didynamous, the 2 upper included, the two lower arched to meet under the upper lip, often with appendages about the middle; anthers connate in pairs. *Ovary* with many ovules; style slender; stigma 2-lamellate. *Fruit* a linear or oblong septicidal capsule, the valves separating from the placentiferous dissepiment which is often winged. *Seeds* many, rugose or cancellate.

*Calyx*, especially in fruit, rather broadly winged:—

*Calyx* and corolla both small, together under .7 in. long:—

*Calyx* broadly ovoid with ciliate wings; pedicels slender, .5-1 in. long; lower filaments without appendages; leaves ovate, acute, sharply serrate, cuneate or sub-cordate at base, up to 1.25 in. long, petiole .25-.5 in. long . . . . . 1. *cordifolia*.

*Calyx* narrowly oblong with ciliate wings; pedicels slender, 1-2 in.

- long; lower filaments with clavate appendages; leaves triangular-ovate, acute, crenate-serrate, obtuse at base, up to 1·5 in. long, petiole ·1–2 in. long ..... 2. *courtallensis*.  
 Calyx and corolla both long, the calyx narrowly oblong, especially in fruit, not ciliate, ·7–1 in. long, the lobes acuminate, decurrent at base; corolla up to 1·25 in. long; lower filaments with subulate appendages; pedicels up to nearly 2 in. long, thick and usually deflexed in fruit; leaves ovate-lanceolate, acuminate, obtuse at base, serrate, up to 2 in. long, petiole ·1–5 in. long ..... 3. *travancorica*.  
 Calyx, especially in fruit, narrowly winged, the wings often only keeled not decurrent, hirsute, ciliate; corolla small, up to ·75 in. long; lower filaments with short rounded appendages; pedicels 1–1·5 in. long, thickened and deflexed in fruit; leaves ovate to ovate-oblong, sub-obtuse, truncate or subcordate at base, distantly serrate, up to 1·5 in. long, petiole ·1–2 in. long ..... 4. *vagans*.  
 Calyx not winged:—

Calyx in fruit glabrous, narrowly oblong, ·5–·75 in. long, strongly keeled, the keels decurrent on the stout pedicel; corolla 1–1·25 in. long; appendages of lower filaments shortly subulate; leaves deltoid-ovate, crenate, subcordate, sparsely hirsute, ·75 in. long, petiole up to ·5 in. long ..... 5. *bicolor*.

Calyx in fruit not strongly keeled, hirsute:—

Calyx ·75 in. long, reticulate in fruit; pedicels 1·5 in. long; corolla up to 1·5 in. long, broad at mouth; appendages subulate; leaves deltoid-ovate, acute, truncate or cordate at base, coarsely serrate, up to 2 in. long, 1 in. broad, but usually smaller, very pubescent, petiole ·3–5 in. long ..... 6. *hirsuta*.

Calyx ·4 in. long, hirsute, cleft nearly to the base, the lobes lanceolate; pedicels 2–4 at the node, spreading, ·3–·4 in. long; corolla short; appendages minute; leaves ovate or ovate-lanceolate, acute, serrate, up to 1 in. long, petiole under ·25 in. long ..... 7. *parviflora*.

1. *TORENIA CORDIFOLIA*, Roxb. Cor. Pl. t. 161; F. B. I. iv. 276.

N. Circars, on Mahendragiri Hill, Ganjam (Fischer); W. Gháts, Carcoor Ghát in Malabar (Beddome).

A low erect trichotomously branching herb up to 10 in. high, the stems and branches tetraginous; corolla small, pale bluish purple.

2. *TORENIA COURTALLENSIS*, Gamble in Kew Bull. 1923, ined. *T. cordifolia*, Roxb.; F. B. I. iv. 276 in note by Sir J. D. Hooker.

W. Gháts, Anamalais and hills of Madura, Tinnevely and Travancore, at about 4,000 ft.

A trailing herb with long decumbent stems and long pedicels; flowers lilac, the lower lip mottled with purple (Blatter and Hallberg).

3. *TORENIA TRAVANCORICA*, Gamble n. comb. *T. asiatica*, Hook. f.; F. B. I. iv. 277 *in part*; Wt. Ic. t. 862; Bot. Mag. t. 4249.

W. Gháts, hills of Travancore and Tinnevely.

A creeping annual herb with large flowers, white with blue blotches on the lobes of the lower lip.

4. *TORENIA VAGANS*, Roxb.: F. B. I. iv. 277. *T. hirtella*, Hook. f.; F. B. I. iv. 277 *in part*.

W. Gháts, Nilgiris, especially on the E. side, at 5,000–6,000 ft. (Clarke, Gamble).

A diffuse trailing and rooting herb with pale blue corolla having darker blotches on the lobes of the lower lip.

5. *TORENIA BICOLOR*, Dalz.; F. B. I. iv. 278.

W. Gháts and W. coast from S. Canara to Travancore, up to 2,000 ft.

A small trailing and rooting herb with small leaves and the corolla with dark blue or violet upper and white lower lip. It might be the "Kaka-pu" of Rheede Hort. Mal. ix. t. 53.

6. *TORENIA HIRSUTA*, Benth.; Bot. Mag. t. 5167. *T. asiatica* var. *hirsuta*, Hook. f.; F. B. I. iv. 277.

W. Gháts, in most Districts, but especially W. Nilgiris, at 3,000–6,000 ft.

A rather stout hirsute diffuse herb with handsome flowers, white on the mid-lobe of the lower lip, deep blue on the side lobes, pale blue on the upper lip.

7. *TORENIA PARVIFLORA*, Ham.; F. B. I. iv. 278.

N. Circars, Bison Hills, Godavari (Barber).

A small decumbent annual up to 8 in. in height, with blue pedicellate flowers clustered in the upper axils.

*Torenia Fournieri*, Linden. is an introduction from Cochin China, which is frequently grown in gardens for its showy flowers of a pale blue with bright purple blotches on the lobes of the lower lip and yellow in the throat and tube (Bot. Mag. t. 6747).

15. *Vandellia*, Linn.

Herbs, usually annual, glabrous or pubescent. *Leaves* opposite, often toothed. *Flowers* small, axillary or racemose; bracteoles 0. *Calyx* campanulate, not winged, cleft in 5 lobes, sometimes to the base. *Corolla* 2-lipped; tube cylindric; upper lip outer, erect, notched or bifid, lower 3-lobed spreading. *Stamens* 4, didynamous, the 2 upper, on the corolla throat, usually included, the 2 lower with arched filaments having a subulate or rounded appendage towards the base; anthers cohering in pairs, the cells divaricate. *Ovary* with many ovules; style slender; stigma 2-lamellate. *Fruit* a globose ovoid or linear septicidal capsule, the valves separating from the placentiferous septum, which is usually more or less winged. *Seeds* many, rugose.

Leaves pinnately nerved :—

Capsule about equalling the calyx; placentiferous dissepiment broadly winged :—

Calyx not divided below the middle, lobes acute, glabrous except the prominent rib; flowers pedicelled, axillary or subracemose at the ends of the branches; filaments of lower stamens with subulate appendages; leaves suborbicular ovate or lanceolate, shortly serrate, up to .75 in. long; petiole about .1–.3 in. long . . . 1. *crustacea*. Calyx divided to the base or near it, the lobes strigosely white hispid; filaments of lower stamens with rounded appendages :—

Erect herb with the flowers in lax axillary and terminal racemes; leaves at the main nodes large, ovate or elliptic, obtuse, serrate, membranous, up to 2 in. long, 1 in. broad, petioled, those on branch nodes smaller and sometimes sessile . . . . . 2. *hirsuta*.

Diffuse herb, many-branched, with axillary flowers solitary or in pairs; leaves ovate or ovate-cordate, entire or serrate, about .5 in. long, subsessile . . . . . 3. *scabra*.

Capsule longer than the calyx; placentiferous dissepiment narrowly winged :—

Calyx not divided to the base in flower, scarcely so in fruit; capsule ellipsoid :—

Erect simple or little-branched herb with suborbicular, shortly serrate leaves up to .75 in. long and broad, nearly sessile; pedicels very slender . . . . . 4. *nummularifolia*.

Much branching low herb with ovate-cordate or suborbicular, crenate-serrate leaves .7–1 in. in diam. nearly sessile; pedicels none, the flowers congested in the leaf axils . . . . . 5. *sessiliflora*.

Calyx divided to the base in narrow linear-lanceolate lobes; narrowly

oblong; capsule '3-'5 in. long; pedicels usually axillary, deflexed in fruit; leaves ovate, obtuse or subacute, obscurely crenate-serrate, up to 1 in. long, petiole about '1 in. long .....6. *pedunculata*. Leaves with 3-5 ribs from the base, sessile, elliptic, obtuse, up to '75 in. long; calyx divided to the base, shorter than the ovoid capsule, whose placentiferous dissepiment is tufted at top, but scarcely winged, the calyx-lobes linear, hispid at tip; pedicels solitary, axillary, filiform, longer than the leaves; staminal appendages subulate....7. *pyxidaria*.

1. VANDELLIA CRUSTACEA, Benth.; F. B. I. iv. 279; Wt. Ic. t. 863.

All plains Districts, usually in wet places or rice fields, often in gardens.

A glabrous or pubescent annual herb, branching diffusely and rooting, the corolla purplish or white.

2. VANDELLIA HIRSUTA, Ham.; F. B. I. iv. 280.

W. Coast, S. Canara to Travancore, in fields.

A pubescent erect herb, with pale violet corolla and globose capsule.

3. VANDELLIA SCABRA, Benth.; F. B. I. iv. 281.

W. Deccan, W. Gháts and W. Coast, up to 4,000 ft., in rice fields, etc.

A diffuse herb with corolla having the lower lip white and the upper one brown (Lawson).

Var. *lava* Hook. f. Much elongate and very slender, the leaves so reduced that the inflorescence becomes a raceme; lower leaves rather larger. Without locality (Wight); Guindy (Lawson)

4. VANDELLIA NUMMULARIFOLIA, D. Don.; F. B. I. iv. 282.

Hills of Coimbatore, at Minchiguli, 4,800 ft. (Fischer); Nilgiris, at Naduvatum, 6,000 ft. (Lawson).

A small herb with red-purple corolla.

5. VANDELLIA SESSILIFOLIA, Benth.; F. B. I. iv. 282.

W. Gháts, Nilgiri, Anamalai and Pulney Hills at 2,000-6,000 ft. (Lawson, Fischer).

An erect herb with close clusters of sessile flowers, often cleistogamic (Lawson).

6. VANDELLIA PEDUNCULATA, Benth.; F. B. I. iv. 282.

N. Circars, on the Godavari (Bourne); W. Gháts, in the Anamalai and Pulney Hills, up to 2,000 ft.; W. Coast, in Travancore, in rice fields and other wet places.



A creeping herb with long branches rooting at the lower nodes. the corolla white with a pale violet margin or pale blue with a white spot.

7. *VANDELLIA PYXIDARIA*, Maxim. *V. erecta*, Benth.; F. B. I. iv. 281.

N. Circars in the Upper Godavari (Gamble); Gazalhati Pass, N. Coimbatore (Wight).

A slender divaricatingly branched herb with small apparently white flowers.

16. *Ilysanthes*, Rafin. (including *Bonnaya*, Link and Otto).

Annual glabrous herbs, usually of marshes. *Leaves* opposite, entire or toothed, ribbed from the base or penninerved. *Flowers* small, axillary and solitary or in terminal racemes, bracteate, not bracteolate, peduncles often deflexed in fruit. *Calyx* 5-lobed, usually deeply, the lobes narrow. *Corolla* 2-lipped; tube cylindric, or widening above; upper lip outside, broad, usually shortly bifid, lower spreading, 3-lobed. *Stamens* 2, upper alone perfect, subincluded; lower reduced to 1-2-lobed often glandular hairy staminodes. *Ovary* with many ovules; style slender; stigma 2-lamellate. *Fruit* an ovoid oblong or linear septicidal capsule, the valves entire, separating from the placentiferous septum. *Seeds* numerous, rugose.

Leaves with 3-5 ribs from the base; staminodes usually bilobed; capsule ovate or shortly oblong:—

Erect herbs, 4-18 in. in height:—

Corolla rather large, .3-.5 in. long or longer, glandular-hairy within; lower leaves oblong or oblong-lanceolate up to .75 in. long, upper linear smaller; flowers solitary, axillary, the pedicels filiform, up to 1 in. long, deflexed in fruit; capsule ovoid-oblong, up to .25 in. long

1. *hyssoptioides*.

Corolla small, about .25 in. long; lower leaves ovate lanceolate or oblong, up to 1 in. long, upper smaller; flowers solitary axillary or in slender terminal racemes, the pedicels filiform, up to .75 in. long; capsule ovoid-oblong up to .2 in. long . . . . . 2. *parviflora*.

Erect minute herbs with single stems under 3 in. high; corolla .2-.3 in. long, the lobes broadly spreading; leaves ovate- or elliptic-oblong, under .25 in. long, obtuse; pedicels capillary; capsule subglobose

3. *minima*.

Creeping and rooting herbs with stems up to 10 in. long; corolla .3-

·4 in. long, the lips spreading ; leaves ovate or orbicular, ·3-·5 in. in diam., obtuse, entire or slightly dentate ; pedicels very short ; capsule globose ..... 4. *rotundifolia*.

Leaves penninerved ; staminodes entire ; capsule narrow, linear :—

Leaves sharply deeply and closely serrate :—

Erect, diffusely branched ; leaves sessile, oblong, obtuse or subacute, glabrous, spinous-serrate, up to 1 in. long, ·5 in. broad ; flowers in lax terminal racemes with subulate bracts, pedicelled ; capsules narrowly linear-oblong, ·5 in. long ..... 5. *serrata*.

Prostrate, creeping and rooting at the nodes ; leaves petioled, elliptic-oblong, rounded at apex, finely serrate, up to 2 in. long, ·75 in. broad ; flowers in axillary and terminal racemes with narrow lanceolate bracts ; capsules very slender, ·75 in. long ..... 6. *reptans*.

Leaves distantly and shallowly serrate :—

Stems decumbent at base, rooting at the nodes, the branches ascending ; leaves oblong obovate-lanceolate or oblanceolate, up to 1·5 in. long, ·4 in. broad, broadly petioled to sessile ; flowers in terminal and axillary racemes with linear-lanceolate bracts, sometimes solitary ; capsules up to ·5 in. long ..... 7. *veronicaefolia*.

Stems erect, short, much-branched ; leaves linear-oblong, shortly and distantly serrate, up to 1 in. long, ·15 in. broad, sessile ; flowers in leafy terminal or axillary racemes, the bracts setaceous ; capsules up to ·4 in. long ..... 8. *oppositifolia*.

Leaves entire or very nearly so, linear, up to 1·5 in. long and very narrow, scarcely over ·1 in. broad, sessile ; flowers in slender racemes terminal or axillary, sometimes solitary, the slender pedicels deflexed, bracts subulate ; capsules very slender, up to ·5 in. long .. 9. *tenuifolia*.

1. *ILYSANTHES HYSSOPIOIDES*, Benth. ; F. B. I. iv. 283 ; Wt. Ic. t. 857.

Most Districts, in wet places, especially rice fields, up to 4,000 ft. in the hills.

A straggling slender herb reaching 18 in. in height, the flowers pale blue or white with darker markings, sometimes nearly 1 in. long, the staminodes large and clavate, obscurely bilobed, glandular.

2. *ILYSANTHES PARVIFLORA*, Benth. ; F. B. I. iv. 283. *Gratiola parviflora*, Roxb. Cor. Pl. t. 203.

Most Districts in the plains, in wet places.

An erect branching herb, smaller than the last and with smaller blue or white flowers, the staminodes bilobed.

3. *ILYSANTHES MINIMA*, Benth. ; F. B. I. iv. 284.

Vandalur in Chingleput (Bourne); Tinnevely, about Pallamcottah, in rice fields (Wight).

A minute erect herb with rather large yellow flowers.

4. *ILYSANTHES ROTUNDIFOLIA*, Benth.; F. B. I. iv. 284.

*Gratiola rotundifolia*, Linn.; Roxb. Cor. Pl. t. 204.

E. Coast (*fide* Roxburgh); W. Coast, S. Canara to Travancore, in wet places, banks of ponds, etc.

A creeping herb with round leaves and white flowers, the staminodes rather large.

5. *ILYSANTHES SERRATA*, Urban. *Bonnaya brachiata*, Link and Otto; F. B. I. iv. 284.

All plains Districts and up to about 4,000 ft. in the hills, in wet places, pasture lands, on rocks, etc., common.

A stiff erect herb with pink, purple or white flowers.

6. *ILYSANTHES REPTANS*, Urban. *Bonnaya reptans*, Spr.; F. B. I. iv. 284. *B. veronicaefolia*, Wt. Ic. t. 1411 not of Spr.

Madras (Shuter); Malabar (Wight); Travancore (Bourdillon, Venkoba Row) in swampy places.

A creeping herb with light purple flowers.

7. *ILYSANTHES VERONICAEFOLIA*, Urban. *Bonnaya veronicaefolia*, Spr.; F. B. I. iv. 285. *Gratiola veronicaefolia*, Roxb. Cor. Pl. t. 154. *G. grandiflora*, Roxb. l. c. t. 179. *Bonnaya verbenaeefolia*, Spr.; Wt. Ic. t. 1412.

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

A very variable species, whether in habit, in leaf or in flower, the flowers usually violet with darker lines. The varieties *grandiflora* and *verbenaeefolia* are connected by intermediates with the species.

8. *ILYSANTHES OPPOSITIFOLIA*, Urban. *Gratiola oppositifolia*, Roxb. Cor. Pl. t. 155. *Bonnaya oppositifolia*, Spr.; F. B. I. iv. 286.

Deccan and Carnatic, also W. Coast, in wet places, not common.

A small inconspicuous plant with blue flowers.

9. *ILYSANTHES TENUIFOLIA*, Urban. *Bonnaya tenuifolia*, Spr.; F. B. I. iv. 286.

W. Coast, Malabar and Travancore.

A small very slender tufted weak marsh herb with pale blue flowers.